SIEMENS

Machine and Setting Data 1

Index I

SINUMERIK 840D sl/ 840Di sl

Detailed Maschine Data Description

Parameter Manual

Valid for

Control

SINUMERIK 840D sl/ 840DE sl
SINUMERIK 840Di sl/ 840DiE sl

Software	*Version*
NCU system software for 840D sl/ 840DE sl	1.5/ 2.5
system software for 840Di sl/ 840DiE sl	1.4

01/2008

SINUMERIK® Documentation

Printing history

Brief details of this edition and previous editions are listed below.

The status of each edition is shown by the code in the "Remarks" column.

Status codes in the "Remarks" column.

A .... New documentation.

B .... Unrevised reprint with new Order No.

C .... Revised edition with new status.

If factual changes have been made on a page since the last edition, this is indicated by a new edition coding in the header on that page.

Edition	Order-No.	Remarks
05.05	-	**A**
03/2006	-	C
11/2006	-	C
01/2008	-	C

Order No. -

Subject to change without prior notice

Preface

Structure of the documentation

The SINUMERIK documentation is organized in 3 parts:

- General documentation
- User documentation
- Manufacturer/service documentation

An overview of publications (updated monthly) indicating the language versions available can be found on the Internet at:

http://www.siemens.com/motioncontrol
Select "Support" -> "Technical Documentation" ->"Overview of Publications"

The Internet version of the DOConCD (DOConWEB) is available at:
http://www.automation.siemens.com/doconweb

Information about training courses and FAQs (Frequently Asked Questions) can be found at the following web site:

http://www.siemens.com/motioncontrol under menu option "Support"

Target group

This documentation is intended for project engineers, commissioning engineers, machine operators, service and maintenance personnel.

Benefits

The Parameter Manual enables the intended target group to evaluate error and fault indications and to respond accordingly.

With the help of the Parameter Manual, the target group has an overview of the various diagnostic options and diagnostic tools.

Standard version

This Parameter Manual only describes the functionality of the standard version. Extensions or changes made by the machine tool manufacturer are documented by the machine tool manufacturer.

Other functions not described in this documentation might be executable in the control. This does not, however, represent an obligation to supply such functions with a new control or when servicing.

Further, for the sake of simplicity, this documentation does not contain all detailed information about all types of the product and cannot cover every conceivable case of installation, operation or maintenance.

Technical Support

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Safety Instructions

This Manual contains information which you should carefully observe to ensure your own personal safety and the prevention of material damage. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring to property damage only have no safety alert symbol The warnings appear in decreasing order of risk as given below.

Danger

Indicates an imminently hazardous situation which, if not avoided, **will** result in death or serious injury or in substantial property damage.

t

Warning

Indicates that death or severe personal injury will result if proper precautions are not taken.

Caution

with a warning triangle indicates that minor personal injury can result if proper precautions are not taken.

Caution

without a warning triangle indicates that property damage **can** result if proper precautions are not taken.

Notice

indicates a potential situation which, if not avoided, **may** result in an undesirable event or state.

If several hazards of different degrees occur, the hazard with the highest degree must always be given priority. A warning notice accompanied by a safety alert symbol indicating a risk of bodily injury can also indicate a risk of property damage.

Qualified Personnel

The associated device/system may only be set up and operated using this documentation. Commissioning and operation of a device/system may only be performed by qualified personnel. Qualified persons are defined as persons who are authorized to commission, to ground, and to tag circuits, equipment, and systems in accordance with established safety practices and standards.

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Machine and setting data 1

1.1 Important information about the data tables

This list manual provides information on all the machine and setting data in a concise table format. A functional description of the data is provided in the function manual indicated in the cross reference.

You can also find more information in:

- HMI Online Help directly on the control

1.1.1 Structure of the data tables

Standard table

The standard table contains all the important information about the data:

MD number	Identifier			Display filter	Reference
Unit	Name			Data type	Activation
Attributes					
System	Dimension	Default value	Minimum value	Maximum value	Protection

Expanded table

The expanded table includes data from the standard table plus additional rows with system-specific values.

MD number	Identifier			Display filter	Reference
Unit	Name			Data type	Activation
Attributes					
-	Dimension	Default value	Minimum value	Maximum value	Protection
<System 1>	-	Default value	-	-	-/-
<System 2>	-	-	-	-	-1/-

A minus sign "-" in a field means that the same value as for System 1 applies for the specified system.

The entry "-1/-" in the "Protection" field means that the machine data is not available for the specified system.

Example:

10050	SYSCLOCK.CYCLE_TIME			N01, N05, N11	G3
s	Basic system clock cycle			DOUBLE	POWER ON
				SFCO	
-	-	0.004	0.000125	0.031	7/2
710-2a2c	-	0.002	0.001	0.008	-/-
840di-universal	-	0.002	0.001	0.008	7/RO

1.1.2 Meaning of table fields

MD number

The "MD number" field contains the machine data number. This number is displayed in the data lists on the user interface of the control.

Reference

As a cross reference to the functional description of the data, the "Reference" field contains the short designation of a supporting manual for a specific function manual.

Reference is made to the following supporting manuals:

Function Manual Basic Functions, supporting manuals: A2, A3, B1, B2, D1, F1, G2, H2, K1, K2, N2, P1, P3, R1, S1, V1, W1, Z1

Function Manual Extended Functions, supporting manuals: A4, B3, B4, F3, H1, K3, K5, M1. M5, N2, N4, P2, P5, R2, S3, S7, T1, W3, W4

Function Manual Extended Functions, supporting manuals: F2, G1, G3, K6, M3, S9, T3, TE01, TE02, TE1, TE2, TE3, TE4, TE6, TE7, TE8, V2, W5

Function Manual Drive Functions, supporting manuals: DB1, DD1, DD2, DE1, DF1, DG1, DL1, DM1, DS1, DÜ1

Function Manual Safety Integrated, FBSI

Function Manual ManualTurn, FBMA

Function Manual Tool Management, FBW

ISO Dialects for SINUMERIK Description of Functions, FBFA

Function Manual Synchronous Actions, FBSY

Programming Manual, PG

Programming Manual Job Planning, PGA

Unit

The "Unit" field contains the physical unit of the data in the default setting. A minus sign "-" means that the data does not have a physical unit.

Note

For machine data of the Performance 2 [P2] control module, the unit or units are shown with a filter in row 2, column 1.

Name

The "Name" field contains the name of the data in plain text.

Activation

The "Activation" field contains the action that must be performed by the user in order for a change to take effect.

Activation		User action
po	POWER ON	Otherwise: • HMI softkey "Reset (po)" (HMI sl/HMI Adv. SW 7.5 or higher) • HMI softkey "NCK-Reset" (HMI Embedded) • Reset button on the front of the NCU module • Switch voltage off/on
cf	NEW_CONF	HMI softkey: "Activate MD"
re	RESET	Otherwise: • Channel reset: DBn.DBX 7.7 where n = 21, 22, 23, etc. • Mode group reset: DB11.DBX n.7 where n = 0, 20, 40, etc. • NCK reset: DB11.DBX n.7 where n = 0, 20, 40, etc. in all mode groups of the control • Program end reset (M02/M30)
so	IMMEDI-ATELY	-

The activation levels are listed according to their priority.

- po = highest priority
- so = lowest priority

Protection

Protection
The "Protection" field contains the protection level for reading or writing to the data in the format: Write / read.

Value	Protection level
0 or 10	System
1 or 11	Manufacturer
2 or 12	Service
3 or 13	User
4 or 14	Key-operated switch setting 3
5 or 15	Key-operated switch setting 2
6 or 16	Key-operated switch setting 1
7 or 17	Key-operated switch setting 0

The protection level for user data (GUD) is defined with the numbers 10 to 17.

Display filter

The "Display filter" field contains the identifier of the data filter setting that enables the data to be seen. With the filter setting, the exact data areas needed at a given time can be selected for display.

ID	Data area
EXP	Expert mode
General machine data	
N01	Configuration/scaling
N02	Memory configuration
N03	PLC machine data
N04	Drive control
N05	Status data/diagnostics
N06	Monitoring/limiting functions
N07	Auxiliary functions
N08	Corrections/compensations
N09	Technological functions
N10	I/O configuration
N11	Standard machine
A12	External language
A13	Safety Integrated
A14	Selection for Safety Integrated

ID	Data area
Channelspecific machine data	
C01	Configuration
C02	Memory configuration
C03	Initial settings
C04	Auxiliary functions
C05	Speeds
C06	Monitoring/limiting functions
C07	Transformations
C08	Corrections/compensations
C09	Technological functions
C10	Standard machine
C11	External languages
Axis-specific machine data	
A01	Configuration (including memory)
A02	Measuring system
A03	Machine geometry
A04	Speeds/accelerations
A05	Monitoring/limiting functions
A06	Spindle
A07	Controller data
A08	Status data
A09	Corrections/compensations
A10	Technological functions
A11	Standard machine
A12	External language
A13	Safety Integrated
A14	Selection for Safety Integrated
Display machine data	
H01	ShopMill
H02	ShopTurn
H03	ManualTurn
H04	Access levels
H05	Standard machine

System

The "System" field contains the system for which the data is valid.

ID	System
840Disl	840Di systems solution line
840D	840D systems
810D	810D system
HMI sl	HMI solution line
Adv	HMI Advanced
Emb	HMI Embedded
OP30	OP030
MT	ManualTurn
SM	ShopMill
ST	ShopTurn

If this field is empty, the data is valid for all systems.

Additional identifiers:

iajc	i = number of axes j = number of channels For example: 6a2c = 6 axes, 2 channels
7x0 - iajc	x = 1, 2, etc. In SINUMERIK solution line, designates the relevant NCU, for example NCU 710
x	1, 2, 3

Dimension

The "Dimension" field contains the number of elements of a data field.

Value range

The "Minimum value" and "Maximum value" fields contain the lower limit and upper limit, respectively, of the permissible range of the data.

If the "Minimum value" and "Maximum value" fields contain the string " *** ", an explicit range is not defined for this data. In this case, the range is determined by the specified data type.

SINUMERIK data types

The "Data type" field contains the following data types:

Data type	Value range
BOOLEAN	Machine data bit (1 or 0)
BYTE	Integer values (-128 to 127)
DOUBLE	Real values (± (2.2 * 10^{-308} to 1.8 * 10^{+308}))
DWORD	Integer values (-2147483648 to +2147483647)
DWORD	Hex values (0 to FFFF FFFF)
STRING	Character string (max. 16 characters) consisting of upper-case letters with digits and underscore
UNSIGNED WORD	Integer values (0 to 65536)
SIGNED WORD	Integer values (-32768 to 32767)
UNSIGNED DWORD	Integer values (0 to 4294967300)
SIGNED DWORD	Integer values (-2147483650 to 2147483649)
WORD	Hex values (0000 to FFFF)
FLOAT DWORD	Real values (± (8.43 x 10^{-37} to "3.37 x 10^{38})
UBYTE	Integer values (0 to 255)
LONG	Integer values (4294967296 to 4294967295)

SIMATIC data types

The "Data type" field contains the following data types:

Data type	Meaning	Value range
I8	Integer8	8-bit integer
I16	Integer16	16-bit integer
I32	Integer32	32-bit integer
U8	Unsigned8	8 bits without sign
U16	Unsigned16	16 bits without sign
U32	Unsigned32	32 bits without sign
Float	FloatingPoint32	32-bit floating point number

Software version

The "SW Version" field contains the earliest software version for which the data is valid.

Attributes

The "Attributes" field contains additional attributes of the data:

Attribute	Meaning
NBUP	No Back UP: The data is not backed up as part of the data backup.
ODLD	Only DownLoaD: The data can only be written to via an INI file, archive, or from the part program.
NDLD	No DownLoaD: The data can only be written to via the HMI user interface.
SFCO	SaFety COnfiguration: Component of the "Safety Integrated" function
SCAL	SCaling ALarm: Scaling data; when changed, alarm 4070 is displayed
LINK	LINK description: The data describes a link cluster, component of the "NCU Link" function
CTEQ	ConTainer EQual: The data must be the same for all axes in an axis container, component of the "Axis container" function
CTDE	ConTainer DEscription: The data describes an axis container, component of the "Axis container" function

1.1.3 Overview of the data

Machine and setting data

The machine and setting data are divided into the following areas:

Range	Designation
From 9000 to 9999	Display machine data
From 10000 to 18999	General NC machine data
From 19000 to 19999	Reserved
From 20000 to 28999	Channelspecific machine data
From 29000 to 29999	Reserved
From 30000 to 38999	Axis-specific machine data
From 39000 to 39999	Reserved
From 41000 to 41999	General setting data
From 42000 to 42999	Channel-specific setting data
From 43000 to 43999	Axis-specific setting data
From 51000 to 51299	General configuration machine data
From 51300 to 51999	General cycle machine data
From 52000 to 52299	Channel-specific configuration machine data
From 52300 to 52999	Channel-specific cycle machine data
From 53000 to 53299	Axis-specific configuration machine data
From 53300 to 53999	Axis-specific cycle machine data
From 54000 to 54299	General configuration setting data
From 54300 to 54999	General cycle setting data
From 55000 to 55299	Channel-specific configuration setting data
From 55300 to 55999	Channel-specific cycle setting data
From 56000 to 56299	Axis-specific configuration setting data
From 56300 to 56999	Axis-specific cycle setting data
From 61000 to 61999	General machine data for compile cycles
From 62000 to 62999	Channel-specific machine data for compile cycles
From 63000 to 63999	Axis-specific machine data for compile cycles

Data Identifiers

The identifier (designator) specified in the data description is displayed on the HMI user interface. However, if the data is addressed in the parts program, for example, the identifier of the relevant data area must precede the data identifier (designator).

Identifier	Data area
$MM_	Display machine data
$MN_ / $SN_ $MNS_ / $SNS_	General machine/setting data
$MC_ / $SC_ $MCS_ / $SCS_	Channel-specific machine/setting data
$MA_ / $SA_ $MAS_ / $SAS_	Axis-specific machine/setting data

Characters	Meanings
$	System variables
M	Machine data (first letter)
S	Setting data (first letter)
M, N, C, A, D	Subarea (second letter)
S	Siemens data (third letter)

Note:

Axis-specific data can also be addressed with the axis name as an index. The internal axis identifier (AX1, AX2, AX3, etc.) or the identifier specified in MD10000 $MA_AX_CONF_NAME_TAB can be used as the axis name.

Example: $MA_JOG_VELO[Y1]=2000
The JOG velocity of axis Y1 is 2000 mm/min.

If the content of a machine data is a STRING (e.g., X1) or a hexadecimal value (e.g., H41), the content must be enclosed in single quotation marks (e.g., 'X1' or 'H41').

Example: $MN_DRIVE_INVERTER_CODE[0]='H14'

A FD module with performance data 9/18 A is present on the first slot of the drive bus.

Example: $MA_FIX_POINT_POS**[0,X1]**=500.000

The value 500 is assigned to the first fixed point position on axis 1.

Examples:
$MN_AUXFU_GROUP_SPEC[2]='H41'
Output time of the auxiliary functions of the third auxiliary function group.

$MN_AXCONF_MACHAX_NAME_TAB[0]='X1'
The string "X1" is assigned to name the first machine axis.

$MA_REFP_SET_POS[0,X1]=100.00000
A value of 100 mm is assigned to the first reference point value of axis X1.

Examples:
Assignment to channel-specific machine data:

```
CHANDATA(1)                        ;Selection of the
                                   first
                                   ;channel

$MC_CHAN_NAME='CHAN1'              ;Name of the first
                                   ;channel

$MC_AXCONF_GEOAX_NAME_TAB[1]='Y'   ;Name of the second
                                   ;geometry axis of the
                                   ;first channel is Y

R10 = 33.75                        ;R10 of the first
...                                channel

CHANDATA(2)                        ;Selection of the sec-
                                   ond ;channel

$MC_CHAN_NAME='CHAN2'              ;Name of the second
...                                ;channel

R10 = 96.88                        ;R10 of the second
...                                ;channel
```

1.2 Display machine data

Number	Identifier			Display filters	Reference
Unit	Name			Data type	Active
Attributes					
System	Dimension	Default value	Minimum value	Maximum value	Protection

Description: Description

9056	ALARM_ROTATION_CYCLE			-	-
-	Rotation cycle time for alarm display			DWORD	Immediately
-					
-	-	0	0	10000	7/3

Description: Rotation cycle time in the alarm display:

<500: no rotation in the alarm line

500 - 10000: cycle duration of alarm rotation in milliseconds

If a valid cycle time has been set, all alarms are displayed in the alarm line one after the other.

Each alarm is displayed for the specified time until it is replaced by the next alarm.

If no alarm is present, cycle alarms or program messages are displayed, if required. However, these do not rotate.

9100	CHANGE_LANGUAGE_MODE			-	-
-	Language selection mode			BYTE	Immediately
-					
-	-	1	1	2	7/3

Description: Language selection mode is defined:

1 = directly via selection list

2 = via setting of the 1st and 2nd language

9102	SHOW_TOOL_TIP			-	-
-	Display tooltip			BYTE	Immediately
-					
-	-	1	0	1	7/3

Description: If the MD has been set to 1, tooltips will be displayed.

9103	TOOLTIP_TIME_DELAY			-	-
s	Time delay tooltip display			BYTE	Immediately
-					
-	-	1	0	60	7/3

Description: Time delay for display of the tooltips in seconds.

9105	HMI_WIDE_SCREEN			-	-
-	Display of the HMI as wide screen with OEM area always visible			BYTE	PowerOn
-					
-	-	0	0	1	7/2

Description: Display of the HMI as wide screen. Above the HMI there is a separate application field that is designed by the machine manufacturer.

9900	MD_TEXT_SWITCH			-	-
-	Plaintexts instead of MD identifier			BOOLEAN	Immediately
-					
-	-	0	-	-	7/3

Description: If the MD has been set to 1, clear text is displayed on the operator panel instead of the machine data identifiers.

9990	SW_OPTIONS			-	-
-	Enable HMI software options			DWORD	Immediately
-					
-	-	0	-	-	1/1

Description: Here you can enable the HMI software options

1.3 General machine data

Number	Identifier			Display filters	Reference
Unit	Name			Data type	Active
Attributes					
System	Dimension	Default value	Minimum value	Maximum value	Protection

Description:

1.3.1 System settings

10000	AXCONF_MACHAX_NAME_TAB			N01, N11	K2
-	Machine axis name			STRING	PowerOn
-					
-	31	"X1","Y1","Z1","A1","B1","C1","U1"...	-	-	7/2
710-6a2c	-	"X1","Y1","Z1","A1","B1","C1"	-	-	-/-
720-6a2c	-	"X1","Y1","Z1","A1","B1","C1"	-	-	-/-
730-6a2c	-	"X1","Y1","Z1","A1","B1","C1"	-	-	-/-
840disl-6a	-	"X1","Y1","Z1","A1","B1","C1"	-	-	-/-

Description: List of the machine axis identifiers.

The name of the machine axis is entered in this MD.

In addition to the fixed, defined machine axis identifiers "AX1", "AX2" ..., user-defined identifiers for the machine axes can also be assigned in this data.

The identifiers defined here can be used parallel to the fixed, defined identifiers for addressing axial data (e.g. MD) and machine axis-related NC functions (reference point approach, axial measurement, travel to fixed stop).

Special cases:

- The input machine axis name must not conflict with the designation and assignment of the geometry axes (MD 20060: AXCONF_GEOAX_NAME_TAB, MD 20050: AX-CONF_GEOAX_ASSIGN_TAB) or channel axes (MD 20080: AXCONF_CHA-NAX_NAME_TAB, MD 20070: AXCONF_MACHAX_USED).
- The input machine axis name must not be the same as the names for Euler angles (MD 10620: EULER_ANGLE_NAME_TAB), names for path-relevant orientation (MD 10624: ORIPATH_LIFT_VECTOR_TAB), names for normal vectors (MD 10630: NORMAL_VECTOR_NAME_TAB), names for directional vectors (MD 10640: DIR_VECTOR_NAME_TAB), names for rotator vectors (MD 10642: ROT_VECTOR_NAME_TAB), names for intermediate vector component (MD 10644: INTER_VECTOR_NAME_TAB), names for intermediate circle point coordinates with CIP (MD 10660: INTERMEDIATE_POINT_NAME_TAB) and the names for interpolation parameters (MD 10650: IPO_PARAM_NAME_TAB).

- The input machine axis name must not include any of the following reserved address letters:

D Tool offset	(D function)	E Reserved
F Feedrate	(F function)	G Preparatory function
H Auxiliary function	(H function)	L Subroutine call
M Miscellaneous function	(M function)	N Subblock
P Subroutine number of passes		R Arithmetic parameters
S Spindle speed	(S function)	T Tool (T function)

The name must not include any keywords (e.g. DEF, SPOS etc.) or pre-defined identifiers (e.g. ASPLINE, SOFT).

The use of an axis identifier consisting of a valid address letter (A, B, C, I, J, K, Q, U, V, W, X, Y, Z), followed by an optional numerical extension (1-99) gives slightly better block cycle times than a general identifier.

If no identifier is assigned to a machine axis then the predefined name ("AXn") shall apply to the nth machine axis.

Related to:

MD 20060: AXCONF_GEOAX_NAME_TAB (geometry axis name in the channel [GEOAxisno.]

MD 20080 :AXCONF_CHANAX_NAME_TAB (channel axis name in the channel [Channelaxisno.]

10002	AXCONF_LOGIC_MACHAX_TAB			N01	B3
-	Logical NCK machine axis image			STRING	PowerOn
-					
-	31	"AX1","AX2","AX3","AX4","AX5","AX6"...	-	-	3/2

Description: List of machine axes available on an NCU. (Logical NCK machine axis image)

The MD $MN_AXCONF_LOGIC_MACHAX_TAB creates another NCK global, logical layer between the channel axis layer and the machine axes in an NCU or NCU_Verband. This layer is called the Logic NckMachineAxImage, abbreviation: LAI).

Axes can only be assigned between different NCUs via this new intermediate layer!

The entry $MN_AXCONF_LOGIC_MACHAX_TAB[n] = NCj_AXi assigns the machine axis i on the NCU j to the axis index "n" in the LAI.

This makes the following assignments possible:

1. Local axes (default setting: AX1, AX2 ... AX31)

   The entry $MN_AXCONF_LOGIC_MACHAX_TAB[n] = AX3 assigns the local axis AX3 to axis index n. (Default setting AX3 is present for n = 3 . Thus there is compatibility in software version 5 for MD blocks for software versions up to 4).

2. Link axes (axes that are physically connected to another NCU). The entry $MN_AXCONF_LOGIC_MACHAX_TAB[n] = NCj_AXi assigns axis AXi on NCU j to axis index n (link axis).

Limits:

n Machine axis address (of the local NCU)1 ... 31

j NCU number1 ... 16

i Machine axis address (of the local/remote NCU)1 ... 31

3. Axis container in which there are once again either local or link axes. The entry $MN_AXCONF_LOGIC_MACHAX_TAB[n] = CTr_SLs assigns container r and slot s to axis index n.

Limits:

n Machine axis address (of the local NCU)1 ... 31

r Container number1 ... 16

s Slot number (location) in the container1 ... 32

The channel layer is formed via the related machine data $MC_AXCONF_MACHAX_USED and no longer points (small P5) directly to the machine axes but to the new LAI layer.

$MC_AXCONF_MACHAX_USED [k]=n assigns the LAI axis number "n" to the axis index "k" in the channel layer.

The machine axis and the corresponding NCK can then be determined from the LAI axis number.

If a number of NCUs point to the same machine axis in the cluster as a result of $MN_AXCONF_LOGIC_MACHAX_TAB, then the axial machine data $MA_AXCONF_ASSIGN_MASTER_NCU must define which NCU generates the master NCU and the setpoint values for the position controller after startup.

Related to:

AXCT_AXCONF_ASSIGN_TABi (make entries in containers i)

10010	ASSIGN_CHAN_TO_MODE_GROUP			N01, N02, N11	K1,IAD
-	Channel valid in mode group			DWORD	PowerOn
-					
-	10	1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	10	7/2
710-6a2c	-	-	-	2	-/-
720-6a2c	-	-	-	2	-/-
730-6a2c	-	-	-	2	-/-
840disl-6a	-	-	-	2	-/-

Description:

```
This MD assigns the channel to a mode group
Entry value 1 => Assigned to 1st mode group
Entry value 2 => Assigned to 2nd mode group
etc.
From software version 4, it is permissible not to assign a mode
group number to individual channels.
Channel gaps are allowed, in order to favor uniform configuration
in similar types of machines. In this case, the number 0 is
assigned to the channel instead of assigning a mode group number
equal to or greater than 1. The channel is not activated, however
it is handled like an active channel when counting the channels.
E.g.
ASSIGN_CHAN_TO_MODE_GROUP[0] = 1
ASSIGN_CHAN_TO_MODE_GROUP[1] = 1
ASSIGN_CHAN_TO_MODE_GROUP[2] = 0   ; gap
ASSIGN_CHAN_TO_MODE_GROUP[3] = 1
Application example:
Select desired channel via HMI and enter with
ASSIGN_CHAN_TO_MODE_GROUP = 1.
Note:
This MD must still be entered even when only one mode group is
present.
```

10050	SYSCLOCK_CYCLE_TIME			N01, N05, N11, -	G3
s	System clock cycle			DOUBLE	PowerOn
SFCO					
-	-	0.004	0.000125	0.031	7/2
710-6a2c	-	0.002	0.001	0.008	-/-
710-31a10c	-	0.002	0.001	0.008	-/-
720-6a2c	-	0.002	0.001	0.008	-/-
720-31a10c	-	0.002	0.001	0.008	-/-
730-6a2c	-	0.002	0.001	0.008	-/-
730-31a10c	-	0.002	0.001	0.008	-/-
840disl-6a	-	0.002	0.001	0.008	-/-
840disl-20a	-	0.002	0.001	0.008	-/-

Description: Basic cycle time of the system software

The cycle times settings of cyclical tasks (position controller/ IPO) are multiples of this basic cycle. Apart from special applications in which POSCTRL_SYSCLOCK_TIME_RATIO is set greater than 1, the basic cycle corresponds to the position controller cycle.

For SIMODRIVE611D:

When using a digital drive the basic cycle time and POSCTRL_SYSCLOCK_TIME_RATIO must be set so that the position controller cycle time is not longer than 16ms (otherwise there will be a drive alarm). The set value may be changed by automatic corrections during startup (alarm).

For PROFIBUS/PROFINET:

In the case of systems with a PROFIBUS DP connection, this MD corresponds to the PROFIBUS DP cycle time. This time is read from the configuration file (SDB-Type-2000) during startup and written to the MD.

This MD can only be changed via the configuration file.

Note:

Reducing this MD can result in an automatic correction of POSCTRL_CYCLE_DELAY that cannot be undone by a subsequent increase!

Details:

The basic cycle is incremented in multiples (SYSCLOCK_SAMPL_TIME_RATIO) of units of the measured value sampling cycle. During system startup, the entered value is automatically rounded up to a multiple of this incrementation.

Note:

Discrete timer division ratios can give rise to the entered value producing a value that is not an integer after a Power OFF/ON.

For example:

```
Input                         = 0.005s
                              after Power OFF/ON  =0.00499840
                    or
Input                         = 0.006s
                              after Power OFF/ON  =0.0060032
```

10059	PROFIBUS_ALARM_MARKER			N05	G3
-	PROFIBUS/PROFINET alarm flag (internal only)			BYTE	PowerOn
NBUP, NDLD					
-	-	0	-	-	0/0

Description: PROFIBUS/PROFINET alarm flag:

In this machine data, alarm requests for the PROFIBUS/PROFINET layer are stored beyond a reboot.

If conflicts arise between machine data 10050, 10060, 10070 and the data in SDB on startup, the machine data are matched according to SDB and an alarm is output on the next start up. These alarm requests are stored here.

Related to:

SYSCLOCK_CYCLE_TIME,
SYSCLOCK_SAMPL_TIME_RATIO

10060	POSCTRL_SYSCLOCK_TIME_RATIO			N01, N05	G3
-	Factor for position control cycle			DWORD	PowerOn
SFCO					
-	-	1	1	31	7/2
840disl-6a	-	-	-	-	0/0
840disl-20a	-	-	-	-	0/0

Description: The position-control cycle is stated as a multiple of the time units of the system basic cycle SYSCLOCK_CYCLE_TIME.

The regular setting is 1. The position-control cycle then corresponds to the system basic cycle SYSCLOCK_CYCLE_TIME.

Setting values > 1 costs computing time for the operating system to calculate the additional timer interrupts, and should therefore only be used in those cases in which there is a task in the system that is to run faster than the position-control cycle.

For SIMODRIVE611D:

When using a digital drive, the set value of the position-control cycle can be changed by automatic corrections during startup. Alarm 4101 "position-control cycle for digital drives reduced to [ ] ms" is then issued.

For PROFIBUS/PROFINET:

In the case of systems with a PROFIBUS DP connection, this MD represents the ratio between the PROFIBUS DP cycle and the position controller cycle.

10061	POSCTRL_CYCLE_TIME			N01, N05	G3
-	Position control cycle			DOUBLE	PowerOn
-					
-	-	0.0	-	-	7/RO

Description: Position controller cycle time:

Display of the position controller cycle time (not modifiable !).

It is compiled internally from the machine data SYSCLOCK_CYCLE_TIME and POSCTRL_SYSCLOCK_TIME_RATIO.

10062	POSCTRL_CYCLE_DELAY			N01, N05	G3
s	Position control cycle offset			DOUBLE	PowerOn
-					
-	-	0.003	0.000	0.008	7/2
710-6a2c	-	0.0	-	-	-/-
710-31a10c	-	0.0	-	-	-/-
720-6a2c	-	0.0	-	-	-/-
720-31a10c	-	0.0	-	-	-/-
730-6a2c	-	0.0	-	-	-/-
730-31a10c	-	0.0	-	-	-/-
840disl-6a	-	0.001550	-	-	-/-
840disl-20a	-	0.001550	-	-	-/-

Description: For PROFIdrive only:

Only relevant to operation with PROFIBUS drives.

NCK position controller cycle offset in relation to the PROFIBUS DP cycle.

Offsets that exceed the DP cycle set or that are smaller than the max. Tdx, are automatically corrected to a substitute value half the size of the DP cycle.

MD 10062 > 0:Default for position controller offset

MD 10062 = 0:Automatic determination of the position controller offset with max. Tdx from STEP7 project

Tdx_max is determined through all equidistant busses.

The actually active offset value is displayed in MD 10063[1].

Note:

With MD 10062 > 0 reducing SYSCLOCK_CYCLE_TIME can result in an automatic correction of this MD that cannot be undone by a subsequent increase!

Recommendation:

In this case set the original value or default value once again.

MD 10062 > 0:Default for position controller offset

MD 10062 = 0:Automatic determination of the position controller offset with max. Tdx from STEP7 project

Tdx_max is determined through all equidistant busses.

The actually active offset value is displayed in MD 10063[1].

Note:

With MD 10062 > 0 reducing SYSCLOCK_CYCLE_TIME can result in an automatic correction of this MD that cannot be undone by a subsequent increase!

Recommendation:

In this case set the original value or default value once again.

10063	POSCTRL_CYCLE_DIAGNOSIS			EXP, N01, N05	-
s	Active timing			DOUBLE	PowerOn
-					
-	3	0.0,0.0,0.0	-	-	7/RO

Description: Diagnostic data related to the PROFIBUS/PROFINET cycle.

[0]: Latest date at which the actual values must be available (Tdx)

[1]: Actually active position controller cycle offset (Tm)

[2]: Latest date at which the setpoints were output by the position controller

Diagnostic data are initialized with ZERO with each NCK power up

10065	POSCTRL_DESVAL_DELAY			N01	B3
s	Position setpoint delay			DOUBLE	PowerOn
-					
-	-	0.0	-0.1	0.1	7/2

Description: This MD can parameterize a delay of the setpoints in the position contoller. The area of application is NCU-link when different position control cycles are parameterized on the NCUs and if the axes should nevertheless interpolate with one another. (Used for example for non-circular turning.)

This MD is used to optimize the automatic setting.

Related to:

$MA_POSCTRL_DESVAL_DELAY_INFO

10070	IPO_SYSCLOCK_TIME_RATIO			N01, N05, N11, -	G3
-	Factor for interpolation cycle			DWORD	PowerOn
SFCO					
-	-	4	1	100	7/2

Description: The interpolator cycle is stated as a multiple of the time units of the system basic cycle SYSCLOCK_CYCLE_TIME.

Only integer multiples of the position control cycle can be set (set in POSCTRL_SYSCLOCK_TIME_RATIO). Values that are not an integer multiple of the position control cycle are automatically increased to the next integer multiple of the position control cycle before they become active (on next power up).

This is accompanied by alarm 4102 "IPO cycle increased to [ ] ms".

10071	IPO_CYCLE_TIME			N01, N05, N11, -	G3
-	Interpolator cycle			DOUBLE	PowerOn
-					
-	-	0.0	-	-	7/RO

Description: Interpolation time

Display of the interpolator cycle time (not modifiable !).

It is compiled internally from the machine data SYSCLOCK_CYCLE_TIME and IPO_SYSCLOCK_TIME_RATIO.

10072	COM_IPO_TIME_RATIO			N01, N05	-
-	Division ratio between IPO and communication task			DOUBLE	PowerOn
-					
-	-	1.0	0.0	100.0	7/2

Description: Division ratio between IPO and communication tasks. A value of 2 means, e.g., that the communication task is only processed in every second IPO cycle. This makes more time available for the other tasks. Overlarge values slow down the communication between the HMI and NCK.

Numerical values less than 1 downscale the IPO cycle. This value is adjusted so that only runtimes that are a multiple of the position controller time are possible for the communication task. A call period of about 10 ms is practical for the communication task.

10073	COM_IPO_STRATEGY			EXP	-
-	Strategy for activation of communication.			DWORD	PowerOn
-					
-	-	0x0F	1	0x7F	0/0

Description: The call frequency of the communication task can be controlled by machine data COM_IPO_TIME_RATIO.

The communication tasks are activated cyclically. That has some advantages and disadvantages:

Advantages:

- The communication behavior of the NCK is deterministic in relation to the communication task.

Disadvantages:

- The communication task can lead to level overflows.
- In an unloaded NCK system, the speed of communication is determined by machine data COM_IPO_TIME_RATIO. As this machine data is power ON it cannot adapt to the current NCK operating mode. A typical problem is that uploading a part program can take a very long time on an unloaded NCK. In this case, the bottleneck is the communication task that only progresses in the relation defined by machine data COM_IPO_TIME_RATIO.

This machine data has been introduced to eliminate the above-mentioned disadvantages. It enables control of the times at which the communication software is activated. The machine data is bit-coded. The bits have the following meanings:

Bit 0:

The communication software is calculated cyclically

Bit 1:

The level time overflow monitoring is switched off for the cyclical communication task. This bit is only useful if bit is set to zero. The task is implemented in a non-cyclical level that has a higher priority than the preparation/communication level. The communication task makes a delay of the time defined in COM_IPO_TIME_RATIO after each cycle.

Bit 2:

The communication software is calculated at the start of the task which the domain services accept.

Bit 3:

The communication software is calculated at the end of the task which the domain services accept.

Bit 4:

The communication software is calculated at the start of the task which the domain services accept if a PDU upload has arrived. This bit is only useful if bit 2 is set.

Bit 5:

The communication software is calculated at the end of the task which the domain services accept if a PDU upload has arrived. This bit is only useful if bit 3 is set.

This machine data is only active in systems containing the Softbus communication software. This is in P6 the 840Di with MCI2 software and the Solutionline systems for P7.

The default value is 0x0F. This means that the COS is calculated prior to and after communiction in order to minimize latencies.

10074	PLC_IPO_TIME_RATIO			N01, N05	-
-	Factor of PLC task for the main run.			DWORD	PowerOn
-					
-	-	1	1	50	0/0

Description: Division ratio between IPO and PLC tasks.

A value of 2 means, e. g. that the PLC task is only processed in every second IPO cycle. This makes more runtime available for the other tasks.

10075	PLC_CYCLE_TIME			N01, N05	-
-	PLC cycle time			DOUBLE	PowerOn
-					
-	-	0.0	-	-	1/RO

Description: Display of the PLC cycle time (not modifiable !)

It is compiled internally from the machine data IPO_CYCLE_TIME and PLC_IPO_TIME_RATIO.

10080	SYSCLOCK_SAMPL_TIME_RATIO			EXP, N01	G3
-	Division ratio for actual value recording cycle time			DWORD	PowerOn
-					
-	-	5	1	31	0/0

Description: For SIMODRIVE611D only:

SYSCLOCK_SAMPL_TIME_RATIO sets the division factor of a cycle divider

that is arranged as hardware between the cycle of the measured value sampling

and the interrupt controller.

- The sampler cycle (upstream of the divider) taps the actual value inputs and triggers the digital analog converter.
- The output of the divider generates a timer interrupt as the basic cycle of the

operating system (SYSCLOCK_CYCLE_TIME).

A value greater than 1 may only be entered in SYSCLOCK_SAMPL_TIME_RATIO in exceptional cases:

Values > 1 increase the size of the increments in which the basic cycle can be set. (see SYSCLOCK_CYCLE_TIME)

Special cases:

1. When using the conventional drive interface (analog speed interface), the divider is set according to the following criteria:

   It is advantageous for the control to keep the dead time between reading in the current axis actual positions and outputting the corresponding setpoint values as short as possible. The delay time of the position controller output can be set in fractions of the position control cycle time by setting SYSCLOCK_SAMPL_TIME_RATIO to values > 1. The difficulty with this is reliably determining the time after which the position controller delivers valid results. Multiple triggering of the input/output hardware during one position controller cycle could also be achieved by setting POSCTRL_SYSCLOCK_TIME_RATIO to values > 1. However, the disdvantage with this is the unnecessarily high rate of generating timer interrupts for the operating system. This procedure is not recommended.

2. When using the digital drive controller the division factor is set automatically. The sample cycle time is then set as the 1, 2, 3, ... 8-fold of 125µs.

The SIMODRIVE611D drive can synchronize its own clock generation with these values.

10082	CTRLOUT_LEAD_TIME			EXP, N01, -	K3
%	Shift of setpoint transfer time			DOUBLE	PowerOn
-					
-	-	0.0	0.0	100.0	7/2

Description: For SIMODRIVE611D only:

Lead time for outputting speed setpoints.

The larger the value entered, the sooner the drive accepts the speed setpoints.

- 0 % Setpoints are accepted at the beginning of the next position control cycle.
- 50 % Setpoints are already accepted after execution of half of the position control cycle.

A lead time that is useful for practical purposes can be determined only by measuring the maximum position control calculating time.

MD 10083: CTRLOUT_LEAD_TIME_MAX suggests a value measured by the control. As this is a net value, it is advisable for the user to make a reduction for safety of, for example, 5 %.

If lead times that are too high are input, this can cause output of drive alarm 300506.

The input value is rounded down to the next speed controller cycle in the drive.

If the speed controller cycle settings of the drives are different, changing the value will not necessarily lead to the same degree of improvement of closed-loop control properties for all configured drives.

Note:

This MD is relevant only to axes with digital drives.

Related to:

MD 10083: CTRLOUT_LEAD_TIME_MAX

10083	CTRLOUT_LEAD_TIME_MAX			EXP, N01	K3
%	Max. settable offset of setpoint transfer time			DOUBLE	NEW CONF
-					
-	-	100.0	0.0	100.0	7/2

Description: For SIMODRIVE611D only:

Maximum permissible lead time for outputting speed setpoints on the SIMODRIVE611D.

MD 10083 is a setting aid for MD 10082.

The displayed value can be accepted, with a reduction for safety, directly into MD 10082.

The permissible lead time is determined from the maximum measured CPU time requirement of the position controller. It reduces as the CPU time requirement of the position controller increases.

Reducing the position controller sampling rate via MD 10060 or 10050 also leads to a reduction of the permissible lead time.

The lead time is measured during the entire period of operation. The displayed value can only be increased by manual input.

If the entered lead time is greater than the permissible value (e.g. 100%), a new determination is made automatically.

Note:

This MD is relevant only to axes with digital drives.

Related to:

MD 10050: SYSCLOCK_CYCLE_TIME (system clock cycle)

MD 10060: POSCTRL_SYSCLOCK_TIME_RATIO (factor for position control cycle)

MD 10082: CTRLOUT_LEAD_TIME

10088	REBOOT_DELAY_TIME			EXP	-
s	Reboot delay			DOUBLE	Immediately
-					
-	-	0.2	0.0	1.0	2/2

Description: The reboot following PI "_N_IBN_SS" is delayed by the time $MN_REBOOT_DELAY_TIME.

The suppressable NOREADY alarm 2900 is activated immediately with PI "_N_IBN_SS".

If $MN_REBOOT_DELAY_TIME falls below the $MA_SERVO_DISABLE_DELAY_TIME value of an axis, the axis is decelerated during $MN_REBOOT_DELAY_TIME. The servo enable is disabled afterwards, i.e. the full $MA_SERVO_DISABLE_DELAY_TIME is NOT waited.

Alarm 2900 does not become active with $MN_REBOOT_DELAY_TIME = 0.0 and there is no reboot delay.

The NCK waits beyond the stated delay time until the PI has been able to be acknowledged to the HMI. The delay time may total up to 2 s.

10089	SAFE_PULSE_DIS_TIME_BUSFAIL			N01, N06, -	FBSI
s	Delay time pulse suppr. for bus failure			DOUBLE	PowerOn
-					
-	-	0.0	0	0.8	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Time after the failure of the drive bus at which safe pulse disable takes place. The drive can still respond autonomously to the bus failure during this time (see extended stop and retract)

This time is not waited before disabling pulses in the following cases:

- On selection of an external Stop A, a test stop or a test stop external switch off
- If SBH is active or on selection of SBH
- A pulse disable is parameterized immediately if an SG stage is active or on selection of an SG stage for which an immediate pulse disable is parameterized in $MA_SAFE_VELO_STOP_MODE or $MA_SAFE_VELO_STOP_REACTION.

Note:

$MN_SAFE_PULSE_DIS_TIME_BUSFAIL is transferred to the drive MD 1380 with the copy function of the SI-MD and compared in the data cross-check. This general machine data is contained in the axial checksum calculation of the safety relevant machine data ($MA_SAFE_ACT_CHECKSUM, $MA_SAFE_DES_CHECKSUM).

10090	SAFETY_SYSCLOCK_TIME_RATIO			N01, N06, -	FBSI
-	Factor for monitoring cycle			DWORD	PowerOn
SFCO					
-	-	3	1	50	7/1
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Ratio between the monitoring cycle and the system clock cycle. The monitoring cycle is the product of this data and $MN_SYSCLOCK_CYCLE_TIME.

Special cases:

The monitoring cycle is checked during power on:

- It must be an integer multiple of the position-control cycle
- It must be < 25 ms

The factor is rounded down to the next possible value if the conditions are not fulfilled. The actual set monitoring cycle is displayed by $MN_INFO_SAFETY_CYCLE_TIME.

A new value is also generated for the cross-check cycle, which is displayed by data $MN_INFO_CROSSCHECK_CYCLE_TIME.

Note:

The monitoring cycle defines the monitoring response time. It must be noted that the CPU load increases as the monitoring cycle becomes shorter.

Related to:

MD 10050: $MN_SYSCLOCK_CYCLE_TIME

MD 10091: $MN_INFO_SAFETY_CYCLE_TIME

MD 10092: $MN_INFO_CROSSCHECK_CYCLE_TIME

10091	INFO_SAFETY_CYCLE_TIME			N01, N06, N05, -	FBSI
s	Display of monitoring cycle time			DOUBLE	PowerOn
-					
-	-	0.0	-	-	7/RO
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Display data: Displays the actually active monitoring cycle. The data cannot be written.

The data value is recalculated as soon as one of the following data are changed:

SAFETY_SYSCLOCK_TIME_RATIO,

POSCTRL_SYSCLOCK_TIME_RATIO

SYSCLOCK_CYCLE_TIME

The new value does not become active until after the next Power On.

Related to:

MD 10090: $MN_SAFETY_SYSCLOCK_TIME_RATIO

10092	INFO_CROSSCHECK_CYCLE_TIME			N01, N06, N05, -	FBSI
s	Display of cycle time for cross-checking			DOUBLE	PowerOn
-					
-	-	0.0	-	-	7/RO
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Display data: Maximum cross-checking cycle in seconds.

Derived from INFO_SAFETY_CYCLE_TIME and the number of data to be cross-checked (this may vary according to the type of drive used for the individual axes).

The data value is recalculated as soon as one of the following data are changed:

SAFETY_SYSCLOCK_TIME_RATIO,

POSCTRL_SYSCLOCK_TIME_RATIO

SYSCLOCK_CYCLE_TIME

The new value does not become active until after the next Power On.

Related to:

MD 10090: $MN_SAFETY_SYSCLOCK_TIME_RATIO

MD 36992: $MA_SAFE_CROSSCHECK_CYCLE

10093	INFO_NUM_SAFE_FILE_ACCESS			EXP, N06, N05, -	FBSI
-	Number of SPL file accesses			DWORD	PowerOn
-					
-	-	0	-	-	0/RO
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Display data: SPL file /_N_CST_DIR/_N_SAFE_SPF has been accessed n-times in a protected state. This MD is intended for service purposes only. The MD can only take the values 0 and 1. The value cannot be changed.

10094	SAFE_ALARM_SUPPRESS_LEVEL			EXP, N06, N05, -	FBSI
-	Alarm suppress level			BYTE	PowerOn
-					
-	-	2	0	13	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Affects the display of safety alarms. The monitoring channels NCK and SIMODRIVE611D or NCK and PLC display alarms with the same meaning in several situations.

To reduce the volume of the alarm display, this MD is set to define whether safety alarms with the same meaning are to be hidden or not. This does affect the dual-channel stop response.

0 =

Dual-channel triggered alarms are displayed in full

- Dual-channel display of all axial safety alarms
- Alarm 27001, error code 0 is displayed
- Alarms 27090, 27091, 27092, 27093 and 27095 are dual-channel and displayed several times.

1 =

Alarms with the same meaning are only displayed once

This includes the following alarms:

27010 = 300907

27011 = 300914

27012 = 300915

27013 = 300906

27020 = 300910

27021 = 300909

27022 = 300908

27023 = 300901

27024 = 300900

In the case of these alarms, only one of the alarms listed (270xx or 3009xx) is displayed. The alarm of the monitoring channel that later triggers the alarm with the same meaning is no longer displayed.

Furthermore, alarm 27001 with error code 0 is suppressed.

This alarm is triggered as a result of drive alarm 300911. In this case, drive MDs 1391, 1392, 1393, 1394 give further explanations of the cause of the error.

2 =

Default: In addition to the functionality with MD value = 1, the alarms from the SPL processing (27090, 27091, 27092, 27093 and 27095) are displayed in one channel and only once.

This also applies to the alarms for PROFIsafe communication (27250 and subsequent). This machine data must be set to 0 to create an acceptance log, so that the triggering of all alarms can be logged.

3 =

Axial alarms 27000 and 300950 are replaced by alarm message 27100 for all axes/drives.

12 =

The alarms are prioritized beyond the functionality with MD value = 2. Obvious subsequent alarms are no longer displayed or

automatically deleted from the display.
The following alarms can be affected by this:
27001, 27004, 27020, 27021, 27022, 27023, 27024, 27091,
27101, 27102, 27103, 27104, 27105, 27106, 27107

13 =

The alarms are prioritized beyond the functionality with MD value = 3 as for MD value 12.

The machine data must be set to 0 to create an acceptance log, so that the triggering of all alarms can be logged.

10095	SAFE_MODE_MASK			EXP, N05, -	FBSI
-	'Safety Integrated' operating modes			DWORD	PowerOn
-					
-	-	0	0	0x0001	7/2
710-6a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
720-6a2c	-	-	-	-	-1/-
720-31a10c	-	-	-	-	-1/-
730-6a2c	-	-	-	-	-1/-
730-31a10c	-	-	-	-	-1/-
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Bit 0 = 0: the system variables $A_INSI[1...64] have the default "0".

Bit 0 = 1: the system variables $A_INSI[1...64] have the default "1".

The default is made in 32 bit groups, and only if an axial SGA has been parameterized on at least one of the system variables in this group.

(Compatibility mode for older PLC software versions)

These functions are only supported on one channel by the NCK. This data is not included in the calculation of the axial MD check sum SAFE_ACT_CHECKSUM.

10096	SAFE_DIAGNOSIS_MASK			EXP, N06, N05, -	FBSI
-	'Safety Integrated' diagnosis functions			DWORD	NEW CONF
-					
-	-	1	0	0x0007	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Bit 0 = 0:

SGE differences between NCK and SIMODRIVE611D digital monitoring channel are not displayed

Bit 0 = 1:

Default: SGE differences between NCK and drive monitoring channel are displayed. Differences between the following SGEs are displayed (the bit numbers stated refer to the axial map of the SGEs, they correspond to the assignment of the axial VDI interface):

Bit 0: (SBH/SG Abwahl)

Bit 1: (SBH Abwahl)

Bit 3: (SG-Auswahl: Bit 0)

Bit 4: (SG-Auswahl: Bit 1)

Bit 12: (SE 2 aktivieren)

Bit 28: (SG-Korrektur: Bit 0)

Bit 29: (SG-Korrektur: Bit 1)

Bit 30: (SG-Korrektur: Bit 2)

Bit 31: (SG-Korrektur. Bit 3)

The differences are displayed by message alarm 27004.

Bit 1 = 0: Default: Display of a non-executed SPL start after expiry of the timer defined in MD SAFE_SPL_START_TIMEOUT with alarm 27097

Bit 1 = 1: Display of alarm 27097 is suppressed

Alarm 27097 indicates, that despite the SPL configuration an SPL start has not been executed after expiration of the time specified in MD

SAFE_SPL_START_TIMEOUT. For reasons, see alarm description 27097.

Bit 2 = 0: presetting: display of communication errors with SFC error codes via alarm 27354

Bit 2 = 1: display of alarm 27354 is suppressed

10097	SAFE_SPL_STOP_MODE			N01, N06, -	FBSI
-	Stop reaction for SPL errors			BYTE	PowerOn
-					
-	-	3	3	4	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Selection of the stop response when the NCK / PLC SPL detects errors during a cross-check.

3: Stop D

4: Stop E

Entering the value 4 in this MD (Stop E) leads to alarm 27033, "Axis %1 Parameterization of MD MN_SAFE SPL STOP MODE is invalid" unless external Stop E is enabled in all axes with SI function enable ($_MA_SAFE_FUNCTION_ENABLE is not equal to 0).

As a remedy, either Stop D must be parameterized, or bits 4 and 6 must be set in $MA_SAFE_FUNKTION_ENABLE for all affected axes.

If this MD is set to 4, (Stop E) auf 1 gesetzt werden, um diese Parametrierung der PLC bekannt zu machen. Eine unterschiedliche Parametrierung führt zu dem Alarm 27909, "Fehler bei kreuzweisem Datenvergleich NCK-PLC"

10098	PROFISAFE_IPO_TIME_RATIO			N01, N06, -	FBSI
-	Factor for PROFIsafe communication			DWORD	PowerOn
SFCO					
-	-	1	1	25	7/1
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Ratio between PROFIsafe communication and interpolator cycle. The actual PROFIsafe communication cycle is the product of this data and IPO_CYCLE_TIME, and is displayed in MD INFO_PROFISAFE_CYCLE_TIME. The OB40 on the PLC side is triggered from the NCK side in this cycle to run the communication between F master and F slaves.

The PROFIsafe communication must not exceed 25 ms.

10099	INFO_PROFISAFE_CYCLE_TIME			N01, N06, N05, -	FBSI
s	PROFIsafe communication cycle time			DOUBLE	PowerOn
-					
-	-	0.0	-	-	7/RO
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Display data: Time frame in which F master and F slave communicate with one another. The value results from the interpolator cycle and $MN_PROFISAFE_IPO_TIME_RATIO. The value cannot be changed. The PROFIsafe communication via the OB40 on the PLC runs in this time frame.

10100	PLC_CYCLIC_TIMEOUT			EXP, N01, N06	P3
s	Maximum PLC cycle time			DOUBLE	PowerOn
-					
-	-	0.1	-	-	7/2

Description: Cyclical PLC monitoring time.

This machine data specifies the maximum monitoring time after which the PLC must have incremented its sign of life. Incrementing takes place within the interpolation cycles.

10110	PLC_CYCLE_TIME_AVERAGE		N01, N07	B1
s	Average PLC acknowledgement time		DOUBLE	PowerOn
-				
-	- 0.05	-	-	7/2

Description: Time information for the CNC about the OB1 cycle time. During this cycle time, it is guaranteed that the auxiliary functions will be acknowledged.

By means of the MD, the status transitions:

"channel operates/ channel in RESET/ channel failure --> channel interrupted" can be delayed for the PLC in case of a RESET. With the output "channel interrupted", the NCK waits at least the time indicated in the MD + 1 IPO cycle.

With the time indication, the path feedrate during path control operation in case of an auxiliary function output during motion is controlled in a way to ensure that the minimum travel time corresponds to the time information. This ensures a uniform velocity behavior which is not disturbed by waiting for the PLC acknowledgement. The internal incrementation is performed in the interpolation cycle.

For the auxiliary function output in the continuous-path mode, the MD is also relevant for the FM357 and 802/802s systems. With SW 5.1 and higher, the other systems are parameterized directly via the PLC.

10120	PLC_RUNNINGUP_TIMEOUT		EXP, N01, N06	H2
s	Monitoring time for PLC power up		DOUBLE	PowerOn
-				
-	- 50.0	-	-	7/2

Description: Power up PLC monitoring time

This machine data specifies the maximum monitoring time within which the PLC must report its first sign of life to the NCK. During the power up routine, the monitoring function has the task of verifying that the PLC has properly assumed cyclic operation. If the PLC does not issue a message within this time, the NC issues an alarm message when it powers up; NC-READY is not set. The incrementing takes place within the interpolation cycles.

10130	TIME_LIMIT_NETTO_COM_TASK		EXP, N01	OEM
s	Runtime limitation of communication to HMI		DOUBLE	PowerOn
-				
-	- 0.005	.001	0.100	7/1

Description: Net runtime limit of the communication sub-task

Preprocessing and the communications task share the time that is not used up by the cyclical tasks. Of this remaining time, communication uses the set time at the expense of preprocessing time; in other words, the net block cycle time is increased by the set value. This machine data serves the purpose of optimizing the block cycle time with the function "Reloading part programs block-by-block".

10131	SUPPRESS_SCREEN_REFRESH		EXP	A2
-	Screen refresh response under overload		BYTE	PowerOn
-				
-	- 0	0	2	7/2

Description: There are part programs in which the main run (HL) has to wait until the pre-processing (VL) makes new blocks available.

The pre-processing and display update compete for NC computing time. The MD defines how the NC is to respond when the pre-processing is too slow.

0: When the VL of a channel is too slow, the updating of the display is suppressed in all channels.

1: When the VL of a channel is too slow, the updating of the display is suppressed only in the time-critical channels in order to gain time for the pre-processing.

2: The updating of the display is never suppressed.

10132	MMC_CMD_TIMEOUT		EXP, N01, N06	PA,M4
s	Monitoring time for HMI command in the part program		DOUBLE	PowerOn
-				
-	- 3.0	0.0	100.0	7/2

Description: Monitoring time in seconds until the HMI acknowledges a command from the part program.

The following times are monitored:

- In the case of an HMI command without acknowledgement: time from triggering the transfer of the command string until successful transmission to the HMI
- In the case of an HMI command with synchronous and asynchronous acknowledgement: time from triggering the transfer of the command strings until receipt of the acceptance acknowledgement from the HMI
- For EXTCALL command and execution from external drives: time between the transmission triggering of the command string and the successful sending to the HMI.

10134	MM_NUM_MMC_UNITS		EXP, N01, N02	B3
-	Possible number of simultaneous HMI communication partners		DWORD	PowerOn
-				
-	- 6	1	10	2/2

Description: Possible number of simultaneous HMI communication partners with which the NCU can exchange data.

This value affects then number of communication orders that the NCK can manage. The higher the value, the more HMIs that can be simultaneously connected to the NCK without leading to communication problems.

DRAM is made available for this function in the NCU corresponding to the input in the machine data. The inputs for changing the memory areas have to be taken into account.

The unit of MD 10134 is a "resource unit".

A standard OP030 needs 1 resource unit, an HMI100/103 needs 2. OEM variants may need more or less resources.

- If the value is set lower than would be needed for the number of connected HMIs, this is not inevitably problematical. Actions may not function sporadically during multiple, simultaneous, communication-intensive operations (e.g. loading a program): Alarm 5000 is displayed. The operation then has to be repeated.
- If the value is et higher, more dynamic memory is occupied than necessary. The value should be reduced appropriately if the memory is required for other purposes.

References: /FB/, S7, "Memory Configuration"

10136	DISPLAY_MODE_POSITION		N01	-
-	Display mode for actual position in the WCS		DWORD	Reset
-				
-	- 0	0	1	7/1

Description: Defines how the position and the distance to go are displayed in the WCS.

0: Display as in software version 5 and earlier

1: At end of block, the actual value display is in principle the same as the programmed end point, irrespective of where the machine actually is (e.g. as a result of the tool radius compensation). The distance to go is the same as the actual distance to be traversed. This means that the displayed actual postion has to be the same as the displayed end position minus the distance to go, irrespective of the actual machine position. If the block end points are changed by chamfers, radii, contour definitions, splines or SAR in comparison to the NC programm, then these changes are reflected in the display as if thay had been programmed. This does not apply to changes resulting from tool radius compensation or smoothing.

10140	TIME_LIMIT_NETTO_DRIVE_TASK		EXP, N01	ECO
s	Runtime limit of drive communications sub-task		DOUBLE	PowerOn
-				
-	- 0.02	.001	.5	7/1

Description: Net runtime limit of the drive communication sub-task

The preprocessing and the communications tasks (drive communication and domain service) share the time that is not used up by the cyclical tasks.

10150	PREP_DRIVE_TASK_CYCLE_RATIO		EXP, N01	ECO
-	Factor for communication with drive		DWORD	PowerOn
-				
-	- 2	1	50	7/1

Description: This machine data specifies the division ratio used for activation of the drive communication task in the non-cyclic time level. This allows the time share of preparation in the non-cyclic time level to be increased, which reduces block cycle times. Communication with the digital drives is slowed down in particular during program execution.

10160	PREP_COM_TASK_CYCLE_RATIO		EXP, N01	ECO
-	Factor for communication with HMI		DWORD	PowerOn
-				
-	- 3	1	50	7/1

Description: This machine data specifies the division ratio used for activating the communication task in the non-cyclic time level. This allows the time share of preparation in the non-cyclic time level to be increased, which reduces block cycle times. External communication (file transfer) is slowed down in particular during program execution (block reload).

10161	COM_CONFIGURATION			EXP, N01	-
-	Configuration of communication			DWORD	PowerOn
-					
-	8	5, 5,18, 1,16, 8,18,18	-	-	0/0

Description: Values 1-3 define the maximum number of PDUs that are accepted in one pass.

Value 0 stands for infinite, i.e. all present jobs are executed immediately. These three values become active after PowerOn.

1st value: max. number of variable job PDUs executed per pass.

2nd value: max. number of PI job PDUs executed per pass.

3rd value: max. number of domain job PDUs executed per pass.

Values 4-8 define the credit assignment for optimized download.

4th value: number of PDUs that are assigned as credit at the begin of acknowledgement under opt. domain service (here, the file header and therefore the file on NCK are still unknown)

5th value: number of PDUs that will be requested by default under opt. domain service, if there is no explicit memory limit for the file

6th value: min. number of PDUs that are requested with the data request message (so that data request messages are not displayed again and again)

7th value: max. number of PDUs that are requested with the data request message (max. value is 255, as the log cannot handle more than that!)

8th value: max. number of PDUs that may be present in total

10170	PREP_PLCBG_TASK_CYCLE_RATIO			EXP, N01	ECO
-	Factor for communication with SW PLC2xx			DWORD	PowerOn
-					
-	-	1	1	50	0/0
710-6a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
720-6a2c	-	-	-	-	-1/-
720-31a10c	-	-	-	-	-1/-
730-6a2c	-	-	-	-	-1/-
730-31a10c	-	-	-	-	-1/-
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This machine data specifies the division ratio used for activation of the background task of the software PLC2xx in the non-cyclic time level.

As this cycle should be executed as often as possible (once in each PLC cycle), a ratio to the PREP task of 1:1 should be set. The frequency of activation depends on the computing time of the cyclic tasks (SERVO, IPO, COM, PLC) and the settings for the other subtasks (ratio to PREP, net runtime) or the utilization of the non-cyclic tasks PREP, EXCOM, DRIVE.

10171	TIME_LIMIT_NETTO_PLCBG_TASK			EXP, N01	ECO
s	Runtime limitation of communication to SW PLC2xx			DOUBLE	PowerOn
-					
-	-	0.005	.001	0.100	0/0

Description: Net runtime limit of the Soft PLC2xx background subtask

The machine data determines the minimum computing time assigned to the SW PLC2xx

background task, if activated, as a whole (interrupted by the cyclic tasks

and Linux)

If the task does not give up control on its own (as there is nothing to do),

it will disable both the feed and the other subtasks for this period of time.

If there is only few computing time left, relatively long periods of time may be created this way.

10185	NCK_PCOS_TIME_RATIO			EXP, N01	-
-	Processing time share NCK			DWORD	PowerOn
-					
-	-	100	0	100	0/0
710-6a2c	-	65	10	90	7/2
710-31a10c	-	65	10	90	7/2
720-6a2c	-	65	10	90	7/2
720-31a10c	-	65	10	90	7/2
730-6a2c	-	65	10	90	7/2
730-31a10c	-	65	10	90	7/2
840disl-6a	-	50	10	75	7/2
840disl-20a	-	50	10	75	7/2

Description: This machine data defines the maximum proportion of CPU time given to the NCK in a PC-based system. The division specified by the user is implemented as well as possible.

When implementing the specification, the system takes into account limiting values for the absolute proportion of CPU time that must not be over or undershot.

Adaptations are made without generating an alarm.

10190	TOOL_CHANGE_TIME			N01	BA
-	Tool changing time for simulation			DOUBLE	PowerOn
-					
-	-	0.	-	-	7/2

Description: This data defines how much time is estimated for a tool change (only relevant for a simulation).

10192	GEAR_CHANGE_WAIT_TIME			N01	S1
s	Gear stage change waiting time			DOUBLE	PowerOn
-					
-	-	10.0	0.0	1.0e5	7/2

Description: External events which trigger reorganization, wait for the end of a gear stage change. GEAR_CHANGE_WAIT_TIME now determines the waiting time for the gear stage change. Time unit in seconds.

When this time expires without the gear stage change having been terminated, the NCK reacts with an alarm.

Among others, the following events will cause reorganization:

User ASUB

Mode change

Delete distance-to-go

Axis replacement

Activate user data

10200	INT_INCR_PER_MM			N01	G2
-	Calculation resolution for linear positions			DOUBLE	PowerOn
-					
-	-	1000.	1.0	1.0e9	7/2

Description: MD: INT_INCR_PER_MM defines the number of internal increments per millimeter. Internal calculation accuracy for linear positions.

The internal representation of linear positions and their time derivation is scaled in "internal calculation accuracies" and IPO cycles.

The accuracy of the input of linear positions is limited to the calculation accuracy by rounding the product of the programmed value and the calculation accuracy to an integer. In order to keep the executed rounding easily understandable it is useful to use powers of 10 for the calculation accuracy.

10210	INT_INCR_PER_DEG			N01	G2
-	Calculation resolution for angular positions			DOUBLE	PowerOn
-					
-	-	1000.0	1.0	1.0e9	7/2

Description: INT_INCR_PER_DEG defines the number of internal increments per degree. The internal calculation accuracy for angular positions. The internal representation of angular positions and their time derivation is scaled in "internal calculation accuracies" and IPO cycles. The accuracy of the input of angular positions is limited to the calculation accuracy by rounding the product of the programmed value and the calculation accuracy to an integer.

In order to keep the executed rounding easily understandable it is useful to use powers of 10 for the calculation accuracy.

Application example: The calculation accuracy can be changed to >1000 incr./degree for a high-resolution rotary axis.

10220	SCALING_USER_DEF_MASK			EXP, N01	G2
-	Activation of scaling factors			DWORD	PowerOn
SCAL					
-	-	0x200	0	0x3FFF	7/2

Description: Bit mask for selecting the base values for the data (e.g. machine and setting data) that have a physical unit, they are interpreted in the default units shown below according to the basic system (metric/inch). If other input/output units are to be selected for individual physical units then these are activated with the scale factors associated with this machine data (entered in MD 10230: SCALING_FACTORS_USER_DEF[n]).

This does not affect the programming of geometry and feed values.

Bit set:

Data of the assigned physical variable (see list) are scaled to the unit defined by MD: SCALING_FACTORS_USER_DEF[n].

Bit not set:

Data of the assigned physical variable are scaled to the default unit shown below.

Bit no. (Stated as hex value)	Assigned physical variable	Default units for: MD 10240: SCALING_SYSTEM_IS_METRIC 1 = METRIC	0 = INCH
0	Linear position	1 mm	1 inch
1	Angular position	1 degree	1 degree
2	Linear velocity	1 mm/min	1 inch/min
3	Angular speed	1 rpm	1 rpm
4	Linear acceleration	1 m/s^2	1 $inch/s^2$
5	Angular acceleration	1 rev/s^2	1 rev/s^2
6	Linear jerk	1 m/s^3	1 $inch/s^3$
7	Angular jerk	1 rev/s^3	1 rev/s^3
8	Time	1 s	1 s
9	Position-controller servo gain	1/s	1/s
10	Revolutional feedrate	1 mm/rev	1 mm/rev
11	Compensation value linear pos.	1 mm	1 mm
12	Compensation value angular pos.	1 degree	1 degree
13	Cutting rate	1 m/min	1 feet/min

Example:

SCALING_USER_DEF_MASK =?H3?; (Bit nos. 0 and 1 as hex values)

The scale factor defined in the associated MD: SCALING_FACTORS_USER_DEF[n] is activated for linear and angular positions.

If this machine data is changed, a startup is required as otherwise the associated machine data that have physical units would be incorrectly scaled.

Proceed as follows:

- MD changed manually
  First start up and then enter the associated machine data with physical units.
- MD changed via machine data file
  First start up and then reload the machine data file so that the new physical units are taken into account.

If the machine data are altered, alarm 4070 "Scaling machine data altered" is output.

Application example: Input/output of linear velocities is to be in cm/min:

SCALING_USER_DEF_MASK = 0x4 (bit no. 2 as hex value)

SCALING_FACTORS_USER_DEF[2] = 0.1666666667 (10/60)

[Related to:

MD 10230: SCALING_FACTORS_USER_DEF[n] (scaling factors of the physical variables)

10230	SCALING_FACTORS_USER_DEF			EXP, N01	G2
-	Scaling factors of physical variables			DOUBLE	PowerOn
SCAL					
-	15	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	1e-9	-	7/2

Description: The scale factor of a physical variable that has a unit other than the default unit setting (set bit in MD 10220: SCALING_FACTORS_USER_DEF_MASK) is entered in this MD. The factor must refer to the unit used internally for the physical variable in question.

Index [n]	Assigned physical variable	Internal unit
0	Linear position	1 mm
1	Angular position	1 degree
2	Linear velocity	1 mm/s
3	Angular speed	1 degree/s
4	Linear acceleration	1 mm/s²
5	Angular acceleration	1 degree/s²
6	Linear jerk	1 mm/s³
7	Angular jerk	1 degree/s³
8	Time	1 s
9	Position-controller servo gain	1/s
10	Revolutional feedrate	1 mm/degree
11	Compensation value linear position	1 mm
12	Compensation value angular position	1 degree
13	Cutting rate	1 mm/s

The scaling factor is assigned to the physical variable using the index [0...12]. If this machine data is changed, a startup is required because otherwise the associated machine data that have physical units would be incorrectly scaled.

Proceed as follows:

- MD changed manually
  First start up and then enter the associated machine data with physical units.
- MD changed via machine data file
  First start up and then reload the machine data file so that the new physical units are taken into consideration.

If the machine data are altered, alarm 4070 "Scaling machine data altered" is output.

Application example(s):

Input/output of angular speeds is to be in new degree/min:
SCALING_FACTORS_USER_DEF_MASK = 'H8'; (bit no. 3 as hex value)
SCALING_FACTORS_USER_DEF[3] = 0.01851852; (400/360/60)

[3]: Index for angular speed.

Related to:

MD 10220: SCALING_USER_DEF_MASK (activation of scaling factors).

10240	SCALING_SYSTEM_IS_METRIC			N01	G2
-	Basic system metric			BOOLEAN	PowerOn
SCAL					
-	-	TRUE	-	-	7/2

Description: The MD defines the basic system used by the control for scaling length-dependent physical variables for data input/output.

All corresponding data are stored internally in the basic units of 1 mm, 1 degree and 1 sec.

In the case of access from the interpreter (part program and download), from the operator panel (variable service) or through external communication, scaling takes place in the following units:

SCALING_SYSTEM_IS_METRIC = 1: scaled in:
mm,
mm/min,
m/s^2,
m/s^3,
mm/rev.

SCALING_SYSTEM_IS_METRIC = 0: scaled in:
inch,
inch/min,
$inch/s^2$,
$inch/s^3$,
inch/rev.

The selection of the basic system also defines the interpretation of the programmed F value for linear axes:

	metric	inch
G94	mm/min	inch/min
G95	mm/rev.	inch/rev.

If this machine data is changed, a startup is required because otherwise the associated machine data that have physical units would be incorrectly scaled.

Proceed as follows:

- MD changed manually

  First start up and then enter the associated machine data with physical units.
- MD changed via machine data file

  First start up and then reload the machine data file so that the new physical units are taken into consideration.

If the machine data are altered, alarm 4070 "Scaling machine data altered" is output.

Application example(s):

Startup in the metric system and then change to inch system.

Special cases, errors:

The factor used for changing from 1 mm to 1 inch can be changed with MD 10250: SCALING_VALUE_INCH.

10250	SCALING_VALUE_INCH			EXP	G2
-	Conversion factor for INCH			DOUBLE	PowerOn
SCAL					
-	-	25.4	1e-9	-	0/0

Description: The MD contains the conversion factor from metric to inch.

This factor is only active with the selection of the non-metric basic system (MD 10240: SCALING_SYSTEM_IS_METRIC = 0) in the following conversions:

- Programmed F values for linear axes
- Input/output of lengths and length-dependent data (e.g. when uploading machine data, work offsets)

Programmed geometry axis positions are converted by this factor when the measuring system programmed with G70/G71 is different from the selected basic system (SCAL-ING_ SYSTEM_IS_METRIC).

Programmed synchronous axis positions are converted by the corresponding axial factors (MD 31200: SCALING_FAKTOR_G70_G71) when the measuring system programmed with G70/G71 is different from the selected basic system (SCALING_SYS-TEM_ IS_METRIC). Settings other than the default 25.4 should only be made in exceptional cases as the correct display of the unit on the operator interface depends on this value.

If this machine data is changed, a startup is required because otherwise the associated machine data that have physical units would be incorrectly scaled.

Proceed as follows:

- MD changed manually

  --> Start up and then enter the associated machine data with physical units.
- MD changed via machine data file

  -->Start up and then reload the machine data file so that the new physical units are taken into consideration.

If the machine data are altered, alarm 4070 "Scaling machine data altered" is output.

Application example(s):

This conversion factor is used if a changeover is made from metric to inch or a customized measuring system after startup. Then all the input machine data, among other things, are converted by this factor. The converted values are then given at the next read out and on the operator panel.

Related to:

MD 10240: SCALING_SYSTEM_IS_METRIC

10260	CONVERT_SCALING_SYSTEM			EXP	A3,G2
-	Enable basic system conversion			BOOLEAN	PowerOn
LINK					
-	-	FALSE	-	-	1/1

Description: Determines the handling of MD10240 $MN_SCALING_SYSTEM_IS_METRIC.

0: Inch/metric behavior conforms to SW1-SW4

1: Inch/metric behavior from SW5

Inch/metric functionality of SW5:

1. Switch over the systems of units with HMI softkey
2. New G codes G700/G710
3. Data backup with system of unit recognition INCH/METRIC
4. Automatic data conversion on change of system of units

- All zero point offsets
- Compensation data (EEC, QEC)
- Tool offsets
- etc.

The change from $MN_CONVERT_SCALING_SYSTEM leads to alarm 4070!

This alarm is designed to indicate that data which remain active after a POWERON are not subjected to automatic conversion from SW1-SW4 and SW5 formats.

10270	POS_TAB_SCALING_SYSTEM		N01, N09	T1
-	System of units of position tables		BYTE	Reset
-				
-	- 0	0	1	7/2

Description: Defines the measuring system for the positional data for the following machine data

MD10910 INDEX_AX_POS_TAB_1
MD10930 INDEX_AX_POS_TAB_2
MD41500 SW_CAM_MINUS_POS_TAB_1
MD41501 SW_CAM_PLUS_POS_TAB_1
MD41502 SW_CAM_MINUS_POS_TAB_2
MD41503 SW_CAM_PLUS_POS_TAB_2
MD41504 SW_CAM_MINUS_POS_TAB_3
MD41505 SW_CAM_PLUS_POS_TAB_3
MD41506 SW_CAM_MINUS_POS_TAB_4
MD41507 SW_CAM_PLUS_POS_TAB_4

0: metric
1: inch

This machine data is only evaluated for MD10260 CONVERT_SCALING_SYSTEM = 1.

Related to:

MD10260: CONVERT_SCALING_SYSTEM
MD10910: INDEX_AX_POS_TAB_1
MD10930: INDEX_AX_POS_TAB_2
MD41500: SW_CAM_MINUS_POS_TAB_1
MD41501 SW_CAM_PLUS_POS_TAB_1
MD41502: SW_CAM_MINUS_POS_TAB_2
MD41503: SW_CAM_PLUS_POS_TAB_2
MD41504: SW_CAM_MINUS_POS_TAB_3
MD41505: SW_CAM_PLUS_POS_TAB_3
MD41506: SW_CAM_MINUS_POS_TAB_4
MD41507: SW_CAM_PLUS_POS_TAB_4

10280	PROG_FUNCTION_MASK			EXP, N01	K1
-	Comparing (> and <) compatible with SW6.3			DWORD	PowerOn
-					
-	-	0x0	0	0x2	7/2

Description: Bit mask for parameterizing various sub-program commands

Bit no.Hexadec.Meaning with bit set
Value

0: 0x1Comparison commands ">" and "<" are processed as for SW 6.3 and earlier:

Sub-program data of the type REAL are mapped internally in the IEEE 64 bit format. This mode maps decimal numbers inaccurately if this format's 52-bit wide mantissa is inadequate to map the number in binary notation. To solve this problem, all comparison commands (==, <>, >=, <=, > and <) are checked for a relative equality of 1E-12.

This procedure is switched off for greater than (>) and lesser than (<) comparisons by setting bit 0. (Compatibility setting for software releases earlier than SW 6.4)

1: 0x2Programming the channel names from machine data $MC_CHAN_NAME

By setting bit 1 the channel name stored in machine data $MC_CHAN_NAME acan be programmed in the part program. Thus, the channel name can be programmed instead of a numerical value for the channel number in programming coordination commands such as (START(), INIT(), WAIT() etc.

10284	DISPLAY_FUNCTION_MASK			EXP, N01	-
-	BTSS-variable lastBlockNoStr active			DWORD	PowerOn
-					
-	-	0x0	-	-	7/2

Description: Bit mask for parameterizing various display variables:

BitNo. Hexadec. Meaning with bit set
value

Bit0: 0x1

Parameters are assigned to the OPI variable lastBlockNoStr in the SPARP and SPARPP blocks.

Bit1: 0x2

Concerns the OPI variable cmdSpeed in the SPARPP block. If the bit is set, the variable returns the programmed speed even if the spindle is at a standstill or in another mode (positioning mode, axis mode).

Bit2 0x4

Concerns the OPI variable cmdSpeed in the SPARPP block. (reserved for constant cutting speed)

Bit8: 0x100

Servotrace manages larger numerical values internally. Overruns in data format are avoided. The accuracy may be reduced with large numerical values.

10290	CC_TDA_PARAM_UNIT			N09	G2
-	Physical units of tool data for compile cycles			DWORD	PowerOn
-					
-	10	0,0,0,0,0,0,0,0,0,0	0	9	2/2

Description:

```
Physical units for the user-defined tool-specific data:
0 ;No unit
1 ;Linear position       [ mm ; inch ]
2 ;Angular position      [ degree ; degree ]
3 ;Linear velocity       [ mm/min ; inch/min ]
4 ;Angular speed         [ rpm ; rpm ]
5 ;Linear acceleration   [ m/s²  ; inch/s² ]
6 ;Angular acceleration. [ rev/s ² ; rev/s ² ]
7 ;Linear jerk           [ m/s ³ ; inch/s ³  ]
8 ;Angular jerk          [ rev/s ³ ; rev/s ³ ]
9 ;Revolutional feedrate [ mm/rev ; inch/rev ]
Only available if bit 2 (0x4) is set in MD 18080:
MM_TOOL_MANAGEMENT_MASK
```

10291	CCS_TDA_PARAM_UNIT			N09	-
-	physical units of SIEMENS-OEM tool data			DWORD	PowerOn
-					
-	10	0,0,0,0,0,0,0,0,0,0	0	9	2/2

Description:

```
Physical units for application-specific tool-specific data:
0:   No unit
1:   Linear position              [ mm; inch ]
2:   Angular position             [ degree ; degree ]
3:   Linear velocity              [ mm/min ; inch/min ]
4:   Angular speed                [ rev/min ; rev/min ]
5:   Linear acceleration          [ m/s² ; inch/s² ]
6:   Angular acceleration         [ rev/s² ; rev/s² ]
7:   Linear jerk                  [ m/s³ ; inch/s³ ]
8:   Angular jerk                 [ rev/s³ ; rev/s³ ]
9:   Feedrate per revolution      [ mm/rev; inch/rev]
Only available if Bit 2 (0x4) is set in MD
MM_TOOL_MANAGEMENT_MASK.
Related to: MM_NUM_CCS_TDA_PARAM
```

10292	CC_TOA_PARAM_UNIT			N09	G2
-	Physical units of cutting edge data for compile cycles			DWORD	PowerOn
-					
-	10	0,0,0,0,0,0,0,0,0,0	0	9	2/2

Description:

```
Physical units for the user-defined cutting edge data:
0  ;No unit
1  ;Linear position        [ mm ; inch ]
2  ;Angular position       [ degree ; degree ]
3  ;Linear velocity        [ mm/min ; inch/min ]
4  ;Angular speed          [ rpm ; rpm ]
5  ;Linear acceleration    [ m/s²  ; inch/s² ]
6  ;Angular acceleration.  [ rev/s ² ; rev/s ² ]
7  ;Linear jerk            [ m/s ³ ; inch/s ³  ]
8  ;Angular jerk           [ rev/s ³ ; rev/s ³ ]
9  ;Revolutional feedrate  [ mm/rev ; inch/rev ]
Only available if bit 2 (0x4) is set in MD 18080:
MM_TOOL_MANAGEMENT_MASK
```

10293	CCS_TOA_PARAM_UNIT			N09	-
-	Physical units of SIEMENS-OEM cutting edge data			DWORD	PowerOn
-					
-	10	0,0,0,0,0,0,0,0,0,0	0	9	2/2

Description:

```
Physical units for application-specific cutting data:
0 :  No unit
1 :  Linear position              [ mm ; inch ]
2 :  Angular position             [ degree ; degree ]
3 :  Linear velocity              [ mm/min ; inch/min ]
4 :  Angular speed                [ rev/min ; rev/min ]
5 :  Linear acceleration          [ m/s² ; inch/s² ]
6 :  Angular acceleration         [ rev/s² ; rev/s² ]
7 :  Linear jerk                  [ m/s³ ; inch/s³ ]
8 :  Angular jerk                 [ rev/s³ ; rev/s³ ]
9 :  Feedrate per revolution      [ mm/rev; inch/rev]
Only available if Bit 2 (0x4) is set in MD
MM_TOOL_MANAGEMENT_MASK.
Related to: MM_NUM_CCS_TOA_PARAM
```

10300	FASTIO_ANA_NUM_INPUTS			N10	A4
-	Number of active analog NCK inputs			BYTE	PowerOn
-					
-	-	0	0	8	7/2

Description: This machine data defines the number of usable analog NCK inputs on the control.

Only these analog NCK inputs can be addressed by the NC part program or assigned by NC functions.

If more analog NCK inputs are defined with the machine data than are available in the hardware of the control, the binary analog actual value is set to zero in the control for the inputs that do not exist in the hardware. The NCK value can be altered by the PLC.

Note:

CPU computing time on the interpolation level is required for processing the digital and analog NCK I/Os. The number of active NCK I/Os should therefore be limited to the demands of the machine so that the interpolation cycle time is not unnecessarily loaded.

10310	FASTIO_ANA_NUM_OUTPUTS			N10	A4
-	Number of active analog NCK outputs			BYTE	PowerOn
-					
-	-	0	0	8	7/2

Description: This machine data defines the number of usable analog NCK outputs on the control.

Only these analog NCK outputs can be addressed by the NC part program or assigned by NC functions.

If more analog NCK outputs are defined with the machine data than are available in the hardware of the control, no alarm is triggered. The analog values specified by the part program can be read by the PLC.

Note:

CPU computing time on the interpolation level is required for processing the digital and analog NCK I/Os. The number of active NCK I/Os should therefore be limited to the demands of the machine so that the interpolation cycle time is not unnecessarily loaded.

10320	FASTIO_ANA_INPUT_WEIGHT			N10	A4
-	Weighting factor for analog NCK inputs			DWORD	PowerOn
-					
-	8	10000,10000,10000,10000,10000,10000...	1	10000000	7/2

Description: A weighting factor can be defined with this MD for each analog NCK input [n] to enable adaptation to the various analog-to-digital converters (depending on the I/O module).

The value to be entered in this machine data is the value that is to be read in the part program with the command x = $A_INA[n] if the associated analog input [n] is set to the maximum value or the value +32767 is defined for this input via the PLC interface.

The value read from the analog-to-digital converter or the PLC interface is multiplied by the factor (FASTIO_ANA_INPUT_WEIGHT / 32767) before it can be read in the part program with the system variable $A_INA[n].

Use of the weighting factor for "Analog NCK inputs without hardware": with a weighting factor of 32767, the values defined by the part program and the PLC are numerically identical (1:1 communication between part program and PLC). This is advantageous when the analog NCK inputs/outputs are used purely as PLC inputs/outputs without analog hardware.

Note:

The comparator threshold values MD 41600: COMPAR_THRESHOLD_1 and MD 41601: COMPAR_THRESHOLD_2 are also normalized to FASTIO_ANA_INPUT_WEIGHT corresponding to their assignment to an analog input.

The CC access to analog values is not affected by FASTIO_ANA_INPUT_WEIGHT.

Related to:

IS "PLC setting value for analog NCK inputs" (DB10, DBB148 - 163)

10330	FASTIO_ANA_OUTPUT_WEIGHT			N10	A4
-	Weighting factor for analog NCK outputs			DWORD	PowerOn
-					
-	8	10000,10000,10000,10 000,10000,10000...	1	10000000	7/2

Description: A weighting factor can be defined with this MD for each analog NCK output [n] to enable adaptation to the various analog-to-digital converters (depending on the I/O module used).

[hw] = Index (0 to 7) for addressing the external analog outputs

The value x to be entered in this machine data is the value that is to effect the maximum set value of the associated analog output [n] when programming $A_OUTA[n] = x in the part program or is to generate the value +32767 in the PLC interface for this output.

Use of the weighting factor for "Analog NCK outputs without hardware": With a weighting factor of 32767, the values defined by the part program and the PLC are numerically identical (1:1 communication between part program and PLC). This is advantageous when the analog NCK outputs are used purely as PLC outputs without analog hardware.

Related to:

IS "PLC setting value for analog NCK outputs" (DB10, DBB170 - 185)

IS "Setpoint for analog NCK outputs" (DB10, DBB210 - 225)

10350	FASTIO_DIG_NUM_INPUTS			N10	A4
-	Number of active digital NCK input bytes			BYTE	PowerOn
-					
-	-	1	0	5	7/2

Description: The number of bytes of the digital NCK inputs that can be used on the control are defined in this machine data.

These digital NCK inputs can be read directly by the part program. Moreover, the signal state at the HW inputs can also be changed by the PLC.

If more digital NCK inputs are defined in the machine data than are available in the control hardware, a signal status of 0 is set in the control for the inputs that do not exist in the hardware. The NCK value can be altered by the PLC.

Related to:

IS (Sperre der digitalen NCK-Eingänge 1-8);

(Sperre der externen digitalen Eingänge des NCK 9 - 40)

IS (Setzen der digitalen NCK-Eingänge von PLC 1-9);

(Werte von PLC für die externen digitalen Eingänge des NCK 9 - 40)

IS "Actual value for digital NCK inputs" (DB10, DBB60, DBB186 ...)

10360	FASTIO_DIG_NUM_OUTPUTS			N10	A4
-	Number of active digital NCK output bytes			BYTE	PowerOn
-					
-	-	0	0	5	7/2

Description: The number of bytes for digital NCK outputs that can be used on the control are defined in this machine data.

These digital NCK outputs can be set directly by the part program. The PLC is able to

- set the digital outputs to "0" in a defined way with IS "Disable the digital NCK outputs".
- alter the NCK value with IS "Overwrite mask for digital NCK outputs".
- specify a PLC value with IS "Setting mask for digital NCK outputs".

If more digital NCK outputs are defined in the machine data than are available in the control hardware, no alarm is triggered. The signal states specified by the part program can be read by the PLC.

Special cases:

Digital NCK outputs 5 to 8 can be processed only by the PLC (no hardware outputs).

Related to:

IS "Disable the digital NCK outputs" (DB10, DBB4, DBB130 ...)

IS "Overwrite mask for digital NCK outputs" (DB10, DBB5, DBB131 ...)

IS "PLC setting for digital NCK outputs" (DB10, DBB6, DBB132 ...)

IS "Setting mask for digital NCK outputs" (DB10, DBB7, DBB133 ...)

IS "Setpoint for digital NCK outputs" (DB10, DBB64, DBB190 ...)

10361	FASTIO_DIG_SHORT_CIRCUIT			N10	A2
-	Short circuit of digital inputs and outputs			DWORD	PowerOn
-					
-	10	0,0,0,0,0,0,0,0,0,0	-	-	7/2

Description: Defined short circuits between digital output and input signals of the high-speed NCK I/Os are realized by linking the signals read in from the high-speed NCK I/Os or the PLC interface to defined output signals.

The output signals always remain unchanged by the link, the inputs that have to be taken into account internally arise from the read inputs and the link. If a plurality of output bits are specified for one input bit in overwrite mode, the last defined assignment in the list determines the result.

The definition of non-existent or non-activated inputs/outputs is ignored without an alarm.

Bits 0-7:Number of the input byte to be written (1 - 5)

Bits 8-15:Bit number within the input byte (1 - 8)

Link:

The type of link is selected by adding a hexadecimal number to the input bit number:

- 00 Overwrite input identically to output
- A0 Input is AND-gated to the read input with the status of the stated output
- B0 Input is OR-gated to the read input with the status of the stated output

Bits 16-23:Number of the output byte to be used (1 - 5)

Bits 24-31:Bit number within the output byte (1 - 8)

Example:

$MN_FASTIO_DIG_SHORT_CIRCUIT[0] = 0x04010302

- Input: 3rd bit of the 2nd byte
- Output: 4th bit of the 1st byte (= 4th onboard NCU output)
- The input status is overwritten by the specified output

$MN_FASTIO_DIG_SHORT_CIRCUIT[1] = 0x0705A201

- Input: 2nd bit of the 1st byte (= 2nd onboard NCU input)
- Output: 7th bit of the 5th byte
- The input status is AND-gated with the specified output

$MN_FASTIO_DIG_SHORT_CIRCUIT[2] = 0x0103B502

- Input: 5th bit of the 2nd byte
- Output: 1st bit of the 3rd byte
- The input status is OR-gated with the specified output

Related to:

- MD 10350: FASTIO_DIG_NUM_INPUTS,
- MD 10360: FASTIO_DIG_NUM_OUTPUTS.

References: /FB/, A4, "Digital and Analog NCK I/Os"

10362	HW_ASSIGN_ANA_FASTIN			N10	A4
-	Hardware assignment of the fast analog NCK inputs			DWORD	PowerOn
-					
-	8	0x01000000,0x01000000,0x01000000...	0x01000000	0x060003FF	7/2

Description:

For SIMODRIVE611D (terminal block):

The following 4 bytes assign the external analog NCK inputs to the hardware:

1st byte: I/O no.

2nd byte: Submodule no.

3rd byte: Module no.

4th byte: Segment no.

As soon as value 0 is entered in byte 3 (module no.), external I/Os are no longer processed by the control.

The hardware assignment is control specific and therefore different.

For PROFIBUS/PROFINET:

1st + 2nd byte indicate the logical start address of the I/O slot on the PROFIBUS/PROFINET:

Value 0000 means NO active slot

Values 0001..0100 are reserved for the PLC process image (the value of input slots can be read by the NCK without errors, but output slots are forbidden in this area and cause an alarm on power up)

1st byte = LowByte of the logical start address

2nd byte = HighByte of the logical start address

3nd byte = 0 = without meaning

4th byte = 5 = segment no. for PROFIBUS/PROFINET

The individual bytes are explained in MD 10366: HW_ASSIGN_DIG_FASTIN.

[hw] = Index (0 to 7) for addressing the external analog inputs

Related to:

MD 10366: HW_ASSIGN_DIG_FASTIN

MD 10368: HW_ASSIGN_DIG_FASTOUT

MD 10364: HW_ASSIGN_ANA_FASTOUT

10364	HW_ASSIGN_ANA_FASTOUT			N10	A4
-	Hardware assignment of external analog NCK outputs			DWORD	PowerOn
-					
-	8	0x01000000,0x01000000,0x01000000...	0x01000000	0x060003FF	7/2

Description: For SIMODRIVE611D (terminal block):

The following 4 bytes assign the external analog NCK outputs to the hardware:

1st byte: I/O no.

2nd byte: Submodule no.

3rd byte: Module no.

4th byte: Segment no.

As soon as value 0 is entered in byte 3 (module no.), external I/Os are no longer processed by the control.

For PROFIBUS/PROFINET:

1st + 2nd byte indicate the logical start of the I/O slot on the PROFIBUS/PROFINET:

Value 0000 means NO active slot

Values 0001..0100 are reserved for the PLC process image (the value of input slots can be read by the NCK without errors; however, output slots are forbidden in this area and cause an alarm on power up)

1st byte = LowByte of the logical start address

2nd byte = HighByte of the logical start address

3rd byte = 0 = without meaning

4th byte = 5 = segment no. for PROFIBUS/PROFINET

The individual bytes are explained in MD 10366: HW_ASSIGN_DIG_FASTIN.

Related to:

MD 10366: HW_ASSIGN_DIG_FASTIN

MD 10368: HW_ASSIGN_DIG_FASTOUT

MD 10362: HW_ASSIGN_ANA_FASTIN

10366	HW_ASSIGN_DIG_FASTIN			N10	A4
-	Hardware assignment of external digital NCK inputs			DWORD	PowerOn
-					
-	10	0x01000000,0x01000000,0x01000000...	0x01000000	0x060003FF	7/2

Description:

```
For SIMODRIVE611D (terminal block):
The following 4 bytes assign the external digital NCK I/Os to the
hardware:
      1st byte:     I/O no.
      2nd byte:    Submodule no.
      3rd byte:     Module no.
      4th byte:     Segment no.
As soon as value 0 is entered in byte 3 (module no.), the output
byte concerned is not processed by the control.
 I/O no.:
   Number of the I/O byte on the DP compact module (range: 1 to 2;
   always 1 with analog inputs/outputs)
Submodule no.:
   Submodule slot on the terminal block into which the DP compact
   module is inserted (range: 1 to 8)
Module no.:
   Number of the logical slot into which the terminal block with
   the external I/Os is inserted. The  logical slot is assigned to
   a physical slot by MD 13010: DRIVE_LOGIC_NR (logical drive num-
   ber). Each module occupies a physical slot.
Segment no.:
   Always 1 for 840D (ID for SIMODRIVE611D bus)
        Example:
                HW_ASSIGN_DIGITAL_FASTIN[3] = 01 04 03 02
   1st byte: 02 =     2nd input byte of a 16 bit input module
   2nd byte: 03 =    Input module inserted in slot 3 of the termi-
nal block
   3rd byte: 04 =     Terminal block inserted at logical drive num-
ber 4
   4th byte: 01 =     ID for 611D bus
For PROFIBUS/PROFINET:
   1st + 2nd byte indicate the logical start of the I/O slot on the
PROFIBUS/PROFINET:
Value 0000 means NO active slot
Values 0001..0100 are reserved for the PLC process image (the
value of input slots can be read by the NCK without errors; how-
ever, output slots are forbidden in this area and cause an alarm
on power up)
   1st byte = LowByte of the logical start address
   2nd byte = HighByte of the logical start address
   3rd byte = 0 = without meaning
   4th byte = 5 = segment no. for PROFIBUS/PROFINET
Module no.:   1 ... MD_MAXNUM_SIMO611D_AXES:
   Number of the logical slot in which the terminal block with the
   external I/Os is inserted. The logical slot is assigned to a
   physical slot by $MN_DRIVE_LOGIC_NR, it is activated by
```

$MN_DRIVE_IS_ACTIVE.

1st + 2nd bytes give the logical start address of the I/O slot on the PROFIBUS

1st byte = low byte

2nd byte = high byte

Value 0000 means NO active slots

Values 0001..007F are reserved for the PLC (NCK can also read the value for input slots without error, but output slots are forbidden in this range and lead to an alarm during startup)

Values 0080..02FF are valid

Values > 02FF are invalid

Example:

HW_ASSIGN_DIGITAL_FASTIN[3] = '05000302'

1st + 2nd byte: 0302 (hex) = logical start address 770 (decimal)

3rd byte: 00 = no significance

4th byte: 05 = ID for PROFIBUS/PROFINET

Related to:

MD 10368: HW_ASSIGN_DIG_FASTOUT

MD 10362: HW_ASSIGN_ANA_FASTIN

MD 10364: HW_ASSIGN_ANA_FASTOUT

10368	HW_ASSIGN_DIG_FASTOUT			N10	A4
-	Hardware assignment of external digital NCK outputs			DWORD	PowerOn
-					
-	4	0x01000000,0x01000000,0x01000000...	0x01000000	0x060003FF	7/2

Description: For SIMODRIVE611D (terminal block):

The following 4 bytes assign the external digital NCK outputs to the hardware:

1st byte: I/O no.
2nd byte: Submodule no.
3rd byte: Module no.
4th byte: Segment no.

As soon as value 0 is entered in byte 3 (module no.), the output byte concerned is not processed by the control.

The hardware assignment is control specific and therefore varies.

For PROFIBUS/PROFINET:

1st + 2nd byte indicate the logical start of the I/O slot on the PROFIBUS/PROFINET:

Value 0000 means NO active slot

Values 0001..0100 are reserved for the PLC process image (the value of input slots can be read by the NCK without errors; however, output slots are forbidden in this area and cause an alarm on power up)

1st byte = LowByte of the logical start address
2nd byte = HighByte of the logical start address
3rd byte = 0 = without meaning
4th byte = 5 = segment no. for PROFIBUS/PROFINET

The individual bytes are explained under MD: HW_ASSIGN_DIG_FASTIN.

[hw] = Index (0 to 3) for addressing the external digital output bytes

Related to:

MD 10366: HW_ASSIGN_DIG_FASTIN
MD 10362: HW_ASSIGN_ANA_FASTIN
MD 10364: HW_ASSIGN_ANA_FASTOUT

10380	HW_UPDATE_RATE_FASTIO			EXP, N10	A4
-	Updating rate of clocked external NCK I/Os			BYTE	PowerOn
-					
-	5	2,2,2,2,3	2	3	7/2

Description: For SIMODRIVE611D only (terminal block):

The cycle frequency is selected for the clock-synchronous input and output of the external NCK I/Os with this machine data (840D only).

The cycle time applies to all I/O modules on a terminal block that are operated in synchronization with the clock (MD 10384: HW_CLOCKED_MODULE_MASK[tb]=1).

The selection can be made from the following cycle frequencies:

Value =

1: Synchronous input/outputs in hardware cycles (not in software release 2) (SYSCLOCK_CYCLE_TIME / SYSCLOCK_SAMPL_TIME_RATIO)

2: Synchronous input/outputs in the position control cycle (default setting) (MD: POSCTR_SYSCLOCK_TIME_RATIO)

3: Synchronous inputs/outputs in the interpolation cycle (MD: IPO_SYSCLOCK_TIME_RATIO)

Note on index [tb] (tb = 0 to 1):

Index [tb] identifies the connected NCU terminal blocks in ascending order of the defined logical module numbers (parameterization with MD: DRIVE_LOGIC_NR "logical drive number").

Example:

An additional 2 terminal blocks which are parameterized with the logical drive numbers 6 and 7 are connected to the drive bus.

The following assignments are made for the terminal blocks in the control:

- HW_UPDATE_RATE_FASTIO[0] parameterizes terminal block 1 with no. 6
- HW_UPDATE_RATE_FASTIO[1] parameterizes terminal block 2 with no. 7

This assignment applies analogously to:

MD 10380: HW_UPDATE_RATE_FASTIO[tb] and

MD 10384: HW_CLOCKED_MODULE_MASK [tb]

For more detailed information see References:

/FB1/ Velocities, Setpoint/Actual Value Systems, Cycle Times (G2)

Note:

Please consider the hardware response times of the external I/O modules used.

References:

/PHD/, SINUMERIK 840D, NCU Manual

MD irrelevant to: SINUMERIK FM-NC

Related to:

MD 10382: HW_LEAD_TIME_FASTIO

MD 10384: HW_CLOCKED_MODULE_MASK

POSCTR_SYSCLOCK_TIME_RATIO

IPO_SYSCLOCK_TIME_RATIO

SYSCLOCK_SAMPL_TIME_RATIO

DRIVE_LOGIC_NR

10382	HW_LEAD_TIME_FASTIO		EXP, N10	A4
-	Lead time of clocked external NCK I/Os		DWORD	PowerOn
-				
-	5	100,100,100,100,100	-	-	7/2

Description: For SIMODRIVE611D only (terminal block):

A lead time can be defined for digital and analog NCK I/Os (MD 10384: HW_CLOCKED_MODULE_MASK = 1) operated in synchronization with the clock.

The input signal is stored this length of time before the defined cycle. The output signal is sent to the hardware this same length of time before the defined cycle.

With analog NCK inputs, for example, this makes it possible to consider the hardware-specific conversion time of the analog-to-digital converter so that the digitized analog value is available at the cycle time point.

If the value set in this machine data exceeds the set cycle time (MD 10380: HW_UPDATE_RATIO_FASTIO), it is limited internally to the largest possible offset (i.e. to the parameterized cycle time).

The lead time applies to all NCK inputs/outputs of the terminal block addressed with index [tb] which are operated in synchronization with the clock.

Note on index [tb] see MD 10380: HW_UPDATE_RATE_FASTIO.

Related to:

MD 10380: HW_UPDATE_RATIO_FASTIO

MD 10384: HW_CLOCKED_MODULE_MASK

10384	HW_CLOCKED_MODULE_MASK			N10	A4
-	Synchronous processing of external NCK I/Os			BYTE	PowerOn
-					
-	5	0,0,0,0,0	-	-	7/2

Description: For SIMODRIVE611D only (terminal block):

The I/O modules of the external NCK I/Os can be operated in the following ways with SINUMERIK 840D:

- Asynchronously, i.e. the input and output values are made available in cycles set by the terminal block which are asynchronous to the internal NC processing cycles.
- Synchronously, i.e. the input and output values are made available synchronously to a settable internal NC processing cycle.

These modes of operation can be set via a bit mask (bits 0 to 7) for each individual I/O module of the terminal block addressed with index [tb] (bit 0 for I/O module on slot 1 ... bit 7 for I/O module on slot 8).

Each bit has the following meaning:

Bit n = 0: I/O module on slot n+1 is operated asynchronously

Bit n = 1: I/O module on slot n+1 is operated synchronously

The value is of no significance for the unassigned slots of a terminal block.

Example:

HW_CLOCKED_MODULE_MASK[0] = 30 (bit mask: 0011 0000)

The I/O modules on slots 5 and 6 of terminal block 1 are operated in synchronization with the clock.

Note:

Digital NCK inputs/outputs are generally always operated asynchronously. When analog NCK inputs/outputs are used in closed control loops, values often have to be read in and out in synchronization with the clock.

Note on index [tb] see MD 10380: HW_UPDATE_RATE_FASTIO.

MD irrelevant to: SINUMERIK FM-NC (always operated asynchronously)

Related to:

MD 10382: HW_LEAD_TIME_FASTIO

MD 10380: HW_UPDATE_RATIO_FASTIO

10385	PROFISAFE_MASTER_ADDRESS			N01, N06, -	FBSI
-	PROFIsafe address PROFIsafe master module			DWORD	PowerOn
-					
-	-	0	0	0x0500FA7D	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Definition of the PROFIsafe address of the F master NCK/PLC. Used for unique assignment between F master and F slave. This parameter must be entered corresponding to the parameter "F_source_address" set in S7-ES for the F slaves. Communication is only attempted to be set up with F slaves which have this address entered.

10386	PROFISAFE_IN_ADDRESS			N01, N06, -	FBSI
-	PROFIsafe address input module			DWORD	PowerOn
-					
-	16	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	0x0501FFFF	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: PROFIsafe destination address of an input module

Format: 0s 0x aaaa

s: Bus segment (5 = DP connection on the PLC side)

x: Sub-slot address

Value range: 0...1

x = 0 addresses the F user data signals 1...32

x = 1 adresses the F user data signals 33...64

aaaa: Hexadecimal PROFIsafe address of the F module

10387	PROFISAFE_OUT_ADDRESS			N01, N06, -	FBSI
-	PROFIsafe-address output module			DWORD	PowerOn
-					
-	16	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	0x0501FFFF	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: PROFIsafe destination address of an output module

Format: 0s 0x aaaa

s: Bus segment (5 = DP connection on the PLC side)

x: Sub-slot address

Value range: 0...1

x = 0 addresses the F user data signals 1...32

x = 1 adresses the F user data signals 33...64

aaaa: Hexadecimal PROFIsafe address of the F module

10388	PROFISAFE_IN_ASSIGN			N01, N06, -	FBSI
-	Input.assignment $A_INSE to PROFIsafe module			DWORD	PowerOn
-					
-	16	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	64064	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Assignment between external SPL interface $A_INSE and PROFIsafe input module

The three lower digits indicate the 1st range limit for the $A_INSE variables to be fed.

The three higher digits indicate the 2nd range limit for the $A_INSE variables to be fed.

Example:

PROFISAFE_IN_ASSIGN[0] = 4001 or alternatively 1004:

The system variables $A_INSE[1...4] are fed with the state of the input terminals of the PROFIsafe module specified by MD PROFISAFE_IN_ADDRESS[0].

10389	PROFISAFE_OUT_ASSIGN			N01, N06, -	FBSI
-	Outp.assignment $A_OUTSE to PROFIsafe module			DWORD	PowerOn
-					
-	16	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	64064	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Assignment between external SPL interface $A_OUTSE and PROFIsafe output module

The three lower digits indicate the 1st range limit for the $A_OUTSE variables to be connected.

The three higher digits indicate the 2nd range limit for the $A_OUTSE variables to be connected.

Example:

PROFISAFE_OUT_ASSIGN[0] = 64061 or alternatively 61064:

The system variables $A_OUTSE[61...64] are fed to the output terminals of the PROFIsafe module specified by MD PROFISAFE_OUT_ADDRESS[0].

10390	SAFE_IN_HW_ASSIGN			N01, N06, -	FBSI
-	Input assignment of external SPL interface			DWORD	PowerOn
-					
-	8	0,0,0,0,0,0,0,0	-	-	7/2
710-6a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
720-6a2c	-	-	-	-	-1/-
720-31a10c	-	-	-	-	-1/-
730-6a2c	-	-	-	-	-1/-
730-31a10c	-	-	-	-	-1/-
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: An input byte of the NCK I/Os can be assigned byte by byte to the system variables $A_INSE[x] with this machine data.

```
n   System variables  Comment
=0  $A_INSE[1...8]    Assignment for 1st byte
=1  $A_INSE[9..16]    Assignment for 2nd byte
=2  $A_INSE[17..24]   Assignment for 3rd byte
=3  $A_INSE[25..32]   Assignment for 4th byte
=4  $A_INSE[33..40]   Assignment for 5th byte
=5  $A_INSE[41..48]   Assignment for 6th byte
=6  $A_INSE[49..56]   Assignment for 7th byte
=7  $A_INSE[57..64]   Assignment for 8th byte
```

Related to:

MD 10392: $MN_SAFE_OUT_HW_ASSIGN

See MD 10366:$MN_HW_ASSIGN_DIG_FASTIN for structure.

This involves the restriction that an I/O module has to be addressed via this MD. Assignment to another system variable is not possible.

10392	SAFE_OUT_HW_ASSIGN			N01, N06, -	FBSI
-	Output assignment ext. interface SPL			DWORD	PowerOn
-					
-	8	0,0,0,0,0,0,0,0	-	-	7/2
710-6a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
720-6a2c	-	-	-	-	-1/-
720-31a10c	-	-	-	-	-1/-
730-6a2c	-	-	-	-	-1/-
730-31a10c	-	-	-	-	-1/-
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: An output byte of the NCK I/Os can be assigned byte by byte to the system variables $A_OUTSE[x] with this machine data.

n	System variables	Comment
=0	$A_OUTSE[1..8]	Assignment for 1st byte
=1	$A_OUTSE[9..16]	Assignment for 2nd byte
=2	$A_OUTSE[17..24]	Assignment for 3rd byte
=3	$A_OUTSE[25..32]	Assignment for 4th byte
=4	$A_OUTSE[33..40]	Assignment for 5th byte
=5	$A_OUTSE[41..48]	Assignment for 6th byte
=6	$A_OUTSE[49..56]	Assignment for 7th byte
=7	$A_OUTSE[57..64]	Assignment for 8th byte

Related to:

MD 10390: $MN_SAFE_IN_HW_ASSIGN

10393	SAFE_DRIVE_LOGIC_ADDRESS			N01, N06, -	-
-	Logical drive addresses SI			DWORD	PowerOn
-					
-	31	6700,6724,6748,6772,6796,6820,6844...	258	8191	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Logical I/O addresses of the SI message frames of the drives on the PROFIBUS.

One address is assigned to one drive.

10394	PLCIO_NUM_BYTES_IN			N10	A2
-	Number of directly readable input bytes of the PLC I/Os			BYTE	PowerOn
-					
-	-	0	0	32	7/2

Description: The number of PLC I/O input bytes that can be read directly by the NC.

These bytes are not transmitted by the PLC user program but via an interrupt of the PLC operating system.

The access delay is less than 0.5 ms.

The bytes can be read by the part program and from synchronized actions with the system variables:

$A_PBB_IN,

$A_PBW_IN,

$A_PBD_IN,

$A_PBR_IN

.

Attention:

The machine data MD 10394: PLCIO_NUM_BYTES_IN and MD 10395: PLCIO_LOGIC_ADDRESS_IN must be consistent with the configuration by the PLC.

Related to:

MD 10395: PLCIO_LOGIC_ADDRESS_IN

10395	PLCIO_LOGIC_ADDRESS_IN			N10	A2
-	Start addr. of the directly readable input bytes of the PLC I/Os			DWORD	PowerOn
-					
-	-	0	-	-	7/2

Description: The PLC hardware must configure a number of MD 10394: PLCIO_NUM_BYTES_IN for direct use by the NC starting from this address. These bytes are not transmitted by the PLC user program but directly via an interrupt of the PLC operating system. The access delay is less than 0.5 ms. The bytes can be read by the part program and from synchronized actions with the system variables:

$A_PBB_IN,

$A_PBW_IN,

$A_PBD_IN,

$A_PBR_IN

.

Attention:

The machine data MD 10394: PLCIO_NUM_BYTES_IN and MD 10395: PLCIO_LOGIC_ADDRESS_IN must be consistent with the configuration by the PLC.

Related to:

MD 10394: PLCIO_NUM_BYTES_IN

10396	PLCIO_NUM_BYTES_OUT			N10	A2
-	Number of directly writable output bytes of the PLC I/Os			BYTE	PowerOn
-					
-	-	0	0	32	7/2

Description: The number of PLC I/O output bytes that can be written directly by the NC.

These bytes are not transmitted by the PLC user program but via an interrupt of the PLC operating system.

The access delay is less than 0.5 ms.

The bytes can be written by the part program and from synchronized actions with the system variables:

$A_PBB_OUT,

$A_PBW_OUT,

$A_PBD_OUT,

$A_PBR_OUT

on the NC side.

Attention:

The machine data MD 10396: PLCIO_NUM_BYTES_OUT and MD 10397: PLCIO_LOGIC_ADDRESS_OUT must be consistent with the configuration by the PLC, otherwise other PLC output signals will be overwritten.

10397	PLCIO_LOGIC_ADDRESS_OUT			N10	A2
-	Start addr. of the directly writable output bytes of PLC I/O			DWORD	PowerOn
-					
-	-	0	-	-	7/2

Description: The PLC hardware must configure a number of MD 10396: PLCIO_NUM_BYTES_OUT for direct use by the NC starting from this address.

These bytes are not transmitted by the PLC user program but directly via an interrupt of the PLC operating system.

The access delay is less than 0.5 ms.

The bytes can be written by the part program and from synchronized actions with the system variables:

$A_PBB_OUT,

$A_PBW_OUT,

$A_PBD_OUT,

$A_PBR_OUT

.

Attention:

The machine data MD 10396: PLCIO_NUM_BYTES_OUT and MD 10397: PLCIO_LOGIC_ADDRESS_OUT must be consistent with the configuration by the PLC.

Related to:

MD 10396: PLClO_NUM_BYTES_OUT

10398	PLCIO_IN_UPDATE_TIME		N10	A4
s	Update time for PLCIO input cycle		DOUBLE	PowerOn
-				
-	- 0.0	0	10000	7/2

Description: Specification of the time span during which the data of the PLC I/Os directly readable via $A_PBx_IN system variables are updated.

This time span is rounded up internally to the next-higher multiple of the time predefined by the IPO cycle.

10399	PLCIO_TYPE_REPRESENTATION		N10	A4
-	Little/Big Endian for PLCIO		BYTE	PowerOn
-				
-	- 0	0	1	7/2

Description: Little/big-Endian format representation of the $A_PBx_OUT, $A_PBx_IN system variable for PLC I/Os directly controllable by NCK.

Value = 0 ; the system variable is represented in the little-Endian format

Value = 1 ; the system variable is represented in the big-Endian format

As a rule, the PLC I/Os must always be controlled in the big-Endian format (value = 1). For compatibility reasons, however, the default setting is the little-Endian format (value = 0).

10400	CC_VDI_IN_DATA		EXP, N02	OEM
-	Number of input bytes for compile cycles		DWORD	PowerOn
-				
-	- 0	0	1024	7/1

Description: The compile cycle user can freely define data within a data block on the PLC user interface. As the user, he determines the size of the interface from PLC to NCK. This machine data describes the length of the area on the VDI interface in bytes which defines the NCK input interface. The sum of this MD and the machine data CC_VDI_OUT_DATA must not exceed 400 for software version 1.

10410	CC_VDI_OUT_DATA		EXP, N02	OEM
-	Number of output bytes for compile cycles		DWORD	PowerOn
-				
-	- 0	0	1024	7/1

Description: The compile cycle user can freely define data within a data block on the PLC user interface. As the user, he determines the size of the interface from PLC to NCK. This machine data describes the length of the area on the VDI interface in bytes which defines the NCK output interface. The sum of this MD and the machine data CC_VDI_IN_DATA must not exceed 400.

10420	CC_ASSIGN_FASTOUT_MASK			EXP, N10	OEM
-	Reservation of external outputs for compile cycles			DWORD	PowerOn
-					
-	-	0	-	-	7/2

Description:

Reservation of high-speed hardware outputs for CC applications

Bit 0(LSB)-14: Mask of the digital output bytes reserved for the CC application

Bits 16-30: Mask of the analog outputs reserved for the CC application

The hardware outputs reserved here are included in the multiple assignment monitoring routine when the system is powered up. It is recommended to register all the hardware outputs used by CC applications here.

Bit 15: Suppresses power-up alarm 4275 (multiple assignment of digital output)

Bit 31: Suppresses power-up alarm 4275 (multiple assignment of analog output)

10430	CC_HW_DEBUG_MASK			EXP	OEM
-	Hardware debug mask for compile cycles			DWORD	PowerOn
NBUP, NDLD					
-	-	0	-	-	7/1

Description:

Setting of special responses to peripheral HW interfaces for NCK debug

For practical debugging of NCK software, among other things, the response of peripheral units to the loss of the NCK sign of life must be suppressed when the NCK software has run to a breakpoint.

Bit 0(LSB)-3:

For practical debugging of NCK software, among other things, the response of peripheral units to the loss of the NCK sign of life must be suppressed when the NCK software has run to a breakpoint.

Meaning of set bits:

Bit 0:

Drive modules ignore the loss of the NCK sign of life

Bit 1:

Terminal blocks ignore the loss of the NCK sign of life

Bit 3:

PLC ignores the loss of the NCK sign of life

Bit 4:

Recording of internal and external control commands. Recording the control sequences and storing them in a file in the passive file system. One can trace the exact sequence between the incoming harware signals of the PLC interface and the internal sequences with the aid of the recording file.

Bit 5:

Servotrace: Enable physical addresses without access control

Bit10:

Test for measuring function. If this bit is set, one can use the GUD Variables CHAN INT MEA_TASK and CHAN INT MEA_COUNTER to transfer the inverse transformation of the measured values into cyclical and non-cyclical tasks.

Bit11:

No EMERGENCY STOP alarm on loss of PLC sign of life. If the PLC sign of life is not obtained within the time defined in MD PLC_CYCLIC_TIMEOUT, an alarm is not issued, merely the axis release withdrawn. (Application case: debugging the PLC user program)

Bit15:

Reserved for gantry startup help.

10450	SW_CAM_ASSIGN_TAB			N09	N3
-	Assignment of software cams to machine axes			BYTE	PowerOn
-					
-	32	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	0	31	7/2

Description: This machine data allows one machine axis to be assigned to each of the 16 possible cam pairs (each is comprised of one minus and one plus cam).

If a "0" is entered, the corresponding cam is not processed.

The cam signal output is activated via the axial NC/PLC interface signal (Nocken-Aktivierung).

Index [n] of the machine data addresses the cam pair: n = 0, 1, ... , 15 correspond to cam pairs 1, 2, ... , 16

Corresponding with IS (Nocken-Aktivierung)

Example:

Cam pair 1 is to be assigned to machine axis 3 and cam pair 3 to machine axis 4. Cam pair 2 is not to be assigned to an axis.

MD: SW_CAM_ASSIGN_TAB[0]= 3

MD: SW_CAM_ASSIGN_TAB[1]= 0

MD: SW_CAM_ASSIGN_TAB[2]= 4

10460	SW_CAM_MINUS_LEAD_TIME			N09	N3
s	Lead or delay time at minus cams 1-16			DOUBLE	PowerOn
-					
-	32	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2

Description:

A lead or delay time can be assigned in this machine data to each minus cam 1-16 to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the time value entered.

Positive value: --> Lead time

Negative value: --> Delay time

Serves to compensate for the constant proportion of the internal delay time

between actual value acquisition and signal output.

Index [n] of the machine data addresses the cam pair:

n = 0, 1, ... , 15 correspond to cam pairs 1, 2, ... , 16

This machine data is added to the setting data SW_CAM_MINUS_TIME_TAB_1[n] and SW_CAM_MINUS_TIME_TAB_2[n].

Related to:

SD: SW_CAM_MINUS_TIME_TAB_1[n] (lead or delay time on minus cams 1 - 8)

SD: SW_CAM_MINUS_TIME_TAB_2[n] (lead or delay time on minus cams 9 - 16)

10461	SW_CAM_PLUS_LEAD_TIME			N09	N3
s	Lead or delay time at plus cams 1-16			DOUBLE	PowerOn
-					
-	32	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2

Description:

A lead or delay time can be assigned in this machine data to each plus cam 1-16 to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the time value entered.

Positive value: --> Lead time

Negative value: --> Delay time

Serves to compensate for the constant proportion of the internal delay time

between actual value acquisition and signal output.

Index [n] of the machine data addresses the cam pair:

n = 0, 1, ... , 15 correspond to cam pairs 1, 2, ... , 16

This machine data is added to the setting data SW_CAM_PLUS_TIME_TAB_1[n] and SW_CAM_PLUS_TIME_TAB_2[n].

Related to:

SD: SW_CAM_PLUS_TIME_TAB_1[n] (lead or delay time on plus cams 1 - 8)

SD: SW_CAM_PLUS_TIME_TAB_2[n] (lead or delay time on plus cams 9 - 16)

10470	SW_CAM_ASSIGN_FASTOUT_1		N09	N3
-	Hardware assignment for output of cams 1-8 to NCK I/Os		DWORD	PowerOn
-				
-	- 0	-	-	7/2

Description:

The cam signal status can be output to the NCK I/Os as well as to the PLC.

The hardware assignment of the minus and plus cam signals to the digital output bytes used for the NCK I/Os is made in this machine data for cam pairs 1 - 8.

The assigned output signals can also be inverted with this machine data.

The MD is coded as follows:

Bits 0-7: No. of 1st HW byte used with digital outputs
Bits 8-15: No. of 2nd HW byte used with digital outputs
Bits 16-23: Inversion mask for writing 1st HW byte used
Bits 24-31: Inversion mask for writing 2nd HW byte used
Bit=0: Do not invert
Bit=1: Invert

If both HW bytes are specified, the 1st byte contains the minus cam signals and the 2nd byte the plus cam signals.

If the 2nd byte is not specified (= "0"), then the 8 cams are output as an AND operation of the minus and plus cam signals via the 1st HW byte using the 1st inversion mask.

The status of the non-inverted output signal for linear axes and for rotary axes with "plus cam - minus cam < 180 degrees" is:

"1" between minus and plus cams
"0" outside this range

The status of the non-inverted output signal for rotary axes with "plus cam - minus cam >= 180 degrees" is:

"0" between minus and plus cams
"1" outside this range

The following must be specified as the byte address for the digital outputs:

1: for on-board byte
2 - 5: for external bytes

10471	SW_CAM_ASSIGN_FASTOUT_2		N09	N3
-	Hardware assignment for the output of cams 9-16 to NCK I/Os		DWORD	PowerOn
-				
-	-	0	-	-	7/2

Description: The cam signal status can be output to the NCK I/Os as well as to the PLC.

The hardware assignment of the minus and plus cam signals to the digital output bytes used for the NCK I/Os can be made in this machine data for cam pairs 9 - 16.

The assigned output signals can also be inverted with this machine data.

The MD is coded as follows:

Bits 0-7: No. of 1st HW byte used with digital outputs

Bits 8-15: No. of 2nd HW byte used with digital outputs

Bits 16-23: Inversion mask for writing 1st HW byte used

Bits 24-31: Inversion mask for writing 2nd HW byte used

Bit=0: Do not invert

Bit=1: Invert

If both HW bytes are specified, the 1st byte contains the minus cam signals and the 2nd byte the plus cam signals.

If the 2nd byte is not specified (= "0"), then the 8 cams are output as an AND operation of the minus and plus cam signals via the 1st HW byte using the 1st inversion mask.

The status of the non-inverted output signal for linear axes and for rotary axes with "plus cam - minus cam < 180 degrees" is:

"1" between minus and plus cams

"0" outside this range

The status of the non-inverted output signal for rotary axes with "plus cam - minus cam >= 180 degrees" is:

"0" between minus and plus cams

"1" outside this range

The following must be specified as the byte address for the digital outputs:

1: for on-board byte

2 - 5: for external bytes

10472	SW_CAM_ASSIGN_FASTOUT_3			N09	N3
-	Hardware assignment for output of cams 17-24 to NCK I/Os			DWORD	PowerOn
-					
-	-	0	-	-	7/2

Description: The cam signal status can be output to the NCK I/Os as well as to the PLC.

The hardware assignment of the minus and plus cam signals to the digital output bytes of the NCK I/Os used can be made in this machine data for cam pairs 17 - 24.

The assigned output signals can also be inverted with this machine data.

The MD is coded as follows:

Bits 0-7: Number of 1st HW byte used with digital outputs

Bits 8-15: Number of 2nd HW byte used with digital outputs

Bits 16-23: Inversion mask for writing 1st HW byte used

Bits 24-31: Inversion mask for writing 2nd HW byte used

Bit=0: Do not invert

Bit=1: Invert

If both HW bytes are specified, the 1st byte contains the minus cam signals and the 2nd byte the plus cam signals.

If the 2nd byte is not specified (= "0"), then the 8 cams are output as an AND operation of the minus and plus cam signals via the 1st HW byte using the 1st inversion mask.

The status of the non-inverted output signal for linear axes and for rotary axes with "plus cam - minus cam < 180 degrees" is:

"1" between minus and plus cams

"0" outside this range

The status of the non-inverted output signal for rotary axes with "plus cam - minus cam >= 180 degrees" is:

"0" between minus and plus cams

"1" outside this range

The following must be specified as the byte address for the digital outputs:

1: for on-board byte

2 - 5: for external bytes

10473	SW_CAM_ASSIGN_FASTOUT_4		N09	N3
-	Hardware assignment for output of cams 25-32 to NCK I/Os		DWORD	PowerOn
-				
-	- 0	-	-	7/2

Description: The cam signal status can be output to the NCK I/Os as well as to the PLC

The hardware assignment of the minus and plus cam signals to the digital output bytes of the NCK I/Os used can be made in this machine data for cam pairs 25 - 32.

The assigned output signals can also be inverted with this machine data.

The MD is coded as follows:

Bits 0-7: Number of 1st HW byte used with digital outputs

Bits 8-15: Number of 2nd HW byte used with digital outputs

Bits 16-23: Inversion mask for writing 1st HW byte used

Bits 24-31: Inversion mask for writing 2nd HW byte used

Bit=0: Do not invert

Bit=1: Invert

If both HW bytes are specified, the 1st byte contains the minus cam signals and the 2nd byte the plus cam signals.

If the 2nd byte is not specified (= "0"), then the 8 cams are output as an AND operation of the minus and plus cam signals via the 1st HW byte using the 1st inversion mask.

The status of the non-inverted output signal for linear axes and for rotary axes with "plus cam - minus cam < 180 degrees" is:

"1" between minus and plus cams

"0" outside this range

The status of the non-inverted output signal for rotary axes with "plus cam - minus cam >= 180 degrees" is:

"0" between minus and plus cams

"1" outside this range

The following must be specified as the byte address for the digital outputs:

1: for on-board byte

2 - 5: for external bytes

10480	SW_CAM_TIMER_FASTOUT_MASK			N09	N3
-	Mask for output of cam signals via timer interr. to NCU			DWORD	PowerOn
-					
-	-	0	-	-	7/2

Description: A timer-controlled output to the 4 on-board outputs of the NCK I/Os can be selected in this machine data for 4 cam pairs.

In this case, the minus and plus signals of a cam pair are EXCLUSIVE OR'd for output as one signal.

Meaning for set bit:

Associated cam (minus and plus cam signals EXCLUSIVE OR'd) is output via a timer interrupt at one of the 4 on-board outputs of the NCU.

The on-board outputs are assigned in order of increasing machine axis numbers (with assigned cam pairs).

Example:

Machine axis 3 = cam pair 1 --> on-board output 3

Machine axis 1 = cam pair 2 --> on-board output 1

Machine axis 7 = cam pair 3 --> on-board output 4

Machine axis 2 = cam pair 4 --> on-board output 2

If a plurality of cam pairs are set for one machine axis, then this axis is assigned in ascending order of the cam pairs.

Example:

Machine axis 3 = cam pair 1 --> on-board output 2

Machine axis 3 = cam pair 2 --> on-board output 3

Machine axis 7 = cam pair 3 --> on-board output 4

Machine axis 2 = cam pair 4 --> on-board output 1

This function works independently of the assignment set in MD: SW_CAM_ASSIGN_FASTOUT_1 or MD: SW_CAM_ASSIGN_FASTOUT_2.

Note:

The on-board byte must not be used more than once.

If there is more than one signal change in the IPO cycle for the cam pairs specified in the MD, then the cam pair with the lowest number determines the instant of output. The other signal changes take place at the same time.

10485	SW_CAM_MODE			N09	N3
-	Behavior of SW cams			DWORD	PowerOn
-					
-	-	0	-	-	7/2

Description:

Meaning of the individual bits:

Bit 0(LSB) = 0:

If more than 1 signal change per interpolation cycle is due for the cams specified in MD SW_CAM_TIMER_FASTOUT_MASK, the cam having the lowest number will determine the output instant. The other signals change at the same instant. That is, a maximum of one interrupt-controlled output is effected per interpolation cycle.

Bit 0(LSB) = 1:

Each cam specified in MD SW_CAM_TIMER_FASTOUT_MASK will be output precisely at the time of the interpolation cycle. There is no output priority of the cams. A maximum of 8 interrupt-controlled outputs can be performed per interpolation cycle.

Bit 1 = 0:

Inversion of signal behavior from plus cam where plus cam - minus cam >= 180 degr .

Bit 1 = 1:

No inversion of signal behavior from plus cam where plus cam - minus cam >= 180 degr.

Signal behavior on-board output:

Overtravelling:

Minus cam plus cam

Traversing direction:

positive	0->1	1->0
negative	1->0	0->1

Bit 2 = 0:

No path-time cam

Bit 2 = 1:

Path-time cam for cams where minus position = plus position. The lead/delay time applied is independent of:

- velocity of the axis
- position of the axis
- reversal of traversing direction

The cam is only activated on overtravelling of the cam position. A lead/delay time applied to the minus cam is active and leads to a shift of the whole cam.

Bit 3 = 0:

No alignment signal in case of measurement area selection.

Bit 3 = 1:

Output of an alignment signal for measurement area selection (FM only). On-board output 8 is used permanently.

On-board output 8 = 1: Measurement possible (active range enabled)

On-board output 8 = 0: Measurement not possible

Bit 4 = 0:

and following free

10490	SW_CAM_COMP_NCK_JITTER			N09	-
s	Cam jitter compensation			DOUBLE	NEW CONF
-					
-	-	0	0.0	0.0001	7/2

Description: The compensation value reduces system-related time inaccuracies during output of highly precise cam signals. The default time encumbers the cyclic time level of the control and should therefore be selected as short as possible. It is recommended to return a cam signal to a measuring input of the control and to increase the compensation value until the dispersion of the measured positions cannot be reduced any further.

Currently only active for MD10485 Bit0 = 0

10500	DPIO_LOGIC_ADDRESS_IN			N10	-
-	Logical slot address of the PROFIBUS/PROFINET I/Os			DWORD	PowerOn
-					
-	MD_MAXNUM_DPIO_RANGE_IN	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	8191	7/2

Description: Logical slot address of the PROFIBUS/PROFINET I/Os usable by the NCK.

10501	DPIO_RANGE_LENGTH_IN			N10	-
-	Length of the PROFIBUS/PROFINET I/O range			DWORD	PowerOn
-					
-	MD_MAXNUM_DPIO_RANGE_IN	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	MD_MAXNUM_DPIO_BYTES_RANGE_IN	7/2

Description: Length of the PROFIBUS/PROFINET I/O range consistently usable for the NCK. This range must be defined in STEP 7, hardware configuration.

0: only the first data slot is used.

x: length of the consistent PROFIBUS/PROFINET I/O range

Note: in PROFINET it is not possible to combine several slots in one area.

10502	DPIO_RANGE_ATTRIBUTE_IN			N10	-
-	Attributes of the PROFIBUS/PROFINET I/Os			DWORD	PowerOn
-					
-	MD_MAXNUM_DPIO_RANGE_IN	0x01,0x01,0x01,0x01,0x01,0x01,0x01...	0x00	0x0F	7/2

Description: Attributes of the PROFIBUS/PROFINET I/Os

Bit 0: Little/Big Endian format of the system variable $A_DPx_IN[n,m]

0: Little Endian format

1: Big Endian format

Bit 1: (reserved)

Bit 2: Read input data

0: Read possible through system variable and CC binding (increased performance requirements)

1: Read only possible for CC binding (low performance requirements)

Bit 3: Slot sign-of-life alarm

0: Slot sign-of-life alarms are output

1: Slot sign-of-life alarms are suppressed

10510	DPIO_LOGIC_ADDRESS_OUT			N10	-
-	Logical slot address of the PROFIBUS/PROFINET I/Os			DWORD	PowerOn
-					
-	MD_MAXNUM_DPIO_RANGE_OUT	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	8191	7/2

Description: Logical slot address of the PROFIBUS/PROFINET I/Os usable by the NCK.

10511	DPIO_RANGE_LENGTH_OUT			N10	-
-	Length of the PROFIBUS I/O range			DWORD	PowerOn
-					
-	MD_MAXNUM_DPIO_RANGE_OUT	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	MD_MAXNUM_DPIO_BYTES_RANGE_OUT	7/2

Description: Length of the PROFIBUS I/O range consistently usable for the NCK. This range must be defined in STEP 7, hardware configuration.

0: only the first data slot is used.

x: length of the consistent PROFIBUS I/O range

Note: in PROFINET it is not possible to combine several slots in one area.

10512	DPIO_RANGE_ATTRIBUTE_OUT			N10	-
-	Attributes of the PROFIBUS/PROFINET I/Os			DWORD	PowerOn
-					
-	MD_MAXNUM_DPIO_RANGE_OUT	0x01,0x01,0x01,0x01,0x01,0x01,0x01...	0x00	0x0F	7/2

Description:

```
Attributes of the PROFIBUS/PROFINET I/Os
  Bit 0: Little/Big Endian format of system variable
$A_DPx_OUT[n,m]
         0: Little Endian format
         1: Big Endian format
  Bit 1: Write output data
         0: Write only through system variable
         1: Write only through CC binding
  Bit 2: (reserved)
  Bit 3: Slot sign-of-life alarm
         0: Slot sign-of-life alarms are output
         1: Slot sign-of-life alarms are suppressed
```

10530	COMPAR_ASSIGN_ANA_INPUT_1			N10	A4
-	Hardware assignment of analog inputs for comparator byte 1			BYTE	PowerOn
-					
-	8	0,0,0,0,0,0,0,0	-	-	7/2

Description:

This MD assigns analog inputs 1 to 8 to a bit number of comparator byte 1. This input bit of the comparator is set to "1" if the comparison between the applied analog value and the associated threshold value (MD 41600: COMPAR_THRESHOLD_1 fulfills the condition parameterized in (MD 10540: COMPAR_TYPE_1).

An analog input can be assigned to a plurality of comparator input bits.

The following generally applies to comparator byte 1:

```
   COMPAR_ASSIGN_ANA_INPUT_1 [b] = n
   with index:  b = number of comparator input bit (0 to 7)
                n = number of analog input (1 to 8)
```

Example:

```
           COMPAR_ASSIGN_ANA_INPUT_1[0] = 1
           COMPAR_ASSIGN_ANA_INPUT_1[1] = 2
           COMPAR_ASSIGN_ANA_INPUT_1[2] = 1
           COMPAR_ASSIGN_ANA_INPUT_1[3] = 3
           COMPAR_ASSIGN_ANA_INPUT_1[4] = 3
           COMPAR_ASSIGN_ANA_INPUT_1[5] = 1
           COMPAR_ASSIGN_ANA_INPUT_1[6] = 1
           COMPAR_ASSIGN_ANA_INPUT_1[7] = 1
```

Analog input 1 affects input bits 0, 2 , 5, 6 and 7 of comparator byte 1

Analog input 2 affects input bit 1 of comparator byte 1

Analog input 3 affects input bits 3 and 4 of comparator byte 1

Related to:

MD 10540: COMPAR_TYPE_1

MD 10541: COMPAR_TYPE_2

10531	COMPAR_ASSIGN_ANA_INPUT_2			N10	A4
-	Hardware assignment of analog inputs for comparator byte 2			BYTE	PowerOn
-					
-	8	0,0,0,0,0,0,0,0	-	-	7/2

Description: This MD assigns analog inputs 1 to 8 to a bit number of comparator byte 2. This input bit of the comparator is set to "1" if the comparison between the applied analog value and the associated threshold value (MD 41601: COMPAR_THRESHOLD_2 fulfills the condition parameterized in (MD 10541: COMPAR_TYPE_2).

An analog input can be assigned to a plurality of comparator input bits.

The following generally applies to comparator byte 2:

```
COMPAR_ASSIGN_ANA_INPUT_2 [b] = n
with index:b = number of comparator input bit (0 to 7)
           n = number of analog input (1 to 8)
```

Example:

```
COMPAR_ASSIGN_ANA_INPUT_2[0] = 1
COMPAR_ASSIGN_ANA_INPUT_2[1] = 2
COMPAR_ASSIGN_ANA_INPUT_2[2] = 1
COMPAR_ASSIGN_ANA_INPUT_2[3] = 3
COMPAR_ASSIGN_ANA_INPUT_2[4] = 3
COMPAR_ASSIGN_ANA_INPUT_2[5] = 1
COMPAR_ASSIGN_ANA_INPUT_2[6] = 1
COMPAR_ASSIGN_ANA_INPUT_2[7] = 1
```

Analog input 1 affects input bits 0, 2 , 5, 6 and 7 of comparator byte 2

Analog input 2 affects input bit 1 of comparator byte 2

Analog input 3 affects input bits 3 and 4 of comparator byte 2

Related to:

MD 10540: COMPAR_TYPE_1

MD 10541: COMPAR_TYPE_2

10540	COMPAR_TYPE_1			N10	A4
-	Parameterization for comparator byte 1			DWORD	PowerOn
-					
-	-	0	-	-	7/2

Description: This MD can be used to make the following settings for the individual output bits (0 to 7) of comparator byte 1:

- Bits 0 to 7: Comparison type mask (for comparator output bits 0 to 7)
  Bit = 1: output bit = 1 if analog value >= threshold value
  Bit = 0: output bit = 1 if analog value < threshold value
  (Threshold value defined by MD 41600: COMPAR_THRESHOLD_1)
- Bits 8 to 15: Not used (defined to be set to 0)
- Bits 16 to 23: Assignment of a HW output byte for outputting
  the comparator states (statement of the byte address)
  Byte = 0: No output via digital NCK outputs
  Byte = 1: Output via digital onboard NCK outputs (1 to 4)
  Byte = 2: Output via external digital NCK outputs 9 to 16
  Byte = 3: Output via external digital NCK outputs 17 to 24
  Byte = 4: Output via external digital NCK outputs 25 to 32
  Byte = 5: Output via external digital NCK outputs 33 to 40
- Bits 24 to 31: Inversion mask for the output of the comparator states (bits 0 to 7)
  Bit = 0: Output bit is not inverted
  Bit = 1: Output bit is inverted

Related to:

MD 10530: COMPAR_ASSIGN_ANA_INPUT_1
MD 10531: COMPAR_ASSIGN_ANA_INPUT_2
MD 41600: COMPAR_THRESHOLD_1
MD 41601: COMPAR_THRESHOLD_2
MD 10360: FASTIO_DIG_NUM_OUTPUTS

10541	COMPAR_TYPE_2			N10	A4
-	Parameterization of comparator byte 2			DWORD	PowerOn
-					
-	-	0	-	-	7/2

Description: This MD can be used to make the following settings for the individual output bits (0 to 7) of comparator byte 2:

- Bits 0 to 7: Comparison type mask (for comparator output bits 0 to 7)
  Bit = 1: output bit = 1 if analog value >= threshold value
  Bit = 0: output bit = 1 if analog value < threshold value
  (Threshold value defined by MD 41601: COMPAR_THRESHOLD_2)
- Bits 8 to 15: not used (defined to be set to 0)
- Bits 16 to 23: Assignment of a HW output byte for outputting the comparator states (statement of the byte address)
- Byte = 0: no output via digital NCK outputs
  Byte = 1: output via digital onboard NCK outputs (1 to 4)
  Byte = 2: output via external digital NCK outputs 9 to 16
  Byte = 3: output via external digital NCK outputs 17 to 24
  Byte = 4: output via external digital NCK outputs 25 to 32
  Byte = 5: output via external digital NCK outputs 33 to 40
- Bits 24 to 31: Inversion mask for the output of the comparator states (bits 0 to 7)
  Bit = 0: Output bit is not inverted
  Bit = 1: Output bit is inverted

Related to:

MD 10530: COMPAR_ASSIGN_ANA_INPUT_1
MD 10531: COMPAR_ASSIGN_ANA_INPUT_2
MD 41600: COMPAR_THRESHOLD_1
MD 41601: COMPAR_THRESHOLD_2
MD 10360: FASTIO_DIG_NUM_OUTPUTS

10600	FRAME_ANGLE_INPUT_MODE			EXP, N01, N09	K2
-	Sequence of rotation in FRAME			BYTE	PowerOn
-					
-	-	1	1	2	7/2

Description: FRAME_ANGLE_INPUT_MODE sets how the rotations (ROT and AROT) around the three geometry axes are defined if more than one rotation is programmed in a block. The order in which these rotations are programmed within the block is irrelevant.

The rotations can be set to be calculated according to:

- Euler angle with FRAME_ANGLE_INPUT_MODE = 2

  The rotations are calculated according to the Euler angle in the following order:

  1. Rotation around Z
  2. Rotation around X
  3. Rotation around Y

- RPY with FRAME_ANGLE_INPUT_MODE = 1

  The rotations are calculated according to the Euler angle in the following order:

  1. Rotation around Z
  2. Rotation around Y
  3. Rotation around X

10602	FRAME_GEOAX_CHANGE_MODE			EXP, N01, N09	K2
-	Frames when changing geometry axes			BYTE	PowerOn
-					
-	-	0	0	5	7/2

Description: Geometry axes can be switched over in the following states:

- Selection and deselection of transformations
- Switchable geometry axes GEOAX()

The current total frame is then defined as follows:

0: The current total frame is canceled.

1: The current total frame is recalculated when geometry axes are switched over. Translations, scaling and mirroring for the new geometry axes become active. The rotations of the old geometry axes still apply.

2: The current total frame is recalculated when geometry axes are switched over. Translations, scaling and mirroring for the new geometry axes become active. If rotations were active before switching over to the current base frames, current settable frame or programmable frame, switchover is aborted with an alarm.

3: The current total frame is deleted when selecting and deselecting transformations.When the GEOAX() command is entered, the frame is recalculated and transaction, scaling and mirroring for the new geometry axes become active. The rotations of the old geometry axes still apply.

10604	WALIM_GEOAX_CHANGE_MODE		EXP, N01, N09	A3
-	Working area limitation by changing geometry axes		BYTE	PowerOn
-				
-	- 0	0	1	7/2

Description: This machine data specifies whether a potentially active working area limitation will remain active after geo axis replacement, or whether it will be deactivated.

Meaning of the MD values:

= 0 Working area limitation will be deactivated when replacing geo axis.

= 1 Working area limitation will remain activated when replacing geo axis.

10610	MIRROR_REF_AX		EXP, N01, N09	K2
-	Reference axis for mirroring		BYTE	PowerOn
-				
-	- 0	0	3	7/2

Description:

```
0: Mirroring always takes place in the stated axis, without scal-
ing.
The mirroring of a geometry axis can always be related to a
defined
reference axis.
1: x is the reference axis
   Mirroring of the x axis is unique.
   Mirroring of the y axis  is mapped on:
    a mirroring of the x axis and
    a rotation of the z axis through 180 degrees.
   Mirroring of the z axis is mapped on:
    a mirroring of the x axis and
    a rotation of the x axis through 180 degrees and
    a rotation of the z axis through 180 degrees
2: y is the reference axis
   Mirroring of the x axis is mapped on:
     a mirroring of the y axis and
     a rotation of the z axis through 180 degrees.
   Mirroring of the y axis is unique.
   Mirroring of the z axis  is mapped on:
     a mirroring of the y axis and
     a rotation of the x axis through 180 degrees
3: z is the reference axis
   Mirroring of the x axis is mapped on:
     a mirroring of the z axis and
     a rotation of the z axis through 180 degrees and
     a rotation of the x axis through 180 degrees
   Mirroring of the y axis is mapped on:
     a mirroring of the z axis and
     a rotation of the x axis through 180 degrees.
   Mirroring of the z axis is unique.
```

10612	MIRROR_TOGGLE			EXP, N01, N09	K2
-	Mirror toggle			BYTE	PowerOn
-					
-	-	1	0	1	7/2

Description: Mirror toggle function.

1: Programmed axis values are not evaluated. Toggle switching behavior.

0: Programmed axis values are evaluated.

The axes are mirrored in the case of values not equal to 0 if they are not already mirrored. Mirroring is disabled if the value is 0.

10613	NCBFRAME_RESET_MASK			EXP	K2
-	Active NCU global base frames after reset			DWORD	Reset
-					
-	-	0xFFFF	0	0xFFFF	7/2

Description: Bit mask for the reset setting of the NCU global base frames which are included in the channel.

The following applies:

In the case of $MC_RESET_MODE_MASK bit0 = 1 and bit14 = 1

The entire base frame on reset is created from the linking of the NCU global base frame field elements whose bit in the bit mask is 1.

In the case of $MC_RESET_MODE_MASK bit0 = 1 and bit14 = 0

The entire base frame is deselected on reset.

10615	NCBFRAME_POWERON_MASK			EXP, N12	K2
-	Reset global base frames after power on			DWORD	PowerOn
-					
-	-	0	0	0xFFFF	7/2

Description: This machine data defines whether global base frames are reset in the data management on Power On.

That is

- Offsets are set to 0,
- Scalings are set to 1.
- Mirroring is disabled.

The individual base frames can be selected separately.

Bit 0 means base frame 0, bit 1 base frame 1 etc.

Value=0: Base frame is retained on Power On

Value=1: Base frame is reset in the data management on Power On.

Related to:

$MC_CHBFRAME_POWERON_MASK

10617	FRAME_SAVE_MASK			EXP	K1,PGA
-	Behavior of frames in SAVE subroutines			DWORD	PowerOn
-					
-	-	0	0	0x3	7/2

Description: This machine data is used to define which frames are restored with SAVE attribute at return from a subprogram.

Bit 0: Settable frames G54 through G599

Value = 0:

If the same G code is active at subprogram return and subprogram call, the active settable frame is maintained. If not, the settable frame is reactivated when the subprogram is called.

Value = 1:

At subprogram return, the settable frame is reactivated when the subprogram is called.

Bit 1: Basic frame

Value = 0:

The active basic frame is not changed at subprogram return. This is also the case, if a basic frame change is carried out in the subprogram by an operation or by an implicit frame deselection (possibly through TRAFOOF).

Value = 1:

At subprogram return, the basic frame is reactivated when the subprogram is called.

10618	PROTAREA_GEOAX_CHANGE_MODE			EXP, N01, N09	A3
-	Protection range on change of geometry axes			BYTE	PowerOn
-					
-	-	0	0	3	7/2

Description: This machine data is used to define whether any active protection zones will remain active after a transformation change or geo axis replacement, or whether they will be deactivated.

The machine data is bit-coded with the following meanings:

Bit 0 = 0

Protection zones deactivated on transformation change.

Bit 0 = 1

Active protection zones remain active after transformation change.

Bit 1 = 0

Protection zones deactivated on geo axis replacement.

Bit 1 = 1

Active protection zones remain active after geo axis replacement.

10619	COLLISION_TOLERANCE			EXP	-
mm	Tolerance for collision check			DOUBLE	NEW CONF
-					
-	-	1	0.001	1000.0	7/3

Description: This parameter is used to set the required collision check accuracy. This means: If the distance between two protection zones is smaller than this value, a collision of those two protection zones may be signalled. But: Two protection zones that overlap by less than this value cannot be classified as colliding.

10620	EULER_ANGLE_NAME_TAB			N01, N09	F2
-	Name of Euler angle			STRING	PowerOn
-					
-	3	"A2","B2","C2"	-	-	7/2

Description:

- The name entered must not conflict with the designation and assignment of machine and geometry axis names.
- The name entered must not conflict with channel axis names in the channel (MD 20080: AXCONF_CHANAX_NAME_TAB), names for directional vectors (MD 10640: DIR_VECTOR_NAME_TAB), names for intermediate point coordinates for CIP (MD 10660: INTERMEDIATE_POINT_NAME_TAB) or the names for interpolation parameters (MD 10650: IPO_PARAM_NAME_TAB).
- The name entered must not contain the following reserved address letters:

- D Tool offset (D function)
- E Reserved
- F Feedrate (F function)
- G Preparatory function
- H Auxiliary function (H function)
- L Subprogram call
- M Special function (M function)
- N Subblock
- P Number of subroutine repetitions
- R Arithmetic parameter
- S Spindle speed (S function)
- T Tool (T function)

- Nor are keywords (e.g. DEF, SPOS etc.) and predefined identifiers (e.g. ASPLINE, SOFT) allowed.
- An angle identifier consists of a valid address letter (A, B, C, I, J, K, Q, U, V, W, X, Y, Z), followed by an optional numerical extension (1-99).

10624	ORIPATH_LIFT_VECTOR_TAB			N01, N09	-
-	Name of retraction vector for path-relative orientation.			STRING	PowerOn
-					
-	3	"A8","B8","C8"	-	-	7/2

Description: List of identifiers for components of the retraction vector during reorientations for path relative interpolation of the tool orientation.

The rules for axis identifiers as described in $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers. The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, normal vectors, direction vectors, conical interpolation vectors, interpolation parameters, intermediate point coordinates).

10626	ORIPATH_LIFT_FACTOR_NAME			N01, N09	-
-	Name of relative safety clearance with ORIPATH			STRING	PowerOn
-					
-	-	"ORIPLF"	-	-	7/2

Description: Identifier for relative factor for determining a safety clearance for the retracting movement during reorientations for path relative interpolation of the tool orientation.

The rules for axis identifiers as described in $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers. The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, normal vectors, direction vectors, conical interpolation vectors, interpolation parameters, intermediate point coordinates).

10630	NORMAL_VECTOR_NAME_TAB			N01, N09	F2
-	Name of normal vectors			STRING	PowerOn
-					
-	6	"A4","B4","C4","A5","B5","C5"	-	-	7/2

Description: Normal vector programming from software version 3.2

List of identifiers for the normal vector components at the beginning and end of the block.

The rules for axis identifiers described in $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers.

The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, direction vectors, interpolation parameters, intermediate point coordinates).

10640	DIR_VECTOR_NAME_TAB			N01, N09	F2
-	Name of direction vectors			STRING	PowerOn
-					
-	6	"A3","B3","C3","AN3","BN3","CN3"	-	-	7/2

Description: List of identifiers for the direction vector components. (A3 to C3)

List of identifiers for the vector components perpendicular to the direction vector (AN3 to CN3)

The rules for axis identifiers described in $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers.

The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, interpolation parameters, intermediate point coordinates).

10642	ROT_VECTOR_NAME_TAB		N01, N09	F2
-	Name of rotation vectors		STRING	PowerOn
-				
-	3 "A6","B6","C6"	-	-	7/2

Description: List of identifiers for the rotation vector components in taper direction

The rules for axis identifiers as described in $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers.

The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, interpolation parameters, intermediate point coordinates).

10644	INTER_VECTOR_NAME_TAB		N01, N09	F2
-	Name of intermediate vector components		STRING	PowerOn
-				
-	3 "A7","B7","C7"	-	-	7/2

Description: List of identifiers for the intermediate vector components

The rules for axis identifiers described in $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers.

The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, interpolation parameters, intermediate point coordinates).

10646	ORIENTATION_NAME_TAB		N01, N09	F2
-	Identifiers for programming a second orientation path		STRING	PowerOn
-				
-	3 "XH","YH","ZH"	-	-	7/2

Description: List of identifiers for programming of the 2nd space curve for tool orientation

The rules for axis identifiers as described in $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers.

The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, interpolation parameters, intermediate point coordinates).

10648	NUTATION_ANGLE_NAME		N01, N09	F2
-	Name of aperture angle		STRING	PowerOn
-				
-	- "NUT"	-	-	7/2

Description: Identifier for the opening angle for orientation interpolation

The rules for axis identifiers as described in $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers.

The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates).

10650	IPO_PARAM_NAME_TAB		EXP, N01	K2
-	Name of interpolation parameters		STRING	PowerOn
-				
-	3 "I","J","K"	-	-	7/2

Description: List of identifiers for the interpolation parameters

The rules for axis identifiers described in $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers.

The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates).

Related to:

INTERMEDIATE_POINT_NAME_TAB

References: /PA/, Programming Guide: Fundamentals

10652	CONTOUR_DEF_ANGLE_NAME		EXP, N01, N12	FBFA
-	Name of angle for contour definitions		STRING	PowerOn
-				
-	- "ANG"	-	-	0/0

Description: Identifier for contour angle

The identifier must be selected so that no conflict arises with other identifiers (e.g. axes, Euler angles, normal vectors, direction vectors, interpolation point coordinates).

10654	RADIUS_NAME		EXP, N01, N12	FBFA
-	Name of radius for contour definitions		STRING	PowerOn
-				
-	- "RND"	-	-	0/0

Description: Identifier for contour radius

The identifier must be selected so that no conflict arises with other identifiers (e.g. axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates).

10656	CHAMFER_NAME		EXP, N01, N12	FBFA
-	Name of chamfer for contour definitions		STRING	PowerOn
-				
-	- "CHR"	-	-	0/0

Description: Identifier for contour chamfer

The identifier must be selected so that no conflict arises with other identifiers (e.g. axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates).

10660	INTERMEDIATE_POINT_NAME_TAB		EXP, N01	K2
-	Name of interpolation point coordinates for G2/G3		STRING	PowerOn
-				
-	3 "I1","J1","K1"	-	-	7/2

Description: List of identifiers for the intermediate point coordinates

The rules for axis identifiers described in $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers. The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates).

Related to: IPO_PARAM_NAME_TAB

References: /PA/, Programming Guide: Fundamentals

10670	STAT_NAME			N01, N09	F2
-	Name of state information			STRING	PowerOn
-					
-	-	"STAT"	-	-	7/2

Description: Identifier for position information for solving ambiguities in Cartesian PTP travel.

An identifier must be chosen that does not conflict with other identifiers (e.g. axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates).

10672	TU_NAME			N01, N09	F2
-	Name of state information of axes			STRING	PowerOn
-					
-	-	"TU"	-	-	7/2

Description: Identifier for position information of axes for solving ambiguities in

Cartesian PTP travel.

An identifier must be chosen that does not conflict with other identifiers (e.g. axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates).

10674	PO_WITHOUT_POLY			N01	F2
-	Polynomial programming programmable without G function POLY			BOOLEAN	PowerOn
-					
-	-	FALSE	-	-	7/2

Description: Until now, the G function POLY has always had to be active during polynomial programming

with PO[xx] = (xx), otherwise an alarm was output.

If machine data PO_WITHOUT_POLY is set to TRUE, no alarm is output with POLY inactive during polynomial programming. The end point of the polynomial is then approached with the linear interpolation G1.

There is no polynomial interpolation if POLY is inactive.

10680	MIN_CONTOUR_SAMPLING_TIME			N01, N11, EXP	-
s	Minimum contour sampling time			DOUBLE	Reset
-					
-	-	0.008	-	-	0/0
710-6a2c	-	0.004	-	-	-/-
710-31a10c	-	0.004	-	-	-/-
720-6a2c	-	0.002	-	-	-/-
720-31a10c	-	0.002	-	-	-/-
730-6a2c	-	0.0005	-	-	-/-
730-31a10c	-	0.0005	-	-	-/-
840disl-6a	-	0.002	-	-	-/-
840disl-20a	-	0.002	-	-	-/-

Description: Min. possible contour sampling time in seconds. This MD is used to limit the value that can be entered with MD $MC_CONTOUR_SAMPLING_FACTOR,

independently of the current interpolation cycle of the control.

10682	CONTOUR_SAMPLING_FACTOR		N01, N11, EXP	-
-	Contour sampling factor		DOUBLE	Reset
-				
-	- 1.0	-	-	1/1

Description: This factor defines the maximum time interval with which a curved contour is sampled in the interpolator.

The maximum sampling time results from the set interpolation cycle (see MD $MN_IPO_CYCLE_TIME) and the

factor set with this data and the tolerance set with MD $MA_COMPRESS_POS_TOL[] for

the geometry axes.

The minimum sampling time cannot be shorter than the

time set with MD $MN_MIN_CONTOUR_SAMPLING_TIME.

10700	PREPROCESSING_LEVEL		N01, N02	V2
-	Program preprocessing level		BYTE	PowerOn
-				
-	- 1	-	-	2/2

Description: Bit 0= 0:

No preprocessing

Bit 0= 1:

The call description of the cycles is formed during control power on. All the programs in the directories _N_CUS_DIR, _N_CMA_DIR and _N_CST_DIR can be called in the part program without EXTERNAL declaration. If the parameter interface of a cycle is changed in the control, then this change does not become active until after Power On.

Bit 1=1:

During control power on, all cycles in the directories _N_CUS_DIR, _N_CMA_DIR and _N_CST_DIR are preprocessed to form a process-optimizing compilation. These cycles are then processed more quickly. Changes to the cycle programs do not become active until after the next Power On.

Bit 2=1:

During control power on, the Siemens cycles in the directory _N_CST_DIR are preprocessed to form a process-optimizing compilation (from SW 3.5).

Bit 3=1:

During control power on, the user cycles in the directory _N_CUS_DIR are preprocessed to form a process-optimizing compilation (from SW 3.5).

Bit 4=1:

Preprocessing the user cycles in the directory _N_CMA_DIR

Bit 5=1:

All files marked with PREPRO in the PROG statement line are preprocessed (from SW 6.4)

Bit 5=0:

During control power on, all cycles in the directories activated by bits 1 to 4 are preprocessed. This also applies to programs that are not marked with PREPRO.

Bit 6=1:

The compilation is stored in SRAM if there is inadequate space in DRAM (from SW 7.1).

Memory space is required for preprocessing cycles. Better utilization of memory can be achieved by selective setting of the preprocessing:

The runtime-critical cycles are brought together in one directory. The remaining cycles are in the other directory.

References:

/PG/, "Programming Guide Fundamentals" (EXTERNAL declaration)

10702	IGNORE_SINGLEBLOCK_MASK			N01	K1
-	Prevents stopping at specific blocks in single block mode			DWORD	PowerOn
-					
-	-	0	0	0xFFFF	7/2

Description: This machine data prevents stopping at certain blocks with single block.

Single block stop can be prevented with the following bits of the mask:

Bit0 = 1

Means that there is no stop in any internal ASUB block. Exception: the single block stop has been explicitly activated by the SBLON command.

There are three different internal ASUBs that are triggered by different events.

- Repos: In the case of the events: change of operating mode to a manual mode (JOG, JOGREF,...) unless MODESWITCH_MASK is not set, switch skip block on and off, activate machine data, switch-on overstore, axis replacement, subroutine level abort, switch-on single block, switch dry run feedrate on and off, alarm with compensation block.

- Return: Delete distance-to-go, switchover after TEACH-IN, or deselection of MDI with corrsponding MODESWITCH_MASK.

- _N_PROG_EVENT_SPF: Parameterizing MD 20108 $MC_PROG_EVENT_MASK parameterizes the events whereby _N_PROG_EVENT_SPF is executed.

Bit1 = 1

Means that there is no stop in any user ASUB block. Exception: The single block stop has been explicitly activated via the SBLON command.

User ASUBs are linked to an interrupt channel by the part program command SETINT or via the PI- _N_ASUP__. The interrupt channel is then activated via PLC or the high-speed inputs, and the user ASUBs are retracted.

This disables machine data IGNORE_SINGLEBLOCK_ASUP. The NCK behavior corresponds to the machine data assignment IGNORE_SINGLEBLOCK_ASUP= FFFFFFFF.

Bit2 = 1

Means that there is no stop in any intermediate block. Intermediate blocks are generated at, among other events, tool change, ADIS and complicated geometry.

Bit3 = 1

Means that there is no stop in the block search pickup block. The block search pickup block is the 1st block that is loaded into the main run at the start after search target has been found in the program.

Bit4 = 1

Means that there is no stop in the INIT blocks. INIT blocks are generated from reset immediately after a part program start.

Bit5 = 1

Means that there is no stop in any subprogram block with the parameter DISPLOF.

Bit6 = 1

Means that there is no stop in any block in which the NCK cannot reorganize.

Reorganize is an internal procedure that is needed for mode change after JOG/JOGREF..., switch skip block on and off, activate machine data, axis replacement, switch on overstore, switch on single block, switch dry run feedrate on and off, subroutine level abort, user ASUBs delete distance-to-go, switchover after TEACH-IN. Reorganize is never needed in Reset state.

Example blocks in which reorganize is impossible:

- Tool change
- 1st block after the Repos procedure
- Block after an ASUB from JOG/aborted

Bit7 = 1

Means that there cannot be a stop in any block in which repositioning is impossible.

Reposition is an internal procedure that is needed for mode change after JOG/JOGREF..., switch skip block on and off, activate machine data, axis replacement, switch on overstore, switch on single block, switch dry run feedrate on and off, subroutine level abort and possibly user ASUBs. Reposition is never needed in Reset state.

Example blocks in which reposition is impossible:

- G33 + blocks in which reorganize is impossible.

Bit8 = 1

Means that there is no stop in a residual block that does not contain traversing information.

Bit9 = 1

Means that there is no stop in a run in/main run synchronization block (e.g.STOPRE, $Variable) that is repeated because of an interruption with Reorg (e.g. mode change).

Bit10= 1

Means that there is no stop in a "tool selection block". "Tool selection block" only occurs with tool management (magazine management or TMMG) active. This block gives the corresponding tool change command to the PLC.

This block is generally generated by T programming from the part program.

Example block "N1010 T="Drill" M6 D1"

Depending on machine data, the "tool selection block" can be held in the interpolator until the PLC has acknowledged the corresponding tool change (see $MC_TOOL_MANAGEMENT_MASK). However the program status remains in "run".

Bit11= 1

The control has to automatically generate implicit GET blocks for the axis replacement function (axis replacement: 2 or more channels control one axis alternately) if no explicit GET(D) has been programmed and the following block wants to traverse the axis. (The other channel had previously used this axis).

An explicitly programmed GET may appear as follows "getd(x1,y1,z1) oder get(x1,y1,z1)".

There is no stop at explicit or implicit GET blocks in the single block with this bit 11.

Bit12= 1

There is no stop in the single block type 2 in the SBLON block.

Bit13= 1

If an axis is pulled out in the middle of a block and possibly assigned to another channel, then there is no stop at the PREMATURE end of this block. This block follows a REPOSA in order to traverse it to the end, there is no stop until this end has been reached.

Bit14=1

In a part program line, in which a substitution subroutine is called due to NC language replacement, only one stop is performed under the condition that the subroutine includes PROC attribute SBLOF. It is not important, whether the subroutine is called at block start and/or end or whether it is exited with M17 or with RET.

Related to:

IGNORE_SINGLEBLOCK_ASUP

10704	DRYRUN_MASK			N01	V1
-	Dry run feedrate activation			BYTE	PowerOn
-					
-	-	0	0	2	7/2

Description: DRYRUN_MASK == 0

Dryrun can only be switched on or off at the end of the block.

When DRYRUN_MASK = 1 is set, the dry run feedrate can also be activated during program execution (in the part program block).

NOTICE!

After activating dry run feedrate, the axes are stopped for the duration of the reorganization process.

DRYRUN_MASK == 2

Dryrun can be switched on or off in every phase and the axes are not stopped.

NOTICE:

However, the function does not become active until a "later" block in the program execution and this is with the next (implicit) StopRe block.

Related to:

SD 42100: DRY_RUN_FEED

10706	SLASH_MASK		N01	PG,A2
-	Activation of block skip		BYTE	PowerOn
-				
-	- 0	0	2	7/2

Description: If SLASH_MASK = 0, skip block can only be activated when stopped at the end of the block

If SLASH_MASK = 1, skip block can also be activated during program execution.

NOTICE!

After activating skip block, the axes are stopped for the duration of the reorganization process.

If SLASH_MASK = 2 ,skip block can be activated in every phase.

Notice!

However, the function does not become active until a "later" block in the program execution, and this is with the next (implicit) StopRe block.

10707	PROG_TEST_MASK		N01	K1
-	Program test mode		DWORD	PowerOn
-				
-	- 1	0	1	7/2

Description: Bit-coded mask for program test

Bit 0 == 1 Program test cannot be deselected in 'Stopped' program status.

Bits 1..31 Still unused.

10708	SERUPRO_MASK		N01	K1
-	Seach run modes		DWORD	PowerOn
-				
-	- 0	0	15	7/2

Description: Bit-coded mask for block search via program test (abbr. SERUPRO).

SERUPRO block search is activated by the PI service _N_FINDBL mode paramter == 5.

SERUPRO means SEarchRUn by PROgram test, that is proceed under program test from start of program to search target. Note: Program test does not move any axis.

Bit 0 == 0

There is a stop at M0 during the search phase

Bit 0 == 1

There is no stop at M0 during the search phase

Bit 1 == 0

Alarm 16942 aborts the search phase upon the part programm command START.

Bit 1 == 1

Alarm 16942 is switched off.

NOTICE:

A start program command may really start the other channel!

Bit 2 == 0

Switches the function "Group Serupro" off

Bit 2 == 1

Switches the function "Group Serupro" on.

"Group-Serupro" enables a search routine in which the start part program command is changed into a search routine for the other channel.

Bit 3 == 0

Compels all channels that have started Serupro to end Serupro simultaneously unless they are aborted via Reset or the channel reaches M30 without finding the search taget. In other words, all channels that find the search target (including self-acting Serupro) terminate SERUPRO simultaneously.

Bit 3 == 1

Switches this function off

Bits 4 .. 31

Still unused.

10709	PROG_SD_POWERON_INIT_TAB			EXP, N01	K1
-	Setting data to be initialized			DWORD	PowerOn
-					
-	30	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-	-	7/2

Description: Setting data to be initialized:

The values of the programmable SD indicated in this MD are set to their initial values on control power up.

10710	PROG_SD_RESET_SAVE_TAB			EXP, N01	K1
-	Setting data to be updated			DWORD	PowerOn
-					
-	30	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-	-	7/2

Description: Setting data to be backed up

The values of the SDs listed in this table are stored in non-volatile memory, i.e. remain valid after power ON. The setting data whose HMI numbers were entered in the backup list are written into the (buffered) active file system after the description of the part program on RESET.

Programmable setting data are:

```
                                                  (GCODE)
SD 42000   $SC_THREAD_START_ANGLE                 SF
SD 42010:  $SC_THREAD_RAMP_DISP                   DITS/DITE
SD 42400   $SC_PUNCH_DWELLTIME                    PDELAYON
SD 42800   $SC_SPIND_ASSIGN_TAB                   SETMS
SD 43200:  $SA_SPIND_S                            S at
G94,G95,G97,G971,G972
SD 43202:  $SA_SPIND_CONSTCUT_S                   S bei
G96,G961,G962
```

SD 43210	$SA_SPIND_MIN_VELO_G25	G25S
SD 43220	$SA_SPIND_MAX_VELO_G26	G26 S
SD 43230	$SA_SPIND_MAX_VELO_LIMS	LIMS
SD 43300	$SA_ASSIGN_FEED_PER_REV_SOURCE	FPRAON
SD 43420	$SA_WORKAREA_LIMIT_PLUS	WALIMOF
SD 43430	$SA_WORKAREA_LIMIT_MINUS	WALIMON
SD 43700	$SA_OSCILL_REVERSE_POS1	OSP1
SD 43710	$SA_OSCILL_REVERSE_POS2	OSP2
SD 43720	$SA_OSCILL_DWELL_TIME1	OST1
SD 43730	$SA_OSCILL_DWELL_TIME2	OST2
SD 43740	$SA_OSCILL_VELO	FA
SD 43750	$SA_OSCILL_NUM_SPARK_CYCLES	OSNSC
SD 43760	$SA_OSCILL_END_POS	OSE
SD 43770	$SA_OSCILL_CTRL_MASK	OSCTRL
SD 43780	$SA_OSCILL_IS_ACTIVE	OS

The values of SD 43420: WORKAREA_LIMIT_PLUS (working area limitation plus) and SD 43430: WORKAREA_LIMIT_MINUS (working area limitation minus) are to be stored in the buffered RAM after every RESET, M02, M30 or M17.

--> PROG_SD_RESET_SAVE_TAB[0] = 43420

--> PROG_SD_RESET_SAVE_TAB[1] = 43430

See also: 'REDEF: change attributes of NC language elements', setting data/PRLOC

10711	NC_LANGUAGE_CONFIGURATION		EXP, N01	-
-	NC language commands of inactive options / functions		DWORD	PowerOn
-				
-	- 0	0	4	0/0

Description: Manner of handling language commands whose associated option or function has not been activated.

All programmable commands in an NC program or cycle program are language commands. Detailed information is available in the description of the language command STRINGIS.

ValueMeaning

0: All language commands are known - especially those whose function has not been activated. That means that all language commands are programmable. Whether the required function is active is not detected until execution. If not, then a specific alarm is generated.

Option approved / not approved (for functions without options "Option approved" applies implicitly):

1: All language commands are known. Language commands with options that have not been approved, are recognized at the beginning of the program interpretation and rejected with alarm 12553 "Option/function inactive".

Example:

If the option data for cylinder transformation has not been set, programming of TRACYL will be rejected with alarm 12553.

2: Only those language commands are known that correspond to the current scope of approved NCK software options. This means that options that are not approved are rejected with 12550 "Name not defined or option/function not available". In this case it is not possible to decide whether the relevant command is not known in Siemens NC language in general or whether it is simply not available on this system.

Example:

If the option data for cylinder transformation has not been set, programming of TRACYL will be rejected with alarm 12550.

Function active/inactive:

3: All language commands are known. Language commands with inactive functions are recognized at the beginning of the program interpretation and rejected with alarm 12553 "Option/function inactive".

Example:

If the option data for cylinder transformation has been set, but transformation has not been activated with MD $MC_TRAFO_TYPE_1, programming of TRACYL will be rejected with alarm 12553.

4: Only those language commands are known that correspond to the current scope of active NCK software functions. This means that any command regarding inactive functions are rejected with alarm 12550 "Name not defined or option/function not available". In this case it cannot be decided whether the relevant command is not known in the Siemens NC language in general or whether it is simply not available on this system.

Example:

If the option data for cylinder transformation has been set, but transformation has not been activated with MD $MC_TRAFO_TYPE_1, programming of TRACYL will be rejected with alarm 12550.

Example:

See description for the STRINGIS language command.

10712	NC_USER_CODE_CONF_NAME_TAB		EXP, N01, N12	PA
-	List of reconfigured NC codes		STRING	PowerOn
-				
-	200 ...	-	-	2/2

Description: List of identifiers of the NC codes reconfigured by the user.

The list is to be structured as follows:

Even address: Identifier to be changed

Subsequent odd address: New identifier

The following three types of NC codes can reconfigured:

1. G codes e.g.: G02, G64, ASPLINE...
2. NC addresses e.g.: RND, CHF, ...
3. Pre-defined subprograms e.g.: CONTPRON, ...

10713	M_NO_FCT_STOPRE		EXP, N12, N07	-
-	M function with preprocessing stop		DWORD	PowerOn
-				
-	15 -1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1...	-	-	7/2

Description: The M functions defined by machine data $MN_M_NO_FCT_STOPRE perform an implicit preprocessing stop.

That is, the interpretation of the next part program line will be stopped until the block with the M function defined in that way has been processed completely

(PLC acknowledgement, motion, etc.).

10714	M_NO_FCT_EOP		EXP, N07	S1
-	M function for spindle active after reset		DWORD	PowerOn
-				
-	- -1	-	-	7/2

Description: For spindles where a '2' is configured in $MA_SPIND_ACTIVE_AFTER_RESET, no spindle reset is enabled with this M function when the part program is terminated. The spindle therefore remains active after the end of the part program.

Proposal: M32

Restrictions: see machine data 10715: $MN_M_NO_FCT_CYCLE

Related to:

$MA_SPIND_ACTIVE_AFTER_RESET

$MN_M_NO_FCT_EOP,

$MN_M_NO_FCT_CYCLE,

$MC_SPIND_RIGID_TAPPING_M_NR,

$MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

$MN_EXTERN_M_NO_MAC_CYCLE,

$MN_EXTERN_M_NO_SET_INT

$MN_EXTERN_M_NO_DISABLE_INT,

$MN_EXTERN_CHAN_SYNC_M_NO_MIN,

$MN_EXTERN_CHAN_SYNC_M_NO_MAX

$MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

$MC_NIBBLE_PUNCH_CODE

10715	M_NO_FCT_CYCLE			EXP, N12, N07	FBFA,K1
-	M function to be replaced by a subroutine			DWORD	PowerOn
-					
-	10	-1,-1,-1,-1,-1,-1,-1,-1,-1,-1	-	-	7/2

Description: M number with which a subprogram is called.

The name of the subprogram is stated in $MN_M_NO_FCT_CYCLE_NAME[n]. If the M function defined with $MN_M_NO_FCT_CYCLE[n] is programmed in a part program block, the subprogram defined in M_NO_FCT_CYCLE_NAME[n] is started at the end of the block. If the M function is programmed again in the subprogram, substitution by a subprogram call is then not carried out. $MN_M_NO_FCT_CYCLE[n] acts both in Siemens mode G290 and in external language mode G291.

The subprograms configured with $MN_M_NO_FCT_CYCLE_NAME[n] and $MN_T_NO_FCT_CYCLE_NAME must not be active simultaneously in one block (line of a part program). That means no more than one M/T function replacement can be active in any one block. Neither an M98 nor a modal subprogram call can be programmed in a block with the M function replacement.

Subprogram return and end of part program are also not permitted. Alarm 14016 is output in the event of a conflict.

Restrictions:

M functions with a fixed meaning and configurable M functions are checked for conflicting settings. A conflict is reported with an alarm.

The following M functions are checked:

- M0 to M5,
- M17,M30,
- M19,
- M40 to M45,
- M function for 'Spindle active after part program end' according to machine data $MN_M_NO_FCT_EOP
- M function for subprogram calls according to machine data $MN_M_NO_FCT_CYCLE
- M function for spindle/axis mode switchover according to machine data $MC_SPIND_RIGID_TAPPING_M_NR
- Additional M function for program stop according to machine data $MC_AUXFU_ASSOC_M0_VALUE
- Additional M function for conditional program stop according to machine data $MC_AUXFU_ASSOC_M1_VALUE

For external language mode only:

- M function for 'Macro call via M function' according to machine data $MN_EXTERN_M_NO_MAC_CYCLE
- M functions for interrupt programming according to configuration by $MN_EXTERN_M_NO_SET_INT and $MN_EXTERN_M_NO_DISABLE_INT
- M functions for channel synchronisation according to configuration by $MN_EXTERN_CHAN_SYNC_M_NO_MIN und $MN_EXTERN_CHAN_SYNC_M_NO_MAX
- M function for spindle/axis mode switchover with external language applied according to machine data $MC_EXTERN_RIGID_TAPPING_M_NR
- Additionally M98 and M99 with external language applied

($MN_MM_EXTERN_LANGUAGE).

For nibbling:

- M functions for nibbling/punching according to configuration by $MC_NIBBLE_PUNCH_CODE provided that they have been activated by $MC_PUNCHNIB_ACTIVATION.

Exception:

The M function for the tool change defined by $MC_TOOL_CHANGE_M_CODE must not be used in $MN_M_NO_FCT_CYCLE.

Related to:

$MN_M_NO_FCT_EOP,
$MN_M_NO_FCT_CYCLE,
$MC_SPIND_RIGID_TAPPING_M_NR,
$MC_AUXFU_ASSOC_M0_VALUE,

With external language mode:

$MN_EXTERN_M_NO_MAC_CYCLE,
$MN_EXTERN_M_NO_SET_INT
$MN_EXTERN_M_NO_DISABLE_INT,
$MN_EXTERN_CHAN_SYNC_M_NO_MIN,
$MN_EXTERN_CHAN_SYNC_M_NO_MAX
MC_EXTERN_RIGID_TAPPING_M_NR

With nibbling:

$MC_NIBBLE_PUNCH_CODE

10716	M_NO_FCT_CYCLE_NAME			EXP, N12, N07	FBFA,K1
-	Subroutine name for M function replacement			STRING	PowerOn
-					
-	10		-	-	7/2

Description: The machine data contains the name of the cycle. This cycle is called if the M function has been programmed from machine data $MN_M_NO_FCT_CYCLE.

If the M function is programmed in a motion block, the cycle is executed after the motion.

$MN_M_NO_FCT_CYCLE is active in both Siemens mode G290 and in external language mode G291.

If a T number is programmed in the call block, then the programmed T number can be polled in the cycle under the variable $P_TOOL.

M and T function replacements must not be programmed simultaneously in one block. That means not more than one M or T function replacement may be active in any one block.

Neither an M98 nor a modal subprogram call may be programmed in a block with M function replacement.

Moreover, neither subprogram return nor part program end are allowed.

Alarm 14016 is issued if there is a conflict.

Related to:

$MN_M_NO_FCT_CYCLE,
$MN_T_NO_FCT_CYCLE_NAME

10717	T_NO_FCT_CYCLE_NAME			EXP, N12, N07	FBFA,K1
-	Name of tool-changing cycle for T function replacement			STRING	PowerOn
-					
-	-		-	-	7/2

Description: Cycle name for tool change routine on call-up with a T function.

If a T function is programmed in a part program block, the subprogram defined in T_NO_FCT_CYCLE_NAME is called at the end of the block.

The T number programmed can be polled in the cycle via system variables $C_T / $C_T_PROG as a decimal value and via $C_TS / $C_TS_PROG as a string (only with tool management).
$MN_T_NO_FCT_CYCLE_NAME is active both in Siemens mode G290 and in external language mode G291.

$MN_M_NO_FCT_CYCLE_NAME and $MN_T_NO_FCT_CYCLE_NAME must not be active in one block at the same time, i.e. no more than one M/T function replacement can be active per block. In the block with the T function replacement, neither an M98 nor a modal subprogram call can be programmed. Furthermore, neither subprogram return nor part program end are allowed.

In the event of a conflict alarm 14016 is output.

Related to:

$MN_M_NO_FCT_CYCLE,

$MN_M_NO_FCT_CYCLE_NAME

10718	M_NO_FCT_CYCLE_PAR			EXP, N12, N07	-
-	M function replacement with parameters			DWORD	PowerOn
-					
-	-	-1	-	-	7/2

Description: If an M function replacement was configured with $MN_M_NO_FCT_CYCLE[n] / $MN_M_NO_FCT_CYCLE_NAME[n], a parameter transfer via system variable can be specified for one of these M functions using $MN_M_NO_FCT_CYCLE_PAR, in the same way as T function replacement. The parameters stored in the system variables always refer to the part program line where the M function to be replaced was programmed.

The following system variables are available:

```
$C_ME      : Address extension of the replaced M function
$C_T_PROG  : TRUE if address T was programmed
$C_T       : Value of address T ( Integer )
$C_TE      : Address extension of address T
$C_TS_PROG : TRUE if address TS was programmed
$C_TS     : Value of address TS (string, only with tool management
)
$C_D_PROG  : TRUE if address D was programmed
$C_D       : Value of address D
$C_DL_PROG : TRUE if address DL was programmed
$C_DL      : Value of address DL
```

10719	T_NO_FCT_CYCLE_MODE			EXP, N12, N07	K1
-	Setting of T function substitution			DWORD	PowerOn
-					
-	-	0	0	7	7/2

Description: This machine data parameterizes the execution of the replacement subprogram for the tool and tool offset selection.

Bit 0 = 0:

D or DL number is transferred to the replacement subprogram (default value)

Bit 0 = 1:

The D or DL number is not transferred to the replacement subprogram if the following conditions are fulfilled:
$MC_TOOL_CHANGE_MODE = 1   Programming D/DL with T or M function with which the tool change cycle is called, in a part program line.

Bit 1 = 0

Execution of the replacement subprogram at end of block (default value)

Bit 1 = 1

Execution of the replacement subprogram at block start

Bit 2 = 0:

Execution of the replacement subprogram according to the settin of bit 1

Bit 2 = 1:

Execution of the replacement subprogram at block start and at end of block.

10720	OPERATING_MODE_DEFAULT			N01	H2
-	Setting of mode after power ON			BYTE	PowerOn
-					
-	10	7,7,7,7,7,7,7,7,7,7	0	12	7/2

Description: Default modes of the mode groups after power ON.

If no mode is selected by the PLC, all the channels associated with mode group n are in the mode preset by OPERATING_MODE_DEFAULT[n -1] after power ON:

0 = Automatic mode

1 = Automatic mode, submode REPOS

2 = MDI mode

3 = MDI mode, submode REPOS

4 = MDI mode, submode Teach In

5 = MDI mode, submode Reference point approach

6 = JOG mode

7 = JOG mode, submode Reference point approach

8 = AUTO mode, submode Teach In

9 = AUTO mode, submode Teach In, submode Reference point approach

10 = AUTO mode, submode Teach In, submode Repos

11 = MDI mode, submode Teach In, submode Reference point approach

12 = MDI mode, submode Teach In, submode Repos

10722	AXCHANGE_MASK			EXP, N01	K5
-	Paramameters for axis replacement behavior			DWORD	PowerOn
-					
-	-	0	0	0xFFFF	7/2

Description: The axis replacement behavior can be changed with this machine data.

Bit0 = 1

Means that there is an automatic axis replacement via channels even if the axis has been brought into a neutral state by Waitp.

Bit1 = 1

Means that an AXCTSWE fetches all the axis container axes that can be assigned to the channel by means of implicit GET or GETD, and an axis replacement is not permitted again until after the axis container rotation.

Bit2 = 1

Means that, in the case of a GET, an intermediate block without preprocessing stop is generated, and whether a reorganization is needed is not checked until main run.

Bit3 = 1 means, that the NC carries out an axis replacement request for the VDI interface only for:

- an axis exclusively controlled by the PLC ($MA_BASE_FUNCTION_MASK Bit 4 == 1)
- a permanently assigned PLC axis ($MA_BASE_FUNCTION_MASK Bit 5 == 1)

For such axes, the VDI interface signal 'Axis replacement possible' is always 1.

For all other axes, the VDI interface signal 'Axis replacement possible' is always 0.

For permanently assigned PLC axes, an axis replacement is possible only from neutral axis to PLC axis

or from PLC axis to neutral axis.

Bit3 = 0 means that an axis replacement can be requested by the PLC for each axis.

For permanently assigned PLC axes, an axis replacement is only possible from neutral axis to PLC axis

or from PLC axis to neutral axis.

10731	JOG_MODE_KEYS_EDGETRIGGRD			EXP, N01	IAF
-	Functioning of the JOG keys			BOOLEAN	PowerOn
-					
-	-	TRUE	-	-	0/0

Description: This data determines whether the signals of the VDI interface, which set the JOG mode (progressive INC10000, ... INC1), work as switches (level triggered) or as push buttons (edge triggered). In the latter case, a setting is made in the NCK to retain the function of the key last pressed.

10735	JOG_MODE_MASK			EXP, N01	-
-	Settings for JOG mode			DWORD	PowerOn
-					
-	-	0	0	0xff	7/2

Description:

Bit 0:

Enables JOG in automatic.

JOG is enabled in automatic when all channels in the mode group are in the RESET state and no channel of the DRF mode group has been selected. The mode group changes internally to JOG with the +/- key and the handwheel, and the axis moves. After the JOG motion has ended, a change back to AUTO is also made internally.

Bit 1:

Position with AxFrame.

The function 'JOG to position' considers all axial frames and, in the case of an axis configured as geometry axis, the tool length offset.

Bit 2:

Travel in opposite direction.

The functions 'JOG to position' and 'Approach machine fixed point manually' allow travel in opposite direction, i.e. away from the specified position.

Bit 3:

Tool radius offset.

Machine data $MC_WORKAREA_WITH_TOOL_RADIUS is active with JOG motions of the geometry axes.

Bit 4:

Alarm suppression operating range limit in the basic coordinate system in JOG.

Alarms that would be output in JOG when an operating range limit is reached in the basic coordinate system, are suppressed.

Bit 5:

Alarm suppression operating range limit in the workpiece coordinate system in JOG.

Alarms that would be output in JOG when an operating range limit is reached in the workpiece coordinate system, are suppressed.

Bit 6, 7:

JOG of circles:

Bit 7 and bit 6 = 0: traversing the 2nd geometry axis of the active plane to PLUS for radius increase, traversing to MINUS for radius decrease independently of inner or outer machining being active.

Bit 7 = 1 and bit 6 = 0: traversing the 2nd geometry axis of the active plane to PLUS always travels in the direction of the limiting circle. This means that the radius is increased on inner machining and decreased on outer machining.

Bit 7 = 1 and bit 6 = 1: traversing the 2nd geometry axis of the active plane to MINUS always travels in the direction of the limiting circle. This means that the radius is increased on inner machining and decreased on outer machining.

Bits 8-31:

Currently unassigned.

10760	G53_TOOLCORR			N12	FBFA
-	Method of operation of G53, G153 and SUPA			DWORD	NEW CONF
-					
-	-	0	0	3	7/2

Description: With this MD you define whether tool length offset and tool radius offset are also to be suppressed with language commands G53, G153 and SUPA

The machine data is bit-coded.

Bit 0 = 0: G53, G153 and SUPA cause block-by-block suppression of work offsets. The active tool length offset and tool radius offset remain active.

Bit 0 = 1: G53, G153 and SUPA cause block-by-block suppression of work offsets, active tool length offset and tool radius offset. The tool length behavior can be modified with bit 1.

Bit 1 is only evaluated, if the value of bit 0 is 1.

Bit1 = 0: with bit 0 set, the tool length is always suppressed with G53, G153 and SUPA.

Bit1 = 1: with bit 0 set the tool length is only suppressed with G53, G153 and SUPA, if a cutting edge is not selected in the same block (this can also be the cutting edge that is already active).

10780	UNLOCK_EDIT_MODESWITCH			EXP, N01	-
-	Cancel start disable when editing a part program			BOOLEAN	PowerOn
-					
-	-	FALSE	-	-	0/0

Description: To avoid inconsistent states, a start disable is forced in Teach In mode when a part program is edited.

This start disable during editing can be canceled together with the operating algorithms of the individual MMCs by an NC reset or a mode group change.

0: Start disable when editing is also canceled with NC Reset

1: Start disable when editing is also canceled on a mode group change.

10800	EXTERN_CHAN_SYNC_M_NO_MIN			EXP, N12	FBFA
-	1st M function for channel synchronization			DWORD	PowerOn
-					
-	-	-1	-	-	7/2

Description: M number of the first M function which can be used to perform a channel (program) synchronization in ISO2/3 mode.

To avoid conflicts with standard M functions the lowest permissible value is 100. If you enter a value between 0 and 99, alarm 4170 will be issued.

10802	EXTERN_CHAN_SYNC_M_NO_MAX		EXP, N12	FBFA
-	Last M function for channel synchronization		DWORD	PowerOn
-				
-	- -1	-	-	7/2

Description: M number of the last M function which can be used to perform a channel (program) synchronization in ISO2/3 mode.

In combination with $MN_EXTERN_CHAN_SYNC_M_NO_MIN, the machine data defines an M number range reserved for channel synchronization. This range may be a maximum of 10 times the amount of channels since only 10 WAIT marks may be set for each channel.

If you enter a value between 0 and 99 or less than $MN_EXTERN_CHAN_SYNC_M_NO_MIN, alarm 4170 is issued.

10804	EXTERN_M_NO_SET_INT		EXP, N12	FBFA
-	M function to activate ASUB		DWORD	PowerOn
-				
-	- 96	-	-	7/2

Description: M function number used to activate an interrupt program (ASUB) in ISO2/3 mode. The interrupt program is always started by the 1st high-speed input of the numerical control.

The M number defined in the machine data replaces M96 in external language mode.

Restrictions: Refer to machine data 10715: $MN_M_NO_FCT_CYCLE

Related to:

$MN_M_NO_FCT_EOP,
$MN_M_NO_FCT_CYCLE,
$MC_SPIND_RIGID_TAPPING_M_NR,
$MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

$MN_EXTERN_M_NO_MAC_CYCLE,
$MN_EXTERN_M_NO_SET_INT
$MN_EXTERN_M_NO_DISABLE_INT,
$MN_EXTERN_CHAN_SYNC_M_NO_MIN,
$MN_EXTERN_CHAN_SYNC_M_NO_MAX
$MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

$MC_NIBBLE_PUNCH_CODE

10806	EXTERN_M_NO_DISABLE_INT		EXP, N12	FBFA
-	M function to deactivate ASUB		DWORD	PowerOn
-				
-	- 97	-	-	7/2

Description: M function number used to deactivate an interrupt program (ASUB) in ISO2/3 mode.

The M number defined in the machine data replaces M97 in external language mode.

Restrictions: refer to machine data 10715 $MN_M_NO_FCT_CYCLE

$MN_M_NO_FCT_EOP,

$MN_M_NO_FCT_CYCLE,

$MC_SPIND_RIGID_TAPPING_M_NR,

$MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

$MN_EXTERN_M_NO_MAC_CYCLE,

$MN_EXTERN_M_NO_SET_INT

$MN_EXTERN_M_NO_DISABLE_INT,

$MN_EXTERN_CHAN_SYNC_M_NO_MIN,

$MN_EXTERN_CHAN_SYNC_M_NO_MAX

$MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

$MC_NIBBLE_PUNCH_CODE

10808	EXTERN_INTERRUPT_BITS_M96		EXP, N12	FBFA
-	Activate interrupt program (ASUB)		DWORD	PowerOn
-				
-	- 0	-	-	7/2

Description: Setting the various bits can influence the processing of the interrupt routine activated by M96 P...

Bit 0 = 0,

No interrupt program possible, M96/M97 are normal M functions

Bit 0 = 1,

Using M96/M97 to activate an interrupt program is allowed

Bit 1 = 0,

Continue processing part program at the final position of the next block after the interrupt block

Bit 1 = 1,

Continue processing part program from interrupt position

Bit 2 = 0,

The interrupt signal immediately interrupts the current block and starts the interrupt routine

Bit 2 = 1,

The interrupt routine will not be started until the end of the block

Bit 3 = 0,

Interrupt machining cycle at an interupt signal

Bit 3 = 1,

Do not start interrupt program until the end of a machining cycle.

10810	EXTERN_MEAS_G31_P_SIGNAL			EXP, N12	FBFA
-	Config. of measuring inputs for G31 P..			BYTE	PowerOn
-					
-	4	1,1,1,1	0	3	7/2

Description: This machine data defines the assignment of measurement inputs 1 and 2 to the P numbers programmed with G31 P1 (- P4). The machine data is bit-coded. Only bits 0 and 1 are evaluated. For example, if bit 0 = 1 in $MN_EXTERN_MEAS_G31_P_SIGNAL[1] the 1st measurement input is activated with G31 P2. If $MN_EXTERN_MEAS_G31_P_SIGNAL[3]=2, the 2nd measurement input is activated with G31 P4.

Bit 0: = 0, Do not evaluate measurement input 1 with G31 P1 (- P4)

Bit 0: = 1, Activate measurement input 1 with G31 P1 (- P4)

Bit 1: = 0, Do not evaluate measurement input 2 with G31 P1 (- P4)

Bit 1: = 1, Activate measurement input 2 with G31 P1 (- P4)

10812	EXTERN_DOUBLE_TURRET_ON			EXP, N12	FBFA
-	Double turret with G68			BOOLEAN	PowerOn
-					
-	-	FALSE	-	-	7/2

Description: This machine data is used to determine whether double-slide machining (channel synchronization for 1st and 2nd channel) is to be started using G68 or whether the second tool of a double turret (= two closely-linked tools at a distance defined in the setting data $SC_EXTERN_DOUBLE_TURRET_DIST) is to be activated.

FALSE:

Channel synchronization for double-slide machining

TRUE:

Load 2nd tool of a double turret (that is, activate $SC_EXTERN_DOUBLE_TURRET_DISTANCE as additive zero offset and mirroring around Z axis)

10814	EXTERN_M_NO_MAC_CYCLE			EXP, N12	FBFA
-	Macro call via M function			DWORD	PowerOn
-					
-	10	-1,-1,-1,-1,-1,-1,-1,-1,-1,-1	-	-	7/2

Description: A macro is called with this M number.

The name of the subprogram is stated in $MN_EXTERN_M_NO_MAC_CYCLE_NAME[n].

If the M function specified with $MN_EXTERN_M_NO_MAC_CYCLE[n] is programmed in a part program block, the subprogram defined in EXTERN_M_NO_MAC_CYCLE_NAME[n] is started. All addresses programmed in the block are written into the corresponding variables.

If the M function is programmed again in the subprogram, the replacement by a subprogram call does not take place any more.

$MN_EXTERN_M_NO_MAC_CYCLE[n] is only active in the external language mode G291.

The subprograms configured with $MN_EXTERN_M_NO_MAC_CYCLE_NAME[n] must not be active simultaneously in a block (part program line), i.e. maximally one M function replacement can become active in a block. Neither an M98 nor a modal subprogram call may be programmed in the block with the M function replacement.

Subprogram return and the part program end arealso not permitted. Alarm 14016 is issued in case of a conflict. Restrictions: see machine data 10715: $MN_M_NO_FCT_CYCLE

Related to:

$MN_M_NO_FCT_EOP,
$MN_M_NO_FCT_CYCLE,
$MC_SPIND_RIGID_TAPPING_M_NR,
$MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

$MN_EXTERN_M_NO_MAC_CYCLE,
$MN_EXTERN_M_NO_SET_INT
$MN_EXTERN_M_NO_DISABLE_INT,
$MN_EXTERN_CHAN_SYNC_M_NO_MIN,
$MN_EXTERN_CHAN_SYNC_M_NO_MAX
$MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

$MC_NIBBLE_PUNCH_CODE

10815	EXTERN_M_NO_MAC_CYCLE_NAME			EXP, N12	FBFA
-	Name of subroutine for M function macro call			STRING	PowerOn
-					
-	10		-	-	7/2

Description: Name of the subprogram started by a call via the M function defined by $MN_EXTERN_M_NO_MAC_CYCLE[n].

10816	EXTERN_G_NO_MAC_CYCLE			EXP, N12	FBFA
-	Macro call via G function			DOUBLE	PowerOn
-					
-	50	-1.,-1.,-1.,-1.,-1.,-1.,-1.,-1.,-1....	-	-	7/2

Description: G number for calling a macro.

The name of the subprogram is stated in $MN_EXTERN_G_NO_MAC_CYCLE_NAME[n].

If the G function specified with $MN_EXTERN_G_NO_MAC_CYCLE[n] is programmed in a part program block, the subprogram defined in EXTERN_M_NO_MAC_CYCLE_NAME[n] is started. All addresses programmed in the block are written in the corresponding $C_xx variables.

No subprogram call is executed if a subprogram call is already active via an M/G macro or an M replacement. If a standard G function is programmed in this case, this code is executed. Otherwise, alarm 12470 is issued.

$MN_EXTERN_G_NO_MAC_CYCLE[n] is only active in the external language mode G291.

Only a single subprogram call may be included in a block. This means that only a single M/G function replacement may be programmed in a block and no additional subprogram (M98) or cycle call may be included in the block.

Furthermore, a subprogram return and a part program end are not permitted in the same block.

Alarm 14016 is issued in case of a conflict.

10817	EXTERN_G_NO_MAC_CYCLE_NAME			EXP, N12	FBFA
-	Name of subroutine for G function macro call			STRING	PowerOn
-					
-	50		-	-	7/2

Description: Name of the subprogram started by call via the G function defined by $MN_EXTERN_G_NO_MAC_CYCLE[n].

10818	EXTERN_INTERRUPT_NUM_ASUP			EXP, N12	FBFA
-	Interrupt number for ASUP start (M96)			BYTE	PowerOn
-					
-	-	1	1	8	7/2

Description: Number of the interrupt input starting an asynchronous subprogram activated in ISO mode. (M96 <program number>)

10820	EXTERN_INTERRUPT_NUM_RETRAC			EXP, N12	FBFA
-	Interrupt number for rapid retraction (G10.6)			BYTE	PowerOn
-					
-	-	2	1	8	7/2

Description: Number of the interrupt input triggering rapid retraction to the position programmed with G10.6 in ISO mode.

10850	MM_EXTERN_MAXNUM_OEM_GCODES			EXP, N01, N12	-
-	Maximum number of OEM G codes			DWORD	PowerOn
-					
-	-	0	0	1000	1/1

Description: This machine data is used to define the number of G codes implemented for an external language via an OEM application.

10880	MM_EXTERN_CNC_SYSTEM			N01, N12	FBFA
-	Definition of the control system to be adapted			DWORD	PowerOn
-					
-	-	1	1	5	7/2

Description: Definition of the external CNC system whose part programs are to be executed on the SINUMERIK control in addition to SINUMERIK code (ISO_1):

1: ISO_21: System Fanuc0 milling (5.1 and higher)

2: ISO_31: System Fanuc0 turning (P5.2 and higher)

3: External language via OEM application (P6.2 and higher)

4: ISO_22: System Fanuc0 Milling (P7 and higher)

5: ISO_32: System Fanuc0 Turning (P7 and higher)

10881	MM_EXTERN_GCODE_SYSTEM			N01, N12	FBFA
-	ISO_3 Mode: GCodeSystem			DWORD	PowerOn
-					
-	-	0	0	2	7/2

Description: Definition of the GCodeSystem to be actively executed in ISO_3 Mod (turning):

Value = 0 : ISO_3: Code system B

Value = 1 : ISO_3: Code system A

Value = 2 : ISO_3: Code system C

10882	NC_USER_EXTERN_GCODES_TAB			N12	FBFA
-	List of user-specific G commands of an external NC language			STRING	PowerOn
-					
-	60		-	-	2/2

Description: List of G commands of external NC languages which have been reconfigured by the user.

The implemented G commands are to be taken from the current Siemens documentation for this programming language.

The list is structured as follows:

Even address: G command to be changed

Subsequent odd address: New G command

Only G codes can be reconfigured, e.g.: G20, G71.

10884	EXTERN_FLOATINGPOINT_PROG			N12	FBFA
-	Evaluation of programmed values without decimal point			BOOLEAN	PowerOn
-					
-	-	TRUE	-	-	7/2

Description: This MD defines how programmed values without a decimal point are evaluated:

0: Values without a decimal point are interpreted in internal units. For example, X1000 = 1 mm (for 0.001 mm input resolution) X1000.0 = 1000 mm

1: Values without decimal point are interpreted as mm, inch or degrees. For example, X1000 = 1000 mm X1000.0 = 1000 mm

Related to:

EXTERN_INCREMENT_SYSTEM

10886	EXTERN_INCREMENT_SYSTEM		N12	FBFA
-	Incremental system in external language mode		BOOLEAN	PowerOn
-				
-	- FALSE	-	-	7/2

Description: This machine data is active for external programming languages, that is if MD 18800: MM_EXTERN_LANGUAGE = 1.

This machine data specifies which incremental system is active:

0: Incremental system IS-B = 0.001 mm/degree
= 0.0001 inch

1: Incremental system IS-C = 0.0001 mm/degree
= 0.00001 inch

Related to:

EXTERN_FLOATINGPOINT_PROG

10888	EXTERN_DIGITS_TOOL_NO		N12	FBFA
-	Digits for T number in ISO mode		BYTE	PowerOn
-				
-	- 2	0	8	7/2

Description: This machine data is only active when $MN_MM_EXTERN_CNC_SYSTEM = 2.

Number of digits of the tool number in the programmed T word.

From the programmed T word, the number of leading digits specified in $MN_EXTERN_DIGITS_TOOL_NO are interpreted as the tool number.

The following digits address the offset memory.

10890	EXTERN_TOOLPROG_MODE			N12	FBFA
-	Tool change programming for external language			DWORD	PowerOn
-					
-	-	0	-	-	7/2

Description: Configuration for programming the tool change in an external programming language:

Bit0=0:

Only active if $MN_MM_EXTERN_CNC_SYSTEM =2: The tool number and offset number are programmed in the T word. $MN_DIGITS_TOOLNO defines the number of leading digits that the tool number generates.

Example:

```
$MN_DIGITS_TOOLNO = 2
T=1234    ; Tool number 12,
          ; Offset number 34
```

Bit0=1:

Only active if $MN_MM_EXTERN_CNC_SYSTEM =2: Only the tool number is programmed in the T word. Offset number = Tool number. $MN_DIGITS_TOOLNO is irrelevant.

Example:

```
T=12      ; Tool number 12
          ; Offset number 12
```

Bit1=0:

Only active if $MN_MM_EXTERN_CNC_SYSTEM =2: A leading 0 is added if the number of digits programmed in the T word is the same as that in $MN_EXTERN_DIGITS_TOOL_NO.

Bit1=1:

Only active if $MN_MM_EXTERN_CNC_SYSTEM =2: If the number of digits programmed in the T word is equal to the number of digits defined in $MN_EXTERN_DIGITS_TOOL_NO, the programmed number is both the offset number and the tool number

Bit2=0:

Only active if $MN_MM_EXTERN_CNC_LANGUAGE =2: ISO T offset selection only with D (Siemens cutting edge number)

Bit2=1:

Only active if $MN_MM_EXTERN_CNC_LANGUAGE =2: ISO T offset selection only with H ($TC_DPH[t,d])

Bit3=0:

Only active if $MN_MM_EXTERN_CNC_SYSTEM =2: Each H number is only allowed once in each TOA, except H=0. If bit3 1 -> 0 is set, no H number may occur more than once in a TO unit. Otherwise an alarm will be issued at the next restart.

Bit3=1:

Only active if $MN_MM_EXTERN_CNC_SYSTEM =2: Each H number is only allowed more than once in each TOA.

Bit6=0:

Only active if MN_MM_EXTERN_CNC_SYSTEM =1: Tool length cannot be selected under address H

Bit6=1:

Only active if MN_MM_EXTERN_CNC_SYSTEM =1: Tool length selected under address H

Bit7=0:

Only active if MN_MM_EXTERN_CNC_SYSTEM =1: Tool length cannot be selected under address D

Bit7=1:

Only active if MN_MM_EXTERN_CNC_SYSTEM =1: Tool length selected under address D.

Selection under address D or H is possible if bits 6 and 7 have been set.

10900	INDEX_AX_LENGTH_POS_TAB_1			N09	T1
-	Number of positions for indexing axis table 1			DWORD	Reset
-					
-	-	0	0	60	7/2

Description: The indexing position table is used to assign the axis positions in the valid unit of measurement (mm, inches or degrees) to the indexing positions [n] on the indexing axis. The number of indexing positions used in table 1 is defined by the MD: INDEX_AX_LENGTH_POS_TAB_1.

These indexing positions must contain valid values in table 1. Any indexing positions in the table above the number specified in the machine data are ignored. Up to 60 indexing positions (0 to 59) can be entered in the table.

Table length = 0 means that the table is not evaluated. If the length is not equal to 0, then the table must be assigned to an axis with the MD: INDEX_AX_ASSIGN_POS_TAB.

If the indexing axis is defined as a rotary axis (MD: IS_ROT_AX = "1") with modulo 360° (MD: ROT_IS_MODULO = "1"), the machine data defines the last indexing position after which, with a further traversing movement in the positive direction, the indexing positions begin again at 1 .

Special cases:

Alarm 17090 "Value violates upper limit" if values over 60 are entered in the MD: INDEX_AX_LENGTH_POS_TAB_1.

Related to:

MD: INDEX_AX_ASSIGN_POS_TAB (axis is an indexing axis)

MD: INDEX_AX_POS_TAB_1 (indexing position table 1)

MD: IS_ROT_AX (rotary axis)

MD: ROT_IS_MODULO (modulo conversion for rotary axis)

10910	INDEX_AX_POS_TAB_1			N09	T1
mm/inch, degrees	Indexing position table 1			DOUBLE	Reset
-					
-	60	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2

Description: The indexing position table is used to assign the axis positions in the valid unit of measurement (mm, inches or degrees) to the indexing positions [n] on the indexing axis.

[n] = indexing for the entry of the indexing positions in the indexing position table.

Range: 0 y n x 59, where 0 is the 1st indexing position and 59 corresponds to the 60th indexing position.

Note.

Programming with the absolute indexing position (e.g. CAC) starts with indexing position 1. This corresponds to the indexing position with indexing n = 0 in the indexing position table.

The following should be noted when entering the indexing positions:

- Up to 60 different indexing positions can be stored in the table.
- The 1st entry in the table corresponds to indexing position 1; the nth entry corresponds to indexing position n.
- The indexing positions must be entered in the table in ascending order (starting with the negative to the positive traversing range) with no gaps between the entries. Consecutive position values must not be identical.
- If the indexing axis is defined as a rotary axis (MD: IS_ROT_AX = "1") with modulo 360° (MD: ROT_IS_MODULO = "1"), then the position values are limited to a range of 0° x pos. < 360°.

The number of indexing positions used in the table is defined by the MD: INDEX_AX_LENGTH_POS_TAB_1.

Entering the value 1 in the axial machine data: INDEX_AX_ASSIGN_POS_TAB assigns indexing position table 1 to the current axis.

Special cases:

Alarm 17020 "illegal array index" if over 60 positions are entered in the table.

Related to:

MD: INDEX_AX_ASSIGN_POS_TAB (axis is an indexing axis)

MD: INDEX_AX_LENGTH_POS_TAB_1 (no. of indexing positions used in table 1)

MD: IS_ROT_AX (rotary axis)

MD: ROT_IS_MODULO (modulo conversion for rotary axis)

10920	INDEX_AX_LENGTH_POS_TAB_2		N09	T1
-	Number of positions for indexing axis table 2		DWORD	Reset
-				
-	- 0	0	60	7/2

Description: The indexing position table is used to assign the axis positions in the valid unit of measurement (mm, inches or degrees) to the indexing positions [n] on the indexing axis. The number of indexing positions used in table 2 is defined by the MD: INDEX_AX_LENGTH_POS_TAB_2.

These indexing positions in table 2 must contain valid values. Any indexing positions in the table above the number specified in the machine data are ignored.

Up to 60 indexing positions (0 to 59) can be entered in the table.

Table length = 0 means that the table is not evaluated. If the length is not equal to 0, the table must be assigned to an axis with the MD: INDEX_AX_ASSIGN_POS_TAB.

If the indexing axis is defined as a rotary axis (MD: IS_ROT_AX = "1") with modulo 360° (MD: ROT_IS_MODULO = "1"), the machine data defines the last indexing position after which, with a further traversing movement in the positive direction, the indexing positions begin again at 1.

Not relevant for tool magazines (revolvers, chain magazines)

Special cases:

Alarm 17090 "Value violates upper limit" if a value over 60 is entered in the MD:INDEX_AX_LENGTH_POS_TAB_2.

Related to:

MD: INDEX_AX_ASSIGN_POS_TAB (axis is an indexing axis)

MD: INDEX_AX_POS_TAB_2 (indexing position table 2)

MD: IS_ROT_AX (rotary axis)

MD: ROT_IS_MODULO (modulo conversion for rotary axis)

10930	INDEX_AX_POS_TAB_2		N09	T1	
mm/inch, degrees	Indexing position table 2		DOUBLE	Reset	
-					
-	60	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2

Description: The indexing position table is used to assign the axis positions in the valid unit of measurement (mm, inches or degrees) to the indexing positions [n] on the indexing axis.

[n] = indexing for the entry of the indexing positions in the indexing position table.

Range: 0 y n x 59, where 0 is the 1st indexing position and 59 corresponds to the 60th indexing position.

Note:

Programming with the absolute indexing position (e.g. CAC) starts with indexing position 1. This corresponds to the indexing position with indexing n = 0 in the table.

The following should be noted when entering the indexing positions:

- Up to 60 different indexing positions can be stored in the table.
- The 1st entry in the table corresponds to indexing position 1; the nth entry corresponds to indexing position n.
- The indexing positions should be entered in the table in ascending order (starting with the negative to the positive traversing range) with no gaps between the entries. Consecutive position values must not be identical.
- If the indexing axis is defined as a rotary axis (MD: IS_ROT_AX = "1") with modulo 360° (MD: ROT_IS_MODULO = "1"), then the position values are limited to a range of 0° x pos. < 360°.

The number of indexing positions used in the table is defined by the MD: INDEX_AX_LENGTH_POS_TAB_2.

Entering the value 1 in the axial machine data: INDEX_AX_ASSIGN_POS_TAB assigns indexing position table 1 to the current axis.

Special cases:

Alarm 17020 "illegal array index" if over 60 positions are entered in the table.

Related to:

MD: INDEX_AX_ASSIGN_POS_TAB (axis is an indexing axis)

MD: INDEX_AX_LENGTH_POS_TAB_2 (no. of indexing positions used in table 2)

MD: IS_ROT_AX (rotary axis)

MD: ROT_IS_MODULO (modulo conversion for rotary axis)

10940	INDEX_AX_MODE			EXP	-
-	Settings for indexing position			DWORD	PowerOn
-					
-	-	0	0	1	7/2

Description: Affects the display of indexing positions (AA_ACT_INDEX_AX_POS_NO and aaActIndexAxPosNo).

Bit 0 = 0:

Indexing position display changes on reaching/passing the indexing position (indexing range lies between the indexing positions, compatible behavior).

Bit 0 = 1:

Indexing position display changes on passing the half indexing axis position (indexing range lies quasi symmetrically round the indexing position)

11100	AUXFU_MAXNUM_GROUP_ASSIGN			N01, N07, N02	H2
-	Number of auxiliary functions distr. amongst aux. fct. groups			DWORD	PowerOn
-					
-	-	1	1	255	7/2

Description: The maximum number of auxiliary functions that can be assigned to a group by

AUXFU_ASSIGN_TYPE,

AUXFU_ASSIGN_EXTENTION,

AUXFU_ASSIGN_VALUE and

AUXFU_ASSIGN_GROUP.

This number includes only the user-defined auxiliary functions, not the predefined auxiliary functions.

Related to:

MD 22010: AUXFU_ASSIGN_TYPE[n]

11110	AUXFU_GROUP_SPEC			N07	H2
-	Auxiliary function group specification			DWORD	PowerOn
-					
-	64	0x81,0x21,0x41,0x41,0x41,0x41,0x41...	-	-	7/2

Description: Defines the output options for the auxiliary functions belonging to a group.

Bit 0=1

Output duration 1 OB1 pass (normal auxiliary function)

Bit 1=1

Output duration 1 OB40 pass, alarm-controlled (high-speed auxiliary function)

Bit 2 Reserved

Bit 3=1

No output to PLC (may only be set as single bit)

Bit 4=1

Spindle response after acknowledgement by the PLC

Bit 5=1
Output prior to motion
Bit 6=1
Output during motion
Bit 7=1
Output at end of block
Bit 8=1
No output after block search

The MD must be defined for each existing auxiliary function group.

The index [n] indicates the number of the auxiliary function group: 0...14

[0] = 1st auxiliary function group, [1] = 2nd auxiliary function group ...

The assignment of individual auxiliary functions to specific groups is defined in channel-specific machine data (AUXFU_ASSIGN_TYPE, AUXFU_ASSIGN_EXTENTION, AUXFU_ASSIGN_VALUE, AUXFU_ASSIGN_GROUP). M0, M1, M2, M17 and M30 are assigned to group 1 by default.

The specification of this group (0x81: output duration 1 OB1 pass, output at end of block) must not be changed.

All spindle-specific auxiliary functions (M3, M4, M5, M19, M70) are assigned to group 2 by default.

If several auxiliary functions with different output types (before / during / at end of motion) are programmed in one motion block, then the output of the individual auxiliary functions occurs in accordance with their output types.

All auxiliary functions are output simultaneously in a block without motion.

Default setting:

AUXFU_GROUP_SPEC[0]=81H
AUXFU_GROUP_SPEC[1]=21H
AUXFU_GROUP_SPEC[2]=41H
...
AUXFU_GROUP_SPEC[n]=41H

11120	LUD_EXTENDED_SCOPE		N01	PG
-	Function "program global user data (PUD)" is active		BOOLEAN	PowerOn
-				
-	-	FALSE	-	-	7/2

Description: Activate function "Program-global user data (PUD)":

MD = 0: User data of the main program level are only active on this level.

MD = 1: User data of the main program level are also visible in the subprogram levels.

11140	GUD_AREA_SAVE_TAB			N01	-
-	Additional saving for GUD modules			DWORD	Immediately
-					
-	9	0,0,0,0,0,0,0,0,0	-	-	7/2

Description:

```
This data indicates with which additional area the contents of the
GUD module are saved.
$MN_GUD_AREA_SAVE_TAB[0] : SGUD_DEF
$MN_GUD_AREA_SAVE_TAB[1] : MGUD_DEF
$MN_GUD_AREA_SAVE_TAB[2] : UGUD_DEF
$MN_GUD_AREA_SAVE_TAB[3] : GUD4_DEF
$MN_GUD_AREA_SAVE_TAB[4] : GUD5_DEF
$MN_GUD_AREA_SAVE_TAB[5] : GUD6_DEF
$MN_GUD_AREA_SAVE_TAB[6] : GUD7_DEF
$MN_GUD_AREA_SAVE_TAB[7] : GUD8_DEF
$MN_GUD_AREA_SAVE_TAB[8] : GUD9_DEF
BitNo.   Hexadec        Meaning when bit is set
Value
0 (LSB)  0x00000001     Area TOA
```

11160	ACCESS_EXEC_CST			N01	-
-	Execution right for /_N_CST_DIR			BYTE	PowerOn
-					
-	-	7	-	-	7/2

Description:

```
 Execution right assigned to the program stored in directory /
_N_CST_DIR :
 Value  0: Siemens password
 Value  1: Machine OEM password
 Value  2: Password of startup engineer, service
 Value  3: End user password
 Value  4: Keyswitch position 3
 Value  5: Keyswitch position 2
 Value  6: Keyswitch position 1
 Value  7: Keyswitch position 0
 Machine data can only be written with values 0 and 1, and with the
corresponding password also active.
```

11161	ACCESS_EXEC_CMA		N01	-
-	Execution right for /_N_CMA_DIR		BYTE	PowerOn
-				
-	- 7	-	-	7/2

Description: Execution right assigned to the programs stored in directory /_N_CMA_DIR :
Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of startup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0
Machine data can only be written with values 0 and 1, and with the corresponding password also active.

11162	ACCESS_EXEC_CUS		N01	-
-	Execution right for /_N_CUS_DIR		BYTE	PowerOn
-				
-	- 7	-	-	7/3

Description: Execution right assigned to the programs stored in directory /_N_CUS_DIR :
Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of startup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0
Machine data can only be written with values 0, 1 and 2, and with the corresponding password also active.

11165	ACCESS_WRITE_CST		N01	-
-	Write protection for directory /_N_CST_DIR		DWORD	PowerOn
-				
-	- -1	-	-	7/2

Description: Set write protection for cycle directory /_N_CST_DIR:
Assigned to the programs:
Value -1: Keep the value currently set
Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of startup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0
The machine data can only be written with values 0 and 1, and with the corresponding password also active.

11166	ACCESS_WRITE_CMA			N01	-
-	Write protection for directory /_N_CMA_DIR			DWORD	PowerOn
-					
-	-	-1	-	-	7/2

Description: Set write protection for cycle directory /_N_CMA_DIR:
Assigned to the programs:
Value -1: Keep the value currently set
Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of startup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0
The machine data can only be written with values 0 and 1, and with the corresponding password also active.

11167	ACCESS_WRITE_CUS			N01	-
-	Write protection for directory /_N_CUS_DIR			DWORD	PowerOn
-					
-	-	-1	-	-	7/3

Description: Set write protection for cycle directory /_N_CUS_DIR:
Assigned to the programs:
Value -1: Keep the value currently set
Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of startup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0
The machine data can only be written with values 0, 1 and 2, and with the corresponding password also active.

11170	ACCESS_WRITE_SACCESS			N01	-
-	Write protection for _N_SACCESS_DEF			BYTE	PowerOn
-					
-	-	7	-	-	7/2

Description: Set write protection for definition file /_N_DEF_DIR/_N_SACCESS_DEF:
Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of startup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0
The machine data can only be written with values 0 and 1, and with the corresponding password also active.

11171	ACCESS_WRITE_MACCESS			N01	-
-	Write protection for _N_MACCESS_DEF			BYTE	PowerOn
-					
-	-	7	-	-	7/2

Description: Set write protection for definition file /_N_DEF_DIR/_N_SACCESS_DEF:
Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of startup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0
The machine data can only be written with values 0 and 1, and with the corresponding password also active.

11172	ACCESS_WRITE_UACCESS			N01	-
-	Write protection for _N_UACCESS_DEF			BYTE	PowerOn
-					
-	-	7	-	-	7/3

Description: Set write protection for definition file /_N_DEF_DIR/_N_UACCESS_DEF:
Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of startup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0
The machine data can only be written with values 0, 1 and 2, and with the corresponding password also active.

11200	INIT_MD			EXP, N01	IAF,IAD,IA
-	Standard machine data loaded at next Power On			BYTE	PowerOn
-					
-	-	0	-	-	7/2

Description: A power on must be triggered after setting MD: INIT_MD. The function is executed and the MD reset to "0" at power on.

Meaning of the input:

Bit 0 set:

All machine data (with the exception of the memory-configuring data) will be overwritten with the compiled values at the next NCK power on.

Bit 1 set:

All memory-configuring machine data will be overwritten with the compiled values at the next NCK power on.

Bit 2 set:

The OEM machine data brought in by compile cycles will be deleted from the buffered memory at the next power on.

Bit 3 set:

All setting data will be overwritten with the compiled values at the next power on.

Bit 4 set: All option data will be overwritten with the compiled values at the next power on.

INIT_MD is automatically set to 0 at power on.

Memory configuring MDs are described in:

References: /IAD/, Installation and Startup Guide, Memory Configuration

- MD 10010: ASSIGN_CHAN_TO_MODE_GROUP
- All machine data starting with "MM_"

MD 18000 - 18999 (general MD)

MD 28000 - 28999 (channel-specific MD)

MD 38000 - 38999 (axis-specific MD)

11210	UPLOAD_MD_CHANGES_ONLY			N01, N05	IAD
-	Machine data backup of changed machine data only			BYTE	Immediately
-					
-	-	0xFF	-	-	7/3

Description: This MD can be set so that only changed MD and setting data are backed up.

It can be set to output either all data or only data which deviates from the default setting via the RS232C.

If a value is changed in a data which is stored as an array, then the complete MD array will always be output (e.g. MD 10000: AXCONF_MA-CHAX_ NAME_TAB).

Select differential MD upload:

Bit0(LSB) Effectiveness of the differential upload with TEA files

0: All data is output

1: Only MDs which have changed in comparison to the compiled value are output

Bit1 As bit 0

Bit2 Change to a field element

0: Complete array is output

1: Only changed field elements of an array are output

Bit3 R parameters (only for INI files)

0: All R parameters are output

1: Only R parameters not equal to '0' are output

Bit4 Frames (only for INI files)

0: All frames are output

1: Only frames which are not zero frames are output.

Bit5 Tool data (cutting edge parameters) (only for INI files)

0: All tool data is output

1: Only tool data not equal to '0' is output.

Bit6 Buffered system variables ($AC_MARKER[], $AC_PARAM[] only for INI files)

0: All system variables are output

1: Only system variables not equal to '0' are output

Bit7 Synchronized actions GUD (for INI files only)

0: All Syna GUD are output

1: Only Syna GUD not equal to '0' are output

Active: The change in the data becomes active on the start of the upload for the next area.

11220	INI_FILE_MODE			N01, N05	IAD
-	Error response to INI file errors			BYTE	Reset
-					
-	-	1	0	2	7/2

Description: If, while reading machine data files (INI files) into controls, data are read in

- that are faulty or
- do not agree with the check sum

then alarms are generated and the reading in may be aborted. The following control behaviors can be selected via machine data settings:

0: Output of an alarm, abort on detection of 1st error. (As SW versions 1 and 2).

1: Output of an alarm, continuation of execution. An alarm with the number of errors is output at the end of execution.

2: Execution continues despite possible errors. An alarm with the number of errors is output at the end of execution.

11230	MD_FILE_STYLE			N01, N05	IAD
-	Structure of machine data backup files			BYTE	Immediately
-					
-	-	3	-	-	7/3

Description: Appearance of a machine data file at 'upload'

Bit 0 (LSB): Line check sum is generated

Bit 1:

MD numbers are generated

Bit 2:

Channel axis name as field index with axis-MD in the TEA file

Bit 3:

With an NCU-link, the MDs of the LINK axes are also output.

Bit 4:

All local axes are output (even when they are not activated by $MC_AXCONF_MACHAX_USED)

Active:

The change in the data becomes active on the start of the upload for the next area.

Default setting:

The line check sums and MD numbers are generated, but not channel names as field index with axis-MD.

11240	PROFIBUS_SDB_NUMBER			N01, N05	K4,FBU
-	SDB number			DWORD	PowerOn
-					
-	4	-1,-1,-1,-1	-1	7	2/2
710-6a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
720-6a2c	-	-	-	-	-1/-
720-31a10c	-	-	-	-	-1/-
730-6a2c	-	-	-	-	-1/-
730-31a10c	-	-	-	-	-1/-

Description: Only for PROFIBUS/PROFINET with selection option of autonomous SDB data management (802d, 828d):

Number of the system data block (SDB) used for configuring the I/ Os.

11241	PROFIBUS_SDB_SELECT			N01, N05	-
-	SDB source selection			DWORD	PowerOn
-					
-	-	0	0	3	2/2
710-6a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
720-6a2c	-	-	-	-	-1/-
720-31a10c	-	-	-	-	-1/-
730-6a2c	-	-	-	-	-1/-
730-31a10c	-	-	-	-	-1/-

Description: Only for PROFIBUS/PROFINET with selection option of autonomous SDB data management (802d, 828d):

With MD 11240 > 0, SDBs are loaded directly from the directory:

MD 11241=0: /siemens/sinumerik/sdb/...

MD 11241=1: /addon/sinumerik/sdb/...

MD 11241=2: /oem/sinumerik/sdb/...

MD 11241=3: /user/sinumerik/sdb/...

11250	PROFIBUS_SHUTDOWN_TYPE			EXP, N01	G3,FBU
-	PROFIBUS/PROFINET shutdown handling			BYTE	PowerOn
-					
-	-	0	0	2	7/2

Description: For PROFIBUS/PROFINET only:

Handling of PROFIBUS/PROFINET when shutting down NCK (NCK reset)

Value 0:

The bus is shut down directly from cyclic operation, without 'prewarning'

Value 1:

When shutting down NCK, the bus is changed to the CLEAR state for at least 20 cycles. Then, it is shut down. If this is not possible on the hardware side, the procedure described for value 2 is used instead.

Value 2:

When shutting down NCK, the bus is changed to a state where all drives are sent a zero word as control word1 and control word2 (pseudoclear) for at least 20 cycles. The bus itself remains in the Operate status.

11270	DEFAULT_VALUES_MEM_MASK			N01	PGA
-	Activation of default values for NC language elements			DWORD	PowerOn
-					
-	-	0	-	-	7/2

Description: Activation of the function 'Memory for initialization values of NC language elements'

```
Bit   Hex.    Meaning
       value
-------------------------------
0: (LSB)   0x1 default values GUD
```

Meaning of the individual bits:

Bit 0 = 0:

The default values stated for the definition are not stored

Bit 0 = 1:

The default values stated for the definition are stored persistently. The memory reserved via MD $MN_MM_GUD_VALUES_MEM is used for this purpose.

The memory reserved via $MN_MM_GUD_VALUES_MEM should be increased by the size required for default values.

If this size cannot be determined, the memory should be doubled and adaptations should be made later if required.

The stored default values can be restored, provided that the corresponding programming (REDEF) has been performed.

11280	WPD_INI_MODE			N01	IAD
-	Handling of INI files in workpiece directory			BYTE	PowerOn
-					
-	-	0	0	1	7/2

Description: Processing mode of INI files in the workpiece directory:

Value = 0:

An INI file, _N_werkstück_INI, stored in the workpiece directory is executed on the first NC start after workpiece selection.

Value = 1:

INI files with the names of the selected part program and extensions are executed on the first NC start after workpiece selection

SEA,

GUD,

RPA,

UFR,

PRO,

TOA,

TMA and

CEC

.

11285	MACH_MODEL_MODE			EXP	IAD
-	Type of file with machine model			BYTE	Immediately
-					
-	-	0	0	1	3/3

Description: If 3D protection zones have been defined, creation of a machine model can be requested with this machine data.

Value 0: No model is created.

Value 1: After each change (including activation) of the 3D protection zones, a machine model is created in user directory /_N_VRML_DIR with the name _N_VRMLMODEL_WRL.

11290	DRAM_FILESYSTEM_MASK			N01	IAD
-	Select directories in DRAM			DWORD	PowerOn
-					
-	-	0	-	-	2/2
710-6a2c	-	0x3f	-	-	0/0
710-31a10c	-	0x3f	-	-	0/0
720-6a2c	-	0x3f	-	-	0/0
720-31a10c	-	0x3f	-	-	0/0
730-6a2c	-	0x3f	-	-	0/0
730-31a10c	-	0x3f	-	-	0/0

Description: Bit0-n = 0:

The files of the corresponding directory should be stored in SRAM

1:

The files of the corresponding directory should be stored in DRAM.

Bit0 CST directory (Siemens cycles)

Bit1 CMA directory (machine manufacturer's cycles)

Bit2 CUS directory (user cycles)

Bit3 MPF directory (main programs)

Bit4 SPF directory (subprograms)

Bit5 WPD directory (workpieces)

11291	DRAM_FILESYST_SAVE_MASK			N01	IAD
-	Selection of directories in DRAM			DWORD	PowerOn
-					
-	-	0x07	-	-	2/2
710-6a2c	-	0x3f	-	-	0/0
710-31a10c	-	0x3f	-	-	0/0
720-6a2c	-	0x3f	-	-	0/0
720-31a10c	-	0x3f	-	-	0/0
730-6a2c	-	0x3f	-	-	0/0
730-31a10c	-	0x3f	-	-	0/0

Description: Bit0-n = 0:

No backup is performed. The files stored on NCK are lost if the control is switched off.

1:

Backup in the FFS of the NC card takes place if the files are located in DRAM.

Bit0 CST directory (Siemens cycles)

Bit1 CMA directory (machine manufacturer cycles)

Bit2 CUS directory (user cycles)

Bit3 MPF directory (main programs)

Bit4 SPF directory (subprograms)

Bit5 WPD directory (workpieces)

11292	DRAM_FILESYST_CONFIG			EXP	-
-	Configuration of the DRAM file system			BYTE	PowerOn
-					
-	-	0x01	-	-	0/0
710-6a2c	-	0x22	-	-	-/-
710-31a10c	-	0x22	-	-	-/-
720-6a2c	-	0x22	-	-	-/-
720-31a10c	-	0x22	-	-	-/-
730-6a2c	-	0x22	-	-	-/-
730-31a10c	-	0x22	-	-	-/-

Description: Configuration of the DRAM file system.

It is not permitted to change the default value!

Bit0/1:

Background memory for the DRAM file system

Bit4/5:

Memory for a fast backup during editing of DRAM files.

11294	SIEM_TRACEFILES_CONFIG			EXP	-
-	Configuration of the SIEM* trace file			DWORD	PowerOn
-					
-	-	0	-	-	2/2

Description: Configuration of the tracefiles SIEM*

Bit0:

Additional information about the PDUs sent is to be entered in _N_SIEMDOMAINSEQ_MPF for download

Bit1:

Additional information about the PDUs received is to be entered in _N_SIEMDOMAINSEQ_MPF for download

11295	PROTOC_FILE_MEM			N01	-
-	Memory type for log files			BYTE	PowerOn
-					
-	10	0,0,0,0,0,0,0,0,0,0	0	1	1/1
710-6a2c	-	1,1,1,1,1,0,0,1,1,1	-	-	-/-
710-31a10c	-	1,1,1,1,1,0,0,1,1,1	-	-	-/-
720-6a2c	-	1,1,1,1,1,0,0,1,1,1	-	-	-/-
720-31a10c	-	1,1,1,1,1,0,0,1,1,1	-	-	-/-
730-6a2c	-	1,1,1,1,1,0,0,1,1,1	-	-	-/-
730-31a10c	-	1,1,1,1,1,0,0,1,1,1	-	-	-/-

Description: Type of memory in which the contents of log files are stored.

0: SRAM

1: DRAM area TMP

With Powerline, a DRAM file system must be configured with $MM_DRAM_FILE_MEM_SIZE if files are to be stored in DRAM.

11297	PROTOC_IPOCYCLE_CONTROL			N01	-
-	Prevent overrun of IPO time level			BYTE	PowerOn
-					
-	10	1,1,1,1,1,1,1,1,1,1	0	1	1/1

Description: Setting whether an overflow of the time level is to be prevented during the recording of data in the time level of the IPO.

If applicable, data sets are discarded when the function is active, and are not entered in the log file in order to prevent an impending overflow of the IPO time level.

This may mean that data sets are also then lost if a level overflow would not yet have occurred with the function inactive.

11298	PROTOC_PREPTIME_CONTROL			N01	-
-	Interruption time prep time level in seconds.			DOUBLE	PowerOn
-					
-	10	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	-	-	1/1

Description: Time in seconds, for which the prep time level may be blocked. If the PREP does not manage to pass through within the set time, the cyclic events are not logged. It is thus ensured that operation cannot be completely blocked by data recording.

11300	JOG_INC_MODE_LEVELTRIGGRD		N01	H1
-	INC and REF in jog mode		BOOLEAN	PowerOn
-				
-	- TRUE	-	-	7/2

Description: 1: Jog mode for JOG-INC and reference point approach

JOG-INC:

When the traversing key is pressed in the required direction (e.g. +), the axis begins to traverse the set increment. If the key is released before the increment has been completely the traversed, the movement is interrupted and the axis stops. If the same key is pressed again, the axis completes the remaining distance-to-go until this is 0.

0: Continuous operation for JOG-INC and reference point approach

JOG-INC:

When the traversing key is pressed (first rising edge) the axis travels the whole set increment. If the same key is pressed again (second rising edge) before the axis has completed traversing the increment, the movement is aborted, i.e. not completed.

The differences in axis travel behavior between the jog mode and continuous operation in incremental traversing are described in detail in the relevant chapters.

For travel behavior in reference point approach see

References: /FB/, R1, "Reference Point Approach"

MD irrelevant for:

Continuous traversing (JOG continuous)

11310	HANDWH_REVERSE		N09	H1
-	Threshold for direction change handwheel		BYTE	PowerOn
-				
-	- 2	-	-	7/2

Description: Handwheel travel:

Value = 0:

No immediate travel in the opposite direction

Value > 0:

Immediate travel in the opposite direction if the handwheel is turned at least the stated number of pulses in the opposite direction.

Whether this machine data is also active for handwheel travel with DRF depends on bit10 of machine data 29624: $MC_HANDWH_CHAN_STOP_COND.

11320	HANDWH_IMP_PER_LATCH		N09	H1
-	Handwheel pulses per detent position		DOUBLE	PowerOn
-				
-	6 1.,1.,1.,1.,1.,1.	-	-	7/2

Description: The connected handwheels are adapted to the control in MD: HANDW_IMP_PER_LATCH.

The number of pulses generated by the handwheel for each handwheel detent position is to be entered. The handwheel pulse weighting must be defined separately for each connected handwheel (1 to 3). With this adaptation, each handwheel detent position has the same effect as one press of the traversing key in incremental traversal.

If a negative value is entered, the direction of rotation of the handwheel is reversed.

Related to:

MD: JOG_INCR_WEIGHT

(weighting of an increment of a machine axis for INC/manual).

11322	CONTOURHANDWH_IMP_PER_LATCH		N09	H1
-	Contour handwheel pulses per detent position		DOUBLE	PowerOn
-				
-	6 1.,1.,1.,1.,1.,1.	-	-	7/2

Description: Adaptation factor to the hardware of the contour handwheel:

Enter the number of pulses issued per detent position by the contour

handwheel.

Because of this normalization, a detent position of the contour handwheel

corresponds to one press of a key with incremental jog processes.

Sign reversal reverses the direction of evaluation.

11324	HANDWH_VDI_REPRESENTATION		N01	OEM
-	Display of handwheel number in VDI Interface		DWORD	PowerOn
-				
-	- 0	0	1	7/2

Description: The number of the handwheel is displayed in the channel/axis-specific signals of the

VDI interface:

Value = 0 :

Bit coded (1 of 3, only 3 handwheels can be displayed)

Value = 1 :

Binary coded (6 handwheels can be displayed)

11330	JOG_INCR_SIZE_TAB			EXP, N09	H1
-	Increment size for INC/handwheel			DOUBLE	PowerOn
-					
-	5	1.,10.,100.,1000.,10000.	-	-	7/2

Description: In incremental traversal or handwheel travel, the number of increments to be traversed by the axis can be defined by the user, e.g. via the machine control panel.

In addition to the variable increment sizes (INCvar), 5 fixed increment sizes (INC...) can also be set.

The increment size for each of these 5 fixed increments is defined collectively for all axes by entering values in JOG_INCR_SIZE_TAB [n]. The default setting is INC1, INC10, INC100, INC1000 and INC10000.

The entered increment sizes are also active for DRF.

The size of the variable increment is defined in SD: JOG_VAR_INCR_SIZE.

Related to:

MD: JOG_INCR_WEIGHT(weighting of an increment for INC/manual)

IS

(geometry axis 1-3 active machine function: INC1; ...; INC10000)

IS

(active machine function: INC1; ...; INC10000).

11340	ENC_HANDWHEEL_SEGMENT_NR			EXP, N01	FBMA
-	3rd handwheel: type of drive			BYTE	PowerOn
-					
-	-	1	1	1	0/0

Description: For SIMODRIVE611D only:

Number of the bus segment over which the 3rd handwheel (encoder connection) is addressed:

Related to: $MN_ENC_HANDWHEEL_MODULE_NR
$MN_ENC_HANDWHEEL_INPUT_NR

11342	ENC_HANDWHEEL_MODULE_NR			N01	FBMA
-	3rd handwheel: drive number / measuring circuit number			BYTE	PowerOn
-					
-	-	0	0	31	7/2

Description: For SIMODRIVE611D only:

Number of the module within a segment ($MN_ENC_HANDWHEEL_SEG-MENT_NR) by which the 3rd handwheel is addressed. On the SIMODRIVE611D, the logical drive number must be entered here (see MD 13010: DRIVE_LOGIC_NR).

= 0: The configuration of a 3rd handwheel is deactivated,
the settings of $MN_ENC_HANDWHEEL_SEGMENT_NR and
$MN_ENC_HANDWHEEL_INPUT_NR are irrelevant in this case.

Related to MD 13010: DRIVE_LOGIC_NR
$MN_ENC_HANDWHEEL_SEGMENT_NR
$MN_ENC_HANDWHEEL_INPUT_NR

11344	ENC_HANDWHEEL_INPUT_NR			N01	FBMA
-	3rd handwheel: Input to module/meas. circ. Board			BYTE	PowerOn
-					
-	-	1	1	2	7/2

Description: For SIMODRIVE611D only:

Number of the input on a module over which the 3rd handwheel is addressed.

840D: 1/2 = upper/lower actual value input

Related to $MN_ENC_HANDWHEEL_SEGMENT_NR
$MN_ENC_HANDWHEEL_MODULE_NR

11346	HANDWH_TRUE_DISTANCE			N01	FBMA
-	Handwheel default path or velocity			BYTE	PowerOn
-					
-	-	1	0	7	7/2

Description: Setting the behavior for traversing with the handwheel, contour handwheel and with FDA=0:

Value = 1: (default value)

The default settings of the handwheel are path defaults. No pulses are lost. Residual axes motions occur as a result of the limitation to a maximal permissible velocity.

Value = 0:

The default settings of the handwheel are velocity defaults. The axes stop as soon as the handwheel stops. The motion is immediately braked if no pulses come from the handwheel in an interpolation cycle. Therefore, only a short residual motion of the axes can

occur as a result of the braking ramp. The handwheel pulses supply no path default.

Value = 2:

The default settings of the handwheel are velocity defaults. The axes are to stop as soon as the handwheel stops. The motion is immediately braked if no pulses come from the handwheel in an interpolation cycle.

However in contrast to

value = 0 braking is not along the shortest possible path but

on the next possible point of a notional incrementation.

In each case this incrementation corresponds to a displacement which the selected

axis travels per handwheel detent position (see $MA_JOG_INCR_WEIGHT and

$MN_JOG_INCR_SIZE_TAB, $MC_HANDWH_GEOAX_MAX_INCR_SIZE,

$MA_HANDWH_MAX_INCR_SIZE). The start of the traversing is taken as the zero point

of the incrementation.

Value = 3:

The default settings of the handwheel are path defaults. If premature braking is required

on account of settings in other machine data ($MN_HANDWH_REVERSE != 0, $MC_HANDWH_CHAN_STOP_COND,

$MA_HANDWH_STOP_COND), then in

contrast to value = 1 braking is not along the shortest possible path,

but on the next possible point of a notional incrementation (see

value = 2).

Value = 6:

Same as value = 2, but no stop on the last possible grid position in front of a limitation, but approach to the limitation.

Value = 7:

Same as value = 3, but no stop on the last possible grid position in front of a limitation, but approach to the limitation.

11350	HANDWHEEL_SEGMENT			N09	-
-	Handwheel segment			BYTE	PowerOn
-					
-	6	0,0,0,0,0,0	-	-	7/2
840disl-6a	-	1,1,0,0,0,0	-	-	-/-
840disl-20a	-	1,1,0,0,0,0	-	-	-/-

Description: Machine data defines which

hardware segment the handwheel is connected to:

0 = SEGMENT_EMPTY ;no handwheel

1 = SEGMENT_840D_HW ;handwheel at 840D HW

2 = SEGMENT_802DSL_HW ;handwheel at 802DSL HW

5 = SEGMENT_PROFIBUS ;handwheel at PROFIBUS

7 = SEGMENT_ETHERNET ;handwheel at Ethernet

11351	HANDWHEEL_MODULE			N09	-
-	Handwheel module			BYTE	PowerOn
-					
-	6	0,0,0,0,0,0	0	6	7/2
840disl-6a	-	1,1,0,0,0,0	-	-	-/-
840disl-20a	-	1,1,0,0,0,0	-	-	-/-

Description: Machine data specifies the hardware module to which

the handwheel is connected.

(Content dependent on $MN_HANDWHEEL_MODUL):

0 = no handwheel configured

$MN_HANDWHEEL_MODUL =

1 ;SEGMENT_840D_HW

1 ;SEGMENT_802DSL_HW

1..6 ;SEGMENT_PROFIBUS/PROFINET ;Index for $MN_HANDWHEEL_LOGIC_ADDRESS[(x-1)]

1 ;SEGMENT_ETHERNET

11352	HANDWHEEL_INPUT			N09	-
-	Handwheel connection			BYTE	PowerOn
-					
-	6	0,0,0,0,0,0	0	6	7/2
840disl-6a	-	1,2,0,0,0,0	-	-	-/-
840disl-20a	-	1,2,0,0,0,0	-	-	-/-

Description:
Machine data which is intended to select
the handwheels connected to
a hardware module:
0 = No handwheel configured
1..6 = Handwheel connection to HW module/Ethernet interface

11353	HANDWHEEL_LOGIC_ADDRESS			N04, N10	-
-	Logical handwheel slot addresses			DWORD	PowerOn
-					
-	6	0,0,0,0,0,0	0	8191	7/2

Description:
For PROFIBUS/PROFINET only:
Logical start address of the hand wheel slots if handwheels are connected by PROFIBUS/PROFINET ($MN_HANDWHEEL_SEGMENT = 5)

11380	MONITOR_ADDRESS			EXP, N06	S1Z
-	Test MD for changing the NCK code or data for Safety Integrated			DWORD	Immediately
NBUP, NDLD					
-	-	0	-	-	0/0

Description:
Address of an NCU memory location whose content is displayed in the MDs MONITOR_DISPLAY_INT and MONITOR_DISPLAY_REAL.
There are no protective measures incorporated to prevent unauthorized access. That is the input address points to a memory area protected by the system or unoccupied, so refreshing the MD values MONITOR_DISPLAY_INT and MONITOR_DISPLAY_REAL causes a time-out and the NCU remains at a standstill (watchdog LED lights up)!
There is a list of permisible addresses for the test, which depends on the software version.
A restart resets the address to its starting value.
It then points to any writable and readable memory location that is not used by any other system function.

11382	MONITOR_DISPLAY_INT			EXP, N06	S1Z
-	INTEGER display of the addressed location			DWORD	Immediately
NBUP, NDLD					
-	-	0	-	-	0/0

Description:
INTEGER display of the addressed location SW3.2
This MD displays the content of the NCU memory location that is defined in MD MONITOR_ADDRESS. The displayed values contains the four consecutive bytes from the stated address, whereby the first byte is on the extreme right and the fourth on the extreme left.
This MD is a display MD whose content is read anew on every display refresh. Writing to this MD is ignored (without alarm).

11384	MONITOR_DISPLAY_REAL		EXP, N06	STZ
-	REAL display of the addressed location		DOUBLE	Immediately
NBUP, NDLD				
-	- 0.0	-	-	0/0

Description: REAL display of the addressed location SW3.2

This MD displays the content of the NCU memory location that is defined in MD MONITOR_ADDRESS. The displayed value interprets the eight consecutive memory locations from the stated address as a floating point number with double accuracy (64 bit IEEE format). 0.0 is displayed if this value does not correspond to a valid floating point number.

This MD is a display MD whose content is read anew on every display refresh. Writing to this MD is ignored (without alarm).

11386	MONITOR_INPUT_INT		EXP, N06	STZ
-	INTEGER input for the addressed location		DWORD	Immediately
NBUP, NDLD				
-	- 0	-	-	0/0

Description: INTEGER input for addressed location, SW3.2

The value is written with the aid of MD MONITOR_INPUT_STROBE into the address selected with MD MONITOR_ADDRESS. The 4 bytes from the stated address are taken over by writing the value 1 in the MD MONITOR_INPUT_STROBE.

In so doing, the byte moves to the extreme right of the memory location MONITOR_ADDRESS, the byte to its left into the memory location MONITOR_ADDRESS+1, etc.

11388	MONITOR_INPUT_REAL		EXP, N06	STZ
-	REAL input for addressed location		DOUBLE	Immediately
NBUP, NDLD				
-	- 0.0	-	-	0/0

Description: REAL input for addressed location, SW3.2

The value is written with the aid of MD MONITOR_INPUT_STROBE into the address selected with MD MONITOR_ADDRESS. The 8 bytes from the stated address are taken over by writing the value 2 in the MD MONITOR_INPUT_STROBE.

In so doing, the input floating point number is converted into 64 bit IEEE format.

11390	MONITOR_INPUT_STROBE			EXP, N06	STZ
-	Overwrite the addressed location with MONITOR_INT/ REAL			BYTE	Immediately
NBUP, NDLD					
-	-	0	0	2	0/0

Description: Overwriting the addressed location with MONITOR_INPUT_INT/REAL, SW3.2

An input into this MD takes over the content of the MD MONITOR_INPUT_INT or the MD MONITOR_INPUT_REAL. The input value decides which data is taken over:

0: No action

1: Content of MD MONITOR_INPUT_INT is written in four NCU bytes from MD MONITOR_ADDRESS.

2: Content of MD MONITOR_INPUT_REAL is written in eight NCU bytes from MD MONITOR_ADDRESS.

The content of MONITOR_INPUT_STROBE is reset to 0 after the take-over (no action). A new input can therefore be made immediately.

In order to familiarize oneself with this function, one should first leave MD MONITOR_ADDRESS at its default value. One can then write data without causing damage.

Examples:

MONITOR_INPUT_INT = 55AA

MONITOR_INPUT_STROBE = 1

=> in MONITOR_DISPLAY_INT appears 55AA

MONITOR_INPUT_REAL = 1.234

MONITOR_INPUT_STROBE = 2

=> in MONITOR_DISPLAY_REAL appears 1.234

Caution!!!

Writing data to unknown addresses can even destroy the NCK system program! That may have unforeseen consequences (danger to machine and people!). If the machine and those present survive such an action undamaged, the system program can usually be restored by power off/on.

11398	AXIS_VAR_SERVER_SENSITIVE			EXP	B3
-	Axis-Var server response			BYTE	PowerOn
-					
-	-	0	-	-	7/2

Description: The axis-variable server supplies the data for the OPI blocks SMA/ SEMA, SGA/SEGA and SSP.

If no value can be supplied for an axis (e.g. because the axis is a link axis) then a default value (usually 0) is returned.

For debugging purposes, this machine data can be used to set the axis-var-server to sensitive so that an error message is returned instead of a default value.

0: default value

1: error message

11400	TRACE_SELECT			EXP	-
-	Activation of internal trace functions			DWORD	PowerOn
-					
-	-	0	-	-	0/0

Description: Bit string for activating internal trace functions for NCK time measurements, analog output of variables etc.

11405	TCI_TRACE_ACTIVE			EXP	-
-	Activation of internal task trace function			BOOLEAN	PowerOn
-					
-	-	FALSE	-	-	0/0

Description: Control the activation of the TCI interface for the NRKpro. It will activate the tci and kernel task traces modules.

11410	SUPPRESS_ALARM_MASK			EXP, N06	D1
-	Mask for support of special alarm outputs			DWORD	PowerOn
-					
-	-	0x108000	-	-	7/2

Description: Mask for suppressing special alarm outputs

Bit set: The corresponding alarm (warning) is NOT generated.

Bit 0:

Alarm 15110 "Channel %1 block %2 REORG not possible"

Bit 1:

Alarm 10763 "Channel %1 block %2. The path component of the block in the contour plane is zero"

Bit 2:

Alarm 16924 "Channel %1 Caution: program testing can modify tool/magazine data"

--> Note: The alarm is only a message alarm

Bit 3:

Alarm 22010 "Channel %1 spindle %2 block %3. Actual gear stage does not correspond to the set gear stage"

Bit 4:

Alarm 17188 "Channel %1 D number %2 with tool T nos. %3 and %4 defined"

Alarm 17189 "Channel %1 D number %2 of the tools at magazine/ magazine locations %3 and %4 defined". The two alarms are of equal status and only message alarms.

Bit 5:

Alarm 22071 "TO unit %1 tool %2 duplo no. %3 is active but not in the active wear grouping." The alarm is only a message alarm.

Bit 6:

Alarm 4027 "NOTICE! MD %1 was also changed for the other axes of the axis container %2 "

Alarm 4028 "NOTICE! The axial MDs in the axis container will be aligned on the next runup "

Bit 7:

Alarm 22070 "TO unit %1 please change tool T= %2 into magazine. Repeat data backup". The alarm is only a message alarm.

Bit 8:

Alarm 6411 "Channel %1 tool %2 with duplo no. %3 has reached tool prewarning limit"

Alarm 6413 "Channel %1 tool %2 with duplo no. %3 has reached tool monitoring limit."

The two alarms are only message alarms. They occur during the program execution.

Bit 9:

Alarm 6410 "TO unit %1 tool %2 with duplo no. %3 has reached tool prewarning limit ."

Alarm 6412 "TO unit %1 tool %2 with duplo no. %3 has reached tool monitoring limit ".

The two alarms are only message alarms. They occur as a result of an operator action.

Bit10:

Alarm 10604 "channel %1 block %2 "Thread lead increase too high"

Alarm 10605 "channel %1 block %2 "Thread lead decrease too high"

Bit 11:

Alarm 14088 "Channel 51 block %2 axis %3 doubtful position".

Bit 12:

Alarm 10607 "Channel %1 block %2 tapping cannot be executed with frame."

Bit13:

Alarm 10704 " channel %1 block %2 Protection area monitoring is not guaranteed."

Bit14:

Alarm 21701 "Measuring reactivated too soon (<2 IPO cycles)"

Bit15:

Alarm 5000 "Communication order cannot be executed"

Bit16:

Alarm 21600 "Monitoring active for ESR"

Bit17:

Alarm 16945 "Channel %1 action %2<ALNX> is delayed until block end"

Note: The alarm is only a message alarm.

Bit18:

Alarm 10750 "Channel %1 block %2 Activation of the tool radius compensation without tool number"

Bit19: Alarm 17193 "Channel %1 block %2 The active tool ist no longer at tool holder no./spindle no. %3, program %4"

Bit20:

Alarm 2900 "Reboot is delayed"

Bit21:

Alarm 22012 "Channel %1 block %2. Leading axis %3 is in simulation mode"

Alarm 22013 "Channel %1 block %2. Following axis %3 is in simulation mode"

Alarm 22014 "Channel %1 block %2. The dynamics of leading axis %3 and following axis %4 are very different"

Alarm 22040 "Channel%1 Block %3 Spindle %2 not referenced with zero mark" is no longer checked (cyclically) with

Bit21 set after power ON of the closed loop position control.

Bit22:

Alarm 26080 "Channel %1 retraction position of axis %2 not programmed or invalid"

Alarm 26081 "Channel %1 single axis trigger axis %2 is triggered, but axis is not PLC controlled"

Bit23:

Alarm 16949 "Correspondence between marks of channel %1 and channel %2

is invalid"

Bit24:

Alarm 16950 "Channel %1 search run with holding block"

Bit25:

Alarm 22016 "Channel %1 block %2 following spindle %3 in range of reduced acceleration capacity"

Bit26:

Alarm 22015 "Channel %1 block %2 following spindle %3 no dynamic for additional motion"

Bit27:

Alarms 16112 and 22030 "Channel %1 block %2 following spindle %3 impermissible programming"

Bit28:

Alarm 26083 "Channel %1 ESR for PLC controlled axis %2 was triggered"

Bit29:

Alarm 16772 "Channel %1 block %2 axis %3 is following axis, coupling is opened"

Bit30:

Alarm 16600 "Channel %1 block %2 spindle %3 gear stage change not possible"

Bit31:

Alarm 16774 "Channel %1 axis %2 synchronizsation aborted"

11411	ENABLE_ALARM_MASK		EXP	-
-	Activation of warnings		DWORD	Reset
-				
-	- 0	-	-	7/2

Description: Mask for generating alarms that are normally suppressed

Bit set:Alarms of this alarm group are output.

Bit not set:Alarms of this alarm group are not output

Bit Hex.AlarmMeaning
value

===

0: 0x1Alarms that have SHOWALARMAUTO as the alarm response are output

1: 0x2Alarms that have SHOWWARNING as the alarm response are output

2: 0x4Alarm 22280 'Thread power up path too short' is output.

3: 0x8Alarms that are triggered by the NCU LINK MODULE are switched on.

4: 0x10Alarm 10883 'Chamfer or rounding must be shortened' allowed

5: 0x20Alarm 20096 'Brake test aborted' is output

6: 0x40Alarm 16956 'Program cannot be started because of global start disable' is output

Alarm14005 'Program cannot be started because of program-specific start disable' is output. Alarm can only be switched on in channel status RESET, in all other channel states it is output without conditions.

7: 0x80Alarm 16957 'Stop delay range is suppressed' is output

8: 0x100Alarm 1011 fine coding150019 or 150020 'Incorrect axis number in the LINK'

9: 0x200Alarm 22033 Diagnostics for 'track synchronism' (synchronous spindle)

10: 0x400Alarm 15122 'PowerOn after Powerfail: %1 data were restored, thereof %2 machine data, %3 errors' is output

11: 0x800Alarms 10722, 10723, 10732 or 10733 are output instead of alarms 10720, 10721, 10730 or 10731.

11412	ALARM_REACTION_CHAN_NOREADY		EXP, N01	D1
-	Alarm response CHAN_NOREADY permitted		BOOLEAN	PowerOn
-				
-	- FALSE	-	-	7/2

Description: This MD is used for compatibility with the PLC systems older than SW4.1.

If this MD is not set, the behavior implemented before SW4.1 (configured alarm reaction) is set

With SW 4.1 and higher, it is possible to set signal CHANNEL_NOREADY on the PLC in response to alarms.

If this MD is not set, then the alarm handler internally re-configures BAG_NOREADY into CHAN_NOREADY.

11413	ALARM_PAR_DISPLAY_TEXT		EXP, N01	D1
-	Alarm parameter as text output		BOOLEAN	PowerOn
-				
-	- FALSE	-	-	0/0

Description: If the MD is set, texts can be output as alarm parameters instead of numbers.

11414	ALARM_CLR_NCSTART_W_CANCEL		EXP, N01	D1
-	Clear NCSTART alarms with CANCEL		BOOLEAN	PowerOn
-				
-	- FALSE	-	-	7/2

Description: If this MD is set, then alarms that have ClearInfo=NCSTART are cleared by the Alarm Cancel button as well as by NC-Start.

If this MD is not set, then NCSTART alarms are not cleared by Cancel.

The purpose of this MD is to provide compatibility with system behavior.

11415	SUPPRESS_ALARM_MASK_2		EXP, N06	-
-	Masking of alarm outputs		DWORD	PowerOn
-				
-	- 0x0	-	-	7/2

Description: Mask for suppressing special alarm outputs

Bit set:Corresponding alarm (warning) is NOT triggered.

```
Bit  Hex. Meaning
   value
=================================================================
===================
0:   0x116773  "Channel %1 axis %3 is following axis. The axis/
spindle disables of the leading axes are different."
1:   0x22100  "NCK battery warning level reached"
      2101  "NCK battery alarm"
      2102  "NCK battery alarm"
2:   0x42120 "NCK fan alarm"
3:   0x815120 "PowerFail: Display buffer overflow"
4:   0x1015187 "Error during execution of PROGEVENT file"
5:   0x2015188 "Error during execution of ASUB file"
6:   0x4026120 "$AA_ESR_ENABLE = 1 and axis is to become neutral"
      26121 "Axis is neutral and $AA_ESR_ENABLE =1 is to be set"
      26123 "$AA_ESR_ENABLE = 1 is to be set, but $MA_ESR_REACTION
   is not set"
      26124 "$AC_TRIGGER triggered, but axis is neutral, ESR
   ignores this axis"
7:   0x80:10724 "Software limit violated at block start"
      10734 "Operating range limit violated at block start"
      10737 "WCS operating range limit violated at block start"
```

8: 0x100:14008 "WRITE command in /_N_EXT_DIR"
10734 "Operating range limit violated at block start"
10737 "WCS operating range limit violated at block start"
9: 0x200:14006 "Invalid program name"
10: 0x400:4006 "Maximum number of axes exceeded that can be activated"

11420	LEN_PROTOCOL_FILE			N01	PGA
-	Size of protocol files (kB)			DWORD	PowerOn
-					
-	-	1	1	1000000	7/2

Description: Blocks from the part program can be stored in a file with the WRITE command. The length of the log file is limited. If this maximum length is exceeded, the WRITE command produces an error.

11450	SEARCH_RUN_MODE			EXP, N01	K1
-	Parameterization for search run			DWORD	PowerOn
-					
-	-	0	0	0x3F	7/2

Description: The behavior during the action blocks after search run can be affected by the following bits:

Bit 0 = 0:

Machining is stopped after loading of the last action block after search run, the NC/PLC interface signal (letzter Aktionssatz aktiv) gesetzt und der Alarm 10208 ausgegeben.

Bit 0 = 1:

Machining is stopped with the loading of the last action block after search run, and the NC/PLC interface signal (letzter Aktionssatz aktiv) gesetzt. Der Alarm 10208 wird erst ausgegeben, wenn die PLC dies durch Setzen des Nahtstellensignal DB21-30 DBX1.6 (PLC-Aktion beendet) anfordert.

Usage:

Starting an ASUB from the PLC after search run.

The message to the operator that another NC start is required in order to continue with the program is not to be displayed until after the end of the ASUB.

Bit1 = 1

Automatic ASUB start after output of the action blocks (see also $MN_PROG_EVENT_NAME). Alarm 10208 is not output until the ASUB has finished.

Bit2 = 0:

Spindle: The auxiliary functions are output in the action blocks

Bit2 = 1:

The output of the auxiliary functions in the action blocks is suppressed. The spindle programming collected by search run can be output at a later point in time (e.g. in an ASUB).

The program data for this are stored in the following system variables:

$P_SEARCH_S,

$P_SEARCH_SDIR,

$P_SEARCH_SGEAR,

$P_SEARCH_SPOS,

$P_SEARCH_SPOSMODE.

Bit 3 = 1:

The cascaded search run is disabled (default setting: release).

Cascaded search run means that the search run is restarted immediately after finding a search target.

Bit 4:Reserved

Bit 5 = 0:

During block search on a nibbling block the 1st nibbling stroke is not executed.

Bit 5 = 1:

During block search on a nibbling block a punching stroke is triggered at block start (1st nibbling stroke).

11460	OSCILL_MODE_MASK			N09	P5
-	Mode mask for asynchronous oscillation			DWORD	PowerOn
-					
-	-	0x0	0	0xFFFF	7/2

Description: Bit 0

Value 1

In the case of block search, the oscillation movement is started immediately after NC start, i.e. during approach to approach position, provided it has been activated in the program section being processed.

Value 0

(default value)

The oscillation movement is not started until the approach position is reached.

11470	REPOS_MODE_MASK			EXP, N01	K1
-	Repositioning properties			DWORD	PowerOn
-					
-	-	0x8	0	0xFFFF	7/2

Description: This bit mask can be used to set the behavior of the control during repositioning.

Bit no. Meaning when bit set

----

0 (LSB)

The dwell time is continued in the residual block from where it was interrupted. (If the bit is not set, the dwell time is repeated completely).

1 Reserved

2 When the bit is set, the repositioning of individual axes can be prevented or delayed via the VDI interface.

3 When the bit is set, positioning axes are repositioned in the approach block during search run via program test.

4 As 3, but after every Repos, not only during search run.

5 When the bit is set, changed feeds and spindle speeds already become valid in the residual block, otherwise not until the following block.

6 When the bit is set, neutral axes and positioning spindles are repositioned after SERUPRO as command axes in the approach block.

7 The bit changes the behavior of the VDI-AXIN interface signal "Repos Delay". The level of "Repos Delay" is read if REPOSA is interpreted. Axes that are neither geo nor orientation axes are then excluded from the REPOS, that is REPOS does NOT move these axes.

11480	PLC_OB1_TRACE_DEPTH			EXP, N03, N09	-
-	Buffer depth of PLC trace data at OB1			DWORD	PowerOn
-					
-	-	2	2	8	2/2

Description: Buffer depth of PLC trace data at OB1.

Multiple values of PLC data are buffered, between the time of collection in the PLC and the time of inspection in NCK. Variables traced at "OB1" are collected once per complete PLC scan, but can only be inspected once per IPO cycle.

The buffer size must accomodate at least one more value than the number of buffered values to be inspected. This is to prevent NCK from inspecting a value that the PLC is in the process of collecting.

A good value to start with is one more than machine data item PLC_IPO_TIME_RATIO.

The larger the buffer depth, the fewer PLC variables that can be traced, because there is a single, small, fixed pool of data slots for sending data samples from the PLC to NCK (64 data slots). Every PLC variable being traced is allocated as many data slots from the pool as the value of the buffer depth.

The single pool of data slots is shared by data collected at OB1, OB35, and OB40 (even though the buffer depths of OB1, OB35, and OB40 can be configured to be different from each other). It is also shared by all concurrent users of trace, even though the users might have no knowledge of one another.

11481	PLC_OB35_TRACE_DEPTH			EXP, N03, N09	-
-	Buffer depth of PLC trace data at OB35			DWORD	PowerOn
-					
-	-	2	2	8	2/2

Description: Buffer depth of PLC trace data at OB35.

Multiple values of PLC data are buffered, between the time of collection in the PLC and the time of inspection in NCK. Variables traced at "OB35" are collected every time the PLC timer interrupts, but can only be inspected once per IPO cycle.

The buffer size must accomodate at least one more value than the number of buffered values to be inspected. This is to prevent NCK from inspecting a value that the PLC is in the process of collecting.

A good value to start with is one more than the number of PLC timer interrupts expected to occur every IPO cycle.

The larger the buffer depth, the fewer PLC variables that can be traced, because there is a single, small, fixed pool of data slots for sending data samples from the PLC to NCK (64 data slots). Every PLC variable being traced is allocated as many data slots from the pool as the value of the buffer depth.

The single pool of data slots is shared by data collected at OB1, OB35, and OB40 (even though the buffer depths of OB1, OB35, and OB40 can be configured to be different from each other). It is also shared by all concurrent users of trace, even though the users might have no knowledge of one another.

11482	PLC_OB40_TRACE_DEPTH			EXP, N03, N09	-
-	Buffer depth of PLC trace data at OB40			DWORD	PowerOn
-					
-	-	2	2	8	2/2

Description: Buffer depth of PLC trace data at OB40.

Multiple values of PLC data are buffered, between the time of collection in the PLC and the time of inspection in NCK. Variables traced at "OB40" are collected just when the PLC receives the special, programmably initiated OB40 interrupt from NCK, but can only be inspected once per IPO cycle.

The buffer size must accomodate at least one more value than the number of buffered values to be inspected. This is to prevent NCK from inspecting a value that the PLC is in the process of collecting.

If the OB40 interrupt is issued less frequently than once per IPO cycle, then the OB40 buffer depth should be 2. Otherwise it should be one more than the largest number of interrupts expected during any one IPO cycle.

The larger the buffer depth, the fewer PLC variables that can be traced, because there is a single, small, fixed pool of data slots for sending data samples from the PLC to NCK (64 data slots). Every PLC variable being traced is allocated as many data slots from the pool as the value of the buffer depth.

The single pool of data slots is shared by data collected at OB1, OB35, and OB40 (even though the buffer depths of OB1, OB35, and OB40 can be configured to be different from each other). It is also shared by all concurrent users of trace, even though the users might have no knowledge of one another.

11500	PREVENT_SYNACT_LOCK			N01, N09	S5,FBSY
-	Protected synchronized actions			DWORD	PowerOn
-					
-	2	0,0	0	255	7/2

Description: First and last IDs of a protected synchronized action area.

Synchronized actions with ID numbers in the protected area can no longer be

- overwritten
- disabled (CANCEL)
- locked (LOCK)

once they have been defined. Furthermore, protected synchronized actions cannot be locked by the PLC (LOCK). They are shown at the interface to the PLC as non-lockable.

Note:

The protection should be suspended while creating the synchronized actions to be protected, as otherwise a Power On will be necessary after every change in order to be able to redefine the logic. There is no area of protected synchronized actions with 0.0. The function is disabled. The values are read as absolute values, and over and under values can be given in any order.

11510	IPO_MAX_LOAD		N01, N05	-
%	Max. permitted IPO load		DOUBLE	PowerOn
-				
-	- 0.00	0.0	100.0	7/2

Description: Enable utilization analysis via synchronized actions.

This $MN_IPO_MAX_LOAD sets the IPO computing time (in % of the IPO cycle) after which the variable $AN_IPO_LOAD_LIMIT is to be set to TRUE. The variable is reset to FALSE if the value falls below this after having once exceeded it.

This diagnostics function is disabled if the machine data is 0.

11550	STOP_MODE_MASK		N01	-
-	Defines the stop behavior.		DWORD	PowerOn
-				
-	- 0	0	0x1	7/2

Description: This MD describes the stop behavior of the NCK under certain conditions:

Bit no. Meaning

Bit 0 == 0 :=

No stop if G codes G331/G332 are active and a path motion or G4 has also been programmed.

Bit 0 == 1 :=

Same behavior as until SW version 6.4, i.e. a stop is possible during G331/G332.

Bits 1.....15

Not assigned

11600	BAG_MASK		N01	K1
-	Defines the mode group behavior		DWORD	PowerOn
-				
-	- 0	0	0x3	7/2

Description: This MD describes the effect of the VDI signals on the channels of a mode group in respect of ASUBs and interrupt routines.

Bit no. Hexadec. Meaning when bit set
value

Bit0: 0x0 Normal response to mode group signals in all channels of the mode group (as SW 3)

All channels switch into a program operating mode on interrupt.

Bit0: 0x1 No response to other mode group VDI signale in the channel in which an

interrupt handling (ASUB) is running. (BAG-RESET, BAG-STOP. individual types

A and B, mode selection)

Bit1: 0x1 There is an operating mode changeover only in those channels

which have received an interrupt request.

(Only when bit 0 is set!)

11602	ASUP_START_MASK			N01, -	K1
-	Ignore stop conditions for ASUP			DWORD	PowerOn
-					
-	-	0	0	0xf	7/2

Description: This machine data defines which stop reasons are to be ignored at an ASUB start. The ASUB is started, or the following stop reasons are ignored:

Bit 0 :

STOP reason: STOP key , M0 or M01

An ASUB is started immediately if NCK is in RESET state (or JOG mode)(no ASUB can be started in RESET/JOG without this bit).

NOTICE:

- This bit is set implicitly if $MC_PROG_EVENT_MASK deviates from zero in a channel!

- This bit is set implicitly if BIT 1 is set in $MN_SEARCH_RUN_MODE!

Bit 1 :

Start allowed even if not all axes have yet been referenced.

Bit 2:

Start allowed even if a read-in disable is active,that is the blocks of the ASUB program are loaded and executed immediately. This disables machine data IGNORE_INHIBIT_ASUP. The NCK behavior corresponds to the machine data contents of IGNORE_INHIBIT_ASUP== FFFFFFFF.

If the bit is not set:

then the ASUB is internally selected, but not processed until the read-in disable is canceled.

The assignment of the machine data IGNORE_INHIBIT_ASUP is evaluated.

If IGNORE_INHIBIT_ASUP = 0 also applies, then an ASUB is triggered immediately internally, but the blocks of the ASUB program are not loaded until the read-in disable is canceled.

The path is immediately decelerated when the ASUB is triggered (except with option BLSYNC).

The read-in disable is set once more in the ASUB program.

Bit 3:

Notice:

The following function can always be activated in single-channel systems. Multi-channel system require bit1 in machine data $MN_BAG_MASK in addition. The function is active o_n_l_y for those ASUBs that were activated from program status Abort (channel status Reset). The function is not active in multi-channel systems without $MN_BAG_MASK Bit1.

If an ASUB is started automatically from JOG, the user may stop in the middle of the ASUB program. The JOG mode is continuously displayed for the user. With bit 3 set, the user may jog in this situation. This is not possible without bit 3. In this case mode change is locked with alarm 16927. By pressing the Start key, the user can continue the ASUB program. As long as the ASUB program is running, the user is naturally not able to jog. After ASUB program end the user may jog again.

Bits 4 to 15:Reserved

Related to:

MD 11604: ASUP_START_PRIO_LEVEL

11604	ASUP_START_PRIO_LEVEL			N01, -	K1
-	Priorities from which 'ASUP_START_MASK' is effective			DWORD	PowerOn
-					
-	-	0	0	128	7/2

Description: This machine data defines the ASUB priority from which machine data ASUP_START_MASK is to be applied. MD ASUP_START_MASK is applied from the level specified here up to the highest ASUB priority level 1.

Related to:

ASUP_START_MASK

11610	ASUP_EDITABLE			N01	K1
-	Activation of a user-specific ASUP program			DWORD	PowerOn
-					
-	-	0	0	0x7	7/2

Description: This MD determines whether user-specific routine: _N_ASUP_SPF stored in directory _N_CUS_DIR/ _N_CMA_DIR is to be used to process RET and REPOS. The user ASUB is searched for first in _N_CUS_DIR.

Value: Meaning:

0 Routine _N_ASUP_SPF is not activated for either RET or REPOS.

Bit0 = 1User-specific routine _N_ASUP_SPF is executed for RET, the routine supplied by the system is executed for REPOS.

Bit1 = 1User-specific routine _N_ASUP_SPF is executed for REPOS, the routine supplied by the system is executed for RET

Bit0= + bit1 = 3User-specific routine _N_ASUP_SPF is executed for both RET and REPOS

Bit2 = 1User ASUB _N_ASUP_SPF is searched for first in _N_CMA_DIR

Related to:

MD 11612: ASUP_EDIT_PROTECTION_LEVEL

References:

/IAD/ "Installation and Start-Up Guide"

11612	ASUP_EDIT_PROTECTION_LEVEL			N01	K1
-	Protection level of the user-specific ASUP program			DWORD	PowerOn
-					
-	-	2	0	7	7/2

Description: Protection level of the user-specific ASUB program for RET and/or REPOS

The data is active only if MD 11610: ASUP_EDITABLE is set to a value other than 0.

This machine data defines the protection level of the program _N_ASU_CUS.

MD irrelevant for:

ASUP_EDITABLE set to 0

Related to:

ASUP_EDITABLE

11620	PROG_EVENT_NAME			EXP, N12	-
-	Program name for PROG_EVENT			STRING	PowerOn
-					
-	-		-	-	7/2

Description: Name of the user program called by the functions "Event-controlled program calls" and "Automatic ASUB start after block search" ($MN_SEARCH_RUN_MODE Bit1). _N_PROG_EVENT_SPF is preset.

The presetting becomes active if $MN_PROG_EVENT_NAME includes a blank string.

If the machine data does not contain a blank string, then the syntax of the string is checked as in the case of a subprogram identifier. This means that the first two characters must be letters or underscores (not numbers). If this is not the case, alarm 4010 is output during power on.

The program must be located in a cycle directory. The following search path is run through when it is called:

1. /_N_CUS_DIR/_N_PROG_EVENT_SPF
2. /_N_CMA_DIR/_N_PROG_EVENT_SPF
3. /_N_CST_DIR/_N_PROG_EVENT_SPF

The prefix (_N_) and the suffix (_SPF) of the program name are added automatically if they have not been declared.

11640	ENABLE_CHAN_AX_GAP			N01, N11	K2
-	Allow channel axis gaps in AXCONF_MACHAX_USED			DWORD	PowerOn
-					
-	-	0x0	0	0x1	2/2

Description: Bit0 = 1

Machine data allows configuration of channel axis gaps in the machine data $MC_AXCONF_MACHAX_USED.

Permits following MD assignment:

```
$AXCONF_MACHAX_USED[0] = 1     ; 1st  MA is 1st axis in channel
$AXCONF_MACHAX_USED[1] = 2     ; 2nd MA is 2nd axis in channel
$AXCONF_MACHAX_USED[2] = 0     ; Channel axis gap
$AXCONF_MACHAX_USED[3] = 3     ; 3rd MA is 3rd axis in channel
$AXCONF_MACHAX_USED[4] = 0
```

C A U T I O N:

(BIT0 set with $MC_AXCONF_MACHAX_USED):

If a geo axis is placed in a channel axis gap with $MC_AXCONF_GEOAX_ASSIGN_TAB[1]= 3, the control responds as with $MC_AXCONF_GEOAX_ASSIGN_TAB[1]= 0. This eliminates the geo axis!

Transformation machine data must not be assigned a channel axis number specified as a gap.

BIT1 - BIT31: not used.

Related to:

AXCONF_CHANAX_NAME_TAB,
AXCONF_GEOAX_ASSIGN_TAB,
AXCONF_GEOAX_NAME_TAB
AXCONF_MACHAX_USED
TRAFO_AXES_IN_X
TRAFO_GEOAX_ASSIGN_TAB_X

11660	NUM_EG			N09	M3
-	Number of possible 'electronic gear units'			BYTE	PowerOn
-					
-	-	0	-	-	1/1

Description: The size of memory space specified here is reserved in DRAM for implementing the function "Electronic Gear". The number of EG axis groupings stated here is the maximum number that can be defined simultaneously with EGDEF.

11700	PERMISSIVE_FLASH_TAB			EXP, N01	IAD
-	Codes for NC card			DWORD	PowerOn
-					
-	6	0,0,0,0,0,0,0,0	-	-	1/1

Description: Normally, the NCK knows the program algorithms for writing on the flash of the PCMCIA card, however, if "new" cards with another ManufactorCode and/or DeviceCode are used, then these values can be entered here. Whereby, the ManufactorCode must be entered in the first line, and the DeviceCode in the following line.

11717	D_NO_FCT_CYCLE_NAME			EXP, N12, N07	-
-	Subroutine name for D function replacement			STRING	PowerOn
-					
-	-		-	-	7/2

Description: Cycle name for replacement routine of the T function.

If a D function is programmed in a part program block, then, depending on machine data $MN_T_NO_FCT_CYCLE_NAME, $MN_T_NO_FCT_CYCLE_MODE and $MN_M_NO_FCT_CYCLE_PAR, the subprogram defined in D_NO_FCT_CYCLE_NAME is called.

The programmed D number can be polled in the cycle via system variable $C_D / $C_D_PROG.

$MN_D_NO_FCT_CYCLE_NAME is only active in Siemens mode (G290).

No more than one M/T/D function replacement can be active per part program line.

A modal subprogram call must not be programmed in the block with the D function replacement. Furthermore, neither subprogram return nor part program end are allowed.

In the event of a conflict alarm 14016 is output.

11750	NCK_LEAD_FUNCTION_MASK			N09	-
-	Functions for master value coupling			DWORD	NEW CONF
-					
-	-	0x00	0	0x10	1/1

Description: Special functions of the master value coupling are set with this MD.

The MD is bit-coded, the following bits are assigned:

Bits 0-3:

reserved

Bit 4 == 0:

the following axis of a master value coupling decelerates independently on NC or mode group stop or channel-specific feed disable

Bit 4 == 1:

the following axis of a master value coupling does not decelerate independently on NC or mode group stop or channel-specific feed disable

Bits 5-31:

reserved

11752	NCK_TRAIL_FUNCTION_MASK			N09	-
-	Functions for coupled motion			DWORD	NEW CONF
-					
-	-	0x200	0	0x210	1/1

Description: Special functions for coupled motions are set with this MD.

The MD is bit-coded; the following bits are assigned:

Bits 0-3:

reserved

Bit 4 = 0:

the following axis of a coupled axis grouping activated by a synchronized action decelerates independently on NC or mode group stop or channel-specific feed disable

Bit 4 = 1:

the following axis of a coupled axis grouping activated by a synchronized action does not decelerate independently on NC or mode group stop or channel-specific feed disable

Bit 5-31:

reserved

11754	COUPLE_CYCLE_MASK			EXP, N09	-
-	Replacement of coupling language commands by machining cycles			DWORD	PowerOn
-					
-	-	0x0	0	0x3F	1/1
710-6a2c	-	0x3F	-	-	-/-
710-31a10c	-	0x3F	-	-	-/-
720-6a2c	-	0x3F	-	-	-/-
720-31a10c	-	0x3F	-	-	-/-
730-6a2c	-	0x3F	-	-	-/-
730-31a10c	-	0x3F	-	-	-/-

Description: This machine data defines which predefined procedures for axis-spindle coupling are replaced by machining cycles.

This MD is bit-coded; the following bits have been assigned:

Bit 0 == 0:

The predefined procedures EGDEL, EGOFC, EGOFS, EGON, EGONSYN and EGONSYNE are executed

Bit 0 == 1:

The predefined procedures EGDEL, EGOFC, EGOFS, EGON, EGONSYN and EGONSYNE are replaced by calling machining cycles

Bit 1 == 0:

The predefined procedures LEADON and LEADOF are executed

Bit 1 == 1:

The predefined procedures LEADON and LEADOF are replaced by calling machining cycles

Bit 2 == 0:

The predefined procedures TRAILON and TRAILOF are executed

Bit 2 == 1:

The predefined procedures TRAILON and TRAILOF are replaced by calling machining cycles

Bit 3 == 0:

The predefined procedures COUPDEF, COUPDEL, COUPOF, COUPOFS, COUPON, COUPONC and COUPRES are executed

Bit 3 ==1:

The predefined procedures COUPDEF, COUPDEL, COUPOF, COUPOFS, COUPON, COUPONC and COUPRES are replaced by calling machining cycles

Bit 4 == 0:

The predefined procedures LEADON and LEADOF are executed in synchronized actions

Bit 4 == 1:

The predefined procedures LEADON and LEADOF are replaced in synchronized actions by calling machining cycles as technology cycles

Bit 5 == 0:

The predefined procedures TRAILON and TRAILOF are executed in synchronized actions

Bit 5 == 1:

The predefined procedures TRAILON and TRAILOF are replaced in synchronized actions by calling machining cycles as technology cycles

11756	NCK_EG_FUNCTION_MASK			N09	-
-	Functions for Electronic Gear			DWORD	NEW CONF
-					
-	-	0x0	0	0x2F	1/1

Description:

```
This MD is used to set special functions of Electronic Gear (EG).
The MD is bit-coded, the following bits are occupied:
Bit 0 - 4:
   reserved
Bit 5 = 0:
   Positions indicated in EGONSYN and EGONSYNE are evaluated
   according to setting G700 or G710 inch or metric that is valid
   in the currently machined part program block.
Bit 5 = 1
   Positions indicated in EGONSYN and EGONSYNE are evaluated in
   the basic system involved.
Bit 6 - 31:
   reserved
```

1.3.2 Override switch settings

12000	OVR_AX_IS_GRAY_CODE			EXP, N10	V1
-	Axis feedrate override switch Gray-coded			BOOLEAN	PowerOn
-					
-	-	TRUE	-	-	7/2

Description:

```
1This machine data is used to adapt the axis feed override switch
to the interface coding of the PLC interface.
1:   The 5 low-order bits of the "feed override" PLC interface
signal (DB31, ...    DBB0) are interpreted as a Gray code. The
value which is read corresponds to a switch setting. It is used as
an index for selecting the correct override factor from the table
of MD 12010: OVR_FACTOR_AX_SPEED [n]. (Vorschubkorrektur A-H) wer-
den als Gray-Code interpretiert. Der gelesene Wert entspricht
einer Schalterstellung. Er dient als Index für die Auswahl des
gültigen Korrekturfaktors aus der Tabelle des MD 12010:
OVR_FACTOR_AX_SPEED [n]
0:   The feed override byte of the PLC interface is interpreted as
a binary representation of the override value in percent (limit
200 percent).
Related to:
   IS  (Vorschubkorrektur A-H), (achsspezifisch)
   MD 12010: OVR_FACTOR_AX_SPEED [n]
   (Evaluation of the axis feed override switch)
```

12010	OVR_FACTOR_AX_SPEED			EXP, N10	V1
-	Evaluation of axis feedrate override switch			DOUBLE	PowerOn
-					
-	31	0.00,0.01,0.02,0.04,0.06,0.08,0.10...	0.00	2.00	7/2

Description: Evaluation of the axis velocity override switch with gray-coded interface.

Not relevant with:

MD 12000: OVR_AX_IS_GRAY_CODE = 0

Related to:

IS (Vorschubkorrektur A-H)), (achsspezifisch)

12020	OVR_FEED_IS_GRAY_CODE			EXP, N10	V1
-	Path feedrate override switch Gray-coded			BOOLEAN	PowerOn
-					
-	-	TRUE	-	-	7/2

Description: This machine data is used to adapt the path feed override switch to the interface coding of the PLC interface.

1: The 5 low-order bits of the NC/PLC interface signal (Vorschubkorrektur A-H) werden als Gray-Code interpretiert. Der gelesene Wert entspricht einer Schalterstellung. Er dient als Index für die Auswahl des gültigen Override-Faktors aus der Tabelle des MD 12030: OVR_FACTOR_FEEDRATE [n].

0: The feed override byte of the PLC interface is interpreted as a binary representation of the override value in percent (limit 200 percent).

Related to:

IS (Vorschubkorrektur A-H)

MD 12030: OVR_FACTOR_FEEDRATE [n]

(Evaluation of the path feed override switch)

12030	OVR_FACTOR_FEEDRATE			EXP, N10	V1
-	Evaluation of path feedrate override switch			DOUBLE	PowerOn
-					
-	31	0.00,0.01,0.02,0.04,0.06,0.08,0.10...	0.00	2.00	7/2

Description: Evaluation of the feedrate override switch with gray-coded interface.

Special function of the 31st value for the velocity control:

The setting of the 31st override value defines the dynamic reserves which take the velocity control to be an excessive increase in the path feed. The setting should correspond to the highest override factor actually used.

Thus, the function of the 31st value is identical to the effect of the MD OVR_FACTOR_LIMIT_BIN when using the binary-coded interface.

Not relevant with:

MD 12020: OVR_FEED_IS_GRAY_CODE = 0

Related to:

IS (Vorschubkorrektur A-H)

12040	OVR_RAPID_IS_GRAY_CODE			EXP, N10	V1
-	Rapid traverse override switch Gray-coded			BOOLEAN	PowerOn
-					
-	-	TRUE	-	-	7/2

Description: This machine data is used to adapt the rapid traverse override switch to the interface coding of the PLC interface.

1: The 5 low-order bits of the "rapid traverse override" PLC interface signal are interpreted as a Gray code. The value which is read corresponds to a switch setting. (Eilgangkorrektur A-H) werden als Gray-Code interpretiert. Der gelesene Wert entspricht einer Schalterstellung.

It is used as an index for selecting the correct override factor from the table of MD 12050: OVR_FACTOR_RAPID_TRA. [n].

0: The rapid traverse override byte of the PLC interface is interpreted as a binary representation of the override value in percent (limit 200 percent).

Related to:

IS (Eilgangkorrektur A-H)

MD 12050: OVR_FACTOR_RAPID_TRA[n]

(Evaluation of the rapid traverse override switch)

12050	OVR_FACTOR_RAPID_TRA			EXP, N10	V1
-	Evaluation of rapid traverse override switch			DOUBLE	PowerOn
-					
-	31	0.00,0.01,0.02,0.04,0.06,0.08,0.10...	0.00	1.00	7/2

Description: Evaluation of the rapid traverse override switch with gray-coded interface.

Not relevant with:

MD 12040: OVR_RAPID_IS_GRAY_CODE = 0

Related to:

IS (Eilgangkorrektur A-H)

12060	OVR_SPIND_IS_GRAY_CODE			EXP, N10	V1
-	Spindle override switch Gray-coded			BOOLEAN	PowerOn
-					
-	-	TRUE	-	-	7/2

Description: This machine data is used to adapt the spindle speed override switch to the interface coding of the PLC interface.

1: The 5 least significant bits of the "spindle speed override" PLC interface signal are interpreted as a Gray code. The value which is read corresponds to a switch setting. It is used as an index for selecting the correct override factor from the table of MD 12070: OVR_FACTOR_SPIND_ SPEED [n].

0: The spindle speed override byte of the PLC interface is interpreted as a binary representation of the override value in percent (limit 200 percent).

Related to:

IS "Spindle speed override" (DB31, ... DBB0)

MD 12070: OVR_FACTOR_SPIND_SPEED[n]

(Evaluation of the spindle speed override switch)

12070	OVR_FACTOR_SPIND_SPEED			EXP, N10	V1
-	Evaluation of spindle override switch			DOUBLE	PowerOn
-					
-	31	0.5,0.55,0.60,0.65,0.70, 0.75,0.80...	0.00	2.00	7/2

Description: Evaluation of the spindle-specific override switch with Gray-coded interface.

Special function of the 31st value for the velocity control:

The setting of the 31st override value defines the dynamic reserves which take the velocity control to be an excessive increase in the spindle feed. The setting should correspond to the highest override factor actually used.

Thus, the function of the 31st value is thus identical to the effect of the MD OVR_FACTOR_LIMIT_BIN when using the binary-coded interface.

Not relevant for:

MD 12060: OVR_SPIND_IS_GRAY_CODE = 0

Related to:

IS "Spindle override" (DB31, ... DBB0)

12080	OVR_REFERENCE_IS_PROG_FEED			N10, N09	V1
-	Override reference speed			BOOLEAN	PowerOn
-					
-	-	TRUE	-	-	7/2

Description: The entry in this MD specifies whether the spindle override given by the IS refers to the speed limited by MD/SD or to the programmed speed.

1: Spindle override acts with reference to the programmed speed

(programmed speed _ spindle override 100%)

0: Spindle override acts on the speed limited by MD or SD

(speed limited by MD/SD _ spindle override 100%)

Related machine data:

A speed limitation is effected by the following MDs or SDs:

MD 35100: SPIND_VELO_LIMIT Maximum spindle speed

MD 35130: GEAR_STEP_MAX_VELO_LIMIT Maximum speed of gear stage

MD 35160: SPIND_EXTERN_VELO_LIMIT Spindle speed limitation by PLC

SD 43220: SPIND_MAX_VELO_G26 Maximum spindle speed

SD 43230: SPIND_MAX_VELO_LIMS Spindle speed limitation with G96

12082	OVR_REFERENCE_IS_MIN_FEED			N10, N09	V1
-	Specification of the reference of the path override			BOOLEAN	PowerOn
-					
-	-	FALSE	-	-	7/2

Description: The reference speed for the path feed override specified via the machine control panel can be set differently from the standard.

0: Standard:

The override is relative to the programmed feed.

1: Special case:

The override is relative to the programmed feed or to the path feed limit, depending on which resulting value is lower. In this way, even for a great feed reduction (due to the permissible axis dynamics), the effect of the override value (in the range 0 to 100%) is always visible.

12090	OVR_FUNCTION_MASK			N01, N10, N09	-
-	Selection of override specifications			DWORD	Reset
-					
-	-	0	0	0x01	7/2

Description: The functionality of the override switches can be affected by the bits.

Bit 0: = 0,

Standard: Spindle override active with G331/G332

= 1,

Path override is active instead of spindle override with G331/G332

(Tapping without compensating chuck)

12100	OVR_FACTOR_LIMIT_BIN			EXP, N10	V1
-	Limitation for binary-coded override switch			DOUBLE	PowerOn
-					
-	-	1.2	0.0	2.0	7/2

Description: This machine data can be used as an additional limit for the override factor when using the binary-coded interface for path, axis and spindle feeds.

In this case, the maximum values

- 200% for channel-specific feed override
- 100% for channel-specific rapid traverse override
- 200% for axis-specific feed override
- 200% for spindle override

are replaced with the limit value entered in MD: OVR_FACTOR_LIMIT_BIN when this value is lower.

Example: OVR_FACTOR_LIMIT_BIN = 1.20

--> maximum override factor for

- channel-specific feed override =120%
- channel-specific rapid traverse override =100%
- axis-specific feed override =120%
- spindle override =120%

This value also defines the dynamic reserves maintained by the speed control for increasing the path and spindle feedrates.

References:

/FB/, B1, "Continuous Path Mode, Exact Stop and Look Ahead"

12200	RUN_OVERRIDE_0			N01, N09	FBMA,V1
-	Traversing response with override 0			BOOLEAN	PowerOn
-					
-	-	FALSE	-	-	7/2

Description:

= 0

Override 0 is active and means deceleration (JOG mode, safety function).

Bits 0 and 1 in $MA_HANDWH_STOP_COND for hand wheels and in $MC_HANDW_CHAN_STOP_COND for machine axes define whether the pulses are collected for geometry axes and contour handwheel.

= 1

Traversing with handwheels and in JOG mode with fixed feedrates is also possible with a 0 % override.

Related to:

$MA_HANDWH_STOP_COND

$MC_HANDW_CHAN_STOP_COND

12202	PERMANENT_FEED			N01, N09	FBMA,V1
mm/min	Fixed feedrates for linear axes			DOUBLE	Reset
-					
-	4	0.,0.,0.,0.	-	-	7/2

Description:

In AUTOMATIC mode:

After activating a fixed feedrate via an interface signal, traversing is done with a fixed feedrate instead of the programmed feedrate.

Note:

The fixed feedrate is also evaluated in continuous-path mode in order to optimize the overhead for the Look Ahead calculation. Unnecessarily high values should therefore be avoided. Enter zero if a fixed feedrate is not wanted

In JOG mode:

After activating a fixed feedrate via an interface signal, and traversing the linear axis with a traversing key, traversing proceeds in the selected direction with the fixed feedrate.

n = 0, 1, 2, 3 mean fixed feedrates 1, 2, 3, 4. The values must be entered in ascending order.

Special cases, errors, ...

The maximum velocity defined by $MA_MAX_AX_VELO is active. An override setting of 100 % is assumed. $MN_RUN_OVERRIDE_0 is active if the override is 0.

Related to:

$MN_RUN_OVERRIDE_0

12204	PERMANENT_ROT_AX_FEED			N01, N09	FBMA
rev/min	Fixed feedrates for rotary axes			DOUBLE	Reset
-					
-	4	0.,0.,0.,0.	-	-	7/2

Description: Fixed feedrate values:

In AUTOMATIC mode:

After activating a fixed feedrate via an interface signal, traversing is done with a fixed feedrate instead of the programmed feedrate.

Note: PERMANENT_ROT_AX_FEED is used instead of PERMANENT_FEED for the path motion if all synchronously traversed axes in the current block are rotary axes. PERMANENT_FEED applies if linear and rotary axes are to be synchronously traversed together.

The fixed feedrate is also evaluated in continuous-path mode in order to optimize the overhead for the Look Ahead calculation. Unnecessarily high values should therefore be avoided. Enter zero if a fixed feedrate is not wanted

In JOG mode:

After activating a fixed feedrate via an interface signal, and traversing the rotary axis with a traversing key, traversing proceeds in the selected direction with the fixed feedrate.

n = 0, 1, 2, 3 mean fixed feedrates 1, 2, 3, 4.

Special cases, errors, ...

The maximum velocity defined by $MA_MAX_AX_VELO is active. An override setting of 100 % is assumed. $MN_RUN_OVERRIDE_0 is active if the override is 0.

Related to:

$MN_RUN_OVERRIDE_0

12205	PERMANENT_SPINDLE_FEED			N01, N09	FBMA
rev/min	Fixed feedrates for spindles			DOUBLE	Reset
-					
-	4	0.,0.,0.,0.	-	-	7/2

Description: Fixed feedrate values:

JOG: A spindle is traversed with a fixed feedrate by activating the traversing keys and activating the appropriate signals in the PLC interface.

The override is not active.

Depending upon MD $MN_RUN_OVERRIDE_0, traversing also takes place with override 0.

The value defined by $MA_MAX_AX_VELO is taken as the upper limit. If the fixed feedrate has a larger value, the aforementioned limiting value applies.

12300	CENTRAL_LUBRICATION			N01, N09	-
-	Central lubrication active			BOOLEAN	PowerOn
-					
-	-	FALSE	-	-	7/2

Description: When a settable axial path has been exceeded, the axial VDI signals request a lubrication pulse from the PLC (compare $MA_LUBRICATION_DIST). These axial pulses act (by default) independently of each other.

If the machine construction requires a central lubrication, i.e. the lubrication pulse of any axis is acting on all axes, the corresponding path monitoring of all axes must be restarted after lubrication pulse output. This start synchronization of the monitoring is executed via $MN_CENTRAL_LUBRICATION=TRUE.

12510	NCU_LINKNO			N01	B3
-	NCU number in an NCU cluster			DWORD	PowerOn
-					
-	-	1	1	16	7/2

Description: Number or name for identifying an NCU within an NCU grouping.

In an NCU grouping (NCU cluster), the NCUs are connected to one another by a link bus.

Related to:

MM_NCU_LINK_MASK

12520	LINK_TERMINATION			N01	B3
-	NCU numbers for which bus termination resistances are activated			BYTE	PowerOn
LINK					
-	2	0,1	0	15	3/2

Description: LINK_TERMINATION defines with which NCUs the bus termination resistances for the timing circuit must be switched in through the link module.

Related to:

MM_NCU_LINK_MASK

12540	LINK_BAUDRATE_SWITCH			N01	B3
-	Link bus baud rate			DWORD	PowerOn
LINK					
-	-	9	0	9	3/2

Description: The assigned baud rate for the link communication is defined by the values entered:

Set value	Rate	
0	9,600	kBd
1	19,200	kBd
2	45,450	kBd
3	93,750	kBd
4	187,000	kBd
5	500,000	kBd
6	1,500	MBd
7	3,000	MBd
8	6,000	MBd
9	12,000	MBd

Not relevant for:

Systems without link modules

Related to:

MM_NCU_LINK_MASK

12550	LINK_RETRY_CTR			N01	B3
-	maximum number of message frame transmission retries			DWORD	PowerOn
LINK					
-	-	4	1	15	3/2

Description: Maximum retry limit in cases of error.

Not relevant for:

Systems without link modules

Related to:

MM_NCU_LINK_MASK

12701	AXCT_AXCONF_ASSIGN_TAB1			N01	B3
-	Assignment of an axis container location			STRING	PowerOn
CTDE					
-	32		-	-	3/2

Description:

```
Assignment of an axis container location (slot s) to a machine
axis or link axis. A maximum of 32 locations can be assigned axes
in an axis container.
Structure of entries:
NCm_AXn             with NCU number m: 1..16
                    and machine axis address n: 1... 31
Example:
NC2_AX1           ; The axis is on the NCU2 and is the
                  ; 1st machine axis there.
AX5               ; local axis 5 only with one NCU
                  ; the axis container mechanism is only used by
                  ; several channels of one NCU.
The reference to an axis container location of a channel is
defined by the definitions in MD $MC_AXCONF_MACHAX_USED and  MD
$MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The actually assigned axis at a specific time is dependent upon
the  container rotation status. All channels that access an axis
container use the same axis entries stored there. If channels of
various NCUs access this container, then inter-NCU consistency
must be ensured.
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9 $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed via NCU-link.
Related to:
  AXCONF_LOGIC_MACHAX_TAB
```

12702	AXCT_AXCONF_ASSIGN_TAB2			N01	B3
-	Assignment of an axis container location			STRING	PowerOn
CTDE					
-	32		-	-	3/2

Description:

```
Assignment of an axis container location (slot s) to a machine
axis or link axis. A maximum of 32 locations can be assigned axes
in an axis container.
Structure of entries:
NCm_AXn              with NCU number m: 1..16
                     and machine axis address n: 1... 31
Example:
NC2_AX1            ; The axis is on the NCU2 and is the
                   ; 1st machine axis there.
AX5                ; local axis 5 only with one NCU
                   ; the axis container mechanism is only used by
                   ; several channels of one NCU.
The reference to an axis container location of a channel is
defined by the definitions in MD $MC_AXCONF_MACHAX_USED and  MD
$MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The actually assigned axis at a specific time is dependent upon
the  container rotation status. All channels that access an axis
container use the same axis entries stored there. If channels of
various NCUs access this container, then inter-NCU consistency
must be ensured.
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9
$MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed via NCU-link.
Related to:
  AXCONF_LOGIC_MACHAX_TAB
```

12703	AXCT_AXCONF_ASSIGN_TAB3			N01	B3
-	Assignment of an axis container location			STRING	PowerOn
CTDE					
-	32		-	-	3/2

Description: Assignment of an axis container location (slot s) to a machine axis or link axis. A maximum of 32 locations can be assigned axes in an axis container.

Method of writing entries:

```
NCm_AXn             with NCU number m: 1..16
                    and machine axis address n: 1... 31
```

Example:

```
NC2_AX1 ; The axis is on the NCU2 and is the
                  ; 1st machine axis there
AX5               ; local axis 5, with only one NCU
                  ; the axis container mechanism is only used by
                  ; several channels of one NCU.
```

The reference to an axis container location of a channel is determined by the definitions in

MD $MC_AXCONF_MACHAX_USED and MD $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.

The axis actually assigned at a given time is dependent upon the container rotation status. All channels that access an axis container use the same axis entries stored there. If channels from various NCUs access this container, ensure that there is consistency between the NCUs!

Example:

```
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
```

This machine data is distributed over the NCU-link.

Related to:

AXCONF_LOGIC_MACHAX_TAB

12704	AXCT_AXCONF_ASSIGN_TAB4			N01	B3
-	Assignment of an axis container location			STRING	PowerOn
CTDE					
-	32		-	-	3/2

Description: Assignment of an axis container location (slot s) to a machine axis or link axis. A maximum of 32 locations can be assigned axes in an axis container. Method of writing entries:

```
NCm_AXn          with NCU number m: 1..16
                 and machine axis address n: 1... 31
```

Example:

```
NC2_AX1 ; The axis is on the NCU2 and is the
                 ; 1st machine axis there
AX5              ; local axis 5, with only one NCU
                 ; the axis container mechanism is only used by
                 ; several channels from one NCU.
```

The reference to an axis container location of a channel is determined by the definitions in MD $MC_AXCONF_MACHAX_USED and MD $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.

The axis actually assigned at a given time is dependent upon the container rotation status. All channels that access an axis container use the same axis entries stored there. If channels from various NCUs access this container, ensure that there is consistency between the NCUs!

Example:

```
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
```

This machine data is distributed over the NCU-link.

Related to:

AXCONF_LOGIC_MACHAX_TAB

12705	AXCT_AXCONF_ASSIGN_TAB5			N01	B3
-	Assignment of an axis container location			STRING	PowerOn
CTDE					
-	32		-	-	3/2

Description: Assignment of an axis container location (slot s) to a machine axis or link axis. A maximum of 32 locations can be assigned axes in an axis container.

Method of writing entries:

```
NCm_AXn          with NCU number m: 1..16
                 and machine axis address n: 1... 31
```

Example:

```
NC2_AX1         ; The axis is on the NCU2 and is the
                ; 1st machine axis there
AX5             ; local axis 5, with only one NCU
                ; the axis container mechanism is only used by
                ; several channels of one NCU.
```

The reference to an axis container location of a channel is determined by the definitions in MD $MC_AXCONF_MACHAX_USED and MD $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.

The axis actually assigned at a given time is dependent upon the container rotation status. All channels that access an axis container use the same axis entries stored there. If channels from various NCUs access this container, ensure that there is consistency between the NCUs!

Example:

```
CHANDATA(1)
$MC_MACHAX_USED[4]=9
$MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
```

This machine data is distributed over the NCU-link.

Related to:

AXCONF_LOGIC_MACHAX_TAB

12706	AXCT_AXCONF_ASSIGN_TAB6			N01	B3
-	Assignment of an axis container location			STRING	PowerOn
CTDE					
-	32		-	-	3/2

Description:

```
Assignment of an axis container location (slot s) to a machine
axis or link axis. A maximum of 32 locations can be assigned axes
in an axis container.
Method of writing entries:
NCm_AXn              with NCU number m: 1..16
                     and machine axis address n: 1... 31
Example:
NC2_AX1            ; The axis is on the NCU2 and is the
                   ; 1st machine axis there
AX5                ; local axis 5, with only one NCU
                   ; the axis container mechanism is only used by
                   ; several channels from one NCU.
The reference to an axis container location of a channel is deter-
mined by the definitions in MD $MC_AXCONF_MACHAX_USED and MD
$MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the
container rotation status. All channels that access an axis con-
tainer use the same axis entries stored there. If channels from
various NCUs access this container, ensure that there is consis-
tency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.
Related to:
  AXCONF_LOGIC_MACHAX_TAB
```

12707	AXCT_AXCONF_ASSIGN_TAB7			N01	B3
-	Assignment of an axis container location			STRING	PowerOn
CTDE					
-	32		-	-	3/2

Description:

```
Assignment of an axis container location (slot s) to a machine
axis or link axis. A maximum of 32 locations can be assigned axes
in an axis container.
Method of writing entries:
NCm_AXn          with NCU number m: 1..16
                 and machine axis address n: 1... 31
Example:
NC2_AX1        ; The axis is on the NCU2 and is the
               ; 1st machine axis there
AX5            ; local axis 5, with only one NCU
               ; the axis container mechanism is only used by
               ; several channels from one NCU.
The reference to an axis container location of a channel is deter-
mined by the definitions in MD $MC_AXCONF_MACHAX_USED and MD
$MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the
container rotation status. All channels that access an axis con-
tainer use the same axis entries stored there. If channels from
various NCUs access this container, ensure that there is consis-
tency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.
Related to:
  AXCONF_LOGIC_MACHAX_TAB
```

12708	AXCT_AXCONF_ASSIGN_TAB8			N01	B3
-	Assignment of an axis container location			STRING	PowerOn
CTDE					
-	32		-	-	3/2

Description:

```
Assignment of an axis container location (slot s) to a machine
axis or link axis. A maximum of 32 locations can be assigned axes
in an axis container.
Method of writing entries:
NCm_AXn            with NCU number m: 1..16
                   and machine axis address n: 1... 31
Example:
NC2_AX1          ; The axis is on the NCU2 and is the
                 ; 1st machine axis there
AX5              ; local axis 5, with only one NCU
                 ; the axis container mechanism is only used by
                 ; several channels from one NCU.
The reference to an axis container location of a channel is deter-
mined by the definitions in MD $MC_AXCONF_MACHAX_USED and MD
$MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the
container rotation status. All channels that access an axis con-
tainer use the same axis entries stored there. If channels from
various NCUs access this container, ensure that there is consis-
tency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.
Related to:
  AXCONF_LOGIC_MACHAX_TAB
```

12709	AXCT_AXCONF_ASSIGN_TAB9			N01	B3
-	Assignment of an axis container location			STRING	PowerOn
CTDE					
-	32		-	-	3/2

Description: Assignment of an axis container location (slot s) to a machine axis or link axis. A maximum of 32 locations can be assigned axes in an axis container.

Method of writing entries:

```
NCm_AXn         with NCU number m: 1..16
                and machine axis address n: 1... 31
```

Example:

```
NC2_AX1       ; The axis is on the NCU2 and is the
              ; 1st machine axis there
AX5           ; local axis 5, with only one NCU
              ; the axis container mechanism is only used by
              ; several channels from one NCU.
```

The reference to an axis container location of a channel is determined by the definitions in MD $MC_AXCONF_MACHAX_USED and MD $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.

The axis actually assigned at a given time is dependent upon the container rotation status. All channels that access an axis container use the same axis entries stored there. If channels from various NCUs access this container, ensure that there is consistency between the NCUs!

Example:

```
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
```

This machine data is distributed over the NCU-link.

Related to:

AXCONF_LOGIC_MACHAX_TAB

12710	AXCT_AXCONF_ASSIGN_TAB10			N01	B3
-	Assignment of an axis container location			STRING	PowerOn
CTDE					
-	32		-	-	3/2

Description:

```
Assignment of an axis container location (slot s) to a machine
axis or link axis. A maximum of 32 locations can be assigned axes
in an axis container.
Method of writing entries:
NCm_AXn        with NCU number m: 1..16
               and machine axis address n: 1... 31
Example:
NC2_AX1       ; The axis is on the NCU2 and is the
              ; 1st machine axis there
AX5           ; local axis 5, with only one NCU
              ; the axis container mechanism is only used by
              ; several channels from one NCU.
The reference to an axis container location of a channel is deter-
mined by the definitions in MD $MC_AXCONF_MACHAX_USED and MD
$MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the
container rotation status. All channels that access an axis con-
tainer use the same axis entries stored there. If channels from
various NCUs access this container, ensure that there is consis-
tency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.
Related to:
  AXCONF_LOGIC_MACHAX_TAB
```

12711	AXCT_AXCONF_ASSIGN_TAB11			N01	B3
-	Assignment of an axis container location			STRING	PowerOn
CTDE					
-	32		-	-	3/2

Description: Assignment of an axis container location (slot s) to a machine axis or link axis. A maximum of 32 locations can be assigned axes in an axis container.

Method of writing entries:

```
NCm_AXn          with NCU number m: 1..16
                 and machine axis address n: 1... 31
```

Example:

```
NC2_AX1        ; The axis is on the NCU2 and is the
               ; 1st machine axis there
AX5            ; local axis 5, with only one NCU
               ; the axis container mechanism is only used by
               ; several channels from one NCU.
```

The reference to an axis container location of a channel is determined by the definitions in MD $MC_AXCONF_MACHAX_USED and MD $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.

The axis actually assigned at a given time is dependent upon the container rotation status. All channels that access an axis container use the same axis entries stored there. If channels from various NCUs access this container, ensure that there is consistency between the NCUs!

Example:

```
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
```

This machine data is distributed over the NCU-link.

Related to:

AXCONF_LOGIC_MACHAX_TAB

12712	AXCT_AXCONF_ASSIGN_TAB12			N01	B3
-	Assignment of an axis container location			STRING	PowerOn
CTDE					
-	32		-	-	3/2

Description:

```
Assignment of an axis container location (slot s) to a machine
axis or link axis. A maximum of 32 locations can be assigned axes
in an axis container.
Method of writing entries:
NCm_AXn          with NCU number m: 1..16
                 and machine axis address n: 1... 31
Example:
NC2_AX1        ; The axis is on the NCU2 and is the
               ; 1st machine axis there
AX5            ; local axis 5, with only one NCU
               ; the axis container mechanism is only used by
               ; several channels from one NCU.
```

The reference to an axis container location of a channel is determined by the definitions in MD $MC_AXCONF_MACHAX_USED and MD $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.

The axis actually assigned at a given time is dependent upon the container rotation status. All channels that access an axis container use the same axis entries stored there. If channels from various NCUs access this container, ensure that there is consistency between the NCUs!

Example:

```
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
```

This machine data is distributed over the NCU-link.

Related to:

AXCONF_LOGIC_MACHAX_TAB

12713	AXCT_AXCONF_ASSIGN_TAB13			N01	B3
-	Assignment of an axis container location			STRING	PowerOn
CTDE					
-	32		-	-	3/2

Description: Assignment of an axis container location (slot s) to a machine axis or link axis. A maximum of 32 locations can be assigned axes in an axis container.

Method of writing entries:

```
NCm_AXn         with NCU number m: 1..16
                and machine axis address n: 1... 31
```

Example:

```
NC2_AX1       ; The axis is on the NCU2 and is the
              ; 1st machine axis there
AX5           ; local axis 5, with only one NCU
              ; the axis container mechanism is only used by
              ; several channels from one NCU.
```

The reference to an axis container location of a channel is determined by the definitions in

MD $MC_AXCONF_MACHAX_USED and MD $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.

The axis actually assigned at a given time is dependent upon the container rotation status. All channels that access an axis container use the same axis entries stored there. If channels from various NCUs access this container, ensure that there is consistency between the NCUs!

Example:

```
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
```

This machine data is distributed over the NCU-link.

Related to:

AXCONF_LOGIC_MACHAX_TAB

12714	AXCT_AXCONF_ASSIGN_TAB14			N01	B3
-	Assignment of an axis container location			STRING	PowerOn
CTDE					
-	32		-	-	3/2

Description:

```
Assignment of an axis container location (slot s) to a machine
axis or link axis. A maximum of 32 locations can be assigned axes
in an axis container.
Method of writing entries:
NCm_AXn          with NCU number m: 1..16
                 and machine axis address n: 1... 31
Example:
NC2_AX1        ; The axis is on the NCU2 and is the
               ; 1st machine axis there
AX5            ; local axis 5, with only one NCU
               ; the axis container mechanism is only used by
               ; several channels from one NCU.
```

The reference to an axis container location of a channel is determined by the definitions in MD $MC_AXCONF_MACHAX_USED and MD $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.

The axis actually assigned at a given time is dependent upon the container rotation status. All channels that access an axis container use the same axis entries stored there. If channels from various NCUs access this container, ensure that there is consistency between the NCUs!

Example:

```
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
```

This machine data is distributed over the NCU-link.

Related to:

AXCONF_LOGIC_MACHAX_TAB

12715	AXCT_AXCONF_ASSIGN_TAB15			N01	B3
-	Assignment of an axis container location			STRING	PowerOn
CTDE					
-	32		-	-	3/2

Description: Assignment of an axis container location (slot s) to a machine axis or link axis. A maximum of 32 locations can be assigned axes in an axis container.

Method of writing entries:

```
NCm_AXn           with NCU number m: 1..16
                  and machine axis address n: 1... 31
```

Example:

```
NC2_AX1          ; The axis is on the NCU2 and is the
                 ; 1st machine axis there
AX5              ; local axis 5, with only one NCU
                 ; the axis container mechanism is only used by
                 ; several channels from one NCU.
```

The reference to an axis container location of a channel is determined by the definitions in MD $MC_AXCONF_MACHAX_USED and MD $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.

The axis actually assigned at a given time is dependent upon the container rotation status. All channels that access an axis container use the same axis entries stored there. If channels from various NCUs access this container, ensure that there is consistency between the NCUs!

Example:

```
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
```

This machine data is distributed over the NCU-link.

Related to:

AXCONF_LOGIC_MACHAX_TAB

12716	AXCT_AXCONF_ASSIGN_TAB16			N01	B3
-	Assignment of an axis container location			STRING	PowerOn
CTDE					
-	32		-	-	3/2

Description: Assignment of an axis container location (slot s) to a machine axis or link axis. A maximum of 32 locations can be assigned axes in an axis container.

Method of writing entries:

```
NCm_AXn            with NCU number m: 1..16
                   and machine axis address n: 1... 31
```

Example:

```
NC2_AX1          ; The axis is on the NCU2 and is the
                 ; 1st machine axis there
AX5              ; local axis 5, with only one NCU
                 ; the axis container mechanism is only used by
                 ; several channels from one NCU.
```

The reference to an axis container location of a channel is determined by the definitions in MD $MC_AXCONF_MACHAX_USED and MD $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.

The axis actually assigned at a given time is dependent upon the container rotation status. All channels that access an axis container use the same axis entries stored there. If channels from various NCUs access this container, ensure that there is consistency between the NCUs!

Example:

```
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
```

This machine data is distributed over the NCU-link.

Related to:

AXCONF_LOGIC_MACHAX_TAB

12750	AXCT_NAME_TAB			N01	B3
-	Axis container identifier			STRING	PowerOn
CTDE					
-	16	"CT1","CT2","CT3","CT4","CT5","CT6"...	-	-	1/1

Description: List of axis container identifiers

In addition to the channel identifier of an axis, the axis container identifier, which can be defined by the user here, can also be used as an axis container name for e.g. a rotation of an axis container (AXCTSWE(CT1)).

12970	PLC_DIG_IN_LOGIC_ADDRESS			N10	-
-	Logical start address of the digital PLC input address			DWORD	PowerOn
-					
-	-	0	0	1023	0/0

Description: Logical start address of the digital input addresses of the PLC

Related to:

PLC_DIG_IN_NUM

12971	PLC_DIG_IN_NUM		N10	-
-	Number of digital input addresses		DWORD	PowerOn
-				
-	- 64	1	1023	0/0

Description: Number of digital input addresses as from the start address
Related to:
PLC_DIG_IN_LOGIC_ADDRESS

12974	PLC_DIG_OUT_LOGIC_ADDRESS		N10	-
-	Logical start address of the digital PLC output addresses		DWORD	PowerOn
-				
-	- 0	0	1023	0/0

Description: Logical start address of the digital output addresses of the PLC
Related to:
PLC_DIG_OUT_NUM

12975	PLC_DIG_OUT_NUM		N10	-
-	Number of digital output addresses		DWORD	PowerOn
-				
-	- 48	1	1023	0/0

Description: Number of digital output addresses as from the start address

12978	PLC_ANA_IN_LOGIC_ADDRESS		N10	-
-	Logical start address of the analog PLC input addresses		DWORD	PowerOn
-				
-	- 0	0	1023	0/0

Description: Logical start address of the analog input addresses of the PLC
Related to:
PLC_ANA_IN_NUM

12979	PLC_ANA_IN_NUM		N10	-
-	Number of analog input addresses		DWORD	PowerOn
-				
-	- 0	0	1023	0/0

Description: Number of analog input addresses as from the start address
Related to:
PLC_ANA_IN_LOGIC_ADDRESS

12982	PLC_ANA_OUT_LOGIC_ADDRESS		N10	-
-	Logical start address of the analog PLC output addresses		DWORD	PowerOn
-				
-	- 0	0	1023	0/0

Description: Logical start address of the analog output addresses of the PLC
Related to:
PLC_ANA_OUT_NUM

12983	PLC_ANA_OUT_NUM		N10	-
-	Number of analog output addresses		DWORD	PowerOn
-				
-	- 0	0	1023	0/0

Description: Number of analog output addresses as from the start address
Related to:
PLC_ANA_OUT_LOGIC_ADDRESS

12986	PLC_DEACT_IMAGE_LADDR_IN			N10	-
-	Deactivation of I/O connection to the PLC image			DWORD	PowerOn
-					
-	8	-1,-1,-1,-1,-1,-1,-1,-1	-1	8191	1/1
710-6a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
720-6a2c	-	-	-	-	-1/-
720-31a10c	-	-	-	-	-1/-
730-6a2c	-	-	-	-	-1/-
730-31a10c	-	-	-	-	-1/-

Description: The PLC input/output image of the stations with these logical addresses
is not connected to the real I/Os

12987	PLC_DEACT_IMAGE_LADDR_OUT			N10	-
-	Deactivation of I/O connection to the PLC image			DWORD	PowerOn
-					
-	8	-1,-1,-1,-1,-1,-1,-1,-1	-1	8191	1/1
710-6a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
720-6a2c	-	-	-	-	-1/-
720-31a10c	-	-	-	-	-1/-
730-6a2c	-	-	-	-	-1/-
730-31a10c	-	-	-	-	-1/-

Description: The PLC input/output image of the stations with these logical addresses
is not connected to the real I/Os

1.3.3 Central drive data

13000	DRIVE_IS_ACTIVE			EXP	G2
-	Drive activation (SIMODRIVE611D)			BOOLEAN	PowerOn
-					
-	31	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description:

For SIMODRIVE611D only:

A drive is activated/deactivated with this MD.

1: Drive is active

0: Drive is not active.

The drive is not supplied with setpoints and is not monitored. No input [actual value] or output [setpoint] can be configured on this module. This module is only taken into account during basic initialization of the drive bus.

The machine data

MD 13020: DRIVE_INVERTER_CODE,

MD 13010: DRIVE_LOGIC_NR,

MD 13030: DRIVE_MODULE_TYPE and

MD 13040: DRIVE_TYPE

must be parameterized.

The slot number of a physically available drive is used as the index [n]. [Slot nos.] : 0-14

The index is numbered from the beginning of the drive bus starting with "0" (corresponds to 1st physically available drive) and continues in ascending order to the end.

Example(s) for application:

deactivating an available drive for testing purposes.

13010	DRIVE_LOGIC_NR			EXP	G2
-	Logical drive number			BYTE	PowerOn
-					
-	31	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	0	31	7/2

Description: For SIMODRIVE611D only:

A "logical drive number" must be assigned to each physically available drive. This parameterization defines how the actual order of the modules connected to one drive train relate to the logical drive numbers.

A non-existing drive module is assigned the logical drive number "0". In this way it is possible to create positions for modules that do not yet exist but are to be inserted at this point in the drive bus at a later time.

The logical drive number is used in assigning actual values and setpoints (MD 30220: ENC_MODULE_NR[n], MD 30110: CTRLOUT_MODULE_NR[n]).

The slot number of a real available drive is used as the index [n]. [Slot no.] : 0-14

The index is numbered from the beginning of the drive bus starting with "0" (= _ 1st real drive available) and continues in ascending order to the end. 810D is assigned the slot nos. 0-5.

Each drive must only be assigned one logical drive number.

The following alarms may be output if an input error occurs:

- Alarm 300001 "Drive number not possible"
- Alarm 300002 "Drive number defined several times"
- Alarm 300005 "At least 1 module too many on drive bus"
- Alarm 300006 "At least 1 module too few on drive bus"

13020	DRIVE_INVERTER_CODE			EXP	G2
-	Power section code of drive module			DWORD	PowerOn
-					
-	31	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-	-	7/2

Description: For SIMODRIVE611D only:

The power section code of the MSD or FDD module being used is entered (as hex value) in the MD.

Power section code for FDD modules:

Code number (hex)	Power section MLFB	Current
00	no power section specified	-----
11	6SN1130-1Dx1x-0HA0	3/6 A
12	6SN1130-1Dx1x-0AA0	5/10 A
13	6FC5447-1Dx1x-0AA0	6/12 A (810D)
14	6SN1130-1Dx1x-0BA0	9/18 A
16	6SN1130-1Dx1x-0CA0	18/36 A
17	6SN1130-1Dx1x-0DA0	28/56 A
19	6SN1130-1Dx1x-0EA0	56/112 A
1A	6SN1130-1Dx1x-0FA0	70/140 A
1E	6FC5447-1Dx1x-0AA0	18/36 A (810D)

Power section code for MSD modules:

Code number (hex)	Power section MLFB	Current
06	6SN1135-1DA1x-0CA0	24/32/36 A
07	6SN1135-1DA1x-0DA0	30/40/56 A
08	6SN1135-1DA1x-0GA0	45/60/80 A
09	6SN1135-1DA1x-0EA0	60/80/106 A
0A	6SN1135-1DA1x-0FA0	85/110/140 A
0E	6FC5447-1DA1x-0AA0	24/32 A (810D)

The slot number of a physically available drive is used as the index [n]. [Slot no.] : 0-14

The index is numbered from the beginning of the drive bus starting with "0" (= 1st physically available drive) and continues in ascending order to the end.

13030	DRIVE_MODULE_TYPE			EXP	G2
-	Module ID			BYTE	PowerOn
-					
-	31	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1...	0	10	7/2

Description: For SIMODRIVE611D only:

An identifier for the module type used is to be entered in this MD.

0: No module or module has been removed (SW 6.3 and higher)

1: 1-axis module

2: 2-axis module

6: SINUMERIK 810D 6 axis controls / 3 power sections

9: Terminal block for digital/analog I/Os

The slot number of a physically available drive is used as the index [n]. [Slot no.] : 0-14

The index is numbered from the beginning of the drive bus starting with "0" (= 1st physically available drive) and continues in ascending order to the end.

If the wrong module type is assigned to an axis module, alarm 300003 "Wrong module type (1-/2-axis)" is output.

13040	DRIVE_TYPE			EXP	G2,FBHY
-	ID for drive type (1: FDD, 2: MSD, 3: LIN)			BYTE	PowerOn
-					
-	31	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1...	0	5	7/2

Description: For SIMODRIVE611D only (for PROFIdrive drives MD $MN_DRIVE_TYPE_DP is valid instead):

An identifier for the drive type is to be entered in this MD:

0: No drive

1: FDD

2: MSD

3: Linear drive

4: Analog drive (spec. hydraulic)

5: Hydraulic drive

The slot number of a physically available drive is used as the index [n]. [Slot no.] : 0-14

The index is numbered from the beginning of the drive bus starting with "0" (= 1st physically available drive) and continues in ascending order to the end. If the wrong drive type is assigned to a drive, alarm 300004, "Incorrect drive type (FDD, MSD, linear drive)" is output.

13050	DRIVE_LOGIC_ADDRESS			N04, N10	G2
-	Logical drive addresses			DWORD	PowerOn
-					
-	31	272,292,312,332,352,372,392,412,432...	258	8191	7/2
710-6a2c	-	4100,4140,4180,4220,4260,4300,4340...	-	-	-/-
710-31a10c	-	4100,4140,4180,4220,4260,4300,4340...	-	-	-/-
720-6a2c	-	4100,4140,4180,4220,4260,4300,4340...	-	-	-/-
720-31a10c	-	4100,4140,4180,4220,4260,4300,4340...	-	-	-/-
730-6a2c	-	4100,4140,4180,4220,4260,4300,4340...	-	-	-/-
730-31a10c	-	4100,4140,4180,4220,4260,4300,4340...	-	-	-/-
840disl-6a	-	4100,4140,4180,4220,4260,4300,4340...	-	-	-/-
840disl-20a	-	4100,4140,4180,4220,4260,4300,4340...	-	-	-/-

Description: For PROFIdrive only:

Logical I/O addresses of the PROFIdrive drives on the PROFIBUS/ PROFINET. An address is assigned to a drive.

This MD is the link to the description of the PROFIBUS/PROFINET configuration in SDB.

The MD value is the address index of the logical I/O drive address assigned with HW-Config (SIMATIC Manager S7).

Example:

DRIVE_LOGIC_ADDRESS[1] = 272 (The start address 272 is assigned to drive 1.)

The SDB defines the logical I/O address of the drives on the PROFIBUS/PROFINET. An address is assigned to a drive or to a slave.

The address index is used for actual-value and setpoint-value assignment

(MD 30220: ENC_MODULE_NR[n], MD 30110: CTRLOUT_MODULE_NR[n]).

Note:

The same drive (I/O address) must be assigned to the MD 30220: ENC_MODULE_NR[0] and MD 30110: CTRLOUT_MODULE_NR[0]

of a machine axis.

Each drive or slave must be assigned to a single logical address index.

The index [n] of the machine data has the following coding: [Drive index]:

Drive 1 -->n-=0

Drive 2 -->n-=1,

13060	DRIVE_TELEGRAM_TYPE			N04, N10	G2
-	Standard message frame type for PROFIdrive			DWORD	PowerOn
-					
-	31	102,102,102,102,102,102,102,102,102...	-	-	7/2
710-6a2c	-	116,116,116,116,116,116,116,116,116...	-	-	-/-
710-31a10c	-	116,116,116,116,116,116,116,116,116...	-	-	-/-
720-6a2c	-	116,116,116,116,116,116,116,116,116...	-	-	-/-
720-31a10c	-	116,116,116,116,116,116,116,116,116...	-	-	-/-
730-6a2c	-	116,116,116,116,116,116,116,116,116...	-	-	-/-
730-31a10c	-	116,116,116,116,116,116,116,116,116...	-	-	-/-

Description: For PROFIdrive only:

Standard message frame type for PROFIdrive axes:

0 = No standard type, user-defined
(Message frame type 103 is then used inside the NCK, whereby other process data can be added.)

1... 6 = PROFIdrive type

101...107 = 611U type

116 = 611U type 106 plus trace data

201...203 = internal type

Notes: Alarm 26015 is issued with reference to this machine data:

a. If less data has been configured on the bus (message length) than required for the message frame type selected here.

b. If the message frame configuration contains inconsistencies, that is the message frame type selected here of the NCK side does not correspond to the message frame type set on the drive (see parameter P922), and the process data configuration does not match (see parameters P923, P915, P916). The check for message frame configuring errors can be disabled by MD DRIVE_FUNCTION_MASK bit15.

13070	DRIVE_FUNCTION_MASK			N04, N10	G2
-	PROFIdrive expansion functions			DWORD	PowerOn
-					
-	31	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-	-	7/2
710-6a2c	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2...	-	-	-/-
710-31a10c	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2...	-	-	-/-
720-6a2c	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2...	-	-	-/-
720-31a10c	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2...	-	-	-/-
730-6a2c	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2...	-	-	-/-
730-31a10c	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2...	-	-	-/-

Description: For PROFIdrive only:

Bit-coded mask for skipping the scope of available functions for PROFIdrive axes expected from NCK.

Meaning of set bits:

Bit 0:Deactivation of axial drive alarm display

Note: the effect of this bit may be hidden depending on the value in $MN_PROFIBUS_ALARM_ACCESS.

Bit 1:Deactivation of 611U description file intermediate storage in the NCK

Bit 2:Deactivation of axial encoder driver parameter accesses

Bit 3:Deactivation of axial output driver parameter accesses

Bit 4:reserved, free (previously activation of DSC bits)

Bit 5:Deactivation of the 611U-specific drive parking (STW2.7/STA2.7)

Bit 6:Deactivation of the 611U-specific travel to fixed stop (STW2.8/STA2.8)

Bit 7:Deactivation of the 611U-specific motor switching int. (STW2.9 to 2.11)

Bit 8:Deactivation of the 611U-specific ramp block (STW1.11+13)

Bit 9:Deactivation of the 611U-specific function generator bits (STW1.8/STA1.13)

Bit 10:Deactivation of the control of the holding brake (STW1.12 / STA2.5)

Bit 11:Deactivation of the effect of OFF2/OFF3 on "driveReady" (DB31, ... DBX93.5) (Drive Ready)

Bit 12:Not assigned; free

Bit 13:Drive parking simulation (STA2.7 = STW2.7)

Bit 14:Selection of non-cyclical communication 0 = DPT 1 = DPV1

Bit 15: Deactivation of the consistency check of the PROFIdrive telegram configuration

Configuration of bits 5 - 10 which are new for SW 6.3 and higher allows an adaptation of certain control or status bits that are not standardized in the PROFIdrive profile. The bits may have a different significance and effect in the default setting of external drives.

13080	DRIVE_TYPE_DP			EXP	G2
-	PROFIBUS/PROFINET drive type			BYTE	PowerOn
-					
-	31	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	0	4	7/2

Description: For PROFIdrive only (for SIMODRIVE611D MD $MN_DRIVE_TYPE applies instead):

MD is relevant to PROFIdrive drives at the PROFIBUS/PROFINET:

Drive type:

0: No drive or drive type unknown (default),
software-internally treated as:

1: FDD drive (SRM: Synchronous rotary drive)

2: MSD drive (ARM: Asynchronous rotary drive)

3: Linear drive

4: Analog drive (no automatic entry)

Note:

In general, the drive type is entered automatically with Siemens drives as soon as the drives start operating.

With non-Siemens drives (at least with linear drives) the value must be entered manually if automatic drive recognition is not possible.

13100	DRIVE_DIAGNOSIS			EXP, N05	IAD,Kap.3
-	Diagnosis drive link			DWORD	PowerOn
-					
-	9	0,0,0,0,0,0,1,0,0	-	-	7/2

Description:

```
Relevant to SIMODRIVE611D diagnostics:
1.   Special function of DRIVE_DIAGNOSIS[6]
1.1. Standard preassignment
Content = 1:
   Initiates the output of
    1. current setpoint
    2. speed setpoint
    3. actual speed value
   to the 3 digital-to-analog converter outputs of all active
   drive modules.
   These outputs are made for the 1st axis for 2-axis modules.
Content = 2:
   Initiates the output of the values for the 2nd axis of 2-axis
   modules.
1.2. Expansion reset-resistant digital-to-analog converters
Content = 0:
   No reset-resistant digital-to-analog converters
Content = 1:
   Default value 1 is activated, every further change is retained.
Content = 2:
   Default value 2  is activated, every further change is retained.
If a change in the content is detected during NCK restart, the
information stored up to this point is deleted.
2.   Transport trace
DRIVE_DIAGNOSIS[7]   Activation of transport trace (!=0, active on
PowerOn)
3.   If MD13100 DRIVE_DIAGNOSIS[8] contains a value other than
zero, then the control has found at least one closed-loop control
module that does not support the measuring. The machine axis
affected is entered bit-coded in the machine data.
1st example:
Only axis 1 is affected --> DRIVE_DIAGNOSIS[8] = 0x0001
2nd example:
Axis 3 and axis 4 are affected ---> DRIVE_DIAGNOSIS[8] = 0x000C
```

13110	PROFIBUS_TRACE_ADDRESS			EXP	-
-	PROFIBUS/PROFINET trace of I/O slots			DWORD	NEW CONF
-					
-	14	0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	8191	2/2

Description:

```
For PROFIBUS/PROFINET only:
Logical I/O address that is to be recorded.
```

13111	PROFIBUS_TRACE_TYPE			EXP	-
-	PROFIBUS/PROFINET trace settings			DWORD	NEW CONF
-					
-	-	0	0	2	2/2
840disl-6a	-	-	-	0	-/-
840disl-20a	-	-	-	0	-/-

Description: For PROFIBUS/PROFINET only:

0: Recording into the part program memory /_N_MPF_DIR/_N_SIEMDPTRC_MPF

1: Recording into the mass storage /user/sinumerik/data/temp/siem-dptrc.trc

2: Recording into the part program memory with runtime measurement

13112	PROFIBUS_TRACE_FILE_SIZE			EXP	-
-	Maximum trace file size in kbytes			DWORD	NEW CONF
-					
-	-	40	-	-	2/2

Description: For PROFIBUS/PROFINET only:

0: Trace without file size limitation

>0: Trace with file size limitation

13113	PROFIBUS_TRACE_START			EXP	-
-	Activation of PROFIBUS/PROFINET trace			DWORD	Immediately
-					
-	-	0	0	1	2/2

Description: For PROFIBUS/PROFINET only:

0: Trace off

1: Trace on

MD13112 > 0: Trace is automatically disabled when the file size is reached.

13114	PROFIBUS_TRACE_START_EVENT			EXP	-
-	Trigger conditions for PROFIBUS/PROFINET trace			DWORD	NEW CONF
-					
-	14	0,0,0,0,0,0,0,0,0,0,0,0,0,0	0x00000000	0x111fffff	2/2

Description: For PROFIBUS/PROFINET only:

The trigger frequency is configured bit-by-bit

Bits 0-15: 0x0001-0xffff: bit mask

Bits 16-23: 0x01-0x14: process data number (a maximum of 20 words are permissible)

Bits 24-27:0x01: status change 0->1

0x00: status change 1->0

Bits 28-31:0x10: send slot

0x00: receive slot

The trigger is not active if the process data number=0

The trigger is immediately active if MD 13114=1 and MD 13114=0x0

13120	CONTROL_UNIT_LOGIC_ADDRESS			N04, N10	-
-	Logical address of SINAMICS CU			DWORD	PowerOn
-					
-	7	0,0,0,0,0,0,0	0	8191	7/2
710-6a2c	-	6500,0,0,0,0,0,0	-	-	-/-
710-31a10c	-	6500,0,0,0,0,0,0	-	-	-/-
720-6a2c	-	6500,0,0,0,0,0,0	-	-	-/-
720-31a10c	-	6500,0,0,0,0,0,0	-	-	-/-
730-6a2c	-	6500,0,0,0,0,0,0	-	-	-/-
730-31a10c	-	6500,0,0,0,0,0,0	-	-	-/-

Description: For PROFIBUS/PROFINET, SINAMICS:

Logical I/O address of a SINAMICS-CU (Control Unit) on the PROFIBUS/PROFINET.

The cyclic DP communication with SINAMICS-CU is activated by taking over the associated slot address from the STEP7 project. The onboard I/Os cannot be accessed until after configuration.

13140	PROFIBUS_ALARM_ACCESS			N04, N10	-
-	Alarm response of PROFIBUS/PROFINET drives on power up			DWORD	Immediately
-					
-	-	1	0	2	2/7

Description:

```
For PROFIBUS/PROFINET only:
Specifies the time of activation for evaluation/transmission of
PROFIBUS/PROFINET node alarms or warnings
(fine diagnostics messages) on the NCK.
Affects drive alarms or warnings 380500, 380501
(or alarms 200000ff etc. created from these in the HMI)
as well as drive safety alarms 27900.
Meaning of the MD values:
0 = alarms/warnings are evaluated immediately
1 = alarms/warnings are not evaluated
2 = alarms are evaluated only after power up, i.e.
    as soon as HMI has set value 2 active again (NCK automatically
    resets the MD value to 1 at every power up; HMI must
    explicitely articulate its readiness for message processing
    by setting value 2)
Note: the MD restricts the range or effectiveness
         of MD 13150 SINAMICS_ALARM_MASK
Default: the display default behavior of the mentioned drive
         alarms changes with the introduction of this MD.
         Now the alarms are not transported and displayed
         by default.
         The previous default behavior can be restored
         with $MN_PROFIBUS_ALARM_ACCESS=0.
```

13150	SINAMICS_ALARM_MASK			N04, N05	-
-	Activate fault and warning buffer output for Sinamics			DWORD	Immediately
-					
-	-	0x0909	-	-	7/2

Description:

```
For PROFIBUS/PROFINET only, especially SINAMICS:
Relevant to SINAMICS diagnostics:
Note: the effect of this MD may be hidden independently of
         the value of $MN_PROFIBUS_ALARM_ACCESS.
Mask for displaying the SINAMICS DOS fault and warning buffers
Bit set:Alarms in this DO group are output
Bit not set:Alarms in this DO group are not output
Bit  Hex. Meaning
   value
=================================================================
===================
0:   0x1 Output faults of the Control Units
1:   0x2 Reserved
2:   0x4 Output faults of the Drive Controls
3:   0x8 Output faults of the Line Modules
4:   0x10 Output faults of the Terminal Boards
5:   0x20 Output faults of the Terminal Modules
8:   0x100 Output warnings of the Control Units
9:   0x200 Output warnings of the Communication Objects
10:  0x400 Output warnings of the Drive Controls
11:  0x800 Output warnings of the Line Modules
12:  0x1000 Ouptut warnings of the Terminal Boards
13:  0x2000 Output warnings of the Terminal Modules
```

13200	MEAS_PROBE_LOW_ACTIVE			N10, N09	M5
-	Polarity reversal of sensor			BOOLEAN	PowerOn
-					
-	2	FALSE,FALSE	-	-	7/2

Description:

```
The electrical polarity of each connected sensor is defined by
this MD.
Value 0:
   (default setting)
   Non-deflected state        0 V
   Deflected state           24 V
Value 1:
   Non-deflected state       24 V
   Deflected state            0 V
```

The programmed edges of the sensor are independent of the electrical polarity and are to be regarded as purely mechanical. The programming of a positive edge always means the transition from the non-deflected into the deflected state. The programming of a negative edge always means the transition from the deflected into the non-deflected state.

13210	MEAS_TYPE			N10, N09	M5
-	Meas. type with decentralized drives			BYTE	PowerOn
-					
-	-	1	0	1	7/2
710-6a2c	-	0	-	-	-/-
710-31a10c	-	0	-	-	-/-
720-6a2c	-	0	-	-	-/-
720-31a10c	-	0	-	-	-/-
730-6a2c	-	0	-	-	-/-
730-31a10c	-	0	-	-	-/-
840disl-6a	-	0	-	-	-/-
840disl-20a	-	0	-	-	-/-

Description: For PROFIdrive only:

This MD sets the measuring function of decentralized drives.

The MD currently only functions for PROFIdrive drives.

MEAS_TYPE = 0 defines:

A probe is used that is connected centrally to the NC.

However, as the encoders only provide actual position values in cycles, the actual measuring position is found by interpolation.

MEAS_TYPE = 1 defines:

The probe must be wired decentralized to ALL drives.

The measuring functionality of the drive is then used,

saving the actual encoder values in the hardware at the time of the measuring edge.

This method is more accurate than that with MEAS_TYPE = 0, but it requires a more complex wiring and drives that support this measuring functionality (e.g. 611U).

13211	MEAS_CENTRAL_SOURCE			N10, N09	-
-	Data source central measurement with PROFIBUS/ PROFINET drives			BYTE	PowerOn
-					
-	-	3	1	3	0/0
840disl-6a	-	1	-	-	-/-
840disl-20a	-	1	-	-	-/-

Description: For PROFIBUS/PROFINET only:

This MD is used to set the method used to obtain the time stamps for central
measurement with PROFIdrive drives.

The following applies if MEAS_CENTRAL_SOURCE = 1:

NRK accesses are used to access the onboard measuring registers.

For this purpose, the appropriate hardware which allows this must be
available, e.g. 840Di with MCI extension board.

The following applies if MEAS_CENTRAL_SOURCE = 2:

The SINAMICS DO1 telegram is used (telegram type 391),
variant "Cyclic measurement" without
handshake.

For this purpose, an integrated SINAMICS must be available, e.g. NCU 710.

(Not available until supported by SINAMICS).

The following applies if MEAS_CENTRAL_SOURCE = 3:

The SINAMICS DO1 telegram is used (telegram type 391),
in the variant with handshake. This procedure is
fault-tolerant, however, allows a measuring edge only every 4 PROFIBUS/PROFINET
cycles, i.e. it is considerably slower.

For this purpose, an integrated SINAMICS must be available, e.g. NCU 710.

This MD is only relevant, if MD 13210 MEAS_TYPE == 0.

13220	MEAS_PROBE_DELAY_TIME			N10, N09	FBA/IAD
s	Delay time between probe deflection and recognition			DOUBLE	PowerOn
-					
-	2	0.0,0.0	0	0.1	7/2

Description: For probes with e.g. radio transmission, the probe deflection can be detected in the NC only with delay.

With this MD, the transmission link delay between the probe deflection and its detection is set in the control.

The measured value is corrected internally by the control by the distance that corresponds to the traversing motion during this time before measuring (modeling).

It is practicable to set values only up to a maximum of 15 position controller cycles.

Anyhow, the modeling could not work with the expected accuracy with values greater than that. In this case, the input value is therefore limited internally by the software to 15 position controller cycles (without any further feedback).

13230	MEAS_PROBE_SOURCE			N10, N09	-
-	Probe simulation			BYTE	PowerOn
-					
-	-	0	0	8	7/2

Description: Simulation of the probe only works when all axes are simulated.

Value = 0: the probe is triggered on the programmed end position.

Value > 0: the probe is triggered via digital output with the number=value.

13231	MEAS_PROBE_OFFSET			N10, N09	-
mm/inch, degrees	Probe offset			DOUBLE	Immediately
-					
-	-	0.1	-	-	7/7

Description: The switching position of the probe is offset by the value.

The offset is only active with the simulated probes and MD 13230=0.

13300	PROFISAFE_IN_FILTER			N01, N06, -	-
-	Useful F data filter IN			DWORD	PowerOn
-					
-	16	0xFFFFFFFF,0xFFFFFFFF,0xFFFFFFFF...	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Filter between F user data and $INSE variables

Machine data $MN_PROFISAFE_IN_FILTER defines which F user data bits of the PROFIsafe module are accepted from the F user data interface of the PROFIsafe module into the NCK for further processing.

The filtered F user data bits are compressed internally in the NCK to form a contiguous bit field.

Machine data $MN_PROFISAFE_IN_ASSIGN then also defines the $INSE variables to which the filtered F user data bits are transferred.

Example:

Note:

Only 16 bits are shown for the sake of simplicity.

Parameterization:

```
   $MN_PROFISAFE_IN_FILTER = 1010100101000100
   $MN_PROFISAFE_IN_ASSIGN = 011006
 n = 16       11        6        1
     |x|x|x|x|x|1|1|1|0|0|1|x|x|x|x|x|
   $INSE[n], x = irrelevant
     |0|0|0|0|0|0|0|0|0|0|1|1|1|0|0|1|
   NCK-internal image of F user data
     |1|0|1|0|1|0|0|1|0|1|0|0|0|1|0|0|
   $MN_PROFISAFE_IN_FILTER
     |1|0|1|0|1|0|0|0|0|0|0|0|0|1|0|0|
   Exemplary value present at F user data interface of the
   PROFIsafe module
```

13301	PROFISAFE_OUT_FILTER			N01, N06, -	-
-	Useful F data filter OUT			DWORD	PowerOn
-					
-	16	0xFFFFFFFF,0xFFFFFFFF,0xFFFFFFFF...	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description:

```
Filter between $OUTSE variables and F user data
Machine data $MN_PROFISAFE_OUT_ASSIGN defines which $OUTSE[n]
variables are transferred to the F user data bits of the PROFIsafe
module.
Machine data $MN_PROFISAFE_OUT_FILTER defines the F user data bit
to which the relevant $OUTSE[n] variable is transferred.
Example:
Note: Only 16 bits are shown for the sake of simplicity.
Parameterization:
   $MN_PROFISAFE_OUT_FILTER = 1010100101000100
   $MN_PROFISAFE_OUT_ASSIGN = 011006
n = 16       11        6        1
     |x|x|x|x|x|1|1|1|1|1|1|x|x|x|x|x|
   Exemplary value present in the $OUTSE variables, x = irrelevant
     |0|0|0|0|0|0|0|0|0|0|1|1|1|1|1|1|
   NCK-internal image of F user data
     |1|0|1|0|1|0|0|1|0|1|0|0|0|1|0|0|
   $MN_PROFISAFE_OUT_FILTER
     |1|0|1|0|1|0|0|1|0|1|0|0|0|1|0|0|
   F user data of the PROFIsafe module
```

13310	SAFE_SPL_START_TIMEOUT			N01, N05, -	FBSI
s	Delay in display of alarm 27097			DOUBLE	PowerOn
-					
-	-	20.	1.	60.	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: After powerup of the control, alarm 27097 is displayed after the time if the SPL start is not carried out.

13320	SAFE_SRDP_IPO_TIME_RATIO			N01, N06, -	FBSI
-	Factor F_DP communication cycle			DWORD	PowerOn
SFCO					
-	-	10	1	65535	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Ratio between interpolator cycle and F_DP cycle, in which the F_DP communication is performed. In the resulting time interval the NCK triggers OB40 on the PLC in order to perform the F_DP communication.

The value for the communication cycle resulting from this MD and the set IPO cycle must not exceed 250ms.

13322	INFO_SAFE_SRDP_CYCLE_TIME			N01, N06, N05, -	FBSI
s	Maximum F_DP communication cycle			DOUBLE	PowerOn
-					
-	-	0.0	-	-	7/RO
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Display data: shows the maximum time interval, in which the F_DP communication is performed. The value results from the interpolator cycle and MD $MN_SAFE_SRDP_IPO_TIME_RATIO. If the value of the set communication cycle is exceeded, this is displayed here as well. This is only a display data. The value cannot be changed.

13330	SAFE_SDP_ENABLE_MASK			N01, N06, -	FBSI
-	Enable screen F_SENDDP communication relationships			DWORD	PowerOn
-					
-	-	0x0	0x0	0xFFF	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Enable screen for the individual F_SENDDP communication relationships

13331	SAFE_SDP_ID			N01, N06, -	FBSI
-	ID for F_SENDDP communication relationship			DWORD	PowerOn
-					
-	MD_MAXNUM_SFSRDP_SEND_SLOT	0,0,0,0,0,0,0,0,0,0,0,0	MD_MINVAL_SFSRDP_DPDPID	MD_MAXVAL_SFSRDP_DPDPID	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Any network unique value as ID for F_SENDDP communication relationship.

SIMATIC module parameter: DP_DP_ID

13332	SAFE_SDP_NAME			N01, N06, -	FBSI
-	Name of SPL connection			STRING	PowerOn
-					
-	MD_MAXNUM_SFSRDP_SEND_SLOT		-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: A name can be assigned to each SPL connection.

If a name was assigned, this name will be displayed in the alarm text instead of DP_DP_ID.

13333	SAFE_SDP_CONNECTION_NR			N01, N06, -	FBSI
-	Number of SPL connection			BYTE	PowerOn
-					
-	MD_MAXNUM_SFSRDP_SEND_SLOT	0,0,0,0,0,0,0,0,0,0,0,0	0	3	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This machine data is used to set the number of the SPL connection that is parameterized with this data record.

The number of the SPL connection is at the same time also the index for access to the system variables of the user interface of this SPL connection.

This applies to the following system variables:

- $A_FSDP_ERR_REAC
- $A_FSDP_ERROR
- $A_FSDP_SUBS_ON
- $A_FSDP_DIAG

Example: $MN_SAFE_SDP_CONNECTION_NR[2] = 3 means that the control and status information of the SPL connection that is parameterized via data record 2 can be found in the system variables with field index 3.

13334	SAFE_SDP_LADDR			N01, N06, -	FBSI
-	Basic address of the input/output data range F_SENDDP			DWORD	PowerOn
-					
-	MD_MAXNUM_SFSRDP_SEND_SLOT	288,288,288,288,288,288,288,288,288...	288	32767	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: The start address of the input and output data range - parameterized in SIMATIC STEP 7 - through which F_SENDDP of this communication relationship communicates.

SIMATIC module parameter: LADDR

13335	SAFE_SDP_TIMEOUT			N01, N06, -	FBSI
s	Monitoring time F_SENDDP			DOUBLE	PowerOn
-					
-	MD_MAXNUM_SFSRDP_SEND_SLOT	0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5...	0.0	60.0	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: The monitoring time is the time in which F_SENDDP must have sent a new F telegram to F_RECVDP or in which F_RECVDP must have acknowledged a new F telegram. When the monitoring time is exceeded, F_RECVDP outputs replacement values to the SPL.

SIMATIC module parameter: TIMEOUT

13336	SAFE_SDP_ASSIGN			N01, N06, -	FBSI
-	Output assignment.$A_OUTSE to F_SENDDP user data			DWORD	PowerOn
-					
-	MD_MAXNUM_SFSRDP_SEND_SLOT	0,0,0,0,0,0,0,0,0,0,0,0	0	64064	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: The SPL signals $A_OUTSE to be transmitted can only be selected area by area.

Format: 00 aaa bbb (decimal) with

aaa = area limit 1, SPL signal $A_OUTSE[aaa]

bbb = area limit 2, SPL signal $A_OUTSE[bbb]

Example: $MN_SAFE_SDP_ASSIGN[0] = 001 004 or alternatively 004 001

The SPL signals $A_OUTSE[1] to $A_OUTSE[4] are transmitted to the F_SENDDP user data selected via MD SAFE_SDP_FILTER[0].

13337	SAFE_SDP_FILTER			N01, N06, -	FBSI
-	F user data filter between $A_OUTSE and F_SENDDP			DWORD	PowerOn
-					
-	MD_MAXNUM_SFSRDP_SEND_SLOT	0xFFFF,0xFFFF,0xFFFF,0xFFFF,0xFFFF...	0x0	0xFFFF	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: The SPL signals selected via MD $MN_SAFE_SDP_ASSIGN are transmitted to the F_SENDDP user data signals in the order of the FILTER bits set to 1. The lowest-value SPL signal to the bit position of the F_SENDDP user data of the lowest-value filter bit set to 1, etc. for all SPL signals selected.

Bit x = 1: an SPL signal is transmitted to bit position x of the F_SENDDP user data.

Bit x = 0: no SPL signal is transmitted to bit position x of the F_SENDDP user data.

13338	SAFE_SDP_ERR_REAC			N01, N06, -	FBSI
-	Fault reaction			DWORD	PowerOn
-					
-	MD_MAXNUM_SFSRDP_SEND_SLOT	0,0,0,0,0,0,0,0,0,0,0,0	0	3	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: In the case of a communication error the fault reaction defined here is triggered. This value is valid as long as no other value is specified from the SPL via system variable $A_FSDP_ERR_REAC.

Meaning of the values:

- 0 = alarm 27350 + stop D/E
- 1 = alarm 27350
- 2 = alarm 27351 (displayed only; self-extinguishing)
- 3 = no system reaction

13340	SAFE_RDP_ENABLE_MASK			N01, N06, -	FBSI
-	Enable screen F_RECVDP communication relationships			DWORD	PowerOn
-					
-	-	0x0	0x0	0xFFF	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Enable screen for the individual F_RECVDP communication relationships

13341	SAFE_RDP_ID			N01, N06, -	FBSI
-	ID for F_RECVDP communication relationships			DWORD	PowerOn
-					
-	MD_MAXNUM_SFSRDP_RECV_SLOT	0,0,0,0,0,0,0,0,0,0,0,0	MD_MINVAL_SFSRDP_DPDPID	MD_MAXVAL_SFSRDP_DPDPID	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Any network unique value as ID for F_RECVDP communication relationships.

SIMATIC module parameter: DP_DP_ID

13342	SAFE_RDP_NAME			N01, N06, -	FBSI
-	Name of SPL connection			STRING	PowerOn
-					
-	MD_MAXNUM_SFSRDP_RECV_SLOT		-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: A name can be assigned to each SPL connection.

If a name was assigned, this name will be displayed in the alarm text instead of DP_DP_ID.

13343	SAFE_RDP_CONNECTION_NR			N01, N06, -	FBSI
-	Assignment SPL connection to system variables			BYTE	PowerOn
-					
-	MD_MAXNUM_SFSRDP_RECV_SLOT	0,0,0,0,0,0,0,0,0,0,0,0	0	3	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This machine data is used to set the number of the SPL connection that is parameterized with this data record.

The number of the SPL connection is at the same time also the index for access to the system variables of the user interface of this SPL connection.

This applies to the following system variables:

- $A_FRDP_SUBS
- $A_FRDP_ERR_REAC
- $A_FRDP_ERROR
- $A_FRDP_SUBS_ON
- $A_FRDP_ACK_REQ
- $A_FRDP_DIAG
- $A_FRDP_SENDMODE

Example: $MN_SAFE_RDP_CONNECTION_NR[2] = 3 means that the control and status information of the SPL connection that is parameterized via data record 2 can be found in the system variables with field index 3.

13344	SAFE_RDP_LADDR			N01, N06, -	FBSI
-	Basic address of the input/output data range F_RECVDP			DWORD	PowerOn
-					
-	MD_MAXNUM_SFSRDP_RECV_SLOT	288,288,288,288,288,288,288,288,288...	288	32767	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: The start address of the input and output data range - parameterized in SIMATIC STEP 7 - through which F_RECVDP of this communication relationship communicates.

SIMATIC module parameter: LADDR

13345	SAFE_RDP_TIMEOUT			N01, N06, -	FBSI
s	Monitoring time F_RECVDP			DOUBLE	PowerOn
-					
-	MD_MAXNUM_SFSRDP_RECV_SLOT	0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5...	0.0	60.0	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: The monitoring time is the time in which F_SENDDP must have sent a new F telegram to F_RECVDP or in which F_RECVDP must have acknowledged a new F telegram. When the monitoring time is exceeded, F_RECVDP outputs replacement values to the SPL.

SIMATIC module parameter: TIMEOUT

13346	SAFE_RDP_ASSIGN			N01, N06, -	FBSI
-	Input assignment. F_RECVDP user data to $A_INSE			DWORD	PowerOn
-					
-	MD_MAXNUM _SFSRDP_RE CV_SLOT	0,0,0,0,0,0,0,0,0,0,0,0	0	64064	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description:

```
The SPL signals $A_INSE to be supplied can only be selected area by area.
Format: 00 aaa bbb (decimal) with
 aaa = area limit 1, SPL signal $A_INSE[aaa]
 bbb = area limit 2, SPL signal $A_INSE[bbb]
 Example: $MN_SAFE_RDP_ASSIGN[0] = 001 004 or alternatively 004 001
 The SPL signals $A_INSE[1] to $A_INSE[4] are transmitted to the F_RECVDP user data selected via MD SAFE_RDP_FILTER[0].
```

13347	SAFE_RDP_FILTER			N01, N06, -	FBSI
-	F user data filter between F_RECVDP and $A_INSE			DWORD	PowerOn
-					
-	MD_MAXNUM _SFSRDP_RE CV_SLOT	0xFFFF,0xFFFF,0xFFF F,0xFFFF,0xFFFF...	0x0	0xFFFF	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description:

```
The F_RECVDP user data signals the filter bits of which are set to 1 are transmitted to the SPL signals via MD $MN_SAFE_RDP_ASSIGN. The lowest-value F_RECVDP user data signal to the lowest-value selected SPL signal etc. for all F_RECVDP user data selected.
 Bit x = 1: the F_RECVDP user data signal of bit position x is transmitted as SPL signal.
 Bit x = 0: the F_RECVDP user data signal of bit position x is not transmitted as SPL signal.
```

13348	SAFE_RDP_ERR_REAC			N01, N06, -	FBSI
-	Fault reaction			DWORD	PowerOn
-					
-	MD_MAXNUM _SFSRDP_SE ND_SLOT	0,0,0,0,0,0,0,0,0,0,0,0	0	3	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description:

```
In the case of a communication error, the fault reaction defined here is triggered. This value is valid as long as no other value is specified from the SPL via system variable $A_FRDP_ERR_REAC.
Meaning of the values:
```

- 0 = alarm 27350 + stop D/E
- 1 = alarm 27350
- 2 = alarm 27351 (displayed only; self-clearing)
- 3 = no system reaction

13349	SAFE_RDP_SUBS			N01, N06, -	FBSI
-	Replacement values in case of error			DWORD	PowerOn
-					
-	MD_MAXNUM_SFSRDP_SEND_SLOT	0,0,0,0,0,0,0,0,0,0,0,0	0	0xFFFF	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: In the case of a communication error, the replacement values defined here are activated in the system variables $A_INSE assigned to this SPL connection.

This value is valid as long as no other value is specified from the SPL via system variable $A_FRDP_SUBS.

14504	MAXNUM_USER_DATA_INT			N03	P3
-	Number of user data (INT)			DWORD	PowerOn
-					
-	-	0	0	256	7/2

Description: Number of NC/PLC user data of type INT

14506	MAXNUM_USER_DATA_HEX			N03	A2,P3
-	Number of user data (HEX)			DWORD	PowerOn
-					
-	-	0	0	256	7/2

Description: Number of NC/PLC user data (HEX)

14508	MAXNUM_USER_DATA_FLOAT			N03	A2,P3
-	Number of user data (FLOAT)			DWORD	PowerOn
-					
-	-	0	0	32	7/2

Description: Number of NC/PLC user data of type FLOAT

14510	USER_DATA_INT			N03	A2,P3
-	User data (INT)			DWORD	PowerOn
-					
-	256	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-32768	32767	7/2

Description: User data is stored in the NCK-PLC interface and can be read by the PLC user from the DB20 during the runup.

14512	USER_DATA_HEX			N03	A2,P3
-	User data (HEX)			DWORD	PowerOn
-					
-	256	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	0	0x0FF	7/2

Description: User data is stored in the NCK-PLC interface and can be read by the PLC user from the DB20 during the runup.

14514	USER_DATA_FLOAT			N03	A2,P3
-	User data (FLOAT)			DOUBLE	PowerOn
-					
-	32	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-3.40e38	3.40e38	7/2

Description: User data is stored in the NCK-PLC interface and can be read by the PLC user from the DB20 during the runup.

14516	USER_DATA_PLC_ALARM			N03	A2,P3
-	User data (HEX)			BYTE	PowerOn
-					
-	64	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-	-	0/0

Description: User data is stored in the NCK-PLC interface and can be evaluated by the PLC basic system (currently for software PLC 2xx).

15700	LANG_SUB_NAME			N01	-
-	Name for substitution subroutine			STRING	PowerOn
-					
-	-		-	-	7/2

Description: Name of the user program called on the basis of a substitution configured by $MA_AXIS_LANG_SUB_MASK.

The user program is called with the path configured by $MN_LANG_SUB_PATH.

15702	LANG_SUB_PATH			N01	-
-	Call path for substitution subroutine			BYTE	PowerOn
-					
-	-	0	0	2	7/2

Description: Path with which the user program set by $MN_LANG_SUB_NAME is called on the basis of a substitution configured by $MA_AXIS_LANG_SUB_MASK:

0: /_N_CMA_DIR (default)

1: /_N_CUS_DIR

2: /_N_CST_DIR

17200	GMMC_INFO_NO_UNIT			EXP	K1
-	Global HMI information (without physical unit)			DOUBLE	PowerOn
-					
-	16	3.,4.,3.,1.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	0/7

Description: The HMI stores the global display machine data

- $MM_DISPLAY_RESOLTION
- $MM_DISPLAY_RESOLTION_INCH
- $MM_SPIND_DISPLAY_RESOLUTION
- $MM_MA_COORDINATE_SYSTEM

in the NCK machine data from $MN_GMMC_INFO_NO_UNIT[0] to $MN_GMMC_INFO_NO_UNIT[3]. This enables these display machine data to be accessed from the NCK.

17201	GMMC_INFO_NO_UNIT_STATUS			EXP	K1
-	Global HMI status info (without physical unit)			BYTE	PowerOn
-					
-	16	1,1,1,1,0,0,0,0,0,0,0,0,0,0,0,0	-	-	0/7

Description: Value 0: input not assigned

Value 1: input assigned

17400	OEM_GLOBAL_INFO			A01, A11	-
-	OEM version information			STRING	PowerOn
-					
-	5		-	-	7/2

Description: A version information freely available to the user (is indicated in the version screen)

17500	MAXNUM_REPLACEMENT_TOOLS			N09	FBW
-	Maximal number of replacement tools.			DWORD	PowerOn
-					
-	-	0	0	32	7/2

Description: Only relevant if the tool management function is active.

Maximum number of replacement tools.

Value = 0

means that the number of replacement tools is not monitored. (compatible to prior versions)

Value = 1

means that exactly one tool may be given to an identifier.

The data does not influence the memory requirement. It is solely for monitoring purposes.

See also

MM_TOOL_MANAGEMENT_MASK,

TOOL_MANAGEMENT_MASK

17510	TOOL_UNLOAD_MASK			N09	FBW
-	Behavior of tool data when unloading			DWORD	PowerOn
-					
-	-	0	0	0xF	7/2

Description: When unloading a tool, certain tool data can be set to store fixed values.

Bit no.Bit valueHEXMeaning

0 0Tool status 'active' remains unchanged.

1 0x1Tool status 'active' is deleted ($TC_TP8, Bit 0).

1 0Tool status 'was in use' remains unchanged.

1 0x2Tool status 'was in use' is deleted ($TC_TP8, Bit 7).

2 0Tool parameter $TC_TP10 remains unchanged.

1 0x4Tool parameter $TC_TP10 is set to zero. That is, the tool replacement change strategy is reset.

3 0Tool parameter $TC_TP11 remains unchanged.

1 0x8Tool parameter $TC_TP11 is set to zero. That is, the assignment to the tool subgroup is resolved.

17515	TOOL_RESETMON_MASK			N09	-
-	Tool data behavior with RESETMON			DWORD	PowerOn
-					
-	-	0x14	0	0x49F	7/2

Description: The 5th parameter of the RESETMON command defines which tool status is to be reset. If the 5th parameter is omitted, it is replaced by the value in this MD. With the PI service "_N_TRESMON", work is always done with this value.

In that case the bits are always assigned as the bits in the tool status $TC_TP8[i].

Bit Value/HEXMeaning

0 0Tool status "active" remains unchanged

1 /0x1Tool status "active" is deleted

1 0Tool status "released" remains unchanged

1 0x2Tool status "released" is set

2 0Tool status "locked" remains unchanged

1 / 0x4Tool status "locked" is deleted, if this is permitted by the monitoring data and the 4th parameter is set correspondingly.

3 0Tool status "measure" remains unchanged

1 / 0x8Tool status "measure" is set

4 0Tool status "prewarning limit" remains unchanged

1/ 0x10Tool status "prewarning limit" is deleted, if this is permitted by the monitoring data and the 4th parameter is set correspondingly.

5 Not permitted (tool status "tool is being changed")

6 Not permitted (tool status "tool is fixed-location-coded")

7 0Tool status "was in use" remains unchanged

1 / 0x80Tool status "was in use" is deleted

8 Not permitted (tool status "is in retract")

9 Not permitted (tool status "locked is ignored")

10 0Tool status "to unload" remains unchanged

1 / 0x400Tool status "to unload" is deleted

11 Not permitted (tool status "to load")

12 Not permitted (tool status "master tool")

13,ffNot permitted (reserved)

The default setting corresponds to the previous behavior.

Bits not defined here are ignored when writing the machine data.

17520	TOOL_DEFAULT_DATA_MASK			N09	FBW
-	Create new tool: default settings			DWORD	PowerOn
-					
-	-	0	0	0x1F	7/2

Description: When defining a tool for the first time, certain data of the tool can be set to fixed default values. This can prevent simple applications from dealing with data which do not necessarily have to be assigned individual values.

Bit no.Bit valueHEXMeaning

----

0   0Default value of tool status ($TC_TP8), Bit1=0 = 'not released'

1 0x1Default value of tool status ($TC_TP8), Bit1=1 = 'released'

1   0Default value of tool status ($TC_TP8), Bit6=0 = 'not fixed-location-coded'

1 0x2Default value of tool status ($TC_TP8), Bit6=1 = 'fixed-location-coded'

2   0Only when the explicit write command for the tool name is used, is the tool accepted in the tool group. Only then can it be loaded via programming.

1 0x4The tool is automatically accepted in the tool group corresponding to the tool name when it is defined for the first time. The tool can then be changed using the default name ("t" = t-No.). The term 'tool name' ($TC_TP2) can be hidden from the user. (This only makes sense if you do not use replacement tools or if the tool name is not written explicitly. As this may give rise to data consistency problems.)

3   0Only with TMMG: Default value of location type ($TC_TP7) = 9999 = 'not defined'

1 0x8Only with TMMG: Default value of location type ($TC_TP7) = 1 and consequently, default value of magazine location type ($TC_MPP2) = 1. This means that all magazine locations can accept all tools.

4   0Only with TMMG + active consider adjacent location: With SET/RESET of the magazine location status 'disabled', the magazine location status 'Overlapping allowed' remains unchanged.

1 0x10Only with TMMG + active consider adjacent location: With SET/RESET of the magazine location status 'disabled' the magazine location status 'Overlapping allowed' occurs automatically with SET/RESET.

17530	TOOL_DATA_CHANGE_COUNTER			EXP, N01	FBW
-	Mark tool data change for HMI			DWORD	PowerOn
-					
-	-	0	0	0x1F	7/2
710-6a2c	-	0x1F	-	-	-/-
710-31a10c	-	0x1F	-	-	-/-
720-6a2c	-	0x1F	-	-	-/-
720-31a10c	-	0x1F	-	-	-/-
730-6a2c	-	0x1F	-	-	-/-
730-31a10c	-	0x1F	-	-	-/-

Description:

```
HMI display support. This data enables individual data to be
explicitly taken into account or not taken into account in the OPI
variables (block C/S) toolCounter, toolCounterC, toolCounterM.
Bit no.  Bit value   HEX   Meaning
-----------------------------------------------------------------
--------------
0         0                Changes to the value of the tool status
($TC_TP8)
                         are not taken into account in toolCounterC
          1         'H1'   Changes to the value of the tool status
($TC_TP8)
                            are taken into account in toolCounterC
1         0               Changes to the remaining number of tools
($TC_MOP4)
                         are not taken into account in toolCounterC
          1         'H2'   Changes to the remaining number of tools
($TC_MOP4)
                            are taken into account in toolCounterC
2          0                Changes to the value of the tool data
                            are not taken into account in the tool
data update service
           1         'H4'   Changes to the value of the tool data
                           are taken into account in the tool data
update service
3         0               Changes to the value of the magazine data
                            are not taken into account in the tool
data update service
          1         'H8'   Changes to the value of the magazine data
                           are taken into account in the tool data
update service.
4          0                Changes to the value of the ISO tool
offset data are
                           not taken into account in the tool data
update service
           1         'H10'   Changes to the value of the ISO tool
offset data are
                             taken into account in the tool data
update service.
```

17540	TOOLTYPES_ALLOWED		N09	-
-	Permitted tool types		DWORD	PowerOn
-				
-	- 0x3FF	0	0x3FF	7/2

Description: Definition of the tool types permitted in NCK (see $TC_DP1) with the tool offset selection, i.e. tools of any type may be loaded in the NCK; but only the tools types defined here may be defined in the offset defining tool.

A bit value = 1 means that the named tool type range is permitted for the offset selection.

A bit value = 0 means that the named tool type range is refused with a compensation block capable alarm in the case of an attempted offset selection of a cutting edge of this type.

The special value = 0, 9999 for the tool type means 'undefined'. Tool offsets with this tool type value generally cannot be selected

```
Bit no.        ValueMeaning
0               0x1Tool types   1 to  99 permitted
1               0x2Tool types 100 to 199 permitted
                        (milling tools typically have these types)
2               0x4Tool types 200 to 299 permitted
                       (drilling tools typically have these types)
3               0x8Tool types 300 to 399 permitted
4              0x10Tool types 400 to 499 permitted
                         (grinding tools have these types)
5              0x20Tool types 500 to 599 permitted
                        (turning tools typically have these types)
6              0x40Tool types 600 to 699 permitted
7              0x80Tool types 700 to 799 permitted
                         (the slotting saw has the fixed type 700)
8             0x100Tool types 800 to 899 permitted
9             0x200Tool types 900 to 999 permitted
                         (special tools have the fixed type 999)
```

See also

$MN_MM_NUM_CUTTING_EDGES_IN_TOA

17600	DEPTH_OF_LOGFILE_OPT			EXP, N01	-
-	Depth of log memory optimization in REORG			DWORD	Reset
-					
-	-	5	0	300	3/3

Description: The depth of memory optimization in the REORG log file

(=search depth to determine if a parameter to be written is already included in the REORG log file).

The value of the machine data can be increased if alarm 15110 occurs during program execution and if this alarm is to be avoided.

(Alternatively, the size of the REORG log file can be increased with $MC_MM_REORG_LOG_FILE_MEM, provided that the operator has the access rights required. This procedure should generally be preferred.)

Value

0 = No optimization,

That is each write operation creates an input into the REORG log file. Writing a variable value is therefore very time-efficient, but requires more memory.

0< n <= Maximum value

When a new variable value is written, the n previously entered write operations (but maximally up to the previous indicatable block) are checked to determine if the parameter now to be written has already been written in the past. If this is the case, a new entry is not made in the REORG log file.

If this is not the case, an entry is made. A variable value can therefore be written in a very memory-efficient way, but requires more time.

Example:

$MN_DEPTH_OF_LOGFILE_OPT is assumed to be 5 and the following would be a typical program sequence:

```
x10     ; Executable NC block
r1=1    ; The first write command since x10
        ; -> Save old value in log file. 1st entry
r2=1    ; Determine that r2 is not yet included
        ; -> Save old value in log file. 2nd entry
r3=1    ; Determine that r3 is not yet included
        ; -> Save old value in log file. 3rd entry
r4=1    ; Determine that r4 is not yet included
        ; -> Save old value in log file. 4th entry
r5=1    ; Determine that r5 is not yet included
        ; -> Save old value in log file. 5th entry
r6=1    ; Determine that r6 is not yet included
        ; -> Save old value in log file. 6th entry
r2=1    ; Determine that r2 is already included
        ; (5th oldest entry) -> no renewed saving
r3=1    ; Determine that r3 is already included
        ; (4th oldest entry) -> no renewed saving
r1=2    ; As $MN_DEPTH_OF_LOGFILE_OPT = 5 it is not detected that
        ; r1 is already included
        ; (6th oldest entry) -> save old value in log file.
```

```
        ; 7th entry
x20     ; Executable NC block
r1=3    ; The first write command since x20
        ; -> Save old value in log file. 1st entry
r1=4    ; Determine that r1 is already included
        ; (Only one entry) -> no renewed saving
```

The setting of the MD is particularly useful if a small number of verious parameters

are written frequently (e.g. in a loop) and if alarm 15110 occurs for this reason.

17610	DEPTH_OF_LOGFILE_OPT_PF			EXP, N01	-
-	Depth of the PowerFail log memory optimization			DWORD	Reset
-					
-	3	10,0,0	0	300	1/1

Description: Depth of the memory optimization in the PowerFail log file (=search depth, to find out

whether a parameter to be written is already included in the PowerFail log file).

It is possible to increase the value of the machine data if

alarm 15120 occurs during program processing and if you wish to avoid it.

(Alternatively, you can increase the size of the PowerFail log file itself

by means of $MC_MM_ACTFILESYS_LOG_FILE_MEM, if you have the necessary access right

and if the required memory is available.

Value

0

= same effect as value 1.Writing of a variable value is therefore very time-efficient at the cost of the required memory.

0< n <= Maximum val

= Writing of a new variable value leads, prior to saving of the new

variable value in the PowerFail log file, to the last n write operations which have been being checked to see whether
the new parameter to be written has already been written once.

If yes, the new value is not entered again in the PowerFail log file, but the old value is overwritten with the new one.

If no, the new value is entered.At the cost of the required time, writing of a variable value can therefore be designed very memory-efficiently.

Changing of the data can shorten/increase the time requirement of the present application.

Changing of the data can fill the available log buffers faster/ more slowly.

Frequent occuring of alarm 15120 -> Increase values for index=0,1,2.

The value indicating the index to be changed can be deducted from the parameter of alarm 15120:

if it is the value for $MC_MM_ACTFILESYS_LOG_FILE_MEM[0], then increase the value for index 0;

or increase $MC_MM_ACTFILESYS_LOG_FILE_MEM[0] itself.

Index Meaning

0 Search depth in preprocessing buffer

1 Search depth in buffer for data changes within the range of tool change

2 Search depth in buffer for data changes of main processing (especially synchronized actions)

17900	VDI_FUNCTION_MASK			EXP, N09	-
-	Setting to VDI signals			DWORD	PowerOn
-					
-	-	0x0	0	0x1	7/2

Description: Settings for VDI signals:

Bit 0 == 0:

The VDI signals motion command + / motion command - are already issued if there is a travel request (default).

Bit 0 == 1:

The VDI signals motion command + / motion command - are issued only if the axis actually moves.

1.3.4 System specific memory settings

18000	VDI_UPDATE_IN_ONE_IPO_CYCLE			EXP, N01	P3
-	PLC interface update			BOOLEAN	PowerOn
-					
-	-	FALSE	-	-	0/0

Description: 1: Complete reading/writing of the VDI interface in one IPO cycle

0: Complete reading/writing of the VDI interface in two IPO cycles

18030	HW_SERIAL_NUMBER			N05	-
-	Hardware series number			STRING	PowerOn
-					
-	1		-	-	7/RO

Description: During power on of the control, a unique hardware serial number is stored in this MD:

- For Powerline series modules this is the serial number of the NCU module
- For Solutionline series modules this is the serial number of the CF card, or the unique number of the MCI module in the case of PC-based systems

This data cannot be written.

18040	VERSION_INFO		N05	IAD
-	Version and possibly data of the PCMCIA card, not FM-NC		STRING	PowerOn
-				

Description: Version identifiers of the system software

The identifiers of the PCMCIA card (assigned by the configuration management) and the 'system_date_time' from the NCK are stored in this MD during control power on. A unique assignment can always be made with this data from the MD block (startup file or INITIAL_INI) to a software release.

18050	INFO_FREE_MEM_DYNAMIC			N01, N02, N05	S7
-	Display data of free dynamic memory			DWORD	PowerOn
-					
-	-	430080	-	-	7/RO
710-6a2c	-	1048576	-	-	-/-
710-31a10c	-	1048576	-	-	-/-
720-6a2c	-	1048576	-	-	-/-
720-31a10c	-	1048576	-	-	-/-
730-6a2c	-	1048576	-	-	-/-
730-31a10c	-	1048576	-	-	-/-
840disl-6a	-	1048576	-	-	-/-
840disl-20a	-	1048576	-	-	-/-

Description: The data is used for

a) manufacturer's presetting of the memory size [bytes] available to the user for each channel after cold restart.

b) Displaying the available dynamic memory [bytes]

The data cannot be written.

The contents of the data states how much unbuffered memory is available per channel for the increase of unbuffered user data storage area via MD.

One should check whether the available memory is sufficient before increasing, for example, the number of LUDs, number of functional parameters or the size of the IPO buffer.

If necessary, proceed step by step:

- increase by 1, note (old) value
- NCK startup (= 'warm start' or NCK reset), read off new value
- memory requirement = new value - old value

On the first NCK startup or cold restart of the control (=deletion of user data) the data $MN_MM_USER_MEM_DYNAMIC is set by the NCK software so that at least the preset value results for $MN_INFO_FREE_MEM_DYNAMIC.

That is the value is automatically increased if the initial value of $MN_MM_USER_MEM_DYNAMIC is too low.

The following also applies to multichannel systems:

- The preset value applies to each possible channel. That is, if there are ten possible channels the data $MN_MM_USER_MEM_DYNAMIC is set by the NCK SW so that at least the 'preset value* ten' results for $MN_INFO_FREE_MEM_DYNAMIC.

- On activation of a channel, the data $MN_MM_USER_MEM_DYNAMIC will, if necessary, also be increased so that the memory free at the time of activation will continue to be free (provided that the memory structure permits this) after the channel has become active.
- The activation of the maximum possible number of axes is ensured by increasing the data $MN_MM_USER_MEM_DYNAMIC if necessary so that memory free at the time of activation will continue to be free (provided that the memory structure permits this) after the axis has become active.

'If necessary' in the previous sentences means that the adjustment is automatic if the channel/axis could not be activated with the current values of $MN_MM_USER_MEM_DYNAMIC/ $MN_INFO_FREE_MEM_DYNAMIC.

18060	INFO_FREE_MEM_STATIC			N01, N02, N05	S7
-	Display data of free static memory			DWORD	PowerOn
-					
-	-	1048576	-	-	7/RO
710-6a2c	-	2097152	-	-	-/-
710-31a10c	-	2097152	-	-	-/-
720-6a2c	-	2097152	-	-	-/-
720-31a10c	-	2097152	-	-	-/-
730-6a2c	-	2097152	-	-	-/-
730-31a10c	-	2097152	-	-	-/-
840disl-6a	-	5242880	-	-	-/-
840disl-20a	-	5242880	-	-	-/-

Description: The following applies to PowerLine control models:

Output of the buffered memory available in the passive file system [bytes].

The data cannot be written.

The preset value states the minimum number of bytes available to the user when the NCK starts up with a cold restart.

The contents of the data state how much battery-backed memory is available for the passive file system at the time of startup.

After a non-buffered startup, the maximum memory available in the file system can be read.

If MDs that affect the requirement for buffered memory (e.g. MM_NUM_GUD_VALUES_MEM, MM_ENC_COMP_MAX_POINTS) are changed then this changes the amount of memory available for the passive file system, as the amount of memory allocated to the passive file system consists of MM_USER_MEM_BUFFERED minus all other buffered user data.

(See also the document on MM_USER_FILE_MEM_MINIMUM)

At the first NCK startup or cold restart of the control (=deletion of user data) the data $MN_MM_USER_MEM_BUFFERED is set by the NCK software so that at least the default value results for $MN_INFO_FREE_MEM_STATIC.

That is $MN_MM_USER_MEM_BUFFERED is automatically increased if its initial value is too low.

The following applies to SolutionLine control models:

The data reserves the available memory for the data that are not the passive file system.

(The data $MN_MM_USER_FILE_MEM_MINIMUM[0] dimensions the passive file system.)

Machine data for setting the active file system (tools, GUDs, ...) can be increased until this memory has all been allocated.

18070	INFO_FREE_MEM_DPR			EXP, N01, N02, N05	S7
-	Display data of free memory in DUAL PORT RAM			DWORD	PowerOn
-					
-	-	0	-	-	7/RO

Description: Output of the available memory in the Dual Port RAM (Bytes).

The data cannot be written.

18072	INFO_FREE_MEM_CC_MD			EXP, N01, N05	-
-	Display of free memory in CC-MD memory			DWORD	PowerOn
-					
-	-	0	-	-	0/RO

Description: Output of the available memory for compile cycle MDs (bytes).

The data cannot be written.

18074	MM_TOOL_MANAGEMENT_TRACE_SZ			N02, N09	/FBW/, "Description of Functions, Tool Management"
-	Max. size of the tool management diagnostic ring buffers			DWORD	PowerOn
-					
-	2	25,25	4	500	7/2

Description: The number of entries in the tool management diagnostic ring buffers.

Index 0 = IPO trace buffer size.

Index 1 = Prep trace buffer size.

There are separate IPO trace buffers in each channel, and a Prep trace buffer in channel 1 only.

The buffers are allocated only if bit 0 (0x0001) is ON at warm start, in both MD 18080: MM_TOOL_MANAGEMENT_MASK and per-channel MD 20310: TOOL_MANAGEMENT_MASK.

Trace data is written to the buffers when bit 13 (0x2000) is ON in per-channel MD 20310: TOOL_MANAGEMENT_MASK.

18075	MM_NUM_TOOLHOLDERS			N02, N09	/FBW/, "Description of Functions, Tool Management"
-	Max. number of tool holders per TOA			DWORD	PowerOn
-					
-	-	16	1	SLMDMAXMAGLOCATIONSWITHDISTANCE	7/2

Description:

```
Max. number of definable tool holders per TO range.
The address extension e of commands Te=t, Me=6 (*) is the number
of the tool holder.
t=T number/tool name - depending on the function activated in the
NCK.
(*) if: $MC_TOOL_CHANGE_MODE=1 and $MC_TOOL_CHANGE_M_CODE=6
applies
Normally the tool holder of milling machines is a spindle.
Also see $MC_SPIND_DEF_MASTER_SPIND.
For turning machines the tool holder normally is not a spindle
axis.
Also see $MC_TOOL_MANAGEMENT_TOOLHOLDER.
In this case it should reasonably apply that
$MN_MM_NUM_TOOLHOLDERS is larger or equal to
$MC_SPIND_DEF_MASTER_SPIND/$MC_TOOL_MANAGEMENT_TOOLHOLDER.
If bit 0 = 1 in $MN_MM_TOOL_MANAGEMENT_MASK and
$MC_TOOL_MANAGEMENT_MASK is set (=magazine management (TOOLMAN))
it will apply for reasonable values that $MN_MM_NUM_TOOLHOLDERS is
smaller or equal to $MN_MM_NUM_LOCS_WITH_DISTANCE.
A maximum of $MN_MM_NUM_TOOLHOLDERS intermediate memory locations
of the type spindle
($TC_MPP1[9998,x]=2) can then be defined.
Example: TOOLMAN inactive
$MC_SPIND_DEF_MASTER_SPIND shall be =3, $MN_MM_NUM_TOOLHOLDERS
shall be =3.
Then T1=t, T2=t, T3=t, T=t can be programmed.
Example: TOOLMAN active, milling machine with Me=6 as tool change
command
$MN_MM_NUM_TOOLHOLDERS shall be = 14,
$MN_MM_NUM_LOCS_WITH_DISTANCE=20,
10 channels shall be active, all channels have TOOLMAN active and
have the same tool and magazine data
(=one TO range for all channels).
$MC_SPIND_DEF_MASTER_SPIND=1,.....10 for the channels.
Then up to 14 locations of the kind 'tool holder'/'spindle' can be
defined in the intermediate magazine memory.
Additional 6 grippers or others can be defined.
These 20 locations max. can be linked to magazines.
In the channels T1=t, .... T14=t and Tt, or M1=6,....M14=6 and M6
can be programmed.
The PLC version used can limit the maximum number of tool holders.
```

18076	MM_NUM_LOCS_WITH_DISTANCE			N02, N09	/FBW/, "Description of Functions, Tool Management"
-	Max. number of magazine locations per TOA with remote connection			DWORD	PowerOn
-					
-	-	32	1	SLMDMAXMAGLOCATIONSWITHDISTANCE	7/2

Description:

This machine data is reasonable, if the magazine management function, TOOLMAN, is active

- See $MN_MM_TOOL_MANAGEMENT_MASK, $MC_TOOL_MANAGEMENT_MASK; for each bit 0 = 1.

Max. number of magazine locations (spindles, load locations,...) per TOA, that can

have a remote connection to a magazine, defined by $TC_MDPx[n,m].

Example: TOOLMAN shall be active: $MN_MM_NUM_LOCS_WITH_DISTANCE shall be = 5 and $MN_MM_NUM_DIST_REL_PER_MAGLOC = 2.

Two TO units shall be defined with three tool holders/spindles and two load locations each.

Furthermore, two grippers each shall be defined in each TO unit.

This means that a total of 14 locations shall be defined in the intermediate memory magazine/load magazine for the distances and assignments.

4 magazines shall be defined for TO unit 1, 6 magazines for TO unit 2.

With the value set to $MN_MM_NUM_LOCS_WITH_DISTANCE = 5 each tool holder and each load location

of the two TO units with up to two magazines ($MN_MM_NUM_DIST_REL_PER_MAGLOC = 2) per remote relationship

can be connected; (see $TC_MDP1 and $TC_MDP2) and for each tool holder max. two more grippers

($MN_MM_NUM_DIST_REL_PER_MAGLOC = 2) can be assigned; (see $TC_MLSR).

One tool holder / one spindle location can subsequently have two tables - one distance table for magazines and

one assignment table for grippers and similar locations.

18077	MM_NUM_DIST_REL_PER_MAGLOC			N02, N09	/FBW/, "Description of Functions, Tool Management"
-	Max. no. of magazines in the distance table of a magazine loc.			DWORD	PowerOn
-					
-	-	SLMDMAXLINKEDMAGAZINES	0	SLMDMAXLINKEDMAGAZINES	7/2

Description:

```
This machine data will only be active, if the magazine management,
TOOLMAN function is active.
```

- See $MN_MM_TOOL_MANAGEMENT_MASK, $MC_TOOL_MANAGEMENT_MASK.

```
Two sizes are defined with this magazine data:
1.) Max. number of magazines in the distance table of a magazine
location (spindle, load location, ...)
2.) Max. number of locations (gripper, ...) in the connection
table of a spindle/tool holder location.
Example: $MN_MM_NUM_DIST_REL_PER_MAGLOC shall be = 3.
Two TO units shall be defined with two tool holder/spindles each
and one load location each.
Furthermore four grippers shall be defined in each TO unit.
4 magazines shall be defined for TO unit 1; 6 magazines shall be
defined for TO unit 2.
Then, each tool holder can define max. three distances for the
magazines (see $TC_MDP2)
and additionally a max. of three relationships to the grippers
($TC_MLSR).
```

18078	MM_MAX_NUM_OF_HIERARCHIES			N02, N09	/FBW/, "Description of Functions, Tool Management"
-	The maximum number of hierarchies for magazine location types			DWORD	PowerOn
-					
-	-	8	0	32	7/2

Description:

```
The machine data only has effect if the function 'tool magazine
management', TMMG, is activated  - see
$MN_MM_TOOL_MANAGEMENT_MASK, $MC_TOOL_MANAGEMENT_MASK.
The maximum number of hierarchies for magazine location types.
In variable $TC_MPTH[n,m], the allowed range of n is from 0 to
($MN_MM_MAX_NUM_OF_HIERARCHIES - 1).
(The maximum of index m is given by $MN_MM_MAX_HIERARCHY_ENTRIES.)
Value = 0 means that the function 'magazine location type
hierchies' is not available.
```

18079	MM_MAX_HIERARCHY_ENTRIES			N02, N09	/FBW/, "Description of Functions, Tool Management"
-	The max. number of entries in a mag. location type hierarchy.			DWORD	PowerOn
-					
-	-	8	1	32	7/2

Description: The machine data only has effect if the function 'tool magazine management', TMMG, is activated - see $MN_MM_TOOL_MANAGEMENT_MASK, $MC_TOOL_MANAGEMENT_MASK - and if $MN_MM_MAX_NUM_OF_HIERARCHIES is greater than zero.

The maximum number of entries in a magazine location type hierarchy.

In variable $TC_MPTH[n,m], the allowed range of m is from 0 to ($MN_MM_MAX_HIERARCHY_ENTRIES - 1).

(The maximum of index n is given by $MN_MM_MAX_NUM_OF_HIERARCHIES.)

18080	MM_TOOL_MANAGEMENT_MASK			N02, N09	FBW
-	Step-by-step memory reservation for tool management (SRAM)			DWORD	PowerOn
-					
-	-	0x0	0	0xFFFF	7/1

Description: Step-by-step memory reservation for the tool management (TOOLMAN)

Bit-coded activation data. That is the memory for the TOOLMAN can be activated in various versions.

The data is evaluated only during startup of the software.

The TOOLMAN data are battery-backed.

The TOOLMAN-specific memory reservation that is defined in detail by the machine data

MD 18086: $MN_MM_NUM_MAGAZINE_LOCATION
MD 18084: $MN_MM_NUM_MAGAZINE
MD 18096: $MN_MM_NUM_CC_TOA_PARAM
MD 18094: $MN_MM_NUM_CC_TDA_PARAM
MD 18098: $MN_MM_NUM_CC_MON_PARAM
MD 18092: $MN_MM_NUM_CC_MAGLOC_PARAM
MD 18090: $MN_MM_NUM_CC_MAGAZINE_PARAM

is made as a function of this data.

(Further TOOLMAN-specific memory is determined by other machine data, see below.)

Value = 0 ->None of the above memory is reserved: That is TOOLMAN is not available, only the basic functionality can be programmed.

Bit no.HexaMeaning when bit set
value

----

0 (LSB)0x1Tool management data (TMMG) are made available; the memory-reserving MDs must be set correspondingly ($MN_MM_NUM_MAGAZINE_LOCATION, $MN_MM_NUM_MAGAZINE). The machine data $MN_MM_NUM_TOOL, $MN_MM_NUM_CUTTING_EDGES_IN_TOA, which make the memory available for the basic functionality with and without TOOLMAN, must be set correspondingly. The TOOLMAN-specific memory is added to the memory determined by $MN_MM_NUM_TOOL.

1 0x2Monitoring data (TMMO) are made available; the memory-reserving MDs must be set correspondingly ($MN_MM_NUM_MAGAZINE_LOCATION, $MN_MM_NUM_MAGAZINE). The memory for the monitoring data is added to the cutting edges (-> $MN_MM_NUM_CUTTING_EDGES_IN_TOA).

2 0x4OEM, CC data (individually determined by $MN_MM_NUM_CC_...) are made available, the memory-reserving MDs must be set correspondingly.

3 0x8Memory reserved for consider adjacent location

4 0x10Memory and function release for the PI service _N_TSEARC = 'Complex search for tools in magazines'. Depending on the function characteristic, the function requires memory of the order of 10KB.

5 0x20Reserve memory and function release for wear monitoring

6 0x40The classification of the magazine in wear groups is released

7 0x80Reserve memory for the adapter of the magazine locations according to the information in MM_NUM_TOOL_ADAPTER

8 0x100Reserve memory for sum offsets and/or setup offsets according to the information in MM_NUM_SUMCORR, MM_KIND_OF_SUMCORR

9 0x200Value 1 = Tools in a revolver are handled in OPI variable blocks so that they are not 'shown' on toolholder locations, but always in the revolver location. That means that, in particular, tools in a revolver no longer leave their revolver locations when there is a tool change (as far as the display is concerned).

Value 0 = Default behavior; Tools in a revolver are 'displayed' on the OPI according to their actual location (as far as the data is concerned).

Example 1:

```
MM_TOOL_MANAGEMENT_MASK =  1  -> Memory is made available for tool management data
                                 (TMMG).
MM_TOOL_MANAGEMENT_MASK =  2  -> Memory is made available for monitoring data
                                 (TMMO).
MM_TOOL_MANAGEMENT_MASK =  3  -> Memory is made available for TMMG and TMMO.

MM_TOOL_MANAGEMENT_MASK =  4  -> Memory available for OEM/CC data
MM_TOOL_MANAGEMENT_MASK =  9  -> Memory available for TMMG and
                                 consider adjacent location
MM_TOOL_MANAGEMENT_MASK = 17  -> Memory is made available for TMMG data
                                 and the PI service  _N_TSEARC can be used
                                 (decimal 17 = 0x11 = bits 0 and 4)
```

Example 2:

The complete TOA area has 20 tools and 60 cutting edges. All other above-mentioned memory-reserving MDs =0. The TOOLMAN is not active.

Bit 0 (LSB) is now assigned.

The battery-backed memory is deleted after a renewed start of the software because now additional memory has been reserved for the TOOLMAN. Additional memory is reserved for each of the 20 tools.

References:

/FBW/, "Description of Functions, Tool Management"

18082	MM_NUM_TOOL			N02, N09	FBW,S7
-	Number of tools the NCK can manage (SRAM)			DWORD	PowerOn
-					
-	-	30	0	600	7/2

Description: The NC cannot manage more tools than the number entered in the MD. A tool has at least one cutting edge.

Buffered user memory is used.

The maximum possible number of tools is equal to the number of cutting edges!

The MD must also be set when TOOLMAN is not used!

The battery-backed data are lost when the machine data is changed!

Note:

The data did not exist in product version 1. It must be set as from product version 2.

Related to:

MD 18100: MM_NUM_CUTTING_EDGES_IN_TOA

(Number of tool offsets in the NCK)

18084	MM_NUM_MAGAZINE		N02, N09	FBW
-	Number of magazines the NCK can manage (SRAM)		DWORD	PowerOn
-				
-	- 3	0	32	7/2

Description: Number of magazines which the NCK can manage.

Buffered user memory is used.

The MDs for TOOLMAN MD 20310: TOOL_MANAGEMENT_MASK, MD 18080: MM_TOOL_MANAGEMENT_MASK and the optional TOOLMAN $ON_TECHNO_FUNCTION_MASK must be set.

Irrelevant:

MD is irrelevant if TOOLMAN is not in use.

Special cases:

Only tool management version 2:

Value = 0 -> TOOLMAN version 2 cannot be activated because no memory area has been set up for the data.

The battery-backed data are lost if this machine data is altered!

Related to:

MD 18080: MM_TOOL_MANAGEMENT_MASK

(Mask for reserving memory for TOOLMAN)

MD 20310: TOOL_MANAGEMENT_MASK

(Activation of different versions of tool management)

$ON_TECHNO_FUNCTION_MASK

References:

/FBW/, "Description of Functions, Tool Management"

18086	MM_NUM_MAGAZINE_LOCATION		N02, N09	FBW
-	Number of magazine locations the NCK can manage (SRAM)		DWORD	PowerOn
-				
-	- 30	0	600	7/2

Description: Number of magazine locations which the NCK can manage.

Buffered user memory is used.

The MDs for TOOLMAN MD 20310: TOOL_MANAGEMENT_MASK, MD 18080: MM_TOOL_MANAGEMENT_MASK and the optional TOOLMAN $ON_TECHNO_FUNCTION_MASK must be set.

Irrelevant:

MD is irrelevant if TOOLMAN is not in use.

Special cases:

Only tool management version 2:

Value = 0 -> tool management version 2 cannot be activated because no memory area has been set up for the data.

The battey-backed data are lost if this machine data is altered!

Related to:

MD 18080: MM_TOOL_MANAGEMENT_MASK

(Mask for reserving memory for TOOLMAN)

MD 20310: TOOL_MANAGEMENT_MASK

(Activation of different versions of tool management)

$ON_TECHNO_FUNCTION_MASK

References:

/FBW/, "Description of Functions, Tool Management"

18088	MM_NUM_TOOL_CARRIER			N02, N09	W1
-	Maximum number of definable tool holders			DWORD	PowerOn
-					
-	-	0	0	MD_SLMAXNOOF TOOLCARRIERS	7/2

Description: Maximum number of definable toolholders for orientable tools in the TO area. The value is divided by the number of active TO units. The integer result states how many toolholders can be defined for each TO unit. The data for defining a toolholder are set with the system variables $TC_CARR1, ... $TC_CARR14.

The data are stored in battery-backed memory.

Application example(s):

-

18090	MM_NUM_CC_MAGAZINE_PARAM			N02, N09	FBW
-	Number of magazine data generated and evaluated by the CC (SRAM)			DWORD	PowerOn
-					
-	-	0	0	10	2/2

Description: Only if MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 (0x1) and bit 2=1 (0x4), is set for TMMG (and option is set):

Number of magazine data (format IN_Int.) which are created and can be evaluated by compile cycles.

See also: MM_NUM_MAGAZINE

Buffered user memory is used.

Warning:

The battery-backed data are lost if this machine data is altered!

Related to:

MD 18080: MM_TOOL_MANAGEMENT_MASK

(Mask for reserving memory for TOOLMAN)

MD 18084: MM_NUM_MAGAZINE

(Number of magazines managed by the NC)

References:

/FBW/, "Description of Functions, Tool Management"

18091	MM_TYPE_CC_MAGAZINE_PARAM		N02, N09	-
-	Type of OEM magazine data (SRAM)		DWORD	PowerOn
-					
-	10	3,3,3,3,3,3,3,3,3,3	1	6	2/2

Description: Only when MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 (0x1) and bit2=1 (0x4), is set for TMMG (and option is set):

Type of magazine-specific user data configured by MM_NUM_CC_MAGAZINE_PARAM.

Each parameter can be assigned its own type. Permissible types are:

```
Type      Value of machine data
(See types
of the NC language)
-----------------------------------------------------------------
BOOL      1
CHAR      2
INT       3
REAL      4
STRING    5 (identifier may be up to 31 characters long)
AXIS      6
FRAME     not defined
```

See also:

MM_NUM_CC_MAGAZINE_PARAM, MM_NUM_MAGAZINE

Buffered user memory is used.

18092	MM_NUM_CC_MAGLOC_PARAM		N02, N09	FBW
-	Number of OEM magazine location data (SRAM)		DWORD	PowerOn
-					
-	-	0	0	10	2/2

Description: Only if MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 (0x1) and bit 2=1 (0x4), is set for TMMG (and option is set):

Number of magazine location data (format IN_int.) which are created for the memory area and can be evaluated by compile cycles.

Buffered user memory is used.

Irrelevant:

MD is irrelevant if TOOLMAN is not activated

Warning:

The battery-backed data are lost if this machine data is altered!

Related to:

MD 18080: MM_TOOL_MANAGEMENT_MASK

(Mask for reserving memory for TOOLMAN)

MD 18086: MM_NUM_MAGAZINE_LOCATION

References:

/FBW/, "Description of Functions, Tool Management"

18093	MM_TYPE_CC_MAGLOC_PARAM			N02, N09	-
-	Type of OEM magazine location data (SRAM)			DWORD	PowerOn
-					
-	10	3,3,3,3,3,3,3,3,3,3	1	6	2/2

Description: Only when MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 (0x1) and bit 2=1 (0x4), is set for TMMG (and option is set):

Individual types can be assigned to the parameters in this way. The array index n can accept values from 0 to the value of MD 18090: MM_NUM_CC_MAGA-ZINE_PARAM.

The possible values of the MD = 1, 2, 3, 4 and 6 represent the NC language types

1 BOOL,

2 CHAR,

3 INT,

4 REAL and

6 AXIS

The value 5, type STRING, is here explicitly not possible. The value 5 is treated like 2. The type FRAME cannot be defined here.

Example:

MD 18090: MM_NUM_CC_MAGAZINE_PARAM=1

MD 18091: MM_TYPE_CC_MAGAZINE_PARAM=2

"A" can then be programmed for the parameter $TC_MPPC1.

Battery-backed working memory is used. A value change can - but need not - lead to reconfiguration of the battery-backed memory.

18094	MM_NUM_CC_TDA_PARAM			N02, N09	FBW
-	Number of OEM tool data (SRAM)			DWORD	PowerOn
-					
-	-	0	0	10	2/2

Description: Only if MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 (0x4), is set:

User or OEM tool data

Number of tool-specific data (format IN_int.) which are created for the memory area and can be evaluated by compile cycles.

Buffered user memory is used.

Irrelevant:

MD is irrelevant if TOOLMAN is not activated

Warning:

The battery-backed data are lost if this machine data is altered!

Related to:

MD 18080: MM_TOOL_MANAGEMENT_MASK

(Mask for reserving memory for TOOLMAN)

MD 18082: MM_NUM_TOOL

(Number of tools managed by the NCK)

References:

/FBW/, "Description of Functions, Tool Management"

18095	MM_TYPE_CC_TDA_PARAM			N02, N09	-
-	Type of OEM tool data (SRAM)			DWORD	PowerOn
-					
-	10	4,4,4,4,4,4,4,4,4,4	1	6	2/2

Description:

Only when MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 (0x4), is set:

User or OEM data in the tool management.

Individual types can be assigned to the parameters in this way. The array index n can accept values from 0 to the value of MD 18094: MM_NUM_CC_TDA_PARAM.

The possible values of the MD = 1, 2, 3, 4, 5 and 6 represent the NC language types

1 BOOL,

2 CHAR,

3 INT,

4 REAL,

5 STRING and

6 AXIS.

The type FRAME cannot be defined here. The type STRING can be up to 31 characters long.

Example:

MD 18094: MM_NUM_CC_TDA_PARAM=1

MD 18095: MM_TYPE_CC_TDA_PARAM=5

"UserCuttingEdge" can then be programmed for parameter $TC_TPC1.

Battery-backed working memory is used. A value change can - need not - lead to reconfiguration of the battery-backed memory.

18096	MM_NUM_CC_TOA_PARAM			N02, N09	FBW
-	Number of data per tool edge for compile cycles (SRAM)			DWORD	PowerOn
-					
-	-	0	0	10	2/2

Description:

Only when MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 (0x4), is set:

Number of tool-specific data per tool edge (format real) which are created for the memory area and can be evaluated by compile cycles.

Buffered user memory is used.

Irrelevant:

MD is irrelevant if TOOLMAN versions 1 and 2 are not activated.

Special cases:

The battery-backed data are lost if this machine data is altered!

Related to:

MD 18080: MM_TOOL_MANAGEMENT_MASK

(Mask for reserving memory for TOOLMAN)

MD 18100: MM_NUM_CUTTING_EDGES_IN_TOA

(Number of tool offsets in the NCK)

References:

/FBW/, "Description of Functions, Tool Management"

18097	MM_TYPE_CC_TOA_PARAM			N02, N09	-
-	Type of OEM data per cutting edge (SRAM)			DWORD	PowerOn
-					
-	10	4,4,4,4,4,4,4,4,4,4	1	6	2/2

Description:

Only when MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 (0x4), is set:

User or OEM data in the tools.

Type of the cutting-edge-specific user data configured via MM_NUM_CC_TOA_PARAM. Only the default setting may be used.

Individual types can be assigned to the parameters in this way. The array index n can accept values from 0 to the value of MD 18096: MM_NUM_CC_TOA_PARAM.

The possible values of the MD = 1, 2, 3, 4 and 6 represent the NC language types

1 BOOL,

2 CHAR,

3 INT,

4 REAL and

6 AXIS.

The type FRAME cannot be defined here. (5 STRING is not explicitly possible here; the value 5 is treated like value 2).

Example:

MD 18096: MM_NUM_CC_TOA_PARAM=1

MD 18097: MM_TYPE_CC_TOA_PARAM=2

"A" can then be programmed for parameter $TC_DPC1

Battery-backed working memory is used. A value change can - but need not - lead to reconfiguration of the battery-backed memory.

18098	MM_NUM_CC_MON_PARAM			N02, N09	FBW
-	Number of monitoring data per tool for compile cycles			DWORD	PowerOn
-					
-	-	0	0	10	2/2

Description:

Only when $MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 or bit 1=1 and bit 2=1 0x4), is set:

For TOOLMAN compile cycles:

Number of monitor data which are created for each tool and which can be evaluated by compile cycles.

Buffered user memory is used.

Irrelevant:

MD is irrelevant if TOOLMAN is not activated.

Special cases:

The battery-backed data are lost if this machine data is altered!

Related to:

MD 18080: MM_TOOL_MANAGEMENT_MASK

(Mask for reserving memory for TOOLMAN)

MD 18100: MM_NUM_CUTTING_EDGES_IN_TOA

(Number of tool offsets in the NCK)

References:

/FBW/, "Description of Functions, Tool Management"

18099	MM_TYPE_CC_MON_PARAM			N02, N09	FBW
-	Type of OEM monitor data (SRAM)			DWORD	PowerOn
-					
-	10	3,3,3,3,3,3,3,3,3,3	1	6	2/2

Description: Individual types can be assigned to the parameters in this way. The array index n can accept values from 0 to the value of MD 18098: MM_NUM_CC_MON_PA-RAM

Possible values of the MD = 1, 2, 3, 4 and 6 represent the NC language types

1 BOOL,

2 CHAR,

3 INT,

4 REAL and

6 AXIS.

The FRAME type cannot be defined here.

(5 STRING is not possible explicitly here; the value 5 is treated like value 2).

Example:

MD 18098: MM_NUM_CC_MON_PARAM=1

MD 18099: MM_TYPE_CC_MON_PARAM=2

"A" can then be programmed for the parameter $TC_MOPC1

A battery-backed working memory is used. A value change can - but need not - lead to reconfiguration of the battery-backed memory.

18100	MM_NUM_CUTTING_EDGES_IN_TOA			N02, N09	S7
-	Tool offsets in the TO range (SRAM)			DWORD	PowerOn
-					
-	-	30	0	1500	7/2

Description: Defines the number of tool cutting edges in a TO area. This machine data reserves approximately 250 bytes of battery-backed memory per TOA block for each tool cutting edge, irrespective of the tool type.

Tools with cutting edges of type 400-499 (= grinding tools) also occupy the location of a cutting edge.

Example:

Defining 10 grinding tools each of which has one cutting edge. Then at least:

MM_NUM_TOOL = 10

MM_NUM_CUTTING_EDGES_IN_TOA = 20 must apply.

See also MM_NUM_TOOL

Buffered user memory is used.

Special cases:

The battery-backed data are lost if this machine data is altered.

References:

/FBW/, "Description of Functions, Tool Management"

18102	MM_TYPE_OF_CUTTING_EDGE			N02, N09	W1
-	Type of D No. programming (SRAM)			DWORD	PowerOn
-					
-	-	0	0	1	7/2

Description: This MD activates the 'flat D number management'.

The type of D programming can be determined by individual values:

- direct or
- indirect programming.

The default value is zero. This means that the NCK manages the T and D numbers.

The NCK only accepts a value > 0 if bit 0 is not set in MD $MN_MM_TOOL_MANAGEMENT_MASK. That means the tool managment function cannot be active simultaneously.

Value: Meaning

0: No 'flat D number management' active

1: D numbers are programmed directly and absolutely

2: D numbers are programmed indirectly and relatively.

That means the programmed D number is the index to a table in the VDI. The PLC writes the absolute D number in this table. The NCK reads this number and selects the corresponding offset.

The NCK and PLC are synchronized while doing so. The NCK may have to wait until the PLC has made the D number(s) available.

The PLC receives the trigger for this by evaluating the T no.

The NC block containing the change command triggers the synchronization and the waiting for the D numbers.

3 As 2, with simulation of the D numbers by the PLC. Only for testing the NCK functionality.

In this case, the D numbers are placed by the NCK itself. They can be assigned via the R parameters R1,...R9. In which case the value of R1 is mapped onto D1 etc.

Activation (value changed from 0 to > 0) and deactivation (value changed from > 0 to 0) reconfigure the battery-backed memory, that is delete the data!

18104	MM_NUM_TOOL_ADAPTER			N02, N09	FBW
-	Tool adapters in TO area (SRAM)			DWORD	PowerOn
-					
-	-	-1	-1	600	7/2

Description: Number of tool adapters in the TO area.

The function can only be used if there are magazine locations in the NCK.

The tool management function must be active.

Bit 7 (=0x80) must also be set in MD $MN_MM_TOOL_MANAGEMENT_MASK to enable the setting to become active.

Number of tool adapter data blocks available in the NCK.

Battery-backed memory is used.

Changing the data reorganizes the battery-backed memory in the NCK. The data can only be used properly if magazine locations are defined.

Adapter data blocks and the cutting edge-specific basic/adapter dimensions are mutually exclusive. This means that if adapter data are defined, then the parameters $TC_DP21, $TC_DP22, $TC_DP23 and their values are generally not available in the NCK. However, provided that a tool is assigned to a magazine location, then via the cutting edge-specific parameters

$TC_DP21,

$TC_DP22,

$TC_DP23

the magazine location-specific adapter parameters

$TC_ADPT[n, 1], $TC_ADPT[n, 2], $TC_ADPT[n, 3]

can be read and written.

Value: Meaning

-1 An adapter is automatically assigned to each magazine location.

This means that internally the same number of adapters are provided as magazine locations are provided by machine data $MN_MM_NUM_MAGAZINE_LOCATION.

0 No adapter data definitions possible. The cutting edge-specific parameters $TC_DP21, $TC_DP22, $TC_DP23 are available provided that adapters are used outside the active TMMG.

-

(Saves memory, simplifies the handling of identical adapters)

See the machine data:

$MN_MM_TOOL_MANAGEMENT_MASK,

$MC_TOOL_MANAGEMENT_MASK,

$MN_MM_NUM_MAGAZINE,

$MN_MM_NUM_MAGAZINE_LOCATION

18105	MM_MAX_CUTTING_EDGE_NO		N02, N09	W1
-	maximum value of D number (DRAM)		DWORD	PowerOn
-				
-	- 9	1	32000	7/2

Description: Maximum value of the D number.

This does not affect the maximum number of D numbers per cutting edge.

The monitoring of the D number assignment associated with this value is only active when the D numbers are redefined. This means that existing data blocks are not subsequently checked if the MD is changed.

Extra memory is required if MM_MAX_CUTTING_EDGE_NO > MM_MAX_CUTTING_EDGE_PERTOOL is valid. Work can then be done with the function 'unique D numbers'.

The machine data is not evaluated with the function 'flat D number' and therefore has no significance there.

The data can affect the memory requirement.

18106	MM_MAX_CUTTING_EDGE_PERTOOL		N02, N09	W1
-	maximum number of D numbers per tool (DRAM)		DWORD	PowerOn
-				
-	- 9	1	12	7/2

Description: Maximum number of cutting edges (D offsets) per tool (per T number).

This enables more safety to be achieved in the data definition. The value can be set to one if only tools with one cutting edge are used. That prevents more than one cutting edge being assigned to a tool in the data definition.

Extra memory is required if MM_MAX_CUTTING_EDGE_NO > MM_MAX_CUTTING_EDGE_PERTOOL is valid. Work can then be done with the function 'unique D numbers'.

The machine data is not evaluated with the function 'flat D number' and therefore has no significance there.

The data can affect the memory requirement.

18108	MM_NUM_SUMCORR		N02, N09	W1
-	Resulting offsets in TO area (SRAM)		DWORD	PowerOn
-				
-	- -1	-1	9000	7/2

Description: Total number of resulting offsets in the NCK.

The value = -1 means that the number of resulting offsets is equal to the number of cutting edges multiplied by the number of resulting offsets per cutting edge.

See also cutting edge offset, insert offsets.

Battery-backed data is reserved.

See also:

MM_NUM_CUTTING_EDGES_IN_TOA,

MM_MAX_SUMCORR_PER_CUTTEDGE

18110	MM_MAX_SUMCORR_PER_CUTTEDGE		N02, N09	S7
-	Max. number of additive offsets per edge		DWORD	PowerOn
-				
-	-	1	1	6	7/2

Description: Maximum number of resulting offsets per cutting edge.
If MM_NUM_SUMCORR > 0 then:
The data is not memory defining, but is only used for monitoring.
If MM_NUM_SUMCORR = -1 then:
The data is memory defining.
See also
MM_NUM_SUMCORR,
MM_NUM_CUTTING_EDGES_IN_TOA.

18112	MM_KIND_OF_SUMCORR			N02, N09	W1
-	Properties of resulting offsets in TO area (SRAM)			DWORD	PowerOn
-					
-	-	0	0	0x1F	7/2

Description: Properties of the resulting offsets in NCK.

```
Bit no.        Value   Significance
0               0     Resulting offsets are backed up when the tool
                       data are backed up.
0               1     Resulting offsets are not  backed up when the
                       tool data are backed up.
1               0     Set-up offsets are backed up when the tool
                       data are backed up.
1               1     Set-up offsets are not backed up when the
                       tool data are backed up.
2               0     If work is done with the function 'tool man-
agement':
                       Existing resulting offsets are not affected
                       when the tool status is
                       set to 'active'.
2               1     Existing resulting offsets are set to zero
when the
                       tool status is set to 'active'.
```

```
3              0      If work is done with the function 'tool man-
agement'
                       and adapter:
                       Transformation of the resulting offsets
3              1       No transformation of the resulting offsets
4              0       No set-up offset data blocks
4              1       Set-up offset data blocks are additionally
created.
                      Whereby the resulting offset is composed of
the
                     sum of the set-up offset + 'resulting offset
fine'
```

Changing the status of bits 0, 1, 2, 3 does not change the memory structure.

Changing the status of bit 4 triggers restructuring of the battery-backed memory after the next PowerOn.

See also

$MN_MM_NUM_CUTTING_EDGES_IN_TOA

$MN_MM_NUM_SUMCORR

$MN_MM_MAX_SUMCORR_PER_CUTTEDGE

$MN_MM_TOOL_MANAGEMENT_MASK,

$MC_TOOL_MANAGEMENT_MASK,

$MN_MM_NUM_MAGAZINE_LOCATION,

$MN_MM_NUM_TOOL_ADAPTER

18114	MM_ENABLE_TOOL_ORIENT			N02, N09	W1
-	Assign tool cutting edge orientation			DWORD	PowerOn
-					
-	-	0	0	3	7/2

Description: The function allows an orientation deviating from the default value to be assigned to each tool cutting edge.

Value = 0:

The tool orientation function is inactive.

Value = 1:

The system parameter $TC_DPV[n, m] is assigned to each tool cutting edge D=m of the tool T=n, with the aid of which one of 6 possible tool orientations in positive or negative coordinate direction can be defined.

Value = 2:

Not only the system parameter $TC_DPV[n, m] but also the additional three system parameters $TC_DPV3[n, m], $TC_DPV4[n, m] and $TC_DPV5[n, m] are assigned to each tool cutting edge D=m of the tool T=n, with the aid of which any spatial tool orientation can be defined

T, D are the NC addresses T and D with which the tool change or the tool selection and the offset selection are programmed.

Value = 3:

Not only the system parameters $TC_DPV[n, m] and $TC_DPV3 - $TC_DPV5 but also the additional three system parameters $TC_DPVN3[n, m], $TC_DPVN4[n, m] and $TC_DPVN5[n, m] are assigned to each tool cutting edge D=m of the tool T=n, with the aid of which a vector (normal vector) can be defined that is preferably perpendicular to the tool orientation. The normal vector may be modified so that it lies in the plane formed by the orientation and the programmed normal vector but perpendicular to the orientation

The orientation and the possibly modified normal vector together define a complete orientation coordinate system. The machine data affects the requirement for battery-backed memory.

18116	MM_NUM_TOOL_ENV			N02, N09	S7
-	Number of tool environments in the TO area (SRAM)			DWORD	PowerOn
-					
-	-	0	0	MD_MAXNUM_TOOLENVS	7/2

Description: Total number of tool environments in the NCK.

Battery-backed memory is reserved.

18118	MM_NUM_GUD_MODULES			N02	S7
-	Number of GUD files in active file system (SRAM)			DWORD	PowerOn
-					
-	-	7	1	9	7/2

Description: A GUD block corresponds to a file in which user-defined data can be stored. 9 GUD blocks are available of which 3 are already assigned to specific users/applications.

UGUD_DEF_USER (block for user)

SGUD_DEF_USER (block for SIEMENS)

MGUD_DEF_USER (block for machine manufacturer)

Special cases:

The number of GUD modules is determined by the GUD module with the highest number entered.

Example:

If the following GUD modules are defined,

UGUD

MGUD

GUD5

GUD8

then the machine data must be set to a value of 8, signifying a memory requirement of 8 x 120 bytes = 960 bytes.

It is therefore advisable to selected the "lowest" possible GUD module. If GUD modules UGUD and MGUD have not been assigned elsewhere, then they may be used for this purpose.

Related to:

MD 18150: MM_GUD_VALUES_MEM

(Memory space for user variables)

18120	MM_NUM_GUD_NAMES_NCK			N02	S7
-	Number of global user variable names (SRAM)			DWORD	PowerOn
-					
-	-	50	0	32000	7/2

Description: Defines the number of user variables for NCK global user data (GUD). Approximately 80 bytes of memory per variable are reserved in the SRAM for the names of the variables. The additional memory required for the value of the variable depends on the data type of the variable. The number of available NCK global user data is exhausted on reaching the limit value set in MM_NUM_GUD_NAMES_NCK or MD 18150: MM_GUD_VALUES_MEM (memory space for user variables).

Buffered user memory is used.

Special cases:

The battery-backed data are lost if this machine data is altered.

Related to:

MD 18150: MM_GUD_VALUES_MEM

(Memory space for user variables)

18130	MM_NUM_GUD_NAMES_CHAN			N02	S7
-	Number of channel-specific user variable names (SRAM)			DWORD	PowerOn
-					
-	-	150	0	32000	7/2

Description: Defines the number of user variable names for channel-specific global user data (GUD). Approximately 80 bytes of memory are reserved in the SRAM for each variable name. The additional memory required for the value of the variable is equal to the size of the data type of the variable multiplied by the number of channels. This means that each channel has its own memory available for the variable values. The number of available channel-specific global user data is exhausted on reaching the limit value set in MD 18130: MM_NUM_GUD_NAMES_CHAN or MD 18150: MM_GUD_VALUES_MEM (memory space for user variables).

The name created with the DEF statement is valid for all channels.

The memory requirement for the variable value is equal to the size of the data type multiplied by the number of channels.

Buffered user memory is used.

Special cases:

The battery-backed data are lost if this machine data is altered.

Related to:

MD 18150: MM_GUD_VALUES_MEM
(Memory space for user variables)

18150	MM_GUD_VALUES_MEM			N02	S7
-	Memory location for global user variable values (SRAM)			DWORD	PowerOn
-					
-	-	32	0	32000	7/2

Description: The specified value reserves memory space for the variable values of the global user data (GUD). The dimensioning of the memory depends to a large extent on the data types used for the variables.

Overview of the memory requirements of the data types:

Data type	Memory requirement
REAL	8 bytes
INT	4 bytes
BOOL	1 byte
CHAR	1 byte
STRING	1 byte per character, 100 characters permitted per string
AXIS	4 bytes
FRAME	up to 1KB depending on control model

The total memory required by a channel or axis-specific global user variable is the memory requirement of the variables multiplied by the number of channels or axes. The number of global user variables available is given when the limit defined in the MD: MM_NUM_GUD_NAMES_xxxx or MM_GUD_VALUES_MEM is reached.

Buffered user memory is used.

Special cases:

The battery-backed data are lost if this machine data is altered!

Relating to:

MD 18118: MM_NUM_GUD_MODULES:
(Number of GUD blocks)

MD 18120: MM_NUM_GUD_NAMES_NCK
(Number of global user variables)

MD 18130: MM_NUM_GUD_NAMES_CHAN
(Number of channel-specific user variables)

18160	MM_NUM_USER_MACROS			N02	S7
-	Number of macros (DRAM)			DWORD	PowerOn
-					
-	-	50	0	32000	7/2

Description: Defines the number of macros that can be stored in the files _N_SMAC_DEF, _N_MMAC_DEF und _N_UMAC_DEF. Each of these files which is opened occupies at least one kbyte memory space for the file code in the part program memory. Another kbyte of memory is reserved for the file when the one kbyte file code limit is exceeded.

The dynamic user memory is used. For the stated number of macros, approximately 375 bytes are reserved per macro for management tasks.

18170	MM_NUM_MAX_FUNC_NAMES			N02	S7
-	Number of miscellaneous functions (cycles, DRAM)			DWORD	PowerOn
-					
-	-	100	0	32000	7/2

Description: The data limits the maximum number of special functions over and above the predefined functions (such as sine, cosine, etc.) which can be used in

- cycle programs
- compile cycle software.

The function names are entered in the global NCK dictionary and must not conflict with the names that already exist.

The SIEMENS cycle package contains special functions that are taken into account by the default setting of the MD.

The data are stored in unbuffered memory. Approximately 150 bytes are required for each special function for management purposes.

Related to:

MD 18180: MM_NUM_MAX_FUNC_PARAM
(Number. of additional parameters)

18180	MM_NUM_MAX_FUNC_PARAM			N02	S7
-	Number of additional parameters for cycles according to MD 18170			DWORD	PowerOn
-					
-	-	1000	0	32000	7/2

Description: Defines the maximum number of parameters required for the special functions in

- cycle programs
- compile cycle software.

50 parameters are required for the special functions of the SIEMENS cycle package, software version 1.

The data are stored in unbuffered memory. 72 bytes of memory are reserved for each parameter.

Related to:

MD 18170: MM_NUM_MAX_FUNC_NAMES
(Number of special functions)

18190	MM_NUM_PROTECT_AREA_NCK			N12, N02, N06, N09	S7
-	Number of files for machine-related protection zones (SRAM)			DWORD	PowerOn
-					
-	-	0	0	10	7/2

Description: This machine data defines how many blocks are created for the protection zones available in the NCK.

Buffered memory is used.

Special cases:

The battery-backed data are lost if this machine data is altered.

References:

/FB/, A3, "Axis Monitoring, Protection Zones"

18200	MM_NUM_CCS_MAGAZINE_PARAM			N02, N09	FBW
-	Number of Siemens OEM magazine data (SRAM)			DWORD	PowerOn
-					
-	-	0	0	10	2/2

Description: Only when MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 ('H1') and bit 2=1 ('H4'), is set for TMMG (and option is set):

User or OEM data in the tool management (TMMG).

Number of Siemens OEM magazine data (standard format IN_Int).

See also: MM_NUM_CC_MAGAZINE_PARAM, MM_NUM_MAGAZINE

Buffered user memory is used

18201	MM_TYPE_CCS_MAGAZINE_PARAM		N02, N09	FBW
-	Type of Siemens OEM magazine data (SRAM)		DWORD	PowerOn
-				
-	10	3,3,3,3,3,3,3,3,3,3	1	6	2/2

Description: Only when MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 ('H1') and bit 2=1 ('H4'), is set for TMMG (and option is set):

User or OEM data in the tool management.

Type of magazine-specific Siemens user data configured by MM_NUM_CCS_MAGAZINE_PARAM.

Each parameter can be assigned its own type. The permissible types are:

```
Type                              Value of the machine data
(See types
of the NC language)
----------------------------------------------------------------
BOOL                                  1
CHAR                                  2
INT                                   3
REAL                                  4
STRING                                5 (permits identifier up to
31 characters long)
AXIS                                  6
FRAME                                 not defined
```

See also: MM_NUM_CCS_MAGAZINE_PARAM, MM_NUM_MAGAZINE

Buffered user memory is used

18202	MM_NUM_CCS_MAGLOC_PARAM			N02, N09	FBW
-	No. of Siemens OEM magazine location data (SRAM)			DWORD	PowerOn
-					
-	-	0	0	10	2/2

Description: Only when MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 ('H1') and bit 2=1 ('H4'), is set for TMMG (and option is set):

User or OEM data in the tool management.

Number of Siemens OEM magazine location data (standard format IN_Int).

See also: MM_NUM_CC_MAGLOC_PARAM, MM_NUM_MAGAZINE_LOCATION

Buffered user memory is used

18203	MM_TYPE_CCS_MAGLOC_PARAM		N02, N09	FBW
-	Type of Siemens OEM magazine location data (SRAM)		DWORD	PowerOn
-				
-	10	3,3,3,3,3,3,3,3,3,3	1	6	2/2

Description: Only when MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 ('H1') and bit 2=1 ('H4'), is set for TMMG (and option is set)

User or OEM data in the tool management.

Type of magazine-specific Siemens user data configured by MM_NUM_CCS_MAGLOC_PARAM.

Each parameter can be assigned its own type. The permissible types are:

```
Type                          Value of the machine data
(See types of the NC language)
----------------------------------------------------------------
BOOL                            1
CHAR                            2
INT                             3
REAL                            4
```

- (STRING is explicitly impossible here; value 5 is treated like value 2)

```
AXIS                            6
FRAME                           not defined
```

See also: MM_NUM_CCS_MAGLOC_PARAM, MM_NUM_MAGLOC

Buffered user memory is used

18204	MM_NUM_CCS_TDA_PARAM		N02, N09	FBW
-	Number of Siemens OEM tool data (SRAM)		DWORD	PowerOn
-				
-	-	0	0	10	2/2

Description: Only when $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 ('H4'), is set:

User or OEM data of the tools.

Number of Siemens OEM TDA (=tool-specific) data (standard format Int).

See also: MM_NUM_CC_TDA_PARAM, MM_NUM_TOOL

Buffered user memory is used

18205	MM_TYPE_CCS_TDA_PARAM			N02, N09	FBW
-	Type of Siemens OEM tool data (SRAM)			DWORD	PowerOn
-					
-	10	4,4,4,4,4,4,4,4,4,4	1	6	2/2

Description:

```
Only when $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 ('H4'), is set:
User or OEM data in the tool management.
Type of tool-specific Siemens user data configured by
MM_NUM_CCS_TDA_PARAM.
Each parameter can be assigned its own type. The permissible types
are
Type                              Value of the machine data
(See types of the NC language)
----------------------------------------------------------------
BOOL                                1
CHAR                                2
INT                                 3
REAL                                4
STRING                            5 (permits identifiers up to 31
characters long)
AXIS                                6
FRAME                               not defined
See also: MM_NUM_CCS_TDA_PARAM, MM_NUM_TOOL
Buffered user memory is used
```

18206	MM_NUM_CCS_TOA_PARAM			N02, N09	FBW
-	No. of Siemens OEM data per cutting edge (SRAM)			DWORD	PowerOn
-					
-	-	0	0	10	2/2

Description:

```
Only when $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 ('H4'), is set:
User or OEM data of the tools.
Number of Siemens OEM TOA data (standard format IN_Real).
See also: MM_NUM_CC_TOA_PARAM, MM_NUM_CUTTING_EDGES_IN_TOA
Buffered user memory is used
```

18207	MM_TYPE_CCS_TOA_PARAM			N02, N09	FBW
-	Type of Siemens OEM data per cutting edge (SRAM)			DWORD	PowerOn
-					
-	10	4,4,4,4,4,4,4,4,4,4	1	6	2/2

Description: Only when $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 ('H4'), is set:

User or OEM data in the tool management.

Type of cutting-edge-specific Siemens user data configured by MM_NUM_CCS_TOA_PARAM.

Each parameter can be assigned its own type. The permissible types are

```
Type                                  Value of the machine data
(See types of the NC language)
-----------------------------------------------------------------
BOOL                                   1
CHAR                                   2
INT                                    3
REAL                                   4
```

- (STRING is explicitly impossible here; value 5 is treated like value 2)

```
AXIS                                   6
FRAME                                  not defined
```

See also: MM_NUM_CCS_TOA_PARAM, MM_NUM_CUTTING_EDGES_IN_TOA

Buffered user memory is used

18208	MM_NUM_CCS_MON_PARAM			N02, N09	FBW
-	No. of Siemens OEM monitor data (SRAM)			DWORD	PowerOn
-					
-	-	0	0	10	2/2

Description: Only when $MN_MM_TOOL_MANAGEMENT_MASK, bit 0 = 1 or bit 1 = 1 and bit 2=1 ('H4'), is set:

User or OEM data in the tool management.

Number of Siemens OEM monitoring data; standard format IN_Int).

See also: MM_NUM_CC_MON_PARAM, MM_NUM_CUTTING_EDGES_IN_TOA

Buffered user memory is used

18209	MM_TYPE_CCS_MON_PARAM			N02, N09	FBW
-	Type of Siemens OEM monitor data (SRAM)			DWORD	PowerOn
-					
-	10	3,3,3,3,3,3,3,3,3,3	1	6	2/2

Description:

Only when $MN_MM_TOOL_MANAGEMENT_MASK, bit 0 = 1 or bit 1 = 1 and bit 2=1 ('H4'), is set:

User or OEM data in the tool management.

Type of monitoring-specific Siemens user data configured by MM_NUM_CCS_MON_PARAM.

Each parameter can be assigned its own type. The permissible types are

```
Type                               Value of the machine data
(See types of the NC language)
----------------------------------------------------------------
BOOL                                1
CHAR                                2
INT                                 3
REAL                                4
```

- (STRING is explicitly impossible here; value 5 is treated like value 2)

```
AXIS                                6
FRAME                               not defined
```

See also: MM_NUM_CCS_MON_PARAM, MM_NUM_CUTTING_EDGES_IN_TOA

Buffered user memory is used

18210	MM_USER_MEM_DYNAMIC			EXP, N02	S7
-	User memory in DRAM [KB]			DWORD	PowerOn
-					
-	-	3000	0	4000000	7/2
710-6a2c	-	-	-	98304	-/-
710-31a10c	-	-	-	98304	-/-
720-6a2c	-	-	-	98304	-/-
720-31a10c	-	-	-	98304	-/-
730-6a2c	-	-	-	98304	-/-
730-31a10c	-	-	-	98304	-/-
840disl-6a	-	-	-	89303	-/-
840disl-20a	-	-	-	89303	-/-

Description: The DRAM in the NC is used jointly by the system and the user.

MM_USER_MEM_DYNAMIC defines the size of the DRAM available to the user. The input limits depend upon the hardware and software configurations of the CNC.

There are various types of user data in this memory area, for example.

- Local user data
- IPO block buffers
- User macros
- Diagnostics functions such as trace recording of times,.....
- Tool management trace
- Communication with 1-n HMIs; Value of n: See data $MN_MM_NUM_MMC_UNITS.
- Reorg Log file (required for internal purposes of the NC program sequence)
- ...

Each additionally active channel occupies a substantial amount of memory here.

Each activated axis requires part of this memory.

Exactly how much that is depends largely on the control model and the software version.

The settable values depend on the hardware and software configurations.

The value of NCK is automatically set after unbuffered startup of the NCK or deletion of the memory. The value is then such that the free memory defined in $MN_INFO_FREE_MEM_DYNAMIC is available to the user.

(See the description of $MN_INFO_FREE_MEM_DYNAMIC).

If the value is set too high (in the sense that the memory required is

more than that available on the memory module), the NCK responds at the next NCK reset/power on by automatically reducing the machine data value to the maximum possible value that the hardware permits.

Message alarm 6030 advises of this process. This corresponds to a legal response of the NCK and is not an incorrect response.

The essential significance of the machine data is not to release the entire memory to the user because the memory is shared between the system and the user. A part of the physically existing memory is reserved for future develoments of the NCK.

The maximum amount of memory available on the hardware can be found by selecting a value for the data that is so large that, after the subsequent restart, message alarm 6030 indicates the maximum available memory. Applications that use the maximum available memory will in all probability have memory problems with a software conversion to a newer NCK version.

Upper and lower limits are not necessary. The software rejects values outside the permissible range and then automatically sets suitable values.

(See also message alarm 6030.)

The data in the dynamic memory are not battery-backed.

Note:

During power on, the system software compares the sum of all requests for dynamic memory with the value in MD: MM_USER_MEM_DYNAMIC. Alarm 6000 "Memory allocated with standard machine data" is output if the memory required exceeds the memory capacity set with the MD. Alarm 6030 "User memory limit has been adapted" is output if the control detects during the power on that the memory capacity required by MM_USER_MEM_DYNAMIC is larger than the physical memory.

Related to:

The available dynamic memory can be taken from MD 18050: INFO_FREE_MEM_DYNAMIC (display data of the free dynamic memory).

18220	MM_USER_MEM_DPR			EXP, N02	-
-	User memory in DUAL PORT RAM (DPR)			DWORD	PowerOn
-					
-	-	0	-	-	0/0

Description: The functionality is not available in previous software versions.

18230	MM_USER_MEM_BUFFERED			N02	S7
-	User memory in SRAM			DWORD	PowerOn
-					
-	-	0	0	4000000	7/1
710-6a2c	-	-	-	15360	-/-
710-31a10c	-	-	-	15360	-/-
720-6a2c	-	-	-	21504	-/-
720-31a10c	-	-	-	21504	-/-
730-6a2c	-	-	-	21504	-/-
730-31a10c	-	-	-	21504	-/-

Description: Battery-backed user memory (in kbyte).

Various types of user data are stored in this memory area.

For example:

- NC part programs
- R parameters
- Global user data (GUD)
- Definitions of the protection zones
- Correction tables EEC, CEC, QEC
- Tool / magazine data

...

This data is retained after control power off.

(Provided the data backup (battery,...) is in good working order and the Init switch is correctly set on the control).

This means that they are available unchanged after restart.

In the case of control models without a backup battery (e.g. 802S,...) there is, as a rule, an option of , specifically backing up the data by operation, so that they are available again after the next power on process.

The settable values depend on the hardware and software configurations.

The set values are designed for the minimum memory configuration of the particular control model.

256, 512 and 2000, 4000KB of battery-backed memory are available on the hardware.

Approximately 30KB of this physically present memory is used for internal purposes. This means that approximately 226, 482, 1970, 3970KB of user memory can be set.

After all the NCK functions have taken 'their' memory corresponding to the relevant machine data values, the rest of the memory is added to the part program memory. As a rule, the user will thus have more part program memory available than that guaranteed in the sales brochure. This 'more' may however vary from version to version.

If there are various memory configuration options for a control model then the data may have to be increased correspondingly when using the larger memory variants.

In this respect, see the meaning of $MN_INFO_FREE_MEM_STATIC

Special cases:

The battery-backed data are lost if this machine data is altered.

18231	MM_USER_MEM_BUFFERED_TYPEOF			N02	-
-	Technology for data buffering			DWORD	PowerOn
-					
-	3	0,0,0	0	1	0/0
710-6a2c	-	1,1,1	-	-	-/-
710-31a10c	-	1,1,1	-	-	-/-
720-6a2c	-	1,1,1	-	-	-/-
720-31a10c	-	1,1,1	-	-	-/-
730-6a2c	-	1,1,1	-	-	-/-
730-31a10c	-	1,1,1	-	-	-/-

Description: Type of technology used for data back-up

Value = 0 SRAM memory only

Value = 1 SRAM and flash/disk memory

If the value = 1 then see also $MN_MM_ACTFILESYS_LOG_FILE_MEM

Index 0 = Reserved

Index 1 = Definition for the battery-backed data of the active file system (incl. machine data).

Index 2 = Definition for the battery-backed data of the passive file system (part programs, cycles, ...).

This value is in each case automatically derived during power on

from $MN_DRAM_FILESYST_CONFIG.

18232	MM_ACTFILESYS_LOG_FILE_MEM			N02	-
-	System: logfile size in SRAM [KB]			DWORD	PowerOn
-					
-	3	0,0,0	0	32000	0/0
710-6a2c	-	200,5,30	-	-	-/-
710-31a10c	-	200,5,30	-	-	-/-
720-6a2c	-	200,5,30	-	-	-/-
720-31a10c	-	200,5,30	-	-	-/-
730-6a2c	-	200,5,30	-	-	-/-
730-31a10c	-	200,5,30	-	-	-/-

Description: Buffered log file for buffered data of the active file system (in kbyte)

Systems with slow data buffer media store changed buffered data

in the internal system SRAM. When the buffer is full, all data of the active file system are

made persistent. The buffer backs up the data persistence of the last persistence operation

until the next power fail. After a power failure (spontaneous voltage loss or power OFF)

data that had not yet been made persistent at the time of the power failure

can be restored from this buffer.

The log file serves to minimize or totally avoid data loss in the event of power failure.

1000 entries require approximately 70KB.

A value greater than 0 is only practicable, if $MN_MM_USER_MEM_BUFFERED_TYPEOF[1] = 1.

A value equal to 0 means that the buffered data are not voltage loss safe,

if $MN_MM_USER_MEM_BUFFERED_TYPEOF[1] = 1 (typical for SINUMERIK SolutionLine)

Example:

With $MN_MM_ACTFILESYS_LOG_FILE_MEM[2] = 0 data changes from synchronized actions

can be excluded from the power fail data backup. Improved time response of the synchronized

actions would be advantageous. Should only be set, if the buffered data that are changed by

the synchronized action, are not safety-relevant.

Index Meaning

0 Preprocessing buffer

1 Buffer for data changes within the range of tool change

2 Buffer for data changes of main processing (especially synchronized actions)

Also see $MN_DEPTH_OF_LOGFILE_OPT_PF which can be used to optimize the behavior.

18233	IS_CONTINOUS_DATA_SAVE_ON			EXP, N02	-
-	System: Automatic saving of persistent data			BOOLEAN	PowerOn
-					
-	3	FALSE,FALSE,FALSE	-	-	7/2
710-6a2c	-	TRUE,TRUE,TRUE	-	-	-/-
710-31a10c	-	TRUE,TRUE,TRUE	-	-	-/-
720-6a2c	-	TRUE,TRUE,TRUE	-	-	-/-
720-31a10c	-	TRUE,TRUE,TRUE	-	-	-/-
730-6a2c	-	TRUE,TRUE,TRUE	-	-	-/-
730-31a10c	-	TRUE,TRUE,TRUE	-	-	-/-

Description:

The machine data is relevant only if $MN_MM_USER_MEM_BUFFERED_TYPEOF = 1.

The default value should be changed only if the system is operated in an environment,

Value = 0 : Continuous saving of persistent data on disk/flash/ etc. is deactivated.

The dynamic response of the software on systems of the SolutionLine range can thus be improved.

Value = 1 : Continuous automatic saving of persistent data on disk/flash/etc. is active.

Index 0 = Reserved

Index 1 = Definition for the buffered data of the active file system (incl. machine data).

Index 2 = Definition for the buffered data of the passive file system (part programs, cycles, ...).

The default value should be changed only for diagnostic purposes or for optimizing the dynamic response.

The default value should be changed only if the system is operated in an environment,

where no spontaneous shutdown of the system / spontaneous power failure occurs.

Otherwise, persistent data can be lost.

18235	MM_INCOA_MEM_SIZE			EXP	-
-	Size of the DRAM memory for INCOA applications [Kbyte]			DWORD	PowerOn
-					
-	-	0	0	25600	7/2
710-6a2c	-	20480	-	-	-/-
710-31a10c	-	20480	-	-	-/-
720-6a2c	-	20480	-	-	-/-
720-31a10c	-	20480	-	-	-/-
730-6a2c	-	20480	-	-	-/-
730-31a10c	-	20480	-	-	-/-
840disl-6a	-	20480	-	-	-/-
840disl-20a	-	20480	-	-	-/-

Description:

On cold restart of the control system, the default value of $MN_MM_INCOA_MEM_SIZE specifies

the DRAM memory range that is available for INCOA applications in total.

This MD can only be read. With the diagnostics function "Read current actual value" the

memory space actually occupied by the INCOA applications can be determined.

18237	MM_CYC_DATA_MEM_SIZE			EXP, N02	-
-	Cycle/display setting data in SRAM [kB]			DWORD	PowerOn
-					
-	-	0	0	64	7/RO

Description: Size of the buffered memory for 'Setting data for cycles and display' [kB]

18238	MM_CC_MD_MEM_SIZE			N02	-
-	Compile cycle machine data in SRAM [kB]			DWORD	PowerOn
-					
-	-	1	1	32000	7/1

Description: Battery-backed user memory for compile cycles (in kbyte)

18240	MM_LUD_HASH_TABLE_SIZE			EXP, N02	S7
-	Hash table size for LUD (DRAM)			DWORD	PowerOn
-					
-	-	37	11	107	0/0

Description: Defines the size of the hash table for local user data (LUD). The value entered must be a primary number. The setting allows the optimization of

- the interpreter execution time (low value = longer execution time) and
- memory requirements (low value = less memory).

A larger table requires a smaller number of decoding operations for internally decoding the variables and consequently a shorter interpreter execution time. The value of this machine data affects the amount of dynamic memory required for managing the blocks for local user variables with REORG, see MD 28010: MM_NUM_REORG_LUD_MODULES (Number of blocks for local user variables with REORG (DRAM)).

Note:

This machine data is assigned internally by the control and must not be altered by the user.

18242	MM_MAX_SIZE_OF_LUD_VALUE			N02	S7
-	Maximum memory block size for LUD/GUD values			DWORD	PowerOn
-					
-	-	920	920	SLMAXVARBYTES	0/0

Description:

Defines the net memory array size for LUD/GUD variables. Each NC program that defines at least one LUD/GUD variable or has call parameters then occupies at least one memory array of this size.

The LUD/GUD variables of a program may occupy the complete LUD/GUD value memory set for the channel. However, then there is no memory available for other programms.

The memory for the LUD/GUD variables (that is defined for LUD by the channel-specific MD MM_LUD_VALUES_MEM and for GUD by the NCK-specific MD MM_GUD_VALUES_MEM) is divided into equally sized arrays of the size MM_MAX_SIZE_OF_LUD_VALUE.

Example:

```
MM_LUD_VALUES_MEM = 12 (kbytes gross)
MM_MAX_SIZE_OF_LUD_VALUE = 660 (bytes net)
                         + 16 (bytes management data per array)
                         ---------------------------------------
                          676 (bytes gross)
```

One then obtains 12*1024 / 676 = 18 memory arrays each of 660 bytes.

This means that 12 NC programs can either each occupy one array or one NC program can define, for example, 18 variables of type Frame (whose size is approximately 660 bytes.

Data type	Memory requirement
REAL	8 bytes
INT	4 bytes
BOOL	1 byte
CHAR	1 byte
STRING	1 byte per character, 100 characters are possible per string
AXIS	4 bytes
FRAME	up to 1 kbyte (depending on control model)

Related to:

MD 28040: MM_LUD_VALUES_MEM

(Memory size for local user variables (DRAM))

Warning:

The battery-backed data are lost when this machine data is changed!

The size of the NC language type Frame depends on the maximum number of channel axes generated by the NCK.

There are NCK systems with a maximum number of channel axes from 4 to 20. In the case of 20 axes, the type Frame then has a size of 660 bytes.

18250	MM_CHAN_HASH_TABLE_SIZE		EXP, N02	S7
-	Hash table size for channel-specific data (DRAM)		DWORD	PowerOn
-				
-	- 23	3	193	0/0

Description: Defines the size of the hash table for channel-specific names. The value entered must be a primary number. The setting allows the optimization of

- the interpreter execution time (low value = longer execution time) and
- memory requirements (low value = less dynamic memory).

A larger table requires a smaller number of decoding operations for internally decoding the variables and consequently a shorter interpreter execution time. The value of this machine data affects the amount of dynamic memory required.

The memory required per channel in bytes is equal to the value entered multiplied by 68.

Note:

This machine data is assigned internally by the control and must not be altered by the user.

Warning:

The battery-backed data are lost if this machine data is altered!

18260	MM_NCK_HASH_TABLE_SIZE		EXP, N02	S7
-	Hash table size for global data (DRAM)		DWORD	PowerOn
-				
-	- 4001	537	4327	0/0

Description: Defines the size of the NCK-specific names. The value entered must be a primary number. The setting allows the optimization of

- the interpreter execution time (low value = longer execution time) and
- memory requirements (low value = less dynamic memory).

A larger table requires a smaller number of decoding operations for internally decoding the variables and consequently a shorter interpreter execution time. The value of this machine data affects the amount of dynamic memory required. The memory required in bytes is equal to the value entered multiplied by 68.

Note:

This machine data is assigned internally by the control and must not be altered by the user.

18270	MM_NUM_SUBDIR_PER_DIR			N02	S7
-	Number of subdirectories (DRAM)			DWORD	PowerOn
-					
-	-	30	24	250	7/1

Description: Defines the maximum number of subdirectories that a directory in the passive file system can have. The number of directories is limited by MD 18310: MM_NUM_DIR_IN_FILESYSTEM (number of directories in the passive file system). The memory requirement for the number of files per directory is contained in the memory (see MD 18260: MM_NUM_FILES_PER_DIR).

Related to:

MD 18310: MM_NUM_DIR_IN_FILESYSTEM

(Number of directories in the passive file system)

18280	MM_NUM_FILES_PER_DIR			N02	S7
-	Number of files per directory (DRAM)			DWORD	PowerOn
-					
-	-	100	64	MD_MAXNUM_FILES_PER_DIR	7/1

Description: Specifies the maximum number of files which can be created in a directory or subdirectory of the passive file system. The total number of files is limited by MD 18320: MM_NUM_FILES_IN_FILESYSTEM (number of files in the passive file system). The memory space in bytes required for the management of files in the directory is the value entered multiplied by 40. The highest value of MD 18280: MM_NUM_FILES_PER_DIR (number of files per directory) and MD 18270: MM_NUM_SUBDIR_PER_DIR (number of subdirectories) must be entered as the MD setting. The memory required to manage files in the passive file system is reserved by MD 18320: MM_NUM_FILES_IN_FILESYSTEM (number of files in the passive file system).

Special cases:

The battery-backed data are lost if this machine data is altered.

Note

An alteration of the MD has an effect on directories created after this. This means that if the number of files in an existing directory is to be altered, the existing directory must first be deleted and then a new directory created (but only after first saving the files)!

Related to:

MD 18320: MM_NUM_FILES_IN_FILESYSTEM

(Number of files in the passive file system)

18290	MM_FILE_HASH_TABLE_SIZE			EXP, N02	S7
-	Hash table size for files of a directory (SRAM)			DWORD	PowerOn
-					
-	-	47	3	299	0/0

Description: Defines the size for the files of a directory. The value entered must be a primary number. The setting allows the optimization of

- the interpreter execution time (low value = longer execution time) and
- memory requirements (low value = less memory).

The value of this machine data affects the amount of static memory required for the management of directories, see MD 18310: MM_NUM_DIR_IN_FILESYSTEM (number of directories in the passive file system)

Buffered user memory is used.

Note:

This machine data is assigned internally by the control and must not be altered by the user.

Special cases:

The battery-backed data are lost if this machine data is altered!

18300	MM_DIR_HASH_TABLE_SIZE			EXP, N02	S7
-	Hash table size for subdirectories (SRAM)			DWORD	PowerOn
-					
-	-	11	3	349	0/0

Description: Defines the size of the subdirectories of a directory. The value entered must be a primary number. The setting allows the optimization of

- the interpreter execution time (low value = longer execution time) and
- memory requirement (low value = less memory).

The value of this machine data affects the amount of static memory required for the management of directories, see MD 18310: MM_NUM_DIR_IN_FILESYSTEM (number of directories in the passive file system).

Buffered user memory is used.

Note:

This machine data is assigned internally by the control and must not be altered by the user.

Special cases:

The battery-backed data are lost if this machine data is altered!

18310	MM_NUM_DIR_IN_FILESYSTEM			N02	S7
-	Number of directories in passive file system (SRAM)			DWORD	PowerOn
-					
-	-	30	30	256	7/2

Description: This machine data limits the number of directories in the passive file system.

It can be used to reserve memory in the SRAM for the management of the directories. The directories and subdirectories of the passive file system set up by the system are included in this machine data. The memory required for the management of the directories can be calculated as follows:

Memory required = a (440+28 (b+c)) bytes

a = Input value of MD 18310: MM_NUM_DIR_IN_FILESYSTEM

(no. of directories in passive file system)

b = Input value of MD 19300: MM_DIR_HASH_TABLE_SIZE

(HASH table size for subdirectories)

c = Input value of MD 18290: MM_FILE_HASH_TABLE_SIZE

(hash table size for the files of a directory)

Buffered user memory is used.

Special cases:

The battery-backed data are lost if this machine data is altered.

Related to:

MD 18270: MM_NUM_SUBDIR_PER_DIR

(Number of subdirectories)

18320	MM_NUM_FILES_IN_FILESYSTEM			N02	S7
-	Number of files in passive file system (SRAM)			DWORD	PowerOn
-					
-	-	150	64	512	7/2

Description: Defines the number of files available in the part program memory. This machine data is used to reserve memory in SRAM - approximately 320 bytes per file - for managing the file memory. Each file created requires a minimum of one kbyte of memory for the file code. If the one kbyte limit for the file code is exceeded another kbyte is reserved for the file.

Buffered user memory is used.

Special cases:

The battery-backed data are lost if this machine data is altered.

Related to:

MD 18280: MM_NUM_FILES_PER_DIR

(Number of files in directories)

18331	MM_FLASHFILESYS_MEM			N01, N02	-
-	Reserved for FFS (DRAM)			BYTE	PowerOn
-					
-	8	0,0,0,0,0,0,0,0	-	-	0/0

Description: Reserved for FFS

18332	MM_FLASH_FILE_SYSTEM_SIZE			N01, N02	IAD
-	Size of FFS			DWORD	PowerOn
-					
-	-	0	0	4096	7/1

Description: Size of the flash file system on the PCNC (in kbyte)

Entries have to be made in steps of 128KB. Apart from 0, the smallest possible value is 512KB.

If the flash file system is used as a backup memory for the DRAM file system, then $MN_MM_FLASH_FILE_SYSTEM_SIZE must be at least 3 times the size of the largest file in the DRAM file system larger than $MN_MM_DRAM_FILE_MEM_SIZE.

Additional memory space is needed in the DRAM file system for log files if this has been configured by $PROTOC_FILE_MEM.

18342	MM_CEC_MAX_POINTS			N01, N02	K3
-	max. number of interpolation points on sag compensation (SRAM)			DWORD	PowerOn
-					
-	62	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	0	2000	7/2

Description: The MD defines the memory space available for the compensation tables.

When MM_CEC_MAX_POINTS = 0, no memory is set up for the table. The sag compensation function cannot then be used.

Caution!

If MD 18342: MM_CEC_MAX_POINTS[t] is changed, when the system is powered up the battery-backed NC user memory is automatically newly set. Whereby all user data in the battery-backed user memory (e.g. drive and HMI machine data, tool offsets, part programs etc.) is deleted.

Related to:

SD 41300: CEC_TABLE_ENABLE[t] release

Evaluation of the sag compensation table (t).

References:

/FB/, S7, "Memory Configuration"

18350	MM_USER_FILE_MEM_MINIMUM			EXP, N02	S7
-	minimum part program memory (SRAM)			DWORD	PowerOn
-					
-	-	20	0	100	0/0
710-6a2c	-	0	-	0	-/-
710-31a10c	-	0	-	0	-/-
720-6a2c	-	0	-	0	-/-
720-31a10c	-	0	-	0	-/-
730-6a2c	-	0	-	0	-/-
730-31a10c	-	0	-	0	-/-

Description: Valid only for PowerLine control models.

Minimum user memory for files in the passive file system (in kbyte)

There are various types of user data in this memory area.

Defines the minimum remaining battery-backed memory area for the files of the passive file system (in kbyte). The settable value depends on the hardware and software configurations (memory allocation SRAM) and on MD 18230: MM_USER_MEM_BUFFERED (user memory in the SRAM). During the memory allocation of the SRAM, the files of the passive file system are assigned to the end of the remaining memory.

The remaining memory must have at least the memory space stated in MM_USER_FILE_MEM_MINIMUM available for the file system to be able to work. If this is not ensured, the control assigns the pre-assigned data to the memory during power on, as a consequence of which all the battery-backed data entered by the user is lost. Alarm 6000 "Memory allocation with standard machine data" is also output.

The available part program memory can be taken from the MD 18060: INFO_FREE_MEM_STATIC (display data of the free static memory).

Special cases:

The battery-backed data are lost if this machine data is changed and the remaining memory is less than the value of MM_USER_FILE_MEM_MINIMUM.

18351	MM_DRAM_FILE_MEM_SIZE			EXP, N02	IAD
-	Size of part program memory (DRAM)			DWORD	PowerOn
-					
-	-	0	0	32768	7/1
710-6a2c	-	-	-	-	0/0
710-31a10c	-	-	-	-	0/0
720-6a2c	-	-	-	-	0/0
720-31a10c	-	-	-	-	0/0
730-6a2c	-	-	-	-	0/0
730-31a10c	-	-	-	-	0/0

Description: Size of memory for files in the DRAM of the passive file system (in kbyte).

If the flash file system is used as a background memory for the DRAM file system then $MN_MM_FLASH_FILE_SYSTEM_SIZE must be at least 3 times the size of the largest file in the DRAM file system and be larger than $MN_MM_DRAM_FILE_MEM_SIZE.

18352	MM_U_FILE_MEM_SIZE			EXP, N02	-
-	End user memory for part programs/cycles/files			DWORD	PowerOn
-					
-	3	0,0,0	0	0	2/2
710-6a2c	-	2560,0,0	-	9216	-/-
710-31a10c	-	2560,0,0	-	9216	-/-
720-6a2c	-	2560,0,0	-	15360	-/-
720-31a10c	-	2560,0,0	-	15360	-/-
730-6a2c	-	2560,0,0	-	15360	-/-
730-31a10c	-	2560,0,0	-	15360	-/-

Description: The machine data is not available or not defined for PowerLine control models.

End user memory for files in the passive file system (in kbyte).

There are various types of user data in this memory area.
E.g.: NC part programs, cycle programs of the end user, diagnostic files, ...
The settable values depend on the hardware and software configurations.
The settable size of the part program memory is, apart from the upper limit value,
determined by the MD $MN_MM_USER_MEM_BUFFERED and can also
be determined by a software option.
Index 0 = Size of the battery-backed part program / cycle program memory
Index 1 = Reserved
Index 2 = Reserved

18353	MM_M_FILE_MEM_SIZE			EXP, N02	-
-	Memory capacity for machine manufacturer's cycles/files			DWORD	PowerOn
-					
-	3	0,0,0	0	0	1/1
710-6a2c	-	512,0,0	-	9216	-/-
710-31a10c	-	512,0,0	-	9216	-/-
720-6a2c	-	512,0,0	-	15360	-/-
720-31a10c	-	512,0,0	-	15360	-/-
730-6a2c	-	512,0,0	-	15360	-/-
730-31a10c	-	512,0,0	-	15360	-/-

Description: The machine data is not available or not defined for PowerLine control models.
Memory for machine manufacturer files in the passive file system (in kbyte).
The machine manufacturer's files are in this memory area of the passive file system.
E.g.: cycle programs
The settable values depend on the hardware and software configurations.
The settable size of the memory is, apart from the upper limit value,
determined by the MD $MN_MM_USER_MEM_BUFFERED.
Index 0 = Minimum size of the battery-backed (persistent) part program / cycle program memory
Index 1 = Reserved
Index 2 = Reserved

18354	MM_S_FILE_MEM_SIZE			EXP, N02	-
-	Memory capacity for NC manufacturer's cycles/files			DWORD	PowerOn
-					
-	3	0,0,0	0	0	0/0
710-6a2c	-	2048,0,100	-	3072	-/-
710-31a10c	-	2048,0,100	-	3072	-/-
720-6a2c	-	2048,0,100	-	3072	-/-
720-31a10c	-	2048,0,100	-	3072	-/-
730-6a2c	-	2048,0,100	-	3072	-/-
730-31a10c	-	2048,0,100	-	3072	-/-

Description: The machine data is not available or not defined for PowerLine control models.

Memory for the control manufacturer's files in the passive file system (in kbyte).

The control manufacturer's files are in this memory area of the passive file system.

E.g.: cycle programs, system files

The settable values depend on the hardware and software configurations.

The settable size of the memory is, apart from the upper limit value,

for index = 0 determined by MD $MN_MM_USER_MEM_BUFFERED.

For index 1 = Reserved.

For index 2 = limited by the size of the internally availble battery-backed memory (SRAM).

Index 0 = Size of the battery-backed cycle program memory

Index 1 = Reserved

Index 2 = Size of the battery-backed memory for system files

18355	MM_T_FILE_MEM_SIZE			EXP, N02	-
-	Memory size for temporary files			DWORD	PowerOn
-					
-	-	1000	-	-	7/2

Description: The machine data is not available or not defined for PowerLine control models.

Memory for temporary files in the passive file system (in kbyte)

For example: Compilate of cycles (preprocessing), system traces

18356	MM_E_FILE_MEM_SIZE			EXP, N02	-
-	Memory size for the clipboard of external files			DWORD	PowerOn
-					
-	3	0,0,0	0	15360	0/0
710-6a2c	-	512,0,0	-	9216	-/-
710-31a10c	-	512,0,0	-	15360	-/-

Description:

For PowerLine control models the machine data is not available or has not been defined.

Memory for the clipboard of external files in the passive file system (in kB)

The settable values depend on the hardware and software configuration.

The settable memory size is limited, except for the upper limit value,

for index = 0 by $MN_MM_USER_MEM_BUFFERED.

for index = 1 reserved

for index = 2 reserved

Index 0 = size of the buffered clipboard

Index 1 = reserved

Index 2 = reserved

18360	MM_EXT_PROG_BUFFER_SIZE			N01	A2
-	FIFO buffer size for processing from external source (DRAM)			DWORD	PowerOn
-					
-	-	50	30	1000000	7/2

Description:

A FIFO buffer is needed on the NCK for each program level (main program or subprogram) that is processed externally (reload mode).

The size of the FIFO buffer is defined in kbyte by $MN_MM_EXT_PROG_BUFFER_SIZE.

$MN_MM_EXTPROG_NUM sets the number of FIFO buffers which are simultaneously available.

During startup, the memory size determined by multiplying $MN_MM_EXT_PROG_BUFFER_SIZE by $MN_MM_EXTPROG_NUM is reserved in the DRAM.

If the stated value exceeds the available memory space, alarm 4077 is output when writing the machine data.

References:

/PGA/Programming Guide Advanced, Section 2

18362	MM_EXT_PROG_NUM			N01	A2
-	Number of program levels which can be simultaneously processed			BYTE	PowerOn
-					
-	-	1	0	13	7/2

Description:

Number of program levels that can simultaneously be in "Processing from external source" mode NCK-wide.

System resources are reserved for the HMI <-> NCK communication during "Processing from external source". Machine data EXT_PROG_NUM defines the number of possible program levels.

The memory space is reserved during power on by MD 18360 + MD 18362. If it is found during program execution that all system resources are occupied, this is reported by alarm 14600.

18370	MM_PROTOC_NUM_FILES			N02	D1,OEM
-	Max.no. of log files in passive file system			DWORD	PowerOn
-					
-	10	2,0,0,0,0,2,2,0,0,3	0	10	1/1

Description: Maximum number of log files in the passive file system.

18371	MM_PROTOC_NUM_ETPD_STD_LIST			N02	D1,OEM
-	Number of standard data lists ETPD.			DWORD	PowerOn
-					
-	10	25,0,0,0,0,25,25,0,0,3	0	25	1/1

Description: Number of standard data lists in the OPI module ETPD (user-specific)

18372	MM_PROTOC_NUM_ETPD_OEM_LIST			N02	D1,OEM
-	Number of OEM data lists ETPD.			DWORD	PowerOn
-					
-	10	0,0,0,0,0,0,0,0,0,0	0	20	1/1

Description: Number of OEM data lists in the OPI module ETPD (user-specific).

18373	MM_PROTOC_NUM_SERVO_DATA			N02	D1
-	Number of servo data for log			DWORD	PowerOn
-					
-	10	0,0,0,0,0,10,10,0,0,0	0	20	1/1

Description: Number of servo data which must be recordable at the same time (user-specific).

18374	MM_PROTOC_FILE_BUFFER_SIZE			N02	-
-	Size of log file buffer			DWORD	PowerOn
-					
-	10	8000,8000,8000,8000,8000,8000,8000...	5000	-	1/1

Description: Size of the data buffer between the IPO and preprocessing time levels of a log file [Bytes].

18375	MM_PROTOC_SESS_ENAB_USER			N02	-
-	Users enabled for sessions			BYTE	PowerOn
-					
-	10	0,0,0,0,0,1,1,0,0,0	0	1	1/1

Description: Users that are available for session management.

18390	MM_COM_COMPRESS_METHOD			EXP, N01, N02	-
-	Supported compression methods.			DWORD	PowerOn
-					
-	-	0x01	-	-	2/2

Description: Setting for the compression methods to be supported.

18400	MM_NUM_CURVE_TABS		N02, N09	M3
-	Number of curve tables (SRAM)		DWORD	PowerOn
-				
-	- 0	-	-	1/1

Description: Defines the maximum number of curve tables that can be stored in the SRAM of the entire system. A curve table consists of a number of curve segments.

Related to

MD 18402: MM_NUM_CURVE_SEGMENTS

18402	MM_NUM_CURVE_SEGMENTS		N02, N09	M3
-	Number of curve segments (SRAM)		DWORD	PowerOn
-				
-	- 0	-	-	1/1

Description: Defines the maximum number of curve segments that can be stored in the SRAM of the entire system. The curve segments are a component of a curve table.

Related to

MD 18400: MM_NUM_CURVE_TABS

18403	MM_NUM_CURVE_SEG_LIN		N02, N09	-
-	Number of linear curve segments (SRAM)		DWORD	PowerOn
-				
-	- 0	-	-	1/1

Description: Number of linear curve segments in the SRAM available throughout the NCK.

A curve table may consist of "normal" curve segments and linear segments. The number of "normal" curve segments in the SRAM is defined by MD MM_NUM_CURVE_SEGMENTS, these curve segments can accommodate polynomials.

Linear curve segments can only accommodate straight lines.

These linear curve segments are stored in battery-backed memory.

18404	MM_NUM_CURVE_POLYNOMS		N02, N09	M3
-	Number of curve table polynomials (SRAM)		DWORD	PowerOn
-				
-	- 0	-	-	1/1

Description: Defines the maximum total number of polynomials for curve tables that can be stored in the SRAM of the entire system. The polynomials are a component of a curve segment. A maximum of 3 polynomials are required for a curve segment. As a rule, only 2 polynomials are used for each curve segment.

Related to

MD 18400: MM_NUM_CURVE_TABS

MD 18402: MM_NUM_CURVE_SEGMENTS

18406	MM_NUM_CURVE_TABS_DRAM		N02, N09	M3
-	Number of curve tables (DRAM)		DWORD	PowerOn
-				
-	- 0	-	-	1/1

Description: Number of curve tables in the DRAM available throughout the NCK.

The curve tables are stored either in the buffer memory or in the dynamic memory.

This MD is used to set the number of curve tables in the dynamic memory (DRAM).

18408	MM_NUM_CURVE_SEGMENTS_DRAM		N02, N09	M3
-	Number of curve segments (DRAM)		DWORD	PowerOn
-				
-	- 0	-	-	1/1

Description: Number of polynomial curve segments in the DRAM available throughout the NCK.

The curve segments are stored either in the buffer memory or in the dynamic memory.

This MD is used to set the number of segments in the dynamic memory (DRAM).

18409	MM_NUM_CURVE_SEG_LIN_DRAM		N02, N09	-
-	Number of linear curve segments (DRAM)		DWORD	PowerOn
-				
-	- 0	-	-	1/1

Description: Number of linear curve segments in the DRAM available throughout the NCK.

A curve table may consist of "normal" curve segments and linear segments. The number of "normal" curve segments in the DRAM is defined by MD MM_NUM_CURVE_SEGMENTS_DRAM, these curve segments can accommodate polynomials. Linear curve segments can only accommodate straight lines.

The curve segments are stored either in the buffer memory or in the dynamic memory. This MD defines the number of curve segments in the dynamic memory (DRAM).

18410	MM_NUM_CURVE_POLYNOMS_DRAM		N02, N09	M3
-	Number of curve table polynomials (DRAM)		DWORD	PowerOn
-				
-	- 0	-	-	1/1

Description: Number of polynomials for curve tables in the DRAM available throughout the NCK.

The polynomials for curve tables are stored in the buffer memory or in the dynamic memory.

This MD is used to set the number of polynomials for curve tables in the dynamic memory (DRAM).

18450	MM_NUM_CP_MODULES		N02, N09	-
-	Max. number of CP modules		DWORD	PowerOn
-				
-	- 4	0	48	1/1

Description: Number of CP coupling modules available within the NCK

The MD defines the max. permissible number of CP couplings and reserves the required dynamic memory (DRAM).

18452	MM_NUM_CP_MODUL_LEAD			N02, N09	-
-	Maximum number of CP master values			DWORD	PowerOn
-					
-	-	4	0	99	1/1

Description: Number of NCK-wide available CP master values.

This MD defines the max. permissible number of CP master values and reserves the required dynamic memory (DRAM).

18500	MM_EXTCOM_TASK_STACK_SIZE			EXP, N02	S7
-	Stack size for external communications task (DRAM)			DWORD	PowerOn
-					
-	-	30	30	60	0/0

Description: Defines the size (KB) of the stack for external communication. The dynamic memory area is used.

Note:

This machine data is assigned internally by the control and must not be altered by the user.

18502	MM_COM_TASK_STACK_SIZE			EXP, N02	-
-	Stack size in KB for communication task (DRAM)			DWORD	PowerOn
-					
-	-	20	20	40	0/0

Description: Size of the stacks of the communication task in kbyte.

The dynamic memory is used.

18510	MM_SERVO_TASK_STACK_SIZE			EXP, N02	S7
-	Stack size of servo task (DRAM)			DWORD	PowerOn
-					
-	-	20	20	40	0/0

Description: Defines the stack size for the SERVO task. The dynamic memory is used for this purpose.

Note:

This machine data is assigned internally by the control and must not be altered by the user.

18512	MM_IPO_TASK_STACK_SIZE			EXP, C02	-
-	Stack size of IPO task (DRAM)			DWORD	PowerOn
-					
-	-	30	30	40	0/0

Description: Size of the IPO task stack in kbyte.

The dynamic memory is used.

18520	MM_DRIVE_TASK_STACK_SIZE			EXP, N02	S7,ECO
-	Stack size of drive communication subtask (DRAM)			DWORD	PowerOn
-					
-	-	20	20	40	0/0

Description: The size of the stack (Kbyte) for the drive communication subtask is defined with this machine data.

The stack is stored in the dynamic memory area.

Note:

This machine data is assigned internally by the control and must not be altered by the user.

18540	MM_PLC_TASK_STACK_SIZE			EXP, N02	-
-	Stack size of the PLC task (DRAM)			DWORD	PowerOn
-					
-	-	30	30	60	0/0

Description: Size of the stack of the PLC task in kbyte.

Dynamic memory is used.

18541	MM_PLCBG_TASK_STACK_SIZE			EXP, N02	-
-	Stack size of the PLC background task (DRAM)			DWORD	PowerOn
-					
-	-	30	30	60	0/0

Description: Size of the stacks for the PLC background task in Kbyte.

The dynamic memory is used.

18600	MM_FRAME_FINE_TRANS			N02	K2
-	Fine offset with FRAME (SRAM)			DWORD	PowerOn
-					
-	-	1	0	1	7/2

Description: 0: The fine offset cannot be entered or programmed.

Disabling fine offset saves a maximum of 10KB SRAM, (depending on MD 28080: MM_NUM_USER_FRAMES).

1: The fine offset is possible for settable frames, the basic frame and the programmable frame by operator input or via program.

18601	MM_NUM_GLOBAL_USER_FRAMES			N02	K2
-	Number of global predefined user frames (SRAM).			DWORD	PowerOn
-					
-	-	0	0	100	7/2

Description: Number of global predefined user frames.

The value corresponds to the number of field elements for the predefined field $P_UIFR[].

If the value of the data is greater than 0, then all settable fields are only global. The MD $MC_MM_NUM_USER_FRAMES is then ignored.

18602	MM_NUM_GLOBAL_BASE_FRAMES			N02	K2
-	Number of global base frames (SRAM).			DWORD	PowerOn
-					
-	-	0	0	16	7/2

Description: Number of NCU basic frames.

The value corresponds to the number for the predefined field $P_NCBFR[].

18660	MM_NUM_SYNACT_GUD_REAL			N02	-
-	Number of configurable GUD variables of type REAL			DWORD	PowerOn
-					
-	9	0,0,0,0,0,0,0,0,0	0	32767	7/2

Description: The machine data $MN_MM_NUM_SYNACT_GUD_REAL[ ] can be used to extend individual GUD blocks by additional channel-specific parameter areas of type REAL. The GUD blocks are differentiated by the field index:

$MN_MM_NUM_SYNACT_GUD_REAL[0] = <value> -> extension of the SGUD block

$MN_MM_NUM_SYNACT_GUD_REAL[1] = <value> -> extension of the MGUD block

$MN_MM_NUM_SYNACT_GUD_REAL[2] = <value> -> extension of the UGUD block

$MN_MM_NUM_SYNACT_GUD_REAL[3] = <value> -> extension of the GUD4 block

$MN_MM_NUM_SYNACT_GUD_REAL[8] = <value> -> extension of the GUD9 block

In each case, fields with the following properties are created:

Data type REAL

Field size corresponding to <value> of the relevant machine data

Predefined names:

SYG_RS[ ] -> Synact parameter of type REAL in the SGUD block
SYG_RM[ ] -> Synact parameter of type REAL in the MGUD block
SYG_RU[ ] -> Synact parameter of type REAL in the UGUD block
SYG_R4[ ] -> Synact parameter of type REAL in the GUD4 block
....
SYG_R9[ ] -> Synact parameter of type REAL in the GUD9 block

The parameters can be read and written both by the part program and also via synchronous actions.

18661	MM_NUM_SYNACT_GUD_INT			N02	-
-	Number of configurable GUD variables of type integer			DWORD	PowerOn
-					
-	9	0,0,0,0,0,0,0,0,0	0	32767	7/2

Description: The machine data $MN_MM_NUM_SYNACT_GUD_INT[ ] can be used to extend individual GUD blocks by additional channel-specific parameter areas of type INTEGER. The GUD blocks are differentiated by the field index:

$MN_MM_NUM_SYNACT_GUD_INT[0] = <value> -> extension of the SGUD block

$MN_MM_NUM_SYNACT_GUD_INT[1] = <value> -> extension of the MGUD block

$MN_MM_NUM_SYNACT_GUD_INT[2] = <value> -> extension of the UGUD block

$MN_MM_NUM_SYNACT_GUD_INT[3] = <value> -> extension of the GUD4 block

$MN_MM_NUM_SYNACT_GUD_INT[8] = <value> -> extension of the GUD9 block

In each case, fields with the following properties are created:

Data type BOOL

Field size corresponding to <value> of the relevant machine data

Predefined names:

SYG_IS[ ] -> Synact parameter of type INT in the SGUD block
SYG_IM[ ] -> Synact parameter of type INT in the MGUD block
SYG_IU[ ] -> Synact parameter of type INT in the UGUD block
SYG_I4[ ] -> Synact parameter of type INT in the GUD4 block
....
SYG_I9[ ] -> Synact parameter of type INT in the GUD9 block

The parameters can be read and written both by the part program and also via synchronous actions.

18662	MM_NUM_SYNACT_GUD_BOOL			N02	-
-	Number of configurable GUD variables of type Boolean			DWORD	PowerOn
-					
-	9	0,0,0,0,0,0,0,0,0	0	32767	7/2

Description: The machine data $MN_MM_NUM_SYNACT_GUD_BOOL[ ] can be used to extend individual GUD blocks by additional channel-specific parameter areas of type Boolean. The GUD blocks are differentiated by the field index:

$MN_MM_NUM_SYNACT_GUD_BOOL[0] = <value> -> extension of the SGUD block

$MN_MM_NUM_SYNACT_GUD_BOOL[1] = <value> -> extension of the MGUD block

$MN_MM_NUM_SYNACT_GUD_BOOL[2] = <value> -> extension of the UGUD block

$MN_MM_NUM_SYNACT_GUD_BOOL[3] = <value> -> extension of the GUD4 block

$MN_MM_NUM_SYNACT_GUD_BOOL[8] = <value> -> extension of the GUD9 block

In each case, fields with the following properties are created:

Data type BOOL

Field size corresponding to <value> of the relevant machine data

Predefined names:

SYG_BS[ ] -> Synact parameter of type Boolean in the SGUD block
SYG_BM[ ] -> Synact parameter of type Boolean in the MGUD block
SYG_BU[ ] -> Synact parameter of type Boolean in the UGUD block
SYG_B4[ ] -> Synact parameter of type Boolean in the GUD4 block
....
SYG_B9[ ] -> Synact parameter of type Boolean in the GUD9 block

The parameters can be read and written both by the part program and also via synchronous actions.

18663	MM_NUM_SYNACT_GUD_AXIS			N02	-
-	Number of configurable GUD variables of type Axis			DWORD	PowerOn
-					
-	9	0,0,0,0,0,0,0,0,0	0	32767	7/2

Description: The machine data $MN_MM_NUM_SYNACT_GUD_AXIS[ ] can be used to extend individual GUD blocks by additional channel-specific parameter areas of type AXIS. The GUD blocks are differentiated by the field index:

$MN_MM_NUM_SYNACT_GUD_AXIS[0] = <value> -> extension of the SGUD block

$MN_MM_NUM_SYNACT_GUD_AXIS[1] = <value> -> extension of the MGUD block

$MN_MM_NUM_SYNACT_GUD_AXIS[2] = <value> -> extension of the UGUD block

$MN_MM_NUM_SYNACT_GUD_AXIS[3] = <value> -> extension of the GUD4 block

$MN_MM_NUM_SYNACT_GUD_AXIS[8] = <value> -> extension of the GUD9 block

In each case, fields with the following properties are created:

Data type AXIS

Field size corresponding to <value> of the relevant machine data

Predefined names:

SYG_AS[ ] -> Synact parameter of type AXIS in the SGUD block
SYG_AM[ ] -> Synact parameter of type AXIS in the MGUD block
SYG_AU[ ] -> Synact parameter of type AXIS in the UGUD block
SYG_A4[ ] -> Synact parameter of type AXIS in the GUD4 block
....
SYG_A9[ ] -> Synact parameter of type AXIS in the GUD9 block

The parameters can be read and written both by the part program and also via synchronous actions.

18664	MM_NUM_SYNACT_GUD_CHAR			N02	-
-	Configurable GUD variable of type Char			DWORD	PowerOn
-					
-	9	0,0,0,0,0,0,0,0,0	0	32767	7/2

Description: The machine data $MN_MM_NUM_SYNACT_GUD_CHAR[ ]
can be used to extend individual GUD blocks by additional
channel-specific parameter areas of type CHAR.
The GUD blocks are differentiated by the field index:
$MN_MM_NUM_SYNACT_GUD_CHAR[0] = <value> -> extension of the SGUD block
$MN_MM_NUM_SYNACT_GUD_CHAR[1] = <value> -> extension of the MGUD block
$MN_MM_NUM_SYNACT_GUD_CHAR[2] = <value> -> extension of the UGUD block
$MN_MM_NUM_SYNACT_GUD_CHAR[3] = <value> -> extension of the GUD4 block
$MN_MM_NUM_SYNACT_GUD_CHAR[8] = <value> -> extension of the GUD9 block
In each case, fields with the following properties are created:
Data type CHAR
Field size corresponding to <value> of the relevant machine data
Predefined names:
SYG_CS[ ] -> Synact parameter of type CHAR in the SGUD block
SYG_CM[ ] -> Synact parameter of type CHAR in the MGUD block
SYG_CU[ ] -> Synact parameter of type CHAR in the UGUD block
SYG_C4[ ] -> Synact parameter of type CHAR in the GUD4 block
....
SYG_C9[ ] -> Synact parameter of type CHAR in the GUD9 block
The parameters can be read and written both by the part program
and also via synchronous actions.

18665	MM_NUM_SYNACT_GUD_STRING			N02	-
-	Configurable GUD variable of type STRING			DWORD	PowerOn
-					
-	9	0,0,0,0,0,0,0,0,0	0	25	7/2

Description: The machine data $MN_MM_NUM_SYNACT_GUD_STRING[ ] can be used to extend individual GUD blocks by additional channel-specific parameter areas of type STRING.

The GUD blocks are differentiated by the field index:

$MN_MM_NUM_SYNACT_GUD_STRING[0] = <value> -> extension of the SGUD block

$MN_MM_NUM_SYNACT_GUD_STRING[1] = <value> -> extension of the MGUD block

$MN_MM_NUM_SYNACT_GUD_STRING[2] = <value> -> extension of the UGUD block

$MN_MM_NUM_SYNACT_GUD_STRING[3] = <value> -> extension of the GUD4 block

$MN_MM_NUM_SYNACT_GUD_STRING[8] = <value> -> extension of the GUD9 block

In each case, fields with the following properties are created:

Data type STRING

Field size corresponding to <value> of the relevant machine data

The maximum length of a string is 31 characters.

Predefined names:

SYG_SS[ ] -> Synact parameter of type STRING in the SGUD block
SYG_SM[ ] -> Synact parameter of type STRING in the MGUD block
SYG_SU[ ] -> Synact parameter of type STRING in the UGUD block
SYG_S4[ ] -> Synact parameter of type STRING in the GUD4 block
....
SYG_S9[ ] -> Synact parameter of type STRING in the GUD9 block

The parameters can be read and written both by the part program and also via synchronous actions.

18700	MM_SIZEOF_LINKVAR_DATA			N02	B3
-	Size of NCU-link variable memory			DWORD	PowerOn
LINK					
-	-	0	-	-	7/2

Description: Number of bytes of the NCK link memory for the variables $A_DLx.

18710	MM_NUM_AN_TIMER			N02	-
-	Number of global time variable for synchronized actions			DWORD	PowerOn
-					
-	-	0	0	10000	7/2

Description: Number of global time variables for motion-synchronous actions (DRAM)

18720	MM_SERVO_FIFO_SIZE		EXP, N01	-
-	Setpoint value for buffer size between IPO and position control		DWORD	PowerOn
-				
-	- 2	2	35	3/2

Description: The machine data determines the size of the setpoint value buffer between interpolator and position control, and has a direct effect on the dynamic user memory requirement.

That is normally 2. If several NCUs are connected via NCU link for e.g. rotary indexing machines, the value should be set to 3 on all NCUs. This will balance the transmission rates of the setpoint values via the link.

In a master value application (e.g. line shaft), the value should be set to 4, but only on the NCU that generates the master value. For all the other NCUs, the preset value should be maintained at 2.

Note:

In control loops that are connected via interpolator, every increase of the value generates a further dead-time.

When the IPO cycles of the NCUs within an NCU group are set to different values, the link communication will only run in the slowest IPO cycle. The MD must be increased in the ratio of the NCU IPO cycle to the slowest IPO cycle in the NCU group, in order to achieve a synchronized output of the setpoint values on the drive interface. The formula for this is as follows:

MM_SERVO_FIFO_SIZE = 2 * IPO cycle ratio + 1

Example:

In an IPO cycle ratio of 4:1, the value on the fast NCU should be set to 9 instead of 3. On the slow NCU, the value must be set to 3.

18730	MM_MAXNUM_ALARM_ACTIONS		N02	-
-	Length of the alarm action list		DWORD	PowerOn
-				
-	- 500	100	2000	1/1

Description: Maximum number of alarm actions that are retained. This is the length of the alarm action list.

18780	MM_NCU_LINK_MASK			N01	B3
-	Activation of NCU-link communication			DWORD	PowerOn
-					
-	-	0	0	3	3/2

Description: Activating NCU link communication

Bit-coded activation data. That is the NCU link communication can be activated in various forms.

Bit-coded activation data:

Bit 0 = 0x1: Link communication is to be activated.

Bit 1 = 0x2: Different IPO and position-control cycles can be enabled.

(See description FAST_IPO_LINK)

Irrelevant for:

Systems without link modules

Related to:

IS_LOCAL_LINK_AXIS,

NCU_LINK_NO,

LINK_TERMINATION,

LINK_NUM_OF_MODULES,

LINK_BAUDRATE_SWITCH,

LINK_RETRY_CTR

18781	NCU_LINK_CONNECTIONS			N01	B3
-	Number of internal link connections			DWORD	PowerOn
LINK					
-	-	0	0	32	3/1

Description: Value = 0

The software calculates the internal link connnections itself.

Value > 0

Number of internal link connnections from each NCU to each other NCU.

These link connnections do not accommodate the non-cyclic messages.

Each of these connections can transfer 240 bytes of raw data.

Non-cyclic messages occur with alarms, container switches and link variablen.

18782	MM_LINK_NUM_OF_MODULES			N01, N02	B3
-	Number of NCU-link modules			DWORD	PowerOn
-					
-	-	2	2	16	3/2

Description: LINK_NUM_OF_MODULES defines how many link modules can participate in the link communication.

18788	MM_CC_STATION_CHAN_MASK			N01	-
-	Channel bit mask for allocating CC stations			DWORD	PowerOn
-					
-	MD_MAXNUM_CC_STATIONS	1,0,0	-	-	1/1

Description: Machine data for channel-specific creation of special additional software stations for compile cycles.

Enter a bit mask with the bits set for the channels, in which a compile cycle shall use the relevant station.

Meaning of the individual array elements:

$MN_MM_CC_STATION_CHAN_MASK[0]:

Creates a CC station at the end of the geometry preparation and prior to velocity planning in the preparation task. A compile cycle application can buffer the blocks there and manipulate their contents.

$MN_MM_CC_STATION_CHAN_MASK[1]:

Creates another CC-Station that is called directly after the first CC station (see above) and permits the internal block contents independently of this manipulation.

$MN_MM_CC_STATION_CHAN_MASK[2]:

Creates an additional CC station in the preparation task that is called directly prior to tool radius offset and allows manipulation of the internal block contents.

18790	MM_MAX_TRACE_LINK_POINTS			EXP, N02, N06	B3
-	Trace data buffer size for NCU-Link			DWORD	PowerOn
NBUP					
-	-	8	0	20000	2/2

Description: MM_MAX_TRACE_LINK_DATAPOINTS defines the size of an internal data buffer which contains the trace recordings for the NCU-link functionality.

The MD is only evaluated if bit 0 is set in MM_TRACE_LINK_DATA_FUNCTION BIT0.

Related to:

TRACE_SCOPE_MASK,
MM_TRACE_DATA_FUNCTION,
MM_MAX_TRACE_DATAPOINTS
TRACE_STARTTRACE_EVENT,
TRACE_STARTTRACE_STEP,
TRACE_STOPTRACE_EVENT,
TRACE_STOPTRACE_STEP,
TRACE_VARIABLE_NAME,
TRACE_VARIABLE_INDEX,
MM_TRACE_LINK_DATA_FUNCTION

18792	MM_TRACE_LINK_DATA_FUNCTION			EXP, N02, N06	B3
-	Specifies the contents of the NCU-link files			DWORD	PowerOn
NBUP					
-	-	0	0	0x7FFFFFFF	2/2

Description: The NCK sends and receives 32 buffers with a length of 240 bytes in each interpolation cycle.

These buffers are saved in an FIFO (first in-first out) memory of the length MM_MAX_TRACE_LINK_POINTS, and written to a file (ncsctr01.mpf for the 1st channel) if a "trigger event" occurs (e.g. Cancel Alarm button, see MD TRACE_STOPTRACE_EVENT and TRACE_STARTTRACE_EVENT).

The machine data should be interpreted as bit mask and has the following meaning:

BIT0 = 1

Enables the NCU-link trace file.

The others are only evaluated when this bit is set!

MD MM_MAX_TRACE_LINK_POINTS is only evaluated with this bit.

BIT1 = 1

The stored buffer contents are analyzed according to their meanings and stored in the file in plain text. This means that one can, for example, recognize the setpoint transfer by means of the text items "desVal", actual value transfer under the identifiers "actVal"....

BIT1 = 0

The buffers contents are displayed in HEX and not analyzed.

BIT2 = 1

Only those buffers are recorded that contain a sporadically occuring communication message(dynamic message) between the NCUs.

This include, for example, the following events:

- Set machine data
- Set link variables
- Alarms spanning NCUs
- Axis container rotation

18794	MM_TRACE_VDI_SIGNAL			EXP, N02, N06	-
-	Trace specification of VDI signals			DWORD	PowerOn
NBUP					
-	-	0	0	0x7FFFFFFF	2/2

Description: The NCK sends and receives PLC VDI signals. The Trace function stores the signals which have changed in each interpolation cycle in an FIFO memory (first in-first out) having a size of MM_MAX_TRACE_POINTS.

The FIFO is written to a file (for the 1st channel: ncsctr01.mpf) when a "trigger event" occurs (e.g. Cancel Alarm key, see MD TRACE_STOPTRACE_EVENT and TRACE_STARTTRACE_EVENT).

The machine data should be interpreted as bit mask. The corre-sponding VDI signals are recorded depending on which bit is set.

Bits 1.. 6 describe which axial VDI input signals are recorded in the trace

(see .. TRACE_DATA_FUNCTION).

18800	MM_EXTERN_LANGUAGE		N01, N12	FBFA
-	Activation of external NC languages		DWORD	PowerOn
-				
-	- 0x0000	0x0000	0x0001	7/2

Description: The corresponding NC language must be activated to execute part programs of other control manufacturers. Only one external NC language can be selected. The range of instructions which is made available in each case is to be taken from the current documentation.

Bit 0 (LSB):

Execution of part programs ISO_2 or ISO_3.

See $MN_MM_EXTERN_CNC_SYSTEM for coding.

18840	MM_EPSPARAM_DIMENSION		EXP, N01, N02	ePS Dokumentation
-	Dimension of ePS-specific variables $EPS_*		DWORD	PowerOn
-				
-	- 10	0	100	0/0

Description: Dimension of ePS-specific parameters $EPS_R[i], $EPS_I[i], $EPS_B[i], $EPS_A[i], $EPS_C[i], #EPS_S[i]; i = 0-Value of the machine data - 1. MD data value zero indicates that the functionality is not available.

18860	MM_MAINTENANCE_MON		EXP, N01	-
-	Activation of maintenance data recording		BOOLEAN	PowerOn
-				
-	- FALSE	-	-	7/2

Description: Maintenance data is recorded when this MD has the value TRUE.

The axial MD $MA_MAINTENANCE_DATA sets which data are to be recorded.

Details are to be found in the service documentation.

18870	MM_MAXNUM_KIN_CHAINS		EXP, N01	-
-	Max. number of kinematic chains		DWORD	PowerOn
-				
-	- 0	-	200	7/2

Description: Maximum number of kinematic chains in the system

18880	MM_MAXNUM_KIN_CHAIN_ELEM		EXP, N01	-
-	maximum number of elements in kinematic chains		DWORD	PowerOn
-				
-	- 0	-	1000	7/2

Description: Maximum number of links in kinematic chains. If this MD has the value 0 (default value) then no kinematic chains at all are possible.

18890	MM_MAXNUM_3D_PROT_AREAS		EXP, N01	-
-	Maximum number of 3D protection areas		DWORD	PowerOn
-				
-	- 0	0	200	7/2

Description: Maximum number of elements in protection zones. If this MD has the value 0 (default value) then no protection zones are possible.

18892	MM_MAXNUM_3D_PROT_AREA_ELEM			EXP, N01	-
-	Max. number of protection zone elements			DWORD	PowerOn
-					
-	-	0	0	1000	7/2

Description: Maximum number of protection zone elements. If this MD is 0 (default value), no protection zones are possible.

18893	MM_MAXNUM_3D_T_PROT_ELEM			EXP, N01	-
-	Max. number of tool protection area elements			DWORD	PowerOn
-					
-	-	0	0	MAXNUM_3D_T_PROT_ELEMENTS	7/2

Description: Maximum number of protection area elements for automatic creation of tool protection areas.

18894	MM_MAXNUM_3D_PROT_GROUPS			EXP, N01	-
-	Max. number of protection zone groups			DWORD	PowerOn
-					
-	-	0	0	100	7/2

Description: Maximum number of protection zone groups in the system

18895	MM_MAXNUM_3D_FACETS			EXP, N01	-
-	Max. number of protection area facets			DWORD	PowerOn
-					
-	-	0	0	MAXNUM_3D_FACETS	7/2

Description: Maximum number of Facets allowed for all protection areas.

Only applies when the MAXNUM_3D_PROT_AREAS is greater than zero.

18896	MM_MAXNUM_3D_COLLISION			EXP, N01	-
-	Max. number of the memory location for collision check			DWORD	PowerOn
-					
-	-	0	0	MAX_SIZE_3D_S_COLL_TREE_MD	7/2

Description: Maximum size of a temporary memory area (in Kbyte), which is required for the collision check of two protection zones.

If the contents of this machine data is 0, the required memory space is determined automatically from machine data $MN_MM_MAXNUM_3D_PROT_AREA_ELEM, $MN_MM_MAXNUM_3D_PROT_AREAS and $MN_MM_MAXNUM_3D_FACETS.

If the determined memory space is insufficient, it can be explicitely determined using this machine data.

18897	MM_MAXNUM_3D_INTRERFACE_IN			EXP, N01	-
-	Max. no. of interf. bits for pre-activation of protection zones			DWORD	PowerOn
-					
-	-	16	0	MAXNUM_3D_INTERFACEBITS_IN_MD	7/2

Description: Defines how many input bits are available on the VDI interface for pre-activation of 3D protection zones.

It will influence the size of the memory space required for each NC block.

If this machine data has value n, a memory size of approximately n * (n + 1) / 16 bytes will be required per block.

This machine data will be evaluated and will cause reservation of memory space, only if machine data $MN_MM_MAXNUM_3D_PROT_AREAS is inequal to 0.

18898	PROT_AREA_3D_TYPE_NAME_TAB			EXP, N12, N07	-
-	Table of names for protection zone types			STRING	PowerOn
-					
-	10	"BOX","SPHERE","CYLINDER","CONE"...	-	-	7/1

Description: Contains the names for the protection zone types. The meaning of the entry is determined by the postition in the list. A change of name does therefore not cause a change of function.

Meaning of entries:

1. Empty (no protection zone defined)
2. Cuboid
3. Sphere
4. Cylinder
5. Cone
6. Truncated cone
7. Square pyramid
8. Rectangular pyramid
9. Square truncated pyramid
10. Rectangular truncated pyramid

Example: If the third entry "SPHERE" is changed into "CUBOID", this new keyword "CUBOID" still designates a sphere.

A meaningful change would be, for example "SP".

18899	PROT_AREA_TOOL_MASK			EXP	-
-	Controls the creation of automatically created tool protection areas			DWORD	NEW CONF
-					
-	-	0	-	-	7/3

Description: Controls the way tool protection areas are automatically created with collision detection active.

This machine data is bit-coded.

Bit 0 (0x1) If no other data are available, create the tool protection area from the tool data (tool length and radius).

18900	FPU_ERROR_MODE		EXP	-
-	System reaction to FPU calculation error		DWORD	PowerOn
NBUP, NDLD				
-	- 0x1	-	-	0/0

Description: System response to floating point unit arithmetic errors

Bit 0 = 0: (LSB)

The response to an FPU arithmetic error takes place during a station change by the station controller polling the FPU status word. (For CPUs without exception handling)

Bit 0 = 1:

There is an immediate branch into an exception when an FPU arithmetic error occurs:

The address at which the arithmetic error occurred can be exactly localized in the alarm output

18910	FPU_CTRLWORD_INIT		EXP	-
-	Basic initialization of FPU control word		DWORD	PowerOn
NBUP, NDLD				
-	- 0x37F	-	-	0/0

Description: The basic initialization of the FPU control word enables the FPU mode of operation (e.g. rounding mode) to be changed.

Significance of the bit: see manual of the FPU used.

18920	FPU_EXEPTION_MASK		EXP	-
-	Exception mask for FPU calculation errors		DWORD	PowerOn
NBUP, NDLD				
-	- 0xD	-	-	0/0

Description: The exception mask for FPU calculation errors enables selection of the FPU error for which an exception was issued.

Significance of the bits for Intel 486:

Bit 0 (LSB):

invalid operation

Bit 1:

denormalized operand: | operand | < as the smallest 2nd power

Bit 2:

zero divide

Bit 3:

overflow: result is larger than the largest displayable number

Bit 4:

underflow: result is smaller than the smallest displayable number

Bit 5:
precision: result cannot be displayed exactly (e.g. 1/3)
Significance of the bits for Intel 960:
Bit 12:
integer overflow
Bit 24:
floating overflow
Bit 25:
floating underflow
Bit 26:
invalid operation
Bit 27:
zero divide
Bit 28:
floating inexact (precision): result cannot be displayed exactly
Bit 29:
denormalized operand

18930	COREFILE_NAME			EXP	-
-	Path for core file creation			STRING	PowerOn
-					
-	-		-	-	7/1

Description: File name with path name under which a core file is created in the case of a control crash.
The core file is used for problem analysis by NCK development.
A core file will be created, if a valid file name is entered in this MD.

18950	COLLISION_INIT			EXP, N01	-
-	Configuration of the free path lengths in collision avoidance.			DOUBLE	PowerOn
-					
-	5	4.0,2.5,0.5,0.950,0.250	0.001	-	0/0

Description: Configuration date of collision avoidance.

1.3.5 General configuration machine data

51000	DISP_RES_MM			-	-
-	Display resolution in mm			BYTE	Immediately
-					
-	-	3	0	6	7/3

Description: Display resolution in mm

51001	DISP_RES_MM_FEED_PER_REV			-	-
-	Display resolution in mm feedrate/rev			BYTE	Immediately
-					
-	-	3	0	6	7/3

Description: Display resolution in mm feedrate/rev

51002	DISP_RES_MM_FEED_PER_TIME		-	-
-	Display resolution in mm feedrate/min		BYTE	Immediately
-				
-	- 3	0	6	7/3

Description: Display resolution in mm feedrate/min

51003	DISP_RES_MM_FEED_PER_TOOTH		-	-
-	Display resolution in mm feedrate/tooth		BYTE	Immediately
-				
-	- 3	0	6	7/3

Description: Display resolution in mm feedrate/tooth

51004	DISP_RES_MM_CONST_CUT_RATE		-	-
-	Display resolution constant cutting speed m/min		BYTE	Immediately
-				
-	- 3	0	6	7/3

Description: Display resolution constant cutting speed m/min

51010	DISP_RES_INCH		-	-
-	Display resolution in inch		BYTE	Immediately
-				
-	- 4	0	6	7/3

Description: Display resolution in inch

51011	DISP_RES_INCH_FEED_P_REV		-	-
-	Display resolution in inch feedrate/rev		BYTE	Immediately
-				
-	- 4	0	6	7/3

Description: Display resolution in inch feedrate/rev

51012	DISP_RES_INCH_FEED_P_TIME		-	-
-	Display resolution in inch feedrate/min		BYTE	Immediately
-				
-	- 4	0	6	7/3

Description: Display resolution in inch feedrate/min

51013	DISP_RES_INCH_FEED_P_TOOTH		-	-
-	Display resolution in inch feedrate/tooth		BYTE	Immediately
-				
-	- 4	0	6	7/3

Description: Display resolution in inch feedrate/tooth

51014	DISP_RES_INCH_CUT_RATE		-	-
-	Display resolution constant cutting speed ft/min		BYTE	Immediately
-				
-	- 4	0	6	7/3

Description: Display resolution constant cutting speed ft/min

51020	DISP_RES_ANGLE		-	-
-	Display resolution of angle		BYTE	Immediately
-				
-	- 3	0	6	7/3

Description: Display resolution of angle

51021	DISP_RES_SPINDLE			-	-
-	Display resolution of spindles			BYTE	Immediately
-					
-	-	0	0	6	7/3

Description: Decimal places in speed entry field

51022	DISP_RES_ROT_AX_FEED			-	-
-	Display resolution of rotary axis feedrate			BYTE	Immediately
-					
-	-	0	0	6	7/3

Description: Display resolution of rotary axis feedrate

51025	FRAMES_ACT_IMMEDIATELY			-	-
-	Activate active offset immediately			BYTE	Immediately
-					
-	-	1	0	1	4/3

Description: Active data (frames) are activated immediately after change

51026	AXES_SHOW_GEO_FIRST			-	-
-	Actual value display with leading axes			BYTE	Immediately
-					
-	-	1	0	1	4/3

Description: When the machine data value is 1, the geometry axes of the channel are displayed first.

51027	ONLY_MKS_DIST_TO_GO			-	-
-	Distance-to-go display in work window			BYTE	Immediately
-					
-	-	0	0	1	4/3

Description: Distance-to-go display in work window

51028	BLOCK_SEARCH_MODE_MASK			-	-
-	Bit mask for available block search modes			BYTE	PowerOn
-					
-	-	51	-	-	4/3

Description: Bit mask for available block search modes

Bit 0:block search with calculation without approach

Bit 1:block search with calculation with approach

Bit 2:

Bit 3:

Bit 4:block search without calculation

Bit 5:

51029	MAX_SKP_LEVEL			-	-
-	Maximum number of skip levels in the NC program			BYTE	PowerOn
-					
-	-	1	1	10	4/3

Description: The machine data defines how many skip levels are made available for operation.

51030	SPIND_MAX_POWER			-	-
-	Maximum value of spindle power rating display			DWORD	PowerOn
-					
-	-	100	0	255	4/3

Description: Maximum value of spindle power rating displayed as a percentage

51031	SPIND_POWER_RANGE			-	-
-	Display range of spindle power rating display			DWORD	PowerOn
-					
-	-	100	0	255	4/3

Description: Utilization bar display range of spindle power rating displayed as a percentage

51032	STAT_DISPLAY_BASE			-	-
-	Number basis for display of articulated joint STAT			BYTE	Immediately
-					
-	-	2	0	16	4/3

Description: Number basis for display of articulated joint STAT

00: no display

02: binary value display

10: decimal value display

16: hexadecimal value display

51033	TU_DISPLAY_BASE			-	-
-	Number basis for display of rotary axis position TU			BYTE	Immediately
-					
-	-	2	0	16	4/3

Description: Number basis for display of rotary axis position TU

00: no display

02: binary value display

10: decimal value display

16: hexadecimal value display

51034	TEACH_MODE			-	-
-	Teach mode to be activated			BYTE	PowerOn
-					
-	-	1	-	-	4/3

Description: Teach mode to be activated

Bit 0: default teach-in

Taught-in block is transferred to the program using the Accept softkey.

Bit 1: acceptance of teach block can be blocked by the PLC.

DB19.DBX13.0 = 0 block is accepted.

DB19.DBX13.0 = 1 block is not accepted.

Bit 2: block selection only explicitely

Bit 16-31 reserved for OEM.

51035	WRITE_FRAMES_FINE_LIMIT			-	-
-	Input limit for all WO fine			DOUBLE	PowerOn
-					
-	-	0.999	-	-	4/3

Description: Input limit for all work offsets fine

51036	ENABLE_COORDINATE_REL		-	-
-	Enable REL coordinate system		BYTE	Immediately
-				
-	- 0	0	1	7/3

Description: Display REL coordinate system

0 = no relative coordinate system selectable

1 = REL coordinate system can be selected as an alternative of the WCS/SZS coordinate system

51037	ENABLE_COORDINATE_ACS		-	-
-	Enable settable coordinate system		BYTE	Immediately
-				
-	- 0	0	1	7/3

Description: Activate settable coordinate system

0 = WCS coordinate system is displayed

1 = SZS coordinate system is displayed

(SZS is WCS reduced by the offset components defined in MD24030)

51038	SET_ACT_VALUE		-	-
-	Set actual value selection		BYTE	Immediately
-				
-	- 1	0	1	7/3

Description: Set actual value selection

0 = Set actual value is not offered.

1 = if a user frame (settable work offset e.g. G54) is active, it will be used. In G500 Set actual values is not offered (system frame is no longer used).

51039	PROGRAM_CONTROL_MODE_MASK		-	-
-	Options for machine - program influence		DWORD	Immediately
-				
-	- 1	-	-	7/3

Description: Options for machine - program influence:

Bit 0: program test function available

51040	SWITCH_TO_MACH_BY_SELECT		-	-
-	Operating area switchover after program selection		BYTE	Immediately
-				
-	- 1	0	1	7/3

Description: With the machine data set to 1 the program jumps to the machine area after successful selection.

51041	ENABLE_PROGLIST_USER		-	-
-	Activation of PLC program list, USER area		BYTE	Reset
-				
-	- 0	0	1	7/3

Description: Activates the PLC program list of the USER area. The programs entered there can be selected by the PLC for processing.

51042	ENABLE_PROGLIST_INDIVIDUAL		-	-
-	Activation of PLC program list, INDIVIDUAL area		BYTE	Reset
-				
-	- 0	0	1	7/3

Description: Activates the PLC program list of the INDIVIDUAL area. The programs entered here can be selected by the PLC for processing.

51043	ENABLE_PROGLIST_MANUFACT		-	-
-	Activation of PLC program list, MANUFACTURER area		BYTE	Reset
-				
-	- 0	0	1	7/3

Description: Activates the PLC program list of the MANUFACTURER area. The programs entered here can be selected by the PLC for processing.

1.3.6 General cycle machine data

51600	MEA_CAL_WP_NUM		-	-
-	Number of calibration data fields for workpiece probes		BYTE	Immediately
-				
-	- 99	0	99	7/3

Description: The workpiece probe calibration data refer to the workpiece coordinate system (WCS) !

In the data fields, the workpiece probe calibration data of the technologies Milling and

Turning are stored!

51601	MEA_CAL_EDGE_NUM		-	-
-	Number of geometry data fields of gauging block, workpiece probe		BYTE	Immediately
-				
-	- 12	0	99	7/3

Description: The gauging block is exclusively used to calibrate the workpiece probe of the Turning technology!

51602	MEA_CAL_TP_NUM		-	-
-	Number of calibration data fields for tool probes		BYTE	Immediately
-				
-	- 12	0	99	7/3

Description: The geometry data and calibration data of the tool probe refer to the machine coordinate system (MCS)!

51603	MEA_CAL_TPW_NUM		-	-
-	Number of calibration data fields for tool probes		BYTE	Immediately
-				
-	- 12	0	99	7/3

Description: The geometry data and calibration data of the tool probe refer to the workpiece coordinate system (WCS)!

51610	MEA_TOOLCARR_ENABLE			-	-
-	Support of orientable toolholders			BYTE	Immediately
-					
-	-	0	0	1	7/3

Description: Support of orientable toolholders

0: no support of orientable toolholders.

1: support of a probe or tool positioned using an orientable toolholder (kinematics type "T") with reference to the special toolholder positions 0°, 90°, 180° and 270°.

51612	MEA_MONO_COR_POS_ACTIVE			-	-
-	Monoprobe orientation offset			BYTE	Immediately
-					
-	-	1	0	1	7/3

Description: Monoprobe position offset

0: no offset

1: if the workpiece probe is a monoprobe, the orientation of its switching direction (spindle position) is offset by the angle value in _CORA.

51614	MEA_PROBE_LENGTH_RELATE			-	-
-	Length reference of the workpiece probe, measurement technology milling			BYTE	Immediately
-					
-	-	0	0	1	7/3

Description: Length reference of the workpiece probe, measurement technology milling

0: tool length L1, referring to the center of the probe sphere

1: tool length L1, referring to the sphere volume of the probe sphere

51616	MEA_CAL_MONITORING			-	-
-	Calibration status monitoring, for measuring in automatic mode			BYTE	Immediately
-					
-	-	1	0	1	7/3

Description: Activation of calibration status monitoring for measuring in automatic mode

0: Calibration monitoring inactive

1: Calibration monitoring active

Between calibration and measuring the status of the following states is monitored:

- Working plane (G17, 18, 19)
- Probe type (monoprobe, multiprobe)
- Length reference of the probe (center point of the probe sphere, probe sphere volume)
- Programmed probe speed

For "Measure in JOG" these monitoring modes are always active and cannot be deactivated.

51618	MEA_CM_ROT_AX_POS_TOL			-	-
degrees	Tolerance of the rotary axis positions			DOUBLE	Immediately
-					
-	-	0.5	0	5	7/3

Description: Entries in parameter $MN_MEA_CM_ROT_AX_POS_TOL are effective only if $MN_MEA_TOOLCARR_ENABLE=1

The real angle position of the rotary axes can deviate from the programmed one (exact stop fine window).

This deviation depends on the position control features of the axis. The maximum deviation expected on the concrete axis

must be entered in this parameter. When the tolerance is exceeded, alarm 61442 "Toolholder not in parallel with the geometry axes" is displayed.

51750	J_MEA_M_DIST			-	-
mm	Measuring path for measuring with ShopMill, in automatic mode			DOUBLE	Immediately
-					
-	-	5	-10000	10000	7/3

Description: This parameter defines the measuring path in front of and behind the measuring setpoint.

51751	J_MEA_M_DIST_MANUELL			-	-
mm	Measuring path, for "Measure in JOG"			DOUBLE	Immediately
-					
-	-	10	-10000	10000	7/3

Description: This parameter defines the measuring path in front of and behind the measuring setpoint.

51752	J_MEA_M_DIST_TOOL_LENGTH			-	-
mm	Measuring path for tool length measuring, for "Measure in JOG"			DOUBLE	Immediately
-					
-	-	2	-10000	10000	7/3

Description: This parameter defines the measuring path in front of and behind the measuring setpoint.

51753	J_MEA_M_DIST_TOOL_RADIUS			-	-
mm	Measuring path for tool radius measuring, for "Measure in JOG"			DOUBLE	Immediately
-					
-	-	1	-10000	10000	7/3

Description: This parameter defines the measuring path in front of and behind the measuring setpoint.

51755	J_MEA_MEASURING_FEED			-	-
mm/min	Measuring feed for workpiece measurement and calibr., for "Measure in JOG"			DOUBLE	Immediately
-					
-	-	300	0	100000	7/3

Description: Measuring feed for workpiece measurem. and calibration of the workpiece probe, for "Measure in JOG"

51757	J_MEA_COLL_MONIT_FEED			-	-
mm/min	Feedrate in the plane w. active collision detection, for "Measure in JOG"			DOUBLE	Immediately
-					
-	-	1000	0	100000	7/3

Description: Feedrate in the working plane w. active collision detection

51758	J_MEA_COLL_MONIT_POS_FEED			-	-
mm/min	Infeed rate with active collision detection, for "Measure in JOG"			DOUBLE	Immediately
-					
-	-	1000	0	100000	7/3

Description: Feedrate of the infeed axis with active collision detection, for "Measure in JOG".

51770	J_MEA_CAL_RING_DIAM			-	-
mm	Calibration ring diameter, for "Measure in JOG"			DOUBLE	Immediately
-					
-	3	0,0,0	0	10000	7/3

Description: Calibration ring diameter, for probe sphere calibration in the plane, for "Measure in JOG"

51772	J_MEA_CAL_HEIGHT_FEEDAX			-	-
mm	Calibration height in the infeed axis, for probe length calibration			DOUBLE	Immediately
-					
-	3	0,0,0	-100000	100000	7/3

Description: Calibration height in the infeed axis for probe length calibration, for "Measure in JOG"

The calibration height must be entered with reference to the the workpiece coordinate system (WCS)!

51774	J_MEA_T_PROBE_TYPE			-	-
-	Geometry of the tool probe type "cube", for "Measure in JOG"			BYTE	Immediately
-					
-	3	0,0,0	0	-	7/3

Description: For the "cube" tool probe type, the three-dimensional geometric dimensions of the cube probe are entered in the three field elements of this parameter.

Cube-shaped probes are mainly used for turning tool measuring.

51776	J_MEA_T_PROBE_ALLOW_AX_DIR			-	-
-	Axis directions for tool probe calibration, for "Measure in JOG"			DWORD	Immediately
-					
-	3	133,133,133	0	999	7/3

Description:

Permissible axis directions during tool probe calibration for milling tool measuring, for "Measure in JOG"

In the default setting, X and Y correspond to the plus and minus direction, Z only to the minus direction.

The parameter is divided into three elements the functions of which must be assigned to calibration data records 1, 2 and 3!

The calibration data records are assigned to tool measuring in working planes G17 (1), G18 (2) and G19 (3)!

Meaning of the parameter elements

Decimal position:

Ones: 1st geometry axis (X)

Tens: 2nd geometry axis (Y)

Hundreds: 3rd geometry axis (Z)

Value:

= 0: axis not possible

= 1: only minus direction possible

= 2: only plus direction possible

= 3: both directions possible

51778	J_MEA_T_PROBE_DIAM_LENGTH			-	-
mm	Diameter of the tool probe for length measurement, for "Measure in JOG"			DOUBLE	Immediately
-					
-	3	0,0,0	0	10000	7/3

Description: Effective grinding wheel diameter of the tool probe for length measurement on milling tools, for "Measure in JOG"

51780	J_MEA_T_PROBE_DIAM_RAD			-	-
mm	Diameter of the tool probe for radius measurement, for "Measure in JOG"			DOUBLE	Immediately
-					
-	3	0,0,0	0	10000	7/3

Description: Effective grinding wheel diameter of the tool probe for radius measurement on milling tools, for "Measure in JOG"

51782	J_MEA_T_PROBE_T_EDGE_DIST			-	-
mm	Distance between tool probe and tool, for "Measure in JOG"			DOUBLE	Immediately
-					
-	3	2,2,2	-10000	10000	7/3

Description: Distance between the upper edge of the tool probe and the lower edge of the tool for radius measurement on milling tools, for "Measure in JOG"

51784	J_MEA_T_PROBE_APPR_AX_DIR			-	-
-	Approach direction in the plane on the tool probe, for "Measure in JOG"			DWORD	Immediately
-					
-	3	-1,-1,-1	-	-	7/3

Description: Approach direction in the plane on the tool probe, for "Measure in JOG"

= 0 positive direction

= -1 negative direction

51786	J_MEA_T_PROBE_MEASURE_DIST			-	-
mm	Measur. path for tool measurem. w. stationary spindle, for "Measure in JOG"			DOUBLE	Immediately
-					
-	-	10	-10000	10000	7/3

Description: Measuring path for tool probe calibration and tool measuring with stationary spindle, in front of and behind the expected switching position.

51787	J_MEA_T_PROBE_MEASURE_FEED			-	-
mm/min	Measur. feed tool measuring with stationary spindle, for "Measure in JOG"			DOUBLE	Immediately
-					
-	-	100	0	100000	7/3

Description: Measuring feed for tool probe calibration and tool measuring with stationary spindle, for "Measure in JOG".

1.4 Channel-specific machine data

Number	Identifier			Display filters	Reference
Unit	Name			Data type	Active
Attributes					
System	Dimension	Default value	Minimum value	Maximum value	Protection

Description: Description

1.4.1 Basic channel machine data

20000	CHAN_NAME			C01, C10	K1
-	Channel name			STRING	PowerOn
-					
-	-	"CHAN1","CHAN2","CHAN3","CHAN4"...	-	-	7/2

Description: The channel name can be defined in this MD. The channel name is only used for the display on the HMI.

20050	AXCONF_GEOAX_ASSIGN_TAB			C01, C10	K2
-	Assignment of geometry axis to channel axis			BYTE	PowerOn
-					
-	3	1, 2, 3,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/2

Description: This MD is used to specify which channel axis the geometry axis is assiged to. The assignment must be made channel-specifically for all geometry axes. If a geometry axis is not assigned to a channel axis, this geometry axis is not existing and cannot be programmed (with the name defined under AXCONF_GEOAX_NAME_TAB).

For example: Turning machine without transformation:

$MC_AXCONF_GEOAX_ASSIGN_TAB[0] = 1 ; 1st geometry axis = 1st channel axis

$MC_AXCONF_GEOAX_ASSIGN_TAB[1] = 0 ; 2nd geometry axis not defined

$MC_AXCONF_GEOAX_ASSIGN_TAB[2] = 2 ; 3rd geometry axis = 2nd channel axis

The assignment made here is valid if no transformation is active. With active transformation n, the transformation-specific assignment table TRAFO_GEOAX_ASSIGN_TAB_n becomes active.

20060	AXCONF_GEOAX_NAME_TAB		C01, C11, C10	K2	
-	Geometry axis name in channel		STRING	PowerOn	
-					
-	3	"X", "Y", "Z","X", "Y", "Z"...	-	-	7/2

Description: This MD is used to enter the names of the geometry axes for the channel separately. Geometry axes can be programmed in the part program using the names specified here.

Special cases:

- The specified geometry axis name must not conflict with the designation and assignment of the machine and channel axis names.
- The entered machine axis name must not be the same as the names entered for Euler angles (MD 10620: EULER_ANGLE_NAME_TAB), names specified for directional vectors (MD 10640: DIR_VECTOR_NAME_TAB), names given to intermediate point coordinates in the case of CIP (MD 10660: INTERMEDIATE_POINT_NAME_TAB) and the names of interpolation parameters (MD 10650: IPO_PARAM_NAME_TAB).
- The geometry axis name must not include any of the following reserved address letters:

  - D Tool offset (D function) - E Reserved

  - F Feedrate (F function) - G Preparatory function

  - H Auxiliary function (H function) - L Subroutine call

  - M Miscellaneous function (M function) - N Subblock

  - P Subroutine number of passes - R Arithmetic parameters

  - S Spindle speed (S function) - T Tool (T function)
- The name must not include any keywords (e.g. DEF, SPOS etc.) or pre-defined designations (e.g. ASPLINE, SOFT).
- The use of axis designations consisting of a valid address letter (A, B, C, I, J, K, Q, U, V, W, X, Y, Z), followed by an optional numerical extension (1-99) gives slightly better block cycle times than a general designation.
- Identical names may be given to geometry axes assigned to different channels.

Related to:

MD 10000: AXCONF_MACHAX_NAME_TAB

(machine axis name [axis no.])

MD 20080: AXCONF_CHANAX_NAME_TAB

(channel axis name in the channel [channel axis no.])

20070	AXCONF_MACHAX_USED			C01, C10	K2
-	Machine axis number valid in channel			BYTE	PowerOn
-					
-	20	1, 2, 3, 4, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	31	7/2
710-6a2c	-	1, 2, 3, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-	-	-/-
720-6a2c	-	1, 2, 3, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-	-	-/-
730-6a2c	-	1, 2, 3, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-	-	-/-
840disl-6a	-	1, 2, 3, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-	-	-/-

Description: This MD is used to specify the machine axis which the channel axis/special axis is assigned to. Each channel axis has to be assigned to a specific channel. A machine axis that is not assigned to a channel is not active, i.e. the axis control is not computed, the axis is not shown on the screen and it cannot be programmed in any channel.

From software version 5, it is permissible not to assign a machine axis to a channel axis for reasons of uniform configuration. The MD for the machine axis is set to 0 in this case. At the same time, MD 11640: ENABLE_CHAN_AX_GAP must be set to 1 (channel axis gaps are permitted).

From software version 5, the machine data MD 20070: AXCONF_MACHAX_USED does not directly refer to the machine axes created with MD 10000: AXCONF_MACHAX_NAME_TAB, but to the logical machine axis map which is defined with MD 10002: AXCONF_LOGIC_MACHAX_TAB.

MD 10002: AXCONF_LOGIC_MACHAX_TAB refers:

- directly to a local machine axis on the NCU,
- to a machine axis of another NCU in the NCU grouping or
- indirectly to an axis container with local or remote machine axes.

If the default values AX1, AX2, ..., AX31 are entered with MD 10002: AXCONF_LOGIC_MACHAX_TAB, then the NCK behaves in the same way as up to software version 4, this means that machine data MD 20070: AXCONF_MACHAX_USED refers to the corresponding local machine axis.

Special cases:

- Each geometry axis must be assigned to a channel axis and a machine axis so that it can be programmed.
- If a machine axis is assigned to several channels by means of AXCONF_MACHAX_USED, then the number of the channel from which the axis must be programmed must be entered in MD 30550: AXCONF_ASSIGN_MASTER_CHAN.
- Up to software version 4, the list of entries must not contain any gaps (from software version 5 see above). In contrast, the machine axes used may contain gaps.

For example:

Permissible:

```
AXCONF_MACHAX_USED [0] = 3; 3rd MA is 1st axis in channel
AXCONF_MACHAX_USED [1] = 1; 1st MA is 2nd axis in channel
AXCONF_MACHAX_USED [2] = 5; 5th MA is 3rd axis in channel
```

```
   AXCONF_MACHAX_USED [3] = 0
Error for software version 4, permissible for version 5:
   AXCONF_MACHAX_USED [0] = 1; 1st MA is 1st axis in channel
   AXCONF_MACHAX_USED [1] = 2; 2nd MA is 2nd axis in channel
   AXCONF_MACHAX_USED [2] = 0; gap in the list ...
   AXCONF_MACHAX_USED [3] = 3; ... of the channel axes
Axis identifiers must be defined in the corresponding list places
of AXCONF_CHANAX_NAME_TAB for axes activated in the channel.
Related to:
   MD 30550: AXCONF_ASSIGN_MASTER_CHAN
   (Initial setting of the channel for axis change)
   MD 20080: AXCONF_CHANAX_NAME_TAB
   (Channel axis name in the channel [channel axis number])
   MD 10002: AXCONF_LOGIC_MACHAX_TAB
   MD 11649: ENABLE_CHAN_AX_GAP
Reference:
   Description of Functions B3.
```

20080	AXCONF_CHANAX_NAME_TAB			C01, C11, C10	K2
-	Channel axis name in channel			STRING	PowerOn
-					
-	20	"X", "Y", "Z", "A", "B", "C", "U", "V", "X11", "Y11"...	-	-	7/2

Description: This MD is used to set the name of the channel axis/special axis. The first three channel axes are normally occupied by the three assigned geometry axes (see also MD 20050: AXCONF_GEOAX_ASSIGN_TAB). The remaining channel axes are also designated as special axes. The channel axis/special axis is always displayed on the screen in the WCS (workpiece coordinate system) with the name set in this MD.

Special cases:

- The specified channel axis name/special axis name must not conflict with the designation and assignment of the machine and geometry axis names.
- The specified channel axis name must not be the same as the names entered for Euler angles (MD 10620: EULER_ANGLE_NAME_TAB), names specified for directional vectors (MD 10640: DIR_VECTOR_NAME_TAB), names given to intermediate point coordinates in the case of CIP (MD 10660: INTERMEDIATE_POINT_NAME_TAB) and the names of interpolation parameters (MD 10650: IPO_PARAM_NAME_TAB).
- The channel axis name entered must not include any of the following reserved address letters:

  - D Tool offset (D function) - E Reserved
  - F Feedrate (F function) - G Preparatory function
  - H Auxiliary function (H function) - L Subroutine call
  - M Miscellaneous function (M function) - N Subblock
  - P Subroutine number of passes - R Arithmetic parameters
  - S Spindle speed (S function) - T Tool (T function)

- The name must not include any keywords (e.g. DEF, SPOS etc.) or pre-defined identifiers (e.g. ASPLINE, SOFT).
- The use of axis identifiers consisting of a valid address letter (A, B, C, I, J, K, Q, U, V, W, X, Y, Z), followed by an optional numerical extension (1-99) gives slightly better block cycle times than a general identifier.
- No special names need be entered in this MD for channel axes to which geometry axes are assigned (normally the first three channel axes) .

Axis identifiers that are not allowed are rejected with an alarm during runup.

20082	AXCONF_CHANAX_DEFAULT_NAME			C01, C11, C10	-
-	Default axis name for axis variables in the channel			STRING	PowerOn
-					
-	-		-	-	7/2

Description: Variables or parameters of type Axis which have not been initialized are initialized with a default axis identifier. The identifier can be configured via the machine data $MC_AXCONF_CHANAX_DEFAULT_NAME. If this machine data is set with an empty string, the 1st geometry axis is used, as previously.

$MC_AXCONF_CHANAX_DEFAULT_NAME can be set by default with all available, valid axis identifiers. The value of this machine data should generally always correspond to a value of $MC_AXCONF_GEOAX_NAME_TAB, $MC_AXCONF_CHANAX_NAME_TAB or $MN_AXCONF_MACHAX_NAME_TAB.

If an invalid axis name is entered as a value or if this name has been changed, for example, in $MC_AXCONF_CHANAX_NAME_TAB but not in $MC_AXCONF_CHANAX_DEFAULT_NAME, this is indicated with alarm 4041 channel %1 block %2 axis identifier %3 is invalid".

For $MC_AXCONF_CHANAX_DEFAULT_NAME, only valid axis identifiers, empty string, and "NO_AXIS" are allowed. "NO_AXIS" is used for recognition of a non-initialized axis variable, empty string means previous behavior, i.e. each variable is initialized with the 1st geometry axis.

20090	SPIND_DEF_MASTER_SPIND			C01, C03	S1
-	Initial setting of master spindle in channel			BYTE	PowerOn
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	1	20	7/2

Description: Each channel must have a master spindle for the following functions:

- G95 Revolutional feedrate
- G96 /G961 S1 --> Spindle 1 constant cutting speed in m/min (SINUMERIK FM-NC only)
- G97 /G971 Cancel G96/G961 and freeze last spindle speed
- G63 Tapping with compensating chuck
- G33 Thread cutting
- G34 Thread lead increase (progress. speed change)
- G35 Thread lead increase (degress. speed change)
- G331/G332 Rigid tapping
- G4 S1 --> Spindle 1 dwell time in spindle revolutions

The master spindle can also be programmed with the program commands M3, M4, M5, S, SPOS, WAITS, SPOSA, M19, M40, M41 to M45 without specifying the spindle number.

The spindle number of the channel's master spindle is entered in MD 20090: SPIND_DEF_MASTER_SPIND. The initial setting of the master spindle applies until a new master spindle is defined with the SETMS program command. The SETMS setting is deleted with NC start. Following an M02/M30 and new NC start, the spindle defined in SPIND_DEF_MASTER_SPIND is always the master spindle.

20092	SPIND_ASSIGN_TAB_ENABLE			C01, C03, C10	S1
-	Enable/disable the spindle converter.			BYTE	Reset
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/7

Description:

Value 0:

The spindle converter function is deactivated. The contents of SD 42800: SPIND_ASSIGN_TAB[..] are not evaluated.

Value 1:

The spindle converter is activated. Conversion from logical to physical spindle takes place. For more information, see SD 42800: SPIND_ASSIGN_TAB.

Note:

The spindle converter is deactivated after "Delete SRAM" (star-tup switch to position "1").

Related to:

SD 42800: SPIND_ASSSIGN_TAB

20094	SPIND_RIGID_TAPPING_M_NR			C01, C03, C10	FBFA
-	M function for switching into controlled axis mode			DWORD	PowerOn
-					
-	-	70,70,70,70,70,70,70,70,70,70,70,70,70...	-	-	7/2

Description:

This machine data defines the M auxiliary function number with which the spindle is switched over to the axis mode.

The M number defined in the machine data replaces M70 in the Siemens language mode.

Note:

On the VDI interface, M70 with the corresponding address extension is always output as an identifier for the switchover to the axis mode.

Restrictions: Refer to machine data 10715: $MN_M_NO_FCT_CYCLE

Related to:

$MN_M_NO_FCT_EOP,

$MN_M_NO_FCT_CYCLE,

$MC_SPIND_RIGID_TAPPING_M_NR,

$MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

$MN_EXTERN_M_NO_MAC_CYCLE,

$MN_EXTERN_M_NO_SET_INT

$MN_EXTERN_M_NO_DISABLE_INT,

$MN_EXTERN_CHAN_SYNC_M_NO_MIN,

$MN_EXTERN_CHAN_SYNC_M_NO_MAX

$MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

$MC_NIBBLE_PUNCH_CODE

20095	EXTERN_RIGID_TAPPING_M_NR			C01, C11, C03, C10	FBFA
-	M function for switching to controlled axis mode(external mode)			DWORD	PowerOn
-					
-	-	29,29,29,29,29,29,29,29,29,29,29,29,29...	-	-	7/2

Description: This machine data defines the M function number, with which switchover to controlled spindle/axis mode is to be carried out.

The M number defined in the machine data replaces M29 in external language mode.

Pre-defined M numbers such as M00,M1,M2,M3, etc. are not allowed as M number.

Restrictions: See machine data 10715 $MN_M_NO_FCT_CYCLE

Related to:

$MN_M_NO_FCT_EOP,

$MN_M_NO_FCT_CYCLE,

$MC_SPIND_RIGID_TAPPING_M_NR,

$MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

$MN_EXTERN_M_NO_MAC_CYCLE,

$MN_EXTERN_M_NO_SET_INT

$MN_EXTERN_M_NO_DISABLE_INT,

$MN_EXTERN_CHAN_SYNC_M_NO_MIN,

$MN_EXTERN_CHAN_SYNC_M_NO_MAX

$MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

$MC_NIBBLE_PUNCH_CODE

20096	T_M_ADDRESS_EXT_IS_SPINO			C01, C04, C09	W1,FBW
-	Meaning of address extension at T, M tool change			BOOLEAN	PowerOn
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: This MD is only significant if the functions 'Tool management'/ 'flat D numbers' are inactive.

FALSE

The contents of the address extension of the NC addresses T and M 'tool change command number' are not evaluated by the NCK. The PLC decides on the significance of the programmed extension.

TRUE

The address extension of the NC addresses T and M 'tool change command number' - 'tool change command number'=TOOL_CHANGE_M_CODE with 6 as the default value - are interpreted as the spindle number.

NCK treats the extension in the same way as the active functions 'tool management', and 'flat D number management'.

That is, the programmed D number always refers to the T number of the programmed main spindle number.

See also:

$MC_SPIND_DEF_MASTER_SPIND,

$MC_TOOL_CHANGE_MODE,

$MC_TOOL_CHANGE_M_CODE

20098	DISPLAY_AXIS			EXP, C01	IAD
-	Display axis on HMI			DWORD	Immediately
-					
-	20	0xFFFFFFFF, 0xFFFFFFFF, 0xFFFFFFFF, 0xFFFFFFFF, 0xFFFFFFFF...	-	-	7/2

Description: Identification whether the axis is to be displayed by the HMI as a machine, geometry or auxiliary axis.

This data is only evaluated by the HMI.

Bit 0 to 15: MCS

Bit 0= 1 Display machine axis in the actual-value windows
0 Hide machine axis in the actual-value windows

Bit 1= 1 Display machine axis in the reference-point windows
0 Hide machine axis in the reference-point windows

Bit 2=1 Display machine axis in the present/basic offset/scratch window
0 Hide machine axis in the present/basic offset/ scratch window

Bit 3= 1 Display machine axis in the handwheel selection window
0 Hide machine axis in the handwheel selection window

Bit 16 to 31: WCS

Bit 16= 1 Display geometry axis in the actual-value window
0 Hide geometry axis in the actual-value window

(Bit 17) not assigned

Bit 18= 1 Display geometry axis in the basic offset window
0 Hide geometry axis in the basic offset window

Bit 19= 1 Display geometry axis in the handwheel selection window
0 Hide geometry axis in the handwheel selection window

20100	DIAMETER_AX_DEF			C01, C10	P1
-	Geometry axis with transverse axis function			STRING	PowerOn
-					
-	-		-	-	7/2

Description: This MD is used to determine a geometry axis as a transverse axis. Only one transverse axis can be defined here for each channel.

Further transverse axes for axis-specific diameter programming can be activated via MD30460, bit 2.

The axis identifier of an active geometry axis that has been defined via channel-specific MD 20050: AXCONF_GEOAX_ASSIGN_TAB[n] or MD 24120: TRAFO_AX_GEOAX_ASSIGN_TAB_1[n] (from SW 4) and MD 20060: AXCONF_GEOAX_NAME_TAB[n] must be specified.

If space characters are entered or if an axis identifier is specified for an axis which is not defined as a geometry axis, this leads to the following alarms:

- during runup, to alarm 4032 "Channel %1 wrong identifier for transverse axis in %2, if the "Diameter programming" function (DIAMON) or constant cutting velocity G96/G961/G962 is the switch-on setting.
- when the "Diameter programming (DIAMON)" function is activated, to alarm 16510 "Channel %1 block %2 No transverse axis available for diameter programming", if no axis has been permitted via DIAMCHANA[AX] for channel-specific diameter programming.
- when G96/G961/G962 has been programmed, to alarm 10870 "Channel %1 block %2 No transverse axis defined as reference axis for G96/G961/G962", if no geometry axis has been defined via the instruction SCC[ax] as reference axis for G96/G961/G962.

Related to:

MD 20050: AXCONF_GEOAX_ASSIGN_TAB[n]

(assignment of geometry axis to channel axis)

MD 20060: AXCONF_GEOAX_NAME_TAB[n]

(geometry axis name in the channel)

MD 24120: TRAFO_AX_GEOAX_ASSIGN_TAB_1[n]

(assignment of GEO axis to channel axis for transformation 1)

MD 30460: BASE_FUNCION_MASK

(Bit2 == 1: Axis-specific diameter programming)

20106	PROG_EVENT_IGN_SINGLEBLOCK			N01	-
-	Prog-Events ignore single block			DWORD	PowerOn
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x1F	7/2

Description: Event-controlled programm calls (Prog-Events) can be set regarding their single block behavior.

Bit 0 = 1 :

Prog-Event after part program start causes block change without restart

Bit 1 = 1 :

Prog-Event after part program end causes block change without restart

Bit 2 = 1 :

Prog-Event after OP reset causes block change without restart

Bit 3 = 1 :

Prog-Event after runup causes block change without restart

Bit 4 = 1 :

Prog-Event after 1st start after search run causes block change without restart

20107	PROG_EVENT_IGN_INHIBIT			N01	-
-	Prog-Events ignore read-in disable			DWORD	PowerOn
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x1F	7/2

Description: Event-controlled programm calls (Prog-Events) can be set regarding their read-in disable behavior.

Bit 0 = 1 :

Prog-Event after part program start causes block change despite read-in disable

Bit 1 = 1 :

Prog-Event after part program end causes block change despite read-in disable

Bit 2 = 1 :

Prog-Event after OP reset causes block change despite read-in disable

Bit 3 = 1 :

Prog-Event after runup causes block change despite read-in dis-able

Bit 4 = 1 :

Prog-Event after 1st start after search run causes block change despite read-in disable

20108	PROG_EVENT_MASK			N01, -	K1
-	Setting of event-driven programm calls			DWORD	PowerOn
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xF	7/2

Description: Parameterization of the events, at which the user program set with $MN_PROG_EVENT_NAME (default: _N_PROG_EVENT_SPF) is called implicitly:

Bit 0 = 1 : Part program start

Bit 1 = 1 : Part program end

Bit 2 = 1 : Operator panel reset

Bit 3 = 1 : Runup

The user program is called via the following search path:

1. /_N_CUS_DIR/_N_PROG_EVENT_SPF
2. /_N_CMA_DIR/_N_PROG_EVENT_SPF
3. /_N_CST_DIR/_N_PROG_EVENT_SPF

20109	PROG_EVENT_MASK_PROPERTIES			N01	K1
-	Properties of Prog-Events			DWORD	PowerOn
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x1	7/2

Description: Parameterization of additional properties of the event-controlled program calls (in short, Prog-Event), that is, the MD $MC_PROG_EVENT_MASK is further parameterized.

Bit 0 = 1 :

An ASUB started from channel status RESET does not result in a Prog-Event.

20110	RESET_MODE_MASK			C11, C03	K1
-	Definition of basic control settings after reset/PP end			DWORD	Reset
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x7FFFF	7/2
710-6a2c	-	0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1...	-	-	-/-
710-31a10c	-	0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1...	-	-	-/-
720-6a2c	-	0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1...	-	-	-/-
720-31a10c	-	0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1...	-	-	-/-
730-6a2c	-	0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1...	-	-	-/-
730-31a10c	-	0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1...	-	-	-/-
840disl-6a	-	0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1...	-	-	-/-
840disl-20a	-	0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1...	-	-	-/-

Description: Definition of the initial setting of the control after runup and on reset / end-of-part-program with regard to the G codes (in particular the active plane and the settable zero offset), tool length compensation and transformation by setting the following bits:

```
Bit  Hex.Meaning
   value
 0:  0x1Reset mode
 1:  0x2Suppress aux. funct. output on tool selection
 2:  0x4Select reset response after POWER ON (e.g. tool offset)
 3:  0x8Relevant only without active tool management:
        Select reset response after end of test mode with reference
     to active tool offsets.
        The bit is only relevant when bits 0 and 6 (0x41) are set.
        It defines what 'Current setting for active tool length com-
     pensation' refers to:
        - the program which was active at the end of test mode
        - the program which was active before test mode was switched
     on
 4:  0x10Reserved!   Setting now via
 5:  0x20Reserved!   $MC_GCODE_RESET_MODE[]
 6:  0x40Reset response "Active tool length compensation"
 7:  0x80Reset response "Active kinematic transformation"
 8:  0x100Reset response "Coupled-motion axes"
 9:  0x200Reset response "Tangential follow-up"
10:  0x400Reset response "Synchronous spindle"
11:  0x800Reset response "Revolutional feedrate"
12:  0x1000Reset response "Geo-axis replacement"
13:  0x2000Reset response "Master value coupling"
14:  0x4000Reset response "Basic frame"
15:  0x8000Reset response "Electronic gearbox"
16:  0x10000Reset response "Master spindle"
17:  0x20000Reset response "Master tool holder"
```

```
18:  0x40000Reset response "Reference axis for G96/G961/G962"
Bits 4 to 11, 16 and 17 are only evaluated when bit 0 = 1.
Meaning of each bit:
Bit 0 (LSB) = 0 : corresponds to response of SW version 1
   Initial setting after power-up:
   - G codes acc. to $MC_GCODE_RESET_VALUES;
   - Tool length compensation not active
   - Transformation not active
   - No coupled axis groupings active
   - No tangential follow-up active
   - No axial revolutional feedrate active
   - Path revolutional feedrate with master spindle (default)
   Initial setting after reset or end of part program:
   The current settings are retained.
   When next part program is started, the following reset state is
   in effect:
   - G codes acc. to $MC_GCODE_RESET_VALUES;
   - Tool length compensation not active
   - Transformation not active
   - No tangential follow-up active
   - No coupled axis grouping active
   - No master value coupling active
   - No axial revolutional feedrate active
   - Path revolutional feedrate with master spindle (default)
Bit 0(LSB) = 1:
   Initial setting after power-up:
   - G codes acc. to $MC_GCODE_RESET_VALUES;
   - Tool length compensation active acc. to
   $MC_TOOL_RESET_VALUE, $MC_CUTTING_EDGE_RESET_VALUE and
   $MC_SUMCORR_RESET_VALUE
   - Transformation active acc. to $MC_TRAFO_RESET_VALUE
   - Geometry axis change acc. to $MC_GEOAX_CHANGE_RESET
   - No coupled axis groupings active
   - No tangential follow-up active
   Initial setting after reset or end of part program:
   Depending on $MC_GCODE_RESET_MODE the current settings are
   retained for the G groups or the initial settings stored in
   $MC_GCODE_RESET_VALUES are set.
   Initial setting after reset or end of part program:
   Depending on $MC_RESET_MODE_MASK bits 6 to 7,
   the current settings are retained or the initial settings
   stored in the MDs are set for
    - tool length compensation
    - transformation.
   Depending on bits 8 and 9, the current settings of coupled
   motion axes or tangentially corrected axes are either deacti-
   vated or retained.
    - Synchronous spindle coupling configured:
   The coupling is deselected depending on the setting in
   $MC_COUPLE_RESET_MODE_1.
```

- Synchronous spindle coupling not configured:

Depending on bit 10, the copling is either deactivated or retained.

Depending on bit 14, the basic frame is either retained or deselected.

Bit 1 = 0:

Aux. funct. output (D, T, M) to PLC on tool selection according to MDs $MC_TOOL_RESET_VALUE, $MC_CUTTING_EDGE_RESET_VALUE, $MC_TOOL_PRESEL_RESET_VALUE and $MC_TOOL_CHANGE_MODE. With active magazine management, T, M are generally not output as auxiliary functions.

The function uses its own communication in order to output T, M to the PLC.

Bit 1 = 1:

Suppress aux. funct. output to PLC on tool selection. When

the tool management or magazine management function is active, T, M are generally not output as auxiliary functions.

Bit 2 = 0:

When tool or magazine management not active:

- No tool offset after POWER ON active Active and programmed T depend on the further settings of the machine data (bits 0, 6).

When tool or magazine management active:

- Not relevant.

Bit 2 = 1:

When tool or magazine management not active:

- If bit 0 and bit 6 = 1 (0x41), the tool offset of the last active tool in NCK is active after the first resedt after Power ON.

(The value of the programmed tool depends on the value of machine data $MC_TOOL_PRESEL_RESET_VALUE.)

Notice: The NCK does not know the conditions at the machine

When tool or magazine management active:

- Not rellevant.

Bit 3 = 0:

With and without active tool management:

End of test mode: "Current setting for active tool length compensation is retained" (bits 0 and 6 set) refers to the program which was active before activation (!) of test mode.

Bit 3 = 1:

Relevant only without active tool management:

End of test mode: "Current setting for active tool length compensation is retained" (bits 0 and 6 set) refers to the program which was active at the end of test mode. (When tool management is active, the tool on the spindle is generally the active tool. Exception only for $MC_CUTTING_EDGE_DEFAULT = -2)

Bit 4 = 0:Reserved!Setting now via

Bit 4 = 1:Reserved!$MC_GCODE_RESET_MODE[]

Bit 5 = 0:Reserved!Setting now via

Bit 5 = 1:Reserved!$MC_GCODE_RESET_MODE[]

Bit 6 = 0:

Initial setting for active tool length compensation after reset/part program end acc. to

$MC_TOOL_RESET_VALUE,$MC_CUTTING_EDGE_RESET_VALUE, $MC_USEKT_RESET_VALUE and $MC_SUMCORR_RESET_VALUE.

If $MC_TOOL_CHANGE_MODE = 1, the tool specified in $MC_TOOL_PRESEL_RESET_VALUE is also preselected.

When the tool or magazine management function is active, data $MC_TOOL_RESET_VALUE is not used but $MC_TOOL_RESET_NAME instead.

Bit 6 = 1:

Current setting for active tool length compensation is retained after reset/end of part program.

When the tool or magazine management function is active, the tool that is currentlly on the master spindle (generally=master tool holder) is selected.

If the tool on the master spindle is blocked, the 'blocked' status is ignored.

It must be observed that after program end, program abort either the value for master spindle or master tool holder programmed last in the program or the value defined by $MC_SPIND_DEF_MASTER_SPIND or $MC_TOOL_MANAGEMENT_TOOLHOLDER defines the master spindle or master tool holder.

(selected via bit16 or bit17)

For $MC_CUTTING_EDGE_DEFAULT = -2 the following applies especially:

If a tool has been changed in onto the spindle, but a new compensation D has not yet been programmed, the previous tool is still active in the NCK.

If machining is aborted in this status, e.g. with the Reset key, the compensation is determined with the smallest D number of the master spindle tool.

Bit 7 = 0:

Initial setting for active transformation after reset/part program end according to $MC_TRAFO_RESET_VALUE.

Bit 7 = 1:

The current setting for the active transformation is retained after reset/end of part program.

Bit 8 = 0:

Coupled axis groupings are ungrouped after reset/end of part program.

Bit 8 = 1:

Coupled axis groupings remain active after reset/end of part program.

Bit 9 = 0:

Tangential follow-up is switched off at reset/end of part program.

Bit 9 = 1:

Tangential follow-up remains active after reset/end of part program.

Bit 10 = 0:

Non-configured synchronous spindle coupling is switched off at reset/end of part program.

Bit 10 = 1:

Non-configured synchronous spindle coupling remains active after reset/end of part program.

Bit 11 = 0:
On reset/end of part program, the setting data $SA_ASSIGN_FEED_PER_REV_SOURCE is reset to 0 for all non-active axes/spindles, i.e. traversing at revolutional feedrate is cancelled and the setting for path and synchronous axes is reset to the master spindle (default).
Bit 11 = 1:
The current setting for revolutional feedrate is retained after reset/end of part program. At the start of the part program, the setting data $SA_ASSIGN_FEED_PER_REV_SOURCE is reset to 0 for all non-active axes/spindles, i.e. traversing at revolutional feedrate is cancelled and the setting for path and synchronous axes is reset to the master spindle (default).
Bit 12 = 0:
With machine data $MC_GEOAX_CHANGE_RESET set, a changed geometry axis assignment is cancelled with reset/end of part program. The initial setting for the geometry axis assignment defined in the machine data becomes active.
Bit 12 = 1:
A changed geometry axis assignment remains active after reset/ end of part program.
Bit 13 = 0:
Master value couplings are cancelled with reset/end of part program.
Bit 13 = 1:
Master value couplings remain active after reset/end of part program.
Bit 14 = 0:
The basic frame is deselected.
Bit 14 = 1:
The current setting of the basic frame is retained.
Bit 15 = 0:
Active electronic gearboxes remain active after reset/end of part program.
Bit 15 = 1:
Active electronic gearboxes are cancelled with reset/end of part program.
Bit 16 = 0:
Initial setting for the master spindle according to $MC_SPIND_DEF_MASTER_SPIND.
Bit 16 = 1:
The current setting of the master spindle (SETMS) is retained.
With $MC_TOOL_MANAGEMENT_TOOLHOLDER=0, this bit has also an effect on the response of bit6.
Bit 17 = 0:
Initial setting for the master tool holder according to $MC_TOOL_MANAGEMENT_TOOLHOLDER
Bit 17 = 1:
The current setting of the master tool holder (SETMTH) is retained
(Bit17 is relevant only with active tool or magazine management and if $MC_TOOL_MANAGEMENT_TOOLHOLDER> 0. Otherwise, the set-

ting for master spindle bit 16 applies with active tool or magazine management. This bit has also an effect on the response of bit6.

Bit 18 = 0:

Reference axis for G96/G961/G962 in accordance with MD 20100: $MC_DIAMETER_AX_DEF.

When using SCC with its own spindle reset, it is recommended to set bit 18 = 1 (also see MD 20112: $MC_START_MODE_MASK, bit 18).

Bit 18 = 1:

Reference axis for G96/G961/G962 is retained.

Bit 19: Reserved!

(Bit 19 = 0:

The two changeable software limit switches are deleted after reset and are no longer effective.

Bit 19 = 1:

The two changeable software limit switches remain active after reset.

20112	START_MODE_MASK			C03	K1
-	Definition of basic control settings at NC Start			DWORD	Reset
-					
-	-	0x400,0x400,0x400,0x4000,0x400,0x400...		0x7FFFF	7/2

Description: Definition of the initial setting of the control at the start of the part program with respect to G codes (in particular, active plane and active settable zero offset), active tool length compensation, transformation and axis couplings by setting of the following bits:

Bit Meaning

0: (LSB) 0x1 Not assigned; $MC_START_MODE_MASK is evaluated every time a part program is started.

1: Suppress aux. funct. output on tool selection.

2 - Not assigned, but reserved (see corresponding bit in RESET_MODE_MASK)

3: - Not assigned (reserved) (see corresponding bit in RESET_MODE_MASK).

4: Start response for G code "Current plane"

5: Start response for G code "Settable zero offset"

6: Start response for "Active tool length compensation"

7: Start response for "Active transformation"

8: Start response for "Coupled-motion axes"

9: Start response for "Tangential follow-up"

10: Start response for "Synchronous spindle"

11: - Not assigned (reserved) (see corresponding bit in RESET_MODE_MASK).

12: Start response for "Geometry axis change"

13: Start response for "Master value coupling"

14: - Not assigned (reserved) (see corresponding bit in RESET_MODE_MASK).

15: - Not assigned (reserved) (see corresponding bit in RESET_MODE_MASK).

16: Start response for "Master spindle"

17: Start response for "Master tool holder"

18: Start response for "Reference axis for G96/G961/G962"

Meaning of individual bits:

Bit 1 = 0:

Auxiliary function output (D,T,M,DL) to PLC with tool selection according to the following MDs:$MC_TOOL_RESET_VALUE, $MC_CUTTING_EDGE_RESET_VALUE, $MC_TOOL_PRESEL_RESET_VALUE and $MC_TOOL_CHANGE_MODE.

Note:

With active tool or magazine management only auxiliary functions D and DL are output.

Bit 1 = 1:

Suppress auxiliary function output to PLC on tool selection.

Bit 1 is not relevant with active tool or magazine management.

Bit 2 : Reserved (reset response after Power On)

Bit 3 : Reserved (end of test mode)

Bit 4 = 0:

The current setting for a G code "current plane" is retained.

Bit 4 = 1:

Initial setting for G code "current plane" according to $MC_GCODE_RESET_VALUES.

Bit 5 = 0:

The current setting for G code "settable zero offset" is retained.

Bit 5 = 1:

Initial setting for G code "settable zero offset" according to $MC_GCODE_RESET_VALUES.

Bit 6 = 0:

The current setting for the active tool length compensation is retained.

With active tool or magazine management, the tool currently on the active tool holder (spindle) is always selected.

If the tool that is currently on the spindle is blocked, it is automatically replaced by a suitable spare tool.

If such a spare tool does not exist, an alarm is output.

Bit 6 = 1:

Initial setting for active tool length compensation according to $MC_TOOL_RESET_VALUE, $MC_CUTTING_EDGE_RESET_VALUE, $MC_USEKT_RESET_VALUE and $MC_SUMCORR_RESET_VALUE.

If $MC_TOOL_CHANGE_MODE == 1, the tool selected via $MC_TOOL_PRESEL_RESET_VALUE s preselected in addition.

With active tool or magazine management, MD $MC_TOOL_RESET_VALUE is not used, but $MC_TOOL_RESET_NAME instead.

Bit 7 = 0:

The current setting for the active transformation is retained.

Bit 7 = 1:

Initial setting for active transformation after reset/ end of part program according to $MC_TRAFO_RESET_VALUE.

Bit 8 = 0:

Coupled axis groupings remain active.

Bit 8 = 1:

Coupled axis groupings are ungrouped.

Bit 9 = 0:

Tangential follow-up remains active.

Bit 9 = 1:

Tangential follow-up is switched off.

Bit 10 = 0:

Non-configured synchronous spindle coupling remains active.

Bit 10 = 1:

Non-configured synchronous spindle coupling is switched off.

Bit 11 : Reserved (revolutional feedrate)

Bit 12 = 0:

A changed geometry axis assignment remains active when the part program is started.

Bit 12 = 1:

When the machine data $MC_GEOAX_CHANGE_RESET is set, a changed geometry axis assignment is deleted when the part program is started.

Bit 13 = 0:

Master value couplings remain active.

Bit 13 = 1:

Master value couplings are cancelled.

Bit 14 : Reserved (basic frame)

Bit 15 = 0:

Active electronic gearboxes remain active.

Bit 15 = 1:

Active electronic gearboxes are cancelled.

Bit 16 = 0:

The current setting of the master spindle (SETMS) is retained.

Bit 16 = 1:

Initial setting for the master spindle according to $MC_SPIND_DEF_MASTER_SPIND.

Bit 17 = 0:

The current setting of the master tool holder (SETMTH) is retained (relevant only with active tool or magazine management)

Bit 17 = 1:

Only if $MC_TOOL_MANAGEMENT_TOOLHOLDER> 0: Inital setting for the master tool holder according to $MC_TOOL_MANAGEMENT_TOOLHOLDER.

Otherwise, the setting for the master spindle applies.

Bit 18 = 0:

Reference axis for G96/G961/G962 in accordance with MD20100 $MC_DIAMETER_AX_DEF.

When using SCC with its own spindle reset it is recommended to set bit 18 = 1 (see also MD 20110: $MC_RESET_MODE_MASK, Bit 18).

Bit 18 = 1:

Reference axis for G96/G961/G962 is retained.

20114	MODESWITCH_MASK			C03	K1
-	Interruption MDA by mode change			DWORD	Reset
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xFFFF	7/2

Description: After program interruption in MDI mode (e.g. in order to carry out a measurement on the workpiece and to correct the tool wear values or after tool breakage) the tool can be manually withdrawn from the contour by changing into JOG mode.

In this case, the control stores the coordinates of the position of the interruption and indicates the path differences traversed by the axes in JOG mode as "Repos offset". When MDI mode is selected again, the axis is repositioned on the contour. This response can be canceled by means of this machine data.

Bit 0 (LSB)= 0:

When MDI (JOG, JOGREF, JOGREPOS, MDIREF and MDIREPOS) are deselected in stopped status, the system ASUB Repos is selected.

Bit 0 (LSB) = 1:

When MDI (JOG, JOGREF, JOGREPOS, MDIREF and MDIREPOS) are deselected in stopped status, the system ASUB Repos is not selected.

Bit 1 (LSB) = 0:

If the NCK stops at a part program block in the program execution in which repositioning is not possible, alarm 16916 is generated if an attempt is made to switch to manual mode.

Bit 1 (LSB) = 1:

If the NCK stops at a part program block in the program execution in which repositioning is not possible, no alarm is generated if an attempt is made to switch to manual mode.

20116	IGNORE_INHIBIT_ASUP			C01	K1
-	Execuite interrupt program despite read-in disable			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

Description: In spite of the set read-in disable, an assigned user ASUB is completely executed for the interrupt channel with the set bit.

Bit 0 is assigned to interrupt channel 1.

Bit 1 is assigned to interrupt channel 2, etc.

Related to:

IGNORE_SINGLEBLOCK_ASUP

20117	IGNORE_SINGLEBLOCK_ASUP			C01	K1
-	Execute interrupt program completely despite single block			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

Description: In spite of the set single-block processing mode, an assigned user ASUB is completely executed for the relevant channel with the set bit.

Bit 0 is assigned to interrupt channel 1.

Bit 1 is assigned to interrupt channel 2, etc.

The MD is only active with single block type 1.

Related to:

IGNORE_INHIBIT_ASUP

20118	GEOAX_CHANGE_RESET			C03	K1
-	Enable automatic geometry axis change			BOOLEAN	Reset
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: 0: The current configuration of the geometry axes remains unchanged on reset and on part program start. With this setting, the response is identical to older software versions without geometry axis replacement.

1: The configuration of the geometry axes remains unchanged on reset or part program end, depending on MD 20110: RESET_MODE_MASK and, on part program start, depending on MD 20112: START_MODE_MASK or is switched to the initial state defined by MD 20050: AXCONF_GEOAX_ASSIGN_TAB.

Related to:

MD 20050: AXCONF_GEOAX_ASSIGN_TAB

MD 20110: RESET_MODE_MASK

MD 20112: START_MODE_MASK

20120	TOOL_RESET_VALUE			C03	K1
-	Tool with length compens. during runup (reset/part program end).			DWORD	Reset
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32000	7/2

Description: Definition of tool for which tool length compensation is selected during runup or on reset or part program end as a function of MD 20110: RESET_MODE_MASK and, on part program start, depending on MD 20112: START_MODE_MASK.

MD irrelevant for:

MD 20110: RESET_MODE_MASK, bit 0 = 0

20121	TOOL_PRESEL_RESET_VALUE			C03	FBW,K1
-	Preselected tool on RESET			DWORD	Reset
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32000	7/2

Description: Definition of preselected tool for which tool length compensation is selected during runup or on reset or part program end as a function of MD 20110: RESET_MODE_MASK and, on part program start, depending on MD 20112: START_MODE_MASK.

The MD is valid only without tool management.

MD irrelevant for:

MD 20110: RESET_MODE_MASK, bit 0 = 0

MD 22550: TOOL_CHANGE_MODE = 0

20122	TOOL_RESET_NAME			C03	FBW
-	Active tool at RESET/START with tool management			STRING	Reset
-					
-	-		-	-	7/2

Description: This MD is used only with active tool or magazine management (i.e. $MN_MM_TOOL_MANAGEMENT_MASK / $MC_TOOL_MANAGEMENT_MASK, with bit0=1 each time) and the setting which indicates that init blocks are to be processed ($MC_TOOL_MANAGEMENT_MASK, bit10=1 -'H4000'-).

Definition of tool for which tool length compensation is selected during runup or on reset or part program end as a function of $MC_RESET_MODE_MASK (see bits 0, 6) and, on part program start, depending on $MC_START_MODE_MASK (see bit 6).

If $MC_TOOL_RESET_NAME="" applies, this has the same content as the programming of T0, if a tool is on the tool holder at that moment.

Related to:

MD 20110: RESET_MODE_MASK,

MD 20112: START_MODE_MASK

MD 20124: TOOL_MANAGEMENT_TOOLHOLDER

MD 20130: CUTTING_EDGE_RESET_VALUE

References:

Description of Functions: Coordinate Systems (K2)

20123	USEKT_RESET_VALUE			C03	-
-	Preselected value of $P_USEKT on RESET			DWORD	Reset
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	0xF	7/2

Description: The system variable $P_USEKT is set with the value of this MD:

- after run-up:
  depending on $MC_START_MODE_MASK
- after RESET or part program end:
  depending on $MC_RESET_MODE_MASK

20124	TOOL_MANAGEMENT_TOOLHOLDER			C03	FBW
-	Tool holder number			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,00,0,0,0	0	20	7/2

Description:

This MD is only relevant with tool management active.

The TM must know on which tool holder a tool has to be loaded.

The data is only evaluated if the value is greater than zero.

Then the numbers $TC_MPP5 are no longer regarded as spindle numbers but as tool holder numbers.

The automatic address extension of T and of M=6 is then the value of this machine data and no longer the value of $MC_SPIND_DEFMASTER_SPIND.

The MD defines the master tool holder number to which a tool preparation or a tool change refers.

Reference is also made to this value for the determination of the tool on the tool holder for the setting 'retain old offset' of MD $MC_RESET_MODE_MASK.

If a machine has several tool holders, but no defined master spindle then the MD serves as a default value for determining the tool holder on which the tool is to be loaded during a tool change (reset, start, T='identifier', M6).

When defining the magazine locations of an internal magazine (see documentation for TM), locations of the type 'SPINDEL' - $TC_MPP1=2 = spindle location can be given a 'location kind index' ($TC_MPP5). This assigns the location to a concrete tool holder.

The tool holder with the number n can be declared the master tool holder with the language command SETMTH(n). That is, the offsets of a tool which is loaded in a provisional buffer memory location of the type 'SPINDLE' and with the value $TC_MPP5=n, corrects the tool path .

Tool change on 'SPINDLE' locations with $TC_MPP5 unequal to the number of the master tool holder do not influence the path.

The tool holder defined in the MD is again declared as the master tool holder with SETMTH.

Related to:

MD 20110: RESET_MODE_MASK,

MD 20112: START_MODE_MASK

MD 20122: TOOL_RESET_NAME

MD 20130: CUTTING_EDGE_RESET_VALUE

References:

Description of Functions: Coordinate Systems (K2)

20125	CUTMOD_ERR			C08	-
-	Error handling for function CUTMOD			DWORD	Immediately
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: When function CUTMOD becomes active (through explicit call or tool selection), various error conditions may occur. For any of these error conditions it can be set with this machine data whether the error shall trigger an alarm and, if so, whether such an alarm shall only be displayed (warning) or whether the interpretation of the part program shall be aborted.

Two machine data bits are assigned to each error condition (see also the description of alarm 14162).

```
Bit  Hex. Meaning
   Value
--------------------------------
0    0x1Display error "Invalid cutting direction"
1    0x2Program stop after error "Invalid cutting direction"
2    0x4Display error "Undefined cutting angles"
3    0x8Progam stop after error "Undefined cutting angles"
4    0x10Display error "Invalid clearance angle"
5    0x20Progam stop after error "Invalid clearance angle"
6    0x40Display error "Invalid holder angle"
7    0x80Progam stop after error "Invalid holder angle"
8    0x100Display error "Invalid insert angle"
9    0x200Progam stop after error "Invalid insert angle"
10   0x400Error "Invalid combination of cutting edge position and
holder angle"
11   0x800Progam stop after error "Invalid combination of cutting
edge position and holder angle"
12   0x1000Display error "Invalid rotation"
13   0x2000Progam stop after error "Invalid rotation"
```

20126	TOOL_CARRIER_RESET_VALUE			C03	W1
-	Active tool holder on RESET			DWORD	Reset
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: Definition of tool holder for which tool length compensation is selected during runup or on reset or part program end as a function of $MC_RESET_MODE_MASK and, on part program start, depending on $MC_START_MODE_MASK.

References:

/FBW/, Tool Management

20127	CUTMOD_INIT			C08	-
-	Initialize CUTMOD after power ON			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-2	999999999	7/2

Description: The value programmable with NC command CUTMOD is initialized automatically on power ON with the value stored in this machine data. If the value of the machine data equals -2, CUTMOD will be set to the value included in MD 20126: $MC_TOOL_CARRIER_VALUE.

20128	COLLECT_TOOL_CHANGE			C04	FBW,K1
-	Tool change commands to PLC after search run			DWORD	PowerOn
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	-	-	1/1

Description: This MD is only relevant with active magazine management ($MN_MM_TOOL_MANAGEMENT_MASK, $MC_TOOL_MANAGEMENT_MASK).

It defines whether tool change commands, tool preparation command (tool change commands in general) are output or not output to the PLC after block search with calculation.

1: Tool change commands, tool preparation commands are gathered and output to the PLC with program start after reaching of the search target

0: All tool/magazine-specific commands that have been gathered during block search are not output to the PLC with a subsequent program start! That means that programmed POSM, TCI, TCA commands are not output either.

Note 1:

Without active magazine management, the tool change M code is not gathered if it is not assigned to an auxiliary function group. With active magazine management, this corresponds to MD value = 0

Note 2:

Value = 0 is appropriate, for example if, after reaching of the search target, the gathered tool change commands are output to the PLC in an ASUB by means of the GETSELT, GETEXET commands

20130	CUTTING_EDGE_RESET_VALUE			C03	K1
-	Tool edge with length compens. during runup (reset/end of pp)			DWORD	Reset
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32000	7/2

Description: Definition of cutting edge for which tool length compensation is selected during runup or on reset or part program end as a function of MD 20110: RESET_MODE_MASK and, on part program start, depending on MD 20112: START_MODE_MASK.

With active tool management and with the selection bit 0 and bit 6 are set in $MC_RESET_MODE_MASK, the last offset of the active tool at power OFF - as a rule the tool on the spindle - is effective after runup.

MD irrelevant for:

MD 20110: RESET_MODE_MASK, bit 0 = 0

20132	SUMCORR_RESET_VALUE			C03	W1
-	Effective resulting offset on RESET			DWORD	Reset
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	6	7/2

Description: Definition of the resulting offset with which the tool length compensation is selected in the runup and on reset or part program end as a function of machine data $MC_RESET_MODE_MASK and, on part program start, depending on machine data $MC_START_MODE_MASK.

The machine data $MN_MAX_SUMCORR_PERCUTTING_EDGE determines the maximum useful value which can be entered.

20140	TRAFO_RESET_VALUE			C03	K1
-	Transformation data block selected during runup (reset/pp end)			BYTE	Reset
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	20	7/2

Description: Definition of transformation data block which is selected during runup and on reset or part program end as a function of MD 20110: RESET_MODE_MASK and, on part program start, depending on MD 20112: START_MODE_MASK.

Number of transformation data block (1...n) corresponding to MD TRAFO_TYPE_1 to TRAFO_TYPE_n.

MD irrelevant for: MD 20110:

RESET_MODE_MASK, bit 0 = 0

20144	TRAFO_MODE_MASK			C07	M1
-	Function selection of kinematic transformation			BYTE	Reset
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x01	7/2

Description: Selects certain functionality of kinematic transformation by setting the following bits:

Bit 0 = 0:

Default behavior.

Bit 0 = 1:

Transformation as defined in $MC_TRAFO_RESET_VALUE is persistent, i. e. it is also selected with TRAFOOF and not shown in the display. It requires that transformation as defined in $MC_TRAFO_RESET_VALUE is selected automatically after RESET and START via $MC_RESET_MODE_MASK and $MC_START_MODE_MASK, i. e.:

$MC_RESET_MODE_MASK bit 0 = 1 and bit 7 = 0,

$MC_START_MODE_MASK bit 7 = 1

$MC_GEOAX_CHANGE_RESET = TRUE

20150	GCODE_RESET_VALUES			C11, C03	K1,G2,F2
-	Initial setting of G groups			BYTE	Reset
-					
-	60	2, 0, 0, 1, 0, 1, 1, 1, 0, 1, 0, 1, 2, 1, 2, 1, 1, 1, 1, 1, 1...	-	-	7/2

Description: Definition of G codes which become active on runup and reset or at part program end depending on MD 20110 RESET_MODE_MASK (up to software version 4) and MD 20152: GCODE_RESET_MODE (from software version 5) and at part program start depending on MD 20112 START_MODE_MASK.

The index of the G codes in the respective groups must be programmed as the default value.

For a list of the G groups with the G functions they contain, please refer to References:

/PG/, Programming Manual, Fundamentals

```
Title                                              Group
Default setting on 840D/810D/ FM-NC
GCODE_RESET_VALUES[0]         1                  2 (G01)
GCODE_RESET_VALUES[1]         2                  0 (inactive)
GCODE_RESET_VALUES[2]         3                  0 (inactive)
GCODE_RESET_VALUES[3]         4                  1 (START FIFO)
GCODE_RESET_VALUES[4]         5                  0 (inactive)
GCODE_RESET_VALUES[5]         6                  1 (G17)
GCODE_RESET_VALUES[6]         7                  1 (G40)
GCODE_RESET_VALUES[7]         8                  1 (G500)
GCODE_RESET_VALUES[8]         9                  0 (inactive)
GCODE_RESET_VALUES[9]       10                 1 (G60)
GCODE_RESET_VALUES[10]     11                 0 (inactive)
GCODE_RESET_VALUES[11]     12                 1 (G601)
GCODE_RESET_VALUES[12]     13                 2 (G71)
GCODE_RESET_VALUES[13]     14                 1 (G90)
GCODE_RESET_VALUES[14]     15                 2 (G94)
GCODE_RESET_VALUES[15]     16                 1 (CFC)
GCODE_RESET_VALUES[16]     17                 1 (NORM)
GCODE_RESET_VALUES[17]     18                 1 (G450)
GCODE_RESET_VALUES[18]     19                 1 (BNAT)
GCODE_RESET_VALUES[19]     20                 1 (ENAT)
GCODE_RESET_VALUES[20]     21                 1 (BRISK)
GCODE_RESET_VALUES[21]     22                 1 (RTCPOF)
GCODE_RESET_VALUES[22]     23                 1 (CDOF)
GCODE_RESET_VALUES[23]     24                 1 (FFWOF)
GCODE_RESET_VALUES[24]     25                 1 (ORIWKS)
GCODE_RESET_VALUES[25]     26                 2 (RMI)
GCODE_RESET_VALUES[26]     27                 1 (ORIC)
GCODE_RESET_VALUES[27]     28                 1 (WALIMON)
GCODE_RESET_VALUES[28]     29                 1 (DIAMOF)
GCODE_RESET_VALUES[29]     30                 1 (COMPOF)
GCODE_RESET_VALUES[30]     31                 1 (inactive)
GCODE_RESET_VALUES[31]     32                 1 (inactive)
```

```
GCODE_RESET_VALUES[32]     33                  1 (FTCOF)
GCODE_RESET_VALUES[33]     34                  1 (OSOF)
GCODE_RESET_VALUES[34]     35                  1 (SPOF)
GCODE_RESET_VALUES[35]     36                  1 (PDLAYON)
GCODE_RESET_VALUES[36]     37                  1 (FNOORM)
GCODE_RESET_VALUES[37]     38                  1 SPF1)
GCODE_RESET_VALUES[38]     39                  1 (CPRECOF)
GCODE_RESET_VALUES[39]     40                  1 (CUTCONOF)
GCODE_RESET_VALUES[40]     41                  1 (LFOF)
GCODE_RESET_VALUES[41]     42                  1 (TCOABS)
GCODE_RESET_VALUES[42]     43                  1 (G140)
GCODE_RESET_VALUES[43]     44                  1 (G340)
GCODE_RESET_VALUES[44]     45                  1 (SPATH)
GCODE_RESET_VALUES[45]     46                  1 (LFTXT)
GCODE_RESET_VALUES[46]     47                  1 (G290
SINUMERIK_MODE)
GCODE_RESET_VALUES[47]     48                  3 (G462)
GCODE_RESET_VALUES[48]     49                  1 (CP)
GCODE_RESET_VALUES[49]     50                  1 (ORIEULER)
GCODE_RESET_VALUES[50]     51                  1 (ORIVECT)
GCODE_RESET_VALUES[51]     52                  1 (PAROTOF)
GCODE_RESET_VALUES[52]     53                  1 (TOROTOF)
GCODE_RESET_VALUES[53]     54                  1 (ORIROTA)
GCODE_RESET_VALUES[54]     55                  1 (RTLION)
GCODE_RESET_VALUES[55]     56                  1 (TOWSTD)
GCODE_RESET_VALUES[56]     57                  1 (FENDNORM)
GCODE_RESET_VALUES[57]     58                  1 (RELIEVEON)
GCODE_RESET_VALUES[58]     59                  1 (DYNNORM)
GCODE_RESET_VALUES[59]     60                  1 (WALCS0)
GCODE_RESET_VALUES[60]     61                  1 (ORISOF)
                          :                   :
GCODE_RESET_VALUES[69]     70                  1 (not defined)
```

20152	GCODE_RESET_MODE			C03	K1
-	Reset response of G groups			BYTE	Reset
-					
-	60	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	1	7/2

Description:

```
This MD is only evaluated if bit 0 is set in $MC_RESET_MODE_MASK!
This MD used to determine for each entry in MD
$MN_GCODE_RESET_VALUES (therefore for each G group) whether, in
the case of a reset/part program end, the setting according to
$MC_GCODE_RESET_VALUES is taken again ( MD = 0 ), or the current
setting is retained ( MD = 1 ).
Example:
   Here the basic setting for the 6th G group (current level) is
   read out of the machine data $MC_GCODE_RESET_VALUES at each
   reset / part program end:
$MC_GCODE_RESET_VALUES[5]=1  ;Reset value of the 6th G group is
M17
$MC_GCODE_RESET_MODE[5]=0    ;Basic setting for 6th G group corre-
sponds, after
                             ;reset / part program end
                             ;to $MC_GCODE_RESET_VALUES[5]
However, if the current setting for the 6th G group (current
level) is to be retained after reset / part program end, then the
following setting results:
$MC_GCODE_RESET_VALUES[5]=1  ;Reset value of the 6th G group is
M17
$MC_GCODE_RESET_MODE[5]=1     ;Current setting for 6th G group
                             ;is retained
                             ;even after reset / part program end
```

20154	EXTERN_GCODE_RESET_VALUES		C11, C03	FBFA
-	Initial setting of G groups in ISO mode		BYTE	Reset
-				
-	31	1, 1, 1, 2, 1, 1, 1, 3, 4, 1, 1, 2, 2, 1, 3, 2, 1, 0, 1, 1, 1...	-	-	2/2

Description: When an external NC programming language is used, definition of G codes which become active on runup and reset or at part program end depending on machine data $MC_RESET_MODE_MASK and at part program start depending on machine data $MC_START_MODE_MASK.

The following external programming languages are possible:

ISO2 dialect Milling

ISO3 dialect Turning

The G group division to be used is indicated in the current SINUMERIK documentations.

The following groups within the MD EXTERN_GCODE_RESET_VALUES are writable:

ISO2 dialect M:

G group 2: G17/G18/G19

G group 3: G90/G91

G group 5: G94/G95

G group 6: G20/G21

G group 13: G96/G97

G group 14: G54-G59

ISO3 dialect T:

G group 2: G96/G97

G group 3: G90/G91

G group 5: G94/G95

G group 6: G20/G21

G group 16: G17/G18/G19

20156	EXTERN_GCODE_RESET_MODE			C03	K1
-	Reset response of external G groups			BYTE	Reset
-					
-	31	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	1	7/2

Description:

```
This MD is evaluated only if bit0 in $MC_RESET_MODE_MASK (see
there) is set!
This MD is used to define for each entry in MD
$MN_EXTERN_GCODE_RESET_VALUES (i.e. for each G group), whether the
setting as per $MC_EXTERN_GCODE_RESET_VALUES is adopted again
after a reset / part program end ( MD = 0 ) or if the current set-
ting is retained ( MD = 1 ).
Example for ISO dialect M:
Here, the basic setting for the 14th G group (settable zero off-
set) is read out of machine data $MC_EXTERN_GCODE_RESET_VALUES
after each reset / part program end:
$MC_EXTERN_GCODE_RESET_VALUES[13]=1 ;reset value of the 14th G
group
                                    ;is G54
$MC_EXTERN_GCODE_RESET_MODE[13]=0   ;basic setting for the 14th G
group is
                                    ;defined  by

;$MC_EXTERN_GCODE_RESET_VALUES[13]
                                   ;after reset / part program end
However, if the current setting for the 14th G group is to be
retained beyond reset / part program end, this results in the fol-
lowing setting:
$MC_EXTERN_GCODE_RESET_VALUES[13]=1 ;reset value of the 14th G
group
                                    ;is G54
$MC_EXTERN_GCODE_RESET_MODE[13]=1   ;current setting for the 14th
                                   ;G group is retained even after
                                    ;reset / part program end
```

20160	CUBIC_SPLINE_BLOCKS			EXP, C09	K1
-	Number of blocks for C spline			BYTE	PowerOn
-					
-	-	8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8	4	9	7/2

Description:

Number of motion blocks across which a spline section is calculated with the cubic spline (CSPLINE) function.

The larger the value, the closer the generated contour is to the ideal mathematical cubic spline, which in the boundary condition CUBIC_SPLINE_BLOCKS = reaches infinity.

However, the higher the value, the longer the block search calculation time.

References:

/PA/, Programming Guide: Fundamentals

20170	COMPRESS_BLOCK_PATH_LIMIT		C09	K1,PGA
mm	Maximum traversing distance of an NC block with compression		DOUBLE	NEW CONF
-				
-	-	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	-	-	7/2

Description: The machine data defines the maximum traversing length of a block that can be compressed. Longer blocks interrupt the compression and are traversed in the normal way.

Related to:

MD 33100: COMPRESS_POS_TOL (maximum deviation with compression)

References:

/PA/, Programming Guide: Fundamentals

20172	COMPRESS_VELO_TOL		C09	V1,PGA
mm/min	Max. permissible deviation of path feedrate with compression		DOUBLE	PowerOn
-				
-	-	60000.0,60000.0,60000.0,60000.0...	-	-	7/2

Description: The value indicates the maximum permissible deviation for the compression for the path feedrate. The larger the value, the more short blocks can be compressed into a long block. The maximum number of compressible blocks is limited by the size of the spline buffer.

Related to:

$MA_COMPRESS_POS_TOL[AXn]

$MC_COMPRESS_BLOCK_PATH_LIMIT

References:

/PGA/, Programming Guide, Advanced

20178	ORISON_BLOCK_PATH_LIMIT		C09	K1,PGA
mm	Maximum traversing length with orientation smoothing		DOUBLE	NEW CONF
-				
-	-	20.0,20.0,20.0,20.0,20.0,20.0,20.0...	-	-	7/2

Description: The machine data defines the maximum traversing length of a block, for which the orientation is still being smoothed with G code ORISON. Longer blocks interrupt the smoothing and are run as programmed.

20180	TOCARR_ROT_ANGLE_INCR			C08	W1
-	Rotary axis increment of orientable tool holder			DOUBLE	NEW CONF
-					
-	2	0.0, 0.0,0.0, 0.0,0.0, 0.0,0.0, 0.0...	-	-	7/3

Description: For orientable tool holders, this machine data indicates the size of the minimum increment (in degrees) by which the first or second orientation axis can be changed (e.g. for Hirth tooth systems).

A programmed or calculated angle is rounded to the nearest value resulting from

phi = s + n * d

with integer n.

Where

s = $MC_TOCARR_ROT_ANGLE_INCR[i]

d = $MC_TOCARR_ROT_ANGLE_OFFSET[i]

with i equal 0 for the 1st and i equal 1 for the 2nd axis.

If this machine data is equal to zero, no rounding is performed.

20182	TOCARR_ROT_ANGLE_OFFSET			C08	W1
-	Rotary axis offset of orientable tool holder			DOUBLE	NEW CONF
-					
-	2	0.0, 0.0,0.0, 0.0,0.0, 0.0,0.0, 0.0...	-	-	7/3

Description: For orientable tool holders, this machine data indicates the offset of the rotary axis if its position cannot be continuously changed.

It is only evaluated if $MC_TOCARR_ROT_ANGLE_INCR is not equal to zero.

For the precise meaning of this machine data, see the description of $MC_TOCARR_ROT_ANGLE_INCR.

20184	TOCARR_BASE_FRAME_NUMBER			C08	W1
-	Base frame number for holding machine table offset			DWORD	NEW CONF
-					
-	-	-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1...	-1	15	7/3

Description: This machine data indicates into which channel-specific base frame the table offset of an orientable tool holder with a rotary table is written.

This machine data must refer to a valid base frame.

If its content is less than 0 or greater than or equal to the maximum number of base frames set in MM_NUM_BASE_FRAMES, selection of a corresponding tool holder causes an alarm.

20188	TOCARR_FINE_LIM_LIN			C07	-
mm	Limit of linear fine offset TCARR			DOUBLE	Immediately
-					
-	-	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	-	-	7/3

Description: Indicates for each channel the input limit for the linear fine offset values of an orientable tool holder.

20190	TOCARR_FINE_LIM_ROT			C07	-
degrees	Limit of rotary fine offset TCARR			DOUBLE	Immediately
-					
-	-	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	-	-	7/3

Description: Indicates for each channel the input limit for the rotary fine offset values of an orientable tool holder.

20191	IGN_PROG_STATE_ASUP			EXP	K1
-	Do not display interrupt program execution on OPI			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

Description: If the ASUB is started, OPI variables

progStatus and chanStatus do not change, i.e. the HMI does not see this normally short program execution.

Bit 0 is assigned to interrupt channel 1.

Bit 1 is assigned to interrupt channel 2, etc.

Korrespondiert mit:

PROG_EVENT_IGN_PROG_STATE

20192	PROG_EVENT_IGN_PROG_STATE			EXP	-
-	Do not display the Prog-Event on OPI			DWORD	PowerOn
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xF	7/2

Description: Event-controlled program calls (Prog-Events) can be influenced with regard to their behavior on the OPI interface.

In this case, the progStatus and chanStatus variables are not influenced despite active Prog-Event execution and remain in the old value. Thus, the Prog-Event execution can be hidden from the HMI.

Bit 0 = 1 :

Reserved bit without effect

Bit 1 = 1 :

Prog-Event after part program end does not change progStatus and chanStatus

Bit 2 = 1 :

Prog-Event after operator panel reset does not change progStatus and chanStatus.

Bit 3 = 1 :

Prog-Event after power up does not change progStatus and chanStatus.

20193	PROG_EVENT_IGN_STOP			EXP	-
-	Prog-Events ignore the stop key			DWORD	PowerOn
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xF	7/2

Description: Event-controlled program calls (Prog-Events) can be influenced with regard to their behavior after pressing of the stop key.

The Stop, StopAll and StopAtEnd key of the PLC is ignored, if required.

Bit 0 = 1 :

Prog-Event after part program start delays the stop until the part program starts, i.e. the stop only becomes active in the part program, not before its start. If the part program starts with a traversing block, it is possible that it starts briefly, i.e. a short motion occurs, although Stop has already been pressed in the Start-Prog-Event.

Bit 1 = 1 :

Prog-Event after part program end ignores the stop

Bit 2 = 1 :

Prog-Event after operator panel reset ignores the stop

Bit 3 = 1 :

Prog-Event after power up ignores the stop

20196	TOCARR_ROTAX_MODE			C07	W1
-	ToolCarrier: rotary axis setting with axis positions not defined			DWORD	Immediately
-					
-	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2	0	3	7/3

Description: The MD is bit-coded. Bit 0 applies to orientable tool holders with one axis, bit 1 for those with 2 axes.

When the axis positions of an orientable tool holder are determined from a specified frame, it might happen that the required orientation is achieved at any position of a rotary axis.

This MD specifies how the rotary axis position is defined in these cases:

If the relevant bit is 0, the position of the rotary axis will be 0; a possibly necessary rotation is performed through the specified frame.

If the relevant bit is 1, the rotation is performed by means of the rotary axis of the orientable tool holder. The resulting frame will no longer include a rotation.

Example:

A tool in its basic position points into the Z direction, and an axis of the orientable tool holder rotates the workpiece around Z (C_Axis). If the tool shall be oriented in parallel with the Z axis of a rotating frame, and if the frame only rotates around the Z axis, the tool orientation will not be changed, if the C axis is rotated. The condition saying that the tool is to point in the direction of the Z axis defined by the frame is therefore fulfilled for any position of the Z axis.

20200	CHFRND_MAXNUM_DUMMY_BLOCKS		EXP, C02, C06, C09	K1
-	Empty blocks with chamfer/radii		BYTE	PowerOn
-				
-	-	3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3	0	15	7/2

Description: Indicates the maximum number of blocks without traversing information in the compensation plane (dummy blocks) that can be programmed between two blocks with traversing information when chamfer/rounding are active.

20201	CHFRND_MODE_MASK			C09	V1
-	Chamfer/rounding behavior			DWORD	Reset
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xFFFF	7/2

Description: Determination of the chamfer/rounding behavior

Bit 0: (LSB) Assignment of the chamfer/rounding to the preceding or following block.

This influences:

- The technology of the chamfer/rounding (feed, type of feed, M commands ...)
- The execution of the blocks without movement in the active plane (e.g. M commands, movement in the applicate) before or after a modal rounding (RNDM)

Bit 1: free

Meaning of the individual bits:

Bit 0 = 0

Chamfer/rounding is derived from the following block (default value).

The technology of the chamfer/rounding is determined by the following block. Blocks without movement (M commands) or movement only in the applicate between two movement blocks in the plane are executed before the modal rounding.

Bit 0 = 1:

Chamfer/rounding is derived from the preceding block.

The technology of the chamfer/rounding is determined by the preceding block. Blocks without movement (M commands) or movement only in the applicate between two movement blocks in the plane are executed after the modal rounding.

20202	WAB_MAXNUM_DUMMY_BLOCKS			C02, C06	W1
-	maximum number of blocks w/o traversing movement with SAR			BYTE	Reset
-					
-	-	5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5	0	10	7/2

Description: Maximum number of blocks which can appear between the SAR (soft approach and retraction) block and the traversing block which determines the direction of the approach or retraction tangent.

20204	WAB_CLEARANCE_TOLERANCE			C06	W1
mm	Change of direction with SAR			DOUBLE	PowerOn
-					
-	-	0.01,0.01,0.01,0.01,0.01,0.01,0.01...	-	-	7/2

Description: In the case of smooth approach and retraction, the point defined with DISCL, from which, in the case of infeed from the initial plane, traversing is carried out at lower speed (G341) or the point in which the actual approach movement begins (G 340), must lie between the initial plane and the approach plane.

If this point lies outside this interval and the deviation is less than or equal to this machine data, it is assumed that the point lies in the approach or retraction plane.

If the deviation is greater, then alarm 10741 is output.

Example:

An approach is made from position Z = 20. The SAR plane is at Z = 0. The point defined by DISCL must therefore lie between these two values. If it lies between 20.000 and 20.010 or between 0 and -0.010, it is assumed that the value 20.0 or 0.0 was programmed (under the condition that the MD has the value 0.010). The alarm is output if the position is greater than 20.010 or less than -0.010.

20210	CUTCOM_CORNER_LIMIT			C08, C06	W1
degrees	Maximum angle f. compensation blocks in tool radius compensation			DOUBLE	Reset
-					
-	-	100.,100.,100.,100.,100.,100.,100....	0.0	150.	7/2

Description: Where outer corners are very pointed, G451 can result in long idle paths. The system therefore switches automatically from G451 (intersection) to G450 (transition circle, with DISC where appropriate) when the outer corners are very pointed. The contour angle which can be traversed following this automatic switchover (intersection ---> transition circle) can be defined in CUTCOM_CORNER_LIMIT.

20220	CUTCOM_MAX_DISC			C08, C06	W1
-	Maximum value for DISC			DOUBLE	Reset
-					
-	-	50.0,50.0,50.0,50.0,50.0,50.0,50.0...	0.0	75.0	7/2

Description: The G450 transition circle cannot produce sharp outer contour corners, because the path of the tool center point through the transition circle is controlled so that the cutting edge stops at the outer corner (programmed position).

Where sharp outer corners are to be machined with G450, the DISC instruction can be used in the program to program an overshoot. This transforms the transition circle into a conic section and the cutting edge lifts off from the outer corner.

The value range of the DISC instruction extends from 0 to theoretically 100 in steps of 1.

DISC = 0 ...Overshoot disabled, transition circle active

DISC = 100 ...Overshoot large enough to theoretically produce a response similar to intersection (G451).

Programmed values of DISC which are higher than those stored in CUTCOM_MAX_DISC are limited to this maximum value without output of a message. A severely non-linear alteration in the path speed can thus be avoided.

Special cases:

It is not generally meaningful to enter values higher than 50 in DISC.

It is therefore not possible to enter values > 75.

20230	CUTCOM_CURVE_INSERT_LIMIT			C08, C06	W1
-	Maximum angle for calculation of intersection with TRC			DOUBLE	Reset
-					
-	-	10.,10.,10.,10.,10.,10.,10.,10.,10....	0.0	150.	7/2

Description: Where outer corners are very flat, G450 (transition circle) and G451 (intersection) approximate each other more and more. In such a case, it is no longer useful to insert a transition circle. Especially with 5-axis machining, it is not allowed to insert a transition circle at these outer corners, as this might lead to losses in velocity during continuous-path mode (G64).

That is why the system switches automatically from G450 (transition circle, possibly with DISC) to G451 (intersection) in the case of very flat outer corners. The contour angle (in degrees), as of which the automatic switchover (transition circle ---> intersection) is to be carried out, can be specified in CUTCOM_CURVE_INSERT_LIMIT.

20240	CUTCOM_MAXNUM_CHECK_BLOCKS			C08, C02	W1
-	Blocks for look-ahead contour calculation with TRC			DWORD	PowerOn
-					
-	-	4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4	2	-	7/2

Description: Indicates the maximum number of blocks with traversing information at the offset plane that are considered simultaneously for collision detection with active radius compensation.

20250	CUTCOM_MAXNUM_DUMMY_BLOCKS			C08, C02	W1
-	maximum number of blocks without traversing motion in TRC			DWORD	PowerOn
-					
-	-	3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3	-	-	7/2

Description: During active TRC only program blocks with movements of geometry axes perpendicular to the current tool orientation are normally programmed. Nevertheless, individual intermediate blocks that do not contain such path information may also be programmed during active TRC. For example:

- Movements in the direction of tool orientation
- Movements in axes that are not geometry axes
- Auxiliary functions
- In general: Blocks that are taken over into the main run and executed there

The maximum number of intermediate blocks is defined with this MD. If the value is exceeded, alarm 10762 "Too many empty blocks between 2 traversing blocks during active tool radius compensation" is output.

Note:

Comment blocks, arithmetic blocks and empty blocks are not intermediate blocks in the sense of this MD and can therefore be programmed in any number (without an alarm being triggered).

20252	CUTCOM_MAXNUM_SUPPR_BLOCKS			EXP, C01, C08, C02	W1
-	Maximum number of blocks with compensation suppression			DWORD	PowerOn
-					
-	-	5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5	-	-	7/2

Description: Indicates the maximum number of blocks for active tool radius compensation, in which the function "Keep radius offset constant" (CUTCONON or reprogramming of G41 / G42 during active TRC) may be active.

Note:

The restriction of the number of blocks with active CUTONON is necessary in order to carry out repositioning in this situation too. Increasing this value for the machine data can lead to an increased memory requirement for NC blocks.

20254	ONLINE_CUTCOM_ENABLE			EXP, C01, C08	W4
-	Real-time tool radius compensation enabled			BOOLEAN	PowerOn
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: This data enables online tool radius compensation. When the function is enabled, the control reserves the necessary memory space required for online tool radius compensation after POWER ON.

ONLINE_CUTCOM_ENABLE = 0:

Online tool radius compensation can be used

ONLINE_CUTCOM_ENABLE = 1:

Online tool radius compensation cannot be used

20256	CUTCOM_INTERS_POLY_ENABLE			C09	W1
-	Intersection procedure for polynomials is possible			BOOLEAN	PowerOn
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/2

Description: If this machine data is TRUE and tool radius compensation active, the transitions at outer corners where polynomes (splines) are involved can be treated with the intersection mode. If the machine data is FALSE, conic sections (circles) are always inserted in this case.

If the machine data is FALSE, the response is identical to that of software releases older than 4.0.

20260	PATH_IPO_IS_ON_TCP			EXP, C09, C05	-
-	Velocity control with spline			BOOLEAN	PowerOn
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	0/0

Description: For SW-internal function optimization.

20262	SPLINE_FEED_PRECISION			EXP, C09, C05	-
-	Permissible rel. error of path velocity for spline			DOUBLE	PowerOn
-					
-	-	0.001,0.001,0.001,0.001,0.001,0.001...	0.000001	1.0	0/0

Description: This machine data is evaluated only if MD MM_ARCLENGTH_SEGMENTS is larger than 0.

The factor indicates how large the relative error of the path velocity may be for splines, compressor and polynomial interpolation. The smaller the factor the more computing time is required for preprocessing.

Furthermore, more memory is required for the display of the arc length function (see MD MM_ARCLENGTH_SEGMENTS).

Example:

SPLINE_FEED_PRECISION=0.1, programmed path velocity=1000 mm/min.

The actual path velocity for polynomial and spline interpolations can then vary in the range between 900 mm/min and 1100 mm/min.

20270	CUTTING_EDGE_DEFAULT			C11, C03	W1
-	Initial position of tool cutting edge without programming			DWORD	PowerOn
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	-2	32000	7/2

Description: Default cutting edge after tool change

If no cutting edge is programmed after a tool change, the default cutting edge number set in CUTTING_EDGE_DEFAULT will be used.

Value

:= 0

Initially, no cutting edge is active after a tool change.

The cutting edge is not selected until D programming.

:= 1

MD_SLMAXCUTTINGEDGENUMBER

No. of cutting edge (up to P4, MD_SLMAXCUTTINGEDGENUMBER=9 is valid)

:= -1

Cutting edge number of old tool applies also to new tool.

:= -2

Cutting edge (correction) of old tool remains active until D is programmed. That means that the old tool remains the active tool until D is programmed. In other words: the tool on the spindle remains the programmed tool until D is programmed.

Example:

MD: CUTTING_EDGE_DEFAULT = 1;

After a tool change, the first cutting edge is active if no other cutting edge has been programmed.

20272	SUMCORR_DEFAULT			C03	W1
-	Initial position resulting offset without program			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-1	6	7/2

Description: The number of the resulting offset of the cutting edge which becomes active if a new cutting edge correction is activated without a programmed DL value being available.

Machine data $MN_MAX_SUMCORR_PERCUTTING_EDGE determines the maximum useful value which can be entered.

Value Meaning

> 0 Number of the resulting offset

= 0 No resulting offset active with D programming

= 1 The resulting offset number for the previously programmed D is used.

See also: $MC_CUTTING_EDGE_DEFAULT.

20310	TOOL_MANAGEMENT_MASK			C09	FBW
-	Activation of tool management functions			DWORD	PowerOn
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xFFFFFFF	7/2

Description: Activation of tool or magazine management (TM) (only if option TM is set).

Bit-coded activation data. That is, the TM can be activated in various versions.

Comment:

The entire tool change process is essentially composed of two commands to the PLC --> tool change preparation and tool change ON.These terms must be known if one wants to use the following setting options.

(Tool change preparation and ON-T combine both steps from the NCK into one if no M6 is used for programming).

Transport acknowledgement means that the PLC has received the tool change preparation or tool change ON command from the NCK. That is, the tool management command number output from the NCK is acknowledged by the PLC with the value zero (see PLC description).

Comment:

Bits 5, 6, 7, 8 slow down the block processing sequence. Bits 7, 8 have a greater slowing effect than bits 5, 6.

Comment:

Bit 18 lengthens the search procedure for a suitable tool, above all if there are many disabled replacement tools present.

Comment:

Bit 19 in conjunction with set bits 5,6,7,8 slows down block processing.

Notice:

Bits 5 and 7, or 6 and 8 can only be set alternatively.

That is either bit 5 or bit 7; or bit 6 or bit 8.

If bits 5 and 7 or 6 and 8 are set simultaneously then bit 5 or bit 6 will become active with priority over bit 7 or 8.

(Simply formulated: The transport acknowledgement is given priority over the end acknowledgement.)

Bit no.Hexadec.Meaning of set bit

Value

0 (LSB)0x00001Tool or magazine management active (only possible with option release).

1 0x00002TM monitoring functions active (only possible with option release. If the magazine management is activated then that option is sufficient for this function.)

2 0x00004OEM functions, compile cycles functions can become active.

3 0x00008Adjacent location is treated.

4 0x00010The PLC has the option of requesting a tool change preparation again (PLC command numbers = 2,4,5) with changed parameters. Rejected by acknowledging with status = 2, or status = 7. That is, if the PLC uses this option the tool selection is recalculated in NCK and a corresponding new command output to the PLC. If acknowledged with status=2, the tool proposed by the NCK

is also disabled. If these two status numbers 2 and 7 are used although the bit has the value=0, an alarm is generated.

The PLC must not reject the tool defined by the NCK for tool selection after the first start of "block search with calculation". An alarm is generated if this is done nevertheless. The same applies if a tool selection is refused within the scope of an init block.

Programming which needs the selected T number (e.g. GETSELT) must wait until the end acknowledgement = 1 is received (or one of the acknowledgements 103, 105 that show that the T no. is defined).

5 0x00020The main run PLC synchronization with tool change ON command for the main spindle/main tool holder takes place at the same time as the transport acknowledgement to NCK (see PLC description). If bit 19 (0x80000) = 0 -> synchronization with respect to the tool command output (tool change). This means that the command is not regarded as output until the stated acknowledgement from the PLC is present in the NCK. If bit 19 (0x80000) = 1 -> Synchronization with respect to the IPO block. That is, the main run block remains active at least until the stated acknowledgement from the PLC is present in the NCK.

Example: Value = 1

```
M6    ; the next block is processed if the transport acknowl-
edgement
      ; has been made for the tool change ON command.
X5
D2 ; latest possible time for synchronization.
    ; That is, at the time D2 is processed, the PLC must have
    ; acknowledged the two commands tool preparation,
    ; tool change ON as ended.
```

6 0x00040In the case of a tool change ON command for a secondary spindle resp. a secondary tool holder, the main run PLC synchronization takes place at the same time as the transport acknowledgement. If bit 19 (0x80000) = 0 -> Synchronization with respect to the tool command output (tool change). That is, the command is not regarded as output until the stated acknowledgement from the PLC is present in the NCK. If bit 19 (0x80000) = 1 -> Synchronization with respect to the IPO block. That is the main run block remains active at least until the stated acknowledgement from the PLC is received in the NCK.

7 0x00080The main run PLC synchronization with tool change ON command for the main spindle resp. a main tool holder does not take place until receipt of the PLC acknowledgement that the tool change ON command has finished. If bit 19 (0x80000) = 0 -> Synchronization with respect to the tool command output (tool change). This means that the command is not regarded as output until the stated acknowledgement from the PLC is present in the NCK. If bit 19 (0x80000) = 1 -> Synchronization with respect to the IPO block. That is the main run block remains active at least until the stated acknowledgement from the PLC is received in the NCK.

Example: Value=1

```
M6   ; the next block is processed if the end acknowledgement
X5
D2   ; latest possible time for synchronization.
```

; That is, at the time D2 is processed, the PLC must have
; acknowledged the two commands tool preparation,
; tool change as ended.

8 0x00100The main run PLC synchronization with tool change ON command for an auxiliary spindle resp. an auxiliary tool holder does not take place until receipt of the PLC acknowledgement that the tool change ON command has finished. If bit 19 (0x80000) = 0 -> Synchronization with respect to the tool command output (tool change). This means that the command is not regarded as output until the stated acknowledgement from the PLC is present in the NCK. If bit 19 (0x80000) = 1 -> Synchronization with respect to the IPO block. That is the main run block remains active at least until the stated acknowledgement from the PLC is received in the NCK.

9 0x00200This bit is only used for test purposes. Simulation of the PLC acknowledgements for tool motion and change active. It is used for testing the data transport to NCK and HMI - without the otherwise necessary PLC program. NCK gives itself the necessary acknowledgements from the PLC.

10 0x00400The tool change ON command (PLC command number= 3) is not output until a PLC preparation acknowledgement is received.

11 0x00800The tool preparation command (PLC command numbers=2,4,5) is also executed if the same tool preparation command has already been made. (Commands 4,5 contain the tool preparation)

Example: (Tool change made with M6 (PLC command no.= 3):

T="Tool1" ; tool preparation

M6 ; Tool change

T="Tool2" ; 1st tool preparation after M6 (for same tool holder) is always output to PLC

T="Tool2" ; 2nd tool preparation is only output as command to the PLC; if bit 11 = 1.

; This tool preparation counts as the first if the state of the tool has changed since the previous tool preparation such that it would no longer be serviceable. That can, for example, be an asynchronous unloading of the tool. This tool preparation then attempts to select a replacement tool.

12 0x01000The tool preparation command (PLC command numbers=2,4,5) is also executed if the tool is already in the spindle/tool holder.

T="Tool1" ; tool preparation

M6 ; Tool change

T="Tool1" ;Tool is already in the tool holder

; 1st tool preparation after M6 (for the same tool holder) is only output to the PLC if; bit 12 = 1.

; An unserviceable tool (e.g. disabled because of tool monitoring.) on the tool holder does not count as being on the tool holder. This tool preparation then attempts to select a replacement tool.

T="Tool1" ; 2. Tool preparation - the rules of bit 11 apply to the output.

13 0x02000This bit is only used for test purposes. Recording of the tool sequences in a diagnosis buffer. On reset, the commands are retrieved from the diagnosis buffer and stored in a file in the part program memory. The diagnosis file can be used to inves-

tigate problems in the set up of the NCK-PLC communication (of the PLC program).

14 0x04000Automatic tool change on Reset and Start as per the machine data:

$MC_TOOL_RESET_NAME,$MC_RESET_MODE_MASK,

$MC_TOOL_MANAGEMENT_TOOLHOLDER .

15 0x08000No return transport of the tool from any defined buffers if there are multiple preparation commands (Tx->Tx) during the power on process.

16 0x10000Programming T 'location number' is active, otherwise T=''identifier'.

17 0x20000Value 1 = Control of the time monitoring via the PLC. That is the PLC starts/stops the time monitoring counter.

Value = 0 standard. That is, traversing blocks unequal to G00 let the counter run.

18 0x40000Message to the PLC if the last replacement tool is loaded from a tool group.

19 0x80000Value 0 = The synchronizations defined by bits 5,6,7,8 (0x20,...0x100) refer to the TM command output.

Value 1 = The synchronizations defined by bits 5,6,7,8 (0x20,...0x100) refer to the main run block.

20 0x100000Value 0 = Standard setting: If the PLC signal 'program test active' is present, then the commands generated are not output to the PLC! NCK acknowledges the commands itself. No magazine data is changed. Tool data are not changed. Exception: The tool status of the tool activated in test mode can assume the status 'active'.

Value 1 = If the PLC signal 'program test active' is present, then the commands generated are output to the PLC. Depending upon the type of acknowledgement by the PLC, tool/magazine data can be changed in the NCK. If the acknowledgement parameters for the 'target magazine' are given the values of the 'source magazine', then there is no tool transport and thus also no data change in the NCK. Exception: The tool status of the tool activated in test mode can assume the status 'active'.

21 0x200000Value 0 = Standard setting: Ignore the tool state 'W' during tool selection (0x20 = tool is being changed).

Value 1 = Tools in the state 'W' cannot be selected by another tool change/tool preparation command.

22 0x400000Value 0 = Standard setting

Value 1 = If the function T='location number' (bit16) is active then the tool groups are divided into subgroups. $TC_TP11 is the grouping parameter.During the transition to the replacement tool, only those tools of the group are recognized as replacement tools that have set at least one bit of the tool on the programmed location in the $TC_TP11 value.

23 0x800000Value 0 = Standard setting: TMMG selects the tool in the main run optimally and safely. That is, in a serious case of offset selection, the interpreter must wait for the end of the tool selection.

Value 1 = For simple applications. Interpreter selects the tool itself. That is there is no synchronization with the main run is required for offset selection. (However, an 'uncorrectable' alarm may be issued if the tool becomes unserviceable after selection but before being loaded.)

24 0x1000000Value 0 = Standard setting: If the PLC commands 8 and 9 want to move a tool to a location reserved for another tool, then this is rejected with an alarm.

Value 1 = If the PLC commands 8 and 9 want to move a tool to a location reserved for another tool with 'reserved for tool from buffer' (bit value= 'H4'), then this is possible. This location reservation is removed before the execution of the motion ('reserved for new tool to be loaded' (bit value= 'H8') remains effective).

With the default setting - Bit6-9 = 0 - the synchronization is related to a tool change for main spindle/main tool holder in the block in which a cutting edge of the new tool has been selected for the first time.

The synchronization can either be made via the transport acknowledgement or via the end acknowledgement.

If the option for the tool management or magazine management is missing, bit no. 0 cannot be set.

If the option for the tool monitoring is missing, bit no. 1 cannot be set.

(However, if bit no. 0 can be set, then that also gives the right to set bit no. 1.)

All functions as from bit no. 3 only become effective if bit no. 0 is set.

Examples:

TOOL_MANAGEMENT_MASK = 0x1 -> tool and/or magazine management active

TOOL_MANAGEMENT_MASK = 0x3 -> TM + tool monitoring function active

TOOL_MANAGEMENT_MASK = 0x20003 -> TM + tool monitoring function active;
PLC controls time monitoring

TOOL_MANAGEMENT_MASK = 0x2 -> tool monitoring function active without TM

20320	TOOL_TIME_MONITOR_MASK			C06, C09	FBW
-	Time monitoring for tool in tool holder			DWORD	PowerOn
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	-	-	7/2

Description: Activation of the tool time monitoring for the tool holders / spindles 1..x.

As soon as the path axes are traversed (not with G00, always with G63), the tool time monitoring data of the active D compensation for the tool that is present in the selected tool holder, which is also the master tool holder, are updated.

Notice:

The time monitoring can be switched off through the PLC.

Notice:

With test mode activated, the time monitoring is switched off automatically.

Bit No. Meaning when bit is set

0...x-1 Monitoring of tool in tool holder 1...x

Example: $MC_TOOL_TIME_MONITOR_MASK = 'H5' or = 'B101'.

The two tool holders with numbers 1 and 3 are generally time-monitored.

If tools are present on tool holders 1, 2, 3 and if the active tool is on master tool holder 1, then exactly this tool is monitored, and the actual time value of the active D compensation reduced.

If the active tool is later on tool holder 2, then it is not time-monitored, as bit 1 (for tool holder=2) of $MC_TOOL_TIME_MONITOR_MASK is not set.

Note:

If you are working with setting $MC_CUTTING_EDGE_DEFAULT=-2, then there can be programming situations, where the active tool does not equal the tool changed in. In this situation, the tool of the master tool holder is monitored (instead of the active tool).

And this only, if the active D compensation number is also known to the tool on the tool holder. Otherwise, there will be no time monitoring.

20350	TOOL_GRIND_AUTO_TMON			C06, C09	W4
-	Activation of tool monitoring. 0/1: Monitoring off/on			BYTE	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2

Description: This MD is used to define whether tool monitoring is switched on automatically if tool length compensation for a grinding tool with monitoring is selected (odd type number types 401 - 499).

TOOL_GRIND_AUTO_TMON = 1 : Automatic monitoring switched on

TOOL_GRIND_AUTO_TMON = 0 : Automatic monitoring switched off

20360	TOOL_PARAMETER_DEF_MASK			C09	W1
-	Definition of tool parameters			DWORD	PowerOn
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xFFFF	7/2

Description: Definition of effects of tool parameters.

Bit no. Meaning when bit is set

Bit 0: (LSB):

For turning and grinding tools, the wear parameter of the transverse axis is allowed for as diameter value.

For SW 5.3 and higher:

Bit 1:

For turning and grinding tools, the tool length component of the transverse axis is allowed for as diameter value.

Bit 2:

If a wear component or a length component is allowed for as diameter value, the tool may be used only in the plane that was active when the tool was selected. A plane change leads to an alarm.

Bit 3:

Zero offsets in frames in the transverse axis are allowed for as diameter value.

Bit 4:

PRESET value is allowed for as diameter value

Bit 5:

Allow for external work offset in the transverse axis as diameter value

Bit 6:

Read actual values of the transverse axis as diameter value (AA_IW, AA_IEN, AA_IBN, AA_IB, caution: but not AA_IM)

Bit 7:

Display of all actual values of the transverse axis as diameter value independent of the G code of group 29 (DIAMON / DIAMOF)

Bit 8:

Display of the distance-to-go in the WCS always as radius

Bit 9:

During DRF handwheel travel of a transverse axis, only half the distance of the specified increment is traveled (on the condition that $MN_HANDWHEEL_TRUE_DISTANCE = 1).

Bit10:

Activate the tool component of an active orientable tool holder even if no tool is active.

Bit11:

The tool parameter $TC_DP6 is not interpreted as tool radius but as tool diameter.

Bit12:

The tool parameter $TC_DP15 is not interpreted as wear of the tool radius but as wear of the tool diameter.

Bit13:

During JOG of circles the circle center coordinate is always a radius value, see 42690 $SC_JOG_CIRCLE_CENTRE.

Bit14:

Absolute values of the transverse axis with cycle masks in the radius

Bit15:

Incremental values of the transverse axis with cycle masks in the radius

20370	SHAPED_TOOL_TYPE_NO			C01, C08	-
-	Tool type number for contour tools			DWORD	Immediately
-					
-	4	0, 0, 0, 0,0, 0, 0, 0,0, 0, 0, 0...	-	-	7/2

Description: Indicates for each channel max. two number ranges for tool types that are treated as forming tools. Therefore individual ranges are possible both for grinding and for turning tools.

The first range is specified by the first and the second number, the second range by the third and fourth number.

If the first number is not smaller than the second one (the same applies for the third and fourth number), no range will be defined, but two individual numbers will be specified instead.

The numbers 400 through 599 are permissible (tool type numbers for turning and grinding tools), and also value 0 (no tool type number defined).

Examples:

400 405 590 596 : Tool types 400-405 and 590-596 are contour tools

410 400 590 596 : tool types 400, 410 and 590-596 are contour tools

450   0 420 430 : Tool types 450 and 420-430 are contour tools

20372	SHAPED_TOOL_CHECKSUM			C01, C08	-
-	Checksum test for contour tools			BOOLEAN	Immediately
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/5

Description: Indicates for each channel whether for completion of the contour tool definition an edge must be available that includes the negative sums of tool length components and tool radius of the previous edges.

20380	TOOL_CORR_MODE_G43G44			C01, C08, C11	FBFA
-	Treatment of tool length compensation with G43 / G44			BYTE	Reset
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,00 ,0,0,0	0	2	7/2

Description: This machine data determines in ISO dialect M (G43 / G44) the way in which length compensations programmed with H are processed.

0: Mode A

Tool length H always acts on the third geometry axis (usually Z)

1: Mode B

Tool length H acts, depending on the active plane, on one of the three geometry axes. This means with

G17 on the 3rd geometry axis (usually Z)

G18 on the 2nd geometry axis (usually Y)

G19 on the 1st geometry axis (usually X)

In this mode, compensations in all three geometry axes can be configured through multiple programming, i.e. through the activation of one component, the length compensation possibly active in another axis is not deleted.

2: Mode C

The tool length acts, independent of the active plane, on the axis that has simultaneously been programmed with H. Otherwise, the response is the same as with mode B.

20382	TOOL_CORR_MOVE_MODE			C01, C08	FBFA
-	Traversing of tool length compensation			BOOLEAN	Reset
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: This machine data determines how the tool length compensations are traversed.

0: A tool length compensation is only traversed if the associated axis has been programmed (behavior as in previous software versions)

1: Tool lengths are always traversed independently of whether the associated axes are programmed or not.

20384	TOOL_CORR_MULTIPLE_AXES			C01, C08, C11	FBFA
-	Tool length compensation in several axes simultaneously			BOOLEAN	Reset
-					
-	-	TRUE,TRUE,TRUE,TR UE,TRUE,TRUE,TRUE ...	-	-	7/2

Description: This machine data determines for tool length compensation in ISO dialect M (ISO2) (G43 / G44), whether the compensation shall be allowed in mode C (selection of the axis on which the compensation is acting by specifying the corresponding axis letter) to act on several axes simultaneously.

If this machine data is 1, this type of programming is allowed; otherwise it is rejected with an alarm.

20390	TOOL_TEMP_COMP_ON			C01, C08	W1
-	Activation of temperature compensation for tool length			BOOLEAN	Reset
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: This machine data activates the temperature compensation in tool direction (see also setting data TOOL_TEMP_COMP)

20392	TOOL_TEMP_COMP_LIMIT			C01, C08	W1,BAS,PG
mm	Max. temperature compensation for tool length			DOUBLE	Reset
-					
-	3	1.0, 1.0 , 1.0,1.0, 1.0 , 1.0...	-	-	7/7

Description: With temperature compensation, this machine data indicates the maximum permissible value for the tool length for each geometry axis.

If a temperature compensation value larger than this limit value is entered, it will be limited without an alarm.

20396	TOOL_OFFSET_DRF_ON			C01, C08	W1
-	Handwheel override in tool direction			BOOLEAN	Reset
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2
710-6a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
720-6a2c	-	-	-	-	-1/-
720-31a10c	-	-	-	-	-1/-
730-6a2c	-	-	-	-	-1/-
730-31a10c	-	-	-	-	-1/-
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This machine data activates the handwheel override in tool direction.

When this machine data is set, a handwheel override is active in the axis that is assigned to length L1 of the active tool, in the direction defined by tool orientation.

Example:

G17 is active; the tool is a milling tool; tool length L1 is therefore assigned to the Z axis (the 3rd geometry axis).

When the tool (e.g. with active 5-axis transformation) is turned around the Y axis by 90 degrees, so that it shows in X direction, a handwheel override becomes active in the 3rd axis in the X axis.

20400	LOOKAH_USE_VELO_NEXT_BLOCK			EXP, C05	B1
-	LookAhead following block velocity			BOOLEAN	PowerOn
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/2

Description: For SW-internal function optimization.

20430	LOOKAH_NUM_OVR_POINTS			EXP, C02, C05	B1
-	Number of override characteristics for LookAhead			DWORD	PowerOn
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	2	7/2

Description: For SW-internal function optimization.

20440	LOOKAH_OVR_POINTS			EXP, C05	B1
-	Override switch points for Look Ahead			DOUBLE	PowerOn
-					
-	2	1.0, 0.2,1.0, 0.2,1.0, 0.2,1.0, 0.2...	0.2	2.0	7/2

Description: For SW-internal function optimization.

20442	LOOKAH_SYSTEM_PARAM			EXP	-
-	System parameter for extended LookAhead			DOUBLE	NEW CONF
-					
-	MD_MAXNUM_LOOKAH_TEST_PARAM	0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0....	-	-	0/0

Description: System parameter for extended LookAhead.

20443	LOOKAH_FFORM			EXP, C05	-
-	Activate extended LookAhead			BYTE	NEW CONF
-					
-	5	0, 0, 0, 0, 0,0, 0, 0, 0, 0...	0	5	7/2

Description: The MD specifies for which technology group the extended LookAhead is active. Value 0: default LookAhead; value 1: extended LookAhead

e.g. $MC_LOOKAH_FFORM[4]=1; i.e. activation for DYNFINISH.

Entry for all dynamic G code groups.

When changing between the default LookAhead and the extended LookAhead or vice versa the continuous-path mode is interrupted by an interpolatory stop.

20450	LOOKAH_RELIEVE_BLOCK_CYCLE			EXP, C05	B1
-	Relief factor for block cycle time			DOUBLE	PowerOn
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2

Description: Block cycle problems occur for the following reason:

The traversing length of the NC blocks to be processed is so short that the Look Ahead function must reduce the machine velocity to provide enough time for block preparation. In this situation, constant deceleration and acceleration of the path motion can occur.

This machine data defines the extent to which such velocity fluctuations are to be smoothed.

Special cases:

Values up to approx. 1.0 are appropriate.

The value 0.0 means that the function is deactivated.

20455	LOOKAH_FUNCTION_MASK			EXP, C05	FBSI
-	Look Ahead special functions			BYTE	NEW CONF
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	1	7/2

Description: Look Ahead special functions:

Bit 0 = 1:

The Safety Integrated setpoint limitation is already taken into account in Look Ahead.

20460	LOOKAH_SMOOTH_FACTOR			EXP, C05	B1
%	Smoothing factor for Look Ahead			DOUBLE	NEW CONF
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0.	500.0	7/2

Description: A smoothing factor can be defined to give a more stable path velocity control.

It defines the maximum permitted productivity loss.

Acceleration procedures which contribute less than this factor to a shorter program run time are then not executed.

In this case, only those acceleration procedures whose frequency lies above the frequency parameterized in MD $MA_LOOKAH_FREQUENCY are taken into account.

The entry of 0.0 deactivates the function.

20462	LOOKAH_SMOOTH_WITH_FEED			EXP, C05	B1
-	Path velocity smoothing with programmed feed			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/2

Description: The MD defines whether the programmed feed is also taken into account with tool path velocity smoothing. In these cases, the defined factor of MC_LOOKAH_SMOOTH_FACTOR can be met better when the override is set to 100%.

Related to:

$MA_LOOKAH_FREQUENCY,

$MC_LOOKAH_SMOOTH_FACTOR

20464	PATH_MODE_MASK			EXP, C05	-
-	Path behavior			DWORD	Reset
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	0xffff	7/2

Description: This machine data is used to influence the path action

Bit0:

If only rotary axes are traversed in the block as path axes with active G700, the programmed rotary axis velocity corresponds to

0: [degrees/min]

1: [25.4*degrees/min]

20465	ADAPT_PATH_DYNAMIC			EXP, C05	B1
-	Adaptation of path dynamic response			DOUBLE	NEW CONF
-					
-	2	1.0, 1.0,1.0, 1.0,1.0, 1.0,1.0, 1.0...	1.0	100.0	7/2

Description: This adaptation factor can be used to reduce the dynamics of changes in tool path velocity.

ADAPT_PATH_DYNAMIC[0] is effective with Brisk, reducing the permissible acceleration

ADAPT_PATH_DYNAMIC[1] is effective with Soft, reducing the permissible jerk

Considering only acceleration processes using a frequency above the frequency parameterized in MD $MA_LOOKAH_FREQUENCY.

To disable this function, enter 1.0.

20470	CPREC_WITH_FFW			EXP, C06, C05	K6,B1
-	Programmable contour accuracy			BOOLEAN	PowerOn
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: This machine data defines the behavior of the programmable function CPRECON in conjunction with feedforward control.

FALSE: The CPRECON function is inactive when feedforward control is activated simultaneously.

TRUE: CPRECON is also active with feedforward control.

Related to:

$SC_CONTPREC, $SC_MINFEED

20480	SMOOTHING_MODE			EXP	B1
-	Behavior of smoothing with G64x			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	15344	7/7

Description: Configuration of smoothing with G641 and G642 or G643.

The MD is decimal-coded. The units digits define the behavior of G643 and the tens digits the behavior of G642. With the hundreds digit, you can define whether, with G641 or G642, the axes are possibly accelerated within the smoothing area or traversed at constant velocity. With the thousands and ten-thousands digit, smoothing with G644 is configured.

x0: G643 uses axis-specific tolerances. They are set with the axis-specific MD MA_COMPRESS_POS_TOL.

x1: G643 uses the contour tolerance SC_SMOOTH_CONTUR_TOL for the geometry axes at smoothing. The remaining axes are smoothed by using the axis-specific tolerances MA_COMPRESS_POS_TOL.

x2: The orientation movement is smoothed by using the angular tolerance SC_SMOOTH_ORI_TOL. For all other axes, the axis-specific tolerances MA_COMPRESS_POS_TOL are used.

x3: Combination of the two possibilities 01 and 02. That means, G643 uses the tolerances SC_SMOOTH_CONTUR_TOL and SC_SMOOTH_ORI_TOL. Any further axes are smoothed with axis-specific tolerance.

x4: G643 uses the smoothing length programmed with ADIS= or ADISPOS=. Specification of possible axis-specific tolerances or the contour and orientation tolerance is ignored.

0x: G642 uses axis-specific tolerances. They are set with the axis-specific MD MA_COMPRESS_POS_TOL.

1x: G642 uses the contour tolerance for the geometry axes at smoothing. The remaining axes are smoothed by using the axis-specific tolerances MA_COMPRESS_POS_TOL.

2x: The orientation movement of G642 is smoothed by using the angular tolerance SC_SMOOTH_ORI_TOL. For all other axes, the axis-specific tolerances MA_COMPRESS_POS_TOL are used.

3x: Combination of the two possibilities 10 and 20. That means, G642 uses the tolerances SC_SMOOTH_CONTUR_TOL and SC_SMOOTH_ORI_TOL. Any further axes are smoothed with axis-specific tolerance.

x4: G642 uses the smoothing length programmed with ADIS= or ADISPOS=. Specification of possible axis-specific tolerances or the contour and orientation tolerance is ignored.

< 100:

Within the smoothing range, a profile of the limit velocity is calculated, as it results from the specified maximum values for acceleration and jerk of the axes or the path involved. This can lead to an increase of the path velocity in the smoothing range and consequently to an acceleration of the axes involved.

>=100:

For smoothing blocks with G641/G642, a profile of the limit velocity is not calculated. Only a constant limit velocity is specified. Thus, it can be avoided that, during smoothing with G641/G642, the involved axes are possibly accelerated in the smoothing range. However, this setting can possibly lead to smoothing blocks being traversed at a velocity that is too low, especially with large smoothing ranges.

1xx:

No velocity profile for G641

2xx:

No velocity profile for G642

Possible values for the thousands digit (configuration of G644):

0xxx:

When smoothing with G644, the maximum deviations of each axis specified in MD COMPRESS_POS_TOL are adhered to. If the dynamic response of the axis allows it, the specified tolerance is possibly not fully utilized.

1xxx:

When smoothing with G644, the smoothing distance is specified.

2xxx:

When smoothing with G644, the maximum occuring frequency of the smoothing movement of each axis will be limited. The maximum frequency is specified in MD $MA_LOOKAH_FREQUENCY.

3xxx:

When smoothing with G644, neither the tolerance nor the smoothing sitance are monitored. Each axis traverses around a corner with the maximum possible dynamic response. With SOFT, both the maximum acceleration and the maximum jerk of each axis is observed. With BRISK, the jerk is not limited; instead each axis traverses with the maximum possible acceleration.

4xxx:

When smoothing with G644, the maximum deviations of each axis specified in MD COMPRESS_POS_TOL are adhered to. Differing from value 0xxx, the specified tolerance is fully utilized where possible. The axis then does not reach its maximum possible dynamic response.

5xxx:

When smoothing with G644, the smoothing distance is specified (ADIS or ADISPOS). Differing from value 1xxx, the specified smoothing distance is fully utilized here, if possible. The axes involved then possibly do not reach their maximum possible dynamic response.

Possible values for the ten-thousands digit (configuration of G644):

0xxxx:

The velocity profiles of the axes are defined in the smoothing range without jerk limitiation when BRISK is active and with jerk limitation when SOFT is active.

1xxxx:

The velocity profiles of the axes are defined in the smoothing range always with jerk limitation independent of whether BRISK or SOFT is active.

The values of the units, tens, hundreds and thousands digits are added.

Related to:

$MA_COMPRESS_POS_TOL,

$SC_SMOOTH_CONTUR_TOL,

$SC_SMOOTH_ORI_TOL

20482	COMPRESSOR_MODE			EXP	F2,PGA
-	Mode of compressor			BYTE	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	133	7/7

Description: This MD is used to set the compressor operating mode.

The ones, tens and hundreds digits have different meanings.

The following possibilities are available:

Ones:

0: With the compressor, the tolerances specified via $MA_COMPRESS_POS_TOL are met for all axes (geometry and orientation axes).

1: With the compressor, the contour tolerances specified via $SC_COMPRESS_CONTUR_TOL become active for the geometry axes.

For the orientation axes, the axis-specific tolerances $MA_COMPRESS_POS_TOL become active.

2: With the compressor, the axis-specific tolerances $MA_COMPRESS_POS_TOL become active for the geometry axes. The orientation movement is compressed with the maximum angular deviations specified via $SC_COMPRESS_ORI_TOL and $SC_COMPRESS_ORI_ROT_TOL being observed.

3: With the compressor, the contour tolerance $SC_COMPRESS_CONTUR_TOL becomes active for the geometry axes and the maximum angular deviation $SC_COMPRESS_ORI_TOL or $SC_COMPRESS_ORI_ROT_TOL for the orientation axes.

Tens:

The tens digits of this MD can be used to set a compressor response that is compatible with previous software releases (< SW 6.3).

0x: All blocks with orientations and value assignments are compressed.

This is the default setting.

Notice: This response is incompatible with previous software releases!

1x: Blocks with value assignments are not compressed (e.g. X=100 ... etc.)

2x: Blocks with a programmed tool orientation are not compressed.

(e.g. A3= B3= C3=).

3x: All blocks with value assignments and/or programmed tool orientation are not compressed. With this setting, the response is fully compatible with previous software releases (< 6.3).

Hundreds:

The hundreds digits can be used to set whether circular blocks are compressed or not:

0xx: circular blocks are not compressed. Compatible with previous releases.

1xx: circular blocks are linearized and compressed by COMPCAD.

20484	COMPRESSOR_PERFORMANCE			EXP	PGA
-	Compressor power			BYTE	Reset
-					
-	-	9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9	0	9	0/0

Description: This MD is used to set the compressor power. Higher values ensure better surfaces, but also require a higher computer power. The correct value is prespecified for each NCU. For this reason, this MD should only be modified in exceptional cases.

20485	COMPRESS_SMOOTH_FACTOR			EXP, C05	B1
-	Smoothing by compressor			DOUBLE	NEW CONF
-					
-	5	0., 0., 0., 0., 0.,0., 0., 0., 0., 0....	0.	1.	7/2

Description: Smoothing of the programmed block end points with compressor type COMPCAD. Value 0: no smoothing. Value 1: maximum smoothing.

Entry for all dynamic G code groups.

20486	COMPRESS_SPLINE_DEGREE			EXP, C05	B1
-	Compressor spline degree			BYTE	NEW CONF
-					
-	5	3, 3, 3, 3, 3,3, 3, 3, 3, 3...	3	5	0/0

Description: Spline degree for compressor type COMPCAD. Value 3 is recommended; value 5 may be possible for roughing, if soft and rapid movements are more important than accuracy

Entry for all dynamic G code groups.

20488	SPLINE_MODE			EXP	-
-	Setting for spline interpolation			BYTE	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	7	7/7

Description: This MD is used to determine the settings for spline interpolation. The allocation of the spline segments to the NC blocks can thus be influenced. With spline interpolation, the spline blocks are combined, if possible, in such a way, that there are no blocks that are too short and could lead to a reduction in the possible path velocity.

Bit 0: With BSPLINE, blocks that are too short are avoided.

Bit 1: With BSPLINE/ORICURVE, blocks that are too short are avoided.

Bit 2: With CSPLINE, blocks that are too short are avoided.

20490	IGNORE_OVL_FACTOR_FOR_ADIS			EXP	-
-	G641/G642 independent of overload factor			BOOLEAN	NEW CONF
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7

Description: A block transition is normally only smoothed with G641 and G642 when the tool path velocity at block transition is reduced due to the set overload factor (MD $MA_MAX_ACCEL_OVL_FACTOR). When SOFT is active, the maximum jerk at block transitions is limited additionally by machine data $MA_PATH_TRANS_JERK_LIM. This means that the effect of smoothing with G641 and G642 depends on the set values for the overload factor and possibly for the maximum jerk.

By setting MD $MC_IGNORE_OVL_FACTOR_FOR_ADIS = TRUE, you can achieve that a block transition is smoothed with G641 and G642 independent of the set values for the overload factor.

20500	CONST_VELO_MIN_TIME			EXP, C05	B2
s	Minimum time with constant velocity			DOUBLE	PowerOn
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0.0	0.1	7/2

Description: Defines the minimum time for constant velocity during transition from acceleration to deceleration in short blocks in which the set velocity cannot be reached. Entering a time of at least several IPO cycles prevents a direct transition from the acceleration to the deceleration phase and thus reduces the acceleration jump to half. This acceleration limitation is only active with the acceleration profile BRISK.

MD irrelevant for:

Look Ahead does not take account of this function.

20550	EXACT_POS_MODE			EXP	B1
-	Exact stop conditions on G00/G01.			BYTE	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	33	7/2

Description: Configuration of the exact stop conditions for G00 and other G codes of the 1st G code group.

The MD is decimal-coded. The units digits define the behavior at G00 (infeed motion) and the tens digits the behavior of all the other G codes of the 1st group ("machining G codes").

x0: At G00, the relevant programmed exact stop conditions become active.

x1: At G00, G601 (fine positioning window) becomes active independent of the programmed exact stop condition.

x2: At G00, G602 (coarse positioning window) becomes active independent of the programmed exact stop condition.

x3: At G00, G603 (setpoint value reached) becomes active independent of the programmed exact stop condition.

0x: At the machining G codes, the relevant programmed exact stop conditions become active.

1x: At the machining G codes, G601 (fine positioning window) becomes active independent of the programmed exact stop condition.

2x: At the machining G codes, G602 (coarse positioning window) becomes active independent of the programmed exact stop condition.

3x: At the machining G codes, G603 (setpoint value reached) becomes active independent of the programmed exact stop condition.

The values of the units digits and tens digits are added.

For example, the value of EXACT_POS_MODE = 2 means that the exact stop condition G602 is always activated automatically at G00, independently of which exact stop condition was programmed. At all other G codes of group 1, the programmed exact stop condition becomes active.

20552	EXACT_POS_MODE_G0_TO_G1			EXP	PG
-	Exact stop condition at G00-G01 transition			BYTE	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	5	7/2

Description: Configuration of a stop at transition from G00 to a different G code of the 1st G code group, and also vice versa, at transition from non-G00 to G00 in continuous-path mode.

In exact-stop mode, the positioning window programmed or set in $MC_EXACT_POS_MODE is used.

The following applies:

0: No additional stop, no control of exact stop

1: Behavior active as with G601 (positioning window, fine).

2: Behavior active as with G602 (positioning window, coarse).

3: Behavior active as with G603 (setpoint reached).

4: As 0,

in addition, the override of the subsequent non-G00 block is taken into account in the G00 block via LookAhead in the case of a change from G00 to non-G00.

5: As 0,

in addition, the override of the subsequent block is taken into account via LookAhead in the case of a change from G00 to non-G00 and non-G00 to G00.

20600	MAX_PATH_JERK			C05	B2
m/s³	Path-related maximum jerk			DOUBLE	NEW CONF
-					
-	5	100., 100., 100., 100., 100....	1.e-9	-	7/2

Description: The jerk limitation restricts the path acceleration change in SOFT mode. The path acceleration divided by the jerk limitation value produces a time in which the acceleration change takes place.

The jerk limitation is activated on the path by the NC command SOFT, and deactivated by BRISK.

MD irrelevant for:

Error states that lead to a rapid stop. In addition, the limitation is also inactive for positioning axes.

There is an entry for each dynamic G code group.

20602	CURV_EFFECT_ON_PATH_ACCEL			EXP, C05	B1
-	Effect of path curvature on path dynamic			DOUBLE	NEW CONF
-					
-	5	0., 0., 0., 0., 0.,0., 0., 0., 0., 0....	0.	0.95	7/2

Description: This MD is used to determine whether the reaction of path curvature on path acceleration and path velocity is taken into account

0:

Not taken into account

> 0:

If required, path velocity and path acceleration are reduced to keep a sufficient reserve on the machine axes for centripetal acceleration.

0.75: Recommended setting.

$MC_CURV_EFFECT_ON_PATH_ACCEL indicates the share of the axis accelerations (see $MA_MAX_AX_ACCEL[..]), which can be used for centripetal acceleration. The remainder is used for changes in path velocity.

Centripetal acceleration is not required for linear blocks; therefore, full axis acceleration is available for path acceleration. On slightly curved contours or with a sufficiently low maximum path feedrate $MC_CURV_EFFECT_ON_PATH_ACCEL has no full or no effect at all. Correspondingly, path acceleration is higher than specified via (1. - $MC_CURV_EFFECT_ON_PATH_ACCEL) * $MA_MAX_AX_ACCEL[..].

There is an entry for each dynamic G code group.

20603	CURV_EFFECT_ON_PATH_JERK			EXP, C05	B1
-	Effect of path curvature on path jerk			DOUBLE	NEW CONF
-					
-	5	0., 0., 0., 0., 0.,0., 0., 0., 0., 0....	0.	1000.	7/2

Description: Allows the reaction of the path curvature on the path jerk to be taken into account on especially jerk-sensitive machines.

Entry for each dynamic G code group.

20605	PREPDYN_SMOOTHING_FACTOR			EXP, C05	B1
-	Factor for curve smoothing			DOUBLE	NEW CONF
-					
-	5	1., 1., 1., 1., 1.,1., 1., 1., 1., 1....	-	-	1/1

Description: Factor to determine the degree of smoothing and torsion.

A larger value of this MD causes a stronger smoothing and thus a more homogenous curvature/torsion and resulting path velocity.

With this factor being zero no smoothing is performed.

There is an entry for all dynamic G code groups.

20606	PREPDYN_SMOOTHING_ON			EXP, C05	B1
-	Activation of curve smoothing			BOOLEAN	NEW CONF
-					
-	5	0, 0, 0, 0, 0,0, 0, 0, 0, 0...	-	-	7/7

Description: Switch on of curve and torsion smoothing.

Smoothing of the curve or torsion causes a homogenous path velocity.

Smoothing is only performed, when the relevant factor is MD 20605 $MC_PREPDYN_SMOOTHING_FACTOR > 0.

There is an entry for all dynamic G code groups.

20607	PREPDYN_MAX_FILT_LENGTH_GEO			EXP, C05	B1
mm, degrees	Maximum filter length for geometry axes			DOUBLE	NEW CONF
-					
-	5	2., 2., 2., 2., 2.,2., 2., 2., 2., 2....	-	-	1/1

Description: Maximum filter length for curve and torsion smoothing of the geometry axes.

There is an entry for all dynamic G code groups.

20608	PREPDYN_MAX_FILT_LENGTH_RD			EXP, C05	B1
mm, degrees	Maximum filter length for rotary axes			DOUBLE	NEW CONF
-					
-	5	5., 5., 5., 5., 5.,5., 5., 5., 5., 5....	-	-	1/1

Description: Maximum filter length for curve and torsion smoothing of the rotary axes.

There is an entry for all dynamic G code groups.

20610	ADD_MOVE_ACCEL_RESERVE			C05	K1,B1,B2
-	Acceleration margin for overlaid movements			DOUBLE	PowerOn
-					
-	-	.2,.2,.2,.2,.2,.2,.2,.2,.2,.2,.2,.2,.2...	0.	0.9	7/2

Description: This machine data contains the factor which defines the acceleration margin which is not used by a path movement in order to provide sufficient acceleration reserves for an overlaid movement for the velocity control.

A factor of 0.2 means that the path axes utilize 80% of the path acceleration in normal operation. Only when a request for overlaid movement is made, can 100% of the path acceleration be utilized.

MD irrelevant for:

Error states that lead to a rapid stop. In addition, the limitation is also ineffective for positioning axes.

Special cases:

At the moment the machine data is only taken into account if the function "Fast retraction" is first activated.

Related to:

MD 32300: MAX_AX_ACCEL (axis acceleration)

20620	HANDWH_GEOAX_MAX_INCR_SIZE			C08, C06	H1
mm	Limitation handwheel increment for geometry axes			DOUBLE	PowerOn
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2

Description: > 0: Limitation of the size of the selected increment for geometry axes
$MN_JOG_INCR_SIZE0[<increment/VDI signal>] or
$SN_JOG_VAR_INCR_SIZE for geometry axes
0: No limitation on geometry axes

20621	HANDWH_ORIAX_MAX_INCR_SIZE			C08, C06	F2
degrees	Limiting of handwheel increment for orientation axes			DOUBLE	PowerOn
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2

Description: > 0: Limitation of the size of the selected increment for orientation axes
$MN_JOG_INCR_SIZE[<increment/VDI signal>] or
$SN_JOG_VAR_INCR_SIZE for orientation axes
= 0: No limitation on orientation axes

20622	HANDWH_GEOAX_MAX_INCR_VSIZE			C08, C06, C05	H1
mm/min	Path velocity override			DOUBLE	PowerOn
-					
-	-	500.,500.,500.,500.,500.,500.,500....	-	-	7/2

Description: The following applies to the velocity override of the path:
> 0: Limitation of the size of the selected increment
($MN_JOG_INCR_SIZE_[<increment/VDI signal>] or
$SN_JOG_VAR_INCR_SIZE) / 1000*IPO sampling time
= 0: No limitation

20623	HANDWH_ORIAX_MAX_INCR_VSIZE			C08, C06, C05	F2
rev/min	Orientation velocity overlay			DOUBLE	PowerOn
-					
-	-	0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1...	-	-	7/2

Description: For the orientation velocity overlay:
> 0: Limitation of the size of the selected increment
($MN_JOG_INCR_SIZE[< increment/VDI signal>] or
$SN_JOG_VAR_INCR_SIZE) / 1000 * IPO sampling time
= 0: No limitation

20624	HANDWH_CHAN_STOP_COND			EXP, C09	H1
-	Definition of response of handwheel travel, channel-specific			DWORD	PowerOn
-					
-	-	0x13FF,0x13FF,0x13FF,0x13FF,0x13FF...	0	0xFFFF	7/2

Description: Definition of the behavior for handwheel travel to channel-specific VDI interface signals (bit 0 to bit 7) or the context-sensitive interpolator stop (bit 7):

Bit = 0:

Interruption or gathering of the displacements entered via the handwheel

Bit = 1:

Stop of traversing and no gathering

Bit assignment

Bit 0: Mode group stop

Bit 1: Mode group stop, axes plus spindle

Bit 2: NC stop

Bit 3: NC stop, axes plus spindles

Bit 4: Feed disable (exceptions for $MA_BASE_FUNCTION_MASK bit 6)

For bit 4 feed disable it must be considered that a PLC-controlled axis, for which $MA_BASE_FUNCTION_MASK bit 6 = 1, is not stopped by the feed disable and that no interruption and no abort is triggered here.

Bit 5: Feedrate override

Bit 6: Rapid traverse override

Bit 7: Feed stop, geometry axis or context-sensitive interpolator stop

Bit 8 = 0:

The maximum feedrate for handwheel travel is that specified in machine data JOG_AX_VELO of the corresponding machine axis/axes.

Bit 8 == 1:

The maximum feedrate for handwheel travel is that specified in machine data MAX_AX_VELO of the corresponding machine axis/axes.

Bit 9 = 0:

The override is active during handwheel travel

Bit 9 = 1:

During handwheel travel, the override is assumed to be 100% independent of the position of the override switch.

Exception: override 0, which is always active.

Bit 10 = 0:

Machine data $MN_HANDWH_REVERSE is not active for DRF, i.e. handwheel travel with DRF is carried out as if $MN_HANDWH_REVERSE == 0.

Bit 10 = 1:

Machine data $MN_HANDWH_REVERSE is active for DRF.

Bit 11 = 0:

When the contour handwheel is deselected, program processing is continued automatically.

Bit 11 = 1:

When the contour handwheel is deselected, an NCSTOP is triggered automatically. Program processing is not continued until NCSTART is entered.

Bit 12 = 0

NC start has no effect on handwheel travel

Bit 12 = 1:

After NC start the paths collected so far will be rejected.

Bit 13 = 0:

For DRF, bits 0 - 3 and bit 12: bit == 0 / bit == 1 are active (see above),

Bit 13 = 1:

For DRF, bits 0 - 3 and bit 12 are NOT active: the DRF motion is not interrupted by a stop, and even in the 'Automatic interrupted' state (achieved by NC Stop), a DRF motion can be carried out.

Note:

If an alarm leads to an axis stop and if such an alarm is pending, no DRF motion can take place.

Bit 14 = 0:

The maximum feedrate for handwheel travel is that specified in setting data $SN_JOG_REV_SET_VELO or in machine data $MA_JOG_REV_VELO (for revolutional feedrate) or in $MA_JOG_REV_VELO_RAPID (for rapid traverse) of the corresponding machine axis, allowing for the spindle or rotary axis feedrate.

Bit 14 = 1:

The maximum feedrate for handwheel travel in the case of rotational feedrate is that specified in machine data $MA_MAX_AX_VELO of the corresponding machine axis (see also bit 6).

Bit 15 = 0:

If an axis with active diameter programming is traversed in the channel, only half of the distance of the specified increment is traveled during handwheel travel ($MN_HANDWH_TRUE_DISTANCE = 1 or 3).

Bit 15 = 1:

If an axis with active diameter programming is traversed in the channel, the specified increment is fully traveled during handwheel travel ($MN_HANDWH_TRUE_DISTANCE = 1 or 3).

20700	REFP_NC_START_LOCK			C01, C03	R1
-	NC start disable without reference point			BOOLEAN	Reset
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/2

Description: 0: The NC/PLC interface signal (NC-Start) zum Starten von Teileprogrammen oder Teileprogrammsätzen (MDA und Überspeichern) ist wirksam, auch wenn eine oder alle Achsen des Kanals noch nicht referiert sind.

To ensure that the axes nevertheless reach the correct position after NC Start, the workpiece coordinate system (WCS) must be set to the correct value by means of other methods (scratch method, automatic zero offset determination etc.).

1: Those axes, for which the axial MD $MA_REFP_CYCLE_NR specifies that a reference point is obligate (value > -1), must have been referenced before NC Start is allowed.

20730	G0_LINEAR_MODE			C09	P2
-	G0 interpolation mode			BOOLEAN	PowerOn
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/2

Description: This machine data defines the interpolation behavior of G0:

0: Non-linear interpolation (RTLIOF): Every path axis interpolates as individual axis (positioning axis) independently of the other axes at rapid traverse of the axis ($MA_MAX_AX_VELO).

1: Linear interpolation (RTLION): The path axes are interpolated jointly.

Related to:

$MC_EXTERN_G0_LINEAR_MODE

20732	EXTERN_G0_LINEAR_MODE			N12	P2
-	G00 interpolation mode			BOOLEAN	PowerOn
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/2

Description: This machine data defines the interpolation behavior of G00:

0: Axes are traversed as positioning axes

1: Axes interpolate with each other

Related to:

EXTERN_INCREMENT_SYSTEM

20734	EXTERN_FUNCTION_MASK			N12	FBFA
-	Function mask for external language			DWORD	Reset
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	0xFFFF	7/2

Description: This machine data is used to influence functions in ISO mode.

Bit0: 0:

ISO mode T: "A" and "C" are interpreted as axes. If contour definition has been programmed, "A" or "C" must be preceded by a comma.

1:

"A" and "C" in the part program are always interpreted as a contour definition. An axis "A" or "C" is not allowed.

Bit1: 0:

ISO mode T: G10 P < 100 tool geometry
P > 100 tool wear

1:

G10 P < 10000 tool geometry
P > 10000 tool wear

Bit2: 0:

G04 dwell time: always [s] or [ms]

1:

If G95 is active, in spindle revolutions

Bit3: 0:

Errors in ISO scanner lead to an alarm

1:

Errors in ISO scannner are not output, the block is transferred to the Siemenstranslator.

Bit4: 0:

G00 is traversed with the current exact stop - continuous-path mode G code

1:

G00 is always traversed with G09

Bit5: 0:

Modulo rotary axis is positioned at the shortest possible distance

1:

Direction of rotation of modulo rotary axis depends on sign

Bit6: 0:

Only 4-digit program number allowed.

1:

8-digit program number allowed. If the program number has less than 4 digits, it is expanded to 4 digits with 0.

Bit7: 0:

Axis programming for geometry axis exchange/parallel axes is ISO mode-compatible.

1:

Axis programming for geometry axis exchange/parallel axes is compatible in ISO mode with Siemensmode.

Bit8: 0:

With cycles, the F value transferred is always interpreted as a feedrate.

1:

With threading cycles, the F value transferred is interpreted as pitch.

Bit9: 0:

Multiplication with 0.01mm / 0.0001inch is carried out in ISO mode T for G84, G88 and in standard mode F for G95.

1:

Multiplication with 0.001mm / 0.00001inch is carried out in ISO mode T for G84, G88 and in standard mode F for G95.

Bit10: 0:

With M96 Pxx, the program programmed with Pxx is always called in the case of an interrupt

1:

With M96 Pxx, CYCLE396.spf is always called in the case of an interrupt

Bit11: 0:

With G54 Pxx, only G54.1 is displayed

1:

With G54 Pxx, the programmed program is displayed after the point, e.g. G54.48

Bit12: 0:

When the subroutine defined with M96 Pxx is called, $P_ISO_STACK is not modified

1:

When the subroutine defined with M96 Pxx is called, $P_ISO_STACK is incremented

Bit13: 0:

G10 is executed without internal STOPRE

1:

G10 is executed with internal STOPRE

20750	ALLOW_G0_IN_G96			C09, C05	V1
-	G0 logic with G96, G961			BOOLEAN	PowerOn
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/2

Description: This machine data defines the speed regulation characteristic of the spindle in G0 blocks with constant cutting rate (G96, G961) selected .

1: In a G0 block, the spindle speed is kept constant at the last value of the previous block that was unequal G0.

Prior to a subsequent block that does not contain G0, the spindle speed is increased to a value that belongs to the transverse axis position of the subsequent block.

0: In a G0 block, the spindle speed changes against the transverse axis position.

20800	SPF_END_TO_VDI			C04, C03	H2
-	End of subroutine to PLC			BYTE	PowerOn
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	-	-	7/2

Description: Bit 0 = 1:

The M functions for subroutine end (M17 and/or M2/M30) are transferred to the PLC interface.

Bit 0 = 0:

The M functions for subroutine end (M17 and/or M2/M30) are not transferred to the PLC interface.

Note:

To prevent stopping in continuous-path mode, M17 must not be programmed alone in a block.

Example of a subroutine: G64 F2000 G91 Y10 X10
X10 Z10 M17

Bit 1 = 0:

M01:

conditional program stop is always output to PLC, irrespective of whether the M01 signal is active or not.

Fast auxiliary function output M=QU(1) is inactive because M01 is assigned to the 1st M function group and thus is always output at block end.

Bit 1 = 1:

M01:

conditional program stop is only output to PLC, if M01 is also active.

This thus enables optimal run-time processing of the part program.

With fast auxiliary function output M=QU(1), M1 is output during the movement; thus it is possible to traverse blocks in continuous-path mode with programmed M01 as long as M01 is not active.

The request of the M01 signal with M=QU(1) no longer occurs at block end but during the movement.

20850	SPOS_TO_VDI			C04, C03	S1
-	Output of M19 to PLC on SPOS/SPOSA			BYTE	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

Description: Bit 0 = 0:

SPOS and SPOSA are not output to the VDI interface.

Therefore there is no acknowledgement time of the M function, which can cause faults in the case of the very short spindle positioning blocks and SPOSA blocks.

Bit 0 = 1:

In the case of SPOS and SPOSA, "M19" is output to the VDI interface.

The response is the same as that of a programmed "M19".

20900	CTAB_ENABLE_NO_LEADMOTION			EXP	M3
-	Curve tables with jump of slave axis			BYTE	Reset
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/2

Description: This MD is used to configure the way jumps of the slave axis are processed in curve tables. A jump of the slave axis results from the presence of a movement of the slave axis in a segment of the curve table with no corresponding movement of the master axis.

The jumps of the slave axis may be programmed directly, or they are created internally in the control.

These segments may be created especially if a curve table with active tool radius compensation is generated.

The following configurations are possible:

0:   No curve tables are created that contain a jump of the slave axis. If a jump of the slave axis occurs, alarm 10949 (CTAB_NO_LEADMOTION) is issued and program processing is terminated. This setting is compatible with previous software versions.

1:   Curve tables containing a jump of the slave axis may be implemented. If a jump of the slave axis occurs, alarm 10955 (CTAB_NO_LEADMOTIONWARNING) is issued without terminating program processing.

2:   Curve tables with jumps of the slave axis are implemented without issuing an alarm or a note.

20905	CTAB_DEFAULT_MEMORY_TYPE			EXP	M3
-	Default memory type for curve tables			BYTE	Reset
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2

Description: This machine data defines the memory (SRAM or DRAM) in which the curve tables are created by default.

This MD is only relevant if no memory type was specified when defining a curve table using CTABDEF().

The following settings can be selected:

0: By default, curve tables are created in the SRAM.

1: By default, curve tables are created in the DRAM.

21000	CIRCLE_ERROR_CONST			C06	K1
mm	Circle end point monitoring constant			DOUBLE	PowerOn
-					
-	-	0.01,0.01,0.01,0.01,0.01,0.01,0.01...	-	-	7/2

Description: This machine data is used to specify the permissible absolute circle error [mm].

When a circle is programmed, the radius from the programmed center point to the start point and to the end point are usually not equal (the circle is "overdefined").

The maximum permissible difference of those two radii that is accepted without an alarm is defined by the larger value of the following data:

- CIRCLE_ERROR_CONST
- Start radius multiplied with MD 21010: CIRCLE_ERROR_FACTOR

This means that for small circles the tolerance is a fixed value (CIRCLE_ERROR_CONST) and for large circles it is proportional to the start radius.

Related to:

MD 21010: CIRCLE_ERROR_FACTOR

(circle end point monitoring factor)

21010	CIRCLE_ERROR_FACTOR			C06	K1
-	Circle end point monitoring factor			DOUBLE	PowerOn
-					
-	-	0.001,0.001,0.001,0.001,0.001,0.001...	-	-	7/2

Description: Factor for permissible radius difference.

Defines the factor for large circles by which the starting radius and end radius may deviate from each other

(see also MD 21000: CIRCLE_ERROR_CONST (circle end point monitoring constant).

21015	INVOLUTE_RADIUS_DELTA			C06	PG
mm	Involute end point monitoring			DOUBLE	PowerOn
-					
-	-	0.01,0.01,0.01,0.01,0.01,0.01,0.01...	-	-	7/2

Description: Permissible absolute difference of radius at involute interpolation [mm].

At involute interpolation, the radius of the basic circle determined by the end point may differ from the programmed radius.

This data is used to limit the permissible maximum difference between start radius and end radius.

21016	INVOLUTE_AUTO_ANGLE_LIMIT			C06	PG
-	Automatic angle limitation during involute interpolation			BOOLEAN	PowerOn
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: If the angle of rotation is programmed for an involute (AR=angle), the maximum angle of rotation is limited in case the involute is travelling towards the basic circle (AR < 0). The maximum angle of rotation is reached when the involute touches the basic circle.

Normally, if an angle larger than the maximum angle is programmed, an alarm is issued and the NC program aborted.

If this MD is set to TRUE any angle is accepted without an alarm for programming. If required, this angle is limited automatically.

21020	WORKAREA_WITH_TOOL_RADIUS			C03, C06	A3
-	Consideration of tool radius for working area limitation			BOOLEAN	Reset
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: This machine data indicates whether the tool radius is taken into account with working area limitation.

0: It is checked whether the tool center lies within the working area limits (corresponds to version P2)

1: The tool radius is taken into account when the working area limitation is checked. This means that the working area is reduced by the tool radius.

21050	CONTOUR_TUNNEL_TOL			C06	F2
mm	Response threshold for contour tunnel monitoring			DOUBLE	NEW CONF
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2

Description: Response threshold for contour tunnel monitoring. Defines the radius of the "tunnel" around the path of the tool tip.

If three geometry axes are defined, the tunnel can be regarded as a tube through the center of which the path of the tool tip travels.

If only two geometry axes are defined, this tube can be regarded as squashed flat in the plane of the two geometry axes.

Monitoring is only active if:

- option contour tunnel monitoring is present and
- $MC_CONTOUR_TUNNEL_TOL is larger than 0.0 and
- at least two and at most three geometry axes are defined.

Related to:

CONTOUR_TUNNEL_REACTION,
CONTOUR_ASSIGN_FASTOUT,
ENC_CHANGE_TOL

21060	CONTOUR_TUNNEL_REACTION			C06	F2
-	Reaction when contour tunnel monitoring responds			BYTE	PowerOn
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	2	7/2

Description:

```
Reaction to response of the alarm
0:   Only display alarm, continue machining
1:   Ramp stop
2:   Rapid stop
MD irrelevant:
   if 'contour tunnel monitoring' option is not available
Related to:
   CONTOUR_TUNNEL_TOL, CONTOUR_ASSIGN_FASTOUT
```

21070	CONTOUR_ASSIGN_FASTOUT			C01, C06	F2
-	Assignment of an analog output for the output of contour error			BYTE	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	8	7/2

Description:

```
Assignment of an analog output on which the calculated contour
error can be output.
0:   No output
1:   Output on output 1
2:   Output on output 2
etc.
8:   Output on output 8
An error in the amount of the response threshold
$MC_CONTOUR_TUNNEL_TOL appears on the output as a voltage of 10V.
Multiple assignment of the same output through other signals is
checked automatically.
MD irrelevant:
   if 'contour tunnel monitoring' option is available
Related to:
   CONTOUR_TUNNEL_TOL, CONTOUR_TUNNEL_REACTION
```

21080	CUTCOM_PARALLEL_ORI_LIMIT			C08, C06	W5
degrees	Minimum angle (path tangent / tool orientation) in 3D TRC			DOUBLE	Reset
-					
-	-	3.,3.,3.,3.,3.,3.,3.,3.,3.,3.,3.,3....	0.1	89.	7/2

Description:

```
With 3D tool radius compensation, the angle between the path tan-
gent and the tool orientation may not drop below a certain limit
angle. This machine data specifies this angle (in degrees).
Generally speaking, the lower the value entered in this machine
data, the greater the computing capacity required to check that
the above conditions are fulfilled.
Linear blocks with constant orientation are an exception.
```

21082	CUTCOM_PLANE_ORI_LIMIT			C08, C06	W5
degrees	Minimum angle between surface normal vector and tool orientation			DOUBLE	Reset
-					
-	-	3.,3.,3.,3.,3.,3.,3.,3.,3.,3.,3.,3....	1.0	89.	7/2

Description: This machine data applies to 3D face milling operations and specifies the minimum angle that must exist between the surface normal vector and the tool orientation on every point of the path if the applied lateral angle is not equal to zero and the tool is not a ball mill. Otherwise, machining is aborted with an alarm if the angle is smaller than the value set here.

Generally speaking, the lower the value entered in this machine data, the greater the computing capacity required to check that the above conditions are fulfilled.This data has no effect in linear blocks with constant orientation. The angle between the surface normal vector and tool orientation may be as small as desired in such cases, even if the lateral angle is not equal to zero.

21084	CUTCOM_PLANE_PATH_LIMIT			C08, C06	W5
degrees	Min. angle betw. surface normal vector and path tangent vector			DOUBLE	Reset
-					
-	-	3.,3.,3.,3.,3.,3.,3.,3.,3.,3.,3.,3....	1.0	89.	7/2

Description: This machine data applies to 3D face milling operations and specifies the minimum angle that must exist between the surface normal vector and the path tangent vector on every point of the path. Otherwise machining is aborted with an alarm if the angle is smaller than the value set here.

Generally speaking, the lower the value entered in this machine data, the greater the computing capacity required to check that the above conditions are fulfilled.

21090	MAX_LEAD_ANGLE			C08, C09	-
degrees	Maximum value of permitted lead angle for orientation progr.			DOUBLE	NEW CONF
-					
-	-	80.,80.,80.,80.,80.,80.,80.,80.,80....	0.	80.	7/7

Description: Maximum permissible value of the lead angle in degrees.

21092	MAX_TILT_ANGLE			C08, C09	-
degrees	Maximum value of permitted side angle for orientation progr.			DOUBLE	NEW CONF
-					
-	-	180.,180.,180.,180.,180.,180.,180....	-180.	180.	7/7

Description: Maximum permissible value of the tilt angle in degrees.

21094	ORIPATH_MODE			C02	-
-	Setting for ORIPATH path-relative orientation			BYTE	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	211	7/7

Description: This MD is used to set the behavior for ORIPATH, i.e. path-relevant interpolation of tool orientation.

With the various digits of this machine data various functions for ORIPATH are activated.

Meaning of the units digit: Activation of the "real" path-relative orientation interpolation

xx 0:

Only at the end of the block, the tool orientation has the relation programmed with LEAD and TILT to the path tangent and the normal vector; within the block, the orientation does not follow the path tangent. This corresponds to the behavior of SW release 6.xx.

xx1:

The relation of the tool orientation to the path tangent and the surface normal vector programmed with LEAD/TILT is retained during the whole block. Meaning of the tens digit: Interpretation of the TILT angle

x0x:

LEAD = Rotation around direction vertical to tangent and normal vector

(forward angle)

TILT = Rotation of orientation around normal vector

This is the interpretation of the LEAD/TILT angles in SW releases < 7.2

x1x:

LEAD = Rotation around direction vertical to tangent and normal vector

(forward angle)

TILT = Rotation of orientation around vector in direction of tangent

(tilt angle)

Meaning of hundreds digit: Activation of a retract movement in the case of re-orientation.

0xx:

In the case of re-orientation with ORIPATH, a retract movement is not carried out.

1xx:

In the case of re-orientation with active ORIPATH, a retract movement in the direction of the programmed vector is carried out. The programmed vector for the direction of the retract movement refers to the coordinate system defined by the current tool direction (z coordinate) and the change in orientation (x coordinate).

2xx:

In the case of re-orientation with active ORIPATH, a retract movement in the direction of the programmed vector is carried out. The programmed vector for the direction of the retract movement refers to the coordinate system defined by the current surface normal vector (z coordinate) and the change in orientation (x coordinate).

A retract movement is possible only with a "real" path-relative orientation interpolation, i.e. if the units digit of the MD has the value one.

21100	ORIENTATION_IS_EULER			C01, C09	F2
-	Angle definition for orientation programming			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: This data is only active for $MC_ORI_DEF_WITH_G_CODE = 0

MD = 0 (FALSE):

The values programmed with A2, B2, C2 during orientation programming are interpreted as an RPY angle (in degrees).

The orientation vector is produced by rotating a vector in direction Z first by C2 around the Z axis, then by B2 around the new Y axis and finally by A2 around the new X axis. In contrast to Euler angle programming, all three values influence the orientation vector in this case.

MD = 1 (TRUE):

The values programmed with A2, B2, C2 during orientation programming are interpreted as Euler angles (in degrees).

The orientation vector is produced by rotating a vector in direction Z first by A2 around the Z axis, then by B2 around the new X axis and finally by C2 around the new Z axis. This means that the value of C2 is meaningless.

21102	ORI_DEF_WITH_G_CODE			C01, C07	F2
-	Definition of orientation axes with G code			BOOLEAN	NEW CONF
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

Description: Definition of the orientation angles A2, B2, C2

0: Definition as per MD $MC_ORIENTATION_IS_EULER

1: Definition as per G code (ORIEULER, ORIRPY, ORIVIRT1, ORIVIRT2)

21103	ORI_ANGLE_WITH_G_CODE			C01, C07	-
-	Definition of orientation angles via G code			BOOLEAN	NEW CONF
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

Description: Definition of the orientation angles A2, B2, C2:

FALSE: Definition as per MD $MC_ORIENTATION_IS_EULER

TRUE : Definition as per G code (ORIEULER, ORIRPY, ORIVIRT1, ORIVIRT2)

Only programming of angles with A2, B2, C2 is interpreted in accordance with G codes ORIEULER, ORIRPY, ORIVIRT1, ORIVIRT2 and not programming of angles by means of the orientation axes, as is the case with MD $MC_ORI_DEF_WITH_G_CODE = 1.

21104	ORI_IPO_WITH_G_CODE			C01, C07	F2
-	G code for orientation interpolation			BOOLEAN	NEW CONF
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: Definition of the type of interpolation for the orientation

FALSE:Referred to G codes ORIWKS and ORIMKS

TRUE :Referred to G codes ORIAXES, ORIVECT, ORIPLANE, ORICONxx and ORICURVE of the 51st G code group

21106	CART_JOG_SYSTEM			C01, C07	H1
-	Coordinate systems for Cartesian JOG			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	7	7/2

Description: This machine data has two meanings. First, it is used to activate the "Cartesian manual traverse" function. Second, it is used to determine the reference systems between which a switchover can be performed.

The meaning of the individual bits is determined as follows:

Bit 0 : Basic coordinate system

Bit 1 : Workpiece coordinate system

Bit 2 : Tool coordinate system

21108	POLE_ORI_MODE			C07	-
-	Response with vector interpolation in pole position			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	122	7/7

Description: This MD defines how the change in orientation in the case of vector interpolation is treated if the orientation runs through the pole taper, which is defined by MD $TRAFO5_POLE_LIMIT_n.

Vector interpolation is present, if tool orientation is interpolated independent of the kinematics, e.g. by means of large circle interpolation (orientation is swiveled in a plane), taper interpolation or through interpolation of a 2nd reference point on the tool (ORICURVE), and not directly the orientation axes.

In the pole, the pole axis can have any position. For large circle interpolation, however, this axis requires a certain orientation.

If the start orientation is equal or close to the pole orientation and the end orientation of the block lies outside the tolerance circle defined by machine data TRAFO5_POLE_LIMIT_n, the pole axis can be moved to a position suitable to ensure that the subsequent vector interpolation can be carried out. This is set via the units and tens digits of this machine data.

The units digits can have the following values (active if start orientation equal to pole orientation):

0: The interpolation is carried out as an axis interpolation. The specified orientation path (large circle) is followed only if the pole axis (coincidentally) has the right position and the basic orientation is perpendicular to the 2nd rotary axis.

1: A block, that positions the pole axis to a position enabling large circle interpolation to be carried out in the subsequent block, is inserted before the block where the situation described occurs.

2: If the block preceding the block in which the situation described occurs contains a geometry axis movement but no orientation movement the required positioning movement of the pole axis is additionally carried out in this previous block.

If one of the two conditions is not fulfilled (block does not contain a geometry axis movement or block contains an orientation movement), the pole axis movement is carried out in a separate block (same behavior as under 1.)

The tens digits can have the following values (active if the start orientation differs from the pole orientation, but lies within the tolerance circle defined by TRAFO5_POLE_LIMIT_n):

00: The interpolation is carried out as an axis interpolation. The specified orientation path (large circle) is followed only if the pole axis (coincidentally) has the right position hat and the basic orientation is perpendicular to the 2nd rotary axis.

10: A block, which positions the two rotary axes to the point where the programmed large circle interpolation intersects with the tolerance circle defined by TRAFO5_POLE_LIMIT_n, is inserted before the block where the situation described occurs. In the original block, large circle interpolation is applied as of this point.

20: If the block preceding the block in which the described situation occurs contains a geometry axis movement but no orientation movement the necessary positioning movements of the two rotary axes are additionally carried out in this previous block. The residual movement in the original block is the same as that of value 10 of this machine data.

If one of the two conditions is not fulfilled (block does not contain a geometry axis movement or block contains an orientation movement), the pole axis movement is carried out in a separate block (same behavior as under 10.)

The behavior for the case that the orientation runs through the pole taper or ends within the pole taper is set with the hundreds digit of this MD.

The hundreds digit can have the following values:

000: A block with the orientation running within the pole taper is subdivided only if the start orientation is equal to the pole orientation (with POLE_ORI_MODE = 1) or is close to the pole orientation (with POLE_ORI_MODE = 10). If the pole orientation occurs at an arbitrary point in the block, the whole change in orientation is traversed by means of rotary axis interpolation. In general, this leads to a more or less significant deviation from the programmed orientation path.

100: If the programmed orientation path runs through the pole taper, the block is subdivided in up to 3 parts, so that there is a deviation from the orientation path only within the pole taper. Outside the pole taper, the orientation is interpolated exactly on the programmed orientation path.

The values of the units, tens and hundreds digits are added.

21110	X_AXIS_IN_OLD_X_Z_PLANE			EXP, C01, C09	M1
-	Coordinate system for automatic frame definition			BOOLEAN	PowerOn
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: 1 = With automatic definition of a frame (TOFRAME), the Z direction of which equals the current tool orientation, the new coordinate system is additionally rotated around the new Z axis so that the new X axis is in the old Z-X plane.

0 = With automatic definition of a frame (TOFRAME), the Z direction of which equals the current tool orientation, the new coordinate system is maintained as it results from the kinematics of the machine, i.e. it is assumed that the coordinate system is fixed to the tool and rotates with the tool (orientation).

From SW 5.3:

This machine data is only effective when the three lowest value decimal positions (units, tens, hundreds) of the setting data 42980 (TOFRAME_MODE) equal zero. Otherwise the frame definition is specified by TOFRAME_MODE.

MD irrelevant for:

No orientation programming

Related to:

MD 21100

Further references:

/PG/, Programming Guide, Fundamentals

21120	ORIAX_TURN_TAB_1			C07	F2
-	Definition of reference axes for orientation axes			BYTE	NEW CONF
-					
-	3	1, 2, 3,1, 2, 3,1, 2, 3,1, 2, 3...	0	3	7/2

Description: Defines the assignment of the rotations of the orientation axes around the reference axes for each channel (definition 1).

This orientation description is activated with the G code ORIVIRT1

0: No rotation

1: Rotation around reference axis X

2: Rotation around reference axis Y

3: Rotation around reference axis Z

Example :

$MC_ORIAX_TURN_TAB_1[0] = 3 ; 1st ORI axis rotates around reference axis Z

$MC_ORIAX_TURN_TAB_1[1] = 2 ; 2nd ORI axis rotates around reference axis Y

$MC_ORIAX_TURN_TAB_1[2] = 1 ; 3rd ORI axis rotates around reference axis X

21130	ORIAX_TURN_TAB_2			C07	F2
-	Definition of reference axes for orientation axes			BYTE	NEW CONF
-					
-	3	1, 2, 3,1, 2, 3,1, 2, 3,1, 2, 3...	0	3	7/2

Description: Defines the assignment of the rotations of the orientation axes around the reference axes for each channel (definition 2).

This orientation description is activated with the G code ORIVIRT2

0: No rotation

1: Rotation around reference axis X

2: Rotation around reference axis Y

3: Rotation around reference axis Z

Example :

$MC_ORIAX_TURN_TAB_1[0] = 3 ; 1st ORI axis rotates around reference axis Z

$MC_ORIAX_TURN_TAB_1[1] = 2 ; 2nd ORI axis rotates around reference axis Y

$MC_ORIAX_TURN_TAB_1[2] = 1 ; 3rd ORI axis rotates around reference axis X

21132	ORI_DISP_IS_MODULO			C07	F2
-	Modulo display of orientation axis positions			BOOLEAN	NEW CONF
-					
-	3	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7

Description: This MD is used to activate the modulo display of orientation axes.

This only impairs the displayed positions and not the possible programming or traversing range of these axes.

The modulo range is set using MD $MC_ORI_DISP_MODULO_RANGE and $MC_ORI_DISP_MODULO_RANGE_START.

21134	ORI_DISP_MODULO_RANGE			C07	-
degrees	Size of the modulo range for orientation axis display.			DOUBLE	NEW CONF
-					
-	3	360.0, 360.0, 360.0,360.0, 360.0, 360.0...	1.0	360000000.0	7/7

Description: Defines the size of the modulo range for the display of orientation axis positions.

This modulo range does not impair the programmable values of the positions nor the possible traversing range of orientation axes.

21136	ORI_DISP_MODULO_RANGE_START			C07	-
degrees	Starting position of the modulo range for orientation axis display.			DOUBLE	NEW CONF
-					
-	3	-180.0, -180.0, -180.0,-180.0, -180.0, -180.0...	-	-	7/7

Description: Defines the start position for the modulo range used to display the positions of orientation axes.

This only impairs the displayed positions, but not the possible programming or traversing range of these axes.

Example:

```
Start =    0 degree -> modulo range    0 <->360 degrees
Start =  180 degrees -> modulo range  180 <->540 degrees
Start = -180 degrees -> modulo range -180 <->180 degrees
```

21150	JOG_VELO_RAPID_ORI			C07	-
rev/min	JOG rapid traverse for orientation axes			DOUBLE	Reset
-					
-	3	10.0, 10.0, 10.0,10.0, 10.0, 10.0...	-	-	7/2

Description: Velocity in JOG mode with rapid traverse override for orientation axes in the channel [degrees/min]

21155	JOG_VELO_ORI			C07	-
rev/min	Jog feedrate for orientation axes			DOUBLE	Reset
-					
-	3	2.0, 2.0, 2.0,2.0, 2.0, 2.0...	-	-	7/2

Description: Velocity in JOG mode for orientation axes in the channel

21160	JOG_VELO_RAPID_GEO			C07	F2
mm/min	JOG rapid traverse for geometry axes			DOUBLE	Reset
-					
-	3	10000., 10000.0, 10000.,10000., 10000.0, 10000....	-	-	7/2

Description: Velocity in JOG mode with rapid traverse override for geometry axes in the channel (mm/min)

21165	JOG_VELO_GEO			C07	F2
mm/min	Jog feedrate for geometry axes			DOUBLE	Reset
-					
-	3	1000., 1000., 1000.,1000., 1000., 1000....	-	-	7/2

Description: JOG velocity for geometry axes in the channel (mm/min)

21170	ACCEL_ORI			C07	-
rev/s²	Acceleration for ORI axes			DOUBLE	NEW CONF
-					
-	3	.05, .05, .05,.05, .05, .05...	-	-	7/2

Description: Acceleration for orientation axes in the channel

21180	ROT_AX_SWL_CHECK_MODE		C07	F2
-	Check of software limits for orientation axes		DWORD	NEW CONF
-				
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	112	7/7

Description: This machine data is evaluated only with generic 5-axis transformation.

If block preparation shows that the programmed path causes a violation of the software limits of the orientation axes, this machine data determines the type of modification rotary axes may travel if the direction is programmed.

The units digit of the MD is used to determine how alternative end positions of the rotary axes are created if the software limits are violated. The tens digit is used to determine how the axes approach those end positions. The hundreds digit is used to activate an automatic limitation of the axis that swivels through the pole (non-pole axis).

Meaning of the units digit:

0: The path is not modified. If it is not possible to travel the shortest path, alarm 10720 (SW_LIMITSWITCH) is issued.

1: If the orientation path determined first violates the axis limits of the orientation axes, the end point will be adapted to try a motion.

In a first attempt, the second solution will be used. (In general, there are always two solutions when converting orientation ==> angle of axis). If this solution will violate the limits of the axis as well, there will be an attempt to find a permissible solution modifying both rotary axes by multiples of 360 degrees with both solutions.

The modifications of final positions described will only be performed if axis interpolation of rotary axes is activated.

2: Monitoring and modifications of rotary-axis positions - if applicable - correspond to value 1 of the machine data.

However, modifications are also permissible if vector interpolation (large-circle interpolation, outside-of-the-taper interpolation, etc.) is activated. If in such a case the rotary-axes positions have to be modified, there will be a switchover to axis interpolation. The orientation path programmed originally will usually not be followed.

Meaning of the tens digit:

0x: The orientation axes travel simultaneously to the possible end position. There may possibly be more or less large deviations from the original orientation path.

1x: If possible, the orientation is first turned into pole direction. In the pole position, the pole axis is then positioned so that the final orientation can then be approached by turning the orientation from the pole position into the programmed direction. The originally programmed orientation path is then followed.

Meaning of the hundreds digit:

0xx: The range of the non-pole axis is determined by its software limits or working area limitations.

1xx: The range of the non-pole axis is limited either to the positive or negative travel range. The possible range is determined by the limits (positive or negative value) with the largest absolute value.

Examples:

1. $MA_POS_LIMIT_MINUS[AX5] = -5.0 and $MA_POS_LIMIT_PLUS[AX5] = 135.0, the possible range of axis AX5 is 0 ... 135.0

2. $MA_POS_LIMIT_MINUS[AX5] = -100.0 and $MA_POS_LIMIT_PLUS[AX5] = 10.0, the possible range of axis AX5 is -100.0 ... 0.0

3. $MA_POS_LIMIT_MINUS[AX5] = 5.0 and $MA_POS_LIMIT_PLUS[AX5] = 120.0, the possible range is 5.0 ... 120.0, there is no automatic limitation of the travel range.

21186	TOCARR_ROT_OFFSET_FROM_FR			C01, C07	-
-	Offset of TOCARR rotary axes from WO			BOOLEAN	Immediately
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: Rotary axes offset for the orientable tool holder is automatically accepted from the work offset activated on activation of the orientable tool holder for the rotary axes.

21190	TOFF_MODE			C08	F2
-	Mode of correction in tool direction			BYTE	Reset
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

Description: This machine data specifies the online correction mode in tool direction via $AA_TOFF[ ].

Bit 0: Behavior of $AA_TOFF in case of a RESET

0: $AA_TOFF is deseclected in case of a RESET

1: $AA_TOFF is maintained also after RESET

Bit 1: Effect of the value assignment on the 1st component of $AA_TOFF[ ]

0: absolute value

1: incremental value (integrator)

Bit 2: Effect of the value assignment on the 2nd component of $AA_TOFF[ ]

0: absolute value

1: incremental value (integrator)

Bit 3: Effect of the value assignment on the 3rd component of $AA_TOFF[ ]

0: absolute value

1: incremental value (integrator)

21194	TOFF_VELO			C08	F2
mm/min	Feedrate for online correction in tool direction			DOUBLE	NEW CONF
-					
-	3	0., 0., 0.,0., 0., 0.,0., 0., 0....	-	-	7/2

Description: Feedrate for online correction in tool direction [mm/min] via $AA_TOFF[ ]

21196	TOFF_ACCEL			C08	F2
m/s²	Acceleration for online correction in tool direction			DOUBLE	NEW CONF
-					
-	3	100., 100., 100.,100., 100., 100....	1.0e-3	-	7/2

Description: Acceleration for online correction in tool direction [m/s**2] via $AA_TOFF[ ]

21200	LIFTFAST_DIST			C09	K1
mm	Traversing distance on rapid lift from contour			DOUBLE	PowerOn
-					
-	-	0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1...	-	-	7/2

Description: The machine data determines the absolute value of the traverse movement for rapid lift. The direction of the traverse movement is defined in the part program by the command ALF.

References:

/PA/, Programming Guide: Fundamentals

21202	LIFTFAST_WITH_MIRROR			C09	K1
-	Rapid retract with mirrorring			BOOLEAN	PowerOn
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: 1: When determining the retraction direction, if mirroring of the contour is active then the retraction direction is also mirrored. Mirroring of the retraction direction only refers to the directional components vertical to the tool direction.

0: Mirroring of the contour is NOT taken into account when determining the retraction direction.

21204	LIFTFAST_STOP_COND			C09	PGA
-	Stop behavior with fast retraction			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

Description: Specifies the stop behavior of the liftfast motion under different stop conditions

Bit0: Axial NC/PLC interface signal (Vorschub Halt/Spindel Halt) bzw. kontextsensitiver Interpolator-Stopp

=0 Stop of the retraction motion in case of an axial feed stop or context-sensitive interpolator stop

=1 No stop of the retraction motion in case of an axial feed stop or context-sensitive interpolator stop

Bit1: Feed disable in channel NC/PLC interface signal (Vorschubsperre)

=0 Stop of the retraction motion in case of the feed stop in the channel

=1 No stop of the retraction motion in case of the feed stop in the channel

21210	SETINT_ASSIGN_FASTIN			C01, C09	K1
-	HW assignment of ext. NCK input byte for NC progr. interrupts			DWORD	PowerOn
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	-	-	7/2

Description: HW assignment of the fast input byte for NC program interrupts

Bit 0 to 7:

Number of input used

Bit 16 to 23:

Mask of signals that the channel is not to evaluate

Bit 24 to 31:

Mask of signals that are to be evaluated in inverted form

Bit set: Interrupt initiated by falling edge.

Possible inputs:

1:

On board-inputs of the 840D (4 fast + 4 bits via VDI default)

2 - 5:

External digital inputs (fast NCK I/Os or VDI default)

128 - 129:

Comparator byte (results from fast analog inputs or VDI default)

21220	MULTFEED_ASSIGN_FASTIN			C01, C09	V1
-	Assignment of the NCK I/Os for 'several feedrates in the block'			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

Description: In MD: MULTFEED_ASSIGN_FASTIN (assignment of the input bytes of the NCK I/Os for "Multiple feeds in one block"), at most two digital input bytes or comparator input bytes of the NCK I/Os can be assigned to the input byte for the "Multiple feeds in one block" function.

Furthermore, the assigned input signals can be inverted with the machine data.

The MD is coded as follows:

Bit 0-7:

No. of 1st digital input byte or comparator input byte used

Bit 8 - 15:

No. of 2nd digital input byte or comparator input byte used

Bit 16 - 23:

Inversion mask for describing the 1st byte

Bit 24 - 31:

Inversion mask for describing the 2nd byte

Bit=0: do not invert

Bit=1: invert

If a 2nd byte is entered, the contents of the 1st and 2nd bytes are ORed before being used.

The number for the digital inputs should be specified as follows:

1: for the on-board byte

2 - 5: for external bytes

The number for a comparator input byte should be specified as follows:

128: for comparator 1 (corresponds to 80Hex)

129: for comparator 2 (corresponds to 81Hex)

21230	MULTFEED_STORE_MASK			C01, C09	V1
-	Memory response for 'several feedrates in the block'			BYTE	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

Description: The priority of the signals for feeds F2 - F7 of the "Multiple feeds in one block" function decreases as the bit number increases in the input byte. The highest priority signal determines the current feed.

The MD: MULTFEED_STORE_MASK (store input signals of the "Multiple feeds in one block" function) can be used to specify the response when the highest priority input drops out:

Set bit 2 - 7 has the effect that the associated feed (F2 to F7) that has been selected by the highest priority input signal in each case is retained, even if the input signal drops out and a lower priority is present.

The MD is coded as follows:

Bit 0 - 1: No significance

Bit 2 - 7: Storage response of the feed signals

Bit 8 - 31: Reserved

21240	PREVENT_SYNACT_LOCK_CHAN			C01, C09	FBSY
-	Protected synchronized actions			DWORD	PowerOn
-					
-	2	-1, -1,-1, -1,-1, -1,-1, -1,-1, -1...	-1	255	7/2

Description: The machine data specifies a range of synchronized action IDs.

Synchronized actions with IDs in this range cannot be overwritten, cancelled or locked via synchronized actions.

With 0.0, there is no range of protected synchronized actions. The values are read as absolute values; the upper value and the lower value can be indicated in any order.

If a value is configured with -1, the configuration of the general machine data becomes active.

Note:

During the creation of protected static synchronized actions, the protection should be cancelled; otherwise, a power ON would be necessary for each change in order to be able to redefine the logic.

21300	COUPLE_AXIS_1			C09	S3
-	Synchr.spindle pair def, mach.axis no: follow.sp[0], lead.sp[1]			BYTE	PowerOn
-					
-	2	0, 0,0, 0,0, 0,0, 0,0, 0,0, 0,0, 0...	0	31	7/2

Description: One synchronized spindle pair per NC channel can be defined in a fixed configuration with this machine data.

The machine axis numbers (channel-specific MD: AXCONF_MACHAX_USED) applicable in the NC channel must be entered for the following spindle [n=0] and the leading spindle [1].

If a value of "0" is entered, then the coupling is not configured, thus leaving 2 couplings to be configured freely via the NC part program.

MD irrelevant for:

User-defined coupling

Related to:

Channel-specific MD; COUPLING_MODE_1

(type of coupling in synchronous spindle mode)

Channel-specific MD: COUPLE_IS_WRITE_PROT_1

(write-protection for coupling parameters)

Channel-specific MD: COUPLE_RESET_MODE_1

(coupling abort response)

Channel-specific MD: COUPLE_BLOCK_CHANGE_CTRL_1

(block change response in synchronous spindle mode)

SD: $SC_COUPLE_RATIO_1

(speed ratio parameters for synchronous spindle mode)

21310	COUPLING_MODE_1			C03, C09	S3
-	Type of coupling in synchronous spindle operation			BYTE	PowerOn
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	2	7/2

Description: This machine data determines the type of coupling for the fixed coupling configuration defined with machine data COUPLE_AXIS_1[n].

1: Setpoint coupling activated.

With a setpoint coupling, the reference variable for the following spindle is calculated from the position setpoint for the leading spindle, allowing the setpoints for the FS and LS to be input simultaneously. This has a particularly positive effect on the spindle synchronization during acceleration and deceleration processes.

Better command behavior to setpoint changes is thus obtained with the setpoint coupling than with the actual-value coupling.

When a setpoint coupling is selected, the following conditions must be fulfilled before synchronous mode is activated:

- The LS must be assigned to the same NC channel as the FS
- The FS and LS must be in position control mode (SPCON)
- The FS and LS must have the same dynamic control response

0: Actual-value coupling activated.

With an actual-value coupling, the command variable for the following spindle is calculated from the position actual value of the leading spindle. With this type of coupling, the following drive must be significantly more dynamic than the leading drive, but never vice versa.

The actual-value coupling can be used, for example, in the following cases:

- The LS must be assigned to a different NC channel than the FS
- For leading spindles which are not suitable for position control
- In cases where the dynamic control response of the leading spindle is considerably slower than that of the following spindle. As soon as the actual-value coupling is active, the IS "Actual-value coupling" for the FS is set to "1-signal". (Istwertkopplung) für die FS auf 1-Signal gesetzt.

2: Velocity coupling activated.

Internally, velocity coupling is a setpoint coupling. The dynamic requirements placed on FS and LS are lower. A defined position relation between FS and LS cannot be established.

Velocity coupling is applied in the following cases:

- LS and/or FS are not in position control.
- There are no measuring systems present.

The coupling type can be altered in the NC part program when the coupling is deactivated by means of language instruction COUPDEF provided this option has not been inhibited by channel-specific MD: COUPLE_IS_WRITE_PROT_1. The parameterized value of channel-specific MD: COUPLING_MODE_1 does not, however, get altered.

MD irrelevant to:

User-defined coupling

Related to:

Channel-specific MD: COUPLE_AXIS_1

(definition of pair of synchronous spindles)
Channel-specific MD: COUPLE_IS_WRITE_PROT_1
(write-protection for configured parameters)
IS (Istwertkopplung)

21320	COUPLE_BLOCK_CHANGE_CTRL_1			C09	S3
-	Block change behavior in synchronous spindle operation			BYTE	PowerOn
-					
-	-	3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3	0	3	7/2

Description: This machine data determines the condition on which a block change must be executed when synchronous mode is activated for the fixed coupling configuration defined in channel-specific machine data COUPLE_AXIS_ [n].

The following options are available:

0: Block change is enabled immediately

1: Block change in response to "Fine synchronization"

2: Block change in response to "Coarse synchronization"

3: Block change in response to IPOSTOP (i.e. after setpoint-based synchronization)

The block change response can be altered in the NC part program with language instruction COUPDEF provided this option has not been inhibited by channel-specific MD: COUPLE_IS_WRITE_PROT_1. The parameterized value of channel-specific MD: COUPLE_BLOCK_CHANGE_CTRL_1 does not, however, get altered.

The selected block change response remains valid even when the velocity ratio is changed or a defined angular offset is programmed while the coupling is active.

MD irrelevant for:

User-defined coupling

Related to:

Channel-specific MD; COUPLE_AXIS_1
(definition of pair of synchronous spindles)
Channel-specific MD: COUPLE_IS_WRITE_PROT_1
(change of coupling parameters not possible)
Channel-specific MD: COUPLE_POS_TOL_COARSE or COUPLE_VELO_TOL_COARSE
(threshold value for coarse synchronization)
Channel-specific MD: COUPLE_POS_TOL_FINE or COUPLE_VELO_TOL_FINE
(threshold value for fine synchronization)

21330	COUPLE_RESET_MODE_1			C03, C09	S3
-	Coupling abort behavior			DWORD	PowerOn
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	0x3FF	7/2

Description: This machine data defines the behavior of the synchronous mode for the pair of synchronous spindles configured with machine data COUPLE_AXIS_1[n].

Bit 0=0:

Synchronous mode remains active with a new program start and can be cancelled only with COUPOF as long as the control remains switched on.

Bit 0=1:

Synchronous mode is cancelled with program start (from the reset condition).

Bit 1=0:

Synchronous mode remains active even with program end and reset and can be cancelled only with COUPOF as long as the control remains switched on.

Bit 1=1:

Synchronous mode is cancelled with program end or RESET.

Bit 5=1:

The configured data are activated with program start.

Bit 6=1:

The configured data are activated with program end or RESET.

Bit 9=1:

Synchronous mode is switched on with program start.

Note:

Synchronous mode is not deselected with NC Start after NC Stop!

MD irrelevant to:

User-defined coupling

Related to:

Channel-specific MD: COUPLE_AXIS_1 (definition of pair of synchronous spindles)

IS (aktive Spindelbetriebsart:Synchronbetrieb)

21340	COUPLE_IS_WRITE_PROT_1			C09	S3
-	Coupling parameters cannot be altered			BOOLEAN	PowerOn
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: This machine data defines whether or not the coupling parameters (velocity ratio, block change response, coupling type) for the pair of synchronous spindles configured with channel-specific machine data COUPLE_AXIS_1[n] may be altered by the NC part program.

1: Coupling parameters may not be altered by the NC program (write-protection active)

An alarm message is generated if an attempt is made to change the parameters.

0: NC part program may alter coupling parameters using language instruction COUPDEF.

MD irrelevant for:

User-defined coupling

Related to:

Channel-specific MD: COUPLE_AXIS_1
(definition of pair of synchronous spindles)
Channel-specific MD: COUPLING_MODE_1
(type of coupling in synchronous spindle mode)
Channel-specific MD: COUPLE_RESET_MODE_1
(coupling abort response)
Channel-specific MD: COUPLE_BLOCK_CHANGE_CTRL_1
(block change response in synchronous spindle mode)
SD: $SC_COUPLE_RATIO_1
(velocity ratio parameters for synchronous spindle mode)

21380	ESR_DELAY_TIME1			EXP, N09	M3
s	Delay time ESR axes			DOUBLE	NEW CONF
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2

Description: When, for example, an alarm occurs, this MD can be used to delay deceleration in order, for example, to enable a retraction from the tooth gap (ESR) in gear wheel machining.

21381	ESR_DELAY_TIME2			EXP, N09	M3
s	ESR time for IPO controlled braking			DOUBLE	NEW CONF
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2

Description: When time $MN_ESR_DELAY_TIME1 has expired, the time ($MN_ESR_DELAY_TIME2) specified for interpolatory braking is still available.

When time $MN_ESR_DELAY_TIME2 has expired, rapid deceleration with following follow-up is initiated.

1.4.2 Machine data for grinding function

21500	TRACLG_GRINDSPI_VERT_OFFSET			C07	S8
mm	Vertical position offset of grinding axis in centerless grinding			DOUBLE	PowerOn
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2

Description: The vertical offset of the grinding axis is specified in this MD.

21501	TRACLG_GRINDSPI_HOR_OFFSET			C07	S8
mm	Horiz. position offset of grinding axis in centerless grinding			DOUBLE	PowerOn
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2

Description: Horizontal position offset of the grinding axis in centerless grinding.

The setting in this MD is significant only when MD: TRAFO_AXES_IN_n[0] = 0, i.e. no axis is programmed for the grinding wheel.

21502	TRACLG_CTRLSPI_VERT_OFFSET			C07	S8
mm	vert. position offset of regulating axis in centerless grinding			DOUBLE	PowerOn
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2

Description: The vertical offset for the regulating axis is specified in this MD.

21504	TRACLG_SUPPORT_VERT_OFFSET			C07	S8
mm	Vertical offset of work blade in centerless grinding			DOUBLE	PowerOn
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2

Description: Y offset for work blade

Rule: X(0) = Y(offset) + Q1 <Y(direction vectorQ1) + Q2 < Y(direction vector Q2)

21506	TRACLG_SUPPORT_HOR_OFFSET			C07	S8
mm	Horizontal offset of work blade in centerless grinding			DOUBLE	PowerOn
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2

Description: X offset for work blade

Rule: X(0) = X(offset) + Q1 <X(direction vector Q1) + Q2 < X(direction vector Q2)

21508	TRACLG_VERT_DIR_SUPPORTAX_1			C07	S8
-	Vertical component of work blade direction vector for Q1			DOUBLE	PowerOn
-					
-	-	1.,1.,1.,1.,1.,1.,1.,1.,1.,1.,1.,1....	-	-	7/2

Description: Y component of blade direction vector for Q1

Rule: Y0 = Y(offset) + Q1 <Y(direction vectorQ1) + Q2 < Y(direction vector Q2)

21510	TRACLG_HOR_DIR_SUPPORTAX_1			C07	S8
-	Horizontal component of work blade direction vector for Q1			DOUBLE	PowerOn
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2

Description: X component of blade direction vector for Q1

Rule: X(0) = X(offset) + Q1 <X(direction vector Q1) + Q2 < X(direction vector Q2)

21512	TRACLG_VERT_DIR_SUPPORTAX_2			C07	S8
-	Vertical component of work blade direction vector for Q2			DOUBLE	PowerOn
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2

Description: Y component of blade direction vector for Q2

Rule: Y(0) = Y(offset) + Q1 <Y(direction vectorQ1) + Q2 < Y(direction vector Q2)

21514	TRACLG_HOR_DIR_SUPPORTAX_2			C07	S8
-	Horizontal component of work blade direction vector for Q2			DOUBLE	PowerOn
-					
-	-	1.,1.,1.,1.,1.,1.,1.,1.,1.,1.,1.,1....	-	-	7/2

Description: X component of blade direction vector for Q2

Rule: X(0) = X(offset) + Q1 <X(direction vector Q1) + Q2 < X(direction vector Q2)

21516	TRACLG_SUPPORT_LEAD_ANGLE			C07	S8
degrees	Lead angle of work blade in centerless grinding			DOUBLE	PowerOn
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-90.	90.	7/2

Description: The angle of lead of the work blade (a) is entered here.

21518	TRACLG_CONTACT_UPPER_LIMIT			C07	S8
mm	Upper contact limit of work blade with work in centerl. grinding			DOUBLE	PowerOn
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2

Description: It is necessary to specify the upper contact limit of the blade with the part to be ground (d1) for the purpose of monitoring the support range limits.

Related to:

MD: TRACLG_CONTACT_LOWER_LIMIT

21520	TRACLG_CONTACT_LOWER_LIMIT			C07	S8
mm	Lower contact limit of work blade with work in centerl. grinding			DOUBLE	PowerOn
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2

Description: It is necessary to specify the lower contact limit of the blade with the part to be ground (d2) for the purpose of monitoring the support range limits.

Related to:

MD: TRACLG_CONTACT_UPPER_LIMIT

21522	TRACLG_GRINDSPI_NR			C07	S8
-	Definition of grinding spindle for centerless grinding			BYTE	PowerOn
-					
-	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2	1	20	7/2

Description: The number of the grinding spindle is specified in this MD.

21524	TRACLG_CTRLSPI_NR			C07	S8
-	Definition of regulating spindle for centerless grinding			BYTE	PowerOn
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	1	20	7/2

Description: The number of the regulating spindle is specified in this MD.

21526	TRACLG_G0_IS_SPECIAL			C07	S8
-	Special logic for G0 in centerless grinding			BOOLEAN	PowerOn
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/2

Description: This MD can be used to define how the speed of the regulating wheel must respond in the case of transitions from motion blocks with G0 and without G0 (see table).

TRACLG_G0_IS_SPECIAL = 1:

On transition from a motion block with G0 to one without G0, the speed of the regulating wheel is increased during the G0 block to the desired initial speed in the block without G0.

TRACLG_G0_IS_SPECIAL = 0:

The speed of the regulating wheel is controlled only for motion blocks without G0 (the transitions from a motion block with G0 to one without G0 are not taken into account).

1.4.3 Channel auxiliary function settings

22000	AUXFU_ASSIGN_GROUP			C04	H2
-	Auxiliary function group			BYTE	PowerOn
-					
-	255	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,1, 1...	1	64	7/2

Description: See MD 22010: AUXFU_ASSIGN_TYPE [n] (auxiliary function type)

22010	AUXFU_ASSIGN_TYPE			C04	H2
-	Auxiliary function type			STRING	PowerOn
-					
-	255	"", "", "", "", "", "", "", "", "", "", "", "", "", "", "", ""...	-	-	7/2

Description:

```
Machine data  AUXFU_ASSIGN_TYPE[n] (auxiliary function type),
AUXFU_ASSIGN_EXTENSION[n] (auxiliary function extension),
AUXFU_ASSIGN_VALUE[n] (auxiliary function value) and
AUXFU_ASSIGN_GROUP[n] (auxiliary function group) can be used to
assign an auxiliary function type (M,S,H,T,D), the associated
extension and the auxiliary function value to an auxiliary func-
tion group .
Example:
                              M 0 = 100  =>  Group 5  (corr. M100)
                               | |    |             |
                               | |    |             |
Auxiliary function type      -| |    |             |
Auxiliary function extension ---|    |             |
Auxiliary function value     --------|             |
Auxiliary function group     ----------------------|
MD: AUXFU_ASSIGN_TYPE[0] = "M"
MD: AUXFU_ASSIGN_EXTENSION[0] = 0
MD: AUXFU_ASSIGN_VALUE[0] = 100
MD: AUXFU_ASSIGN_GROUP[0] = 5              ; (5th group)
```

M00, M01, M02, M17 and M30 are assigned to group 1 as default.

M3, M4, M5 and M70 of the master spindle are assigned to group 2 as default.

The S functions of the master spindle are assigned to group 3 as default.

The set synchronization with respect to the PLC interface and a programmed movement can be taken from MD: AUXFU_GROUP_SPEC [n] (auxiliary function group specification) when assigning an auxiliary function to a group. The defaults defined in machine data MD: AUXFU_[M,S,H,T,D,F] _SYNC_TYPE (output time of the [M,S,H,T,D,F] functions) are not considered for the selected auxiliary functions. Even a programmed fast auxiliary function (e.g. M=QU(100)) is not taken into account.

The index [n] of the machine data indicates the auxiliary function number in the channel: 0-49. All auxiliary functions which are assigned to auxiliary function groups must be numbered in ascending consecutive order.

[0]81st auxiliary function [1]82nd.

The four machine data for assigning an auxiliary function to an auxiliary function group must always be given the same index [n].

Note:

It is not possible to assign type DL.

Special cases:

If the auxiliary function value of an auxiliary function is less than 0, all auxiliary functions of this type and extension are assigned to one group.

Example:

S2 = -1 => group 9

(all S values of the 2nd spindle are assigned to group 9)

Related to:

MD 11100: AUXFU_MAXNUM_GROUP_ASSIGN

22020	AUXFU_ASSIGN_EXTENSION			C04	H2
-	Auxiliary function extension			BYTE	PowerOn
-					
-	255	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	99	7/2

Description: See MD 22010: AUXFU_ASSIGN_TYPE [n] (auxiliary function type)

Special cases:

The auxiliary function extensions 1 to 4 are reserved for spindle functions with S and M functions.

22030	AUXFU_ASSIGN_VALUE			C04	H2
-	Auxiliary function value			DWORD	PowerOn
-					
-	255	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2

Description: See MD 22010: AUXFU_ASSIGN_TYPE [n] (auxiliary function type)

22035	AUXFU_ASSIGN_SPEC			C04	H2
-	Output specification			DWORD	PowerOn
-					
-	255	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2

Description: Specification of the output behavior of the user-defined auxiliary functions.

```
Bit 0 (LSB) = 1 -> Acknowledgement "normal" after an OB1 cycle
Bit 1       = 1  -> Acknowledgement "quick" with OB40
Bit 2       = 1  -> No predefined auxiliary function
Bit 3       = 1  -> No output to VDI (may only be set as a single
bit)
Bit 4       = 1  -> Spindle reaction after acknowledgement by the
PLC
Bit 5       = 1  -> Output before the motion
Bit 6       = 1  -> Output during the motion
Bit 7       = 1  -> Output at block end
Bit 8       = 1  -> No output after block search
```

22040	AUXFU_PREDEF_GROUP			C04	H2
-	Predefined auxiliary function groups			BYTE	PowerOn
-					
-	33	1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 4, 4, 4, 4, 4, 4, 3, 1, 1, 1...	0	64	7/2

Description: Group assignment of predefined auxiliary functions

The predefined groups cannot be changed for indices 0, 1, 2, 3, 4, 22, 23, 24.

22050	AUXFU_PREDEF_TYPE			C04	H2
-	Predefined auxiliary function type			STRING	PowerOn
-					
-	33	"M", "M", "M", "M", "M", "M", "M", "M", "M", "M","M", "M", "M"...	-	-	7/2

Description: The address codes of the predefined auxiliary functions are fix.
This setting cannot be changed!

22060	AUXFU_PREDEF_EXTENSION			C04	H2
-	Predefined auxiliary function extension			BYTE	PowerOn
-					
-	33	0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 0, 0, 0...	0	99	7/2

Description: Address extension for predefined auxiliary functions:
This setting can be changed only for indices 6 to 17!

22070	AUXFU_PREDEF_VALUE			C04	H2
-	Predefined auxiliary function value			DWORD	PowerOn
-					
-	33	0, 1, 2, 17, 30, 6, 3, 4, 5, 19, 70, 40, 41, 42, 43, 44, 45, -1...	-	-	7/2

Description: Value of predefined auxiliary functions:
This setting cannot be changed!

22080	AUXFU_PREDEF_SPEC			C04	H2
-	Output specification			DWORD	PowerOn
-					
-	33	0x81, 0x81, 0x81, 0x81, 0x81, 0x81, 0x21, 0x21, 0x21, 0x21, 0x21,0x21...	-	-	7/2

Description: Specification of the output behavior of the predefined auxiliary functions.
The settings for the indices 0 to 5 and 22 to 24 cannot be changed!
Bit 0 (LSB) = 1 -> Acknowledgement "normal" after an OB1 cycle
Bit 1 = 1 -> Acknowledgement "quick" with OB40
Bit 2 = 1 -> No predefined auxiliary function
Bit 3 = 1 -> No output to VDI (only a single bit may be set)
Bit 4 = 1 -> Spindle reaction after acknowledgement by PLC
Bit 5 = 1 -> Output before motion
Bit 6 = 1 -> Output during motion
Bit 7 = 1 -> Output at block end
Bit 8 = 1 -> No output after block search

22100	AUXFU_QUICK_BLOCKCHANGE			C04	H2
-	Block change delay with quick auxiliary functions.			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2

Description:

Block change is not delayed with quick auxiliary functions.

0: With the quick auxiliary function output the block change is delayed until acknowledgement by the PLC (OB40).

1: With the quick auxiliary function output to the PLC the block change is not delayed.

MD irrelevant for:

Auxiliary functions with normal acknowledgement

References:

/FBSY/, Synchronized Actions

22110	AUXFU_H_TYPE_INT			C11, C04	H2
-	Data format of H auxiliary functions (integer/real)			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2

Description:

0: The values of H auxiliary functions are present in floating point format.

The maximum value range is +/-3.4028 ex 38.

1: The value of H auxiliary functions is rounded and changed to an integer.

The basic program in the PLC must interpret the value as an integer.

The maximum value range is -2147483648 to 2147483647.

22200	AUXFU_M_SYNC_TYPE			C04	H2
-	Output time of M functions			BYTE	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	3	7/2

Description:

Synchronization of the M auxiliary functions with regard to a simultaneously programmed axis motion.

0 = Output before motion

1 = Output during motion

2 = Output at block end

3 = No output to the PLC (therefore no block change delay)

Notice:

The synchronization type of the group, which can be assigned individual auxiliary functions via configuration, has a higher priority!

22210	AUXFU_S_SYNC_TYPE		C04	H2
-	Output time of S functions (see MD22200 for values)		BYTE	PowerOn
-				
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	4	7/2

Description: Synchronization of the S auxiliary functions with regard to a simultaneously programmed axis motion.

0 = Output before motion

1 = Output during motion

2 = Output at block end

3 = No output to the PLC (therefore no block change delay)

4 = Output in accordance with the predefined output specification

Notice:

The synchronization type of the group, which can be assigned individual auxiliary functions via configuration, has a higher priority!

22220	AUXFU_T_SYNC_TYPE		C11, C04	H2
-	Output time for T functions (see MD22200 for values)		BYTE	PowerOn
-				
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	4	7/2

Description: Synchronization of the T auxiliary functions with regard to a simultaneously programmed axis motion.

0 = Output before motion

1 = Output during motion

2 = Output at block end

3 = No output to the PLC (therefore no block change delay)

4 = Output in accordance with the predefined output specification

Notice:

The synchronization type of the group, which can be assigned individual auxiliary functions via configuration, has a higher priority!

22230	AUXFU_H_SYNC_TYPE		C04	H2
-	Output time for H functions (see MD22200 for values)		BYTE	PowerOn
-				
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	3	7/2

Description: Synchronization of the H auxiliary functions with regard to a simultaneously programmed axis motion.

0 = Output before motion

1 = Output during motion

2 = Output at block end

3 = No output to the PLC (therefore no block change delay)

Notice:

The synchronization type of the group, which can be assigned individual auxiliary functions via configuration, has a higher priority!

22240	AUXFU_F_SYNC_TYPE			C04	H2
-	Output time for F functions (see MD22200 for values)			BYTE	PowerOn
-					
-	-	3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3	0	4	7/2

Description: Synchronization of the F auxiliary functions with regard to a simultaneously programmed axis motion.

0 = Output before motion

1 = Output during motion

2 = Output at block end

3 = No output to the PLC (therefore no block change delay)

4 = Output in accordance with the predefined output specification

Notice:

The synchronization type of the group, which can be assigned individual auxiliary functions via configuration, has a higher priority!

22250	AUXFU_D_SYNC_TYPE			C04	H2
-	Output time for D functions (see MD22200 for values)			BYTE	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	4	7/2

Description: Synchronization of the D auxiliary functions with regard to a simultaneously programmed axis motion.

0 = Output before motion

1 = Output during motion

2 = Output at block end

3 = No output to the PLC (therefore no block change delay)

4 = Output in accordance with the predefined output specification

Notice: The synchronization type of the group, which can be assigned individual auxiliary functions via configuration, has a higher priority!

22252	AUXFU_DL_SYNC_TYPE			C04	H2
-	Output time of DL functions			BYTE	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	4	7/2

Description: Synchronization of the auxiliary function with regard to a simultaneously programmed motion.

0 = Output before motion

1 = Output during motion

2 = Output at block end

3 = No output to the PLC (therefore no block change delay)

4 = Output in accordance with the predefined output specification

Notice:

The synchronization type of the group, which can be assigned individual auxiliary functions via configuration, has a higher priority!

22254	AUXFU_ASSOC_M0_VALUE			C01, C03, C10	H2
-	Additional M function to stop a program			DWORD	PowerOn
-					
-	-	-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1...	-	-	7/2

Description:

```
This machine data defines an additional, predefined M function
behaving in the same way as M0. The value of the machine data cor-
responds to the number of the auxiliary M function.
Predefined M numbers such as M0, M1, M2, M3, etc. are not allowed.
Restriction:
   See MD 10715: M_NO_FCT_CYCLE
Related to:
   $MN_M_NO_FCT_EOP,
   $MN_M_NO_FCT_CYCLE,
   $MC_SPIND_RIGID_TAPPING_M_NR,
   $MC_AUXFU_ASSOC_M0_VALUE
For external language mode:
   $MN_EXTERN_M_NO_MAC_CYCLE,
   $MN_EXTERN_M_NO_SET_INT
   $MN_EXTERN_M_NO_DISABLE_INT,
   $MN_EXTERN_CHAN_SYNC_M_NO_MIN,
   $MN_EXTERN_CHAN_SYNC_M_NO_MAX
   $MC_EXTERN_RIGID_TAPPING_M_NR
For nibbling:
   $MC_NIBBLE_PUNCH_CODE
```

22420	FGROUP_DEFAULT_AXES		C11	FBFA
-	Default setting for FGROUP command		BYTE	PowerOn
-				
-	8	0, 0, 0, 0, 0, 0, 0, 0,0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/7

Description: Default setting for FGROUP command. You can specify up to 8 channel axes whose resulting velocity is equivalent to the programmed path feed.

If all eight values are zero (default), the geo axis entered in $MC_AXCONF_GEOAX_ASSIGN_TAB are active as the default setting for the FGROUP command as previously.

22510	GCODE_GROUPS_TO_PLC			C04	K1
-	G codes output at NCK-PLC interface on block change/ RESET			BYTE	PowerOn
-					
-	8	0, 0, 0, 0, 0, 0, 0, 0,0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2

Description: Specification of the G code group, the G codes of which are output to the NCK/PLC interface in case of block change/ reset.

The interface is updated after each block change and reset.

Notice:

It is not guaranteed that a PLC user program has at all times a block-synchronous relation between the active NC block and the G codes present.

Example: Path mode with very short blocks

22512	EXTERN_GCODE_GROUPS_TO_PLC			C11, C04	FBFA
-	Send G codes of an external NC language to PLC			BYTE	PowerOn
-					
-	8	0, 0, 0, 0, 0, 0, 0, 0,0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2

Description: Specification of the G code group of external languages, the G codes of which are output at the NCK interface on block change/ reset.

The interface is updated at each block change and after RESET.

Notice:

It is not guaranteed that a PLC user program has at all times a block-synchronous relation between the active NC block and the G codes present. (Example: Path mode with very short blocks).

22515	GCODE_GROUPS_TO_PLC_MODE			C04	-
-	Behavior of G group transfer to PLC			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0 ,0,0,0	0	1	7/2

Description: For setting the behavior, i.e. how the G groups are to be interpreted in the PLC with regard to data.

With the current behavior (bit 0 = 0), the G group is the array index of a 64-byte field (DBB 208 - DBB 271).

Maximally the 64th G group can be reached in this way.

With the new behavior (bit 0 = 1), the data storage in the PLC consists of max. 8 bytes (DBB 208 - DBB 215).

With this procedure, the array index of this byte array is identical with the index of the MD $MC_GCODE_GROUPS_TO_PLC[Index] and $MC_EXTERN_GCODE_GROUPS_TO_PLC[Index].

Each index (0 - 7) may only be set for one of the two machine data; the value 0 must be entered for the other MD.

Bit 0(LSB) = 0:

Behavior as before, the 64-byte field is used for displaying the G codes

Bit 0(LSB) = 1:

The user specifies for which G groups the first 8 bytes are to be used

22530	TOCARR_CHANGE_M_CODE			C04	W1
-	M code at change of tool holder			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0 ,0,0,0	-99999999	99999999	7/2

Description: The absolute value of this machine data indicates the number of the M code, which is output at the VDI interface when a tool holder is activated.

- If the MD is positive, the unchanged M code is always output.
- If the MD is negative, the number of the tool holder is added to the absolute value of the machine data and the number is output.

Special cases:

N M code is output, if the number of the M code to be output or the absolute value of this MD is set to one of the values 0 to 6, 17 or 30. It is not monitored whether an M code created in this way will conflict with other functions.

References:

/FB/, H2, Auxiliary Function Output to PLC

22532	GEOAX_CHANGE_M_CODE			C04	K2
-	M code at change of geo axes			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	99999999	7/2

Description: Number of the M code, which is output at the VDI interface in the case of a switchover of the geometry axes.

No M code is output if this MD is set to one of the values 0 to 6, 17 or 30.

It is not monitored whether an M code created in this way will conflict with other functions.

22534	TRAFO_CHANGE_M_CODE			C04	M1
-	M code at change of transformation			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	99999999	7/2

Description: Number of the M code that is output at the VDI interface in the case of a transformation changeover of the geometry axes.

No M code is output if this MD is set to one of the values 0 to 6, 17 or 30.

It is not monitored whether an M code created in this way will conflict with other functions.

22550	TOOL_CHANGE_MODE			C01, C11, C04, C09	W1
-	New tool compensation for M function			BYTE	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2

Description: The T function is used to select a tool in the program. The setting in this machine data determines whether the new tool is loaded immediately on execution of the T function:

MD: TOOL_CHANGE_MODE = 0

The new tool is loaded immediately on execution of the T function. This setting is used mainly on turning machines with tool turrets.

MD: TOOL_CHANGE_MODE = 1

The new tool is prepared for loading on execution of the T function. This setting is used mainly on milling machines with a tool magazine, in order to bring the new tool into the tool change position without interrupting the machining process. The M function entered in MD 22560: TOOL_CHANGE_M_CODE is used to remove the old tool from the spindle and load the new tool onto the spindle. This tool change is required to be programmed with the M function M06, in accordance with DIN 66025.

Related to:

MD 22560: TOOL_CHANGE_M_CODE

22560	TOOL_CHANGE_M_CODE			C01, C04, C09	W1
-	M function for tool change			DWORD	PowerOn
-					
-	-	6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6	0	99999999	7/2

Description: If the T function is only used to prepare a new tool for a tool change (this setting is used mainly on milling machines with a tool magazine, in order to bring the new tool into the tool change position without interrupting the machining process), another M function must be used to trigger the tool change.

The M function entered in TOOL_CHANGE_M_CODE triggers the tool change (remove old tool from the spindle and load new tool into the spindle). This tool change is required to be programmed with M function M06, in accordance with DIN 66025.

Related to:

MD 22550: TOOL_CHANGE_MODE

22562	TOOL_CHANGE_ERROR_MODE			C09	W1
-	Response to tool change errors			DWORD	PowerOn
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xFF	7/2

Description: Behavior if faults/problems occur during programmed tool change.

Bit-coded activation data.

Bit no.Hexadec.

ValueMeaning

----

0 (LSB)0x00001

Value 0Standard behavior: Stop on the faulty NC block

Value 1If a fault is detected in the block with the tool change preparation, the alarm is delayed until the corresponding tool change command (M06) is interpreted in the program sequence. Not earlier than that will the alarm that has been triggered by the preparation command be output. The operator can take corrective measures in this block.

Value = 1 is relevant only if the setting $MC_TOOL_CHANGE_MODE = 1 is used.

1   0x00002Relevant only with active tool management:

Value 0Standard behavior: Only tools with data assigned to a magazine are detected during tool change preparation.

Value 1Manual tools can be loaded. A tool will also be loaded, if its data are known in the NCK but are not assigned to a magazine. In this case, the tool data will automatically be assigned to the programmed tool holder. Corresponding messages prompt the user to carry out the necessary actions (insert tools into and remove tools from the tool holder).

2   0x00004Qualifying the offset programming

Value 0Standard behavior:

T0 and Dx - with x larger 0 - results in offset zero

D0 and DL=x - with x larger 0 - results in offset zero

(and thus also total offset zero)

Value 1T0 and Dx - with x larger 0 - leads to an alarm message

D0 and DL=x - with x larger 0 - leads to an alarm message

Bits 3 and 4:   Only relevant with active tool management.

Function:

Control of the behavior of the init block generation on program START, if a disabled tool is on the spindle and this tool is to be activated.

In particular, see

$MC_START_MODE_MASK,

$MC_RESET_MODE_MASK.

In particular on RESET, the behavior "Keep disabled tool on the spindle active" is not influenced hereby.

----

3   0x00008

Value 0Standard: If the tool on the spindle is disabled: Create a tool change command, which request a replacement tool. If there is no such replacement tool, an alarm will be generated.

Value 1The disabled status of the spindle tool is ignored. The tool becomes active. The subsequent part program should be formulated in such a way that no parts are machined with the disabled tool.

4 0x00010

Value 0Standard: The system tries to activate the spindle tool or its replacement tool.

Value 1If the tool on the spindle is disabled, T0 is programmed in the START init block.

5 Reserved

6 0x00040

Value 0Standard: With T0 or D0, only T0 or D0 is exactly programmed. This means that with programming of T0 machine data $MC_CUTTING_EDGE_DEFAULT and $MC_SUMCORR_DEFAULT determine the value of D, DL.

Example: $MC_CUTTING_EDGE_DEFAULT = 1, $MC_SUMCORR_DEFAULT = 2, $MC_TOOL_CHANGE_MODE = 0 (tool change with T programming)

N10 T0 ; T no. 0 has active numbers D1 and DL=2 which results in offset zero

If bit 2 is set in addition:

Programming of

a) T0 ; for tool deselection

b) D0 ; for offset deselection

generates an alarm, if

a) at least one of the machine data $MC_CUTTING_EDGE_DEFAULT or $MC_SUMCORR_DEFAULT is unequal to zero (T0 D0 DL=0 is the correct programming).

b) machine data $MC_SUMCORR_DEFAULT is unequal to zero (D0 DL=0 is the correct programming).

Value 1Controls the NCK behavior when (x, y, z all larger than zero) is programmed, if at least one of the machine data $MC_CUTTING_EDGE_DEFAULT or $MC_SUMCORR_DEFAULT is unequal to zero.

a) Tx Dy --> T0:

With T0, D0 or D0 DL=0 is automatically programmed in the NCK; i.e. values of machine data $MC_CUTTING_EDGE_DEFAULT, $MC_SUMCORR_DEFAULT unequal to zero are treated as values equal to zero.

b) Tx Dy --> T0 Dy, or T0 DL=z, or T0 Dy DL=z, or T0 D0 DL=z

Explicitly programmed values of D, DL are not influenced.

c) Dy DL=z --> D0

With D0, DL=0 is automatically programmed in the NCK; i.e. values of machine data $MC_SUMCORR_DEFAULT unequal to zero are treated as values equal to zero.

d) Dy DL=z --> D0 DL=z

Explicitly programmed values of DL are not influenced. If bit 2 is set in addition:

You only have to program T0 / D0 for tool/offset deselection and you don't get an alarm. The statements with regard to $MC_SUMCORR_DEFAULT or DL are valid only if the 'Total offset' function is active (see $MN_MM_TOOL_MANAGEMENT_MASK, bit 8).

7 0x00080

Value 0 =Standard behavior:

When Tx is programmed, a check is carried out to see whether a tool with the T number x is known in the TO unit of the channel. If not, the program is stopped in this block with alarm 17190

Value 1 =Only if tool basic functionality is active ($MC_TOOL_MANAGEMENT_MASK, bit0,1=0) and ($MN_MM_TYPE_OF_CUTTING_EDGE=0):

When Tx is programmed, an unknown Tx will firstly be ignored and the alarm with regard to the preparation command (Tx) will also be ignored until the D selection is interpreted in the program sequence. Only then will alarm 17191, which has been triggered by the preparation command, be output. This means that the operator can take corrective measures in this block. When the program is continued, the incorrect NC block will again be interpreted and the preparation command will be automatically executed again internally.

(Is of interest for Cutting-Edge-Default=0 or =-2 or D0 programming, otherwise the D of Cutting-Edge-Default will be selected on tool change.)

This variant is justified, if you wish to program "Tool number = Location" (revolver as tool holder) without tool management. The revolver can now positioned on a location for which a tool has not (yet) been defined.

If bit0=1 of this MD (alarm delay) is set, this bit has no meaning.

This behavior is compatible with software versions older than P6.5.13.

22600	SERUPRO_SPEED_MODE			EXP	-
-	Speed for block search run type 5			DWORD	Immediately
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	-	-	2/2

Description:

```
This machine data specifies the search run mode: SERUPRO
SERUPRO search run is activated with PI service _N_FINDBL mode
parameter = 5.
SERUPRO means SEarchRUn by PROgram test, i.e. traversing under
program test from beginning of program to search target.
Note:
   Program test does not move any axes/spindles.
Bit0 and Bit1:
==========
0:   Under program test, the axes/spindles are traversed at the
following speeds:
   Axes:      $MC_SERUPRO_SPEED_FACTOR*dry run feed.
   Spindles:  $MC_SERUPRO_SPEED_FACTOR*programmed speed.
   Dynamic axis / spindle limitations are not taken into account.
1:     Under program test, the axes/spindles are traversed at the
following speeds:
   Axes:     at the same speed as dry run feed.
   Spindles: at the programmed speed.
   Dynamic axis / spindle limitations are taken into account.
2:      Under program test, the axes/spindles are traversed at the
programmed velocity/speed.
   Dynamic axis /spindle limitations are taken into account.
3:      Not assigned.
Related to:
   $SC_DRY_RUN_FEED, $MC_SERUPRO_SPEED_FACTOR
```

22601	SERUPRO_SPEED_FACTOR			EXP	K1
-	Speed factor for search run type 5			DOUBLE	Immediately
-					
-	-	10.0,10.0,10.0,10.0,10.0,10.0,10.0...	1.0	-	2/2

Description:

```
SERUPRO means SEarch RUn by PROgram test, i.e. traversing under
program test from beginning of program to search target.
Note:
   Program test does not move any axes / spindles.
The machine data is relevant only if the first two bits of
$MC_SERUPRO_SPEED_MODE are 0. The sign of the machine data has the
following meaning:
Axes: MD specifies the factor by which the test run feedrate is
multiplied.
Spindles: MD specifies the factor by which the programmed speed is
multiplied.
Dynamic limitations of axes / spindles are always ignored.
Related to:
   $MC_DRY_RUN_FEED, $MC_SERUPRO_SPEED_MODE
```

22620	START_MODE_MASK_PRT			EXP, C03	K1
-	Initial setting on special starts			DWORD	Reset
-					
-	-	0x400,0x400,0x400,0x400,0x400,0x400...	0	0xFFFF	7/2

Description: This machine data is activated via $MC_ENABLE_START_MODE_MASK_PRT.

If $MC_ENABLE_START_MODE_MASK_PRT is in its initial setting, $MC_START_MODE_MASK_PRT is inactive.

If $MC_START_MODE_MASK_PRT is activated in the case of a "search via program test" (abbr. SERUPRO), $MC_START_MODE_MASK_PRT will replace the machine data $MC_START_MODE_MASK if "search via program test" is started.

In this case, a behavior deviating from PLC start can be set at the start of the search. The meaning of the bit-oriented assignment of $MC_START_MODE_MASK_PRT is the same as $MC_START_MODE_MASK.

22621	ENABLE_START_MODE_MASK_PRT			EXP, C03	K1
-	Enables $MC_START_MODE_MASK_PRT			DWORD	Reset
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x1	7/2

Description: The machine data $MC_START_MODE_MASK_PRT is activated via $MC_ENABLE_START_MODE_MASK_PRT.

If $MC_ENABLE_START_MODE_MASK_PRT is at its initial setting $MC_START_MODE_MASK_PRT is inactive.

Bit0 = 1:

If a "search via program test" (abbr. SERUPRO) is started from RESET (PI service _N_FINDBL mode paramter == 5), $MC_START_MODE_MASK_PRT will replace the machine data $MC_START_MODE_MASK.

This method can be used to set a start behavior differing from PLC start when the search
is started.

22622	DISABLE_PLC_START			EXP	-
-	Enable part program start via PLC			DWORD	PowerOn
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	-	-	2/2

Description: Allow part program start via PLC.

This machine data will ONLY be evaluated, if "Group-Serupro" mode is switched on.

"Group-Serupro" is switched on by means of "$MC_SERUPRO_MODE BIT2".

BIT0 = 0

A part program can be started in this channel only via the PLC. Starting via the part program command "START" is interlocked.

BIT0 = 1

A part program can be started in this channel only by means of the part program command "START" from another channel. Starting via the PLC is interlocked.

22680	AUTO_IPTR_LOCK			EXP, C03	-
-	Disable interrupt pointer			DWORD	Reset
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x3	7/2

Description: With $MC_AUTO_IPTR_LOCK program areas are defined in which the individually indicated coupling types are active. If a program abort is executed in a program range that is defined as such, it will not be the currently executed part program block that is stored in the interrupt pointer (OPI module Interruption-Search),but the last block prior to activation of the coupling.

22700	TRACE_STARTTRACE_EVENT			EXP, C06	BA,S5,FBSY
-	Diagnostic data rec. starts with event TRACE_STARTTRACE_EVENT.			STRING	PowerOn
NBUP					
-	-		-	-	2/2

Description: The machine data is used for diagnostics.

The recording of the diagnostic data does not start until the event (TRACE_STARTTRACE_EVENT) has occurred at the trace point (TRACE_STARTTRACE_TRACEPOINT) and in the correct step (TRACE_STARTTRACE_STEP).

22702	TRACE_STARTTRACE_STEP			EXP, C06	BA,S5,FBSY
-	Conditions for start of trace recording			STRING	PowerOn
NBUP					
-	2	"","","","","","","","","",""...	-	-	2/2

Description: The machine data is only intended for diagnostic use.

See TRACE_STARTTRACE_EVENT

In the case of TRACE_STARTTRACE_EVENT BLOCK_CHANGE the string TRACE_STARTTRACE_STEP is interpreted as a file name and block number.

In the case of BSEVENTTYPE_SETALARM the string is interpreted as an alarm number.

22704	TRACE_STOPTRACE_EVENT			EXP, C06	BA,S5,FBSY
-	Conditions for stop of trace recording			STRING	PowerOn
NBUP					
-	-	"CLEARCANCELALARM_M","CLEARCANCELALARM_M"...	-	-	2/2

Description: The machine data is only used for diagnostics.

The recording of the diagnostic data ends when the event (TRACE_STOP_ART_EVENT) has occurred at the trace point (TRACE_STOPTRACE_TRACEPOINT) and in the correct step (TRACE_STOPTRACE_STEP).

(After reaching the stop condition, the previously recorded diagnostic data is stored in a file "NCSCTRyy.MPF" or for NCU-LINK in "NCxxTRyy.MPF" in the MPF directory.

22706	TRACE_STOPTRACE_STEP			EXP, C06	BA,S5,FBSY
-	CommandSequenzStep with which the recording ends			STRING	PowerOn
NBUP					
-	2	"", "","", "","", "","", "","", ""...	-	-	2/2

Description: The machine data is only intended for diagnostic use.

22708	TRACE_SCOPE_MASK			EXP, C06	BA,S5,FBSY
-	Selects the contents of the trace file			STRING	PowerOn
NBUP					
-	-		-	-	2/2

Description: The machine data is only intended for diagnostic purposes.

Specific trace contents are selected with the MD datum.

The entry SETALARM records the alarm environment and the block change in the main run is also logged by means of BLOCK_CHANGE.

22710	TRACE_VARIABLE_NAME			-	BA,S5,FBSY
-	Definition of trace data			STRING	PowerOn
NBUP					
-	10	"BL_NR", "TR_POINT", "EV_TYPE", "EV_SRC", "CS_ASTEP"...	-	-	2/2

Description: The machine data is only intended for diagnostic purposes.

The MD datum defines which data are recorded in the trace file.

22712	TRACE_VARIABLE_INDEX			EXP, C06	BA,S5,FBSY
-	Index for trace recording data			DWORD	PowerOn
NBUP					
-	10	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0xFFFF	2/2

Description: The machine data is only intended for diagnostic use.

The MD data, together with TRACE_VARIABLE_NAME, determines which data are recorded in the trace file.

It enables access to an array element.

E.g. use as an axis index when accessing axis data.

22714	MM_TRACE_DATA_FUNCTION			EXP, C02, C06	BA,S5,FBSY
-	Activating diagnostics			DWORD	PowerOn
NBUP					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x3FFFF	2/2

Description: The machine data is only intended for diagnostic use.
Activating the diagnostics
An internal ring buffer records important events.
After a trigger event, with the 'Cancel alarm' key set as default,
the ring buffer is briefly freezed, read and converted into an ASCII file
in the part program directory. The file name for the 1st channel
is ncsctr01.mpf and for the 7th channel it is ncsctr07.mpf.
The data in the ring buffer are subsequently called dynamic data.
In addition to the trigger event, further current data are read from the
NCK and transferred to the ASCII file. These recordings do
NOT have a history and are subsequently called static data.

```
Bit no.   Significance when bit is set
-----------------------------------------------------------------
-
0 (LSB)Recording of the dynamic data (see TRACE_VARIABLE_NAME)
1      Recording of the block control static data
2      Recording of the alarm data static data
3      Recording of the process data static data
4      Recording of the command sequence static data
5      Recording of the tool management static data
6      Recording of the NCK version file. Static data
7      Recording of the statuses of the current block
       Various statuses of the axes and the SPARPI.  Static data
8      Recording of various statuses of the channel.  Static data
9     Error statuses in the NCK memory management are scanned dur-
ing trace generation.
       An error renames the trace file. Static data
       Possible names and their meaning:
       NCFIER.MPF   Error in the file system
       NCSLER.MPF   Error during string creation
       NCFIER.MPF   Error on New/Delete
10     All block changes in the interpreter are recorded. Dynamic
data.
11     Axial VDI signals are recorded. Dynamic data.
       Only in conjunction with $MN_MM_TRACE_VDI_SIGNAL
12     OEM traces are activated. Dynamic data.
13     Synchronized actions are recorded. Dynamic data.
       NOTICE:  In applications with an intensive use of
       filled with these trace points, other events are ignored!
       That is why this bit should remain at 0 in these cases.
14     Not assigned.
15     Recording of the station commands.    Dynamic data.
       Note: Most important output of the NCK module NCSC!
```

16 Recording of the gantry commands
17 Recording of the status changes of the drive

22800	TRACE_COMPRESSOR_OUTPUT			EXP, C01	D1
-	Activation of trace output for compressor			BYTE	PowerOn
NBUP					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	0/0

Description: A trace output of the compressor can be activated with this machine data. With this, the polynomials created by the compressor can be output in an internal file. If this MD is active, the NCK works like a preprocessor, i.e. there is also no program execution.

The following values are possible for this MD:

0: Trace output not active.

1: Polynomials created by the compressor are output.

2: The following are also output:

- Type of continuousness of the block transitions generated by the compressor
- Compression rate (number of compressed blocks)
- Corner detection

22900	STROKE_CHECK_INSIDE			EXP, C01, C11	FBFA
-	Direction (inside/outside) in which prot. zone 3 is effective			BOOLEAN	PowerOn
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: This MD defines whether protection zone 3 is a protection zone inside or outside.

Meaning:

0: Protection zone 3 is a protection zone inside, i.e. the protection zone must not entered inwardly.

1: Protection zone 3 is a protection zone outside

22910	WEIGHTING_FACTOR_FOR_SCALE			EXP, C01, C11	FBFA
-	Input resolution for scaling factor			BOOLEAN	PowerOn
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: Definition of the unit for the scaling factor P and for the axial scaling factors I, J, K

Meaning:

0 Scale factor in 0.001

1 Scale factor in 0.00001

Related to:

DEFAULT_SCALEFACTOR_AXIS,
DEFAULT_SCALE_FACTOR_P

22914	AXES_SCALE_ENABLE			EXP, C01, C11	FBFA
-	Activation for axial scaling factor (G51)			BOOLEAN	PowerOn
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: Axial scaling is enabled with this MD.

Meaning:

0: axial scaling not possible

1: axial scaling possible -> MD DEFAULT_SCALE_FACTOR_AXIS is active

Related to:

DEFAULT_SCALE_FACTOR_AXIS

22920	EXTERN_FIXED_FEEDRATE_F1_ON			EXP, C01, C11	FBFA
-	Activation of fixed feedrates F1 - F9			BOOLEAN	PowerOn
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: This MD is used to activate the fixed feedrates from the setting data $SC_EXTERN_FIXED_FEEDRATE_F1_F9[].

Meaning:

0: no fixed feedrates with F1 - F9

1: the feedrates set in setting data $SC_EXTERN_FIXED_FEEDRATE_F1_F9[] will become active when programming F1 - F9

22930	EXTERN_PARALLEL_GEOAX			EXP, C01, C11	FBFA
-	Assignment of a parallel channel axis to the geometry axis			BYTE	PowerOn
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/2

Description: Assignment table of the axes positioned parallel to the geometry axes.

This table can be used to assign channel axes positioned parallel to the geometry axes. The parallel axes can then be activated as geometry axes in ISO mode using the G functions of plane selection (G17 - G19) and the axis name of the parallel axis. The axis is then replaced by the axis defined via $MC_AXCONF_GEOAX_ASSIGN_TAB[].

Prerequisite:

The channel axes used must be active. (list position assigned in AXCONF_MACHAX_USED). Entering zero deactivates the corresponding parallel geometry axis:

24000	FRAME_ADD_COMPONENTS			C03	K2
-	Frame components for G58 and G59			BOOLEAN	PowerOn
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7

Description: Additive programmable frame components can be separately programmed and modified.

0: Additive translations which have been programmed with ATRANS are stored in the frame together with the absolute translation (prog. with TRANS).

G58 and G59 are not possible.

1: The sum of the additive translations are stored in the fine offset of the programmable frame. The absolute and the additive translations can be changed independently of one another.

G58 and G59 are possible.

24002	CHBFRAME_RESET_MASK			C03	K2
-	Active channel-specific base frames after reset			DWORD	Reset
-					
-	-	0xFFFF,0xFFFF,0xFFFF,0xFFFF,0xFFFF...	0	0xFFFF	7/2

Description: Bit mask for the reset setting of the channel-specific base frames which are included in the channel.

The following apply:

If $MC_RESET_MODE_MASK bit0 = 1 and BIT14 = 1

Entire base frame is derived on reset from linking the base frame field elements whose bit is 1 in the bit mask.

If $MC_RESET_MODE_MASK bit0 = 1 and BIT14 = 0

The entire base frame is deselected on reset

24004	CHBFRAME_POWERON_MASK			C03	FBFA
-	Reset channel-specific base frames after power on			DWORD	PowerOn
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xFFFF	7/2

Description: This machine data defines whether channel-specific base frames are reset in the data management on Power On.

That is

- Offsets and rotations are set to 0,
- Scalings are set to 1.
- Mirror image machining is disabled.

The selection can be made separately for individual base frames.

Bit 0 means base frame 0, bit 1 base frame 1 etc.

Value=0: Base frame is retained on Power On

Value=1: Base frame is reset in the data management on Power On.

Related to:

$MN_NCBFRAME_POWERON_MASK

24006	CHSFRAME_RESET_MASK			C03	K2
-	Active system frames after reset			DWORD	Reset
-					
-	-	0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1...	0	0x00000FFF	7/2

Description: Bit mask used for the reset setting of the channel-specific system frames included in the channel.

Bit 0: System frame for actual value setting and scratching is active after reset.

Bit 1: System frame for external work offset is active after reset.

Bit 2: Reserved, for TCARR and PAROT see $MC_GCODE_RESET_VALUES[].

Bit 3: Reserved, for TOROT and TOFRAME see $MC_GCODE_RESET_VALUES[].

Bit 4: System frame for workpiece reference points is active after reset.

Bit 5: System frame for cycles is active after reset.

Bit 6: Reserved; reset behavior dependent on $MC_RESET_MODE_MASK.

Bit 7:System frame $P_ISO1FR (ISO G51.1 Mirror) active after reset

Bit 8:System frame $P_ISO2FR (ISO G68 2DROT) active after reset

Bit 9:System frame $P_ISO3FR (ISO G68 3DROT) active after reset

Bit 10:System frame $P_ISO4FR (ISO G51 Scale) active after reset

Bit 11: System frame $P_RELFR active after reset.

Related to:

MD 28082: MM_SYSTEM_FRAME_MASK

24007	CHSFRAME_RESET_CLEAR_MASK			C03	-
-	Deletion of system frames after reset			DWORD	Reset
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x00000FFF	7/2

Description: Bit mask used to delete channel-specific system frames in data management on reset.

Bit 0: System frame for actual value setting and scratching is deleted on reset.

Bit 1: System frame for exernal work offset is deleted on reset.

Bit 2: Reserved, for TCARR and PAROT see $MC_GCODE_RESET_VALUES[].

Bit 3: Reserved, for TOROT and TOFRAME see $MC_GCODE_RESET_VALUES[].

Bit 4: System frame for workpiece reference point is deleted on reset.

Bit 5: System frame for cycles is deleted on reset.

Bit 6: Reserved; reset behavior depends on $MC_RESET_MODE_MASK.

Bit 7:System frame $P_ISO1FR (ISO G51.1 Mirror) is deleted on reset.

Bit 8:System frame $P_ISO2FR (ISO G68 2DROT) is deleted on reset.

Bit 9:System frame $P_ISO3FR (ISO G68 3DROT) is deleted on reset.

Bit 10:System frame $P_ISO4FR (ISO G51 Scale) is deleted on reset.

Bit 11: System frame $P_RELFR is deleted on reset.

24008	CHSFRAME_POWERON_MASK			C03	K2
-	Reset channel system frames after power on			DWORD	PowerOn
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x00000FFF	7/2

Description: This machine data defines whether channel-specific system frames are reset in the data management on Power On. That is offsets and rotations are set to 0, scalings to 1. Mirroring is disabled.

The selection can be made separately for individual system frames.

Bit 0:System frame for set actual value and scratching is deleted after Power On.

Bit 1:System frame for external work offset is deleted after Power On.

Bit 2:System frame for TCARR and PAROT is deleted after Power On.

Bit 3:System frame for TOROT and TOFRAME is deleted after Power On.

Bit 4:System frame for work piece reference points deleted after Power On.

Bit 5:System frame for cycles retained after Power On.

Bit 6:System frame for transformations deleted after Power On.

Bit 7:System frame $P_ISO1FR (ISO G51.1 Mirror) is deleted after power ON.

Bit 8:System frame $P_ISO2FR (ISO G68 2DROT) is deleted after power ON.

Bit 9:System frame $P_ISO3FR (ISO G68 3DROT) is deleted after power ON.

Bit 10:System frame $P_ISO4FR (ISO G51 Scale) is deleted after power ON.

Bit 11:System frame $P_RELFR is deleted after power ON.

Related to:

MD 28082: MM_SYSTEM_FRAME_MASK

24010	PFRAME_RESET_MODE			C03	K2
-	Reset mode for programmable frame			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2

Description: 0: Programmable frame is deleted at reset.

1: Programmable frame remains active at reset.

24020	FRAME_SUPPRESS_MODE			C03	K2
-	Positions for frame suppression			DWORD	PowerOn
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x0000003	7/2

Description: Bit mask for configuring the positions for frame suppressions (SUPA, G153, G53).

The following rule applies:

Bit 0: Positions for display (OPI) without frame suppression

Bit 1: Position variables without frame suppression

24030	FRAME_ACS_SET			C03	K2
-	Adjustment of SZS coordinate system			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2

Description: 0: SZS results from the WCS transformed with $P_CYCFRAME and $P_PFRAME.

1: SZS results from the WCS transformed with the $P_CYCFRAME.

24040	FRAME_ADAPT_MODE			C03	-
-	Adaptation of active frames			DWORD	PowerOn
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x0000007	7/2

Description: Bit mask for adapting the active frames or axis configuration

The following applies:

Bit 0:

Rotations in active frames that rotate coordinate axes for which there are no geometry axes are deleted from the active frames.

Bit 1:

Shear angles in active frames are orthogonalized.

Bit 2:

Scalings of all geometry axes in the active frames are set to value 1.

24050	FRAME_SAA_MODE			C03	-
-	Saving and activating of data management frames			DWORD	PowerOn
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x0000003	7/2

Description: Bit mask for saving and activating data handling frames.

The following applies:

Bit 0:

Data handling frames are only activated by programming the bit masks $P_CHBFRMASK, $P_NCBFRMASK and $P_CHSFRMASK. G500..G599 only activate the relevant settable frame. The reset behavior is independent of this.

Bit 1:

Data handling frames are not written implicitly by system functions such as TOROT, PAROT, ext. work offset, transformations.

24080	USER_FRAME_POWERON_MASK			N01	-
-	Parameterize properties for settable frame			DWORD	PowerOn
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x1	7/2

Description: Setting the following bits activates certain properties of the settable frame:

Bit 0 = 0: default behavior.

Bit 0 = 1: if $MC_GCODE_RESET_MODE[7] = 1, the last active settable frame is selected again according to G code group 8 after power up of the control.

1.4.4 Transformation definitions in channel

24100	TRAFO_TYPE_1			C07	F2
-	Definition of transformation 1 in channel			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description:

This MD specifies the first available transformation in each channel.

The 4 low-value bits identify the specific transformation of a specific transformation group. The transformation group is identified by a number starting with the 5th bit.

Meaning:

0 No transformation

16 and higher

5-axis transformation with turnable tool

32 and higher

5-axis transformation with turnable workpiece

48 and higher

5-axis transformation with turnable tool and turnable workpiece

72

Generic 5-axis transformation. Type and kinematic data are determined by an associated, orientable tool holder, see MD $MC_TRAFO5_TCARR_NO_1 and $MC_TRAFO5_TCARR_NO_2

The 4 low-value bits have the following meaning for a 5-axis transformation:

0 Axis sequence AB

1 Axis sequence AC

2 Axis sequence BA

3 Axis sequence BC

4 Axis sequence CA

5 Axis sequence CB

8 Generic orientation transformation (3- 5 axes)

256 and higher

TRANSMIT transformation

512 and higher

TRACYL transformation

1024 and higher

TRAANG transformation

2048

TRACLG: centerless transformation

From 4096 to 4098

OEM transformation

8192 and higher

TRACON: cascaded transformations

Example:

A 5-axis transformation with turnable tool and axis sequence CA (i.e. C axis turns A axis) has number 20 (= 16 + 4)

Attention:

Not all combinations of group numbers and axis sequences are allowed. If you enter a number for a non-existing transformation, you will not get an error message.

Related to:

TRAFO_TYPE_2, TRAFO_TYPE_3, ... TRAFO_TYPE_8

References:

/FB/, F2, "5-Axis Transformation"

24110	TRAFO_AXES_IN_1			C07	F2
-	Axis assignment for the 1st transformation in the channel			BYTE	NEW CONF
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

Description: Axis assignment at input point of 1st transformation

The index input at the nth position states which axis is mapped internally from the transformation to axis n.

Not relevant:

No transformation

Releated to:

TRAFO_AXES_IN_2, TRAFO_AXES_IN_3, ...
TRAFO_AXES_IN_8

References:

/FB/, F2, "5-Axis Transformation"

24120	TRAFO_GEOAX_ASSIGN_TAB_1			C07	F2
-	Assignment of geometry axes to channel axes for transformation 1			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 1.

Not relevant:

No transformation

Related to:

$MC_AXCONF_GEOAX_ASSIGN_TAB, if no transformation is active.

References:

/FB/, K2, "Coordinate Systems, Axis Types, Axis Configurations, Workpiece-Related Actual Value System, External Work Offset"

24130	TRAFO_INCLUDES_TOOL_1			C07	M1,F2
-	Tool handling with 1st active transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: This machine data states for each channel whether the tool is handled during the 1st transformation or externally.

This machine data is evaluated only with specific transformations.

It is evaluated on the condition that the orientation of the tool with reference to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only the "inclined-axis transformation" fulfills this condition.

If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP).

The method of operation of protection zones and working area limitations varies correspondingly.

24200	TRAFO_TYPE_2			C07	F2
-	Definition of the 2nd transformation in the channel			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: This MD states the second available transformation in each channel.

Same as TRAFO_TYPE_1, but for the second available transformation in the channel.

References:

/FB/, F2, "5-Axis Transformation"

24210	TRAFO_AXES_IN_2			C07	F2
-	Axis assignment for transformation 2			BYTE	NEW CONF
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

Description: TRAFO_AXES_IN_2(n)

Axis assignment at input of 2nd to 8th transformation.

Same meaning as for TRAFO_AXES_IN_1.

24220	TRAFO_GEOAX_ASSIGN_TAB_2			C07	F2
-	Assignment of geometry axes to channel axes for transformation 2			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 2.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

24230	TRAFO_INCLUDES_TOOL_2			C07	M1,F2
-	Tool handling with active 2nd transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: This machine data states for each channel whether the tool is handled during the 2nd transformation or externally.

This machine data is evaluated only with specific transformations.

It is evaluated on the condition that the orientation of the tool with reference to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only "inclined-axis transformation" fulfills this condition.

If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP).

The method of operation of protection zones and working area limitations varies correspondingly.

24300	TRAFO_TYPE_3			C07	F2
-	Definition of the 3rd transformation in the channel			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: This MD states the third available transformation in each channel.

Same as TRAFO_TYPE_1, but for the third available transformation in the channel.

References:

/FB/, F2, "5-Axis Transformation"

24310	TRAFO_AXES_IN_3			C07	F2
-	Axis assignment for transformation 3			BYTE	NEW CONF
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

Description: Axis assignment at the input point of the 3rd transformation in the channel.

Meaning is the same as TRAFO_AXES_IN_1, but for the third available transformation in the channel.

24320	TRAFO_GEOAX_ASSIGN_TAB_3			C07	F2
-	Assignment of geometry axes to channel axes for transformation 3			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 3.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

24330	TRAFO_INCLUDES_TOOL_3			C07	M1,F2
-	Tool handling with active 3rd transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: This machine data states for each channel whether the tool is handled during the 3rd transformation or externally.

This machine data is evaluated only with specific transformations.

It is evaluated on the condition that the orientation of the tool with reference to to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only "inclined-axis transformation" fulfills this condition.

If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP).

The method of operation of protection zones and working area limitations varies correspondingly.

24400	TRAFO_TYPE_4			C07	F2
-	Definition of the 4th transformation in the channel			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: This MD states the fourth available transformation in each channel.

Same as TRAFO_TYPE_1, but for the fourth available transformation in the channel.

References:

/FB/, F2, "5-Axis Transformation"

24410	TRAFO_AXES_IN_4			C07	F2
-	Axis assignment for the 4th transformation in the channel			BYTE	NEW CONF
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

Description: Axis assignment at the input point of the 4th transformation in the channel.

Meaning is the same as TRAFO_AXES_IN_1, but for the fourth available transformation in the channel.

24420	TRAFO_GEOAX_ASSIGN_TAB_4			C07	F2
-	Assignment of geometry axes to channel axes for transformation 4			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 4.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

24426	TRAFO_INCLUDES_TOOL_4			C07	M1,F2
-	Tool handling with active 4th transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: This machine data states for each channel whether the tool is handled during the 4th transformation or externally.

This machine data is evaluated only with specific transformations.

It is evaluated on the condition that the orientation of the tool with reference to to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only "inclined-axis transformation" fulfills this condition.

If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP).

The method of operation of protection zones and working area limitations varies correspondingly.

24430	TRAFO_TYPE_5			C07	F2,M1
-	Type of transformation 5 in the channel			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: Type of transformation available as the fifth in the channel. See $MC_TRAFO_TYPE_1 for explanation.

24432	TRAFO_AXES_IN_5			C07	F2,M1
-	Axis assignment for transformation 5			BYTE	NEW CONF
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

Description: Axis assignment at the input point of the 5th transformation. See TRAFO_AXES_IN_1 for explanation.

24434	TRAFO_GEOAX_ASSIGN_TAB_5			C07	F2,M1
-	Assignment of geometry axes to channel axes for transformation 5			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 5.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

24436	TRAFO_INCLUDES_TOOL_5			C07	M1,F2
-	Tool handling with active 5th transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: This machine data states for each channel whether the tool is handled during the 5th transformation or externally.

This machine data is evaluated only with specific transformations.

It is evaluated on the condition that the orientation of the tool with reference to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only "inclined-axis transformation" fulfills this condition.

If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP).

The method of operation of protection zones and working area limitations varies correspondingly.

24440	TRAFO_TYPE_6			C07	F2,M1
-	Type of transformation 6 in the channel			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: Type of transformation available as the sixth in the channel. See $MC_TRAFO_TYPE_1 for explanation.

24442	TRAFO_AXES_IN_6			C07	F2,M1
-	Axis assignment for transformation 6			BYTE	NEW CONF
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

Description: Axis assignment at the input point of the 6th transformation. See TRAFO_AXES_IN_1 for explanation.

24444	TRAFO_GEOAX_ASSIGN_TAB_6			C07	F2,M1
-	Assignment of geometry axes to channel axes for transformation 6			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 6.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

24446	TRAFO_INCLUDES_TOOL_6			C07	M1,F2
-	Tool handling with active 6th transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: This machine data states for each channel whether the tool is handled during the 6th transformation or externally.

This machine data is evaluated only with specific transformations.

It is evaluated on the condition that the orientation of the tool with reference to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only "inclined-axis transformation" fulfills this condition.

If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP).

The method of operation of protection zones and working area limitations varies correspondingly.

24450	TRAFO_TYPE_7			C07	F2,M1
-	Type of transformation 7 in the channel			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: Type of transformation available as the seventh in the channel. See $MC_TRAFO_TYPE_1 for explanation.

24452	TRAFO_AXES_IN_7			C07	F2,M1
-	Axis assignment for transformation 7			BYTE	NEW CONF
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

Description: Axis assignment at the input point of the 7th transformation. See TRAFO_AXES_IN_1 for explanation.

24454	TRAFO_GEOAX_ASSIGN_TAB_7			C07	F2,M1
-	Assignment of geometry axes to channel axes for transformation 7			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 7.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

24456	TRAFO_INCLUDES_TOOL_7			C07	M1,F2
-	Tool handling with active 7th transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: This machine data states for each channel whether the tool is handled during the 7th transformation or externally.

This machine data is evaluated only with specific transformations.

It is evaluated on the condition that the orientation of the tool with reference to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only "inclined-axis transformation" fulfills this condition.

If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP).

The method of operation of protection zones and working area limitations varies correspondingly.

24460	TRAFO_TYPE_8			C07	F2,M1
-	Type of transformation 8 in the channel			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: Type of transformation available as the eighth in the channel. See $MC_TRAFO_TYPE_1 for explanation.

24462	TRAFO_AXES_IN_8			C07	F2,M1
-	Axis assignment for transformation 8			BYTE	NEW CONF
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

Description: Axis assignment at the input point of the 8th transformation. See TRAFO_AXES_IN_1 for explanation.

24464	TRAFO_GEOAX_ASSIGN_TAB_8			C07	F2,M1
-	Assignment of geometry axes to channel axes for transformation 8			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 8.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

24466	TRAFO_INCLUDES_TOOL_8			C07	M1,F2
-	Tool handling with 8th active transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: This machine data states for each channel whether the tool is handled during the 8th transformation or externally.

This machine data is evaluated only with specific transformations.

It is evaluated on the condition that the orientation of the tool with reference to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only "inclined-axis transformation" fulfills this condition.

If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP).

The method of operation of protection zones and working area limitations varies correspondingly.

24470	TRAFO_TYPE_9			C07	M1
-	Type of transformation 9 in the channel			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: Type of transformation available as the ninth in the channel. See $MC_TRAFO_TYPE_1 for explanation.

24472	TRAFO_AXES_IN_9			C07	M1
-	Axis assignment for transformation 9			BYTE	NEW CONF
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

Description: Axis assignment at the input point of the 9th transformation. See TRAFO_AXES_IN_1 for explanation.

24474	TRAFO_GEOAX_ASSIGN_TAB_9			C07	M1
-	Assignment of geometry axes to channel axes for transformation 9			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 9.

24476	TRAFO_INCLUDES_TOOL_9			C07	M1
-	Treatment of tool with active 9th transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: Same as TRAFO_INCLUDES_TOOL_1, but for the 9th transformation.

24480	TRAFO_TYPE_10			C07	M1
-	Transformation 10 in channel			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: Same as TRAFO_TYPE_1, but for the tenth available transformation in the channel.

24482	TRAFO_AXES_IN_10			C07	M1
-	Axis assignment for transformation 10			BYTE	NEW CONF
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

Description: Axis assignment at the input of the 10th transformation. See TRAFO_AXES_IN_1 for explanation.

24484	TRAFO_GEOAX_ASSIGN_TAB_10			C07	M1
-	Assignment of geometry axes to channel axes f. transformation 10			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

Description: Assignment table of geometry axes with transformation 10

Same as AXCONF_GEOAX_ASSIGN_TAB, but only effective when transformation 10 is active.

24486	TRAFO_INCLUDES_TOOL_10			C07	M1
-	Treatment of tool with active 10th transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: Same as TRAFO_INCLUDES_TOOL_1, but for the 10th transformation.

24500	TRAFO5_PART_OFFSET_1			C07	F2
mm	Offset vector of 5-axis transformation 1			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: This machine data designates an offset of the workpiece carrier for the first (MD: TRAFO5_PART_OFFSET_1) or second (MD: TRAFO5_PART_OFFSET_2) 5-axis transformation of a channel and has a specific meaning for the different machine types:

Machine type 1 (two-axis swivel head for tool):

Vector from machine reference point to zero point of workpiece table. This will generally be a zero vector if both coincide.

Machine type 2 (two-axis rotary table for workpiece):

Vector from the second rotary joint of workpiece rotary table to zero point of table.

Machine type 3 (single-axis rotary table for workpiece and single-axis swivel head for tool):

Vector from rotary joint of workpiece table to zero point of table.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

24510	TRAFO5_ROT_AX_OFFSET_1			C07	F2
degrees	Position offset of rotary axes 1/2/3 for 5-axis transformation 1			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0, 0.0,0.0, 0.0, 0.0...	-	-	7/7

Description: This machine data designates the angular offset of the first or second rotary axis in degrees for the first 5-axis transformation of a channel.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

24520	TRAFO5_ROT_SIGN_IS_PLUS_1			C07	F2
-	Sign of rotary axis 1/2/3 for 5-axis transformation 1			BOOLEAN	NEW CONF
-					
-	3	TRUE, TRUE, TRUE,TRUE, TRUE, TRUE...	-	-	7/7

Description: This machine data designates the sign with which the two rotary axes are included in the first 5-axis transformation of a channel.

MD = 0 (FALSE):

Sign is reversed.

MD = 1 (TRUE) :

Sign is not reversed and the traversing direction is defined according to AX_MOTION_DIR.

This machine data does not mean that the rotational direction of the rotary axis concerned is to be reversed, but specifies whether its motion is in the mathematically positive or negative direction when the axis is moving in the positive direction.

The result of a change to this machine data is not therefore a change in the rotational direction, but a change in the compensatory motion of the linear axes.

However, if a directional vector and thus, implicitly, a compensatory motion is specified, the result is a change in the rotational direction of the rotary axis concerned.

On a real machine, therefore, the machine data may be set to FALSE (or zero) only if the rotary axis is turning in an anti-clockwise direction when moving in a positive direction.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

24530	TRAFO5_NON_POLE_LIMIT_1		C07	F2
degrees	Definition of pole range for 5-axis transformation 1		DOUBLE	NEW CONF
-				
-	-	2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0...	-	-	7/7

Description: This MD designates a limit angle for the fifth axis of the first 5-axis transformation with the following properties: if the path runs below this angle past the pole, the traverse will pass through the pole.

For the 5-axis transformation, the two orientation axes of the tool form a coordinate system of length and width circles on a spherical surface. If orientation programming (that is the orientation vector lies in a plane) leads the path so close past the pole that the angle defined by the MD is undershot then there is a deviation from the defined interpolation such that the interpolation runs through the pole.

Alarm 14112 is output if this modification of the path gives a deviation greater than a tolerance defined by MD 24540: TRAFO5_POLE_LIMIT_1.

MD irrelevant:

If the "5-Axis Transformation" option is not installed.

Also irrelevant with programming in the machine coordinate system ORIMKS.

Related to:

MD: TRAFO5_POLE_LIMIT_n

24540	TRAFO5_POLE_LIMIT_1		C07	F2
degrees	End angle toler. with interpol. through pole for 5-axis transf.		DOUBLE	NEW CONF
-				
-	-	2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0...	-	-	7/7

Description: This MD designates an end angle tolerance for the fifth axis of the first 5-axis transformation with the following properties:

With the interpolation through the pole point, only the fifth axis moves, the fourth axis retains its starting position. If a motion is programmed that does not run exactly through the pole point but is to run near the pole within the area given by MD: TRAFO5_NON_POLE_LIMIT then there is a deviation from the defined path as the interpolation runs exactly through the pole point. This results in a deviation in the position of the end point of the fourth axis (the polar axis) from the programmed value.

This MD defines the angle by which the polar axis may deviate from the programmed value with 5-axis transformation when switching from the programmed interpolation to the interpolation through the pole point.

Alarm 14112 is output if there is a greater deviation and the interpolation is not executed.

MD irrelevant:

If the "5-Axis Transformation" option is not installed.

Also irrelevant with programming in the machine coordinate system ORIMKS.

Related to:

MD: TRAFO5_NON_POLE_LIMIT_n

24542	TRAFO5_POLE_TOL_1			C07	-
degrees	End angle tolerance for pole interpolation			DOUBLE	NEW CONF
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0	-	7/7

Description: End angle tolerance for interpolation through the pole for the 1st 5/6-axis transformation.

This MD is evaluated only by the generic 5/6-axis transformation.

If the end orientation lies within the pole cone and within the tolerance cone specified by means of this MD, the pole axis does not move

and retains it start position. The other rotary axis, however, moves to the programmed angle.

This results in a deviation of the end orientation from the programmed orientation.

The maximum active value of this MD is the value of MD TRAFO5_POLE_LIMIT_1, which is used to define the pole cone.

24550	TRAFO5_BASE_TOOL_1			C07	F2
mm	Vector of base tool on activation of 5-axis transformation 1			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: This MD specifies the vector of the base tool which takes effect when the first transformation (MD: TRAFO5_BASE_TOOL_1) or the second (MD: TRAFO5_BASE_TOOL_2) is activated without a length compensation being selected. Programmed length compensations have an additive effect with respect to the base tool.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

24558	TRAFO5_JOINT_OFFSET_PART_1			C07	F2
mm	Vector of kinematic table offset			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: This machine data is only evaluated for generic 5-axis transformations with rotatable workpiece and rotatable tool (TRAFO_TYPE = 56, mixed kinematics).

It indicates the part of the vector between table and turning head assigned to the table.

Only the sum of this MD and MD TRAFO5_JOINT_OFFSET is entered in the transformation equations.

A difference results only when reading the whole tool length using the function GETTCOR. In this case, only the MD TRAFO5_JOINT_OFFSET is considered.

On a machine with mixed kinematics, this machine data can be used to assign the machine data of the 5-axis transformation and the parameters of the orientable tool holder uniquely to one another as follows:

Orientable tool holder	5-axis transformation (1st transformation)
1	TRAFO5_JOINT_OFFSET_1
2	TRAFO5_BASE_TOOL_1
3	TRAFO5_JOINT_OFFSET_PART_1
4	TRAFO5_PART_OFFSET_1

24560	TRAFO5_JOINT_OFFSET_1			C07	F2
mm	Vector of the kinem.offset of the 1st 5-axis transf. in channel			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: This machine data designates the vector between first and second rotary joint for the first transformation of a channel and has a specific meaning for the various machine types:

Machine type 1 (two-axis swivel head for tool) and:

Machine type 2 (two-axis rotary table for workpiece):

Vector between first and second rotary joint of tool rotary head or workpiece rotary table.

Machine type 3 (single-axis rotary table for workpiece and single-axis swivel head for tool):

Vector from machine reference point to joint of workpiece table.

MD irrelevant:

if the "5-Axis Transformation" option is not installed. The same applies for 3-axis and 4-axis transformations.

24561	TRAFO6_JOINT_OFFSET_2_3_1			C07	-
mm	Vector of kinematic offset			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: In the case of 6-axis transformations, defines the offset between the 2nd and third rotary axes for the 1st transformation of each channel.

24562	TRAFO5_TOOL_ROT_AX_OFFSET_1			C07	F2
mm	Offset of swivel point of 1st rotary axis on 5-axis transform. 1			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: In the case of 5-axis transformation with swiveling linear axis, the value indicates the offset of the rotary axis which swivels the linear axis with reference to machine zero for the 1st transformation.

MD irrelevant for:

other 5-axis transformations

Related to:

MD 24662

24564	TRAFO5_NUTATOR_AX_ANGLE_1			C07	F2
degrees	Nutating head angle in 5-axis transformation			DOUBLE	NEW CONF
-					
-	-	45.0,45.0,45.0,45.0,45.0,45.0,45.0...	-89.	89.	7/7

Description: Angle between the second rotary axis and the axis corresponding to it in the rectangular coordinate system

MD irrelevant for: Transformation type other than "universal milling head".

Related to:

TRAFO_TYPE_n

24566	TRAFO5_NUTATOR_VIRT_ORIAX_1			C07	-
-	Virtual orientation axes			BOOLEAN	NEW CONF
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7

Description: The MD has the following values:

0: The axis angles of the orientation axes are machine axis angles.

1: Virtual orientation axes are defined that form a rectangular coordinate system and the axis angles are rotations around these virtual axes.

24570	TRAFO5_AXIS1_1			C07	F2
-	Direction of 1st rotary axis			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: The MD indicates the vector that describes the direction of the first rotary axis in the general 5-axis transformation (TRAFO_TYPE_* = 24).

The vector can have any magnitude.

Example:

Both with (0, 1, 0) and with (0, 7.21, 0), the same axis is described (in the direction of the 2nd geometry axis, i.e. usually Y).

Valid for the first transformation of a channel.

24572	TRAFO5_AXIS2_1			C07	F2
-	Direction of 2nd rotary axis			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: Indicates the vector that describes the direction of the second rotary axis in the general 5-axis transformation (TRAFO_TYPE_* = 24, 40, 56).

The vector can have any magnitude except zero.

Example:

Both with (0, 1, 0) and with (0, 7.21, 0), the same axis is described (in the direction of the 2nd geometry axis, i.e. usually Y).

Valid for the first transformation of a channel.

24573	TRAFO5_AXIS3_1			C07	-
-	Direction of third rotary axis			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: Indicates the vector which defines the direction of the third rotary axis in the case of the general 6-axis transformation (TRAFO_TYPE_* = 24, 40, 56, 57).

The vector may have any value except zero.

Example:

The same axis is defined with both (0, 1, 0) and (0, 7.21, 0) (in the direction of the 2nd geometry axis, that is as a rule Y).

Valid for the first orientation transformation of a channel.

24574	TRAFO5_BASE_ORIENT_1			C07	-
-	Vector of the tool base orientation for 5-axis transformation			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: Indicates the vector of the tool orientation in the general 5-axis transformation (TRAFO_TYPE_* = 24, 40, 56) if this is not defined on the transformation call or read from a programmed tool.

The vector can have any magnitude except zero.

24576	TRAFO6_BASE_ORIENT_NORMAL_1			C07	-
-	Normal tool vector in 6-axis transformation			DOUBLE	NEW CONF
-					
-	3	0.0, 1.0 , 0.0,0.0, 1.0 , 0.0...	-	-	7/7

Description: Indicates a vector that is perpendicular to the tool orientation (TRAFO5_BASE_ORIENTATION_1) in the case of the general 6-axis transformation (TRAFO_TYPE_* = 24, 40, 56, 57).

If TRAFO6_BASE_ORIENT_NORMAL_1 and TRAFO5_BASE_ORIENTATION_1 are neither orthogonal nor parallel, then the two vectors are orthogonalized by modifying the normal vector.The two vectors must not be parallel.

The vector may have any value other than zero.

Valid for the first orientation transformation of a channel.

24580	TRAFO5_TOOL_VECTOR_1			C07	F2
-	Direction of orientation vector for the first 5-axis transf.			BYTE	NEW CONF
-					
-	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2	0	2	7/2

Description: Indicates the direction of the orientation vector for the first 5-axis transformation for each channel.

0: Tool vector in x direction

1: Tool vector in y direction

2: Tool vector in z direction

24582	TRAFO5_TCARR_NO_1			C07	-
-	TCARR number for the first 5-axis transformation			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: If the value of this machine data is not zero and if machine data $MC_TRAFO_TYPE_n that points to the first orientation transformation has value 72, the kinematics data (offsets etc.) that parameterize the first 5-axis transformation, will not be read from the machine data, but from the data of the orientable tool holder to which this machine data refers.

24585	TRAFO5_ORIAX_ASSIGN_TAB_1			C07	F2
-	Orientation axis / channel axis assignment transformation 1			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/2

Description: Assignment table of the orientation axes for 5-axis transformation 1

Only active with active 5-axis transformation 1.

24590	TRAFO5_ROT_OFFSET_FROM_FR_1			C01, C07	-
-	Offset of transformation rotary axes from WO.			BOOLEAN	Immediately
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: The programmable offset for orientation axes is automatically accepted from the work offset active for the orientation axes on switch-on of an orientation transformation.

24594	TRAFO7_EXT_ROT_AX_OFFSET_1			C07	F2
degrees	Position offset of the external rotary axes for 7-axis transformation 1			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0, 0.0,0.0, 0.0, 0.0...	-	-	7/7

Description: This machine data designates the angular offset of the external rotary axis in degrees for the first 7-axis transformation of a channel.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

24595	TRAFO7_EXT_AXIS1_1			C07	F2
-	Direction of the 1st external rotary axis			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: The MD indicates the vector that describes the direction of the first external rotary axis in the general 5/6-axis transformation (TRAFO_TYPE_* = 24).

The vector can have any magnitude.

Example:

Both with (0, 1, 0) and with (0, 7.21, 0), the same axis is described (in the direction of the 2nd geometry axis, i.e. usually Y).

Valid for the first transformation of a channel.

24600	TRAFO5_PART_OFFSET_2			C07	F2
mm	Offset vector of the 2nd 5-axis transformation in the channel			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: This machine data designates an offset of the workpiece carrier for the first (MD: TRAFO5_PART_OFFSET_1) or second (MD: TRAFO5_PART_OFFSET_2) 5-axis transformation of a channel and has a specific meaning for the different machine types:

Machine type 1 (two-axis swivel head for tool):

Vector from machine reference point to zero point of workpiece table. This will generally be a zero vector if both coincide.

Machine type 2 (two-axis rotary table for workpiece):

Vector from second joint of workpiece rotary table to zero point of table.

Machine type 3 (single-axis rotary table for workpiece and single-axis swivel head for tool):

Vector from joint of workpiece table to zero point of table.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

24610	TRAFO5_ROT_AX_OFFSET_2			C07	-
degrees	Position offset of rotary axes 1/2/3			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0, 0.0,0.0, 0.0, 0.0...	-	-	7/7

Description: Indicates the offset for each channel of the rotary axes in degrees for the second orientation transformation.

24620	TRAFO5_ROT_SIGN_IS_PLUS_2			C07	F2
-	Sign of rotary axis 1/2/3 for 5-axis transformation 2			BOOLEAN	NEW CONF
-					
-	3	TRUE, TRUE, TRUE,TRUE, TRUE, TRUE...	-	-	7/7

Description: This machine data designates the sign with which the two rotary axes are included in the second 5-axis transformation of a channel.

MD = 0 (FALSE):

Sign is reversed.

MD = 1 (TRUE) :

Sign is not reversed and the traversing direction is defined according to AX_MOTION_DIR.

This machine data does not mean that the rotational direction of the rotary axis concerned is to be reversed, but specifies whether its motion is in the mathematically positive or negative direction when the axis is moving in the positive direction.

The result of a change to this data is not therefore a change in the rotational direction, but a change in the compensatory motion of the linear axes.

However, if a directional vector and thus, implicitly, a compensatory motion is specified, the result is a change in the rotational direction of the rotary axis concerned.

On a real machine, therefore, the machine data may be set to FALSE (or zero) only if the rotary axis is turning in an anti-clockwise direction when moving in a positive direction.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

24630	TRAFO5_NON_POLE_LIMIT_2			C07	F2
degrees	Definition of pole range for 5-axis transformation 2			DOUBLE	NEW CONF
-					
-	-	2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0...	-	-	7/7

Description: This MD designates a limit angle for the fifth axis of the second 5-axis transformation with the following properties: if the path runs below this angle past the pole, the traverse will pass through the pole.

For the 5-axis transformation, the two orientation axes of the tool form a coordinate system of length and width circles on a spherical surface. If orientation programming (that is the orientation vector lies in a plane) leads the path so close past the pole that the angle defined by this MD is undershot, then there is a deviation from the defined interpolation such that the interpolation runs through the pole.

Alarm 14112 is output if this modification of the path gives a deviation greater than a tolerance defined by MD 24640: TRAFO5_POLE_LIMIT_2.

MD irrelevant:

If the "5-Axis Transformation" option is not installed.

Also irrelevant with programming in the machine coordinate system ORIMKS.

Related to:

MD: TRAFO5_POLE_LIMIT_n

24640	TRAFO5_POLE_LIMIT_2			C07	F2
degrees	End angle toler. with interpol. through pole for 5-axis transf.			DOUBLE	NEW CONF
-					
-	-	2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0...	-	-	7/7

Description: This MD designates an end angle tolerance for the fifth axis of the second 5-axis transformation with the following properties:

With the interpolation through the pole point, only the fifth axis moves, the fourth axis retains its starting position. If a motion is programmed that does not run exactly through the pole point but is to run near the pole within the area given by MD: TRAFO5_NON_POLE_LIMIT then there is a deviation from the defined path as the interpolation runs exactly through the pole point. This results in a deviation in the position of the end point of the fourth axis (the polar axis) from the programmed value.

This MD defines the angle by which the polar axis may deviate from the programmed value with 5-axis transformation when switching from the programmed interpolation to the interpolation through the pole point.

An error message (alarm 14112) is output if there is a greater deviation and the interpolation is not executed.

MD irrelevant:

If the "5-Axis Transformation" option is not installed.

Also irrelevant with programming in the machine coordinate system ORIMKS.

Related to:

MD: TRAFO5_NON_POLE_LIMIT_1

24642	TRAFO5_POLE_TOL_2			C07	-
degrees	End angle tolerance for pole interpolation			DOUBLE	NEW CONF
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0	-	7/7

Description: End angle tolerance for interpolation through the pole for the 2nd 5/6-axis transformation.

This MD is evaluated only by the generic 5/6-axis transformation.

If the end orientation lies within the pole cone and within the tolerance cone specified by means of this MD, the pole axis does not move

and retains it start position. The other rotary axis, however, moves to the programmed angle.

This results in a deviation of the end orientation from the programmed orientation.

The maximum active value of this MD is the value of MD TRAFO5_POLE_LIMIT_2, which is used to define the pole cone.

24650	TRAFO5_BASE_TOOL_2			C07	F2
mm	Vector of base tool on activation of 5-axis transformation 2			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: This MD indicates the vector of the base tool which takes effect when the first transformation is activated without a length compensation being selected. Programmed length compensations have an additive effect with respect to the base tool.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

24658	TRAFO5_JOINT_OFFSET_PART_2			C07	F2
mm	Vector of kinematic table offset			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: Same as MD 24558: TRAFO5_JOINT_OFFSET_PART_1, but for the second transformation.

24660	TRAFO5_JOINT_OFFSET_2			C07	F2
mm	Vector of the kinem.offset of the 2nd 5-axis transformation			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: This machine data designates the vector between first and second rotary joint for the first transformation of a channel and has a specific meaning for the various machine types:

Machine type 1 (two-axis swivel head for tool) and:

Machine type 2 (two-axis rotary table for workpiece):

Vector between first and second rotary joint of tool rotary head or workpiece rotary table.

Machine type 3 (single-axis rotary table for workpiece and single-axis swivel head for tool):

Vector from machine reference point to joint of workpiece table.

MD irrelevant:

if the "5-Axis Transformation" option is not installed. The same applies for 3-axis and 4-axis transformations.

24661	TRAFO6_JOINT_OFFSET_2_3_2			C07	-
mm	Vector of kinematic offset			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: As TRAFO6_JOINT_OFFSET_2_3_1 but for the second transformation.

24662	TRAFO5_TOOL_ROT_AX_OFFSET_2			C07	F2
mm	Offset swivel point of 2nd 5-axis transf. (swivelled lin.axis)			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: In the case of 5-axis transformation with swiveled linear axis, the value indicates the offset of the rotary axis which swivels the linear axis with reference to machine zero for the 2nd transformation.

MD irrelevant for:

other 5-axis transformations

Related to:

MD 24562

24664	TRAFO5_NUTATOR_AX_ANGLE_2			C07	F2
degrees	Nutating head angle			DOUBLE	NEW CONF
-					
-	-	45.0,45.0,45.0,45.0,45.0,45.0,45.0...	-89.	89.	7/7

Description: Angle between the second rotary axis and the axis corresponding to it in the rectangular coordinate system

MD irrelevant for:

Transformation type other than "universal milling head"

Related to:

TRAFO5_NUTATOR_AX_ANGLE_1

24666	TRAFO5_NUTATOR_VIRT_ORIAX_2			C07	-
-	Virtual orientation axes			BOOLEAN	NEW CONF
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7

Description: The MD has the following values:

0: The axis angles of the orientation axes are machine axis angles.

1: Virtual orientation axes are defined that form a rectangular coordinate system and the axis angles are rotations around these virtual axes.

24670	TRAFO5_AXIS1_2			C07	F2
-	Direction of 1st rotary axis			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: As for TRAFO5_AXIS1_1 but for the second orientation transformation of a channel.

24672	TRAFO5_AXIS2_2			C07	F2
-	Direction of 2nd rotary axis			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: As for TRAFO5_AXIS2_1 but for the second transformation of a channel.

24673	TRAFO5_AXIS3_2			C07	-
-	Direction of third rotary axis			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: As TRAFO5_AXIS3_1 but for the second orientation transformation of a channel.

24674	TRAFO5_BASE_ORIENT_2			C07	F2
-	Basic tool orientation			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: As for TRAFO5_BASE_ORIENT_1 but for the second transformation of a channel.

24676	TRAFO6_BASE_ORIENT_NORMAL_2			C07	-
-	Normal tool vector			DOUBLE	NEW CONF
-					
-	3	0.0, 1.0 , 0.0,0.0, 1.0 , 0.0...	-	-	7/7

Description: As TRAFO6_BASE_ORIENT_NORMAL_1 but for the second orientation transformation

24680	TRAFO5_TOOL_VECTOR_2			C07	F2
-	Direction of orientation vector			BYTE	NEW CONF
-					
-	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2	0	2	7/2

Description: Indicates the direction of the orientation vector for the second 5-axis transformation for each channel.

0: Tool vector in x direction

1: Tool vector in y direction

2: Tool vector in z direction

24682	TRAFO5_TCARR_NO_2			C07	-
-	TCARR number for the second 5-axis transformation			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: Same as TRAFO5_TCARR_NO_1, but for the second orientation transformation.

24685	TRAFO5_ORIAX_ASSIGN_TAB_2			C07	F2
-	Orientation axis / channel axis assignment transformation 1			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/2

Description: Assignment table of the orientation axes for 5-axis transformation 2

Only active with active 5-axis transformation 2.

24690	TRAFO5_ROT_OFFSET_FROM_FR_2			C01, C07	-
-	Offset of transformation rotary axes from WO.			BOOLEAN	Immediately
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: Same as TRAFO5_ROT_OFFSET_FROM_FR_1, but for the 2nd transformation of a channel

24694	TRAFO7_EXT_ROT_AX_OFFSET_2			C07	F2
degrees	Position offset of the external rotary axes for 7-axis transformation 2			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0, 0.0,0.0, 0.0, 0.0...	-	-	7/7

Description: This machine data designates the angular offset of the external rotary axis in degrees for the second 7-axis transformation of a channel.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

24695	TRAFO7_EXT_AXIS1_2			C07	F2
-	Direction of the 1st external rotary axis			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: The MD indicates the vector that describes the direction of the second external rotary axis in the general 5/6-axis transformation (TRAFO_TYPE_* = 24).

The vector can have any magnitude.

Example:

Both with (0, 1, 0) and with (0, 7.21, 0), the same axis is described (in the direction of the 2nd geometry axis, i.e. usually Y).

Valid for the first transformation of a channel.

24700	TRAANG_ANGLE_1			C07	M1
degrees	Angle between Cartesian axis and real (inclined) axis			DOUBLE	NEW CONF
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7

Description: Indicates for the first agreed TRAANG transformation of the channel the angle of the inclined axis in degrees between the 1st machine axis and the 1st basic axis while TRAANG is active. The angle is measured positively clockwise.

Related to:

TRAANG_ANGLE_2

24710	TRAANG_BASE_TOOL_1			C07	M1
mm	Vector of base tool for 1st TRAANG transformation			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: Indicates a basic offset of the tools zero for the 1st TRAANG transformation. The offset is referenced to the geometry axes valid when TRAANG is active. The basic offset is included with and without selection of the tool length compensation. Programmed length corrections have an additive effect with respect to the basic tool.

The index i takes the values 0, 1, 2 for the 1st to 3rd geometry axes.

Related to:

$MC_TRAANG_BASE_TOOL_2

24720	TRAANG_PARALLEL_VELO_RES_1			C07	M1
-	Velocity margin for 1st TRAANG transformation			DOUBLE	NEW CONF
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0.0	1.0	7/7

Description: Indicates the axis velocity reserve for jog, positioning and oscillating movements for each channel for the first TRAANG transformation, which is held ready on the parallel axis (see $MC_TRAFO_AXES_IN_n[1]) for the compensating movement.

Velocity reserve to be provided for jog, positioning and oscillating movements on the parallel axis to handle the compensating movement as a consequence of the inclined axis.

0.0 means that the control or the transformation itself determines the reserve according to the angle of the inclined axis and the velocity capacity of the inclined and parallel axes. - The criterion for this is that the same speed limit is to be maintained in the direction of the parallel axis and the vertical (virtual) axis.

>0.0 means that a fixed reserve has been set (TRAANG_PARALLEL_VELO_RES_1 * MAX_AX_VELO of the parallel axis). The velocity capacity in the virtual axis is determined by this. The lower TRAANG_PARALLEL_VELO_RES_1 has been set, the lower it is

Related to:

TRAANG_PARALLEL_ACCEL_RES_2

24721	TRAANG_PARALLEL_ACCEL_RES_1			C07	M1
-	Acceleration margin of parallel axis for the 1st TRAANG transf.			DOUBLE	NEW CONF
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0.0	1.0	7/7

Description: Indicates the acceleration margin for jog, positioning and oscillating movements which is held ready on the parallel axis (see $MC_TRAFO_AXES_IN_n[1]) for the compensatory movement; MD setting applies to the first TRAANG transformation for each channel.

Related to:

$MC_TRAANG_PARALLEL_VELO_RES_1

24750	TRAANG_ANGLE_2			C07	M1
degrees	Angle between Cartesian axis and real (inclined) axis			DOUBLE	NEW CONF
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7

Description: Indicates for the second agreed TRAANG transformation of the channel the angle of the inclined axis in degrees between the 1st machine axis and the 1st basic axis while TRAANG is active. The angle is measured positively clockwise.

Related to:

TRAANG_ANGLE_1

24760	TRAANG_BASE_TOOL_2			C07	M1
mm	Vector of base tool for 2nd TRAANG transformation			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: Indicates a basic offset of the tools zero for the 2nd TRAANG transformation. The offset is referenced to the geometry axes valid when TRAANG is active. The basic offset is included with and without selection of the tool length compensation. Programmed length corrections have an additive effect with respect to the basic tool.

The index i takes the values 0, 1, 2 for the 1st to 3rd geometry axes.

Related to:

$MC_TRAANG_BASE_TOOL_1

24770	TRAANG_PARALLEL_VELO_RES_2			C07	M1
-	Velocity margin for 2nd TRAANG transformation			DOUBLE	NEW CONF
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0.0	1.0	7/7

Description: Indicates the axis velocity reserve for jog, positioning and oscillating movements which is held ready on the parallel axis (see $MC_TRAFO_AXES_IN_n[1]) for the compensatory movement; MD setting applies to the second TRAANG transformation for each channel.

Related to:

TRAANG_PARALLEL_ACCEL_RES_2

24771	TRAANG_PARALLEL_ACCEL_RES_2			C07	M1
-	Acceler. margin of parallel axis for the 2nd TRAANG transform.			DOUBLE	NEW CONF
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0.0	1.0	7/7

Description: Indicates the axis acceleration margin for jog, positioning and oscillating movements which is held ready on the parallel axis (see $MC_TRAFO_AXES_IN_n[1]) for the compensatory movement; MD setting applies to the second TRAANG transformation for each channel.

Related to:

$MC_TRAANG_PARALLEL_RES_1

24800	TRACYL_ROT_AX_OFFSET_1			C07	M1
degrees	Offset of rotary axis for the 1st TRACYL transformation			DOUBLE	NEW CONF
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7

Description: Indicates the offset of the rotary axis for the first agreed TRACYL transformation in degrees in relation to the neutral position while TRACYL is active.

Related to:

TRACYL_ROT_AX_OFFSET_2

24805	TRACYL_ROT_AX_FRAME_1			C07	-
-	Rotary axis offset TRACYL 1			BYTE	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/7

Description: 0: axial rotary axis offset is not considered.

1: axial rotary axis offset is considered.

2: axial rotary axis offset is considered until SZS.

SZS frames include transformed axial rotary axis offsets.

24808	TRACYL_DEFAULT_MODE_1			C07	M1
-	TRACYL mode selection			BYTE	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/7

Description: Default setting of TRACYL type 514:

0: without groove side offset (i.e. TRACYL type 514 - equals 512)

1: with groove side offset (i.e. TRACYL type 514 - equals 513)

With $MC_TRAFO_TYPE_.. = 514 it can be decided via the selection parameters, whether calculation is made with or without groove side offset. The parameter will define the variable to be selected, if no selection is made in the call parameters.

If $MC_TRACYL_DEFAULT_MODE_1 = 1, it will be sufficient to program TRACYL(30) in the part program instead of TRACYL(30,1,1).

24810	TRACYL_ROT_SIGN_IS_PLUS_1			C07	M1
-	Sign of rotary axis for 1st TRACYL transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: Indicates the sign with which the rotary axis is taken into account in the TRACYL transformation for the first agreed TRACYL transformation.

Related to:

TRACYL_ROT_SIGN_IS_PLUS_2

24820	TRACYL_BASE_TOOL_1			C07	M1
mm	Vector of base tool for 1st TRACYL transformation			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: Indicates a basic offset of the tools zero for the 1st TRACYL transformation. The offset is referenced to the geometry axes valid when TRACYL is active. The basic offset is included with and without selection of the tool length compensation. Programmed length corrections have an additive effect with respect to the basic tool.

The index i takes the values 0, 1, 2 for the 1st to 3rd geometry axes.

Related to:

$MC_TRACYL_BASE_TOOL_2

24850	TRACYL_ROT_AX_OFFSET_2			C07	M1
degrees	Offset of rotary axis for the 2nd TRACYL transformation			DOUBLE	NEW CONF
-					
-	-	0.0,0.0.0,0.0.0,0.0.0,0.0,0.0,0.0,0.0...	-	-	7/7

Description: Indicates the offset of the rotary axis in degrees in relation to the neutral position for the 2nd agreed TRACYL transformation for each channel.

MD irrelevant:

If no TRACYL is active

Related to:

TRACYL_ROT_AX_OFFSET_1

24855	TRACYL_ROT_AX_FRAME_2			C07	-
-	Rotary axis offset TRACYL 2			BYTE	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/7

Description: 0: axial rotary axis offset is not considered.

1: axial rotary axis offset is considered.

2: axial rotary axis offset is considered until SZS.

SZS frames include transformed axial rotary axis offsets.

24858	TRACYL_DEFAULT_MODE_2			C07	M1
-	TRACYL mode selection			BYTE	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/7

Description: Default setting of TRACYL type 514 for the 2nd TRACYL:

0: without groove side offset (i.e. TRACYL type 514 - equals 512)

1: with groove side offset (i.e. TRACYL type 514 - equals 513)

With $MC_TRAFO_TYPE_.. = 514 it can be decided via the selection parameters, whether calculation is made with or without groove side offset. The parameter defines the variable to be selected, if no selection is made in the call parameters.

If $MC_TRACYL_DEFAULT_MODE_2 = 1, it will be sufficient to program TRACYL(30,2) in the part program instead of TRACYL(30,2,1).

24860	TRACYL_ROT_SIGN_IS_PLUS_2			C07	M1
-	Sign of rotary axis for 2nd TRACYL transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: Indicates the sign with which the rotary axis is taken into account in the TRACYL transformation for the 2nd agreed TRACYL transformation for each channel.

Related to:

TRACYL_ROT_SIGN_IS_PLUS_1

24870	TRACYL_BASE_TOOL_2			C07	M1
mm	Vector of base tool for 2nd TRACYL transformation			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: Indicates a basic offset of the tools zero for the 2ndTRACYL transformation. The offset is referenced to the geometry axes valid when TRACYL is active. The basic offset is included with and without selection of the tool length compensation. Programmed length corrections have an additive effect with respect to the basic tool.

The index i takes the values 0, 1, 2 for the 1st to 3rd geometry axes.

Related to:

$MC_TRACYL_BASE_TOOL_1

24900	TRANSMIT_ROT_AX_OFFSET_1			C07	M1
degrees	Offset of rotary axis for the 1st TRANSMIT transformation			DOUBLE	NEW CONF
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7

Description: Indicates the offset of the rotary axis for the first agreed TRANSMIT transformation in degrees in relation to the neutral position while TRANSMIT is active.

Related to:

TRANSMIT_ROT_AX_OFFSET_2

24905	TRANSMIT_ROT_AX_FRAME_1			C07	-
-	Rotary axis offset TRANSMIT 1			BYTE	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/7

Description:

0: axial rotary axis offset is not considered.

1: axial rotary axis offset is considered.

2: axial rotary axis offset is considered until SZS.

SZS frames include transformed rotations around the rotary axis.

24910	TRANSMIT_ROT_SIGN_IS_PLUS_1			C07	M1
-	Sign of rotary axis for 1st TRANSMIT transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: Indicates the sign with which the rotary axis is taken into account in the TRANSMIT transformation for the first agreed TRANSMIT transformation for each channel.

Related to:

TRANSMIT_ROT_SIGN_IS_PLUS_2

24911	TRANSMIT_POLE_SIDE_FIX_1			C07	M1
-	Restr. working range before/behind the pole, 1. TRANSMIT			BYTE	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/7

Description: Restriction of the working area in front of/behind pole or no restriction, i.e. traversal through the pole.

The assigned values have the following meanings:

1: Working area of linear axis for positions >=0,
(if tool length compensation parallel to linear axis equals 0)

2: Working area of linear axis for positions <=0,
(if tool length compensation parallel to linear axis equals 0)

0: No restriction of working area. Traversal through pole.

24920	TRANSMIT_BASE_TOOL_1			C07	M1
mm	Vector of base tool for 1st TRANSMIT transformation			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: Indicates a basic offset of the tools zero for the 1st TRANSMIT transformation. The offset is referenced to the geometry axes valid when TRANSMIT is active. The basic offset is included with and without selection of the tool length compensation. Programmed length corrections have an additive effect with respect to the basic tool.

The index i takes the values 0, 1, 2 for the 1st to 3rd geometry axes.

Related to:

$MC_TRANSMIT_BASE_TOOL_2

24950	TRANSMIT_ROT_AX_OFFSET_2			C07	M1
degrees	Offset of rotary axis for the 2nd TRANSMIT transformation			DOUBLE	NEW CONF
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7

Description: Indicates the offset of the rotary axis for the second agreed TRANSMIT transformation in degrees in relation to the neutral position while TRANSMIT is active.

Related to:

TRANSMIT_ROT_AX_OFFSET_1

24955	TRANSMIT_ROT_AX_FRAME_2			C07	-
-	Rotary axis offset TRANSMIT 2			BYTE	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/7

Description: 0: axial rotary axis offset is not considered.

1: axial rotary axis offset is considered.

2: axial rotary axis offset is considered until SZS.
SZS frames include transformed rotations around the rotary axis.

24960	TRANSMIT_ROT_SIGN_IS_PLUS_2			C07	M1
-	Sign of rotary axis for 2nd TRANSMIT transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: Indicates the sign with which the rotary axis is taken into account in the TRANSMIT transformation for the second agreed TRANSMIT transformation for each channel.

Related to:

TRANSMIT_ROT_SIGN_IS_PLUS_1

24961	TRANSMIT_POLE_SIDE_FIX_2			C07	M1
-	Restr. of working range before/behind the pole, 2. TRANSMIT			BYTE	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/7

Description: Restriction of working area in front of/behind pole or no restriction, i.e. traversal through pole.

The assigned values have the following meanings:

1: Working area of linear axis for positions >=0,
(if tool length compensation parallel to linear axis equals 0)

2: Working area of linear axis for positions <=0,
(if tool length compensation parallel to linear axis equals 0)

0: No restriction of working area. Traversal through pole.

24970	TRANSMIT_BASE_TOOL_2			C07	M1
mm	Vector of base tool for 2nd TRANSMIT transformation			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: Indicates a basic offset of the tools zero for the 2nd TRANSMIT transformation. The offset is referenced to the geometry axes valid when TRANSMIT is active. The basic offset is included with and without selection of the tool length compensation. Programmed length corrections have an additive effect with respect to the basic tool.

The index i takes the values 0, 1, 2 for the 1st to 3rd geometry axes.

Related to:

$MC_TRANSMIT_BASE_TOOL_1

24995	TRACON_CHAIN_1			C07	M1
-	Transformation grouping			DWORD	NEW CONF
-					
-	4	0, 0, 0, 0,0, 0, 0, 0,0, 0, 0, 0...	0	20	7/7

Description: Transformation chain of the first concatenated transformation.

In the table, the numbers of the transformations which are to be concatenated are given in the order in which the transformation has to be executed from BCS into MCS.

Example:

A machine can be operated optionally either as a 5-axis machine or as a transmit machine. A linear axis is not arranged at a right-angles to the other linear axes (inclined axis).

5 transformations must be set via the machine data, e.g.

TRAFO_TYPE_1 = 16 (5-axis transformation)

TRAFO_TYPE_2 = 256 (Transmit)

TRAFO_TYPE_3 = 1024 (Inclined axis)

TRAFO_TYPE_4 = 8192 (Concatenated transformation)

TRAFO_TYPE_5 = 8192 (Concatenated transformation)

If the 4th transformation concatenates the 5-axis transformation / inclined axis and the 5th transformation concatenates the transmit / inclined axis, then (1, 3, 0, 0) is entered in the first table TRACON_CHAIN_1, and (2, 3, 0, 0) in the table TRACON_CHAIN_2. The entry 0 means no transformation.

The order in which the transformations are assigned (TRAFO_TYPE_1 to TRAFO_TYPE_20) is arbitrary. The linked transformations do not have to be the last. However, they must always stand behind all the transformations which occur in a transformation chain. In the previous example, this means that, e.g. the third and fourth transformations must not be switched.

However, it would be possible to define a further, sixth transformation, if this does not go into a linked transformation.

Transformations cannot be linked with one another at will.

The following limitations apply in SW version 5:

The first transformation in the chain must be an orientation transformation (3- , 4- , 5-axis transformation, nutator) transmit or peripheral curve transformation. The second transformation must be an inclined axis transformation.

No more than two transformations may be linked.

24996	TRACON_CHAIN_2			C07	M1
-	Transformation grouping			DWORD	NEW CONF
-					
-	4	0, 0, 0 ,0,0, 0, 0, 0,0, 0, 0, 0...	0	20	7/7

Description: Transformation chain of the first concatenated transformation.

In the table, the numbers of the transformations which are to be concatenated are given in the order in which the transformation has to be executed from BCS into MCS.

Example:

A machine can be operated optionally either as a 5-axis machine or as a transmit machine. A linear axis is not arranged at a right-angles to the other linear axes (inclined axis).

Transformation chain of the second concatenated transformation.

Example: 5 transformations must be set via the machine data

TRAFO_TYPE_1 = 16 (5-axis transformation)

TRAFO_TYPE_2 = 256 (Transmit)

TRAFO_TYPE_3 = 1024 (Inclined axis)

TRAFO_TYPE_4 = 8192 (Concatenated transformation)

TRAFO_TYPE_5 = 8192 (Concatenated transformation)

If the 4th transformation concatenates the 5-axis transformation / inclined axis and the 5th transformation concatenates the transmit / inclined axis, then (1, 3, 0, 0) is entered in the first table TRACON_CHAIN_1, and (2, 3, 0, 0) in the table TRACON_CHAIN_2. The entry 0 means no transformation.

The order in which the transformations are assigned (TRAFO_TYPE_1 to TRAFO_TYPE_20) is arbitrary. The cocatenated transformations do not have to be the last. However, they must always follow all the transformations which occur in a transformation chain. In the previous example, this means that, e.g. the third and fourth transformations must not be switched.

However, it would be possible to define a further, sixth transformation, if this does not go into a concatenated transformation.

Transformations cannot be concatenated with one another at will.

The following limitations apply in SW version 5:

The first transformation in the chain must be an orientation transformation (3- , 4- , 5-axis transformation, nutator) transmit or peripheral curve transformation.

The second transformation must be an inclined axis transformation.

No more than two transformations may be concatenated.

24997	TRACON_CHAIN_3			C07	M1
-	Transformation grouping			DWORD	NEW CONF
-					
-	4	0, 0, 0 ,0,0, 0, 0, 0,0, 0, 0, 0...	0	20	7/7

Description: Transformation chain of the third concatenated transformation.

See TRACON_CHAIN_1 for documentation.

24998	TRACON_CHAIN_4			C07	M1
-	Transformation grouping			DWORD	NEW CONF
-					
-	4	0, 0, 0 ,0,0, 0, 0, 0,0, 0, 0, 0...	0	20	7/7

Description: Transformation chain of the fourth concatenated transformation.
See TRACON_CHAIN_1 for documentation.

25100	TRAFO_TYPE_11			C07	F2
-	Definition of the 11th transformation in the channel			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0 ,0,0,0	-	-	7/7

Description: This MD defines for each channel, which transformation is available as 11th transformation in the channel.
Other than that it has the same meaning as TRAFO_TYPE_1.

25102	TRAFO_AXES_IN_11			C07	F2
-	Axis assignment for transformation 11			BYTE	NEW CONF
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

Description: Axis assignment at the input of the 11th transformation.
See TRAFO_AXES_IN_1 for explanation.

25104	TRAFO_GEOAX_ASSIGN_TAB_11			C07	F2
-	Assignment of geometry axes to channel axes for transformation 11			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 11.
Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

25106	TRAFO_INCLUDES_TOOL_11			C07	M1,F2
-	Tool handling with 11th active transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: This MD defines for each channel, whether the tool is treated in the 11th transformation or externally.
Other than that it has the same meaning as TRAFO_INCLUDES_TOOL_1.

25110	TRAFO_TYPE_12			C07	F2
-	Definition of transformation 12 in channel			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0 ,0,0,0	-	-	7/7

Description: This MD defines for each channel, which transformation is available as 12th transformation in the channel.
Other than that it has the same meaning as TRAFO_TYPE_1.

25112	TRAFO_AXES_IN_12			C07	F2
-	Axis assignment for transformation 12			BYTE	NEW CONF
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

Description: Axis assignment at the input of the 12th transformation.

See TRAFO_AXES_IN_1 for explanation.

25114	TRAFO_GEOAX_ASSIGN_TAB_12			C07	F2
-	Assignment of geometry axes to channel axes for transformation 12			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 12.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

25116	TRAFO_INCLUDES_TOOL_12			C07	M1,F2
-	Tool handling with 12th active transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: This MD defines for each channel, whether the tool is treated in the 12th transformation or externally.

Other than that it has the same meaning as TRAFO_INCLUDES_TOOL_1.

25120	TRAFO_TYPE_13			C07	F2
-	Definition of transformation 13 in channel			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: This MD defines for each channel, which transformation is available as 13th transformation in the channel.

Other than that it has the same meaning as TRAFO_TYPE_1.

25122	TRAFO_AXES_IN_13			C07	F2
-	Axis assignment for transformation 13			BYTE	NEW CONF
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

Description: Axis assignment at the input of the 13th transformation.

See TRAFO_AXES_IN_1 for explanation.

25124	TRAFO_GEOAX_ASSIGN_TAB_13			C07	F2
-	Assignment of geometry axes to channel axes for transformation 13			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 13.
Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

25126	TRAFO_INCLUDES_TOOL_13			C07	M1,F2
-	Tool handling with 13th active transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: This MD defines for each channel, whether the tool is treated in the 13th transformation or externally.
Other than that it has the same meaning as TRAFO_INCLUDES_TOOL_1.

25130	TRAFO_TYPE_14			C07	F2
-	Definition of transformation 14 in channel			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: This MD defines for each channel, which transformation is available as 14th transformation in the channel.
Other than that it has the same meaning as TRAFO_TYPE_1.

25132	TRAFO_AXES_IN_14			C07	F2
-	Axis assignment for transformation 14			BYTE	NEW CONF
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

Description: Axis assignment at the input of the 14th transformation.
See TRAFO_AXES_IN_1 for explanation.

25134	TRAFO_GEOAX_ASSIGN_TAB_14			C07	F2
-	Assignment of geometry axes to channel axes for transformation 14			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 14.
Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

25136	TRAFO_INCLUDES_TOOL_14			C07	M1,F2
-	Tool handling with 14th active transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: This MD defines for each channel, whether the tool is treated in the 14th transformation or externally.

Other than that it has the same meaning as TRAFO_INCLUDES_TOOL_1.

25140	TRAFO_TYPE_15			C07	F2
-	Definition of transformation 15 in channel			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: This MD defines for each channel, which transformation is available as 15th transformation in the channel.

Other than that it has the same meaning as TRAFO_TYPE_1.

25142	TRAFO_AXES_IN_15			C07	F2
-	Axis assignment for transformation 15			BYTE	NEW CONF
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

Description: Axis assignment at the input of the 15th transformation.

See TRAFO_AXES_IN_1 for explanation.

25144	TRAFO_GEOAX_ASSIGN_TAB_15			C07	F2
-	Assignment of geometry axes to channel axes for transformation 15			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 15.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

25146	TRAFO_INCLUDES_TOOL_15			C07	M1,F2
-	Tool handling with 15th active transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: This MD defines for each channel, whether the tool is treated in the 15th transformation or externally.

Other than that it has the same meaning as TRAFO_INCLUDES_TOOL_1.

25150	TRAFO_TYPE_16			C07	F2
-	Definition of transformation 16 in channel			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: This MD defines for each channel, which transformation is available as 16th transformation in the channel.

Other than that it has the same meaning as TRAFO_TYPE_1.

25152	TRAFO_AXES_IN_16			C07	F2
-	Axis assignment for transformation 16			BYTE	NEW CONF
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

Description: Axis assignment at the input of the 16th transformation.

See TRAFO_AXES_IN_1 for explanation.

25154	TRAFO_GEOAX_ASSIGN_TAB_16			C07	F2
-	Assignment of geometry axes to channel axes for transformation 16			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 16.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

25156	TRAFO_INCLUDES_TOOL_16			C07	M1,F2
-	Tool handling with 16th active transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: This MD defines for each channel, whether the tool is treated in the 16th transformation or externally.

Other than that it has the same meaning as TRAFO_INCLUDES_TOOL_1.

25160	TRAFO_TYPE_17			C07	F2
-	Definition of transformation 17 in channel			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: This MD defines for each channel, which transformation is available as 17th transformation in the channel.

Other than that it has the same meaning as TRAFO_TYPE_1.

25162	TRAFO_AXES_IN_17			C07	F2
-	Axis assignment for transformation 17			BYTE	NEW CONF
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

Description: Axis assignment at the input of the 17th transformation.

See TRAFO_AXES_IN_1 for explanation.

25164	TRAFO_GEOAX_ASSIGN_TAB_17			C07	F2
-	Assignment of geometry axes to channel axes for transformation 17			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 17.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

25166	TRAFO_INCLUDES_TOOL_17			C07	M1,F2
-	Tool handling with 17th active transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: This MD defines for each channel, whether the tool is treated in the 17th transformation or externally.

Other than that it has the same meaning as TRAFO_INCLUDES_TOOL_1.

25170	TRAFO_TYPE_18			C07	F2
-	Definition of transformation 18 in channel			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: This MD defines for each channel, which transformation is available as 18th transformation in the channel.

Other than that it has the same meaning as TRAFO_TYPE_1.

25172	TRAFO_AXES_IN_18			C07	F2
-	Axis assignment for transformation 18			BYTE	NEW CONF
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

Description: Axis assignment at the input of the 18th transformation.

See TRAFO_AXES_IN_1 for explanation.

25174	TRAFO_GEOAX_ASSIGN_TAB_18			C07	F2
-	Assignment of geometry axes to channel axes for transformation 18			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 18.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

25176	TRAFO_INCLUDES_TOOL_18			C07	M1,F2
-	Tool handling with 18th active transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: This MD defines for each channel, whether the tool is treated in the 18th transformation or externally.

Other than that it has the same meaning as TRAFO_INCLUDES_TOOL_1.

25180	TRAFO_TYPE_19			C07	F2
-	Definition of transformation 19 in channel			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: This MD defines for each channel, which transformation is available as 19th transformation in the channel.

Other than that it has the same meaning as TRAFO_TYPE_1.

25182	TRAFO_AXES_IN_19			C07	F2
-	Axis assignment for transformation 19			BYTE	NEW CONF
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

Description: Axis assignment at the input of the 19th transformation.

See TRAFO_AXES_IN_1 for explanation.

25184	TRAFO_GEOAX_ASSIGN_TAB_19			C07	F2
-	Assignment of geometry axes to channel axes for transformation 19			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 19.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

25186	TRAFO_INCLUDES_TOOL_19			C07	M1,F2
-	Tool handling with 19th active transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: This MD defines for each channel, whether the tool is treated in the 19th transformation or externally.

Other than that it has the same meaning as TRAFO_INCLUDES_TOOL_1.

25190	TRAFO_TYPE_20			C07	F2
-	Definition of transformation 20 in channel			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: This MD defines for each channel, which transformation is available as 20th transformation in the channel.

Other than that it has the same meaning as TRAFO_TYPE_1.

25192	TRAFO_AXES_IN_20			C07	F2
-	Axis assignment for transformation 20			BYTE	NEW CONF
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

Description: Axis assignment at the input of the 20th transformation.

See TRAFO_AXES_IN_1 for explanation.

25194	TRAFO_GEOAX_ASSIGN_TAB_20			C07	F2
-	Assignment of geometry axes to channel axes for transformation 20			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 20.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

25196	TRAFO_INCLUDES_TOOL_20			C07	M1,F2
-	Tool handling with 20th active transformation			BOOLEAN	NEW CONF
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: This MD defines for each channel, whether the tool is treated in the 20th transformation or externally.

Other than that it has the same meaning as TRAFO_INCLUDES_TOOL_1.

25200	TRAFO5_PART_OFFSET_3			C07	F2
mm	Offset vector of 5-axis transformation 3			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: This machine data designates an offset of the workpiece holder for the 3rd 5-axis transformation of a channel and has a special meaning for each of the various machine types:

Other than that it has the same meaning as TRAFO5_PART_OFFSET_1.

25210	TRAFO5_ROT_AX_OFFSET_3			C07	F2
degrees	Position offset of rotary axes 1/2/3 for 5-axis transformation 3			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0, 0.0,0.0, 0.0, 0.0...	-	-	7/7

Description: This machine data designates the angular offset of the first or second rotary axis in degrees for the 3rd 5-axis transformation of a channel.

Other than that it has the same meaning as TRAFO5_ROT_AX_OFFSET_1.

25220	TRAFO5_ROT_SIGN_IS_PLUS_3			C07	F2
-	Sign of rotary axis 1/2/3 for 5-axis transformation 3			BOOLEAN	NEW CONF
-					
-	3	TRUE, TRUE, TRUE,TRUE, TRUE, TRUE...	-	-	7/7

Description: This machine data designates the sign with which the two rotary axes enter the 3rd 5-axis transformation of a channel.

Other than that it has the same meaning as TRAFO5_ROT_SIGN_IS_PLUS_1.

25230	TRAFO5_NON_POLE_LIMIT_3			C07	F2
degrees	Definition of pole range for 5-axis transformation 3			DOUBLE	NEW CONF
-					
-	-	2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0...	-	-	7/7

Description: This machine data designates a limit angle for the fifth axis of the 3rd 5-axis transformation.

Other than that it has the same meaning as TRAFO5_NON_POLE_LIMIT_1.

25240	TRAFO5_POLE_LIMIT_3			C07	F2
degrees	End angle toler. with interpol. through pole for 5-axis transf.			DOUBLE	NEW CONF
-					
-	-	2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0...	-	-	7/7

Description: This machine data designates an end angle tolerance for the fifth axis of the 3rd 5-axis transformation with the following properties:

Other than that it has the same meaning as TRAFO5_POLE_LIMIT_1.

25242	TRAFO5_POLE_TOL_3			C07	-
degrees	End angle tolerance for pole interpolation			DOUBLE	NEW CONF
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0	-	7/7

Description: End angle tolerance for interpolation through the pole for 5/6-axis transformation 3.

Other than that it has the same meaning as TRAFO5_POLE_TOL_1.

25250	TRAFO5_BASE_TOOL_3			C07	F2
mm	Vector of base tool on activation of 5-axis transformation 3			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: This MD defines the vector of the base tool for activaiton of the 3rd transformation.

Other than that it has the same meaning as TRAFO5_BASE_TOOL_1.

25258	TRAFO5_JOINT_OFFSET_PART_3			C07	F2
mm	Vector of kinematic table offset			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: This machine data is only evaluated in generic 5-axis tranformations with rotatable workpiece and rotatable tool (TRAFO_TYPE = 56, mixed kinematics).

Other than that it has the same meaning as TRAFO5_JOINT_OFFSET_PART_1.

25260	TRAFO5_JOINT_OFFSET_3			C07	F2
mm	Vector of the kinem.offset of the 3rd 5-axis transf. in channel			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: This machine data designates the vector from the first to the second rotary joint for the 3rd transformation of a channel.

Other than that it has the same meaning as TRAFO5_JOINT_OFFSET_1.

25261	TRAFO6_JOINT_OFFSET_2_3_3			C07	-
mm	Vector of kinematic offset			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: In the case of 6-axis transformations, defines the offset between the 2nd and third rotary axes for the 3rd transformation of each channel.

25262	TRAFO5_TOOL_ROT_AX_OFFSET_3			C07	F2
mm	Offset of swivel point of the rotary axis on the 3rd 5-axis transformation			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: In the case of 5-axis transformation with swiveling linear axis, the value indicates the offset of the rotary axis which swivels the linear axis with reference to machine zero for the 3rd transformation.

Other than that it has the same meaning as >TRAFO5_TOOL_ROT_AX_OFFSET_1.

25264	TRAFO5_NUTATOR_AX_ANGLE_3			C07	F2
degrees	Nutating head angle in 5-axis transformation			DOUBLE	NEW CONF
-					
-	-	45.0,45.0,45.0,45.0,45.0,45.0,45.0...	-89.	89.	7/7

Description: Angle between the second rotary axis and the axis corresponding to it in the rectangular coordinate system

Other than that it has the same meaning as TRAFO5_NUTATOR_AX_ANGLE_1.

25266	TRAFO5_NUTATOR_VIRT_ORIAX_3			C07	-
-	Virtual orientation axes			BOOLEAN	NEW CONF
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/7

Description: it has the same meaning as TRAFO5_NUTATOR_VIRT_ORIAX_1.

25270	TRAFO5_AXIS1_3			C07	F2
-	Direction of 1st rotary axis			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: The MD designates the vector that describes the direction of the first rotary axis with the general 5-axis transformation (TRAFO_TYPE_* = 24).

Other than that it has the same meaning as TRAFO5_AXIS1_1.

25272	TRAFO5_AXIS2_3			C07	F2
-	Direction of 2nd rotary axis			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: The MD designates the vector that describes the direction of the second rotary axis with the general 5-axis transformation (TRAFO_TYPE_* = 24, 40, 56).

Other than that it has the same meaning as TRAFO5_AXIS2_1.

25273	TRAFO5_AXIS3_3			C07	-
-	Direction of third rotary axis			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: The MD designates the vector that describes the direction of the third rotary axis with the general 6-axis transformation (TRAFO_TYPE_* = 24, 40, 56, 57).

Other than that it has the same meaning as TRAFO5_AXIS3_1.

25274	TRAFO5_BASE_ORIENT_3			C07	-
-	Vector of the tool base orientation for 5-axis transformation			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: Indicates the vector of the tool orientation in the general 5-axis transformation (TRAFO_TYPE_* = 24, 40, 56) if this is not defined on the transformation call or not read from a programmed tool.

Other than that it has the same meaning as TRAFO5_BASE_ORIENT_1.

25276	TRAFO6_BASE_ORIENT_NORMAL_3			C07	-
-	Normal tool vector in 6-axis transformation			DOUBLE	NEW CONF
-					
-	3	0.0, 1.0 , 0.0,0.0, 1.0 , 0.0...	-	-	7/7

Description: Indicates the vector that stands vertically on the tool orientation (TRAFO5_BASE_ORIENTATION_1) in general 6-axis transformation (TRAFO_TYPE_* = 24, 40, 56, 57).

Other than that it has the same meaning as TRAFO6_BASE_ORIENT_NORMAL_1.

25280	TRAFO5_TOOL_VECTOR_3			C07	F2
-	Direction of orientation vector for the first 5-axis transf.			BYTE	NEW CONF
-					
-	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2	0	2	7/2

Description: Indicates the direction of the orientation vector for the first 5-axis transformation for each channel.

Other than that it has the same meaning as TRAFO5_TOOL_VECTOR_1.1.

25282	TRAFO5_TCARR_NO_3			C07	-
-	TCARR number for the third 5-axis transformation			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: It has the same meaning as TRAFO5_TCARR_NO_1.

25285	TRAFO5_ORIAX_ASSIGN_TAB_3			C07	F2
-	Orientation axis / channel axis assignment transformation 3			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/2

Description: Assignment table of the orientation axes for 5-axis transformation 3

Other than that it has the same meaning as TRAFO5_ORIAX_ASSIGN_TAB_1.

25290	TRAFO5_ROT_OFFSET_FROM_FR_3			C01, C07	-
-	Offset of transformation rotary axes from WO.			BOOLEAN	Immediately
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: It has the same meaning as TRAFO5_ROT_OFFSET_FROM_FR_1.

25294	TRAFO7_EXT_ROT_AX_OFFSET_3		C07	F2
degrees	Position offset of the external rotary axes for 7-axis transformation 3		DOUBLE	NEW CONF
-				
-	3	0.0, 0.0, 0.0,0.0, 0.0, 0.0...	-	-	7/7

Description: This machine data designates the angular offset of the external rotary axis in degrees for the third 7-axis transformation of a channel.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

25295	TRAFO7_EXT_AXIS1_3			C07	F2
-	Direction of the 1st external rotary axis			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: The MD indicates the vector that describes the direction of the first external rotary axis in the third general 5/6-axis transformation (TRAFO_TYPE_* = 24).

The vector can have any magnitude.

Example:

Both with (0, 1, 0) and with (0, 7.21, 0), the same axis is described (in the direction of the 2nd geometry axis, i.e. usually Y).

Valid for the first transformation of a channel.

25300	TRAFO5_PART_OFFSET_4			C07	F2
mm	Offset vector of 5-axis transformation 4			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: This machine data designates an offset of the workpiece holder for the 4th 5-axis transformation of a channel and has a special meaning for each of the various machine types:

Other than that it has the same meaning as TRAFO5_PART_OFFSET_1.

25310	TRAFO5_ROT_AX_OFFSET_4			C07	F2
degrees	Position offset of rotary axes 1/2/3 for 5-axis transformation 4			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0, 0.0,0.0, 0.0, 0.0...	-	-	7/7

Description: This machine data designates the angular offset of the first or second rotary axis in degrees for the 4th 5-axis transformation of a channel.

Other than that it has the same meaning as TRAFO5_ROT_AX_OFFSET_1.

25320	TRAFO5_ROT_SIGN_IS_PLUS_4			C07	F2
-	Sign of rotary axis 1/2/3 for 5-axis transformation 4			BOOLEAN	NEW CONF
-					
-	3	TRUE, TRUE, TRUE,TRUE, TRUE, TRUE...	-	-	7/7

Description: This machine data designates the sign with which the two rotary axes enter the 4th 5-axis transformation of a channel.

Other than that it has the same meaning as TRAFO5_ROT_SIGN_IS_PLUS_1.

25330	TRAFO5_NON_POLE_LIMIT_4			C07	F2
degrees	Definition of pole range for 5-axis transformation 4			DOUBLE	NEW CONF
-					
-	-	2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0...	-	-	7/7

Description: This machine data designates a limit angle for the fifth axis of the 4th 5-axis transformation.

Other than that it has the same meaning as TRAFO5_NON_POLE_LIMIT_1.

25340	TRAFO5_POLE_LIMIT_4			C07	F2
degrees	End angle toler. with interpol. through pole for 5-axis transf.			DOUBLE	NEW CONF
-					
-	-	2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0...	-	-	7/7

Description: This machine data designates an end angle tolerance for the fifth axis of the 4th 5-axis transformation with the following properties:

Other than that it has the same meaning as TRAFO5_POLE_LIMIT_1.

25342	TRAFO5_POLE_TOL_4			C07	-
degrees	End angle tolerance for pole interpolation			DOUBLE	NEW CONF
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...		-	7/7

Description: End angle tolerance for interpolation through the pole for 5/6-axis transformation 4.

Other than that it has the same meaning as TRAFO5_POLE_TOL_1.

25350	TRAFO5_BASE_TOOL_4			C07	F2
mm	Vector of base tool on activation of 5-axis transformation 4			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: This MD defines the vector of the base tool for activation of the 4th transformation.

Other than that it has the same meaning as TRAFO5_BASE_TOOL_1.

22256	AUXFU_ASSOC_M1_VALUE			C01, C03, C10	H2
-	Additional M function for conditional stop			DWORD	PowerOn
-					
-	-	-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1...	-	-	7/2

Description: This machine data defines an additional, predefined M function behaving the same way as M1. The value of the machine data corresponds to the number of the auxiliary M function.

Predefined M numbers such as M0, M1, M2, M3, etc. are not allowed.

Restriction:

See MD 10715: M_NO_FCT_CYCLE

Related to:

$MN_M_NO_FCT_EOP,
$MN_M_NO_FCT_CYCLE,
$MC_SPIND_RIGID_TAPPING_M_NR,
$MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

$MN_EXTERN_M_NO_MAC_CYCLE,
$MN_EXTERN_M_NO_SET_INT
$MN_EXTERN_M_NO_DISABLE_INT,
$MN_EXTERN_CHAN_SYNC_M_NO_MIN,
$MN_EXTERN_CHAN_SYNC_M_NO_MAX
$MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

$MC_NIBBLE_PUNCH_CODE

22400	S_VALUES_ACTIVE_AFTER_RESET			C04, C03, C05	S1
-	S function active beyond RESET			BOOLEAN	PowerOn
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: 1: The last S values set in the main run are still active after a RESET.

0: The various S values are equal to 0 after a RESET and must therefore be reprogrammed.

22410	F_VALUES_ACTIVE_AFTER_RESET			C04, C03, C05	V1
-	F function active beyond RESET			BOOLEAN	PowerOn
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: 1: The last programmed F, FA, OVR and OVRA values are still active after RESET.

0: The various values are set to their default values after reset.

Related to:

MD 22240: AUXFU_F_SYNC_TYPE Output time of the F functions

25358	TRAFO5_JOINT_OFFSET_PART_4			C07	F2
mm	Vector of kinematic table offset			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: This machine data is only evaluated in generic 5-axis tranformations with rotatable workpiece and rotatable tool (TRAFO_TYPE = 56, mixed kinematics).

Other than that it has the same meaning as TRAFO5_JOINT_OFFSET_PART_1.

25360	TRAFO5_JOINT_OFFSET_4			C07	F2
mm	Vector of the kinem.offset of the 4th 5-axis transf. in channel			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: This machine data designates the vector from the first to the second rotary joint for the 4th transformation of a channel.

Other than that it has the same meaning as TRAFO5_JOINT_OFFSET_1.

25361	TRAFO6_JOINT_OFFSET_2_3_4			C07	-
mm	Vector of kinematic offset			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: In the case of 6-axis transformations, defines the offset between the 2nd and third rotary axes for the 4th transformation of each channel.

25362	TRAFO5_TOOL_ROT_AX_OFFSET_4			C07	F2
mm	Offset of swivel point of the rotary axis on the 4th 5-axis transformation			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: In the case of a 5-axis transformation with a swiveling linear axis, the value indicates the offset of the rotary axis which swivels the linear axis with reference to machine zero for the 4th transformation.

Other than that it has the same meaning as >TRAFO5_TOOL_ROT_AX_OFFSET_1.

25364	TRAFO5_NUTATOR_AX_ANGLE_4			C07	F2
degrees	Nutating head angle in 5-axis transformation			DOUBLE	NEW CONF
-					
-	-	45.0,45.0,45.0,45.0,45.0,45.0,45.0...	-89.	89.	7/7

Description: Angle between the second rotary axis and the axis corresponding to it in the rectangular coordinate system

Other than that it has the same meaning as TRAFO5_NUTATOR_AX_ANGLE_1.

25366	TRAFO5_NUTATOR_VIRT_ORIAX_4			C07	-
-	Virtual orientation axes			BOOLEAN	NEW CONF
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7

Description: it has the same meaning as TRAFO5_NUTATOR_VIRT_ORIAX_1.

25370	TRAFO5_AXIS1_4			C07	F2
-	Direction of 1st rotary axis			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: The MD designates the vector that describes the direction of the first rotary axis with the general 5-axis transformation (TRAFO_TYPE_* = 24).

Other than that it has the same meaning as TRAFO5_AXIS1_1.

25372	TRAFO5_AXIS2_4			C07	F2
-	Direction of 2nd rotary axis			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: The MD designates the vector that describes the direction of the second rotary axis with the general 5-axis transformation (TRAFO_TYPE_* = 24, 40, 56).

Other than that it has the same meaning as TRAFO5_AXIS2_1.

25373	TRAFO5_AXIS3_4			C07	-
-	Direction of third rotary axis			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: The MD designates the vector that describes the direction of the third rotary axis with the general 6-axis transformation (TRAFO_TYPE_* = 24, 40, 56, 57).

Other than that it has the same meaning as TRAFO5_AXIS3_1.

25374	TRAFO5_BASE_ORIENT_4			C07	-
-	Vector of the tool base orientation for 5-axis transformation			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: Indicates the vector of the tool orientation in the general 5-axis transformation (TRAFO_TYPE_* = 24, 40, 56) if this is not defined on the transformation call or not read from a programmed tool.

Other than that it has the same meaning as TRAFO5_BASE_ORIENT_1.

25376	TRAFO6_BASE_ORIENT_NORMAL_4			C07	-
-	Normal tool vector in 6-axis transformation			DOUBLE	NEW CONF
-					
-	3	0.0, 1.0 , 0.0,0.0, 1.0 , 0.0...	-	-	7/7

Description: Indicates the vector that stands vertically on the tool orientation (TRAFO5_BASE_ORIENTATION_1) in general 6-axis transformation (TRAFO_TYPE_* = 24, 40, 56, 57).

Other than that it has the same meaning as TRAFO6_BASE_ORIENT_NORMAL_1.

25380	TRAFO5_TOOL_VECTOR_4			C07	F2
-	Direction of orientation vector for the first 5-axis transf.			BYTE	NEW CONF
-					
-	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2	0	2	7/2

Description: Indicates the direction of the orientation vector for the first 5-axis transformation for each channel.

Other than that it has the same meaning as TRAFO5_TOOL_VECTOR_1.1.

25382	TRAFO5_TCARR_NO_4			C07	-
-	TCARR number for the 4th 5-axis transformation			DWORD	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: It has the same meaning as TRAFO5_TCARR_NO_1.

25385	TRAFO5_ORIAX_ASSIGN_TAB_4			C07	F2
-	Orientation axis / channel axis assignment transformation 4			BYTE	NEW CONF
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/2

Description: Assignment table of the orientation axes for 5-axis transformation 4

Other than that it has the same meaning as TRAFO5_ORIAX_ASSIGN_TAB_1.

25390	TRAFO5_ROT_OFFSET_FROM_FR_4			C01, C07	-
-	Offset of transformation rotary axes from WO.			BOOLEAN	Immediately
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description: It has the same meaning as TRAFO5_ROT_OFFSET_FROM_FR_1.

25394	TRAFO7_EXT_ROT_AX_OFFSET_4			C07	F2
degrees	Position offset of the external rotary axes for 7-axis transformation 4			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0, 0.0,0.0, 0.0, 0.0...	-	-	7/7

Description: This machine data designates the angular offset of the external rotary axis in degrees for the fourth 7-axis transformation of a channel.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

25395	TRAFO7_EXT_AXIS1_4			C07	F2
-	Direction of the 1st external rotary axis			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

Description: The MD indicates the vector that describes the direction of the first external rotary axis in the fourth general 5/6-axis transformation (TRAFO_TYPE_* = 24).

The vector can have any magnitude.

Example:

Both with (0, 1, 0) and with (0, 7.21, 0), the same axis is described (in the direction of the 2nd geometry axis, i.e. usually Y).

Valid for the first transformation of a channel.

25495	TRACON_CHAIN_5			C07	M1
-	Transformation grouping			DWORD	NEW CONF
-					
-	4	0, 0, 0 ,0,0, 0, 0, 0,0, 0, 0, 0...	0	20	7/7

Description: Transformation chain of the 5th concatenated transformation.

See TRACON_CHAIN_1 for documentation.

25496	TRACON_CHAIN_6			C07	M1
-	Transformation grouping			DWORD	NEW CONF
-					
-	4	0, 0, 0 ,0,0, 0, 0, 0,0, 0, 0, 0...	0	20	7/7

Description: Transformation chain of the 6th concatenated transformation.

See TRACON_CHAIN_1 for documentation.

25497	TRACON_CHAIN_7			C07	M1
-	Transformation grouping			DWORD	NEW CONF
-					
-	4	0, 0, 0 ,0,0, 0, 0, 0,0, 0, 0, 0...	0	20	7/7

Description: Transformation chain of the 7th concatenated transformation.

See TRACON_CHAIN_1 for documentation.

25498	TRACON_CHAIN_8			C07	M1
-	Transformation grouping			DWORD	NEW CONF
-					
-	4	0, 0, 0 ,0,0, 0, 0, 0,0, 0, 0, 0...	0	20	7/7

Description: Transformation chain of the 8th concatenated transformation.

See TRACON_CHAIN_1 for documentation.

1.4.5 Punching and nibbling

26000	PUNCHNIB_ASSIGN_FASTIN			C01, C09	N4
-	Hardware assignment for input byte for stroke control			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

Description: Assignment of the high-speed input byte for "punching and nibbling"

Bit 0-7: Number of the input byte used

Bit 8-15: Free

Bit 16-23: Inversion mask for writing the hardware byte

Bit 24-31: Free

This data defines which input byte is to be used for the signal "travel active".

= 1:

On-board inputs (4 high-speed NCK outputs) are used.

2, 3, 4, 5

The external digital NCK inputs are used

128-129:

Comparator byte (results from high-speed analog inputs or VDI specification)

Related to:

NIBBLE_PUNCH_INMASK[n]

References:

/FB/, A4, Digital and Analog NCK I/Os

The signal is high active as default from software 3.2. That is there is wire break monitoring. If the signal is low active then, e.g., the MD must be set to the value MD ="H 0001 0001" for the outboard inputs.

26002	PUNCHNIB_ASSIGN_FASTOUT			C01, C09	N4
-	Hardware assignment for output byte for stroke control			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

Description:

This data defines which output byte is to be used for the stroke control.

Number of the high-speed output byte for "punching and nibbling"

Bit 0-7: Number of the output byte used

Bit 8-15: Free

Bit 16-23: Inversion mask for writing the hardware byte

Bit 24-31: Free

Possible inputs:

1:

840D on-board outputs (4 high-speed + 4 bits via VDI specification)

2, 3, 4, 5

External digital outputs (high-speed NCK O/I or VDI specification)

Related to:

NIBBLE_PUNCH_OUTMASK[n]

References:

/FB/, A4, Digital and Analog NCK I/Os

26004	NIBBLE_PUNCH_OUTMASK			C01, C09	N4
-	Mask for fast output bits			BYTE	PowerOn
-					
-	8	1, 0, 0, 0, 0, 0, 0, 0,0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2

Description:

Mask for high-speed output bits for punching and nibbling.

Byte 1: Contains the bit for stroke release

Bytes 2-8: Currently free

Special cases:

Only NIBBLE_PUNCH_OUTMASK[0] is significant.

This is used to define the output bit for the signal "Release stroke".

Related to:

PUNCHNIB_ASSIGN_FASTOUT

26006	NIBBLE_PUNCH_INMASK			C01, C09	N4
-	Mask for fast input bits			BYTE	PowerOn
-					
-	8	1, 0, 0, 0, 0, 0, 0, 0,0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2

Description: This data can define up to 8 byte masks for the output of the high-speed bits.

The standard assignment of this data is as follows:

NIBBLE_PUNCH_INMASK[0]=1:

2° = first bit for the first punch interface (SPIF1)

NIBBLE_PUNCH_INMASK[1]=4:

Second punch interface (SPIF2), not available as standard

NIBBLE_PUNCH_INMASK[2]=0

...

NIBBLE_PUNCH_INMASK[7]=0

Note:

-

Special cases:

Only NIBBLE_PUNCH_INMASK[0] is relevant. This is used to define the input bit for the signal "Stroke active".

Related to:

PUNCHNIB_ASSIGN_FASTIN

26008	NIBBLE_PUNCH_CODE			C09	N4
-	Definition of M functions			DWORD	PowerOn
-					
-	8	0,23,22, 25, 26, 0, 0, 0,0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2

Description: This data defines the special M functions for punching and nibbling.

```
                            Standard value             Example
NIBBLE_PUNCH_CODE[0] =  0        20        End punching, nibbling with M20
NIBBLE_PUNCH_CODE[1] = 23        23        End punching, nibbling with M23
NIBBLE_PUNCH_CODE[2] = 22        22        Start nibbling
NIBBLE_PUNCH_CODE[3] = 25        25        Start punching
NIBBLE_PUNCH_CODE[4] = 26        26        Activate dwell time
NIBBLE_PUNCH_CODE[5] =122       122       Start nibbling with pretension,
                                          stroke control at servo level
NIBBLE_PUNCH_CODE[6] =125       125       Start punching with pretension,
                                          stroke control at servo level
NIBBLE_PUNCH_CODE[7] =  0         0        Not used
                                             (in preparation)
```

Special cases:

If MD: PUNCHNIB_ACTIVATION = 2 (M functions are interpreted directly by the software), then MD: NIBBLE_PUNCH_CODE[0] =20 has to be set.

Related to:

PUNCHNIB_ACTIVATION

26010	PUNCHNIB_AXIS_MASK			C09	N4
-	Definition of punching and nibbling axes			DWORD	PowerOn
-					
-	-	7,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

Description: Defines the axes involved in punching and nibbling. That is all the axes defined here must be at rest during punching and nibbling.

Related to:

PUNCH_PARTITION_TYPE

26012	PUNCHNIB_ACTIVATION		C09	N4
-	Activation of punching and nibbling functions		DWORD	PowerOn
-				
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

Description: This MD defines the ways in which punching and nibbling functions can be activated:

PUNCHNIB_ACTIVATION = 0

None of the punching or nibbling functions can be activated. The automatic path segmentation is the only exception if it is enabled via MD: PUNCH_PATH_SPLITTING.

PUNCHNIB_ACTIVATION = 1

The functions are activated via language commands. If M functions are to be used, then they must be programmed using macros.

PUNCHNIB_ACTIVATION = 2

The M functions are interpreted directly by the software. Language commands can still be used.

Note:

This option is intended only as a temporary solution.

Related to:

PUNCH_PATH_SPLITTING

NIBBLE_PUNCH_CODE[n]

26014	PUNCH_PATH_SPLITTING		C09	N4
-	Activation of automatic path segmentation		DWORD	PowerOn
-				
-	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2	-	-	7/2

Description: Activation data for automatic path segmentation.

Value Significance

-

0 =

Automatic path segmentation only active with punching and nibbling.

1 =

Automatic path segmentation can also be activated without punching and nibbling functions;

that is, it is programmable and be used NC internally

2 =

Automatic path segmentation can only be used NC internally;

that is it cannot be programmed.

26016	PUNCH_PARTITION_TYPE			C09	N4
-	Behavior of individual axes with automatic path segmentation			DWORD	PowerOn
-					
-	-	1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

Description: This machine data defines how single axes that are also nibbling axes within the meaning of MD: PUNCHNIB_AXIS_MASK are to behave.

In this case, there are the following options for the behavior of the single axes during path segmentation and stroke control:

PUNCH_PARTITION_TYPE = 0

No special behavior during automatic path segmentation. If the single axes are programmed together with path axes in one block then their total traversing path is split up according to the path axes. That is the pure geometric relationship between the single axes and path axes is identical to the undivided motion. If the single axes are programmed without the path axes but with SPN=<value> then the path is divided accordng to the programmed SPN value.

PUNCH_PARTITION_TYPE = 1

In this case, the path of the single axes, if they are programmed together with path axes, are generally traversed in the first section (that is independently of the currently active type of interpolation).

PUNCH_PARTITION_TYPE = 2

In this case the single axes behave with linear interpolation in the same way as with PUNCH_PARTITION_TYPE = 1, with all other types of interpolation, in the same way as with PUNCH_PARTITION_TYPE = 0.

Related to:

PUNCHNIB_AXIS_MASK

26018	NIBBLE_PRE_START_TIME			C09	N4
s	Delay time for nibbling/punching with G603			DOUBLE	PowerOn
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2

Description: To minimize any dead times due to the reaction time of the punching unit, it is possible to release the stroke before reaching the in-position window of the axes. The reference time for this is the interpolation end. Since there is normally a delay of some interpolation cycles after reaching the interpolation end (depending on the machine dynamics) until the axes actually come into position, the prestart time is a delay time with respect to reaching the interpolation end.

The function is therefore coupled to G603 (block change at the end of interpolation).

The time can be set via the machine data NIBBLE_PRE_START_TIME).

Example:

With an interpolation cycle of 5 µs, a stroke shall be released 2 cycles after reaching the interpolation end. In this case, the value 0.010 s must be selected for NIBBLE_PRE_START_TIME. If a value that is not integrally divisible by the set interpolation time is selected, then the stroke is initiated in the interpolation cycle following the set time.

26020	NIBBLE_SIGNAL_CHECK			C09	N4
-	Alarm on chattering punching signal			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

Description: When stroke active signal is set, for example by punch overshoots between the strokes, then the interpolation is stopped. It is also possible to generate the message "unclean punch signal" as a function of machine data NIBBLE_SIGNAL_CHECK.

0: No error message when the punching signal is irregular

1: Alarm, when the punching signal is irregular between strokes

27100	ABSBLOCK_FUNCTION_MASK			N01	-
-	Parameterize the block display with absolute values			DWORD	PowerOn
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x1	7/2

Description: Parameterization of the "block display with absolute values" function

Bit 0 = 1 :

The position values of the transverse axis are always displayed as diameter values.

Transverse axes can be applied via MD20100 or MD30460, bit2.

27200	MMC_INFO_NO_UNIT			EXP, -	-
-	HMI info (without physical unit)			DOUBLE	PowerOn
-					
-	80	45., 2., 0., 1., 0., -1., 0., 1., 100., 1., 1., 0., 0., 0., 0....	-	-	0/2

Description: –

27201	MMC_INFO_NO_UNIT_STATUS			EXP, -	-
-	HMI status info (without physical unit)			BYTE	PowerOn
-					
-	80	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1...	-	-	0/2

Description: –

27202	MMC_INFO_POSN_LIN			EXP, -	-
mm	HMI info (linear positions)			DOUBLE	PowerOn
-					
-	50	0., 0., 1., 1., 0., 0., 100., 0., 0., 1000., 1., 1....	-	-	0/2

Description: –

27203	MMC_INFO_POSN_LIN_STATUS			EXP, -	-
-	HMI status info (linear positions)			BYTE	PowerOn
-					
-	50	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1...	-	-	0/2

Description: –

27204	MMC_INFO_VELO_LIN			EXP, -	-
mm/min	HMI info (linear velocities)			DOUBLE	PowerOn
-					
-	16	10., 10., 2000., 10000., 300., 1000., 1000., 10., 0.,0.,0.,0....	-	-	0/2

Description: –

27205	MMC_INFO_VELO_LIN_STATUS			EXP, -	-
-	HMI status info (linear velocities)			BYTE	PowerOn
-					
-	16	1,1,1,1,1,1,1,1,0,0,0,0,0,0,0,0...	-	-	0/2

Description: –

27206	MMC_INFO_CUT_SPEED			EXP, -	-
m/min	HMI info (cutting speed)			DOUBLE	PowerOn
-					
-	5	100.,0.,0.,0.,0.,100.,0.,0.,0.,0....	-	-	0/2

Description: –

27207	MMC_INFO_CUT_SPEED_STATUS			EXP, -	-
-	HMI status info (cutting speed)			BYTE	PowerOn
-					
-	5	1,0,0,0,0,1,0,0,0,0,1,0,0,0,0...	-	-	0/2

Description: –

27208	MMC_INFO_REV_FEED			EXP, -	-
mm/rev	HMI info (feed)			DOUBLE	PowerOn
-					
-	10	1.,0.100,1.,1.,0.,0.,0.,0.,0.,0....	-	-	0/2

Description: –

27209	MMC_INFO_REV_FEED_STATUS			EXP, -	-
-	HMI status info (feed)			BYTE	PowerOn
-					
-	10	1,1,1,1,0,0,0,0,0,0,1,1,1,1,0,0,0,0,0,0...	-	-	0/2

Description: –

27400	OEM_CHAN_INFO			A01, A11	-
-	OEM version information			STRING	PowerOn
-					
-	3	"", "", "","", "", "","", "", ""...	-	-	7/2

Description: A version information freely available to the user (is indicated in the version screen)

27800	TECHNOLOGY_MODE			C09	A2
-	Mode of technology in channel			BYTE	NEW CONF
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

Description: This machine data can be used for stating the technology independently of the channel.

This information is used, among other things, for evaluating HMI, PLC and standard cycles.

Meaning:

MD = 0:Milling

MD = 1:Turning

MD = 2:Grinding

21:Cylindrical grinding

22:Surface grinding

MD = 3:Nibbling

MD = 4:...

(Enter additional technologies as and when required)

27860	PROCESSTIMER_MODE			C09	K1
-	Activation of program runtime measurement			DWORD	Reset
-					
-	-	0x00,0x00,0x00,0x00,0x00,0x00,0x00...	0	0x1FF	7/2

Description: Timers are provided as system variables under the function program runtime. While the NCK-specific timers are always activated (for time measurements since the last control power on), the channel-specific timers have to be started via this machine data.

Meaning:

Bit 0 = 0
    No measurement of total operating time for all part programs

Bit 0 = 1
    Measurement of total operating time for all part programs is active ($AC_OPERATING_TIME)

Bit 1 = 0
    No measurement of current program runtime

Bit 1 = 1
    Measurement of current program runtime is active ($AC_CYCLE_TIME)

Bit 2 = 0
    No measurement of tool operation time

Bit 2 = 1
    Measurement of tool operation time is active ($AC_CUTTING_TIME)

Bit 3
    Reserved

Other bits only when bit 0,1,2 = 1:

Bit 4 = 0   No measurement with active dry run feed

Bit 4 = 1   Measurement also with active dry run feed

Bit 5 = 0   No measurement with program test

Bit 5 = 1   Measurement also with program test

Bit 6 only when Bit 1 = 1:

Bit 6 = 0
    Delete $AC_CYCLE_TIME also with start by ASUB and PROG_EVENTs

Bit 6 = 1
    $AC_CYCLE_TIME is not deleted on start by ASUB and PROG_EVENTs.

Bit 7 only when bit 2 = 1:

Bit 7 = 0
    $AC_CUTTING_TIME counts only with active tool

Bit 7 = 1
    $AC_CUTTING_TIME counts irrespective of tool

Bits 8 only when bit 1 = 1

Bit 8 = 0
    $AC_CYCLE_TIME is not deleted on jumping to program start with GOTOS

Bit 8 = 1
    $AC_CYCLE_TIME is deleted on jumping to program start with GOTOS.

Bit 9 to 31
    Reserved

27880	PART_COUNTER			C09	K1
-	Activation of workpiece counter			DWORD	Reset
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x0FFFF	7/2

Description:

```
The part counters can be configured with this machine data.
Note: with bit 0 = 1 and $AC_REQUIRED_PARTS smaller than 0 all
workpiece counts
activated in this MD are frozen at the status reached.
Meaning of the individual bits:
Bits 0 - 3:Activating $AC_REQUIRED_PARTS
-----------------------------------------------------------------
-------
Bit 0 = 1:Counter $AC_REQUIRED_PARTS is activated
Further significance of bits 1-3 only when bit 0 =1 and
$AC_REQUIRED_PARTS > 0:
Bit 1 = 0:Alarm/VDI output if $AC_ACTUAL_PARTS corresponds to
$AC_REQUIRED_PARTS
Bit 1 = 1:Alarm/VDI output if $AC_SPECIAL_PARTS corresponds to
$AC_REQUIRED_PARTS
Bit 2Reserved!
Bit 3Reserved!
Bits 4 - 7:Activating $AC_TOTAL_PARTS
-----------------------------------------------------------------
--------
Bit 4 = 1:Counter $AC_TOTAL_PARTS is active
Further meaning of bits 5-7 only when bit 4 =1 and
$AC_REQUIRED_PARTS > 0:
Bit 5 = 0:Counter $AC_TOTAL_PARTS is incremented by 1 with a VDI
output of M02/M30
Bit 5 = 1:Counter $AC_TOTAL_PARTS  is incremented by 1 with output
of the M command from MD PART_COUNTER_MCODE[0]
Bit 6 = 0:$AC_TOTAL_PARTS also active with program test/block
search
Bit 7 = 1:counter $AC_TOTAL_PARTS is incremented by 1 when jumping
back with GOTOS
Bits 8 - 11:Activating $AC_ACTUAL_PARTS
-----------------------------------------------------------------
--------
Bit 8 = 1:Counter $AC_ACTUAL_PARTS is active
Further significance of bits 9-11 only when bit 8 =1 and
$AC_REQUIRED_PARTS > 0:
Bit 9 = 0:Counter $AC_ACTUAL_PARTS is incremented by 1 with a VDI
output of M02/M30
Bit 9 = 1:Counter $AC_ACTUAL_PARTS  is incremented by 1 with out-
put of the M command from MD PART_COUNTER_MCODE[1]
Bit 10 = 0:$AC_ACTUAL_PARTS also active with program test/block
search
Bit 10 = 1:No machining $AC_ACTUAL_PARTS with program test/block
search
Bit 11 = 1:counter $AC_ACTUAL_PARTS is incremented by 1 when jump-
ing bakc with GOTOS
```

Bit 12 - 15:Activating $AC_SPECIAL_PARTS

Bit 12 = 1:Counter $AC_SPECIAL_PARTS is active

Further significance of bits 13-15 only when bit 12 =1 and $AC_REQUIRED_PARTS > 0:

Bit 13 = 0:Counter $AC_SPECIAL_PARTS is incremented by 1 with a VDI output of M02/M30

Bit 13 = 1:Counter $AC_SPECIAL_PARTS is incremented by 1 with output of the M command from MD PART_COUNTER_MCODE[2]

Bit 14 = 0:$AC_SPECIAL_PARTS also active with program test/block search

Bit 14 = 1:No machining $AC_SPECIAL_PARTS with program test/block search

Bit 15 = 1:counter $AC_SPECIAL_PARTS is incremented by 1 when jumping back with GOTOS

Related to:

PART_COUNTER_MCODE

27882	PART_COUNTER_MCODE			C09	K1
-	Workpiece counting with user-defined M command			BYTE	PowerOn
-					
-	3	2, 2, 2,2, 2, 2,2, 2, 2,2, 2, 2...	0	99	7/2

Description: If part counter is activated via MD PART_COUNTER the count pulse can be triggered via a special M command.

Only then are values defined here taken into account:

Meaning:

The part counters are incremented by 1 in the VDI output of the described M command, where:

$PART_COUNTER_MCODE[0] for $AC_TOTAL_PARTS

$PART_COUNTER_MCODE[1] for $AC_ACTUAL_PARTS

$PART_COUNTER_MCODE[2] for $AC_SPECIAL_PARTS

27900	REORG_LOG_LIMIT		EXP, C02	S7
-	Percentage of IPO buffer for enabling log file		BYTE	PowerOn
-				
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	-	-	0/0

Description: The machine data defines the percentage of the IPO buffer above which data in the REORG LOG memory can be released in stages, if the block preparation has been interrupted due to an overflow of the REORG LOG data memory.

The released data are no longer available to the REORG function (References: /FB /, K1, "Mode Groups, Channels, Program Operation Mode").

A consequence of this status is that a further REORG command is cancelled with an error message.

If the status of "non-reorganizability" occurs, warning 15110 is output. The output of the warning can be suppressed by enabling the highest significant bit. The bit is set by adding the value 128 to the input value in REORG_LOG_LIMIT.

In addition to the instructions of the NC blocks, the size of the IPO buffer and the REORG data memory also affect the frequency of data release.

Related to:

MD 28000: MM_REORG_LOG_FILE_MEM
(memory size for REORG)
MD 28060: MM_IPO_BUFFER_SIZE
(number of blocks in the IPO buffer)

27920	TIME_LIMIT_NETTO_INT_TASK			EXP, C01	-
s	Runtime limit of interpreter subtask			DOUBLE	PowerOn
-					
-	-	0.005,0.005,0.005,0.005,0.005,0.005...	0.001	0.100	7/0

Description: With $MC_TIME_LIMIT_NETTO_INT_TASK the maximum runtime of the interpreter subtask is set. The interpreter subtask is started from the preprocessing task. If the interpreter task does not end on its own within the time set with $MC_TIME_LIMIT_NETTO_INT_TASK, it will be stopped and continued after a preprocessing clock.

1.4.6 Channel-specific memory settings

28000	MM_REORG_LOG_FILE_MEM			EXP, C02	S7
-	Memory space for REORG (DRAM)			DWORD	PowerOn
-					
-	-	50,50,50,50,50,50,50,50,50,50,50,50,50...	1	500	7/2

Description: Definition of the size (in kbyte) of the dynamic memory for the REORG-LOG data. The size of the memory determines the quantity of the data available for the function REORG.

References:

/FB/, K1, "Mode Groups, Channel, Program Operation"

28010	MM_NUM_REORG_LUD_MODULES			EXP, C02	S7
-	Number of blocks for local user variables in REORG (DRAM)			DWORD	PowerOn
-					
-	-	8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8	0	SLMAXNUMBEROF_USERMODULES	7/2

Description: Defines the number of additional LUD data blocks available for the function REORG (see Description of Functions, Channels, Mode Groups, Program Operation (K1)).

This value can be 0 if the function REORG is not used. The CNC always opens 12 LUD data blocks, of which 8 are used for NC programs and 4 for the ASUBs.

An LUD data block is needed for each NC program and ASUB in which a local user variable is defined. This value may have to be increased for the function REORG if a large IPO buffer is present and a large number of short NC programs in which LUD variables are defined are active (prepared NC blocks of the programs are located in the IPO buffer).

An LUD data block is needed for each of these programs. The size of the reserved memory is affected by the number of LUDs per NC program and their individual memory requirements. The LUD data blocks are stored in the dynamic memory.

The memory requirement for managing the blocks for local user variables with REORG can be determined as follows:

The size of the LUD blocks depends on the number of active LUDs and their data type. The memory for the LUD blocks is limited by the MD 28000: MM_REORG_LOG_FILE_MEM (memory size for REORG).

28020	MM_NUM_LUD_NAMES_TOTAL			C02	S7
-	Number of local user variables (DRAM)			DWORD	PowerOn
-					
-	-	400,400,400,400,400,400,400,400,400...	0	32000	7/2

Description: Defines the number of variables for the local user data (LUD) which are permitted to exist in the active sections of the program. Approximately 150 bytes of memory per variable are reserved for the names of the variables and the variable values. The memory required for the variable value is equal to the size of the data type. If the total of the local user variables from the active main program and the related subprograms is larger than the defined limit, the variables which are over the limit are not accepted during execution of the program. Dynamic memory is used for the variable names and variable values.

Overview of the memory used by the data types:

Data type	Memory used
REAL	8 bytes
INT	4 bytes
BOOL	1 byte
CHAR	1 byte
STRING	1 byte per character, 200 characters per string are possible
AXIS	4 bytes
FRAME	400 bytes

28040	MM_LUD_VALUES_MEM			C02	S7
-	Memory space for local user variables (DRAM)			DWORD	PowerOn
-					
-	-	50,50,50,50,50,50,50,50,50,50,50,50,50...	0	32000	7/2

Description: This MD defines the amount of memory space available for LUD variables.

The number of available LUDs is exhausted when one of the limit values in either MD 28020: MM_NUM_LUD_NAMES_TOTAL or MM_LUD_VALUES_MEM is reached.

The memory defined here is subdivided into (MM_LUD_VALUES_MEM * 1024) / MM_MAX_SIZE_OF_LUD_VALUE blocks and allocated to part programs which request memory. Each part program which contains at least one definition of an LUD variable or which has call parameters uses at least one such block.

It should be remembered that several part programs can be open at once and thus use memory in the NCK. The number depends on the type of programming, the program length and the size of the internal NCK block memory upwards of (MM_IPO_BUFFER_SIZE, MM_NUM_BLOCKS_IN_PREP).

Related to:

MD 28020: MM_NUM_LUD_NAMES_TOTAL
(number of local user variables (DRAM))

28050	MM_NUM_R_PARAM			C02	S7
-	Number of channel-specific R parameters (SRAM)			DWORD	PowerOn
-					
-	-	100,100,100,100,100,100,100,100,100...	0	32535	7/2

Description: Defines the number of R parameters available in the channel. A maximum of 32535 R parameters are available per channel. This machine data reserves 8 bytes of buffered user memory per R parameter.

R parameters have a considerably lower management overhead in comparison to LUD and GUD variables.

Attention:

The buffered data are lost when this machine data is changed!

28060	MM_IPO_BUFFER_SIZE			C02	S7
-	Number of NC blocks in IPO buffer (DRAM)			DWORD	PowerOn
-					
-	-	10,10,10,10,10,10,10,10,10,10,10,10,10...	2	1000	7/2

Description: Defines the number of blocks for the interpolation buffer. This buffer contains prepared NC blocks available for the interpolation. A number of kbytes of the dynamic user memory are reserved for each NC block. The data also limits the number of blocks for look ahead consideration of speed limitation for the LookAhead function.

The MM_IPO_BUFFER_SIZE is set by the system.

Related to:

MD 28070: MM_NUM_BLOCKS_IN_PREP
(number of blocks for block preparation)

28070	MM_NUM_BLOCKS_IN_PREP			EXP, C02	S7
-	Number of blocks for block preparation (DRAM)			DWORD	PowerOn
-					
-	-	50,50,50,50,50,50,50,50,50,50,50,50,50...	20	500	7/2

Description: Defines the number of NC blocks available for NC block preparation. This figure is determined mainly by the system software and is used largely for optimization. Approximately 10 Kbytes of dynamic memory is reserved per NC block.

Related to:

MD 28060: MM_IPO_BUFFER_SIZE
(number of NC blocks with IPO buffer)

28080	MM_NUM_USER_FRAMES			C11, C02	S7
-	Number of settable frames (SRAM)			DWORD	PowerOn
-					
-	-	5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5	5	100	7/2

Description: Defines the number of predefined user frames. Approximately 400 bytes of backup memory are reserved per frame.

The standard system configuration provides four frames for G54 to G57 and one frame for G500.

Special cases:

The backup data are lost if this machine data is altered!

28081	MM_NUM_BASE_FRAMES			C02	K2
-	Number of base frames (SRAM)			DWORD	PowerOn
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	16	7/2

Description: Number of channel-specific base frames per channel.

The value corresponds to the number of field elements for the predefined field $P_CHBFR[].

Buffered memory is reserved for this.

28082	MM_SYSTEM_FRAME_MASK			C02	K2
-	System frames (SRAM)			DWORD	PowerOn
-					
-	-	0x21,0x21,0x21,0x21,0x21,0x21,0x21...	0	0x00000FFF	7/2

Description: Bit mask for configuring channel-specific system frames included in the channel.

Bit 0: System frame for setting actual value and scratching

Bit 1: System frame for external work offset

Bit 2: System frame for TCARR aund PAROT

Bit 3: System frame for TOROT and TOFRAME

Bit 4: System frame for workpiece reference points

Bit 5: System frame for cycles

Bit 6: System frame for transformations

Bit 7:System frame $P_ISO1FR for ISO G51.1 Mirror

Bit 8:System frame $P_ISO2FR for ISO G68 2DROT

Bit 9:System frame $P_ISO3FR for ISO G68 3DROT

Bit 10:System frame $P_ISO4FR for ISO G51 Scale

Bit 11: System frame $P_RELFR for relative coordinate systems

28083	MM_SYSTEM_DATAFRAME_MASK			C02	-
-	System frames (SRAM)			DWORD	PowerOn
-					
-	-	0xF9F,0xF9F,0xF9F,0xF9F,0xF9F,0xF9F...	0	0x00000FFF	7/2

Description: Bit mask for configuring channel-specific system frames in the data storage (SRAM).

Bit 0: System frame for setting actual value and scratching

Bit 1: System frame for external work offset

Bit 2: System frame for TCARR aund PAROT

Bit 3: System frame for TOROT and TOFRAME

Bit 4: System frame for workpiece reference points

Bit 5: System frame for cycles

Bit 6: System frame for transformations

Bit 7:System frame $P_ISO1FR for ISO G51.1 Mirror

Bit 8:System frame $P_ISO2FR for ISO G68 2DROT

Bit 9:System frame $P_ISO3FR for ISO G68 3DROT

Bit 10:System frame $P_ISO4FR for ISO G51 Scale

Bit 11: System frame $P_RELFR for relative coordinate systems

28085	MM_LINK_TOA_UNIT			C02, C09	FBW,S7
-	Assignment of a TO unit to a channel (SRAM)			DWORD	PowerOn
-					
-	-	1,2,3,4,5,6,7,8,9,10,11, 12,13,14,15,16	1	10	7/2

Description: A TO unit is assigned to each channel through a default setting. The memory is thus reserved for the data blocks (tools, magazines).

A TOA unit can also be assigned to several channels.

Def.: The TOA area is the sum of all TOA and magazine blocks in the NC.

The TOA unit consists of a TOA block and, with activated TM function, a magazine block.

Special cases:

The backup data are lost if this machine data is altered!

28090	MM_NUM_CC_BLOCK_ELEMENTS			EXP, C02	S7
-	Number of block elements for compile cycles (DRAM)			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0 ,0,0,0	0	130	7/1

Description: The input value defines the number of block elements that can be used for compile cycles.

In the case of software version 2, approximately 1.2KB of dynamic memory is required per block element.

28100	MM_NUM_CC_BLOCK_USER_MEM			EXP, C02	S7
-	Size of block memory for compile cycles (DRAM), in KB			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0 ,0,0,0	0	64000	7/1

Description: The value defines the total capacity of block memory available to the user in the dynamic memory area for the compile cycles. The memory is allocated in staggered blocks of 128 bytes.

28105	MM_NUM_CC_HEAP_MEM			EXP, C02	S7
-	Heap memory in kbytes for compile-cycle applications (DRAM)			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0 ,0,0,0	0	64000	7/2

Description: Size of the heap memory in kbytes which can be used by the compile cycle user.

Dynamic memory is reserved.

The memory is allocated in subdivisions of 128 byte blocks.

The start address and the size of the reserved memory is made available via a binding, the management lies in the hands of the CC user.

28150	MM_NUM_VDIVAR_ELEMENTS			C02	P3
-	Number of elements for writing PLC variables			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32000	7/2

Description: The MD defines the number of elements which the user has available for writing PLC variables ($A_DBx=...). This number also applies to block search, but not to synchronized actions.

The memory requirement is ca. 24 bytes per element.

One element is needed for each write action when writing PLC variables in quick succession.

If more writing actions are to be performed than elements are available, block transport must be guaranteed (trigger preprocessing stop, if required)

However, the number of elements can be reduced if the accessing actions are made separately (block transport has already been accomplished). Writing accesses (var=$A_DBx) are unlimited.

28160	MM_NUM_LINKVAR_ELEMENTS			C02	B3
-	Number of elements for writing NCU-link variables			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32000	7/2

Description: Defines the number of elements which the user has available for programming link variables ($A_DLx=...). This number also applies to block search, but not to synchronized actions.

The memory requirement is approx. 24 bytes per element.

One element is needed for each write action when writing NCU-link variables in quick succession.

However, the number of elements can be reduced if the accessing actions are made separately (block transport has already been accomplished).

If more writing actions are to be performed than elements are available, block transport must be guaranteed (trigger preprocessing stop, if required).

28180	MM_MAX_TRACE_DATAPOINTS			EXP, C02, C06	BA,S5,FBSY
-	Length of the trace data buffer			DWORD	PowerOn
NBUP					
-	-	100,100,100,100,100,100,100,100,100...	0	20000	2/2

Description: MM_MAX_TRACE_DATAPOINTS defines the size of an internal data buffer which contains the trace recordings.

28200	MM_NUM_PROTECT_AREA_CHAN			C02, C06, C09	S7
-	Number of files for channel-specific protection zones (SRAM)			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	10	7/2

Description: This machine data defines how many blocks are set up for channel-specific protection zones.

Related to:

MD 28210: MM_NUM_PROTECT_AREA_ACTIVE

(number of simultaneously active protection zones)

MD 18190: MM_NUM_PROTECT_AREA_NCK

(number of files for machine-related protection zones (SRAM))

References:

/FB/, A3, "Axis/Contour Tunnel Monitoring, Protection Zones"

28210	MM_NUM_PROTECT_AREA_ACTIVE			C11, C02, C06, C09	S7
-	Number of simultaneously active protection zones in one channel			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	10	7/2

Description: This machine data defines the number of protection zones that may be activated simultaneously for each channel.

It is not practical to enter a numerical value higher than MD 18190: MM_NUM_PROTECT_AREA_NCK + MD 28200: MM_NUM_PROTECT_AREA_CHAN.

Related to:

MD 28200: MM_NUM_PROTECT_AREA_CHAN

(Number of blocks for channel-specific protection zones)

MD 18190: MM_NUM_PROTECT_AREA_NCK

(Number of files for machine-related protection zones (SRAM))

References:

/FB1/ Function Manual Basic Functions; Axis Monitoring, Protection Zones (A3)

28212	MM_NUM_PROTECT_AREA_CONTOUR			C11, C02, C06, C09	-
-	Elements for active protection zones (DRAM)			DWORD	PowerOn
-					
-	-	30,30,30,30,30,30,30,30,30,30,30,30,30...	0	50	7/2

Description: This machine data defines for each channel how many internal contour elements in total are held available for active protection zones.

Dynamic memory is used.

The MD affects the memory requirements for the activated protection zones.

This machine data is active only if $MC_MM_NUM_PROTECT_AREA_ACTIVE is not equal to 0.

28250	MM_NUM_SYNC_ELEMENTS			C02, -	S5,FBSY
-	Number of elements for expressions in synchronized actions			DWORD	PowerOn
-					
-	-	159,159,159,159,159,159,159,159,159...	0	32000	7/2

Description: The expressions of the motion-synchronous actions are stored in memory elements in the control. A motion-synchronous action occupies at least 4 elements.

It occupies:

- 1 element for each operand in the condition
- >= 1 element for each action
- 2 elements for each assignment
- 1 element for each further operand in complex expressions.

One element is ca 64 bytes.

The option "Synchronous actions stage 2" is required if the MD is to be changed beyond its default value.

References:

Programming Guide, Advanced

28251	MM_NUM_SAFE_SYNC_ELEMENTS			C02, -	S5,FBSI
-	Number of elements for expressions in Safety synchr. actions			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32000	7/2

Description: The expressions of motion-synchronous actions are stored in memory elements of the control. A motion-synchronous action assigns at least 4 elements.

Assignments:

Each operand in the condition:1 element

Each action:>= 1 element

Each assignment:2 elements

Each additional operand in complex expressions:1 element

Also see:

MD 28250: $MC_MM_NUM_SYNC_ELEMENTS

28252	MM_NUM_FCTDEF_ELEMENTS			C02	S5,FBSY
-	Number of FCTDEF elements			DWORD	PowerOn
-					
-	-	3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3	0	100	7/2

Description: Defines the number of FCTDEF elements.

28254	MM_NUM_AC_PARAM			C02	FBSY
-	Dimension of $AC_PARAM.			DWORD	PowerOn
-					
-	-	50,50,50,50,50,50,50,50,50,50,50,50,50...	0	20000	7/2

Description: Panel size of $AC_PARAM.

28255	MM_BUFFERED_AC_PARAM			C02	FBSY
-	$AC_PARAM[] is stored in SRAM.			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2

Description: $AC_PARAM[] is stored in SRAM.

28256	MM_NUM_AC_MARKER			C02	FBSY
-	Dimension of $AC_MARKER			DWORD	PowerOn
-					
-	-	8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8	0	20000	7/2

Description: Number of channel-specific markers $AC_MARKER for motion-synchronous actions.

DRAM or SRAM is required depending on $MC_MM_BUFFERED_AC_MARKER.

28257	MM_BUFFERED_AC_MARKER			C02	FBSY
-	$AC_MARKER[] is stored in SRAM.			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2

Description: $AC_MARKER[] is stored in SRAM.

28258	MM_NUM_AC_TIMER			C02	S5,FBSY
-	Number of time variables $AC_TIMER (DRAM)			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	10000	7/2

Description: Number of channel-specific time variables $AC_TIMER for motion-synchronous actions (DRAM)

28260	NUM_AC_FIFO			C01	S5,FBSY
-	Number of FIFO variable for synchronized actions			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	10	7/2

Description: Number of FIFO variables $AC_FIFO1 - $AC_FIFO10 for motion-synchronous actions.

FIFO variables are used for product tracking. A piece of information (e.g. the product length) for each part can be temporarily stored on a band in each FIFO variable.

FIFO variables are stored in R parameters.

The MD $MC_START_AC_FIFO defines the number of the R parameter from which the FIFO variables can be stored. All R parameters with lower numbers can be used freely in the part program.

R parameters above the FIFO range cannot be written from the part program.

The number of R parameters must set via machine data MD $MC_MM_NUM_R_PARAM so that all FIFI variables can be accommodated from the start of the R parameters:

$MC_MM_NUM_R_PARAM=$MC_MM_START_FIFO + $MC_NUM_AC_FIFO*($MC_LEN_AC_FIFO+6)

The FIFO variables bear the names $AC_FIFO1 to $AC_FIFOn.

They are stored as fields.

The indices 0 - 5 have special meanings:

n= 0:

A new value is stored in the FIFO when writing with index 0.

The oldest element is read and removed from the FIFO when writing with index 0.

n=1: Access to the first element read in

n=2: Access to the last element 1 read in

n=3: Sum of all FIFO elements

n=4: Number of elements available in the FIFO

n=5: Current write index relative to FIFO start

n=6: 1st element read in

28262	START_AC_FIFO			C01	S5,FBSY
-	FIFO variables store from R parameter			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32535	7/2

Description: Number of the R parameter from which FIFO variables are stored. All R parameters with lower numbers can be used freely in the part program. R parameters above the FIFO range cannot be written from the part program.

The number of R parameters must set via machine data MD 28050: $MC_MM_NUM_R_PARAM so that all FIFI variables can be accommodated from the start of the R parameters:

$MC_MM_NUM_R_PARAM=$MC_START_FIFO + $MC_NUM_AC_FIFO*($MC_LEN_AC_FIFO+6)

The FIFO variables bear the names $AC_FIFO1 to $AC_FIFOn. They are stored as fields.

The indices 0 - 5 have special meanings:

n= 0:

A new value is stored in the FIFO when writing with index 0.

The oldest element is read and removed from the FIFO when writing with index 0.

n=1: Access to the first element read in

n=2: Access to the last element read in

n=3: Sum of all FIFO elements

n=4: Number of elements available in the FIFO

n=5: Current write index relative to FIFO start

Related to:

MD 28260: NUM_AC_FIFO

28264	LEN_AC_FIFO			C01	S5,M5,FBSY
-	Length of FIFO variables AC_FIFO1-AC_FIFO10			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32535	7/2

Description: Length of the FIFO variables $AC_FIFO1 to $AC_FIFO10.

All FIFO variables are the same length.

28266	MODE_AC_FIFO			C01	S5,FBSY
-	Mode of FIFO processing			BYTE	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	-	7/2

Description: Mode of FIFO processing:

Bit 0 = 1:

The sum of all FIFO contents is updated at each write access.

Bit 0 = 0:

No summation

Related to:

MD 28260: NUM_AC_FIFO

28274	MM_NUM_AC_SYSTEM_PARAM			EXP, C02	FBSY
-	Number of $AC_SYSTEM_ PARAM for motion-synchronous actions			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	20000	7/2

Description: Number of $AC_SYSTEM_ PARAM parameters for motion-synchronous actions.

Depending on $MC_MM_BUFFERED_AC_PARAM, DRAM or SRAM is required.

Reserved for SIEMENS applications.

28276	MM_NUM_AC_SYSTEM_MARKER			EXP, C02	FBSY
-	Number of $AC_SYSTEM_MARKER for motion-synchronous actions			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	20000	7/2

Description: Number of $AC_SYSTEM_MARKER markers for motion-synchronous actions.

Depending on $MC_MM_BUFFERED_AC_MARKER, DRAM or SRAM is required.

Reserved for SIEMENS applications.

28290	MM_SHAPED_TOOLS_ENABLE			C01, C08, C02	-
-	Enable tool radius compensation for contour tools			BOOLEAN	PowerOn
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/0

Description: The function "Tool radius compensation for contour tools" is enabled with this tool.

Modification of this machine data will cause a reconfiguration of the memory.

28300	MM_PROTOC_USER_ACTIVE			C02	D1,OEM
-	Activation of logging for a user			BOOLEAN	PowerOn
-					
-	10	TRUE, FALSE, FALSE, FALSE, FALSE, TRUE, TRUE, FALSE, FALSE...	-	-	1/1

Description: Activation of recording for a user.

The users 0 and 1, and 5 - 9 are reserved for system functions.

The users 2, 3 and 4 can be used by OEM.

28301	MM_PROTOC_NUM_ETP_OEM_TYP			C02	D1,OEM
-	Number of OEM event types ETP.			DWORD	PowerOn
-					
-	10	0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	1/1

Description: Number of OEM event types in OPI module ETP.

28302	MM_PROTOC_NUM_ETP_STD_TYP			C02	-
-	Number of standard event types ETP			DWORD	PowerOn
-					
-	10	28, 0, 0, 0, 0, 20, 20, 0, 0, 3...	0	51	1/1

Description: Number of standard event types required in the ETP OPI block.

28400	MM_ABSBLOCK			EXP, C02	S7
-	activate block display w. absolute values			DWORD	PowerOn
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	512	7/2

Description: Value:

0: Block display with absolute values deactivated

1: Block display with absolute values activated;

A display buffer with the following size is created:

($MC_MM_IPO_BUFFER_SIZE + $MC_MM_NUM_BLOCKS_IN_PREP) * 256 bytes

>= 128:Block display with absolute values activated;

A display buffer with the following size is created:

($MC_MM_IPO_BUFFER_SIZE + $MC_MM_NUM_BLOCKS_IN_PREP) * <value>

28402	MM_ABSBLOCK_BUFFER_CONF			EXP, C02	S7
-	Setting of upload buffer size			DWORD	PowerOn
-					
-	2	2, 4,2, 4,2, 4,2, 4,2, 4,2, 4,2, 4...	0	32000	7/2

Description: Size of upload buffer:

$MC_MM_ABSBLOCK_BUFFER_CONF[0] : Number of blocks before current block

$MC_MM_ABSBLOCK_BUFFER_CONF[1] : Number of blocks after current block

The machine data is tested for the following upper / lower limits during startup:

0 <= $MC_MM_ABSBLOCK_BUFFER_CONF[0] <= 8

0 <= $MC_MM_ABSBLOCK_BUFFER_CONF[1] <= ($MC_MM_IPO_BUFFER_SIZE + $MC_MM_NUM_BLOCKS_IN_PREP)

When violating the limits, alarm 4152 is issued.

28450	MM_TOOL_DATA_CHG_BUFF_SIZE			-, C02, C06	-
-	Buffer for tool data changes (DRAM)			DWORD	PowerOn
-					
-	-	60,60,60,60,60,60,60,60,60,60,60,60,60...	0	2500	7/2
710-6a2c	-	100,100,100,100,100,100,100,100,100...	-	-	-/-
710-31a10c	-	100,100,100,100,100,100,100,100,100...	-	-	-/-
720-6a2c	-	100,100,100,100,100,100,100,100,100...	-	-	-/-
720-31a10c	-	100,100,100,100,100,100,100,100,100...	-	-	-/-
730-6a2c	-	100,100,100,100,100,100,100,100,100...	-	-	-/-
730-31a10c	-	100,100,100,100,100,100,100,100,100...	-	-	-/-

Description: Number of entries in the buffer for the OPI change service for tool data.

Dynamic memory is used.

This buffer is created only if bit 2 or bit 3 is set in MD $MN_TOOL_DATA_CHANGE_COUNTER.

28500	MM_PREP_TASK_STACK_SIZE			EXP, C02	S7
-	Stack size of preparation task (DRAM)			DWORD	PowerOn
-					
-	-	70,70,70,70,70,70,70,70,70,70,70,70,70...	70	500	0/0

Description: Defines the stack size in kbytes for the preparation task. The stack is stored in the dynamic memory.

Note:

This machine data is assigned internally by the control and must not be altered by the user.

28502	MM_INT_TASK_STACK_SIZE			EXP, C02	-
-	Stack size for interpreter subtask (kB).			DWORD	PowerOn
-					
-	-	20,20,20,20,20,20,20,20,20,20,20,20,20...	20	40	0/0

Description: Definition of the stack size (kByte) for the interpreter subtask.

28520	MM_MAX_AXISPOLY_PER_BLOCK			C02	S7
-	maximal number of axial polynomials per block			DWORD	PowerOn
-					
-	-	3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3	1	5	7/2

Description: Maximum number of axis polynomials which can be contained in a block.

In the standard case, each block only contains one polynomial per axis, i.e. this data can immediately be set to one.

Currently, more polynomials are only needed for the new ADIS function with G643.

In this case, this data must have a minimum value of three.

28530	MM_PATH_VELO_SEGMENTS			C02	K1
-	Number of memory elements for path velocity limitation			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	100	7/2

Description: Number of memory elements available for limiting the path velocity and changing it in the block.

0 : Each block is limited by a maximum path velocity.

> 0 : If required, a profile of the permissible path velocity
; and its modification options is generated and monitored
; in the block.
; This results in a smoother axis velocity progression and
; a shorter travel time.
; $MC_MM_PATH_VELO_SEGMENTS defines the average available
; number of segments in the block.
; The necessary setting essentially depends
; on the requirements.

The following values are recommended:

3: for G643, if only geometry axes are traversed
5: for G643, if geometry and rotary axes are traversed
5: for COMPCAD
5: for dyn. transformation

A value that is too low this may lead to additional velocity limitations if an insufficient number of blocks can be made available for interpolation.

$MC_MM_PATH_VELO_SEGMENTS additionally increases the memory requirement of dyn. Look Ahead. Values higher than 5 are only practical in exceptional cases.

3 ... 5 :
Recommended setting.

28533	MM_LOOKAH_FFORM_UNITS			C02	-
-	Memory for extended LookAhead			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	100000	7/2

Description: The machine data is used to configure the work memory for extended LookAhead.

The MD scales the value defined internally through $MC_MM_IPO_BUFFER_SIZE, $MC_MM_MAX_AXISPOLY_PER_BLOCK, $MC_MM_PATH_VELO_SEGMENTS, $MC_MM_FEED_PROFILE_SEGMENTS, $MC_MM_ARCLENGTH_SEGMENTS).

The reasonable size depends on the part program, the block lengths, the axis dynamics as well as an active kinematic transformation.

The MD should only be set for those channels in which free-form surfaces are machined also.

0 : default LookAhead is active.

> 0 : extended LookAhead is active, if it is switched on through $MC_LOOKAH_FFORM.

The guide value is: 18..20: for free-form applications

28535	MM_FEED_PROFILE_SEGMENTS			C02	-
-	Number of memory element for feed profiles			DWORD	PowerOn
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	1	10	7/2

Description: Number of memory elements available for feed profile per block.

The default value 1 is adequate for a programmable feed profile (FLIN, FCUB, FPO()).

If compile cycle applications require more segments per block, this machine data must be increased accordingly.

If, for example, a feed profile is to be activated in which there is deceleration at both the beginning and the end of the block, 3 segments will be required for the feed profile in the block, i.e. this MD must have value 3.

28540	MM_ARCLENGTH_SEGMENTS			C02	K1
-	Number of memory elements for arc length function representation			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	100	7/2

Description: Number of memory elements available for the arc length function for parameterizing polynomials.

If this machine data is equal to zero, a fixed interval division is used to represent the arc length function. In this case, the calculated function is only tangent-continuous. This can lead to discontinuities in the axis acceleration.

If the function G643 is used for smoothing and/or COMPCAD, this MD should be assigned a value of at least 10. In this case, the calculated function also has a constant curvature which results in a smoother progression of the path velocity as well as the axis velocities and accelerations.

Values substantially larger than 10 are only practical in exceptional cases.

Not only the value of $MC_MM_ARCLENGTH_SEGMENTS but also that of $MC_SPLINE_FEED_PRECISION are crucial for the accuracy.

28560	MM_SEARCH_RUN_RESTORE_MODE			C02	K1
-	Data restore after simulation			DWORD	PowerOn
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x00000001	7/2

Description: Bit mask to restore data after abort of a simulated program execution. The following applies:

Bit 0: All frames in the data storage are restored.

28580	MM_ORIPATH_CONFIG			C02	-
-	Setting for ORIPATH path-relative orientation			BYTE	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	1/1

Description: This MD is used to configure the behavior with ORIPATH, that is path-relative interpolation of the tool orientation. Furthermore, orientation smoothing is enabled with the G codes OSD or OST.

The following options are available:

0: The MD $MC_ORIPATH_MODE has no effect. G codes OSD and OST have no effect.

1: The "genuine" path-relative orientation intepolation can be activated with the MD $MC_ORIPATH_MODE = 1. The reference of the tool orientation to the path tangent and to the vector normal to the surface programmed with LEAD/TILT is retained throughout the block.

Note:

If ORIPATH is programmed for ORIPATH_MODE = 1 or OSD or OST without the MD ORIPATH_CONFIG = 1, alarm 10980 will be displayed.

28590	MM_ORISON_BLOCKS			C02	-
-	Setting for orientation smoothing			BYTE	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	-	1/1

Description: With this MD the function "Orientation smoothing with ORISON" is activated. If value "Zero" is set for this data, no orientation smoothing will be possible.

The value of this machine data indicates over how many blocks this orientation is smoothed. A maximum of 30 blocks is possible. For most applications, however, 10 blocks should suffice for smoothing.

Value 4 should be entered as a minimum.

Orientation smoothing over 4 blocks is possible.

If this MD is smaller than 4 and if G code ORISON is programmed, alarm 10982 will be displayed.

28600	MM_NUM_WORKAREA_CS_GROUPS			C02	-
-	Number of coordinate system-specific operating range limits			DWORD	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	10	7/2

Description: Number of data blocks in the channel that are created for coordinate system-specific operating range limits.

It indicates the maximum value of the 1st index of system variable $P_WORKAREA_CS...[WALimNo, Ax]. It furthermore defines the number of the programmable G functions "WALCS1, WALCS2, ... WALCS10" as well as the maximum value in system variable $AC_WORKAREA_CS_GROUP".

= 0: Function "Monitoring of coordinate system-specific operating range limits" cannot be activated.

28610	MM_PREPDYN_BLOCKS			C02	-
-	Number of blocks for velocity preparation			BYTE	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	30	1/1

Description: This MD is used to define the number of blocks that are considered when defining the path velocity (velocity preparation). If the value of this MD is zero, only the relevant axis motions are considered in this block in order to define the maximum path velocity of a block. If the geometry in adjacent blocks is also considered when defining the path velocity, the path velocity will be more homogenous.

1.4.7 Channel-specific configuration machine data

52000	DISP_COORDINATE_SYSTEM			-	-
-	Coordinate system position			BYTE	Immediately
-					
-	-	0	0	47	7/3

Description: With this MD you adapt the operator panel of the coordinate system to the machine's coordinate system. Depending on the selected position, all help screens, the sequence graphic, the simulation and the input fields with the circular direction specified will change automatically.

Also note MD 52210 $MCS_FUNCTION_MASK_DISP, bit 1.

52005	DISP_PLANE_MILL			-	-
-	Plane selection Milling			BYTE	Immediately
-					
-	-	17	0	19	7/3

Description: Plane selection Milling

0: plane selection on the operator panel

17: always G17

18: always G18

19: always G19

52006	DISP_PLANE_TURN			-	-
-	Plane selection Turning			BYTE	Immediately
-					
-	-	18	0	19	0/0

Description: Plane selection Turning

0: plane selection on the operator panel

17: always G17

18: always G18

19: always G19

52010	DISP_NUM_AXIS_BIG_FONT			-	-
-	Number of actual values with large font			BYTE	PowerOn
-					
-	-	3	0	31	7/3

Description: Number of actual values with large font

52200	TECHNOLOGY			-	-
-	Technology			BYTE	Immediately
-					
-	-	0	0	2	7/3

Description: Technology

0: no specific configuration

1: turning

2: milling

Also note MD 52201 $MCS_TECHNOLOGY_EXTENSION.

52201	TECHNOLOGY_EXTENSION			-	-
-	Extended technology			BYTE	Immediately
-					
-	-	0	0	2	7/3

Description: Extended technology

0: no specific configuration

1: turning

2: milling

Also note MD 52200 $MCS_TECHNOLOGY.

Example:

Turning machine with milling technology

MD 52200 $MCS_TECHNOLOGY = 1

MD 52201 $MCS_TECHNOLOGY_EXTENSION = 2

52206	AXIS_USAGE			-	-
-	Meaning of the axes in the channel			BYTE	PowerOn
-					
-	20	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0	0	7	7/3

Description: Meaning of the axes in the channel

0 = no special meaning

1 = tool spindle (driven tool)

2 = auxiliary spindle (driven tool)

3 = main spindle (turning)

4 = C axis of the main spindle (turning)

5 = counterspindle (turning)

6 = C axis of the counterspindle (turning)

7 = linear axis of the counterspindle (turning)

8 = tailstock (turning)

9 = steady rest (turning)

52207	AXIS_USAGE_ATTRIB			-	-
-	Axis attributes			BYTE	PowerOn
-					
-	20	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0	-	-	7/3

Description: Axis attributes

Bit 0: rotates around the 1st geometry axis (applies to rotary axes)

Bit 1: rotates around the 2nd geometry axis (applies to rotary axes)

Bit 2: rotates around the 3rd geometry axis (applies to rotary axes)

Bit 3: reverse direction of rotation (applies to rotary axes)

52210	FUNCTION_MASK_DISP			-	-
-	Function mask Display			BYTE	Immediately
-					
-	-	3	-	-	7/3

Description: Function mask Display

Bit 0: reserved

Bit 1: use training coordinate system for G17

52212	FUNCTION_MASK_TECH			-	-
-	Function mask Cross-technology			BYTE	Immediately
-					
-	-	0	-	-	7/3

Description: Function mask Cross-technology

Bit 0: enable Swivel

52214	FUNCTION_MASK_MILL			-	-
-	Function mask Milling			DWORD	Immediately
-					
-	-	0	-	-	7/3

Description: Function mask Milling

Bit 0: reserved

Bit 1:high speed settings cycle (CYCLE832) Unhide input field Technology

Bit 2:high speed settings cycle (CYCLE832) Input field Tolerance or Table

[0 = input field Tolerance (values 0 ... 0.999 real value)]

[1 = selection field (toggle) Tolerance table (value 1,2,3 .. 9 or higher)

The tolerance table is available in manufacturer cycle CYC_832T

52216	FUNCTION_MASK_DRILL			-	-
-	Function mask Drilling			DWORD	Immediately
-					
-	-	0	-	-	7/3

Description: Function mask Drilling

Bit 0:CYCLE84 Unhide input fields Technology

Bit 1:CYCLE840 Unhide input fields Technology

52218	FUNCTION_MASK_TURN			-	-
-	Function mask Turning			BYTE	Immediately
-					
-	-	0	-	-	7/3

Description: Function mask Turning

Bit 0: reserved

Bit 1: enable parts gripper for cut-off

52270	TM_FUNCTION_MASK			-	-
-	Function mask Tool management			DWORD	Immediately
-					
-	-	0	-	-	7/3

Description: Function mask Tool management

Bit 0:do not allow "Create tool on magazine location"

Bit 1:load/unload disable, when machine is not in reset

Bit 2:load/unload disable for emergency stop

Bit 3:load/unload tool to/from spindle disabled

Bit 4:load directly in spindle

Bit 5:reserved

Bit 6:reserved

Bit 7:create tool using the tool number

Bit 8:deactivate Relocate tool

Bit 9:deactivate Position magazine

Bit 10:reactivate tool using Position magazine

52271	TM_MAG_PLACE_DISTANCE			-	-
mm	Distance betw. indiv. magazine locations			DOUBLE	Immediately
-					
-	-	70	0	10000	4/3

Description: Distance between individual magazine locations.

Is used for graphical display of magazine and tools in tool management.

52272	TM_TOOL_LOAD_DEFAULT_MAG			-	-
-	Default magazine for tool loading			BYTE	Immediately
-					
-	-	0	0	30	4/3

Description: Default magazine for tool loading

0 = no default magazine

52273	TM_TOOL_MOVE_DEFAULT_MAG			-	-
-	Default magazine for tool relocation			BYTE	Immediately
-					
-	-	0	0	30	4/3

Description: Default magazine for tool relocation

0 = no default magazine

1.4.8 Channel-specific cycle machine data

52600	MEA_INPUT_PIECE_PROBE			-	-
-	Workpiece probe measuring input			BYTE	Immediately
-					
-	2	0,1	0	1	7/3

Description:

```
NC measuring input for workpiece measurement
    $MCS_MEA_INPUT_PIECE_PROBE[0] corresponds to NC measuring
input 1
    $MCS_MEA_INPUT_PIECE_PROBE[1] corresponds to NC measuring
input 2
This parameter must be applied in connection with
$MCS_MEA_INPUT_TOOL_PROBE[n]!
Depending on the NC measuring input, either a workpiece probe or a
tool probe can be connected!
Value:
 =0: no workpiece probe connected/active
 =1: workpiece probe connected/active
```

52601	MEA_INPUT_TOOL_PROBE			-	-
-	Tool probe measuring input			BYTE	Immediately
-					
-	2	1,0	0	1	7/3

Description:

```
NC measuring input for workpiece measurement
    $MCS_MEA_INPUT_TOOL_PROBE[0] corresponds to NC measuring input
1
    $MCS_MEA_INPUT_TOOL_PROBE[1] corresponds to NC measuring input
2
This parameter must be applied in connection with
$MCS_MEA_INPUT_PIECE_PROBE[n]!
Depending on the NC measuring input, either a workpiece probe or a
tool probe can be connected!
Value:
 =0: no workpiece probe connected/active
 =1: workpiece probe connected/active
```

52605	MEA_TURN_CYC_SPECIAL_MODE			-	-
-	Functional behavior of third geometry axis (Y), turning technology			BYTE	Immediately
-					
-	-	0	0	1	7/3

Description:

```
Functional behavior of a third geometry axis (Y axis) in the turn-
ing technology based on the G18 working plane!
=0: an existing third geometry axis (Y axis; applicate); is not
supported by the measuring cycles!
=1: specified setpoint and parameterization (SETVAL, _TUL, _TLL,
SZO) refer to the third geometry axis (Y axis).
      However, tool length offset or work offset are performed in
the components active in the second geometry axis (X axis, ordi-
nate)
      (i.e. measurement in Y and offset in X). The offset target
can be influenced using the _KNUM parameter!
```

52800	ISO_M_ENABLE_POLAR_COORD			-	-
-	Polar coordinates			BYTE	Immediately
-					
-	-	0	0	1	7/3

Description: Polar coordinates
0: OFF
1: ON

52802	ISO_ENABLE_INTERRUPTS			-	-
-	Interrupt process			BYTE	Immediately
-					
-	-	0	0	1	7/3

Description: Interrupt process
0: OFF
1: ON

52804	ISO_ENABLE_DRYRUN			-	-
-	Machining skipped at DRYRUN			BYTE	Immediately
-					
-	-	0	0	1	7/3

Description: Maching skipped during tapping G74/G84 at DRYRUN
0: OFF
1: ON

52806	ISO_SCALING_SYSTEM			-	-
-	Basic system			BYTE	Immediately
-					
-	-	0	0	2	7/3

Description: Basic system:
0: not defined
1: METRIC
2: INCH

52808	ISO_SIMULTAN_AXES_START			-	-
-	Simultaneous approach to the boring position on all programmed axes			BYTE	Immediately
-					
-	-	0	0	1	7/3

Description: Simultaneous approach to the boring position on all programmed axes
0: OFF
1: ON

52810	ISO_T_DEEPHOLE_DRILL_MODE			-	-
-	Deep hole drilling with chipbreaking/stock removal			BYTE	Immediately
-					
-	-	0	0	1	7/3

Description: Select the type of deep hole drilling
0: deep hole drilling with chipbreaking
1: deep hole drilling with stock removal

1.5 Axis-specific machine data

Number	Identifier			Display filters	Reference
Unit	Name			Data type	Active
Attributes					
System	Dimension	Default value	Minimum value	Maximum value	Protection

Description: Description

1.5.1 Configuration

30100	CTRLOUT_SEGMENT_NR			EXP, A01	G2
-	Setpoint assignment: bus segment number			BYTE	PowerOn
-					
-	1	1	1	5	7/2
710-6a2c	-	5	5	5	-1/-
710-31a10c	-	5	5	5	-1/-
720-6a2c	-	5	5	5	-1/-
720-31a10c	-	5	5	5	-1/-
730-6a2c	-	5	5	5	-1/-
730-31a10c	-	5	5	5	-1/-
840disl-6a	-	5	5	5	-1/-
840disl-20a	-	5	5	5	-1/-

Description: In this MD enter the number of the bus segment through which the output is addressed.

0: Local bus (for 802D MCPA)

1: SIMODRIVE611D drive bus for SINUMERIK 840D/810D (1st DCM)

2: reserved (previously local P bus)

3: reserved (previously 611D bus, 2nd DCM)

4: reserved (virtual buses)

5: PROFIBUS/PROFINET (e.g. SINUMERIK 840Di)

6: reserved (same effect as 5)

30110	CTRLOUT_MODULE_NR			A01, A11, -	G2
-	Setpoint assignment: module number			BYTE	PowerOn
-					
-	1	1,2,3,4,5,6,7,8,9,10,11, 12,13,14,15,16,17,18...	1	31	7/2

Description: In this MD enter the number of the module within a bus segment through which the output is addressed.

For axes with SIMODRIVE611D the logical drive number (see MD 13010: DRIVE_LOGIC_NR[n]) must be entered here.

For axes on the PROFIBUS/PROFINET the number of the drive assigned with MD DRIVE_LOGIC_ADDRESS must be entered here (CTRLOUT_MODULE_NR=n consequently points to DRIVE_LOGIC_ADDRESS[n])

30120	CTRLOUT_NR			EXP, A01, -	G2
-	Setpoint assignment: Setpoint output on drive submodule/ module			BYTE	PowerOn
-					
-	1	1	1	3	2/2

Description: Number of the output on a module, through which the setpoint output is addressed.

In SIMODRIVE611D or PROFIdrive the value is always 1.

30130	CTRLOUT_TYPE			A01, A11	G2,S6
-	Output type of setpoint			BYTE	PowerOn
-					
-	1	0	0	3	7/2

Description: The type of setpoint output is entered into the MD:

0: Simulation (no hardware required)

1: Standard (distinguished via hardware configuration)

2: reserved (previously stepper motor)

3: reserved (previously stepper motor)

4: reserved (previously virtual axis (up to SW 3), simulation, no hardware available

For SW 4 and higher, MD 30132 IS_VIRTUAL_AX must now be used instead of value 4.

30132	IS_VIRTUAL_AX			A01	M3
-	Axis is a virtual axis			BOOLEAN	PowerOn
CTEQ					
-	1	FALSE	-	-	7/2

Description: Virtual axis. An axis that is also interpolated in the follow-up mode. (electronic transfer technology; virtual and real master value)

This MD is the successor of MD 30130: CTRLOUT_TYPE=4. Instead of MD 30130: CTRLOUT_TYPE=4, MD 30130: CTRLOUT_TYPE=0 and IS_VIRTUAL_AX=1 are to be used.

Related to:

MD 30130: CTRLOUT_TYPE

30134	IS_UNIPOLAR_OUTPUT			A01	G2
-	Setpoint output is unipolar			BYTE	PowerOn
-					
-	1	0	0	2	7/2

Description: Only for PROFIdrive, special application of analog additional drives:

Unipolar output driver (for unipolar analog drive actuator):

Only positive set speeds are supplied to the drive, the sign of the set speed is separately output in its own digital control signal.

Input value "0":

Bipolar output with pos./neg. set speed (this is the normal case)

Input value "1":

0. Digital bit = servo enable

1. Digital bit = neg. direction of travel

Input value "2": (linking of enable and direction of travel signals):

0. Digital bit = servo enable pos. direction of travel

1. Digital bit = servo enable neg. direction of travel

30200	NUM_ENCS			A01, A02, -	G2
-	Number of encoders			BYTE	PowerOn
-					
-	-	1	0	2	7/2

Description: The number of encoders of the axis or spindle is to be entered in the MD for actual position value sensing (the differentiation of direct/indirect measuring system, i.e. the installation location of these encoders, is then specified, for example, via MD 31040: ENC_IS_DIRECT)

For simulation axes/spindles, NUM_ENCS > 0 must be specified for referencing.

30210	ENC_SEGMENT_NR			EXP, A01, A02	G2
-	Actual value assignment: bus segment number.			BYTE	PowerOn
-					
-	2	1, 1	1	5	7/2
710-6a2c	-	5, 5	5	5	-1/-
710-31a10c	-	5, 5	5	5	-1/-
720-6a2c	-	5, 5	5	5	-1/-
720-31a10c	-	5, 5	5	5	-1/-
730-6a2c	-	5, 5	5	5	-1/-
730-31a10c	-	5, 5	5	5	-1/-
840disl-6a	-	5, 5	5	5	-1/-
840disl-20a	-	5, 5	5	5	-1/-

Description: Number of the bus segment, through which the encoder is addressed.

The bus segments must be firmly assigned to the control systems.

0: reserved (previously local bus)

1: SIMODRIVE611D drive bus for SINUMERIK 840D/810D (1st DCM)

2: reserved (previously local P bus)

3: reserved (previously 611D bus, 2nd DCM)

4: reserved (virtual buses)

5: PROFIBUS/PROFINET (e.g. SINUMERIK 840Di)

6: reserved (same effect as 5)

Index [n] has the following coding [Encodernr.]: 0 or 1

30220	ENC_MODULE_NR			A01, A02, A11	G2
-	Actual value assignment: Drive number/measuring circuit number			BYTE	PowerOn
-					
-	2	1, 1,2, 2,3, 3,4, 4,5, 5,6, 6,7, 7...	1	31	7/2

Description: In the MD the number of the module within a bus segment (MD: ENC_SEGMENT_NR[n]) must be entered, through which the encoder is addressed.

- For axes with SIMODRIVE611D, the logical drive number (see MD: DRIVE_LOGIC_NR[n]) must be entered here.

For axes on PROFIBUS/PROFINET the number of the drive assigned via MD: DRIVE_LOGIC_ADDRESS must be entered here (ENC_MODULE_NR=n consequently points to DRIVE_LOGIC_ADDRESS[n])

Index[n] of the machine data has the following coding:

[Encodernr.]: 0 or 1

Related to:

MD: CTRLOUT_MODULE_NR[n]

(setpoint assignment: drive number/module number)

30230	ENC_INPUT_NR			A01, A02, A11, -	G2
-	Actual value assignm.: Input on drive module/meas. circuit board			BYTE	PowerOn
-					
-	2	1, 2	1	2	7/2

Description: For SIMODRIVE611D:

Number of the input on a module through which the encoder is addressed.

This determines through which input the actual position value is sensed:

for example with SIMODRIVE611D: 1 (upper measuring cycle plug or 2 (lower measuring cycle plug).

For PROFIdrive:

Number of the encoder within the PROFIdrive message frame through which the encoder is addressed.

For example telegram 103: 1 (=G1_ZSW etc.) or 2 (=G2_ZSW etc.).

The index[n] of the machine data has the following coding:

[Encodernr.]: 0 or 1

If an input is selected, to which no encoder is connected, alarm 300008 "Measuring circuit not available on drive" is output.

30240	ENC_TYPE			A01, A02, A11, -	G2,R1
-	Encoder type of actual value sensing (actual position value).			BYTE	PowerOn
-					
-	2	0, 0	0	5	7/2

Description:

```
Encoder type:
0:   simulation
1:   raw signal generator (high resolution)
2:   rectangular signal encoder (quadruplication of the pulse num-
ber per revolution) - for SIMODRIVE611D only
3:   reserved (previously encoder for stepper motor)
4:   general absolute encoder (e.g. with EnDat interface)
5:   special absolute encoder with SSI interface - for
SIMODRIVE611D only
Related to:
   SIMODRIVE-611D drive MD:
     1011ACTUAL_VALUE_CONFIG, bit 3
     1030 ACTUAL_VALUE_CONFIG_DIRECT, bit 3
   PROFIdrive parameter p979 (compare there)
```

30242	ENC_IS_INDEPENDENT			A02, A11, -	G2
-	Encoder is independent			BYTE	NEW CONF
-					
-	2	0, 0	0	3	7/2

Description: If actual value corrections performed by the NC on the encoder selected for position control are not to influence the actual value of any other encoder defined in the same axis, then the position control encoder must be declared to be "independent".

Actual value corrections include the following:

- Modulo treatment,
- Reference point approach,
- Measuring system calibration,
- PRESET

Example:

$MA_NUM_ENCS[AX1] = 2

$MA_ENC_IS_INDEPENDENT[0, AX1] = 0

$MA_ENC_IS_INDEPENDENT[1, AX1] = 1

When the VDI interface has selected the first encoder for position control, the above mentioned actual value corrections will be executed on this encoder only.

When the VDI interface has selected the second encoder for position control, the above mentioned actual value corrections will be executed on both encoders.

The machine data is therefore only valid for encoders that have not been selected by the VDI interface for positon control (passive encoders)!

For SW5 and higher, the scope of functions has been extended:

ENC_IS_INDEPENDENT = 2

The passive encoder is dependent. The active encoder changes the actual encoder value. In combination with MD35102 REFP_SYNC_ENCS = 1, the passive encoder is adjusted to the active encoder during reference point approach, but is NOT referenced.

In reference mode MD34200 ENC_REFP_MODE = 3 (distance-coded reference marks), the passive encoder is automatically referenced with the next traversing movement after zero mark distance overtravel. This is done independently of the current mode setting.

ENC_IS_INDEPENDENT = 3

In contrast to ENC_IS_INDEPENDENT = 1, modulo actual value corrections are executed in the passive encoder of modulo rotary axes.

30244	ENC_MEAS_TYPE			A01, A02, A11	-
-	Encoder measurement type			BYTE	PowerOn
-					
-	2	1, 1	0	1	7/2

Description: For PROFIdrive only:

In combination with the NCK MD MEAS_TYPE=1 (decentralized measurement) this MD can be used to set the type of the axial measuring function for drives.

Encoder measurement type:

0: encoder measurement type central (global) measurement

1: encoder measurement type decentral (local) measurement

MEAS_TYPE	ENC_MEAS_TYPE	measuring sensor input used
0	0	central
0	1	central
1	0	central
1	1	decentralized

30250	ACT_POS_ABS			EXP, A02, A08	R1
-	Internal encoder position			DOUBLE	PowerOn
ODLD, -, -					
-	2	0.0, 0.0	-	-	7/2

Description: In this MD the actual position (mere hardware counter status without machine reference) is stored (in internal format display).

At power ON (or activated encoder) it functions with:

- Absolute encoders:

  for restoring the current position (in combination with the position (possibly with several meanings) buffered in the encoder).

- Incremental encoders:

  for actual value buffering via power OFF when the functionality is activated MD 34210: ENC_REFP_STATE > 0 (i.e. as reference point replacement).

Note:

This MD is changed control-internal during traversing movements. Loading an MD data block that was saved earlier can therefore destroy the encoder calibration (machine position reference) of absolute encoders.

We recommend for software conversions to remove the MD data block in the old software release prior to conversion and to reload it to the new software release without moving any axis in between. Protection level 1 should be set for SW 3.6; for SW 4 and higher, protection level 2 will suffice. The encoder calibration must be explicitely verified (controlled, calibrated) after software conversion.

30260	ABS_INC_RATIO		EXP, A01, A02	R1
-	Absolute encoder: Ratio of absolute to incremental resolution		DWORD	PowerOn
-				
-	2 4, 4	-	-	7/2

Description: Absolute track resolution in relation to the incremental signal resolution.

This MD only applies for absolute encoders:

- SIMODRIVE611D drives:

  With plausible SIMODRIVE611D parameters (e.g. values unequal 0 of SIMODRIVE611D and ratio of integral multiple of "4"), the value of this MD in combination with SIMODRIVE611D is automatically calculated and updated from 611D parameters (1005/1022 or 1007/1032; if the SIMODRIVE611D values are plausible).

  Unplausible input values in the current MD are reset to default value "4". In addition, alarm 26002 is output in order to inform the user.

- PROFIBUS drives:

  Absolute information XIST2 related to incremental information XIST1.

  With plausible drive parameters (e.g. for SIMODRIVE 611U: P1042/P1043 or P1044/P1045 or the relevant entries in PROFIdrive parameter p979) the value of this MD is automatically calculated and updated from drive parameters (if parameter read-out has not been deactivated by $MN_DRIVE_FUNCTION_MASK, bit2).

With plausible drive parameters (e.g. for SIMODRIVE 611U: P1042/P1043 or P1044/P1045 or the relevant entries in PROFIdrive parameter p979) the value of this MD is calculated and updated automatically from the drive parameters (provided that parameter read-out has not been disabled by $MN_DRIVE_FUNCTION_MASK, bit2).

Unplausible drive parameters (e.g. multiplication of absolute track higher than that of the incremental signal) are rejected and replaced by the value entered in the current MD.

Unplausible input values in the current MD (e.g. value=0) are reset to the default value. In addition, alarm 26025 or 26002 is output in order to inform the user.

30270	ENC_ABS_BUFFERING			EXP, A01, A02	FBA,R1
-	Absolute encoder: Traversing range extension			BYTE	PowerOn
-					
-	2	0, 0	0	1	7/2

Description:

This MD defines in which way the absolute encoder position is buffered, and whether a traversing range extension is active on software side (exceeding the limits of the absolute value encoder area that can be displayed on the hardware).

"0" = standard = traversing range extension (comp. ACT_POS_ABS) is active.

"1" = traversing range extension on software side is inactive.

When using an absolute linear scale, there will not be a traversing range overflow for mechanical reasons. This MD is therefore only valid for rotary absolute value encoders.

For rotary absolute value encoders, the traversing range that can be clearly displayed on encoder side, is stored in ENC_ABS_TURNS_MODULO. You can do without a traversing range extension without any problems (a hardware counter overflow that might be within the traversing range, is concealed in the software via shortest-path decision):

a. in linear axes or limited rotary axes, if the actual traversing range on load side is smaller than the traversing range on load side that corresponds to ENC_ABS_TURNS_MODULO.

b. in endlessly turning rotary axes (ROT_IS_MODULO = TRUE), if the absolute encoder is connected on load side (no gear to be considered) or if "without remainder" can be calculated:

Number of rotations on load side = ENC_ABS_TURNS_MODULO * gear ratio

(Example: ENC_ABS_TURNS_MODULO = 4096 encoder rotations, gear 25:32, i.e. number of rotations on load side = 4096*(25/32)=3200).

Notice:

If you do not meet the conditions under a. or b., you run the risk of getting a wrong absolute encoder position at next Power ON or encoder activation after parking without prewarning, in case the traversing range extension is not working. Therefore, the traversing range extension remains active in the standard version.

Related to:

$MA_ENC_TYPE

$MA_IS_ROT_AX

$MA_ROT_IS_MODULO

$MA_ACT_POS_ABS

$MA_ENC_ABS_TURNS_MODULO

$MA_REFP_MOVE_DIST_CORR

30300	IS_ROT_AX			A01, A06, A11, -	R2
-	Rotary axis / spindle			BOOLEAN	PowerOn
SCAL, CTEQ					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2

Description:

1: Axis: The axis is defined as a "rotary axis".

- The special functions of the rotary axis are active or can be activated by means of additional machine data according to the type of machine required (see below).
- The unit of measurement is degrees.
- The units of the axis-specific machine and setting data are interpreted as follows with the standard control setting:

  - Positions in "degrees"
  - Velocitiesin "rev/minute"
  - Accelerationin "rev/second²"
  - Jerk limitationin "rev/second³"

Spindle:

The machine data should always be set to "1" for a spindle, otherwise alarm 4210 "Rotary axis declaration missing" is output.

0: Axis: The axis is defined as a "linear axis".

Special cases:

For axis: Alarm 4200 if the axis is already defined as a geometry axis.

For spindle: Alarm 4210

Related to:

The following machine data are active only after activation of MD: IS_ROT_AX = "1":

- MD: ROT_IS_MODULO"Modulo conversion for rotary axis"
- MD: DISPLAY_IS_MODULO"Position display is modulo"
- MD: INT_INCR_PER_DEG"Calculation precision for angular positions"

30310	ROT_IS_MODULO			A01, A06, A11, -	R2
-	Modulo conversion for rotary axis / spindle			BOOLEAN	PowerOn
CTEQ					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

Description: 1: A modulo conversion is performed on the setpoints for the rotary axis. The software limit switches and the working area limitations are inactive; the traversing range is therefore unlimited in both directions. MD: IS_ROT_AX must be set to "1"

0: No modulo conversion

MD irrelevant for:

MD: IS_ROT_AX = "0" (linear axes)

Related to:

MD: DISPLAY_IS_MODULO

"Position display is modulo 360°"

MD: IS_ROT_AX = 1

"Rotary axis"

MD: POS_LIMIT_MINUS

"Software limit switch minus"

MD: POS_LIMIT_PLUS

"Software limit switch plus"

SD: WORKAREA_LIMIT_MINUS

"Working area limitation minus"

SD: WORKAREA_LIMIT_PLUS

"Working area limitation plus"

30320	DISPLAY_IS_MODULO			A01, A06, A11	R2
-	Modulo 360 degrees displayed for rotary axis or spindle.			BOOLEAN	PowerOn
CTEQ					
-	-	FALSE	-	-	7/2

Description: 1: "Modulo 360° " position display is active:

The position display of the rotary axis or spindle (for basic or machine coordinate system) is defined as "Modulo 360° ". In the case of a positive direction of rotation, the control resets the position display internally to 0.000° following each cycle of 359.999°. The display range is always positive and always between 0° and 359.999°.

0: Absolute position display is active:

In contrast to the modulo 360° display method, absolute positions are indicated by the absolute position display, e.g. +360° after 1 rotation and +720° after 2 rotations, etc. In this case, the display range is limited by the control in accordance with the linear axes.

MD irrelevant for:

Linear axes MD: IS_ROT_AX = "0"

Related to:

MD: IS_ROT_AX = 1 "Axis is rotary axis"

30330	MODULO_RANGE			EXP, A01, -	R2
degrees	Size of modulo range.			DOUBLE	Reset
CTEQ					
-	-	360.0	1.0	360000000.0	7/2

Description: Defines the size of the modulo range. Default positions are accepted and displayed within this range. Useful modulo ranges are n * 360 degrees with integer n. Other settings are equally possible in principle. Attention should be paid to having a useful relationship between the positions in the NC and the mechanics (ambiguity). Velocity definitions are not affected by settings in this MD.

30340	MODULO_RANGE_START			EXP, A01	R2
degrees	Modulo range start position			DOUBLE	Reset
CTEQ					
-	-	0.0	-	-	7/2

Description: Defines the start position for the modulo range.

Example:

```
Start =    0 degree -> modulo range          0 <->360 degrees
Start =  180 degrees -> modulo range   180 <->540 degrees
Start = -180 degrees -> modulo range  -180 <->180 degrees
```

30350	SIMU_AX_VDI_OUTPUT			A01, A06	G2
-	Axis signals output for simulation axis			BOOLEAN	PowerOn
CTEQ					
-	-	FALSE	-	-	7/2

Description: This machine data defines whether axis-specific interface signals are output to the PLC during simulation of an axis.

1: The axis-specific interface signals of a simulated axis are output to the PLC.

In this way the user PLC program can be tested without the drives.

0: The axis-specific interface signals of a simulated axis are not output to the PLC.

All axis-specific interface signals are set to "0".

MD irrelevant for:

MD 30130: CTRLOUT_TYPE (output type of setpoint value) = 1

30450	IS_CONCURRENT_POS_AX			EXP, A01	P2
-	Default for reset: neutral/channel axis			BOOLEAN	Reset
CTEQ					
-	-	FALSE	-	-	7/2

Description: For SW4.3:

If FALSE: On RESET, a neutral axis is reassigned to the NC program.

If TRUE: On RESET, a neutral axis remains in the neutral axis state and an axis assigned to the NC program becomes a neutral axis

30455	MISC_FUNCTION_MASK			A06, A10	R2
-	Axis functions			DWORD	Reset
CTEQ					
-	-	0x00	0	0x80	7/2

Description: Bit 0 =0:

Modulo rotary axis/spindle: programmed positions must lie within the modulo range. Otherwise, an alarm is output.

Bit 0 =1:

When positions outside the modulo range are programmed, no alarm is output. The position will be modulo-converted internally.

Example: B-5 is equivalent to B355, POS[A]=730 is identical to POS[A]=10 and SPOS=-360 behaves like SPOS=0 (modulo range 360 degrees)

Bit 1 =0:

Determination of reference point position of rotary, distance-coded encoders analog (1:1) to the mechanical absolute position.

Bit 1 =1:

Determination of reference point position of rotary, distance-coded encoders within the configured modulo range.

For rotary axes with $MA_ROT_IS_MODULO=0 using rotary, distance-coded encoders $MA_ENC_REFP_MODE=3 the reference point position is determined depending on $MA_MODULO_RANGE and $MA_MODULO_RANGE_START. It is automatically adapted to the motion limits of the modulo range. This bit is irrelevant to rotary axes with $MA_ROT_IS_MODULO=1, since the reference point position is always determined within the modulo range.

Bit 2 =0:

Modulo rotary axis positioned at G90 with AC by default

Bit 2 =1:

Modulo rotary axis positioned at G90 with DC by default (shortest path)

Bit 3 =0:

With spindle/axis disable, $VA_IM,$VA_IM1,$VA_IM2 supply the setpoint value

Bit 3 =1:

With spindle/axis disable, $VA_IM,$VA_IM1,$VA_IM2 supply the actual value

Bit 4 =0:

Synchronous spindle link, following spindle: cancellation of feedrate enable will decelerate link grouping.

Bit 4 =1:

Following spindle: feedrate enable only refers to the interpolation share of the overlaid motion (SPOS,..) and has no impact on the link.

Bit 5 = 0:

Synchronous spindle link, following spindle: position control, feedforward control and parameter block are set independently of the leading spindle.

Bit 5 =1:

Synchronous spindle link: the parameters of the following spin-

```
   dle are set as in the unlinked case.
Bit 6 =0:
   Programming of FA, OVRA, ACC and VELOLIMA acts separately for
   spindle and axis mode. The assignment is made by the programmed
   axis or spindle identifier.
Bit 6 =1:
   Programming of FA, OVRA, ACC and VELOLIMA acts in concert for
   spindle and axis mode irrespectively of the programmed identi-
   fier.
Bit 7 = 0:
   Synchronous spindle, correct synchronism error: correction
   value $AA_COUP_CORR[Sn] is continuously calculated as long as
   the NC/PLC interface signal is present. (Synchronlauf nach-
   führen) gesetzt ist und sollwertseitiger Synchronlauf vorhanden
   ist.
Bit 7 = 1:
   Synchronous spindle, correct synchronism error: correction
   value $AA_COUP_CORR[Sn] is calculated only at the moment the
   NC/PLC interface signal is set. (Synchronlauf nachführen) von 0
   auf 1 berechnet.
```

30460	BASE_FUNCTION_MASK			A01	-
-	Axis functions			DWORD	PowerOn
CTEQ					
-	-	0x00	0	0x1FF	7/2

Description: Axis-specific functions can be set by means of this MD.

The MD is bit-coded; the following bits are assigned:

Bit 0 = 0:

"Axis control" is not permissible.

Bit 0 = 1:

"Axis control" is permissible (the axis moves in the speed mode, if the NC/PLC interface signal is set). (Achse Steuern) gesetzt ist).

Bit 1:

Reserved for "Axis control".

Bit 2 = 0:

Axis-specific diameter programming not permitted.

Bit 2 = 1:

Axis-specific diameter programming permitted.

Bit 3:

Reserved for "Axis control"

Bit 4 = 0:

For control purposes, the axis can be used by NC and PLC.

Bit 4 = 1:

The axis is exclusively controlled by the PLC.

Bit 5 = 0:

The axis can be used by the NC and PLC.

Bit 5 = 1:

The axis is a permanently assigned PLC axis. However, the axis can be jogged and referenced.

Axis exchange between channels is not possible. The axis cannot be assigned to the NC program.

Bit 6 = 0:

The channel-specific interface signal (Vorschubsperre) wirkt auf die Achse, auch wenn diese eine PLC-kontrollierte Achse ist.

Bit 6 = 1:

The channel-specific interface signal (Vorschubsperre) wirkt nicht auf die Achse, wenn diese eine PLC-kontrollierte Achse ist.

Bit 7 = 0:

The channel-specific interface signal (alle Achsen stehen) wird abhängig von der Achse gesetzt, auch wenn diese PLC-kontrolliert ist.

Bit 7 = 1:

The channel-specific interface signal (alle Achsen stehen) wird unabhängig von der Achse gesetzt, wenn diese PLC-kontrolliert ist.

Bit 8 = 0:

The axis is an 'interpolating (full) axis' (path/GEO/additional path axis/GEOAX()/spindle for thread cutting/tapping)

Bit 8 = 1:

The axis is a positioning axis / auxiliary spindle

30465	AXIS_LANG_SUB_MASK		N01	-
-	Substitution of NC language commands		DWORD	PowerOn
-				
-	- 0x0	0x0	0x3	7/2

Description: $MA_AXIS_LANG_SUB_MASK defines for the leading spindle(s) of a coupling (synchronous spindle coupling, ELG, tangential tracking, coupled motion, master value coupling, master/slave) which language constructs/functions are to be substituted by the user program set by $MN_LANG_SUB_NAME / $MN_LANG_SUB_PATH (default: /_N_CMA_DIR/_N_LANG_SUB_SPF).

The substitution is executed only if a coupling is active for the relevant spindle and in the case of a gear stage change only if a gear stage change is actually pending.

Bit 0 = 1:

Automatic (M40) and direct (M41-M45) gear stage change

Bit 1 = 1:

Spindle positioning with SPOS/SPOSA/M19

30500	INDEX_AX_ASSIGN_POS_TAB		A01, A10	T1
-	Axis is an indexing axis		BYTE	Reset
-				
-	- 0	0	3	7/2

Description:

```
The axis is declared as an indexing axis by assignment of indexing
position table 1 or 2.
 0:  The axis is not declared as an indexing axis
 1:  The axis is an indexing axis. The associated indexing posi-
tions are stored in table 1 (MD: INDEX_AX_POS_TAB_1).
 2:  The axis is an indexing axis. The associated indexing posi-
tions are stored in table 2 (MD: INDEX_AX_POS_TAB_2).
 3:  Equidistant indexing with SW 4.3 and higher (840D) and SW 2.3
and higher (810D)
>3:  Alarm 17090 "Value violates upper limit"
Special cases:
   Several axes can be assigned to an indexing position table on
   the condition that all the axes are of the same type (linear
   axis, rotary axis, modulo 360° function). If they are not, alarm
   4000 is output during power-up.
   Alarm 17500 "Axis is not an indexing axis"
   Alarm 17090 "Value violates upper limit"
Related to:
   MD: INDEX_AX_POS_TAB1 (indexing position table 1)
   MD: INDEX_AX_LENGTH_POS_TAB_1
   (no. of indexing positions used in table 1)
   MD: INDEX_AX_POS_TAB2 (indexing position table 2)
   MD: INDEX_AX_LENGTH_POS_TAB_2
   (no. of indexing positions used in table 2)
   For equidistant indexings with value 3:
   MD: INDEX_AX_NUMERATOR  Numerator
   MD: INDEX_AX_DENOMINATOR Denominator
   MD: INDEX_AX_OFFSET First indexing position
   MD: HIRTH_IS_ACTIVE    Hirth tooth system
```

30501	INDEX_AX_NUMERATOR		A01, A10	T1
mm, degrees	Indexing axis equidistant positions numerator		DOUBLE	Reset
-				
-	- 0.0	-	-	7/2

Description:

```
Defines the value of the numerator for calculating the distances
between two indexing positions when the positions are equidistant.
Modulo axes ignore this value and use $MA_MODULO_RANGE instead.
MD irrelevant for non-equidistant indexes in accordance with
tables.
Related to:
   MD 30502: INDEX_AX_DENOMINATOR,
   MD 30503: INDEX_AX_OFFSET;
   MD 30500: INDEX_AX_ASSIGN_POS_TAB
```

30502	INDEX_AX_DENOMINATOR			A01, A10	T1
-	Indexing axis equidistant positions denominator			DWORD	Reset
-					
-	-	1	1	-	7/2

Description: Defines the value of the denominator for calculating the distances between two indexing positions when the positions are equidistant. For modulo axes it therefore specifies the number of indexing positions.

MD irrelevant for non-equidistant indexes in accordance with tables.

Related to:

MD 30501: INDEX_AX_NUMERATOR

MD 30503: INDEX_AX_OFFSET

MD 30500: INDEX_AX_ASSIGN_POS_TAB

30503	INDEX_AX_OFFSET			A01, A10	T1
mm, degrees	Indexing axis with equidistant positions first index position			DOUBLE	Reset
-					
-	-	0.0	-	-	7/2

Description: Defines the position of the first indexing position from zero for an indexing axis with equidistant positions.

MD irrelevant for non-equidistant indexes in accordance with tables.

Related to:

MD 30501, 30502, 30500

30505	HIRTH_IS_ACTIVE			A01, A10	T1
-	Axis is an indexing axis with Hirth tooth system			BOOLEAN	Reset
CTEQ					
-	-	FALSE	-	-	7/2

Description: Hirth tooth system is active when value 1 is set.

MD irrelevant is axis is not the indexing axis.

Related to:

MD 30500, 30501, 30502, 30503

30550	AXCONF_ASSIGN_MASTER_CHAN			A01, A06, A10	K5
-	Initial setting of channel for change of axis			BYTE	PowerOn
-					
-	-	0	0	10	7/2

Description: Definition of the channel to which the axis is assigned after Power ON.

Related to:

MD: AXCONF_MACHAX_USED

30552	AUTO_GET_TYPE			EXP, A06, A10	S1,K5
-	Automatic GET for get axis			BYTE	PowerOn
-					
-	-	1	0	2	7/2

Description: 0 = No automatically created GET -> Alarm in response to incorrect programming.

1 = GET is output when GET is generated automatically.

2 = GETD is output when GET is generated automatically.

30554	AXCONF_ASSIGN_MASTER_NCU			A01, A06, A10	B3
-	Initial setting which NCU creates setpoints for the axis			BYTE	PowerOn
-					
-	-	0	0	16	7/2

Description: This machine data is evaluated only if the NCU is linked with other NCUs via the NCU link communication.

Assignment of master NCU:

If a machine axis is activated via $MC_AXCONF_LOGIC_MACHAX_TAB in several NCUs in an NCU cluster, then a MASTER NCU must be assigned to it. This NCU takes over the setpoint creation for the axis after the runup. For axes which are only activated in one NCU, the number of this NCU or 0 must be entered. Other entries initiate a runup interrupt.

30560	IS_LOCAL_LINK_AXIS			EXP, A01	B3
-	Axis is a local link axis			BOOLEAN	PowerOn
-					
-	-	FALSE	-	-	7/2

Description: An axis for which this MD is set to 1 is not addressed by the local NCU at runup. The associated drive is put into operation.

The axis is traversed by another NCU. The evaluation is made only if link communication exists.

Not relevant for:

Systems without link modules

Related to:

MM_NCU_LINK_MASK

30600	FIX_POINT_POS			A03, A10	K1
mm, degrees	Fixed-value positions of axis with G75			DOUBLE	PowerOn
-					
-	2	0.0, 0.0, 0.0, 0.0	-	-	7/2

Description: The fixed-point positions (4 max.) for each axis which can be approached when G75 is programmed or via JOG are entered in these machine data.

References:

/PA/, "Programming Guide: Fundamentals"

30610	NUM_FIX_POINT_POS			A03, A10	K1
-	Number of fixed-value positions of an axis			DWORD	PowerOn
-					
-	-	0	0	2	7/2

Description: Number of fixed point positions set, i.e. the number of valid entries in machine data 30600 FIX_POINT_POS.

For G75 two (2) fixed point positions are assumed in $MA_FIX_POINT_POS for reasons of compatibility, even if '0' has been entered in this machine data.

30800	WORKAREA_CHECK_TYPE		-	A2
-	Type of check of working area limitations.		BOOLEAN	NEW CONF
CTEQ				
-	- FALSE	-	-	7/2

Description: With this machine data you can specify whether only the working area limitations of traversing axes are to be checked (0)

or

whether the stationary axes in a traversing block are also to be checked (1).

The value 0 corresponds to the behavior up to SW5.

1.5.2 Encoder matching

31000	ENC_IS_LINEAR		A02, A11, -	G2
-	Linear scale		BOOLEAN	PowerOn
-				
-	2 FALSE, FALSE	-	-	7/2

Description: MD = 1: Encoder for position actual-value acquisition is linear (linear scale).

MD = 0: Encoder for position actual-value acquisition is rotary.

The index [n] of the machine data has the following coding:

[encoder no.]: 0 or 1

31010	ENC_GRID_POINT_DIST		A02, A11, -	G2
mm	Division period for linear scales		DOUBLE	PowerOn
-				
-	2 0.01, 0.01	-	-	7/2

Description: For linear measuring system only:

The distance between the reference marks on the linear scale must be entered in this MD.

Index [n] of the machine data has the following coding:

[encoder no.]: 0 or 1

31020	ENC_RESOL		A02, A11, -	G2
-	Encoder lines per revolution		DWORD	PowerOn
-				
-	2 2048, 2048	-	-	7/2

Description: For rotary measuring system only:

The number of encoder lines per encoder revolution must be entered in this MD.

Index [n] of the machine data has the following coding:

[encoder no.]: 0 or 1

31025	ENC_PULSE_MULT		EXP, A01, A02	K4
-	Encoder multiplication (high-resolution)		DWORD	PowerOn
-				
-	2	2048, 2048	-	-	7/2

Description: For PROFIdrive only:

This MD describes the measuring system multiplication on PROFIBUS/PROFINET.

Default value 2048 means: changing by just one encoder line can be seen in bit11 of the actual PROFIdrive value XIST1, that is, the actual encoder value is multiplied by 2 to the power of 11= 2048.

31030	LEADSCREW_PITCH		A02, A11, -	G2
mm	Pitch of leadscrew		DOUBLE	PowerOn
-				
-	-	10.0	-	-	7/2

Description: The ball screw lead must be entered in the MD (see data sheet: mm/rev or inch/rev).

Special meaning for hydraulic linear drives:

If a hydraulic linear drive (HLA) is configured as rotary axis, it must be specified in this MD, which drive feedrate in mm corresponds to a programmed revolution (360 degrees).

31040	ENC_IS_DIRECT		A02, A11, -	G2
-	Direct measuring system (no compilation to load position)		BOOLEAN	PowerOn
-				
-	2	FALSE, FALSE	-	-	7/2

Description: MD = 1:

Encoder for actual position value sensing is attached directly (without intermediate gear unit) to the machine.

MD = 0:

Encoder for actual position value sensing is attached to the motor (MD: DRIVE_AX_RATIO_NUMERA and DRIVE_AX_RATIO_DENOM are included in encoder valuation).

The index[n] of the machine data has the following coding:

[encoder no.]: 0 or 1

Special cases:

Incorrect entry may cause faulty encoder resolution, as, for example, incorrect gear ratios are then calculated.

31044	ENC_IS_DIRECT2			A02, -	-
-	Encoder mounted on the additional gearbox			BOOLEAN	NEW CONF
-					
-	2	FALSE, FALSE	-	-	7/2

Description: When using a load intermediate gearbox (for example for rotating tools, compare $MA_DRIVE_AX_RATIO2_NUMERA and $MA_DRIVE_AX_RATIO2_DENOM), the encoder installation location can be defined "on the output" of this load intermediate gearbox:

Encoder installation "on the output of the load intermediate gearbox" is configured by $MA_ENC_IS_DIRECT=1 and $MA_ENC_IS_DIRECT2=1 at the same time.

Encoder installation "on the input of the load intermediate gearbox" is configured by $MA_ENC_IS_DIRECT=1 together with $MA_ENC_IS_DIRECT2=0.

A parameterization alarm will be output, if $MA_ENC_IS_DIRECT2=1 is set without $MA_ENC_IS_DIRECT=1 (this combination has not been defined).

31050	DRIVE_AX_RATIO_DENOM			A02, A11, -	G2
-	Denominator load gearbox			DWORD	PowerOn
-					
-	6	1, 1, 1, 1, 1, 1	1	2147000000	7/2

Description: The load gearbox denominator is entered in this MD.

The index [n] of the machine data has the following coding:

[control parameter set no.]: 0-5

31060	DRIVE_AX_RATIO_NUMERA			A02, A11, -	G2
-	Numerator load gearbox			DWORD	PowerOn
-					
-	6	1, 1, 1, 1, 1, 1	-2147000000	2147000000	7/2

Description: The load gearbox numerator is entered in this MD.

The index [n] of the machine data has the following coding:

[control parameter set no.]: 0-5

31064	DRIVE_AX_RATIO2_DENOM			A02, -	-
-	Denominator additional gearbox			DWORD	NEW CONF
-					
-	-	1	1	2147000000	7/2

Description: Intermediate gearbox denominator

The MD together with $MA_DRIVE_AX_RATIO2_NUMERA defines an intermediate gearbox that acts as multiplier to the motor/load gearbox (described by $MA_DRIVE_AX_RATIO_NUMERA and $MA_DRIVE_AX_RATIO_DENOM).

The load intermediate gearbox is inactive with default values 1:1.

Please consider $MA_ENC_IS_DIRECT2 for encoder installation.

When functionality Safety Integrated (see $MA_SAFE_FUNCTION_ENABLE) is active, the intermediate gearbox can be used, if

- the effectively active gear ratio from the motor to the tool is considered in the safety-relevant machine data and if
- the safety-relevant secondary conditions are considered the gear ratios.

For more detailed information see the Safety Integrated Description of Functions.

31066	DRIVE_AX_RATIO2_NUMERA			A02, -	-
-	Numerator additional gearbox			DWORD	NEW CONF
-					
-	-	1	-2147000000	2147000000	7/2

Description: Intermediate gearbox numerator

Related to:

MD 31064

31070	DRIVE_ENC_RATIO_DENOM			A02, A11, -	G2
-	Denominator measuring gearbox			DWORD	PowerOn
-					
-	2	1, 1	1	2147000000	7/2

Description: The measuring gearbox denominator is entered in this MD.

The index [n] of the machine data has the following coding:

[encoder no.]: 0 or 1

31080	DRIVE_ENC_RATIO_NUMERA			A02, A11, -	G2
-	Numerator measuring gearbox			DWORD	PowerOn
-					
-	2	1, 1	1	2147000000	7/2

Description: The measuring gearbox numerator is entered in this MD.

The index [n] of the machine data has the following coding:

[encoder no.]: 0 or 1

31090	JOG_INCR_WEIGHT			A01, A12	H1,G2
mm, degrees	Evaluation of an increment with INC/handwheel			DOUBLE	Reset
CTEQ					
-	2	0.001, 0.00254	-	-	7/2

Description: The path of an increment which applies when an axis is traversed with the JOG keys in incremental mode or with the handwheel is defined in this MD.

The path covered by the axis on each increment each time the traversing key is pressed or for each handwheel position is defined by the following parameters:

- MD: JOG_INCR_WEIGHT
  (weighting of an increment of a machine axis for INC/handwheel)
- Selected increment size (INC1, ..., INCvar)

The possible increment stages are defined globally for all axes in the MD: JOG_INCR_SIZE_TAB [n] and in SD: JOG_VAR_INCR_SIZE.

Entering a negative value reverses the direction of the traverse keys and the handwheel rotation.

Related to:

MD: JOG_INCR_SIZE_TAB
SD: JOG_VAR_INCR_SIZE

31122	BERO_DELAY_TIME_PLUS			A02, A06	S1
s	BERO delay time Plus			DOUBLE	NEW CONF
-					
-	2	0.000110, 0.000110	-	-	7/2

Description: The machine data in combination with the setting in MD 34200: ENC_REFP_MODE (referencing mode) = 7 causes a signal runtime compensation in positive direction of movement at position determination with a BERO (zero mark).

The typical total delay time of the BERO message path for overtravel in positive direction of movement is entered.

The time includes:

- the BERO edge delay time
- the time for signal digitizing
- the time for measured value editing, etc.

The periods of time depend on the hardware used. The default value is typical for SIEMENS products. Adjustment by the customer is only required in exceptional cases.

Input of minimum value "0.0" deactivates the compensation (only active in combination with MD 34200: ENC_REFP_MODE = 7).

The machine data is available for all encoders.

Related to:

MD 34200: ENC_REFP_MODE (referencing mode)
MD 34040: REFP_VELO_SEARCH_MARKER[n]
(reference point creep velocity [Enc. no.])

31123	BERO_DELAY_TIME_MINUS			A02, A06	S1
s	BERO delay time minus			DOUBLE	NEW CONF
-					
-	2	0.000078, 0.000078	-	-	7/2

Description: The machine data in combination with the setting in MD 34200: ENC_REFP_MODE (referencing mode) = 7 causes a signal runtime compensation in negative direction of movement at position determination with a BERO (zero mark).

The typical total delay time of the BERO message path for overtravel in negative direction of movement is entered.

The time includes:

- the BERO edge delay time
- the time for signal digitizing
- the time for measured value editing, etc.

The periods of time depend on the hardware used. The default value is typical for SIEMENS products. Adjustment by the customer is only required in exceptional cases.

Input of minimum value "0.0" deactivates the compensation (only active in combination with MD 34200: ENC_REFP_MODE = 7).

The machine data is available for all encoders.

Related to:

MD 34200: ENC_REFP_MODE (referencing mode)

MD 34040: REFP_VELO_SEARCH_MARKER[n]

(creep velocity [Enc. no.])

31200	SCALING_FACTOR_G70_G71			EXP, A01	G2
-	Factor for converting values while G70/G71 is active			DOUBLE	PowerOn
CTEQ					
-	-	25.4	1.e-9	-	7/2

Description: The conversion factor for inch/metric conversion by which the programmed geometry of an axis (position, polynomial coefficients, radius for circular programming,...) is multiplied when the programmed value for G code group G70/G71 differs from the initial setting value (set in MD: GCODE_RESET_VALUES[n]) is entered in this MD.

The factor can be set for each axis individually so that pure positioning axes are not dependent on G70/G71. The factors within the three geometry axes should not be different.

The data influenced by G70/G71 are described in the Programming Guide.

Related to:

MD: GCODE_RESET_VALUES[n] (G group initial setting).

31600	TRACE_VDI_AX			EXP, N06	-
-	Trace-specification for axial VDI signals			BOOLEAN	PowerOn
NBUP					
-	-	FALSE	-	-	2/2

Description: This machine data determines whether the axial VDI signals for this axis are recorded in the NCSC trace (according to MM_TRACE_VDI_SIGNAL).

1.5.3 Closed-loop control

32000	MAX_AX_VELO			A11, A04	G2
mm/min, rev/min	maximum axis velocity			DOUBLE	NEW CONF
CTEQ					
-	-	10000.	1.e-9	-	7/2

Description: Maximum velocity at which the axis can permanently travel. The value limits both the positive and the negative axis velocity. The axis traverses at this velocity, if rapid traverse has been programmed.

Depending on the machine data $MA_IS_ROT_AX, the maximum rotary or linear axis velocity has to be entered.

In the machine data, the dynamic behavior of the machine and drive and the limit frequency of the actual value acquisition must be taken into account.

32010	JOG_VELO_RAPID			A11, A04, -	H1
mm/min, rev/min	Rapid traverse in jog mode			DOUBLE	Reset
CTEQ					
-	-	10000.	-	-	7/2

Description: The axis velocity entered applies when the rapid traverse override key is operated in JOG mode and when the axial feedrate override is set to 100%.

The value entered must not exceed the maximum permissible axis velocity (machine data MAX_AX_VELO).

This machine data is not used for the programmed rapid traverse G00.

MD irrelevant to:

Operating modes AUTOMATIC and MDI

Related to:

MD: MAX_AX_VELO (maximum axis velocity)

MD: JOG_REV_VELO_RAPID

(revolutional feedrate for JOG with rapid traverse override)

IS (Eilgangüberlagerung)

IS (Vorschubkorrektur A-H)

32020	JOG_VELO		A11, A04, -	H1
mm/min, rev/min	Jog axis velocity		DOUBLE	Reset
CTEQ				
-	- 2000.	-	-	7/2

Description: The velocity entered applies to traversing in JOG mode when the axial feedrate override switch is on position 100%.

This velocity is only used when general setting data JOG_SET_VELO = 0 for linear axes and linear feedrate is selected (MD: JOG_REV_IS_ACTIVE = 0) or SD: JOG_ROT_AX_SET_VELO = 0 for rotary axes.

If this is the case, the axis velocity is active for

- continuous jogging
- incremental jogging (INC1, ... INCvar)
- handwheel jogging

The value entered must not exceed the maximum permissible axis velocity (machine data MAX_AX_VELO).

If DRF is active, the axis velocity for JOG must be reduced with MD: HANDWH_VELO_OVERLAY_FACTOR.

Spindles in JOG mode:

This machine data can also be used to define the JOG mode speed for specific spindles (if SD: JOG_SPIND_SET_VELO = 0). However, the speed can be modified with the spindle override switch.

Related to:

MD : MAX_AX_VELO
(maximum axis velocity)
MD: JOG_REV_VELO
(revolutional feedrate for JOG)
MD: HANDWH_VELO_OVERLAY_FACTOR
(ratio JOG velocity to handwheel velocity (DRF))
SD: JOG_SET_VELO
(JOG velocity for G94)
SD: JOG_ROT_AX_SET_VELO
(JOG velocity for rotary axes)
IS (Vorschubkorrektur A-H)

32040	JOG_REV_VELO_RAPID		A11, A04	H1
mm/rev	Revolutional feedrate in JOG with rapid traverse override		DOUBLE	Reset
CTEQ				
-	- 2.5	-	-	7/2

Description: The value entered defines the revolutional feedrate of the axis in JOG mode with rapid traverse override referred to the revolutions of the master spindle. This feedrate is active when SD: JOG_REV_IS_ACTIVE = 1. (Revolutional feedrate active with JOG)

MD irrelevant for:

SD: JOG_REV_IS_ACTIVE = "0"

Related to:

SD: JOG_REV_IS_ACTIVE (revolutional feedrate for JOG active)
MD: JOG_REV_VELO (revolutional feedrate with JOG)

32050	JOG_REV_VELO			A11, A04	H1
mm/rev	Revolutional feedrate in JOG			DOUBLE	Reset
CTEQ					
-	-	0.5	-	-	7/2

Description: The value entered defines the revolutional feedrate of the axis in JOG mode referred to the revolutions of the master spindle.

This feedrate is active when SD: Revolutional feedrate active with JOG, JOG_REV_IS_ACTIVE = 1.

MD irrelevant for:

Linear feedrate; i.e. SD: JOG_REV_IS_ACTIVE = 0

Related to:

SD: JOG_REV_IS_ACTIVE
(revolutional feedrate for JOG active)

MD: JOG_REV_VELO_RAPID
(JOG revolutional feedrate with rapid traverse override)

32060	POS_AX_VELO			A12, A04	P2
mm/min, rev/min	Initial setting for positioning axis velocity			DOUBLE	Reset
CTEQ					
-	-	10000.	-	-	7/2

Description: Where a positioning axis is programmed in the part program without specifying the axis-specific feedrate, the feedrate entered in MD: POS_AX_VELO is automatically used. The feedrate from MD: POS_AX_VELO applies until an axis-specific feedrate is programmed in the part program for this positioning axis.

MD irrelevant for:

POS_AX_VELO is irrelevant for all axis types other than positioning axis.

Special cases:

If a ZERO velocity setting is entered in POS_AX_VELO, the positioning axis does not traverse if it is programmed without feed. If a velocity setting is entered in POS_AX_VELO that is higher than the maximum velocity of the axis (MD 32000: MAX_AX_VELO ZERO), the velocity is automatically restricted to the maximum rate.

32070	CORR_VELO			A04	H1,K2,W4
%	Axis velocity for override			DOUBLE	Reset
CTEQ					
-	-	50.0	-	-	7/2

Description: Limitation of axis velocity for handwheel override, external zero offset, continuous dressing, distance control $AA_OFF via synchronized actions related to the JOG velocity

MD: JOG_VELO,

MD: JOG_VELO_RAPID,

MD: JOG_REV_VELO,

MD: JOG_REV_VELO_RAPID.

The maximum permissible velocity is the maximum velocity in MD: MAX_AX_VELO. Velocity is limited to this value.

The conversion into linear or rotary axis velocity is made according to MD: IS_ROT_AX.

32074	FRAME_OR_CORRPOS_NOTALLOWED			A01	H1,K2,W4
-	Frame or tool length compensation are not permissible			DWORD	PowerOn
CTEQ					
-	-	0	0	0xFFF	7/2

Description:

```
This machine data is used to define the effectiveness of the
frames and tool length compensations for indexing axes, PLC axes
and command axes started from synchronized actions.
Bit assignment:
Bit 0 = 0:
  Programmable zero offset (TRANS) allowed for indexing axis
Bit 0 = 1:
  Programmable zero offset (TRANS) forbidden for indexing axis
Bit 1 = 0:
  Scale modification (SCALE) allowed for indexing axis
Bit 1 = 1:
  Scale modification (SCALE) forbidden for indexing axis
Bit 2 = 0:
  Direction change (MIRROR) allowed for indexing axis
Bit 2 = 1:
  Direction change (MIRROR) forbidden for indexing axis
Bit 3 = 0:
  DRF offset allowed for axis
Bit 3 = 1:
  DRF offset forbidden for axis
Bit 4 = 0:
  External zero offset allowed for axis
Bit 4 = 1:
  External zero offset forbidden for axis
Bit 5 = 0:
  Online tool compensation allowed for axis
Bit 5 = 1:
  Online tool compensation forbidden for axis
Bit 6 = 0:
  Synchronized action offset allowed for axis
Bit 6 = 1:
  Synchronized action offset forbidden for axis
Bit 7 = 0:
  Compile cycles offset allowed for axis
Bit 7 = 1:
  Compile cycles offset forbidden for axis
Bit 8 = 0:
  Axial frames and tool length compensation are NOT considered
  for PLC axes  (bit evaluation so for compatibility reasons)
Bit 8 = 1:
  Axial frames are considered for PLC axes, and the tool length
  compensation is considered for PLC axes which are geometry
  axes.
Bit 9 = 0:
  Axial frames are considered for command axes, and the tool
  length compensation is considered for  command axes which are
```

geometry axes.

Bit 9 = 1:

Axial frames and tool length compensation are NOT considered for command axes

Bit 10 = 0:

In JOG mode, too, traversing of a geometry axis as a PLC or command axis is NOT allowed with active rotation.

Bit 10 = 1:

In JOG mode, traversing of a geometry axis as a PLC axis or command axis (static synchronized action) is allowed with active rotation (ROT frame). Traversing must be terminated prior to returning to AUTOMATIC mode (neutral axis state), as otherwise alarm16908 would be output when the mode is changed.

Bit 11 = 0:

In the 'Program interrupted' status, repositioning to the interrupt position (AUTO - JOG) takes place when changing from JOG to AUTO.

Bit 11 = 1:

Prerequisite: Bit 10 == 1 (PLC or command axis motion with active rotation in JOG mode).

In the 'Program interrupted' status, the end point of the PLC or command axis motion is taken over when changing from JOG to AUTOMATIC and the geometry axes are positioned according to the rotation

32080	HANDWH_MAX_INCR_SIZE			A05, A10	H1
mm, degrees	Limitation of selected increment			DOUBLE	Reset
CTEQ					
-	-	0.0	-	-	7/2

Description: > 0: Limitation of size of selected increment $MN_JOG_INCR_SIZE <Increment/VDI signal>Ü or $SN_JOG_VAR_INCR_SIZE for the associated machine axis

0: No limitation

32082	HANDWH_MAX_INCR_VELO_SIZE			A05, A10, A04	H1
mm/min, rev/min	Limitation for velocity override			DOUBLE	Reset
CTEQ					
-	-	500.0	-	-	7/2

Description: For the velocity override of positioning axes:

>0: Limitation of size of selected increment $MN_JOG_INCR_SIZEL<Increment/VDI signal> 0 or $SN_JOG_VAR_INCR_SIZE for the associated machine axis

0: No limitation

32084	HANDWH_STOP_COND			EXP, A10	H1
-	Handwheel travel behavior			DWORD	Reset
CTEQ					
-	-	0xFF	0	0x7FF	7/2

Description: Definition of the behavior of the handwheel travel on axis-specific VDI interface signals or context-sensitive interpolator stop:

Bit = 0:

Interruption or collection of the distances preset via the handwheel

Bit = 1:

Cancellation of the traversing motion or no collection

Bit assignment:

Bit 0: feedrate override

Bit 1: spindle speed override

Bit 2: feedrate stop/spindle stop or context-sensitive interpolator stop

Bit 3: clamping procedure running (= 0 no effect)

Bit 4: servo enable

Bit 5: pulse enable

For machine axis:

Bit 6 = 0

For handwheel travel the maximum possible velocity corresponds to the feedrate set in MD 32020: JOG_VELO for the appropriate machine axis.

Bit 6 = 1

For handwheel travel the maximum possible velocity corresponds to the feedrate set in MD 32000: MAX_AX_VELO for the appropriate machine axis.

Bit 7 = 0

The override is active in handwheel travel.

Bit 7 = 1

The override is always assumed to be 100% for handwheel travel regardless of how the override switch is set.

Exception: override 0% is always active.

Bit 8 = 0

The override is active with DRF

Bit 8 = 1

The override is always assumed to be 100% for DRF regardless of how the override switch is set.

Exception: override 0% is always active.

Bit 9 = 0

For handwheel travel the maximum possible velocity with revolutional feedrate is

- with the feedrate in the setting data $SN_JOG_REV_SET_VELO or
- the feedrate in the machine data $MA_JOG_REV_VELO or
- in the case of rapid traverse with $MA_JOG_REV_VELO_RAPID

of the relevant machine axis calculated with the spindle or rotary axis feedrate.

Bit 9 = 1

For handwheel travel, the maximum possible velocity is with the revolutional feedrate in the machine data $MA_MAX_AX_VELO of the relevant machine axis. (see also bit 6)

Bit 10 = 0

For overlaid motions, $AA_OVR is not active.

Bit 10 = 1

For overlaid motions (DRF, $AA_OFF, external work offset, online tool offset) the override $AA_OVR settable via synchronized actions is active.

Bit 11 = 0

With the VDI interface signal "driveReady" (= 0) missing, paths defined by the handwheel are not collected, but a traversing request is displayed. Start of a continuous JOG motion in continuous mode ($SN_JOG_CONT_MODE_LEVELTRIGGRD 41050 = 0) or an incremental JOG motion in continuous mode ($MN_JOG_INC_MODE_LEVELTRIGGRD 11300 = 0) is displayed as a traversing request. With "driveReady" = 1, however, the tool is not traversed, but the procedure is aborted and must be started again.

Bit 11 = 1

With the VDI interface "driveReady" missing, the paths defined by the handwheel are collected. Start of a continuous JOG motion in continuous mode ($SN_JOG_CONT_MODE_LEVELTRIGGRD 41050 = 0) or an incremental JOG motion in continuous mode ($MN_JOG_INC_MODE_LEVELTRIGGRD 11300 = 0) is displayed and saved as traversing request. With "driveReady" = 1 the traversing motion is started.

32090	HANDWH_VELO_OVERLAY_FACTOR			A10, A04	H1
-	Ratio of JOG velocity to handwheel velocity (DRF)			DOUBLE	Reset
CTEQ					
-	-	0.5	-	-	7/2

Description: The velocity active with the handwheel in DRF can be reduced from the JOG velocity with this machine data.

The following applies to linear axes for the velocity active with DRF:

vDRF = SD:JOG_SET_VELO * MD:HANDWH_VELO_OVERLAY_FACTOR

or when SD:JOG_SET_VELO = 0:

vDRF = MD:JOG_VELO * MD:HANDWH_VELO_OVERLAY_FACTOR

The velocity setting in SD: JOG_ROT_AX_SET_VELO applies for DRF on rotary axes instead of the value in SD: JOG_SET_VELO.

MD irrelevant for:

JOG handwheel

Related to:

MD: JOG_VELO (JOG axis velocity)

SD: JOG_SET_VELO (JOG velocity for G94)

SD: JOG_AX_SET_VELO (JOG velocity for rotary axes)

32100	AX_MOTION_DIR			A07, A03, A11, -	G2
-	Traversing direction (not control direction)			DWORD	PowerOn
-					
-	-	1	-1	1	7/2

Description: The direction of movement of the machine can be reversed with this MD.

The control direction is, however, not destroyed, i.e. closed-loop control remains stable.

-1: direction reversed

0, 1: direction not reversed

32110	ENC_FEEDBACK_POL			A07, A02, A11	G2
-	Sign actual value (control direction)			DWORD	PowerOn
-					
-	2	1, 1	-1	1	7/2

Description: The evalution direction of the shaft encoder signals is entered into the MD.

-1: actual value is reversed

0, 1: actual value is not reversed

The index[n] of the machine data has the following coding:

[Encoder no.]: 0 or 1

Special cases:

When an incorrect control direction is entered, the axis can run off.

Depending on the setting of the corresponding limit values, one of the following alarms is displayed:

Alarm 25040 "Standstill monitoring"

Alarm 25050 "Contour monitoring"

Alarm 25060 "Speed setpoint limitation"

If an uncontrolled setpoint leap occurs on connection of a drive, the control direction might be incorrect.

32200	POSCTRL_GAIN			A07, A11	G2
1000/min	Servo gain factor			DOUBLE	NEW CONF
CTEQ					
-	6	16.66666667, 16.66666667, 16.66666667, 16.66666667, 16.66666667...	0	2000.	7/2

Description: Position controller gain, or servo gain factor.

The input/output unit for the user is [(m/min)/mm].

I.e. POSCTRL_GAIN[n] = 1 corresponds to 1 mm following error at V = 1m/min.

The following machine data have default settings for adapting the standard selected input/output unit to the internal unit [rev/s].

- MD 10230: SCALING_FACTORS_USER_DEF[9] = 16.666667S
- MD 10220: SCALING_USER_DEF_MASK = 0x200; (bit no 9 as hex value).

If the value "0" is entered the position controller is opened.

When entering the servo gain factor it is important to check that the gain factor of the whole position control loop is still dependent on other parameters of the controlled system. A distinction should be made between a "desired servo gain factor " (MD: POSCTRL_GAIN) and an "actual servo gain factor" (produced by the machine). Only when all the parameters of the control loop are matched will these servo gain factors be the same.

Other factors are:

- Speed setpoint adjustment (MD 32260: RATED_VELO, MD 32250: RATED_OUTVAL)

or automatic speed setpoint interface adjustment (with MD 32250=0 etc.)

- Correct actual value recording of the position encoder (encoder line, high resolution, encoder mounting location, gear etc.)
- Correct actual speed recording on the drive (standardization, possibly tacho compensation, tacho generator)

Note:

Axes which interpolate together and are to perform a machining, must either have the same gain setting (i.e. have the same identical following error = 45° slope at the same velocity) or they must be matched via MD 32910: DYN_MATCH_TIME.

The actual servo gain factor can be checked by means of the following error (in the service display). However, note that the drift compensation must be checked first.

In the case of analog axes a drift compensation must be performed prior to the control.

The index [n] of the machine data has the following coding:

[control parameter set no.]: 0-5

32210	POSCTRL_INTEGR_TIME			A07	G2
s	Position controller integral time			DOUBLE	NEW CONF
-					
-	-	1.0	0	10000.0	7/2

Description: Position controller integral action time for the integral component in s

The MD is only active if $MA_POSCTRL_INTEGR_ENABLE = TRUE.

A value of the MD less than 0.001 disables the integral component of the PI controller. The controller is then a P controller which works with disabled manipulated variable clamping (s.a. $MA_POSCTRL_CONFIG, bit0 = 1).

32220	POSCTRL_INTEGR_ENABLE			A07	G2
-	Enable integral component position controller			BOOLEAN	PowerOn
-					
-	-	FALSE	-	-	7/2

Description: Enable of the integral component position controller; the position controller is then a PI controller in which the manipulated variable clamping is disabled (s.a. $MA_POSCTRL_CONFIG, bit0 = 1).

Position overshoots may occur if the integral component is used. For this reason, this functionality may only be used in special cases.

32230	POSCTRL_CONFIG			A07	-
-	Configuration of the position controller structure			BYTE	PowerOn
-					
-	-	0	0	17	7/2

Description: Configuration of the position controller structure:

Bit0 = 1: Manipulated variable clamping inactive

Bit4 = 1: Accelerated exact stop signal active

32250	RATED_OUTVAL			A01, A11	G2
%	Rated output voltage			DOUBLE	NEW CONF
CTEQ					
-	1	80.0	-	-	7/2
710-6a2c	-	0.0	-	-	-/-
710-31a10c	-	0.0	-	-	-/-
720-6a2c	-	0.0	-	-	-/-
720-31a10c	-	0.0	-	-	-/-
730-6a2c	-	0.0	-	-	-/-
730-31a10c	-	0.0	-	-	-/-
840disl-6a	-	0.0	-	-	-/-
840disl-20a	-	0.0	-	-	-/-

Description: a.)

Scaling of the manipulated variable with analog drives:

The value of the speed setpoint in percent is to be entered into the MD, related to the maximum speed setpoint, at which the motor speed specified in MD: RATED_VELO[n] is reached.

Related to:

MD: RATED_OUTVAL[n] only makes sense in combination with MD: RATED_VELO[n].

Example:

1. At a voltage of 5V, the drive reaches a speed of 1875 rev/min ==> RATED_OUTVAL = 50%, RATED_VELO = 11250 [degrees/s]
2. At a voltage of 8V, the drive reaches a speed of 3000 rev/min ==> RATED_OUTVAL = 80%, RATED_VELO = 18000 [degrees/s]
3. At a voltage of 1.5V, the drive reaches a speed of 562.5 rev/min ==> RATED_OUTVAL = 15%, RATED_VELO = 3375 [degrees/s]

All three examples are possible for one and the same drive/converter. The ratio of both values is decisive; in all three examples it is the same.

MD RATED_OUTVAL and MD RATED_VELO describe physical characteristics of converter and drive; they can therefore only be determined by means of measurement or start-up instructions (converter, drive).

b.)

Scaling of the manipulated variable with digital PROFIdrive drives:

Default value "0" declares RATED_OUTVAL and RATED_VELO as invalid. Scaling of the manipulated variable is automatically determined and adjusted from the drive parameters instead.

Otherwise (RATED_OUTVAL unequal to zero) scaling of the manipulated variable is not determined from the drive (for example non-Siemens PROFIdrive drives), but set via RATED_VELO and RATED_OUTVAL even for these independently of the standardization active on the drive. In this case the following applies:

Scaling of the manipulated variable on the drive = RATED_VELO / RATED_OUTVAL

During simultaneous operation of analog drives and PROFIdrive drives the settings for analog axes must be adjusted according to a.).

32260	RATED_VELO			A01, A11	G2
rev/min	Rated motor speed			DOUBLE	NEW CONF
CTEQ					
-	1	3000.0	-	-	7/2

Description: Only applies when:

MD: RATED_OUTVAL is set higher than 0.

The drive speed (scaled on the drive) must be entered into the MD that is reached with the speed setpoint in percent specified in MD: RATED_OUTVAL[n].

Related to:

MD: RATED_VELO[n] only makes sense in combination with MD: RATED_OUTVAL[n].

32300	MAX_AX_ACCEL			A11, A04, -	B2
m/s², rev/s²	maximum axis acceleration			DOUBLE	NEW CONF
CTEQ					
-	5	1.0, 1.0, 1.0, 1.0, 1.0	1.0e-3	-	7/2

Description: Acceleration, i.e. change in setpoint velocity, which is to act upon the axis as a maximum. The value limits both the positive and negative axis acceleration.

Depending on machine data $MA_IS_ROT_AX, the maximum angular or linear axis acceleration must be entered.

If axes are interpolated linearly in a grouping, the grouping is limited in such a way that no axis is overloaded. With regard to contour accuracy, the control dynamic behavior has to be taken into account.

MD irrelevant for error states that lead to rapid stop.

Related to:

MD 32210: MAX_ACCEL_OVL_FACTOR
MD 32434: G00_ACCEL_FACTOR
MD 32433: SOFT_ACCEL_FACTOR
MD 20610: ADD_MOVE_ACCEL_RESERVE
MD 20602: CURV_EFFECT_ON_PATH_ACCEL

32301	JOG_MAX_ACCEL			A11, A04, -	-
m/s², rev/s²	Maximum axis acceleration in JOG mode			DOUBLE	NEW CONF
CTEQ					
-	-	0.0	-	-	0/0

Description: The MD is effective only in JOG mode and corresponds with MD 32300: $MA_MAX_AX_ACCEL[<axis>].

The value in $MA_JOG_MAX_ACCEL[<axis>] should be smaller than $MA_MAX_AX_ACCEL[<axis>], otherwise the value in $MA_MAX_AX_ACCEL[<axis>] will apply.

$MA_JOG_MAX_ACCEL[<axis>] is thus limited by $MA_MAX_AX_ACCEL[<axis>] as the maximum value!

32310	MAX_ACCEL_OVL_FACTOR			A04	B1
-	Overload factor for axial velocity steps			DOUBLE	NEW CONF
CTEQ					
-	5	1.2, 1.2, 1.2, 1.2, 1.2	-	-	7/7

Description: The overload factor limits the velocity jump of the machine axis on block transition. The value entered refers to the value of MD 32300: MAX_AX_ACCEL (axis acceleration) and states by how much the maximum acceleration for one IPO cycle can be exceeded.

Related to:

MD 32300: MAX_AX_ACCEL (axis acceleration)

MD 10070: IPO_SYSCLOCK_TIME_RATIO (interpolator clock)

There is an entry for each dynamic G code group.

32320	DYN_LIMIT_RESET_MASK			A05, A06, A10, A04	-
-	Reset behavior of dynamic response limitation.			DWORD	Reset
CTEQ					
-	-	0	0	0x01	7/2

Description: With MD $MA_DYN_LIMIT_RESET_MASK, the reset behavior of functions limiting the dynamic response can be set.

The MD is bit-coded; currently only bit 0 (LSB) is assigned.

Bit 0 == 0:

Channel reset/M30 resets the programmed ACC to 100%. (compatibility: same response as before)

Bit 0 == 1:

Programmed ACC is maintained beyond channel reset/M30.

32400	AX_JERK_ENABLE			A07, A04, -	B2
-	Axial jerk limitation			BOOLEAN	NEW CONF
CTEQ					
-	-	FALSE	-	-	7/2

Description: Enables the function of an axial jerk limitation.

The limitation is set via a time constant; it is always active.

The limitation works independently of the limitations "path-related maximum jerk", "knee-shaped acceleration characteristic" and the axial jerk limitation of the axes that are operated in JOG mode or positioning axis mode.

Related to:

MD 32410: AX_JERK_TIME (time constant for axial jerk limitation)

32402	AX_JERK_MODE			A07, A04	B2,G2,B3
-	Filter type for axial jerk limitation			BYTE	PowerOn
CTEQ					
-	-	1	1	3	7/2

Description:

```
Filter type for axial jerk limitation:
1:   2nd order filter (like SW 1 through 4)
2:   Sliding-type averaging (SW 5 and higher)
3:   Bandstop filter (SW 6 and higher)
Type 2 requires more computing time, but causes less contour
errors at the same smoothing effect, or smoother movements at the
same accuracy.
Type 2 is recommended; type 1 is set as default value for reasons
of compatibility.
The maximum jerk is set via time constant MD 32410: AX_JERK_TIME.
Recommended values for type 1:
  min. 0.03 s; max. 0.06s.
Recommended values for type 2:
  min. 1 position control cycle; max. 16 position control cycles
  At a position control cycle of 2ms this corresponds to 0.002 s
  through 0.032 s.
Type 3 requires setting of AX_JERK_TIME, AX_JERK_FREQ and
AX_JERK_DAMP.
For parameterization of a mere bandstop filter we recommend to set
AX_JERK_TIME=0 which automatically sets "denominator frequency =
numerator frequency = blocking frequency = AX_JERK_FREQ".
However, with AX_JERK_TIME>0 a specific denominator frequency is
set, which makes it possible to implement a bandstop filter with
amplitude increase for frequencies beyond the blocking frequency.
MD 32402: AX_JERK_MODE is only active, if MD 32400: AX_JERK_ENABLE
has been set to 1.
Special cases, errors:
  The machine data must be same for all axes of an axis container.
Related to:
  MD 32400: AX_JERK_ENABLE
  MD 32410: AX_JERK_TIME
  as well as for type 3: AX_JERK_FREQ and AX_JERK_DAMP
```

32410	AX_JERK_TIME		A07, A04	B2
s	Time constant for axial jerk filter		DOUBLE	NEW CONF
-				
-	- 0.001	-	-	7/2

Description: Time constant of the axial jerk filter which causes a smoother axis setpoint characteristic. The jerk filter will only be active, if the time constant is higher than a position control cycle.

Not active in case of errors that cause a change in follow-up mode (for example EMERGENCY STOP99:

Special cases:

Machine axes that are supposed to be interpolating with one another, must have the same effective jerk filtering (for example the same time constant for tapping without compensating chuck).

Related to:

MD 32400: AX_JERK_ENABLE (axial jerk limitation)

32412	AX_JERK_FREQ		A07, A04	P6
-	Blocking frequency of axial jerk filter		DOUBLE	NEW CONF
-				
-	- 10.0	-	-	7/2

Description: Blocking frequency of axial jerk filter bandstop MD is only active if $MA_AX_JERK_MODE = 3

32414	AX_JERK_DAMP		A07, A04	P6
-	Damping of axial jerk filter		DOUBLE	NEW CONF
-				
-	- 0.0	-	-	7/2

Description: Damping of axial jerk filter bandstop:

Input value 0 means complete blocking with $MA_AX_JERK_FREQ, input values >0 can attenuate the blocking effect.

MD is only active if $MA_AX_JERK_MODE = 3

32420	JOG_AND_POS_JERK_ENABLE		A04	B2
-	Default setting of axis jerk limitation		BOOLEAN	Reset
CTEQ				
-	- FALSE	-	-	7/2

Description: Enables the function of the axis-specific jerk limitation for the operating modes JOG, REF and positioning axis mode.

1: Axial jerk limitation for JOG mode and positioning axis mode

0: No jerk limitation for JOG mode and positioning axis mode

The maximum jerk occurring is defined in JOG_AND_POS_MAX_JERK.

Related to:

MD 32430: JOG_AND_POS_MAX_JERK (axial jerk)

32430	JOG_AND_POS_MAX_JERK			A04	B2
m/s³, rev/s³	Axial jerk			DOUBLE	NEW CONF
CTEQ					
-	-	1000.0	1.e-9	-	7/2

Description: The jerk limit value limits the rate of change of axis acceleration in the JOG and REF modes and in positioning axis mode. The setting and time calculation are made as for MD 20600: MAX_PATH_JERK (path-related maximum jerk).

MD irrelevant for:

path interpolation and error states that lead to rapid stop.

Related to:

MD 32420: JOG_AND_POS_JERK_ENABLE
(initial setting of axial jerk limitation)

32431	MAX_AX_JERK			A04	B1
m/s³, rev/s³	maximum axial jerk for path movement			DOUBLE	NEW CONF
-					
-	5	1.e6, 1.e6, 1.e6, 1.e6, 1.e6	1.e-9	-	3/3

Description: Maximum axial jerk for path movement

Entry for each dynamic G code group.

32432	PATH_TRANS_JERK_LIM			A04	B1
m/s³, rev/s³	maximum axial jerk at block transition in continuous-path mode			DOUBLE	NEW CONF
CTEQ					
-	5	1.e6, 1.e6, 1.e6, 1.e6, 1.e6	-	-	3/3

Description: The control limits the jerk (acceleration jump) at a block transition between contour sections of different curvature to the value set.

MD irrelevant for:

Exact stop

Related to:

Continuous-path mode, SOFT type of acceleration

32433	SOFT_ACCEL_FACTOR			A04, -	B1
-	Scaling of acceleration limitation with SOFT			DOUBLE	NEW CONF
-					
-	5	1., 1., 1., 1., 1.	1e-9	-	3/3

Description: Scaling acceleration limitation with SOFT.

Relevant axial acceleration limitation for SOFT =:

($MA_SOFT_ACCEL_FACTOR[..] * $MA_MAX_AX_ACCEL[..])

There is an entry for each dynamic G code group.

32434	G00_ACCEL_FACTOR			A04, -	B1
-	Scaling of acceleration limitation with G00.			DOUBLE	NEW CONF
-					
-	-	1.	1e-9	-	3/3

Description: Scaling of acceleration limitation with G00.

Relevant axial acceleration limitation for G00 =:

($MA_G00_ACCEL_FACTOR[..] * $MA_MAX_AX_ACCEL[..])

32435	G00_JERK_FACTOR			A04	B1
-	Scaling of jerk limitation with G00.			DOUBLE	NEW CONF
-					
-	-	1.	1e-9	-	3/3

Description: Scaling of jerk limitation with G00.

Relevant axial jerk limitation for G00 =:

($MA_G00_JERK_FACTOR[..] * $MA_MAX_AX_JERK[..])

32436	JOG_MAX_JERK			A04	-
m/s³, rev/s³	Maximum axial jerk during JOG motion			DOUBLE	NEW CONF
CTEQ					
-	-	0.0	-	-	0/0

Description: The jerk limit value limits the change of axis acceleration in JOG mode only .

The behavior of the MD is analog to:

MD 32430: JOG_AND_POS_MAX_JERK

It therefore also communicates with:

MD 32420: JOG_AND_POS_JERK_ENABLE

(default of the axial jerk limitation)

32440	LOOKAH_FREQUENCY			EXP, A04	B1
-	Smoothing frequency for Look Ahead			DOUBLE	NEW CONF
-					
-	-	10.	-	-	7/2

Description: Acceleration procedures in continuous-path mode with Look Ahead which execute with a higher frequency than that parameterized in this MD are smoothed as a function of the parameterization in MD $MC_LOOKAH_SMOOTH_FACTOR.

It is always the minimum of all the axes participating in the path which is determined.

If vibrations are aroused in the mechanics of this axis and if their frequency is known, then this MD should be set to a lower value than this frequency.

32450	BACKLASH			A09	K3
mm, degrees	Backlash			DOUBLE	NEW CONF
-					
-	2	0.0, 0.0	-	-	7/2

Description: Backlash on reversal between positive and negative travel direction.

Input of the compensation value is

- positive, if the encoder is leading the machine part (normal situation)
- negative, if the encoder is behind the machine part.

Backlash compensation is not active when 0 is entered.

Backlash compensation is always active after reference point approach in all operating modes.

Special cases:

For each measuring system, a specific backlash on reversal must be entered.

Related to:

MD: NUM_ENC (number of measuring systems)

MD: ENC_CHANGE_TOL

(maximum tolerance at actual position value change)

32452	BACKLASH_FACTOR			A09	K3
-	Evaluation factor for backlash			DOUBLE	NEW CONF
-					
-	6	1.0, 1.0, 1.0, 1.0, 1.0, 1.0	0.01	100.0	7/2

Description: Evaluation factor for backlash.

The machine data enables the backlash defined in MD 32450: BACKLASH to be changed as a function of the parameter set, in order to take a gear stage dependent backlash into account, for example.

Related to:

MD 32450: BACKLASH[n]

32460	TORQUE_OFFSET			A09	K3
%	Additional torque for electronic weight compensation			DOUBLE	NEW CONF
-					
-	1	0.0	-100.0	100.0	7/2
710-6a2c	-	-	-	-	0/0
710-31a10c	-	-	-	-	0/0
720-6a2c	-	-	-	-	0/0
720-31a10c	-	-	-	-	0/0
730-6a2c	-	-	-	-	0/0
730-31a10c	-	-	-	-	0/0

Description: For SIMODRIVE611D only: (for PROFIdrive drives a weight compensation should be performed on the drive)

The additional torque for electronic counterweight is switched directly to the current controller and becomes immediately effective when the current controller is activated. This reduces a sag of vertical axes on servo enable setting, especially if the reset time of the speed controller is high.

100% correspond to the nominal torque of the axis drive.

Definition of signs (prior to NCK.P6_48): A positive value would move the drive in positive travel direction when the speed controller is switched off (see also MD 32100: AX_MOTION_DIR).

If, for example, the positive travel direction goes upwards (axis is lifted), a positive value will have to be entered for counterweight.

If the positive travel direction goes downwards, a negative value will be required.

Special cases:

See mutual effect with "Travel to fixed stop"

32490	FRICT_COMP_MODE			A09	K3
-	Type of friction compensation			BYTE	PowerOn
-					
-	1	1	0	2	7/2

Description: 0: No friction compensation

1: Friction compensation with constant injection value or adaptive characteristic

2: Friction compensation with learned characteristic via neural network

32500	FRICT_COMP_ENABLE			A09	K3
-	Friction compensation active			BOOLEAN	NEW CONF
-					
-	-	FALSE	-	-	7/2

Description: 1: Friction compensation is enabled for this axis.

Depending on the setting of MD 32490: FRICT_COMP_MODE, either "friction compensation with constant injected value" or "QEC with neural networks" becomes active.

In the case of neural QEC, the machine data should first be set to "1" when a valid characteristic has been "learnt".

During the learning stage, the compensation values are injected independently of the contents of this machine data.

0: Friction compensation is not enabled for this axis.

Thus, no friction compensation values are injected.

Related to:

MD 32490: FRICT_COMP_MODE
Friction compensation type
MD 32510: FRICT_COMP_ADAPT_ENABLE
Friction compensation adaptation active
MD 32520: FRICT_COMP_CONST_MAX
Maximum friction compensation value
MD 32540: FRICT_COMP_TIME
Friction compensation time constant
MD 38010: MM_QEC_MAX_POINTS
Number of interpolation points for QEC with neural networks

32510	FRICT_COMP_ADAPT_ENABLE			EXP, A09	K3
-	Adaptation friction compensation active			BOOLEAN	NEW CONF
-					
-	1	FALSE	-	-	7/2

Description:

1: Friction compensation with amplitude adaptation is enabled for the axis. With friction compensation, quadrant errors on circular contours can be compensated.

Often, the injection amplitude of the friction compensation value is not constant over the entire acceleration range. In this case, a smaller compensation value must be injected for optimum friction compensation for high accelerations than for small accelerations.

The parameters of the adaptation curve must be determined and entered in the machine data.

0: Friction compensation with amplitude adaptation is not enabled for the axis.

MD irrelevant for:

MD 32500: FRICT_COMP_ENABLE = 0

MD 32490: FRICT_COMP_MODE = 2

Related to:

MD 32500: FRICT_COMP_ENABLE

Friction compensation active

MD 32520: FRICT_COMP_CONST_MAX

Maximum friction compensation value

MD 32530: FRICT_COMP_CONST_MIN

Minimum friction compensation value

MD 32550: FRICT_COMP_ACCEL1

Adaptation acceleration value 1

MD 32560: FRICT_COMP_ACCEL2

Adaptation acceleration value 2

MD 32570: FRICT_COMP_ACCEL3

Adaptation acceleration value 3

MD 32540: FRICT_COMP_TIME

Friction compensation time constant

32520	FRICT_COMP_CONST_MAX			EXP, A09	K3
mm/min, rev/min	Maximum friction compensation value			DOUBLE	NEW CONF
-					
-	1	0.0	-	-	7/2

Description:

With inactive adaption (MD32510=0), the maximum friction compensation is injected all over the acceleration range.

With active adaption (MD32510=1), the maximum friction compensation is injected according to the adaptation curve.

In the 1st acceleration range (a < MD32550), the injection amplitude = MD32520 * (a/MD32550)

In the 2nd acceleration range (MD32550 <= a <= MD32560), the injection amplitude = MD32520

In the 3rd acceleration range (MD32560 < a < MD32570), the injection amplitude = MD32520 * (1-(a-MD32560)/(MD32570-MD32560))

In the 4th acceleration range (MD32570 <= a   ), the injection amplitude = MD32530

MD irrelevant for:

MD 32500: FRICT_COMP_ENABLE = 0
MD 32490: FRICT_COMP_MODE = 2 (neural QEC)

Related to:

MD 32500: FRICT_COMP_ENABLE
Friction compensation active
MD 32510: FRICT_COMP_ADAPT_ENABLE
Friction compensation adaptation active
MD 32530: FRICT_COMP_CONST_MIN
Minimum friction compensation value
MD 32550: FRICT_COMP_ACCEL1
Adaptation acceleration value 1
MD 32560: FRICT_COMP_ACCEL2
Adaptation acceleration value 2
MD 32570: FRICT_COMP_ACCEL3
Adaptation acceleration value 3
MD 32540: FRICT_COMP_TIME
Friction compensation time constant

32530	FRICT_COMP_CONST_MIN			EXP, A09	K3
mm/min, rev/min	Minimum friction compensation value			DOUBLE	NEW CONF
-					
-	1	0.0	-	-	7/2

Description: The minimum friction compensation value is active only if "Friction compensation with adaptation" (MD32510=1) is active.

The amplitude of the friction compensation value is injected in the 4th acceleration range (MD32570 <= a).

MD irrelevant for:

MD 32510: FRICT_COMP_ADAPT_ENABLE = 0

MD 32490: FRICT_COMP_MODE = 2 (neural QEC)

Special cases:

In special cases, the value for FRICT_COMP_CONST_MIN may even be higher than for MD 32520: FRICT_COMP_CONST_MAX.

Related to:

MD 32500: FRICT_COMP_ENABLE

Friction compensation active

MD 32510: FRICT_COMP_ADAPT_ENABLE

Friction compensation adaptation active

MD 32520: FRICT_COMP_CONST_MAX

Maximum friction compensation value

MD 32550: FRICT_COMP_ACCEL1

Adaptation acceleration value 1

MD 32560: FRICT_COMP_ACCEL2

Adaptation acceleration value 2

MD 32570: FRICT_COMP_ACCEL3

Adaptation acceleration value 3

MD 32540: FRICT_COMP_TIME

Friction compensation time constant

32540	FRICT_COMP_TIME			EXP, A09	K3
s	Friction compensation time constant			DOUBLE	NEW CONF
-					
-	1	0.015	-	-	7/2

Description: The friction compensation value is injected via a DT1 filter.

The injection amplitude decays in accordance with the time constant.

MD irrelevant for:

MD 32500: FRICT_COMP_ENABLE = 0

Related to:

MD 32500: FRICT_COMP_ENABLE

Friction compensation active

MD 32520: FRICT_COMP_CONST_MAX

Maximum friction compensation value

32550	FRICT_COMP_ACCEL1			EXP, A09	K3
m/s², rev/s²	Adaptation acceleration value 1			DOUBLE	NEW CONF
-					
-	1	0.0	-	-	7/2

Description: The adaptation acceleration value is only required if "Friction compensation with adaptation" (MD32510=1) is active.

The adaptation acceleration values 1 to 3 are interpolation points for defining the adaptation curve. The adaptation curve is subdivided into 4 sections in which different friction compensation values apply.

For the 1st range (a < MD32550), the injection amplitude = a * MD32520/ MD32550

MD irrelevant for:

MD 32510: FRICT_COMP_ADAPT_ENABLE = 0

MD 32490: FRICT_COMP_MODE = 2

Related to:

MD 32500: FRICT_COMP_ENABLE

Friction compensation active

MD 32510: FRICT_COMP_ADAPT_ENABLE

Friction compensation adaptation active

MD 32520: FRICT_COMP_CONST_MAX

Maximum friction compensation value

MD 32530: FRICT_COMP_CONST_MIN

Minimum friction compensation value

MD 32550: FRICT_COMP_ACCEL2

Adaptation acceleration value 2

MD 32570: FRICT_COMP_ACCEL3

Adaptation acceleration value 3

MD 32540: FRICT_COMP_TIME

Friction compensation time constant

32560	FRICT_COMP_ACCEL2			EXP, A09	K3
m/s^2, rev/s^2	Adaptation acceleration value 2			DOUBLE	NEW CONF
-					
-	1	0.0	-	-	7/2

Description: The adaptation acceleration value is only required if "Friction compensation with adaptation" (MD32510=1) is active.

The adaptation acceleration values 1 to 3 are interpolation points for defining the adaptation curve. The adaptation curve is subdivided into 4 sections in which different friction compensation values apply.

In the 1st acceleration range (a < MD32550), the injection amplitude = MD32520 * (a/MD32550)

In the 2nd acceleration range (MD32550 <= a <= MD32560), the injection amplitude = MD32520

In the 3rd acceleration range (MD32560 < a < MD32570), the injection amplitude = MD32520 * (1-(a-MD32560)/(MD32570-MD32560))

In the 4th acceleration range (MD32570 <= a), the injection amplitude = MD32530

MD irrelevant for:

MD 32510: FRICT_COMP_ADAPT_ENABLE = 0

MD 32490: FRICT_COMP_MODE = 2

Related to:

MD 32500: FRICT_COMP_ENABLE
Friction compensation active

MD 32510: FRICT_COMP_ADAPT_ENABLE
Friction compensation adaptation active

MD 32520: FRICT_COMP_CONST_MAX
Maximum friction compensation value

MD 32530: FRICT_COMP_CONST_MIN
Minimum friction compensation value

MD 32550: FRICT_COMP_ACCEL1
Adaptation acceleration value 1

MD 32570: FRICT_COMP_ACCEL3
Adaptation acceleration value 3

MD 32540: FRICT_COMP_TIME
Friction compensation time constant

32570	FRICT_COMP_ACCEL3			EXP, A09	K3
m/s², rev/s²	Adaptation acceleration value 3			DOUBLE	NEW CONF
-					
-	1	0.0	-	-	7/2

Description: The adaptation acceleration value is only required if "Friction compensation with adaptation" (MD32510=1) is active.

The adaptation acceleration values 1 to 3 are interpolation points for defining the adaptation curve. The adaptation curve is subdivided into 4 sections in which different friction compensation values apply.

In the 1st acceleration range (a < MD32550), the injection amplitude = MD32520 * (a/MD32550)

In the 2nd acceleration range (MD32550 <= a <= MD32560), the injection amplitude = MD32520

In the 3rd acceleration range (MD32560 < a < MD32570), the injection amplitude = MD32520 * (1-(a-MD32560)/(MD32570-MD32560))

In the 4th acceleration range (MD32570 <= a   ), the injection amplitude = MD32530

MD irrelevant for:

MD 32510: FRICT_COMP_ADAPT_ENABLE = 0

MD 32490: FRICT_COMP_MODE = 2

Related to:

MD 32500: FRICT_COMP_ENABLE

Friction compensation active

MD 32510: FRICT_COMP_ADAPT_ENABLE

Friction compensation adaptation active

MD 32520: FRICT_COMP_CONST_MAX

Maximum friction compensation value

MD 32530: FRICT_COMP_CONST_MIN

Minimum friction compensation value

MD 32550: FRICT_COMP_ACCEL1

Adaptation acceleration value 1

MD 32570: FRICT_COMP_ACCEL2

Adaptation acceleration value 2

MD 32540: FRICT_COMP_TIME

Friction compensation time constant

32580	FRICT_COMP_INC_FACTOR			A09	K3
%	Weighting factor of friction comp. value w/ short trav. movem.			DOUBLE	NEW CONF
-					
-	1	0.0	0	100.0	7/2

Description: The optimum friction compensation value determined by the circularity test can cause overcompensation of this axis if compensation is activated and axial positioning movements are short.

In such cases, a better setting can be achieved by reducing the amplitude of the friction compensation value and acts on all positioning blocks that are made within an interpolation cycle of the control.

The factor that has to be entered can be determined empirically and can be different from axis to axis because of the different friction conditions. The input range is between 0 and 100% of the value determined by the circularity test.

The default setting is 0; so that no compensation is performed for short traversing movements.

Related to:

MD 32500: FRICT_COMP_ENABLE Friction compensation active

32610	VELO_FFW_WEIGHT			A07, A09	K3
-	Feedforward control factor f. velocity/speed feedforward control			DOUBLE	NEW CONF
-					
-	6	1.0, 1.0, 1.0, 1.0, 1.0, 1.0	-	-	7/2

Description: Weighting factor for feedforward control. Is normally = 1.0 on digital drives, since these keep the setpoint speed exactly .

On analog drives, this factor can be used to compensate the gain error of the drive actuator, so that the actual speed becomes exactly equal to the setpoint speed (this reduces the following error with feedforward control).

On both drive types, the effect of the feedforward control can be continuously reduced with a factor of < 1.0, if the machine moves too abruptly and other measures (e.g. jerk limitation) are not to be used. This also reduces possibly existing overshoots; however, the error increases on curved contours, e.g. on a circle. With 0.0, you have a pure position controller without feedforward control.

Contour monitoring takes into account factors < 1.0.

In individual cases, it can, however, become necessary to increase MD CONTOUR_TOL.

32620	FFW_MODE			A07, A09	K3
-	Feedforward control mode			BYTE	Reset
-					
-	-	1	0	4	7/2
710-6a2c	-	3	-	-	-/-
710-31a10c	-	3	-	-	-/-
720-6a2c	-	3	-	-	-/-
720-31a10c	-	3	-	-	-/-
730-6a2c	-	3	-	-	-/-
730-31a10c	-	3	-	-	-/-
840disl-6a	-	3	-	-	-/-
840disl-20a	-	3	-	-	-/-

Description: FFW_MODE defines the feedforward control mode to be applied on an axis-specific basis:

0 = No feedforward control

1 = Speed feedforward control with PT1 balancing

2 = Torque feedforward control (only for SIMODRIVE611D) with PT1 balancing

3 = Speed feedforward control with Tt balancing

4 = Torque feedforward control (only for SIMODRIVE611D) with Tt balancing

The high-level language instructions FFWON and FFWOF are used to activate and deactivate the feedforward control for specific channels on all axes.

To prevent the feedforward control from being affected by these instructions on individual axes, you can define that it is always activated or always deactivated in machine data FFW_ACTIVATION_MODE (see also FFW_ACTIVATION_MODE).

The torque feedforward control must be activated via the global option data $ON_FFW_MODE_MASK.

If a feedforward control mode is selected (speed or torque feedforward control), it can be programmed additionally in MD 32630: FFW_ACTIVATION_MODE whether the feedforward control can be activated or deactivated by the part program.

Torque feedforward control is an option that must be enabled.

Related to:

MD 32630: FFW_ACTIVATION_MODE

MD 32610: VELO_FFW_WEIGHT

MD 32650: AX_INERTIA

32630	FFW_ACTIVATION_MODE			A07, A09	K3,PA1
-	Activate feedforward control from program			BYTE	Reset
CTEQ					
-	-	1	0	2	7/2

Description: With FFW_ACTIVATION_MODE you can define whether the feedforward control for this axis/spindle can be switched on and off by the part program.

0 = The feedforward control cannot be switched on or off by the high level elements FFWON or FFWOF.

For the axis/spindle the state specified with MD: FFW_MODE therefore always becomes effective.

1 = The feedforward control can be switched on or off by the part program with FFWON or FFWOF.

The instruction FFWON/FFWOF is active immediately

2 = The feedforward control can be switched on or off by the part program with FFWON or FFWOF.

The instruction FFWON/FFWOF is only active with the next axis standstill

The default setting is specified with channel-specific MD 20150: GCODE_RESET_VALUES. This setting is valid, before the first NC block is executed.

Notes:

The last valid state continues to be active even after Reset (and therefore also with JOG).

As the feedforward control is switched on or off by all axes of the channel with FFWON or FFWOF, MD:FFW_ACTIVATION_MODE should be set identical for interpolating axses.

Feedforward control switch-on/off when the axis/spindle traverses may cause compensation operation in the control loop. Interpolating axes are therefore stopped by the part program in the case of these switching operations (internal stop Stop G09 is triggered).

Related to:

MD 32620: FFW_MODE

MD 20150: GCODE_RESET_VALUES

32640	STIFFNESS_CONTROL_ENABLE			A01, A07	K3,FBA
-	Dynamic stiffness control			BOOLEAN	NEW CONF
CTEQ					
-	1	FALSE	-	-	7/2

Description: Activate dynamic stiffness control, if bit is set.

With active stiffness control, higher servo gain factors are possible (MD 32200: POSCTRL_GAIN).

Precondition: the drive supports function DSC (compare SIMODRIVE611D or PROFIdrive).

Note on SIMODRIVE611D:

Due to the higher computational load in the SIMODRIVE611D, the setting of the sampling cycles (current/drive module sampling time) should possibly be adjusted in the SIMODRIVE611D. For a single-axis drive module, the standard setting (sampling time: 125µs current, 125µs speed controller) is sufficient; for double-axis modules, the speed controller should possibly be increased (to 250µs).

32642	STIFFNESS_CONTROL_CONFIG			A01, A07	K3,FBA
-	Dynamic stiffness control configuration (DSC)			BYTE	NEW CONF
CTEQ					
-	1	0	0	1	7/2

Description: Configuration of dynamic stiffness control (DSC):

0: DSC in drive works with indirect measuring system, i.e. motor measuring system (standard case)

1: DSC in drive works with direct measuring system

Notes:

Availability of this function depends on the drive used (the drive must support function DSC).

With SIMODRIVE611D (without independent parameterization on the drive) or SINAMICS (P1193 unequal to 0) the value of this machine data must be set to 0.

32644	STIFFNESS_DELAY_TIME			A01, A07	K3,FBA
s	dynamic stiffness control: Delay			DOUBLE	PowerOn
CTEQ					
-	1	0.0	-0.02	0.02	7/2

Description: Configuration of compensation dead time of the dynamic stiffness control (DSC) with optimized PROFIBUS/PROFINET cycle, unit: seconds

32650	AX_INERTIA			EXP, A07, A09	K3
kgm²	Inertia for torque feedforward control			DOUBLE	NEW CONF
-					
-	-	0.0	-	-	7/2
710-6a2c	-	-	-	-	0/0
710-31a10c	-	-	-	-	0/0
720-6a2c	-	-	-	-	0/0
720-31a10c	-	-	-	-	0/0
730-6a2c	-	-	-	-	0/0
730-31a10c	-	-	-	-	0/0

Description: Only with SIMODRIVE611D:

Inertia of axis. Used for torque feedforward control.

With torque feedforward control, an additional current setpoint proportional to the torque is directly injected at the input of the current controller. This value is formed using the acceleration and the moment of inertia. The equivalent time constant of the current control loop must be defined for this purpose and entered in MD 32800: EQUIV_CURRCTRL_TIME.

The total moment of inertia of the axis (drive + load) must also be entered in AX_INERTIA (total moment of inertia referred to motor shaft according to data supplied by machine manufacturer).

When AX_INERTIA and MD 32800: EQUIV_CURRCTRL_ TIME are set correctly, the following error is almost zero even during acceleration (check this by looking at the "following error" in the service display).

The torque feedforward control is deactivated if AX_INERTIA is set to 0. However, because the calculations are performed anyway, torque feedforward control must always be deactivated with MD 32620 FFW_MODE = 0 or 1 or 3 (recommended). Because of the direct current setpoint injection, torque feedforward control is only possible on digital drives (SIMODRIVE611D).

MD irrelevant for:

MD 32620: FFW_MODE = 0 or 1 or 3

Related to:

MD 32620: FFW_MODE

MD 32630: FFW_ACTIVATION_MODE

MD 32800: EQUIV_CURRCTRL_TIME

32652	AX_MASS			EXP, A07, A09	K3
kg	Axis mass for torque feedforward control			DOUBLE	NEW CONF
-					
-	-	0.0	-	-	7/2
710-6a2c	-	-	-	-	0/0
710-31a10c	-	-	-	-	0/0
720-6a2c	-	-	-	-	0/0
720-31a10c	-	-	-	-	0/0
730-6a2c	-	-	-	-	0/0
730-31a10c	-	-	-	-	0/0

Description: For SIMODRIVE611D only:

Mass of axis for torque feedforward control.

This MD is used instead of AX_INERTIA on linear drives (DRIVE_TYPE=3).

32700	ENC_COMP_ENABLE		A09	K3
-	Encoder/spindle error compensation.		BOOLEAN	NEW CONF
-				
-	2 FALSE, FALSE	-	-	7/2

Description: 1: LEC (leadscrew error compensation) is activated for the measuring system.

Leadscrew errors and measuring system errors can thus be compensated.

The function is not enabled internally until the relevant measuring system has been referenced (IS: "Referenced/synchronized" = 1).

0: LEC is not active for the axis/measuring system.

Related to:

MD: MM_ENC_COMP_MAX_POINTS number of interpolation points with LEC

IS "Referenced/synchronized 1"

IS "Referenced/synchronized 2"

32710	CEC_ENABLE		A09	K3
-	Enable of sag compensation		BOOLEAN	NEW CONF
-				
-	- FALSE	-	-	7/2

Description: 1: Sag compensation is enabled for this axis.

Inter-axis machine geometry errors (e.g. sag and angularity errors) can be compensated with sag compensation.

The function is not activated in the control until the following conditions have been fulfilled:

- Option "Interpolatory compensation" is set
- Associated compensation tables have been loaded into the NC user memory and have been enabled (SD: CEC_TABLE_ENABLE[t] = 1)
- The position measuring system required is referenced (IS "Referenced/synchronized" = 1). =1(Referiert/Synchronisiert 1 bzw. 2)).

0: Sag compensation is not enabled for the compensation axis.

Related to:

MD: MM_CEC_MAX_POINTS[t]

Number of interpolation points for sag compensation

SD: CEC_TABLE_ENABLE[t]

Enable evaluation of sag compensation table t

IS

(referenced/synchronized 1 or 2)

32711	CEC_SCALING_SYSTEM_METRIC		A09	K3
-	Measuring system of sag compensation		BOOLEAN	NEW CONF
-				
-	- TRUE	-	-	7/2

Description: Compensation data exist in:

0: inch system

1: metric system

32720	CEC_MAX_SUM			A09	K3
mm, degrees	Maximum compensation value for sag compensation			DOUBLE	NEW CONF
-					
-	-	1.0	0	10.0	7/2

Description: In sag compensation, the absolute value of the total compensation value (sum of compensation values of all active compensation relations) is monitored axially with machine data value CEC_MAX_SUM.

If the determined total compensation value is larger than the maximum value, alarm 20124 is triggered. Program processing is not interrupted. The compensation value output as the additional setpoint is limited to the maximum value.

MD irrelevant to:

- MSEC
- Backlash compensation
- Temperature compensation

Related to:

MD: CEC_ENABLE
Enable sag compensation
SD: CEC_TABLE_ENABLE[t]
Enable evaluation of sag compensation table t
IS (referenced/synchronized 1 or 2)
(referenced/synchronized 1 or 2)

32730	CEC_MAX_VELO			EXP, A09, A04	K3
%	Change in velocity at CEC			DOUBLE	NEW CONF
-					
-	-	10.0	0	100.0	7/2

Description: In sag compensation, modification of the total compensation value (sum of the compensation values of all active compensation relations) is limited axially. The maximum change value is defined in this machine data as a percentage of MD 32000: MAX_AX_VELO (maximum axis velocity).

If the change in the total compensation value is greater than the maximum value, alarm 20125 is output. Program processing is however continued. The path not covered because of the limitation is made up as soon as the compensation value is no longer subject to limitation.

MD irrelevant to:

- MSEC
- Backlash compensation
- Temperature compensation

Related to:

MD: CEC_ENABLE
Enable sag compensation
MD: MAX_AX_VELO
Maximum axis velocity
SD: CEC_TABLE_ENABLE[t]
Enable evaluation of sag compensation table t
IS (referenced/synchronized 1 or 2)
(referenced/synchronized 1 or 2)

32750	TEMP_COMP_TYPE		A09	K3,W1
-	Temperature compensation type		BYTE	PowerOn
CTEQ				
-	- 0	0	7	7/2

Description: The type of temperature compensation applicable to the machine axis is activated in MD: TEMP_COMP_TYPE.

A distinction is made between the following types:

0: No temperature compensation active

1: Position-independent temperature compensation active

(compensation value with SD: TEMP_COMP_ABS_VALUE)

2: Position-dependent temperature compensation active

(compensation value with SD: TEMP_COMP_SLOPE and SD: TEMP_COMP_REF_POSITION)

3: Position-dependent and position-independent temperature compensation active

(compensation values with SD acc. to type 1 and 2)

Temperature compensation is an option that must be enabled.

Related to:

SD: TEMP_COMP_ABS_VALUE

Position-dependent temperature compensation value

SD: TEMP_COMP_REF_POSITION

Reference point for position-dependent temperature compensation

SD: TEMP_COMP_SLOPE

Gradient for position-dependent temperature compensation

MD: COMP_ADD_VELO_FACTOR

Excessive velocity due to compensation

32760	COMP_ADD_VELO_FACTOR			EXP, A09, A04	K3
-	Excessive velocity due to compensation			DOUBLE	NEW CONF
CTEQ					
-	-	0.01	0.	0.10	7/2

Description: The maximum distance that can be traversed because of temperature compensation in one IPO cycle can be limited by axial MD: COMP_ADD_VELO_FACTOR.

If the resulting temperature compensation value is above this maximum, it is traversed over several IPO cycles. There is no alarm.

The maximum compensation value per IPO cycle is specified as a factor referring to the maximum axis velocity (MD: MAX_AX_VELO).

The maximum gradient of the temperature compensation tanbmax is also limited with this machine data.

Example of calculation of the maximum gradient tanb(max):

1. Calculation of the interpolator cycle time (see Description of Functions Velocities, Setpoint/Actual-Value Systems, Cycle Times (G2))

```
Interpolator cycle time = Basic system clock rate * factor for interpolation cycle
Interpolator cycle time = MD: SYSCLOCK_CYCLE_TIME * MD: IPO_SYSCLOCK_TIME_RATIO
Example:
MD: SYSCLOCK_CYCLE_TIME = 0.004 [s]
MD: IPO_SYSCLOCK_TIME_RATIO = 3
-> Interpolator cycle time = 0.004 * 3 = 0.012 [s]
```

2. Calculation of the maximum velocity increase resulting from a change made to the temperature compensation parameter DvTmax

```
DvTmax = MD: MAX_AX_VELO * MD: COMP_ADD_VELO_FACTOR
Example:  MD: MAX_AX_VELO = 10 000 [mm/min ]
                  MD: COMP_ADD_VELO_FACTOR = 0.01
     -> DvTmax = 10 000 * 0.01 = 100 [mm/min]
```

3. Calculation of the traverse distances per interpolator cycle

```
                                   0.012
  S1 (at vmax)      = 10 000 x  --------- = 2.0 [mm]
                                    60
                                   0.012
  ST (at DvTmax) =       100 x  --------- = 0.02 [mm]
                                    60
```

4. Calculation of tanbmax

```
                        ST      0.02
            tanbmax  =  ----  = ------  = 0.01 (corresponds to
value for
                        S1        2
COMP_ADD_VELO_FACTOR)
             -> bmax = arc tan 0.01 = 0.57 degrees
```

With larger values of SD: TEMP_COMP_SLOPE, the maximum gradient (here 0.57 degrees) for the position-dependent temperature compensation value is used internally. There is no alarm.

Note:

Any additional excessive velocity resulting from temperature compensation must be taken into account when defining the limit value for velocity monitoring (MD: AX_VELO_LIMIT).

MD irrelevant for:

TEMP_COMP_TYPE = 0, sag compensation, LEC, backlash compensation

Related to:

MD: TEMP_COMP_TYPE
Temperature compensation type
SD: TEMP_COMP_ABS_VALUE
Position-independent temperature compensation value
SD: TEMP_COMP_SLOPE
Gradient for position-dependent temperature compensation
MD: MAX_AX_VELO
Maximum axis velocity
MD: AX_VELO_LIMIT
Threshold value for velocity monitoring
MD: IPO_SYSCLOCK_TIME_RATIO
Ratio basic system clock rate to IPO cycle
MD: SYSCLOCK_CYCLE_TIME
Basic system clock rate

32800	EQUIV_CURRCTRL_TIME			EXP, A07, A09	K3,G2
s	Equiv. time const. current control loop for feedforward control			DOUBLE	NEW CONF
-					
-	6	0.0005, 0.0005, 0.0005, 0.0005, 0.0005, 0.0005	-	-	7/2

Description: For SIMODRIVE611D only:

This time constant must be equal to the equivalent time constant of the closed current control loop.

The time constant is used for parameterizing the torque feedforward control and for calculating the dynamic following error model (contour monitoring).

For a correctly set torque feedforward control, the equivalent time constant of the current control loop must be determined exactly by measuring the step response of the current control loop.

On SIMODRIVE611D, the transient condition can be displayed by means of the startup tool.

With $MA_FFW_MODE=4, closed-loop control free of following errors can be set by means of negative values (overshoots during positioning might then possibly occur).

Delay values taken into account automatically by the software internally are thus compensated again until the actually active minimum symmetrizing time "0" is reached.

Any other negative input values have no further effect.

With $MA_FFW_MODE=2, negative input values are automatically converted to the input value "0" internally, which means that they are not active in this case.

Related to:

MD: FFW_MODE

Type of feedfoward control

MD: AX_INERTIA

Moment of inertia for torque feedforward control

or MD: AX_MASS

Axis mass for torque feedforward control

MD: CONTOUR_TOL

Tolerance band contour monitoring

32810	EQUIV_SPEEDCTRL_TIME			A07, A09	K3,G2
s	Equiv. time constant speed control loop for feedforward control			DOUBLE	NEW CONF
-					
-	6	0.008, 0.008, 0.008, 0.008, 0.008, 0.008	-	-	7/2
710-6a2c	-	0.003, 0.003, 0.003, 0.003, 0.003...	-	-	-/-
710-31a10c	-	0.003, 0.003, 0.003, 0.003, 0.003...	-	-	-/-
720-6a2c	-	0.003, 0.003, 0.003, 0.003, 0.003...	-	-	-/-
720-31a10c	-	0.003, 0.003, 0.003, 0.003, 0.003...	-	-	-/-
730-6a2c	-	0.003, 0.003, 0.003, 0.003, 0.003...	-	-	-/-
730-31a10c	-	0.003, 0.003, 0.003, 0.003, 0.003...	-	-	-/-
840disl-6a	-	0.003, 0.003, 0.003, 0.003, 0.003...	-	-	-/-
840disl-20a	-	0.003, 0.003, 0.003, 0.003, 0.003...	-	-	-/-

Description: This time constant must be equal to the equivalent time constant of the closed current control loop.

It is used for parameterizing the speed feedforward control and for calculating the dynamic following error model (contour monitoring).

In addition, this MD determines for simulated drives (MD: CTRLOUT_TYPE = 0) the time behavior of the closed-loop speed control circuit.

For a correctly set speed feedforward control, the equivalent time constant of the current control loop must be determined exactly by measuring the step response of the current control loop.

On SIMODRIVE611D, the transient condition can be displayed by means of the startup tool.

With $MA_FFW_MODE=3, closed-loop control free of following errors can be set by means of negative values (overshoots during positioning might then possibly occur).

Delay values taken into account automatically by the software internally are thus compensated again until the actually active minimum symmetrizing time "0" is reached.

Any other negative input values have no further effect.

With $MA_FFW_MODE=1, negative input values are automatically converted to the input value "0" internally, which means that they are not active in this case.

Related to:

MD: FFW_MODE

Type of feedfoward control

MD: VELO_FFW_WEIGHT

Feedforward control factor velocity/speed feedforward control

MD: CONTOUR_TOL

Tolerance band contour monitoring

32900	DYN_MATCH_ENABLE			A07	G2
-	Dynamic response adaptation			BOOLEAN	NEW CONF
CTEQ					
-	-	FALSE	-	-	7/2

Description: With dynamic response adaptation, axes with different servo gain factors can be set to the same following error with MD: DYN_MATCH_TIME.

1: Dynamic response adaptation active.

0: Dynamic response adaptation inactive.

Related to:

MD 32900: DYN_MATCH_TIME[n]

(time constant of dyamic response adaptation)

32910	DYN_MATCH_TIME			A07	G2
s	Time constant of dynamic response adaptation			DOUBLE	NEW CONF
-					
-	6	0.0, 0.0, 0.0, 0.0, 0.0, 0.0	-	-	7/2

Description: The time constant of the dynamic response adaptation of an axis has to be entered in this MD.

Axes interpolating with each other but having different dynamic responses can be adapted to the "slowest" control loop by means of this value.

The difference of the equivalent time constant of the "slowest" control loop to the individual axis has to be entered here as the time constant of the dynamic response adaptation.

The MD is only active if MD: DYN_MATCH_ENABLE = 1.

Related to:

MD 32900: DYN_MATCH_ENABLE (dynamic response adaptation)

32920	AC_FILTER_TIME			A10	S5,FBSY
s	Smoothing filter time constant for adaptive control			DOUBLE	PowerOn
-					
-	-	0.0	-	-	7/2

Description: For SIMODRIVE611D (as well as for PROFIdrive drives, provided that they transport the following actual drive values in the PROFIdrive message frame, e.g. MD13060 $MN_DRIVE_TELEGRAM_TYPE = 116):

With the main run variables $AA_LOAD, $AA_POWER, $AA_TORQUE and $AA_CURR, the following drive actual values can be measured:

- Drive utilization
- Drive active power
- Drive torque setpoint value
- Current actual value of the axis or spindle

To compensate any peaks, the measured values can be smoothed with a PT1 filter. The filter time constant is defined via MD: AC_FILTER_TIME (filter smoothing time constant for adaptive control).

When measuring the drive torque setpoint value or the current actual value, the filter is active in addition to the filters available in the drive. The two filters are connected in series, if both strongly and slightly smoothed values are required in the system. The filter is switched off when a smoothing time of 0 seconds is entered.

32930	POSCTRL_OUT_FILTER_ENABLE		A07	G2
-	Activation of low-pass filter at position controller output		BOOLEAN	NEW CONF
CTEQ				
-	- FALSE	-	-	7/2

Description: Activation of low-pass filter at position controller output.

Activation of the low-pass filter is only enabled when the dynamic stiffness control is inactive MD32640=0.

32940	POSCTRL_OUT_FILTER_TIME		A07	G2
s	Time constant of low-pass filter at position controller output		DOUBLE	NEW CONF
-				
-	- 0.0	-	-	7/2

Description: Time constant of low-pass filter at position controller output

Related to:

MD 32640: STIFFNESS_CONTROL_ENABLE (dynamic stiffness control)

32950	POSCTRL_DAMPING		EXP, A07	G2
%	Damping of the speed control circuit.		DOUBLE	NEW CONF
-				
-	- 0.0	-	-	7/2

Description: For SIMODRIVE611D only:

Factor for additional attenuation of the speed control loop

Application:

Attenuation of an oscillating axis through additional activation of a rotational speed difference, which is determined from the difference of the two measuring systems.

Condition: the axis must have two measuring systems, while one encoder must be connected directly, the other indirectly.

Explanation of normalization by means of SIMODRIVE611D:

An input value of "100%" means: An additional torque is activated in accordance with drive MD 1725, if

- a positional deviation of 1mm exists on linear motors
- a load-side positional deviation of 360 degrees exists on rotary axes
- a positional deviation corresponding to $MA_LEADSCREW_PITCH (e.g. 10mm as a standard) exists on linear axes (rot. drive).

32990	POSCTRL_DESVAL_DELAY_INFO		EXP, A01, A07	B3
s	Actual setpoint position delay		DOUBLE	NEW CONF
-				
-	3 0.0, 0.0, 0.0	-	-	7/RO

Description: This MD shows the additional setpoint value delay of the position controller in the current controller structure. It is set automatically for NCU link with different position controller cycles and can be changed via MD $MN_POSCTRL_DESVAL_DELAY for the entire NCU.

In index 0, the value is displayed without feedforward control.

In index 1, the value is displayed with speed feedforward control.

In index 2, the value is displayed with torque feedforward control.

Related to:

$MN_POSCTRL_DESVAL_DELAY

33000	FIPO_TYPE		EXP, A07	G2
-	Fine interpolator type		BYTE	PowerOn
CTEQ				
-	- 2	1	3	7/2

Description: The type of the fine interpolator has to be entered in this MD:

1: differential FIPO

2: cubic FIPO

3: cubic FIPO, optimized for operation with feedforward control

Calculation time required and contour quality increase with increasing type of FIPO.

- The default setting is the cubic FIPO.
- If no feedforward control is used in the position control loop, the use of the differential FIPO reduces the calculation time while slightly increasing the contour error.
- If the position control cycle and the interpolation cycle are identical, fine interpolation does not take place, i.e. the different types of fine interpolator do not have different effects.

33050	LUBRICATION_DIST		A03, A10	A2
mm, degrees	Traversing path for lubrication from PLC		DOUBLE	NEW CONF
-				
-	- 1.0e8	-	-	7/2

Description: After the traversing path defined in the MD has been covered, the state of the axial IS "Lubrication pulse" is inverted with which an automatic lubrication device can be activated.

The traversing path is summated after Power on.

The "Lubrication pulse" can be used with axes and spindles.

Application example(s):

The machine bed lubrication can be carried out as a function of the relevant traversed path.

Note:

When 0 is entered, the NC/PLC interface (Schmierimpuls) bei jedem Zyklus gesetzt.

Related to:

IS (Schmierimpuls)

33060	MAINTENANCE_DATA		A10	-
-	Configuration of maintenance data recording		DWORD	Reset
-				
-	- 1	-	-	7/2

Description: Configuration of axis maintenance data recording:

Bit 0:

Recording the entire traversing path, entire traversing time and number of axis traversing procedures

Bit 1:

Recording the entire traversing path, entire traversing time and number of traversing procedures at high axis speed

Bit 2:

Recording the total sum of axis jerks, the time in which the axis is traversed with jerk, and the number of traversing procedures with jerk.

33100	COMPRESS_POS_TOL		A10	K1,PGA
mm, degrees	Maximum deviation during compression		DOUBLE	NEW CONF
CTEQ				
-	- 0.1	1.e-9	-	7/7

Description: The value specifies the maximum permitted path deviation for each axis with compression.

The larger the value, the more short blocks can be compressed into a long block.

33120	PATH_TRANS_POS_TOL		A10	K1,PGA
mm, degrees	Maximum deviation for smoothing with G645		DOUBLE	NEW CONF
CTEQ				
-	- 0.005	1.e-9	-	7/7

Description: The value specifies the maximum permitted path deviation for smoothing with G645.

This is only relevant to tangential block transitions that are not acceleration-continuous.

For smoothing of corner with G645 tolerance $MA_COMPRESS_POS_TOL becomes active like with G642.

1.5.4 Reference point approach

34000	REFP_CAM_IS_ACTIVE		A03, A11	R1
-	Axis with reference point cam		BOOLEAN	Reset
-				
-	- TRUE	-	-	7/2

Description: 1: There is at least one reference point cam for this axis

0: This axis does not have a reference point cam (e.g. rotary axis)

The referencing cycle starts immediately with phase 2 (see documentation)

Machine axes that have only one zero mark over the whole travel range or rotary axes that have only one zero mark per revolution do not require an additional reference cam that selects the zero mark (select REF_CAM_IS_ACTIVE = 0).

The machine axis marked this way accelerates to the velocity specified in MD 34040: REFP_VELO_SEARCH_MARKER (reference point creep velocity) when the plus/minus traversing key is pressed and synchronizes with the next zero mark.

34010	REFP_CAM_DIR_IS_MINUS			A03, A11	R1
-	Approach reference point in minus direction			BOOLEAN	Reset
-					
-	-	FALSE	-	-	7/2

Description:

0: REF_CAM_DIR_IS_MINUS

Reference point approach in plus direction

1: REF_CAM_DIR_IS_MINUS

Reference point approach in minus direction

For incremental measuring systems:

If the machine axis is positioned in front of the reference cam, it accelerates, depending on the plus/minus traversing key pressed, to the velocity specified in MD 34020: REFP_VELO_SEARCH_CAM (reference point approach velocity) in the direction specified in MD: REFP_CAM_DIR_IS_MINUS. If the wrong traversing key is pressed, reference point approach is not started.

If the machine axis is positioned on the reference cam, it accelerates to the velocity specified in MD 34020: REFP_VELO_SEARCH_CAM and travels in the direction opposite to that specified in MD: REFP_CAM_DIR_IS_MINUS.

For linear measuring systems with distance-coded reference marks:

If the machine axis has a reference cam (linear measuring systems with distance-coded reference marks do not necessarily require a reference cam) and the machine axis is positioned on the reference cam, it accelerates, independent of the plus/minus traversing key pressed, to the velocity specified in MD 34040: REFP_VELO_SEARCH_MARKER (reference point creep speed) in the direction opposite to that specified in MD: REFP_CAM_DIR_IS_MINUS.

34020	REFP_VELO_SEARCH_CAM			A03, A11, A04	R1
mm/min, rev/min	Reference point approach velocity			DOUBLE	Reset
-					
-	-	5000.00	-	-	7/2

Description:

The reference point approach velocity is the velocity at which the machine axis travels in the direction of the reference cam after the traversing key has been pressed (phase 1). This value should be set at a magnitude large enough for the axis to be stopped to 0 before it reaches a hardware limit switch.

MD irrelevant for:

Linear measuring systems with distance-coded reference marks

34030	REFP_MAX_CAM_DIST			A03, A11	R1
mm, degrees	Maximum distance to reference cam			DOUBLE	Reset
-					
-	-	10000.0	-	-	7/2

Description:

If the machine axis travels a maximum distance defined in REFP_MAX_CAM_DIST from the starting position in the direction of the reference cam, without reaching the reference cam (NC/PLC interface signal) (Verzögerung Referenzpunktfahren) ist zurückgesetzt), bleibt die Achse stehen und der Alarm 20000 "Referenznocken nicht erreicht" wird ausgegeben.

Irrelevant to:

Linear measuring systems with distance-coded reference marks

34040	REFP_VELO_SEARCH_MARKER			A03, A11, A04	R1
mm/min, rev/min	Creep velocity			DOUBLE	Reset
-					
-	2	300.00, 300.00	-	-	7/2

Description:

1) For incremental measuring systems:

This is the velocity at which the axis travels in the time between initial detection of the reference cam and synchronization with the first zero mark (phase 2).

Traversing direction: Opposite to the direction specified for the cam search (MD 34010: REFP_CAM_DIR_IS_MINUS)

If MD 34050: REFP_SEARCH_MARKER_REVERSE (direction reversal on reference cam) is enabled, the axis, in the case of synchronization to a rising reference cam signal edge, travels to the cam at the velocity defined in MD 34020: REFP_VELO_SEARCH_CAM.

2) For linear measuring systems with distance-coded reference marks:

The axis crosses the two reference marks at this velocity. The max. velocity must be small enough that the time required to travel the smallest possible reference mark distance [(x(minimum)] on the linear measuring system is larger than one position controller cycle.

The formula

```
                     Basic dist.                  Meas.length
[x(minimum)] [mm] = ----------- * Grad.cycle - --------------
                          2                       Basic dist.
```

```
with    Basic distance [multiple of graduation cycle]
          Graduation cycle [mm]
          Measuring length [mm]     yields:
                              x(minimum) [mm]
    max. velocity [m/s] = ---------------------------------
                              Position controller cycle  [ms]
```

This limiting value consideration also applies to the other measuring systems.

Traversing direction:

- as defined in MD: REFP_CAM_DIR_IS_MINUS;
- if the axis is already positioned on the cam, the axis is traversed in the opposite direction

3) Indirect measuring system with BERO on the load-side (preferred for spindles)

At this velocity, the zero mark associated with the BERO is searched for (zero mark selection per VDI signal). The zero mark is accepted if the actual velocity lies within the tolerance range defined in MD 35150: SPIND_DES_VELO_TOL as deviation from the velocity specified in MD 34040: REFP_VELO_SEARCH_MARKER[n].

34050	REFP_SEARCH_MARKER_REVERSE			A03, A11	R1
-	Direction reversal to reference cam			BOOLEAN	Reset
-					
-	2	FALSE, FALSE	-	-	7/2

Description: This MD can be used to set the direction of search for the zero mark:

REFP_SEARCH_MARKER_REVERSE = 0

Synchronization with falling reference cam signal edge

The machine axis accelerates to the velocity specified in MD 34040: REFP_VELO_SEARCH_MARKER (reference point creep velocity) in the opposite direction to that specified in MD 34010: REFP_CAM_DIR_IS_MINUS (reference point approach in minus direction) .

When the axis leaves the reference cam (NC/PLC interface signal (Verzögerung Referenzpunktfahren) ist zurückgesetzt) synchronisiert sich die Steuerung mit der ersten Nullmarke.

MD: REFP_SEARCH_MARKER_REVERSE = 1

Synchronization with rising reference cam signal edge

The machine axis accelerates to the velocity defined in MD 34020: REFP_VELO_SEARCH_CAM (reference point creep velocity) in the opposite direction to that specified in the MD: REFP_CAM_DIR_IS_MINUS. When the axis leaves the reference cam (IS "Reference point approach delay" is reset), the machine axis decelerates to a halt and accelerates in the opposite direction towards the reference cam at the velocity specified in MD: REFP_VELO_SEARCH_MARKER. When the reference cam is reached (NC/PLC interface signal (Verzögerung Referenzpunktfahren) ist gesetzt) synchronisiert sich die Steuerung mit der ersten Nullmarke.

MD irrelevant to:

Linear measuring systems with distance-coded reference marks

34060	REFP_MAX_MARKER_DIST			A03, A11	R1
mm, degrees	maximum distance to reference mark			DOUBLE	Reset
-					
-	2	20.0, 20.0	-	-	7/2

Description: For incremental measuring systems:

If, after leaving the reference cam (IS "Reference point approach delay" is reset), the machine axis travels a distance defined in MD: REFP_MAX_MARKER_DIST without detecting the zero mark, the axis stops and alarm 20002 "Zero mark missing" is output.

For linear measuring systems with distance-coded reference marks:

If the machine axis travels a distance defined in MD: REFP_MAX_MARKER_DIST from the starting position without crossing two zero marks, the axis stops and alarm 20004 "Reference mark missing" is output.

34070	REFP_VELO_POS			A03, A11, A04	R1
mm/min, rev/min	Reference point positioning velocity			DOUBLE	Reset
-					
-	-	10000.00	-	-	7/2

Description: For incremental measuring systems:

The axis travels at this velocity between the time of synchronization with the first zero mark and arrival at the reference point.

For linear measuring systems with distance-coded reference marks:

The axis travels at this velocity between the time of synchronization (crossing two zero marks) and arrival at the target point.

34080	REFP_MOVE_DIST			A03, A11	R1
mm, degrees	Reference point distance			DOUBLE	NEW CONF
-					
-	2	-2.0, -2.0	-1e15	1e15	7/2

Description: 1. Standard measuring system (incremental with equidistant zero marks)

Reference point positioning movement: 3rd phase of the reference point approach:

The axis traverses from the position at which the zero mark is detected with the velocity REFP_AX_VELO_POS along the path REFP_MOVE_DIST + REFP_MOVE_DIST_CORR (relative to the marker).

REFP_SET_POS is set as the current axis position at the target point.

2. Irrelevant for distance-coded measuring system.

Override switch and selection jog/continuous mode (MD JOG_INC_MODE_IS_CONT) are active.

34090	REFP_MOVE_DIST_CORR			A03, A02, A08, A11	R1
mm, degrees	Reference point offset/absolute offset			DOUBLE	NEW CONF
-, -					
-	2	0.0, 0.0	-1e12	1e12	7/2

Description:

- Incremental encoder with zero mark(s):

  After recognition of the zero mark, the axis is positioned away from the zero mark by the distance specified in MD 34080: REFP_MOVE_DIST + REFP_MOVE_DIST_CORR. After traversing this distance, the axis has reached the reference point. MD 34100: REFP_SET_POS is transferred into the actual value.

  During traversing by REFP_MOVE_DIST+REFP_MOVE_DIST_CORR, the override switch and MD : JOG_INC_MODE_IS_CONT (jog/continuous mode) are active

- Distance-coded measuring system:

  REFP_MOVE_DIST_CORR acts as an absolute offset. It describes the offset between the machine zero and the first reference mark of the measuring system. Messsystems.

- Absolute encoder:

  REFP_MOVE_DIST_CORR acts as an absolute offset.

  It describes the offset between the machine zero and the zero point of the absolute measuring system.

Note:

In conjunction with absolute encoders, this MD is modified by the control during calibration processes and modulo offset!

With rotary absolute encoders (on linear and rotary axes), the modification frequency also depends on the setting of MD34220 ENC_ABS_TURNS_MODULO.

Manual input or modification of this MD via the part program should therefore be followed by a Power ON Reset to activate the new value and to ensure that it will not be lost.

The following applies for NCU-LINK:

If a link axis uses an absolute encoder, every modification of MD34090 on the home NCU (servo physically available) is updated only locally and not beyond the limits of the NCU. The modification is therefore not visible for the link axis. Writing of MD34090 through the link axis is rejected with alarm 17070.

34092	REFP_CAM_SHIFT			A03, A11	R1
mm, degrees	electronic cam offset for incremental measuring systems			DOUBLE	Reset
-					
-	2	0.0, 0.0	-	-	7/2

Description: Electronic cam offset for incremental measuring systems with equidistant zero marks.

When the reference cam signal occurs, the zero mark search does not start immediately but is delayed until after the distance from REFP_CAM_SHIFT.

This ensures the reproducibility of the zero mark search through a defined selection of a zero mark, even with temperature-dependent expansion of the reference cam.

Because the reference cam offset is calculated by the control in the interpolation cycle, the actual cam offset is at least REFP_CAM_SHIFT and at most REFP_CAM_SHIFT+(MD 34040: REFP_VELO_SEARCH_MARKER*interpolation cycle)

The reference cam offset is effective in the search direction of the zero mark.

The reference cam offset is only active if existing cam MD 34000: REFP_CAM_IS_ACTIVE=1.

34093	REFP_CAM_MARKER_DIST			A03, A11	R1
mm, degrees	Reference cam/reference mark distance			DOUBLE	PowerOn
-					
-	2	0.0, 0.0	-	-	7/RO

Description: The value displayed corresponds to the distance between exiting the reference cam and the occurrence of the reference mark. If the values are too small, there is a risk of not being able to determine the reference point due to temperature reasons or varying operating times of the cam signal. The distance travelled may serve as a clue for setting the electronic reference cam offset.

This machine data is a display data and can therefore not be changed.

34100	REFP_SET_POS			A03, A11	R1
mm, degrees	Reference point value/target point for distance-coded system			DOUBLE	Reset
-					
-	4	0., 0., 0., 0.	-45000000	45000000	7/2

Description:

- Incremental encoder with zero mark(s):

  The position value which is set as the current axis position after detection of the zero mark and traversal of the distance REFP_MOVE_DIST + REFP_MOVE_DIST_CORR (relative to zero mark). The REFP_SET_POS for the reference point number, which is set as the instant that the edge of the reference cam signal (NC/PLC interface signal (Referenzpunktwert 1-4)) eingestellt ist.
- Distance-coded measuring system:

  Target position which is approached when REFP_STOP_AT_ABS_MARKER is set to 0 (FALSE) and two zero marks have been crossed.
- Absolute encoder:

  REFP_SET_POS corresponds to the correct actual value at the calibration position.

  The reaction on the machine depends on the status of MD34210: ENC_REFP_STATE: When ENC_REFP_STATE = 1, the value of REFP_SET_POS is transferred as the absolute value.

  When ENC_REFP_STATE = 2 and REFP_STOP_AT_ABS_MARKER = 0 (FALSE), the axis approaches the target position stored in REFP_SET_POS.

  The value of REFP_SET_POS that has been set via (NC/PLC interface signal (Referenzpunktwert 1-4)) eingestellt ist.

Related to:

IS (Referenzpunktwert 1-4)

34102	REFP_SYNC_ENCS			A03, A02	R1
-	Calibration of measuring systems			BYTE	Reset
-					
-	-	0	0	1	7/2

Description:

Calibrating the measuring system to the reference measuring system can be activated for all measuring systems of this axis with this machine data.

The calibration procedure is made during reference point approach or when calibrated absolute encoders selected for the closed-loop control are switched on.

Values:

0: No measuring system calibration, measuring systems must be referenced individually

1: Calibration of all measuring systems of the axis to the position of the reference measuring system

In combination with MD30242 ENC_IS_INDEPENDENT = 2, the passive encoder is calibrated to the active encoder but NOT referenced.

34104	REFP_PERMITTED_IN_FOLLOWUP			A03, A02	-
-	Enable referencing in follow-up mode			BOOLEAN	Reset
-					
-	-	FALSE	-	-	7/2

Description: An axis can also be referenced in the follow-up mode under JOG+REF mode by means of an external motion.

34110	REFP_CYCLE_NR			A03	R1
-	Sequence of axes in channel-specific referencing			DWORD	PowerOn
-					
-	-	1,2,3,4,5,6,7,8,9,10,11, 12,13,14,15,16,17,18...	-1	31	7/2

Description: MD: REFP_CYCLE_NR = 0 -----> axis-specific referencing

Axis-specific referencing is started separately for each machine axis with the NC/PLC interface signal (Verfahrtasten plus/minus) gestartet.

Up to 8 axes (840D) can be referenced simultaneously.

The following alternatives are provided for referencing the machine axes in a specific sequence:

- The operator observes the correct sequence on startup.
- The PLC checks the sequence on startup or defines the sequence itself.
- The channel-specific referencing function is used.

MD: REFP_CYCLE_NR = 1 -----> channel-specific referencing

Channel-specific referencing is started with the NC/PLC interface signal (Referieren aktivieren) gestartet. Die Steuerung quittiert den erfolgreichen Start mit dem NC/PLC-Nahtstellen-signal (Referieren aktiv). Mit dem kanalspezifischen Referieren kann jede Maschinenachse, die dem Kanal zugeordnet ist, referiert werden (steuerungsintern werden dazu die Verfahrtasten plus/minus simuliert). Mit dem achspezifischen MD: REFP_CYCLE_NR kann festgelegt werden, in welcher Reihenfolge die Maschinenachsen referiert werden:

-1 means:

The machine axis is not started by channel-specific referencing and NC start is possible without referencing this axis.

0 means:

The machine axis is not started by channel-specific referencing and NC start is not possible without referencing this axis.

1 means:

The machine axis is started by channel-specific referencing.

2 means:

The machine axis is started by channel-specific referencing if all machine axes identified by a 1 in MD: REFP_CYCLE_NR are referenced.

3 means:

The machine axis is started by channel-specific referencing if all machine axes identified by a 2 in MD: REFP_CYCLE_NR are referenced.

4 to 8 :

As above for further machine axes.

Setting the channel-specific MD 20700: REF_NC_START_LOCK (NC start disable without reference point) to zero has the effect of entering -1 for all the axes of a channel.

MD irrelevant to:

Axis-specific referencing

Related to:

IS (Referieren aktivieren)

IS (Referieren aktiv)

34120	REFP_BERO_LOW_ACTIVE			A02	M5
-	BERO polarity change			BOOLEAN	PowerOn
-					
-	-	FALSE	-	-	7/2
710-6a2c	-	-	-	-	0/0
710-31a10c	-	-	-	-	0/0
720-6a2c	-	-	-	-	0/0
720-31a10c	-	-	-	-	0/0
730-6a2c	-	-	-	-	0/0
730-31a10c	-	-	-	-	0/0

Description: For SIMODRIVE611D only:

With this MD, the electrical "polarity" of a BERO connected to the digital drive is indicated.

REFP_BERO_LOW_ACTIVE = 0 means:

Non-deflected state 0V (low), deflected state 24V (high)

REFP_BERO_LOW_ACTIVE = 1 means:

Non-deflected state 24V (high), deflected state 0V (low)

The polarity is evaluated in the referencing mode ENC_REFP_MODE = 5.

Note:

The use of this MD is allowed only in conjunction with ENC_REFP_MODE = 5 and the following SIMODRIVE 611 closed-loop control modules:

Performance 1 control module (1 axis) 6SN1118R0DG2*-0AA1

Performance 1 control module (2 axes) 6SN1118R0DH2*-0AA1

Performance 2 control module (2 axes) 6SN1118R0DK23-0AA0

Related to:

ENC_REFP_MODE

34200	ENC_REFP_MODE			A03, A02	R1
-	Referencing mode			BYTE	PowerOn
-					
-	2	1, 1	0	8	7/2

Description: For referencing, the position measuring systems mounted can be set as follows via ENC_REFP_MODE:

- ENC_REFP_MODE = 0

  If absolute encoder available: MD 34100: REFP_SET_POS is taken over

  Other encoders: Reference point approach not possible (SW2.2 and higher)
- ENC_REFP_MODE = 1

  Referencing of incremental, rotary or linear measuring systems:

  Zero pulse on the encoder track

  Referencing of absolute, rotary measuring systems:

  Replacement zero pulse based on the absolute information
- ENC_REF_MODE = 2 :

  BERO with 1-edge detection.

  Also possible with absolute encoder. After referencing, the absolute encoder is additionally marked as "calibrated".

  Note: for SIMODRIVE611D only (for PROFIdrive the drive evaluates the BERO)
- ENC_REFP_MODE = 3

  Referencing on linear measuring systems with distance-coded reference marks:

  Linear measuring system with distance-coded reference marks (Heidenhain)
- ENC_REF_MODE = 4 :

  reserved (BERO with 2-edge evaluation)
- ENC_REF_MODE = 5:

  When the BERO is passed, the zero mark search is started with the detection of the negative BERO edge, and referencing to the zero mark detected next takes place.

  Note: for SIMODRIVE611D only (for PROFIdrive the drive evaluates the BERO)
- ENC_REFP_MODE = 6

  Measuring system calibration to an encoder already referenced

  (not NCU 570) (SW3.2 and higher)

For measuring system configurations with incremental encoder this mode can be used as direct measuring system, with absolute encoder as indirect measuring system. At the time of referencing the absolute measuring system is already referenced by the incremental encoder.

The absolute position is accepted by the incremental encoder after travel on distance REFP_MOVE_DIST> of the measured lots. This will be referenced afterwards.

Note: for SIMODRIVE611D only

- ENC_REFP_MODE = 7

  BERO with configured approach velocity for axis and spindle applications (SW3.6 and higher) (MD 34040: REFP_VELO_SEARCH_MARKER[n] (reference point creep velocity [enc. no.].

Note: for SIMODRIVE611D only (for PROFIdrive the drive evaluates the BERO)

- ENC_REFP_MODE = 8

Referencing for linear measuring systems with distance-coded reference marks:

Linear measuring system with distance-coded reference marks over 4 zero marks (increased safety).

34210	ENC_REFP_STATE			A07, A03, A02	R1
-	Adjustment status of absolute encoder			BYTE	Immediately
-					
-	2	0, 0	0	2	7/4

Description:

- Absolute encoder:

This machine data contains the absolute encoder status

0: Encoder is not calibrated

1: Encoder calibration enabled (but not yet calibrated)

2: Encoder is calibrated

Default setting for new startup: Encoder is not calibrated.

- Incremental encoder:

This machine data contains the "Referenced status", which can be saved over Power On:

0: Default setting: No automatic referencing

1: Automatic referencing enabled, but encoder not yet referenced

2: Encoder is referenced and at exact stop, automatic referencing active with next encoder activation

Default setting for new startup: No automatic referencing

34220	ENC_ABS_TURNS_MODULO			A03, A02	R2
-	Modulo range for rotary absolute encoder			DWORD	PowerOn
-					
-	2	4096, 4096	1	100000	7/2

Description: Number of encoder revolutions, which a rotary absolute encoder can resolve (cf. also maximum multiturn information of the absolute encoder, cf. encoder data sheet or, for example SIMODRIVE611D-MD 1021 or 1031 or PROFIdrive parameter p979).

The absolute position of a rotary axis is reduced to this resolvable range when an absolute encoder is switched on:

That means that a MODULO transformation takes place, if the actual position sensed is larger than the position permitted by MD ENC_ABS_TURNS_MODULO.

0 degree <= position <= n*360 degrees, (with n = ENC_ABS_TURNS_MODULO)

Note:

With SW 2.2, the position is reduced to this range when the control/encoder is switched on. With SW 3.6 and higher, half of this value represents the maximum permissible travel distance with the control swiched off / the encoder inactive.

Special cases:

For SIMODRIVE611D only powers of two are permissible values (1, 2, 4, 8, 16, ..., 4096).

If other values are entered, these are "rounded down" up to SW < 4.1 without any further message. With SW 4.1 and higher, a rounded down value bcomes visible in the machine data and is indicated by alarm 26025.

For PROFIdrive any integer values are permissible.

This MD is relevant only for rotary encoders (on linear and rotary axes).

Important recommendation:

The default value "1 encoder revolution" has been changed for SW 3.6 and higher to "4096". The new value is a more robust setting for the most frequently used encoder types.

When an encoder with a smaller multiturn information (encoder data sheet!) is used or when singleturn encoders are used, the value must be reduced accordingly. In either case, the value should be adjusted with multiturn absolute encoders to the maximum variable supported by the encoder, in order to be able to utilize the definite maximum travel range (Please observe: This value also influences the permissible position offset with the encoder inactive/ Power Off).

Related to:

SIMODRIVE611D-MD 1021, ENC_ABS_TURNS_MOTOR,

SIMODRIVE611D-MD 1031, ENC_ABS_TURNS_DIRECT

PROFIdrive parameter p979

34230	ENC_SERIAL_NUMBER			A02	R1
-	Encoder serial number			DWORD	PowerOn
-					
-	2	0, 0	-	-	7/2

Description: The encoder serial number (from EnDat encoders) can be read out here.

It is updated at power ON (SIMODRIVE611D or PROFIdrive) or when parking is deselected (only PROFIdrive)

"0" is supplied for encoders which do not have a serial number available.

Manipulating this MD normally causes an automatic absolute encoder maladjustment ($MA_ENC_REFP_MODE returns to "0").

34232	EVERY_ENC_SERIAL_NUMBER			A02	R1
-	Range of encoder serial number			BOOLEAN	PowerOn
-					
-	2	TRUE, TRUE	-	-	7/2

Description: For SIMODRIVE611D only:

With this MD, the working range of MD $MA_ENC_SERIAL_NUMBER can be set on the SIMODRIVE611D:

0 = only valid encoder serial number are entered in the MD, i.e. when the drive supplies a "0" (which corresponds to invalid or unknown) the last valid encoder serial number is retained in the MD (e.g. for add-on axes that are not permanently connected to the machine).

1 = (default, upward compatible): the value supplied by the drive for the encoder serial number is taken over into the MD with every control runup. A validity check is not carried out.

Note for PROFIdrive drives:

As not every drive can supply the relevant parameters at all or in good time, the functionality is coded permanently corresponding to "0" for the PROFIdrive drive. A "1" setting is therefore ineffective on the PROFIBUS.

34300	ENC_REFP_MARKER_DIST			A03, A02	R1
mm, degrees	Basic distance of reference marks of distance-coded encoders.			DOUBLE	PowerOn
-					
-	2	10.0, 10.0	-	-	7/2

Description: In addition to the incremental encoder track, a further encoder track is available with distance-coded measuring systems to determine the absolute encoder position. This encoder track has reference marks at defined different distances. The basic distance between the fixed reference marks (that are the reference marks which are always at the same distance to each other) can be taken from the data sheet and directly transferred to the machine data MD 34300.

With the basic distance between the fixed reference marks (MD 34300), the distance between two reference marks (MD 34310) and the number of encoder marks (MD 31020) on angular measuring systems or the graduation cycle (MD 31010) on linear measuring systems, the absolute encoder position can be determined already after crossing of two subsequent reference marks.

MD 34300 is also used for a plausibility check of reference mark distances.

Examples of application:

For example: Heidenhain LS186 C

MD 31010 = 0.02mm (graduation cycle)

MD 34300 = 20.00mm (basic distance between the reference marks)

MD 34310 = 0.02mm (distance between two reference marks corresponds to one graduation cycle). In addition to the incremental encoder track, a further encoder track is available with distance-coded measuring systems to determine the absolute encoder position. This encoder track has reference marks at defined different distances. The basic distance between the fixed reference marks (that are the reference marks which are always at the same distance to each other) can be taken from the data sheet and directly transferred to the machine data MD 34300.

34310	ENC_MARKER_INC			A03, A02	R1
mm, degrees	Interval between two reference marks for distance-coded scales			DOUBLE	Reset
-					
-	2	0.02, 0.02	-	-	7/2

Description: The distances between two reference marks are defined variably, so that the position of the crossed reference marks can be determined accurately in linear measuring systems with distance-coded reference marks.

The difference between two reference mark distances is entered in MD: ENC_MARKER_INC.

MD irrelevant for:

Incremental measuring systems

Special cases:

On linear measuring systems with distance-coded reference marks supplied by Heidenhain, the interval between two reference marks is always equal to one graduation cycle.

34320	ENC_INVERS			A03, A02	G2,R1
-	Length measuring system inverse to axis movement.			BOOLEAN	Reset
-					
-	2	FALSE, FALSE	-	-	7/2

Description:

- In the case of a distance-coded measuring system:

When setting a reference point, the actual position (determined by the distance-coded reference marks) on the linear measuring system is assigned to an exact machine axis position (referred to the machine zero point). The absolute offset between the machine zero point and the position of the 1st reference mark on the linear measuring system must therefore be entered in MD 34090: REFP_MOVE_DIST_CORR (reference point/absolute offset). In addition, MD: ENC_INVERS must be used to set whether the linear measuring system is connected in the same or the opposite direction to the machine system.

MD irrelevant to:

Incremental encoders without distance-coded reference marks.

34330	REFP_STOP_AT_ABS_MARKER			A03	R1
-	Distance-coded linear measuring system without target point			BOOLEAN	Reset
-					
-	2	TRUE, TRUE	-	-	7/2

Description:

- Distance-coded measuring system:

REFP_STOP_AT_ABS_MARKER = 0:

At the end of the reference cycle, the position entered in MD 34100: REFP_SET_POS is approached (normal case for phase 2).

REFP_STOP_AT_ABS_MARKER = 1:

The axis is braked after detection of the second reference mark (shortening of phase 2)

- Absolute encoder:

MD REFP_STOP_AT_ABS_MARKER defines the response of an axis with valid calibration identifier (MD 34210: ENC_REFP_STATE = 2) with G74 or when a traversing key is actuated in JOG-REF:

REFP_STOP_AT_ABS_MARKER = 0:

Axis traverses to the position entered in MD: REFP_SET_POS

REFP_STOP_AT_ABS_MARKER = 1:

Axis does not traverse.

MD irrelevant for:

Incremental encoders with zero mark (standard encoders)

Related to:

MD 34100: REFP_SET_POS

(reference point distance/target point for distance-coded system)

34990	ENC_ACTVAL_SMOOTH_TIME			A02	V1
s	Smoothing time constant for actual values.			DOUBLE	Reset
-					
-	2	0.0, 0.0	0.0	0.5	7/2

Description: Using low-resolution encoders, a more continuous motion of coupled path or axis motions can be achieved with smoothed actual values. The bigger the time constant, the better the smoothing of actual values and the larger the overtravel.

Smoothed actual values are used for:

- Thread-cutting (G33, G34, G35)
- Revolutional feedrate (G95, G96, G97, FPRAON)
- Display of actual position and velocity, or speed respectively.

1.5.5 Spindles

35000	SPIND_ASSIGN_TO_MACHAX			A01, A06, A11	S1
-	Assignment of spindle to machine axis			BYTE	PowerOn
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	0	20	7/2

Description: Spindle definition. The spindle is defined when the spindle number has been entered in this MD.

Example:

If the corresponding axis is to be spindle 1, value "1" must be entered in this MD.

The spindle functions are possible only for modulo rotary axes. For this purpose MD 30300: IS_ROT_AX and MD 30310: ROT_IS_MODULO must be set.

The axis functionality is maintained; transition to axis operation can be performed with M70.

The spindle data are set gear stage-specific in parameter blocks 1..5; parameter block 0 is used for axis operation (MD 35590: PARAMSET_CHANGE_ENABLE).

The smallest spindle number is 1, the highest number will depend on the number of axes in the channel.

If other spindle numbers shall be assigned, the function "spindle converter" must be used.

With multi-channel systems, the same numbers can be assigned in all channels, except for the spindles active in several channels (replacement axes/spindles MD 30550: AXCONF_ASSIGN_MASTER_CHAN).

35010	GEAR_STEP_CHANGE_ENABLE			A06, A11	S1
-	Parameterize gear stage change			DWORD	Reset
CTEQ					
-	-	0x00	0	0x2B	7/2

Description: Meaning of bit places:

Bit 0 = 0 and bit1 = 0:

There is an invariable gear ratio between motor and load. The MD of the first gear stage are active. Gear stage change with M40 to M45 is not possible.

Bit 0 = 1:

Gear stage change at undefined change position. The gear can have up to 5 gear stages, which can be selected with M40, M41 to M45. To support the gear stage change, the motor can carry out oscillating motions, which must be enabled by the PLC program.

Bit 1 = 1:

Same meaning as for bit 0 = 1, however, the gear stage change is carried out at configured spindle position (SW 5.3 and higher). The change position is configured in MD 35011: "GEAR_STEP_CHANGE_POSITION". The position is approached at the current gear stage before the gear stage change. If this bit is set, bit 0 is not taken into account!

Bit 2: reserved

Bit 3 = 1:

The gear stage change dialog between NCK and PLC is simulated. An NCK-internal acknowledgement is given. PLC signals for the change are output, checkback signals from the PLC are ignored because of the NCK-internal acknowledgement.

Bit 4: reserved

Bit 5 = 1:

For tapping with G331/G332, the second gear stage data set is used. The bit must be set for the master spindle used for tapping. Bit 0 or bit 1 must be set!

Corresponds with:

MD 35090: NUM_GEAR_STEPS (number of gear stages 1st data set, see bit5)

MD 35092: NUM_GEAR_STEPS2 (number of gear stages 2nd data set, see bit5)

MD 35110: GEAR_STEP_MAX_VELO (max. speed for autom. gear stage change)

MD 35112: GEAR_STEP_MAX_VELO2 (max. speed for autom. gear stage change 2nd data set, see bit 5)

MD 35120: GEAR_STEP_MIN_VELO (min. speed for autom. gear stage change)

MD 35122: GEAR_STEP_MIN_VELO2 (min. speed for autom. gear stage change 2nd data set, see bit 5)

35012	GEAR_STEP_CHANGE_POSITION			A06, A11	S1
mm, degrees	Gear stage change position			DOUBLE	NEW CONF
CTEQ					
-	6	0.0, 0.0, 0.0, 0.0, 0.0, 0.0	-	-	7/2

Description: Gear stage change position.

The value range must be within the configured modulo range.

Related to:

MD 35010: GEAR_STEP_CHANGE_ENABLE, bit 1

MD 30330: MODULO_RANGE

35014	GEAR_STEP_USED_IN_AXISMODE			A01, A06, A11	-
-	Gear stage for axis mode with M70			DWORD	NEW CONF
CTEQ					
-	-	0	0	5	7/2

Description: With this MD, a gear stage can be defined which can be loaded into the axis mode during the transition with M70. The parameter set zero used in axis mode is to be optimized on this gear stage.

Significance of the values:

0: There is no implicit gear stage change with M70.

The current gear stage is retained.

1 ... 5:

There is a change into gear stage (1...5) during the execution of M70.

During the transition into axis mode without M70, there is monitoring for this gear stage and alarm 22022 is issued if necessary. The condition for a gear stage change is the general release of the function in MD 35010 GEAR_STEP_CHANGE_ENABLE.

Secondary conditions:

When changing from axis mode into spindle mode, the configured gear stage continues to remain active. There is no automatic return to the last active gear stage in spindle mode.

35020	SPIND_DEFAULT_MODE			A06, A10	S1
-	Initial spindle setting			BYTE	Reset
CTEQ					
-	-	0	0	3	7/2

Description: SPIND_DEFAULT_MODE activates the operating mode of the spindle at the time specified in MD 35030: SPIND_DEFAULT_ACT_MASK. The appropriate spindle operating modes can be selected with the following values:

0 Speed mode, position control deselected

1 Speed mode, position control activated

2 Positioning mode

3 Axis mode

Related to:

MD 35030: SPIND_DEFAULT_ACT_MASK (activate initial spindle setting)

35030	SPIND_DEFAULT_ACT_MASK			A06, A10	S1
-	Time at which initial spindle setting is effective			BYTE	Reset
CTEQ					
-	-	0x00	0	0x03	7/2

Description: SPIND_DEFAULT_ACT_MASK specifies the time at which the operating mode defined in MD 35020: SPIND_DEFAULT_MODE becomes effective. The initial spindle setting can be assigned the following values at the following points in time:

0 POWER ON

1 POWER ON and NC program start

2 POWER ON and RESET (M2/M30)

Special cases:

If MD 35040: SPIND_ACTIVE_AFTER_RESET = 1, the following supplementary conditions are applicable:

- SPIND_DEFAULT_ACT_MASK should be set to 0
- If this is not possible, the spindle must be at standstill prior to activation.

Related to:

MD 35020: SPIND_DEFAULT_MODE (initial spindle setting)

MD 35040: SPIND_ACTIVE_AFTER_RESET (spindle active via reset)

35032	SPIND_FUNC_RESET_MODE			A06, A10	W4
-	Reset response of individual spindle functions			DWORD	PowerOn
CTEQ					
-	-	0x00	0	0x01	7/2

Description: This data allows the "GWPS in every operating mode" function to be selected/deselected.

SPIND_FUNC_RESET_MODE, bit 0 = 0 : "GWPS in every operating mode" is deselected

SPIND_FUNC_RESET_MODE, bit 0 = 1 : "GWPS in every operating mode" is selected

35035	SPIND_FUNCTION_MASK			A06, A10	S1
-	Spindle functions			DWORD	Reset
CTEQ					
-	-	0x510	-	-	7/2

Description: This MD allows spindle-specific functions to be set.

The MD is bit-coded, the following bits are assigned:

Bit 0 = 1: With activated DryRun function for
block programming (M40, M41 to M45), programming via FC18
and synchronized actions, gear stage changes are suppressed.

Bit 1 = 1: With activated Program test function
for block programming (M40, M41 to M45), programming via
FC18 and synchronized actions, gear stage changes are suppressed.

Bit 2 = 1: Gear stage change for programmed gear stage will finally be carried
out after deselection of DryRun or Program test functions with REPOS.

Bit 3: reserved

Bit 4 = 1:

The programmed speed is taken over into SD 43200 $SA_SPIND_S (incl. speed default settings via FC18 and synchronized actions).

S programmings, that are not speed programmings, are not written into the SD. These include, for example, S value with constant cutting speed (G96, G961), S value with revolution-related dwell time (G4).

Bit 5 = 1:

The content of SD 43200 $SA_SPIND_S acts as speed setpoint for JOG. If the content is zero, then other JOG speed default settings become active (s. SD 41200 JOG_SPIND_SET_VELO).

Bit 6: reserved

Bit 7: reserved

Bit 8 = 1:

The programmed cutting speed is taken over into SD 43202 $SA_SPIND_CONSTCUT_S (incl. default settings via FC18 and synchronized actions). S programmings, that are no cutting speed programmings, are not written into the SD. These include, for example, S value beyond constant cutting speed (G96, G961), S value with revolution-related dwell time (G4).

Bit 9: reserved

Bit 10 = 0:

SD 43206 $SA_SPIND_SPEED_TYPE is not changed by part program or channel settings,

= 1:

For the master spindle, the value of the 15th G group (type of feedrate) is taken over into SD 43206 $SA_SPIND_SPEED_TYPE. For all other spindles, the corresponding SD remains unchanged.

Bit 11: reserved

Bit 12 = 1:

Spindle override is active for zero mark search for M19, SPOS

and SPOSA
= 0:
Previous behavior (default)
Related to:
SPIND_ACTIVE_AFTER_RESET
SPIND_DEFAULT_MODE
SPIND_S

35040	SPIND_ACTIVE_AFTER_RESET			A06, A10	S1
-	Own spindle RESET			BYTE	PowerOn
CTEQ					
-	-	0	0	2	7/2

Description: SPIND_ACTIVE_AFTER_RESET defines the response of the spindle after channel reset NC/PLC interface signal (Reset) und Programmende (M2, M30) verhält.

This MD is only active in the spindle mode open-loop control mode. In positioning mode or oscillation mode the spindle is always stopped.

SPIND_ACTIVE_AFTER_RESET = 0:

- Spindle stops (with M2/M30 and channel and bag reset)
- Program is aborted

SPIND_ACTIVE_AFTER_RESET= 1:

- Spindle does not stop
- Program is aborted

SPIND_ACTIVE_AFTER_RESET= 2:

- Spindle does not stop at the M function configured via MD $MN_NO_FCT_EOP (e.g. M32).
- Spindle stops at channel or bag reset

The NC/PLC interface signal (Restweg löschen/Spindel-Reset) wirkt unabhängig vom SPIND_ACTIVE_AFTER_RESET immer.

Not relevant to:

- spindle modes other than control mode.

Corresponds with:
IS (Reset)
IS (Restweg löschen/Spindel-Reset)

35090	NUM_GEAR_STEPS			A06, A10	S1
-	Number of gear stages			DWORD	Reset
-					
-	-	MAXNUM_GEAR_STEPS	1	5	2/2

Description:

```
Number of set gear stages.
The first gear stage is always available.
Corresponding MD:
   MD 35010: GEAR_STEP_CHANGE_ENABLE (gear stages available/functions)
   MD 35012: GEAR_STEP_CHANGE_POSITION (gear stage change position)
   MD 35014: GEAR_STEP_USED_IN_AXISMODE (gear stage for axis mode with M70)
   MD 35110: GEAR_STEP_MAX_VELO (max. speed for gear stage change)
   MD 35120: GEAR_STEP_MIN_VELO (min. speed for gear stage change)
   MD 35130 GEAR_STEP_MAX_VELO_LIMIT (max. speed of gear stage)
   MD 35140: GEAR_STEP_MIN_VELO_LIMIT (min. speed of gear stage)
   MD 35200: GEAR_STEP_SPEEDCTRL_ACCEL (acceleration in speed control mode)
   MD 35210: GEAR_STEP_POSCTRL_ACCEL (acceleration in position control mode)
   MD 35310: SPIND_POSIT_DELAY_TIME (positioning delay time)
   MD 35550: DRILL_VELO_LIMIT (maximum speeds for tapping)
   MD 35092: $MA_NUM_GEAR_STEPS2 (number of gear stages 2nd gear stage data set)
```

35092	NUM_GEAR_STEPS2			A06, A10	S1
-	Number of gear stages of 2nd gear stage data set			DWORD	Reset
-					
-	-	MAXNUM_GEAR_STEPS	1	5	2/2

Description:

```
Number of set gear stages of the second gear stage data set for the function 'Tapping with G331/G332'.
Activation (only makes sense for master spindle on tapping): MD 35010 $MA_GEAR_STEP_CHANGE_ENABLE, bit 5.
The number of gear stages of the first and second gear stage data set must not be equal.
Corresponding MD:
   MD 35010: GEAR_STEP_CHANGE_ENABLE (gear stages available/functions)
   MD 35112: GEAR_STEP_MAX_VELO2 (2nd gear stage data set: max. speed for gear stage change)
   MD 35122: GEAR_STEP_MIN_VELO2 (2nd gear stage data set: min. speed for gear stage change)
   MD 35212: GEAR_STEP_POSCTRL_ACCEL2 (2nd gear stage data set: acceleration in position control mode)
```

35100	SPIND_VELO_LIMIT			A06, A11, A04	S1
rev/min	Maximum spindle speed			DOUBLE	PowerOn
CTEQ					
-	-	10000.0	1.0e-3	-	7/2

Description: SPIND_VELO_LIMIT defines the maximum spindle speed, which the spindle (the spindle chuck with the workpiece or the tool) must not exceed. The NCK limits an excessive spindle setpoint speed to this value. If the maximum actual spindle speed is exceeded, even allowing for the spindle speed tolerance (MD 35150: SPIND_DES_VELO_TOL), there is a fault with the drive and the NC/ PLC interface signal (Drehzahlgrenze überschritten) wird gesetzt. Außerdem wird der Alarm 22050 "Maximaldrehzahl erreicht" ausgegeben und alle Achsen und Spindeln des Kanals abgebremst (Voraussetzung: Geber ist noch funktionsfähig).

Related to:

MD 35150: SPIND_DES_VELO_TOL (spindle speed tolerance)

IS (Drehzahlgrenze überschritten)

Alarm 22050 "Maximum speed reached"

35110	GEAR_STEP_MAX_VELO			A06, A11, A04	S1
rev/min	Maximum speed for gear stage change			DOUBLE	NEW CONF
CTEQ					
-	6	500., 500., 1000., 2000., 4000., 8000.	-	-	7/2

Description: GEAR_STEP_MAX_VELO defines the maximum speed of the gear stage for automatic gear stage change (M40). The gear stages must be defined by GEAR_STEP_MAX_VELO and MD 35120: GEAR_STEP_MIN_VELO in a way that avoids gaps in the programmable spindle speed range between the gear stages.

Incorrect

GEAR_STEP_MAX_VELO [gear stage1] =1000

GEAR_STEP_MIN_VELO [gear stage2] =1200

Correct

GEAR_STEP_MAX_VELO [gear stage1] =1000

GEAR_STEP_MIN_VELO [gear stage2] = 950

Related to:

MD 35010: GEAR_STEP_CHANGE_ENABLE
(gear stage change is possible)

MD 35120: GEAR_STEP_MIN_VELO
(min. speed for gear stage change)

MD 35140: GEAR_STEP_MIN_VELO_LIMIT
(min. speed of gear stage)

MD 35130: GEAR_STEP_MAX_VELO_LIMIT
(max. speed of gear stage)

35112	GEAR_STEP_MAX_VELO2			A06, A11, A04	S1
rev/min	2nd data set: Maximum speed for gear stage change			DOUBLE	NEW CONF
CTEQ					
-	6	500., 500., 1000., 2000., 4000., 8000.	0	-	2/2

Description: With GEAR_STEP_MAX_VELO2, the 2nd data set for the max. speeds (upper switching threshold) of the gear stages for the automatic gear stage change (M40) is set. The gear stage must be defined via GEAR_STEP_MAX_VELO2 and MD 35122: GEAR_STEP_MIN_VELO2 so that there are no gaps between the gear stages in the programmable spindle speed range.

Examples:

incorrect:

GEAR_STEP_MAX_VELO2 [gear stage 1] =1000

GEAR_STEP_MIN_VELO2 [gear stage 2] =1200

correct:

GEAR_STEP_MAX_VELO2 [gear stage 1] =1000

GEAR_STEP_MIN_VELO2 [gear stage 2] =950

Activation of the 2nd gear stage data block for tapping with G331/ G332 via MD 35010: GEAR_STEP_CHANGE_ENABLE bit 5 of the master spindle.

Corresponding with:

MD 35140: GEAR_STEP_MIN_VELO_LIMIT (min. speed of gear stage)

MD 35130: GEAR_STEP_MAX_VELO_LIMIT (max. speed of gear stage)

35120	GEAR_STEP_MIN_VELO			A06, A11, A04	S1
rev/min	Minimum speed for gear stage change			DOUBLE	NEW CONF
CTEQ					
-	6	50., 50., 400., 800., 1500., 3000.	-	-	7/2

Description: GEAR_STEP_MIN_VELO defines the minimum speed of the gear stage for the automatic gear stage change (M40).

Refer to MD 35120: GEAR_STEP_MAX_VELO for more information.

Related to:

MD 35110: GEAR_STEP_MAX_VELO
(maximum speed for gear stage change)

MD 35010: GEAR_STEP_CHANGE_ENABLE
(gear stage change is possible)

MD 35140: GEAR_STEP_MIN_VELO_LIMIT
(minimum speed of gear stage)

MD 35130: GEAR_STEP_MAX_VELO_LIMIT
(maximum speed of gear stage)

35122	GEAR_STEP_MIN_VELO2			A06, A11, A04	S1
rev/min	2nd data set: Minimum speed for gear stage change			DOUBLE	NEW CONF
CTEQ					
-	6	50., 50., 400., 800., 1500., 3000.	0	-	2/2

Description: In GEAR_STEP_MIN_VELO2 the 2nd data block of the minimum speeds (lower switching thresholds) of the gear stages for automatic gear stage change (M40) is set. The gear stages must be defined with GEAR_STEP_MIN_VELO2 and MD 35112: GEAR_STEP_MAX_VELO2 so that there are no gaps between the gear stages within the programmable spindle speed range.

Examples:

incorrect:

GEAR_STEP_MAX_VELO2 [gear stage 1] = 1000

GEAR_STEP_MIN_VELO2 [gear stage 2] = 1200

correct:

GEAR_STEP_MAX_VELO2 [gear stage 1] = 1000

GEAR_STEP_MIN_VELO2 [gear stage 2] = 950

Activation of the 2nd gear stage data block for tapping with G331/ G332 via MD 35010: GEAR_STEP_CHANGE_ENABLE bit 5 of the master spindle.

Corresponding with

MD 35140: GEAR_STEP_MIN_VELO_LIMIT (min. speed of the gear stage)

MD 35130: GEAR_STEP_MAX_VELO_LIMIT (max. speed of the gear stage)

35130	GEAR_STEP_MAX_VELO_LIMIT			A06, A11, A04	S1
rev/min	Maximum speed of gear stage			DOUBLE	NEW CONF
CTEQ					
-	6	500., 500., 1000., 2000., 4000., 8000.	1.0e-3	-	7/2

Description: In GEAR_STEP_MAX_VELO_LIMIT the maximum speed of the gear stage is entered with the position control switched off.

This speed can never be exceeded in the active gear stage.

With the position control switched on, the behavior described in MD 35135 GEAR_STEP_PC_MAX_VELO_LIMIT applies.

Note:

- If an S value is programmed that exceeds the max. speed of the active gear stage, the setpoint speed is limited to the max. speed of the gear stage (with gear stage selection - M41 to M45). Furthermore, the interface signal "Programmed speed too high" will be set.
- If an S value is programmed that exceeds the max. speed for gear stage change, a new gear stage will be set (with automatic gear stage selection - M40).
- If an S value is programmed that exceeds the max. speed of the highest gear stage, the speed will be limited to the max. speed of the gear stage (with automatic gear stage selection - M40).
- If an S value is programmed that does not have a suitable gear stage, no gear stage change will be triggered.

Related to:

MD 35010: GEAR_STEP_CHANGE_ENABLE (gear stage change possible)

MD 35110: GEAR_STEP_MAX_VELO (max. speed for gear stage change)

MD 35120: GEAR_STEP_MIN_VELO (min. speed for gear stage change)

MD 35135: GEAR_STEP_PC_MAX_VELO_LIMIT (min. speed of the gear stage with position control)

MD 35140: GEAR_STEP_MIN_VELO_LIMIT (min. speed of the gear stage)

35135	GEAR_STEP_PC_MAX_VELO_LIMIT			A06, A11, A04	S1
rev/min	Maximum speed of the gear stage with position control			DOUBLE	NEW CONF
CTEQ					
-	6	0., 0., 0., 0., 0., 0.	0	-	7/2

Description: In GEAR_STEP_PC_MAX_VELO_LIMIT the maximum speed of the gear stage is set with the position control active.

If value 0 is set (default), 90% of the value from MD35130: GEAR_STEP_MAX_VELO_LIMIT (control margin) will become the max. speed of the gear stage with position control active. This limit speed is limited to a value that does not exceed MD 35130: GEAR_STEP_MAX_VELO_LIMIT and MD 35100: SPIND_VELO_LIMIT.

If an S value is programmed that exceeds the limit speed, the set-point speed is limited to the limit speed. In this case, the VDI interface signal "Programmed speed too high" will be set.

Related to:

MD 35010: GEAR_STEP_CHANGE_ENABLE (gear stage change possible)

MD 35110: GEAR_STEP_MAX_VELO (max. speed for gear stage change)

MD 35120: GEAR_STEP_MIN_VELO (min. speed for gear stage change)

MD 35140: GEAR_STEP_MIN_VELO_LIMIT (min. speed of the gear stage)

35140	GEAR_STEP_MIN_VELO_LIMIT			A06, A11, A04	S1
rev/min	Minimum speed of gear stage			DOUBLE	NEW CONF
CTEQ					
-	6	5., 5., 10., 20., 40., 80.	-	-	7/2

Description: GEAR_STEP_MIN_VELO_LIMIT defines the minimum speed for the gear stage. The speed cannot drop below this value, even if an S value is programmed that is too low.

The speed can only drop below this minimum value as a result of "Minimum/maximum speed of gear stage" signals/commands/states.

MD irrelevant for:

- Spindle oscillation mode
- Spindle positioning mode, axis mode

Related to:

MD 35010: GEAR_STEP_CHANGE_ENABLE
(gear stage change is possible)
MD 35110: GEAR_STEP_MAX_VELO
(maximum speed for gear stage change)
MD 35120: GEAR_STEP_MIN_VELO
(minimum speed for gear stage change)
MD 35130: GEAR_STEP_MAX_VELO_LIMIT
(maximum speed of gear stage)

35150	SPIND_DES_VELO_TOL			A03, A05, A06, A10, A04	S1
-	Spindle speed tolerance			DOUBLE	Reset
-					
-	-	0.1	0.0	1.0	7/2

Description: In spindle control mode, the set speed (programmed speed x spindle offset, allowing for limits) is compared with the actual speed.

- If the actual speed deviates from the set speed by more than SPIND_DES_VELO_TOL, the NC/PLC interface signal (Spindel im Sollbereich) auf Null gesetzt.
- If the actual speed deviates from the set speed by more than SPIND_DES_VELO_TOL, the path feed is disabled (positioning axes continue traversing).
- If the actual speed exceeds the maximum spindle speed (MD 35100: SPIND_VELO_LIMIT) by more than SPIND_DES_VELO_TOL the NC/PLC interface signal (Drehzahlgrenze überschritten) gesetzt und der Alarm 22050 "Maximaldrehzahl erreicht" ausgegeben. Alle Achsen und Spindeln des Kanals werden abgebremst.

MD irrelevant to:

- Spindle oscillation mode
- Spindle positioning mode

Related to:

MD 35500: SPIND_ON_SPEED_AT_IPO_START
(feed enable for spindle in setpoint range)
MD 35100: SPIND_VELO_LIMIT
(maximum spindle speed)
IS (Spindel im Sollbereich)
IS (Drehzahlgrenze überschritten)
Alarm 22050 "Maximum speed reached"

35160	SPIND_EXTERN_VELO_LIMIT			A06, A04	S1
rev/min	Spindle speed limitation from PLC			DOUBLE	NEW CONF
CTEQ					
-	-	1000.0	1.0e-3	-	7/2

Description: A limiting value for the spindle speed is entered in SPIND_EXTERN_VELO_UNIT, which is taken into account exactly when the IS (Geschwindigkeits-/Drehzahlbegrenzung) gesetzt ist.

The NCK limits a spindle speed which is too high to this value.

35200	GEAR_STEP_SPEEDCTRL_ACCEL			A06, A11, A04, -	S1
rev/s²	Acceleration in speed control mode			DOUBLE	NEW CONF
CTEQ					
-	6	30.0, 30.0, 25.0, 20.0, 15.0, 10.0	1.0e-3	-	7/2

Description: If the spindle is in speed control mode, the acceleration is entered in GEAR_STEP_SPEEDCTRL_ACCEL.

The spindle is in speed control mode with the function SPCOF.

Special cases:

The acceleration in speed control mode (GEAR_STEP_SPEEDCTRL_ACCEL) can be set so that the electric current limit is reached.

Related to:

MD 35210: GEAR_STEP_POSCTRL_ACCEL (acceleration in position control mode)

MD 35220: ACCEL_REDUCTION_SPEED_POINT (speed limit for reduced acceleration)

35210	GEAR_STEP_POSCTRL_ACCEL			A06, A11, A04, -	S1
rev/s²	Acceleration in position control mode			DOUBLE	NEW CONF
CTEQ					
-	6	30.0, 30.0, 25.0, 20.0, 15.0, 10.0	1.0e-3	-	7/2

Description: The acceleration in position control mode must be set so that the electric current limit is not reached.

Related to:

MD 35200: GEAR_STEP_SPEEDCTRL_ACCEL

MD 35212: GEAR_STEP_POSCTRL_ACCEL2

35212	GEAR_STEP_POSCTRL_ACCEL2			A06, A11, A04, -	S1
rev/s²	2nd data set: Acceleration in position control mode			DOUBLE	NEW CONF
CTEQ					
-	6	30.0, 30.0, 25.0, 20.0, 15.0, 10.0	1.0e-3	-	2/2

Description: Second gear stage data set for maximum acceleration capability of the gear stages in position control mode.

The acceleration in position control mode must be set so that the current limit is not reached.

Activation of the 2nd data set for tapping with G331/G332 via MD 35010 GEAR_STEP_CHANGE_ENABLE, bit 5 for the master spindle.

Related to:

MD 35210: GEAR_STEP_POSCTRL_ACCEL

MD 35200: GEAR_STEP_SPEEDCTRL_ACCEL

MD 35220: ACCEL_REDUCTION_SPEED_POINT

35220	ACCEL_REDUCTION_SPEED_POINT			A06, A04	S1,S6,B2
-	Speed for reduced acceleration			DOUBLE	Reset
-					
-	-	1.0	0.0	1.0	7/2

Description: This machine data defines the threshold speed/velocity for spindles/positioning/path axes from which the acceleration reduction is to start. The reference is the defined maximum speed/velocity. The starting point is a percentage of the maximum values.

Example: MD: ACCEL_REDUCTION_SPEED_POINT = 0.7, the maximum speed is 3000 rpm. Acceleration reduction begins with v_on = 2100 rpm, i.e. the maximum acceleration capacity is utilized in the speed range 0...2099.99 rpm. From 2100 rpm to the maximum speed, operation is with reduced acceleration.

Related to:

MD 32000: MAX_AX_VELO
(maximum axis velocity)
MD 35130: GEAR_STEP_MAX_VELO_LIMIT
(maximum gear stage speed)
MD 35230: ACCEL_REDUCTION_FACTOR
(reduced acceleration)

35230	ACCEL_REDUCTION_FACTOR			A06, A04	S1,S6,B2
-	Reduced acceleration			DOUBLE	Reset
CTEQ					
-	-	0.0	0.0	0.95	7/2

Description: The machine data contains the factor by which the acceleration of the spindle/positioning/path axes is reduced with reference to the maximum speed/velocity. The acceleration is reduced by the factor between the threshold speed/velocity defined in MD: ACCEL_REDUCTION_SPEED_POINT and the maximum speed/velocity.

Example:

a= 10 rev/s², v_on = 2100 rpm, MD: ACCEL_REDUCTION_FACTOR = 0.3.

Acceleration and deceleration take place within the speed range 0...2099.99 rpm with an acceleration of 10 rev/s². From speed 2100 rpm up to the maximum speed, the acceleration is reduced from 10 rev/s² down to 7 rev/s².

MD irrelevant to:

Errors that lead to rapid stop.

Related to:

MD 32300: MAX_AX_ACCEL (axis acceleration)
MD 35200: GEAR_STEP_SPEEDCTRL_ACCEL
(acceleration in speed control mode)
MD 35210: GEAR_STEP_POSCTRL_ACCEL
(acceleration in position control mode)
MD 35242: ACCEL_REDUCTION_SPEED_POINT
(speed for reduced acceleration)

35240	ACCEL_TYPE_DRIVE			A04	S6
-	Acceleration curve DRIVE for axes ON/OFF			BOOLEAN	Reset
CTEQ					
-	-	FALSE	-	-	7/2

Description: Basic setting of the acceleration response of the axis (positioning, oscillation, JOG, path motion):

FALSE: No acceleration reduction

TRUE: Acceleration reduction active

MD is active only with JOG_AND_POS_JERK_ENABLE = FALSE.

For spindles (in spindle mode), the settings of MD 35220 ACCEL_REDUCTION_SPEED_POINT and 35230 ACCEL_REDUCTION_FACTOR are always active.

Remark:

This MD also influences the path motion with SOFT, BRISK, TRAFO

35242	ACCEL_REDUCTION_TYPE			A04	S6
-	Type of acceleration reduction			BYTE	Reset
CTEQ					
-	-	1	0	2	7/2

Description: Shape of acceleration reduction characteristic with DRIVE velocity control

0: Constant

1: Hyperbolic

2: Linear

35300	SPIND_POSCTRL_VELO			A06, A04	S1
rev/min	Position control activation speed			DOUBLE	NEW CONF
CTEQ					
-	6	500.0, 500.0, 500.0, 500.0, 500.0, 500.0	-	-	7/2

Description: When positioning a spindle that is not in position control mode from a high speed, the position control is not activated until the spindle has reached or falls below the velocity defined in MD: SPIND_POSCTRL_VELO.

The speed can be changed with FA[Sn] from the part program. Please refer to the documentation:

/FB1/ Function Manual, Basic Funtion; Spindles (S1), section "Spindle mode 'positioning operation'" for a description of the spindle behavior under various supplementary conditions (positioning from rotation, positioning from standstill).

Note:

The active speed from SPIND_POSCTRL_VELO cannot exceed the max. speed set in GEAR_STEP_PC_MAX_VELO_LIMIT. If GEAR_STEP_PC_MAX_VELO_LIMIT = 0, the value is limited to 90% of GEAR_STEP_MAX_VELO_LIMIT.

Related to:

MD 35350: SPIND_POSITIONING_DIR (direction of rotation during positioning from standstill, if no synchronization is available)

MD 35100: SPIND_VELO_LIMIT (chuck speed)

35310	SPIND_POSIT_DELAY_TIME			A06, A04	S1
s	Positioning delay time			DOUBLE	NEW CONF
CTEQ					
-	6	0.0, 0.05, 0.1, 0.2, 0.4, 0.8	-	-	7/2

Description:

Positioning delay time

After reaching the positioning end (exact stop fine), there is a waiting time equal to the time set in this MD. Selection of the position that matches the currently set gear stage.

The delay time is activated for:

- Gear stage change on defined spindle position. After reaching the position configured in MD 35011 GEAR_STEP_CHANGE_POSITION, there is a waiting period equal to the time specified here. After expiry of this time, the position control is switched off for an active direct measuring system and the NC/PLC interface signals (Getriebe umschalten) und <SollgetriebestufeA-C/> (Sollgetriebestufe A-C) ausgegeben.
- Block search at output of an accumulated positioning block (SPOS, SPOSA, M19).

35350	SPIND_POSITIONING_DIR			A06	S1
-	Direction of rotation when positioning			BYTE	Reset
CTEQ					
-	-	3	3	4	7/2

Description:

When SPOS or SPOSA is programmed, the spindle is switched to position control mode and accelerates with the acceleration defined in MD 35210: GEAR_STEP_POSCTRL_ACCEL (acceleration in position control mode) if the spindle is not synchronized. The direction of rotation is defined by MD 35350: SPIND_POSITIONING_DIR (direction of rotation during positioning from standstill).

SPIND_POSITIONING_DIR = 3 ---> Clockwise direction of rotation

SPIND_POSITIONING_DIR = 4 ---> Counterclockwise direction of rotation

Related to:

MD 35300: SPIND_POSCTRL_VELO (position control activation speed)

35400	SPIND_OSCILL_DES_VELO			A06, A04	S1
rev/min	Oscillation speed			DOUBLE	NEW CONF
CTEQ					
-	-	500.0	-	-	7/2

Description: During oscillation, the NC/PLC interface signal (Pendeldrehzahl) eine Motordrehzahl für den Spindelmotor vorgegeben. Diese Motor-drehzahl wird in SPIND_OSCILL_DES_VELO festgelegt. Die in diesem MD festgelegte Motordrehzahl ist unabhängig von der aktuellen Getriebestufe. Im AUTOMATIK und MDA-Bild wird die Pendeldrehzahl im Fenster "Spindel-Soll" angezeigt, bis der Getriebstufenwechsel durchgeführt ist.

MD irrelevant to:

All spindle modes except oscillation mode

Special cases:

The acceleration during oscillation (MD 35410: SPIND_OSCILL_ACCEL) is valid for the oscillation speed defined in this MD.

Related to:

MD 35410: SPIND_OSCILL_ACCEL (acceleration during oscillation)
IS (Pendeldrehzahl)
IS (Pendeln durch die PLC)

35410	SPIND_OSCILL_ACCEL			A06, A04, -	S1
rev/s²	Acceleration during oscillation			DOUBLE	NEW CONF
CTEQ					
-	-	16.0	1.0e-3	-	7/2

Description: The acceleration specified here is only effective for the output of the oscillation speed (MD 35400: SPIND_OSCILL_DES_VELO) to the spindle motor. The oscillation speed is selected using the NC/PLC interface signal (Pendeldrehzahl) ausgewählt.

MD irrelevant to:

All spindle modes except oscillation mode

Related to:

MD 35400: SPIND_OSCILL_DES_VELO (oscillation speed)
IS (Pendeldrehzahl)
IS (Pendeln durch die PLC)

35430	SPIND_OSCILL_START_DIR			A06	S1
-	Start direction during oscillation			BYTE	Reset
CTEQ					
-	-	0	0	4	7/2

Description: With the NC/PLC interface signal (Pendeldrehzahl) beschleunigt der Spindelmotor auf die im MD 35400: SPIND_OSCILL_DES_VELO festgelegte Geschwindigkeit.

The start direction is defined by SPIND_OSCILL_START_DIR if the NC/PLC interface signal (Pendeln durch die PLC) nicht gesetzt ist.

SPIND_OSCILL_START_DIR = 0

---> Start direction same as the last direction of rotation

SPIND_OSCILL_START_DIR = 1

---> Start direction counter to the last direction of rotation

SPIND_OSCILL_START_DIR = 2

---> Start direction counter to the last direction of rotation

SPIND_OSCILL_START_DIR = 3 ---> Start direction is M3

SPIND_OSCILL_START_DIR = 4 ---> Start direction is M4

MD irrelevant to:

All spindle modes except oscillation mode

Related to:

MD 35400: SPIND_OSCILL_DES_VELO (oscillation speed)

IS (Pendeldrehzahl)

IS (Pendeln durch die PLC)

35440	SPIND_OSCILL_TIME_CW			A06	S1
s	Oscillation time for M3 direction			DOUBLE	NEW CONF
CTEQ					
-	-	1.0	-	-	7/2

Description: The oscillation time defined here is active in the M3 direction.

MD irrelevant to:

- All spindle modes except oscillation mode
- Oscillation via PLC (IS "Oscillation via PLC" (DB31, ... DBX18.4) enabled) (Pendeln durch die PLC) gesetzt)

Related to:

MD 35450: SPIND_OSCILL_TIME_CCW (oscillation time for M4 direction)

MD 10070: IPO_SYSCLOCK_TIME_RATIO (interpolator cycle)

IS (Pendeldrehzahl)

IS (Pendeln durch die PLC)

35450	SPIND_OSCILL_TIME_CCW			A06	S1
s	Oscillation time for M4 direction			DOUBLE	NEW CONF
CTEQ					
-	-	0.5	-	-	7/2

Description: The oscillation time defined here is active in the M4 direction.

MD irrelevant to:

- All spindle modes except oscillation mode
- Oscillation via PLC (IS "Oscillation via PLC" (DB31, ... DBX18.4) enabled) (Pendeln durch die PLC) gesetzt)

Related to:

MD 35440: SPIND_OSCILL_TIME_CW (oscillation time for M3 direction)

MD 10070: IPO_SYSCLOCK_TIME_RATIO (interpolator cycle)

IS (Pendeldrehzahl)

IS (Pendeln durch die PLC)

35500	SPIND_ON_SPEED_AT_IPO_START			A03, A06, A10	S1
-	Feedrate enable for spindle in the set range			BYTE	Reset
CTEQ					
-	-	1	0	2	7/2

Description: For SW 4.2 and higher:

Byte = 0:

The path interpolation is not affected

Byte = 1:

The path interpolation is not enabled (positioning axes continue traversing) until the spindle has reached the specified speed. The tolerance range can be set in MD 35150: $MA_SPIND_DES_VELO_TOL. If a measuring system is active, then the actual speed is monitored, otherwise the set speed. Path axes traversing in continuous-path mode (G64) are not stopped.

Byte = 2:

In addition to 1, traversing path axes are also stopped before machining begins, e.g. continuous-path mode (G64) and the change from rapid traverse (G0) to a machining block (G1, G2,..). The path is stopped at the last G0 block and does not start traversing until the spindle is within the set speed range.

Restriction:

If the spindle is newly programmed by the PLC (FC18) or a synchronized action "shortly" before the end of the last G0 block, then the path decelerates taking the dynamic limitation into account. Because the spindle programming is asynchronous, a traverse can be made into the machining block if necessary. If the spindle has reached the setpoint speed range then machining starts from this point.

Byte = 3:

No longer available for SW 5.3 and higher.

Related to:

MD 35150: SPIND_DES_VELO_TOL (spindle speed tolerance)

IS (Spindel im Sollbereich)

35510	SPIND_STOPPED_AT_IPO_START			A03, A06, A10	S1
-	Feedrate enable for spindle stopped			BOOLEAN	Reset
CTEQ					
-	-	FALSE	-	-	7/2

Description: When a spindle is stopped (M5), the path feed is disabled (positioning axes continue traversing) if MD: SPIND_STOPPED_AT_IPO_START is enabled and the spindle is in control mode.

When the spindle has come to a standstill (IS, (Achse/Spindel steht) gesetzt), wird der Bahnvorschub freigegeben.

Related to:

MD 35500: SPIND_ON_SPEED_AT_IPO_START

(feed enable for spindle in setpoint range)

35550	DRILL_VELO_LIMIT			A06, A11, A04	-
rev/min	Maximum speeds for tapping			DOUBLE	NEW CONF
CTEQ					
-	6	10000., 10000., 10000., 10000., 10000., 10000.	1	-	7/2

Description: Limit speed values for tapping without compensating chuck with G331/G332.

The maximum speed of the linear motor characteristic range (constant acceleration capacity) must be specified depending on the gear stage.

35590	PARAMSET_CHANGE_ENABLE			EXP, A05	A2
-	Parameter set can be changed			BYTE	PowerOn
CTEQ					
-	-	0	0	2	7/2

Description:

0: It is not possible to influence the parameter set change.

For axes and spindles in axis mode: the first parameter set is always active. For spindles the parameter set is set to match the gear stage (1st gear stage uses the 2nd parameter set) Exceptions: see below

1: The parameter set applied in the servo is specified via the VDI interface or SCPARA. Parameter sets 1 to 6 can be selected. Sets are selected by means of NC/PLC interface signal <closed-loop controller parameter set1A-C/> (closed-loop controller parameter set1 A-C) in the binary-coded value range 0...5. Binary values 6 and 7 select parameter set no. 6. Exceptions: see below.

For 0 and 1:

With G33, G34, G35, G331, G332, the number of the parameter set for the involved axes is ativated according to the master spindle gear stage, increased by one (corresponds to set of parameters number 2..6).

For spindles, parameter sets 2 to 6 are always active, depending on the set gear stage plus one.

2: the parameter set is specified exclusively by the VDI interface or SCPARA. Parameter sets 1 to 6 can be selected. Sets are selected by means of NC/PLC interface signal <closed-loop controller parameter set1A-C/> (closed-loop controller parameter set1 A-C) in the binary-coded value range 0...5. Binary values 6 and 7 select parameter set no. 6.

Secondary conditions:

Changing a parameter set at which the load gearbox factors differ between the active and the new parameter set, will result in a reset of the referenced signal, provided that the axis has an indirect measuring system.

A parameter set switchover with the load gear factors differing in the active and the new parameter set causes the referenced signal to be reset, if the axis has an indirect measuring system.

The parameter set contains the following axial machine data:

$MA_AX_VELO_LIMIT
$MA_POSCTRL_GAIN
$MA_EQUIV_CURRCTRL_TIME
$MA_EQUIV_SPEEDCTRL_TIME
$MA_DYN_MATCH_TIME
$MA_DRIVE_AX_RATIO_DENOM
$MA_DRIVE_AX_RATIO_NUMERA

Related to:

NC/PLC interface signals (Regler-Parametersatz1 A-C) und <Regler-Parametersatz2A-C/> (Regler-Parametersatz2 A-C)

References:

/FB/, H2, "Output of Auxiliary Functions to PLC"

1.5.6 Monitoring functions

36000	STOP_LIMIT_COARSE			A05	B1
mm, degrees	Exact stop coarse			DOUBLE	NEW CONF
-					
-	-	0.04,0.04,0.04,0.04,0.04,0.04,0.04...	-	-	7/2

Description: Treshold for exact stop coarse

An NC block is considered as terminated if the actual position of the path axes is away from the setpoint position by the value entered for the exact stop limit. If the actual position of a path axis is not within this limit, the NC block is considered as not terminated and further part program execution is not possible. The magnitude of the value entered influences the transition to the next block. The larger the value, the earlier the block change is initiated.

If the specified exact stop limit is not reached

- the block is considered as not terminated,
- further traversing of the axis is not possible,
- alarm 25080 Positioning monitoring is output after expiry of the time specified in MD: POSITIONING_TIME (monitoring time for exact stop fine),
- the direction of movement +/- is indicated for the axis in the positioning display. The exact stop window is also evaluated for spindles in position control mode (SPCON instruction).

Special cases:

MD: STOP_LIMIT_COARSE must not be set smaller than MD: STOP_LIMIT_FINE (exact stop fine). To achieve the identical block change behavior as with the "exact stop fine" criterion, the window of exact stop coarse may be identical to the band of exact stop fine. MD: STOP_LIMIT_COARSE must not be set equal to or larger than MD: STANDSTILL_POS_TOL (standstill tolerance).

Related to:

MD 36020: POSITIONING_TIME (delay time, exact stop fine)

36010	STOP_LIMIT_FINE			A05	B1
mm, degrees	Exact stop fine			DOUBLE	NEW CONF
-					
-	-	0.01,0.01,0.01,0.01,0.01,0.01,0.01...	-	-	7/2

Description: Threshold for exact stop fine

Also see MD: STOP_LIMIT_COARSE (exact stop coarse)

Special cases:

MD: STOP_LIMIT_FINE must not be set larger than MD: STOP_LIMIT_COARSE (exact stop coarse).

MD: STOP_LIMIT_FINE must not be set equal to or larger than MD: STANDSTILL_POS_TOL (standstill tolerance).

Related to:

MD 36020: POSITIONING_TIME (delay time, exact stop fine)

36012	STOP_LIMIT_FACTOR			A05	B1
-	Factor for exact stop coarse/fine and standstill			DOUBLE	NEW CONF
-					
-	6	1.0, 1.0, 1.0, 1.0, 1.0, 1.0	0.001	1000.0	7/2

Description: With this factor,

MD 36000: STOP_LIMIT_COARSE,
MD 36010: STOP_LIMIT_FINE,
MD 36030: STANDSTILL_POS_TOL

can be newly assessed as a function of the parameter set. The relationship of these three values to each other always remains the same.

Application examples:

Matching the positioning behavior if the mass relationships noticeably change with a gear change, or if one wants to save on machine positioning time at the cost of accuracy in various operating conditions.

Related to:

MD 36000: STOP_LIMIT_COARSE,
MD 36010: STOP_LIMIT_FINE,
MD 36030: STANDSTILL_POS_TOL

36020	POSITIONING_TIME			A05	B1,A3
s	Delay time exact stop fine			DOUBLE	NEW CONF
-					
-	-	1.0	-	-	7/2

Description: After termination of a positioning process, the time starts within which the axis must reach the "exact stop fine".

The current following error is therefore continuously monitored for the limit value MD 36010: STOP_LIMIT_FINE. In case of timeout, alarm 25080 "Positioning monitoring" is output and the axis stopped. The MD should be selected large enough to ensure that the monitoring function is not triggered under normal operating conditions taking into account any settling times.

Related to:

MD 36010: STOP_LIMIT_FINE (exact stop fine)

36030	STANDSTILL_POS_TOL			A05	A3
mm, degrees	Standstill tolerance			DOUBLE	NEW CONF
-					
-	-	0.2,0.2,0.2,0.2,0.2,0.2,0.2,0.2,0.2...	-	-	7/2

Description: This MD serves as a tolerance band for the following monitoring functions:

- After termination of a traversing block (position partial set-point=0 at the end of the movement), the following error is monitored for reaching the limit value for STANDSTILL_POS_TOL (standstill tolerance) after the programmable STANDSTILL_DELAY_TIME (delay time, standstill monitoring).
- After termination of a positioning action (exact stop fine reached), positioning monitoring is replaced by standstill monitoring. The axis is monitored for moving more than indicated in MD: STANDSTILL_POS_TOL (standstill tolerance) from its position.

If the setpoint position is exceeded or undergone by the standstill tolerance, alarm 25040 "Standstill monitoring" is output and the axis stopped.

Special cases:

The standstill tolerance must be larger than the "exact stop limit coarse".

Related to:

MD 36040: STANDSTILL_DELAY_TIME (delay time, standstill monitoring)

36040	STANDSTILL_DELAY_TIME			A05	A3
s	Delay time for standstill monitoring			DOUBLE	NEW CONF
-					
-	-	0.4	-	-	7/2

Description: See MD 36030: STANDSTILL_POS_TOL (standstill tolerance)

Related to:

MD 36030: STANDSTILL_POS_TOL (standstill tolerance)

36042	FOC_STANDSTILL_DELAY_TIME			A05	F1
s	Delay time for standstill monit. w/ active torque or force lim.			DOUBLE	NEW CONF
-					
-	-	0.4	-	-	7/2

Description: Only for SIMODRIVE611D or PROFIdrive telegrams including a torque/force limiting value:

Waiting time between the end of a movement and activation of standstill monitoring with active torque/force limitation.

If the configurable end of block criterion occurs within this time, then standstill monitoring is activated.

36050	CLAMP_POS_TOL			A05	A3
mm, degrees	Clamping tolerance			DOUBLE	NEW CONF
-					
-	-	0.5	-	-	7/2

Description: With interface signal (Klemmvorgang läuft) wird die Klemmungsüberwachung aktiviert. Wird die überwachte Achse mehr als um die Klemmungstoleranz aus der Sollposition (Genauhaltgrenze) gedrängt, so wird der Alarm 26000 "Klemmungsüberwachung" erzeugt und die Achse stillgesetzt.

Threshold value for clamping tolerance (half width of window).

Special cases:

The clamping tolerance must be larger than the "exact stop limit coarse".

Related to:

IS (Klemmvorgang läuft)

36052	STOP_ON_CLAMPING			A10	-
-	Special functions with clamped axis			BYTE	NEW CONF
CTEQ					
-	-	0	0	0x07	2/1

Description: This MD defines how a blocked axis is taken into account.

Bit 0 =0:

If a blocked axis is to be traversed again in continuous-path mode, it must be ensured via the part program that the path axes are stopped and that there is time for releasing the blockage.

Bit 0 =1:

If a blocked axis is to be traversed again in continuous-path mode, the LookAhead function stops the path motion if required until the position controller is allowed to traverse the blocked axis again, i.e. until the controller enable is set again.

Bit 1 is relevant only if bit 0 is set:

Bit 1 =0:

If a blocked axis is to be traversed again in continuous-path mode, the LookAhead function does not release the blockage.

Bit 1 =1:

If a blocked axis is to be traversed again in continuous-path mode, a traversing command for the blocked axis is given in the preceding G0 blocks so that the PLC releases the axis blockage again.

Bit 2 =0:

If an axis is to be blocked in continuous-path mode, it must be ensured in the part program that the path axes are stopped to make sure that there is time for setting the blockage.

Bit 2 =1:

If an axis is to be blocked in continuous-path mode, the LookAhead function stops the path motion prior to the next non-G0 block, if the axis has not yet been blocked by that time, i.e. the PLC has not yet set the feedrate override to zero.

36060	STANDSTILL_VELO_TOL			A05, A04	A2
mm/min, rev/min	Threshold velocity/speed 'Axis/spindle in stop'			DOUBLE	NEW CONF
-					
-	-	5.00,5.00,5.00,5.00,5.00,5.00,5.00...	-	-	7/2

Description: This MD defines the standstill range for the axis velocity / spindle speed. If the current actual velocity of the axis or the actual speed of the spindle is smaller than the value entered in this MD, the NC/PLC interface signal (Achse/Spindel steht) gesetzt.

To bring the axis/spindle to a standstill under control, the pulse enable should not be removed until the axis/spindle is at a standstill. Otherwise the axis would coast down.

Related to:

IS (Achse/Spindel steht)

36100	POS_LIMIT_MINUS			A03, A05, A11, -	A3
mm, degrees	1st software limit switch minus			DOUBLE	NEW CONF
CTEQ					
-	-	-1.0e8	-	-	7/2

Description: Same meaning as 1st software limit switch plus, but the traversing range limitation is in the negative direction.

The MD becomes active after reference point approach if PLC interface signal (2. Softwareendschalter Minus) nicht gesetzt ist.

MD irrelevant:

if axis is not referenced.

Related to:

IS (2. Softwareendschalter Minus)

The MD can be activated with SW 5.3 newconf and later, i.e. a new setting of the MD via programming can be activated with NEWCONF.

36110	POS_LIMIT_PLUS			A03, A05, A11, -	A3
mm, degrees	1st software limit switch plus			DOUBLE	NEW CONF
CTEQ					
-	-	1.0e8	-	-	7/2

Description: A software limit switch can be activated in addition to a hardware limit switch. The absolute position in the machine axis system of the positive range limit of each axis is entered.

The MD is active after reference point approach if NC/PLC interface signal (2. Softwareendschalter Plus) nicht gesetzt ist.

MD irrelevant:

if axis is not referenced.

Related to:

IS (2. Softwareendschalter Plus)

The MD can be activated with SW 5.3 newconf and later, i.e. a new setting of the MD via programming can be activated with NEWCONF.

36120	POS_LIMIT_MINUS2			A03, A05, -	A3
mm, degrees	2nd software limit switch minus			DOUBLE	NEW CONF
CTEQ					
-	-	-1.0e8	-	-	7/2

Description: Same meaning as 2nd software limit switch plus, but the traversing range limitation is in the negative direction.

Whether software limit switch 1 or 2 is to be active can be selected by the PLC via interface signal.

For example:

= 0 (1. Softwareendschalter minus) für 1. Achse aktiv

= 1 (2. Softwareendschalter minus) für 1. Achse aktiv

MD irrelevant:

if axis is not referenced.

Related to:

IS (2. Softwareendschalter Minus)

The MD can be activated with SW 5.3 newconf and later, i.e. a new setting of the MD via programming can be activated with NEWCONF.

36130	POS_LIMIT_PLUS2			A03, A05, -	A3
mm, degrees	2nd software limit switch plus			DOUBLE	NEW CONF
CTEQ					
-	-	1.0e8	-	-	7/2

Description: With this machine data, a 2nd software limit switch position in the positive direction can be defined. An interface signal from the PLC can select which of the two software limit switches 1 or 2 is to be active.

For example:

= 0 (1. Softwareendschalter plus) für 1. Achse aktiv

= 1 (2. Softwareendschalter plus) für 1. Achse aktiv

MD irrelevant:

if axis is not referenced.

Related to:

IS (2. Softwareendschalter Plus)

The MD can be activated with SW 5.3 newconf and later, i.e. a new setting of the MD via programming can be activated with NEWCONF.

36200	AX_VELO_LIMIT			A05, A11, A04	A3,G2
mm/min, rev/min	Threshold value for velocity monitoring			DOUBLE	NEW CONF
CTEQ					
-	6	11500., 11500., 11500., 11500., 11500., 11500.	-	-	7/2

Description: The threshold value for actual velocity monitoring is entered in this machine data.

If the axis has at least one active encoder and if this encoder is below its limit frequency, alarm 25030 "Actual velocity alarm limit" is triggered when the treshold value is exceeded and the axis stopped.

Settings:

- For axes, a value should be selected that is 10 to 15 % higher than that of MD: MAX_AX_VELO (maximum axis velocity). With active temperature compensation MD: TEMP_COMP_TYPE, the maximum axis velocity is increased by an additional factor which is determined by MD: COMP_ADD_VELO_FACTOR (velocity overshoot through compensation). The following should therefore apply to the velocity monitoring threshold value:

  MD: AX_VELO_LIMIT[n] > MD: MAX_AX_VELO * (1.1 ... 1.15 + MD: COMP_ADD_VELO_FACTOR)
- For spindles, a value should be selected for each gear stage that is 10 to 15 % higher than that of MD: GEAR_STEP_MAX_VELO_LIMIT[n] (maximum speed of gear stage).

36210	CTRLOUT_LIMIT			EXP, A05	G2
%	Maximum speed setpoint			DOUBLE	NEW CONF
CTEQ					
-	1	110.0	0	200	7/2

Description: This MD defines the maximum speed setpoint in percent. 100% means maximum speed setpoint, correspondingly 10V for analog interfac or maximum speed for SIMODRIVE611D (compare 611D MD 1401: MOTOR_MAX_SPEED) or maximum speed for PROFIdrive drives (manufacturer-specific setting parameter in the drive, e.g. p1082 for SINAMICS).

The maximum speed setpoint depends on possibly available setpoint limitations in the speed and current controller.

An alarm is output and the axis stopped when the limit is exceeded.

The limit is to be selected in such a way that the maximum velocity (rapid traverse) can be reached and an appropriate additional control margin is available.

36220	CTRLOUT_LIMIT_TIME			EXP, A05	A3
s	Delay time for speed setpoint monitoring			DOUBLE	NEW CONF
-					
-	1	0.0	-	-	7/2

Description: This MD defines how long the speed setpoint may be within the limit CTRLOUT_LIMIT[n] (max. speed setpoint) until the monitoring function is triggered.

Monitoring (and with it also this machine data) is always active.

Reaching the limit renders the position control loop non-linear, which results in contour errors provided that the speed setpoint limited axis is participating in contour generation. That is why this MD has default value 0, i.e. the monitoring function responds as soon as the speed setpoint reaches the limit.

36300	ENC_FREQ_LIMIT			EXP, A02, A05, A06	A3
-	Encoder limit frequency			DOUBLE	PowerOn
-					
-	2	3.0e5, 3.0e5	-	-	7/2

Description: This MD is used to enter the encoder frequency, which,

in general, is a manufacturer specification (type plate, documentation).

For SIMODRIVE611D:

If the limit frequency of the encoder is higher than that of the measuring circuit module, the limit is internally reduced to the value of the measuring circuit module.

For PROFIdrive:

No automatic, software-internal limitation for encoders on the PROFIdrive drive; here, the limit values of the measuring circuit module depend on the drive hardware used, i.e. known only by the drive. Therefore, it is the user who is responsible for taking into account the limit frequency of the measuring circuit module.

Special case SIMODRIVE611D:

When asynchronous motors are used in conjunction with digital main spindle drives, all encoders are evaluated by the NC (in contrast to the drive) up to their configured limit frequency. Already at the changeover speed MD1465, the drive itself changes from MSD mode to "encoderless" AM mode.

If the evaluation of the motor encoder through the NC is to be interrupted also at this drive-end-configured changeover speed, MD 36300 must be assigned for this encoder with the changeover speed MD1465 converted into [Hz] as the default value.

Conversion formula: MD 36300 = MD 31020 * MD 1465 / 60.0

36302	ENC_FREQ_LIMIT_LOW			EXP, A02, A05, A06	A3
%	Encoder limit frequency for new encoder synchronization.			DOUBLE	NEW CONF
-					
-	2	99.9, 99.9	0	100	7/2

Description: Encoder frequency monitoring uses a hysteresis.

MD 36300: ENC_FREQ_LIMIT defines the encoder limit frequency. When this frequency is exceeded, the encoder is switched off. When the frequency defined in ENC_FREQ_LIMIT_LOW is undergone, the encoder is switched on again.

ENC_FREQ_LIMIT is entered directly in Hertz. ENC_FREQ_LIMIT_LOW, however, is a fraction of ENC_FREQ_LIMIT in percent.

MA_ENC_FREQ_LIMIT_LOW is therefore already correctly preset for most of the encoders used.

Exception: In the case of absolute encoders with En-Dat interface the limit frequency of the absolute track is possibly considerably lower than the limit frequency of the incremental track. With a small value in ENC_FREQ_LIMIT_LOW you can in this case set, that the encoder is not switched on again until the limit frequency of the absolute track is undergone and that it therefore does not reference until the absolute track allows it. For spindles, this referencing is carried out automatically.

Example EnDat encoder EQN 1325:

Limit frequency of the electronics of the incremental track: 430 kHz

===> ENC_FREQ_LIMIT = 430 kHz

Limit frequency of the absolute track approx. 2000 encoder revs/min at 2048 increments/encoder rev., i.e. encoder frequency 2000/60 * 2048 Hz = 68 kHz

===> ENC_FREQ_LIMIT_LOW = 68/430 = 15%

36310	ENC_ZERO_MONITORING			EXP, A02, A05	A3
-	Zero mark monitoring			DWORD	NEW CONF
-					
-	2	0, 0	-	-	7/2

Description: This MD is used to activate zero mark monitoring.

For SIMODRIVE611D:

0: no zero mark monitoring, but supply of the corresponding diagnostics system variables.

100: no zero mark monitoring as well as suppression of all encoder monitoring operations (i.e. besides alarm 25020, alarms 25000, 25010, etc. are also completely suppressed) and no supply of the corresponding diagnostics system variables.

>0: for incremental measuring systems:

number of detected zero mark errors at which monitoring is to be triggered (alarm output)

for absolute measuring systems ($MA_ENC_TYPE=4):

permissible deviation in 1/2 coarse increments between the absolute and the incremental encoder track (one 1/2 coarse increment is sufficient).

>0: for absolute SSI measuring systems ($MA_ENC_TYPE=5):

with SSI encoders there is no zero mark monitoring in the actual sense. However, there are encoder types with laser beam measurement, where an encoder error message can easily occur due to a beam interruption. To ensure that the control must not be switched off and on every time with such encoders, you can switch over to alarm 25010 (pollution of measuring system, reset alarm) instead of standard Power On alarm 25000 (i.e. zero mark monitoring is not possible with this MD on SSI encoders, but the MD is used for alarm reconfiguration in case of encoder errors).

For PROFIdrive drives (currently generally no supply of the corresponding diagnostics system variables):

for PROFIdrive the permissible deviation must be set in the drive, *not* in the NC. Zero mark monitoring reported by the drive is mapped to the NCK according to the following rule:

0: no zero mark monitoring

100: no zero mark monitoring as well as suppression of all encoder monitoring operations, i.e. besides alarm 25020 also alarms 25000, 25010 etc. are suppressed).

>0 but smaller than 100: direct triggering of power ON alarm 25000 (or 25001).

>100: attenuated error message: instead of power ON alarm 25000 (25001) reset alarm 25010 (25011) is output.

36312	ENC_ABS_ZEROMON_WARNING			EXP, A02, A05	A3
-	Zero mark monitoring warning level			DWORD	NEW CONF
-					
-	2	10, 10	-	-	7/2

Description: Only for absolute measuring systems ($MA_ENC_TYPE=4):

This MD activates zero mark diagnostics.

0: no zero mark diagnostics

>0: permissible deviation in 1/2 coarse increments between the absolute and the incremental encoder track (one 1/2 coarse increment is sufficient).

36314	ENC_ABS_ZEROMON_INITIAL			EXP, A02, A05	A3
-	Warning level for absolute encoder power ON			DWORD	NEW CONF
-					
-	2	1000, 1000	-	-	7/2

Description: Only for absolute measuring systems ($MA_ENC_TYPE=4):

Parameterization in 1/2 coarse increments

At absolute encoder power ON (deselect parking and similar) this MD parameterizes the previously permissible position offset (comparison of the new absolute position with the information last saved in SRAM). When the warning level is exceeded, system variable $VA_ENC_ZERO_MON_ERR_CNT is incremented in coarse increments by the value 10000.

36316	ENC_ZEROMON_SYSVAR_CTRL			EXP, A02, A05	A3
-	Activation of system variables with zero monitoring			DWORD	NEW CONF
-					
-	2	0, 0	-	-	7/2
710-6a2c	-	-	-	-	0/0
710-31a10c	-	-	-	-	0/0
720-6a2c	-	-	-	-	0/0
720-31a10c	-	-	-	-	0/0
730-6a2c	-	-	-	-	0/0
730-31a10c	-	-	-	-	0/0

Description: For SIMODRIVE611D only:

For incremental or distance-coded measuring systems only:

With this MD you can switch on the supply of computing-time intensive system variables for zero monitoring.

Meaning of the set bits:

Bit 0: activation of $VA_ENC_ZERO_MON_ACCESS_CNT

36400	CONTOUR_TOL		A05, A11	A3
mm, degrees	Tolerance band for contour monitoring		DOUBLE	NEW CONF
-				
-	-	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	-	-	7/2

Description: Tolerance band for axial contour monitoring (dynamic following error monitoring).

The permissible deviation between the real and the modelled following error is entered in this MD.

The input of the tolerance band is intended to avoid spurious tripping of the dynamic following error monitoring through slight speed fluctuations, which occur during normal closed-loop control operations (e.g. during first cut).

Following error modelling and thus the input of this MD depends on the position control gain MD: POSCTRL_GAIN and, in the case of precontrol or simulation, on the accuracy of the controlled system model MD: EQUIV_SPEEDCTRL_TIME (equivalent time constant for precontrol of speed control loop), as well as on the accelerations and velocities used.

36500	ENC_CHANGE_TOL			A02, A05	G2
mm, degrees	Tolerance at actual position value change.			DOUBLE	NEW CONF
-					
-	-	0.1	-	-	7/2

Description: The permissible deviation between the actual values of the two measuring systems is entered in this MD.

This difference must not be exceeded when switching over the measuring system used for closed-loop control, in order to avoid compensating processes that are too strong. Otherwise, the error message 25100 "Axis %1 Switchover of measuring system not possible" is generated and the switchover does not take place.

MD irrelevant for:

MD 30200: NUM_ENCS = 0 or 1.

36510	ENC_DIFF_TOL			A02, A05	G2
mm, degrees	Tolerance of measuring system synchronization			DOUBLE	NEW CONF
-					
-	-	0.0	-	-	7/2

Description: Permissible deviation between the actual values of the two measuring systems. This difference must not be exceeded during the cyclic comparison of the two measuring systems used, as otherwise error message 25105 (measuring systems deviate) would be generated.

The corresponding monitoring function is not active

- with MD input value=0,
- if less than 2 measuring systems are active/available in the axis
- or if the axis has not been referenced (at least act. closed-loop control meas. system).

With modulo axes, it is always the absolute value of the shortest/direct position difference that is monitored.

36520	DES_VELO_LIMIT			A02, A05	DA
%	Threshold for setpoint velocity monitoring			DOUBLE	NEW CONF
-					
-	-	125.0	-	-	7/2

Description: Maximum permissible setpoint velocity in percent of the maximum axis/spindle velocity.

With $MA_DES_VELO_LIMIT, the position setpoint is monitored for abrupt changes. If the permissible limit value is exceeded, alarm 1016 error code 550010 is output.

With axes, this machine data refers to $MA_MAX_AX_VELO.

With spindles, the MD refers to the smaller one of the set velocities

$MA_GEAR_STEP_MAX_VELO_LIMIT of the current gear stage or $MA_SPIND_VELO_LIMIT.

36600	BRAKE_MODE_CHOICE			EXP, A05	A3
-	Deceleration response on hardware limit switch			BYTE	PowerOn
CTEQ					
-	-	1	0	1	7/2

Description: If a rising edge of the axis-specific hardware limit switch is detected while the axis is traversing, the axis is braked immediately.

The type of braking is determined via this machine data:

Value = 0:

Controlled braking along the acceleration ramp defined by MD: MAX_AX_ACCEL (axis acceleration).

Value = 1:

Rapid braking (selection of setpoint = 0) with reduction of following error.

Related to:

IS (Hardwareendschalter plus/minus)

36610	AX_EMERGENCY_STOP_TIME			A05, -	A3
s	Maximum time for braking ramp in case of error.			DOUBLE	NEW CONF
-					
-	-	0.05	-	-	7/2

Description: This MD is used to enter the time of the braking ramp in case of errors (e.g. emergency stop) that a spindle requires to brake from maximum speed to standstill. From smaller velocities/speeds standstill is thus reached earlier with the same lead/brake acceleration.

Mechanically robust axes are normally stopped abruptly with speed setpoint 0; in such cases, values in the lower ms range are appropriate (default setting).

However, spindles often have to consider high moving masses or limited mechanical conditions (e.g. gear load capacity). A longer braking ramp through MD change will be required for this.

Notice:

- With interpolating axis/spindle links it is not guaranteed that the contour or link is respected during the braking operation.
- If the time of the braking ramp in case of errors is set too large, controller enable will be removed although the axis/spindle is still moving. Depending on the drive type used as well as the activation of the pulse enable, either an immediate stop with speed setpoint 0 would be initiated or the axis/spindle would coast down weakly. That is why the time in MD AX_EMERGENCY_STOP_TIME should be selected smaller than the time in MD 36620: SERVO_DISABLE_DELAY_TIME (cutout delay, controller enable), so that the braking ramp configured can be fully active throughout the entire braking operation.
- The braking ramp might be ineffective or not respected, if the active drive follows its own braking ramp logic (e.g. SINAMICS).

Related to:

MD 36620: SERVO_DISABLE_DELAY_TIME (cutout delay controller enable)

MD 36210: CTRLOUT_LIMIT (maximum speed setpoint)

36620	SERVO_DISABLE_DELAY_TIME		A05, -	A2
s	Cutout delay servo enable		DOUBLE	NEW CONF
-				
-	- 0.1	-	-	7/2

Description: Maximum time delay for removal of "controller enable" after faults. The speed enable (controller enable) of the drive is removed within the control after the set delay time at the latest.

The delay time entered is active as a result of the following events:

- in case of errors that lead to immediate stopping of the axes
- if the interface signal is removed by the PLC (Reglerfreigabe) weggenommen wird

As soon as the actual speed reaches the standstill range (MD 36060: STANDSTILL_VELO_ TOL) the "controller enable" for the drive is removed. The time should be set large enough to enable the axis / spindle to brake down to standstill from maximum traversing velocity or maximum speed. If the axis / spindle is stationary, the "controller enable" for the drive is removed immediately (i.e. the time defined in MD: SERVO_DISABLE_DELAY_TIME is terminated ahead of schedule).

Application example(s):

Speed control of the drive should be retained long enough to enable the axis / spindle to brake down to standstill from maximum traversing velocity or maximum speed.

Notice:

If the cutout delay controller enable is set too small, controller enable will be removed although the axis/spindle is still moving. This axis/spindle then coasts down powerlessly (which might be reasonable with grinding wheels, for example); otherwise the time SERVO_DISABLE_DELAY_TIME should be set larger than the duration of the braking ramp in case of errors (MD: AX_EMERGENCY_STOP_TIME).

Related to:

IS (Reglerfreigabe)

MD: AX_EMERGENCY_STOP_TIME

36690	AXIS_DIAGNOSIS		EXP, A08	-
-	Internal data for test purposes		DWORD	PowerOn
NBUP				
-	- 0	-	-	0/0

Description: Internal data for test purposes

0: :Basic setting

Bit 0 (LSB) = 1 :For test case task.exp (for alarm SCAL_WARN_VEL)

Bit 1 = 1 :For test case brake test

- ACT_POS_ABS for ENC-SIM on HOST
- Additional error information in $VA_FXS_INFO

Bit 2 = 1 :For travel to fixed stop - preliminary

- Allow rapid braking for linked axes

Bit 3 = 1 :For travel to fixed stop - preliminary

- Consider inversion of direction when switching off rapid braking for linked axes

36700	DRIFT_ENABLE		EXP, A07, A09	K3
-	Automatic drift compensation		BOOLEAN	NEW CONF
-				
-	- FALSE	-	-	1/1

Description: Only for special analog and hydraulic drives (not active with digital SIMODRIVE611D or PROFIdrive drives):

With MD: DRIFT_ENABLE the automatic drift compensation is activated.

1: Automatic drift compensation active (only for position-controlled axes/spindles).

During automatic drift compensation, the control permanently calculates during axis standstill the additional drift value still required to ensure that the following error reaches value 0 (compensation criterion). The total drift value is therfore formed by the drift basic value (MD:DRIFT_VALUE) and the drift additional value.

0: Automatic drift compensation not active.

The drift value is formed only from the drift basic value (MD: DRIFT_VALUE).

MD irrelevant to:

Non-position-controlled spindles

Related to:

MD: DRIFT_LIMIT drift limit value for automatic drift compensation

MD: DRIFT_VALUE drift basic value

36710	DRIFT_LIMIT		EXP, A07, A09	K3
%	Drift limit value for automatic drift compensation		DOUBLE	NEW CONF
-				
-	1 0.0	0	1.e9	1/1

Description: Only for special analog and hydraulic drives (inactive with digital SIMODRIVE611D or PROFIdrive drives):

With MD: DRIFT_LIMIT, the magnitude of the drift additional value calculated during automatic drift compensation can be limited.

If the drift additional value exceeds the limit value entered in MD: DRIFT_LIMIT, alarm 25070 "Drift value too large" is output and the drift additional value is limited to this value.

MD irrelevant to:

MD: DRIFT_ENABLE = 0

36720	DRIFT_VALUE			EXP, A07, A09	K3
%	Basic drift value			DOUBLE	NEW CONF
-					
-	1	0.0	-	-	1/1

Description: Only for special analog and hydraulic drives (not with digital SIMODRIVE611D drives - digital drives do not have a drift):

The value entered in MD: DRIFT_VALUE is always added as an offset to the manipulated variable. While the automatic drift compensation is active only for position-controlled axes, this machine data is always active.

Special case: the following applies to PROFIdrive drives:

The present MD can be used also for "simple" drives that have drift problems due to drive-internal implementation as analog drive. To avoid erroneous settings, this static drift compensation only becomes active with PROFIdrive, if $MA_RATED_OUTVAL != 0 (i.e. the MD has no effect for automatic interface adjustment between the NC and the drive).

Note:

If the DSC function ($MA_STIFFNESS_CONTROL_ENABLE=1) is used, drift compensation is not allowed to be active; otherwise, unexpected speed oscillations will occur when DSC is enabled/ disabled.

Standardization: the input value refers to the interface standardization according to

$MA_RATED_OUTVAL,

$MA_RATED_VELO as well as

$MA_CTRLOUT_LIMIT.

36730	DRIVE_SIGNAL_TRACKING			A10	S5
-	Acquisition of additional drive actual values			BYTE	PowerOn
-					
-	-	0	0	4	7/2

Description: With MD: DRIVE_SIGNAL_TRACKING = 1, the acquisition of the following drive actual values is activated:

For SIMODRIVE611D or PROFIdrive:

- $AA_LOAD Drive load
- $AA_POWER Drive active power
- $AA_TORQUE Drive torque setpoint
- $AA_CURR Smoothed current setpoint (q-axis current) of drive

With SIMODRIVE611D the drive provides the mentioned values automatically.

Mit MD: DRIVE_SIGNAL_TRACKING = 2 acquisition of the following actual drive values is activated:

With PROFIdrive it must be ensured that the mentioned values are also transmitted in the drive actual message frame (provide sufficient message frame length on the bus, assign the values to the message frame contents in the drive, ee.g. use telegram 116.).

- $VA_DP_ACT_TEL shows actual value message frame words

36750	AA_OFF_MODE			A10	FBSY
-	Effect of value assignment for axial override of synchr. action.			BYTE	PowerOn
CTEQ					
-	-	0	0	7	7/2

Description: Mode setting for axial offset $AA_OFF

Bit 0: Effect of value assignment within a synchronized action

0: Absolute value

1: Incremental value (integrator)

Bit 1: Response of $AA_OFF on RESET

0: $AA_OFF is deselected on RESET

1: $AA_OFF is retained beyond RESET

Bit 2: $AA_OFF in JOG mode

0: No superimposed motion due to $AA_OFF

1: A superimposed motion due to $AA_OFF is interpolated

1.5.7 Safety Integrated

36901	SAFE_FUNCTION_ENABLE			A05, -	FBSI
-	Enable safety functions			DWORD	PowerOn
-					
-	-	0	0	0xFFFB	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: The safe operation functions can be enabled for an axis/spindle with this data.

For each axis, only as many axes/spindles can be enabled for safe operation as are enabled by the global option.

The more sub-functions are set, the more CPU time the safety functions need.

Bit 0: Enables safe velocity, safe operational stop

Bit 1: Enables safe limit switch

Bit 2: Reserved for functions with absolute references (such as SE/SN)

Bit 3: Enables actual value synchronization, 2 encoder system

Bit 4: Enables external ESR activation

Bit 5: Enables SG offset

Bit 6: Enables external stop requests

Bit 7: Enables cam synchronization

Bit 8: Enables safe cams, pair 1, cam +

Bit 9: Enables safe cams, pair 1, cam -

Bit 10: Enables safe cams, pair 2, cam +

Bit 11: Enables safe cams, pair 2, cam -

Bit 12: Enables safe cams, pair 3, cam +

Bit 13: Enables safe cams, pair 3, cam -

Bit 14: Enables safe cams, pair 4, cam +

Bit 15: Enables safe cams, pair 4, cam -

Special cases:

- When one of the bits from bit 1 is set then bit 0 must also be set because the control switches to safe operational stop with STOP C, D, E (parameter alarm 27033 is displayed if there is an error).
- If global option does not enable enough axes/spindles for safe operation then this data can be overwritten with the value 0 during power on.

Related to: Global option

References: /FBSI/, SINUMERIK SAFETY INTEGRATED

36902	SAFE_IS_ROT_AX			A01, A05, A06, -	FBSI
-	Rotary axis			BOOLEAN	PowerOn
-					
-	-	FALSE	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: States whether the axis for safe operation is a rotary axis/spindle or a linear axis.

0: Linear axis

1: Rotary axis/spindle

The value in this MD must be equal to that in MD $MA_IS_ROT_AX. A parameterization error is displayed if there is a difference.

36903	SAFE_CAM_ENABLE			A05, -	-
-	Function enable safe cam track			DWORD	PowerOn
-					
-	-	0	0	0x3FFFFFFF	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Function enables of safe cam track for "Safety Integrated".

Bit 0: Enables safe cam track, cam 1

Bit 1: Enables safe cam track, cam 2

Bit 2: Enables safe cam track, cam 3

Bit 3: Enables safe cam track, cam 4

Bit 4: Enables safe cam track, cam 5

Bit 5: Enables safe cam track, cam 6

Bit 6: Enables safe cam track, cam 7

Bit 7: Enables safe cam track, cam 8

Bit 8: Enables safe cam track, cam 9

Bit 9: Enables safe cam track, cam 10

Bit 10: Enables safe cam track, cam 11

Bit 11: Enables safe cam track, cam 12

Bit 12: Enables safe cam track, cam 13

Bit 13: Enables safe cam track, cam 14

Bit 14: Enables safe cam track, cam 15

Bit 15: Enables safe cam track, cam 16

Bit 16: Enables safe cam track, cam 17

Bit 17: Enables safe cam track, cam 18

Bit 18: Enables safe cam track, cam 19

Bit 19: Enables safe cam track, cam 20

Bit 20: Enables safe cam track, cam 21

Bit 21: Enables safe cam track, cam 22

Bit 22: Enables safe cam track, cam 23

Bit 23: Enables safe cam track, cam 24

Bit 24: Enables safe cam track, cam 25

Bit 25: Enables safe cam track, cam 26

Bit 26: Enables safe cam track, cam 27

Bit 27: Enables safe cam track, cam 28

Bit 28: Enables safe cam track, cam 29

Bit 29: Enables safe cam track, cam 30

36905	SAFE_MODULO_RANGE			A02, -	FBSI
degrees	Modulo value Safe cams			DOUBLE	PowerOn
-					
-	-	0.0	0.0	737280.0	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Actual value range in which the safe cams are calculated for rotary axes. The axis must be a rotary axis ($MA_SAFE_IS_ROT_AX = 1).

0: Modulo compensation after +/- 2048 revolutions (that is after 737,280 degrees)

>0: And multiples of 360 degrees: Modulo compensation after this value, for example: value = 360 --> then the actual value range lies between 0 and 359.999 degrees. That is modulo compensation is made after each revolution.

Special cases:

- If the value of this data is not 0 or a multiple of 360 degrees then a corresponding alarm is issued during power on.
- The parameterized actual value ranges of the cam positions are also checked during power on. A corresponding alarm is issued if there is a parameterization error.
- The actual value ranges set by $MA_SAFE_MODULO_RANGE and $MA_MODULO_RANGE must be integers and divisible without a remainder.

Related to:

MD 30330: $MA_MODULO_RANGE

MD 36935: $MA_SAFE_CAM_POS_PLUS[n]

MD 36937: $MA_SAFE_CAM_POS_MINUS[n]

36906	SAFE_CTRLOUT_MODULE_NR			A01, A05, -	-
-	SI drive assignment			BYTE	PowerOn
-					
-	-	1,2,3,4,5,6,7,8,9,10,11, 12,13,14,15,16,17,18...	1	31	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Index into the data field $MN_SAFE_DRIVE_LOGIC_ADDRESS for assigning the drive for the SI motion monitoring.

The drive assigned must be same as that selected via CTRLOUT_MODULE_NR and DRIVE_LOGIC_ADDRESS.

36907	SAFE_DRIVE_PS_ADDRESS			A01, A05, -	-
-	PROFIsafe address of the drive			DWORD	PowerOn
-					
-	-	0	-	-	7/RO
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This NCK MD contains the PROFIsafe address of the drive asigned to this axis. This MD is read out during the power on of the drive. This address must be unique across all axes.

This MD cannot be written, the PROFIsafe address must be parameterized in the drive.

The value of this MD is included in the calculation of MD $MA_SAFE_ACT_CHECKSUM[1].

36910	SAFE_ENC_SEGMENT_NR			EXP, A01, A02, A05, -	FBSI
-	Actual value assignment: type of drive			BYTE	PowerOn
-					
-	-	5	5	5	0/0
710-6a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
720-6a2c	-	-	-	-	-1/-
720-31a10c	-	-	-	-	-1/-
730-6a2c	-	-	-	-	-1/-
730-31a10c	-	-	-	-	-1/-
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Number of the bus segment over which the SI encoder is addressed.

0: Local bus

1: Drive bus SIMODRIVE611D (1st DCM)

2: MERKUR local P-bus

3: Drive bus SIMODRIVE611D (2nd DCM)

4: Reserved (virtual buses)

5: PROFIBUS DP

Safety functions are only possible with SIMODRIVE611D or suitable PROFIBUS drives, see also MD 30210

36911	SAFE_ENC_MODULE_NR			A01, A02, A05, -	FBSI
-	Actual value assignment: drive number/measurement circuit number			BYTE	PowerOn
-					
-	-	1,2,3,4,5,6,7,8,9,10,11, 12,13,14,15,16,17,18...	1	31	7/2
710-6a2c	-	0,0,0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0,0,0,0,0,0,0,0, 0...	0	0	-1/-
710-31a10c	-	0,0,0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0,0,0,0,0,0,0,0, 0...	0	0	-1/-
720-6a2c	-	0,0,0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0,0,0,0,0,0,0,0, 0...	0	0	-1/-
720-31a10c	-	0,0,0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0,0,0,0,0,0,0,0, 0...	0	0	-1/-
730-6a2c	-	0,0,0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0,0,0,0,0,0,0,0, 0...	0	0	-1/-
730-31a10c	-	0,0,0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0,0,0,0,0,0,0,0, 0...	0	0	-1/-
840disl-6a	-	0,0,0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0,0,0,0,0,0,0,0, 0...	0	0	-1/-
840disl-20a	-	0,0,0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0,0,0,0,0,0,0,0, 0...	0	0	-1/-

Description: Module number within a segment by which the SI encoder is addressed.

The logical drive number of the drive assigned to the axis by $MN_DRIVE_LOGIC_NR must be entered here.

In the standard case with a 2 encoder system, the encoder for Safety Integrated is connected to the second encoder connection (lower input) of the same drive submodule.

Special cases:

Any actual value input in the SIMODRIVE611D grouping can be used as the NC-side measuring system for the second encoder.

Related to:

MD 36910: $MA_SAFE_ENC_SEGMENT_NR

MD 36912: $MA_SAFE_ENC_INPUT_NR

MD 13010: $MN_DRIVE_LOGIC_NR

36912	SAFE_ENC_INPUT_NR			A01, A02, A05, -	FBSI
-	Actual value assignm.: Input on drive module/meas. circuit board			BYTE	PowerOn
-					
-	-	1	1	3	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Number of the actual value input of a submodule over which the SI encoder is addressed.

1: SI encoder is connected to the upper input (motor encoder)

2: SI encoder is connected to the lower input (2nd encoder)

In the standard case with a 2 encoder system, the encoder for Safety Integrated is connected to the second encoder connection (lower input) of the same drive submodule.

Special cases:

Any actual value input in the SIMODRIVE611D grouping can be used as the NC-side measuring system for the second encoder.

Related to:

MD 36911: $MA_SAFE_ENC_MODULE_NR

36914	SAFE_SINGLE_ENC			A01, A02, A05, -	-
-	SI single-encoder system			BOOLEAN	PowerOn
-					
-	-	TRUE	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Identifier that SI is carried out with an encoder. This MD must be parameterized to 0 if different encoders are used for the Safety Integrated monitoring functions in the NCK and in the drive.

36915	SAFE_ENC_TYPE			A01, A02, A05, -	FBSI
-	Encoder type			BYTE	PowerOn
-					
-	-	0	0	4	7/2
710-6a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
720-6a2c	-	-	-	-	-1/-
720-31a10c	-	-	-	-	-1/-
730-6a2c	-	-	-	-	-1/-
730-31a10c	-	-	-	-	-1/-
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Definition of the type of SI encoder connected.

0: Simulation

1: Raw signal generator (voltage, current, EXE, etc.) -> high resolution

2: Rectangular signal encoder (standard, quadruplication of increments)

3: Encoder for stepper motor (only for MERKUR)

4: EnDat absolute encoder

5: SSI encoder (synchronous serial interface) only for Merkur, see also MD 30240

- The coding of the value corresponds to the data $MA_ENC_TYPE.

Related to:

MD 30240: $MA_ENC_TYPE

36916	SAFE_ENC_IS_LINEAR			A02, A05, -	FBSI
-	Linear scale			BOOLEAN	PowerOn
-					
-	-	FALSE	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Definition of whether a linear or a rotary encoder is connected.

0: Rotary encoder is connected, its resolution is defined by $MA_SAFE_ENC_RESOL, and converted by $MA_SAFE_ENC_GEAR_PITCH, $MA_SAFE_ENC_GEAR_DENOM[n] and $MA_SAFE_ENC_GEAR_NUMERA[n] on the load side. MD $MA_SAFE_ENC_GRID_POINT_DIST has no significance.

1: Linear encoder is connected, its resolution is defined by $MA_SAFE_ENC_GRID_POINT_DIST. MD $MA_SAFE_ENC_RESOL, $MA_SAFE_ENC_GEAR_PITCH, $MA_SAFE_ENC_GEAR_DENOM[n] and $MA_SAFE_ENC_GEAR_NUMERA[n] have no meaning. If the value changes, alarm 27036 is triggered.

Related to:

With 0:

$MA_SAFE_ENC_RESOL

$MA_SAFE_ENC_GEAR_PITCH

$MA_SAFE_ENC_GEAR_DENOM[n]

$MA_SAFE_ENC_GEAR_NUMERA[n]

With 1:

$MA_SAFE_ENC_GRID_POINT_DIST

36917	SAFE_ENC_GRID_POINT_DIST			A02, A05, -	FBSI
mm	Scale division for linear scale			DOUBLE	PowerOn
-					
-	-	0.01	0.00001	8	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Definition of the grid spacing of the linear scale used.

Not relevant for a rotary encoder.

36918	SAFE_ENC_RESOL			A02, A05, -	FBSI
-	Encoder lines per revolution			DWORD	PowerOn
-					
-	-	2048	1	100000	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Definition of the lines per revolution for a rotary encoder.

Not relevant for a linear encoder.

36919	SAFE_ENC_PULSE_SHIFT			A02, A05, -	-
-	Shift factor of encoder multiplication			BYTE	PowerOn
-					
-	-	11	2	18	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Slide factor of the multiplication factor (high-resolution) of the encoder used for the Safety Integrated monitoring functions in the NCK. The encoder value must be divided by 2, the number of times needed to get the number of encoder lines. A slide factor of 11 corresponds to an encoder multiplication factor of 2048. If the drive provides this information (r0979[3,13,23]), this MD is automatically assigned internally after power ON of the drive. If the value changes during this process, alarm 27036 is triggered.

36920	SAFE_ENC_GEAR_PITCH			A02, A05, -	FBSI
mm	Lead screw pitch			DOUBLE	PowerOn
-					
-	-	10.0	0.1	10000.	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Gear ratio between encoder and load for a linear axis with a rotary encoder.

36921	SAFE_ENC_GEAR_DENOM			A02, A05, -	FBSI
-	Denominator of gearbox encoder/load			DWORD	PowerOn
-					
-	8	1, 1, 1, 1, 1, 1, 1, 1	1	2147000000	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Numerator of the gearbox between encoder and load, that is the numerator of the fraction: number of encoder revolutions / number of load revolutions

n = 0, 1, ... , 7 stand for gear stages 1, 2, ... 8

The current value is selected via safety-relevant input signals (SGE).

Related to:

MD 36922: $MA_SAFE_ENC_GEAR_NUMERA[n]

36922	SAFE_ENC_GEAR_NUMERA			A02, A05, -	FBSI
-	Numerator of gearbox encoder/load			DWORD	PowerOn
-					
-	8	1, 1, 1, 1, 1, 1, 1, 1	1	2147000000	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Numerator of the gearbox between encoder and load, that is the numerator of the fraction:

number of encoder revolutions / number of load revolutions

n = 0, 1, ... , 7 stand for gear stages 1, 2, ... 8

The current value is selected via safety-relevant input signals (SGE).

Related to:

MD 36921: $MA_SAFE_ENC_GEAR_DENOM[n]

36923	SAFE_INFO_ENC_RESOL			A02, A05, -	-
mm, degrees	Safe encoder resolution			DOUBLE	PowerOn
-					
-	8	0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0	-	-	7/RO
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Display data: Resolution of the encoder used in the relevant gear stage for the Safety Integrated monitoring functions. A single encoder system can monitor safe positions with this accuracy. This MD is 0 if different encoders are used in the drive and in the NCK for the Safety Integrated monitoring functions.

36925	SAFE_ENC_POLARITY			A02, A05, -	FBSI
-	Direction reversal of actual value			DWORD	PowerOn
-					
-	-	1	-1	1	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: A direction reversal of the actual value can be set with this data.

-1: Direction reversal

0: No direction reversal or

1: No direction reversal

36926	SAFE_ENC_FREQ_LIMIT			A02, A05, -	FBSI
-	Encoder frequency limit for safe operation			DWORD	PowerOn
-					
-	-	300000	300000	420000	7/2
710-6a2c	-	500000	500000	500000	-1/-
710-31a10c	-	500000	500000	500000	-1/-
720-6a2c	-	500000	500000	500000	-1/-
720-31a10c	-	500000	500000	500000	-1/-
730-6a2c	-	500000	500000	500000	-1/-
730-31a10c	-	500000	500000	500000	-1/-
840disl-6a	-	500000	500000	500000	-1/-
840disl-20a	-	500000	500000	500000	-1/-

Description: Encoder limit frequency above which amplitude monitoring is switched off.

A speed corresponding to this frequency must not be exceeded in safe operation with a 1-encoder system.

If this limit frequency is exceeded in safe operation (SBH or SG,), the drive is shut down by the stop response parameterized for active monitoring.

This frequency can be set to more than 300kHz only for performance-2 control units High Standard und High Performance.

Incorrect parameterizations are indicated by alarm 27033.

36927	SAFE_ENC_MOD_TYPE			A02, A05, -	-
-	Encoder evaluation type			BYTE	PowerOn
-					
-	-	0	-	-	7/RO
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Type of encoder evaluation used for Safety Integrated on this axis. This type is read out during power on by the encoder evaluation and compared with the last value stored here. This MD is then overwritten. The value of this MD is included in the calculation of MD $MA_SAFE_ACT_CHECKSUM[1].

36928	SAFE_ENC_IDENT			A02, A05, -	-
-	Encoder identification			DWORD	PowerOn
-					
-	3	0, 0, 0	-	-	7/RO
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Identification of the encoder evaluation used for Safety Integrated on this axis. This identification is read out during power on by the encoder evaluation and compared with the last value stored here. This MD is then overwritten. The value of this MD is included in the calculation of MD $MA_SAFE_ACT_CHECKSUM[1].

36930	SAFE_STANDSTILL_TOL			A05, -	FBSI
mm, degrees	Standstill tolerance			DOUBLE	PowerOn
-					
-	-	1.	0.	100.	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Definition of the tolerance for safe operational stop.

The control triggers alarm 27010 with STOP B if the difference between position limit value und position actual value is greater than this tolerance when safe operational stop is selected. The position limit value is the position actual value at the time safe operational stop was selected.

Related to:

MD 36956: $MA_SAFE_PULSE_DISABLE_DELAY

36931	SAFE_VELO_LIMIT			A05, A04, -	FBSI
mm/min, rev/min	Limit value for safe velocity			DOUBLE	PowerOn
-					
-	4	2000., 2000., 2000., 2000.	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Definition of the limit values for the safe velocities 1, 2, 3 and 4.

If SG1, SG2, SG3 or SG4 is selected and the current velocity exceeds this limit value, the control triggers alarm 27011 with the stop response configured in $MA_SAFE_VELO_STOP_MODE or $MA_SAFE_VELO_STOP_REACTION.

n = 0, 1, 2, 3 stand for the limit values of SG1, SG2, SG3, SG4

Special cases:

In a 1-encoder system with SBH/SG active, the velocity is monitored according to the encoder frequency set in MD $MA_SAFE_ENC_FREQ_LIMIT. A corresponding alarm is output if this is exceeded.

Related to:

MD 36961: $MA_SAFE_VELO_STOP_MODE

MD 36963: $MA_SAFE_VELO_STOP_REACTION

36932	SAFE_VELO_OVR_FACTOR			A05, -	FBSI
%	SG offset values			DOUBLE	PowerOn
-					
-	16	100.0, 100.0, 100.0, 100.0, 100.0, 100.0, 100.0, 100.0, 100.0...	1.0	100.0	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Overrides for the limit values of safe velocities 2 and 4 can be selected via the SGEs, and the associated override value (percentage values) can be set with this MD.

n = 0, 1, ... , 15 stand for overrides 0, 1, ... 15

Special cases:

- The function "Override safe speed" is enabled by MD 36901 $MA_SAFE_FUNCTION_ENABLE.
- This override is inactive for the limit values of velocities 1 and 3.

Related to:

MD 36978: $MA_SAFE_OVR_INPUT[n]

MD 36931: $MA_SAFE_VELO_LIMIT[n]

36933	SAFE_DES_VELO_LIMIT			A05, A04, -	FBSI
%	SG setpoint speed limit			DOUBLE	Reset
-					
-	-	0.0	0	100	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Weighting factor for determining the setpoint limit from the current actual speed limit. The active SG limit value is weighted with this factor and defined as the setpoint limit for the interpolator. Setpoint 0 is defined when SBH is selected.

An input of 100% limits the setpoint to the active SG stage

The setpoint speed limit is inactive with an input of 0%.

Special cases:

- In order to take the drive dynamics into account, multiple changes may have to be made to set this MD optimally. "Reset" is defined as the effectivity criterion to avoid making this procedure unnecesarily complicated.
- This data is not included in the cross-check with the drive.
- This data is not included in the axial check sum $MA_SAFE_ACT_CHECKSUM, as this is a 1-channel function.

36934	SAFE_POS_LIMIT_PLUS			A03, A05, -	FBSI
mm, degrees	Upper limit of safe end position			DOUBLE	PowerOn
-					
-	2	100000., 100000.	-2147000	2147000	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Definition of the upper limit value for safe end positions 1 and 2.

If SE1 or SE2 is selected and the current actual position is greater than this limit value, the control triggers alarm 27012 with the stop response configured in $MA_SAFE_POS_STOP_MODE and switches to SBH. Stop responses STOP B and A follow if SBH is violated.

n = 0, 1 stand for the upper limit values of SE1, SE2

Related to:

MD 36962: $MA_SAFE_POS_STOP_MODE

MD 36935: $MA_SAFE_POS_LIMIT_MINUS[n]

MD 36901: $MA_SAFE_FUNCTION_ENABLE

Special cases:

A parameterization error is displayed if a value is entered in MD: $MA_SAFE_POS_LIMIT_PLUS[n] which is less than or equal to that in MD: $MA_SAFE_POS_LIMIT_MINUS[n].

36935	SAFE_POS_LIMIT_MINUS			A03, A05, -	FBSI
mm, degrees	Lower limit of safe end position			DOUBLE	PowerOn
-					
-	2	-100000., -100000.	-2147000	2147000	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Definition of the lower limit value for safe end positions 1 and 2.

If SE1 or SE2 is selected and the current actual position is less than this limit value, the control triggers alarm 27012 with the stop response configured in $MA_SAFE_POS_STOP_MODE and switches to SBH. Stop responses STOP B and A follow if SBH is violated.

n = 0, 1 stand for the lower limit values of SE1, SE2

Related to:

MD 36962: $MA_SAFE_POS_STOP_MODE

MD 36934: $MA_SAFE_POS_LIMIT_PLUS[n]

Special cases:

A parameterization error is displayed if a value is entered in MD: $MA_SAFE_POS_LIMIT_PLUS[n] which is less than or equal to that in MD: $MA_SAFE_POS_LIMIT_MINUS[n].

36936	SAFE_CAM_POS_PLUS			A03, A05, -	FBSI
mm, degrees	Plus cam position for safe cams			DOUBLE	PowerOn
-					
-	4	10., 10., 10., 10., 10., 10., 10., 10., 10., 10., 10., 10., 10....	-2147000	2147000	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Definition of the plus cam positions for safe cams SN1 +, SN2 +, SN3 + and SN4 +, ...

The following applies to function "Safe cams":

If, with activated safe cams, the actual position is greater than this value, the corresponding safety-relevant output signal (SGA) is set to 1. If the actual position falls below this value, the SGA is set to 0.

n = 0, 1, 2, 3 stand for plus cam positions of SN1 +, SN2 +, SN3 +, SN4 +

The following applies to function "Safe cam track" (only solution-line):

If function "Safe cam track" has been enabled, the safety-related output signals "cam track" and "Cam range" are set according to cam parameterization. For this purpose parameterization of the cam range in MD $MA_SAFE_CAM_TRACK_ASSIGN[n] must be viewed.

n = 0 ... 29 stands for plus cam position of SN1+, SN2+, ..., SN30+.

Related to:

MD 36988: $MA_SAFE_CAM_PLUS_OUTPUT[n]
MD 36937: $MA_SAFE_CAM_POS_MINUS[n]
MD 36938: $MA_SAFE_CAM_TRACK_ASSIGN[n] (only solutionline)
MD 37900: $MA_SAFE_CAM_TRACK_OUTPUT[n] (only solutionline)
MD 37901: $MA_SAFE_CAM_RANGE_OUTPUT_1[n] (only solutionline)
MD 37902: $MA_SAFE_CAM_RANGE_OUTPUT_2[n] (only solutionline)
MD 37903: $MA_SAFE_CAM_RANGE_OUTPUT_3[n] (only solutionline)
MD 37904: $MA_SAFE_CAM_RANGE_OUTPUT_4[n] (only solutionline)

36937	SAFE_CAM_POS_MINUS			A03, A05, -	FBSI
mm, degrees	Minus cam position for safe cams			DOUBLE	PowerOn
-					
-	4	-10., -10., -10., -10., -10., -10., -10., -10., -10., -10....	-2147000	2147000	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Definition of the minus cam positions for safe cams SN1 -, SN2 -, SN3 -, ...

The following applies to function "Safe cams":

If, with activated safe cams, the actual position is greater than this value, the corresponding safety-relevant output signal (SGA) is set to 1. If the actual position falls below this value, the SGA is set to 0.

n = 0, 1, 2, 3 stand for minus cam positions of SN1 -, SN2 -, SN3 -, SN4 -

The following applies to function "Safe cam track" (only solution-line):

If function "Safe cam track" has been enabled, the safety-related output signals "cam track" and "Cam range" are set according to cam parameterization. For this purpose parameterization of the cam range in MD $MA_SAFE_CAM_TRACK_ASSIGN[n] must be viewed.

n = 0 ... 29 stands for minus cam position of SN1-, SN2-, ..., SN30-.

Related to:

MD 36989: $MA_SAFE_CAM_MINUS_OUTPUT[n]
MD 36936: $MA_SAFE_CAM_POS_PLUS[n]
MD 36938: $MA_SAFE_CAM_TRACK_ASSIGN[n] (only solutionline)
MD 37900: $MA_SAFE_CAM_TRACK_OUTPUT[n] (only solutionline)
MD 37901: $MA_SAFE_CAM_RANGE_OUTPUT_1[n] (only solutionline)
MD 37902: $MA_SAFE_CAM_RANGE_OUTPUT_2[n] (only solutionline)
MD 37903: $MA_SAFE_CAM_RANGE_OUTPUT_3[n] (only solutionline)
MD 37904: $MA_SAFE_CAM_RANGE_OUTPUT_4[n] (only solutionline)

36938	SAFE_CAM_TRACK_ASSIGN			A03, A05, -	FBSI
-	Cam track assignment			DWORD	PowerOn
-					
-	4	100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112...	100	414	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Assignment of the individual cams to the max. 4 cam tracks including definition of the numerical value for SGA "Cam range".

>The hundreds digit defines to which cam track the cam is assigned. Valid values are 1, 2, 3 or 4.

The tens and ones digits include the numerical value that is to be reported to the safe logics as SGA "Cam range" and processed there. Valid values are 0 to 14, while each numerical value per cam track may be used only once.

Therefore the valid value range of this machine data is:

100...114, 200...214, 300...314, 400...414

Examples:

MD36938[0] = 207: cam 1 (index 0) is assigned to cam track 2.

If the position is within the range of this cam, a 7 is entered in SGA "Cam range" of the 2nd cam track.

MD36938[5] = 100: cam 6 (index 5) is assigned to cam track 1.

If the position is within the range of this cam, a 0 is entered in SGA "Cam range" of the 1st cam track.

Related to:

MD 36936: $MA_SAFE_CAM_POS_PLUS[n]
MD 36937: $MA_SAFE_CAM_POS_MINUS[n]
MD 37900: $MA_SAFE_CAM_TRACK_OUTPUT[n]
MD 37901: $MA_SAFE_CAM_RANGE_OUTPUT_1[n]
MD 37902: $MA_SAFE_CAM_RANGE_OUTPUT_2[n]
MD 37903: $MA_SAFE_CAM_RANGE_OUTPUT_3[n]
MD 37904: $MA_SAFE_CAM_RANGE_OUTPUT_4[n]

36940	SAFE_CAM_TOL			A05, -	FBSI
mm, degrees	Tolerance for safe cams			DOUBLE	PowerOn
-					
-	-	0.1	0.001	10	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: As a result of differing encoder mounting positions and differing cycle and run times, the cam signals of the two monitoring channels never switch at exactly the same position or at exactly the same time.

This data defines the tolerance as a load-side path for all cams, within which the monitoring channels can have different signal states for the same cam without triggering alarm 27001.

Recommendation:

Enter a value equal to or slightly larger than that in MD 36942.

36942	SAFE_POS_TOL			A05, -	FBSI
mm, degrees	Tolerance actual value cross-check			DOUBLE	PowerOn
-					
-	-	0.1	0.001	360	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Because of varying installation locations for the encoder, backlash, torsion, lead screw error etc, the two actual positions acquired by NCK and drive at the same time can differ from one another.

The tolerance for the cross-check of the actual positions in the two monitoring channels is entered in this data.

Special cases:

- The prime consideration for defining this tolerance is the "finger protection" (ca. 10 mm).
- If this tolerance is exceeded, stop reaction STOP F ensues.

36944	SAFE_REFP_POS_TOL			A05, -	FBSI
mm, degrees	Tolerance actual value check (referencing)			DOUBLE	PowerOn
-					
-	-	0.01	0	36	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data defines the tolerance for checking the actual values after referencing (for an incremental encoder) or during power on (for an absolute encoder).

Referencing determines an absolute actual position of the axis. A second absolute actual position is derived from the last stored standstill position before the control was switched off and the path traversed since power on. The control checks the actual values after referencing with these two absolute positions, the path traversed and this data.

The following influences must be taken into account when determining the tolerance values:

backlash, leadscrew error, compensations (max. compensation values with LEC, sag and temperature compensations), temperature errors, torsion (2-encoder system), gear tolerance in variable gears, coarser resolution (2-encoder system), oscillation distance with variable gears.

Special cases:

Given user agreement, if the two absolute actual positions differ by more than the value in this data, alarm 27001 is displayed with error code 1003, and renewed user agreement is required for referencing.

36946	SAFE_VELO_X			A05, -	FBSI
mm/min, rev/min	Velocity limit n_x			DOUBLE	PowerOn
-					
-	-	20.	0.	6000.	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data defines the limit speed n_x for the SGA "n < nx".

The SGA "n < nx" is set if this speed limit is undershot.

36948	SAFE_STOP_VELO_TOL			A05, -	FBSI
mm/min, rev/min	Velocity tolerance for Safe braking ramp			DOUBLE	PowerOn
-					
-	-	300.	0.	120000.	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Tolerance of the actual velocity for the safe braking ramp (SBR).

The actual velocity is given this tolerance after the safe braking ramp has been activated

by triggering a Stop B or C.

The actual velocity must not be greater than the limit defined thereby.

Otherwise a Stop A is triggered. This reveals an aceleration of the drive as quickly as possible.

36949	SAFE_SLIP_VELO_TOL			A05, -	FBSI
mm/min, rev/min	Slip velocity tolerance			DOUBLE	PowerOn
-					
-	-	6.	0.	6000.	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Difference in velocity between the motor and load sides tolerated by a 2-encoder system, without the data cross-check between SIMODRIVE611D and NCK signaling an error.

MD 36949 is only evaluated if MD $MA_SAFE_FUNCTION_ENABLE_, bit3 is set.

Relating to:

MD 1349: $MD_SAFE_SLIP_VELO_TOL

36950	SAFE_MODE_SWITCH_TIME			A05, -	FBSI
s	Tolerance time for SGE switchover			DOUBLE	PowerOn
-					
-	-	0.5	0	10.	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: SGE switchovers are not active simultaneously because the data transfer runtimes of the SGEs differ in the two monitoring channels. The data cross-check would report an error in this case.

This data defines the length of time after SGE switchovers during which the actual values and the monitoring results are not cross-checked (the machine data continue to be compared!). The selected monitoring continues to run uninterrupted in both monitoring channels.

A safe function becomes active in a monitoring channel as soon as the selection or switchover is detected in this channel.

The differing runtime is mainly determined by the PLC cycle time.

System-related minimum tolerance time: 2 x PLC cycle time (maximum cycle) + 1 x IPO cycle time.

The runtime differences must also be taken into account in the external circuit (e.g. relay switching times).

36951	SAFE_VELO_SWITCH_DELAY			A05, -	FBSI
s	Delay time for velocity changeover			DOUBLE	PowerOn
-					
-	-	0.1	0	600.	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: A timer is started with this value when transferring from a higher to a lower safe speed or when selecting safe operational stop with safe speed active.

The parameterized value selected must be as low as possible.

The last selected speed limit value continues to be monitored while the timer is running. During this time, the axle/spindle can be decelerated, for example via the PLC user program, without the monitoring reporting an error and triggering a stop reaction.

Special cases:

1. The timer is aborted immediately on switching to a limit greater than or equal to the previously active SG limit.
2. The timer is aborted immediately on switching to "Non-safe operation" (SGE "Deselect SBH/SG=1).
3. The timer is retriggered (restarted) on switching to a limit less than the previously active SG limit or to SBH while the timer is running.

36952	SAFE_STOP_SWITCH_TIME_C			A05, -	FBSI
s	Transition time STOP C to safe standstill			DOUBLE	PowerOn
-					
-	-	0.1	0	600.	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data defines the time after which a switch is made to safe operational stop when a STOP C has been triggered.

The parameterized value selected must be as low as possible.

Safe operational stop is monitored after this time has expired. STOP A or B is triggered if the axis/spindle could not be stopped.

36953	SAFE_STOP_SWITCH_TIME_D			A05, -	FBSI
s	Transition time STOP D to safe standstill			DOUBLE	PowerOn
-					
-	-	0.1	0	600.	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data defines the time after which a switch is made to safe operational stop when a STOP D has been triggered.

The parameterized value selected must be as low as possible.

Safe operational stop is monitored after this time has expired. STOP B is triggered if the axis/spindle could not be stopped.

36954	SAFE_STOP_SWITCH_TIME_E			A05, -	FBSI
s	Transitional period STOP E to safe standstill			DOUBLE	PowerOn
-					
-	-	0.1	0	600.	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Time period after which a switch over takes place from STOP E to safe operational stop.

The parameterized value selected must be as small as possible.

36955	SAFE_STOP_SWITCH_TIME_F			A05, -	FBSI
s	Transition time STOP F to STOP B			DOUBLE	PowerOn
-					
-	-	0.0	0	600.	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Time period after which a switch over takes place from stop F to stop B with active monitoring functions.

The parameterized value selected must be as low as possible.

During this time, another deceleration reaction can be activated, e.g. by means of synchronized actions.

The switch over also takes place if a C/D/E stop occurs during this time.

36956	SAFE_PULSE_DISABLE_DELAY			A05, -	FBSI
s	Delay time for pulse suppression			DOUBLE	PowerOn
-					
-	-	0.1	0	600.	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: On STOP B, deceleration is made with speed setpoint 0 at the current limit and changed to STOP A for pulse suppression after the delay time defined with this data.

The parameterized value selected must be as low as possible.

Special cases:

The pulse suppression is performed earlier than defined in this data if the condition for pulse suppression is present via MD 36960: $MA_SAFE_STANDSTILL_VELO_TOL or via MD 36620: $MA_SERVO_DISABLE_DELAY_TIME.

If the time is set in this data to ZERO, then on STOP B an immediate change is made to STOP A (immediate pulse suppression).

Relating to:

MD 36960: $MA_SAFE_STANDSTILL_VELO_TOL
MD 36620: $MA_SERVO_DISABLE_DELAY_TIME
MD 36060: $MA_STANDSTILL_VELO_TOL

36957	SAFE_PULSE_DIS_CHECK_TIME			A05, -	FBSI
s	Time for checking pulse suppression			DOUBLE	PowerOn
-					
-	-	0.1	0	10	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Definiiton of the time after which pulses have to be disabled after a request to disable pulses.

The time between deleting the SGA "Enable pulse" and detecting the disabling of pulses via the SGE "Status pulses disabled" must not exceed the value of this data.

Special cases:

STOP A is triggered if this time is exceeded.

36958	SAFE_ACCEPTANCE_TST_TIMEOUT			A05, -	FBSI
s	Time limit for acceptance test duration			DOUBLE	PowerOn
-					
-	-	40.0	5	100	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: On the NCK side, a time limit can be specified for the duration of an acceptance test.

The NCK terminates the test if an acceptance test lasts longer than the time defined in MD 36958.

The acceptance test status is set to zero on the NCK side. When the acceptance test status is reset, SI-power-ON-alarms are reset again from reset-acknowledgeable to power-ON-acknowledgeable on the NCK and drive sides.

The NCK clears alarm 27007 and the drive clears alarm 300952.

This MD is also used to limit the duration of an SE (safe limit position) acceptance test. After the programmed time has elapsed, the SE acceptance test is aborted and alarm 27008 deleted. The software limit positions then once again act as defined in the machine data.

36960	SAFE_STANDSTILL_VELO_TOL			A05, A04, -	FBSI
mm/min, rev/min	Creep speed for pulse suppression			DOUBLE	PowerOn
-					
-	-	0.0	0.0	6000.	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Speed below which the axle/spindle is regarded as being at a standstill and the pulses are disabled with STOP B (through transition to STOP A).

Related to:

MD 36956: $MA_SAFE_PULSE_DISABLE_DELAY

36961	SAFE_VELO_STOP_MODE			A05, -	FBSI
-	Stop reaction for safe velocity			BYTE	PowerOn
-					
-	-	5	0	14	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: The stop reaction defined in this data is triggered if the limit value for the safe velocity 1, 2, 3 or 4

is exceeded.

= 0, 1, 2, 3 correspond to STOP A, B, C, D, common to each safe velocity stage

= 5 means that the stop reaction can be configured specifically for each safe velocity in MD 36963.

The units digit defines the selection of the stop reaction when the safe velocity is exceeded.

The tens digit defines the behavior in the case of a drive bus failure if a time greater than 0 is parameterized in $MN_SAFE_PULSE_DIS_TIME_BUSFAIL.

0: Stop A

1: Stop B

2: Stop C

3: Stop D

4: Stop E

5: SAFE_VELO_STOP_MODE invalid, stop reaction is parameterized via MD SAFE_VELO_STOP_REACTION

10: Stop A, additionally, in the event of a drive bus failure, pulses are not disabled immediately if safe velocity is active

11: Stop B, additionally, in the event of a drive bus failure, pulses are not disabled immediately if safe velocity is active

12: Stop C, additionally, in the event of a drive bus failure, pulses are not disabled immediately if safe velocity is active

13: Stop D, additionally, in the event of a drive bus failure, pulses are not disabled immediately if safe velocity is active

14: Stop E, additionally, in the event of a drive bus failure, pulses are not disabled immediately if safe velocity is active

Special cases:

- If the value in this MD is 5, the stop reaction for each safe velocity stage is defined selectively in $MA_SAFE_VELO_STOP_REACTION.

Related to:

MD 36931: $MA_SAFE_VELO_LIMIT[n]

MD 36963: $MA_SAFE_VELO_STOP_REACTION[n]

36962	SAFE_POS_STOP_MODE			A05, -	FBSI
-	Stop reaction for safe end position			BYTE	PowerOn
-					
-	-	2	2	4	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: The stop reaction defined in this data is triggered if safe end position 1 or 2 is overrun.

2: Stop C

3: Stop D

4: Stop E

Related to:

MD 36934: $MA_SAFE_POS_LIMIT_PLUS[n]

MD 36935: $MA_SAFE_POS_LIMIT_MINUS[n]

36963	SAFE_VELO_STOP_REACTION			A05, -	FBSI
-	Stop reaction for safe velocity			BYTE	PowerOn
-					
-	4	2, 2, 2, 2	0	14	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: The stop reaction defined in this data is triggered if the limit value for the safe velocity 1, 2, 3 or 4 is exceeded.

= 0, 1, 2, 3 stand for SG1, SG2, SG3, SG4

The units digit defines the selection of the stop reaction for each specific safe velocity when the safe velocity is exceeded.

The tens digit defines the behavior in the case of a drive bus failure for each specific safe velocity if a time greater than 0 has been parameterized in $MN_SAFE_PULSE_DIS_TIME_BUSFAIL.

Value Meaning

0: Stop A

1: Stop B

2: Stop C

3: Stop D

4: Stop E

10: Stop A, additionally, in the event of a drive bus failure, pulses are not disabled immediately if this safe velocity stage is active

11: Stop B, additionally, in the event of a drive bus failure, pulses are not disabled immediately if this safe velocity is active

12: Stop C, additionally, in the event of a drive bus failure, pulses are not disabled immediately if this safe velocity is active

13: Stop D, additionally, in the event of a drive bus failure, pulses are not disabled immediately if this safe velocity is active

14: Stop E, additionally, in the event of a drive bus failure, pulses are not disabled immediately if this safe velocity is active

Special cases:

This MD is only active when MD 36961 and MD 1361 have the value 5.

Related to:

MD 10089: $MN_SAFE_PULSE_DIS_TIME_BUSFAIL

MD 36961: $MA_SAFE_VELO_STOP_MODE

36964	SAFE_IPO_STOP_GROUP			A01, A05, -	FBSI
-	Safety-integrated IPO-response grouping			BYTE	Reset
-					
-	-	0	0	1	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This MD is only active with Safety Integrated axes and spindles.

It influences the channel-wide IPO response distribution of Safety Integrated:

0 = Default: All other axes/spindles in the channel are informed of the IPO stop response of this axis.

1 = For internal stops, the axes and machining spindles interpolating with the axis in question are also influenced via the triggered safety alarms.

Other axes/spindles in the channel, however, continue without disturbance. In the case of external stops (without an alarm) all other axes/spindles are not influenced by the safety axis/spindle stop. This allows, for example, the safe cancellation of the pulses of a spindle (using external Stop A) so that the spindle can be turned manually but still move the axes safely with monitoring.

If the other axes/spindles stop together with the safety axis/spindle in certain machining situations, the user must implement this at his own responsibility using the PLC or synchronous action operations.

36965	SAFE_PARK_ALARM_SUPPRESS			A01, -	FBSI
-	Alarm suppression on parking axis			BOOLEAN	PowerOn
-					
-	-	FALSE	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This MD is only active for Safety Integrated axes/spindles.

0 = Default: Alarms 27000/300950 are displayed when parking is selected.

1 = Alarms 27000/300950 are not displayed when parking is selected. This is necessary for axes that are disconnected on the encoder side (e.g. dressing axes) during the machining process. The alarms are displayed when parking is deselected again.

36966	SAFE_BRAKETEST_TORQUE			A05, A10, -	FBSI
%	Holding torque for brake test			DOUBLE	PowerOn
CTEQ					
-	-	5.0	0.0	800.0	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Specification of the torque and force for the functional test of the brake mechanism. The holding brake must be able to apply this torque without the axis starting to slip.

This MD must be at least 10% above the current torque when the brake test is selected, that is with the brake off. This ensures that the motor can brake the axis again if the brake is defective. If this is not the case, the brake test is aborted with alarm 20095. If the drive MD 1192 is not correctly parameterized and if bit 0 of MD $MA_SAFE_BRAKETEST_CONTROL is not set, the safety reserve required is increased to double the difference between the actual torque and the parameterization in MD 1192.

Specification of the torque and force for the functional test of the brake mechanism.

The holding brake must be able to apply this torque without the axis starting to slip.

The corresponding test function is enabled by MD $MA_FIXED_STOP_MODE bit 1.

This MD must be at least 10% above the current torque when the brake test is selected, (that is with the brake off). This ensures that the motor can brake the axis again if the brake is defective. If this is not the case, the brake test is aborted with alarm 20095.

If the drive MD 1192 is not correctly parameterized, the safety reserve required is increased to double the difference between the actual torque and the parameterization in MD 1192.

36967	SAFE_BRAKETEST_POS_TOL			A05, A10, -	FBSI
mm, degrees	Position tolerance for brake test			DOUBLE	PowerOn
CTEQ					
-	-	1.0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Maximum position tolerance for the functional test of the brake mechanics.

The functional test of the brake mechanics is aborted if the axis position deviates

by more than this tolerance from the position at selection of the brake test.

The corresponding test function is enabled by

MD $MA_FIXED_STOP_MODE bit 1.

36968	SAFE_BRAKETEST_CONTROL			A05, A10, -	-
-	Program check for the brake test			DWORD	PowerOn
CTEQ					
-	-	0	0	1	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Program check for the brake test.

Bit 0: Selection of the average value of the torque limit

= 0: Drive MD 1192 is used as the average value of the torque limit

= 1: The torque measured at the time of selection of the brake test is used as the average value of the torque limit

36969	SAFE_BRAKETEST_TORQUE_NORM			A05, A10, -	FBSI
kgm²	Reference variable for brake test holding torque			DOUBLE	PowerOn
CTEQ					
-	-	0.0	-	-	7/RO
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Setting of the reference variable for torques

All torques indicated as relative value refer to this reference variable.

This MD is an image of drive parameter p2003

36970	SAFE_SVSS_DISABLE_INPUT			A01, A05, -	FBSI
-	Input assignment SBH/SG deselection			DWORD	PowerOn
-					
-	-	0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data defines the NCK input for selecting/deselectng the functions SBH and SG.

Signal Meaning

= 0 SG or SBH is selected

= 1 SG and SBH are deselected

Structure:

Special cases:

- Entry of 0 means there is no existing assignment, the input remains fixed at 0, SG and SBH cannot be deselected.
- Entry of 80 00 00 00 means there is no existing assignment, the input remains fixed at 1.
- If a single output signal is placed on a terminal, the signal is processed inverted if MD bit 31 is set.
- If several output signals are placed on the same terminal, the signal concerned is initially inverted if MD bit 31 is set.

  If MD bit 31 is set, the signal concerned is initially inverted. The (if applicable inverted) output signals are then AND-ed. The result is output on the terminal.

Related to:

MD 10366: $MN_HW_ASSIGN_DIG_FASTIN

MD 13010: $MN_DRIVE_LOGIC_NR

References: /FB/, A4, Digital and Analog NCK I/Os

36971	SAFE_SS_DISABLE_INPUT			A01, A05, -	FBSI
-	Input assignment SBH deselection			DWORD	PowerOn
-					
-	-	0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description:

```
Assignment of the NCK input for deselecting the function safe
operational stop.
Structure: See $MA_SAFE_SVSS_DISABLE_INPUT
Assignment of the terminal level for the safe functions if either
safe velocity or safe operational stop  have been activated.
Signal           Meaning
= 0  Safe operational stop is selected
= 1  Safe operational stop is deselected (only if other functions
have not triggered a STOP C, D or E)
Special cases:
-    The signal is processed inverted if MD bit 31 is set.
-    This input is irrelevant if SG and SBH have been deselected
(see $MA_SAFE_SVSS_DISABLE_INPUT).
Related to:
   MD 36970: $MA_SAFE_SVSS_DISABLE_INPUT
```

36972	SAFE_VELO_SELECT_INPUT			A01, A05, -	FBSI
-	Input assignment SG selection			DWORD	PowerOn
-					
-	2	0, 0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description:

```
This data defines the two inputs for selecting SG1, SG2, SG3 or
SG4.
Structure: See $MA_SAFE_SVSS_DISABLE_INPUT
n = 1, 0 stand for bit 1, 0 for selecting SG1 to SG4
Assignment of the input bits to the safe velocities:
Bit 1            Bit 0              Selected SG
0                  0                    SG1
0                  1                    SG2
1                  0                    SG3
1                  1                    SG4
Special cases:
The signal is processed inverted if the MD bits 31 are set.
```

36973	SAFE_POS_SELECT_INPUT			A01, A05, -	FBSI
-	Input assignment SE selection			DWORD	PowerOn
-					
-	-	0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data defines the input for selecting safe limit positions 1 or 2.

Structure see: $MA_SAFE_SVSS_DISABLE_INPUT

Signal Meaning

= 0 SE1 is active

= 1 SE2 is active

Special cases:

The signal is processed inverted if MD bit 31 is set.

Related to:

MD 36970: $MA_SAFE_SVSS_DISABLE_INPUT.

36974	SAFE_GEAR_SELECT_INPUT			A01, A05, -	FBSI
-	Input assignment speed ratio selection			DWORD	PowerOn
-					
-	3	0, 0, 0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Assignment of the input terminals for selecting the gear ratio (gear stage).

Structure: See $MA_SAFE_SVSS_DISABLE_INPUT

n = 2, 1, 0 stand for bit 2, 1, 0 for selecting gear stages 1 to 8

Bit 2	Bit 1	Bit 0	Active gear stage
0	0	0	Stage 1
0	0	1	Stage 2
0	1	0	Stage 3
...	...	...	...
1	1	1	Stage 8

Special cases:

The signals are processed inverted if the MD bits 31 are set.

Related to:

MD 36970: $MA_SAFE_SVSS_DISABLE_INPUT

36975	SAFE_STOP_REQUEST_INPUT			A01, A05, -	FBSI
-	Input assignment test stop selection			DWORD	PowerOn
-					
-	-	0	-	-	7/2
710-6a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
720-6a2c	-	-	-	-	-1/-
720-31a10c	-	-	-	-	-1/-
730-6a2c	-	-	-	-	-1/-
730-31a10c	-	-	-	-	-1/-
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data defines the input for selecting the test stop.

Structure see: $MA_SAFE_SVSS_DISABLE_INPUT

Signal Meaning

= 0 test stop is inactive

= 1 test stop is executed

Special cases:

The signal is processed inverted if MD bit 31 is set.

36976	SAFE_PULSE_STATUS_INPUT			A01, A05, -	FBSI
-	Input assignment status pulses suppressed			DWORD	PowerOn
-					
-	-	0	-	-	7/2
710-6a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
720-6a2c	-	-	-	-	-1/-
720-31a10c	-	-	-	-	-1/-
730-6a2c	-	-	-	-	-1/-
730-31a10c	-	-	-	-	-1/-
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data defines the input for reading back the disabling of pulses.

Structure see: $MA_SAFE_SVSS_DISABLE_INPUT

Signal Meaning

= 0 Pulses are enabled

= 1 Pulses are disabled

Special cases:

- The signal is processed inverted if MD bit 31 is set.
- This MD need not be parameterized. With the default value 0, the status of the disabling of pulses is determined internally. The old use of this MD with the wiring of the terminals AS1/AS2 is still permissible.

36977	SAFE_EXT_STOP_INPUT			A01, A05, -	FBSI
-	Input assignment for external stop request			DWORD	PowerOn
-					
-	4	0, 0, 0, 0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data defines the NCK inputs for selecting/deselecting the external brake requests.

n = 0, 1, 2, 3 stand for the various braking modes

n = 0: Assignment for "Deselect external stop A" (SH, disabling of pulses)

n = 1: Assignment for "Deselect external stop C" (braking at the current limit)

n = 2: Assignment for "Deselect external stop D" (path braking)

n = 3: Assignment for "Deselect external stop E" (ESR + path braking)

Structure: See $MA_SAFE_SVSS_DISABLE_INPUT

Special cases:

The signals are processed inverted if the MD bits 31 are set. The signal "Deselect external stop A" cannot be parameterized inverted. A parameter error is reported if there is an error.

36978	SAFE_OVR_INPUT			A01, A05, -	FBSI
-	Input assignment for SG override			DWORD	PowerOn
-					
-	4	0, 0, 0, 0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Assignment of the NCK inputs for the override of the limit values of safe velocities 2 and 4.

Structure: See $MA_SAFE_SVSS_DISABLE_INPUT

n = 3, 2, 1, 0 stand for the override selection bits 3, 2, 1, 0

Assignment of the input bits to the SG override values:

Bit 3	Bit 2	Bit 1	Bit 0	
0	0	0	0	Override 0 is selected
0	0	0	1	Override 1 is selected
to ...				
1	1	1	1	Override 15 is selected

The following machine data defines the override factor itself (percentage value):

MD 36932: $MA_SAFE_VELO_OVR_FACTOR[n]

Special cases:

- The function "Override safe velocity" is enabled by MD 36901 $MA_SAFE_FUNCTION_ENABLE.
- The signals are processed inverted if the MD bits 31 are set.

Related to:

MD 36932: $MA_SAFE_VELO_OVR_FACTOR[n]

36979	SAFE_STOP_REQUEST_EXT_INPUT			A01, A05, -	FBSI
-	Input assignment for test of external shutdown			DWORD	PowerOn
-					
-	-	0	-	-	7/2
710-6a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
720-6a2c	-	-	-	-	-1/-
720-31a10c	-	-	-	-	-1/-
730-6a2c	-	-	-	-	-1/-
730-31a10c	-	-	-	-	-1/-
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Assignment of the input terminal for selecting the test of the external switch off.

This MD must be parameterized as soon as the internal pulse suppression is used (bit 30 in $MA_SAFE_PULSE_ENABLE_OUTPUT=1)

Structure: see coding of input assignment

With each such machine data, a single input/output bit is assigned to a terminal or a system variable. Otherwise the structure corresponds to machine data 36970 ff..

36980	SAFE_SVSS_STATUS_OUTPUT			A01, A05, -	FBSI
-	Output assignment SBH/SG active			DWORD	PowerOn
-					
-	-	0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Assignment of the output for reporting the status of the functions safe velocity and safe operational stop.

Signal Meaning

= 0 SG and SBH are not active

= 1 SG or SBH is active

Special cases:

- Entry of 0 means
  there is no existing assignment, the output is not affected.
- Entry of 80 00 00 00 means there is no existing assignment, the output remains fixed at 1.
- If a single output signal is placed on a terminal, the
  the signal is processed inverted if MD bit 31 is set.
- If several output signals are placed on the same terminal, then
  the signal concerned is initially inverted if MD bit 31 is set.
  The (if applicable inverted) output signals are then AND-ed.
  The result is output on the terminal.

Related to:

MD 10368: $MN_HW_ASSIGN_DIG_FASTOUT

MD 13010: $MN_DRIVE_LOGIC_NR

References: /FB/, A4, Digital and Analog NCK I/Os

36981	SAFE_SS_STATUS_OUTPUT			A01, A05, -	FBSI
-	Output assignment SBH active			DWORD	PowerOn
-					
-	-	0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data defines the output or the system variable for the message "SBH active".

Structure see: $MA_SAFE_EXT_STOP_INPUT

Signal Meaning

= 0 SBH is inactive

= 1 SBH is active

Special cases:

The signal is processed inverted if MD bit 31 is set.

36982	SAFE_VELO_STATUS_OUTPUT			A01, A05, -	FBSI
-	Output assignment for active SG selection			DWORD	PowerOn
-					
-	2	0, 0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data defines the outputs or the system variables for the messages "SBH active bit 0" and "SBH active bit 1".

Structure see: $MA_SAFE_EXT_STOP_INPUT

n = 1, 0 stand for SG active bits 1, 0

SG active

Bit 1	Bit 0	Meaning:
= 0	= 0	SG1 active if SBH/SG are active and SBH is not active
		SBH active if SBH/SG are active and SBH is active
= 1	= 0	SG2 active
= 0	= 1	SG3 active
= 1	= 1	SG4 active

Special cases:

The signal is processed inverted if MD bit 31 is set.

36984	SAFE_EXT_PULSE_ENAB_OUTPUT			A01, A05, -	FBSI
-	Output assignment enable for pulses external			DWORD	PowerOn
-					
-	-	0	-	-	7/2
710-6a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
720-6a2c	-	-	-	-	-1/-
720-31a10c	-	-	-	-	-1/-
730-6a2c	-	-	-	-	-1/-
730-31a10c	-	-	-	-	-1/-
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Assignment of the output terminal for the request "Enable pulses externally".

This MD must be parameterized as soon as the internal pulse suppression is used (bit 30 in $MA_SAFE_PULSE_ENABLE_OUTPUT=1).

Structure: see coding of input assignment.

With each such machine data, a single input/output bit is assigned to a terminal or a system variable. Otherwise the structure corresponds to machine data 36970 ff..

36985	SAFE_VELO_X_STATUS_OUTPUT			A01, A05, -	FBSI
-	Output assignment n < n_x			DWORD	PowerOn
-					
-	-	0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data defines the output or the system variable for the message "n < nx".

Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT

Signal Meaning

= 0 Actual speed is greater than the limit speed in $MA_SAFE_VELO_X

= 1 Actual speed is less than or equal to the limit speed in $MA_SAFE_VELO_X

Related to: $MA_SAFE_VELO_X

Special cases:

The signal is processed inverted if MD bit 31 is set.

36986	SAFE_PULSE_ENABLE_OUTPUT			A01, A05, -	FBSI
-	Output assignment enable pulses			DWORD	PowerOn
-					
-	-	0	-	-	7/2
710-6a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
720-6a2c	-	-	-	-	-1/-
720-31a10c	-	-	-	-	-1/-
730-6a2c	-	-	-	-	-1/-
730-31a10c	-	-	-	-	-1/-
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data defines the output for the request "Enable pulses".

Structure: See $MA_SAFE_SVSS_STATUS_OUTPUT

Signal Meaning

= 0 Request to disable pulses

= 1 Request to enable pulses

Special cases:

- The signal is processed inverted if MD bit 31 is set.
- Bit 30 is given the following special meaning:

  If bit 30 is set to 1, the pulse are switched internally via the drive bus (only permissible with SIMODRIVE611 digital performance module). In this case, the MDs for external pulse enable must be parameterized as an additional safeguard if the internal pulse disable fails ($MA_SAFE_EXT_PULSE_ENAB_OUTPUT and $MA_SAFE_STOP_REQUEST_EXT_INPUT)

Possible combinations for the most significant bits (30, 31) in this MD:

Bit 31 Bit 30 MD value Meaning

0 0 0xxxxxxxH The SGA "Enable Pulses" is output to the parameterized interface (SPL or I/Os).

0 1 4xxxxxxxH The pulses are disabled internally via the drive bus. The SGA "Enable Pulses" contains the same information and is output inverted to the parameterized interface (SPL or I/O).

1 0 8xxxxxxxH The SGA "Enable Pulses" is output inverted to the parameterized interface.

1 1 CxxxxxxxH The pulses are disabled internally via the drive bus. The SGA "Enable Pulses" contains the same information and is output inverted to the parameterized interface.

36987	SAFE_REFP_STATUS_OUTPUT			A01, A05, -	FBSI
-	Output assignment axis safely referenced			DWORD	PowerOn
-					
-	-	0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data defines the output for the message "Axis safely referenced".

Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT

Signal Meaning

= 0 Axis is not safely referenced (that is the safe limit monitoring is inactive!)

= 1 Axis is safely referenced

Special cases:

The signal is processed inverted if MD bit 31 is set.

36988	SAFE_CAM_PLUS_OUTPUT			A01, A05, -	FBSI
-	Output assignment SN1 + to SN4 +			DWORD	PowerOn
-					
-	4	0, 0, 0, 0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data defines the outputs for the cam signals SN1 + to SN4 +.

Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT

n = 0, 1, 2, 3 correspond to the assignments for plus cams SN1 +, SN2 +, SN3 +, SN4 +

Signal Meaning

= 0 Axis is left of the cam (actual value < cam position)

= 1 Axis is right of the cam (actual value > cam position)

Special cases:

The signal is processed inverted if MD bit 31 is set.

36989	SAFE_CAM_MINUS_OUTPUT			A01, A05, -	FBSI
-	Output assignment SN1 - to SN4 -			DWORD	PowerOn
-					
-	4	0, 0, 0, 0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data defines the outputs for the minus cams SN1 - to SN4 -.

Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT

n = 0, 1, 2, 3 correspond to the assignments for minus cams SN1 -, SN2 -, SN3 -, SN4 -

Signal Meaning

= 0 Axis is left of the cam (actual value < cam position)

= 1 Axis is right of the cam (actual value > cam position)

Special cases:

- If a cam is negated and placed with another cam on an output, it is AND-ed and a single cam signal is generated for range recognition.

36990	SAFE_ACT_STOP_OUTPUT			A01, A05, -	FBSI
-	Output assignment of active stop			DWORD	PowerOn
-					
-	4	0, 0, 0, 0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Assignment of the output terminals for displaying the currently active stop.

Index 0: Assignment for "Stop A/B active"

Index 1: Assignment for "Stop C active"

Index 2: Assignment for "Stop D active"

Index 3: Assignment for "Stop E active"

36992	SAFE_CROSSCHECK_CYCLE			A01, A05, A08, -	FBSI
s	Display of axial cross-check cycle			DOUBLE	PowerOn
-					
-	-	0.0	-	-	7/RO
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Display data for safety functions: Effective axial cross-check cycle in seconds.

The cycle derives from INFO_SAFETY_CYCLE_TIME and the number of data to be cross-checked.

The axial value displayed depends on the associated drive module as the length of cross-check lists varies between performance-1/ standard-2 and performance-2 modules.

36993	SAFE_CONFIG_CHANGE_DATE			EXP, A07, A05, -	FBSI
-	Date/time of last change of SI-NCK MD			STRING	PowerOn
-					
-	7	"", "", "", "", "", "", ""	-	-	7/RO
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Display data for safety functions:

Date and time of the last configuration change to safety related NCK machine data.

Changes to the machine data included in the calculation of axial checksums SAFE_ACT_CHECKSUM are recorded.

36994	SAFE_PREV_CONFIG			EXP, A07, A05, -	FBSI
-	Data of previous safety configuration			DWORD	PowerOn
-					
-	MD_MAXNUM_SF_CONFIG_CHANGE_DATA	0, 0, 0, 0, 0, 0, 0, 0, 0	-	-	0/RO
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: Intermediate buffer for storing previous safety configuration data

Index [0]: Status flag for change history

Index [1]: Previous value of function enable

Index [2]: Previous value of set checksum SAFE_DES_CHECKSUM[0]

Index [3]: Last value of function enable before standard data were loaded

Index [4]: Last value of set checksum SAFE_DES_CHECKSUM[0] before standard data were loaded.

Index [5]: Previous value of set checksum SAFE_DES_CHECKSUM[1]

Index [6]: Last value of set checksum SAFE_DES_CHECKSUM[1] before standard data were loaded

Index [7]: Previous value of set checksum SAFE_DES_CHECKSUM[2]

Index [8]: Last value of set checksum SAFE_DES_CHECKSUM[2] before standard data were loaded

36995	SAFE_STANDSTILL_POS			A07, A05, -	FBSI
-	Standstill position			DWORD	PowerOn
-					
-	-	0	-	-	0/0
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This MD displays the current standstill position.

In order to be able to test the referencing of the axis for plausibility at the next control Power ON, the current position of the axis is stored in non-volatile memory in the following cases:

- On selection of safe operational stop (SBH)
- Cyclically, if SE/SN are activated

Special cases:

If the MD is changed manually, this will be detected at the next Power ON and plausibility test. Another user agreement is required after referencing.

36997	SAFE_ACKN			A07, A05, -	FBSI
-	User acknowledge			DWORD	PowerOn
-					
-	-	0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data displays the status of the user agreement.

The user agreement can be given or withdrawn by the user by means of a corresponding screen.

If the software detects internally that the reference to the machine has been lost, then it is "automatically" withdrawn (e.g. on changing gear or if the plausibility comparison with the stored standstill position fails during referencing).

Special cases:

If the MD is changed manually, then this will be detected at the next Power ON and plausibility test. Another user agreement is required after referencing.

36998	SAFE_ACT_CHECKSUM			EXP, A07, A05, -	FBSI
-	Actual checksum			DWORD	PowerOn
-					
-	2	0, 0, 0	-	-	7/RO
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: The actual checksum calculated after POWER ON or on RESET is entered here over the current values of the safety relevant machine data.

Assignment of the field indices:

Index 0: axial monitoring function and global NC machine data for Safety Integrated

Index 1: HW component recognition (only Solutionline)

Index 2: PROFIsafe parameter from S7 configuring

36999	SAFE_DES_CHECKSUM			EXP, A07, A05, -	FBSI
-	Desired (expected) checksum			DWORD	PowerOn
-					
-	2	0, 0, 0	-	-	7/1
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: In this data, the set checksum stored at the last machine acceptance appears above the current values of the safety relevant machine data.

Assignment of the field indices:

Index 0: axial monitoring functions and global NC machine data for Safety Integrated

Index 1: HW component recognition (only Solutionline). For powerline a 0 must be entered here.

Index 2: PROFIsafe parameter from S7 configuring

1.5.8 Travel to fixed stop

37000	FIXED_STOP_MODE		A10, -	F1
-	Travel to fixed stop mode		BYTE	PowerOn
CTEQ				
-	- 0	0	3	7/2

Description: This machine data defines how the function "Travel to fixed stop" can be started.

0: Travel to fixed stop not available.

1: Travel to fixed stop can be started only from the NC program with command FXS[x]=1.

2: Control of function exclusively from PLC

3: NCK and PLC have equal priority (user ensures synchronization.)

37002	FIXED_STOP_CONTROL		A10	F1
-	Sequence control for travel to fixed stop		BYTE	PowerOn
-				
-	- 0	0	3	7/2

Description: Sequence control for travel to fixed stop.

Bit 0: behavior on pulse disable at fixed stop

= 0: travel to fixed stop is canceled

= 1: travel to fixed stop is interrupted, i.e. the drive is without power.

As soon as the pulse disable is canceled again, the drive continues with the limited torque.

Control of the torque injection see bit 1.

Bit 1: behavior after pulse disable at the fixed stop

= 0: the torque is applied in steps.

= 1: the torque is applied in ramps (see MD37012 FIXED_STOP_TORQUE_RAMP_TIME)

37010	FIXED_STOP_TORQUE_DEF			A10	F1
%	Default fixed stop clamping torque			DOUBLE	PowerOn
CTEQ					
-	-	5.0	0.0	100.0	7/2

Description: The clamping torque in % of the maximum motor torque (in the case of FDD this corresponds to % of max. current setpoint) is set in this machine data.

The clamping torque becomes active as soon as the fixed stop is reached or the NC/PLC interface signal (Festanschlag erreicht quittieren) gesetzt wurde.

The entered value is a default and is active only as long as

- no clamping torque has been programmed with command FXST[x]
- the clamping torque set in SD 43510: FIXED_STOP_TORQUE was not changed (after fixed stop has been reached).

In the case of "Travel to fixed stop" in an analog drive (611-A) and fixed clamping torque, the torque limit set in the drive should be the same as the limit entered in MD: FIXED_STOP_ANA_TORQUE.

Related to:

MD 37070: FIXED_STOP_ANA_TORQUE

(torque limit on approach to fixed stop for analog drives)

SD 43510: FIXED_STOP_TORQUE

(clamping torque for travel to fixed stop)

37012	FIXED_STOP_TORQUE_RAMP_TIME			A10	F1
s	Time period until reaching the changed torque limit			DOUBLE	NEW CONF
-					
-	-	0.0	-	-	7/2

Description: Period in seconds until the changed torque limit is reached with function "Travel to fixed stop".

The value 0.0 deactivates the ramp function.

Default setting: 0 s

37014	FIXED_STOP_TORQUE_FACTOR			A10	F1
-	Adaption factor torque limit			DOUBLE	NEW CONF
-					
-	-	1.0	-	-	7/2

Description: Interface factor torque limit.

With this factor, the torque limit of linked slave axes (MD 37250) can be weighted additionally.

Even with different motors, the torque limits can be kept equal in all linked axes.

37020	FIXED_STOP_WINDOW_DEF		A05, A10	F1
mm, degrees	Default fixed-stop monitoring window		DOUBLE	PowerOn
CTEQ				
-	- 1.0	-	-	7/2

Description: This machine data is used to enter the default for the standstill monitoring window at fixed stop.

Fixed stop monitoring becomes active as soon as the fixed stop is reached, i.e. NC/PLC interface signal (Festanschlag erreicht) ist gesetzt.

If the position at which the fixed stop is detected is left by more than the tolerance specified in MD: FIXED_STOP_WINDOW_DEF alarm 20093 "Fixed stop monitoring has responded" is output and the "FXS" function is deselected.

The value entered is a default setting and is active only as long as

- no fixed stop monitoring window is programmed with command FXSW[x],
- the fixed stop monitoring window is not changed via SD 43520: FIXED_STOP_WINDOW (after reaching of fixed stop).

Related to:

SD 43520: FIXED_STOP_WINDOW (fixed stop monitoring window)

37030	FIXED_STOP_THRESHOLD		A10, -	F1
mm, degrees	Threshold for fixed stop detection		DOUBLE	NEW CONF
-				
-	- 2.0	-	-	7/2

Description: Threshold value for fixed stop detection.

The contour deviation is checked for this threshold as a criterion for reaching the fixed stop. As a further condition for digital drives, reaching of the set torque limit is waited for.

This machine data is only active if MD: FIXED_STOP_BY_SENSOR = 0.

NC/PLC interface signal (Festanschlag erreicht) wird gesetzt, wenn die axiale Konturabweichung den im MD: FIXED_STOP_THRESHOLD eingegebenen Wert überschritten hat.

MD irrelevant to:

MD 37040: FIXED_STOP_BY_SENSOR = 1

Related to:

IS (Festanschlag erreicht)

37040	FIXED_STOP_BY_SENSOR			A10	F1
-	Fixed stop detection by sensor			BYTE	Immediately
CTEQ					
-	-	0	0	3	7/2

Description: This machine data defines how the crtierion "Fixed stop reached" is determined.

A change of this machine data becomes active with the next selection of travel to fixed stop.

MD=0

The criterion "Fixed stop reached" is determined internally on the basis of the axial FIXED_STOP_THRESHOLD.

MD=1

The criterion "Fixed stop reached" is determined via an external sensor and signalled to the NC via NC/PLC interface signal (Sensor Festanschlag) mitgeteilt.

MD=2

The criterion "Fixed stop reached" is accepted, if either contour monitoring (MD = 0) or the signal of the external sensor (MD = 1) has responded.

MD=3

Triggering through movement analysis (only as an alternative to triggering via sensor)

Related to:

MD 37030: FIXED_STOP_THRESHOLD

(threshold for fixed stop detection)

IS (Sensor Festanschlag)

37050	FIXED_STOP_ALARM_MASK			A05, A10	F1
-	Enable of the fixed stop alarms			BYTE	NEW CONF
-					
-	-	1	0	15	7/2

Description: This machine data defines whether the alarms

20091 "Fixed stop not reached",

20094 "Fixed stop aborted" and

25042 "FOC: Standstill monitoring" are output.

MD= 0

Suppression of alarm 20091 "Fixed stop not reached"

MD= 2

Suppression of alarms

20091 "Fixed stop not reached" and

20094 "Fixed stop aborted" (SW 4 and higher)

MD=3

Suppression of alarm 20094 "Fixed stop aborted" (SW 4 and higher)

Add value 8

Suppression of alarm 25042 "FOC: Standstill monitoring" (SW 7 and higher)

Independent of the setting of the alarm screen, errors during travel to fixed stop can be read out from the status variable $AA_FXS.

Standard: 1 = Alarm 20091, 20094 and alarm 25042 are triggered

37052	FIXED_STOP_ALARM_REACTION			A05, A10	F1
-	Reaction with fixed stop alarms			BYTE	PowerOn
-					
-	-	0	-	-	7/1

Description: Behavior of VDI signal "Mode group ready" in case of fixed stop alarms:

Bit value = 0: "Mode group ready" will be deleted (drives de-energized)

Bit value = 1: "Mode group ready" remains active

Bit0: Alarm 20090 Travel to fixed stop not possible

Bit1: Alarm 20091 Fixed stop not reached

Bit2: Alarm 20092 Travel to fixed stop still active

Bit3: Alarm 20093 Standstill monitoring at fixed stop has triggered

Bit4: Alarm 20094 Travel to fixed stop aborted

All other bits without meaning.

Standard: 0 = All alarms de-energize the drives

37060	FIXED_STOP_ACKN_MASK			A10	F1
-	Waiting for PLC acknowledgements during travel to fixed stop			BYTE	PowerOn
CTEQ					
-	-	0	0	3	7/2

Description: This machine data defines whether or not the NC waits for acknowledgement messages from the PLC when the "Travel to fixed stop" function is active.

Bit 0 = 0

Once the NC has transmitted interface signal (Fahren auf Festanschlag aktivieren) an die PLC übergeben hat, startet sie die programmierte Verfahrbewegung.

Bit 0 = 1

After the NC has transferred interface signal (Fahren auf Festanschlag aktivieren) an die PLC übergeben hat, wartet die NC auf eine Quittierung durch die PLC mit dem Nahtstellensignal (Fahren auf Festanschlag freigeben) und startet dann die programmierte Verfahrbewegung.

Bit 0 should be set to 1 for analog drives so that the motion is not started before the PLC has limited the torque in the drive.

Bit 1 = 0

Once the NC has transferred interface signal (Festanschlag erreicht) an die PLC übergeben hat, erfolgt der Satzwechsel.

Bit 1 = 1

After the NC has transferred IS (Festanschlag erreicht) an die PLC übergeben hat, wartet die NC auf eine Quittierung durch die PLC mit dem Nahtstellensignal (Festanschlag erreicht quittieren), gibt das programmierte Moment aus und führt dann den Satzwechsel durch.

Bit 1 should be set for analog drives so that the PLC can switch the drive over to torque-controlled operation if a programmable clamping torque must be specified.

With digital drives (SIMODRIVE611D, PROFIdrive), the "Travel to fixed stop" function can be executed without any acknowledgements, thus allowing program run times to be reduced.

Related to:

IS (Fahren auf Festanschlag aktivieren)

IS (Fahren auf Festanschlag freigeben)

IS (Festanschlag erreicht)

IS (Festanschlag erreicht quittieren)

37070	FIXED_STOP_ANA_TORQUE			A10	F1
%	Torque limit when approaching the fixed stop for analog drives			DOUBLE	PowerOn
CTEQ					
-	-	5.0	0.0	100.0	7/2

Description: Only for analog drives (irrelevant to digital drives SIMODRIVE611D or PROFIdrive):

This machine data defines an internal NC torque limit for analog drives. It is specified as a percentage of the maximum drive torque (corresponds to % of max. current setpoint with FDD).

This torque limit is active in the NC from the start of the motion (acceleration torque) until the instant the fixed stop is reached.

The torque limit must have the same effect as the torque limit set in the drive (SIMODRIVE611D-A).

This torque limit is required to ensure that

- there are no step changes in torque during switchover from speed-controlled to current-controlled or torque-controlled operation,
- the acceleration is reduced to the correct value in the NC.

37080	FOC_ACTIVATION_MODE			A10	F1
-	Initial setting of modal torque/force limitation			BYTE	PowerOn
-					
-	-	0	0	3	7/2

Description: The initial setting of the modal torque/force limitation is set with this MD after reset and PowerOn:

Bit 0: Response after PowerON

= 0 : FOCOF

= 1 : FOCON (modal)

Bit 1: Response after reset

= 0 : FOCOF

= 1 : FOCON (modal)

Default setting: FOCOF after reset and PowerOn

37100	GANTRY_AXIS_TYPE			A01, A10	G1
-	Gantry axis definition			BYTE	PowerOn
CTEQ					
-	-	0	0	33	7/2

Description: General: decimal representation, with a b

a

0: Leading axis

1: Synchronized axis

b

0: No gantry axis

1: Axis in gantry grouping 1

2: Axis in gantry grouping 2

3: Axis in gantry grouping 3

...

A max. of 8 gantry groupings is possible.

Examples:

11: Axis is synchronized axis in gantry grouping 1

2: Axis is leading axis in gantry grouping 2

12: Axis is synchronized axis in gantry grouping 2

3: Axis is leading axis in gantry grouping 3

13:Axis is synchronized axis in gantry grouping 3

Special cases:

Alarm 10650 "Incorrect gantry machine data" and 10651 "Gantry unit not defined" in the case of incorrect gantry axis definition.

Related to:

MD 37110: GANTRY_POS_TOL_WARNING (gantry warning limit)

MD 37120: GANTRY_POS_TOL_ERROR (gantry trip limit)

MD 37130: GANTRY_POS_TOL_REF (gantry trip limit during referencing)

37110	GANTRY_POS_TOL_WARNING			A05, A10	G1
mm, degrees	Gantry warning limit			DOUBLE	Reset
-					
-	-	0.0	-	-	7/2

Description: Value > 0

With gantry axes, the difference between the position actual values of the leading and synchronized axes is constantly monitored.

MD: GANTRY_POS_TOL_WARNING is used to define a limit value for the position actual value difference; when the limit is exceeded, warning 10652 "Warning limit exceeded" is output. However, the gantry axes are not stopped internally in the control. The warning threshold must therefore be selected such that the machine can withstand the position actual value deviation between the gantry axes without sustaining mechanical damage.

Furthermore, NC/PLC interface signal (Gantry-Warngrenze überschritten) an die PLC auf "1" gesetzt. Damit können vom PLC-Anwenderprogramm bei Überschreitung der Warngrenze die notwendigen Maßnahmen (z.B. Programmunterbrechung am Satzende) angestoßen werden.

As soon as the current position actual value difference has dropped below the warning limit again, the message is canceled and IS "Gantry warning limit exceeded" reset.

Effect of gantry warning limit on gantry synchronization process:

The position actual value difference between the leading and synchronized axes is determined during gantry synchronization. If the deviation is lower than the gantry warning limit, the synchronizing motion of the gantry axes is automatically started internally in the control.

The synchronizing motion must otherwise be initiated via the PLC interface (interface signal (Gantry-Synchronisationslauf starten)).

Value = 0

Setting MD: GANTRY_POS_TOL_WARNING = 0 deactivates the monitoring for violation of the warning limit.

Gantry synchronization is not initiated internally in the control.

Special cases:

Alarm 10652 "Warning limit exceeded" in response to violation of gantry warning limit.

Related to:

MD 37100: GANTRY_AXIS_TYPE Gantry axis definition

MD 37120: GANTRY_POS_TOL_ERROR Gantry trip limit

MD 37130: GANTRY_POS_TOL_REF

Gantry trip limit during referencing

IS (Gantry-Warngrenze überschritten)

IS (Gantry-Synchronisationslauf starten)

37120	GANTRY_POS_TOL_ERROR		A05, A10	G1
mm, degrees	Gantry trip limit		DOUBLE	PowerOn
-				
-	- 0.0	-	-	7/2

Description: With gantry axes, the difference between the position actual values of the leading and synchronized axes is continuously monitored. The maximum permissible deviation in position actual value between the synchronized axis and the leading axis in the gantry axis grouping must be defined with MD: GANTRY_POS_TOL_ERROR. Monitoring for violation of this limit value takes place only if the gantry axis grouping is already synchronized (IS "Gantry grouping is synchronized" = 1); otherwise the value set in MD 37130: GANTRY_POS_TOL_REF is used. = 1 (Gantry-Verbund ist synchronisiert)) ist; ansonsten wird der Wert von MD 37130: GANTRY_POS_TOL_REF verwendet.

When the limit value is exceeded, alarm 10653 "Error limit exceeded" is output. The gantry axes are immediately stopped internally in the control to prevent any damage to the machine.

In addition, IS (Gantry-Abschaltgrenze überschritten) an die PLC auf "1" gesetzt.

Special cases:

Alarm 10653 "Error limit exceeded" in response to violation of gantry trip limit.

Related to:

MD 37100: GANTRY_AXIS_TYPE Gantry axis definition

MD 37110: GANTRY_POS_TOL_WARNING Gantry warning limit

MD 37130: GANTRY_POS_TOL_REF

Gantry trip limit during referencing

IS (Gantry-Verbund ist synchronisiert)

IS (Gantry-Abschaltgrenze überschritten)

37130	GANTRY_POS_TOL_REF			A05, A10	G1
mm, degrees	Gantry trip limit during referencing			DOUBLE	PowerOn
-					
-	-	0.0	-	-	7/2

Description: With gantry axes, the difference between the position actual values of the leading and synchronized axes is continuously monitored. The maximum permissible deviation in position actual values between the synchronized axis and the leading axis that is monitored if the gantry axis grouping is not yet synchronized (IS "Gantry grouping is synchronized" = "0") must be set in MD: GANTRY_POS_TOL_REF. = "0" (Gantry-Verbund ist synchronisiert)) ist.

When the limit value is exceeded, alarm 10653 "Error limit exceeded" is output. The gantry axes are immediately stopped internally in the control to prevent any damage to the machine.

In addition, IS (Gantry-Abschaltgrenze überschritten) an die PLC auf "1" gesetzt.

Special cases:

Alarm 10653 "Error limit exceeded" in response to violation of gantry trip limit.

Related to:

MD 37100: GANTRY_AXIS_TYPE Gantry axis definition

MD 37110: GANTRY_POS_TOL_WARNING Gantry warning limit

MD 37120: GANTRY_POS_TOL_ERROR Gantry trip limit

IS (Gantry-Verbund ist synchronisiert)

IS (Gantry-Abschaltgrenze überschritten)

37135	GANTRY_ACT_POS_TOL_ERROR			A05, A10	-
mm, degrees	Current gantry trip limit			DOUBLE	Reset
-					
-	-	0.0	-	-	7/2

Description: Actual value difference between master axis and slave axis in the case of alarm 10653.

Leads to alarm 10657 after Power ON.

37140	GANTRY_BREAK_UP			EXP, A01, A10	G1
-	Invalidate gantry axis grouping			BOOLEAN	Reset
CTEQ					
-	-	FALSE	-	-	7/2

Description: GANTRY_BREAK_UP = "0"

The forced coupling of the gantry axis grouping remains valid. Monitoring of violation of the gantry warning or trip limit is active!

GANTRY_BREAK_UP = "1"

This invalidates the forced coupling of the gantry grouping, thus allowing all gantry axes in this grouping to be traversed individually in manual mode. The monitoring for violation of the gantry warning or trip limit is deactivated. IS "Gantry grouping is synchronized" is set to "0".

Notice:

In cases where the gantry axes are still mechanically coupled, the machine may sustain damage in this operating state when the leading or synchronized axis is traversed!

The gantry axes cannot be referenced individually.

Related to:

MD 37100: GANTRY_AXIS_TYPE Gantry axis definition

MD 37110: GANTRY_POS_TOL_WARNING Gantry warning limit

MD 37130: GANTRY_POS_TOL_REF
Gantry trip limit during referencing

IS (Gantry-Verbund ist synchronisiert)

IS (Gantry-Abschaltgrenze überschritten)

37150	GANTRY_FUNCTION_MASK			A10	-
-	Gantry functions			DWORD	Reset
-					
-	-	0x00	0	0x3	7/2

Description: Special gantry functions are set with this MD.

The MD is bit-coded, the following bits are assigned:

Bit 0 == 0:

Extended monitoring of the actual value difference is inactive.

An offset between master and slave axes occurring in the tracking or BREAK_UP is not taken into account in the monitoring of the actual value difference.

Alarm 10657 is not output if alarm 10563 occurs before Power OFF.

Bit 0 == 1:

Extended monitoring of the actual value difference is active.

An offset between master and slave axes occurring in the tracking or BREAK_UP is taken into account in the monitoring of the actual value difference.

Prerequisite: The gantry grouping must be re-referenced or re-synchronized after starting of the control.

Alarm 10657 is output if alarm 10563 occurs before Power OFF.

Bit 1 == 0:

Zero mark search direction of the slave axis analogous to MD 34010

Bit 1 == 1:

Zero mark search direction of the slave axis same as for master axis

37160	LEAD_FUNCTION_MASK			A10	-
-	Functions for master value coupling			DWORD	NEW CONF
CTEQ					
-	-	0x01	0	0x3	1/1

Description: With this MD, special functions of master value coupling are set.

The MD is bit-coded, the following bits are assigned:

Bit 0 = 0:

Dead time compensation is not active at actual value coupling.

Bit 0 = 1:

Dead time compensation is active at actual value coupling.

During actual value coupling, a systematic position offset is created between master and following axis. It is caused by the IPO/position controller dead time between the actual values of master axis and following axis.

For SW 6.4 and higher, this position offset can be compensated by a linear extrapolation of the master value.

Possible velocity fluctuations in the master axis may have an increased impact on the following axis.

The bit must be set for the relevant master axis.

Bit 1 = 0:

The spindle/axis disable of the axis will not become effective with the master value coupling active.

The spindle/axis disable of the master axis becomes effective.

Bit 1 = 1:

The spindle/axis disable is effective for this axis even with the master value coupling active.

The bit must be set for the relevant following axis.

37200	COUPLE_POS_TOL_COARSE			A05, A10	S3
mm, degrees	Threshold value for 'Synchronism coarse'			DOUBLE	NEW CONF
-					
-	-	1.0	-	-	7/2

Description: In synchronous mode, the positional difference between the leading and following spindles is monitored (only DV and AV mode).

NC/PLC interface signal (Synchronlauf grob) wird gesetzt, wenn sich die aktuelle Lagedifferenz innerhalb des mit dem Schwellwert festgelegten Toleranzbandes befindet.

Furthermore, this threshold value represents the criterion for a block change on activation of synchronous mode or on alteration of the transmission parameters when the coupling is active in cases where "Synchronism coarse" is selected as the block change response condition (see channel-specific MD: COUPLE_BLOCK_CHANGE_CTRL_1 or language instruction COUPDEF).

If the value "0" is input, IS "Synchronism coarse" is always set to "1" in DV and AV mode.

Related to:

Channel-specific MD: COUPLE_BLOCK_CHANGE_CTRL_1

(block change response in synchronous spindle mode)

IS (Synchronlauf grob)

37210	COUPLE_POS_TOL_FINE		A05, A10	S3
mm, degrees	Threshold value for 'Synchronism fine'		DOUBLE	NEW CONF
-				
-	- 0.5	-	-	7/2

Description: In synchronous mode the positional difference between the leading and following spindles is monitored (only DV and AV mode).

NC/PLC interface signal (Synchronlauf fein) wird gesetzt, wenn sich die aktuelle Lagedifferenz innerhalb des mit dem Schwellwert festgelegten Toleranzbandes befindet.

Furthermore, this threshold value represents the criterion for a block change on activation of synchronous mode or on alteration of the transmission parameters when the coupling is active in cases where "Synchronism fine" is selected as the block change response condition (see channel-specific MD: COUPLE_BLOCK_CHANGE_CTRL_1 or language instruction COUPDEF).

If the value "0" is input, NC/PLC interface signal (Synchronlauf fein) im DV- und AV-Mode immer auf "1" gesetzt.

Related to:

Channel-specific MD: COUPLE_BLOCK_CHANGE_CTRL_1
(block change response in synchronous spindle mode)
IS (Synchronlauf fein)

37220	COUPLE_VELO_TOL_COARSE		A05, A10	S3
mm/min, rev/min	Velocity tolerance 'coarse'		DOUBLE	NEW CONF
-				
-	- 60.0	-	-	7/2

Description: In synchronous mode, the velocity difference between the leading and following spindles is monitored (VV mode only).

NC/PLC interface signal (Synchronlauf grob) wird gesetzt, wenn sich die aktuelle Geschwindigkeitsdifferenz innerhalb des mit dem Schwellwert festgelegten Toleranzbandes befindet.

Furthermore, this threshold value represents the criterion for a block change on activation of synchronous mode or on alteration of the transmission parameters when the coupling is active in cases where "Synchronism coarse" is selected as the block change response condition (see channel specific MD: COUPLE_BLOCK_CHANGE_CTRL_1 or language instruction COUPDEF).

If the value "0" is input, NC/PLC interface signal (Synchronlauf grob) im VV-Mode immer auf "1" gesetzt.

Related to:

Channel-specific MD: COUPLE_BLOCK_CHANGE_CTRL_1
(block change response in synchronous spindle mode)
IS (Synchronlauf grob)

37230	COUPLE_VELO_TOL_FINE		A05, A10	S3
mm/min, rev/min	Velocity tolerance 'fine'		DOUBLE	NEW CONF
-				
-	- 30.0	-	-	7/2

Description: In synchronous mode, the velocity difference between the leading and following spindles is monitored (VV mode only).

NC/PLC interface signal (Synchronlauf fein) wird gesetzt, wenn sich die aktuelle Geschwindigkeitsdifferenz innerhalb des mit dem Schwellwert festgelegten Toleranzbandes befindet.

Furthermore, this threshold value represents the criterion for a block change on activation of synchronous mode or on alteration of the transmission parameters when the coupling is active in cases where "Synchronism fine" is selected as the block change response condition (see channel-specific MD: COUPLE_BLOCK_CHANGE_CTRL_1 or language instruction COUPDEF).

If the value "0" is input, IS (Synchronlauf fein) im VV-Mode immer auf "1" gesetzt.

Related to:

Channel-specific MD: COUPLE_BLOCK_CHANGE_CTRL_1
(block change response in synchronous spindle mode)
IS (Synchronlauf fein)

37240	COUP_SYNC_DELAY_TIME		A05, A10	-
s	Delay time actual value synchronism		DOUBLE	NEW CONF
-				
-	2 60, 30	-	-	7/2

Description: Synchronous spindle coupling: delay time - time monitoring for reaching actual value synchronism after reaching setpoint synchronism.

$MA_COUP_SYNC_DELAY_TIME[0]: time to reach 'Synchronism fine'

$MA_COUP_SYNC_DELAY_TIME[1]: time to reach 'Synchronism coarse'

If value "0" is entered, the relevant monitoring is inactive

Related to:

MD 37200 $MA_COUPLE_POS_TOL_COARSE
MD 37210 $MA_COUPLE_POS_TOL_FINE
MD 37220 $MA_COUPLE_VELO_TOL_COARSE
MD 37230 $MA_COUPLE_VELO_TOL_FINE

37250	MS_ASSIGN_MASTER_SPEED_CMD		A10	TE3
-	Master axis number for speed setpoint coupling		DWORD	PowerOn
-				
-	- 0	0	31	7/2

Description: A master/slave speed setpoint linkage is configured by indicating the machine axis number of the master axis belonging to this slave.

Related to:

$MA_MS_ASSIGN_MASTER_TORQUE_CTR

37252	MS_ASSIGN_MASTER_TORQUE_CTR			A10	TE3
-	Master axis number for torque control			DWORD	PowerOn
-					
-	-	0	0	31	7/2

Description: Torque control between the master and the slave axis is configured by indicating the machine axis number of the master axis belonging to the slave.

By using the torque balance control, you can achieve a homogenous torque control.

For this purpose the control must know the actual torque values of the involved drives (in SIMODRIVE611D available by default, in PROFIdrive the message frame used must include and transfer these values, e.g. use message frame 116).

With default setting = 0, the same master axis is used for torque control as for speed setpoint linkage $MA_MS_ASSIGN_MASTER_SPEED_CMD.

Related to:

$MA_MS_ASSIGN_MASTER_SPEED_CMD
$MA_MS_TORQUE_CTRL_MODE
$MA_MS_TORQUE_CTRL_P_GAIN
$MA_MS_TORQUE_CTRL_I_TIME
$MA_MS_TORQUE_WEIGHT_SLAVE

37253	MS_FUNCTION_MASK			A10	-
-	Master/slave settings			DWORD	NEW CONF
-					
-	-	0x0	-	-	7/2

Description: Parameterizing master/slave link

Bit 0 = 0:

Scaling of MD 37256, MD 37260 is smaller by factor 1s/IPO cycle than described in the documentation.

Bit 0 = 1:

Scaling of MD 37256, MD 37260 corresponds to documentation.

37254	MS_TORQUE_CTRL_MODE			A10	TE3
-	Torque compensatory controller interconnection			DWORD	Immediately
-					
-	-	0	0	3	7/2

Description: The output of the torque compensatory controller is connected to

0: Master and slave axis
1: Slave axis
2: Master axis
3: No axis

when the torque control is active.

Related to:

$MA_MS_ASSIGN_MASTER_TORQUE_CTR
$MA_MS_ASSIGN_MASTER_SPEED_CMD
$MA_MS_TORQUE_CTRL_MODE

37255	MS_TORQUE_CTRL_ACTIVATION		A10	TE3
-	Torque compensatory controller activation		BYTE	NEW CONF
-				
-	- 0	0	1	7/2

Description: The torque compensatory controller can be switched ON and OFF by means of MD 37254 or by means of the PLC (DB3x.DBX24.5).

For this purpose the control must know the actual torque values of the involved drives (in SIMODRIVE611D available by default, in PROFIdrive the message frame used must include and transfer these values, e.g. use message frame 116).

In the case of the PLC, MD 37254 is only used for configuring the interconnection of the torque compensatory controller.

0: Switch ON/OFF via MD37254

1: Switch ON/OFF via DB3x.DBX24.5

37256	MS_TORQUE_CTRL_P_GAIN		A10	TE3
%	Torque compensatory controller gain factor		DOUBLE	NEW CONF
-				
-	- 0.0	0.0	100.0	7/2

Description: Gain factor of the torque compensatory controller

The gain factor is entered in percent as a ratio of the maximum axis velocity of the slave axis on load side to the rated torque.

The maximum axis velocity is derived from MD 32000, the rated torque from the product of drive machine data MD1725.

Related to:

$MA_MS_TORQUE_CTRL_MODE

$MA_MS_TORQUE_CTRL_I_TIME

$MA_MAX_AX_VELO

37258	MS_TORQUE_CTRL_I_TIME		A10	TE3
s	Torque compensatory controller integral action time		DOUBLE	NEW CONF
-				
-	- 0.0	0.0	100.0	7/2

Description: Integral time of torque compensatory controller

The integral time does not become active until the P gain factor is greater than 0.

Related to:

$MA_MS_TORQUE_CTRL_MODE

$MA_MS_TORQUE_CTRL_P_GAIN

$MA_MAX_AX_VELO

37260	MS_MAX_CTRL_VELO			A10	TE3
%	Torque compensatory controller limit			DOUBLE	NEW CONF
-					
-	-	100.0	0.0	100.0	7/2

Description: Torque compensatory controller limitation

The speed setpoint value calculated by the torque compensatory controller is limited.

The limit that can be entered as a percentage refers to $MA_MAX_AX_VELO of the slave axis.

Related to:

$MA_MS_TORQUE_CTRL_MODE

$MA_MS_TORQUE_CTRL_P_GAIN

$MA_MS_TORQUE_CTRL_I_TIME

$MA_MAX_AX_VELO

37262	MS_COUPLING_ALWAYS_ACTIVE			A10	TE3
-	Permanent master/slave link			BYTE	NEW CONF
-					
-	-	0	0	1	7/2

Description: Activation behavior of a master/slave link

0: Temporary link

The link is activated/deactivated via PLC interface signals and language commands.

1: Permanent link

This machine data activates the permanent link.

PLC interface signals and language commands do not have any effect.

Related to:

$MA_MS_ASSIGN_MASTER_TORQUE_CTR

$MA_MS_ASSIGN_MASTER_SPEED_CMD

37263	MS_SPIND_COUPLING_MODE			A10	-
-	Link response of a spindle			BYTE	NEW CONF
-					
-	-	0	0	1	7/2

Description: Link behavior of a speed-controlled spindle:

0: Link is closed/released in standstill only.

1: Link is closed/released already during motion.

The configuration is valid both for activation/deactivation via DB3x.DBX24.5 and for MASLON, MASLOF, MASLOFs, MASLDEL

37264	MS_TENSION_TORQUE			A10	TE3
%	Master/slave tension torque			DOUBLE	Immediately
-					
-	-	0.0	-100.0	100.0	7/2

Description: A constant tension torque as a percentage of the rated drive torque of the slave axis can be entered between the master and the slave axis.

Use of a tension torque requires an active torque compensatory controller (compare MD 37255: MS_TORQUE_CTRL_ACTIVATION).

Related to:

$MA_MS_ASSIGN_MASTER_TORQUE_CTR

$MA_MS_TENSION_TORQ_FILTER_TIME

$MA_MS_TORQUE_CTRL_ACTIVATION

37266	MS_TENSION_TORQ_FILTER_TIME			A10	TE3
s	Filter time constant tension torque			DOUBLE	NEW CONF
-					
-	-	0.0	0.0	100.0	7/2

Description: The tension torque between master and slave axis can be activated via a PT1 filter. Any change of $MA_MS_TENSION_TORQUE is then travelled out with the time constant of the filter.

As default, the filter is inactive; any torque change becomes active unfiltered.

Related to:

$MA_MS_TENSION_TORQUE

37268	MS_TORQUE_WEIGHT_SLAVE			A10	TE3
%	Torque weighting of slave axis			DOUBLE	NEW CONF
-					
-	-	50.0	1.0	100.0	7/2

Description: The torque share that the slave axis contributes to the total torque can be configured via the weighting. Different torque shares between the master and slave axis can thus be implemented.

In the case of motors with the same rated torque, a 50% to 50% torque sharing is suggested.

The torque share of the master axis results implicitly from 100% - MD37268.

Related to:

$MA_MS_ASSIGN_MASTER_TORQUE_CTR

$MA_MS_TENSION_TORQ_FILTER_TIME

37270	MS_VELO_TOL_COARSE			A10	TE3
%	Master/slave speed tolerance coarse			DOUBLE	NEW CONF
-					
-	-	5.0	-	-	7/2

Description: Tolerance window, coarse, for the differential speed between the master and the slave.

If the speed difference is within the tolerance window, the NC/PLC interface signal (Master/ Slave Ausgleichr. aktiv) gesetzt.

The tolerance value is entered as a percentage of $MA_MAX_AX_VELO.

37272	MS_VELO_TOL_FINE			A10	TE3
%	Master/slave speed tolerance fine			DOUBLE	NEW CONF
-					
-	-	1.0	-	-	7/2

Description: Tolerance window, fine, for the differential speed between the master and the slave.

If the speed difference is within the tolerance window, the NC/PLC interface signal (Master/Slave grob) gesetzt.

The tolerance value is entered as a percentage of $MA_MAX_AX_VELO.

37274	MS_MOTION_DIR_REVERSE			A10	TE3
-	Inverting traversing direction slave axis			BYTE	NEW CONF
-					
-	-	0	0	1	7/2

Description: Inverting the traversing direction of a slave axis in the linked status.

0: Equidirectional to the master axis

1: Inverse to the master axis

37400	EPS_TLIFT_TANG_STEP			A10	T3
mm, degrees	Tangent angle for corner recognition			DOUBLE	Reset
CTEQ					
-	-	5.0	-	-	7/2

Description: If TLIFT has been programmed and the axis is tracked tangentially, a step of the position setpoint larger than EPS_TLIFT_TANG_STEP causes an intermediate block to be inserted. The intermediate block traverses the axis to the position corresponding to the start tangent in the next block.

MD irrelevant if: TLIFT not activated

Related to:

TLIFT instruction

37402	TANG_OFFSET			A10	T3
mm, degrees	Default angle for tangential correction			DOUBLE	Reset
CTEQ					
-	-	0.0	-	-	7/2

Description: Default offset (angle), which the tracked axis forms with the tangent. The angle acts in addition to the angle programmed in the TANGON block.

MD irrelevant if tangential tracking not active.

Related to:

TANGON instruction

37500	ESR_REACTION			EXP, A01, A10, -	M3
-	Axial mode of "Extended Stop and Retract"			BYTE	NEW CONF
CTEQ					
-	-	0	0	22	7/2

Description: Selection of the response to be triggered via system variable "$AN_ESR_TRIGGER".

0 = No response Reaktion (or only external response through synchronized action programming of rapid digital outputs).

21 = NC-controlled retraction axis

22 = NC-controlled stopping axis

The following setting values are active with SIMODRIVE611D only:

10 = Drive-autonomous generator axis

11 = Drive-autonomous retraction axis

12 = Drive-autonomous stopping axis

13 = Drive-autonomous generator axis with NC-controlled stopping

Notes for SIMODRIVE611D:

- on 11 and 12: these are activated jointly in the drive - in the same way as with communication failure - through broadcast to all drives.
- on 22: parameter assignment "22" is also used for configuration of the corresponding drive-autonomous response in the case of communication failure or DC link undervoltage.
- If the option data is missing, the MD is reset to "0".

37510	AX_ESR_DELAY_TIME1			EXP, A01, A10, -	-
s	Delay time ESR single axis			DOUBLE	NEW CONF
CTEQ					
-	-	0.0	-	-	7/2

Description: If, for example, an alarm occurs, the deceleration time can be delayed by means of this MD, e.g. to allow in case of gear hobbing the retraction from the tooth gap first.

37511	AX_ESR_DELAY_TIME2			EXP, A01, A10, -	-
s	ESR time for interpolatory deceleration of single axis			DOUBLE	NEW CONF
CTEQ					
-	-	0.0	-	-	7/2

Description: After expiry of time $MA_AX_ESR_DELAY_TIME1, the time for interpolatory braking specified here ($MA_AX_ESR_DELAY_TIME2) is still remaining.

After expiry of time $MA_AX_ESR_DELAY_TIME2, rapid braking with subsequent tracking is initiated.

37550	EG_VEL_WARNING		A05, A10	M3
%	Threshold value for velocity warning threshold.		DOUBLE	NEW CONF
-				
-	- 90.0	0	100	7/2

Description: Threshold value for VDI signals

If, with active EG axis link, the maximum velocities stored in MD 32000: $MA_MAX_AX_VELO have been reached for the current velocity of the axis by the percentage set here, a warning (signal) for velocity is output.

Related to:

MD 32000: MAX_AX_VELO

37560	EG_ACC_TOL		A05, A10	M3
%	Threshold value for 'Axis accelerating'		DOUBLE	NEW CONF
-				
-	- 25.0	-	-	7/2

Description: Threshold value for VDI signal "Axis accelerates"

If, with active EU axis link, the maximum accelerations stored in MD 32300: $MA_MAX_AX_ACCEL have been reached for the current acceleration of the axis by the percentage set here, a warning (signal) for acceleration is output.

Korrespondiert mit:

MD 32300: MAX_AX_ACCEL

37600	PROFIBUS_ACTVAL_LEAD_TIME		EXP, A01, A02	G3
s	Actual value acquisition time (PROFIBUS/PROFINET Ti)		DOUBLE	PowerOn
-				
-	- 0.000125	0.0	0.032	0/0

Description: For PROFIBUS/PROFINET only:

Machine data for setting the actual value acceptance time (Ti) of the encoder on the PROFIBUS/PROFINET.

Unit: seconds; therefore default is 125µs

(this is also the default which STEP 7 sets for a 611U).

NOTICE:

The actual Ti value is read directly from the SDB configuration or the drive, if possible.

In this case, the machine data value is set to the read value and will only serve for display purposes.

37602	PROFIBUS_OUTVAL_DELAY_TIME		EXP, A01, A02	G3
s	Setpoint delay time (PROFIBUS/PROFINET To)		DOUBLE	PowerOn
-				
-	- 0.003	0.0	0.032	0/0

Description: For PROFIBUS/PROFINET only:

Machine data for setting the setpoint acceptance time (To) on the PROFIBUS/PROFINET.

Unit: seconds

NOTICE:

The actual To value is read directly from the SDB configuration or the drive, if possible.

In this case, the value of the machine data is set to the read value and serves for display purposes only.

37610	PROFIBUS_CTRL_CONFIG			EXP, A01	K4
-	PROFIdrive control bit configuration			BYTE	PowerOn
-					
-	-	0	0	2	7/2

Description: For PROFIdrive only:

Machine data for setting special PROFIdrive control word functionality:

0 =

default = no change of standard behavior

1 =

STW2, bits 0-1 are set depending on mode of operation/rapid traverse suppressing the setting of defaults for the VDI control bits "Parameter set bit0/1" from the PLC.

Bits 0-1 get the following combinations depending on the mode of operation, and controlled by NCK:

00 = Default (after Power-On)

01 = JOG (except for JOG-INC) or ((AUTOMATIC or MDI) and G0)

10 = ((AUTOMATIC or MDI) and not G0), other

11 = JOG-INC

2 =

Combination of MD=0 (preset by VDI) and MD=1 (internally preset):

MD=2 acts as MD=1, as long as there are no VDI control bits from the PLC, i.e. if the VDI control bits "Parameter set bit0/1" are both reset (0).

MD=2 acts as MD=0, if the VDI control bits "Parameter set bit0/1" are set both or individually (!=0). In this case, the VDI control bits are transferred directly to the drive (priority of VDI signals higher than that of internally created signals).

37620	PROFIBUS_TORQUE_RED_RESOL			EXP, A01	-
%	Resolution PROFIdrive torque reduction			DOUBLE	NEW CONF
-					
-	-	1.0	0.005	10.0	7/2

Description: For PROFIdrive only:

Resolution of the torque reduction on the PROFIdrive (LSB significance)

The MD is only relevant to controls with PROFIdrive drives. For these controls, it defines the resolution of the cyclic interface data "Torque reduction value" (only exists for $MN_DRIVE_TELEGRAM_TYPE = 101 ff. or 201 ff.), which is required for the "Travel to fixed stop" functionality.

The 1% default value corresponds to the original significance. The torque limit is transferred on the PROFIdrive with increments of 1%; the value 100 in the corresponding PROFIdrive message frame data cell corresponds to full torque reduction (i.e. without force).

By changing this MD to 0.005%, for example, the value can be entered in increments of 0.005%, i.e. the increments for the torque limit value become finer by the factor 200.

For the limitation to the rated torque, the value 0 is transmitted in this case; a complete torque reduction (i.e. without force) characterizes the transmittable value 10000.

To avoid misadaptation, the setting value of the MD must be selected to match the interpretation configured on the drive side or the firmly defined interpretation of the torque reduction value. If the setting of the control on the drive (manufacturer-specific drive parameter) is known (i.e. with SIEMENS drives such as SIMODRIVE 611U or SINAMICS), the software automatically sets the MD, i.e. in this case the MD is merely used for display purposes.

37800	OEM_AXIS_INFO			A01, A11	-
-	OEM version information			STRING	PowerOn
-					
-	2	"", ""	-	-	7/2

Description: A version information freely available to the user

(is indicated in the version screen)

37900	SAFE_CAM_TRACK_OUTPUT			A01, A05, -	FBSI
-	Output assignment cam track 1 to 4			DWORD	PowerOn
-					
-	MD_MAXNUM_SF_CAM_TRACK_OUTPUT	0, 0, 0, 0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description:

```
This data defines the outputs for the cam tracks 1 to 4.
Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT
n = 0, 1, 2, 3 correspond to the assignment for cam track 1 to 4
Signal       Meaning
= 0  Axis is not placed on a cam of the cam track
= 1  Axis is placed on a cam of the cam track
Special cases:
The function "Safe cam track" is enabled via MD 36903
$MA_SAFE_CAM_ENABLE.
```

37901	SAFE_CAM_RANGE_OUTPUT_1			A01, A05, -	FBSI
-	Output assignment cam range for cam track 1			DWORD	PowerOn
-					
-	MD_MAXNUM_SF_CAM_RANGE_OUTPUT	0, 0, 0, 0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description:

```
This data defines the outputs for the cam range of cam track 1.
Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT
n = 0, 1, 2, 3 correspond to the 4 bits for the indicated range on
cam track 1
Bit 3  Bit 2   Bit 1  Bit 0
  0      0       0      0      Cam range 0 active
  0      0       0      1      Cam range 1 active
to ...
  1      1       1      1      Cam range 15 active
The cam range is defined via the following machine data:
MD 36938: $MA_SAFE_CAM_TRACK_ASSIGN[n]
Signal          Meaning
= 0...14Axis is placed within the cam range, to which the range ID
0...14 on cam track 1 was assigned
= 15  Axis is placed within the range to the right of the cam with
the highest position of cam track 1
Special cases:
The function "Safe cam track" is enabled via MD 36903
$MA_SAFE_CAM_ENABLE.
```

37902	SAFE_CAM_RANGE_OUTPUT_2			A01, A05, -	FBSI
-	Output assignment cam range for cam track 2			DWORD	PowerOn
-					
-	MD_MAXNUM_SF_CAM_RANGE_OUTPUT	0, 0, 0, 0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data defines the outputs for the cam range of cam track 2.

Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT

n = 0, 1, 2, 3 correspond to the 4 bits for the indicated range on cam track 2

```
Bit 3  Bit 2   Bit 1  Bit 0
  0      0       0      0      Cam range 0 active
  0      0       0      1      Cam range 1 active
to ...
  1      1       1      1      Cam range 15 active
```

The cam range is defined via the following machine data:

MD 36938: $MA_SAFE_CAM_TRACK_ASSIGN[n]

Signal Meaning

= 0...14Axis is placed within the cam range, to which the range ID 0...14 on cam track 2 was assigned

= 15 Axis is placed within the range to the right of the cam with the highest position of cam track 2

Special cases:

The function "Safe cam track" is enabled via MD 36903 $MA_SAFE_CAM_ENABLE.

37903	SAFE_CAM_RANGE_OUTPUT_3			A01, A05, -	FBSI
-	Output assignment cam range for cam track 3			DWORD	PowerOn
-					
-	MD_MAXNUM_SF_CAM_RANGE_OUTPUT	0, 0, 0, 0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data defines the outputs for the cam range of cam track 3.

Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT

n = 0, 1, 2, 3 correspond to the 4 bits for the indicated range on cam track 3

Bit 3	Bit 2	Bit 1	Bit 0	
0	0	0	0	Cam range 0 active
0	0	0	1	Cam range 1 active
to ...				
1	1	1	1	Cam range 15 active

The cam range is defined via the following machine data:

MD 36938: $MA_SAFE_CAM_TRACK_ASSIGN[n]

Signal Meaning

= 0...14Axis is placed within the cam range, to which the range ID 0...14 on cam track 3 was assigned

= 15 Axis is placed within the range to the right of the cam with the highest position of cam track 3

Special cases:

The function "Safe cam track" is enabled via MD 36903 $MA_SAFE_CAM_ENABLE.

37904	SAFE_CAM_RANGE_OUTPUT_4			A01, A05, -	FBSI
-	Output assignment cam range for cam track 4			DWORD	PowerOn
-					
-	MD_MAXNUM_SF_CAM_RANGE_OUTPUT	0, 0, 0, 0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data defines the outputs for the cam range of cam track 4.

Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT

n = 0, 1, 2, 3 correspond to the 4 bits for the indicated range on cam track 4

```
Bit 3  Bit 2   Bit 1  Bit 0
  0      0       0      0      Cam range 0 active
  0      0       0      1      Cam range 1 active
to ...
  1      1       1      1      Cam range 15 active
```

The cam range is defined via the following machine data:

MD 36938: $MA_SAFE_CAM_TRACK_ASSIGN[n]

Signal Meaning

= 0...14Axis is placed within the cam range, to which the range ID 0...14 on cam track 4 was assigned

= 15 Axis is placed within the range to the right of the cam with the highest position of cam track 4

Special cases:

The function "Safe cam track" is enabled via MD 36903 $MA_SAFE_CAM_ENABLE.

37906	SAFE_CAM_RANGE_BIN_OUTPUT_1			A01, A05, -	FBSI
-	Output assignment cam range bit for cam track 1			DWORD	PowerOn
-					
-	MD_MAXNUM_SF_CAM_RANGE_BIN_OUTPUT	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data defines the outputs for the cam range bits of cam track 1.

Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT

Field index n corresponds to the parameterizable cam range numbers on cam track 1.

The cam range number is defined via the following machine data:

MD 36938: $MA_SAFE_CAM_TRACK_ASSIGN[k]

Signal Meaning

= 0 Axis is not placed on cam with cam range number n

= 1 Axis is placed on cam with cam range number n

Example:

The signal addressed with field index 5 changes to 1, if the axis is placed on the cam, to which cam range number 5 on cam track 1 was assigned during parameterization.

Special cases:

- The function "Safe cam track" is enabled via MD 36903 $MA_SAFE_CAM_ENABLE.
- If cam range number n on cam track 1 is not parameterized, the signal of field index can never change to 1. In this case the output MD with field index n does not have to be parameterized.

37907	SAFE_CAM_RANGE_BIN_OUTPUT_2			A01, A05, -	FBSI
-	Output assignment cam range bit for cam track 2			DWORD	PowerOn
-					
-	MD_MAXNUM_SF_CAM_RANGE_BIN_OUTPUT	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description: This data defines the outputs for the cam range bits of cam track 2.

Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT

Field index n corresponds to the parameterizable cam range numbers on cam track 2.

The cam range number is defined via the following machine data:

MD 36938: $MA_SAFE_CAM_TRACK_ASSIGN[k]

Signal Meaning

= 0 Axis is not placed on cam with cam range number n

= 1 Axis is placed on cam with cam range number n

Example:

The signal addressed with field index 5 changes to 1, if the axis is placed on the cam, to which cam range number 5 on cam track 2 was assigned during parameterization.

Special cases:

- The function "Safe cam track" is enabled via MD 36903 $MA_SAFE_CAM_ENABLE.
- If cam range number n on cam track 2 is not parameterized, the signal of field index n can never change to 1. In this case the output MD with field index n does not have to be parameterized.

37908	SAFE_CAM_RANGE_BIN_OUTPUT_3			A01, A05, -	FBSI
-	Output assignment cam range bit for cam track 3			DWORD	PowerOn
-					
-	MD_MAXNUM_SF_CAM_RANGE_BIN_OUTPUT	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description:

```
This data defines the outputs for the cam range bits of cam track
3.
Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT
Field index n corresponds to the parameterizable cam range numbers
on cam track 3.
The cam range number is defined via the following machine data:
MD 36938: $MA_SAFE_CAM_TRACK_ASSIGN[k]
Signal          Meaning
= 0  Axis is not placed on cam with cam range number n
= 1  Axis is placed on cam with cam range number n
Example:
The signal addressed with field index 5 changes to 1, if the axis
is placed on the cam, to which cam range number 5 on cam track 3
was assigned during parameterization.
Special cases:
•   The function "Safe cam track" is enabled via MD 36903
    $MA_SAFE_CAM_ENABLE.
•   If cam range number n on cam track 3 is not parameterized, the
    signal of field index n can never change to 1. In this case the
    output MD with field index n does not have to be parameterized.
```

37909	SAFE_CAM_RANGE_BIN_OUTPUT_4			A01, A05, -	FBSI
-	Output assignment cam range bit for cam track 4			DWORD	PowerOn
-					
-	MD_MAXNUM_SF_CAM_RANGE_BIN_OUTPUT	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0	-	-	7/2
840disl-6a	-	-	-	-	-1/-
840disl-20a	-	-	-	-	-1/-

Description:

```
This data defines the outputs for the cam range bits of cam track
4.
Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT
Field index n corresponds to the parameterizable cam range numbers
on cam track 4.
The cam range number is defined via the following machine data:
MD 36938: $MA_SAFE_CAM_TRACK_ASSIGN[k]
Signal          Meaning
= 0  Axis is not placed on cam with cam range number n
= 1  Axis is placed on cam with cam range number n
Example:
The signal addressed with field index 5 changes to 1, if the axis
is placed on the cam, to which cam range number 5 on cam track 4
was assigned during parameterization.
Special cases:
```

- The function "Safe cam track" is enabled via MD 36903 $MA_SAFE_CAM_ENABLE.
- If cam range number n on cam track 4 is not parameterized, the signal of field index n can never change to 1. In this case the output MD with field index n does not have to be parameterized.

1.5.9 Axis-specific memory settings

38000	MM_ENC_COMP_MAX_POINTS			A01, A09, A02	K3
-	Number of intermediate points for interpol. compensation (SRAM)			DWORD	PowerOn
-					
-	2	0, 0	0	5000	7/2

Description: For leadscrew error compensation, the number of interpolation points required per measuring system must be defined.

The required number can be calculated as follows using the defined parameters:

```
                             $AA_ENC_COMP_MAX - $AA_ENC_COMP_MIN
MD: MM_ENC_COMP_MAX_POINTS= ----------------------------------- +
1
                                        $AA_ENC_COMP_STEP
```

$AA_ENC_COMP_MINInitial position (system variable)

$AA_ENC_COMP_MAXEnd position (system variable)

$AA_ENC_COMP_STEPDistance between interpolation points (system variable)

In selecting the number of interpolation points and/or the distances between them, it is important to take account of the size of the resulting compensation table and the space required in the backed-up NC user memory (SRAM). 8 bytes are required per compensation value (interpolation point).

The index [n] has the following coding: [encoder no.]: 0 or 1

Special cases: Notice:

After any change in MD: MM_ENC_COMP_MAX_POINTS, the non-volatile NC user memory is automatically re-allocated on system power-on.

All data in the backed-up NC user memory are then lost (e.g. part programs, tool offsets etc.). Alarm 6020 "Machine data changed - memory reallocated" is signaled.

If reallocation of the NC user memory fails because the total memory capacity available is not sufficient, alarm 6000 "Memory allocation made with standard machine data" is signaled.

In this case, the NC user memory division is allocated using the default values of the standard machine data.

References:

/FB/, S7, "Memory Configuration"

/DA/, "Diagnostics Guide"

Related to:

MD: ENC_COMP_ENABLE[n]LEC active

References:

/FB/, S7, "Memory Configuration"

38010	MM_QEC_MAX_POINTS		A01, A09	K3
-	Number of values for quadrant error compens. with neural network		DWORD	PowerOn
-				
-	1	0	0	1040	7/2

Description: In quadrant error compensation with neural networks (QEC) the number of required compensation values must be entered for every axis to be compensated.

The required number can be calculated as follows using the defined parameters: MM_QEC_MAX_POINTS _ - ($AA_QEC_COARSE_STEPS + 1) * $AA_QEC_FINE_STEPS

$AA_QEC_COARSE_STEPS Coarse quantization of characteristic (system variable)

$AA_QEC_FINE_STEPS Fine quantization of characteristic (system variable)

For "direction-dependent" compensation the number must be greater than or equal to double the value of this product.

When selecting coarse or fine quantization, the resulting size of the compensation table and the memory required for it in the non-volatile user memory must be taken into account. 4 bytes are required for each compensation value. If the value 0 is entered, no memory is reserved for the table; i.e. the table does not exist and the function cannot therefore be activated.

Special cases: Caution!

If MD: MM_QEC_MAX_POINTS is altered, the non-volatile NC user memory is automatically re-allocated on system power-on. This deletes all the user data in the non-volatile user memory (e.g. drive and HMI machine data, code, tool offsets, part programs etc.).

Note:

Because the exact number of required interpolation points is not known during the first start-up of the function, a large number should be chosen initially. As soon as the characteristics are recorded and saved, the number can be reduced to the required size. After performing a power-on again, the saved characteristics can be reloaded.

References:

/FB/, S7, "Memory Configuration"

1.5.10 Axis-specific configuration machine data

53200	DISP_DIR_SPINDLE			-	-
-	Displayed direction of rotation of a spindle with M3			BYTE	Immediately
-					
-	-	0	-	-	7/3

Description: Displayed direction of rotation of a spindle with M3

1.6 Setting data

Number	Identifier			Display filters	Reference
Unit	Name			Data type	Active
Attributes					
System	Dimension	Default value	Minimum value	Maximum value	Protection

Description: Description

1.6.1 General setting data

41010	JOG_VAR_INCR_SIZE			-	H1
-	Size of the variable increment for JOG			DOUBLE	Immediately
-					
-	-	0.	-	-	7/7

Description: This setting data defines the number of increments when variable increment (INCvar) is selected. This increment size is traversed by the axis in JOG mode whenever the traverse key is pressed or the handwheel is turned one detent position and variable increment is selected (PLC interface signal "Active machine function: INC variable" for machine or geometry axes is set to 1). The defined increment size also applies to DRF.

Note:

Please note that the increment size is active for incremental jogging and handwheel jogging. So if a large increment value is entered and the handwheel is turned the axis might cover a large distance (depends on setting in MD: JOG_INCR_WEIGHT).

SD irrelevant to ......

JOG continuous

Related to ....

IS (Geometrieachse 1-3 aktive Maschinenfunktion: Var. INC) bzw. NST (aktive Maschinenfunktion: Var. INC)

MD: JOG_INCR_WEIGHT (weighting of an increment for INC/handwheel)

41050	JOG_CONT_MODE_LEVELTRIGGRD		-	H1
-	Jog mode / continuous operation with continuous JOG		BOOLEAN	Immediately
-					
-	-	TRUE	-	-	7/7

Description: 1: Jog mode for JOG continuous

In jog mode (default setting) the axis traverses as long as the traverse key is held down and an axis limitation has not been reached. When the key is released the axis is decelerated to zero speed and the movement is considered complete.

0: Continuous operation for JOG continuous

In continuous operation the traverse movement is started with the first rising edge of the traverse key and continues to move even after the key is released. The axis can be stopped again by pressing the traverse key again (second rising edge).

SD irrelevant for ......

Incremental jogging (JOG INC)

Reference point approach (JOG REF)

41100	JOG_REV_IS_ACTIVE			-	-
-	JOG mode: (1) revolutional feedrate / (0) feedrate			BYTE	Immediately
-					
-	-	0x0E	-	-	7/7

Description:

```
Bit 0 = 0:
   The behavior depends on the following:
   - in the case of an axis/spindle:
      on the axial setting data $SA_ASSIGN_FEED_PER_REV_SOURCE
   - in the case of a geometry axis with an active frame with rota-
   tion:
      on the channel-specific setting data
   $SC_JOG_FEED_PER_REV_SOURCE
   - in the case of an orientation axis:
      on the channel-specific setting data
   $SC_JOG_FEED_PER_REV_SOURCE
Bit 0 = 1:
   A JOG motion with revolutional feedrate shall be traversed
   depending on the master spindle.
   The following must be considered:
   - If the master spindle is the spindle itself, it will be tra-
   versed without revolutional feedrate.
   - If the master spindle is in stop position and if the setting
   data is $SA_ASSIGN_FEED_PER_REV_SOURCE (with an axis/spindle)
   or $SC_JOG_FEED_PER_REV_SOURCE (with a geometry axis with an
   active frame with rotation, or with an orientation axis) = -3,
   traversing will be carried out without revolutional feedrate.
Bit 1 = 0:
   The axis/spindle, geometry axis or orientation axis will be
   traversed with revolutional feedrate even during rapid traverse
   (see bit 0 for selection).
Bit 1 = 1:
   The axis/spindle, geometry axis or orientation axis is always
   traversed without revolutional feedback during rapid traverse.
Bit 2 = 0:
   The axis/spindle, geometry axis or orientation axis is tra-
   versed with revolutional feedrate during JOG handwheel travel,
   too (see bit 0 for selection).
Bit 2 = 1:
   The axis/spindle, geometry axis or orientation axis is always
   traversed without revolutional feedrate during JOG handwheel
   travel.
Bit 3 = 0:
   The axis/spindle is traversed with revolutional feedrate during
   DRF handwheel travel, too (see bit 0 for selection).
Bit 3 = 1:
   The axis/spindle is always traversed without revolutional fee-
   drate during DRF handwheel travel.
```

41110	JOG_SET_VELO			-	H1
mm/min	Axis velocity in JOG			DOUBLE	Immediately
-					
-	-	0.0	-	-	7/7

Description: Value not equal to 0:

The velocity value entered applies to linear axes traversed in JOG mode if linear feedrate (G94) is active for the relevant axis (MD: JOG_REV_IS_ACTIVE = 0).

The axis velocity is active for

- continuous jogging
- incremental jogging (INC1, ... INCvar)
- handwheel traversing.

The value entered is valid for all linear axes and must not exceed the maximum permissible axis velocity (MD: MAX_AX_VELO).

In the case of DRF, the velocity defined by SD: JOG_SET_VELO is reduced by

MD: HANDWH_VELO_OVERLAY_FACTOR.

Value = 0:

If 0 has been entered in the setting data, the active linear feedrate in JOG mode is

MD: JOG_VELO "Jog axis velocity". Each axis can be given its own JOG velocity with this MD (axial MD).

SD irrelevant for ......

- Linear axes if SD: JOG_REV_IS_ACTIVE = 1
- Rotary axes (SD: JOG_ROT_AX_SET_VELO is active here)

Application example(s)

The operator can thus define a JOG velocity for a specific application.

Related to ....

Axial SD: JOG_REV_IS_ACTIVE (revolutional feedrate with JOG active)

Axial MD: JOG_VELO (JOG axis velocity)

Axial MD: MAX_AX_VELO (maximum axis velocity)

Axial MD: HANDWH_VELO_OVERLAY_FACTOR (ratio of JOG velocity to handwheel velocity (DRF))

SD: JOG_ROT_AX_SET_VELO (JOG speed with rotary axes)

41120	JOG_REV_SET_VELO			-	H1
mm/rev	Revolutional feedrate of axes in JOG mode			DOUBLE	Immediately
-					
-	-	0.0	-	-	7/7

Description: Value not equal to 0:

The velocity value entered applies to axes traversed in JOG mode if revolutional feedrate (G95) is active for the relevant axis (MD: JOG_REV_IS_ACTIVE = 1). The axis velocity is active for

- continuous jogging
- incremental jogging (INC1, ... INCvar)
- handwheel traversing. The value entered is valid for all axes and must not exceed the maximum permissible axis velocity (MD: MAX_AX_VELO).

Value = 0:

If 0 has been entered in the setting data, the active revolutional feedrate in JOG mode is MD: JOG_REV_VELO "revolutional feedrate with JOG".

Each axis can be given its own revolutional feedrate with this MD (axial MD).

SD irrelevant for ......

- For axes if SD: JOG_REV_IS_ACTIVE = 0

Application example(s)

The operator can define a JOG velocity for a particular application.

Related to ....

Axial SD: JOG_REV_IS_ACTIVE (revolutional feedrate for JOG active)

Axial MD: JOG_REV_VELO (revolutional feedrate with JOG)

Axial MD: MAX_AX_VELO (maximum axis velocity)

41130	JOG_ROT_AX_SET_VELO		-	H1
rev/min	Axis velocity for rotary axes in JOG mode		DOUBLE	Immediately
-				
-	-	0.0	-	-	7/7

Description: Value not equal to 0:

The velocity entered applies to rotary axes in JOG mode (in continuous mode, in incremental mode, in traversing with handwheel). The value entered is common to all rotary axes and must not exceed the maximum permissible axis velocity (MD: MAX_AX_VELO).

With DRF, the velocity set with SD: JOG_ROT_AX_SET_VELO must be reduced by the MD: HANDWH_VELO_OVERLAY_FACTOR.

Value equal to 0:

If the value 0 is entered in the setting data, the velocity that applies to rotary axes in JOG mode is the axial MD: JOG_VELO (jog axis velocity). In this way, it is possible to define a separate JOG velocity for each axis.

Application example(s)

The operator can define a JOG velocity for a particular application.

Related to ....

MD: JOG_VELO (JOG axis velocity)

MD: MAX_AX_VELO (maximum axis velocity)

MD: HANDWH_VELO_OVERLAY_FACTOR (ratio JOG velocity to handwheel velocity (DRF)

41200	JOG_SPIND_SET_VELO			-	H1
rev/min	Speed for spindle JOG mode			DOUBLE	Immediately
-					
-	-	0.0	-	-	7/7

Description: Value not equal to 0:

The speed entered applies to spindles in JOG mode if they are traversed manually by the "Plus or minus traversing keys" or the handwheel. The speed is active for

- continuous jogging
- incremental jogging (INC1, ... INCvar)
- handwheel traversing. The value entered is valid for all spindles and must not exceed the maximum permissible speed (MD: MAX_AX_VELO).

Value = 0:

If 0 has been entered in the setting data, MD: JOG_VELO (JOG axis velocity) acts as the JOG velocity. Each axis can thus be given its own JOG velocity with this MD (axial MD).

The maximum speeds of the active gear stage (MD: GEAR_STEP_VELO_LIMIT) are taken into account when traversing the spindle with JOG.

SD irrelevant for ......

Application example(s). The operator can thus define a JOG speed for the spindles for a specific application.

Related to ....

Axial MD: JOG_VELO (JOG axis velocity)

MD: GEAR_STEP_MAX_VELO_LIMIT (maximum speed of the gear range)

41300	CEC_TABLE_ENABLE			-	K3
-	Compensation table enable			BOOLEAN	Immediately
-					
-	62	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7

Description: 1: The evaluation of the compensation table [t] is enabled.

The compensation table is now included in the calculation of the compensation value for the compensation axis.

The compensation axis $AN_CEC_OUTPUT_AXIS can be taken from the table configuration.

The effective total compensation value in the compensation axis can be adapted to the current machining by the targeted activation of tables (from NC part programm or PLC user program).

The function does not become active until the following conditions have been fulfilled:

- The option "Interpolatory compensation" is set
- The associated compensation tables in the NC user memory have been loaded and enabled (SD: CEC_TABLE_ENABLE[t] = 1)
- The current position measuring system is referenced (IS: "Referenced/Synchronized" =1).

0: The evaluation of the sag compensation table [t] is not enabled.

Related to ....

MD: MM_CEC_MAX_POINTS[t] Number of interpolation points with sag compensation

SD: CEC_TABLE_ENABLE[t] Evaluation of the sag compensation table t is enabled

IS (Referiert/Synchronisiert 1)

IS (Referiert/Synchronisiert 2)

41310	CEC_TABLE_WEIGHT			-	K3
-	Weighting factor compensation table			DOUBLE	Immediately
-					
-	62	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	-	-	7/7

Description: The compensation value stored in the table [t] is multiplied by the weighting factor.

When selecting the weighting factor it should be ensured that the total compensation value in the compensation axis does not exceed the maximal value of

(MD: CEC_MAX_SUM). With [t] = index of the compensation table (see MD: MM_CEC_MAX_POINTS)

If, for example, the weight of the tools used on the machine or the workpieces to be machined are too different and this affects the error curve by changing the amplitude, this can be corrected by changing the weighting factor. In the case of sag compensation, the weighting factor in the table can be changed for specific tools or workpieces from the PLC user program or the NC program by overwriting the setting data. However, different compensation tables are to be used if the course of the error curve is substantially changed by the different weights.

Related to ....

SD: CEC_TABLE_ENABLE[t] Evaluation of the sag compensation table t is enabled

MD: CEC_MAX_SUM Maximum compensation value for sag compensation

41500	SW_CAM_MINUS_POS_TAB_1			-	N3
mm/inch, degrees	Trigger points at falling cam 1-8			DOUBLE	Immediately
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

Description: The cam positions of minus cams 1 - 8 are entered in this machine data.

The positions are entered in the machine coordinate system.

Index [n] of the setting data addresses the cam pair:

n = 0, 1, ... , 7 corresponds to cam pair 1, 2, ... , 8

When the set switching points are overtraveled in the positive axis direction, the associated "minus" cam signals in the PLC interface (and any applied fast output signals) switch from 1 to 0.

41501	SW_CAM_PLUS_POS_TAB_1			-	N3
mm/inch, degrees	Trigger points at rising cam edge 1-8			DOUBLE	Immediately
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

Description: The cam positions of plus cams 1 - 8 are entered in this machine data.

The positions are entered in the machine coordinate system.

Index [n] of the setting data addresses the cam pair:

n = 0, 1, ... , 7 corresponds to cam pair 1, 2, ... , 8

When the set switching points are overtraveled in the positive axis direction, the associated "plus" cam signals in the PLC interface (and any applied fast output signals) switch from 0 to 1.

41502	SW_CAM_MINUS_POS_TAB_2			-	N3
mm/inch, degrees	Trigger points at falling cam edge 9-16			DOUBLE	Immediately
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

Description: The cam positions of minus cams 9-16 are entered in this machine data.

The positions are entered in the machine coordinate system.

Index [n] of the setting data addresses the cam pair:

n = 8, 9, ... , 15 corresponds to cam pair 9, 10, ... , 16

Switching points with falling edges of cams 9 - 16.

When the set switching points are overtraveled in the positive axis direction, the associated "minus" cam signals in the PLC interface (and any applied fast output signals) switch from 1 to 0.

41503	SW_CAM_PLUS_POS_TAB_2			-	N3
mm/inch, degrees	Trigger points at rising cam edge 9-16			DOUBLE	Immediately
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

Description: The cam positions of plus cams 9-16 are entered in this machine data.

The positions are entered in the machine coordinate system.

Index [n] of the setting data addresses the cam pair:

n = 8, 9, ... , 15 corresponds to cam pair 9, 10, ... , 16

Switching points with rising edges of cams 9 - 16.

When the set switching points are overtraveled in the positive axis direction, the associated "plus" cam signals in the PLC interface (and any applied fast output signals) switch from 0 to 1.

41504	SW_CAM_MINUS_POS_TAB_3			-	N3
mm/inch, degrees	Trigger points at falling cam edge 17-24			DOUBLE	Immediately
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

Description: The cam positions of minus cams 17 - 24 are entered in this machine data.

The positions are entered in the machine coordinate system.

Index [n] of the setting data addresses the cam pair:

n = 0, 1, ... , 7 corresponds to cam pair 17, 18, ... , 24

Switching points with falling edges of cams 17 - 24.

When the set switching points are overtraveled in the positive axis direction, the associated "minus" cam signals in the PLC interface (and any applied fast output signals) switch from 1 to 0.

41505	SW_CAM_PLUS_POS_TAB_3			-	N3
mm/inch, degrees	Trigger points at rising cam edge 17-24			DOUBLE	Immediately
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

Description: The cam positions of plus cams 17 - 24 are entered in this machine data.

The positions are entered in the machine coordinate system.

Index [n] of the setting data addresses the cam pair:

n = 0, 1, ... , 7 corresponds to cam pair 17, 18, ... , 24

Switching points with rising edges of cams 17 - 24

When the set switching points are overtraveled in the positive axis direction, the associated "plus" cam signals in the PLC interface (and any applied fast output signals) switch from 0 to 1.

41506	SW_CAM_MINUS_POS_TAB_4			-	N3
mm/inch, degrees	Trigger points at falling cam edge 25-32			DOUBLE	Immediately
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

Description: The cam positions of minus cams 25 - 32 are entered in this machine data.

The positions are entered in the machine coordinate system.

Index [n] of the setting data addresses the cam pair:

n = 8, 9, ... , 15 corresponds to cam pair 25, 26, ... , 32

Switching points with falling edges of cams 25 - 32.

When the set switching points are overtraveled in the positive axis direction, the associated "minus" cam signals in the PLC interface (and any applied fast output signals) switch from 1 to 0.

41507	SW_CAM_PLUS_POS_TAB_4		-	N3
mm/inch, degrees	Trigger points at rising cam edge 25-32		DOUBLE	Immediately
-				
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

Description: The cam positions of plus cams 25 - 32 are entered in this machine data.

The positions are entered in the machine coordinate system.

Index [n] of the setting data addresses the cam pair:

n = 8, 9, ... , 15 corresponds to cam pair 25, 26, ... , 32

Switching points with rising edges of cams 25 - 32.

When the set switching points are overtraveled in the positive axis direction, the associated "plus" cam signals in the PLC interface (and any applied fast output signals) switch from 0 to 1.

41520	SW_CAM_MINUS_TIME_TAB_1			-	N3
s	Rate time for '-' trigger points of cams 1-8			DOUBLE	Immediately
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

Description: A lead or delay time can be assigned to each cam 1-8 in this setting data to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the time value entered.

Positive value: Lead time

Negative value: Delay time

Index [n] of the setting data addresses the cam pair:

n = 0, 1, ... , 7 corresponds to cam pair 1, 2, ... , 8

This setting data is added to MD: SW_CAM_MINUS_LEAD_TIME[n].

Related to ....

MD: SW_CAM_MINUS_LEAD_TIME[n] (lead or delay time on minus cams 1 - 16)

41521	SW_CAM_PLUS_TIME_TAB_1			-	N3
s	Rate time for '+' trigger points of cams 1-8			DOUBLE	Immediately
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

Description: A lead or delay time can be assigned to each plus cam 1-8 in this setting data to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the time value entered.

Positive value: Lead time

Negative value: Delay time

Index [n] of the setting data addresses the cam pair:

n = 0, 1, ... , 7 corresponds to cam pair 1, 2, ... , 8

This setting data is added to MD: SW_CAM_PLUS_LEAD_TIME[n].

Related to ....

MD: SW_CAM_PLUS_LEAD_TIME[n] (lead or delay time on plus cams 1 - 16)

41522	SW_CAM_MINUS_TIME_TAB_2			-	N3
s	Rate time for '-' trigger points of cams 9-16			DOUBLE	Immediately
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

Description: A lead or delay time can be assigned to each minus cam 9 - 16 in this setting data to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the time value entered.

Positive value: Lead time

Negative value: Delay time

Index [n] of the setting data addresses the cam pair:

n = 8, 9, ... , 15 corresponds to cam pair 9, 10, ... , 16

This setting data is added to MD: SW_CAM_MINUS_LEAD_TIME[n+8].

Related to ....

MD: SW_CAM_MINUS_LEAD_TIME[n] (lead or delay time on minus cams 1 - 16)

41523	SW_CAM_PLUS_TIME_TAB_2			-	N3
s	Rate time for '+' trigger points of cams 9-16			DOUBLE	Immediately
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

Description: A lead or delay time can be assigned to each plus cam 9 - 16 in this setting data to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the time value entered.

Positive value: Lead time

Negative value: Delay time

Index [n] of the setting data addresses the cam pair:

n = 8, 9, ... , 15 corresponds to cam pair 9, 10, ... , 16

This setting data is added to MD: SW_CAM_PLUS_LEAD_TIME[n+8].

Related to ....

MD: SW_CAM_PLUS_LEAD_TIME[n] (lead or delay time on plus cams 1 - 16)

41524	SW_CAM_MINUS_TIME_TAB_3			-	N3
s	Rate time for '-' trigger points of cams 17-24			DOUBLE	Immediately
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

Description: A lead or delay time can be assigned to each minus cam 17-24 in this setting data to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the time value entered.

Positive value: Lead time

Negative value: Delay time

Index [n] of the setting data addresses the cam pair:

n = 0, 1, ... , 7 corresponds to cam pair 17, 18, ... , 24

This setting data is added to MD: SW_CAM_MINUS_LEAD_TIME[n].

Related to ....

MD: SW_CAM_MINUS_LEAD_TIME[n] (lead or delay time on minus cams 1 - 16)

41525	SW_CAM_PLUS_TIME_TAB_3			-	N3
s	Rate time for '+' trigger points of cams 17-24			DOUBLE	Immediately
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

Description: A lead or delay time can be assigned to each plus cam 17-24 in this setting data to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the time value entered.

Positive value: Lead time

Negative value: Delay time

Index [n] of the setting data addresses the cam pair:

n = 0, 1, ... , 7 corresponds to cam pair 17, 18, ... , 24

This setting data is added to MD: SW_CAM_PLUS_LEAD_TIME[n].

Related to ....

MD: SW_CAM_PLUS_LEAD_TIME[n] (lead or delay time on plus cams 1 - 16)

41526	SW_CAM_MINUS_TIME_TAB_4			-	N3
s	Rate time for '-' trigger points of cams 25-32			DOUBLE	Immediately
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

Description: A lead or delay time can be assigned to each minus cam 25-32 in this setting data to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the time value entered.

Positive value: Lead time

Negative value: Delay time

Index [n] of the setting data addresses the cam pair:

n = 8, 9, ... , 15 corresponds to cam pair 25, 26, ... , 32

This setting data is added to MD: SW_CAM_MINUS_LEAD_TIME[n+8].

Related to ....

MD: SW_CAM_MINUS_LEAD_TIME[n] (lead or delay time on minus cams 1 - 16)

41527	SW_CAM_PLUS_TIME_TAB_4			-	N3
s	Rate time for '+' trigger points of cams 25-32			DOUBLE	Immediately
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

Description: A lead or delay time can be assigned to each plus cam 25 - 32 in this setting data to com-pensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the time value entered.

Positive value: Lead time

Negative value: Delay time

Index [n] of the setting data addresses the cam pair:

n = 8, 9, ... , 15 corresponds to cam pair 25, 26, ... , 32

This setting data is added to MD: SW_CAM_PLUS_LEAD_TIME[n+8].

Related to ....

MD: SW_CAM_PLUS_LEAD_TIME[n] (lead or delay time on plus cams 1 - 16)

41600	COMPAR_THRESHOLD_1			-	A4
-	Threshold value of the 1st comparator			DOUBLE	Immediately
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

Description: COMPAR_THRESHOLD_1[b] defines the threshold values for the individual input bits [b] of comparator byte 1.

The output bit n of the 1st comparator is created by comparing the threshold value n according to the comparison type defined in bit n of COMPAR_TYPE_1.

For example:

```
COMPAR_ASSIGN_ANA_INPUT_1[2] = 4
COMPAR_TRESHOLD_1[2]         = 5000.0
COMPAR_TYPE_1                = 5
```

The 3rd output bit of comparator 1 is set if the input value at AnalogIn 4 is greater than or equal to 5 volts.

Index [b]: Bits 0 - 7

Related to ....

MD 10530: COMPAR_ASSIGN_ANA_INPUT_1
MD 10531: COMPAR_ASSIGN_ANA_INPUT_2
MD 10540: COMPAR_TYPE_1 MD 10541: COMPAR_TYPE_2

41601	COMPAR_THRESHOLD_2			-	A4
-	Threshold value of the 2nd comparator			DOUBLE	Immediately
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

Description: COMPAR_THRESHOLD_1[b] defines the threshold values for the individual input bits [b] of comparator byte 1.

The output bit n of the 1st comparator is created by comparing the threshold value n according to the comparison type defined in bit n of COMPAR_TYPE_2.

Index [b]: Bits 0 - 7

Related to ....

MD 10530: COMPAR_ASSIGN_ANA_INPUT_1
MD 10531: COMPAR_ASSIGN_ANA_INPUT_2
MD 10540: COMPAR_TYPE_1
MD 10541: COMPAR_TYPE_2

41700	AXCT_SWWIDTH			-	B3
-	Default rotation of axis container			DWORD	NEW CONF
CTDE					
-	16	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-32	32	7/7

Description: The number of entries (slots) by which the entries in the axis container are advanced on execution of the rotation. The value is interpreted modulo of the actually existing entries. Negative values reverse the direction of rotation.

Related to the container rotation command, container axes.

This machine data is distribued via the NCU-link.

Contrary to the the definition for setting data, this SD is not immediately active, but first with NEWCONF.

1.6.2 Channel-specific setting data

42000	THREAD_START_ANGLE			-	K1
degrees	Starting angle for thread			DOUBLE	Immediately
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/7

Description: In the case of multiple thread cutting, the offset of the individual threads can be programmed with the aid of this setting data.

This SD can be changed by the part program with the command SF.

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)

42010	THREAD_RAMP_DISP			-	V1
mm	Acceleration behavior of axis when thread cutting			DOUBLE	Immediately
-					
-	2	-1., -1.,-1., -1.,-1., -1.,-1., -1....	-1.	999999.	7/7

Description: The SD is active for thread cutting with G33 (G34, G35).

It features two elements that define the behavior of the thread axis during runup (1st element) and during deceleration/smoothing (2nd element).

The values have the same properties for thread run-in and thread run-out:

<0:

The thread axis is started/decelerated with configured acceleration. Jerk is according to the current programming of BRISK/SOFT. Behavior is compatible with MD 20650__THREAD_START_IS_HARD = FALSE used until now.

0:

Starting/deceleration of the feed axis during thread cutting is stepped. Behavior is compatible with MD 20650__THREAD_START_IS_HARD = TRUE used until now.

>0:

The maximum thread starting or deceleration path is specified. The specified distance can lead to acceleration overload of the axis. The SD is written from the block when DITR (displacement thread ramp) is programmed.

Note:

MD 10710: PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)

42100	DRY_RUN_FEED			-	V1
mm/min	Dry run feedrate			DOUBLE	Immediately
-					
-	-	5000.,5000.,5000.,5000.,5000.,5000....	-	-	7/7

Description: The feedrate for the active dry run is entered in this setting data. The setting data can be altered on the operator panel in the "Parameters" operating area.

The entered dry run feedrate is always interpreted as a linear feed (G94). If the dry run feedrate is activated via the PLC interface, the dry run feedrate is used as the path feed after a reset instead of the programmed feed. The programmed velocity is used for traversing if the programmed velocity is greater than the velocity stored here.

Application example(s)

Program testing

Related to ....

IS (Probelaufvorschub aktivieren)

IS (Probelaufvorschub angewählt)

42101	DRY_RUN_FEED_MODE			-	V1
-	Mode for dry run velocity			BYTE	Immediately
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	12	7/7

Description: This MD can be used to set the method of operation of the dry run velocity specified by the setting data $SC_DRY_RUN_FEED.

The following values are possible:

0:

The maximum of setting data $SC_DRY_RUN_FEED and the programmed velocity become active. This is the standard setting and corresponds to the behavior up to SW 5.

1:

The minimum of setting data $SC_DRY_RUN_FEED and the programmed velocity become active.

2:

The setting data $SC_DRY_RUN_FEED becomes active directly irrespective of the programmed velocity.

The values 3...9 are reserved for extensions.

10:

As configuration 0 except thread cutting (G33, G34, G35) and tapping (G331, G332, G63). These functions are executed as programmed.

11:

As configuration 1 except thread cutting (G33, G34, G35) and tapping (G331, G332, G63). These functions are executed as programmed.

12:

As configuration 2 except thread cutting (G33, G34, G35) and tapping (G331, G332, G63). These functions are executed as programmed.

42110	DEFAULT_FEED			-	V1,FBFA
mm/min	Path feed default value			DOUBLE	Immediately
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/7

Description: Default value for path feedrate, The setting data is evaluated when the part program starts taking into account the feedrate type active at this time (see $MC_GCODE_RESET_VALUES and $MC_EXTERN_GCODE_RESET_VALUES).

42120	APPROACH_FEED			-	-
mm/min	Path feedrate in approach blocks			DOUBLE	Immediately
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/7

Description: Default value for path feedrate in approach blocks (after repos., block search, SERUPRO etc).

The contents of this settting data are only used when it is non-zero.

It is evaluated like an F word programmed for G94.

42122	OVR_RAPID_FACTOR			-	$MN_OVR_FACTOR_RAPID_TRA,$AC_OVR
%	Add. rapid traverse override can be specified through operation			DOUBLE	Immediately
-					
-	-	100.,100.,100.,100.,100.,100.,100....	-	-	7/7

Description: Additional channel-specific rapid traverse override in %. The value is calculated to the path depending on OPI variable enablOvrRapidFactor. The value multiplies the other rapid traverse overrides (rapid traverse override of the machine control panel, override default through synchronized actions $AC_OVR).

42125	SERUPRO_SYNC_MASK			-	-
-	Ssynchronization in approach blocks			DWORD	Immediately
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description:

A synchronized approach can be set for the search type SERUPRO with the setting data SERUPRO_SYNC_MASK.

SERUPRO uses the function REPOS to move from the current machine position to the target block of the search. A synchronization of the channels can be forced between the reapproach block and the target block via SERUPRO_SYNC_MASK which would correspond to the use of wait markers.

Note:

The user cannot program wait markers between reapproach block and target block in a part program.

SERUPRO_SYNC_MASK activates this intermal wait marker, and defines for which other channels this channel is to wait.

Example for channel 3: $SC_SERUPRO_SYNC_MASK= 0x55

A new block is now inserted in the Serupro approach between the reapproach block and the target block, the function of which corresponds to the following programming: WAITM(101, 1,3,5,7), i.e. a wait mark synchronizes the channels 1, 3, 5 and 7.

The wait marks used internally cannot be explicitly programmed by the user.

NOTICE:

Similarly to the part program, the user can make the error of not setting the mark in a channel, so that the other channels naturally wait for ever!

Comment: The bit mask can contain a channel that does not exist (channel gaps) without a

deadlock occurring.

Example for channel 3: $SC_SERUPRO_SYNC_MASK= 0x55 and channel 5 do not exist, so WAITM(101, 1,3,7) is set.

Note: The block content corresponds to "WAITM(101, 1,3,5,7)", the user does not see this block content, he sees REPOSA!

Note:

SERUPRO_SYNC_MASK is evaluated as soon as the part program command REPOSA is interpreted.

SERUPRO_SYNC_MASK can still be changed if SERUPRO is in the state "search target found".

If REPOSA has already been executed, a change to SERUPRO_SYNC_MASK can only become active if a new REPOS is set. This occurs, for example, by:

- Starting a new ASUB.
- STOP-JOG-AUTO-START
- STOP - select a new REPOS mode RMI/RMN/RME/RMB - START

Comment:

If one use the prog. event for search and if the NCK is at alarm 10208 then a change of SERUPRO_SYNC_MASK is not active unless one sets a new REPOS.

SERUPRO_SYNC_MASK == 0   A block is NOT inserted.

Note:

If the bit for the current channel is not set in $SC_SERUPRO_SYNC_MASK then a block is NOT inserted.

Example:

If $SC_SERUPRO_SYNC_MASK= 0xE is programmed in channel 1, then a block is NOT inserted.

This assignment is reserved for a future function!

42140	DEFAULT_SCALE_FACTOR_P			-	FBFA
-	Default scaling factor for address P			DWORD	Immediately
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	-	-	7/7

Description: The value in this machine data is active if no scaling factor P has been programmed in the block.

Related to:

WEIGHTING_FACTOR_FOR_SCALE

42150	DEFAULT_ROT_FACTOR_R			-	-
-	Default rotation factor for address R			DOUBLE	Immediately
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/7

Description: The value in this machine data is active if no factor for rotation R is programmed in the block.

42160	EXTERN_FIXED_FEEDRATE_F1_F9			-	FBFA
-	Fixed feedrates F1 - F9			DOUBLE	Immediately
-					
-	10	0., 0., 0., 0., 0., 0., 0., 0., 0., 0....	-	-	7/7

Description: Fixed feedrate values for programming with F1 - F9. If the machine data $MC_FEEDRATE_F1_F9_ON = TRUE is set with the programming of F1 - F9, the feedrate values are read from the setting data $SC_EXTERN_FIXED_FEEDRATE_F1_F9[0] - $SC_EXTERN_FIXED_FEEDRATE_F1_F9[8], and activated as the machining feedrate.

The rapid traverse feedrate must be entered in $SC_EXTERN_FIXED_FEEDRATE_F1_F9[0].

42162	EXTERN_DOUBLE_TURRET_DIST			-	FBFA
-	Double turret head tool distance			DOUBLE	Immediately
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/7

Description: Distance between both tools of a double turret head.

The distance is activated using G68 as additive zero point offset if $MN_EXTERN_DOUBLE_TURRET_ON is set to TRUE.

42200	SINGLEBLOCK2_STOPRE			-	BA
-	Activate SBL2 debug mode			BOOLEAN	Immediately
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7

Description: Value = TRUE:

A preprocessing stop is made with every block if SBL2 (single block with stop after every block) is active. This suppresses the premachining of part program blocks. This variant of the SBL2 is not true-to-contour.

This means that a different contour characteristic might be generated as a result of the preprocessing stop than without single block or with SBL1.

Application: Debug mode for testing part programs.

42300	COUPLE_RATIO_1			-	-
-	Speed ratio for synchr. spindle mode, numerator, denominator			DOUBLE	Immediately
-					
-	2	1.0, 1.0,1.0, 1.0,1.0, 1.0,1.0, 1.0...	-1.0e8	1.0e8	7/7

Description: This setting data defines the speed ratio parameters for the fixed coupling configuration defined with the channel-specific MD: COUPLE_AXIS_1[n].

-

k_Ü = Speed ratio parameter of numerator / Speed ratio parameter of denominator

= $SC_COUPLE_RATIO[0] / $SC_COUPLE_RATIO[1]

The speed ratio parameters can be altered in the NC part program with the language instruction COUPDEF provided that this is not locked by the channel-specific MD 21340: COUPLE_IS_WRITE_PROT_1.

However, the parameterized values of SD: $SC_COUPLE_RATIO_1 are not changed.

The calculation of k_Ü is initiated with POWER ON.

SD irrelevant for ......

User-defined coupling

Related to ....

SD: $SC_COUPLE_RATIO_1 currently has the same action as a machine data (e.g. active after POWER ON). The SD data are therefore displayed and input in the same way as channel-specific machine data.

42400	PUNCH_DWELLTIME			-	N4
s	Dwell time for punching and nibbling			DOUBLE	Immediately
-					
-	-	1.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7

Description: This data sets the dwell time between reaching the position and triggering the stroke.

The set value is rounded to an integer multiple of the interpolation cycle. (This means that the value set here can only differ slightly from that which is actually executed.)

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be set so that the value written by the part program is transferred into the active file system on reset (i.e. the value is retained even after the reset).

42402	NIBPUNCH_PRE_START_TIME			-	N4
s	Delay time (punch/nibble) with G603			DOUBLE	Immediately
-					
-	-	.02,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7

Description: This machine data has exactly the same effect as machine data NIBBLE_PRE_START_TIME. Its primary purpose is to allow the pre-start time to be altered from the NC program so that it can be adapted to different metal sheet sizes and thicknesses. However, the setting data is active only when the machine data has been set to zero.

Related to .... NIBBLE_PRESTART_TIME

42404	MINTIME_BETWEEN_STROKES			-	N4
s	Minimum time between 2 strokes in seconds			DOUBLE	Immediately
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7

Description: Minimum time between 2 strokes in seconds

42440	FRAME_OFFSET_INCR_PROG			-	K2
-	Traversing from zero offset with incr. programming			BOOLEAN	Immediately
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: 0: When incremental programming is used on an axis, only the programmed position delta is traversed after a frame change. Zero offsets in FRAMES are only traversed when an absolute position is specified.

1: When incremental programming is used on an axis, changes to zero offsets are traversed after a frame change (standard response up to software version 3).

Related to ....

SD 42442: TOOL_OFFSET_INCR_PROG

42442	TOOL_OFFSET_INCR_PROG			-	W1
-	Traversing from zero offset with incr. programming			BOOLEAN	Immediately
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: 0: When incremental programming is used on an axis, only the programmed position delta is traversed after a frame change. Tool length offsets in FRAMES are only traversed when an absolute position is specified.

1: When incremental programming is used on an axis, changes to tool length offsets are traversed after a tool change (standard response up to SW version 3).

Related to ....

SD 42440: FRAME_OFFSET_INCR_PROG

42444	TARGET_BLOCK_INCR_PROG			-	BA
-	Set down mode after search run with calculation			BOOLEAN	Immediately
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: If the first programming of an axis after "Search run with calculation to end of block" is incremental, the incremental value is added as a function of SD $SC_TARGET_BLOCK_INCR_PROG to the value accumulated up to the search target :

SD = TRUE: Incremental value is added to accumulated position

SD = FALSE: Incremental value is added to current actual value

The setting data is evaluated on NC start for output of the action blocks.

42450	CONTPREC			-	B1,K6
mm	Contour accuracy			DOUBLE	Immediately
-					
-	-	0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1...	0.000001	999999.	7/7

Description: Contour accuracy. This setting data can be used to define the accuracy to be maintained for the path of the geometry axes on curved contours. The lower the value and the lower the servogain factor of the geometry axes, the greater the reduction of path feed on curved contours.

Related to ....

$MC_CPREC_WITH_FFW

$SC_MINFEED

42460	MINFEED			-	B1,K6
mm/min	Minimum path feedrate for CPRECON			DOUBLE	Immediately
-					
-	-	1.,1.,1.,1.,1.,1.,1.,1.,1.,1.,1.,1....	0.000001	999999.	7/7

Description: Minimum path feedrate with the "Contour accuracy" function active. The feedrate is not limited to below this value, unless a lower F value has been programmed or the axis dynamics do not permit it.

Related to ....

$MC_CPREC_WITH_FFW

$SC_CONTPREC

42465	SMOOTH_CONTUR_TOL			-	B1
mm	maximum contour tolerance on smoothing			DOUBLE	Immediately
-					
-	-	0.05,0.05,0.05,0.05,0.05,0.05,0.05...	0.000001	999999.	7/7

Description: This setting data defines the maximum tolerance of smoothing for the contour.

Related to:

$MC_SMOOTHING_MODE,

$SC_SMOOTH_ORI_TOL

42466	SMOOTH_ORI_TOL			-	B1
degrees	Maximum deviation of tool orientation during smoothing.			DOUBLE	Immediately
-					
-	-	0.05,0.05,0.05,0.05,0.05,0.05,0.05...	0.000001	90.	7/7

Description: This setting data defines the maximum tool orientation tolerance during smoothing.

The data determines the maximum

angular displacement of the tool orientation.

This data only applies if an orientation tranformation

is active.

Related to:

$MC_SMOOTHING_MODE,

$SC_SMOOTH_CONTUR_TOL

42470	CRIT_SPLINE_ANGLE			-	W1,PGA
degrees	Corner limit angle for compressor			DOUBLE	Immediately
-					
-	-	36.0,36.0,36.0,36.0,36.0,36.0,36.0...	0.0	89.0	7/7

Description: The setting data defines the limit angle from which the compressor COMPCAD interprets a block transition as a corner. Practical values lie between 10 and 40 degrees. Values from 0 to 89 degrees inclusive are permitted.

The angle only serves as an approximate measure for corner detection. The compressor can also classify flatter block transitions as corners and eliminate larger angles as outliers on account of plausibility considerations.

42471	MIN_CURV_RADIUS			EXP, C09	-
mm	Minimum radius of curvature			DOUBLE	Immediately
-					
-	-	3.0,3.0,3.0,3.0,3.0,3.0,3.0,3.0,3.0...	-	-	7/7

Description: The setting data defines a typical tool radius. It is only evaluated in compressor COMPCAD. The lower the value, the greater the precision, but the slower the program execution.

42475	COMPRESS_CONTUR_TOL			-	F2,PGA
mm	maximum contour deviation with compressor			DOUBLE	Immediately
-					
-	-	0.05,0.05,0.05,0.05,0.05,0.05,0.05...	0.000001	999999.	7/7

Description: This setting data defines the maximum contour tolerance in the compressor.

42476	COMPRESS_ORI_TOL			-	F2,PGA
degrees	Maximum deviation of tool orientation with compressor			DOUBLE	Immediately
-					
-	-	0.05,0.05,0.05,0.05,0.05,0.05,0.05...	0.000001	90.	7/7

Description: This setting data defines the maximum tool orientation tolerance in the compressor. This data defines the maximum permissible angular displacement of the tool orientation.

This data is active only if an orientation transformation is active.

42477	COMPRESS_ORI_ROT_TOL			-	F2,PGA
degrees	Maximum deviation of tool rotation with compressor			DOUBLE	Immediately
-					
-	-	0.05,0.05,0.05,0.05,0.05,0.05,0.05...	0.000001	90.	7/7

Description: This setting data defines the maximum tolerance in the compressor for turning the tool orientation. This data defines the maximum permissible angular displacement of the tool rotation.

This data is only active if an orientation transformation is active.

Turning the tool orientation is only possible with 6-axis machines.

42480	STOP_CUTCOM_STOPRE			-	W1
-	Alarm response with tool radius compensation and preproc. stop			BOOLEAN	Immediately
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: If this setting data is TRUE, block execution is stopped by preprocessing stop and active tool radius compensation, and does not resume until after a user acknowledgement (START).

If it is FALSE, machining is not interrupted at such a program point.

42490	CUTCOM_G40_STOPRE			-	W1
-	Retraction behavior of tool radius compensation with prep. stop			BOOLEAN	Immediately
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7

Description: FALSE:

If there is a preprocessing stop (either programmed or generated internally by the control) before the deselection block (G40) when tool radius compensation is active, then firstly the starting point of the deselection block is approached from the last end point before the preprocessing stop. The deselection block itself is then executed, i.e. the deselection block is usually replaced by two traversing blocks. Tool radius compensation is no longer active in these blocks. The behavior is thus identical with that before the introduction of this setting data.

TRUE:

If there is a preprocessing stop (either programmed or generated internally by the control) before the deselection block (G40) when tool radius compensation is active, the end point of the deselection point is traversed in a straight line from the last end point before the preprocessing stop.

42494	CUTCOM_ACT_DEACT_CTRL			-	W1
-	Approach & retraction behavior with 2-1/2D tool radius compens.			DWORD	Immediately
-					
-	-	2222,2222,2222,2222,2222,2222,2222...	-	-	7/7

Description: This setting data controls the approach and retraction behavior with tool radius compensation if the activation or deactivation block does not contain any traversing information. It is only evaluated with 2-1/2D TRC

(CUT2D or CUT2DF).

The decimal coding is as follows:

```
N N N N
|   |   |   |____  Approach behavior for tools with tool point
direction
|   |   |           (turning tools)
|   |   |______ Approach behavior for tools without tool point
direction
|   |           (milling tools)
|   |________  Retract behavior for tools with tool point direc-
tion
|               (turning tools)
|__________   Retract behavior for tools without tool point direc-
tion
             (milling tools)
```

If the position in question contains a 1, approach or retraction is always performed, even if G41/G42 or G40 stands alone in a block.

For example:

```
N100 x10 y0
N110 G41
N120 x20
```

If we assume a tool radius of 10mm in the above example, position x10y10 is approached in block N110.

If the position in question contains the value 2, the approach or retraction movement is only performed if at least one axis of the offset plane is programmed in the activation/deactivation block. To obtain the same results as the above example with this setting, the program must be altered as follows:

```
N100 x10 y0
N110 G41 x10
N120 x20
```

If axis information x10 is missing in block N110, activation of TRC is delayed by one block, i.e. the activation block would now be N120.

If the position in question contains a value other than 1 or 2, i.e. in particular the value 0, an approach or retraction movement is not performed in a block that does not contain any traversing information.

About the term "Tools with tool point direction":

These are tools with tool numbers between 400 and 599 (turning and grinding tools), whose tool point direction has a value between 1 and 8. Turning and grinding tools with tool point direction 0 or 9 or other undefined values are treated like milling tools.

Note:

If the value of this setting data is changed within a program, we recommend programming a preprocessing stop (stopre) before the description to avoid the new value being used in program sections before that point. The reverse case is not serious, i.e. if the setting data is written, subsequent NC blocks will definitely access the new value.

42496	CUTCOM_CLSD_CONT			-	-
-	Tool radius compensation behavior with closed contour			BOOLEAN	Immediately
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7

Description: FALSE:

If two intersections are created on correction of the inner side of an (almost) closed contour consisting of two successive circle blocks or a circle and a linear block, the intersection that lies on the first part contour nearer to the block end will be selected as per the default behavior.

A contour will be considered as (almost) closed if the distance between the starting point of the first block and the end point of the second block is smaller than 10% of the active compensation radius, but not larger than 1000 path increments (corresponds to 1mm to 3 decimal places).

TRUE:

Under the same condition as described above, the intersection that lies on the first part contour nearer to block start is selected.

42500	SD_MAX_PATH_ACCEL			-	B2
m/s²	maximum path acceleration			DOUBLE	Immediately
-					
-	-	10000.,10000.,10000.,10000.,10000....	1.0e-3	-	7/7

Description: Setting data for additional limitation of (tangential) path acceleration

Related to ...

MD 32300: MAX_AX_ACCEL

SD 42502: IS_SD_MAX_PATH_ACCEL

42502	IS_SD_MAX_PATH_ACCEL			-	B2
-	Evaluate SD SC_SD_MAX_PATH_ACCEL			BOOLEAN	Immediately
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7

Description: Setting data SD_MAX_PATH_ACCEL is included in the limit calculations if SD: IS_SD_MAX_PATH_ACCEL=TRUE

Related to ...

SD 42500: SD_MAX_PATH_ACCEL

42510	SD_MAX_PATH_JERK			-	B2
m/s³	maximum path-related jerk as setting data			DOUBLE	Immediately
-					
-	-	100000.,100000.,100000.,100000....	1.e-9	-	7/7

Description: As well as MD: MAX_PATH_JERK, the maximum path-related jerk can also limit the jerk.

Related to ...

MD 20600: MAX_PATH_JERK

SD 42510: IS_SD_MAX_PATH_JERK

42512	IS_SD_MAX_PATH_JERK			-	B2
-	Evaluate SD SD_MAX_PATH_JERK			BOOLEAN	Immediately
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7

Description: Setting data SD_MAX_PATH_JERK is included in the limit calculations if SD: IS_SD_MAX_PATH_JERK=TRUE

Related to ...

SD 42510: SD_MAX_PATH_JERK (SD for additional limitation of (tangential) path jerk)

42520	CORNER_SLOWDOWN_START			-	-
mm	Start of feed reduction at G62.			DOUBLE	Immediately
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/7

Description: Traverse path distance from which the feed is reduced before the corner with G62.

42522	CORNER_SLOWDOWN_END			-	-
mm	End of feed reduction at G62.			DOUBLE	Immediately
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/7

Description: Traverse path distance up to which the feed remains reduced after a corner with G62.

42524	CORNER_SLOWDOWN_OVR			-	-
%	Feed override reduction at G62			DOUBLE	Immediately
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/7

Description: Override used to multiply the feed at the corner with G62.

42526	CORNER_SLOWDOWN_CRIT			-	-
degrees	Corner detection at G62			DOUBLE	Immediately
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/7

Description: Angle from which a corner is taken into account when reducing the feed with G62.

For example: CORNER_SLOWDOWN_CRIT = 90 means that all corners of 90 degrees or a more acute angle are traversed slower with G62.

42528	CUTCOM_DECEL_LIMIT			-	-
-	Feed lowering on circles with tool radius compensation			DOUBLE	Immediately
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	0.	1.	7/7

Description: The setting data limits feed lowering of the tool center point on concave circle segments with tool radius compensation active and CFC or CFIN selected.

With CFC, the feed is defined at the contour. On concave circular arcs, feed lowering of the tool center point is created by the ratio of the contour curvature to the tool center point path curvature. The setting data is limiting this effect, reducing backing off and overheating of the tool.

For contours with varying curvatures, a mid-range curvature is used.

0: Provides the previous behavior: If the ratio between contour radius and tool center point path radius is less than or equal to 0.01 the feed is applied to the tool center point path. Less pronounced feed reductions are executed.

>0: Feed lowering is limited to the programmed factor. At 0.01, this means that the feed of the tool center point path is possibly only 1 percent of the programmed feed value.

1: On concave contours, the tool center point feed equals the programmed feed (the behavior then corresponds to CFTCP).

42600	JOG_FEED_PER_REV_SOURCE			-	V1
-	Control revolutional feedrate in JOG			DWORD	Immediately
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-3	31	7/7

Description: The revolutional feedrate in JOG mode for geometry axes on which a frame with rotation acts.

0= No revolutional feedrate is active.

>0= Machine axis index of the rotary axis/spindle from which the revolutional feedrate is derived.

-1= The revolutional feedrate is derived from the master spindle of the channel in which the axis/spindle is active.

-2= The revolutional feedrate is derived from the axis with machine axis index == 0.

-3= The revolutional feedrate is derived from the master spindle of the channel in which the axis/spindle is active. No revolutional feedrate is active if the master spindle is at a standstill.

Related to ....

SD 43300: ASSIGN_FEED_PER_REV_SOURCE (revolutional feedrate for position axes/spindles)

42650	CART_JOG_MODE			-	H1
-	Coordinate system for Cartesian jog traverse			DWORD	Immediately
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x0404	7/7

Description: This SD can be used to set the reference coordinate system for Cartesian manual travel, with bits 0 to 7 provided for selecting the coordinate system for translation, bits 8 to 15 for selecting the reference system for orientation.

Cartesian manual travel will not be enabled if no bit is set or if just one bit is set for translation or for orientation. This means that one bit must always be set for translation and one for orientation. Cartesian manual travel will also not be enabled if more than one bit is set for translation or orientation.

The meaning of the individual bits is defined as follows :

Bit 0 : Translation in Basic Coordinate System
Bit 1 : Translation in Workpiece Coordinate System
Bit 2 : Translation in Tool Coordinate System
Bit 3 : reserved
Bit 4 : reserved
Bit 5 : reserved
Bit 6 : reserved
Bit 7 : reserved
Bit 8 : Orientation in Basic Coordinate System
Bit 9 : Orientation in Workpiece Coordinate System
Bit 10 : Orientation in Tool Coordinate System
Bit 11 : reserved
Bit 12 : reserved
Bit 13 : reserved
Bit 14 : reserved
Bit 15 : reserved

42660	ORI_JOG_MODE			-	-
-	Definition of virtual kinematics for JOG			DWORD	Immediately
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0 ,0,0,0	0	5	7/7

Description: This SD can be used to define virtual kinematics, which become active for the manual travel of orientations.

This setting data is evaluated only by the generic 5/6-axis transformation. This data has no meaning for OEM transformations.

The following setting options are available:

0: The virtual kinematics are defined by the transformation.

1: Euler angles are traversed during jog, that is the 1st axis turns round the Z direction, the 2nd axis turns around the X direction and, if present, the 3rd axis turns aound the new Z direction.

2: RPY angles are traversed during jog with the turning sequence XYZ, that is the 1st axis turns around the x direction, the 2nd axis turns around the Y direction and, if present, the 3rd axis turns around the new Z direction.

3: RPY angles are traversed during jog with the turning sequence ZYX, that is the 1st axis turns around the Z direction, the 2nd axis turns around the Y direction and, if present, the 3rd axis turns around the new X direction.

4: The turning sequence of the rotary axes is set by means of MD $MC_ORIAX_TURN_TAB_1.

5: The turning sequence of the rotary axes is set by means of MD $MC_ORIAX_TURN_TAB_2.

42670	ORIPATH_SMOOTH_DIST			-	-
mm, degrees	Path for smoothing the orientation			DOUBLE	Immediately
-					
-	-	0.05,0.05,0.05,0.05,0.0 5,0.05,0.05...	0.0	-	7/7

Description: Displacement by which a jump in the tool orientation is smoothed with ORIPATH path-relative orientation interpolation. There is a deviation within this displacement from the relation of the orientation to the path tangent and the surface normal vector programmed with LEAD/TILT.

If zero is entered for this path length ($SC_ORIPATH_SMOOTH_DIST = 0.0), an intermediate block is inserted for smoothing the orientation. This means that the path motion remains at a stop in a corner and the orientation is then turned separately.

42672	ORIPATH_SMOOTH_TOL			-	-
degrees	Tolerance for smoothing the orientation			DOUBLE	Immediately
-					
-	-	0.05,0.05,0.05,0.05,0.0 5,0.05,0.05...	0.000001	-	7/7

Description: Maximum angle (in degrees) for the deviation of the tool orientation with ORIPATH path-relative orientation interpolation. This angular tolerance is used for smoothing a "kink" in the orientation path.

42674	ORI_SMOOTH_DIST			-	-
mm, degrees	Path for orientation smoothing during smoothing			DOUBLE	Immediately
-					
-	-	0.05,0.05,0.05,0.05,0.05,0.05,0.05...	0.000001	-	7/7

Description: Path through which a tool orientation bend is smoothed on a block transition with G code OSD.

42676	ORI_SMOOTH_TOL			-	-
degrees	Tolerance for orientation smoothing during smoothing			DOUBLE	Immediately
-					
-	-	0.05,0.05,0.05,0.05,0.05,0.05,0.05...	0.000001	-	7/7

Description: Maximum angle (in degree) for the tool orientation deviation during orientation smoothing with G code OST with a bend in the orientation curve on block transitions.

42678	ORISON_TOL			-	-
degrees	Tolerance for smoothing the orientation			DOUBLE	Immediately
-					
-	-	10.00,10.00,10.00,10.00,10.00,10.00...	-	-	7/7

Description: Maximum angle (in degree) for the tool orientation deviation during orientation smoothing with G code ORISON over several blocks. However, smoothing is performed only via the path specified with SD $SC_ORISON_DIST.

42680	ORISON_DIST			-	-
mm, degrees	Path for orientation smoothing			DOUBLE	Immediately
-					
-	-	5.00,5.00,5.00,5.00,5.00,5.00,5.00...	-	-	7/7

Description: Maximum path for orientation smoothing with G code ORISON across several blocks. The tolerance specified with SD $SC_ORISON_TOL is not exceeded in any case.

42690	JOG_CIRCLE_CENTRE			-	-
mm	Center of the circle			DOUBLE	Immediately
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	-	-	7/7

Description: This setting data is used to define the circle center point in the workpiece coordinate system during JOG of circles.

Only the relevant center point coordinates of the geometry axes in the active plane are evaluated, not the coordinate of the geometry axis vertical to the plane. This setting data is written via the user interface.

By default the coordinate of an axis with diameter programming is in the diameter. This can be changed with machine data 20360 $MC_TOOL_PARAMETER_DEF_MASK Bit 13 = 1 by indicating a radius.

42691	JOG_CIRCLE_RADIUS			-	-
mm	Circle radius			DOUBLE	Immediately
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: With this setting data, the circle radius in the WCS, the maximum circle during inner machining or the minimum circle during outer machining are defined when jogging circles. This setting data is written via the user interface.

42692	JOG_CIRCLE_MODE			-	-
-	JOG of circles mode			DWORD	Immediately
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	0xf	7/7

Description: This setting data sets the following during JOG of circles:

Bit 0 = 0 :

Travel to + creates traversing on a circular path in counter-clockwise direction; travel to - creates traversing in clock-wise direction.

Bit 0 = 1 :

Travel to + creates traversing on a circular path in clockwise direction; travel to - creates traversing in counterclockwise direction.

Bit 1 = 0 :

The tool radius is not taken into account when the limitation caused by the specified angle or by the circle element limited by start and end angle is checked.

Bit 1 = 1 :

The tool radius is taken into account when the limitation caused by the specified angle or by the circle element limited by start and end angle is checked.

Bit 2 = 0 :

An inner machining is performed. The circle radius in $SC_JOG_CIRCLE_RADIUS is the max. possible radius.

Bit 2 = 1 :

An outer machining is performed. The circle radius in $SC_JOG_CIRCLE_RADIUS is the min. possible radius.

Bit 3 = 0 :

Given a full circle the radius is enlarged starting with the circle center point in the direction of the ordinate (2nd geometry axis) of the plane.

Bit 3 = 1 :

Given a full circle the radius is enlarged starting with the circle center point in the direction of the abscissa (1st geometry axis) of the plane.

This setting data should be written via the user interface.

42693	JOG_CIRCLE_START_ANGLE			-	-
degrees	Circle start angle			DOUBLE	Immediately
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	360	7/7

Description: This setting data defines the start angle during JOG of circles.

The start angle refers to the abscissa of the current plane. Tra-versing is only possible within the range

between the start and the end angle. Setting data $SC_JOG_CIRCLE_MODE bit 0 defines the direction from the start to the end angle. If start and end angle equal zero, no limitation is active.

This setting data is written via the user interface.

42694	JOG_CIRCLE_END_ANGLE			-	-
degrees	Circle end angle			DOUBLE	Immediately
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	360	7/7

Description: This setting data defines the end angle during JOG of circles.

The end angle refers to the abscissa of the current plane. Tra-versing is only possible within the range

between the start and the end angle. Setting data $SC_JOG_CIRCLE_MODE bit 0 defines the direction from the start to the end angle. If start and end angle equal zero, no limitation is active.

This setting data is written via the user interface.

42700	EXT_PROG_PATH			-	K1
-	Program path for external subroutine call EXTCALL			STRING	Immediately
-					
-	-		-	-	7/7

Description: The total path results from the string chaining of $SC_EXT_PROG_PATH + the programmed subprogram identifier.

42750	ABSBLOCK_ENABLE			-	K1
-	Enable base block display			BOOLEAN	Immediately
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

Description: Value 0: Disable block display with absolute values (basic block display)

Value 1: Enable block display with absolute values (basic block display)

42800	SPIND_ASSIGN_TAB			-	S1
-	Spindle number converter.			BYTE	Immediately
-					
-	21	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17...	0	21	7/7

Description: The spindle converter converts the programmed (= logical) spindle number to the physical (= internal, configured) spindle number.

The index of the setting data (SD) corresponds to the programmed spindle number or the programmed address extension.

The SD contains the physical spindle which actually exists.

Special cases, errors, ...

Notes:

- The zero index (SPIND_ASSIGN_TAB[0]) is only used to display the master spindle selected in the channel and must not be overwritten.
- Changes to the spindle converter take effect immediately. It is therefore not advisable to change the spindle converter for spindles used in a part program from the MMC or PLC while a part program is running.
- After "delete SRAM", the numbers of the logical and physical spindles are identical.

42900	MIRROR_TOOL_LENGTH			-	W1
-	Sign change of tool length with mirror image machining			BOOLEAN	Immediately
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7

Description: TRUE:

If a frame with mirror image machining is active, the tool components

($TC_DP3[..., ...] to $TC_DP5[..., ...]) and the components of the base dimensions

($TC_DP21[..., ...] to $TC_DP23[..., ...]) whose associated axes

are mirrored, are also mirrored, i.e. their sign is inverted. The wear values

are not mirrored. If the wear values are to be mirrored too, setting data

$SC_MIRROR_TOOL_WEAR must be set.

FALSE:

The sign for tool length components is unaffected by whether a frame with mirror image machining is active.

42910	MIRROR_TOOL_WEAR			-	W1
-	Sign change of tool wear with mirror image machining			BOOLEAN	Immediately
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7

Description: TRUE:

If a frame with mirror image machining is activated, the signs of the wear values of the components in question are inverted. The wear values of the components that are not assigned to mirrored axes remain unchanged.

FALSE:

The signs for wear values are unaffected by whether a frame with mirror image machining is active.

42920	WEAR_SIGN_CUTPOS			-	W1
-	Sign of tool wear depending on tool point direction			BOOLEAN	Immediately
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7

Description: TRUE:

In the case of tools with a relevant tool point direction (turning and grinding tools), the sign for wear of the tool length components depends on the tool point direction.

The sign is inverted in the following cases (marked with an X):

Tool point direction	Length 1	Length 2
1		
2	X	
3	X	X
4		X
5		
6		
7	X	
8		X
9		

The sign for wear value of length 3 is not influenced by this setting data.

The setting data WEAR_SIGN acts in addition to this setting data.

FALSE:

The sign for wear of the tool length components is unaffected by the tool point direction.

42930	WEAR_SIGN			-	W1
-	Sign of wear			BOOLEAN	Immediately
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/7

Description: TRUE:

The sign for wear of the tool length components and the tool radius are inverted, i.e. if a positive value in entered, the total dimension is decreased.

FALSE:

The sign for wear of the tool length components and the tool radius is not inverted.

42935	WEAR_TRANSFORM			-	W1,W4
-	Transformations for tool components			DWORD	Immediately
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: This setting data is bit-coded.

It determines which of the three wear components

wear

($TC_DP12 - $TC_DP14),

additive offsets fine ($TC_SCPx3 - $TC_SCPx5),

and additive offsets coarse ($TC_ECPx3 - $TC_ECPx5)

are subject to adapter transformation and transformation by an orientable tool holder, if one of the two G codes TOWMCS or TOWWCS from G code group 56 is active. If initial-setting G code TOWSTD is active, this setting data will not become active.

Then, the following assignment is valid:

Bit 0 = TRUE: Do not apply transformations to $TC_DP12 - $TC_DP14.

Bit 1 = TRUE: Do not apply transformations to $TC_SCPx3 - $TC_SCPx5.

Bit 2 = TRUE: Do not apply transformations to $TC_ECPx3 - $TC_ECPx5.

The bits not mentioned here are (currently) not assigned.

42940	TOOL_LENGTH_CONST			-	W1
-	Change of tool length components with change of active plane			DWORD	Immediately
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: If this setting data is not equal to 0, the assignment of tool length components (length, wear, base dimensions) to geometry axes is not changed when the machining plane (G17 - G19) is changed.

The assignment of tool length components to geometry axes can be derived from the value of the setting data acc. to the following tables.

A distinction is made between turning and grinding tools (tool types 400 to 599) and other tools (typically milling tools) in the assignment.

Representation of this information in tables assumes that geometry axes 1 to 3 are called X, Y and Z. For assignment of an offset to an axis, not the axis identifier but the axis sequence is relevant.

Assignment for turning tools and grinding tools (tool types 400 to 599):

Content	Length 1	Length 2	Length 3
17	Y	X	Z
18*	X	Z	Y
19	Z	Y	X
-17	X	Y	Z
-18	Z	X	Y
-19	Y	Z	X

* Any value which is not 0 and is not one of the six values listed, is treated as value 18.

For values that are the same but with a different sign, assignment of length 3 is always the same, lengths 1 and 2 are reversed.
Assignment for all tools which are neither turning nor grinding tools (tool types < 400 or > 599):

Content	Length 1	Length 2	Length 3
17*	Z	Y	X
18	Y	X	Z
19	X	Z	Y
-17	Z	X	Y
-18	Y	Z	X
-19	X	Y	Z

* Any value which is not 0 and is not one of the six values listed, is treated as value 17.

For values that are the same but with a different sign, assignment of length 1 is always the same, lengths 2 and 3 are reversed.

42950	TOOL_LENGTH_TYPE			-	W1
-	Assignment of tool length compensation independent of tool type			DWORD	Immediately
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

Description: This setting data defines the assignment of the tool length components to the geometry axes independently of the tool type. It can assume any value between 0 and 2. Any other value is interpreted as 0.

Value

0: Assignment as standard. A distinction is made between turning and grinding tools (tool types 400 to 599) and other tools (milling tools).

1: The assignment of the tool length components is independent of the actual tool type, always as for milling tools.

2. The assignment of the tool length components is independent of the actual tool type, always as for turning tools.

The setting data also affects the wear values assigned to the length components.

If setting data SC_TOOL_LENGTH_CONST is set, the tables defined there access the table for milling and turning tools defined by SC_TOOL_LENGTH_TYPE irrespective of the actual tool type, if the value of the table is not equal to 0.

42960	TOOL_TEMP_COMP			-	W1
-	Temperature compensation for tool			DOUBLE	Immediately
-					
-	3	0.0, 0.0, 0.0,0.0, 0.0, 0.0...	-	-	7/7

Description: Temperature compensation value for the tool. The compensation value acts as vector according to the current rotation of the tool direction.

This setting data will only be evaluated, if temperature compensation has been activated for tools with MD 20390: $MC_TOOL_TEMP_COMP_ON.

Apart from that, the temperature compensation type must be set in bit 2 for the "Compensation in tool direction" MD 32750: TEP_COMP_TYPE.

The "Temperature compensation" is an option that has to be previously enabled.

42970	TOFF_LIMIT			-	F2
mm	Upper limit of correction value via $AA_TOFF			DOUBLE	Immediately
-					
-	3	100000000.0, 100000000.0, 100000000.0...	-	-	7/7

Description: Upper limit of the offset value which can be defined by means of synchronized actions via the $AA_TOFF system variable.

This limit value influences the absolutely effective amount of offset through $AA_TOFF.

Whether the offset value is within the limit range can be checked via the $AA_TOFF_LIMIT system variable.

42974	TOCARR_FINE_CORRECTION			C08	-
-	Fine offset TCARR ON / OFF			BOOLEAN	Immediately
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7

Description: TRUE:

On activating an orientable tool holder, the fine offset values are considered.

FALSE:

On activating an orientable tool holder, the fine offset are not considered.

42980	TOFRAME_MODE			-	K2
-	Frame definition at TOFRAME, TOROT and PAROT			DWORD	Immediately
-					
-	-	1000,1000,1000,1000,1000,1000,1000...	-	-	7/7

Description: This setting data defines the direction of the X or Y axis in the case of frame definition by means of TOFRAME, TOROT or PAROT.

In the case of these frame definitions, the Z direction is uniquely defined, the rotation around the Z axis is free at first.

This free rotation can be defined by this setting data so that the newly defined frame deviates as little as possible from a previously active frame. In all cases in which the setting data is not zero, an active frame remains unchanged if the Z directions of the old and the new frame are the same.

0: The orientation of the coordinate system is determined by the value of the machine data X_AXIS_IN_OLD_X_Z_PLANE.

1: The new X direction is selected so that it lies in the X-Z plane of the old coordinate system. The angular difference between the old and new Y axes is minimal with this setting.

2: The new Y direction is selected so that it lies in the Y-Z plane of the old coordinate system. The angular difference between the old and new X axes is minimal with this setting.

3: The average of the two settings resulting from 1 and 2 is selected.

Addition of 100:

In the case of a plane change from G17 to G18 or G19, a tool matrix is generated, in which the new axis directions are parallel to the old directions. The axes are correspondingly swapped cyclically(standard transformation with plane changes). If the hundreds digit equals zero, a matrix is supplied in the cases of G18 and G19 which is derived from the unit matrix by simply rotating through 90 degrees around the X axis (G18) or through 90 degrees around the Y axis (G19). Thus in each case one axis is antiparallel to an initial axis. This setting is required to remain compatible with old software versions.

Addition of 1000:

The tool-frame is linked to any active basic frames and settable frames. The response is thus compatible with earlier software versions (before 5.3). If the thousands digit is not set, the tool frame is calculated so that any active basic frames and settable frames are taken into account.

Addition of 2000:

The tool frame is still correctly formed if the frames in the frame chain after the TOOLFRAME contain any values (rotations and translations). This mode is only possible if the system frame for the tool frame is present. The machine data X_AXIS_IN_OLD_X_Z_PLANE is no longer evaluated. All values in the units digit of this setting data that are not equal to 1 or 2 are handled as if the value was three. In particular, the behavior with 2000 is identical to that with 2003. TOFRAME sets the zero point of the workpiece coordinate system to the current position.

42984	CUTDIRMOD			C08	-
-	Modification of $P_AD[2] or $P_AD[11]			STRING	Immediately
-					
-	-		-	-	7/7

Description: States whether the tool point direction and cutting direction are to be modified on reading the corresponding system variables $P_AD[2] and $P_AD[11].

Modification is made by rotating the vector of the tool point direction or cutting direction by a specific angle in the active machining plane (G17-G19). The resulting output value is always the tool point direction or cutting direction created by the rotation or to which the rotated value is closest. the angle of rotation can be defined by one of the following six options:

1: The string is empty. The stated data are output unchanged.

2: The contents of the string is "P_TOTFRAME". The resulting rotation is determined from the total frame.

3: The contents of the string is a valid frame name (e.g. $P_NCBFRAME[3]). The resulting rotation is then calculated from this frame.

4: The contents of the string has the form "Frame1 : Frame2". The resulting rotation is determined from the part frame chain that is created by chaining all frames from Frame1 to Frame2 (in each case inclusive). Frame1 and Frame2 are valid frame names such as $P_PFRAME or $P_CHBFRAME[5]"

5: The contents of the frame is the valid name of a rotary axis (machine axis). The resulting rotation is determined from the programmed end position of this rotary axis. Additionally, an offset can be stated (in degrees, e.g. "A+90).

6: The rotation is programmed explicitly (in degrees).

Optionally, the first character of the string can be written as sign (+ or -). A plus sign will not have any effect on the angle calculation, but a minus sign will invert the sign of the calculated angle.

42990	MAX_BLOCKS_IN_IPOBUFFER			-	K1
-	maximum number of blocks in IPO buffer			DWORD	Immediately
-					
-	-	-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1...	-	-	7/7

Description: This setting data can be used to delimit the maximum number of blocks in the interpolation buffer by the maximum number specified in MD MM_IPO_BUFFER_SIZE.

A negative value means that no limitation of the number of blocks is active in the interpolation buffer, and the number of blocks is determined solely by the MD MM_IPO_BUFFER_SIZE (default setting).

42995	CONE_ANGLE			-	-
-	Taper angle			DOUBLE	Immediately
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-90	90	7/7

Description: This setting data writes the taper angle for taper turning. This setting data is written via the operator interface.

42996	JOG_GEOAX_MODE_MASK			-	-
-	JOG of geometry axis mode			DWORD	Immediately
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	0x7	7/7

Description: This setting data sets the following during JOG of geometry axes:

Bit 0 = 1 :

A traversing request for the 1st geometry axis is inverted, i.e. a traversing request to + triggers a traversing motion to - .

Bit 1 = 1 :

A traversing request for the 2nd geometry axis is inverted, i.e. a traversing request to + triggers a traversing motion to -.

Bit 2 = 1:

A traversing request for the 3rd geometry axis is inverted, i.e. a traversing request to + triggers a traversing motion to -.

1.6.3 Axis-specific setting data

43100	LEAD_TYPE			-	M3
-	Defines what is used as master value			DWORD	Reset
CTEQ					
-	-	1	0	2	7/7

Description: Defines which value is to be used as master value:

0: Actual value

1: Setpoint

2: Simulated master value

43102	LEAD_OFFSET_IN_POS			-	M3
-	Offset of master value if coupled to this axis			DOUBLE	Reset
-					
-	-	0.0	-	-	7/7

Description: Offset of the master value before use on the coupling.

If this axis is a master value coupled following axis with CTABP as the curve table and X as the master value, then its position setpoint is calculated from LEAD_OFFSET_OUT_POS + LEAD_SCALE_OUT_POS * CTABP(LEAD_OFFSET_IN_POS + LEAD_SCALE_IN_POS * X)

Related to ....

SD 43104: LEAD_SCALE_IN_POS

SD 43106: LEAD_OFFSET_OUT_POS

SD 43108: LEAD_SCALE_OUT_POS

43104	LEAD_SCALE_IN_POS			-	M3
-	Scaling of master value if coupled to this axis			DOUBLE	Reset
-					
-	-	1.0	-	-	7/7

Description: Scaling of the master value before use on the coupling.

If this axis is a master value coupled following axis with CTABP as the curve table and X as the master value, then its position setpoint is calculated from LEAD_OFFSET_OUT_POS + LEAD_SCALE_OUT_POS * CTABP(LEAD_OFFSET_IN_POS + LEAD_SCALE_IN_POS * X)

Related to ....

SD 43102: LEAD_OFFSET_IN_POS

SD 43106: LEAD_OFFSET_OUT_POS

SD 43108: LEAD_SCALE_OUT_POS

43106	LEAD_OFFSET_OUT_POS			-	M3
mm, degrees	Offset of the functional value of the curve table			DOUBLE	Reset
-					
-	-	0.0	-	-	7/7

Description: Offset of the master value before use on the coupling.

If this axis is a master value coupled following axis with CTABP as the curve table and X as the master value, then its position setpoint is calculated from LEAD_OFFSET_OUT_POS + LEAD_SCALE_OUT_POS * CTABP(LEAD_OFFSET_IN_POS + LEAD_SCALE_IN_POS * X)

Related to ....

SD 43102: LEAD_OFFSET_IN_POS

SD 43104: LEAD_SCALE_IN_POS

SD 43108: LEAD_SCALE_OUT_POS

43108	LEAD_SCALE_OUT_POS			-	M3
-	Scaling of functional value of the curve table			DOUBLE	Reset
-					
-	-	1.0	-	-	7/7

Description: Scaling of the function value before use of the curve table.

If this axis is a master value coupled following axis with CTABP as the curve table and X as the master value, then its position setpoint is calculated from LEAD_OFFSET_OUT_POS + LEAD_SCALE_OUT_POS * CTABP(LEAD_OFFSET_IN_POS + LEAD_SCALE_IN_POS * X)

Related to ....

SD 43102: LEAD_OFFSET_IN_POS

SD 43104: LEAD_SCALE_IN_POS

SD 43106: LEAD_OFFSET_OUT_POS

43120	DEFAULT_SCALE_FACTOR_AXIS		-	FBFA
-	Axial default scaling factor with G51 active		DWORD	Immediately
-				
-	- 1	-	-	7/7

Description: If no axial scaling factor I, J, or K is programmed in the G51 block, DEFAULT_SCALEFACTOR_AXIS is active. The scaling factor is only active if MD AXES_SCALE_ENABLE is set.

Related to:

AXES_SCALE_ENABLE,

WEIGHTING_FACTOR_FOR_SCALE

43200	SPIND_S		-	S1
rev/min	Speed for spindle start by VDI		DOUBLE	Immediately
-				
-	- 0.0	-	-	7/7

Description: Spindle speed at spindle start by NC/PLC interface signals (Spin-del-start Rechtslauf) und (Spindel-start Linkslauf).

Example: $SA_SPIND_S[S1] = 600

Spindle 1 is started at a speed of 600 rpm upon detection of the positive edge of one of the above-mentioned VDI starting signals.

Speed programming values are entered in the SD by setting bit 4=1 in MD 35035 SPIND_FUNCTION_MASK.

The SD becomes active in JOG mode as a default speed by setting bit 5=1 in MD 35035 SPIND_FUNCTION_MASK (exception: the value is zero).

Related to:

SPIND_FUNCTION_MASK

43202	SPIND_CONSTCUT_S		-	S1
m/min	Const cut speed for spindle start by VDI		DOUBLE	Immediately
-				
-	- 0.0	-	-	7/7

Description: Definition of the constant cutting speed for the master spindle.

The setting data is evaluated at spindle start by the NC/PLC interface signals (Spindel-start Rechtslauf) und (Spindel-start Linkslauf) ausgewertet.

Cutting speed programming values are entered in the SD by setting bit 8=1 in MD 35035 SPIND_FUNCTION_MASK.

Related to:

SPIND_FUNCTION_MASK

43206	SPIND_SPEED_TYPE		A06	-
-	Spindle speed type for spindle start through VDI		DWORD	Immediately
-				
-	-	94	93	972	7/7

Description: Definition of the spindle speed type for the master spindle.

The setting data is evaluated via the DB31, ... DBB30 interface at spindle start.

The range of values and the functionality correspond to the 15th G group "feed type".

Permissible values are the G values: 93, 94, 95, 96, 961, 97, and 971.

With the stated values, a functional distinction has to be made between the following variants:

==> 93, 94, 95, 97 and 971: The spindle is started at the speed in SD 43200 $SA_SPIND_S.

==> 96 and 961: The speed of the spindle is derived from the cutting speed of SD 43202 $SA_SPIND_CONSTCUT_S and the radius of the transverse axis.

The default value is 94 (corresponds to G94).

The default value becomes active if the SD is written with impermissible values.

43210	SPIND_MIN_VELO_G25			-	S1
rev/min	Programmed spindle speed limitation G25			DOUBLE	Immediately
-					
-	-	0.0	-	-	7/7

Description: A minimum spindle speed limit below which the spindle must not fall is entered in SPIND_MIN_VELO_G25. The NCK limits the set spindle speed to this value if it is too low.

The spindle speed may only fall below the minimum for the following:

- Spindle offset 0%
- M5
- S0
- IS (Spindel Halt)
- IS (Reglerfreigabe)
- IS (Kanalzustand: Reset)
- IS (Restweg löschen/Spindel-Reset)
- IS (Pendeldrehzahl)
- Cancel S value

SD irrelevant to ......

other spindle modes used in open-loop control mode (SPOS, M19, SPOSA)

Related to:

MD 10710: PROG_SD_RESET_SAVE_TAB (from SW 5.3)

43220	SPIND_MAX_VELO_G26		-	S1
rev/min	Programmed spindle speed limitation G26		DOUBLE	Immediately
-				
-	- 1000.0	-	-	7/7

Description: A maximum spindle speed is entered in SPIND_MAX_VELO_G26, which the spindle must not exceed. The NCK limits an excessive spindle speed setpoint to this value.

SD irrelevant for ......

all spindle modes except open-loop control mode.

Special cases, errors, ...

The value in SD: SPIND_MIN_VELO_G26 can be altered by means of:

- G26 S.... in the part program
- Operator commands via HMI

The value in SPIND_MIN_VELO_G26 is retained after a reset or Power Off.

Related to ....

SD 43210: SPIND_MIN_VELO_G25 (programmed spindle speed limit G25)

SD 43230: SPIND_MAX_VELO_LIMS (programmed spindle speed limit G96/961)

MD 10710: PROG_SD_RESET_SAVE_TAB

43230	SPIND_MAX_VELO_LIMS		-	S1
rev/min	Spindle speed limitation with G96		DOUBLE	Immediately
-				
-	- 100.0	-	-	7/7

Description: Limits the spindle speed with G96, G961, G97 to the stated maximum value [degrees/second]. This setting data can be written from the block with LIMS.

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be set so that the value written by the part program is transferred into the active file system on reset (that is the value is retained after reset)

Related to ....

SD 43220: SPIND_MAX_VELO_G26 (maximum spindle speed)

SD 43210: SPIND_MIN_VELO_G25 (minimum spindle speed)

MD 10710: PROG_SD_RESET_SAVE_TAB (from SW 5.3)

43240	M19_SPOS		-, A12	S1
degrees	Spindle position for spindle positioning with M19.		DOUBLE	Immediately
-				
-	- 0.0	-10000000.0	10000000.0	7/7

Description: Spindle position in [DEGREES] for spindle positioning with M19.

The position approach mode is defined in $SA_M19_SPOSMODE.

Default positions must lie in the range 0 <= pos < $MA_MODULO_RANGE.

Path defaults ($SA_M19_SPOSMODE = 2) can be positive or negative and are only limited by the input format.

43250	M19_SPOSMODE			-, A12	S1
-	Spindle position approach mode for spindle positioning with M19.			DWORD	Immediately
-					
-	-	0	0	5	7/7

Description: Spindle position approach mode for spindle positioning with M19.

In which signify:

0: DC (default) approach position on the shortest path.

1: AC approach position normally.

2: IC approach incrementally (as path), sign gives the traversing direction

3: DC approach position on the shortest path.

4: ACP approach position from the positive direction.

5: ACN approach position from the negative direction.

43300	ASSIGN_FEED_PER_REV_SOURCE			-	V1,P2,S1
-	Revolutional feedrate for positioning axes/spindles			DWORD	Immediately
CTEQ					
-	-	0	-3	31	7/7

Description: 0= No revolutional feedrate is active.

>0= Machine axis index of the rotary axis/spindle, from which the revolutional feedrate is derived.

-1= The revolutional feedrate is derived from the master spindle of the channel in which the axis/spindle is active

-2= The revolutional feedrate is derived from the axis with machine axis index == 0 or the axis with an index in $MN_AXCONF_LOGIC_MACHAX_TAB == 0.

-3= The revolutional feedrate is derived from the master spindle of the channel in which the axis/spindle is active. No revolutional feedrate is active if the master spindle is at a standstill.

Related to ....

SD 42600: JOG_FEED_PER_REV_SOURCE (revolutional feedrate for geometry axes on which a frame with rotation acts in JOG mode.)

43320	JOG_POSITION			-	-
mm, degrees	JOG position			DOUBLE	Immediately
-					
-	-	0.0	-	-	7/7

Description: Position to be approached in JOG. Depending on $MN_JOG_MODE_MASK bit 4 axial frames and, with an axis configured as geometry axis, the tool length offset are considered.

43340	EXTERN_REF_POSITION_G30_1			-, A12	FBFA
-	Reference point position for G30.1			DOUBLE	Immediately
-					
-	-	0.0	-	-	7/7

Description: Reference point position for G30.1.

This setting data will be evaluated in CYCLE328.

43350	AA_OFF_LIMIT		-	S5,FBSY
mm, degrees	Upper limit of offset value $AA_OFF with clearance control		DOUBLE	PowerOn
CTEQ				
-	- 100000000.0	-	-	7/7

Description: The upper limit of the offset value, which can be defined by means of synchronized actions via the variable $AA_OFF.

This limit value acts on the absolutely effective amount of offset by means of $AA_OFF.

It is used for clearance control in laser machining:

The offset value is limited so that the laser head cannot get caught in the plate recesses.

Whether the offset value lies within the limit range can be queried via system variable $AA_OFF_LIMIT.

43400	WORKAREA_PLUS_ENABLE		-	A3
-	Working area limitation active in positive direction		BOOLEAN	Immediately
CTEQ				
-	- FALSE	-	-	7/7

Description: 1: The working area limitation of the axis concerned is active in the positive direction.

0: The working area limitation of the axis concerned is switched off in the positive direction.

The setting data is parameterized via the operator panel in the operating area "Parameters" by activating/deactivating the working area limitation.

SD irrelevant for ......

G code: WALIMOF

43410	WORKAREA_MINUS_ENABLE		-	A3
-	Working area limitation active in the negative direction		BOOLEAN	Immediately
CTEQ				
-	- FALSE	-	-	7/7

Description: 1: The working area limitation of the axis concerned is active in the negative direction.

0: The working area limitation of the axis concerned is switched off in the negative direction.

The setting data is parameterized via the operator panel in the operating area "Parameters" by activating/deactivating the working area limitation.

SD irrelevant for ......

G code: WALIMOF

43420	WORKAREA_LIMIT_PLUS			-	A3
mm, degrees	Working area limitation plus			DOUBLE	Immediately
-					
-	-	1.0e+8	-	-	7/7

Description: The working area as defined in the basic coordinate system in the positive direction of the axis concerned can be limited with axial working area limitation.

The setting data can be changed on the operator panel in the operating area "Parameters".

The positive working area limitation can be changed in the program with G26.

SD irrelevant for ......

G code: WALIMOF

Related to ....

SD 43400: WORKAREA_PLUS_ENABLE

43430	WORKAREA_LIMIT_MINUS			-	A3
mm, degrees	Working area limitation minus			DOUBLE	Immediately
-					
-	-	-1.0e+8	-	-	7/7

Description: The working area as defined in the basic coordinate system in the negative direction of the axis concerned can be limited with axial working area limitation.

The setting data can be changed on the operator panel in the operating area "Parameters".

The negative working area limitation can be changed in the program with G25.

SD irrelevant for ......

G code: WALIMOF

Related to ....

SD 43410: WORKAREA_MINUS_ENABLE

43500	FIXED_STOP_SWITCH			-	F1
-	Selection of travel to fixed stop			BYTE	Immediately
-					
-	-	0	0	1	7/7

Description: The "Travel to fixed stop" function to be selected and deselected with this setting data.

SD=0 Deselect "Travel to fixed stop"

SD=1 Select "Travel to fixed stop"

The setting data can only be overwritten by the part program with the command FXS[x]=1/0 when software version 2.x is installed.

The status of the setting data is indicated on the operator panel in the "Parameters" area.

43510	FIXED_STOP_TORQUE			-	F1
%	Fixed stop clamping torque			DOUBLE	Immediately
-					
-	-	5.0	0.0	800.0	7/7

Description: The clamping torque is entered in this setting data as a % of the maximum motor torque (corresponds to % of max. current value with FDD).

The setting data is active only if the fixed stop has been reached.

The fixed stop is considered reached when,

- with MD: FIXED_STOP_ACKN_MASK, bit 1 = 0 (no acknowledgment required) interface signal (Festanschlag erreicht) von der NC gesetzt wird
- with MD: FIXED_STOP_ACKN_MASK, bit 1 = 1 (acknowledgment required) interface signal (Festanschlag erreicht) von der NC gesetzt wird und mit dem Nahtstellensignal (Festanschlag erreicht quittieren) quittiert wird

The status of the setting data is indicated on the operator panel in the "Parameters" area.

The FXST[x] command effects a block-synchronous change to this setting data. It can also be changed by the user or via the PLC. The value is otherwise transferred from MD: FIXED_STOP_TORQUE_DEF to the setting data when "Travel to fixed stop" is active.

Related to ....

MD 37010: FIXED_STOP_TORQUE_DEF (default setting for clamping torque)

43520	FIXED_STOP_WINDOW			-	F1
mm, degrees	Fixed stop monitoring window			DOUBLE	Immediately
-					
-	-	1.0	-	-	7/7

Description: The fixed stop monitoring window is entered in this setting data.

The setting data is active only if the fixed stop has been reached.

The fixed stop is considered reached when,

- with MD: FIXED_STOP_ACKN_MASK, bit 1 = 0 (no acknowledgment required) interface signal (Festanschlag erreicht) von der NC gesetzt wird
- with MD: FIXED_STOP_ACKN_MASK, bit 1 = 1 (acknowledgment required) interface signal (Festanschlag erreicht) von der NC gesetzt wird und mit dem Nahtstellensignal (Festanschlag erreicht quittieren) quittiert wird

If the position at which the fixed stop was detected leaves the tolerance band by more than the amount specified in SD 43520: FIXED_STOP_WINDOW, then alarm 20093 "Fixed stop monitoring has responded" is output and the "FXS" function is deselected.

The status of the setting data is indicated on the operator panel in the "Parameters" area.

The FXSW[x] command effects a block-synchronous change to this setting data. It can also be changed by the user or via the PLC.

The value is otherwise transferred from MD: FIXED_STOP_WINDOW_DEF to the setting data when "Travel to fixed stop" is active.

Related to ....

MD 37020: FIXED_STOP_WINDOW_DEF (default setting for fixed stop monitoring window)

43600	IPOBRAKE_BLOCK_EXCHANGE			A06, A10	K1
%	Block change criterion 'braking ramp'			DOUBLE	Immediately
-					
-	-	0.0	0	100.0	7/7

Description: Specifies the application time at single axis interpolation for the block change criterion braking ramp: At 100%, the block change criterion is fulfilled at the time of application of the braking ramp. At 0%, the block change criterion is identical with IPOENDA.

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be set so that the value written by the part program is transferred into the active file system on reset (i.e. the value is retained even after reset).

43610	ADISPOSA_VALUE		A06, A10	P2
mm, degrees	Tolerance window 'braking ramp'		DOUBLE	Immediately
-				
-	- 0.0	-	-	7/7

Description: In case of single-axis interpolation, this value defines the size of the tolerance window which the axis must have reached in order to enable a block change in case of the block-change criterion 'braking ramp with tolerance window valid' and when reaching the corresponding % value of the braking ramp ($SA_IPOBRAKE_BLOCK_EXCHANGE).

Note:

By means of the MD 10710 $MN_PROG_SD_RESET_SAVE_TAB, the user can specify that the value written by the part program is transferred into the active file system in case of a reset (i.e. the value is retained even after the reset).

43700	OSCILL_REVERSE_POS1		-	P5
mm, degrees	Oscillation reversal point 1		DOUBLE	Immediately
-				
-	- 0.0	-	-	7/7

Description: Position of the oscillating axis at reversal point 1.

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after RESET.)

Application example(s)

NC language: OSP1[Axis]=Position

Related to ....

OSCILL_REVERSE_POS2

43710	OSCILL_REVERSE_POS2		-	P5
mm, degrees	Oscillation reversal point 2		DOUBLE	Immediately
-				
-	- 0.0	-	-	7/7

Description: Position of the oscillating axis at reversal point 2.

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)

Application example(s)

NC language: OSP2[Axis]=Position

Related to ....

OSCILL_REVERSE_POS1

43720	OSCILL_DWELL_TIME1		-	P5
s	Hold time at oscillation reversal point 1		DOUBLE	Immediately
-				
-	- 0.0	-	-	7/7

Description: Hold time of the oscillating axis at reversal point 1.

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after RESET.)

Application example(s)

NC language: OST1[Axis]=Position

Related to ....

OSCILL_DWELL_TIME2

43730	OSCILL_DWELL_TIME2		-	P5
s	Hold time at oscillation reversal point 2		DOUBLE	Immediately
-				
-	- 0.0	-	-	7/7

Description: Hold time of the oscillating axis at reversal point 2.

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after RESET.)

Application example(s)

NC language: OST2[Axis]=Position

Related to ....

OSCILL_DWELL_TIME1

43740	OSCILL_VELO		-	P5
mm/min, rev/min	Feedrate of reciprocating axis		DOUBLE	Immediately
-				
-	- 0.0	-	-	7/7

Description: Feed rate of the oscillating axis

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after RESET.)

Application example(s)

NC language: FA[Axis]=F value

43750	OSCILL_NUM_SPARK_CYCLES			-	P5
-	Number of spark-out strokes			DWORD	Immediately
-					
-	-	0	-	-	7/7

Description: Number of sparking-out strokes performed after ending the oscillating movement

Application example(s)

NC language: OSNSC[Axis]=Stroke number

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)

43760	OSCILL_END_POS			-	P5
mm, degrees	End position of the reciprocating axis			DOUBLE	Immediately
-					
-	-	0.0	-	-	7/7

Description: Position the oscillating axis travels to after ending the sparking-out strokes.

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)

Application example(s)

NC language: OSE[Axis]=Position

43770	OSCILL_CTRL_MASK			-	P5
-	Oscillation sequence control mask			DWORD	Immediately
-					
-	-	0	-	-	7/7

Description: Bit mask:

```
Bit no.        | Meaning in OSCILL_CTRL_MASK
-----------------------------------------------------------------
-------------
0(LSB)-1      | 0: Stop at the next reversal point if the
              |    oscillating movement is switched off
              |
              | 1: Stop at reversal point 1 if the
              |    oscillating movement is switched off
              | 2: Stop at reversal point 2 if the
              |    oscillating movement is switched of
              | 3: Do not approach a reversal point when the oscil-
lating movement is switched off if no sparking-out strokes are
programmed
-----------------------------------------------------------------
-------------
```

```
2           | 1: Approach end position after sparking out
-----------------------------------------------------------------
-------------
3          | 1: If the oscillating movement is aborted by delete
distance-to-go,
           |    then the sparking-out strokes are to be executed
afterwards
            |    and the end position approached if necessary
-----------------------------------------------------------------
-------------
4          | 1: If the oscillating movement is aborted by delete
distance-to-go,
            |    then the corresponding reversal point
            |    is approached on switch off
-----------------------------------------------------------------
-------------
5          | 1: Changed feedrate does not become active until the
next reversal point
-----------------------------------------------------------------
-------------
6           | 1: Path override is active if the feed rate is 0,
            |    otherwise speed override is active
-----------------------------------------------------------------
-------------
7           | 1: In the case of rotary axes DC (shortest path)
-----------------------------------------------------------------
-------------
8          | 1: Execute sparking-out stroke as single stroke not
as double stroke
-----------------------------------------------------------------
-------------
9           | 1: On starting, first approach the starting posi-
tion, see
            |    $SA_OSCILL_START_POS
-----------------------------------------------------------------
-------------
```

Application example(s)

NC language: OSCTRL[Axis]=(setting options, reset options)

43780	OSCILL_IS_ACTIVE		-	P5
-	Activate oscillation movement		BOOLEAN	Immediately
-				
-	- FALSE	-	-	7/7

Description: Switching the oscillating movement on and off

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)

Application example(s)

NC language: OS[Axis]=1, OS[Axis]=0

43790	OSCILL_START_POS		-	-
mm, degrees	Start position of reciprocating axis		DOUBLE	Immediately
-				
-	-	0.0 -	-	7/7

Description: Position approached by the oscillating axis at the start of oscillation if this is set in $SA_OSCILL_CTRL_MASK.

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)

43900	TEMP_COMP_ABS_VALUE		-	K3
-	Position-independent temperature compensation value		DOUBLE	Immediately
-				
-	-	0.0 -	-	7/7

Description: The position-independent temperature compensation value is defined by SD: TEMP_COMP_ABS_VALUE.

-

The machine axis traverses this additional compensation value as soon as the position-independent temperature compensation has been activated (MD: TEMP_COMP_TYPE = 1 or 3).

SD irrelevant for ......

MD: TEMP_COMP_TYPE = 0 or 2

Related to ....

MD: TEMP_COMP_TYPE Temperature compensation type

MD: COMP_ADD_VELO_FACTOR Velocity overshoot caused by compensation

43910	TEMP_COMP_SLOPE		-	K3
-	Lead angle for position-dependent temperature compensation		DOUBLE	Immediately
-				
-	-	0.0 -	-	7/7

Description: In the case of position-dependent temperature compensation, the error curve characteristic of the temperature-dependent actual-value deviation can often be approximated by a straight line. This straight line is defined by a reference point P_0 and a lead tanß.

SD: TEMP_COMP_SLOPE defines the lead tanß. This lead can be changed by the PLC user program as a function of the current temperature.

The axis traverses additionally the compensation value calculated for the current actual position as soon as the position-dependent temperature compensation becomes active (MD: TEMP_COMP_TYPE = 2 or 3).

MD: COMP_ADD_VELO_FACTOR limits the maximum lead angle tanß_max of the error curve. This maximum lead angle cannot be exceeded.

SD irrelevant for ......

MD: TEMP_COMP_TYPE = 0 or 1

Special cases, errors, ...

When TEMP_COMP_SLOPE is greater than tanß_max , the lead tanß_max is used to calculate the position-dependent temperature compensation value internally. No alarm is output.

Related to ....

MD: TEMP_COMP_TYPE Temperature compensation type

SD: TEMP_COMP_REF_POSITION Reference position for position-dependent temperature compensation

MD: COMP_ADD_VELO_FACTOR Velocity overshoot caused by compensation

43920	TEMP_COMP_REF_POSITION		-	K3
-	Ref. position of position-dependent temperature compensation		DOUBLE	Immediately
-				
-	- 0.0	-	-	7/7

Description: In the case of position-dependent temperature compensation, the error curve characteristic of the temperature-dependent actual-value deviation can often be approximated by a straight line. This straight line is defined by a reference point P_0 and a lead tanß.

SD: TEMP_COMP_REF_POSITION defines the position of the reference point P_0. This reference position can be changed by the PLC user program as a function of the current temperature.

The axis traverses additionally the compensation value calculated for the current actual position as soon as the position-dependent temperature compensation becomes active (MD: TEMP_COMP_TYPE = 2 or 3).

SD irrelevant for ......

MD: TEMP_COMP_TYPE = 0 or 1

Related to ....

MD: TEMP_COMP_TYPE Temperature compensation type

SD: TEMP_COMP_SLOPE Lead angle for position-dependent temperature compensation

1.6.4 General configuration setting data

54000	ACCESS_SHOW_SBL2		-	-
-	Display protection level SBL2		BYTE	Immediately
-				
-	- 7	0	7	4/3

Description: Display protection level SBL2

54001	ACCESS_TEACH_IN		-	-
-	Protection level TEACH IN		BYTE	Immediately
-				
-	- 7	0	7	4/3

Description: Protection level TEACH IN

54002	ACCESS_CLEAR_RPA		-	-
-	Protection level delete R variables		BYTE	Immediately
-				
-	- 7	0	7	4/3

Description: Protection level delete R variables

54010	ACCESS_READ_GUD_LUD			-	-
-	Read user variable protection level			BYTE	Immediately
-					
-	-	7	0	7	4/3

Description: Read user variable protection level

54020	ACCESS_WRITE_GUD_LUD			-	-
-	Write protection level of user variables			BYTE	Immediately
-					
-	-	7	0	7	4/3

Description: Write protection level of user variables

54021	ACCESS_WRITE_PRG_COND			-	-
-	Write program control protection level			BYTE	Immediately
-					
-	-	7	0	7	4/3

Description: Write program control protection level

54022	ACCESS_WRITE_PROGRAM			-	-
-	Write part program protection level			BYTE	Immediately
-					
-	-	7	0	7	4/3

Description: Write part program protection level

54023	ACCESS_WRITE_RPA			-	-
-	Protection level write R variables			BYTE	Immediately
-					
-	-	7	0	7	4/3

Description: Protection level write R variables

54024	ACCESS_WRITE_SEA			-	-
-	Protection level write setting data			BYTE	Immediately
-					
-	-	7	0	7	4/3

Description: Protection level write setting data

54025	ACCESS_WRITE_BASEFRAME			-	-
-	Write basic work offset protection level			BYTE	Immediately
-					
-	-	7	0	7	4/3

Description: Write basic work offset (basic frame) protection level

54026	ACCESS_WRITE_CYCFRAME			-	-
-	Write cycle frame protection level			BYTE	Immediately
-					
-	-	7	0	7	4/3

Description: Write cycle frame protection level

54027	ACCESS_WRITE_EXTFRAME			-	-
-	Write external WO protection level			BYTE	Immediately
-					
-	-	7	0	7	4/3

Description: Write external work offset protection level

54028	ACCESS_WRITE_PARTFRAME		-	-
-	Write table reference protection level		BYTE	Immediately
-				
-	- 7	0	7	4/3

Description: Write table reference protection level

54029	ACCESS_WRITE_SETFRAME		-	-
-	Write basic reference protection level		BYTE	Immediately
-				
-	- 7	0	7	4/3

Description: Write basic reference protection level

54030	ACCESS_WRITE_TOOLFRAME		-	-
-	Write basic tool reference protection level		BYTE	Immediately
-				
-	- 7	0	7	4/3

Description: Write basic tool reference protection level

54031	ACCESS_WRITE_TRAFRAME		-	-
-	Write transformation frame protec. level		BYTE	Immediately
-				
-	- 7	0	7	4/3

Description: Write transformation frame protec. level

54032	ACCESS_WRITE_USERFRAME		-	-
-	Write settable work offset protection level		BYTE	Immediately
-				
-	- 7	0	7	4/3

Description: Write settable work offset (G54 ... G599) protection level

54033	ACCESS_WRITE_WPFRAME		-	-
-	Write workpiece reference protection level		BYTE	Immediately
-				
-	- 7	0	7	4/3

Description: Write workpiece reference protection level

54034	ACCESS_WRITE_FINE		-	-
-	Write protection level for fine offset of all work offsets		BYTE	Immediately
-				
-	- 7	0	7	4/3

Description: Write protection level for fine offset of all work offsets

54035	ACCESS_SET_ACT_VALUE		-	-
-	Set actual value protection level		BYTE	Immediately
-				
-	- 7	0	7	4/3

Description: Set actual value protection level

54200	ACCESS_WRITE_TM_GEO		-	-
-	Write tool offset geometry data protection level		BYTE	Immediately
-				
-	- 7	0	7	7/4

Description: Write tool offset geometry data protection level

54201	ACCESS_WRITE_TM_WEAR			-	-
-	Write tool offset wear data protection level			BYTE	Immediately
-					
-	-	7	0	7	7/4

Description: Write tool offset wear data protection level

54202	ACCESS_WRITE_TM_WEAR_DELTA			-	-
-	Protection level for tool offset restricted writing of wear data			BYTE	Immediately
-					
-	-	7	0	7	7/4

Description: Protection level for restricted writing of tool wear values

S. MD 54213: TM_WRITE_DELTA_LIMIT

54203	ACCESS_WRITE_TM_SC			-	-
-	Write tool offset sum offset protection level			BYTE	Immediately
-					
-	-	7	0	7	7/4

Description: Write tool offset sum offset protection level

54204	ACCESS_WRITE_TM_EC			-	-
-	Write tool offset use offsets protection level			BYTE	Immediately
-					
-	-	7	0	7	7/4

Description: Write tool offset use offsets protection level

54205	ACCESS_WRITE_TM_SUPVIS			-	-
-	Write tool offset monitoring data protection level			BYTE	Immediately
-					
-	-	7	0	7	7/4

Description: Write tool offset monitoring data protection level

One authorization applies to all limit values: quantity, service life, wear and the monitoring type.

54206	ACCESS_WRITE_TM_ASSDNO			-	-
-	Write tool offset unique D number protection level			BYTE	Immediately
-					
-	-	7	0	7	7/4

Description: Write tool offset unique D number protection level

54207	ACCESS_WRITE_TM_WGROUP			-	-
-	Write tool offset wear groups protection level			BYTE	Immediately
-					
-	-	7	0	7	7/4

Description: Write tool offset wear groups (magazine location / magazine) protection level

54208	ACCESS_WRITE_TM_ADAPT			-	-
-	Write tool offset adapter data protection level			BYTE	Immediately
-					
-	-	7	0	7	7/4

Description: Write tool offset tool adapter geometry data protection level

54209	ACCESS_WRITE_TM_NAME			-	-
-	Write tool offset tool name protection level			BYTE	Immediately
-					
-	-	7	0	7	7/4

Description: Write tool offset tool name and duplo data protection level

54210	ACCESS_WRITE_TM_TYPE			-	-
-	Write tool offset tool type protection level			BYTE	Immediately
-					
-	-	7	0	7	7/4

Description: Write tool offset tool type protection level

54211	ACCESS_READ_TM			-	-
-	Read tool offset data protection level			BYTE	Immediately
-					
-	-	7	0	7	7/4

Description: Read tool offset data protection level

54212	TM_WRITE_WEAR_ABS_LIMIT			-	-
mm	Maximum tool wear value			DOUBLE	Immediately
-					
-	-	0	0	10	7/4

Description: With TM_WRITE_WEAR_ABS_LIMIT the max. possible value of a tool wear is limited absolutely, independently of the current protection level (keyswitch position), i.e. also independently of ACCESS_WRITE_TM_WEAR. Absolute and incremental wear limitation can be combined, i.e. the wear can be changed incrementally up to the absolute limit. S. MD 54213.

54213	TM_WRITE_WEAR_DELTA_LIMIT			-	-
mm	Maximum difference value restricted tool wear input			DOUBLE	Immediately
-					
-	-	0	0	10	7/4

Description: When entering tool offsets, the value of the change from the previous value to the new value cannot exceed the value set here.

With TM_WRITE_WEAR_DELTA_LIMIT the change to a tool wear can be limited incrementally, if the current protection is the same as or higher than the one set in ACCESS_WRITE_TM_WEAR_DELTA. With the current protection level being the same or higher than ACCESS_WRITE_TM_WEAR an incremental limitation is no longer performed. Absolute and incremental wear limitation can be combined, i.e. the wear can be changed

up to the absolute limit. S. MD 54212.

54214	TM_WRITE_LIMIT_MASK			-	-
-	Validity of the restricted tool wear input			BYTE	Immediately
-					
-	-	7	0	7	7/4

Description: Validity of the restricted tool wear input

Bit 0:use for cutting edge data, wear

Bit 1:use for SC data, sum offsets

Bit 2:use for EC data, use offsets

Bit 0+1+2:use for all data, wear, SC, EC

54215	TM_FUNCTION_MASK_SET			-	-
-	Function mask Tool management			DWORD	Immediately
-					
-	-	0	-	-	7/4

Description: Function mask TOOLMAN

Bit 0:diameter display for rotating tools

Bit 1:default direction of rotation for all tools is M3

Bit 2:create tool without name proposal

Bit 3:name and type input disable for loaded tools

Bit 4:input disable for loaded tools, if NC is not in reset position

Bit 5:additively calculate tool wear inputs

Bit 6:numerical input of the tool ident

1.6.5 General cycle setting data

54600	MEA_WP_BALL_DIAM			-	-
mm	Effective diameter of the probe sphere for the workpiece probe			DOUBLE	Immediately
-					
-	99	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	0	10000	7/6

Description: Effective sphere diameter of the probe sphere for the workpiece probe.

The value of this parameter is created by the operation "Calibrate workpiece probe"!

54601	MEA_WP_TRIG_MINUS_DIR_AX1			-	-
mm	Trigger point of the 1st measuring axis in negative direction			DOUBLE	Immediately
-					
-	99	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-100000	100000	7/6

Description: Trigger point of the 1st measuring axis (abscissa) in negative traversing direction (X at G17) of the workpiece probe.

The term "negative traversing direction" refers to the currently active workpiece zero point reference!

The value of this parameter is created by the operation "Calibrate workpiece probe"!

54602	MEA_WP_TRIG_PLUS_DIR_AX1			-	-
mm	Trigger point of the 1st measuring axis in positive direction			DOUBLE	Immediately
-					
-	99	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-100000	100000	7/6

Description: Trigger point of the 1st measuring axis (abscissa) in positive traversing direction (X at G17) of the workpiece probe.

The term "positive traversing direction" refers to the currently active workpiece zero point reference!

The value of this parameter is created by the operation "Calibrate workpiece probe"!

54603	MEA_WP_TRIG_MINUS_DIR_AX2			-	-
mm	Trigger point of the 2nd measuring axis in negative direction			DOUBLE	Immediately
-					
-	99	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-100000	100000	7/6

Description: Trigger point of the 2nd measuring axis (ordinate) in negative traversing direction (Y at G17) of the workpiece probe.

The term "negative traversing direction" refers to the currently active workpiece zero point reference!

The value of this parameter is created by the operation "Calibrate workpiece probe"!

54604	MEA_WP_TRIG_PLUS_DIR_AX2			-	-
mm	Trigger point of the 2nd measuring axis in positive direction			DOUBLE	Immediately
-					
-	99	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-100000	100000	7/6

Description: Trigger point of the 2nd measuring axis (ordinate) in positive traversing direction (Y at G17) of the workpiece probe.

The term "positive traversing direction" refers to the currently active workpiece zero point reference!

The value of this parameter is created by the operation "Calibrate workpiece probe"!

54605	MEA_WP_TRIG_MINUS_DIR_AX3			-	-
mm	Trigger point of the 3rd measuring axis in negative direction			DOUBLE	Immediately
-					
-	99	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-100000	100000	7/6

Description: Trigger point of the 3rd measuring axis (applicate) in negative traversing direction (Z at G17) of the workpiece probe.

The term "negative traversing direction" refers to the currently active workpiece zero point reference!

The value of this parameter is created by the operation "Calibrate workpiece probe"!

54606	MEA_WP_TRIG_PLUS_DIR_AX3			-	-
mm	Trigger point of the 3rd measuring axis in positive direction			DOUBLE	Immediately
-					
-	99	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-100000	100000	7/6

Description: Trigger point of the 3rd measuring axis (applicate) in positive traversing direction (Z at G17) of the workpiece probe.

The term "positive traversing direction" refers to the currently active workpiece zero point reference!

The value of this parameter is created by the operation "Calibrate workpiece probe"!

54607	MEA_WP_POS_DEV_AX1			-	-
mm	Position deviation of the probe sphere in the 1st measuring axis			DOUBLE	Immediately
-					
-	99	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-100000	100000	7/6

Description: The position deviation in the 1st measuring axis represents a geometrical offset of the center point of the probe sphere

related to the electrical center point of the probe in this axis!

The value of this parameter is created by the operation "Calibrate workpiece probe"!

54608	MEA_WP_POS_DEV_AX2			-	-
mm	Position deviation of the probe sphere in the 2nd measuring axis			DOUBLE	Immediately
-					
-	99	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-100000	100000	7/6

Description: The position deviation in the 2nd measuring axis represents a geometrical offset of the center point of the probe sphere

related to the electrical center point of the probe in this axis!

The value of this parameter is created by the operation "Calibrate workpiece probe"!

54609	MEA_WP_STATUS_RT			-	-
-	Calibration status axis positions			DOUBLE	Immediately
-					
-	99	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-	-	7/6

Description: Calibration status of the axis positions reserved for internal use!

The value of this parameter is created by the operation "Calibrate workpiece probe"!

54610	MEA_WP_STATUS_GEN			-	-
-	Calibration status in general			DOUBLE	Immediately
-					
-	99	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-	-	7/6

Description: Calibration status in general reserved for internal use!

The value of this parameter is created by the operation "Calibrate workpiece probe"!

54625	MEA_TP_TRIG_MINUS_DIR_AX1			-	-
mm	Trigger point of the 1st measuring axis in negative direction			DOUBLE	Immediately
-					
-	12	0,0,0,0,0,0,0,0,0,0,0,0	-100000	100000	7/6

Description: Trigger point of the 1st measuring axis in negative direction (abscissa, X at G17, Z at G18)

The trigger point refers to the machine coordinate system (MCS).

Prior to calibration the approximate trigger point must be entered in the machine coordinate system!

The exact value of this parameter is created by the operation "Calibrate workpiece probe"!

54626	MEA_TP_TRIG_PLUS_DIR_AX1			-	-
mm	Trigger point of the 1st measuring axis in positive direction			DOUBLE	Immediately
-					
-	12	0,0,0,0,0,0,0,0,0,0,0,0	-100000	100000	7/6

Description: Trigger point of the 1st measuring axis in positive direction (abscissa, X at G17, Z at G18)

The trigger point refers to the machine coordinate system (MCS).

Prior to calibration the approximate trigger point must be entered in the machine coordinate system!

The exact value of this parameter is created by the operation "Calibrate workpiece probe"!

54627	MEA_TP_TRIG_MINUS_DIR_AX2			-	-
mm	Trigger point of the 2nd measuring axis in negative direction			DOUBLE	Immediately
-					
-	12	0,0,0,0,0,0,0,0,0,0,0,0	-100000	100000	7/6

Description: Trigger point of the 2nd measuring axis in negative direction (ordinate, Y at G17, X at G18)

The trigger point refers to the machine coordinate system (MCS).

Prior to calibration the approximate trigger point must be entered in the machine coordinate system!

The exact value of this parameter is created by the operation "Calibrate workpiece probe"!

54628	MEA_TP_TRIG_PLUS_DIR_AX2			-	-
mm	Trigger point of the 2nd measuring axis in positive direction			DOUBLE	Immediately
-					
-	12	0,0,0,0,0,0,0,0,0,0,0,0	-100000	100000	7/6

Description: Trigger point of the 2nd measuring axis in positive direction (ordinate, Y at G17, X at G18)

The trigger point refers to the machine coordinate system (MCS).

Prior to calibration the approximate trigger point must be entered in the machine coordinate system!

The exact value of this parameter is created by the operation "Calibrate workpiece probe"!

54629	MEA_TP_TRIG_MINUS_DIR_AX3			-	-
mm	Trigger point of the 3rd measuring axis in negative direction			DOUBLE	Immediately
-					
-	12	0,0,0,0,0,0,0,0,0,0,0,0	-100000	100000	7/6

Description: Trigger point of the 3rd measuring axis in negative direction (applicate, Z at G17, Y at G18)

The trigger point refers to the machine coordinate system (MCS).

Prior to calibration the approximate trigger point must be entered in the machine coordinate system!

The exact value of this parameter is created by the operation "Calibrate workpiece probe"!

54630	MEA_TP_TRIG_PLUS_DIR_AX3			-	-
mm	Trigger point of the 3rd measuring axis in positive direction			DOUBLE	Immediately
-					
-	12	0,0,0,0,0,0,0,0,0,0,0,0	-100000	100000	7/6

Description: Trigger point of the 3rd measuring axis in positive direction (applicate, Z at G17, Y at G18)

The trigger point refers to the machine coordinate system (MCS).

Prior to calibration the approximate trigger point must be entered in the machine coordinate system!

The exact value of this parameter is created by the operation "Calibrate workpiece probe"!

54631	MEA_TP_EDGE_DISK_SIZE			-	-
mm	Tool probe edge length/wheel diameter			DOUBLE	Immediately
-					
-	12	0,0,0,0,0,0,0,0,0,0,0,0	0	1000	7/6

Description: Effective edge length or grinding wheel diameter of the tool probe.

Milling tools are normally measured with wheel-shaped probes while turning tools

are measured with square probes.

54632	MEA_TP_AX_DIR_AUTO_CAL			-	-
-	Automatic tool probe calibration, enable axes/directions			DWORD	Immediately
-					
-	12	133,133,133,133,133,133,133,133,133...	0	999	7/6

Description: Enabling axes and traversing directions for "Automatic calibration" of milling tool probes.

The default setting refers in X and Y to the plus and minus direction respectively, in Z only to the minus direction.

The parameter is divided into three components the functions of which are to be assigned to calibration data records 1, 2 or 3.

The calibration data records are firmly assigned to tool measuring in the working planes G17 (1), G18 (2) and G19 (3)!

Meaning of the parameter components

Decimal position:

Ones 1st geometry axis (X)

Tens: 2nd geometry axis (Y)

Hundreds: 3rd geometry axis (Z)

Value:

=0: axis not enabled

=1: only minus direction possible

=2: only plus direction possible

=3: both directions possible

54633	MEA_TP_TYPE			-	-
-	Tool probe type cube / wheel			DOUBLE	Immediately
-					
-	12	0,0,0,0,0,0,0,0,0,0,0,0	0	999	7/6

Description: Tool probe type

0: cube

101: wheel in XY, working plane G17

201: wheel in ZX, working plane G18

301: wheel in YZ, working plane G19

54634	MEA_TP_CAL_MEASURE_DEPTH			-	-
mm	Distance between the upper tool probe edge and the lower milling tool edge			DOUBLE	Immediately
-					
-	12	2,2,2,2,2,2,2,2,2,2,2,2	-1000	1000	7/6

Description: Distance between the upper tool probe edge and the lower milling tool edge.

For tool probe calibration this distance defines the calibration depth and

for milling tool measuring the measuring depth!

This parameter does not apply to turning tool measuring!

54655	MEA_REPEAT_ACTIVE			-	-
-	Measurem. repetitions after exceeding dimens. difference and safety margin			BYTE	Immediately
-					
-	-	0	0	1	7/6

Description: Measurement repetitions after exceeding of the dimensional difference (parameter _TDIF) and/or the safety margin (parameter _TSA)

=0: when the dimensional difference and/or safety margin is exceeded, the measurement is not repeated. A corresponding alarm is displayed that can be acknowledged with "RESET".

=1: when the dimensional difference and/or safety margin is exceeded, the measurement is repeated 4 times max.

54656	MEA_REPEAT_WITH_M0			-	-
-	Alarm and M0 is included in measurement repetitions.			BYTE	Immediately
-					
-	-	0	0	1	7/6

Description: This parameter refers to SD54655 $SNS_MEA_REPEAT_ACTIVE, provided that it is set to "1"!

In this case one of the following behaviors can be selected:

=0: no alarm, no M0 in the measurement repetitions

=1: NC command "M0" is generated in all measurement repetitions; the repetition must be started with NC-START.

The corresponding alarm that can be acknowledged with "NC-START" is displayed for each measurement repetition,

[default = 0]

54657	MEA_TOL_ALARM_SET_M0			-	-
-	M0, when allowance, undersize or permissible dimens. difference is exceeded			BYTE	Immediately
-					
-	-	0	0	1	7/6

Description: M0 with tolerance alarms 62304 Allowance, 62305 Undersize, 62306 Permissible dimensional difference exceeded

=0: no M0 is generated when alarms 62304 "Allowance", 62305 "Undersize" or 62306 "Permissible dimensional difference exceeded" are output.

These alarms are merely displayed, but do not cause program execution to be interrupted!

=1: NC command "M0" is generated when these alarms are displayed.

54659	MEA_TOOL_MEASURE_RELATE		-	-
-	Tool measuring and calibration in machine workpiece coordinate system		BYTE	Immediately
-				
-	- 0	0	1	7/6

Description: Tool measuring and calibration in the machine workpiece coordinate system.

The function of this parameter only refers to CYCLE982.

=0: tool probe calibration and tool measuring are performed in the machine coordinate system (MCS).

Tool probe calibration data are stored in the $SNS_MEA_TP_..... parameter fields.

=1: tool probe calibration and tool measuring are performed in the active workpiece coordinate system (WCS).

Calibration and measurement must be performed under the same environmental conditions (frames). Thus, tools can be measured even at

active transformations, e.g. TRAANG.

Notice: the $SNS_MEA_TP_..... parameter fields are used for calibration and measurement here, too.

54660	MEA_PROBE_BALL_RAD_IN_TOA		-	-
-	Accept the calibrated workpiece probe radius in the tool data.		BYTE	Immediately
-				
-	- 0	0	1	7/6

Description: Accept the calibrated workpiece probe radius in the tool data.

The function of this parameter only refers to CYCLE976.

0: calibrated workpiece probe radius is not accepted in the tool data

1: for the calibration type "with probe sphere calculation" the determined "effective probe sphere diameter" (54600 $SNS_MEA_WP_BALL_DIAM)

is converted into a radius value and entered in the tool radius geometry memory of the active workpiece probe.

54662	MEA_WP_PROBE_INPUT_SUB		-	-
-	Workpiece probe available/active on the counterspindle		BYTE	Immediately
-				
-	- 0	-	-	7/6

Description: Workpiece probe available/active on the counterspindle

=0: workpiece probe not available/active on the counterspindle

=1: workpiece probe available/active on the counterspindle

54664	MEA_T_PROBE_INPUT_SUB		-	-
-	Tool probe available/active on the counterspindle		BYTE	Immediately
-				
-	- 0	-	-	7/6

Description: Tool probe available/active on the counterspindle

=0: tool probe not available/active on the counterspindle

=1: tool probe available/active on the counterspindle

54689	MEA_T_PROBE_MANUFACTURER			-	-
-	Tool probe type (manufacturer)			BYTE	Immediately
-					
-	-	0	0	2	7/6

Description: Tool probe type (manufacturer)

These indications are required for tool measuring with rotating spindle.

=0: no indication

=1: TT130 (Heidenhain)

=2: TS27R (Renishaw)

54691	MEA_T_PROBE_OFFSET			-	-
-	Measurement result offset for tool measuring			BYTE	Immediately
-					
-	-	0	0	2	7/6

Description: Measurement result offset for tool measuring with rotating spindle.

=0: no offset

=1: cycle-internal offset (only effective with SD54690 $SNS_MEA_T_PROBE_MANUFACTURER<>0)

=2: offset through user-defined offset table

54750	MEA_ALARM_MASK			-	-
-	Expert mode for cycle alarms			DWORD	Immediately
-					
-	-	0	-	-	7/6

Description: Bit 0-7 workpiece measurement

Bit 0 =1 alarms with cycle-internal states and codings are displayed (expert mode)!

Bit 1-7 reserved

Bit 8-16 tool measuring

Bit 0-7 reserved

54798	J_MEA_FUNCTION_MASK_PIECE			-	-
-	Setting for input screen, Measure in JOG, workpiece measurement			DWORD	Immediately
-					
-	-	0	-	-	7/6

Description: Setting for input screen, measuring cycles in JOG, workpiece measurement

Bit0 measuring plane G17 (XY), G18 (ZX), G19 (YZ)

Bit1 reserved

Bit2 determination of the WO effective on measuring

Bit3 calibration data (probe number/field)

Bit4 measuring feed input (VMS)

Bit5 reserved

Bit6 WO compensation basic reference

Bit7 WO compensation channel-specific basis

Bit8 WO compensation global basis

Bit9 WO compensation in active frame

Bit10WO compensation in active frame

54799	J_MEA_FUNCTION_MASK_TOOL		-	-
-	Setting for input screen, Measure in JOG, workpiece measurement		DWORD	Immediately
-				
-	- 0	-	-	7/6

Description: Setting for input screen "Measure in JOG", tool measuring

Bit0 measuring plane G17 (XY), G18 (ZX), G19 (YZ)

Bit1 reserved

Bit2 reserved

Bit3 default feedrate/spindle speeds

Bit4 no spindle speed reduction for last probing on tool measuring

1.6.6 Channel-specific configuration setting data

55200	MAX_INP_FEED_PER_REV		-	-
mm/rev	Upper limit feedrate/rev		DOUBLE	Immediately
-				
-	- 1	0	5	7/4

Description: Feedrate input upper limit for mm/rev

55201	MAX_INP_FEED_PER_TIME		-	-
mm/min	Upper limit feedrate/min		DOUBLE	Immediately
-				
-	- 10000	0	100000	7/4

Description: Feedrate input upper limit for mm/min

55202	MAX_INP_FEED_PER_TOOTH		-	-
mm	Upper limit feedrate/tooth		DOUBLE	Immediately
-				
-	- 1	0	1	7/4

Description: Feedrate input upper limit for mm/tooth

55212	FUNCTION_MASK_TECH_SET		-	-
-	Function mask Cross-technology		BYTE	Immediately
-				
-	- 0	-	-	7/4

Description: Function mask Cross-technology

Bit 0: reserved

Bit 1: automatic thread depth calculation

55214	FUNCTION_MASK_MILL_SET		-	-
-	Function mask Milling		DWORD	Immediately
-				
-	- 3	-	-	7/4

Description: Function mask Milling

Bit 0: default setting - milling cycles with synchronous operation

Bit 1: turning angle refers to the center point despite dimensioning round the corner (POCKET3)

Bit 2: depth calculation in milling cycles without safety clearance (parameter SC)

55216	FUNCTION_MASK_DRILL_SET			-	-
-	Function mask Drilling			DWORD	Immediately
-					
-	-	24	-	-	7/4

Description: Function mask Drilling

Bit 0:tapping CYCLE84: reverse the direction of spindle rotation in the cycle

Bit 1: -

Bit 2: -

Bit 3:tapping CYCLE84: monitoring machine data 31050 and 31060 of the spindle

Bit 4:tapping CYCLE840: monitoring machine data 31050 and 31060 of the spindle

Bit 5:tapping CYCLE84: calculation of the brake point at G33

55218	FUNCTION_MASK_TURN_SET			-	-
-	Function mask Turning			DWORD	Immediately
-					
-	-	1	-	-	7/4

Description: Function mask Turning

Bit 0: new thread table during thread cutting

Bit 1:reserved (CYCLE93)

Bit 2:reserved (CYCLE93)

55221	FUNCTION_MASK_SWIVEL_SET			-	-
-	Function mask Swivel CYCLE800			DWORD	Immediately
-					
-	-	0	-	-	7/6

Description: Function mask Swivel CYCLE800

Bit 0: unhide input field "No swivel"

Bit 1: deactivate offsets after the rotation

The settings of the function mask Swivel affect all swivel data records

55230	CIRCLE_RAPID_FEED			-	-
mm/min	Positional feed on circular paths			DOUBLE	Immediately
-					
-	-	100000	100	100000	7/4

Description: Rapid traverse feedrate in mm/min for positioning on circle path

1.6.7 Channel-specific cycle setting data

55410	MILL_SWIVEL_ALARM_MASK		-	-
-	Hide and unhide cycle alarms for CYCLE800		DWORD	Immediately
-				
-	- 0	-	-	7/3

Description: Hide and unhide cycle alarms CYCLE800

Bit 0: error analysis 62186 - active work offset G%4 and base (base relation) include rotations

Bit 1: error analysis 62187 - active base and base relation (G500) include rotations

55480	DRILLING_AXIS_IS_Z		-	-
-	Drilling axis depends on plane or always Z		BYTE	Immediately
-				
-	- 0	0	1	7/6

Description: Drilling axis depends on plane (G17, G18, G19) or always Z

55481	DRILL_TAPPING_SET_GG12		-	-
-	Setting tapping G group 12: block change behavior at exact stop		DOUBLE	Immediately
-				
-	- 0	0	3	7/4

Description: Settings for tapping G group 12 cycle CYCLE84 and CYCLE840:

G group 12: block change behavior at exact stop (G60)

55482	DRILL_TAPPING_SET_GG21		-	-
-	Setting tapping G group 21: acceleration profile		DOUBLE	Immediately
-				
-	- 0	0	2	7/4

Description: Settings for tapping G group 21 cycle CYCLE84

G group 21: acceleration profile (SOFT, BRISK, ...)

55483	DRILL_TAPPING_SET_GG24		-	-
-	Setting tapping G group 24: precontrol		DOUBLE	Immediately
-				
-	- 0	0	3	7/4

Description: Settings for tapping G group 24 cycle CYCLE84 and CYCLE840:

G group 24: precontrol (FFWON, FFWOF)

55484	DRILL_TAPPING_SET_MC		-	-
-	Setting tapping: spindle operation at MCALL		DOUBLE	Immediately
-				
-	- 0	0	1	7/4

Description: Setting for tapping cycle CYCLE84 spindle operation at MCALL

0= reactivate spindle operation at MCALL

1= maintain position-controlled spindle operation at MCALL

55500	TURN_FIN_FEED_PERCENT			-	-
%	Roughing feedrate for complete machining in %			BYTE	Immediately
-					
-	-	100	1	100	7/4

Description: When selecting Complete machining (roughing and finishing), the percentage of the entered feedrate F as specified in this setting data is used for finishing.

55510	TURN_GROOVE_DWELL_TIME			-	-
s	Tool clearance time for grooving at the base (neg. value=rotations)			DOUBLE	Immediately
-					
-	-	-1	-100	100	7/4

Description: If a tool clearance time occurs in a cycle, e.g. deep hole drilling, grooving, the value of this setting data is used

- negative value in spindle revolutions
- positive value in seconds

55515	TURN_THREAD_RELEASE_DIST			-	-
mm	Return distance for thread cutting			DOUBLE	Immediately
-					
-	-	2	0.001	1000	7/4

Description: In this setting data you can specify the distance to the workpiece, to which the tool is returned between the infeeds during thread cutting.

55582	TURN_CONT_TRACE_ANGLE			-	-
degrees	Contour turning: minimum angle for rounding along contour			DOUBLE	Immediately
-					
-	-	5	0	90	7/4

Description: This setting data specifies the angle between the cutting edge and the contour, at which the contour is rounded in order to remove residual material.

55600	MEA_COLLISION_MONITORING			-	-
-	Collision detection with tool probe for intermediate positioning			BYTE	Immediately
-					
-	-	1	0	1	7/6

Description: Collision detection with tool probe for intermediate positioning

=0: no collision detection

=1: the movement of positioning operations calculated by the measuring cycles and performed between the measuring points

is stopped as soon as the probe provides a switching signal. A corresponding alarm message is displayed.

55602	MEA_COUPL_SPIND_COORD			-	-
-	Coupling spindle orientation with coordinate rotation in the active plane			BYTE	Immediately
-					
-	-	0	0	1	7/6

Description: Coupling of spindle orientation and coordinate rotation in the active plane, in the case of workpiece measurement with multiprobe in Automatic mode

=0: no coupling of spindle orientation and coordinate rotation in the plane.

=1: when multiprobes are used, the spindle is oriented depending on the active coordinate rotation in the plane (rotations around the infeed axis (applicate)).

Thus, the axis-parallel orientation of the probe sphere contact points (calibrated trigger points) is maintained with regard to the geometry axis.

The direction of spindle rotation is defined by SD55604 $SCS_MEA_SPIND_MOVE_DIR!

Note:

Coordinate rotation in the active plane means: - Rotation around the Z axis at G17,

- Rotation around the Y axis at G18
- Rotation around the X axis at G19.

Notice:

The coupling is annulled by the measuring cycle, if

- rotations around the 1st or 2nd measuring axis (abscissa or ordinate at G17) between calibration and actual measuring are not identical !!!
- the working spindle is not position-controlled (no SPOS possible)
- a monoprobe is used (_PRNUM=x1xx)!

When the coupling is annulled by the measuring cycle, no alarm or message is displayed!

55604	MEA_SPIND_MOVE_DIR			-	-
-	Direction of rotation of spindle positioning			BYTE	Immediately
-					
-	-	0	0	1	7/6

Description: Direction of rotation of spindle positioning with regard to active coupling of spindle orientation and coordinate rotation in the active plane

=0: the spindle is positioned as specified by the default.

- coordinate rotation angle in the plane 0°: spindle positioning 0°
- coordinate rotation angle in the plane 90°: spindle positioning 270°

=1: the spindle is positioned in the opposite direction (adjusted angle values).

- coordinate rotation angle in the plane 0°: spindle positioning 0°
- coordinate rotation angle in the plane 90°: spindle positioning 90°

55606	MEA_NUM_OF_MEASURE			-	-
-	Number of measurement repetitions, if the probe does not switch			BYTE	Immediately
-					
-	-	0	0	1	7/6

Description: Number of measurement repetitions, if the probe does not switch

=0: max. 5 measuring attempts are performed before measuring cycle alarm "Probe does not switch" is output.

=1: after the first unsuccessful measuring attempt measuring cycle alarm "Probe does not switch" is generated.

55608	MEA_RETRACTION_FEED			-	-
-	Retraction velocity from the measuring point			BYTE	Immediately
-					
-	-	0	0	1	7/6

Description: Retraction velocity from the measuring point

=0: retraction of the measuring point is performed with the same velocity as in intermediate positioning (SD55631 $SCS_MEA_FEED_PLANE_VALUE).

=1: the retraction velocity depends on the rapid traverse velocity in percent as specified in SD55630 $SCS_MEA_FEED_RAPID_IN_PERCENT and is only

effective with active collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=1).

55610	MEA_FEED_TYP			-	-
-	Selection of measuring feed function, normal/rapid			BYTE	Immediately
-					
-	-	0	0	1	7/6

Description: Measuring feed

=0: for the measuring travel the feedrate generated in the cycle or the feedrate programmed in parameter _VMS is used.

=1: travel is first performed with "rapid measuring feed" SD55633 $SCS_MEA_FEED_FAST_MEASURE; after contact of the probe with the measuring object

a retraction of 2mm from the measuring point is performed. Now the measuring travel itself with the feedrate from _VMS is performed.

The function "Rapid measuring feed" is realized only if the value in parameter is _FA >=1!

55613	MEA_RESULT_DISPLAY			-	-
-	Selection of measurement result display			BYTE	Immediately
-					
-	-	0	0	10	7/6

Description: Measurement result display

=0: no measurement result display

=1: the measurement result is displayed until cycle end

=2: the measurement result is displayed until the next cycle is started/called

=3: with the measurement result display the cycle is stopped by an internal M0,

with NC start the measuring cycle is continued and the measurement result display is deselected

55618	MEA_SIM_ENABLE			-	-
-	Selection of measuring cycle response in a simulated environment			BYTE	Immediately
-					
-	-	1	0	1	7/6

Description: Selection of measuring cycle response in an environment simulated in HMI Advanced or in ShopMill / ShopTurn

= 0: measuring cycles are not executed (measuring cycle is skipped internally)

= 1: measuring cycles are executed; real axes are required!

During calibration no values are entered in the probe data fields,

no measurement result is displayed,

the measuring cycle is not logged,

the travel is performed without collision detection.

55619	MEA_SIM_MEASURE_DIFF			-	-
mm	Value for simulated error of measurement			DOUBLE	Immediately
-					
-	-	0	-100	100	7/6

Description: With this parameter simulated measurement errors can be specified on the measuring points.

Provided that SD55618 $SCS_MEA_SIM_ENABLE=1 is used and that the measuring cycles are executed in a

simulated environment of HMI Advanced or ShopMill / ShopTurn, a measurement difference can be

entered in this parameter. The value of the measurement difference must be smaller than the measuring path in parameter _FA!

Otherwise cycle alarm 61301 "Probe does not switch" is output during active simulation.

55622	MEA_EMPIRIC_VALUE_NUM			-	-
-	Number of empirical values			DWORD	Immediately
-					
-	-	20	0	1000	7/6

Description: Number of empirical values

55624	MEA_AVERAGE_VALUE_NUM			-	-
-	Number of mean values			DWORD	Immediately
-					
-	-	20	0	1000	7/6

Description: Number of mean values

55630	MEA_FEED_RAPID_IN_PERCENT			-	-
%	Rapid traverse velocity in per cent, for intermediate positioning			DOUBLE	Immediately
-					
-	-	50	0	100	7/6

Description: Traverse velocities for positioning in the measuring cycle between the measuring positions,

with rapid traverse velocity in per cent, with collision detection not active

Note:

If necessary, adapt the value of the rapid traverse velocity in per cent to the probe type used and to the

machine characteristics! This means that the maximum deflection of the actual probe type must be considered!!

Explanations:

In the measuring cycles any intermediate positions are calculated prior to the actual set of measurements. These positions can be approached

- with collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=1 or
- without collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=0).

Depending on this setting different velocities are used for the approach:

- with collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=1):

  With SD55631 $SCS_MEA_FEED_PLAN_VALUE the traversing feed is performed in the plane and

  with SD55632 $SCS_MEA_FEED_FEEDAX_VALUE during traversing in the feed axis (applicate).

  If the probe switches when these intermediate positions are approached, the movement is stopped and the alarm "Probe collision" is output.

- without collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=0):

  The intermediate positions are approached with the maximum axis velocity (rapid traverse) in per cent as specified in SD55630 $SCS_MEA_FEED_RAPID_IN_PERCENT.

  With SD55630 $SCS_MEA_FEED_RAPID_IN_PERCENT=0 and SD55630 $SCS_MEA_FEED_RAPID_IN_PERCENT=100 the maximum axis velocity is effective.

55631	MEA_FEED_PLANE_VALUE			-	-
mm/min	Traverse velocity for intermediate positioning in the plane			DOUBLE	Immediately
-					
-	-	1000	0	10000	7/6

Description: Traverse velocities for intermediate positioning in the measuring cycle in the plane, with and without collision detection

Note:

If necessary, adapt the value of the velocity for the plane to the probe type used and to the

machine characteristics! This means that the maximum deflection of the actual probe type must be considered!!

Explanations:

In the measuring cycles any intermediate positions are calculated prior to the actual set of measurements. These positions can be approached

- with collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=1 or
- without collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=0).

Depending on this setting different velocities are used for the approach:

- with collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=1):

  With SD55631 $SCS_MEA_FEED_PLAN_VALUE the traversing feed is performed in the plane.

  If the probe switches when these intermediate positions are approached, the movement is stopped and the alarm "Probe collision" is output.
- without collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=0):

  The intermediate positions are approached with the maximum axis velocity (rapid traverse) in per cent as specified in SD55630 $SCS_MEA_FEED_RAPID_IN_PERCENT.

  With SD55630 $SCS_MEA_FEED_RAPID_IN_PERCENT=0 and SD55630 $SCS_MEA_FEED_RAPID_IN_PERCENT=100 the maximum axis velocity is effective.

55632	MEA_FEED_FEEDAX_VALUE			-	-
mm/min	Positioning velocity in the infeed axis			DOUBLE	Immediately
-					
-	-	1000	0	10000	7/6

Description: Traverse velocities for intermediate positioning in the measuring cycle in the infeed axis, with and without collision detection

Note:

If necessary, adapt the value of the velocity in the infeed axis to the probe type used and to the

machine characteristics! This means that the maximum deflection of the actual probe type must be considered!!

Explanations:

In the measuring cycles any intermediate positions are calculated prior to the actual set of measurements. These positions can be approached

- with collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=1 or
- without collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=0).

Depending on this setting different velocities are used for the approach:

- with collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=1):

  With SD55632 $SCS_MEA_FEED_FEEDAX_VALUE the traversing feed is performed in the infeed axis (applicate).

  If the probe switches when these intermediate positions are approached, the movement is stopped and the alarm "Probe collision" is output.
- without collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=0):

  The intermediate positions are approached with the maximum axis velocity (rapid traverse) in per cent as specified in SD55630 $SCS_MEA_FEED_RAPID_IN_PERCENT.

  With SD55630 $SCS_MEA_FEED_RAPID_IN_PERCENT=0 and SD55630 $SCS_MEA_FEED_RAPID_IN_PERCENT=100 the maximum axis velocity is effective.

55633	MEA_FEED_FAST_MEASURE			-	-
mm/min	Rapid measuring feed			DOUBLE	Immediately
-					
-	-	900	0	10000	7/6

Description: Rapid measuring feed

Note:

If necessary, adjust the value of the velocity to the probe type used and to the machine characteristics!

This means that the maximum deflection of the actual probe type must be considered!!

The use of "Rapid measuring feed" depends of SD55610 $SCS_MEA_FEED_TYP!

55760	J_MEA_SET_TOOL_OFFSET_MODE			-	-
-	Selection of the offset target during tool measuring, in "Measure in JOG"			BYTE	Immediately
-					
-	-	1	0	1	7/6

Description:

```
Selection of the offset target during tool measuring, in "Measure
in JOG"
=0: offset to the geometry of the tool component to be offset
=1: offset to the wear of the tool component to be offset
```

55761	J_MEA_SET_NUM_OF_ATTEMPTS			-	-
-	Numb. of meas. attempts, if the probe does not switch, in "Measure in JOG"			BYTE	Immediately
-					
-	-	0	0	1	7/6

Description:

```
Numb. of meas. attempts, if the probe does not switch, in "Measure
in JOG"
=0: 5 measuring attempts, then alarm "Probe does not switch" is
output
=1: 1 measuring attempt, then alarm "Probe does not switch" is
output
```

55762	J_MEA_SET_RETRAC_MODE			-	-
-	Select. of velocity of retract. from the meas. point, in "Measure in JOG"			BYTE	Immediately
-					
-	-	0	0	1	7/6

Description:

```
Selection of the velocity of retraction from the measuring point,
in "Measure in JOG"
=0: retraction is performed at the same velocity as that of inter-
mediate positioning
=1: retraction is performed with rapid traverse
```

55763	J_MEA_SET_FEED_MODE			-	-
-	Measuring with rapid or normal measuring feed, in "Measure in JOG"			BYTE	Immediately
-					
-	-	0	0	1	7/6

Description:

```
Measuring with rapid or normal measuring feed, in "Measure in JOG"
=0: measuring with measuring feed
=1: first probing is performed with "Rapid measuring feed" from
SD55633 $SCS_MEA_FEED_FAST_MEASURE;
      the second probing represents the measurement itself per-
formed with measuring feed.
```

55764	J_MEA_SELECT_CORR_FRAME			-	-
-	Selection of the channel frame to be offset, in "Measure in JOG"			BYTE	Immediately
-					
-	-	0	0	1	7/6

Description: Selection of the channel frame to be offset, in "Measure in JOG"

=0: if "base frame" is used as the offset target in the parameterization mask, the offset is made to the last channel-specific base frame

=1: if "base frame" is used as the offset target in the parameterization mask, the offset is made to the system frame "Set zero point" ($P_SETFRAME)

55770	J_MEA_SET_COUPL_SP_COORD			-	-
-	Coupling spindle with coordinate rotation in the plane, in "Measure in JOG"			BYTE	Immediately
-					
-	-	0	0	-	7/6

Description: Coupling of spindle orientation and coordinate rotation in the active plane, in the case of workpiece measurement with multiprobe in the "Measure in JOG" mode

=0: when multiprobes are used, the spindle is oriented depending on the active coordinate rotation in the plane (rotations around the infeed axis (applicate)).

Thus, the axis-parallel orientation of the probe sphere contact points (calibrated trigger points) is maintained with regard to the geometry axis.

The direction of spindle rotation is defined by SD55604 $SCS_MEA_SPIND_MOVE_DIR!

=1: current spindle orientation with NC-START of the measuring task for "Measure in JOG" is used as starting position for the following procedure!

Note:

Coordinate rotation in the active plane means: - Rotation around the Z axis at G17,

- Rotation around the Y axis at G18
- Rotation around the X axis at G19.

Notice:

The coupling is annulled by the measuring cycle, if

- rotations around the 1st or 2nd measuring axis (abscissa or ordinate at G17) between calibration and actual measuring are not identical !!!
- the working spindle is not position-controlled (no SPOS possible)
- a monoprobe is used !

When the coupling is annulled by the measuring cycle, no alarm or message is displayed!

55771	J_MEA_SET_CAL_MODE		-	-
-	Calibration hole with known/unknown center point, in "Measure in JOG"		BYTE	Immediately
-				
-	- 0	0	-	7/6

Description: Calibration in the hole with known or unknown center point, in "Measure in JOG"

=0: calibration in a hole with unknown center point

=1: calibration in a hole with known center point

55772	J_MEA_SET_PROBE_MONO		-	-
-	Selection of the probe type, in "Measure in JOG"		BYTE	Immediately
-				
-	- 0	0	1	7/6

Description: Selection of the probe type, in "Measure in JOG"

=0 probe type is multiprobe

=1 probe type is monoprobe

55800	ISO_M_DRILLING_AXIS_IS_Z		-	-
-	Drilling axis depends on the plane / always Z		BYTE	Immediately
-				
-	- 0	0	1	7/6

Description: Selection of the drilling axis

0: drilling axis is vertical to the active plane

1: drilling axis is always "Z", independently of the active plane

55802	ISO_M_DRILLING_TYPE		-	-
-	Tapping type		BYTE	Immediately
-				
-	- 0	0	3	7/6

Description: Tapping type

0: tapping without compensating chuck

1: tapping with compensating chuck

2: deep hole tapping with chip breakage

3: deep hole tapping with stock removal

55804	ISO_M_RETRACTION_FACTOR		-	-
%	Factor for retraction speed (0...200%)		DWORD	Immediately
-				
-	- 100	0	200	7/6

Description: Factor for retraction speed (0...200%)

55806	ISO_M_RETRACTION_DIR		-	-
-	Retraction direction at G76/87		BYTE	Immediately
-				
-	- 0	0	4	7/6

Description: Retraction direction for precision drilling and reverse counter-sinking G76/G87

0: G17(-X) G18(-Z) G19(-Y)

1: G17(+X) G18(+Z) G19(+Y)

2: G17(-X) G18(-Z) G19(-Y)

3: G17(+Y) G18(+X) G19(+Z)

4: G17(-Y) G18(-X) G19(-Z)

55808	ISO_T_RETRACTION_FACTOR		-	-
%	Factor for retraction speed		DWORD	Immediately
-				
-	- 100	0	200	7/6

Description: Factor (1-200%) for retraction speed at tapping G84/G88

55810	ISO_T_DWELL_TIME_G95		-	-
-	Dwell time evaluation		BYTE	Immediately
-				
-	- 0	0	1	7/6

Description: Dwell time evaluation for deep hole drilling G83/G87

0: seconds

1: revolutions

1.7 Machine data compile cycles

Number	Identifier			Display filters	Reference
Unit	Name			Data type	Active
Attributes					
System	Dimension	Default value	Minimum value	Maximum value	Protection

Description: Description

1.7.1 General machine data compile cycles

61516	CC_PROTECT_PAIRS			-	-
-	Axis collision protection configuration			DWORD	Reset
-					
-	-	0	0	0	7/2

Description: This MD defines the axis pairs that must be protected against mutual collision. The machine axis number of the first axis is entered in the decades of 1s and 10s. The number of the second machine axis must be entered in the decades of 100s and 1000s.

Example:

$MN_CC_PROTECT_PAIRS[0] = 1201 ; axis_1 = 1   axis_2 = 12

When zero is entered, collision protection is deactivated.

61517	CC_PROTECT_SAFE_DIR			-	-
-	Axis collision protection. Definition of the retraction direction.			DWORD	Reset
-					
-	-	0	0	0	7/2

Description: In this MD the direction of retraction for both axes of a collision-protected axis pair is entered. Entry in the decade of 1s and 10s defines the direction of retraction of the first axis. Entry in the decade of 100s and 1000s defines that of the second axis. A value > 0 means retraction in the plus direction. 0 means retraction in the minus direction.

The value can only be changed only if collision protection for the axis pair is inactive!

61518	CC_PROTECT_OFFSET			-	-
mm, degrees	Axis collision protection. Position offset			DOUBLE	Reset
-					
-	-	0.0	0.0	0.0	7/2

Description: Position offset for the collision detection of the two axes defined in MD_60972.

The following applies to calculation of distance d between axes AX1 and AX2:

d = abs(POS[AX1] + $MN_CC_PROTECT_OFFSET[n] - POS[AX2])

The axis collision protection function guarantees that the following condition is always fulfilled:

d > $MN_CC_PROTECT_WINDOW[n]

This considers the current axis velocities and the acceleration/braking capacity of the axes in order to brake the axes in time if required.

The value can be changed only if collision protection for the axis pair is inactive!

61519	CC_PROTECT_WINDOW			-	-
mm, degrees	Axis collision protection. Minimum distance			DOUBLE	Reset
-					
-	-	10.0	0.0	10000.0	7/2

Description: Minimum distance that must be kept by the axes.

The value can be changed even if the protection is active. In this case, however, the axes must have a safe distance between them.

1.7.2 Channel-specific machine data compile cycles

62500	CLC_AXNO			-	-
-	Axis assignment for clearance control			DWORD	PowerOn
-					
-	-	0	-2	CC_MAXNUM_AXES_PER_CHAN	7/2

Description: n=0: Deactivates the clearance control

n > 0:

Activates the 1D clearance control for the channel axis with the axis number indicated under n. This axis must not be a modulo rotary axis.

n < 0: Activates the 3D clearance control.

Activation of the 3D clearance control requires configuration of at least one of the two possible 5-axis transformations in the channel.

-1: with n = -1 the first 5-axis transformation (16 <=transformer type <=149) configured with $MC_TRAFO_TYPE_n in the 1st channel is selected for clearance control.

-2: with n = -2 the second 5-axis transformation configured in the 1st channel is selected.

The overlaid motion acts on the axes configured as linear axes in the first three elements of $MC_TRAFO_AXES_IN_n of the selected transformation.

Configuration of 3- and 4-axis transformations is permissible (2D clearance control).

Restriction:

- Only one of the linear axes involved in clearance control must be configured as master axis of a gantry grouping.
- No axis of the clearance control must be configured as slave axis of a gantry grouping.
- Erroneous configurations are rejected after power ON with CLC alarm 75000.

62502	CLC_ANALOG_INPUT			-	-
-	Analog input for clearance control			DWORD	-
-					
-	-	1	1	8	7/2

Description: The machine data defines the number of the analog input that is used for the clearance sensor.

Differing from the functions realized in the interpolator (synchronized actions) the input of the clearance control cannot be influenced via PLC interface DB10 DBW148ff.

62504	CLC_SENSOR_TOUCHED_INPUT			-	-
-	Input bit assignment for "Sensor collision" signal			DWORD	PowerOn
-					
-	-	0	-40	40	7/2

Description: This machine data defines the digital input that is used for collision detection.

Requirements:

- The clearance sensor has a "sensor collision" signal.
- The numbering of the digital inputs corresponds to the numbering of the corresponding system variables: $A_IN[n], with n = number of the digital input.
- Example: 3rd input on the 2nd input byte:
  $MC_CLC_SENSOR_TOUCHED_INPUT = 11 ;   3 + 1 * 8

Negative values result in the corresponding input signal being used internally inverted (fail-safe).

See section 2.4, /TE1/ for sensor collision detection.

62505	CLC_SENSOR_LOWER_LIMIT			-	-
mm, degrees	Lower motion limit of the clearance control			DOUBLE	Reset
-					
-	2	-5.0,-10.0	-1.0e40	0.0	7/2

Description: This machine data consists of 2 field elements:

- CLC_SENSOR_LOWER_LIMIT[0]

With the first field element the lower limit for the deviation from the sensor-controlled machine position from the programmed position is entered.

As soon as the limit is reached, PLC signal DB21.DBX37.4 is set and CLC alarm 75020 is displayed:

- CLC_SENSOR_LOWER_LIMIT[1]

The second field element limits the value of the maximum lower motion limit that can be programmed.

62506	CLC_SENSOR_UPPER_LIMIT			-	-
mm, degrees	Upper motion limit of the clearance control			DOUBLE	Reset
-					
-	2	+10.0,+40.0	0.0	+1.0e40	7/2

Description: This machine data consists of 2 field elements:

- CLC_SENSOR_UPPER_LIMIT[0]

With the first field element the upper limit for the deviation from the sensor-controlled machine position from the programmed position is set.

As soon as the limit is reached, PLC signal DB21.DBB37.5 is set and CLC alarm 75021 is displayed.

- CLC_SENSOR_UPPER_LIMIT[1]

The second field element limits the value of the maximum upper motion limit that can be programmed.

62508	CLC_SPECIAL_FEATURE_MASK			-	-
-	Special functions and CLC modes			DWORD	PowerOn
-					
-	-	0x3	-	-	7/2

Description: Bit 0 and bit 1:

Alarm reaction on reaching the CLC motion limits: This machine data configures the alarm reaction on reaching the motion limits set with MD 62505 and MD 62506 or programmed with CLC_LIM .

Bit 0 = 0: Alarm 75020 does not stop program execution. The alarm can be acknowledged by pressing the Cancel key.

Bit 0 = 1: Alarm 75020 stops program execution at the lower limit. The alarm can only be acknowledged with reset.

Bit 1 = 0: Alarm 75021 does not stop program execution. The alarm can be acknowledged by pressing the Cancel key.

Bit 1 = 1: Alarm 75021 stops program execution at the upper limit. The alarm can only be acknowledged with reset.

Bit 4:

Operation as online tool length compensation in orientation direction

Bit 4 = 0: Clearance control works as usual.

Bit 4 = 1: Unlike the clearance control mode the analog input does not specify a velocity, but directly an offset position instead. In this case, the ordinate of the selected sensor characteristic $MC_CLC_SENSOR_VELO_TABLE_x is interpreted in mm or inch instead of in mm/min (inch/min).

This operating mode can be used for testing purposes and for implementing a 3D tool length compensation. The analog value is thereby not read in in position controller cycle, but in IPO cycle. In this operating mode, a normal influence or definition of the analog values by the PLC is possible via DB10 DBW148ff. The input used must have been activated through the following machine data: MD 10300 $MN_FASTIO_ANA_NUM_INPUTS

Bit 5:

Mode for rapid retraction in position controller cycle

Bit 5 = 0: Clearance control works as usual.

Bit 5 = 1: The analog input is inactive. If the digital input configured with MD 62504 is activated (inverted, if required), a retraction motion will start in the same position controller cycle that corresponds to an analog signal specification of +10V during operation as "Online tool length compensation" (see bit 4).

The digital input signal that starts the retraction movement cannot be influenced by the PLC. In addition to the reaction in the position controller, the input "sensor collision" and the subsequent stop of the path motion is handled in the interpolator. This signal branch can be influenced by the PLC through default signals DB10 DBB0ff.

Bit 8:

Mode for alarm output when the lower motion limit is reached.

Bit 8 = 0: Alarm 75020 is displayed.

Bit 8 = 1: Alarm 75020 will not be displayed, if the alarm reaction after reaching of the CLC movement limits (bit 0) was configured without program execution stop: bit 0 = 0

Bit 9:

Mode for alarm display when the upper motion limit is reached.

Bit 9 = 0: Alarm 75021 is displayed.

Bit 9 = 1: Alarm 75021 will not be displayed, if the alarm reaction on reaching the CLC motion limits (bit 0) was configured without program execution stop: bit 1 = 0

Bit 14:

Synchronization of the start position with single-axis clearance control.

Bit 14 = 0: If the clearance control has been configured for one axis only (MD62500), the current actual position of the next part program block on clearance control power OFF with CLC(0) is synchronized for this axis only.

Bit 14 = 1: If the clearance control has been configured for one axis only (MD62500), the current actual positions of the next part program block on clearance control power OFF with CLC(0) are synchronized for all axes.

This setting is required only for those applications for which a single-axis clearance control is used together with a 3/4/5-axis transformation (e.g. pipe cutting with rotating workpiece) and when an axis jump in the CLC axis or alarm: "Channel %1 Axis %2 System error 550010" occur at the first traversing block after CLC (0).

62510	CLC_SENSOR_VOLTAGE_TABLE_1			-	-
V	Coordinate voltage sensor characteristic 1			DOUBLE	Reset
-					
-	2	-10.0,10.0,0.0,0.0,0.0	-10.0	10.0	7/2

Description: This machine data defines the voltage values of sensor characteristic 1. The corresponding velocity value must be entered under the same index i of this machine data:

MD62511 $MC_CLC_SENSOR_VELO_TABLE_1[i]

For the simplest case it will suffice to define the characteristic via two interpolation points as a symmetrical straight through the zero point:

Example:

- $MC_CLC_SENSOR_VOLTAGE_TABLE_1[0] = -10.0 ; Volt
- $MC_CLC_SENSOR_VOLTAGE_TABLE_1[1] = 10.0; Volt
- $MC_CLC_SENSOR_VELO_TABLE_1[0] = 500.0; mm/min
- $MC_CLC_SENSOR_VELO_TABLE_1[1] = -500.0; mm/min

For all field elements of the machine data not used in the example value 0.0 must be set.

If the defined sensor characteristic creates an incorrect control direction, i.e. after power ON of the clearance control the sensor "flees" from the workpiece, the control direction can be corrected either by reversing the polarity of the sensor signal at the I/O module, or by changing the sign in front of the voltage values in the machine data.

Notes on how to define the sensor characteristic:

- A point with velocity value 0 must not stand at the end of the table.
- The characteristic must be monotonic, i.e. the velocity values above the voltage must either only rise or only fall.
- The characteristic must not have any jumps in the velocity sequence, i.e. it is not permissible to define different velocities for the same voltage value.
- The characteristic must have at least two interpolation points.
- Do not enter more than 5 interpolation points (3 for 840D prior to SW 5.3) with positive or with negative velocity.
- Characteristics that do not go directly throught the zero point may influence the clearance normalization set on the clearance sensor.

62511	CLC_SENSOR_VELO_TABLE_1			-	-
mm/min	Coordinate velocity sensor characteristic 1			DOUBLE	Reset
-					
-	2	2000.0/60.0,-2000.0/ 60.0,0.0...	-	-	7/2

Description: This machine data defines the velocity values of sensor characteristic 1. The corresponding voltage value must be entered under the same index i of the machine data:

MD62510 $MC_CLC_SENSOR_VOLTAGE_TABLE_1[i]

Additional information on how to define the characteristic is available in the description of machine data MD62510.

62512	CLC_SENSOR_VOLTAGE_TABLE_2			-	-
V	Coordinate voltage sensor characteristic 2			DOUBLE	Reset
-					
-	2	-10.0,10.0,0.0,0.0,0.0	-10.0	10.0	7/2

Description: This machine data defines the voltage values of sensor characteristic 2.

Additional information on how to define the characteristic is available in the description of machine data MD62510.

62513	CLC_SENSOR_VELO_TABLE_2			-	-
mm/min	Coordinate velocity sensor characteristic 2			DOUBLE	Reset
-					
-	2	2000.0/60.0,-2000.0/ 60.0,0.0...	-	-	7/2

Description: This machine data defines the voltage values of sensor characteristic 2.

Additional information on how to define the characteristic is available in the description of machine data MD62510.

62516	CLC_SENSOR_VELO_LIMIT			-	-
%	Velocity of the clearance control motion			DOUBLE	Reset
-					
-	-	100.0	-200.0	200.0	7/2

Description: 1D clearance control:

This machine data defines the maximum traversing velocity of the overlaid control motion as a percentage value of the max. residual axis velocity from the maximum value (MD32000 $MA_MAX_AX_VELO[AX#]) of the next clearance-controlled axis.

2D/3D clearance control

With 2D or 3D clearance control the maximum velocity of the slowest clearance-controlled axis multiplied with the root of 2 or with the root of 3 is used as reference value.

62517	CLC_SENSOR_ACCEL_LIMIT			-	-
%	Acceleration of the clearance control movement			DOUBLE	Reset
-					
-	-	100.0	0.0	200.0	7/2

Description: 1D clearance control:

This machine data defines the maximum acceleration of the overlaid control motion as a percentage value of the max. residual axis velocity from the maximum value (MD32300 $MA_MAX_AX_ACCEL[AX#]) of the next clearance-controlled axis.

2D/3D clearance control:

With 2D or 3D clearance control the maximum velocity of the slowest clearance-controlled axis multiplied with the root of 2 or with the root of 3 is used as reference value.

62520	CLC_SENSOR_STOP_POS_TOL			-	-
mm, degrees	Pos. tolerance for status report "CLC standstill"			DOUBLE	Reset
-					
-	-	0.05	0.0	1.0e40	7/2

Description: With the clearance control active and in order to achieve the exact stop condition (G601/G602), not only the axis involved in the programmed traversing motion, but also the clearance-controlled axes must have reached their exact stop conditions.

The exact stop condition of the clearance control is defined via a position window and a dwell time:

- MD62520 $MC_CLC_SENSOR_STOP_POS_TOL
- MD62521 $MC_CLC_SENSOR_STOP_DWELL_TIME

If the clearance control or the clearance-controlled axes are within the position tolerance during the parameterized dwell time, the exact stop condition of the clearance control is fulfilled.

Setting notes:

If the clearance control should not be able to keep the parameterized position window for the corresponding dwell time, the following alarm will be displayed in certain situations:

- Alarm "1011 Channel Channel number System error 140002"

In order to avoid the alarm or in case the alarm occurred, the following measures must be taken:

1. Switch on the clearance control with the typical machining clearance between the clearance sensor and a small metal sheet.

2. Tap on the metal sheet so that the laser head performs visible adjustment motions. After these adjustment movements are completed, do not touch the metal sheet again.

3. If the interface signal DB3x.DBX60.7 (position reached with fine exact stop) "flickers" after the tapping or after release of the process gas, the following machine data will have to be adjusted:

- MD36010 $MA_STOP_LIMIT_FINE (increase)
- MD62520 $MC_CLC_SENSOR_STOP_POS_TOL (increase)
- MD62521 $MC_CLC_SENSOR_STOP_DWELL_TIME (shorten)

The changes to the machine data will become active only after NCK RESET. The clearance control therefore may have to be switched on again after NC start.

62521	CLC_SENSOR_STOP_DWELL_TIME			-	-
s	Wait time for "CLC standstill"			DOUBLE	Reset
-					
-	-	0.1	0.0	1.0e40	7/2

Description: This machine data defines the dwell time for reaching the exact stop conditions of the clearance control.

The corresponding position tolerance must be entered in machine data:

- MD62520 $MC_CLC_SENSOR_STOP_POS_TOL

Additional information on the exact stop condition of the clearance control is available in the description of machine data MD62520.

Related to:

The set dwell time must not be longer than the maximum delay for reaching the exact stop condition parameterized in the following machine data:

- MD36020 $MA_POSITIONING_TIME

.

62522	CLC_OFFSET_ASSIGN_ANAOUT			-	-
-	Assignment of internal additional analog value to sensor signal			DWORD	PowerOn
-					
-	-	0	-1020008 , -8	1020008 , 8	7/2

Description: This machine data defines the analog output, the output value of which is subtracted from the input voltage of the clearance sensor.

The numbering of the analog output corresponds to the numbering of the relevant system variables: $A_OUTA[n], with n = number of the analog output.

The analog output can be used through variable $A_OUTA[n] both block-synchronous from a part program or asynchronous via a synchronized action.

62523	CLC_LOCK_DIR_ASSIGN_DIGOUT			-	-
-	Assignment digital output interlocking CLC			DWORD	PowerOn
-					
-	2	0,0	-40	40	7/2

Description: This machine data consists of 2 field elements:

- CLC_LOCK_DIR_ASSIGN_DIGOUT[0]

The first field element defines the digital output through which the negative motion direction of the clearance control can be locked.

- CLC_LOCK_DIR_ASSIGN_DIGOUT[1]

The second field element defines the digital output through which the positive motion direction of the clearance control can be locked.

Entering the negative output number will invert the evaluation of the switching signal.

Example:

Digital output 1 ($A_OUT[1]) shall lock the negative motion direction; digital output 2 ($A_OUT[2]) shall lock the positive motion direction:

- MD 62523 $MC_CLC_LOCK_DIR_ASSIGN_DIGOUT[0] = 1
- MD 62523 $MC_CLC_LOCK_DIR_ASSIGN_DIGOUT[1] = 2

With the corresponding system variables interlocking of the relevant motion direction can be switched on or off either block-synchronous in the part program or asynchronous via synchronized actions.

- Interlock of the negative motion direction ON/OFF: $A_OUT[1] = 1 / 0
- Interlock of the positive motion direction ON/OFF: $A_OUT[2] = 1 / 0

With switching signal inversion (MD 62523 $MA_CLC_LOCK_DIR_ASSIGN_DIGOUT[0] = -1):

Interlock of the negative motion direction ON/OFF: $A_OUT[1] = 0 / 1

62524	CLC_ACTIVE_AFTER_RESET			-	-
-	Clearance control active after RESET			BOOLEAN	PowerOn
-					
-	-	FALSE	-	-	7/2

Description: 1D clearance control:

This machine data parameterizes the RESET behavior (program end RESET or NC RESET) of the 1D clearance control.

- CLC_ACTIVE_AFTER_RESET = 0: after RESET the clearance control is switched off analog to the part program command CLC(0).
- CLC_ACTIVE_AFTER_RESET = 1: after RESET the cleance control maintains its current activation status.

3D clearance control:

This machine data does not effective with a 3D clearance control. The clearance control will in this case always be switched off after RESET.

62525	CLC_SENSOR_FILTER_TIME			-	-
s	Time constant of PT1 sensor filtering			DOUBLE	Immediately
-					
-	-	0.0	0.0	10.0	7/2

Description: This machine data parameterizes the time constant for the PT1 filter of the clearance control (corresponds to an RC element).

With the PT1 filter, the higher-frequency noise components in the input signal of the clearance control can be diminished.

The filter's effect can be observed through the function-specific display data (see section 2.7, /TE1/).

A value of zero switches the filter off completely.

Note:

Any additional time constant in the control loop reduces the max. achievable control loop dynamics.

62528	CLC_PROG_ORI_AX_MASK			-	-
-	Axis screen for CLC with free direction specification			DWORD	PowerOn
-					
-	-	0x0	-	-	7/2

Description: Each bit of the axis screen refers to the channel axis[n+1] depending on its bit index n. Only exactly 3 bits may be set according to the three direction axes of the compensation vector. The bits are evaluated in ascending order.

The first channel axis parameterized like that corresponds to the X coordinate of the compensation vector. The second channel axis to the Y coordinate, and so on.

62529	CLC_PROG_ORI_MAX_ANGLE			-	-
degrees	Limit angle for CLC with free direction specification			DOUBLE	Reset
-					
-	-	45.0	0.0	180.0	7/2

Description: Permissible limit angle between tool orientation and CLC direction defined freely through additonal axes.

62530	CLC_PROG_ORI_ANGLE_AC_PARAM			-	-
-	Index of the display variables f. the current differential angle			DWORD	Reset
-					
-	-	-1	-1	20000	7/2

Description: Index n of system variable $AC_PARAM[n] in which the current differential angle between tool orientation and CLC direction is output.

62560	FASTON_NUM_DIG_OUTPUT			-	-
-	Configuration of the switching output			BYTE	PowerOn
-					
-	-	0	0	4	7/2

Description: This machine data assigns the number of the digital onboard output (1...4) to the NCU, on which the fast switching signal is output.

Output of the switching signal is deactivated with 0.

62561	FASTON_OUT_DELAY_MICRO_SEC			-	-
-	still missing			DWORD	NEW CONF
-					
-	2	0,0	-5000	5000	7/2

Description: This MD enables separate specification of time delay values for the switch-on and switch-off edge of the fast switching signal.

$MC_FASTON_OUT_DELAY_MICRO_SEC[0] Time delay of the switch-on edge

$MC_FASTON_OUT_DELAY_MICRO_SEC[1] Time delay of the switch-off edge

Negative values create a derivative action time for signal output. Positive values cause the output to be delayed. Derivative action time or delay are used to compensate external switching delays. The values must be determined empirically and should not exceed a few 100 microseconds. Values that are larger than approx. a half position control cycle clock will possibly not have a correct effect.

62571	RESU_RING_BUFFER_SIZE			-	-
-	RESU ring buffer size (block buffer)			DWORD	PowerOn
-					
-	-	1000	10	1000000	7/2

Description: The block buffer includes the geometrical information for the part program. The value entered in the machine data corresponds to the number of loggable part program blocks (with 32 byte / part program block). The block buffer size corresponds to the number of retrace-capable blocks.

62572	RESU_SHARE_OF_CC_HEAP_MEM			-	-
%	RESU share of the parameterized heap memory			DOUBLE	PowerOn
-					
-	-	100.0	1.0	100.0	7/2

Description: The total heap memory size available for all compile cycles is parameterized by channel-specific machine data MD 28105 $MC_MM_NUM_CC_HEAP_MEM

The RESU machine data can limit the maximum heap memory share that RESU is to use.

62573	RESU_INFO_SA_VAR_INDEX			-	-
-	RESU indices of the synchronized action variables used			DWORD	PowerOn
-					
-	2	-1	-1	10000	7/2

Description: Reserved. This machine data must not be used.

62574	RESU_SPECIAL_FEATURE_MASK			-	-
-	RESU parameterizable behavior			DWORD	PowerOn
-					
-	-	0x0	0x0	0x0f	7/2

Description: With bit settings parameterizable behavior of the RESU function:

Bit 0:reserved. Do not use!

Bit 1:

Bit 1 = 0:(default) RESU main program CC_RESU.MPF is created in the dynamic memory area

of the NC (DRAM) (recommended setting)

Bit 1 = 1:RESU main program CC_RESU.MPF is created in the buffered part program memory

of the NC(SRAM).

Bit 2:

Bit 2 = 0:(default)

The following RESU-specific subroutines are created as user cycles:

- CC_RESU_INI.SPF
- CC_RESU_END.SPF
- CC_RESU_BS_ASUP.SPF
- CC_RESU_ASUP.SPF

Bit 2 = 1:(recommended setting)

The RESU-specific subroutines (see above) are created as OEM cycles.

Bit 3:

Bit 3 = 0: (default)

No effect (see under bit 3 = 1).

Bit 3 = 1: (recommended setting, if bit 2 = 1)

If the RESU-specific subroutines (see above) are created as OEM cycles

and if during NC start RESU-specific subroutines are neverthe-less available as user

cycles, these will be cancelled without prior checkback.

62575	RESU_SPECIAL_FEATURE_MASK_2			-	-
-	RESU additional parameterizable behavior			DWORD	Reset
-					
-	-	0x0	0x0	0x01	7/2

Description: With bit settings parameterizable behavior of the RESU function:

Bit 0:

Bit 0 = 0: (default)

For continued machining at the contour, a block search with con-tour calculation beginning at

the part program start is used (recommended setting).

Bit 0 = 1:In order to accelerate that machining is continued, 2 different block search types are used:

- From part program start to the last main block: block search without calculation
- From the last main block to the current part program block: block search with contour

calculation

62580	RESU_WORKING_PLANE			-	-
-	RESU determination of the working plane			DWORD	PowerOn
-					
-	-	1	1	3	7/2

Description: These machine data determine the working plane for the 2-dim. function RESU. The following settings are possible:

1 : for working plane G17 (first and second geometry axis)

2 : for working plane G18 (first and third geometry axis)

3 : for working plane G19 (second and third geometry axis)

62600	TRAFO6_KINCLASS			-	-
-	Kinematics class			DWORD	NEW CONF
-					
-	-	1	1	2	7/2

Description: The following kinematics classes can be indicated:

- Standard transformation: 1
- Special transformation: 2

62601	TRAFO6_AXES_TYPE			-	-
-	Axis type for transformation [axis no.]: 0...5			DWORD	NEW CONF
-					
-	6	1, 1, 1, 3, 3, 3	1	4	7/2

Description: This machine data identifies the axis type used in the transformation.

The following axis types can be indicated:

- Linear axis: 1
- Delta/acme spindle drive: 2
- Rotary axis: 3 (4)

62602	TRAFO6_SPECIAL_KIN			-	-
-	Special kinematics type			DWORD	NEW CONF
-					
-	-	1	-	-	7/2

Description: This machine data identifies the type of special kinematics.

The following special kinematics are available:

- No special kinematics:1
- 5-axis articulated arm with coupling of axis 2 to axis 3: 2
- 2-axis SCARA with forced coupling to tool: 3
- 3-axis SCARA with degrees of freedom X, Y, A: 4
- 2-articulated arm with coupling of axis 1 to axis 2: 5
- 2-axis articulated arm without coupling of axis 1 to axis 2: 8
- 4-axis SCARA with coupling of axis 1 to axis 2: 7

62603	TRAFO6_MAIN_AXES			-	-
-	Basic axis identification			DWORD	NEW CONF
-					
-	-	1	1	7	7/2

Description: This machine data identifies the type of basic axis assignment. Normally, the first 3 axes are the basic axes.

The following basic axis assignments are included:

- SS (gantry): 1
- CC (SCARA): 2
- NR (articulated arm): 3
- SC (SCARA): 4
- RR (articulated arm): 5
- CS (SCARA): 6
- NN (articulated arm): 7

62604	TRAFO6_WRIST_AXES			-	-
-	Identification of the hand axes			DWORD	NEW CONF
-					
-	-	1	1	6	7/2

Description: This machine data identifies the robot hand type. Normally, axes 4 to 6 are the robot hand.

The following hand types are included:

- No hand: 1
- Central hand: 2
- Beveled hand: 3
- Hand with elbow: 5
- Beveled hand with elbow: 6

62605	TRAFO6_NUM_AXES			-	-
-	Number of transformed axes			DWORD	NEW CONF
-					
-	-	3	2	6	7/2

Description: This machine data identifies the number of axes involved in the transformation.

Package 2.3 (810D) or 4.3 (840D) support kinematics with a max. of 5 axes.

62606	TRAFO6_A4PAR			-	-
-	Axis 4 parallel / antiparallel to the last basic axis			DWORD	NEW CONF
-					
-	-	0	0	1	7/2

Description: This machine data identifies whether the 4th axis is parallel / antiparallel to the last rotary basic axis.

This machine data only applies for kinematics with more than 3 axes.

- Axis 4 is parallel / antiparallel: 1
- Axis 4 is not parallel: 0

62607	TRAFO6_MAIN_LENGTH_AB		-	-
mm	Basic axis length A and B, n = 0...1		DOUBLE	NEW CONF
-				
-	2	0.0, 500.0	-	-	7/2

Description: This machine data identifies the basic axis lengths A and B. These lengths are particularly defined for each basic axis type.

- n = 0: basic axis length A
- n = 1: basic axis length B

62608	TRAFO6_TX3P3_POS			-	-
mm	Attachment of the hand (position share), n = 0...2			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0, 0.0	-	-	7/2

Description: This machine data identifies the position share of frame TX3P3 connecting the basic axes with the hand.

- Index 0: X component
- Index 1: Y component
- Index 2: Z component

62609	TRAFO6_TX3P3_RPY			-	-
degrees	Attachment of the hand (rotation share), n = 0...2			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0, 0.0	-	-	7/2

Description: This machine data identifies the orientation share of frame TX3P3 connecting the basic axes with the hand.

- Index 0: rotation with RPY angle A
- Index 1: rotation with RPY angle B
- Index 2: rotation with RPY angle C

62610	TRAFO6_TFLWP_POS			-	-
mm	Frame between hand pt. and flange coordinate system, n = 0...2			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0, 0.0	-	-	7/2

Description: This machine data identifies the position share of frame TFLWP that connects the hand point with the flange.

- Index 0: X component
- Index 1: Y component
- Index 2: Z component

62611	TRAFO6_TFLWP_RPY			-	-
degrees	Frame between hand point and flange coordinate system, n = 0...2			DOUBLE	NEW CONF
-					
-	3	0.0, 0.0, 0.0	-	-	7/2

Description: This machine data identifies the orientation share of frame TFLWP that connects the hand point with the flange.

- Index 0: rotation with RPY angle A
- Index 1: rotation with RPY angle B
- Index 2: rotation with RPY angle C

62612	TRAFO6_TIRORO_POS		-	-
mm	Frame between foot pt. and int. coordinate system, n = 0...2		DOUBLE	NEW CONF
-				
-	3 0.0, 0.0, 0.0	-	-	7/2

Description: This machine data identifies the position share of frame TIRORO that connects the basic coordinate system with the internal transformation coordinate system.

- Index 0: X component
- Index 1: Y component
- Index 2: Z component

62613	TRAFO6_TIRORO_RPY		-	-
degrees	Frame between foot pt. and int. coordinate system, n = 0...2		DOUBLE	NEW CONF
-				
-	3 0.0, 0.0, 0.0	-	-	7/2

Description: This machine data identifies the orientation share of frame TIRORO that connects the basic coordinate system with the internal transformation coordinate system.

- Index 0: rotation with RPY angle A
- Index 1: rotation with RPY angle B
- Index 2: rotation with RPY angle C

62614	TRAFO6_DHPAR4_5A		-	-
mm	Parameter A for configuration of the hand, n = 0...1		DOUBLE	NEW CONF
-				
-	2 0.0, 0.0	-	-	7/2

Description: This machine data identifies length a.

- n = 0: transition axis 4 to 5
- n = 1: transition axis 5 to 6

62615	TRAFO6_DHPAR4_5D		-	-
mm	Parameter D for configuration of the hand, n = 0...1		DOUBLE	NEW CONF
-				
-	2 0.0, 0.0	-	-	7/2

Description: This machine data identifies length d.

- n = 0: transition axis 4 to 5
- n = 1: transition axis 5 to 6

62616	TRAFO6_DHPAR4_5ALPHA		-	-
degrees	Parameter ALPHA for configuration of the hand, n = 0...1		DOUBLE	NEW CONF
-				
-	2 -90.0, 90.0	-	-	7/2

Description: This machine data identifies angle alpha

- n = 0: transition axis 4 to 5
- n = 1: transition axis 5 to 6

62617	TRAFO6_MAMES			-	-
-	Offset of math. to mech. zero point [axis no.]: 0...5			DOUBLE	NEW CONF
-					
-	6	0.0, 0.0, 0.0, 0.0, 0.0, 0.0	-	-	7/2

Description: This machine data can specify an adjustment of the zero point for a rotary axis to the mathematical zero point specified by the transformation.

Based on the mechanical zero point the offset is hereby related to the mathematically positive direction of axis rotation.

62618	TRAFO6_AXES_DIR			-	-
-	Adjustm. of the phys. and math. dir. of rot. [axis no.]: 0...5			DWORD	NEW CONF
-					
-	6	1, 1, 1, 1, 1, 1	-1	1	7/2

Description: This machine data can adjust the mathematical and physical direction of rotation

of the axes.

- +1: same direction of rotation
- -1: different direction of rotation

62619	TRAFO6_DIS_WRP			-	-
mm	Medium distance between hand point and singularity			DOUBLE	NEW CONF
-					
-	-	10.0	0.00001	999999.9999	7/2

Description: Through this machine data a limit value for the distance between the hand point and the singularity can be entered.

Inactive!

62620	TRAFO6_AXIS_SEQ			-	-
-	Axis reorganization			DWORD	NEW CONF
-					
-	6	1, 2, 3, 4, 5, 6	1	6	7/2

Description: This machine data can reverse the order of the axes in order to internally transfer a kinematic system into a standard kinematic system.

62621	TRAFO6_SPIN_ON			-	-
-	Triangular or acme-screw spindles available			DWORD	NEW CONF
-					
-	-	0	0	1	7/2

Description: This machine data identifies whether triangular spindles or acme connections are available.

- 0: not available
- 1: available

This function is currently not supported.

MD62621 must be set to 0. Machine data MD62622 through MD62628 are thus inactive!

62622	TRAFO6_SPIND_AXIS		-	-
-	Axis on which the triangular spindle has an effect, n = 0...2		DWORD	NEW CONF
-				
-	3 0, 0, 0	-	-	7/2

Description: This machine data identifies for which axis a triangular spindle is active. A maximum of 3 triangular spindles may be available.

- n = 0: 1st triangular axis
- n = 1: 2nd triangular axis
- n = 2: 3rd triangular axis

62623	TRAFO6_SPINDLE_RAD_G		-	-
mm	Length G for triangular spindle, n = 0...2		DOUBLE	NEW CONF
-				
-	3 0.0, 0.0, 0.0	-	-	7/2

Description: This machine data identifies length G for the n-th triangular spindle.

62624	TRAFO6_SPINDLE_RAD_H		-	-
mm	Length H for triangular spindle, n = 0...2		DOUBLE	NEW CONF
-				
-	3 0.0, 0.0, 0.0	-	-	7/2

Description: This machine data identifies length H for the n-th triangular spindle.

62625	TRAFO6_SPINDLE_SIGN		-	-
-	Sign for triangular spindle, n = 0...2		DWORD	NEW CONF
-				
-	3 1, 1 ,1	-1	1	7/2

Description: This machine data identifies the sign for the adjustment of the direction of rotation for the n-th triangular spindle.

62626	TRAFO6_SPINDLE_BETA		-	-
degrees	Angular offset for triangular spindles, n = 0...2		DOUBLE	NEW CONF
-				
-	3 0.0, 0.0, 0.0	-	-	7/2

Description: This machine data identifies offset angle b for adjustment of the zero point
for the n-th triangular spindle.

62627	TRAFO6_TRP_SPIND_AXIS		-	-
-	Axes driven by acme spindle, n = 0...1		DWORD	NEW CONF
-				
-	2 0, 0	-	-	7/2

Description: This machine data identifies which axes are driven by an acme connection.

- n = 0: axis driven by an acme
- n = 1: coupling axis

62628	TRAFO6_TRP_SPIND_LEN		-	-
mm	Acme length, n = 0...3		DOUBLE	NEW CONF
-				
-	4 0.0, 0.0, 0.0, 0.0	-	-	7/2

Description: This machine data specifies the lengths of the acme connection.

62629	TRAFO6_VELCP			-	-
mm/min	Cartesian velocity [no.]: 0...2			DOUBLE	Immediately
-					
-	3	600000.0, 600000.0, 600000.0	-	-	7/2

Description: This machine data can specify a velocity for the Cartesian directions of traversing blocks with G0.

- n = 0: velocity in X direction
- n = 1: velocity in Y direction
- n = 2: velocity in Z direction

62630	TRAFO6_ACCCP			-	-
m/s²	Cartesian accelerations [no.]: 0...2			DOUBLE	Immediately
-					
-	3	0.5, 0.5, 0.5	0.001	100000	7/2

Description: This machine data can specify an acceleration for the Cartesian directions of traversing blocks with G0.

- n = 0: velocity in X direction
- n = 1: velocity in Y direction
- n = 2: velocity in Z direction

62631	TRAFO6_VELORI			-	-
rev/min	Orientation angle velocities [no.]: 0...2			DOUBLE	Immediately
-					
-	3	1.6666, 1.6666, 1.6666	-	-	7/2

Description: This machine data can specify a velocity for the orientation angles of traversing blocks with G0.

- n = 0: velocity angle A
- n = 1: velocity angle B
- n = 2: velocity angle C

62632	TRAFO6_ACCORI			-	-
rev/s²	Orientation angle accelerations [no.]: 0...2			DOUBLE	Immediately
-					
-	3	0.00277, 0.00277, 0.00277	0.001	100000	7/2

Description: This machine data can specify an acceleration for the orientation angles of traversing blocks with G0.

- n = 0: velocity angle A
- n = 1: velocity angle B
- n = 2: velocity angle C

62633	TRAFO6_REDVELJOG			-	-
-	Reduction factor velocity in JOG [no.]: 0...2			DOUBLE	Immediately
-					
-	6	10.0, 10.0, 10.0, 10.0, 10.0, 10.0	-	-	7/2

Description: This machine data is inactive.

62634	TRAFO6_DYN_LIM_REDUCE			-	-
-	Reduction factor for velocity controller			DOUBLE	NEW CONF
-					
-	-	1.0	0.001	1.0	7/2

Description: This MD can be used to specify a reserve for the maximum velocity, so that an excessive increase in the velocity by the velocity controller will not cause the maximum velocity to be exceeded.

The value must be regarded as a factor that has an effect on the maximum velocity.

62635	TRAFO6_VEL_FILTER_TIME			-	-
s	Time constant for velocity controller			DOUBLE	NEW CONF
-					
-	-	0.024	0.0	100.0	7/2

Description: This MD can be used to set the time constant for the velocity controller in the interpolator. This can avoid controller vibration.

63514	CC_PROTECT_ACCEL			-	-
m/s², rev/s²	PROT braking acceleration in the case of collision			DOUBLE	Reset
-					
-	-	1000.0	1.0	10000.0	7/2

Description: If the axis collision protection function PROT has detected a collision, the involved axes are braked using the acceleration set in this machine data.

Recommended setting: a few per cent higher than 32300__$MA_MAX_AX_ACCEL, provided that the dimensioning of the drive and the mechanical system allow it.

Notice: the braking acceleration set here always has a BRISK effect independently of other parameterizations (e.g. parameter set, active dyn. G code)

1.7.3 Axis-specific machine data compile cycles

63540	CC_MASTER_AXIS			-	-
-	Indicates the corresponding CC_Master axis for a CC_Slave axis			DWORD	Reset
-					
-	-	0	0	CC_MAXNUM_AXES_IN_SYSTEM	7/2

Description: By assigning a valid CC_Master axis in this machine data, the relevant axis is defined as the CC-Slave axis of an MCS coupling. The assignment is made by entering the machine axis number of the CC_Master axis.

The machine axis number and the axis name must be taken from the channel-specific machine data:

- 20070 $MC_AXCONF_MACHAX_USED
- 20080 $MC_AXCONF_CHANAX_NAME_TAB

Notice:

CC_Master and CC_Slave must have the same axis type (linear or rotary axis).

CC_Master and CC_Slave must not be a spindle.

CC_Master and CC_Slave must not be replacement axes.

If the axes are dynamically different, it is recommended to make the axis with the lower dynamics the CC_Master axis.

The machine data may be changed only when the coupling has been switched off.

63541	CC_POSITION_TOL			-	-
mm, degrees	Monitoring window (only relevant to a CC_Slave axis)			DOUBLE	Reset
-					
-	-	0.0	-	-	7/2

Description: Monitoring window of the MCS coupling. Only the entry in the machine data of the CC_Slave axis is evaluated. The difference of the actual values between the CC_Master and CC_Slave must always range within this window. Otherwise an alarm will be output.

The following condition is monitored:

abs(ActualPos[CC_Master] - (ActualPos[CC_Slave] + CC_Offset)) <= MD63541

with:

CC_Offset= position difference between CC_Master and CC_Slave when switching on the coupling.

Monitoring is switched off by entering value 0.0

63542	CC_PROTECT_MASTER			-	-
-	Indicates the corresponding PMaster axis for a PSlave axis			DWORD	Reset
-					
-	-	0	0	CC_MAXNUM_AXES_IN_SYSTEM	7/2

Description: By assigning a valid Protect-Master axis in this machine data the relevant axis is defined as the Protect-Slave axis. Assignment is made by entering the machine axis number of the Protect-Master axis.

The machine axis and the axis name must be taken from the channel-specific machine data:

- MD20070 $MC_AXCONF_MACHAX_USED[n-1]
- MD20080 $MC_AXCONF_CHANAX_NAME_TAB

Notice:

Protect-Master and Protect-Slave axis must have the same axis type (linear or rotary axis).

63543	CC_PROTECT_OPTIONS			-	-
-	Configuration of the collision protection function			DWORD	Reset
-					
-	-	0	0	0xFF	7/2

Description: The collision protection function can be adapted to the special situation by setting the following:

Bit 0 - bit 3 for Protect-Master and Protect-Slave

Bit 0 = 1:

Retraction in PLUS

Bit 1 = 1:

Braking to avoid collision is made by increasing the max. braking acceleration by factor 1.2

Bit 2 = 1:

Monitoring can be activated even without a referenced axis

Bit 3 = 1

Reverse the direction of retraction, if the axis is the master axis

Bit 4 - bit 7 only relevant to Protect-Slave

Bit 4 = 1:

Monitoring always active (otherwise ON/OFF via PLC)

Bit 5

Reserve

Bit6

Reserve

Bit 7=1:

Display active protection in DB3x, DBX66.0

63544	CC_COLLISION_WIN			-	-
mm, degrees	Collision protection window			DOUBLE	Reset
-					
-	-	-1.0	-	-	7/2

Description: Minimum distance between the Protect-Slave axis and the Protect-Master axis. Only the value entered in the Slave axis is used. With a value smaller than 0, the monitoring function cannot be activated.

63545	CC_OFFSET_MASTER			-	-
mm, degrees	Work offset for collision protection			DOUBLE	PowerOn
-					
-	-	0.0	-	-	7/2

Description: Work offset for collision detection between Protect-Slave and Protect-Master axis.

The value entered for the Protect-Slave axis is used only.

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Suggestions and/or Corrections

Siemens AG A&D MC MS P. O. Box 3180 D-91050 Erlangen Federal Republic of Germany Fax +49 (0) 9131 98 - 63315[Documentation] mailto:docu.motioncontrol@siemens.com	Suggestions Corrections
	for Publication/Manual SINUMERIK 840D sl, 840Di sl Detailed Maschine Data Description (AMDsl) Manufacturer/Service documentation
From Name: Company/Dept. Address :____________________________ Telephone : ______ / ________________________ Telefax : ______ / ________________________ email : ______________________________	Order No.: - 01/2008
	Should you come across any printing errors when reading this publication, please notify us on this sheet. Suggestions for improvements are also welcome.

Document Overview SINUMERIK 840D sl / 840Di sl

General Documentation

- SINUMERIK — Brochure
- SINUMERIK 840D sl, 840Di sl — Catalog NC 61 *)
- SINAMICS S120 — Catalog D21.1 Converter chassis units *)

User Documentation

- SINUMERIK 840D sl — Operating Manual
  – HMI sl Universal / Turning / Milling *)
  – HMI Embedded *)
  – ShopMill
  – ShopTurn
- SINUMERIK 840D sl, 840D, 840Di sl, 840Di — Operating Manual
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Manufacturer / Service Documentation

- SINUMERIK 840D sl — Manual
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- SINUMERIK 840D sl, 840D, 840Di sl, 840Di — Function Manual
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- SINUMERIK 840D sl — Function Manual Safety Integrated
- SINUMERIK — EMC Directives

Electronic Documentation

- SINUMERIK, SINAMICS, Motors — DOCONCD *), DOCONWEB

*) Recommended minimum scope of documentation