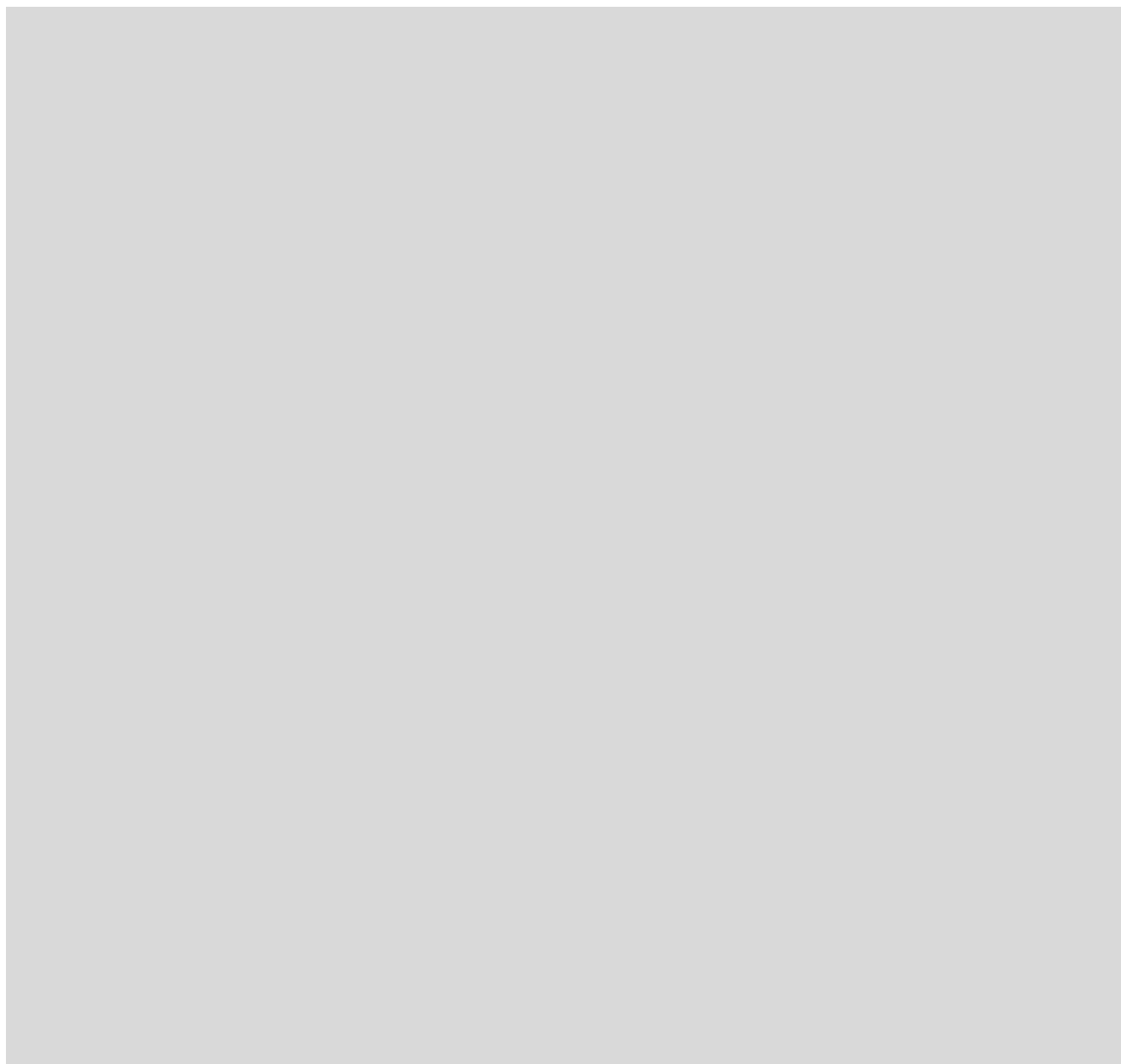


CL500

Computer Interface Module R500P

Module description



Version

101



CL500

Computer Interface Module R500P

Module description

1070 072 138-101 (94.03) GB



Reg. Nr. 16149-03

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Discretionary charge 20.– DM

Safety instructions and reading help

Read this instruction manual before you use the computer interface module R500P. Keep this manual in a place where it is always accessible to all users.

Standard operation

This instruction manual contains all of the information required for standard operation of the described products. These products are used for connecting control components by means of the PROFIBUS interface.

The products described were developed, manufactured, tested and documented in accordance with the relevant safety standards. There should be no risk of danger to personnel or property if the specifications and safety instructions relating to the project phase and installation and correct operation of the product are followed.

Qualified personnel

This instruction manual is designed for specially trained PLC personnel. The relevant requirements are based on the job specifications as described by the ZVEI, see:

**Anforderungsprofile für SPS – Fachkräfte
I + K SPEKTRUM 19
Hrsg.: ZVEI
Stresemannallee 19
60596 Frankfurt
Federal Republic of Germany
ISSN 0932 – 5018**

This instruction manual is designed for PLC specialists. They require special knowledge of the CL500 controller and PROFIBUS.

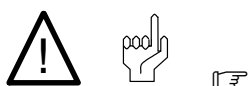
Interventions in the hardware and software of our products which are not described in this instruction manual may only be performed by our skilled personnel.

Unqualified interventions in the hardware or software or non-compliance with the warnings listed in this instruction manual or indicated on the product may result in serious personal injury or damage to property.

Qualified personnel are persons who

- as **planning personnel**, are familiar with the safety guidelines used in electrical engineering and automation technology.
- as **operating personnel**, are familiar with the equipment used in the field of automation technology and are thus familiar with the operating instructions in this manual.
- as **commissioning personnel**, are authorized to commission, ground and classify electric circuits and devices/systems in accordance with the relevant safety standards.

Safety instructions in this manual



These symbols are used throughout this manual subject to the following conditions.



This symbol is used wherever an insufficient or lacking compliance with instructions can result in **personal injury**.

Safety instructions accompanied by this symbol are serially numbered, for example 0.1. The appendix provides translations of the safety notes shown here in all the official EC languages.



This symbol is used wherever an insufficient or lacking compliance with instructions can result in **damage to equipment or files**.

Safety instructions accompanied by this symbol are serially numbered, for example 0.1. The appendix provides translations of the safety notes shown here in all the official EC languages.



This symbol is used to inform the user of special features.

Safety instructions on the control components

The following warnings and notices may be indicated on the control components themselves and have the following meaning:



Danger: High voltage!



Danger: Battery acid!



Electrostatically – sensitive components!



Disconnect at mains before opening!



Pin for connecting PE conductor only!



For screened conductor only!



We would greatly appreciate any contributions to improve this manual. If you have any suggestions, please fill out the page provided at the end of this manual.

Safety instructions



0.1

Test every new program before operating the system!



0.2

When handling the R500P all preventions for ESD protection must be observed! Avoid electrostatic discharges!

Observe the following protective measures for electrostatically endangered modules (EEM)!

- The employees responsible for the storage, transport and handling must be trained in ESD protection.
- EEMs must be stored and transported in the protective packaging specified.
- EEMs may basically only be handled at special ESD work places set up specifically for this purpose.
- Employees, work surfaces and all devices and tools, which could come into contact with EEMs must be same potential (e.g. earthed).
- Wear an approved earthing strap around your wrist. The grounding bracelet must be connected via a cable with integrated 1 M Ω resistance with the work surface.
- EEMs may on no account come into contact with chargeable objects, these include most plastics.
- When inserting EEMs into devices and removing them, the power source of the device must be switched off.

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1 Hardware

The R500P PROFIBUS module is used for connecting the CL500 controller to other Bosch controllers or other communication devices capable of exchanging data.

The R500MP is equipped with a 9-pin PROFIBUS port for connecting the CL500 controller with other communication partners which support the PROFIBUS protocol in accordance with DIN 19245, Parts 1 and 2.

A combined V.24/20mA interface is provided on the R500P for point-to-point connections.

1.1 Design and System Bus Coupling

The R500P is a computer interface module equipped with a combined V.24/20mA interface and a PROFIBUS interface connection.

Channel **0** is assigned to the V.24/20mA serial interface, and channel **1** is assigned to the PROFIBUS interface. Both channels can be operated simultaneously.

1.2 Front panel

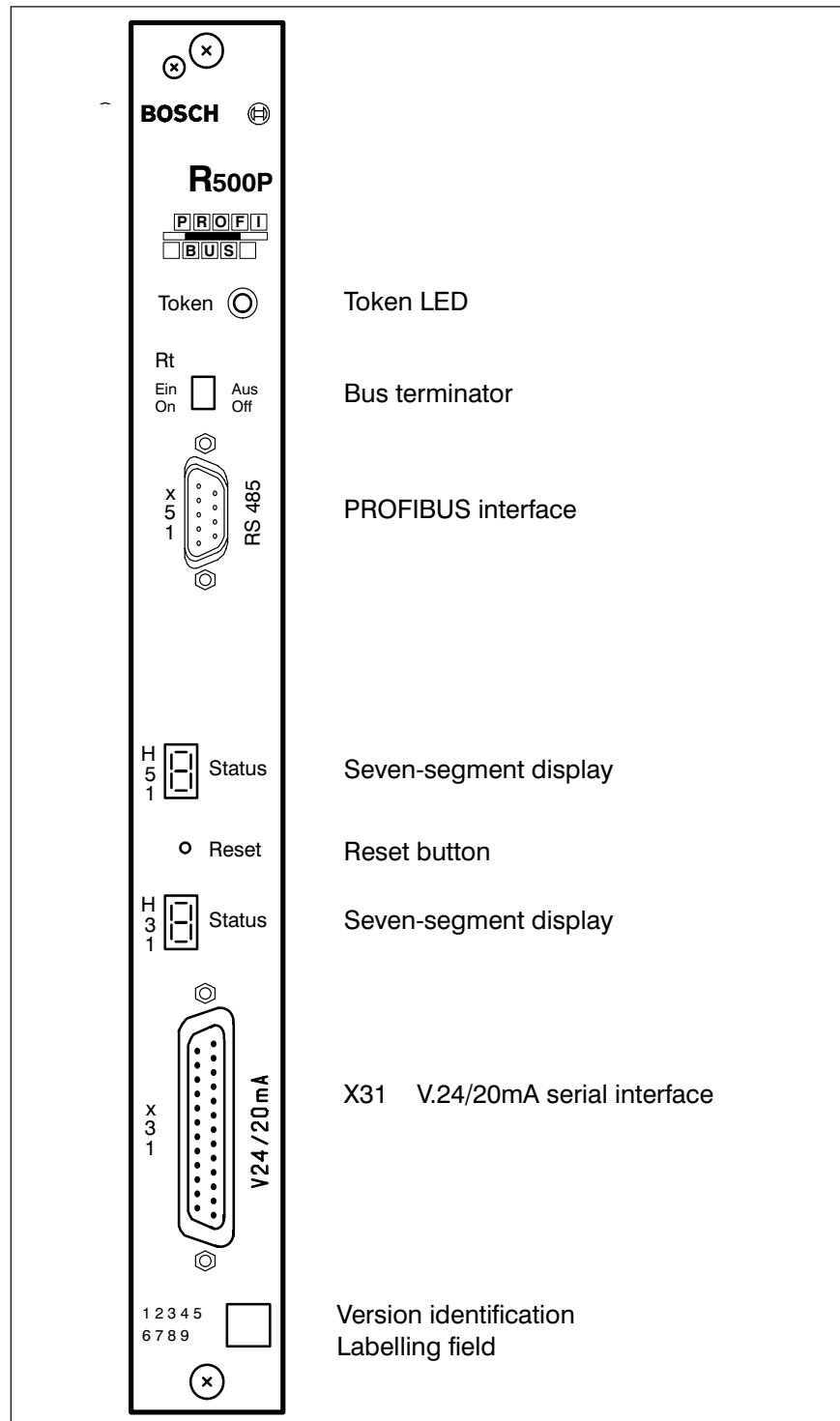


Fig. 1-1 Front panel of the R500P

Green Token LED

The token LED is on when channel 1 of the PROFIBUS protocol is operating. This requires that valid configuration data have been loaded.

The LED comes on as soon as the R500P in the logical token ring receives the clear-to-send signal, i.e., the token. At the conclusion of the token holding time, the module passes the token to the next communication partner and the token LED goes out.

Bus terminator

This is used for switching the bus terminator on and off.

Seven-segment display – H51

This indicates the faulty jobs of channel 1; see subsection [1.2.1](#).

Seven-segment display – H31

This indicates the faulty jobs of channel 0; see subsection [1.2.1](#).

Interfaces

The PROFIBUS interface is described in section [1.5](#). The V.24/20mA interface is described in subsections [1.6.4](#) through [1.6.6](#).

Version identification

Used for identifying the module version

Labelling field

Used for identifying the module address

1.2.1 Status Display

The status can be displayed for each channel of the R500P. Running (central) jobs as well as error messages are displayed.

Channel-specific displays

Code	Meaning
.	One central job is processing
P	<ul style="list-style-type: none">● Protocol error (error occurred during protocol memory programming)● Protocol not loaded
0 through F	Job channel number of a faulty job

Fig. 1-2 Status display, channel-specific

The display only corresponds to the job number if the job number ≤ 15 . If the job number is > 15 , the R5REQ function block randomly assigns a free job channel number between 0 and 11. This job number is displayed if an error occurs.

Channel-independent displays

Code	Meaning
H	Hardware error
P flashes	Flash memory currently being loaded by PLC services programme

Fig. 1-3 Status display, channel-independent

Display assignments

- In addition to a faulty job's number, the decimal point is also displayed for the processing duration of subsequent central jobs.
- Each faulty job is filed in the display table. It remains there until a job with the same number is successfully concluded.
- If a faulty job has been successfully concluded and was displayed, the number of the next job stored in the display table is indicated in the display. This is the job with the highest number of all the faulty jobs.

Different jobs can be processed simultaneously with PROFIBUS.

If the last job was concluded with no errors, the decimal point for the job still being processed is shown.

1.3 Connection Possibilities

Connection to PROFIBUS

All devices, including those of other manufacturers, with a PROFIBUS connection in compliance with DIN 19245 Parts 1 and 2, can be connected to the PROFIBUS interface. PROFIBUS is an open, nonproprietary, and normed transmission protocol. The PROFIBUS interface is isolated and permanently assigned to **channel 1** of the R500P.

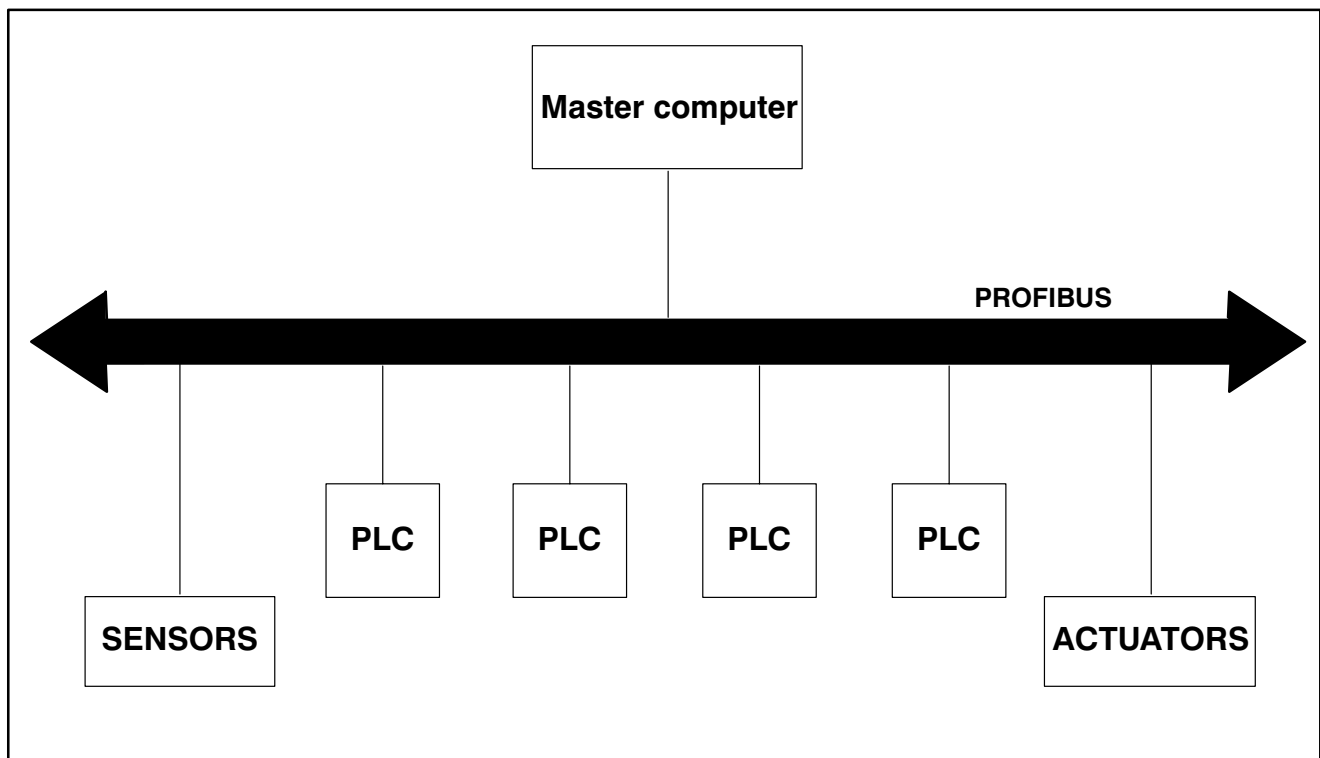


Fig. 1-4 Example for connection by means of PROFIBUS

Connection via the V.24/20mA serial interface

V.24/20mA interface is available to the user on **channel 0**.

Devices equipped with a V.24 or 20mA interface can be connected to the V.24/20mA interface.

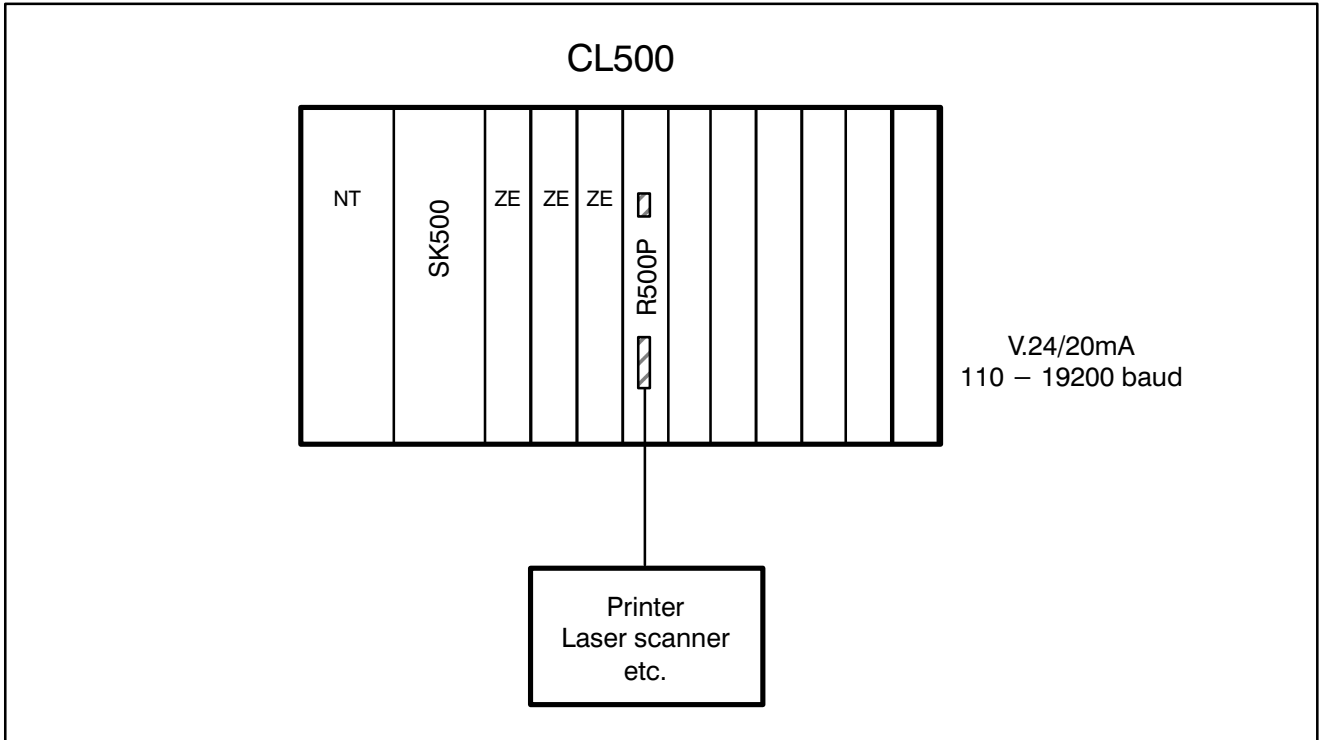


Fig. 1-5 Example for connection via the V.24/20mA interface

1.4 Slots

A maximum of 5 R500Ps can be operated in the basic unit in slots 5 through 14.

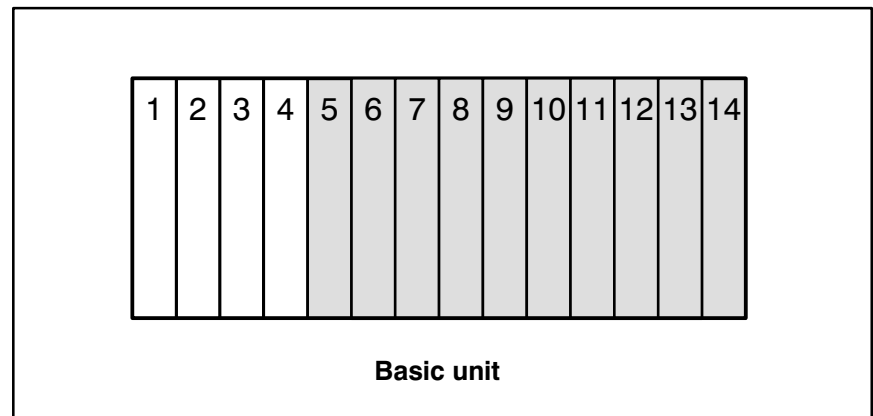


Fig. 1-6 Slots of the R500P

1.5 PROFIBUS Interface

The PROFIBUS interface port conforms to DIN 19245 Parts 1 and 2, and is located on the front panel in the form of a subminiature socket.

The interface is isolated.

1.5.1 Contact Assignment and Connection Cable

Contact assignment

The following shows the plug connector contact assignment on the bus cable and on the interface connection:

Pin no.	RS-485 reference	Signal	Meaning
1		Shield	Shield or Protective ground
2		free	
3	B/B'	RxD/TxD-P	Receive / Transmit data P
4		free	
5	C/C'	DGND	Data ground
6		VP	Voltage Plus
7		free	
8	A/A'	RxD/TxD-N	Receive / Transmit data P
9		free	

Fig. 1-7 PROFIBUS contact assignment

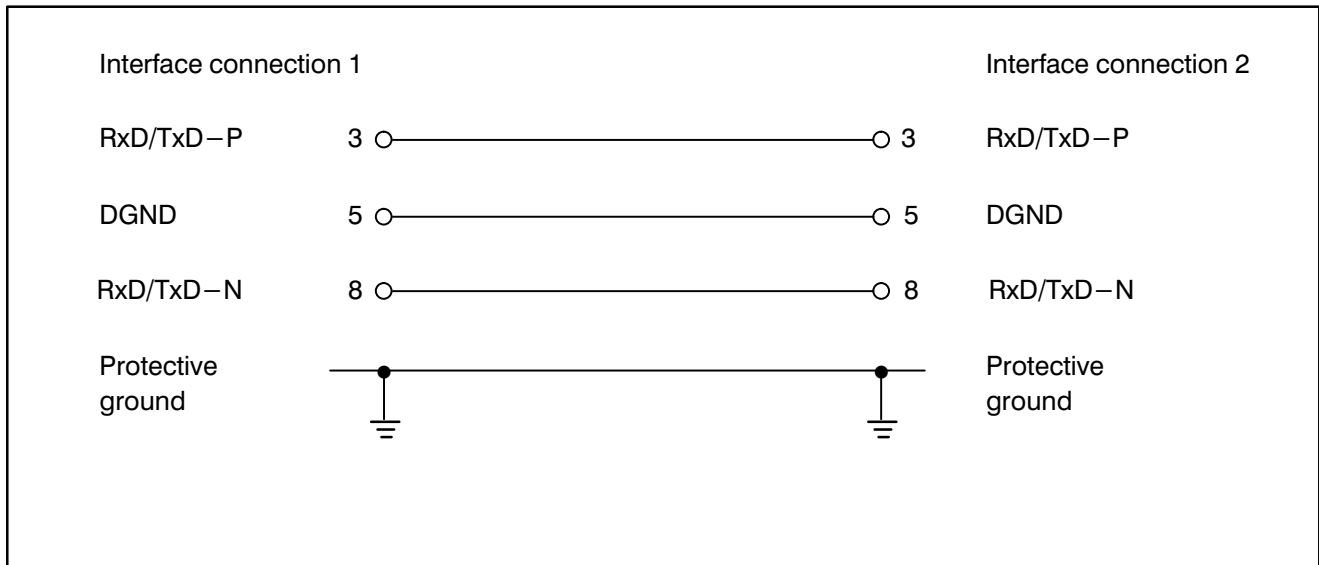


Fig. 1-8 PROFIBUS wiring

Connection cable

A shielded, twisted 2-wire cable in accordance with DIN 19245 Part 1 is used as the connection cable (for example: Bosch cable, order no. 913 548).

A connector assembly kit is available from Bosch, order no. 068 451.

1.5.2 Transmission Speeds and Cable Lengths

Data traffic via PROFIBUS is possible at 5 different speeds.

The higher the transmission speed, however, the shorter the maximum possible cable length.

Baud rate	Maximum cable length			
	No repeater	1 repeater	2 repeaters	3 repeaters
9.6/19.2/93.75 kBaud	1.2 km	2.4 km	3.6 km	4.8 km
187.5 kBaud	600 m	1.2 km	1.8 km	2.4 km
500 kBaud	200 m	400 m	600 m	800 m

Fig. 1-9 Transmission speeds and transmission distances

Cable lengths and the number of users can be increased by using bidirectional repeaters. Note the maximum of three repeaters between two users.

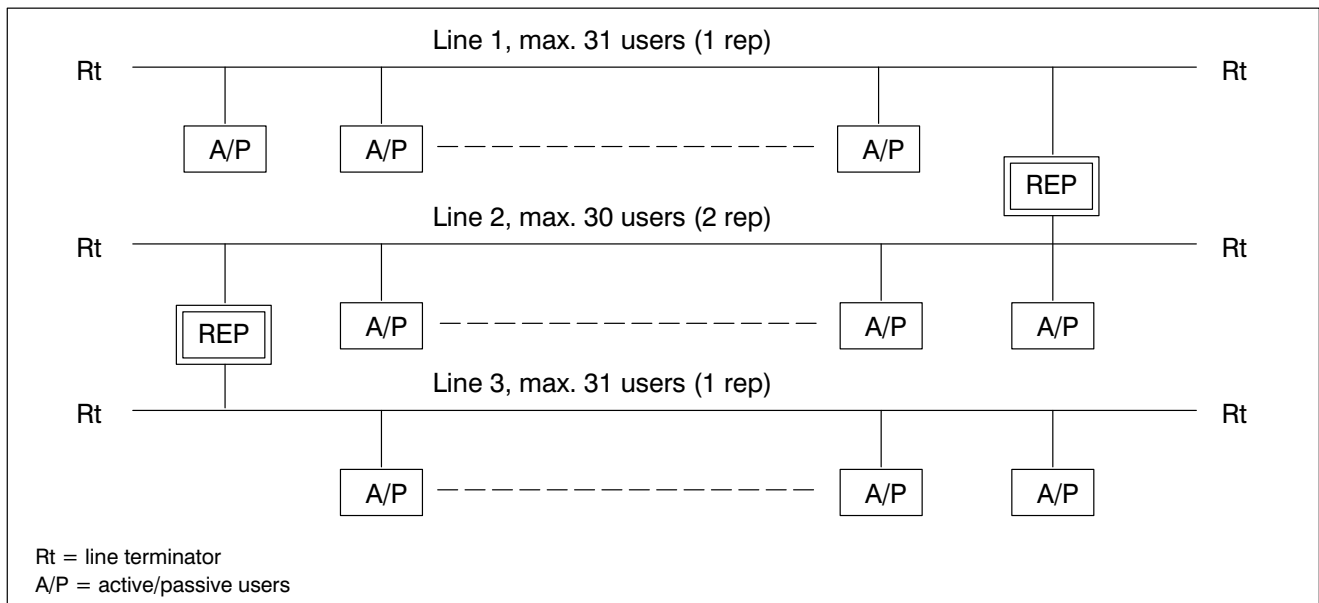


Fig. 1-10 Repeaters connected in series

1.5.3 Bus Connection, PROFIBUS T–connector, Bus Terminator

The user is connected to the bus with a **PROFIBUS T–connector**, the rear side of which is connected to the R500P and is equipped with 2 sockets on the front for the incoming and outgoing bus cable; see fig. 1–12.

Designation	Order number
PROFIBUS T–connector	064 142

Fig. 1–11 PROFIBUS T–connector, order no.

Users at the system end do not require T–connectors.

The bus terminator must be switched on for the users at the line ends; see fig. 1–10. The bus terminator is switched on with the bus terminator switch **Rt** on the front panel.

- **On** – Bus terminator switched on
- **Off** – Bus terminator switched off



PROFIBUS operations require that both partners representing the bus terminator are always switched on.

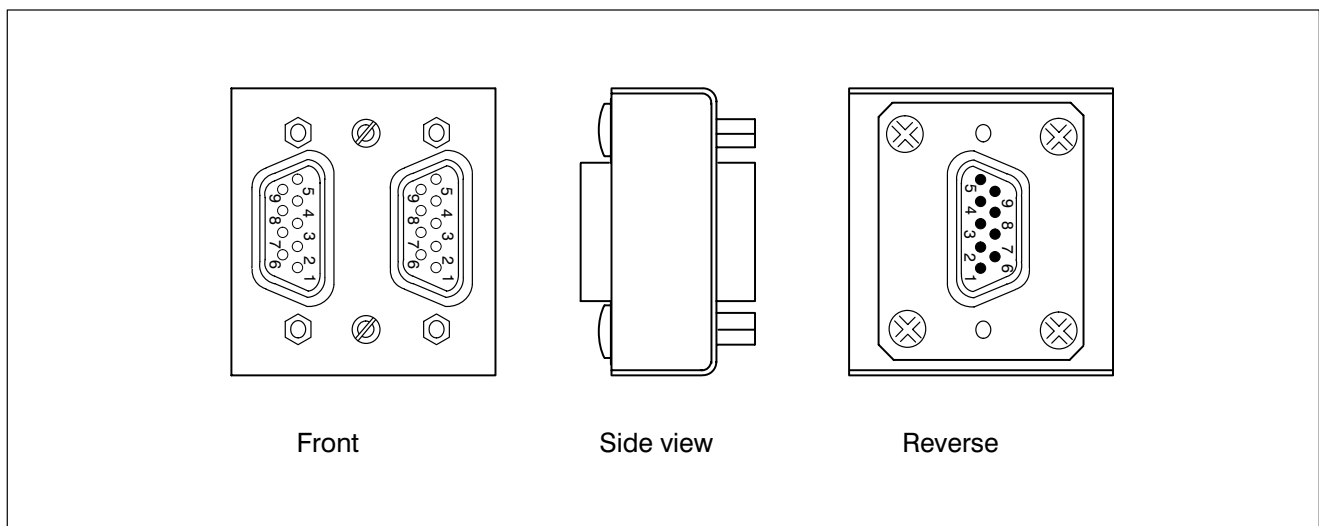


Fig. 1–12 PROFIBUS T–connector

1.6 Settings on the R500P



These settings must be made before starting R500P operations.



1.1

All necessary precautions regarding ESD protection must be taken when working with the computer interface module R500P. Avoid electrostatic discharges!

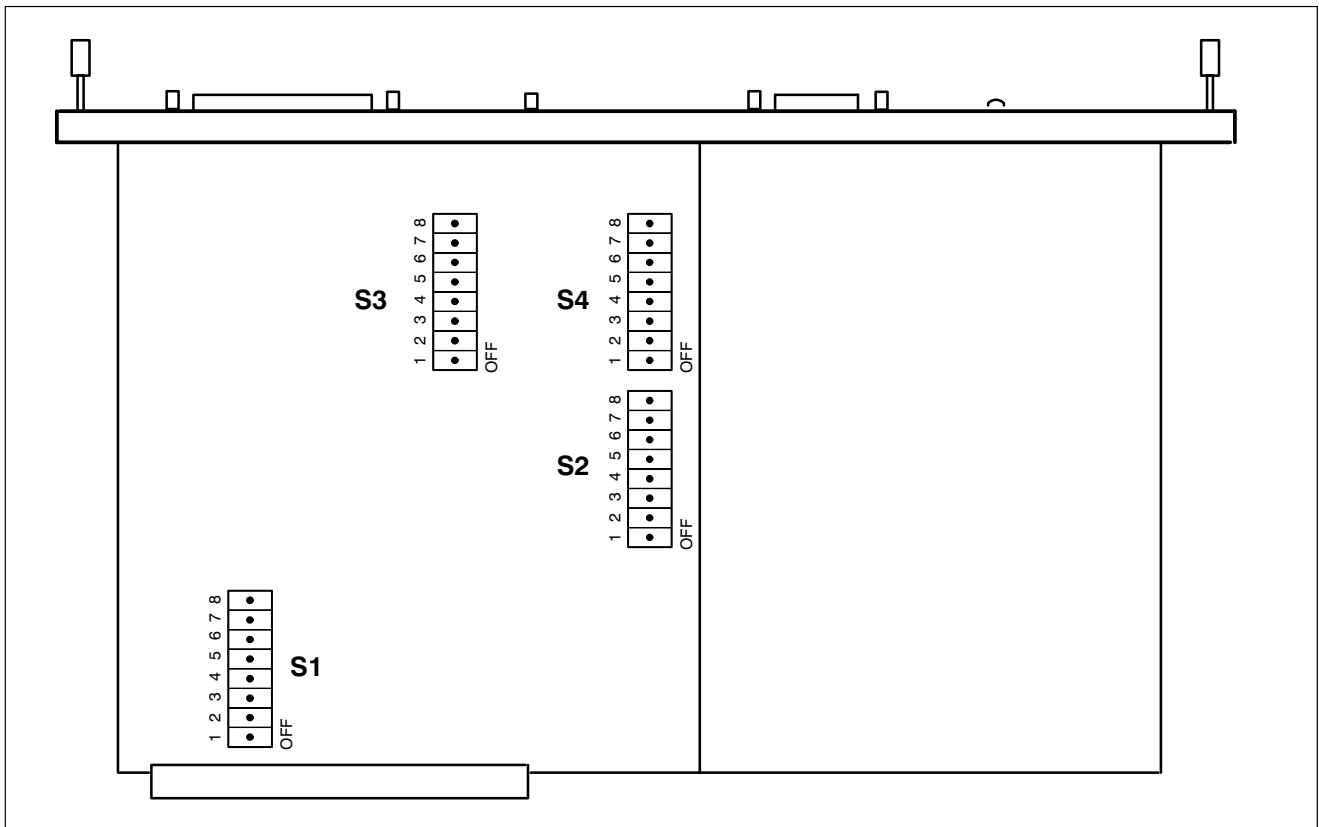


Fig. 1-13 DIP switch arrangement on the R500P

DIP switches

- S1 – For setting the block address of the R500P
- S2 – For setting the PROFIBUS transmission speed
- S3 – For setting the transmission format, the number of characters, the transmission speed of the serial transmission, and the control signal for the V.24/20mA interface.
- S4 – For setting the PROFIBUS user address

1.6.1 Setting the Block Address of the R500P

The R500P occupies 4 blocks on the system bus.

The DIP switch **S1** is used for setting the block address of the R500P.

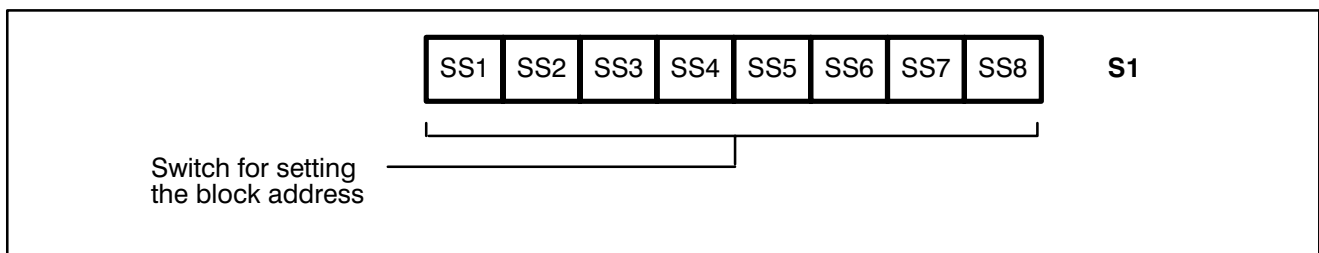


Fig. 1–14 S1, block address of the R500P

Switch numbers of the DIP switch S1								Address on the system bus of the CL500
SS1	SS2	SS3	SS4	SS5	SS6	SS7	SS8	
off	off	off	off	off	off	off	off	00H – 000D
on	off	off	off	off	off	off	off	01H – 001D
off	on	off	off	off	off	off	off	02H – 002D
.
off	on	on	on	on	on	on	on	FEH – 254D
on	on	on	on	on	on	on	on	FFH – 255D

Fig. 1–15 Block address of the R500P

1.6.2 Setting the PROFIBUS User Address

Switches SS1 – SS7 on the DIP switch **S4** are used for setting the PROFIBUS user address. There are 126 user addresses. User address **0** is reserved for the PROFIBUS configurator.

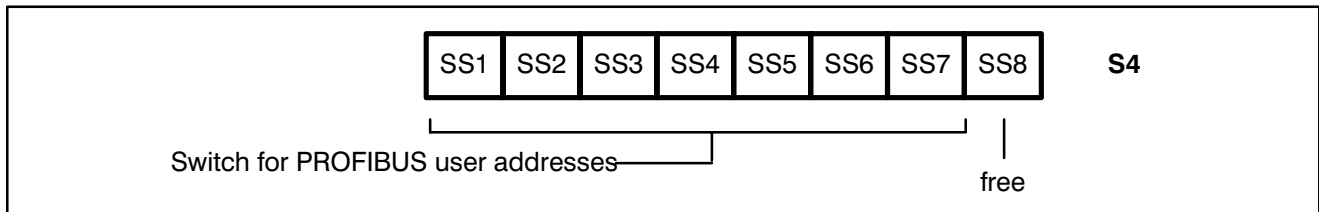


Fig. 1–16 S4, PROFIBUS user addresses

Switch numbers of the DIP switch S4							PROFIBUS user address
SS1	SS2	SS3	SS4	SS5	SS6	SS7	
off	off	off	off	off	off	off	(0) reserved for configurator
on	off	off	off	off	off	off	1
off	on	off	off	off	off	off	2
on	on	off	off	off	off	off	3
off	off	on	off	off	off	off	4
on	off	on	off	off	off	off	5
		.					.
		.					.
		.					.
		.					.
off	on	on	on	on	on	on	126

Fig. 1–17 PROFIBUS user addresses

1.6.3 Setting the PROFIBUS Transmission Speed

4 bits on the R500P **S2** DIP switch are provided for protocol-specific settings. Switches SS5 – SS7 are used for setting the transmission speed.

Switches SS1 – SS4 are for the channel **0** settings; refer to the following operating instructions:

CL500
Übertragungsprotokolle R500
Bausteinbeschreibung
P.–Nr. 4320

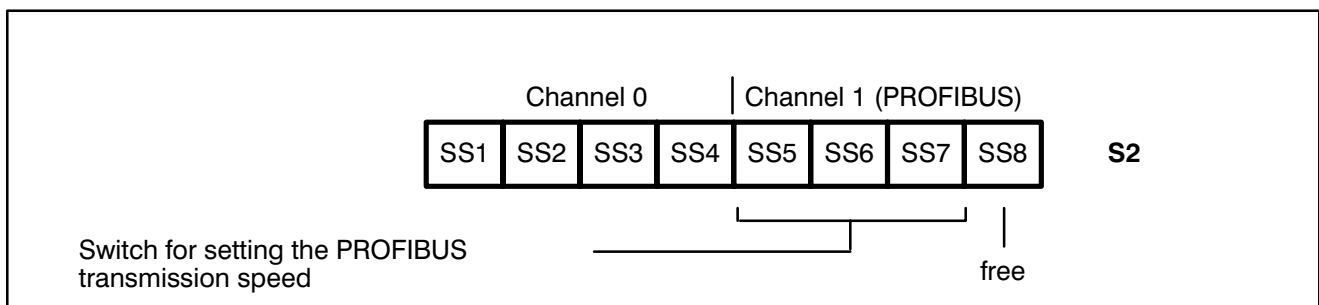


Fig. 1–18 S2, PROFIBUS transmission speed

Switch numbers of DIP switch S2			Transmission speed
SS5	SS6	SS7	
off	off	off	9.6 kBaud
on	off	off	19.2 kBaud
off	on	off	93.75 kBaud
on	on	off	187.5 kBaud
off	off	on	500 kBaud

Fig. 1–19 PROFIBUS transmission speed

1.6.4 Setting the Control Signal for the V.24/20mA Interface

Switch SS8 of DIP switch **S3** is used for establishing whether or not control signals (DTR/DSR) for the V.24/20mA interface are requested.

Note the following:

- Request control signals SS8 set to **On**
- Do not request control signals SS8 set to **Off**

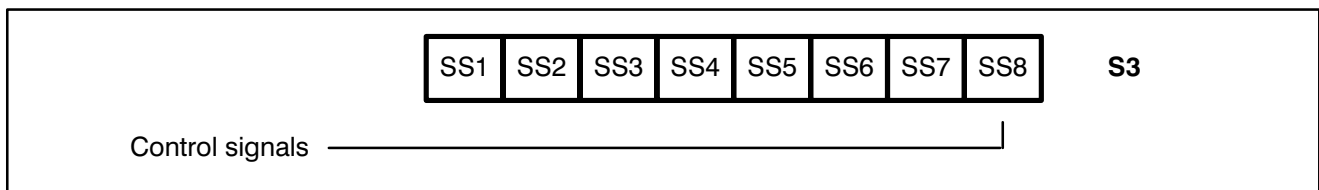


Fig. 1–20 S3, control signal

1.6.5 Setting the Transmission Speed for the V.24/20mA Interface

Switches SS5 through SS7 of the **S3** DIP switch are used for setting the transmission speed for the V.24/20mA interface.

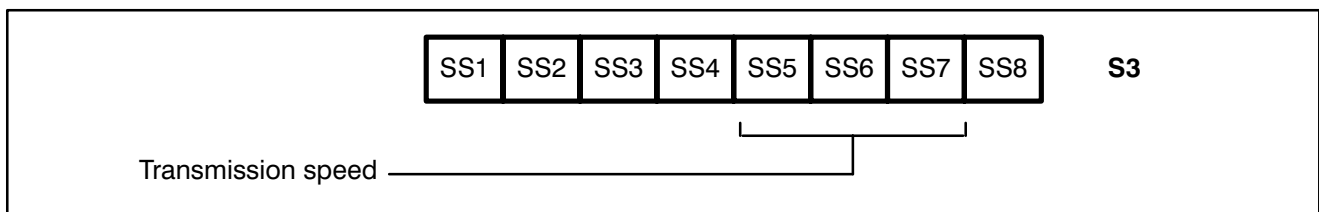


Fig. 1–21 S3, transmission speed

SS5	SS6	SS7	Transmission speed
on	on	on	19200 baud
off	on	on	9600 baud
on	off	on	4800 baud
off	off	on	2400 baud
on	on	off	1200 baud
off	on	off	600 baud
on	off	off	300 baud
off	off	off	110 baud

1.6.6 Setting the Transmission Format for the V.24/20mA Interface

Switches SS1 through SS4 of the **S3** DIP switch are used for setting the transmission format for the V.24/20mA interface.

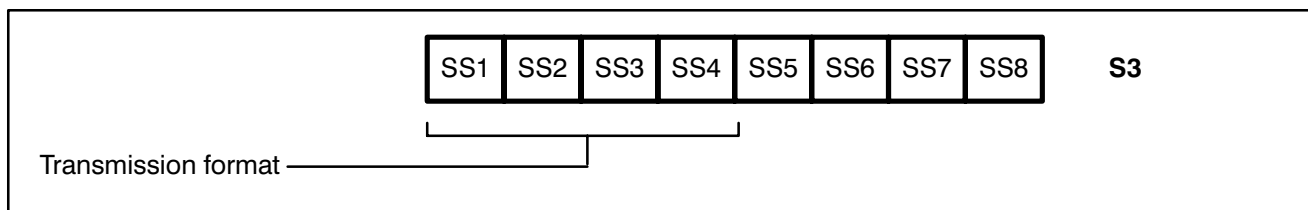


Fig. 1–22 S3, transmission format

Note the following settings:

SS1	1 Stop bit	:	on
	2 Stop bits	:	off
SS2	7 Information bits	:	on
	8 Information bits	:	off
SS3	Even parity	:	on
	Uneven parity	:	off
SS4	Parity	:	on
	No parity	:	off

The 2 combined V.24/20mA interfaces are 25–pin subminiature connectors located on the front panel of the R500.

V.24 or 20mA operation is determined by the cable's pin assignment.

V.24 interface

The signal voltage level and connector assignment comply with VDI Directive 2880, Sheet 2, for programmable logic controllers, process interfaces and data interfaces. The control and signalling lines are evaluated by the hardware and then set, if desired, by appropriately setting the **S4** DIP switch for the upper interface or the **S3** DIP switch for the lower interface. The interface is isolated.

Signal level (data line) : Logic 1 → –15 V to –3 V
 Logic 0 → +3 V to +15 V

Signal level (signalling and control line) :
 Active → +3 V to +15 V
 Passive → –15 V to –3 V

Meaning	Designation	Connection no.	Signal Direction
Transmit data PLC	TxD	2	→ X
Receive data PLC	RxD	3	← X
Reference conductor, Ground (Signal Ground)		7	
Data Set Ready	DSR	6	← X
Data Terminal Ready	DTR	20	→ X

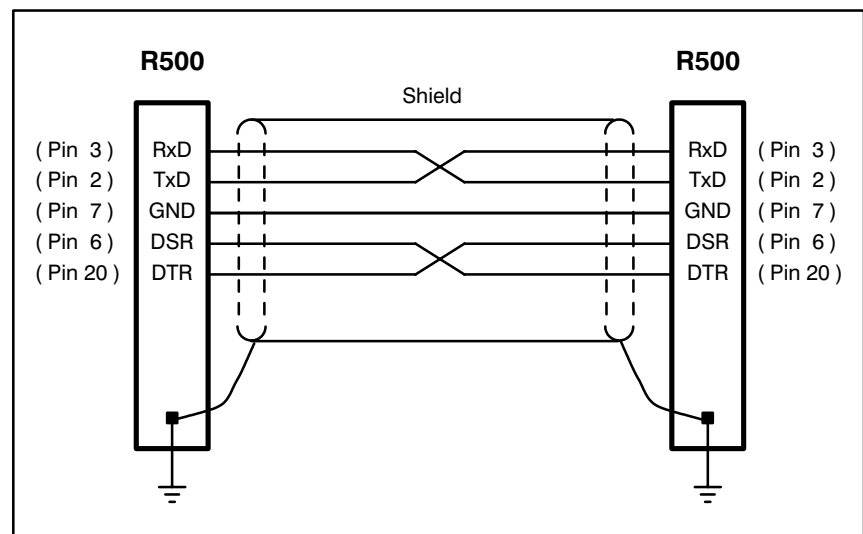


Fig. 1–23 Example of interfacing two CL500s via the V.24 interface



There must only be a voltage difference of $-2\text{ V} \leq \Delta V \text{ diff} \leq +2\text{ V}$ between the receiver and transmitter.

20mA interface

The signal level and connector assignment comply with VDI Directive 2880, Sheet 2 (max. blocking voltage 27 V) for programmable logic controllers, process interfaces and data interfaces.

The 20mA interface, depending on pin assignment, can be actively connected (to the power source), or passively connected.

Line state : Logic 1 → 20 mA
 Logic 0 → no current

20 mA / Active

Meaning	Designation	Connection no.	Signal direction
Receive data +PLC	RxD +	12	←
Receive data –PLC	RxD –	24	
Transmit data +PLC	TxD +	13	→
Transmit data –PLC	TxD –	25	
Data Set Ready +	DSR +	14	←
DataSet Ready –	DSR –	18	
Reader Control +	RDRCTL +	16	→
Reader Control –	RDRCTL –	21	



For active operations, connections 9 (12V in) and 10 (12V out) must be bridged.

20 mA / Passive

Meaning	Designation	Connection no.	Signal direction
Receive data + PLC	RxD +	22	←
Receive data – PLC	RxD –	12	
Transmit data + PLC	TxD +	23	→
Transmit data – PLC	TxD –	13	
Data Set Ready +	DSR +	11	←
Data Set Ready –	DSR –	14	
Reader Control +	RDRCTL +	19	→
Reader Control –	RDRCTL –	16	

Connection cable and cable lengths

Use a shielded and twisted cable, for example Bosch cable no. 910152, for connections.

The data line must not be installed parallel to power cables in its immediate vicinity.

Characteristics

The cable used must not exceed with following limits:

Line resistance: 138 Ω/km
 Capacity: 120 pF/m

V.24/20mA interface line lengths

Transmission speed baud	V.24 (m)	20mA (m)
19200	100	150
9600	300	300
4800	300	350
2400	300	350
1200	300	350
600	300	350
300	300	350
110	300	350

1.7 Technical Data

Technical data	R500P
Interfaces	<ul style="list-style-type: none"> • V.24/20mA in accordance with VDI 2880, Sheet 2 • RS485 in accordance with US standard EIA Both interfaces are isolated.
Baud rates	<ul style="list-style-type: none"> • 110 baud to 19.2 kBaud V.24/20mA interface • 9,6 kBaud to 500 kBaud PROFIBUS interface
Current consumption from 5 V voltage supply	750 mA typical 1.2 A maximum
Current consumption from 12 V voltage supply	60 mA + 20 mA per active current loop
Current consumption from 12 V voltage supply	10 mA typical
Interference – field strength	in accordance with DIN IEC 1131
Resistance compared to mains-borne disturbance	in accordance with DIN IEC 1131
Protection standard in accordance with DIN 40 050	IP 20
Humidity class in accordance with DIN 40 050	F
Electrostatic resistance in accordance with DIN IEC 1131	ESTB
Mechanical loading	Installation in a permanently mounted, vibration-free device
Max. number per controller	5
Permissible ambient temperature range	0 to +55 °C
Storage temperature range	–25 to +70 °C
Modular width	1
Weight	590 g

Fig. 1–24 Technical data

2 PROFIBUS Transmission Protocol

The PROFIBUS transmission protocol supports the RS485 interface and is based on the ISO/OSI layer model of open communication systems.

PROFIBUS makes use of the physical layer 1, the data link layer 2, and the application layer 7.

The data link layer and the physical layer are described in DIN 19245 Part 1.

The application layer and network management are described in DIN 19245 Part 2.

2.1 PROFIBUS Services

Fig. 2-1 provides an overview of the current R500P functions.

Service	Client	Server
Initiate	X	X
Abort	X	X
Reject	–	X
Status	X	X
Identify	X	X
Read	X	X
Write	X	X
Get–OV	X	X
FMA7 event	X	X
FMA7 initiate	–	X
FMA7 abort	–	X
Initiate–Load–KBL–Rem	–	X
Load–KBL–Rem	–	X
Terminate–Load–KBL	–	X
Read–KBL–Rem	–	X
Set–Value–Rem	–	X
Read–Value–Rem	–	X
Ident–Rem	–	X
LSAP–Status–Rem	–	X

Fig. 2-1 PROFIBUS services

Note the following for 2-1:

- X = supported
- = not supported



The R500P supports low priority services in accordance with DIN 19 245, Parts 1 and 2.

2.2 Application of the PROFIBUS Communication Model for the CL500

In the following, the terms **central and peripheral jobs** are used for the purpose of unified terminology when referring to the computer interface modules of the CL500 and the PROFIBUS module R500P.

PROFIBUS module	PROFIBUS norm	Meaning
Central job	Client behaviour	Job issued by the PLC programme
Peripheral job	Server behaviour	Job received by the communication partner

Fig. 2-2 Terms used for the PROFIBUS communication model

The user accesses the communication system with a PLC interface which is implemented with the aid of function blocks.

Data exchange between the R500P and ZS500 central unit is via the system bus.

2.3 PLC Interface

The PLC interface allows access to the communication system and is implemented with the aid of the following 4 function blocks:

- R5INIT
- R5REQ
- R5CON
- R5IND

The PLC offers the possibility of sending jobs to the R500P (client behaviour of the CL500) or of monitoring the execution of jobs which have been issued by the communication partner (server behaviour of the CL500). In addition, any events which occur are displayed.

Job monitoring (time monitoring) is not supported by the function blocks. This is done in the R500P's firmware.

PROFIBUS offers the additional possibility of monitoring connections. Here, the communication system checks, at intervals the user can determine, whether the connection to the communication partner still exists.

If a connection is interrupted, the user is notified by the R5IND.

3 R5INIT

3.1 Characteristics

Characteristics	R5INIT
Block name	R5INIT
Block length	715 words
Call length	14 words
Processing time	1.8 ms to 14.3 ms 1.8 ms + 2.5 ms for each computer interface module to be initialised
Occupied marker	M230 to M254

Fig. 3–1 R5INIT characteristics

The **R5INIT initialising** function block creates various tables in the ZS and in the computer interface module and copies information into them which is accessed during communication operations between the two modules.

After the controller is switched on, this block must only run once before communication via the computer interface can take place. For this reason, it is generally called in the run–up organisation module OM5 or OM7.



The R5INIT function block is not required in purely server operations.

3.2 Parameters

The R5INIT features five input parameters and one output parameter.

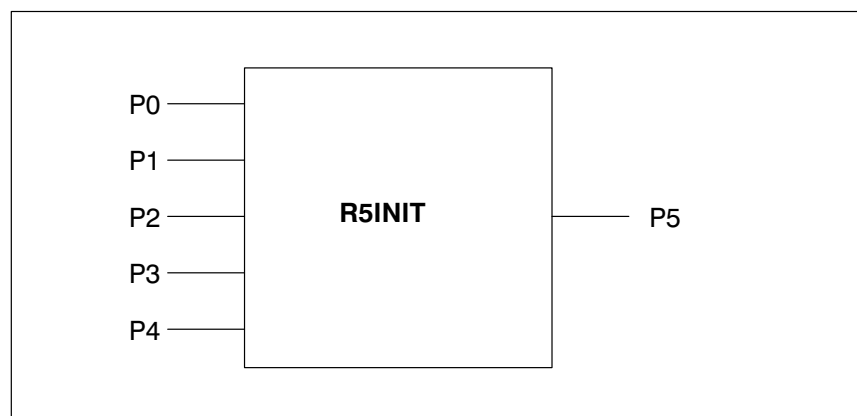


Fig. 3-2 Parameters of the R5INIT

Input parameters

P0	(W)	Module number of computer interface 0
P1	(W)	Module number of computer interface 1
P2	(W)	Module number of computer interface 2
P3	(W)	Module number of computer interface 3
P4	(W)	Module number of computer interface 4

The module number corresponds to the entry in the system table. The user can freely select the assignment of the computer interface number to the module number.

If the module number is changed in the SK table, the R5INIT parameter must also be changed accordingly. The parameter value FFFFH must be specified for modules which are not in the system.

Because this block may be called only once in each ZS, **all** computer interface modules (R500, R500P, R500M-EN) required for processing the respective ZS data communication jobs are initialised.

Output parameters

P5 (W) Result

This parameter provides the PLC programme with the results of the initialisation operation and reports any errors :

Code	Meaning
0000H	Initialization successful
0001H	No computer interface corresponding to parameter 0
0002H	No computer interface corresponding to parameter 1
0004H	No computer interface corresponding to parameter 2
0008H	No computer interface corresponding to parameter 3
0010H	No computer interface corresponding to parameter 4
0020H	No free memory available
0021H	No data field address in the memory management list
0030H	Communication error at the computer interface
0031H	Communication error at the ZS

Fig. 3-3 Output parameter P5

Notes:

4 R5REQ

4.1 Characteristics

Characteristics	R5REQ
Block name	R5REQ
Block length	903 words
Call length	14 words
Processing time	0.2 ms to 48.2 ms 0.2 ms + 3 ms for each job to be transmitted
Occupied marker	M230 to M254

Fig. 4–1 R5REQ characteristics

The function block **Request R5REQ** must be called to start one or more central jobs from the PLC programme.

The R5REQ manages a job using the job table, transfers the required parameters to the corresponding R500P, and provides the user with a message indicating whether the job was successfully transferred to the R500P.

4.2 Parameters

The R5REQ has four input parameters and two output parameters.

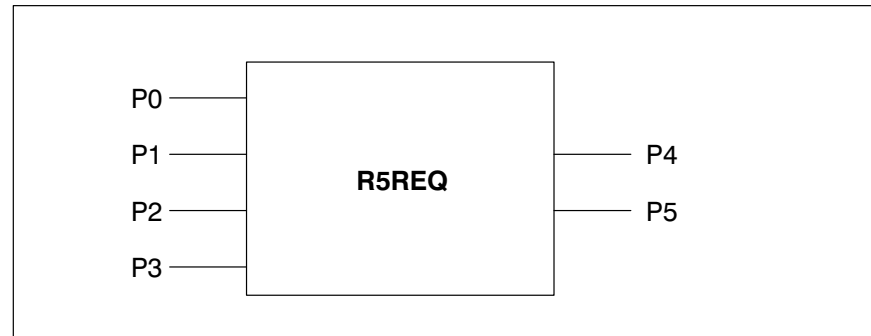


Fig. 4-2 R5REQ parameters

4.2.1 Input Parameters

P0

P0 (W) Data type

This parameter defines the type of the data area. Here, a data area consisting of 16 words for the protocol-specific parameters is reserved for each job. Possible data types are data module (44H), data buffer (64H), and data field (43H). The user must always reserve 16 words per job for the job-specific parameters.

P1

P1 (W) Data type extension

If P0 defines a data module as the data area, P1 specifies the data module number. Otherwise, P1 is meaningless. Permissible values: 0 – 255

P2

P2 (W) Byte offset

The start address for the job parameters in the selected data area is specified here.

P3**P3 (W) Job bit strip**

With this parameter, the user specifies the jobs which should be simultaneously started with a single R5REQ call operation. Here, one bit is assigned to each job. When a bit is set, the parameters in the specified data module or data field assigned to a job become the valid parameters. Note the following assignment:

Job bit 0		1st parameter field in DM/DB/DF
Job bit 1	→	2nd parameter field in DM/DB/DF
.		
.		
Job bit 15	→	16th parameter field in DM/DB/DF

4.2.2 Output Parameters

P4

P4 (W) Error messages

Error codes recognised by the R5REQ during job allocation are entered here. The low byte contains the error number and the high byte contains the recommended action.

Low byte: Error number

Code	Meaning
00H	No errors recognised, correct call operation
01H	The input parameter P3 (job bit strip) is 0
02H	The specified data module is not available
03H	The specified data module is too short
04H	The specified offset is invalid
06H	Incorrect memory management list
07H	The module is not in the SK list
08H	Incorrect module block address

Fig. 4-3 Output parameter P4, Error numbers

High byte: Reaction

Code	Meaning
00H	No errors recognised, correct call operation
01H	Repeat R5REQ call
02H	Change PLC programme
03H	Change protocol parameters
04H	The FM R5INIT must be rerun
05H	The FM R5REQ must be rerun
06H	The FM R5CON must be rerun
07H	Reload V24 protocol

Fig. 4-4 Output parameter P4, Reaction

P5**P5 (W) Result bit strip**

The user is informed of any errors which were detected during job allocation. Here, one job is assigned to each result bit.

This assignment corresponds to that for the input parameter **job strip bit**. A set result bit indicates that the corresponding job could not be allocated. In addition, a detailed error code is transferred in the specified data module/data field/data buffer for each job.

4.3 Meaning of the Parameters in the Data Area

A parameter field consisting of 16 words must be reserved for each job in the data field **DF**, data buffer **DB**, or data module **DM**.

The address and the data area offset is defined by means of the parameter P0 through P2 in the R5REQ.

In the **job bit strip** and **result bit strip**, each parameter field is allocated one bit, beginning with bit 0.

1. Job
 - DW0 Result of the job
 - DW1 Computer interface module and channel number
 - DW2 Job number
 - DW3 – DW15 Protocol-specific parameters
 2. Job
 - DW16 – DW31
- etc.

DW0

DW0 (W) Result of the job

Error messages are issued here after every R5REQ call operation. The low byte contains the error number and the high byte contains the recommended PLC reaction.

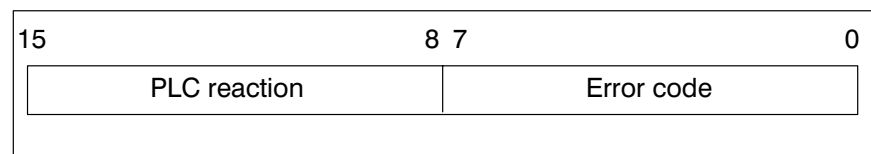


Fig. 4-5 DW0, Result of job

Error code

Low byte	Meaning
00H	Job successfully transferred to computer interface
01H	Job is processing
02H	Job in queue
03H	Job acknowledged but not yet confirmed
04H	Incorrect channel number
05H	Incorrect computer interface number
06H	Incorrect job number
07H	Not possible to abort job
08H	No free job number at the computer interface
10H	Computer interface 0 not initialised
11H	Computer interface 1 not initialised
12H	Computer interface 2 not initialised
13H	Computer interface 3 not initialised
14H	Computer interface 4 not initialised
20H	Computer interface 0 not in SK table
21H	Computer interface 1 not in SK table
22H	Computer interface 2 not in SK table
23H	Computer interface 3 not in SK table
24H	Computer interface 4 not in SK table
30H	Communication error at the computer interface
31H	Communication error at the ZS
92H	Invalid command parameter
D0H	Protocol for channel 0 (V24 channel) not loaded
D1H	Job queue full

Fig. 4-6 DW0, Error codes

PLC reaction

High byte	Meaning
00H	Job successfully transferred to computer interface
01H	Recall R5REQ
02H	Change PLC programme
03H	Change protocol parameters
04H	Rerun R5INIT
05H	Rerun R5REQ
06H	Rerun R5CON
07H	Reload V.24 protocol
08H	Check system configuration

Fig. 4–7 DW0, PLC reaction

DW1

DW1 (W) Computer interface and channel number

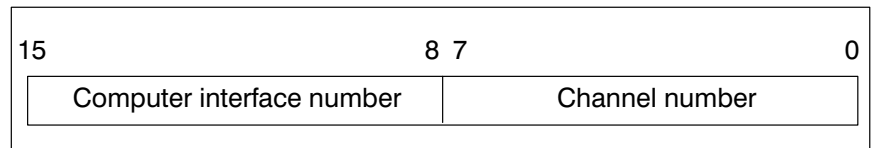


Fig. 4–8 DW1, computer interface and channel number

This word is used for specifying the R500P and the channel to be used for processing the job.

The channel number for the PROFIBUS protocol is always 1.

DW2

DW2 (W) Job number

The CL500 interface modules allow you to start up to 16 parallel jobs. Specifying job numbers allows you to differentiate between jobs. A job with the same number as another job can only be started once the old job with that number has been completed. If an attempt is made to start a job if another job with the same number is not yet completed, the R5REQ rejects the attempt and issues an error message.

However, starting several central jobs with different job numbers in one PLC cycle is possible.

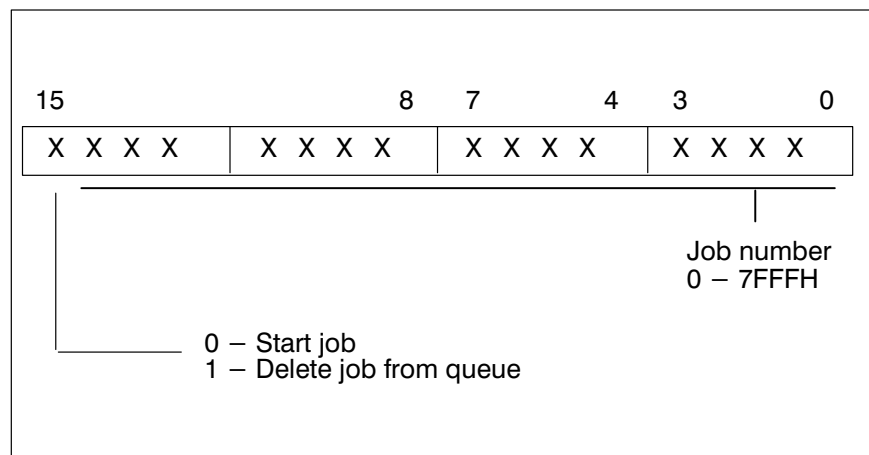


Fig. 4–9 DW2, Job numbers

The job numbers 12 ... 15 are reserved for high–priority jobs. Specifying one of these numbers in this parameter assigns the job in question a higher priority and it is processed accordingly.

DW3 – DW15

DW3 – DW15 Protocol–specific parameters

This parameter field can have different meanings, depending on the loaded protocol.

Protocol–specific input parameters

The protocol–specific input parameters of the data field are arranged as follows:

DW3 (W) Communication reference

This is the key index (number) of a communication association by which the job, in accordance with the KBL entry, is to be handled.

DW4: **(W)** Service

This ASCII code entry designates the PROFIBUS service to be performed. Refer to the following tables for permissible values (ASCII codes). Only upper case letters are valid.

Parameters DW5 through DW15 depend on the PROFIBUS service to be performed. Their meanings are defined in the following, grouped in service classes.

4.4 Context Management Services

The Context Management services are used for establishing and clearing connections, as well as for rejecting prohibited services.

DW4	Initiate IN	Abort AB
DW5	–	Reason–Code
DW6 – DW15	–	–

Fig. 4–10 Context Management services

4.4.1 Initiate Service

This service is used for connecting two communication partners. A connection can only be used for data communication once this service has been successfully executed.

4.4.2 Abort Service

This service is used for disconnecting two communication partners.

DW5 (W) Reason code

This parameter is used for indicating the reason why a connection was interrupted.

Note the following reasons :

- 00H Disconnect
The FMS user clears the connection.
- 01H Version –OV–incompatible
The versions of the object directories (**Source–OV and Remote–OV**) of both communication partners are incompatible.
- 02H Password–Error
A communication association with the same password is already established.
- 03H Profile–Number–incompatible
The profile of the server is not supported.
- 04H Limited–Services–Permitted
The device has assumed the logical status "Limited services".
- 05H OV–Loading–Interacting
Put–OV–Services are active.

4.5 Variable Access Services

The Variable Access model provides services which allow you to read or write variables, as well as define or delete dynamic new Variable list objects.

The description of the variables is established by the configuration in the object directory of the communication partner. The variables are addressed by a logical address, the so-called Index. Name addresses are not supported.

	Read	Write
DW4	RE	WR
DW5	Index	Index
DW6	PROFIBUS data type	PROFIBUS data type
DW7	Destination field type	Source field type
DW8	Field index	Field index
DW9	Field offset	Field offset
DW10	–	Number
DW11	Subindex	Subindex
DW12	–	–
DW13	–	–
DW14	–	–
DW15	–	–

Fig. 4–11 Variable Access services

The services Read and Write address a communication object at the communication partner end (destination-addressed Services).

4.5.1 Read Service

This service is used to read the value of a variable object at the communication partner end. The communication partner's object directory contains the variable description.

DW5 (W) Index

Logical address of the variable to be read at the Server.

DW6 (W) PROFIBUS data type

This parameter indicates the data type read at the remote partner. The number of bytes to be transferred must be an integer multiple of the length of the specified data type. Otherwise, a negative acknowledgement is locally output.

Permissible values:

Integer8	=	2	Unsigned8	=	5
Integer16	=	3	Unsigned16	=	6
Integer32	=	4	Unsigned32	=	7
Octet-String	=	10			

DW7 (W) Destination field type

This parameter indicates the field type of the destination memory area into which the data of the R500P read by the communication partner should be filed.

Permissible values are:	004DH	=	Flag area
	0044H	=	Data module
	0064H	=	Data buffer
	0043H	=	Data field

DW8 (W) Field index

Part of the field type which serves as destination memory area. The permissible values are shown in fig. 4-12.

DW9 (W) Field offset

Address offset in the specified destination field type. The permissible values are shown in fig. 4-12.

Destination: Field type DW7	Field index DW8	Field offset DW9
4D H = Marker	–	Byte no. 0 – 255
44 H = Data module	DM no. 0 – 255	Byte no. 0 – 511
64 H = Data buffer	–	Byte no. 0 – 511
43 H = Data field	–	Byte no. 0 – 24575

Fig. 4–12 Destination address

DW10 (W) No meaning

DW11 (W) Subindex

Logical subaddress of the object. Addressing individual elements of a variable at the Server is possible if the variable is an Array object.

Subindex for the Read–Req.–Service

Subindex = 0001H	–	1st variable element
Subindex = 0064H	–	100th variable element
Subindex = 0001H	–	whole variable addressed, no subindex

4.5.2 Write Service

Here, a value is assigned to a variable object at the communication partner end. The communication partner's object directory contains the variable description.

DW5 (W) Index

Logical address of the variable to be written at the Server.

DW6 (W) PROFIBUS data type

This parameter indicates the data type of the data to be written.

Permissible values:

Integer8	=	2	Unsigned8	=	5
Integer16	=	3	Unsigned16	=	6
Integer32	=	4	Unsigned32	=	7
Octet–String	=	10			

DW7 (W) Source field type

This parameter indicates the field type of the memory area out of which the R500P reads the data, and transfers them into the variable at the communication partner end; see fig. 4–13 .

Permissible values are:

004DH	=	Flag area
0044H	=	Data module
0064H	=	Data buffer
0043H	=	Data field

DW8 (W) Field index

Part of the specified named field type. The permissible values are shown in fig. 4–13.

DW9 (W) Field offset

Address offset in the specified field type. The permissible values are shown in fig. 4–13.

Destination field type DW7	Field type DW8	Field offset DW9
4D H = Marker	–	Byte no. 0 – 255
44 H = Data module	DM no. 0 – 255	Byte no. 0 – 511
64 H = Data buffer	–	Byte no. 0 – 511
43 H = Data field	–	Byte no. 0 – 24575

Fig. 4–13 Source address

DW10 (W) Number

Amount of data of the data type specified in DW10 to be transferred.

DW11 (W) Subindex

Logical subaddress of the object.

Addressing individual elements of a variable at the Server is possible if the variable is an Array object.

Subindex for the Write–Req.–Service

Subindex = 0001H	–	1st variable element
Subindex = 0064H	–	100th variable element
Subindex = 0000H	–	whole variable addressed, no subindex

4.6 VFD Support Services

The **Virtual Field Device (VFD)** is an abstract model used for describing the data and the behaviour of an automation system from the point of view of a communications system user. The basis of the VFD model is the VFD object.

The VFD object contains all the objects and object descriptions which can be used by a communications system user with the aid of the Services described here.

VFD objects are implicitly addressed by means of communication associations. The Status and Identify services implicitly address the VFD object.

DW4	Status ST	Identify ID	Set Status SS
DW5	–	–	–
DW6	–	–	–
DW7	Destination field type	Destination field type	Physical status
DW8	Field index	Field index	Local detail
DW9	Field offset	Field offset	–
DW10–DW15	–	–	–

Fig. 4–14 VFD Support services

4.6.1 Status Service

This service is used to read the device and user status of the communication partner.

The read data consist of

- Logical status (1 byte),
- Physical status (1 byte) and
- Local detail (3 bytes)

The **logical status** contains information on the device's communication status.

- | | | |
|---|---|---|
| 0 | = | Ready
All services can be used normally. |
| 2 | = | Limited number of services
The server supports at least the following services: <ul style="list-style-type: none">– Initiate– Abort– Reject– Identify– Status– Get–OV |
| 4 | = | OV–LOADING–NON–INTERACTING
If the object directory is in OV–LOADING–NON–INTERACTING status, processing the service Initiate–Put–OV is not allowed. |
| 5 | = | OV–LOADING–INTERACTING
If the object directory is in OV–LOADING–NON–INTERACTING status, all connections are blocked except the connection which was used to receive the Initiate–Put–OV service. A connection attempt is rejected. |

The **Physical Status** provides a rough overview of the operating status of the physical device :

- | | | |
|---|---|----------------------|
| 0 | = | Ready |
| 1 | = | Partially ready |
| 2 | = | Not ready |
| 3 | = | Maintenance required |

The **Local detail** indicates the local status of the application and the device. The meaning of the individual bits is established by Profiles.

The length of the read data is 5 bytes. They are copied by the R500P to the specified memory area as follows:

Logical status	Physical status	Local detail		
Byte 1	Byte 2	Byte 3	Byte 4	Byte 5

Fig. 4–15 Byte distribution in memory

If the R500P is answered by the Status service (server function), the addressed R500P codes the operating mode of the respective ZS in byte 4 of the local detail.

Operating mode of the ZS is STOP byte 4 = 10D

Operating mode of the ZS is RUN byte 4 = 11D

DW7 (W) Destination field type

This parameter indicates the field type of the destination memory area into which the data of the R500P read by the communication partner should be filed, see fig. 4–16.

Permissible values: 0044H = Data area
 0064H = Data buffer
 0043H = Data field

DW8 (W) Field index

Part of the field type which serves as destination memory area. The permissible values are shown in fig. 4–16.

DW9 (W) Field offset

Address offset in the specified destination field type. The permissible values are shown in fig. 4–16.

Destination field type DW7	Field index DW8	Field offset DW9
44 H = Data module	DM no. 0 – 255	Byte no. 0 – 511
64 H = Data buffer	–	Byte no. 0 – 511
43 H = Data field	–	Byte no. 0 – 24575

Fig. 4–16 Data type and offset for the Status service

4.6.2 Identify Service

This service, which identifies a VFD, is used to read the vendor name, model name, and revision of a virtual field device.

The read data are the visible string data type. The length depends on the application, and can be up to 238 bytes.

The identification string of the R500P, 57 bytes long, is as follows:

' ROBERT BOSCH GmbH R500P ZS/VFD–Nr.: xx Z.Nr. 066932–xxx'

DW7 (W) Destination field type

This parameter indicates the field type of the destination memory area into which the data of the R500P read by the communication partner should be filed; see fig. 4–17.

Permissible values:	0044H	=	Data area
	0064H	=	Data buffer
	0043H	=	Data field

DW8 (W) Field index

Part of the field type which serves as destination memory area. The permissible values are shown in fig. 4–17.

DW9 (W) Field offset

Address offset in the specified destination field type. The permissible values are shown in fig. 4–17.

Destination field type DW7	Field index DW8	Field offset DW9
44 H = Data module	DM no. 0 – 255	Byte no. 0 – 511
64 H = Data buffer	–	Byte no. 0 – 511
43 H = Data field	–	Byte no. 0 – 24575

Fig. 4–17 Data type and offset for the Identify service

4.6.3 Set Status Service

This service is used to write a device's or user's own status. The Set Status service is a local service and is not described in the PROFIBUS norm. In this local service, the Communication Reference is irrelevant.

DW7 (W) Physical status

The **Physical Status** provides a rough overview of the operating status of the physical device :

Permissible values:

- 0 = Ready
- 1 = Partially ready
- 2 = Not ready
- 3 = Maintenance required

DW8 (W) Local detail

The **Local detail** indicates the local status of the application and the device. The meaning of the individual bits is established by Profiles.

Permissible values: 0 – FFFFH

4.7 Local Services

DW4	CA
DW5	–
DW6	–
DW7	Destination field type
DW8	Field index
DW9	Field offset
DW10–15	–

Fig. 4–18 Local services

4.7.1 Connection Attributes

The service **Connection Attributes** provides the parameters transferred by the communication partner during the Initiate service to the PLC programme.

8 words with the following meanings are filed under the addresses specified in DW7–DW9:

Word	Contents
DW0	00FFH Connection made 0000H Connection not made
DW1	Low byte Profile number High byte Version number
DW2	Object directory version
DW3	–
DW4	–
DW5	–
DW6	–
DW7	–

Fig. 4–19 Connection Attributes

5 R5CON

5.1 Characteristics

Characteristics	R5CON
Block name	R5CON.P50
Block length	555 words
Call length	12 words
Processing time	0.5 ms
Occupied marker	M230 to M254

Fig. 5-1 R5CON, Characteristics

The module **Confirmation R5CON** is used for monitoring central jobs. It provides information to the user during job processing, as well as at the conclusion of a job. The R5CON does this by retrieving the status and the error word from the job table and issues this information to the addresses which were specified by the user as parameters.

The R5CON allows either confirmation of only one job per call, or of all error-free jobs together with one faulty job. The R5CON routes the status and the error word from the job table to the PLC programme.

You must run R5CON for all the jobs issued by R5REQ in order to read out the result of a specific job in question. For unconfirmed Services, a local confirmation is generated.

Only after the confirmation has been read can a new job be initiated with the same number.

All R5CON error messages are stored until the job is restarted. This means that the same error code is displayed even if the module is called several times.

5.2 Parameters

The R5CON has two input parameters and three output parameters.

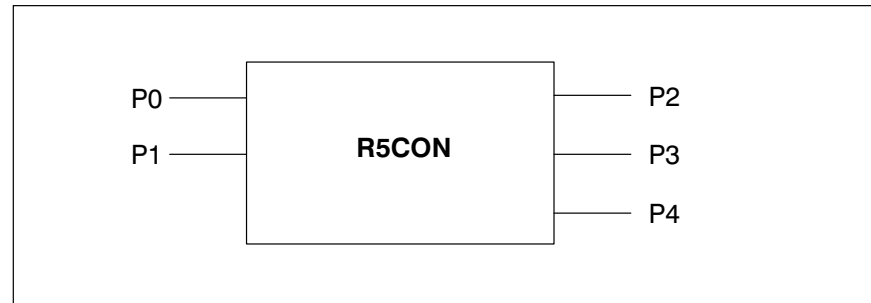


Fig. 5-2 R5CON parameters

5.2.1 Input Parameters

P0

P0 (W) Computer interface and channel number

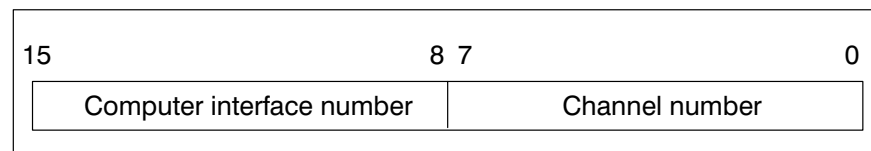


Fig. 5-3 P0, computer interface and channel number

This parameter is for the computer interface number and the number of the channel which was used for handling the corresponding job.

P1

P1 (W) Job number (0 through 7FFFH, FFFEH or FFFFH)

By specifying a job number from 0 to 7FFFH, the user selects that job from which he wants a check-back signal. In this way, the user can check on a specific job.

If the user specifies the value in FFFEH in this parameter, the R5CON confirms all the error-free jobs which have been completed up to this point by the R500P module specified by P0. If other jobs with errors have been concluded, the R5CON confirms the job with the highest job number and returns its status and error code to the output parameters.

Any remaining jobs with errors which have been concluded are not confirmed by the R5CON.

FFFFH is confirmed in the output parameter P2 if no job is completed. If only error-free jobs have been concluded, they are all confirmed in P2 with the value FFFE H.

For parameterisation with FFFFH, the function block supplies the status and error code of the job handled by the computer interface module and whose check-back signal has not yet been retrieved by the R5CON.

If there are several jobs with this status in the job table, the job with the highest number is displayed. The remaining jobs are not confirmed.

5.2.2 Output Parameters

P2

P2 (W) Job number

This parameter contains the number of the job whose check-back signal is output in the following output parameters.

If a valid job number was specified when the R5CON was called, it is displayed here.

If no job is completed in case of parameterisation with FFFFH, FFFFH is confirmed as the job number.

FFFEH is confirmed if an error-free job has been completed in case of parameterisation with FFFEH, and if one or more jobs without an error message have been completed.

P3

P3 (W) Status

The current status of the job is indicated in this word every time the R5CON is run. The current processing status of the job is indicated in the high byte of this word.

High byte	Meaning
00H	Job completed without error
01H	Job processing on the computer interface
02H	Job in queue on the computer interface
03H	Job terminated with error
04H	No job processing with this job number

Fig. 5-4 P3, Status

If a job was terminated with an error, the P3 low byte contains a code which suggests a suitable measure (PLC reaction) for handling the error. This code is valid after the job has been terminated.

Low byte	Meaning
00H	Error-free operation
01H	Recall FM R5CON
02H	Change PLC programme
03H	Check job parameter and change
04H	Rerun FM R5INIT
05H	Rerun FM R5REQ
06H	Reserved
07H	Reload V24 protocol
08H	Check configuration data
09H	Repeat job
0AH	Check FM R5CON job parameter
10H	Repeat job; job was aborted by PLC programme or with RESET button
20H	Job error-free, but was read at reduced data length
30H	Reconnect with Initiate service
40H	Reset module, rerun required
50H	Undefined error code, no reaction possible

Fig. 5-5 P3, Status

P4

P4 (W) Error messages

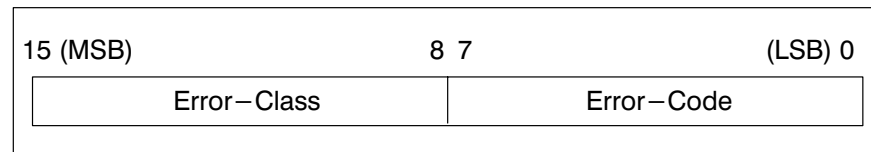


Fig. 5-6 Parameter P4, Error messages

Code	Meaning of the error class
FFH	Fault message of the FM
FEH	Error message of the computer interface module
0 – FCH	Error classes of the protocol

Fig. 5-7 R5CON Error class

The meaning of the error messages is provided in the following.

Error class	Error type	fig.
00H through 08H	FMS errors	5-9
09H through 10H	FMA7 errors	5-10
11H	ALI/FMS and CMI errors	5-11
30H	System bus error	5-12
31H	Computer interface – Operating system error	5-13
F0H	ALI errors	5-14
FFH	Function block error	5-15

Fig. 5-8 Error class

FMS errors

Error class	Error code	Meaning
		Initiate
00H	00H	Other
00H	01H	Max PDU size insufficient
00H	02H	Feature not supported
00H	03H	Version object directory incompatible
00H	04H	User initiate denied
00H	05H	Password error
00H	06H	Profile number incompatible
		VFD state
01H	00H	VFD other
		Application
02H	00H	Application – Other
02H	01H	Application – Unreachable
		Definition
03H	00H	Definition – Other
03H	01H	Object – Undefined
03H	02H	Object attribute inconsistent
03H	03H	Object already exists
		Resource
04H	00H	Resource – Other
04H	01H	Memory unavailable

Error class	Error code	Meaning
		Service
05H	00H	Service–Other
05H	01H	Object–State conflict
05H	02H	PDU size
05H	03H	Object–Constraint conflict
05H	04H	Parameter inconsistent
05H	05H	Illegal parameter
		Access
06H	00H	Access–Other
06H	01H	Object invalidated
06H	02H	Hardware fault
06H	03H	Object access denied
06H	04H	Invalid address
06H	05H	Object attribute inconsistent
06H	06H	Object access unsupported
06H	07H	Object nonexistent
06H	08H	Type conflict
06H	09H	Name access unsupported
		OV
07H	00H	OV–Other
07H	01H	Name length overflow
07H	02H	OV overflow
07H	03H	Object directory write protected
07H	04H	Extension length overflow
07H	05H	Object description length overflow
07H	06H	Operational problem
		Other
08H	00H	Other FMS error

Fig. 5–9 FMS errors

FMA7 errors

Error class	Error code	Meaning
		Initiate
09H	00H	Other
09H	01H	Max PDU size insufficient
09H	02H	Feature not supported
09H	03H	User initiate denied
		Application
0AH	00H	Application–Other
0AH	01H	Application–Unreachable
		Resource
0BH	00H	Resource–Other
0BH	01H	Memory–Unavailable
		Service
0CH	00H	Service–Other
0CH	01H	Object–State conflict
0CH	02H	Object–Constraint conflict
0CH	03H	Parameter inconsistent
0CH	04H	Illegal parameter
0CH	05H	Permanent internal fault
		User
0DH	00H	User–Other
0DH	01H	Don't Worry Be Happy
0DH	02H	Memory unavailable
		Access
0EH	00H	Access–Other
0EH	01H	Object access unsupported
0EH	02H	Object nonexistent
0EH	03H	Object access denied
0EH	04H	Hardware fault
0EH	05H	Type conflict

Error class	Error code	Meaning
		KBL
0FH	00H	KBL–Other
0FH	01H	Invalid KBL error
0FH	02H	No KBL entry
0FH	03H	Invalid KBL
0FH	04H	No KBL
0FH	05H	KBL write protected
		Other
10H	00H	Other FMA7 error

Fig. 5–10 FMA7 errors

ALI/FMS and CMI errors

Error class	Error code	Meaning
		ALI/FMS
11H	0BH	Invalid controller type or software version
11H	0CH	Specified entity (FMS/FMA7) invalid
11H	0DH	Specified service invalid
11H	0EH	Specified primitive (REQ/RES) invalid
11H	10H	Specified KR nonexistent
11H	11H	Specified KR is not FMS–KR
11H	12H	Specified KR is not FMA7–KR
11H	15H	No resources for service processing
11H	16H	Parallel services prohibited
11H	17H	Service momentarily not available
11H	18H	Service not contained in supported subset
11H	19H	Service cannot be executed
11H	0AH	Controller does not answer
11H	0FH	Data block in CMI too small
11H	13H	Invalid driver function
11H	14H	Serious error in the CMI or driver

Fig. 5–11 ALI/FMS and CMI errors

System bus errors

Error class	Error code	Meaning
30H	80H	Command undefined
30H	90H	Field type at receiver module unknown
30H	91H	Execution condition undefined
30H	92H	Invalid command interpreter
30H	93H	Incorrect address alignment
30H	94H	Address error (address access denied)
30H	95H	No memory, or incorrect memory type
30H	96H	Buffer overflow (general)
30H	97H	Incorrect structure parameter
30H	98H	Structure format not defined
30H	99H	Max. structure length exceeded
30H	B0H	Data accessing via system bus blocked
30H	B1H	Error signal active during data accessing
30H	C1H	Execution condition (coordination flag) not fulfilled
30H	D0H	Command in STOP cannot be executed
30H	D1H	Command in RUN cannot be executed
30H	D2H	Changing operating mode not possible
30H	D3H	Access mode prohibited (Read, Write)
30H	D4H	Field protection active
30H	D5H	Timer blocked
30H	D6H	Module number too large
30H	D7H	Module not available
30H	D8H	Module too small
30H	D9H	Monitor blocked
30H	DAH	Reference list blocked
30H	DBH	System clock error, Read/Write
30H	DCH	Changing reference list entry prohibited

Fig. 5-12 System bus error

Computer interface – Operating system errors

Error class	Error code	Meaning
31H	50H	No system bus allocation; error signal during command transmission; partner command buffer pointer incorrectly read
31H	52H	Partner command buffer full
31H	53H	Command execution time expired
31H	54H	Acknowledgement wait buffer of computer interface full
31H	56H	Destination module unknown
31H	60H	Passive job abort
31H	61H	Active job abort
31H	62H	Local abort of executed job

Fig. 5–13 Computer interface – Operating system errors

ALI errors

Error class	Error code	Meaning
F0H	00H	Abort message received on specified connection
F0H	01H	Protocol-specific parameters outside of specified range
F0H	02H	Connection not made
F0H	03H	Connection already made
F0H	04H	Invalid KR; KR cannot be addressed from this ZS
F0H	05H	User data length exceeds max. value of 220 bytes
F0H	06H	Initiate Service momentarily not possible

Fig. 5–14 ALI errors

Function block errors

Error class	Error code	Meaning
FFH	00H	Channel number invalid
FFH	01H	Channel initialisation not started
FFH	03H	Job number invalid
FFH	04H	No job processing
FFH	05H	Computer interface number invalid
FFH	06H	No entry in memory management list
FFH	07H	Incorrect block address
FFH	30H	Computer interface reported error in communication with the ZS
FFH	31H	ZS reported error in communication with the computer interface
FFH	D0H	V24 protocol not loaded (channel 0)
FFH	D1H	Job queue full

Fig. 5–15 Function block errors

Classification of the error classes:

- The error classes 00H through 0FH are generated by the PROFIBUS protocol software. The PROFIBUS norm DIN 19245, Parts 1 and 2, provide an exact description of the error classes.
- Errors from error class 10H are generated in the ALI and in the CMI driver. These are errors specific to the Softing–PROFIBUS implementation.
- The remaining errors originate in the CL500 system.
- The error codes 60H through 62H in error class 31 H are generated if bit 15 is set in the job parameter 'job number' of the R5REQ.

Note the following three error codes in error class 31H:

Error code 60H: Passive job abort

The job is in the job queue, but is not yet processed by the protocol (non-interactive abort for client and server).

Error code 61H: Active job abort

The job is aborted by the protocol before the telegramme is sent (non-interactive abort for client and server).

Error code 62H: Local abort of an executed job

The job has already been transmitted via the bus. Access to the client's objects, however, is not permitted (non-interactive job termination for the client, but not for the server).

Notes:

6 R5IND

6.1 Characteristics

Characteristics	R5IND
Block name	R5IND
Block length	573 words
Call length	14 words
Occupied marker	M238 to M254

Fig. 6–1 R5IND, Characteristics

Controlling peripheral jobs and events

The R500P automatically executes peripheral jobs which were initiated by a communication partner. This does not require PLC programme support, nor, in turn, a function block. For this reason, the programme on the ZS has no information on a peripherally initiated data exchange operation.

Function

The module **Indication** (R5IND) is intended to aid the user in recognizing peripheral jobs and events. If the PLC programme requires no information on the peripheral jobs, the R5IND need not be employed.

Because 4 virtual field devices (for example, ZS50x, SK500, ZA386) can be supported with the R500P, the module is provided with 4 indication buffers.

Each buffer is 8 x 8 words.

The indication buffers are designed as ring buffers which means that new entries overwrite old ones in case of data overflow. Every time the R5IND is called, the entire ring memory responsible for the ZS is read. Entries are read according to the FIFO principle.

When the R5IND is called, a data module, data buffer, or data field must be specified in which the job-specific parameter and events from the R5IND can be entered. The user must reserve 8 words per message in the data module. The R500P can store up to 8 messages concerning executed services/events. The user must create the data module with at least 64 words (8 x 8 words) for the output parameters of the messages.

If the ring memory is not read out by the user, the R500P overwrites old messages when new ones arrive.

The R5IND is called only once in each PLC cycle for registering peripheral jobs.

6.2 Parameters

The R5CON has four input parameters and two output parameters.

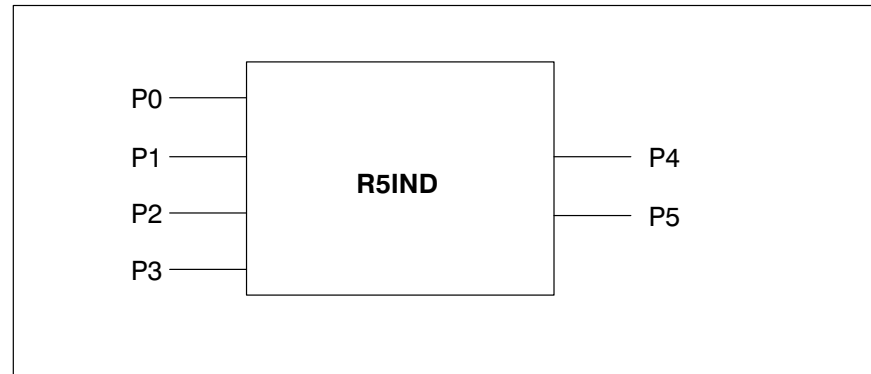


Fig. 6–2 R5IND parameters

6.2.1 Input Parameters

P0

P0 (W) Data type

This parameter is for specifying the area in which the job–specific parameters and event messages should be filed by means of the peripheral job. Possible data types are data module (44H), data buffer (64H), and data field (43H).

P1

P1 (W) Data type extension

If parameter 0 defines a data module as the data area, P1 specifies the data module number. Otherwise, P1 is meaningless.

Permissible values are: DM: 0 – 255

P2**P2 (W) Offset**

This parameter defines the start address of the job-specific parameters and the event messages in the specified data area.

Permissible values are:

DM:	0 – 382 dez	Byte address in DM
DB:	0 – 382 dez	Byte address in DB
DF:	0 – 24446 dez	Byte address in DF

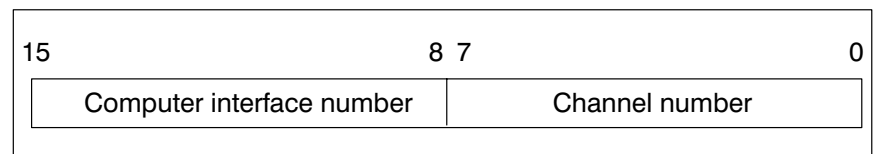
P3**P3 (W) Computer interface and channel number**

Fig. 6-3 P3, computer interface and channel number

The number of the computer interface is specified in the high byte of this parameter, while the channel number is specified in the parameter's low byte.

The channel number for the PROFIBUS protocol is always 1.

6.2.2 Output Parameters

P4

P4 (W) Result

In this parameter, the programming and parameterisation errors are shown for the user when the R5IND is called.

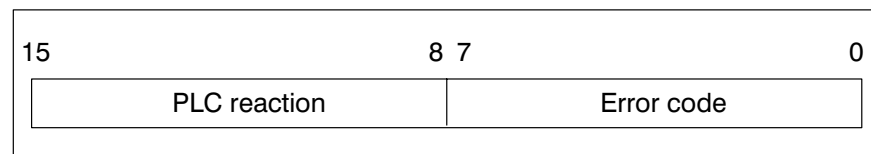


Fig. 6–4 Parameter P4, Results

Results	Explanation
0000H	Input parameters correct, indications/events exist
0001H	Input parameters correct, no indications/events
0130H	Error in computer interface – CL500 communication
0131H	Error in PLC programme – computer interface communication
0202H	Protocol does not support indication
0203H	Channel initialisation not yet started; do not run R5INIT
0204H	The specified memory area (DM) is not created
0205H	The specified memory area is too short
0306H	The input parameter channel number is invalid
0307H	The input parameter offset is invalid
0308H	The input parameter DM number is invalid
0309H	Incorrect memory management list
07D0H	V24 protocol not loaded for channel 0
0820H	Computer interface 0 not entered in SK table
0821H	Computer interface 1 not entered in SK table
0822H	Computer interface 2 not entered in SK table
0823H	Computer interface 3 not entered in SK table
0824H	Computer interface 4 not entered in SK table

Fig. 6–5 R5IND, Results

If the parameter result = 0001H, the job-specific parameters in the specified data module are undefined.

Permissible values are selected so that the low byte contains a serial number and the high byte contains the PLC reaction.

High byte	PLC reaction
00H	No reaction, correct operation
01H	Recall FM, temporary state
02H	Change PLC programme, programme error
03H	Change input parameters, parameterisation error

Fig. 6-6 Parameter P4, PLC reaction

P5

P5 (W) Number

The parameter indicates how many messages from the R5IND were copied to the specified data area. Entries are contiguous and sequential.

6.3 Job-specific Output Parameters

Note that in the specified data area space must be reserved for 8 job-specific parameter fields of 8 words each into which the function block files the parameters of the peripheral job or of the event.

DW1 (Word): Communication reference

Key index (number) of a communication association by which the peripheral job was received.

The value here is **0** for events not assigned to a communication reference.

DW2 (Word): Service/Event

This parameter designates the executed service or the event which has occurred.

Refer to the following tables for permissible values (ASCII codes). Only upper case letters are valid.

DW3 – DW8:

These parameters depend on the received PROFIBUS service or the event. Their meanings, grouped in service classes, are defined in the following.

6.4 Context Management Services

The Context Management services are used for establishing and clearing connections, as well as for rejecting prohibited services.

DW2	Initiate 'IN'	Abort 'AB'	Reject 'RJ'
DW3		Reason code	Detected here
DW4		Locally generated	
DW5		Abort identifier	Reject code
DW6		Abort detail	Original IV ID
DW7–8			

Fig. 6–7 Context Management services

6.4.1 Initiate Service

Connection was established by a communication partner.

6.4.2 Abort Service

An existing connection to a communication partner was aborted.

DW3 (W) Reason code

This parameter is used for indicating the reason why a connection was interrupted.

The permissible value corresponds to the PROFIBUS norm shown in fig. 6–8.

DW4 (W) Locally generated

This parameter indicates whether the connection was locally aborted or aborted by the communication partner. Permissible values are:

- 0000H – Abort triggered by communication partner
- 0001H – Abort locally triggered

DW5 (W) Abort identifier

This parameter indicates where the cause of the connection abort was detected. Permissible values are:

Abort identifier	Error location	fig.
0000H	USER	6–9
0001H	FMS	6–10
0002H	LLI	6–11
0003H	FDL	6–12
0004H	FMA7	
0005H	FMA2	
0006H	ALI	
0007H	FMI	

Fig. 6–8 Abort identifiers, overview

User

Abort identifier	Reason code	Meaning
0000H	0000H	Disconnect
0000H	0001H	Version object directory incompatible
0000H	0002H	Password error
0000H	0003H	Profile number incompatible
0000H	0004H	Limited service permitted
0000H	0005H	Object directory loading interacted

Fig. 6–9 USER

FMS

Abort identifier	Reason code	Meaning
0001H	0000H	FMS–KBL error
0001H	0001H	User error
0001H	0002H	FMS PDU error
0001H	0003H	Connection state conflict LLI
0001H	0004H	LLI error
0001H	0005H	PDU size exceeds maximum PDU size
0001H	0006H	Feature not supported
0001H	0007H	Invoke ID error
0001H	0008H	Max services overflow
0001H	0009H	Connection state conflict FMS
0001H	000AH	Service error
0001H	000BH	Invoke–ID error request
0001H	000CH	FMS disabled

Fig. 6–10 FMS

LLI

Abort identifier	Reason code	Meaning
0002H	0000H	LLI–LLI context check negative
0002H	0001H	Invalid LLI–PDU during associate or abort
0002H	0002H	Invalid LLI–PDU during data transfer phase
0002H	0003H	Unknown LLI–PDU received
0002H	0004H	DTA_ACK_PDU received and SAC = 0
0002H	0005H	Max no of parallel services exceeded by PDU
0002H	0006H	Unkown invoke–ID
0002H	0007H	Priority error
0002H	0008H	Local error at the remote partner
0002H	0009H	Timeout during associate
0002H	000AH	Timeout of cyclic control timer
0002H	000BH	Timeout of idle receive timer
0002H	000CH	Error while activating LSAP (state in AD)
0002H	000DH	Illegal FDL primitive during associate or abort (see AD)
0002H	000EH	Illegal FDL primitive during data transfer (see AD)
0002H	000FH	Unknown FDL primitive
0002H	0010H	Unknown LLI primitive
0002H	0011H	Illegal LLI primitive during associate
0002H	0012H	Illegal LLI primitive during data transfer
0002H	0013H	Invalid KBL entry
0002H	0014H	Associate connection conflict
0002H	0015H	Error during cyclic data transfer
0002H	0016H	Max no of parallel services exceeded by FMS
0002H	0017H	KBL is loaded from FMA7; LLI is disabled
0002H	0018H	Confirm / indication mode error
0002H	0019H	Illegal FMA1/2 primitive
0002H	001AH	Illegal FMS service on cyclic connection
0002H	001BH	FMS PDU too large on cyclic connection
0002H	001CH	Resource error during associate
0002H	001DH	Resource error during data transfer phase
0002H	001EH	Resource error during abort
0002H	001FH	LLI state error
0002H	0020H	Timer error
0002H	0021H	Resource transfer to FDL failed

Fig. 6–11 LLI

FDL

Abort identifier	Reason code	Meaning
0003H	0001H	UE Remote user interface error
0003H	0002H	RR No remote resource available
0003H	0003H	RS Service not activated at remote SAP
0003H	000CH	RDL No resources for send response data low
0003H	000DH	RDH No resources for send response data high
0003H	0010H	LS Service not activated at local SAP
0003H	0011H	NA No reaction from remote station
0003H	0013H	NO FDL service not ok
0003H	0014H	LR No local resources available
0003H	0015H	IV Invalid request parameters

Fig. 6–12 Abort identifier and Reason codes

DW6 (W) Abort detail

This parameter contains additional information concerning the reason for the abort.

Permissible values are:

- 00H: Error while loading the UPDATE buffer
- 01H: Error when a Poll–Listen entry was activated
- 02H: Error when a Poll–Listen entry was deactivated
- 03H: Error during transmission (SDA)
- 04H: Error during transmission (CSR D)
- 05H: Error during transmission (SR D)
- 06H: Error during reception (CSD R)

6.4.3 Reject Service

The FMS rejected an illegal PDU with the Reject service.

DW3 (W) Detected here

This parameter indicates whether the error was recognised as a local (TRUE) error. **FALSE** is only permissible if the parameter **Reject PDU type** has the value **Confirmed response PDU**, and the parameter Reason code has the value **PDU size**.

Permissible values are: 0000H: FALSE
00FFH: TRUE

DW5 (W) Reject code

This parameter indicates the reason why the PDU was rejected. Permissible values are:

- 0000H Other
- 0001H Invoke ID exists
Confirmed service request received from FMS user and Invoke ID already exists.
- 0002H Max services overflow
Confirmed service request received from FMS user and Outstanding Services Counter Client \geq Outstanding Services Client.
- 0003H Service–Not–Supported–Connection–Oriented
Service.req received from FMS user and the Service is not supported as Client.
- 0004H Service–Not–Supported–Connectionless
Unconfirmed–Service.req received from FMS user and the Service is not supported as Client.
- 0005H PDU size
PDU length > maximum PDU length
- 0006H User–Error–Connectionless
Prohibited or incorrect Service primitive from the FMS user.

DW6 (W) Original–Invoke–ID

The Invoke ID of the rejected PDU.

Permissible values are 0000H through 00FFH.

6.5 Variable Access Services

The Variable Access model provides services which allow you to read or write variables, as well as define or delete dynamic new Variable list objects. The description of the variables is established by the configuration in the object directory of the communication partner. The variables are addressed by a logical address, the so-called Index. Name addresses are not supported.

DW2	Read 'RE'	Write 'WR'
DW3	Index	Index
DW4	PROFIBUS data type	PROFIBUS data type
DW5	Number	Number
DW6	Subindex	Subindex
DW7–8		

Fig. 6–13 Variable Access services

6.5.1 Read Service

The object addressed by DW3 and DW6 were read by the communication partner.

DW3 (W) Index

Logical address of the variable object which was read by the received job.

DW4 (W) PROFIBUS data type

This parameter indicates the data type of the data which were read.

DW5 (W) Number

Amount of read data of the data type specified in DW4.

DW6 (W) Subindex

Logical subaddress of the variable object which was read by the received job.

If no subaddress was used, this parameter is 0.

The permissible values depend on the data type:

Subindex for the Read–Ind.–Service

6.5.2 Write Service

The object addressed by DW3 and DW6 were written by the communication partner.

DW3 (W) Index

Logical address of the variable object which was written by the received job.

DW4 (W) PROFIBUS data type

This parameter indicates the data type of the data which were written.

DW5 (W) Number

Amount of written data of the data type specified in DW4.

DW6 (W) Subindex

Logical subaddress of the variable object which was written by the received job.

If not subaddress was used, this parameter is 0.

The permissible values depend on the data type:

Subindex for the Write-Ind.-Service

6.6 VFD Support Services

DW2	Status 'ST'	Identify 'ID'
DW3-8		

Fig. 6-14 VFD Support services

6.6.1 Status Service

A communication partner reads its own device/user status.

6.6.2 Identify Service

A communication partner reads its own identification string. The identification string of the R500P, 57 bytes long, is:

' ROBERT BOSCH GmbH R500P ZS/VFD-Nr.: xx Z.Nr. 066932-xxx'

6.7 Object Directory Management Services

The Object Directory Management Services are used for manipulating the object directory (**OV = object directory**).

DW2	Get–OV GO	Initiate–Put–OV IO	Put–OV PO	Terminate–Put–OV TO
DW3	Index	Consequence		
DW4	Format			
DW5–8				

Fig. 6–15 Object Directory Management services

6.7.1 Get–OV–Service

The Get–OV–Service reads one or more object descriptions.

DW3 (W) Index

Logical address of the variable object whose object description was read.

DW4 (W) Format

This parameter indicates whether the object description was read in short form or in long form.

Permissible values are:

00H Short form
FFH Long form

6.7.2 Initiate–Put–OV–Service

The Initiate–Put–OV–Service starts the procedure for interactively or noninteractively loading an object directory at a remote user.

6.7.3 Put–OV–Service

The Put–OV–Service is used for copying one or more object descriptions into an object directory of another user.

6.7.4 Terminate–Put–OV–Service

The Terminate–Put–OV–Service terminates the object directory loading procedure at a remote user. The objects are generated with their state machines.

6.8 FMA7 Context Management

The Context Management services are used for establishing and clearing the Management connection.

DW2	FMA7 – Initiate 'MI'	FMA7 – Abort 'MA'
DW3		Reason code
DW4		Locally generated
DW5		Abort identifier
DW6		Abort detail
DW7–8		

Fig. 6–16 FMA7 Context Management

6.8.1 FMA7 Initiate Service

The FMA7 Management connection is established by the configurator.

6.8.2 FMA7 Abort Service

This service clears, or aborts, the existing Management connection to the configurator.

User

Abort identifier	Reason code	Meaning
0000H	0000H	Disconnect

Fig. 6–17 User

FMA7

Abort identifier	Reason code	Meaning
0001H	0000H	FMA7–KBL error
0001H	0001H	User error
0001H	0002H	FMA7–PDU error
0001H	0003H	Connation–State–Conflict–LLI
0001H	0004H	LLI error
0001H	0005H	PDU size exceeds maximum PDU size
0001H	0006H	FMA7 Service not supported
0001H	0007H	Response error
0001H	0008H	Max services overflow
0001H	0009H	Connection–State–Conflict–FMA7
0001H	000AH	Service error

Fig. 6–18 FMA7

LLI

Abort identifier	Reason code	Meaning
0002H	0000H	LLI–LLI context check negative
0002H	0001H	Invalid LLI–PDU during associate or abort
0002H	0002H	Invalid LLI–PDU during data transfer phase
0002H	0003H	Unknown LLI–PDU received
0002H	0004H	DTA_ACK_PDU received and SAC = 0
0002H	0005H	Max no of parallel services exceeded by PDU
0002H	0006H	Unkown invoke – ID
0002H	0007H	Priority error
0002H	0008H	Local error at the remote partner
0002H	0009H	Timeout during associate
0002H	000AH	Timeout of cyclic control timer
0002H	000BH	Timeout of idle receive timer
0002H	000CH	Error while activating LSAP (state in AD)
0002H	000DH	Illegal FDL primitive during associate or abort (see AD)
0002H	000EH	Illegal FDL primitive during data transfer (see AD)
0002H	000FH	Unknown FDL primitive
0002H	0010H	Unknown LLI primitive
0002H	0011H	Illegal LLI primitive during associate
0002H	0012H	Illegal LLI primitive during data transfer
0002H	0013H	Invalid KBL entry
0002H	0014H	Associate connection conflict
0002H	0015H	Error during cyclic data transfer
0002H	0016H	Max no of parallel services exceeded by FMS
0002H	0017H	KBL is loaded from FMA7; LLI is disabled
0002H	0018H	Confirm / indication mode error
0002H	0019H	Illegal FMA1/2 primitive
0002H	0020H	Illegal FMS–service on cyclic connection
0002H	0021H	FMS PDU too large on cyclic connection
0002H	0022H	Resource error during associate
0002H	0023H	Resource error during data transfer phase
0002H	0024H	Resource error during abort
0002H	0025H	LLI state error
0002H	0026H	Timer error
0002H	0027H	Resource transfer to FDL failed

Fig. 6–19 LLI

FDL

Abort identifier	Reason code	Meaning
0003H	0001H	UE Remote user interface error
0003H	0002H	RR No remote resources available
0003H	0003H	RS Service not activated at remote SAP
0003H	000CH	RDL No resources for send response data low
0003H	000DH	RDH No resources for send response data high
0003H	0010H	LS Service not activated at local SAP
0003H	0011H	NA No reaction from remote station
0003H	0013H	NO FDL service not ok
0003H	0014H	LR No local resources available
0003H	0015H	IV Invalid request parameters

Fig. 6-20 FDL



If the Management connection is aborted by a USER abort due to a timeout, the Abort detail is 55H.

6.9 FMA7 Configuration Management

The Configuration Management functions allow :

- Loading and reading the communication association list
- Accessing variables, statistics counter and parameters of Layers 1/2
- Identification of communication components of the bus station
- Recording the bus station

KBL–Rem services

The KBL is loaded at another station using PROFIBUS by means of a sequence consisting of Initiate–Load–KBL–Rem, one or more Load–KBL–Rem services, and a Terminate–Load–KBL–Rem.

The Read–KBL–Rem service is used for reading out a KBL entry in a management–capable station.

DW2	Initiate–Load–KBL–Rem IK	Load–KBL–Rem LK	Terminate–Load–KBL–Rem TK	Read–KBL–Rem RK
DW3	–	Loaded KR	–	Read KR
DW4–8	–	–	–	–

Fig. 6–21 FMA7 Configuration Management

6.9.1 Initiate–Load–KBL–Rem Service

The configurator initiates the load operation for loading the KBL in a management–capable station with the Initiate–Load–KBL–Rem service.

6.9.2 Load–KBL–Rem Service

The configurator uses the Load–KBL–Rem service to load the KBL header as well as the static parts of a KBL entry in a management–capable station.

6.9.3 Terminate–Load–KBL–Rem Service

The configurator terminates the load operation for loading the KBL in a management–capable station with the Terminate–Load–KBL–Rem service.

6.9.4 Read–KBL–Rem Service

The configurator uses the Read–KBL–Rem service to read out the KBL header as well as the static parts of a KBL entry in a management–capable station.

6.10 Layer 1/2–Value–Rem Service

The configurator can use these services to read out or set FDL operating parameters in a management–capable station.

The address of the station itself, the baud rate and the release of the PROFIBUS interface connection cannot be changed because only variables which are not critical to the stability of the token ring can be changed.

DW2	Set–Value–Rem 'SV'	Read–Value–Rem 'RV'
DW3	Variable identifier	Variable identifier
DW4–8		

Fig. 6–22 Layer 1/2–Value–Rem service

6.10.1 Set–Value–Rem Service

Variables in the FDL of the remote user are set with the Set–Value–Rem service.

Identifier	FDL operating parameters	Explanation
3	Medium_Red	Redundancy
6	TSL	Slot–Time
7	MIN_TSDR	Minimale Station Delay Time
8	MAX_TSDR	Maximale Station Delay Time
9	TQUI	Modulator fade time
10	TSET	Setup time
11	TTR	Token cycle time
12	G	Gap update factor
13	In_ring_desired	Logical token ring desired
14	HSA	Highest station address in the token ring
15	max_retry_limit	Max. number of repeats
20	Frame_sent_count	Number of transmitted telegrammes
21	Retry_count	Number of telegrammes repeats
22	SD_count	Number of valid start delimiters
23	SD_error_count	Number of incorrect start delimiters

Fig. 6–23 Set–Value–Rem service

6.10.2 Read–Value–Rem Service

Variables are read from the FDL or PHY of the remote user with the Read–Value–Rem service.

Identifier	FDL operating parameters	Explanation
1	TS	Own station address and segment
2	Baud_rate	Baud rate
3	Medium_Red	Redundancy
4	HW–Release	Hardware release
5	SW–Release	Software release
6	TSL	Slot–Time
7	MIN_TSDR	Minimale Station Delay Time
8	MAX_TSDR	Maximale Station Delay Time
9	TQUI	Modulator fade time
10	TSET	Setup time
11	TTR	Token cycle time
12	G	Gap update factor
13	In_ring_desired	Logical token ring desired
14	HSA	Highest station address in the token ring
15	max_retry_limit	Max. number of repeats
16	TRR	Real rotation time
17	LAS	List of active stations
18	GAPL	List of all users in own GAP area
20	Frame_sent_count	Number of transmitted telegrams
21	Retry_count	Number of telegrams repeats
22	SD_count	Number of valid start delimiters
23	SD_error_count	Number of incorrect start delimiters

Fig. 6–24 Read–Value–Rem service

6.11 FMA7 Identification Service

The FMA7 Identification services allow the FMA7 user to query the vendor, the soft and hardware releases, and the PROFIBUS interface characteristics. These services identify the communication components, as opposed to the FMS Identification service.

DW2	Ident-Rem IR	LSAP-Status-Rem LS
DW3	Entity identifier	LSAP-Wert
DW4-8		

Fig. 6-25 FMA7 Identification service

6.11.1 Ident-Rem Service

The Ident-Rem service is used for reading out the Ident-List of the FMS, FMA7, LLI, or the FDL, or for reading out the Station-Ident-List of a remote user.

Identifier	Entity
0	FMA7
1	FMS
2	LLI
3	FDL
4	STATION
5	PHY

Fig. 6-26 Ident-Rem service

6.11.2 Remote-LSAP Status Request

The FMA7 user is provided with services for retrieving information on the configuration of Layer 2 SAPs (Service Access Points) at the remote user regarding its FDL services.

6.12 Network Management Services

DW2	FMA7 – Event 'EV'
DW3	Entity identifier
DW4	Event/Fault
DW5	Additional – Detail
DW6–8	

Fig. 6–27 Network Management services

6.12.1 FMA7 Event Service

This service informs the user of local events or errors from the individual entities.

DW3 (W) Entity identifier

This parameter indicates in which entity the error or event occurred.

Permissible values are:

0002H LLI
 0003H FMA2

DW4 (W) Event/Fault

This parameter designates the event or the fault. Permissible values are:

Entity	Fault	Meaning
LLI		
0002H	0001H	Error during SAP activation (.con(-))
0002H	0002H	Error during SAP deactivation (.con(-))
0002H	0003H	Error during leading the update buffer
0002H	0004H	Activate cyclic polling failed
0002H	0005H	Deactivate cyclic polling failed
0002H	0006H	Invalid FDL primitive during associate or abort
0002H	0007H	Invalid FDL primitive during data transfer phase
0002H	0008H	Unkown FDL primitive
0002H	0009H	Unkown LLI primitive
0002H	000AH	Illegal LLI primitive during associate or abort
0002H	000BH	Illegal LLI – primitive during data transfer

Entity	Fault	Meaning
0002H	000CH	Error during sending (SDA.con)
0002H	000DH	Error during sending (CSR.D.con)
0002H	000EH	Error during sending (SRD.con)
0002H	000FH	Error during sending (SDN.con)
0002H	0010H	Error during receiving (CSR.D.con)
0002H	0011H	Poll list loading failed (CSR.D.con)
0002H	0012H	Timeout during associate
0002H	0013H	Timeout during abort
0002H	0014H	Poll list deactivation failed
0002H	0015H	No matching communication reference in LLI
0002H	0016H	Illegal FMA1/2 primitive received
0002H	0017H	Invalid FDL primitive received during LLI start
0002H	0018H	Confirm / indication mode error
0002H	0019H	Timer error
0002H	001AH	Resource transfer to FDL failed
0002H	001BH	Resource error during association
0002H	001CH	Resource error in data transfer phase
0002H	001DH	Resource error during abort
0002H	001EH	LLI state error
FMA2		
0003H	0001H	Double address recognized
0003H	0002H	Transceiver error occurred
0003H	0003H	Timeout on bus
0003H	0004H	No receiver synchronization
0003H	0005H	Station out of Ring
0003H	0006H	New station in ring

Fig. 6–28 FMA7 Event service

DW5 (W) Additional Detail

This parameter contains additional information for the respective event or the respective error.

Notes:

7 Configuration

The PROFIBUS protocol is specially optimized to efficiently transmit messages. This is achieved by establishing the parameters and description of the objects and of the communication association before starting up the bus system, and not during the data transmission phase.

The PROFIBUS configurator can be used for conveniently and reliably creating configuration data for the R500P.

7.1 PROFIBUS Configurator

The PROFIBUS configurator is suitable for remote configuration operations as well as local configuration operations.

In case of local configuration operations, configuration data is filed in the programming unit in the form of several ASCII files.

In addition, the user is able to take advantage of the configurator's convenience and its error recognitions capabilities.



Users with limited knowledge of PROFIBUS are urged to take advantage of the helpful configuration tool PROFIBUS Configurator.

7.2 Local Configuration

Projection data can be created with the PROFIBUS configurator, or with any other ASCII editor, including the Bosch PLC programme editor. We point out again, however, that the PROFIBUS configurator is the only tool which can test the validity of PROFIBUS parameters. Value range tests and consistency checks are not performed when loading the data in the start-up phase of the PROFIBUS protocol on the R500P. Any configuration errors are only detected once operations begin.

When the configuration operation is concluded and the corresponding ASCII files have been created, data are loaded into the R500P by means of the PROFI software.

The menu PROFIBUS of the PLC software's loader can be used to load configuration data into or unload configuration from the the R500P via the SK500. In addition, these data can be compared to the data in the R500P.

7.3 PROFIBUS Job Log

The menu item PROFIBUS of the PLC software's loading programme allows you to switch the PROFIBUS job log on and off.

If the log has been activated in the PROFIBUS job log menu, channel 0 is blocked for the V.24/20mA protocol. The PROFIBUS protocol software then uses this interface for providing test messages. By connecting a terminal or a printer, this allows the user to follow the course of communication operations. This can be extremely useful during the start-up phase.



The job log is only intended for use during start-up.

All protocol messages, as well as all network management messages (event and fault indications) are displayed for the user.

If the PROFIBUS job log is active, transmission times increase.

The messages contain :

in case of Productive services

- the communication reference
- the VFD number
- the Invoke ID
- the index and subindex (for Read or Write)
- the transferred data values

in case of Management services

- the communication reference
- the VFD number
- the error location (local or remote)
- the entity identifier reason code of the error which occurred
- a more detailed description of the error (Additional Detail)

All Event, Fault, and Abort indications, and all internal error messages, are provided with a characteristic error identifier in order to more easily distinguish them from correct protocol messages.

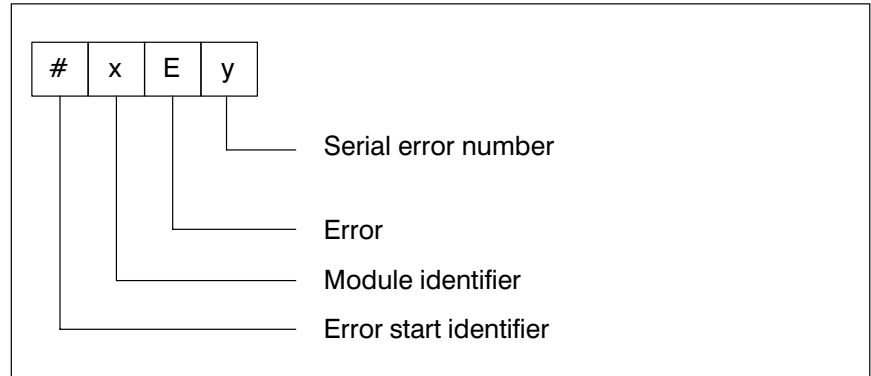


Fig. 7-1 Error identifier structure

The following table shows the correlation between the module name and the maximum occurring error number within the module.

Module name	Max. Error number
bu_main	12
bu_fm1	17
bu_var	4
bu_vfd	10
bu_ctx	4
bu_ov	12

Fig. 7-2 Module name – Error number

Notes:

8 Example

An example programme is provided in the following pages.

A Appendix

A.1 Abbreviations

ABL	Job bit strip
ALI	Application Layer Interface
ESD	electro static discharge Abbreviation for all designations which concern electrostatic discharge, for example, ESD protection, ESD hazard, etc.
FDL	Fieldbus Data Link, Fieldbus Layer 2
FMA	Fieldbus Management
FMS	Fieldbus Message Specification
HSA	Highest Station Address
KBL	Communication association list
KR	Communication reference
LLI	Lower Layer Interface
MMAZ	Master / Master acyclical
MSAZ	Master / Slave acyclical
MSZY	Master / Slave cyclical
OV	Object directory
RSS	Computer interface
SAP	Service Access Point
VFD	Virtual field device

A.2 Literature

- DIN 19 245, Part 1 and Part 2
Source:
Beuth Verlag
Burggrafenstr. 6
D–1000 Berlin 30
- PROFIBUS
Der Feldbus für die Automation
Author: Klaus Bender
Publisher: Carl Hanser Verlag
D–8000 München
A–1110 Wien
- Benutzerhandbuch
PROFIBUS–Protokoll–Software Schicht 7
Version 3.0,
Company: Softing

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VFD Support services, [4-17](#), [6-16](#)

Virtual field device, [4-17](#), [4-20](#)

W

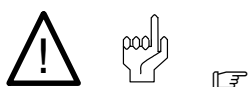
Weight, [1-22](#)

Write service, [4-15](#)

A.4 Safety instructions

A.4.1 Dansk

Sikkerhedshenvisningerne i denne brugsanvisning



Disse symboler anvendes i den foreliggende brugsanvisning i følgende tilfælde:



Dette symbol benyttes, hvis en unøjagtig eller manglende overholdelse af anvisningerne kan medføre beskadigelser af **personer**.



Dette symbol benyttes, hvis en unøjagtig eller manglende overholdelse af anvisningerne kan medføre beskadigelser af **apparater eller filer**.



Dette symbol benyttes for at gøre Dem opmærksom på noget særligt.



0.1

Prøv hvert nyt program, inden De tager et anlæg i drift!



0.2/1.1

Ved brugen med computersammenkoblingskomponenten R500P skal alle sikkerhedsforanstaltninger til ESD-beskyttelse overholdes! Undgå elektrostatiske udladninger!

Sikkerhedshenvisninger på styrekomponenterne

På styrekomponenterne selv kan der være anbragt følgende advarsler og henvisninger, som skal gøre Dem opmærksom på bestemte ting:



Advarsel mod farlig elektrisk spænding!



Advarsel mod farer fra batterier!



Elektrostatisk udsatte komponenter!



Træk netstikket ud, inden De åbner!



Bolt kun til tilslutning af jordledningen PE!



Kun til tilslutning af en afskærmningsledning!

A.4.2 Deutsch

Sicherheitshinweise in dieser Gebrauchsanweisung



Diese Symbole werden in dieser Gebrauchsanweisung unter den folgenden Bedingungen verwendet.



Dieses Symbol wird benutzt, wenn es durch ungenaues Befolgen oder Nichtbefolgen von Anweisungen zu **Personenschäden** kommen kann.



Dieses Symbol wird benutzt, wenn es durch ungenaues Befolgen oder Nichtbefolgen von Anweisungen zu **Beschädigungen von Geräten oder Dateien** kommen kann.



Dieses Symbol wird benutzt, wenn Sie auf etwas Besonderes aufmerksam gemacht werden sollen.



0.1

Testen Sie jedes neue Programm bevor Sie eine Anlage in Betrieb nehmen!



0.2/1.1

Beim Umgang mit der R500P müssen alle Vorkehrungen zum ESD-Schutz eingehalten werden! Elektrostatische Entladungen vermeiden!

Sicherheitshinweise an den Steuerungskomponenten

An den Steuerungskomponenten selbst können folgende Warnungen und Hinweise angebracht sein, die Sie auf bestimmte Dinge aufmerksam machen sollen:



Warnung vor gefährlicher elektrischer Spannung!



Warnung vor Gefahren durch Batterien!



Elektrostatisch gefährdete Bauelemente!



Vor dem Öffnen Netzstecker ziehen!



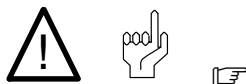
Bolzen nur für Anschluß des Schutzleiters PE!



Nur für Anschluß eines Schirmleiters!

A.4.3 Français

Directives de sécurité relatives au présent mode d'emploi



Ces symboles sont utilisés dans les conditions suivantes:



Ce symbole est utilisé s'il y a un risque de **dommage corporel** si les consignes données ne sont pas respectées ou lorsqu'elles sont mal respectées.



Ce symbole est utilisé s'il y a un risque de dommage matériel ou risque de destruction de fichier si les consignes données ne sont pas respectées ou lorsqu'elles sont mal respectées.



Ce symbole est utilisé lorsqu'il s'agit d'attirer votre attention sur un point particulier.



0.1

Testez chaque nouveau programme avant de mettre une installation en service!



0.2/1.1

En cas d'utilisation du module de couplage du calculateur R500P, il convient de suivre les mesures de sécurité relatives à la protection ESD. Les décharges électrostatiques doivent être évitées!

Mesures de sécurité relatives aux dispositifs de commande

Les pictogrammes et messages d'avertissement suivants peuvent se trouver sur les éléments de commande afin d'attirer votre attention sur certains points:



Présence de tension électrique dangereuse



Danger lié à la présence de batteries



Modules sensibles à l'électricité statique



Enlever la fiche secteur avant l'ouverture



Uniquement pour le raccordement de la terre PE !

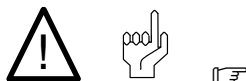


Uniquement pour le raccordement d'un câble blindé

A.4.4 *Ελληνικά*

A.4.5 Italiano

Avvertenze per la sicurezza in queste istruzioni per l'uso



Questi simboli vengono impiegati in queste istruzioni per l'uso nelle seguenti condizioni.



Questo simbolo viene impiegato qualora l'osservanza imprecisa o la mancata osservanza delle istruzioni possono provocare danni alle **persone**.



Questo simbolo viene impiegato qualora l'osservanza imprecisa o la mancata osservanza delle istruzioni può provocare danni agli **apparecchi o ai file**.



Questo simbolo viene impiegato quando si voglia richiamare l'attenzione su qualcosa di particolare.



0.1

Provare ogni nuovo programma prima di mettere in funzione l'impianto!



0.2/1.1

Durante l'impiego di un'unità di accoppiamento del calcolatore R500P devono essere osservate tutte le misure preventive per la protezione ESD! Evitare scariche elettrostatiche!

Avvertenze per la sicurezza sui componenti di comando

Sui componenti di comando stessi possono essere applicate le seguenti targhette di avvertimento e di avvertenza, che richiamano l'attenzione su particolari pericoli:



Avvertimento per tensione elettrica pericolosa!



Avvertimento per pericoli dovuti alle batterie!



Elementi costruttivi danneggiabili da cariche elettrostatiche!



Sfilare la spina dalla rete prima di aprire!



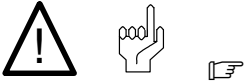
Perno solo per il collegamento del conduttore di protezione PE!



Solo per il collegamento di un conduttore schermato!

A.4.6 Nederlands

Veiligheidsrichtlijnen in deze gebruiksaanwijzing



Deze symbolen worden in deze gebruiksaanwijzing onder de volgende voorwaarden gebruikt.



Dit symbool wordt gebruikt wanneer door onnauwkeurige of niet-naleving van aanwijzingen **schade aan personen** kan worden berokkend.



Dit symbool wordt gebruikt wanneer door onnauwkeurige of niet-naleving van aanwijzingen **schade aan toestellen of bestanden** kan worden berokkend.



Dit symbool wordt gebruikt wanneer wij u op iets bijzonders willen attent maken.



0.1

Test elk nieuw programma voor u een installatie opstart!



0.2/1.1

Tijdens het werken met de interface module R500P moeten alle voorzorgsmaatregelen voor ESD-beveiliging in acht worden genomen. Voorkom elektrostatische ontladingen.

Veiligheidsaanwijzingen bij de besturingscomponenten

Aan de besturingscomponenten zelf kunnen de volgende waarschuwingen en richtlijnen aangebracht zijn. Zij zijn bedoeld om u op bepaalde zaken te attenderen:



Waarschuwing voor gevaarlijke elektrische spanning.



Waarschuwing voor gevaar veroorzaakt door akku's.



Elektrostatisch gevoelige componenten.



Trek de stekker uit alvorens te openen.



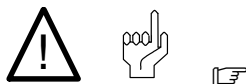
Bouten alleen voor aansluiting van de veiligheidsaarding PE.



Alleen voor aansluiting van een afgeschermde kabel.

A.4.7 Português

Instruções de segurança contidas nas presentes instruções de serviço



Estes símbolos são utilizados nas presentes instruções de serviço nos seguintes casos:



Este símbolo é utilizado quando existe o perigo de ferimento de pessoas por observância incorrecta ou não observância das instruções.



Este símbolo é utilizado quando existe o perigo de danificação de aparelhos ou ficheiros por observância incorrecta ou não observância das instruções.



Este símbolo é utilizado para chamar a atenção para algo de especial.



0.1

Antes de colocar uma instalação em funcionamento há que experimentar sempre qualquer programa novo!



0.2/1.1

Ao lidar com o módulo de acoplamento de computadores R500P há que respeitar todas as medidas de protecção ESD! Evitar descargas electrostáticas!

Instruções de segurança nos componentes de comando

Nos próprios componentes de comando podem estar afixados os avisos ou as instruções seguidamente descritos para chamar à atenção para determinados pontos.



Aviso referente a uma tensão eléctrica perigosa!



Aviso referente a perigos relacionados com baterias!



Módulos em perigo electrostático!



Antes de abrir tirar o cabo alimentador da rede!



Borne apenas para ligação do condutor de protecção à massa PE!



Só para ligação de um condutor blindado!

A.4.8 Español

Indicaciones de seguridad en estas instrucciones de empleo



Estos símbolos se utilizan en estas instrucciones de empleo bajo las siguientes condiciones.



Este símbolo se utiliza cuando por una ejecución incorrecta o la no ejecución de instrucciones se pueden llegar a producir **daños a las personas**.



Este símbolo se utiliza cuando por la ejecución incorrecta o la no ejecución de instrucciones se pueden llegar a producir **daños en los aparatos o archivos**.



Este símbolo se utiliza cuando se le debe llamar la atención respecto a algo especial.



0.1

¡Compruebe cada nuevo programa antes de poner en funcionamiento una instalación!



0.2/1.1

¡Para el manejo del módulo de acoplamiento del ordenador R500P se han de cumplir todas las disposiciones para la protección ESD! ¡Evitar las descargas electrostáticas!

Indicaciones de seguridad en los componentes de control

En los componentes de control mismos pueden estar dispuestos las siguientes advertencias e indicaciones que le deben llamar la atención sobre determinados temas:



¡Advertencia ante tensión eléctrica peligrosa!



¡Advertencia ante riesgos por baterías!



¡Elementos constructivos con riesgos de descargas electrostáticas!



¡Antes de abrir, desenchufar el conector de la red!



¡Perno sólo para la conexión del conductor protector PE!



¡Sólo para la conexión de un conector blindado!

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Technische Änderungen vorbehalten

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