

# SIEMENS

Equipment for special machines

GRACIS

Interactive Graphics System for Process

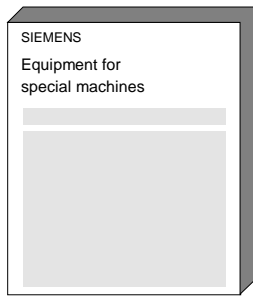
Monitoring and Diagnosis with Network Capabilities

Installation Instructions

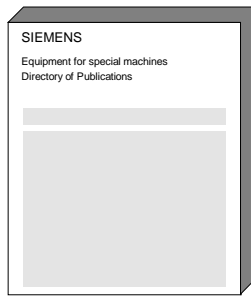
Edition 07.94

SIMATIC S5 Interface (SINEC L2)  
GRACIS V 1.5

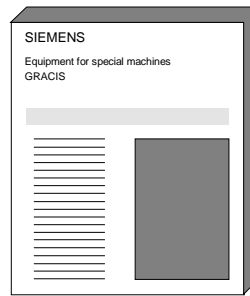
## General documentation



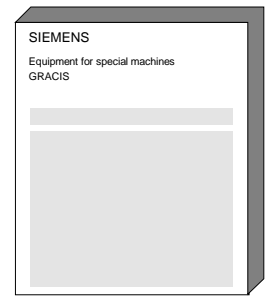
Catalog



Directory of Publications

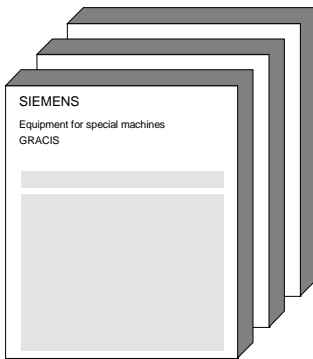


Product brief



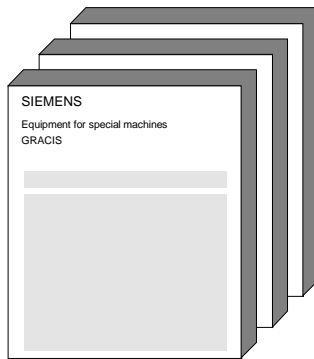
Description

## User and service documentation



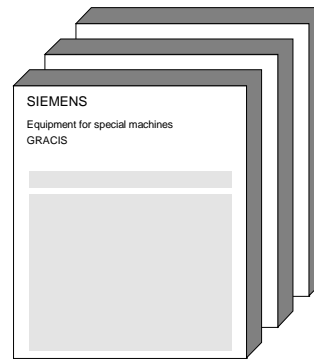
Technical Description

- HPF (Higher Performance)
- LPF (Lower Performance)



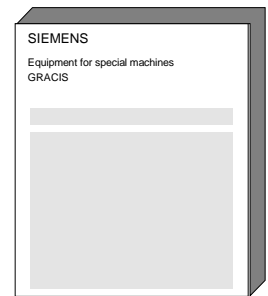
Installation Guide

- SIMATIC S5 Interface (local, H1)
- SIMATIC S5 Interface (L2)
- Process mode



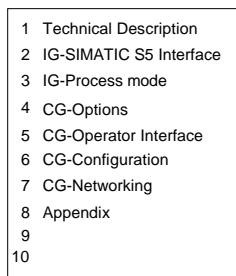
Configuration Guide

- Operator Interface
- Configuration HPF
- Configuration LPF
- Networking
- Options

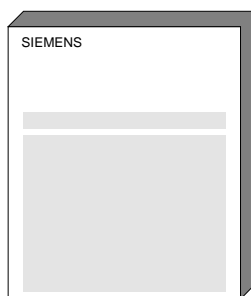


Appendix

## Supplementary documentation

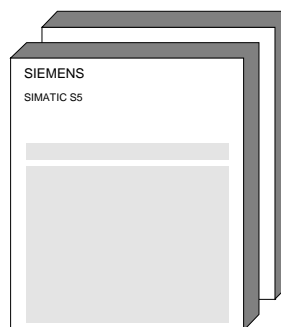


Register - cover page



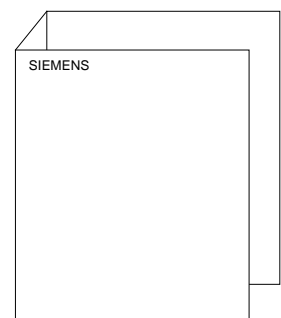
Reference manual for

- WS 400-30/WS 400-50
- MPs, monitors, keyboards
- IW 30, PC32-F, PC32-X
- VP 30, CP581



Manual for

- PG 7xx
- S5-115U
- S5-135U
- S5-155U



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# SIEMENS

## GRACIS

Interactive Graphics System for  
Process Monitoring and Diagnosis  
with Network Capabilities

Installation Instructions  
SIMATIC S5 Interface (SINEC L2)

Edition July 1994

**Preliminary Remarks 1**

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**Integration into the  
Interface Concept 2**

---

**Synchronization 3**

---

**Cyclic Data Request  
by GRACIS  
(Peripherals Initiative) 4**

---

**Data Transfer on the  
Initiative of SIMATIC S5 5**

---

**Technical Data 6**

---

**Programming Example 7**

---

**Index 8**

---

**9**

---

**10**

---

## **Note**

*Because of clear arrangement, this documentation does not inform about all details of all types of the product. Therefore, it cannot take into account all possible cases of installation, operation and maintenance.*

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# 1 Preliminary Remarks

**What information is contained in this documentation ?**

This documentation contains the possibilities of data transfer between GRACIS and the SIMATIC S5.

**For whom is this documentation intended ?**

This documentation is intended for S5 programming engineers programming the data transfer between GRACIS and SIMATIC S5. The necessary preconditions are described below.

**What prior knowledge is required ?**

Profound knowledge of the use of GRACIS as well as of SIMATIC S5, and, first of all, knowledge of the programming language STEP 5 is required.

**How to find your way about this documentation ?**

After an overview of the GRACIS interface concept this documentation describes the following data transfer possibilities:

- On peripheral initiative
- On central initiative

The technical data concerning the function blocks are followed by a programming example also stored on the included diskette.

**What is the meaning of the following terms ?** As used in the documentation or the danger indications on the product itself, these terms have the following meanings:

Qualified personnel is understood to mean personnel acquainted with the assembly, start-up and operation of the product, with qualifications equalling their job requirements.

- ▷ Personnel trained and authorized to put into operation, ground and label electric circuits and devices/systems as per the relevant safety standards.
- ▷ Personnel especially trained to service and use appropriate safety equipment as per the relevant safety standards.
- ▷ Personnel trained in First Aid.



## DANGER

means that failure to observe the safety measures **will result** in death, grievous bodily harm or extensive equipment damage.



## WARNING

means that failure to observe the safety measures **could result** in death, grievous bodily harm or extensive equipment damage.



## CAUTION

means that failure to observe the safety measures **could result** in physical injury or equipment damage.



This symbol precedes important information on the product, its use, or the section in the documentation to which particular attention is to be paid.

## **2                    Integration into the Interface Concept**

<b>2.1</b>	<b>GRACIS Interface Concept.....</b>	<b>2-2</b>
<b>2.2</b>	<b>Configurations .....</b>	<b>2-3</b>
<b>2.3</b>	<b>Method of operation .....</b>	<b>2-3</b>
2.3.1	Cyclic data request by the SIMATIC S5 (central initiative).....	2-3
2.3.2	Event orientated data transfer by the SIMATIC S5 (central initiative).....	2-4

## 2.1 GRACIS Interface Concept

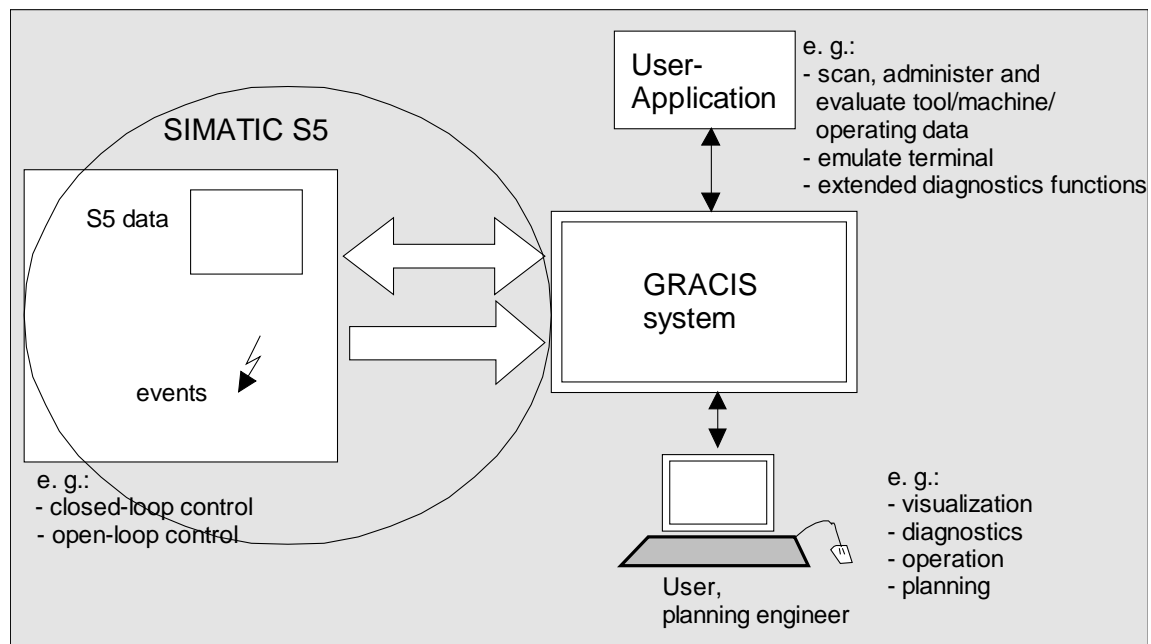
For technology-specific visualization and diagnostics of machine tools, machining lines, assembly lines, transfer lines, etc., GRACIS provides the user with interfaces for:

- data
- functions and
- graphical representation

These interface can be used in connection to a different extent.

They can be used

- by a control, e.g. SIMATIC S5,
- by the user and
- by user applications



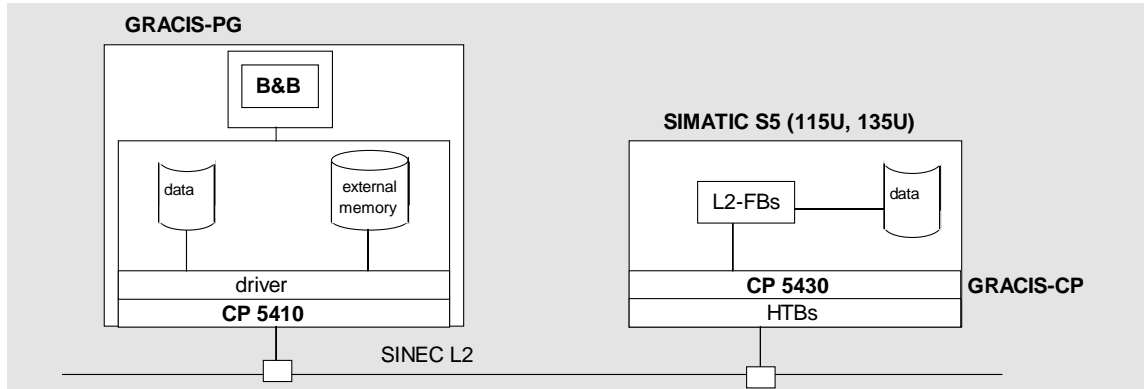
This description applies to the interface of SIMATIC S5 controls and GRACIS systems with SINEC L2 network.



## 2.2 Configurations

The following configurations are possible:

- S5 controller with the communication processor CP 5430.
- 730/750/770 programmer with CP 5410



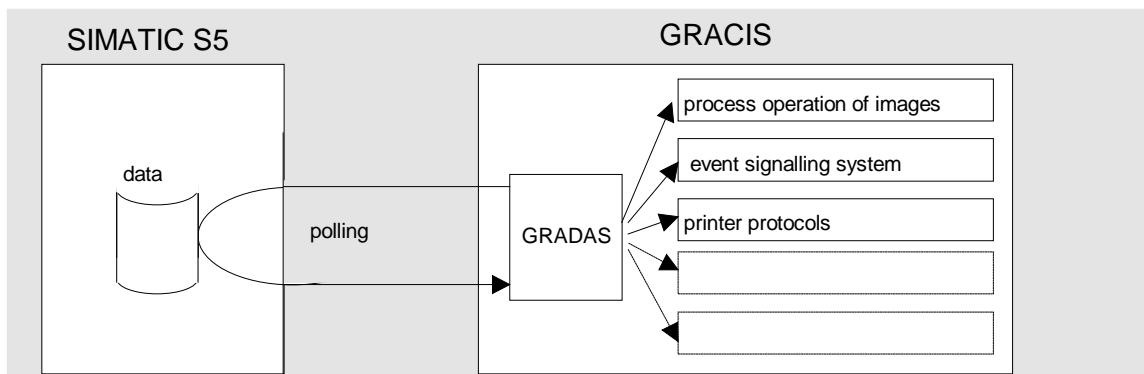
Each S5 controller can access another connected SIMATIC S5 control as far as reading and writing is concerned, including the external memory data of GRACIS S5 and the GRACIS programmers.



When GRACIS and STEP 5 are operated simultaneously via the SINEC L2 bus, you cannot use the firmware supplied with the SINEC L2 module. Please request a modified firmware (free of charge) via the GRACIS hotline.

## 2.3 Method of operation

### 2.3.1 Cyclic data request by the SIMATIC S5 (central initiative)



GRADAS offers the GRACIS applications (process image operation, protocols etc.) access to data of the SIMATIC S5 systems in the connected GRACIS network and to data in the external memory (static RAM and fixed disc).

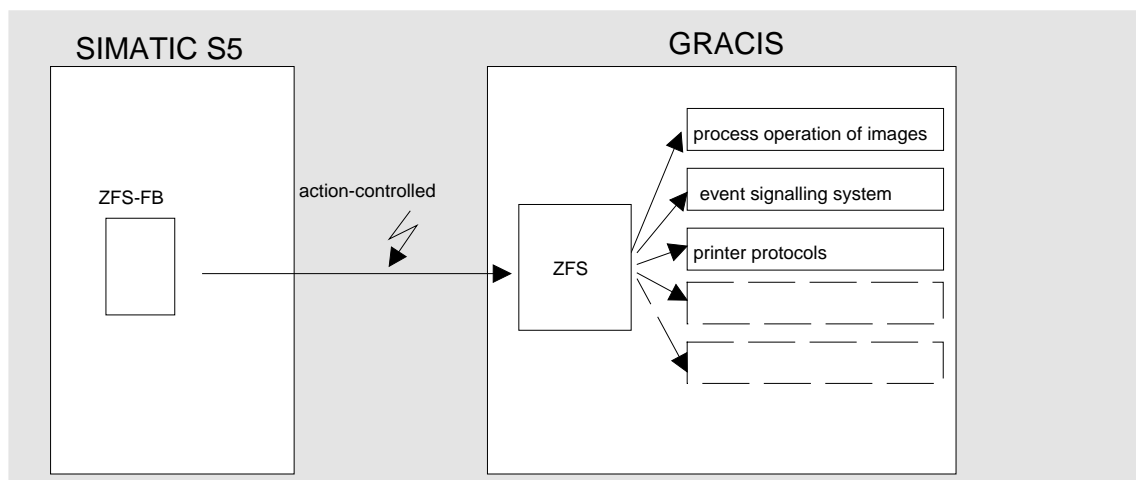
Furthermore, GRADAS transfers requests triggered by the controller (SIMATIC S5) to the GRACIS applications (central initiative).

## Basic idea

The GRACIS standard functions, such as image, protocol and event signalling system are intended for operation with peripheral initiative. This means that all data requests and function initiations are triggered and detected by GRACIS (polling).

This operating mode requires no S5 user program for the animation of images and the data of protocols and messages, so that the SIMATIC S5 can be used for other control functions (storage space, cycle time).

### 2.3.2 Event orientated data transfer by the SIMATIC S5 (central initiative)



## Basic idea

In contrast to GRADAS, the ZFS initiation of the data transfer is centrally triggered by the SIMATIC S5 CPU (action-controlled).

The SIMATIC S5 requires an user program to carry out the ZFS functions.

## Functions

Command	Command word in KH
Read data	0001
Write data with L2 protocol acknowledgement	0002
Write data without L2 protocol acknowledgement	0003

## **3 Synchronization**

<b>3.1</b>	<b>Parameters of FB SYNCHRON.....</b>	<b>3-2</b>
<b>3.2</b>	<b>Start-up programming .....</b>	<b>3-3</b>
<b>3.3</b>	<b>Parameters of FB GL2-INIT .....</b>	<b>3-3</b>
<b>3.4</b>	<b>Parameters of FB GL2-CLOG.....</b>	<b>3-4</b>

The CP 5430 is provided with a total of 4 page frames, each of a size of 128 bytes. That means that in multiprocessor mode, there is one page frame for each S5 CPU for communication..

The start page frame can be set on the CP as a multiple of 4. It is in the following designated "page frame m".

The following assignments apply for the S5 CPU's:

- CPU 1 or monoprocessor mode, page frame m
- CPU 2 page frame m+1
- CPU 3 page frame m+2
- CPU 4 page frame m+3



**This assignment is imperative.**

For synchronization of the CP module, the standard handling block FB SYNCHRON is available.

This block has to be called in the start-up and restart-up OB.

### 3.1 Parameters of FB *SYNCHRON*



SSNR	D	KF	;Interface number (page frame number), to be synchronized (0-255) Example KY 0,n
BLGR	D	KF	;Specification of blocking size. Number of data transferred per S5 cycld. 0 = 256 bytes 1 = 16 bytes 2 = 32 bytes 3 = 64 bytes 4 = 128 bytes 5 = 256 bytes 6 = 512 bytes >6 = 256 bytes
PAFE	A	BY	;Control and status byte of synchronization Bit 0 = 1 Synchron. part 4 terminated Bit 1 = 1 Synchron. part 3 terminated Bit 2 = 1 Synchron. part 2 terminated Bit 3 = 1 Synchron. part 1 terminated Bit 4 = 1 Block size error Bit 5 = 1 Parameter error SSNR, BLGR Bit 6 = 1 Positive termination of synchronization Bit 7 = 1 Trigger new synchronization

An indirect parameterization of the FB is not possible.

### 3.2 Start-up programming

Synchronization with the CP has to be effected in the start-up OP of the controller.

To process the GRACIS L2 protocol, the GRACIS L2 function blocks need a control DB in which both global and connection-specific information is stored. The control DB is created through the FB GL2-INIT upon start-up.

For each connection to be operated via the GRACIS L2 protocol, a pertaining connection-specific are must be initialized in the control DB in start-up (Connection Control Block, CCB).

The CCB's are filed in the control DB justified one behind the other. A CCB is accessed by specifying its position in the control DB. The position of the CCB is called object ID (OBID). A CCB is initialized with the FB GL2-CLOG, so that all values necessary for identifying an L2 connection are filed in the CCB. In the GRACIS L2 FB's, a connection is only identified by specifying the OBID.

Control DB organization

	Global area (32 words)
OBID 1	VCB 1 (20 words)
OBID 2	VCB 2 (20 words)
	:
OBID n	VCB n (20 words)

### 3.3 Parameters of FB GL2-INIT



STDB	D	KY	Control data block Specifies the DB in which the control DB is created. If the DB is not present, it is created; if it is too short, it is extended to the required length. Example: KY 0,12      data block 12
VERB	D	KF	Number of connections Specifies the maximum number of connections via which data are transferred. Example: KF 10      10 connections
KNNR	D	KF	S5 has ist own node number In the GRACIS network each participant has an individual node number. Now enter the GRACIS node number of the local S5 CPU. Example: KF 10      GRACIS node 10

**Indirect parameterization:**

For the indirect parameterization the parameter STDB FY=0,0 is set. The FB parameters must be stored beginning at MW 240 in the sequence it is expected by the FB.

Parameter	Flag
STDB	MW240
VERB	MW242
KNNR	MW244

**3.4 Parameters of FB GL2-CLOG**

STDB	D	KY	Control DB, initiated as with <i>GL2-INIT</i> Example: KY 0.12 data block 12
OBID	D	KF	Indicates which GRACIS-L2 connection is set up. The OBID may be situated in the area of $1 \leq OBID \leq \text{max. number of connections}$ . Example: KF 1 1. connection
TIME	D	KF	Timeout ( $n \cdot 100\text{ms}$ ) The timeout monitoring is only required if the S5 CPU has the function of the GRACIS L2 client, i.e. send client requests to a partner. The timeout monitoring responds if the partner sends no acknowledgement to a request within the defined period. Example: KF 100 10 seconds
SSNR	D	KF	Interface number of the CP 5430 on which the connection is parameterized. Example: KF 0 page frame 0
ANSR	D	KF	Send command number of connection as parameterized with COM 5430. Example: KF 10 command number 10
ANRR	D	KF	Receive command number of connection as parameterized with COM 5430. Example: KF 11 command number 11

DB-S	D	KY	<p>Declaration of Send DB in which the GRACIS L2 FBs define the L2 telegrams according to the GRACIS L2 protocol.</p> <p>For each connection a Send DB of its own has to be defined by the user. The size depends on the CP and the useful data to be transferred plus 16 bytes for the protocol header. Up to 128 bytes can be transferred with the CP 5430. For GRADAS requests, the DB must have at least the same size as that of the telegram defined in the network control list.</p> <p>Example: KY 0,11          data block 11</p>
KNNR	D	KF	<p>Node number of the communication partner:</p> <p>Example: KF 10          partner node 10</p>

### Indirect parameterization:

For the indirect parameterization the parameter STDB KY=0,0 is set. The FB parameters must be stored beginning at MW 240 in the sequence it is expected by the FB.

Parameter	Flag
STDB	MW240
OBID	MW242
TIME	MW244
SSNR	MW246
ANRS	MW248
ANRR	MW250
DB-S	MW252
KNNR	MW254





## 4 Cyclic Data Request by GRACIS (Peripheral Initiative)

The data required for the GRACIS process operation are transferred via the GRADAS interface.

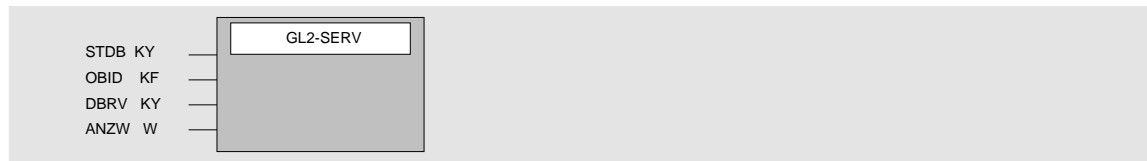
The data transfer is initiated by the GRACIS system. The user must synchronize the interface to the CP according to the page frame during the start-up procedure.

The control DB must be set and initiated in the start-up OB.

The standard handling blocks *SEND*, *RECEIVE* and *CONTROL* must be present in the PLC. these blocks are called by the L2 FBs.

In the cyclic part of the user program The L2 FB *GL2-SERV* must be called for each connection once. The block is designed for an overall completion of a GRACIS L2 request, i.e. if a partner system has a request. The FB evaluates the telegram, operates the data according to the request and acknowledges the request.

### 4.1 Parameter of the FB *GL2-SERV*



STDB	D	KY	Control-DB Example: KY 0,12      data block 12
OBID	D	KF	Object ID of the connection for which the block is called according to the call of the FB <i>GL2-CLOG</i> . Example: KF 1      connection 1
DBRV	D	KY	Data block in which the receive data are stored. It is sufficient to use one Receive DB for all connections. the Db must be defined by the user. The size is dependent on the CP and the useful data to be transferred plus 16 bytes for the protocol header. Up to 128 bytes can be transferred with the CP 5430. Example: KY 0,10      data block 10
ANZW	A	W	Display word The command status and error messages are output. Example: ANZW MW100

**Indirect parameterization:**

For the indirect parameterization the parameter STDB KY=0,0 is set. The FB parameters must be stored beginning at MW 240 in the sequence it is expected by the FB.

Parameter	Flag
STDB	MW240
OBID	MW242
DBRV	MW244

## **5 Data Transfer on the Initiative of SIMATIC S5**

<b>5.1</b>	<b>Parameters of the FB GL2-CLIE.....</b>	<b>5-2</b>
5.1.1	Structure of the command buffer of the FB GL2-CLIE .....	5-3
5.1.1.1	Read command.....	5-3
5.1.1.2	Write command.....	5-4
<b>5.2</b>	<b>Parameters of the FB GL2_T0.....</b>	<b>5-5</b>
<b>5.3</b>	<b>Superior polling interface GRACIS L2 .....</b>	<b>5-6</b>
5.3.1	Parameterization of the FB ZGL2-SST .....	5-6
5.3.1.1	Parameter data block P-DB .....	5-7
5.3.2	Bit profile, pulse diagram .....	5-8
5.3.3	Overview of data transfer.....	5-9
<b>5.4</b>	<b>Parameterization Errors .....</b>	<b>5-10</b>
<b>5.5</b>	<b>Display Word.....</b>	<b>5-11</b>

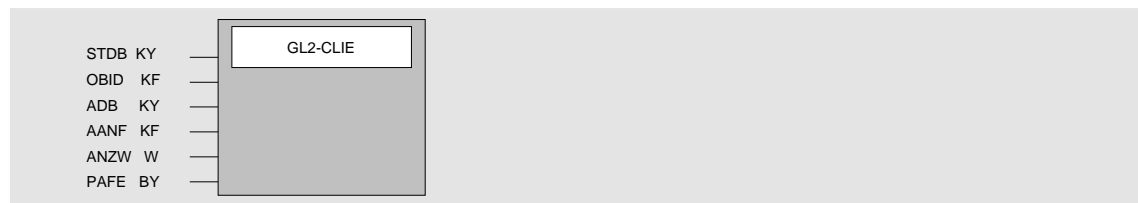
With the function blocks *GL2-CLIE* the user can write and read data all over the network on the initiative of the SIMATIC S5. For the acknowledgement the FB *GL2-SERV* must be called once per cycle for the relevant connection.

For the timeout monitoring the FB *GL2-T0* must be called in the Time OB. If the FB is not called, there is no time out monitoring.

In the PLC the standard handling blocks *SEND*, *RECEIVE* and *CONTROL* must be present. These blocks are called by the L2 FBs.

Only one GRACIS L2 client command can be active in one connection.

## 5.1 Parameters of the FB GL2-CLIE



STDB	D	KY	Control DB Example: KY 0,12      data block 12
OBID	D	KF	Object ID of the connection in which the FB is called according to the call of the FB "GL2-CLOG" during start-up. Example: KF 1      connection 1
ADB	D	KY	Data block in which the command buffer for this command is stored. Example: KY 0,20      data block 20
AANF	D	KF	Offset of command buffer in data block Example: KF 1      initial address DW 1
ANZW	A	W	Display word Example: ANZW MW 102
PAFE	A	BY	Parameterization error Example: PAFE MB 104

Indirect parameterization:

For the indirect parameterization the parameter STDB KY=0,0 is set. The FB parameters must be stored beginning at MW 240 in the sequence it is expected by the FB.

Parameter	Fral
STDB	MW240
OBID	MW242
ADB	MW244
AAZW	MW246

### 5.1.1 Structure of the command buffer of the FB GL2-CLIE

With the command buffer a GRACIS L2 service is specified. The command buffer is situated in a data block and has the following structure.

#### 5.1.1.1 Read command

15	8 7	0
AKEN	QNNR	Service identifier and source description
QFID	QTYP	
QDBNR		
QANF		
QLAE		
ZFID	ZTYP	Destination description
ZDBNR		
ZANF		
ZLAE		

The source description describes the data area in the communication partner from which the data are read out.

The destination description describes the data area in the local system in which the read data are stored.

The individual entries have the following meanings:

AKEN	The service identifier specifies the service carried out. <ul style="list-style-type: none"> <li>Read 01H data with L2 protocol acknowledgement</li> </ul>
QNNR	GRACIS source node number of the system from which data are read. 1..255
QFID	specify the source data area of the GRACIS L2 service.
QTYP	Value range, see table.
QDBNR	<ul style="list-style-type: none"> <li>In Read variable, the source data area specifies the address in the partner node from which the data are read out. Value range, see table.</li> </ul>
QANF	
QLAE	The source length specifies the number of data to be transferred. It must coincide with the destination length.
ZFID	specify the destination data area of the GRACIS L2 service.
ZTYP	<ul style="list-style-type: none"> <li>In Read variables, the destination data area specifies the address in the local node from which the data to be read are filed. Value range, see table.</li> </ul>
ZDBNR	
ZANF	The destination length specifies the number of data to be transferred. For inputs, outputs and flags, the indication is made in bytes, for all other data types, in words. With the CP 5430, max. 112 bytes (56 words) can be transferred.
ZLAE	

### 5.1.1.2 Write command

15	8 7	0
AKEN	ZNNR	Service identifier and destination description
ZFID	ZTYP	
ZDBNR		
ZANF		
ZLAE		
QFID	QTYP	Source description
QDBNR		
QANF		
QLAE		

The destination description describes the data area in the communication partner to which the data are written.

The source description describes the data area in the local system from which the data to be written are read out.

The individual entries have the following meanings:

AKEN	<p>The service identifier specifies the service carried out.</p> <ul style="list-style-type: none"> <li>• Write 02H data with L2 protocol acknowledgment</li> <li>• Write 03H data without L2 protocol acknowledgment</li> </ul> <p>When writing data with acknowledgment, an evaluation of the display word definitely proves whether or not the data have been written.</p>
ZNNR	<p>GRACIS destination node number of the system to which the data are written.</p> <p>1..255</p>
ZFID	specify the destination data area of the GRACIS L2 service.
ZTYP	Value range, see table.
ZDBNR	<ul style="list-style-type: none"> <li>• In Read variable, the destination data area specifies the address in the</li> </ul>
ZANF	partner node from which the data are written.
ZLAE	<p>The destination length specifies the number of data to be written. For inputs, outputs and flags, the indication is made in bytes, for all other data types, in words. With the CP 5430, max. 112 bytes (56 words) can be transferred.</p>
QFID	specify the source data area of the GRACIS L2 service.
QTYP	<ul style="list-style-type: none"> <li>• In Read variables, the source data area specifies the address in the local</li> </ul>
QDBNR	node from which the data to be written are read out. Value range, see table.
QANF	
QLAE	<p>The source length specifies the number of data to be transferred. It must coincide with the destination length.</p>

	DB	Flag	Inputs	Outputs	DX
Drive					
ZFID	0	0	0	0	0
ZTYP	01H	02H	03H	04H	0AH
ZDBNR	1..255				1..255
ZANF	0..2047	0..255	0..127	0..127	0..2047

	RDB	RDX	PDB	PDX	PDB	PDX
Drive	ram:	ram:	hd0:	hd0:	hd1:	hd1:
ZFID	1..255	1..255	1..255	1..255	1..255	1..255
ZTYP	21H	2AH	41H	4AH	51H	5AH
ZDBNR	1..255	1..255	1..255	1..255	1..255	1..255
ZANF	0..2042	0..2042	0..2042	0..2042	0..2042	0..2042

	FBA	FXA	FBB	FBX
Drive	A:	A:	B:	B:
ZFID	1..255	1..255	1..255	1..255
ZTYP	61H	6AH	71H	7AH
ZDBNR	1..255	1..255	1..255	1..255
ZANF	0..2042	0..2042	0..2042	0..2042

## 5.2 Parameters of the FB *GL2\_T0*

For the timeout monitoring the FB *GL2\_T0* must be called in the Time OB. If the FB is not called, there is no time monitoring.



STDB    D    KY    Control data block

### Indirect parameterization:

For the indirect parameterization the parameter STDB KY=0,0 is set. The FB parameters is then entered in the MW 240.

Parameter	Flag
STDB	MW240

## 5.3 Superior polling interface GRACIS L2

The FB *ZGL2-SST* is, apart from the standard function blocks, an additional polling interface for communication via the L2 bus.

The FB defines a command manager executing commands stored in a command buffer.

A repetition counter can specify how often a command can be repeated in case of negative acknowledgement.

A cycle counter can define a number of cycles as a delay between the commands.

For time-critical commands in the control a disable bit can be set to interrupt sending data and thus decrease the cycle time.

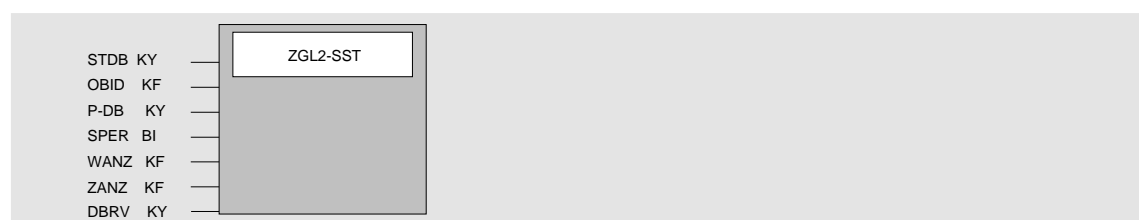
The *ZGL2-SST* block can only operate in one connection.

Only one current command can be active via each connection to a L2 partner. A new command can only be triggered after the active command has been processed.

The *ZGL2-SST* block calls the GRACIS L2 function blocks internally and thus exclusively assigns this connection. The user can no longer utilize this connection by means of direct handling block calls or GRACIS L2 function blocks!

### 5.3.1 Parameterization of the FB *ZGL2-SST*

The function block must permanently be called in the cycle, it must not be processed conditionally.



STDB	D	KY	Control data block Example: KY 0,12      data block DB12
OBID	D	KF	Object ID of the connection via which data are sent. Example: KF 1      1st connection
P-DB	D	KY	Parameter data block which contains the user interface. Example: KY 0,13      data block DB13
SPER	E	BI	Disable bit with which the sender can be disabled. The current command is concluded, other commands already initiated are canceled as long as the disable is removed. Example: M 14.1



WANZ	D	KF	Repetition counter which can specify in case of a negative send acknowledgement how often a command is to be repeated. Number+0 means no repetition but only a trial. Example: KF +3            3 repetitions before the command is rejected.
ZANZ	D	KF	Cycle counter which can specify a number of cycles as a delay between the individual send commands. Example: KF 0            no delay
DBRV	D	KY	Receive data block in which data as well as the acknowledgement telegrams, when sending with data acknowledgement, can be received. Example: KY 0,11        data block 11

### 5.3.1.1 Parameter data block P-DB

The user stores information on the individual commands in the parameter data block P-DB. The data block must be created by the user with 131 DWs.

	15	0	
0	Lubricating data word		Reserved for edge evaluation and internal states
1	Send initiating bits		
2	Acknowledgement bits		
3	Error bits		
4	Reserved		
5			
6			
7			
8			
9	Reserved		
10	QFID	QTYP	1st data interface for bit 1.0
11	QDB	QANF	
12	LAE		
13	ZFID	ZTYP	
14	ZDB	ZANF	
15	HANZW	PAFE	
16	QFID	QTYP	2nd data interface for bit 1.1
17	QDB	QANF	
18	LAE		
			16th data interface for bit 1.15
105	HANZW	PAFE	
106	Reserved		Reserved as operating area
129			
130	Reserved		

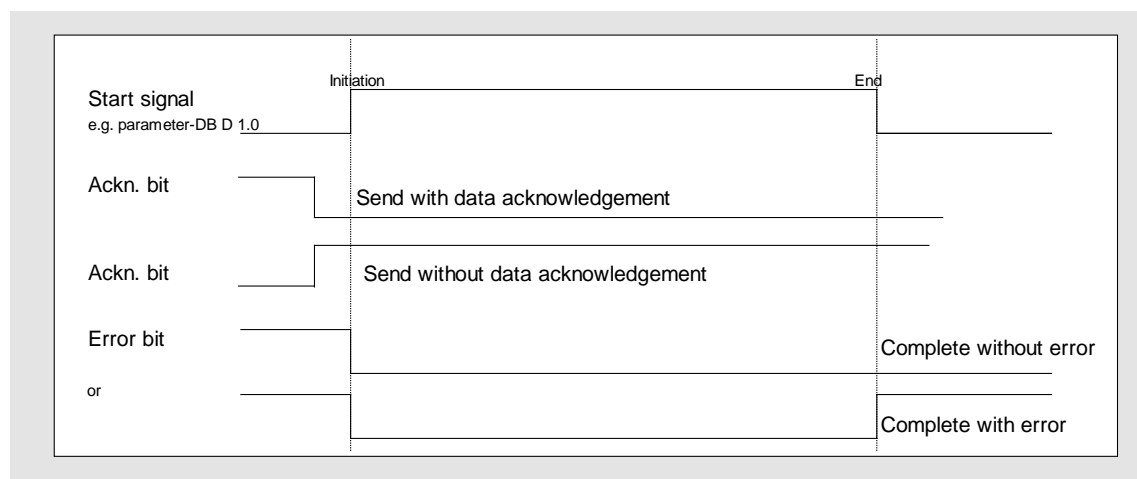
**Send initiating bits**      Up to 16 commands possible. Priorities are assigned to the bits, bit 0 has a higher priority than bit 15.

**Acknowledgement bits**      Bit position according to the send bits. It is selected whether the send command is executed with or without acknowledgement. A command with acknowledgement takes longer than a command without one. It can finally be defined whether the writing of the data was successful or not.

**Error bits**                      Bit position according to send bits which marks the successful completion of a send command.  
 0 = without error, 1 = with error

Command1	DW 10-15	First data interface for bit 1.0. The parameters Q/ZFID, Q/ZTYP, Q/ZDBRN, Q/ZANF correspond to the parameters in the command block of the GL2-CLIE. The parameter LAE corresponds to the parameter Q/ZLAE. The parameter HANZW corresponds to the high-byte of the GL2-CLIE display word, PAFE is the parameterization error of the GL2-CLIE.
Command 2	DW 16-21	Second data interface for bit 1.1 Assignment identical to 10-15
Command 3	DW 22-27	bit 1.2
Command 4	DW 28-33	bit 1.3
Command 5	DW 34-39	bit 1.4
Command 6	DW 40-45	bit 1.5
Command 7	DW 46-51	bit 1.6
Command 8	DW 52-57	bit 1.7
Command 9	DW 58-63	bit 1.8
Command 10	DW 64-69	bit 1.9
Command 11	DW 70-75	bit 1.10
Command 12	DW 76-81	bit 1.11
Command 13	DW 82-87	bit 1.12
Command 14	DW 88-93	bit 1.13
Command 15	DW 94-99	bit 1.14
Command 16	DW100-105	bit 1.15

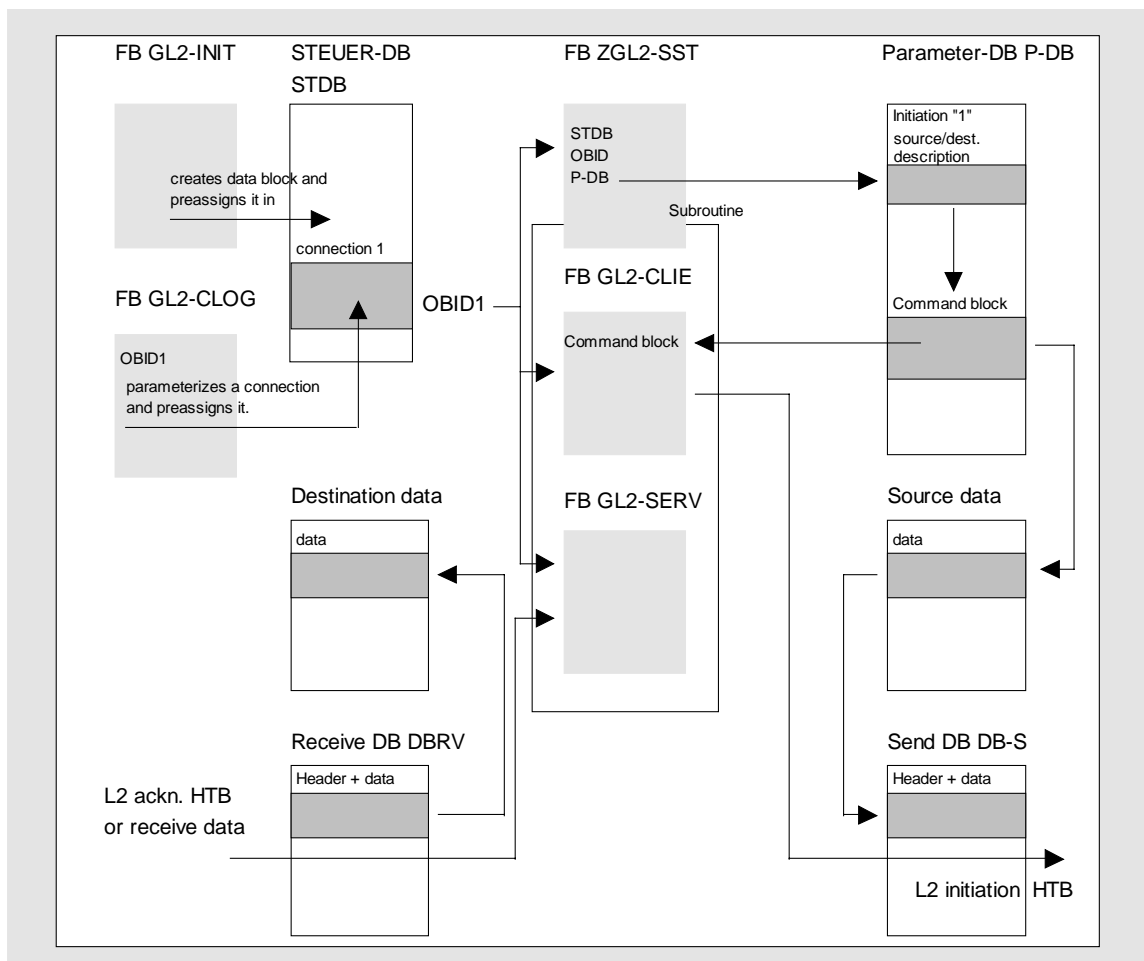
### 5.3.2 Bit profile, pulse diagram



After completing the transfer with the message Completed with error, the cause of error can be read out in the error display word of the interface.

For example: command 1: in DW 15

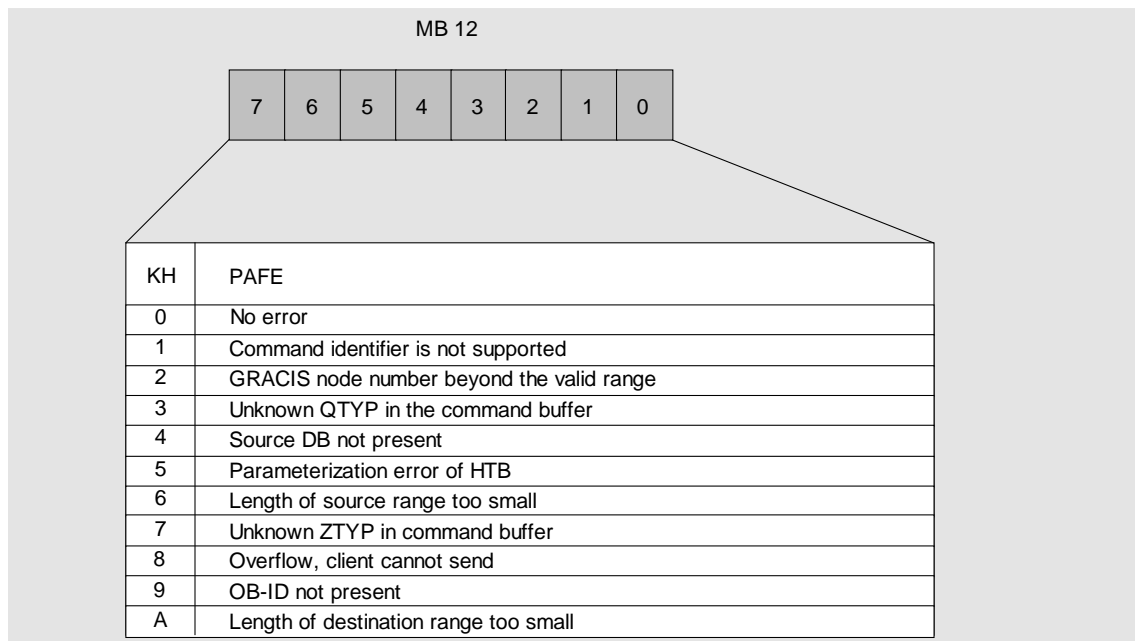
### 5.3.3 Overview of data transfer



## 5.4 Parameterization errors

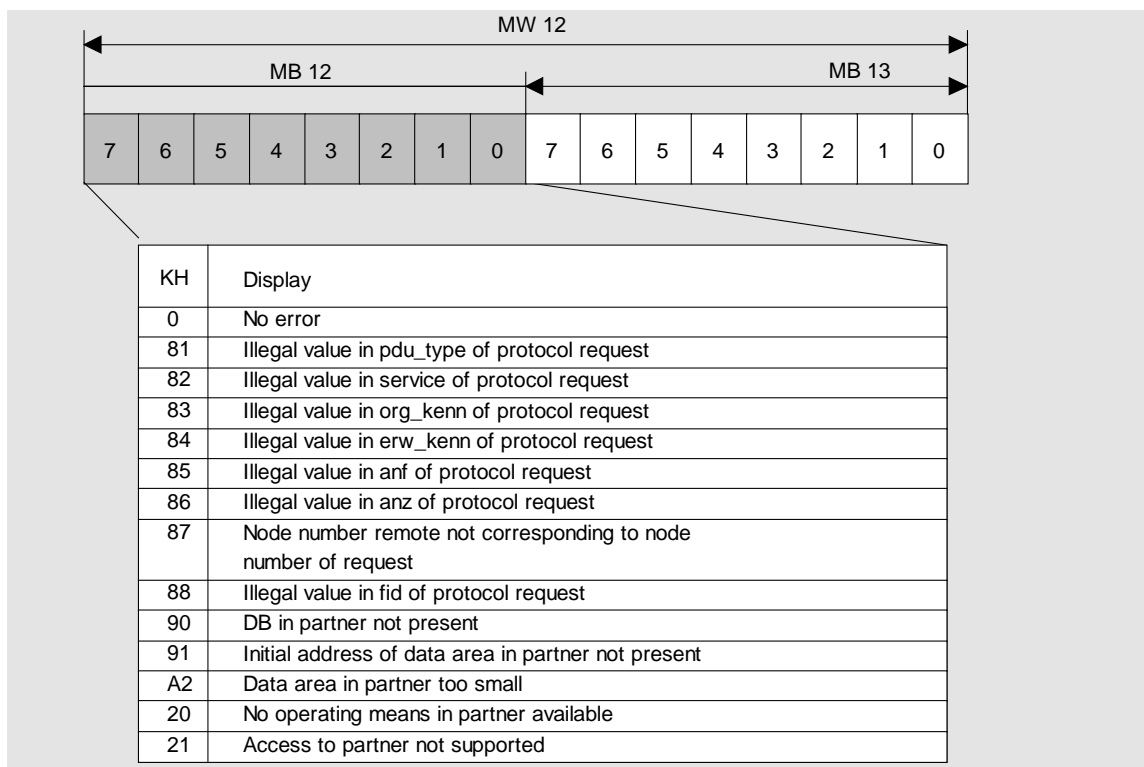
The parameterization error byte of the FB GL2-CLIE assigns one byte in the flag area.

In this byte the FB stores error codes if there are erroneous entries in the FB parameters or in the command buffer.



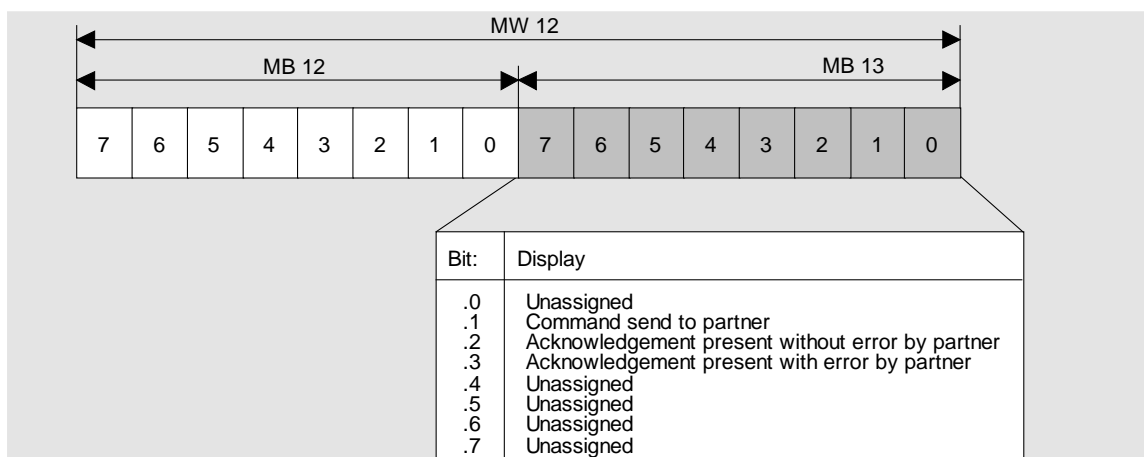
## 5.5 Display word

The display word ANZW assigns one word in the flag area. In the left byte the error code of the command is stored, the right byte contains the current command status.



The errors 01-0F are error messages of the handling blocks.

Display word right byte:





## 6 Technical Data

The software package ZFS blocks is delivered on a 3.5" disc which includes the files for all automation devices.

AG 115U: CPU 942, CPU 943, CPU 944      Datei: L2115GST.S5D  
 AG 135U: CPU 922, CPU 928, CPU 928B      Datei: L2135GST.S5D

### L2-L2 blocks:

FB	PLC 115U	PLC 135U
GL2-INIT	FB 140	FB 140
GL2-CLOG	FB 141	FB 141
GL2-SERV	FB 142	FB 142
GL2-CLIE	FB 143	FB 143
GL2-T0	FB 144	FB 144
GL2-SST	FB 145	FB 145

The FBs require the subordinate control-specific standard handling blocks. These are to be loaded into the S5-CPU with the relevant SIMATIC S5 control.

### Handling blocks:

The function blocks FB 244 to FB 249 are already included in the SIMATIC S5-115U in the firmware and need not be ordered.

FB	PLC 115U	PLC 135U	PLC 155U
SEND-ALL	FB 244	FB 126	FB 126
SEND-DIRECT	FB 244	FB 120	FB 120
RECEIVE-ALL	FB 245	FB 127	FB 127
CONTROL	FB 247	FB 123	FB 123
RESET	FB 248	FB 124	FB 124
SYNCHRON	FB 249	FB 125	FB 125

## Function block data of the individual controls

S5-CPU	File	Block data		
		FB No.	Bib.-No.	Length in words
		FB140	E88530-S-140-A-2	274
PLC 115U	L2115GST.S5D	FB141	E88530-S-141-A-2	152
		FB142	E88530-S-142-A-3	1474
CPU 942		FB143	E88530-S-143-A-3	966
		FB144	E88530-S-144-A-2	147
		FB145	E88530-S-145-A-2	361

S5-CPU	File	Block data		
		FB No.	Bib.-No.	Length in words
		FB140	E88530-S-140-B-1	262
PLC 135U	L2135GST.S5D	FB141	E88530-S-141-B-1	146
		FB142	E88530-S-142-B-3	1437
CPU 922		FB143	E88530-S-143-B-2	954
		FB144	E88530-S-144-B-1	106
		FB145	E88530-S-145-B-1	333



## **7                    Programming Example**

<b>7.1</b>	<b>Start-up of the SIMATIC S5 System.....</b>	<b>7-2</b>
<b>7.2</b>	<b>Cyclic Part .....</b>	<b>7-3</b>

In this example the following functions are to be realized:

- Write and read a S5 data block into the external memory (fixed disc and SRAM).

Hardware configuration:

- PLC115U
- CPU 944
- CP 5430 with basic page frame 0 nodes 20
- GRACIS PG node 10

**M 180.0** Write DB 100 ( DW 0 to DW 19) from S5-CPU into external memory (fixed disc) PDB 99 FID 1 as from DW 0.

**M 180.1** Read RDB 12 FID 199 DW 0 to DW 19 from external memory SRAM in DB 102 as from DW 0 by S5-CPU.

The flag M 180.0 to 180-1 must be set by the user program. The data block DB 20 must be created with a length of 10 words, the data blocks DB 10 and DB 11 with a length of 128 bytes.

On the GRACIS system an image should be planned that displays the four variable fields "PDB 99 FID 1 DW 0 length 20 ASCII", "RDB 12 FID 199 DW 0 length 20 ASCII", "DB 100 DW 0 length 20, ASCII" und "DB 102 DW 0 length 20 ASCII".

These fields are to be defined as INPUT/OUTPUT fields. An external data block is created by GRACIS or extended if it has not been present when writing or has been too short respectively.

## 7.1 Start-up of the SIMATIC S5 System

### OB 21

Network 1 synchronization of page frames

:SPA	FB	249	Synchronization of page frame 0 GRADAS
NAME	:SYNC		
SSNR	:	KY 0,0	Interface number 0
BLGR	:	KY 0,4	Block size 4 = 128 bytes
PAFE	:	FY 1	FY 1 includes the parameterization error
:			

Network 2 Installing the connection DB

:SPA	FB	140	Install STDB
NAME	:GL2_INIT		
STDB	:	KY 0,12	Data block DB 12=STDB
VERB	:	KF +1	Install up to 1 connection
KNNR	:	KF 20	Node number of the local GRACIS system
:			
:***			

## Network 3 Preassignment of STDB

:SPA	FB	141	NAME :GL2-INIT
STDB	:	KY 0,12	Data block 12 is STDB
OBID	:	KF 1	OBID of connection
TIME	:	KF 100	1 sec timeout
SSNR	:	KF 0	Page frame 0
ANSR	:	KF 10	Send command number as in CP 5430 with COM 5430
ANRR	:	KF 11	Receive command number as in CP 5430 with COM 5430
5430			
DB-S	:	KY 0,11	Send DB of this connection
KNNR	:	KF 10	Node of connected partner
	:	BE	

**OB 22**

## Network 1 Synchronization of page frame

:SPA	FB	249	Synchronization of page frame 0 GRADAS
NAME	:	SYNC	
SSNR	:	KY 0,0	Interface number 0
BLGR	:	KY 0,4	Block size 4 = 128 bytes
PAFE	:	FY 1	FY 1 includes the parameterization error
	:	BE	

**7.2 Cyclic Part****OB 1**

## Network 1

:UN	M	0.1	
:S	M	0.1	VKE = 1
:U	M	0.0	
:R	M	0.0	VKE = 0
	:	***	

## Network 2 GRADAS functions

:SPA	FB	142	GL2_SERV
NAME	:	GL2_SERV	
STDB	:	KY 0,12	Control DB 12
OBID	:	KF 1	Connection identifier
DBRV	:	KY 0,10	Receive DB 10
ANZW	:	MW 100	Display word MW 100
	:	***	

## Network 3

:SPA	FB	1	External memory
NAME	:	EXTERN	
E SC	:	M 180.0	Write
E LE	:	M 180.1	Read
	:	U 0.1	
	:	R 180.0	
	:	R 180.1	
	:	BE	

**FB 1**

Network 1

NAME :EXTERN

BEZ :E SC E/A/D/B/T/Z: E BI/BY/W/D: BI

BEZ :E LE E/A/D/B/T/Z: E BI/BY/W/D: BI

	:A	DB	20	
	:U	=E SC		Write
	:SPB	=SCHR		
	:U	=E LE		Read
	:SPB	=LESE		
	:SPA	=DRUE		
SCHR	:L	KY	2,10	Write command after node 10
	:T	DW	1	
	:L	KY	1,65	Destination : ZFID 1 , ZTYP "PDB" (41h)
	:T	DW	2	
	:L	KF	99	Destination : PDB 99
	:T	DW	3	
	:L	KF	0	Destination : As from data word 0
	:T	DW	4	
	:L	KF	20	Destination : 20 data words
	:T	DW	5	
	:L	KY	0,1	Source : no FID, QTYP "DB" (01h)
	:T	DW	6	
	:L	KY	0,100	Source : DB 100
	:T	DW	7	
	:L	KF	0	Source : As from data word 0
	:T	DW	8	
	:L	KF	20	Source : 20 data words
	:T	DW	9	
	:SPA	=FB		
LESE	:L	KY	1,10	Read command after node 10
	:T	DW	1	
	:L	KY	199,33	Source : QFID 199; QTYP "RDB" (21h)
	:T	DW	2	
	:L	KF	12	Source : RDB 12
	:T	DW	3	
	:L	KF	0	Source : As from data word 0
	:T	DW	4	
	:L	KF	20	Source : 20 data words
	:T	DW	5	
	:L	KY	0,1	Destination : ZFID 0 , ZTYP "DB" (01h)
	:T	DW	6	
	:L	KF	102	Destination : DB 102
	:T	DW	7	
	:L	KF	0	Destination : As from data word 0
	:T	DW	8	
	:L	KF	20	Destination: 20 data words
	:T	DW	9	
DRUE	:SPA	=FB		
	:ON	M 103.2		Acknowledgment without error
	:ON	M 103.3		Acknowledgment with error
	:BEB			
FB	:***			

## Network 2

:SPA FB 143  
NAME :GL2-CLIE  
STDB : KY 0,12  
OBID : KF 1  
ADB : KY 0,20  
AANF : KF 1  
ANZW : MW 102  
PAFE : MB 104  
:BE

Data block 12 = STDB  
Connection 1  
Command DB  
Initial address of command  
Display word  
Parameterization error



## 8 Index

### A

Acknowledgement bits ..... 5-6  
ANZW ..... 5-10

### C

Central interface ..... 2-4  
Command buffer ..... 5-3  
Command manager ..... 5-5  
Configurations ..... 2-3  
Control DB ..... 3-3  
Cyclic data request ..... 4-1

### E

Error bits ..... 5-7

### D

Display word ..... 5-10

### F

FB GL2-CLIE parameter ..... 5-2  
FB GL2-CLOG  
    Indirect parameterization ..... 3-5  
    Parameters ..... 3-4  
FB GL2-INIT  
    Indirect parameterization ..... 3-4  
    Parameters ..... 3-3  
FB GL2-SERV  
    Command buffer ..... 5-3  
    Indirect parameterization ..... 4-2; 5-2  
    Parameters ..... 4-1  
FB GL2\_T0  
    Indirect parameterization ..... 5-4  
    Parameters ..... 5-4  
FB SYNCHRON ..... 3-2  
FB ZGL2-SST Parameterization ..... 5-5  
Function block data ..... 6-2  
Functions ..... 2-4

### G

GRADAS ..... 2-3; 4-1

### H

Handling blocks ..... 6-1

### L

L2 blocks ..... 6-1

### O

OBID ..... 3-4  
Organization Control DB ..... 3-3

### P

Page frames ..... 3-2  
Parameter data block ..... 5-6  
Parameterization error ..... 5-9  
Peripheral initiative ..... 2-3

### R

Read data with L2 protocol  
acknowledgement ..... 5-3

### S

Send DB ..... 3-5  
Send initiating bits ..... 5-6  
Service identifier ..... 5-3  
Start-up programming ..... 3-3  
Superior polling interface ..... 5-5  
Synchronization ..... 3-2

### T

Technical data ..... 6-1

### W

Write data ..... 5-3  
Write data without L2 protocol  
acknowledgement ..... 5-3

### Z

ZFS blocks ..... 6-1





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**Suggestions**

**Corrections**

For Publication / Manual:  
GRACIS  
Installation Instructions  
SIMATIC S5 Interface (SINEC L2)

Order No.: 6ZB5 440-0UW02-0AA1  
Edition: July 1994

**From:**

Name: \_\_\_\_\_

Company/Dept.: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_ / \_\_\_\_\_

Should you come across any printing errors when reading this publication, please notify us on this sheet. Suggestions for improvement are also welcome.

**Suggestions and / or corrections:**

## Content and target group of the GRACIS documentation

### Acquisition phase

#### Product Brief HPF/LPF

6ZB5 440-0TX02-0BA1

**Target group: O/I users**

General, brief overview of the GRACIS system covering hardware and software components.

#### Description HPF/LPF

6ZB5 440-0TY02-0BA0

**Target group: O/I users**

General system overview

#### AR10 Catalog HPF/LPF

E86060-K6310-A101-A4-7600

**Target group: Special machine builders**

Order numbers / scope of supply

### General GRACIS publications

#### Operator Interface HPF/LPF

6ZB5 440-0UD02-0AA0

**Target group: GRACIS configurat. engineer**

Like all system, GRACIS has its own term.

Terms like "work window", "slider", etc. are explained for you. You will also get to know the GRACIS operator panels. The last chapter lists the operator panels against their functions.

### GRACIS LPF

#### Technical Description LPF

6ZB5 440-0VD02-0AA1

**Target group: Startup engineers/  
system configuration engineers/  
process operators**

This publication enables you to start up a GRACIS system.

The emphasis is on hardware startup. There is a description of how to incorporate the components from the configurat. stage (S5 program list and GRACIS list) .

You will become familiar with the GRACIS-specific characteristics in process mode..

- Service modul
- GRAPH 5 sequence diagnostics

#### Configuration LPF

6ZB5 440-0VE02-0AA0

**Target group: GRACIS configurat. engineer**

With its information on how to configure GRACIS, you are certain to use this publication frequently in the future.

- First steps in configuring
- Management, system services

Configuring from

- Process displays
- Printouts
- Text list
- Messages
- GRAPH 5

## Configuration stage GRACIS HPF

### **SIMATIC S5 Interface (local and SINEC H1)**

**6ZB5 440-0UB02-0AA0**

**Target group: S5 programmers**

You get to know the interface between SIMATIC S5 and GRACIS for local and SINEC H1 networked systems.

You program the exchange of process displays and the specialist applications of central function control.

### **SIMATIC S5 Interface (SINEC L2)**

**6ZB5 440-0UW02-0AA1**

**Target group: S5 programmers**

You get to know the interface between SIMATIC S5 and GRACIS for local and SINEC H1 networked systems.

You program the exchange of process displays.

### **Configuration HPF**

**6ZB5 440-0UE02-0AA1**

**Target group: GRACIS configurat.  
engineers**

With its information on how to configure GRACIS, you are certain to use this publication frequently in the future.

- First steps in configuring
- Management, system services

Configuring of

- Process displays
- Printouts
- Text list
- Messages
- Access control
- GRAP1
- GRAPH 5

### **Networking**

**6ZB5 440-0UF02-0AA0**

**Target group: Networking  
engineers**

This publication shows you how to configure and execute a GRACIS network. It explains both serial connection and networking via SINEC L2 and SINEC H1.

### **Configuring Options**

**6ZB5 440-0UG02-0AA1**

**Target group: GRACIS configurat.  
engineer**

You become familiar with the available GRACIS options.

The publication gives information on functions, configuration and incorporation into the GRACIS system.

## Process mode phase GRACIS HPF

### **Process mode**

**6ZB5 440-0UC02-0AA1**

**Target group: Process operators**

Here you learn the GRACIS-specific characteristics in process mode.

You learn the effects of active fields, input/output fields, display control, cursor control and password interlocking in process mode.

- Saving GRACIS data
- Service modul
- GRAPH 5 sequence diagnostics

### **Technical Description HPF**

**6ZB5 440-0UA02-0AA0**

**Target group: Startup engineers/  
system configurat. engineers**

This publication enables you to start up a GRACIS system.

The emphasis is on hardware startup. There is a description of how to incorporate the components from the configuration stage (S5 program list and GRACIS lists).