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Library LSINAExt Control of a SINAMICS drive via function blocks

SINAMICS / V1.0 / Control via function blocks

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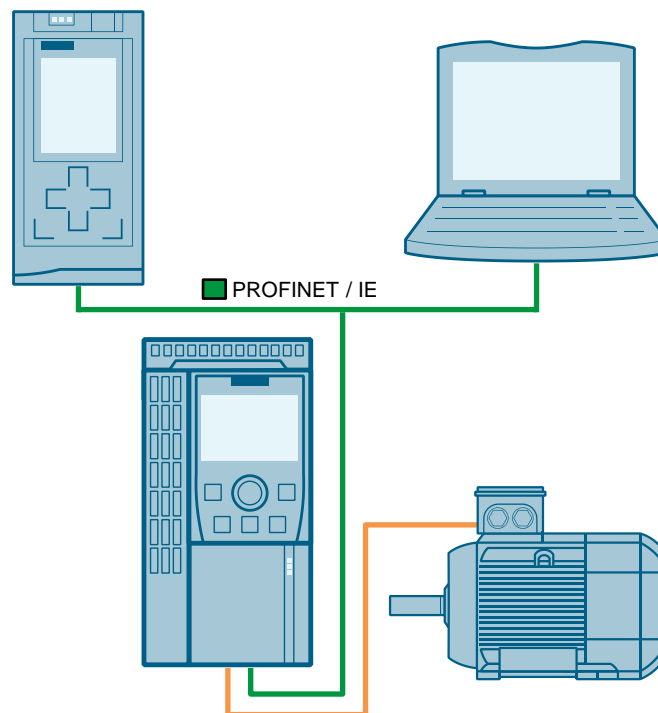
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1 Introduction

1.1 Overview

The library "Library SINAMICS Extended" (LSINAExt) contains function blocks for simple, cyclic control of a SINAMICS drive. Consistent data exchange between the SIMATIC controller and the SINAMICS drive takes place via PROFINET or PROFIBUS DP. The function blocks can be used in the SIMATIC S7-1200 and S7-1500 controllers.

Figure 1-1 Hardware configuration



The function blocks contained in the library are intended to make it easier for the user to control a SINAMICS drive. Communication with the drive takes place via selected PROFIdrive standard and SIEMENS telegrams. The input parameters at the function blocks are reduced to the minimum necessary, so that a simple control without knowledge of the telegram structure is possible. The output parameters output the standardized process data of the SINAMICS drive transmit telegrams, as well as error states and corresponding error numbers.

1.2 Included function blocks

- SINA_SPEED
 - SINA_SPEED_TLG20 (see section [2.2](#))
Speed setting via standard telegram 20
 - SINA_SPEED_TLG352 (see section [2.3](#))
Speed setting via SIEMENS telegram 352

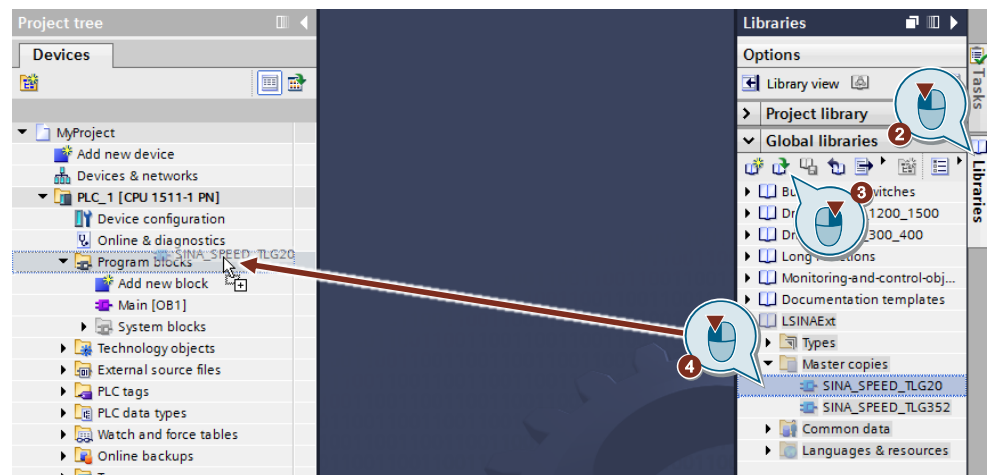
1.3 Integration in a user program

1.3.1 Including a function block

To integrate the function blocks for controlling a SINAMICS drive into a user program, proceed as follows:

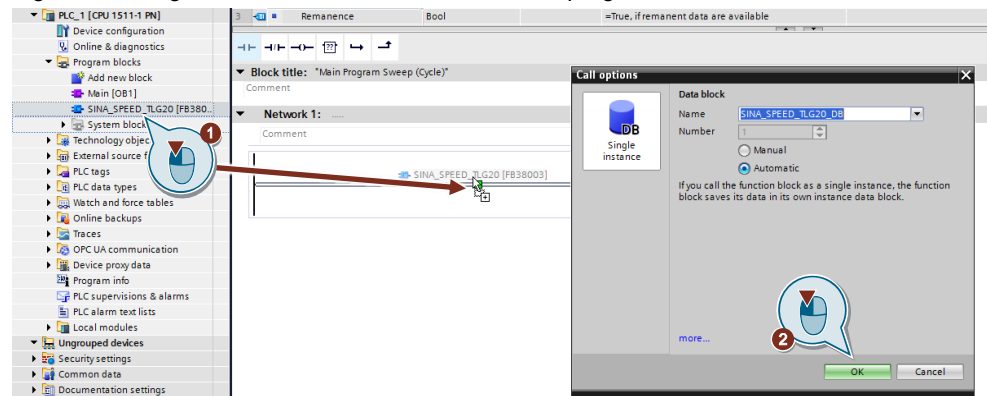
1. Unpack the library "LSINAExt" (see [2](#)).
2. Open the "Libraries" task card.
3. Open the unpacked library in the palette "Global libraries".
4. Drag and drop the desired function block from the master copies into the program blocks folder of the opened project.

Figure 1-2 Integration of a function block in the project



5. Call the function block in the user program.

Figure 1-3 Integration of a function block in the user program

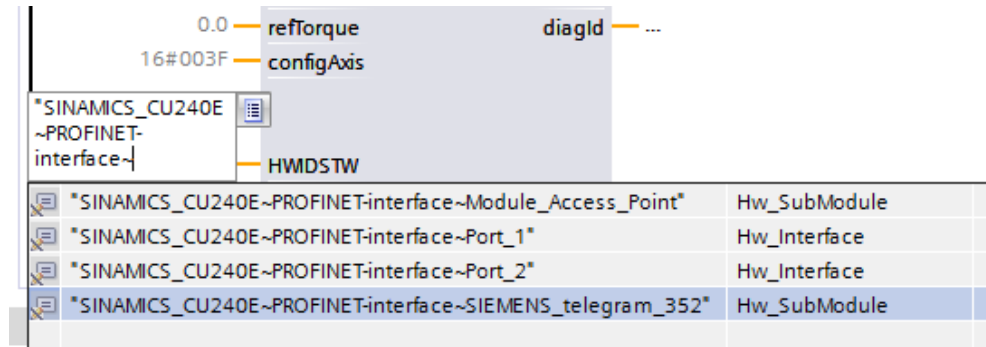


6. Parameterize the input parameters as specified in the description of the function block.

1.3.2 Input parameters HWIDSTW and HWIDZSW

The input parameters HWIDSTW and HWIDZSW must refer to the hardware identification of the telegram used. Select the automatically generated system constant of the telegram on the SINAMICS drive in the auto-complete function (Ctrl + space bar).

Figure 1-4 Connection of the telegram slot



Note

Always download the hardware and software configuration of the SIMATIC controller and the SINAMICS drive after changes to the telegram connection so that the system constants used are consistent with the drive configuration.

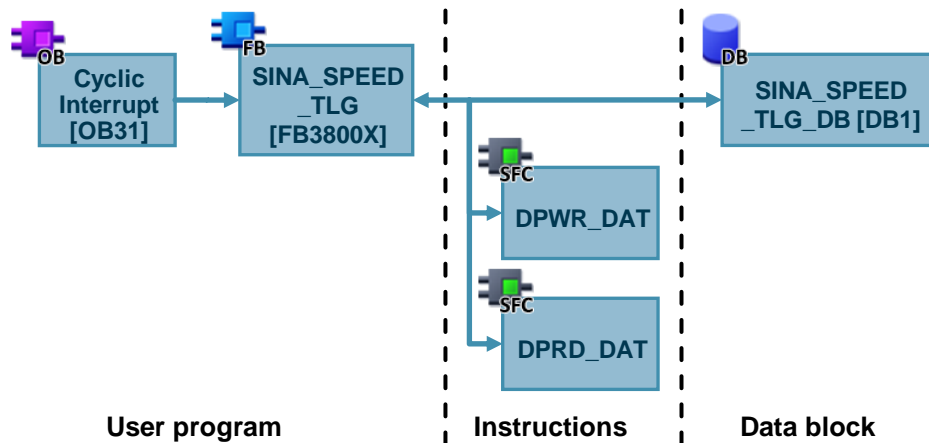
2 Function blocks SINA_SPEED_TLGXXX

2.1 Description

With the SINA_SPEED function blocks SINA_SPEED_TLG20 (FB38003) and SINA_SPEED_TLG352 (FB38004), a speed setting can be specified at a SINAMICS drive. Communication with the drive takes place via the corresponding telegram of the function block. The input/output parameters are selected so that operation of the function block is possible without knowledge of the telegram structure. The necessary parameters are consistently transmitted to the SINAMICS drive in accordance with the telegram specification and the response is output in standardized form at the output parameters.

2.1.1 Called blocks

Figure 2-1 Program overview



For cyclic communication to a SINAMICS drive, the function block accesses the following instructions:

- DPWR_DAT (see [3/](#))
write consistent data of a DP standard slave
- DPRD_DAT (see [4/](#))
read consistent data of a DP standard slave

These instructions ensure that consistency is maintained over the entire process data, i.e. that all elements of the process data of a device originate from the same bus cycle or are transferred in one bus cycle.

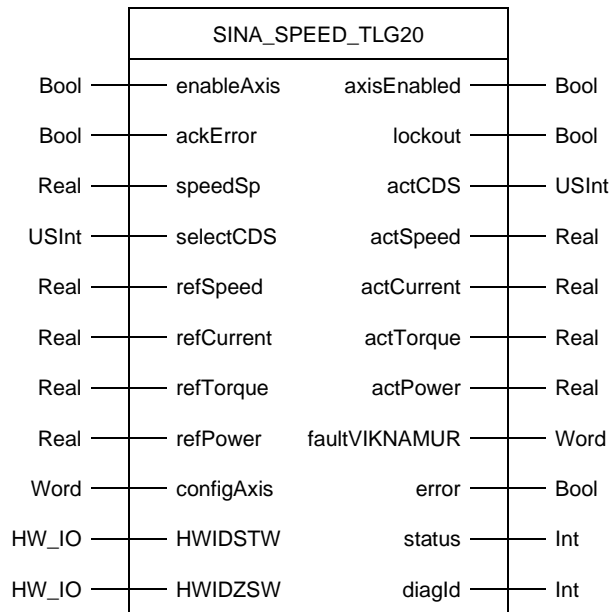
2.1.2 Calling OBs

The function blocks can be called in the following OBs:

- Cyclic OBs, e.g. OB1
- Cyclic interrupt OBs, e.g. OB30

2.2 SINA_SPEED_TLG20 (FB38003)

Figure 2-2: SINA_SPEED_TLG20



2.2.1 Description

With the function block SINA_SPEED_TLG20 (FB38003), a speed setting can be specified on a SINAMICS drive using the standard telegram 20.

In addition to the actual speed also the actual current, the actual torque and the actual active power are output with the correct specification of the respective reference value.

It is also possible to select the command data set (CDS) to be used in the SINAMICS drive by the function block.

NOTE

The SINA_SPEED_TLG20 block cannot be used with firmware versions V4.7 SP9 and V4.7 SP10 of the SINAMICS.

With these firmware versions, the SINA_SPEED_TLG20 block always displays an error. You should update the inverter to firmware V4.7 SP13 or higher.

If you cannot switch to another firmware, you can comment on the lines after the comment `//VIKNAMUR fault word` (line 163) in the SCL code of the block SINA_SPEED_TLG20.

After translating and downloading it into the S7-CPU, no errors in the fault word MELD_NAMUR are signaled via the output ERROR.

2.2.2 Standard telegram 20

The standard telegram 20 consists of two receive words and six transmit words.

From the point of view of the drive unit, the received process data represent the receive words and the process data to be sent represent the transmit words.

The receive and transmit words consist of the following elements:

- Receive words: Control words or setpoints
- Transmit words: Status words or actual values

Table 2-1 Structure of standard telegram 20

	PZD1	PZD2	PZD3	PZD4	PZD5	PZD6
Receive telegram	STW1	NSOLL_A				
Transmit telegram	ZSW1	NIST_A_ GLATT	IAIST_ GLATT	MIST_ GLATT	P_IST_ GLATT	MELD_ NAMUR

The standard telegram 20 transmits a control word (STW1 of VIK-NAMUR) and a speed setpoint (NSOLL_A) to the SINAMICS drive. The SINAMICS drive transmits a status word (ZSW1 of VIK-NAMUR) and the smoothed actual values speed (NIST_A_GLATT), current (IAIST_GLATT), torque (MIST_GLATT) and active power (P_IST_GLATT) to the controller. In addition to the ZSW1, the transmit telegram contains a fault word (MELD_NAMUR) according to VIK-NAMUR definition (see section [2.2.5](#)).

2.2.3 Input parameters

Table 2-2 Input parameters of SINA_SPEED_TLG20

Name	P type	Data type	Comment
enableAxis	IN	Bool	0 → 1 = Switching on the drive (AUS1 = 0 → 1)
ackError	IN	Bool	0 → 1 = Fault acknowledgement
speedSp	IN	Real	Speed setpoint [1/min]
selectCDS	IN	USInt	Command data set selection [p810] (0: CDS0, 1: CDS1)
refSpeed	IN	Real	Reference speed [p2000] in [1/min]
refCurrent	IN	Real	Reference current [p2002] in [Aeff]
refTorque	IN	Real	Reference torque [p2003] in [Nm]
refPower	IN	Real	Reference power [p2005] in [kW]
configAxis	IN	Word	Binary-coded input parameter for controlling all control word bits that are not available as input parameters. (see section 2.2.3.2)
HWIDSTW	IN	HW_IO	Hardware ID of the setpoint slot (see section 1.3.2)
HWIDZSW	IN	HW_IO	Hardware ID of the actual value slot (see section 1.3.2)

2.2.3.1 Assigning the reference values

The corresponding reference values must be specified at the input parameter for the standardization of the setpoints and actual values:

Table 2-3 Reference values input parameters

Input parameter	Data type	Meaning	Parameter in SINAMICS drive
refSpeed	Real	Reference speed	p2000
refCurrent*	Real	Reference current	p2002
refTorque*	Real	Reference torque	p2003
refPower*	Real	Reference power	r2004

*Optional: If not specified, no actual value is output at the output parameter.

Note

The reference values can be assigned as fixed values or read out by the SINAMICS drive using acyclic communication. You can use the function block "SINA_PARA" from the DriveLib for this purpose (see [5](#)). If several SINAMICS drives are communicated simultaneously, the LAcycCom standard library can also be used for coordinated acyclic work (see [6](#)).

2.2.3.2 Default setting of the input parameter "configAxis"

The interface of the function block is limited to a few input and output parameters. The input parameter "configAxis" is connected to the additionally available control word bits of control word 1 (STW1) and its functions. The standard assignment 16#003F of the input parameter "configAxis" is designed in such a way that only the existing input parameter "enableAxis" has to be set to move the axis.

Table 2-4 Default assignment "configAxis"

Bit	Default setting	Meaning	Parameters in SINAMICS drives
0	1	OFF2	r2090.1 = p844[0]
1	1	OFF3	r2090.2 = p848[0]
2	1	Inverter enable	r2090.3 = p852[0]
3	1	Enable the ramp-function generator	r2090.4 = p1140[0]
4	1	Continue the ramp-function generator	r2090.5 = p1141[0]
5	1	Enable speed setpoint	r2090.6 = p1142[0]
6	0	Invert setpoint	r2090.11 = p1113[0]

Note

The function block SINA_SPEED_TLG20 permanently sets the control word bits 13 "Motor potentiometer setpoint higher" & 14 "Motor potentiometer setpoint lower" to "false", since the BICO assignment can be retained after a changeover from a telegram to the standard telegram 20. Although these and other various STW1 bits are not used in the standard telegram 20, these assignments remain active and setting these bits could lead to undesired effects.

2.2.4 Output parameters

Table 2-5 Output parameters SINA_SPEED_TEL20

Name	P type	Data type	Comment
axisEnabled	OUT	Bool	1 = Drive in operation
lockout	OUT	Bool	1 = Switching-on inhibited active
actCDS	OUT	USInt	Active command data set (0 = CDS0, 1 = CDS1)
actSpeed	OUT	Real	Current speed [1/min]
actCurrent	OUT	Real	Actual current value in [Aeff]
actTorque	OUT	Real	Torque actual value in [Nm]
actPower	OUT	Real	Active power actual value smoothed in [kW]
faultVIKNAMUR	OUT	Word	Fault word according to VIK-NAMUR definition
error	OUT	Bool	1 = Error in function block / drive
status	OUT	Int	Status output 7002 = FB in operation 7xxx = Warning 8xxx = Error description
diagId	OUT	Int	Error code of the system functions DPWR_DAT/DPRD_DAT (see section 3.3)

2.2.5 Fault word according to VIK-NAMUR definition (MELD_NAMUR)

The aim of the VIK¹-NAMUR² guideline NE 37 is to create a standardized interface between drive and process control system. This makes it possible to exchange a drive without changes to the process control system. The VIK-NAMUR guideline defines a status word (ZSW1), a control word (STW1) and a fault word (MELD_NAMUR). The standard telegram 20 transmits the fault word in the send telegram PZD6.

Table 2-6 Fault word according to VIK-NAMUR definition

Bit	Meaning
0	1 = Control unit reports a fault
1	1 = Network error: Phase failure or inadmissible voltage
2	1 = DC link overvoltage
3	1 = Malfunction of the power module, e.g. overcurrent or overtemperature
4	1 = Inverter overtemperature
5	1 = Ground fault / phase fault in the engine cable or in the engine
6	1 = Engine overload
7	1 = Communication to the superimposed control system disturbed
8	1 = Error in a safe monitoring channel
10	1 = Fault in inverter-internal communication
11	1 = Mains fault
15	1 = Other faults

Bits that are not listed are not evaluated by the drive.

¹ Association of Industrial Energy and Power Industries e.V.

² Interest group automation technology of the process industry

NOTICE

The PROFIdrive standard specifies the connection of the NAMUR fault word to the PZD6 of the transmit telegram. In the SINAMICS drive, parameter r3113 "NAMUR message bit bar" is already connected per default. However, the PZD6 can be freely connected in the parameter setting of the transmit direction of the SINAMICS drive. The function block SINA_SPEED_TLG20 is only functional if the PROFIdrive standard is adhered to.

2.2.6 Operation

The axis is ready to switch on if there is no error ("error" = 0) and no lockout is set ("lockout" = 0).

The axis is switched on via the input parameter "enableAxis". OFF2 and OFF3 are preset with "1" via the input parameter "configAxis" and do not have to be written by the user for operation.

The active command data set of the SINAMICS drive is selected at the input parameter "selectCDS". By default, the command data set 0 (CDS0) is selected.

The speed setpoint value "speedSp" at the input parameter is given in the format Real and the unit [1/min]. The speed setpoint value can be changed during operation and is immediately active.

The reference speed "refSpeed" is assumed to be 100% for normalization of the speed setpoint value. The speed setpoint value is transmitted to the SINAMICS drive in normalized form in the range -200% to 200% depending on the reference speed. If a speed reference value greater or smaller than the value range is specified, it is limited to the respective limit.

The faults of the SINAMICS drive can be acknowledged via a positive edge at the input parameter "ackError".

2.2.7 Error handling

The collective error "error" is set as soon as one of the following conditions is fulfilled

- SINAMICS drive reports fault
- Switch-on inhibit of the SINAMICS drive is active
- Fault word MELD_NAMUR reports a fault
- Invalid values were specified for an input parameter.
- Error while reading/writing the telegram data (SFC error see diagID)

Table 2-7 Description of the output parameter "status"

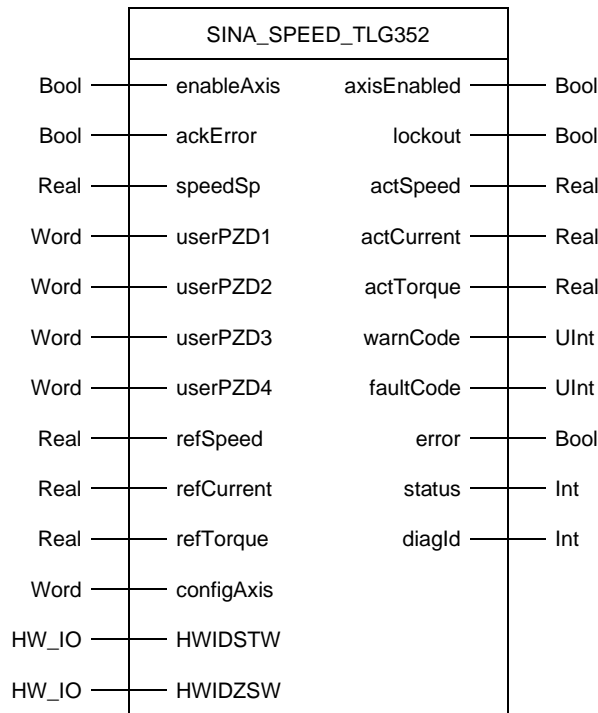
Value	Meaning	Remedy
16#7002	No fault active, FB is executed	
16#7010	Invalid value at input parameter "refCurrent", at output parameter "actCurrent" 0 is output.	Specify a valid reference value at the respective input parameter. (see Table 2-3)
16#7011	Invalid value at input parameter "refTorque", at output parameter "actTorque" 0 is output.	
16#7012	Invalid value at input parameter "refPower", at output parameter "actPower" 0 is output.	

2 Function blocks SINA_SPEED_TLGXXX

Value	Meaning	Remedy
16#7013	Several reference values are invalid	
16#8001	Reference speed is invalid, operation not possible	
16#8002	Invalid command data set selected	Enter a valid value at the input parameter "selectCDS": CDS0 = 0 CDS1 = 1
16#8401	Drive fault active	Check drive fault, acknowledge if necessary via "ackError".
16#8402	Switch-on inhibit of the SINAMICS drive is active	Check for axis / encoder parked, safety functions active, parameter p10 ≠ 0
16#8600	Error when reading the telegram data	Evaluate error code of DPRD_DAT in "diagID" (see section 3.3)
16#8601	Error while writing the telegram data	Evaluate error code of DPWR_DAT in "diagID" (see section 3.3)
16#8700	Fault word "faultVIKNAMUR" reports fault	Evaluate fault word VIK-NAMUR (see section 2.2.5)

2.3 SINA_SPEED_TLG352 (FB38004)

Figure 2-3: SINA_SPEED_TLG352



2.3.1 Description

With the function block SINA_SPEED_TLG352 (FB38004), a speed setting can be specified on a SINAMICS drive using the SIEMENS telegram 352.

In addition to the actual speed also the actual current and the actual torque are output with the correct specification of the respective reference value.

The error and warning numbers of the SINAMICS drive are displayed directly as output parameters.

2.3.2 Siemens telegram 352

The SIEMENS telegram 352 consists of six receive words and six transmit words.

From the point of view of the drive unit, the received process data represent the receive words and the process data to be sent represent the transmit words.

The receive and transmit words consist of the following elements:

- Receive words: Control words or setpoints
- Transmit words: Status words or actual values

Table 2-8 Structure of SIEMENS telegram 352

	PZD1	PZD2	PZD3	PZD4	PZD5	PZD6
Receive telegram	STW1	NSOLL_A	USER1	USER2	USER3	USER4
Transmit telegram	ZSW1	NIST_A_ GLATT	IAIST_ GLATT	MIST_ GLATT	WARN_ CODE	FAULT_ CODE

The SIEMENS telegram 352 transmits a control word (STW1), a speed setpoint (NSOLL_A) and four freely configurable words (USER) to the SINAMICS drive. The SINAMICS drive transmits a status word (ZSW1) and the smoothed actual values speed (NIST_A_GLATT), current (IAIST_GLATT) and torque (MIST_GLATT) to the controller. In addition to the ZSW1, the transmit telegram contains the warning number (WARN_CODE) and the error number (FAULT_CODE) of the SINAMICS drive.

2.3.3 Input parameters

Table 2-9 Input parameters of SINA_SPEED_TLG352

Name	P type	Data type	Comment
enableAxis	IN	Bool	0 → 1 = Switching on the drive (AUS1 = 0 → 1)
ackError	IN	Bool	0 → 1 = Fault acknowledgement
speedSp	IN	Real	Speed setpoint [1/min]
userPZD1	IN	Word	User-PZD1
userPZD2	IN	Word	User PZD2
userPZD3	IN	Word	User PZD3
userPZD4	IN	Word	User PZD4
refSpeed	IN	Real	Reference speed [p2000] in [1/min]
refCurrent	IN	Real	Reference current [p2002] in [Aeff]
refTorque	IN	Real	Reference torque [p2003] in [Nm]
configAxis	IN	Word	Binary-coded input parameter for controlling all control word bits that are not available as input parameters. (see section 2.2.3.2)
HWIDSTW	IN	HW_IO	Hardware ID of the setpoint slot (see section 1.3.2)
HWIDZSW	IN	HW_IO	Hardware ID of the actual value slot (see section 1.3.2)

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2.3.3.1 Assigning the reference values

The corresponding reference values must be specified at the input parameter for the standardization of the setpoints and actual values:

Table 2-10 Reference values input parameters

Input parameters	Data type	Meaning	Parameters in SINAMICS drives
refSpeed	Real	Reference speed	p2000
refCurrent*	Real	Reference current	p2002
refTorque*	Real	Reference torque	p2003

*Optional: If not specified, no actual value is output at the output parameter.

Note

The reference values can be fixed or read out by the SINAMICS drive using acyclic communication. You can use the function block "SINA_PARA" from the DriveLib for this purpose (see [5](#)). If several SINAMICS drives are communicated simultaneously, the LAcycCom standard library can also be used for coordinated acyclic work (see [6](#)).

2.3.3.2 Default setting of the input parameter "configAxis"

The interface of the block is limited to a few input and output parameters. The input parameter "configAxis" is connected to the additionally available control word bits of control word 1 (STW1) and its functions. The standard assignment 16#003F of the input parameter "configAxis" is designed in such a way that only the existing input parameter "enableAxis" has to be set to move the axis.

Table 2-11 Default assignment "configAxis"

Bit	Default setting	Meaning	Parameters in SINAMICS drives
0	1	OFF2	r2090.1 = p844[0]
1	1	OFF3	r2090.2 = p848[0]
2	1	Inverter enable	r2090.3 = p852[0]
3	1	Enable the ramp-function generator	r2090.4 = p1140[0]
4	1	Continue the ramp-function generator	r2090.5 = p1141[0]
5	1	Enable speed setpoint	r2090.6 = p1142[0]
6	0	Invert setpoint	r2090.11 = p1113[0]
7	0	Motorized potentiometer setpoint higher	r2090.13 = p1035[0]
8	0	Motorized potentiometer setpoint lower	r2090.14 = p1036[0]

2.3.4 Output parameters

Table 2-12 Output parameters of SINA_SPEED_TEL352

Name	P type	Data type	Comment
axisEnabled	OUT	Bool	1 = Drive in operation
lockout	OUT	Bool	1 = Switching-on inhibited active
actSpeed	OUT	Real	Current speed [1/min]
actCurrent	OUT	Real	Actual current value in [Aeff]
actTorque	OUT	Real	Torque actual value in [Nm]
warnCode	OUT	UInt	Warning number of the drive
faultCode	OUT	UInt	Error number of the drive
error	OUT	Bool	1 = Error in function block / drive
status	OUT	Int	Status output 7002 = FB in operation 7xxx = Warning 8xxx = Error description
diagId	OUT	Int	Error code of the system functions DPWR/DPRD_DAT (see section 3.3)

2.3.5 Operation

The axis is ready to switch on if there is no error ("error" = 0) and no lockout is set ("lockout" = 0).

The axis is switched on via the input parameter "enableAxis". OFF2 and OFF3 are preset with "1" via the input parameter "configAxis" and do not have to be written by the user for operation.

The speed setpoint value "speedSp" at the input parameter is given in the format Real and the unit [1/min]. The speed setpoint value can be changed during operation and is immediately active.

The reference speed "refSpeed" is assumed to be 100% for normalization of the speed setpoint value. The speed setpoint value is transmitted to the SINAMICS drive in normalized form in the range -200% to 200% depending on the reference speed. If a speed setpoint value greater or smaller than the value range is specified, it is limited to the respective limit.

The faults of the SINAMICS drive can be acknowledged via a positive edge at the input parameter "ackError".

2.3.6 User data "userPZD"

At the input words "userPZD1..4", user-specific data, such as a torque specification (note: The transmitted setpoint value is interpreted as a normalized value in relation to the reference value) or a control word can be transmitted to the drive. In the receiving direction of the SINAMICS drive, connect the PZD3..6 with the desired parameters.

Code example 1: Transmit torque input

```
#myTorque := 1.2;
// reference torque of the drive (p2003)
#refTorque := 1.7;
// normalize myTorque in relation to the
// reference torque of the drive (16#4000 equals 100%)
#tempTorque := #myTorque * (16#4000 / #refTorque);
// convert percentage to WORD and assign to userPZD1
"SINA_SPEED_TLG352_DB".userPZD1 := INT_TO_WORD(REAL_TO_INT(#tempTorque));
```

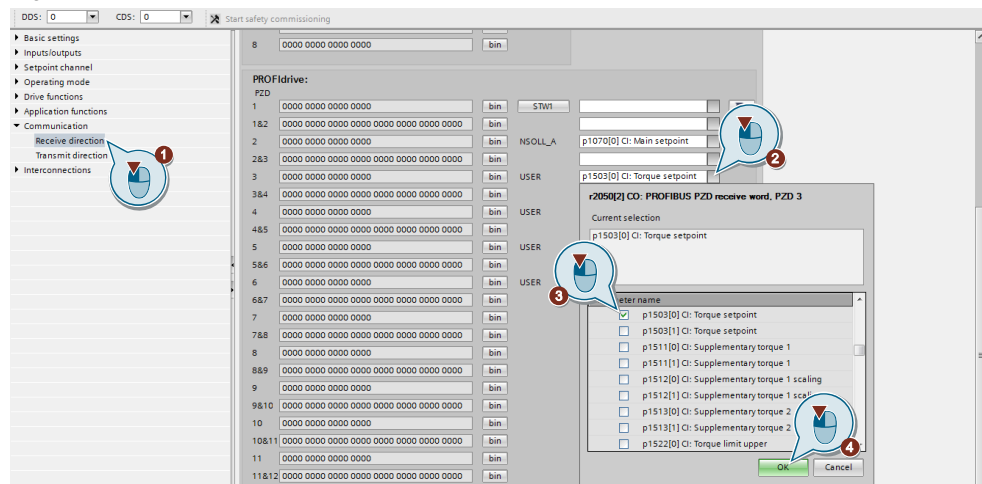
2.3.7 Connection of user data in the SINAMICS drive

Connect the user data from the input words in the receive direction of the communication of the SINAMICS drive. There the PZD3-6 are freely connectable. Select a free PZD of the SIEMENS telegram 352 for the respective input words and connect it to one or more parameters in the SINAMICS drive.

PZDs can be received in the SINAMICS drive either as word or double word and connected to parameters. In the configuration of the receive telegram you connect one PZD (word) or two PZDs (double word) to one or more parameters.

Example: In [Figure 2-4](#) the PZD 3 is connected to the torque setpoint p1503[0]

Figure 2-4 Connection of a received word



2.3.8 Error handling

The collective error "error" is set as soon as one of the following conditions is fulfilled

- SINAMICS drive reports fault
- Switch-on inhibit of the SINAMICS drive is active
- Invalid values were specified at an input parameter
- Error when reading/writing telegram data (SFC error see "diagID")

Table 2-13 Description of the output parameter "status"

Value	Meaning	Remedy
16#7002	No fault active, FB is executed	
16#7005	Warning on drive active	Warning number is output at output parameters "warnCode"
16#7010	Invalid value at input parameter "refCurrent", at output parameter "actCurrent" 0 is output.	Specify a valid reference value at the respective input parameter (see Table 2-10)
16#7011	Invalid value at input parameter "refTorque", at output parameter "actTorque" 0 is output.	
16#7013	Several reference values are invalid	
16#8001	Reference speed is invalid, operation not possible	
16#8401	Drive fault active	Check drive fault, acknowledge if necessary via "ackError".
16#8402	Switch-on inhibit of the SINAMICS drive is active	Check for axis / encoder parked, safety functions active, parameter p10 ≠ 0
16#8600	Error when reading the telegram data	Evaluate error code of DPRD_DAT in "diagID" (see section 3.3)
16#8601	Error while writing the telegram data	Evaluate error code of DPWR_DAT in "diagID" (see section 3.3)
16#8800	Drive fault	Error number is output at output parameter "faultCode".

3 Appendix

3.1 Control word 1 (STW1)

With the exception of standard telegram 20, all telegrams available in the SINAMICS drive use the same control word bits. Differences in the meanings of a single control word bit are indicated in the following table.

Table 3-1 Control word 1

Bit	Meaning		Explanation	Signal switching in the inverter
	Telegram 20	Other telegrams		
1	0 = OFF1		The motor decelerates with the ramp-down time p1121 of the ramp-function generator. At standstill, the converter switches off the motor.	p0840[0] = r2090.0
	0 → 1 = ON		The converter goes to "ready" status. If bit 3 = 1 in addition, the inverter switches the engine on.	
1	0 = OFF2		Switch off the motor immediately after the motor coasts down.	p0844[0] = r2090.1
	1 = No OFF2		Switching on the motor (ON command) is possible.	
2	0 = Fast stop (OFF3)		Rapid stops: the motor decelerates with the OFF3 time p1135 down to standstill.	p0848[0] = r2090.2
	1 = No quick stop (OFF3)		Switching on the motor (ON command) is possible.	
3	0 = Disable operation		Switch off the motor immediately (delete pulses).	p0852[0] = r2090.3
	1 = Enable operation		Switch on motor (pulse enable possible).	
4	0 = HLG lock		The inverter immediately sets its ramp-function generator output to 0.	p1140[0] = r2090.4
	1 = Do not lock HLG		Ramp-function generator enable is possible.	
5	0 = Stop HLG		The output of the ramp-function generator remains at its current value.	p1141[0] = r2090.5
	1 = Release HLG		The output of the ramp-function generator follows the setpoint.	
6	0 = Lock set point		The converter brakes the motor to the ramp-down time p1121 of the ramp-function generator.	p1142[0] = r2090.6
	1 = Release set point		Motor accelerates with the ramp-up time p1120 to the setpoint.	
7	0 → 1 = Acknowledge faults		Acknowledge fault. If the ON command is still active, the converter goes into the "power-on inhibit" state.	p2103[0] = r2090.7
8.9	Reserved			
10	0 = No guidance by PLC		Converter ignores the process data from the fieldbus.	p0854[0] = r2090.10
	1 = guidance by PLC		Control via fieldbus, converter takes the process data from the fieldbus.	
11	1 = reversal of direction		Invert setpoint in the converter.	p1113[0] = r2090.11

Bit	Meaning		Explanation	Signal switching in the inverter
	Telegram 20	Other telegrams		
12	Not used			
13	Not used 1)	1 = MOP higher	Increase stored setpoint in the motor potentiometer.	p1035[0] = r2090.13
14	Not used 1)	1 = MOP lower	Decrease stored setpoint in the motor potentiometer.	p1036[0] = r2090.14
15	CDS bit 0	Reserved	Switch between settings for different operating interfaces (command data sets).	p0810 = r2090.15

- ¹⁾ If you switch from another telegram to the standard telegram 20, different BICO connections from the previous telegram can remain in the drive. This can lead to unwanted behavior. Therefore, a BICO reset must be carried out before the telegram change.

Note

The function block SINA_SPEED_TLG20 permanently sets the control word bits 13 & 14 to "false", since the BICO assignment can be retained after a change-over from a telegram to the standard telegram 20. Although these and other various STW1 bits are not used in the standard telegram 20, these assignments remain active and setting these bits could lead to undesired effects.

3.2 Status word 1 (ZSW1)

With the exception of the standard telegram 20, all telegrams available in the SINAMICS drive use the same status word bits. Differences in the meanings of a single status word bit are indicated in the following table.

Table 3-2 Status word 1

Bit	Meaning		Explanation	Signal switching in the inverter
	Telegram 20	Other telegrams		
0	1 = Ready to switch on		Power supply is switched on, electronics initialized, pulses disabled.	p2080[0] = r0899.0
1	1 = Ready for operation		Engine is switched on (ON/OFF1 = 1), no fault is active. The converter switches the motor on with the "Enable operation" command (STW1.3).	p2080[1] = r0899.1
2	1 = Operation enabled		Engine follows setpoint. See control word 1, bit 3.	p2080[2] = r0899.2
3	1 = Fault effective		There is a fault in the converter. Acknowledge fault with STW1.7.	p2080[3] = r2139.3
4	1 = OFF2 inactive		Coast to standstill is not active.	p2080[4] = r0899.4
5	1 = OFF3 inactive		Rapid stop is not active.	p2080[5] = r0899.5
6	1 = Activation disable is active		Switching on the engine is only possible after a positive edge at ON/OFF1.	p2080[6] = r0899.6
7	1 = Warning is active		Engine remains switched on; no acknowledgment necessary.	p2080[7] = r2139.7
8	1 = Speed deviation within the tolerance range		Setpoint / actual value deviation within tolerance.	p2080[8] = r2197.7
9	1 = Control required		The automation system is requested to assume control of the converter.	p2080[9] = r0899.9
10	1 = reference speed reached or exceeded		Speed is greater than or equal to the corresponding maximum speed.	p2080[10] = r2199.1
11	1 = current or torque limit reached	1 = torque limit reached	Reference value for current or torque is reached or exceeded	p2080[11] = r0056.13 / r1407.7
12	Not used ¹⁾	1 = Holding brake open	Signal for opening and closing a motor holding brake.	p2080[12] = r0899.12
13	0 = Engine overtemperature warning		--	p2080[13] = r2135.14
14	1 = Engine turns right		Inverter-internal actual value > 0.	p2080[14] = r2197.3
	0 = Engine turns left		Inverter-internal actual value < 0.	
15	1 = Show CDS	0 = Warning thermal overload inverter		p2080[15] = r0836.0 / r2135.15

¹⁾ If you switch from another telegram to the standard telegram 20, different BICO connections from the previous telegram can remain in the drive. This can lead to unwanted behavior. Therefore, a BICO reset must be carried out before the telegram change.

3.3 Error codes of DPWR_DAT and DPRD_DAT

The following table shows the error codes of the system blocks DPWR_DAT and DPRD_DAT that are relevant for the library LSINAExt and can occur at the output parameter "diagId".

For a complete overview of all error codes, refer to the function description DPWR_DAT (see [\3\](#)) and DPRD_DAT (see [\4\](#)).

Table 3-3 Error code

Error code (W#16#...)	Explanation	Remedy
0000	No error occurred.	
8090	<ul style="list-style-type: none"> You have not configured a module for the specified HW identifier, or You have ignored the restriction on the length of the consistent data, or You have not specified a HW ID as the address in parameter HWIDSTW/HWIDZSW. 	Connect a valid HW identifier (see 1.3.2).
8093	For the HW ID specified under HWIDSTW/HWIDZSW, there is no DP module / PROFINET IO device from which you can read consistent data. If the module addressed via HWIDSTW/HWIDZSW does not have inputs, this error code also occurs.	
80A0 80A1	An access error was detected when accessing the periphery.	Check the hardware configuration of the TIA project
80B1	The length of the specified target area at parameter RECORD is shorter than the configured user data length.	Check telegram configuration

3.4 Links and literature

Table 3-4 Links and Literature

No.	Topic
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	Link to the article page of the application example https://support.industry.siemens.com/cs/ww/en/view/109747655
\3\	Description of function DPWR_DAT https://support.industry.siemens.com/cs/ww/en/view/109755202/95340509067
\4\	Description of function DPRD_DAT https://support.industry.siemens.com/cs/ww/en/view/109755202/95340531851
\5\	DriveLib in Siemens Industry Online Support https://support.industry.siemens.com/cs/ww/en/view/109475044
\6\	Standard library LAcycCom in Siemens Industry Online Support https://support.industry.siemens.com/cs/ww/en/view/109479553

3.5 Change documentation

Table 3-5 Change documentation

Version	Date	Change
V1.0	02/2019	First version
V1.0.1	11/2019	Added note in chapter 2.2.1