onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

INTERBUS-S

User Manual for INTERBUS-S

Controller Board for Siemens SIMATIC S5

onlinecomponents.com

Type: IBS S5 DCB UM E

Revision: B

Order No.: 27 58 36 3

This user manual is valid for:

IBS S5 DCB/I-T	Order No.: 27 58 15 6	Firmware ≥ 3.5
IBS S5 DCB-T		Hardware revision ≥C
IBS S5 SWD	Order No.: 28 06 22 8	Software ≥ 2.2
IBS SYS SWT	Order No.: 27 80 88 1	Software ≥ 2.3

Copyright by Phoenix Contact 04/1994

5003B

PHOENIX CONTACT

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

onlinecomponents.com

We are constantly attempting to improve the quality of our manuals.

Should you have any suggestions or recommendations for improvement of the contents and layout of our manuals, we would appreciate it if you would send your recommendations to:

Phoenix Contact GmbH & Co.
Abt. Applikation/Techn. Dokumentation

Flachsmarktstraße 8 – 28
32825 Blomberg
Germany

☎ *49-5235-550
FAX *49-5235-55-1200

5003B

PHOENIX CONTACT

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Please read completely before reading this manual !!

In order to guarantee that your use of this manual is as straightforward as possible and that hardware is used safely in the installation, operation and maintenance phases, we request that you carefully read and observe the following instructions:

Explanation of Symbols Used

The "attention" symbol refers to erroneous handling, which could lead to damage to the hardware or software, or in indirect connection with dangerous process peripherals (e.g., unprotected shafts or motors with actuator functions) to light to severe personal injury. The symbol is always located to the left of the tagged text.

The "pointer" hand gives you tips and advice on the efficient use of hardware and on software optimization, to save you from performing extra work, for example. In addition, text marked in this way informs you of system-related conditions that must absolutely be observed to achieve error-free operation. The hand is also found in front of clarifications of terms.

Statement of Legal Authority

This manual, including all illustrations contained herein, is copyright protected. Use of this manual by any third party in departure from the copyright provision is forbidden. Reproduction, translation, or electronic or photographic archiving or alteration requires the express written consent of Phoenix Contact. Violations are liable for damages.

Phoenix Contact reserves the right to make any technical changes that serve for the purpose of technical progress. Phoenix Contact reserves all rights in the case of a patent award or listing of a registered design. External products are always named without reference to patent rights. The existence of such rights shall not be excluded, however.

The use of products described in this manual is oriented exclusively to qualified electricians or persons trained in the electrical field, who are entrusted with the applicable national standards. Phoenix Contact assumes no liability for erroneous handling of or damage to Phoenix Contact or external products resulting from disregard or information contained in this manual.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Supplementary Notes

IBS S5 DCB UM E, Order No.: 27 58 36 3, Revision B

Although the manual was thoroughly checked, some additions became necessary after its publication. Please observe the following notes.

Chapter 7.2, “Cable Installation”:
InterBus was designed for industrial use.

To fulfill the requirements of the EMC directive 89/336/EEC (Electromagnetic Compatibility) and the listed harmonized European standards, the following specifica-tions are to be observed besides the installation guidelines in the relevant manuals and Data Sheets.

Connect, in the **immediate vicinity** (max. 25 cm) of the controller board, the remote bus cable shield to the equipontential bonding conductor (see figure below).

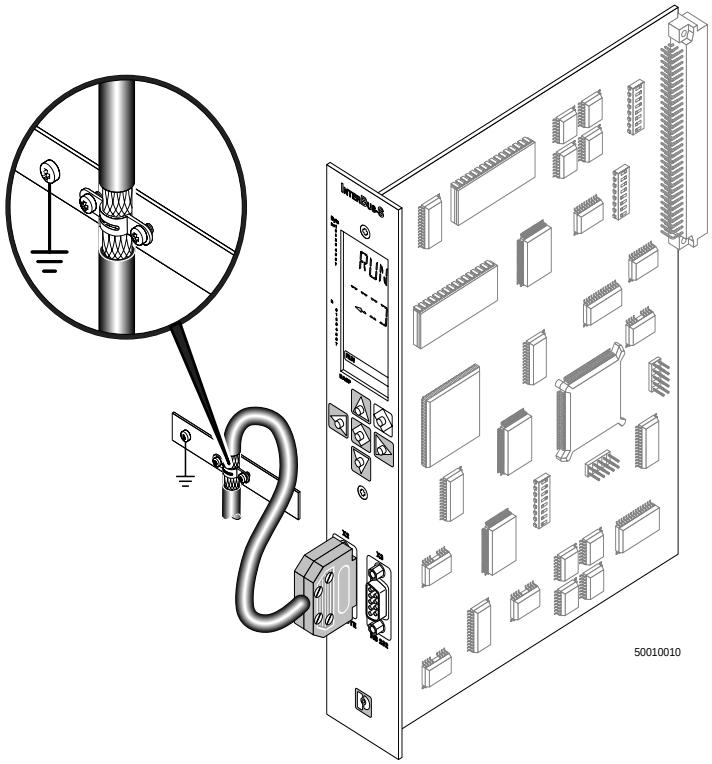


Figure C1: Example for grounding the shield with a metal clamp
(The controller board shown is of no specific type!)

Expose the braided shield only over the length required for grounding the shield, without causing damage to the braid or the signal lines!
Use a metal clamp that fits the diameter of your remote bus cable, which ensures a secure connection while not squeezing the cable!

InterBus devices with the degree of protection IP20 and lower must be installed in electrical equipment rooms or in closed cabinets (e.g. metal switch cabinets).
When installing controller boards and slave boards, please observe also the PLC and computer manufacturers’ installation instructions!

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Chapter 6, “Startup”:

The communication register base address settings documented in the manual do not match the program examples on the ISFP diskette.
The following sections of the text (with page numbers) are affected:

Page	Section
6-10	c) Program example
6-15	d) Detailed program example with organization, function and data blocks
6-25	d) Detailed program example with organization, function and data blocks
6-28	FB210 listing
6-43	d) Detailed program example with organization, function and data blocks
6-57	d) Detailed program example with organization, function and data blocks

Replace the values as follows in the above text sections!

FEN3 : KF+200 -> FEN3 : KF +252

In accordance with this change, change the communication register addresses in the figures listed in the table below **(200->252; 202->254)**:

Page	Section
6-9	Figure 6-6
6-12	Figure 6-8
6-22	Figure 6-9
6-26	Figure 6-10
6-40	Figure 6-11
6-54	Figure 6-12

Chapter 3.1, “ID Code of the Modules”, Page 3-4, Table 3-2

All register width details are given as number of bytes.

The numbers given for the IB ST 24 DO 8/3-2A module were mixed up by mistake for the columns "OUT-AR" and "Register width" (both numbers are given in bytes).
Correct is: OUT-AR =1 and register width = 1
The number"“81 *" for the IB ST 24 DO 8/3-2A module in the "Length code" column was given in a hexadecimal format. The correct decimal value is "129".
The number"“1**" is of no importance.
The footnote text for both length specifications refers to firmware versions below version 3.5.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

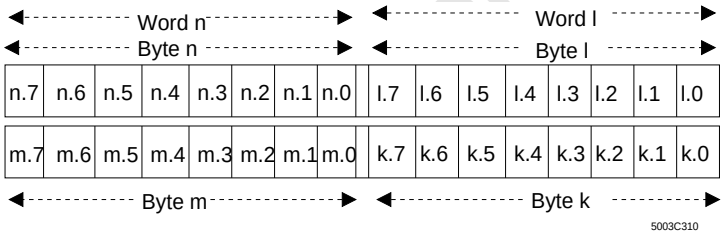
The numbers for the IBS IP CDI 1/24-F, IBS IP CDI 2/24-F, IBS IP CDO 1/24-F, IBS IP CDO 2/24-F, IB ST 24 DI 16/4 modules were given **one** byte too small in the “Register width” column. The register width is 2 bytes for the above modules.
The numbers for the IB ST 24 DI 32/2 and IB ST 24 DO 32/2 modules were given **two** bytes too small in the “Register width” column (both in bytes). The register width for the above modules is 4 bytes.

Chapter 3.1, “ID Code of the Modules”, Page 3-5, Table 3-3

The numbers for the InterBus-S module IBS 24 IP DIO BB1/E-T were given **one** byte too small in the columns "OUT-AR" and "Register width" (both numbers in bytes). For this module the register width is 4 bytes and the assigned output address area is 2 bytes.

Chapter 3.5.7, "Digital Modules with 16 Inputs and 16 Outputs", Page 3-30, Figure 3-17

The bit designations for byte l and byte m were reversed in Figure 3-17. The correct bit assignment is shown in the following figure.



Chapter 6, “Bus topology for the example (DCBADR, DCBEEP, DCBZYK, DCBCP, DCBECP)”, Pages 6-12, 6-22, 6-26, 6-40, 6-54

The addresses for the diagnostic bit register in the example diagrams on the above pages are **not** “I 30.0 - I 31.7”, but “I 126.0 - 127.7”.

Chapter 6, Pages 6-51, 6-53, 6-60 and 6-62, data block designations:

The numbers in the data blocks are reversed between the Pages 51 and 53 as well as between Pages 60 and 62.
Correct is: Pages 51 and 60 describe the data block 23 and Pages 53 and 62 describe the data block 21.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

New Firmware Revision V3.71 for the IBS S5 DCB (/I)-T Controller Board for SIMATIC® S5 PLCs

Owing to functional extensions, technical improvements and corrections in the firmware, there are some innovations for the IBS S5 DCB (/I)-T controller boards for SIMATIC® S5 PLCs.

Controller boards and documentation concerned:

Hardware:
IBS S5 DCB/I-T: Order No.: 27 58 15 6
IBS S5 DCB-T: Order No.: 28 06 21 5

Firmware:
- Previous version: 3.5x
- Update version: 3.71

Upgrade:
A hardware upgrade with the update version is possible with:
- Hardware version: IBS GB S5 9166835 C
- Plug-on board type: MA5

The firmware can be updated as of:
- Firmware version: 3.3x

User manuals:
German: IBS S5 DCB UM (Order No.: 28 06 23 1)
English: IBS S5 DCB UM E (Order No.: 27 58 36 3)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Diagnostic Information

For InterBus-S system diagnostics, the front plate makes various diagnostic information via LEDs and a 3-digit seven-segment display available.

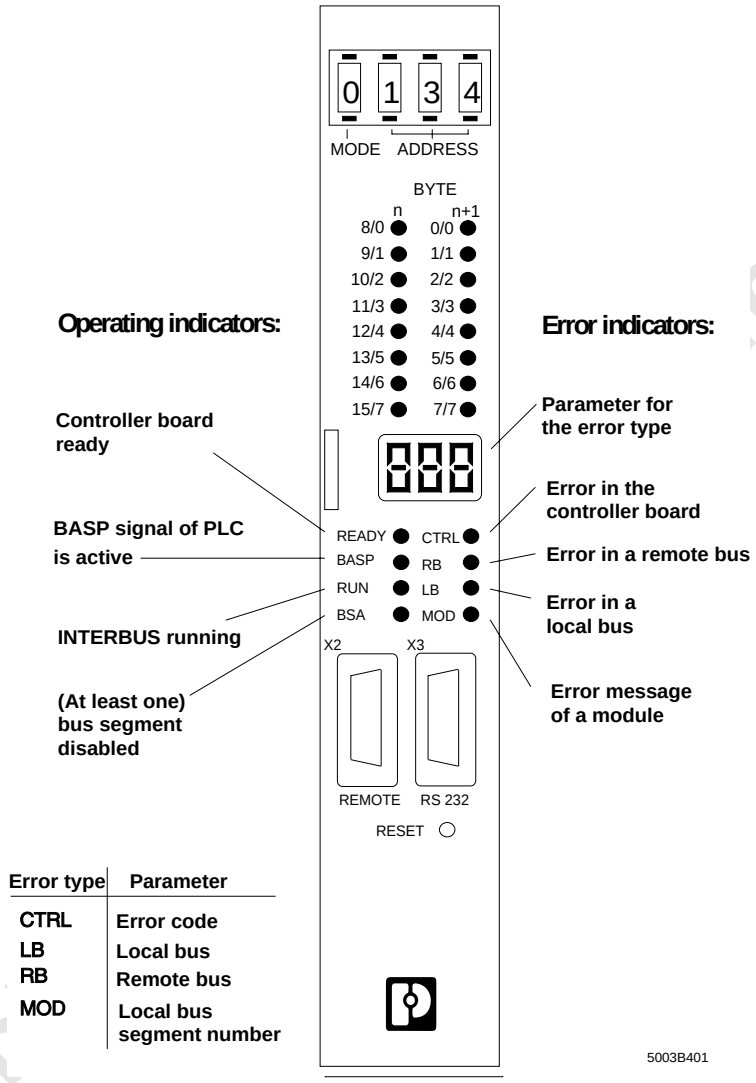


Figure 1: Operating and error indicators on the front plate

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

CTRL (Controller Error)
LED description
- Red LED
- Parameterization error on the controller board or in the software parameterization

Parameter
- Hexadecimal value
- Error description in the user manual

RB (Remote Bus Error)
LED description
- Red LED
- Wrong remote bus segment consisting of a BK module and the preceding remote bus cable

Parameter
- Decimal value
- No. of the bus segment concerned

LB (Local Bus Error)
LED description
- Red LED
- Wrong local bus segment consisting of the individual local bus modules and the connecting bus cables

Parameter
- Decimal value
- No. of the bus segment concerned

MOD (Module Error)
LED description
- Red LED
- Defective module periphery
- I/O voltage failure
- Short-circuit at the output
- Only for devices with status message

Parameter
- Decimal value
- No. of the bus segment concerned

RB and LB (Indication of the error location by specifying an area)
LED description
- Red LED

Parameter
- Decimal value
- The parameter specifies the base bus segment number of the area concerned.
- Group error messages with the error codes E01, E02, E04, E05 and E06
- The error was assigned to a bus area which may consist of several bus segments.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Table 1: Indication of the diagnostic data on the front plate

LB - LED	RB - LED	Description
on	off	Error in the displayed local bus segment
off	on	Error in the displayed remote bus segment
on	on	See Figure 2, the error cause is limited to the branch of the: 1) preceding remote bus 2) preceding IB ST compact station/local bus segment 3) preceding installation remote bus and the bus segment whose number is shown on the seven-segment display of the front plate.

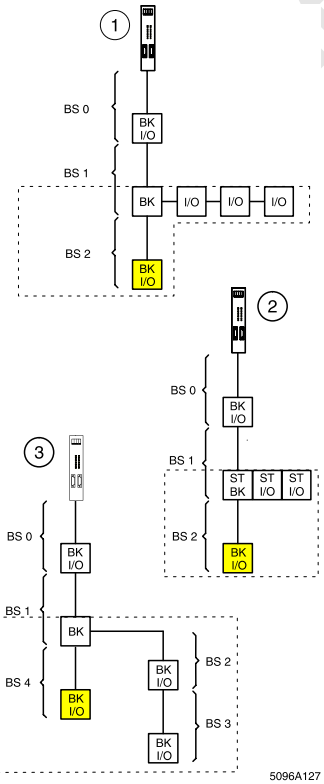


Figure 2: Error location (dashed area) with respect to the displayed bus segment (gray)

When logical addressing is used (physical addressing is shown here!) the order of the bus segment numbers may differ from the one shown here (see System Description).

Extension and improved explanations of the error numbers for the error type EE03, "Bus-Error-Information-Indication", Page 9-56

Error no.	Error description (local bus, short: LB)
DD01	The ID of a BK does not agree with the one of the original configuration (e.g. due to a device replacement or device error).
DD02	Error description like the DD01, but related to a BK I/O.
DD03	LB is missing or open LB cable (no or defective connection between a BK and the 1st LB module or two LB modules).
DD04	LB is longer than expected because a module was added during operation.
DD05	LB is shorter than expected because a module was removed during operation.
DD06	In the specified LB a module ID code is not identical with that in the original configuration.
DD07	Configuration could not be read in because the bus system was not connected.
DD08	LB is at the wrong position in the bus system, because the LB was connected to a free BK module of the initial configuration.
DD09	Bus segment is missing or the remote bus cable is open (no or defective remote bus cable connection).
DD0A	Too many transm. errors (corresponds to error type EE06, no error when configuration was acquired and compared) between two error-free data cycles.
DD0B	Configuration longer than expected because the remote bus was extended compared with the initial configuration.
DDOC	Maximum configuration exceeded, the number of bus modules or of the register positions is too high.
DD11	Wrong process data length or data register of a bus device is defective (remote bus).
DD12	Wrong process data length or data register of a bus device is defective (local bus).
DD15	Temporary change of an ID code during operation with specified BK or module in specified LB (similar to DD01/02/06).
DD18	Temporary error in a LB using 8-wire technology during operation caused by a cable and/or module error (similar to DD03/05/08).
DD19	Bus interruption or voltage reset in the additional diagnostic phase.
DD1A	Like DD0A, but in the additional diagnostic phase.
DD2B	Like DD0B, but in the additional diagnostic phase.
DD42	Temporary bus interrupt, voltage reset or jumper in the outgoing remote bus defective.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Chapter 3.1, "ID Code of the Modules", Page 3-4, Table 3-2
With the firmware update V3.71 the new IBS IP KES A/4 IN module is assigned to the ID code 23_{hex}.
This has the following consequences:

- The messages "battery" and "power fail" are not used for the motor relay module.
- The I/O data is processed byte-by-byte.
- The inputs and outputs of a bus terminal module can be switched off.

As of firmware 3.71, IBS devices with a process data length of 26 words are supported. These devices have a length code of 17_{dec} in the more significant byte of the ID word.

Chapter 8.3.3, Function block EVENT (FB 76), Page 8-85, valid as of ISFP version 2.3:
The following features were implemented for the event processing:
- Comparison of an input with a given pattern
- Counting of the occurred events in the associated event counters
- Suppression of event indications
- Readout of the event counters

Event processing is only possible with digital IBS modules.

Chapter 2.3.1.1, "I/O Status Indicators", Page 2-5 ff., Mode 9 settings
Besides the familiar direct error indication with the red LEDs CTRL, RB, LB, MOD and the associated parameters on the diagnostic front plate, firmware 3.71 includes further service information. This service information can be accessed with the switch setting MODE 9 and an associated address. The associated data is displayed via the three-position diagnostic display.
Note: MODE 9 must be used for service purposes only.

Table 3 summarizes the data shown on the front plate.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Table 3: Mode 9 settings

Switch position	Description of the display (7-segment display/LEDs)
9180 - 918x	Displays the module numbers of the ten modules with the greatest number of errors on the seven-segment display (9180 = the module with the greatest number of errors, 9181 = the module with the second greatest number of errors, etc.) If there are less than 10 modules to which errors can be assigned, 'Ad' appears on the free positions. The module number 'FF' shows special CRC errors. In addition, all I/O data LEDs light up. The hundred's place of the module numbers is also mapped onto the I/O data LEDs. LED 0 lights up for the module numbers 0-99, LED1 for 100-199, LED2 for 200-299 and so on. This setting of the code selector switch corresponds to the result of the Send-Located-Error-Counter (0109_{hex}) or Send-Located-Error-Counter-V24 ($010A_{hex}$) services.
9190-9199	Displays the local bus numbers of the last 10 module status errors on the seven-segment display. This setting of the code selector switch corresponds to the result of the Send-Last-Module-Status-Error ($010B_{hex}$) or Send-Last-Module-Status-Error ($010C_{hex}$) services.
9200	Firmware revision (371 for version 3.71)
9210	Supplementary error message DDxx
9300 - 93xx	An input and an output word are reserved in the PLC's memory with the help of the special ID code **0015_{hex}**. The content of the output word appears on the yellow I/O LEDs when the selector switches are set to 93XX. Also, the value XX (decimal, value range 0-99) appears in the defined input word. When the configuration is specified, the special ID code 0015_{hex} is attached to the actual configuration by means of the Check-Physical-Configuration (0058_{hex}) service. It may occur only once in the configuration specification. By means of logical addressing the two words can be placed on any address in the PLC memory.
94xx - 99xx	The selector switch settings 9400 to 9912 display the ID codes of the current configuration in their physical order as hexadecimal values on the seven-segment display. The first position 9400 provides the number of modules of the current configuration. If there are more than 255 modules (greater than $FF_{hex)}$, the point of the right digit of the seven-segment display lights up for the third hex position. This code selector switch setting corresponds to the result of the Send-Actual-Configuration ($010D_{hex}$) or Send-Actual-Configuration-V24 ($010E_{hex}$) services.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Statistical Diagnostics

Automatic enabling of the statistical diagnostic functionality
The statistical diagnostic functionality is enabled automatically with every start command.

Display of the diagnostic status on the controller board

When InterBus-S is active, a disabled statistical diagnostic functionality is shown with a **bracket symbol** in the left field of the three-position seven-segment display on the controller board. The exact representation can be taken from the following figure.

7-segment display	Bus status	Remark	Diagnostic status
]Ad	Bus active	Invalid address setting on the controller board	Statistical diagnostics inactive
]- -	Bus active	Run status of the controller board	Statistical diagnostics inactive
Ad	Bus active	Invalid address setting on the controller board	Statistical diagnostics active
- -	Bus active	Run status of the controller board	Statistical diagnostics active

5044AC01

Part 1: Writing the Diagnostic Data to the Parameterization Memory (e.g. EEPROM or S-RAM)

(Part 2 for firmware version 3.72, see Page 14)

The diagnostic data is always transferred into the EEPROM when transmission errors cause the stop of the bus. The data remains stored in the EEPROM until it is overwritten by further transmission errors.
The EEPROM data can be read out with the **Send-Test-Parameter** command, when bit 8 is set for the selection. If there is no EEPROM, a negative confirmation is returned in which the parameter error type is $\mathbf{02_{hex}}$.

If an error occurs when the data is written, the EEPROM-Write-Error is reported. If there is no EEPROM available when the data is written there will be no error message.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

New Firmware Revision V3.72 for the IBS S5 DCB (/I)-T Controller Board for SIMATIC® S5 PLCs

Owing to functional extensions, technical improvements and corrections in the firmware, there are some innovations for the IBS S5 DCB (/I)-T controller board for SIMATIC® S5 PLCs.

Controller boards and documentation concerned:

Boards:
IBS S5 DCB/I-T: Order No.: 27 58 15 6
IBS S5 DCB-T: Order No.: 28 06 21 5

Firmware:
- Previous version: 3.71
- Update version: 3.72

Upgrade:
A hardware upgrade with the update version is possible with:
- Hardware version: IBS GB S5 9166835 C
- Plug-on board type: MA5

The firmware can be updated as of:
- Firmware version: 3.3x

User manuals:
German: IBS S5 DCB UM (Order No.: 28 06 23 1)
English: IBS S5 DCB UM E (Order No.: 27 58 36 3)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Diagnostic Performance as of FW 3.72

With firmware version 3.72 the diagnostic performance of the controller board was further improved.This performance manifests itself when bus operation was frequently interrupted.

In this case the controller board stops bus operation and resets all outputs.
In an additional diagnostic phase, the entire bus configuration (without the controller board) is examined. The blinking display "-||-" on the front plate and a set analysis bit in the diagnostic register (bit 15) indicate this error analysis phase.

Diagnostic phase	Meaning
Diagnotics during operation	Detection of remote bus, local bus, module errors in the bus configuration and hardware or firmware errors on the controller board.
	Detection of changes in the bus configuration
	Detection of located CRC errors
Long reset after frequent bus malfunctions	Reset of the outputs
Error analysis after a bus stop	Determination of temporary errors, continuous monitoring of the bus system, in order to detect temporary malfunctions

Depending on the size of the bus, the error location(s) and error frequency, the additional diagnostic phase may last from 10 seconds to several minutes.
It may be stopped with the following commands without the error message “Bus-Error-Information” being sent:

- Configure-Bus (0023_{hex})
- Warmstart ($004C_{hex}$)
- Check-Physical-Configuration (0058_{hex})
- Alarm-Stop ($004A_{hex}$)
- Group-Off (0021_{hex})

Depending on the PLC’s status when the bus is stopped, the BASP LED may light up during the additional diagnostic phase.
If groups were disabled before the bus was stopped the BSA LED is also on.
After the diagnostic phase has been completed there is either an

- LED error indication (RB, LB or MOD) **or**, **if the error cannot be located,**
- E0x (x= 1,2,4,5,6) is output on the diagnostic display.

The errors indicated are ordered as with firmware revision 3.71.
For the indication by means of LEDs it is generally true that
local bus errors are only indicated if no bus errors were found.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

During the additional diagnostic phase some commands are only confirmed negative and will therefore not be executed. The following table lists these commands. All commands which are not listed will be executed as usual.

Negatively acknowledged commands during the additional diagnostic phase	Negative messages for the listed commands
Start-Interbus-Cycle (0001_{hex})	Start-Bus-Not-Possible-Con ($00E3_{hex}$)
Switch-Group-On (0021_{hex})	Switch-Group-On-Failed-Con ($80C5_{hex}$)
Set-BK-Alarm-Log (0024_{hex}) Reset-BK-Alarm-Log (0025_{hex}) Set-BK-Alarm-Phy (0026_{hex}) Reset-BK-Alarm-Phy (0027_{hex})	BK-Alarm-Failed-Con ($005A_{hex}$)
Send-Bus-Error-Information ($005A_{hex}$) Send-Bus-Error-Information-V24 (0116_{hex}) Send-Localbus-Module-Error ($005B_{hex}$) Send-All-Module-Error ($005B_{hex}$)	No-Map-Entry-Con ($00ED_{hex}$)
Quit-Module-Error (0064_{hex}) Quit-Module-Error-All (0065_{hex})	Quit-Module-Error-Not-Possible-Con ($80FF_{hex}$)

New Bit in the Diagnostic Bit Register

Bit 14 in the diagnostic-bit register is called "bus quality bit". It is set if more than 20 cycles with errors were detected within 1 million data cycles.

Part 2: Writing the Diagnostic Data to the Parameterization Memory

(Part 1 for firmware version 3.71, see Page 11)

Diagnostic data which describe transmission errors are only written to the parameterization memory if there were error-free data cycles before these errors occurred.

Additional Error Numbers for the Error Message Bus-Error-Information-Indication ($80C4_{hex}$)

Error No.	Error Description
DD50	Remote bus or local bus error detected in the additional diagnostic phase
DD51	Local bus error detected in the additional diagnostic phase
DD52	Remote bus error detected in the additional diagnostic phase

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

New Command: “Create-Default-CRL ($012D_{hex}$)”

Should the controller board detect PCP devices in the bus configuration after the Default-CRL was already generated (because of the startup of the controller board or the PLC system) , this command can be used to adapt the default communication relationship list. Afterwards the command generates a new default communication relationship list according to the valid configuration. The valid configuration may also be predetermined by means of logical addressing.

This command is used to cancel the services “Init-Communication”,“Receive-CRL-Req” and “Receive-CR-Req”, which might have been active before.

Command:

Create-Default-CRL-Req	$012D_{hex}$

Positive Message:

Create-Default-CRL-Con		8123_{hex}
Parameter block length		0001
Result +		00 00

Protocol Extension for the Bit-Controlled Command Execution

Up to now it was possible to initiate only one command sequence in the protocol with the associated action bit at a given point in time.
Firmware 3.72, however, allows to set several action bits, regardless of whether a command sequence is still being processed.
The command sequences of several set action bits are processed in turn, thus from bit 0 to bit 15 and starting again with bit 0. The consequence is that still only one command sequence is exectuted at at time.
The action bit register is evaluated if no command sequence is executed. Therefore, the setting and clearing of the action bit during the execution of another command sequence cannot lead to the execution of the associated command sequences.

Also - in order to have an easy to maintain program sequence - it is recommended to initiate the command sequences one after another in order to define the processing order.

online-components.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

New Firmware Revision V3.73 for the IBS S5 DCB (/I)-T Controller Board for SIMATIC® S5 PLCs

Owing to functional extensions, technical improvements and corrections in the firmware, there are some innovations for the IBS S5 DCB (/I)-T controller board for SIMATIC® S5 PLCs.

Controller boards and documentation concerned:

Boards:
IBS S5 DCB/I-T: Order No.: 27 58 15 6
IBS S5 DCB-T: Order No.: 28 06 21 5

Firmware:
- Previous version: 3.72
- Update version: 3.73

Upgrade:
A hardware upgrade with the update version is possible with:
- Hardware version: IBS GB S5 9166835 C
- Plug-on board type: MA5

The firmware can be updated as of:
- Firmware version: 3.3x

User manuals:
German: IBS S5 DCB UM (Order No.: 28 06 23 1)
English: IBS S5 DCB UM E (Order No.: 27 58 36 3)

Changed Position of the Analysis Bit

When the firmware was updated to revision 3.73, the analysis bit in the diagnostic bit register was shifted from position 15 to position 13.

The request of analysis bit must be adapted in PLC programs that have previously used firmware 3.72 and this bit.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Chapter 2.3.1.1, “I/O Status Indicators”

Mode	Address area
0	Inputs, P area
1	Outputs, P area
2	Inputs, Q area
3	Outputs, Q area
4	Inputs, extended area 1
5	Outputs, extended area 1
6	Inputs, extended areas 2
7	Outputs, extended area 2
8	Must not be set!

The use of the extended address areas 1 and 2 does **not** increase the maximum number of process data words connectable in the InterBus system (256)! The extended address areas are only used for relocating InterBus process data if the P and/or Q area would be excessively filled by other input/output units!
The extended areas are organized by the new function blocks

- GETINDB (FB 80) / PUTOUTDB (FB 81), in a data-block-oriented way (...DB) or

- GETINMW (FB 82) / PUTOUTMW (FB 83) in a flag-word-oriented way (...MW).

The function blocks will be described on the following pages.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Chapter 8.3.5, new function block GETINDB (FB 80)

The GETINDB function block (FB 80) reads the data in the extended input area and copies it to the specified data block from the specified data word onwards. The start and end addresses are provided with the “ADR” parameter and are to be specified in words (even-numbered).
The start and end address of the output data is transferred with the “ADR” parameter and must be specified in words (even-numbered).
The return bit indicates whether the function block has been executed error-free.
FB 80 is called at the beginning of the cycle.

Call of the GETINDB function block (FB 80)

```
      :SPB FB 80

NAME :GETINDB
IBDB  :     DB  9        INTERBUS data block
EXT   :     KF +1        Selection of the extended area
ADR   :     KY 0,128     Start and end address of the data to be read
DBDW  :     KY 10,000    Number of the destination DB and data block
RET   :     M0.2         Return bit
      :
```

Table 8-20: Parameters of the GETINDB function block (FB 80)

Name	Type	Description
IBDB	DB	Number of an InterBus data block (DB 0 ... 255) The data block is to be set up by you
EXT	BY	Specifies the area to be read: 1 = extended area 1; 2 = extended area 2
ADR	BY	Start and end address of the data to be read (even values only!)
DBDW	DB	Number of the destination DB and data word (2 bytes in one data word!)
RET	BI	Return bit: 0/1 = Function executed without/with errors Error causes: - Start address higher than end address - Data area in the DB is insufficient for the amount of data to be read.

Structure of the data block for the selected extended area

```
E.g.   DW x       = (data n), (data n+1)
       DW x+1     = (data n+2), (data n+3)
       ...
       DW x+126   = (data n+252), (data n+253)
       DW x+127   = (data n+254), (data n+255)
```

n = first byte of the (even) start address of the data to be read, see ADR parameter

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Chapter 8.3.6, new function block PUTOUTDB (FB 81)

The PUTOUTDB function block (FB 81) writes the data in the extended input area to the extended output area determined by the “ADR” and “EXT” parameters.
The start and end address of the output data are transferred with the “ADR” parameter; they are to be specified in words (even-numbered).
The return bit indicates whether the function block has been executed without errors.
FB 81 is called at the end of the cycle.

Table 8-21: Parameters of the PUTOUTDB function block (FB 81)

Name	Type	Description
IBDB	DB	Number of an InterBus data block (DB 0 ... 255) The data block is to be set up by you
EXT	BY	Specifies the area to be read: 1 = extended area 1; 2 = extended area 2
ADR	BY	Start and end address of the data to be written (even values only!)
DBDW	DB	Number of the source DB and data word (2 bytes in one data word!)
RET	BI	Return bit of the function: 0 = Function executed without errors; 1 = Function executed with errors

```
        :SPB FB 81

NAME :PUTOUTDB
IBDB   :      DB  9          INTERBUS data block
EXT    :      KF +1          Selection of the extended area
ADR    :      KY 0,128       Start and end address of the data to be written
DBDW :        KY 10,000      Number of the source DB and data word
RET    :      M0.2           Return bit
```

Structure of the data block for the selected extended area

E.g.
DW x = (data n), (data n+1)
DW x+1 = (data n+2), (data n+3)
...
DW x+126 = (data n+252), (data n+253)
DW x+127 = (data n+254), (data n+255)

n = first byte of the (even) start address of the data to be written, see ADR parameter

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Chapter 8.3.7, new function block GETINMW (FB 82)

The GETINMW function block (FB 82) reads the data in the extended input area and copies it to the following flag words specified from MW onwards.
The start and end addresses of the output data are transferred with the “ADR” parameter; they are to be specified in words (even-numbered).
The return bit indicates whether the function block has been executed error-free.
FB 82 is called at the beginning of the cycle.

Table 8-22: Parameters of the GETINMW function block (FB 82)

Name	Type	Description
IBDB	DB	InterBus data block Number of a data block (DB 0 ... 255) The data block is to be set up by you
EXT	BY	Specifies the area to be read: 1 = extended area 1; 2 = extended area 2
ADR	BY	Start and end address of the data to be read
MW		Number of the destination flag word (MW) (2 bytes in one flag word)
RET	BI	Return bit: 0/1 = Function executed without errors/with errors Error causes: - Start address higher than end address - Data area of the flags is insufficient for the volume of data to be read.

Call of the GETINMW function block (FB 82)

```
          :SPB FB 82
NAME      :GETINMW
IBDB      :     DB  9        INTERBUS data block
EXT       :     KF  +1       Selection of the extended area
ADR       :     KY 0,128     Start and end address of the data to be read
MW        :     MW 100       Number of the destination flag word
RET       :     M   0.2      Return bit
          :
```

Flag word assignment for the selected extended area

E.g.
MW x = (data n), (data n+1)
MW x+2 = (data n+2), (data n+3)
...
MW x+126 = (data n+252), (data n+253)
MW x+127 = (data n+254), (data n+255)

n = first byte of the (even) start address of the data to be read see ADR parameter

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Chapter 8.3.7, new function block PUTOUTMW (FB 83)

The PUTOUTMW function block (FB 83) writes the data in the specified flag word to the extended output area determined by the “ADR” and “EXT” parameters.
The start and end addresses of the output data are transferred with the “ADR” parameter and are to be specified in words (even-numbered).
The return bit indicates whether the function block has been executed without errors.
FB 83 is called at the end of the cycle.

Table 8-23: Parameters of the PUTOUTMW function block (FB 83)

Name	Type	Description
IBDB	DB	InterBus data block Number of a data block (DB 0 ... 255) The data block is to be set up by you
EXT	BY	Specifies the area to be read: 1 = extended area 1; 2 = extended area 2
ADR	BY	Start and end address of the data to be written (even-numbered values only!)
MW	DB	Number of the source flag word (2 bytes in one flag word)
RET	BI	Return bit: 0/1 = Function executed without errors Error cause: - Start address higher than end address

Call of the PUTOUTMW function block (FB 83)

```
          :SPB FB 83
NAME      :PUTOUTMW
IBDB      :     DB  9      INTERBUS data block
EXT       :     KF   +1    Selection of the extended area
ADR       :     KY 0,128   Start and end address of the data to be written
MW        :     MW 100     Number of the source flag word
RET       :     M    0.2   Return bit
          :
```

Assignment of the flag words for the selected extended area

E.g.. MW x = (data n), (data n+1)
MW x+2= (data n+2), (data n+3)
...
MW x+252= (data n+252), data (n+253)
MW x+254= (data n+254), data (n+255)

n = first byte of the (even) start address of the data to be written,
see ADR parameter

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

New Firmware Revision V3.75 for the SIMATIC® S5 Controller Board IBS S5 DCB (/I)-T

Owing to technical improvements of the hardware and the resulting adaptation of the firmware, a new firmware revision, V3.75, has been introduced for the SIMATIC® S5 controller boards IBS S5 DCB (/I)-T.

Controller boards and documentation concerned:

Boards:
IBS S5 DCB/I-T: Order No.: 27 58 15 6
IBS S5 DCB-T: Order No.: 28 06 21 5

Firmware:
- Previous version: 3.73
- Update version: 3.75
- Revision marking: 13/375 (sticker at the lower edge of the front plate)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Table of Contents

1 System Overview 1-1

1.1 Networking with INTERBUS-S 1-1

1.2 INTERBUS-S Topology 1-2
1.2.1 General Method of Operation 1-3
1.2.2 Error Protection Mechanisms 1-4
1.2.3 INTERBUS-S Protocol Sequence 1-5
1.2.4 INTERBUS-S Scan Time Calculation 1-6
1.2.5 Basic System Specifications 1-10

1.3 System Components 1-11
1.3.1 Host Controller Board 1-11
1.3.2 Remote Bus 1-12
1.3.3 Installation Remote Bus 1-13
1.3.4 Bus Terminal Module 1-15
1.3.5 Local Bus 1-16
1.3.6 INTERBUS-S I/O Modules 1-18
1.3.6.1 Remote Bus and Installation Remote Bus Modules 1-18
1.3.6.2 Local Bus Modules 1-18

2 Technical Description 2-1

2.1 Host Controller Board Method of Operation 2-1

2.2 Application Area of the Host Controller Board 2-2

2.3 Overview 2-3
2.3.1 Front Plate Components 2-4
2.3.1.1 I/O Status Indicators 2-5
2.3.1.2 Operating Indicators 2-6
2.3.1.3 Error Indicators 2-7
2.3.1.4 Interfaces 2-7
2.3.2 Controller Board Components 2-8

2.4 Host Controller Board Installation 2-9
2.4.1 Slot Allocation and Installation 2-9

2.5 Configuration of the Controller Board 2-11
2.5.1 PLC Address Area 2-11
2.5.2 Hardware Term Definitions 2-12
2.5.3 Configuring the Default Setting 2-13

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2.6 Hardware Settings ... 2-19
2.6.1 Mounting Positions of the Jumpers ... 2-19
2.6.2 Operation in the Central Controller and Controller Expansion Unit ... 2-20
2.6.3 Startup and Operating Mode Selection ... 2-21
2.6.3.1 INTERBUS-S in the PLC's Address Area ... 2-25
2.6.3.2 Address Locations for Automatic Start in the DCB Mode ... 2-26
2.6.3.3 Address Locations for Controlled Start in the DCB Mode ... 2-27
2.6.3.4 Address Locations for Automatic Start in the DAB Mode ... 2-28
2.6.3.5 Address Locations for Controlled Start in the DAB Mode ... 2-29
2.6.4 Address Windows ... 2-30
2.6.5 Interrupt Processing ... 2-36
2.6.5.1 Settings for Interrupt Processing ... 2-36
2.6.5.2 Different Interrupt Sources ... 2-38
2.6.6 Acknowledgment Delay Message ... 2-38
2.6.7 Disconnecting the RESET Button ... 2-39

2.7 Data Sheet ... 2-40

3 User Interfaces ... 3-1

3.1 ID Code of the Modules ... 3-3

3.2 Process Data Interface ... 3-8
3.2.1 Example Configuration ... 3-9
3.2.2 Order of the Modules on the Bus ... 3-11

3.3 Physical Addressing (DCB Mode) ... 3-12
3.3.1 Function ... 3-12
3.3.2 Addressing ... 3-12
3.3.3 Address Orientation ... 3-14

3.4 Logical Addressing (DCB Mode) ... 3-17
3.4.1 Function ... 3-17
3.4.2 Structure of an INTERBUS-S Address List ... 3-18
3.4.3 Addressing ... 3-19

3.5 Access to INTERBUS-S Modules ... 3-23
3.5.1 Digital Modules with 16 Inputs ... 3-24
3.5.2 LC Modules with 16 Digital Inputs ... 3-25
3.5.3 Digital Modules with 32 Inputs ... 3-26
3.5.4 Digital Modules with 16 Outputs ... 3-27
3.5.5 LC Modules with 16 Digital Outputs ... 3-28
3.5.6 Digital Modules with 32 Outputs ... 3-29
3.5.7 Digital Modules with 16 Inputs and 16 Outputs ... 3-30
3.5.8 Four-Channel Analog-Input Module with Programmable Gain ... 3-31
3.5.9 Four-Channel Analog-Output Modules ... 3-34
3.5.10 Relais Modules ... 3-36
3.5.11 Communication Interface Boards ... 3-37
3.5.12 Modules for Thermocouples ... 3-38

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

4 Diagnostic Interfaces 4-1

4.1 Diagnostics on the Controller Board's Front Plate 4-2
4.1.1 Operating Indicators 4-4
4.1.2 Error Indication 4-5
4.1.3 Error Codes for Controller Errors (CTRL) 4-8

4.2 Notes on Error Diagnostics 4-11
4.2.1 Indication of Errors on the Front Plate 4-12
4.2.2 Example of a System Documentation 4-19

4.3 Diagnostic Registers 4-23
4.3.1 Diagnostic Bit Register 4-23
4.3.2 Diagnostic Parameter Register 4-23
4.3.3 Diagnostic Register Locations 4-24

4.4 I/O Status Indicators 4-26

4.5 Startup and Acknowledgment Displays 4-28
4.5.1 Host Controller Board Startup 4-28
4.5.2 Acknowledgment after an Error 4-29

4.6 Diagnostics on the Modules 4-30
4.6.1 Diagnostic Functions on I/O Modules 4-31
4.6.2 Diagnostic Functions on Bus Terminal Modules 4-32
4.6.3 Diagnostics on Third-Party Devices 4-32

4.7 Using the Hand Held Monitor 4-33

4.8 Using the Monitor Program for INTERBUS-S on the PC 4-34

4.9 CTRL Error Displays 4-35
4.9.1 List of Errors 4-36

5 System Interfaces 5-1

5.1 Interface Description 5-1
5.1.1 Interface Function 5-2
5.1.2 Interface Classification 5-3

5.2 Command and Message Structure 5-4
5.2.1 Structure of Commands and Messages 5-4

5.3 Interface Description 5-5
5.3.1 ISFP 5-5
5.3.1.1 Program Structure 5-6
5.3.1.2 INTERBUS-S System Control 5-8
5.3.1.3 Function Overview 5-10
5.3.2 Bit-Controlled Command Execution 5-13
5.3.2.1 Description 5-13
5.3.2.2 Access to the Bit-Controlled Command Sequences 5-13
5.3.3 IBS SYS SWT 5-16
5.3.3.1 Description 5-16
5.3.3.2 Commands 5-18

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

6 Startup 6-1

6.1 Introduction 6-1
6.1.1 General Information About Physical Addressing 6-1
6.1.2 General Information About Logical Addressing 6-2
6.1.3 Modes of Operation 6-2
6.1.4 Startup Behavior 6-3
6.1.5 Acknowledgment Behavior 6-4
6.2 Hardware Setting 6-5
6.3 Software Setting 6-6

7 Installation 7-1

7.1 Slots for the Controller Board 7-1
7.2 Cable Installation 7-2
7.3 Pin Assignment of the Hardware Interfaces 7-3
7.3.1 System Connector 7-4
7.3.2 Remote Bus Interface 7-5
7.3.3 Serial Interface (V.24/RS-232) 7-6
7.3.4 Ordering Information 7-8

8 ISFP 8-1

8.1 Interface Description 8-1
8.1.1 Program Structure 8-2
8.1.2 Inclusion of the Interface Drivers 8-5
8.1.2.1 INITIB (FB 60) 8-6
8.1.2.2 CON/IND 8-10
8.1.2.3 REQ/RES 8-12
8.1.2.4 INTERBUS Data Block (IBDB) 8-14
8.1.3 INTERBUS-S System Control 8-16
8.1.3.1 Structure of the Functions 8-18
8.1.3.2 Overview of Functions 8-20
8.2 Command Functions 8-24
8.2.1 CONTROL (FB 68) 8-24
8.2.1.1 Configure INTERBUS-S (FKT 0) 8-26
8.2.1.2 Start INTERBUS-S Cycle (FKT 1) 8-26
8.2.1.3 Stop InterBus-S Cycle (FKT 2) 8-26
8.2.1.4 Alarm Stop (FKT 3) 8-26
8.2.1.5 Clear Display (FKT 4) 8-26
8.2.1.6 Disable All Messages (FKT 5) 8-27
8.2.1.7 Implement All Logical Address Map (FKT 6) 8-27
8.2.1.8 Init Communication (FKT 7) 8-27
8.2.1.9 INTERBUS-S Delay (FKT 8) 8-27
8.2.1.10 Quit Module Error All (FKT 9) 8-27

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.2 DEFINE (FB 69) 8-28
8.2.2.1 Physical Configuration Map (FKT 0) 8-30
8.2.2.2 Logical Local Bus Address Map (FKT 1) 8-31
8.2.2.3 Logical IN Address Map (FKT 2) 8-32
8.2.2.4 Logical OUT Address Map (FKT 3) 8-33
8.2.2.5 Communication Reference (FKT 4) 8-34
8.2.2.6 Event Map (FKT 5) 8-35
8.2.2.7 Group Numbers (FKT 6) 8-37
8.2.2.8 Parameter Timeout Constant (FKT 7) 8-38
8.2.2.9 Receive KBL (FKT 8) 8-39
8.2.2.10 Receive Bit Manipulation (FKT 9) 8-41
8.2.2.11 Group Error Characteristics (FKT 10) 8-50
8.2.2.12 Quit Module Error (FKT 11) 8-52
8.2.3 SYSINFO (FB 70) 8-53
8.2.3.1 Physical Configuration Map (FKT 0) 8-55
8.2.3.2 Software Revision (FKT 1) 8-55
8.2.3.3 Switch Information (FKT 2) 8-56
8.2.3.4 INTERBUS-S Cycle Counter (FKT 3) 8-56
8.2.3.5 Logical Address Error (FKT 4) 8-57
8.2.4 ON/OFF (FB 71) 8-58
8.2.4.1 Group ON (FKT 0) 8-60
8.2.4.2 Group OFF (FKT 1) 8-60
8.2.4.3 BK-Alarm ON (FKT 2) 8-60
8.2.4.4 BK-Alarm OFF (FKT 3) 8-61
8.2.4.5 Event ON (FKT 4) 8-61
8.2.4.6 Event OFF (FKT 5) 8-61
8.2.5 ADDRESS (FB 72) 8-62
8.2.5.1 ID Code List 8-66
8.2.5.2 Bus Segment Address List 8-67
8.2.5.3 IN Address List 8-68
8.2.5.4 OUT Address List 8-69
8.2.5.5 Group No. List 8-70
8.2.5.6 Group Error Characteristics 8-72
8.2.5.7 Communication Reference List 8-73
8.2.6 ERRINFO (FB 74) 8-74
8.2.6.1 Controller Error Code (FKT 0) 8-76
8.2.6.2 Bus Information (FKT 1) 8-76
8.2.6.3 Defective Group (FKT 2) 8-77
8.2.6.4 Module Error (FKT 3) 8-78
8.2.6.5 Local Bus Module Error (FKT 4) 8-79

8.3 Message Functions 8-80
8.3.1 SYSERROR (FB 73) 8-80
8.3.2 RECONFIG (FB 75) 8-82
8.3.3 EVENT (FB 76) 8-83

8.4 Working with Communication 8-84
8.4.1 Introduction 8-84
8.4.1.1 Control During Communication 8-86
8.4.1.2 Call Structure of the Function Blocks 8-86
8.4.1.3 Initialization/Addressing 8-87
8.4.1.4 Service Structure 8-89
8.4.1.5 Service Execution 8-90
8.4.1.6 Activation Flag Service 8-90
8.4.1.7 Message Flag Service 8-92

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.4.1.8 Principal Service Sequence 8-94
8.4.1.9 Example of a Service 8-96
8.4.2 Request/Confirmation 8-97
8.4.2.1 Read Request 8-100
8.4.2.2 Write Request 8-100
8.4.2.3 Start Request 8-100
8.4.2.4 Stop Request 8-100
8.4.2.5 Information Report Request 8-101
8.4.2.6 Status Request 8-101
8.4.2.7 Identify Request 8-101
8.4.2.8 Initiate Request 8-101
8.4.2.9 Abort Request 8-102
8.4.2.10 Read Confirmation 8-102
8.4.2.11 Write Confirmation 8-102
8.4.2.12 Start Confirmation 8-103
8.4.2.13 Stop Confirmation 8-103
8.4.2.14 Status Confirmation 8-103
8.4.2.15 Identify Confirmation 8-104
8.4.2.16 Initiate Confirmation 8-104
8.4.2.17 Initiate Error Confirmation 8-104
8.4.3 Response/Indication 8-106
8.4.3.1 Abort Indication 8-106
8.4.3.2 Reject Indication 8-106
8.4.3.3 Start Indication 8-106
8.4.3.4 Stop Indication 8-106
8.4.3.5 Information Report Indication 8-107
8.4.3.6 Read Indication 8-107
8.4.3.7 Write Indication 8-107
8.4.3.8 Initiate Indication 8-108
8.4.3.9 Read Response 8-108
8.4.3.10 Write Response 8-108
8.4.3.11 Start Response 8-109
8.4.3.12 Stop Response 8-109
8.4.4 Application of Communication 8-110
8.4.5 Communication Error Messages 8-113
8.4.5.1 Error Messages for a Connection Abort 8-113
8.4.5.2 Error Messages for the Reject Service 8-115
8.4.5.3 Additional Error Messages 8-116
8.4.5.4 Description of the Service-Specific Error Messages 8-116

9 Commands and Messages 9-1

9.1 Controller Board Commands 9-5
9.1.1 Commands for Bus Operation 9-6
9.1.2 Commands for Configuration 9-9
9.1.3 Commands for Error Recovery 9-18
9.1.4 Commands for System Control 9-24
9.1.5 Commands for Addressing 9-25
9.1.6 Commands for Process Data Linkage 9-27
9.1.7 Commands for Event Processing 9-34
9.1.8 Commands for Communication 9-38
9.1.9 Commands for the EEPROM Management 9-38

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

9.2 Controller Board Messages 9-40
9.2.1 Messages of the User Interface 9-41
9.2.2 Messages for Bus Operation 9-41
9.2.3 Messages for Configuration 9-43
9.2.4 Messages for Error Recovery 9-49
9.2.5 Messages for System Control 9-60
9.2.6 Messages for Addressing 9-61
9.2.7 Messages for Process Data Linkage 9-63
9.2.8 Messages for Event Processing 9-65
9.2.9 Messages for Communication 9-66
9.2.10 Messages for the EEPROM Management 9-67

10 Appendix 10-1

10.1 Overview of the DCB Revisions 10-1
10.2 Technical Data 10-5
10.3 Contents of the Data Diskette 10-6

Figures

Tables

Index

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Chapter 1

System Overview

This chapter provides information on

- the INTERBUS-S system and its components
- the basic INTERBUS-S system specifications
- the specific terms of the INTERBUS-S system

1 System Overview 1-1

1.1 Networking with INTERBUS-S 1-1

1.2 INTERBUS-S Topology 1-2
1.2.1 General Method of Operation 1-3
1.2.2 Error Protection Mechanisms 1-4
1.2.3 INTERBUS-S Protocol Sequence 1-5
1.2.4 INTERBUS-S Scan Time Calculation 1-6
1.2.5 Basic System Specifications 1-10

1.3 System Components 1-11
1.3.1 Host Controller Board 1-11
1.3.2 Remote Bus 1-12
1.3.3 Installation Remote Bus 1-13
1.3.4 Bus Terminal Module 1-15
1.3.5 Local Bus 1-16
1.3.6 INTERBUS-S I/O Modules 1-18
1.3.6.1 Remote Bus and Installation Remote Bus Modules 1-18
1.3.6.2 Local Bus Modules 1-18

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

1 System Overview

INTERBUS-S, the high-speed and universal sensor/actuator bus system.

INTERBUS-S shifts the I/O level from a higher-level control system directly to the machine or into the system. A serial bus cable connects the control system with the I/O modules in the system. This reduces the cabling to a minimum as compared with conventional parallel cabling.

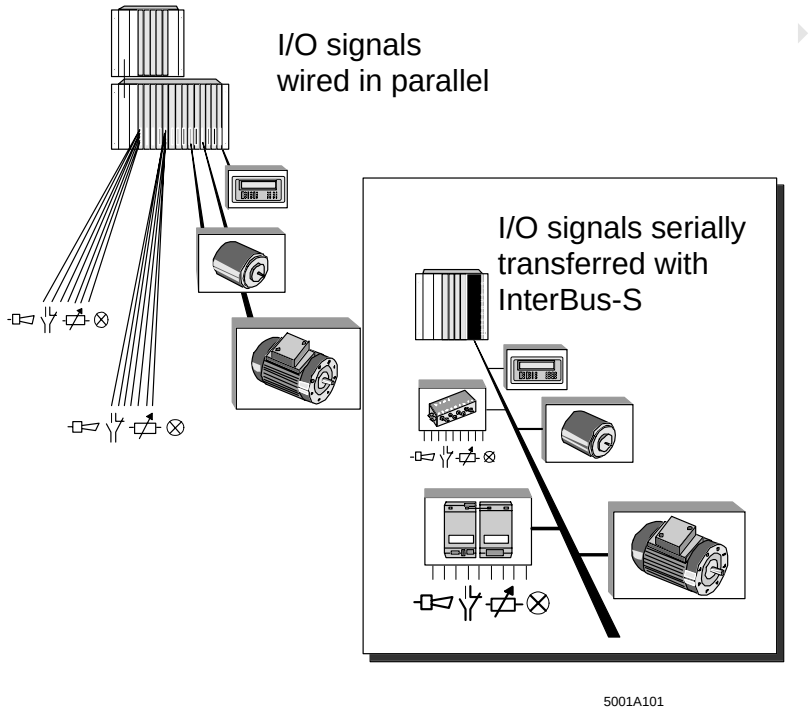


Figure 1-1: Optimization of the transfer structure with INTERBUS-S

1.1 Networking with INTERBUS-S

The constantly increasing degree of automation in general, but also the more complex demands of production and process engineering require more and more powerful sensors and actuators for the specific applications. Today, already more than 200 device manufacturers support INTERBUS-S as an open bus system with the most various products. This enables the users to always select the most powerful and low-cost components for their specific application.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Overview of INTERBUS-S-compatible devices

- Host controller boards/interface boards for
  - programmable logic controllers (PLC)
  - industrial computers and/or PCs

- I/O units for
  - digital inputs/outputs
  - analog inputs/outputs
  - degrees of protection - IP 20
    - IP 65

- High-tech control systems for
  - automatic wrenching
  - positioning
  - robots

- Drives
  - DRIVECOM standard
  - general motion control

- Pneumatic valve terminals

- Encoders

- Identification systems

- Operator and display units

- Further devices with INTERBUS-S interface are in preparation.

1.2 INTERBUS-S Topology

INTERBUS-S is installed in the system as a compact single circuit line following one direction. Starting at the **host controller board,** the bus system connects the respective control or computer systems with the distributed I/O modules (INTERBUS-S modules).

The main line that is led through the plant is called **remote bus** and covers the distances between the distributed substations.

Local branches (spur lines) are possible from the remote bus. Depending on the type, they are either called **installations remote bus** or **local bus**.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The **installation remote bus** corresponds - according to its structure - to the remote bus. However, it provides the option to carry along a voltage supply for the sensors in the bus cable (hybrid cable design).
At the beginning of the installation remote bus there is always a CBK module. The **installation remote bus** may be set up with CDI, CDO, DIO and all remote bus modules.
The **installation remote bus** has been designed to install distributed sub-stations with a direct connection of sensors and actuators. This results in an optimally short and low-cost sensor/actuator connection.

The **local bus** has been designed for the cost-effective and flexible installation of decentralized cabinets and terminal boxes. It interconnects the various local bus modules and also establishes the connection to the bus terminal module (BK).

The **bus terminal module (BK)** connects the local bus to the remote bus.

1.2.1 General Method of Operation

The INTERBUS-S system is a data ring with a central master-slave access method. It has the structure of a spatially distributed shift register. Every module forms with its registers a part of this shift register, through which the master, i.e. the host controller board, clocks the data serially.
With the ring structure it is possible to send and receive data synchronously (full duplex).
To simplify system installation, the ring system is implemented in one cable line.
Because of this, the system appears like a bus system with branching spur lines (simplified tree structure).
Every station in the INTERBUS-S system has an ID register (IDentification register) which includes information such as module type, number of I/O registers, as well as statuses and error states. The I/O modules also have I/O registers for the process data transmission.

There are two types of cycles in an INTERBUS-S system:

- The **ID cycle** which is run upon request or to initialize the INTERBUS-S system. When the host controller board is in the ID cycle it reads out the ID registers of all modules and uses this information to generate the process image.

- The **data cycle** is the actual operating cycle which controls the data transfer. In the data cycle, input data of all modules is read out of the registers and output data is shifted from the host controller board to the modules.

Special test methods ensure a correct data transmission after every cycle.

- If no errors occurred during the data transmission the host controller board accepts the data and/or outputs the data on the modules.

- If an error occurred, the data of the erroneous cycle is rejected because a new cycle is completed faster than the correction of corrupted data.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

1.2.2 Error Protection Mechanisms

As a sensor/actuator bus the INTERBUS-S system has been designed for the use in industrial environments.
In order to ensure a secure data transmission under the most various conditions of an industrial field of application, the INTERBUS-S system features extensive protection mechanisms.
The following precautionary measures ensure a safe data transmission:

Differential signal transfer in accordance with RS-485
The transfer in accordance with RS-485 uses a twisted-wire pair. User data is sent over both lines of a pair as differential signals. This transfer method can be strongly affected by influences from the outside and is used on the remote bus line and the installation remote bus.

Remote bus check
The individual remote bus segments are checked by exchanging special status information. An interrupt of the line or a connector which is not fitted properly causes a remote bus error RB ERR and the 'RC' LED on the remote bus module goes out.

Loopback word
The controller board clocks this word ahead of the data through the ring (bus). Thus, the loopback word is transferred directly between the input and output data through all INTERBUS-S system modules and after the input data back to the controller board. The time required for the loopback word to make a complete cycle is known to and monitored by the controller board. The special bit sequence of the loopback word detects errors on the transmission path or in the modules.

CRC
Every transmission path between two modules in the INTERBUS-S system is checked by means of a CRC (Cyclic Redundancy Check).
For this purpose, a CRC word is calculated both in the output direction as well as in the input direction in every module and in the controller board itself. At the end of every transmission cycle it is checked at the beginning and at the end of a transmission path if the values of the check words match. If the values do not match, this will be reported to the controller board through all following modules and a new cycle is started with current data.
A Hamming distance of 4 is reached with this check.

Test routines
In order to detect hardware faults on the INTERBUS-S host controller board, various test routines are executed after a RESET or a voltage recovery.
These special routines check:

- the CPU of the INTERBUS-S protocol chip,
- the EPROM and RAM,
- the logic circuitries and functions of the various components.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

After error-free execution of the test routines, the green LED READY lights up.
Furthermore, the connected INTERBUS-S system is initialized and its functions are checked. To this end, the controller board activates one bus segment after another and tests the functioning of each.
First, the connection between the host controller board and the first bus terminal module or the first remote bus module is enabled. When no errors occur, a local bus or installation remote bus which is connected to the bus terminal is initialized. Afterwards, the connection to the next remote bus station is enabled. In this way all segments of an INTERBUS-S system are put into operation sequentially and bit by bit. After this configuration phase the host controller board knows the connected INTERBUS-S system and can operate it.
This configuration algorithm is also used to locate the error if a malfunction occurs in the course of normal data traffic.

1.2.3 INTERBUS-S Protocol Sequence

- Starting with a loopback word, the controller board clocks the output data in the output direction into the data ring of the INTERBUS-S system. At the same time the controller board receives in the input direction the input data which has previously been stored in the data ring by the INTERBUS-S modules.

- The loopback word is transferred between the output and input data through the entire data ring, which is formed by all system modules. When the controller board receives the loopback word, all output data is in the ring and all input data is in the controller board.

- The checksums calculated by the CRC generators are transferred to the next module where they are checked.

- When the loopback word is read back correctly and the comparison of the checksums resulted in an error-free transfer on all bus lines, the output data becomes valid and the modules put the data to their outputs. The controller board also passes the read input data to the PLC for processing.

- Afterwards the controller board causes the modules to store all new input data in the ring, before it clocks a new loopback word and new output data into the data ring.

- Due to the cyclic run of the INTERBUS-S protocol all I/O data is constantly updated.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

1.2.4 INTERBUS-S Scan Time Calculation

The scan time of the INTERBUS-S systems depends on few factors. It increases almost linearly with an increasing number of I/O points.
Due to the high efficiency of the INTERBUS-S protocol, it is predominantly determined by the number of I/O points. Furthermore, the number of bus terminal modules, the check sequence, the signal propagation time, and the cable length of the bus system also influence the scan time to a minor degree. The scan time can be calculated with the following simple formula:

$$t_{cycle} = (13 * (6 + n) + 1.5 * m) * t_{Bit} + t_{SW} + t_{PH}$$

t_{cycle}	Transfer time in milliseconds
n	Number of user data bytes
m	Number of remote bus modules installed
t_{Bit}	Bit duration = 0.002 ms for 500 kbit/s
t_{SW}	Software runtime = 0.2 ms
t_{PH}	Runtime on the transmission medium for copper: tPH=0.016 ms * l/km l = length of the remote bus cable in kilometers

When calculating the sum of I/O points, please observe that only the simple register length is taken to calculate the total sum for modules that have inputs and outputs.

Example for determining the bit number which is used for the scan time calculation:

Bus terminal module: IBS 24 BK I/O-T

16 bit inputs
16 bit outputs
Sum for n: 16

IBS 24 DI IBS 24 DO

16 bit inputs	--
--	16 bit outputs
Sum for n: 32	

Onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

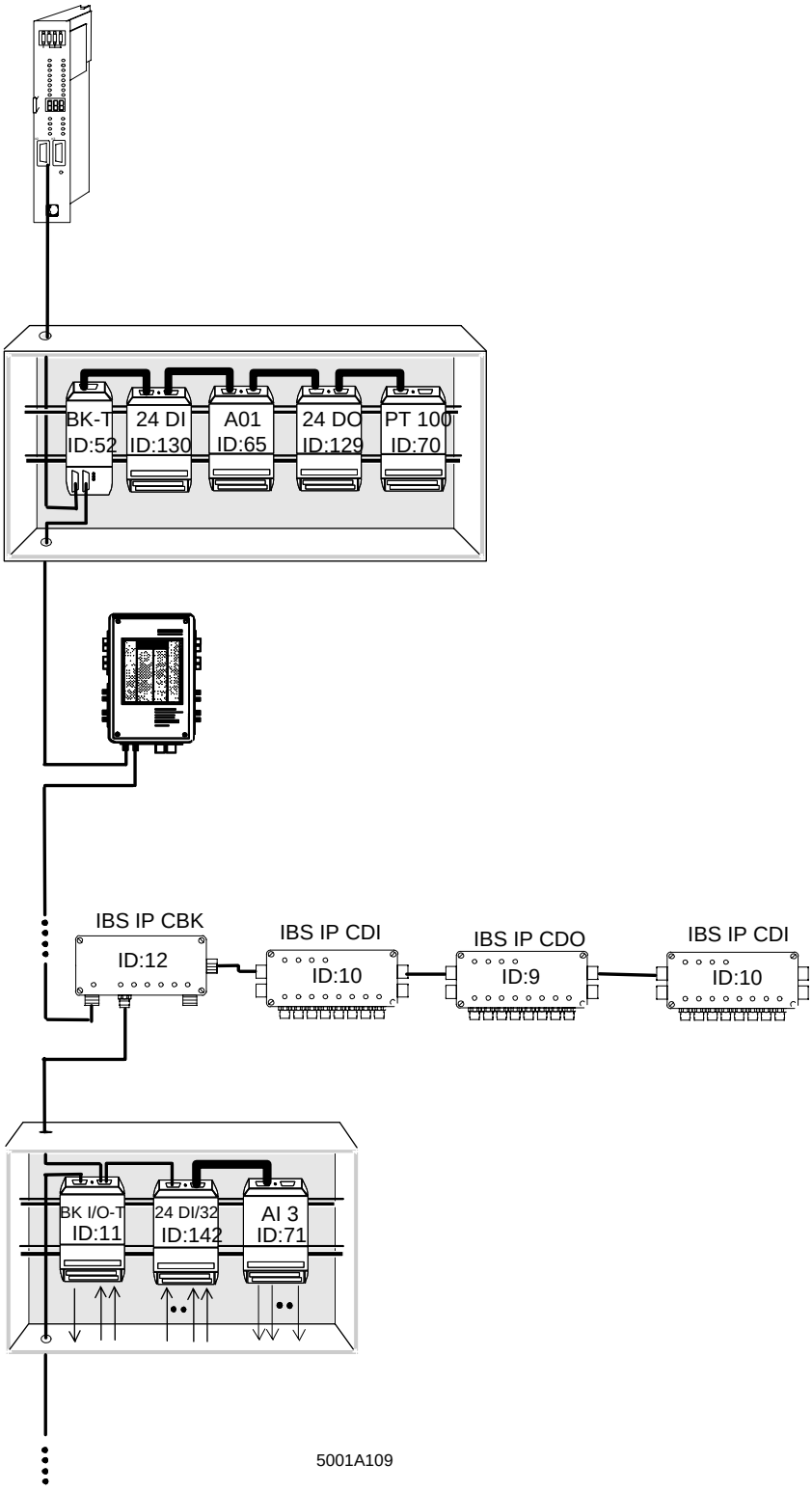


Figure 1-2: Example for a scan time calculation

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Example for a scan time calculation on a demo bus:
The columns in the table show the inputs, outputs, and the number of bits on every module which are used to calculate the scan time.

Module	Inputs*	Outputs*	Register width
IBS 24 BK-T	-	-	-
IBS 24 DI	2	-	2
IBS 24 AO1	-	8	8
IBS 24 DO	-	2	2
IBS PT 100	8	--	8
IBS 24 IP DIO	2	1	2
IBS IP CBK	-	--	-
IBS 24 CDI	1	--	2
IBS 24 CDO	-	1	2
IBS 24 CDI	1	--	2
IBS 24 BK I/O-T	2	2	2
IBS 24 DI/32	4	--	4
IBS 24 AI 3	8	8	8
	28	22	n=42

* The numbers are given in bytes.

Number of user data bytes = 42

Number of the remote bus modules installed = 7

Cable length (copper) e.g. = 400 m

$t_{cycle} = (13 * (6 + n) + 1.5 * m) * t_{Bit} + t_{SW} + t_{PH}$

$t_{cycle} = (13 * (6 + 42) + 1.5 * 7) * 0.002\ ms + 0.2\ ms + 0.016\ ms/km * 0.4\ km = \underline{1.475\ ms}$

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

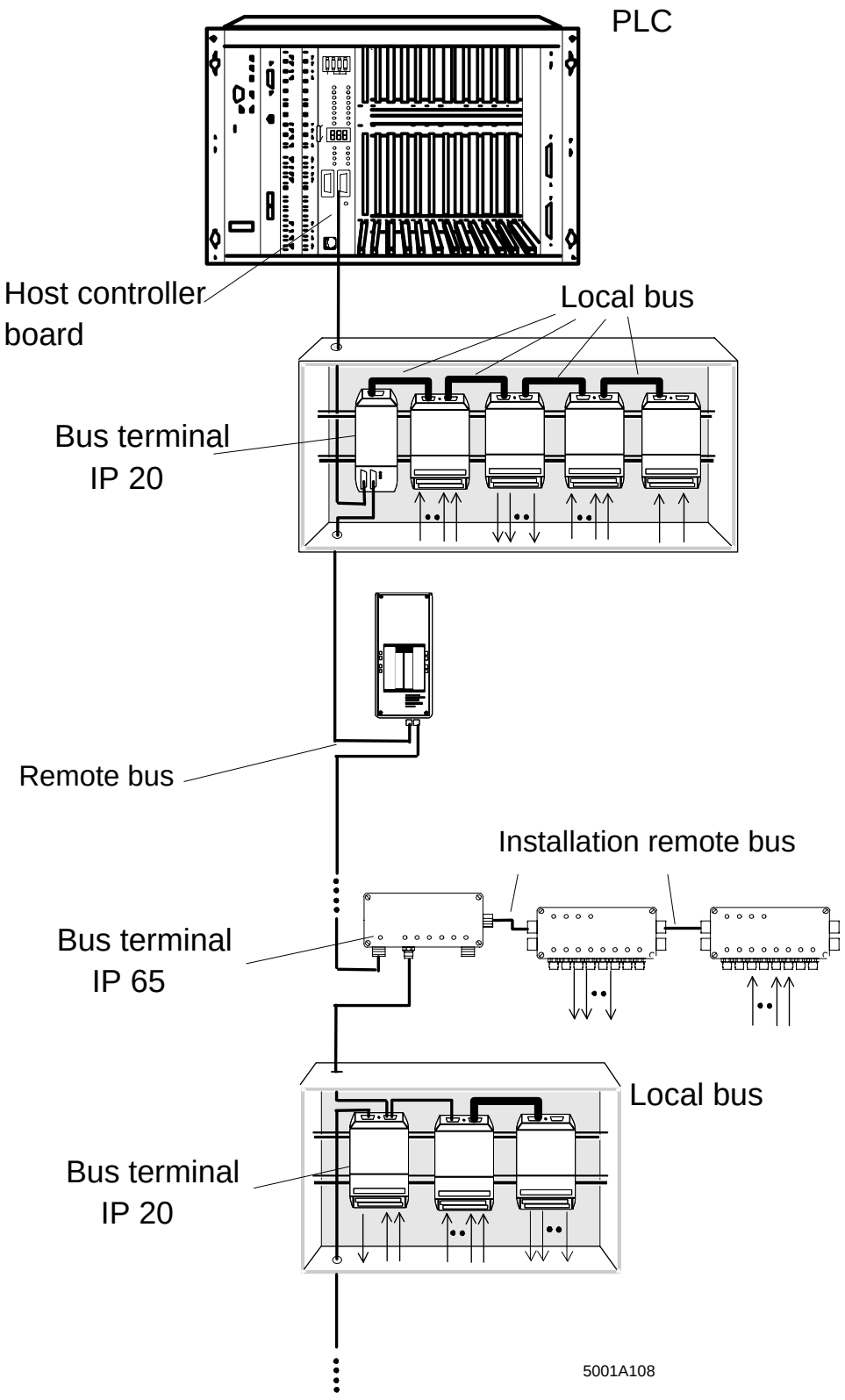


Figure 1-3: INTERBUS-S topology with the various bus types

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

1.2.5 Basic System Specifications

Remote bus

Max. bus cable length between:

host controller board and first remote bus module	400 m
two remote bus module	400 m
host controller board and last remote bus module	13 km

Installation remote bus

Max. total current consumption: 4.5 A

Max. bus cable length between:

BK and first I/O module	50 m
two I/O modules	50 m
BK and last I/O module	50 m

The number of the I/O modules in the installation remote bus is limited by the current consumption of the modules and the connected initiators.
The overall current consumption of these components must not exceed 4.5 A. The current consumption of the actuators is not added to the calculation, because actuators are always supplied with a separate voltage.

Local bus

Max. number of modules in the local bus: Max. 8, (depending on the current consumption of every module and the load carrying capacity of the bus terminal module, see data sheets for more information)

Max. bus cable length between:

BK and first I/O module	1.5 m
BK and last I/O module	10 m

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

1.3 System Components

1.3.1 Host Controller Board

The INTERBUS-S system is a sensor/actuator bus that is independent of the control system. The link to the respective control system is achieved with a special host controller board for every control system.
The host controller board is inserted into the mounting rack of the control system. The controller boards for the programmable logic controllers (PLCs) always couple passively to the I/O bus of the respective control system, like system-contained I/O units. In the control system, the host controller board operates like a system-contained I/O board, so that all control functions and programming commands can be handled in the usual way. In addition, it ensures the cyclic data traffic (with the exception of the PC interface boards) and the error display in the INTERBUS-S system.
There are two types of controller boards which are called DCB (= Diagnostic Controller Board) and DAB (= Diagnose Anschaltbaugruppe).

Host controller board functions:

- Control of the cyclic INTERBUS-S protocol (with the exception of the PC interface boards)
- Transfer of output and/or input data to the IBS-S modules and/or the control system
- Monitoring of the INTERBUS-S system
- Fault detection
  - Determining the type and location of the fault
  - Reporting errors to the control system
- Optical diagnostic functions
  - Operating indicators
  - Error indicators
  - I/O status

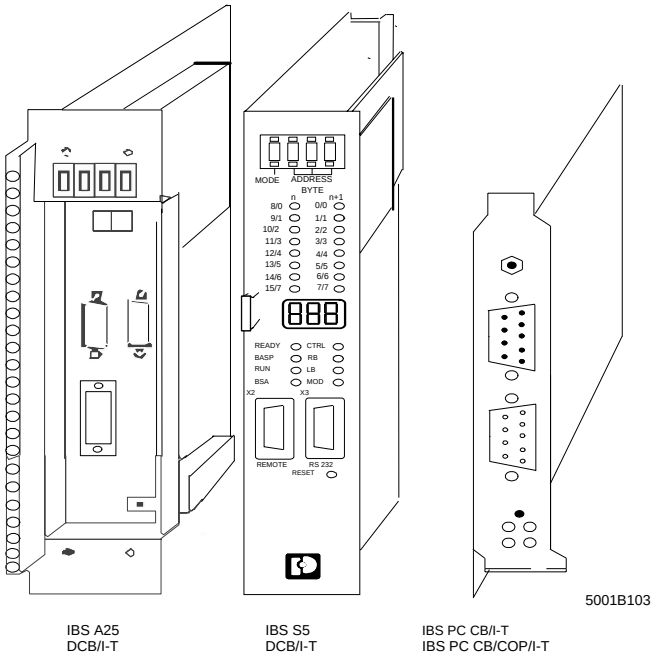


Figure 1-4: Host controller boards for the various computer and control systems

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

1.3.2 Remote Bus

The remote bus covers the long distances within a system. The entire remote bus may be up to 12.8 km long (from the host controller board to the last remote bus module connected). This is achieved by dividing the entire remote bus into individual segments.

A remote bus segment consists of the transmission line (remote bus cable) and the bus terminal module connected to it. I/O modules may be connected to the bus terminal module.
A remote bus segment can bridge up to 400 m.
In this way the entire remote bus can be divided into a maximum of up to 256 remote bus segments (when a DCB controller board is connected) (see Figure 1-5).

The installation remote bus, which will be described in the next chapter, also consists of remote bus segments. They have to be considered in an appropriate way when the sum of the remote bus segments is determined.

Remote bus and installation remote bus are abbreviated "RB".
Please take this into account for the error messages of the host controller board (Chapter 5).

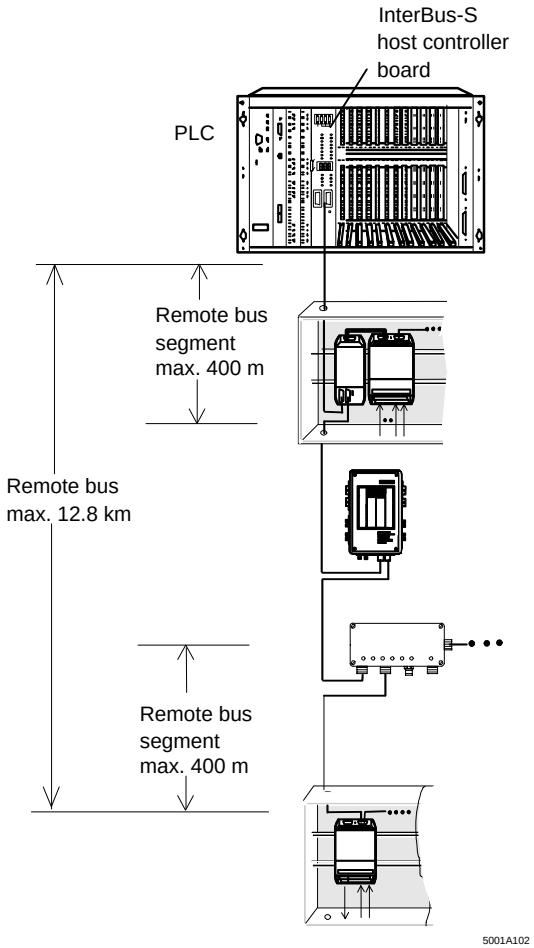


Figure 1-5: Structure and maximum dimensions of the remote bus

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Remote bus

Max. number of remote bus segments for controller boards: (incl. installation remote bus)	(DCB)	256
	(DAB)	64
	(PC CB/COP/I-T)	256
	(PC CB/I-T)	256
	(PC AT-T)	32
Max. length of a remote bus segment:		400 m
Max. bus cable length between:		
host controller board and first remote bus module		400 m
two remote bus modules		400 m
host controller board and last remote bus module		12.8 km
Transmission method:		RS-485
Transmission medium:		simple, shielded signal line

Alternatively, the following media may be used for the remote bus:

- Fiber optic cable
- Slotted waveguide
- Infrared transmission
- Slip ring

1.3.3 Installation Remote Bus

The installation remote bus is a spur line which branches off from the remote bus. From the physical point of view it is a remote bus.
A corresponding bus terminal module (e. g. IBS IP CBK) couples the installation remote bus to the main remote bus cable.
Apart from the actual 24 V DC data lines, the voltage supply lines for the module electronics and the initiators are also carried in the special installation remote bus cable (hybrid cable).

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

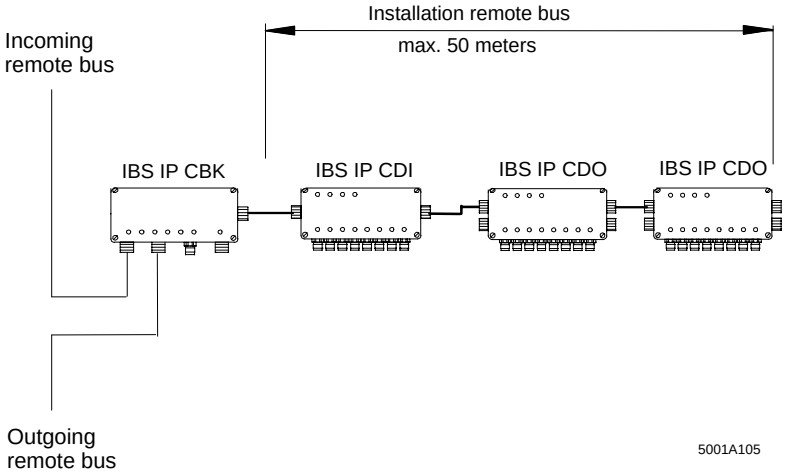


Figure 1-6: Structure and maximum dimensions of the installation remote bus

Remote bus and installation remote bus are often referred to by their abbreviation "RB".
Please take this into account for the error messages of the host controller boards (Chapter 5).

The installation remote bus interface is designed especially to connect the INTERBUS-S I/O modules IBS IP CDI and IBS IP CDO with the IP 65 degree of protection.
It is possible to integrate all remote bus modules with a two-wire interface into the installation remote bus. It is not possible to set up another spur with a bus terminal module.

Basic installation remote bus specifications
Max. bus cable length between:

CBK bus terminal and first I/O module	50 m
CBK bus terminal and last I/O module	50 m
Max. current carrying capacity of the hybrid cable:	4.5 A

The number of I/O modules in the installation remote bus is limited by the current consumption of the modules and the connected initiators.
The overall current consumption of these components must not exceed 4.5 A. The current consumption of the actuators is not added to the calculation because the actuators are supplied with a separate voltage.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Calculation example for determining the number of modules in the installation remote bus:

Let us assume that the following components are used in an installation remote bus. (The information on the current consumption of the I/O modules and initiators is taken from the appropriate data sheets).

Table 1-1: Example for testing the load capacity of an installation remote bus

Current consumption by the module electronics of a CDO or CDI module:	100 mA
Current consumption of a typical initiator:	25 mA
Number of CDO modules:	4
Number of CDI modules:	8
Number of the connected initiators:	27
Total current consumption:	4* 100mA + 8*100 mA + 27*25 mA = 1.875 A

Bus operation is ensured in this example!

1.3.4 Bus Terminal Module

A bus terminal module belongs to the remote bus. It connects a local bus (cf. Chapter 1.3.5) and/or installation remote bus to the remote bus (cf. Chapter 1.3.2). The supply voltage of a bus terminal module must be maintained even when parts of the system are disconnected. Only then can it be guaranteed that the remaining part of the bus system can continue operation.
Bus terminal modules may be identified by the designation BK (IBS IP CBK 1/24-F, IBS 24 BK I/O-T, IBS BK-T, IBS 24 BK/LC 2, IBS 24 BK-I/O, IBS 230 BK, IBS 24 BK, IBS 24 BK/LC). There are also bus terminal modules with additional I/O functions (I/O is included in the name).

If the supply voltage at a bus terminal module fails, the controller board stops the system and generates an error message for the remote bus segment concerned.

Bus terminal functions:
- Coupling an installation remote bus and/or local bus to the remote bus
- Supplying the I/O modules with the operating voltage for the bus electronics
- Regenerating data in the remote bus
- Electrical isolation between remote bus segments
- Switching on or off the local bus, installation remote bus, and the outgoing remote bus
- Indicating errors via a floating alarm output
- For the IBS 24 BK/LC 2: reconfiguration by means of an external pushbutton

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

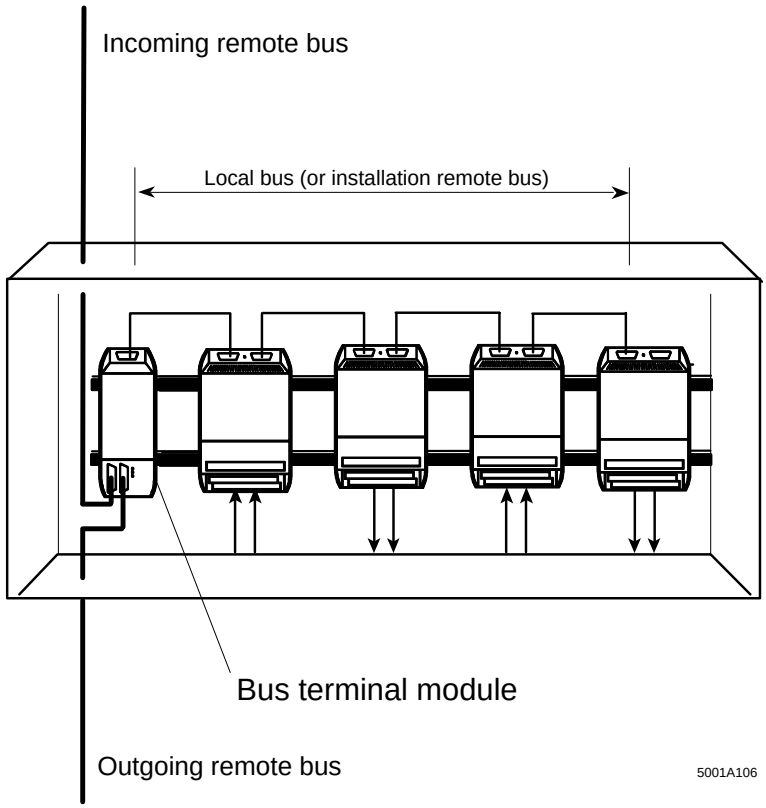


Figure 1-7: Remote bus at the interface to the local bus

1.3.5 Local Bus

The local bus is a local branch of the main remote bus line which is used inside of a switch cabinet. It allows the variable and low-cost installation of a distributed substation.

The local bus is coupled via a bus terminal module to the main remote bus line. In the local bus itself different I/O modules can be combined with one another.
Local bus modules cannot be integrated into the remote bus or installation remote bus. Conversely, it is not possible to use remote bus modules in the local bus.

The local bus is also referred to by its abbreviation "LB". Please take this into account for the error diagnostics of the host controller board (Chapter 5).

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

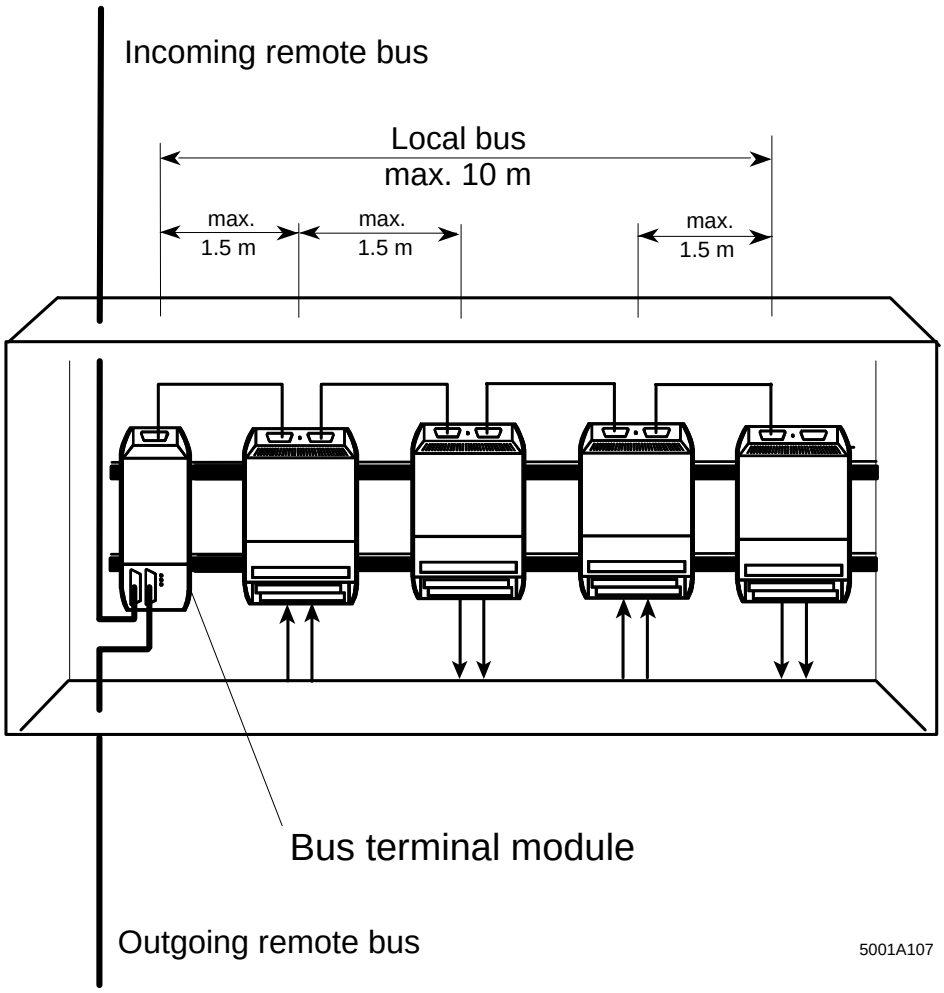


Figure 1-8: Local bus structure and maximum dimensions

Basic local bus specifications

Max. total current consumption:	0.8 A
Max. bus cable length between:	
BK and the first local bus module	1.5 m
two I/O modules	1.5 m
BK and last local bus module	10 m
Max. number of I/O modules in the local bus:	8

You may use preassembled connecting cables with lengths of 10 cm (27 84 17 5), 20 cm (27 06 31 2), 50 cm (27 59 43 0), 100 cm (27 84 18 8) and 150 cm (27 84 19 1) from Phoenix Contact. (The order numbers are given in parentheses.)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

1.3.6 INTERBUS-S I/O Modules

The I/O modules link the sensors and actuators to the INTERBUS-S system. Here, a distinction is to be made between I/O modules in the remote bus and/or installation remote bus and the I/O modules in the local bus.

1.3.6.1 Remote Bus and Installation Remote Bus Modules

Besides I/O modules for digital and analog signals there are I/O modules with bus terminal functionality, such as IBS 24 BK I/O-T, and operator terminals, valve terminals, DRIVECOM devices, ENCOM devices, etc.

If the supply voltage U (CDO, CDI U_L) fails in a remote bus or installation remote bus module, the INTERBUS-S system is stopped and an error message for the respective remote bus segment is output.

For the INTERBUS-S system operation it is necessary that the bus logic of all modules is supplied with voltage.
The voltage (U) for supplying the bus logic is for
- remote and local bus modules directly connected to every I/O module and every BK.
- installation remote bus modules provided via the special installation remote bus cable.

The voltage is supplied through the BK, which is coupled to the main line in the respective installation remote bus.

1.3.6.2 Local Bus Modules

Local bus modules are I/O modules for the variable and cost-effective installation in a decentralized switch cabinet.
In a local bus the modules can be combined with regard to their respective control and monitoring tasks.
The local bus modules of a local bus are coupled through a bus terminal module to the main remote bus line. The bus terminal module features an integrated power pack. It supplies the BK electronics and, via the local bus cable, the bus logic of the connected I/O modules.
The voltage supplied at the respective I/O module serves to supply the peripheral side which is electrically isolated from the bus logic.
If the voltage fails in the bus terminal module, the INTERBUS-S system stops and the controller board reports an error for the remote bus segment concerned.
When calculating the sum of the I/O points, please observe that for modules with inputs and outputs only the simple register width is taken for calculating the total sum.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Chapter 2

Technical Description

This chapter provides information on

- the functions of the operating and display elements of the controller board
- the project planning of the controller board
- the hardware settings in order to get different modes of operation
- the technical data

2 Technical Description 2-1

2.1 Host Controller Board Method of Operation 2-1
2.2 Application Area of the Host Controller Board 2-2
2.3 Overview 2-3
2.3.1 Front Plate Components 2-4
2.3.1.1 I/O Status Indicators 2-5
2.3.1.2 Operating Indicators 2-6
2.3.1.3 Error Indicators 2-7
2.3.1.4 Interfaces 2-7
2.3.2 Controller Board Components 2-8
2.4 Host Controller Board Installation 2-9
2.4.1 Slot Allocation and Installation 2-9
2.5 Configuration of the Controller Board 2-11
2.5.1 PLC Address Area 2-11
2.5.2 Hardware Term Definitions 2-12
2.5.3 Configuring the Default Setting 2-13
2.6 Hardware Settings 2-19
2.6.1 Mounting Positions of the Jumpers 2-19
2.6.2 Operation in the Central Controller and Controller Expansion Unit 2-20
2.6.3 Startup and Operating Mode Selection 2-21
2.6.3.1 INTERBUS-S in the PLC's Address Area 2-25
2.6.3.2 Address Locations for Automatic Start in the DCB Mode 2-26
2.6.3.3 Address Locations for Controlled Start in the DCB Mode 2-27
2.6.3.4 Address Locations for Automatic Start in the DAB Mode 2-28
2.6.3.5 Address Locations for Controlled Start in the DAB Mode 2-29
2.6.4 Address Windows 2-30
2.6.5 Interrupt Processing 2-36
2.6.5.1 Settings for Interrupt Processing 2-36
2.6.5.2 Different Interrupt Sources 2-38
2.6.6 Acknowledgment Delay Message 2-38
2.6.7 Disconnecting the RESET Button 2-39
2.7 Data Sheet 2-40

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2 Technical Description

2.1 Host Controller Board Operation

The diagnostic controller board is an intelligent I/O board for the PLC.
The host controller board is coupled to the PLC with the system connector and to INTERBUS-S with the INTERBUS-S remote bus connector.
A memory component (MPM) forms the interface between the PLC and INTERBUS-S. This memory allows to access the systems (see Figure 2-1).

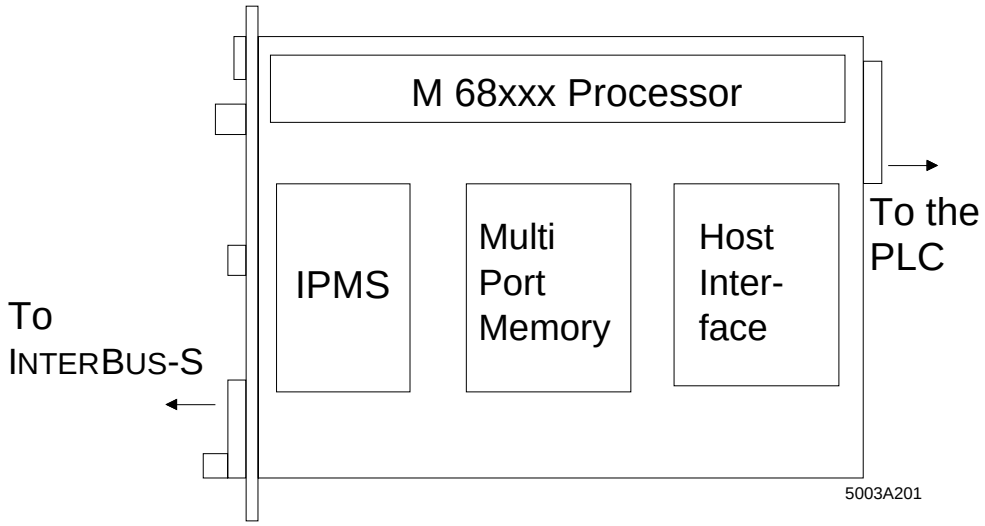


Figure 2-1: Host controller board components

An efficient interface circuit (host interface) between the PLC and the MPM allows several modes of operation and a fast transfer between the components. Registers indicate and control the host controller board's user functions. The user can use function blocks or a programmable EEPROM card in order to dynamically influence the INTERBUS-S system performance.
The INTERBUS-S protocol chip (IPMS) simplifies the data transfer from INTERBUS-S to the MPM. The computer (M 68xxx-CPU) is offloaded so that data can be preprocessed. The user can respond to signal changes of the outputs and address INTERBUS-S by means of logical addressing without prolonging the INTERBUS-S cycle considerably.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2.2 Application Area of the Host Controller Board

The INTERBUS S5 host controller board ensures asynchronous communication between the programmable controllers and the INTERBUS-S I/O system.
The host controller board includes operating and diagnostic indicators, which provide information about the board's status and the connected INTERBUS-S system.
A software package and a memory block constitute the interface between the control program and the controller board. Diagnostic, command and special user functions can be called through this interface.

The host controller board may be used in the following SIMATIC S5 PLCs:

S5 115 U	S5 135 U	S5 130 WB
S5 150 S	S5 150 U	S5 155 U

Other Siemens or compatible PLCs upon request.

When coupled to the S5 backplane bus, the controller board can be used with all Siemens modules.
The two-wire INTERBUS-S system is connected through the remote bus connector. A bus system with the following expansion can be set up:

- max. 256 local bus segments and/or remote bus modules
- max. 320 modules
- max. 256 INTERBUS-S words
- max. 62 PCP stations.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2.3 Overview

This section briefly describes the most important components of the host controller board. The board's front plate is explained first, followed by an explanation of its visible components (printed board with system connector).
The designations used below are retained throughout the user manual.

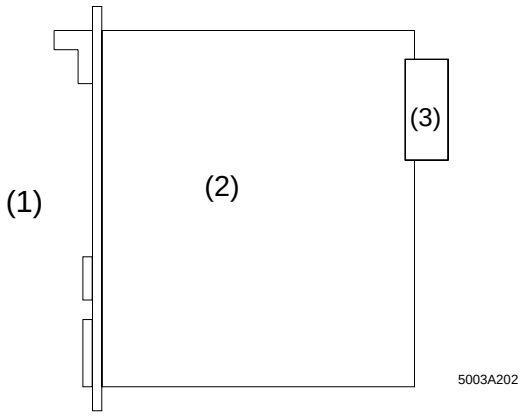


Figure 2-2: Front plate (1), board (2) and system connector (3) of the controller board

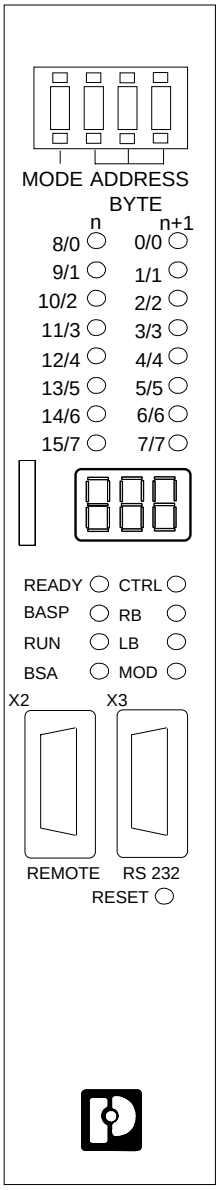
(1) Front plate:
The front plate is externally accessible and contains all operating and display elements of the controller board.

(2) Printed circuit board with system connector (3):
The PCB with the system connector is the part of the host controller board that is inserted into the PLC. The front plate is the termination to the front.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2.3.1 Front Plate Components



5003A203

Figure 2-3: Front plate of the DCB controller board

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2.3.1.1 I/O Status Indicators

The I/O data of the INTERBUS-S modules can be indicated on the front plate. The module address is entered by means of coding switches.

MODE
Selection of the address area:

MODE	Address area
0	Inputs, P area
1	Outputs, P area
2	Inputs, Q area
3	Outputs, Q area

4-8	Must not be set

ADDRESS
The required byte address is set by means of three coding switches. Only a word address (even address) is accepted as a valid address. The address which is set must be used by an INTERBUS-S module.
"Ad" is displayed on the front plate whenever a set address is invalid.

I/O DATA (yellow LEDs)
The data item of the set address is output as a 16-bit word. The word is shown with the bytes n (set even address) and n+1.

Displays on the seven-segment display with coding switch position 918x
With the coding switch position 918x the seven-segment display shows the numbers of the ten modules with the most transmission errors. The position 9180 shows the module that has most errors, the position 9181h the module with the second most errors, etc.

If there are less than 10 modules with errors, the seven-segment display shows less than 10 module numbers. "Ad" is displayed on the free locations. Transmission errors which occur between the last module and the controller board are displayed with the module number FF. In addition, all I/O data LEDs light up.

The hundred position of the module numbers is also indicated with the I/O data LEDs. The LED 0 lights up for the module numbers 0 through 99, the LED 1 for the module numbers 100 trough 199, the LED 2 for the module numbers 200 through 299, and so on. LED 5 lights up for the module numbers 500-511.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Displays on the seven-segment display with the coding switch position 919x
When the coding switches are in position 9190, the seven-segment display shows the number of the local bus station in which the last module status error occurred. The position 9191 indicates the number of the local bus station of the last but one module status error and so on.

Displays on the seven-segment display with the coding switch position 94xx to 99xx
When the coding switches are in position 9400, the seven-segment display shows the number of modules in the current configuration.
When the coding switches are in position 9401 through 9912, the seven-segment display shows the ID codes (hexadecimal) of the current physical configuration ("9401" shows the ID codes of the first bus station, "9402" shows the ID codes of the second bus station, etc.).
The register length of the modules is given in the first digit of the three-digit display.

Display of the firmware revision
The coding switch position 9200 shows the implemented firmware revision on the seven-segment display.

DIAGNOSTICS (seven-segment display)
The three-position seven-segment display shows parameters during operation an when errors occur.

-| |- Controller board stop
-- Run status of the controller board
Ad Invalid address set with the coding switch
A parameter is output in case of an error (an error LED is active).

2.3.1.2 Operating Indicators

Various LEDs indicate the operating state of INTERBUS-S and the PLC. The seven-segment display provides more detailed information.

READY
The controller board has completed the self-test without discovering any errors and is ready for operation.

BASP
The PLC has activated the BASP (**B**efehls **A**usgabe **SP**erren = disable command output) signal and is in the STOP state. In this operating state, INTERBUS-S resets all outputs.

RUN
The RUN LED is active when a data cycle runs on INTERBUS-S.

BSA
The BSA signal (**B**us **S**egment **Ab**geschaltet = bus segment disabled) indicates that one or several bus segments is/are disabled. The remaining bus configuration runs properly.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2.3.1.3 Error Indicators

INTERBUS-S malfunctions are indicated by various LEDs. More detailed information is provided by the seven-segment display.

CTRL
The CTRL ERR (**C**on**TR**o**L**ler Error) reports an error restricted to the controller board or its parameterization. A description of the error numbers (hex) is given in Chapter 4, "Diagnostic Interfaces".

RB
A defective remote bus (**R**emote **B**us Error) has been diagnosed. The seven-segment display shows the number (in decimal) of the defective remote bus segments.

LB
A defective local bus (**L**ocal **B**us Error) has been diagnosed. The seven-segment display shows the number (in decimal) of the defective local bus segment.

MOD
A MOD ERR (**MOD**ule Error) occurs when an INTERBUS-S module indicates an error (e. g. short circuit in the periphery or lacking voltage supply) (only possible in the case of modules with bus acknowledgment). The seven-segment display shows the number (in decimal) of the local bus in which the reporting module is located. The other parts of the bus run properly.

RESET
When this pushbutton is actuated (using a tool), the host controller board and the connected INTERBUS-S are reset.

A RESET must only be triggered when the PLC is in the STOP state. As long as the controller board runs through a self-test, no current inputs are read and no current outputs are set. When the controlled start is used, the bus cycle is **not** re-started (no RUN). All parameter settings are canceled (log. addressing, event definitions, ...).

2.3.1.4 Interfaces

REMOTE
The INTERBUS-S remote bus interface links the host controller board with the INTERBUS-S I/O modules. The interface port is a 9-pos. D-SUB female connector which is located on the front plate of the host controller board. The connection to INTERBUS-S is designed as a two-wire remote bus.

RS-232
The host controller board has a serial interface implemented. The interface port is a 9-pos. D-SUB male connector which is located on the front plate of the host controller board.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The connector pinouts can be found in the section where the interface is described.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2.3.2 Controller Board Components

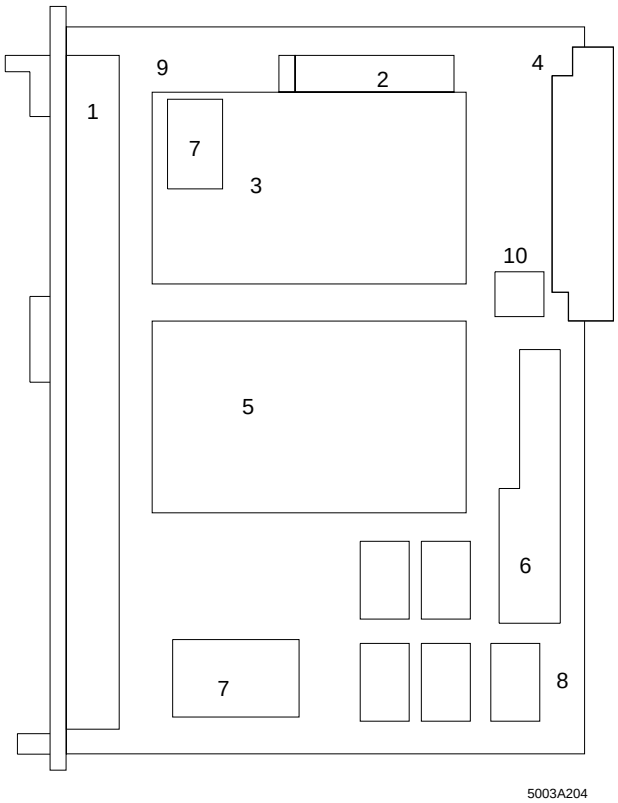


Figure 2-4: DCB with system connector

(1) Front part
The front part comprises the interface ports and the diagnostic indicators.

(2) EEPROM slot
Slot for the EEPROM memory card.

(3) Mounting location 1
INTERBUS-S master board

(4) System connector
The system connector is the link between host controller board and PLC.

(5) Mounting location 2
Reserved location

(6) Jumper IBS S5 DCB/I-T
Settings:

- Mode of operation
- Interrupt selection
- Master/slave

(7) DC/DC converter
Two DC/DC converters for electrical isolation of the board's voltage supply (one converter is fitted).

(8) DIL switch for addressing
The addresses of the controller board are set by means of DIL switches. No address settings are required for the controlled DCB mode (see 2.5.3, 2.3.6)

(9) Version number
Version and controller board designation are noted on the back of the board.

(10) Decoder EEPROM
The decoder EEPROM stores the configured addresses.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2.4 Host Controller Board Installation

2.4.1 Slot Allocation and Installation

The DCB consists of a printed board in the double Euroformat. The front plate covers two slots for printed circuit boards. In SIMATIC PLCs of the type 130 U (and larger), the controller board can be directly inserted. In SIMATIC 115 U PLCs, an adaptation casing must be used.
A standard EEPROM memory card stores the non-volatile configuration data (e.g. logical addressing). On the host controller board the memory card is located below the mounting location 1 (see Figure 2-4 (3)). The memory card sits in a holding support with an ejection mechanism and can only be replaced when the board is not plugged in.

Live insertion or removal of the controller board causes damage.

Slots:
Installation options of the DCB in SIMATIC PLCs of types S5-155U, -150 U, -135 U, -130 WB and -115 U.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Table 2-1: Permissible slots for the S5-155U, -130 WB, - 135 U, - 150 U, -155 U SIMATIC PLCs

Slot designation		3	11	19	27	35	43	51	59	67	75	83	91	99	107	115	123	131	139	147	155	163
S5-155U	S5-150U Mode					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	S5-155U Mode					■	■				■	■			■	■	■	■	⊠	⊠		

Slot designation	3	11	19	27	35	43	51	59	69	79	89	99	107	115	123	131	139	147	155	163
S5-150U	■	■	■							■	■	■	■	■	■	■	■	■	■	■

Slot designation	Software used	3	11	19	27	35	43	51	59	67	75	83	91	99	107	115	123	131	139	147	155	163
S5-135U	Interrupt processing			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	ISFP Software			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	

Slot designation	3	27	35	43	51	69	79	89	97	105	113	121	129	137	145	153	163
S5-130WB						■	■	■	■	■	■						

Slot designation		PS	CPU	0	1	2	3	4	5	6	IM
S5-115U	CR 700-0 LA12 rack			■							
	CR 700-0 LB 11 rack			■	■	■					
	CR 700-1 LA 12 rack			■							
	CR 700-2 LA 12 rack			■	■	■	■	■	■		
	CR 700-3 LA12 rack				■	■	■	■	■		

■ Installation possible

⊠ Installation possible if bridge BR7, at the back of the rack, is installed.
(see Siemens S5 155 U user manual)

5003A236

Other PLC types upon request.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2.5 Configuration of the Controller Board

2.5.1 PLC Address Area

The S5 PLC has an I/O address area of 256 bytes. The address area is provided in duplicate to produce one input and one output address area. The I/O modules are located in this address area (P area).
With every PLC cycle, the first 128 bytes (byte 0 to byte 127**,** depending on the PLC) are mapped onto a further memory area. This area (process image of the inputs and outputs) is preferably used for digital I/O modules. Bit combinations can be done with these addresses.
Addresses outside the process image, however, must be loaded or transferred directly (L PW, T PW).

Extended address area

In some PLCs, an additional address area (Q area) is provided which enlarges the I/O area by 256 bytes. The P and Q areas are addressed by means of different load and transfer commands. (L PW x or L QW x)

If the PLC accommodates SIMATIC I/O modules in its central controller, the addresses which these modules use are stored in the P and Q areas, respectively (see user manuals for SIMATIC PLCs).

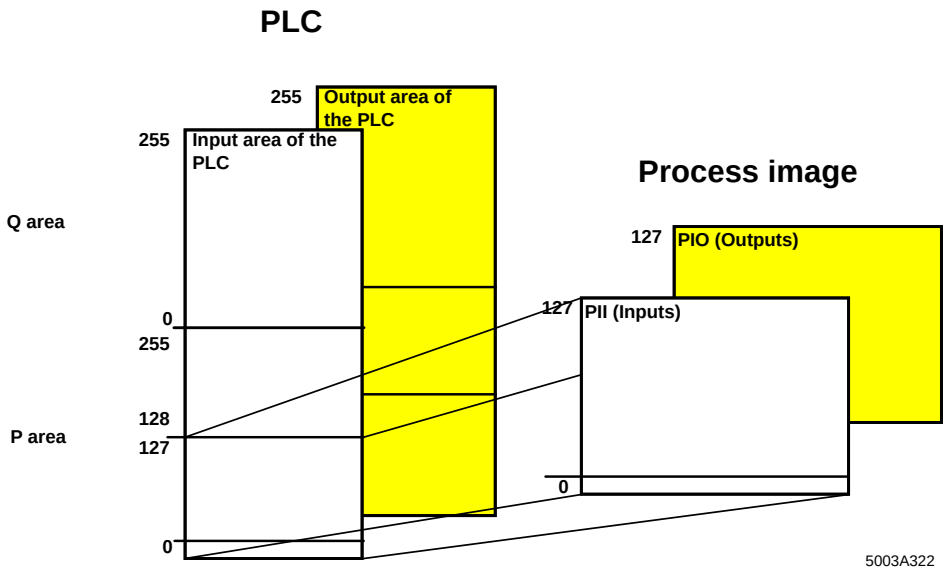


Figure 2-5: I/O area of the PLC

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The input byte 0 in the PLC's I/O area has a special function. This byte transfers the interrupt number of the requesting controller board to the PLC. Thus, for controller boards with interrupt capability the input word 0 (byte 0 and byte 1) is no longer available as an input address.

If the controller board's interrupt line is activated, the board is capable of interrupts and, therefore, occupies the periphery input word 0.

2.5.2 Hardware Term Definitions

I/O area of the PLC with IBS S5 DCB I/T

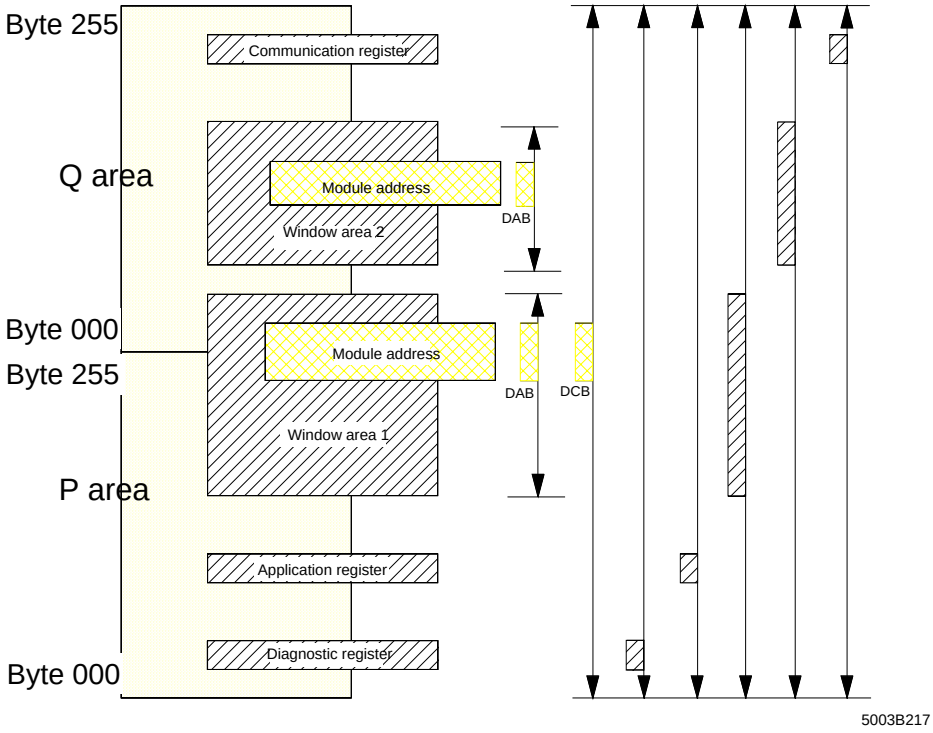


Figure 2-6: Variable locations for registers and window areas

Inputs/outputs

The peripheral area of the PLC with the P and Q areas and the process image is called the input/output (I/O) area of the PLC.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Window areas
Window areas are address areas in the PLC which are occupied through the host controller board. They are set with DIP switches on the host controller board and can occupy inputs or outputs, depending on the board's mode of operation.

Module addresses
Module addresses are the I/O addresses in the PLC which are used by an input or output module. The application program accesses these addresses in order to link inputs and to set outputs. Depending on the mode of operation, these addresses can be within or outside the window areas.

Diagnostic registers
The host controller board automatically monitors the entire bus system and diagnoses errors if they occur. The diagnostic result is displayed on the front plate. This data can also be called by the application program via the diagnostic registers (diagnostic bit register, diagnostic parameter register).

Application registers
Different I/O words are used to perform functions on the controller board and the bus system (bit-controlled command register, bit manipulation register).

Communication registers
These registers are always active in the PLC. They are addressed by means of the included function (driver) blocks (FBs). Using these blocks, control commands and/or messages can be exchanged between the PLC and the controller board.

2.5.3 Configuring the Default Setting

In order to configure the available addresses, jumpers and DIP switches on the controller board, the following information will be of importance:

Definition of I/O addresses
Depending on the number of inputs or outputs, every module occupies 8, 16, 32 or more bits in the PLC. In the PLC, every module is accessible through the controller board. The host controller board displays every input and output data item word by word (as the smallest unit). Here, the base address of the module is decisive. The host controller board allows two different types of addressing. The address area which the host controller board occupies is variable.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

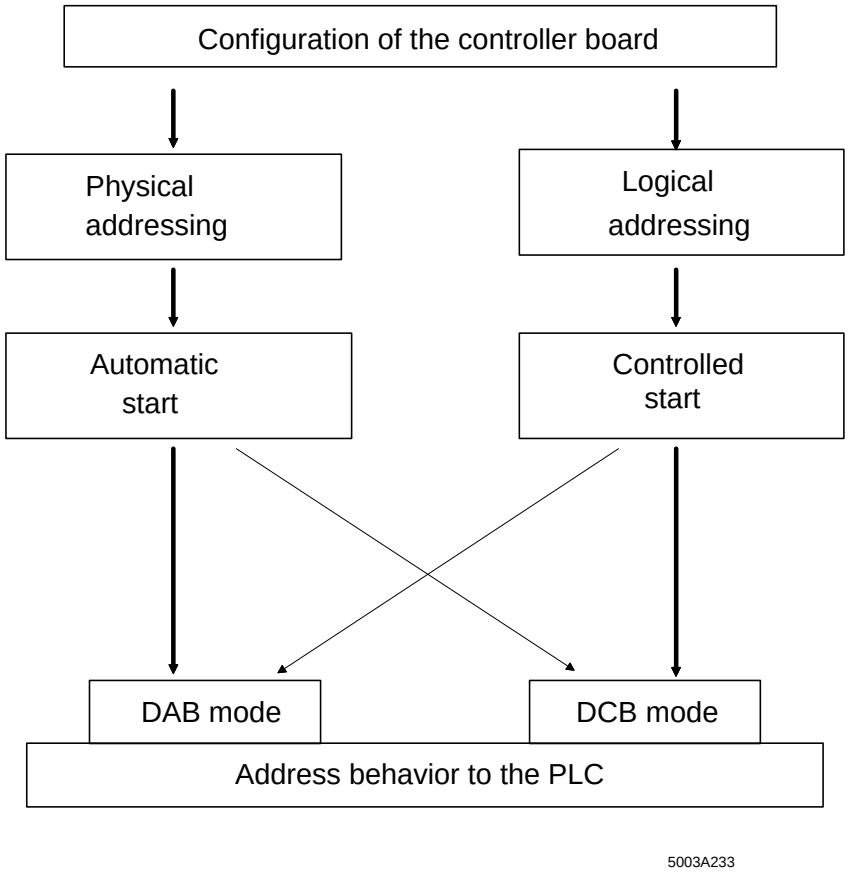


Figure 2-7: How to proceed to determine the mode of operation

Physical addressing

- The modules are addresses in their physical order.
- Only modules which the host controller board has recognized in the INTERBUS-S system will be addressed.
- The address location is predetermined by the hardware setting of the board.

If you remove one or several modules from the configuration when the bus stands still, the host controller board cannot recognize this modification when the physical addressing is used. Depending on your application this case may lead to dangerous situations during the process run.

Logical addressing

- The user allocates an address to every module.
- The host controller board checks whether or not the expected modules are connected to the INTERBUS-S system in the specified way.
- The address location can be specified independently of the hardware setting of the board.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Please note that the addressing modes are described in the Chapter "User Interfaces".
Chapter 2.6.3 "Startup and Operating Mode Selection" describes the different DAB/DCB modes.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Hardware settings

The different operating and addressing modes, the connected PLC, and the signaling behavior of the controller board require several presettings. The following sequence diagram gives in the left column the description of the setting and in the right column the respective switch. A detailed description of the jumpers and DIP switches is given in the Chapter 2.6, "Hardware Settings".

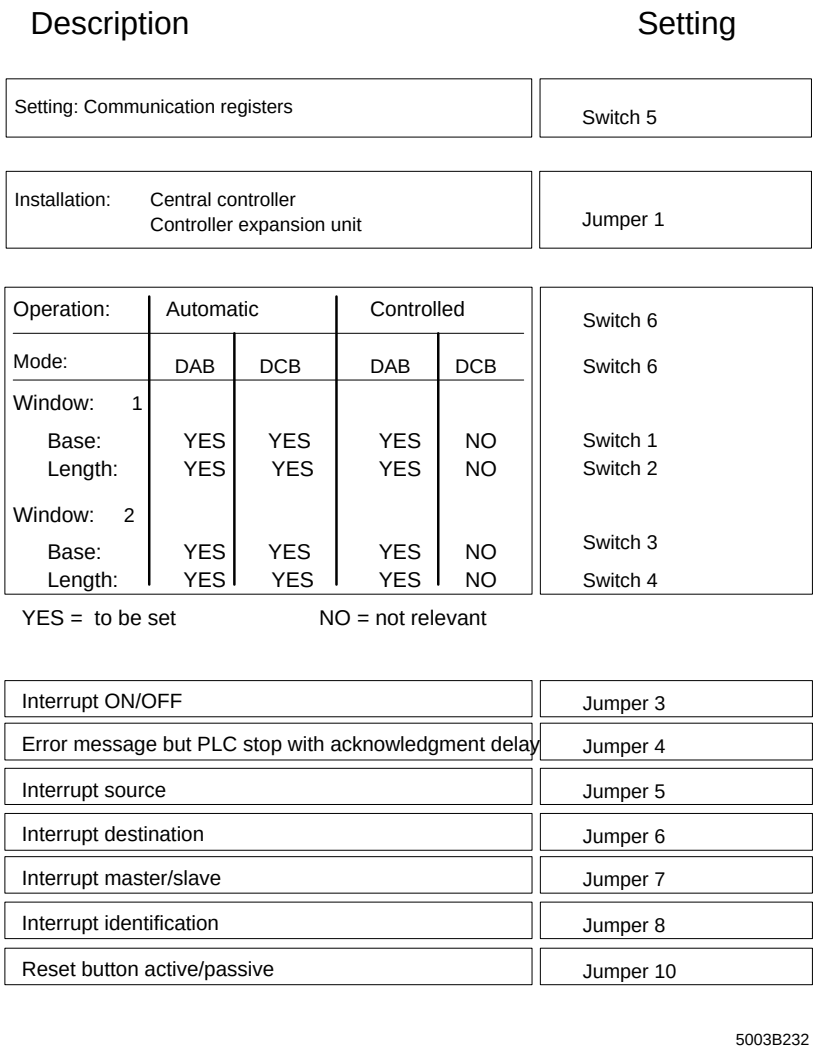


Figure 2-8: Description of the DIP switches and jumpers for the DCB and DAB modes

The locations of jumpers and switches is given in Chapter 2.6.1, "Mounting Positions of the Jumpers".

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Software requirements

There are different ways to program the startup:

- Automatically by means of the host controller board
- Controlled programming by means of the PLC (function blocks) or via the EEPROM card

In both cases the PLC monitors the startup in order to achieve a synchronism between the PLC and the controller board. The application program is kept in its startup blocks until INTERBUS-S provides I/O data.

Program packages

For the PLC:	ISFP **I**nterBus-**S** **F**unctions for the **P**LC	Version: ≥ 2.0
For the EEPROM card:	IBS S5 SWD-T	Version: ≥ 1.0

The different programming methods are described in Chapter 5, "System Interfaces".

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Host controller board startup and operational performance

Figure 2-9 shows the different startup modes of the host controller board.

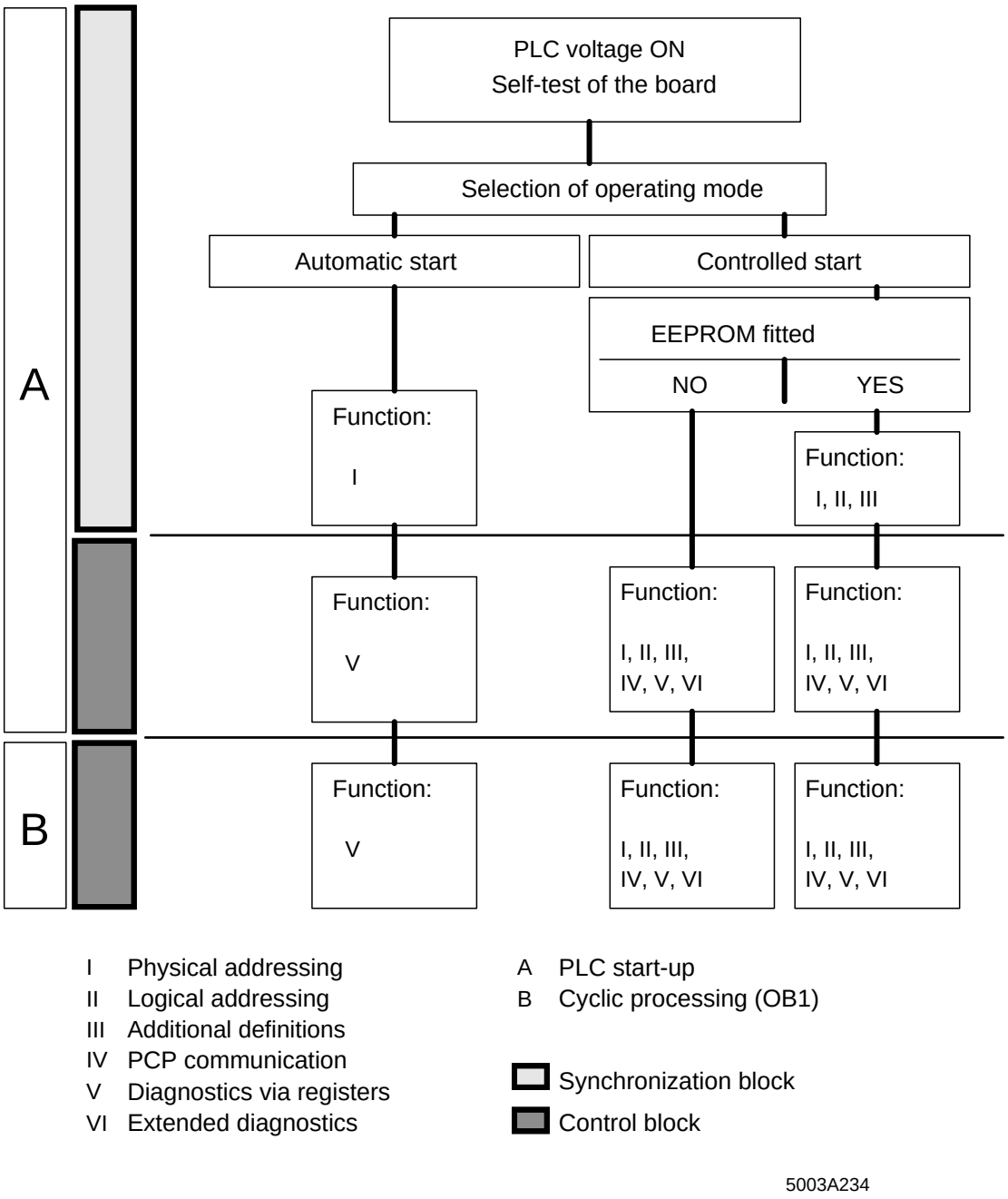


Figure 2-9: Startup modes of the controller board

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Host controller board diagnostics

The controller board diagnostics is subdivided into three areas:

1) Detection of an operating or error state

- Automatic diagnostics

  This includes the complete error detection and processing. As soon as a bus error (RB, LB), a controller board error (CTRL), or a module error (MOD) is detected, the error location or error parameter is determined and displayed.

2) Display of diagnostic data

- Front plate (error group with LEDs and error parameters with seven-segment display)
- Diagnostic registers

  Using two input words, the status and error indicators (LEDs) and the parameters (seven-segment display) are overlaid in the PLC's input area.

- Acknowledgment delay

  By setting a jumper it can be determined whether or not an acknowledgment delay is to occur in the PLC in the event of an error.

3) Other diagnostic functions

- ISFP software program

  Function blocks, which are included in the delivery, allow to get additional error information. (e.g. which module in the case of a MOD error)

- V.24 (RS-232) interface

  In the case of servicing, a PC program can be used to call diagnostic functions.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2.6 Hardware Settings

2.6.1 Mounting Positions of the Jumpers

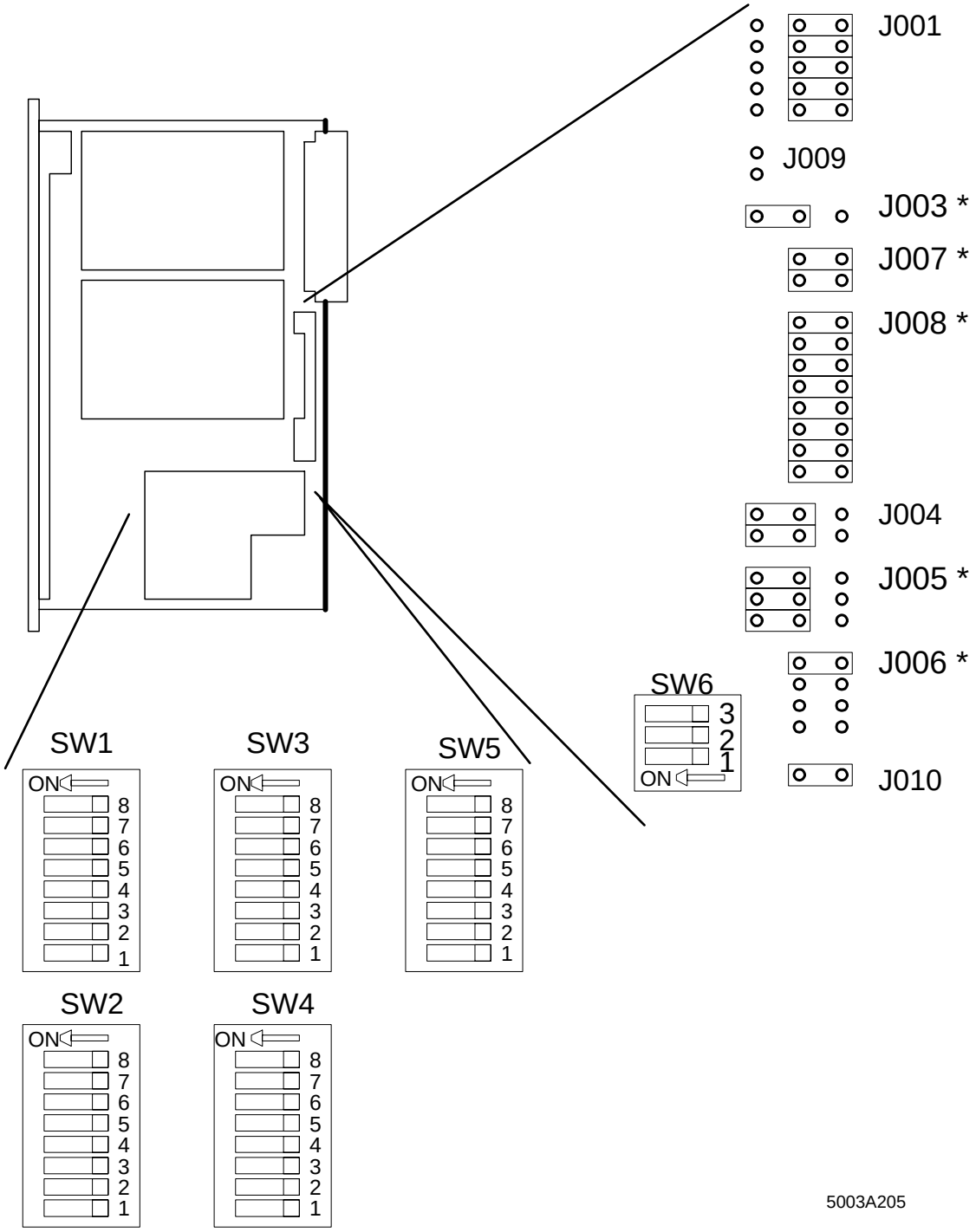


Figure 2-10: Mounting positions of the jumpers and DIP switches
(The jumpers marked with * do not exist on a board with revision C. Chapter 2.3.2 shows how to find out the revision of your controller board. These jumper settings must not be changed.)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2.6.2 Operation in the Central Controller and Controller Expansion Unit

Jumper J1 configures the host controller board for the use in a central controller (CC) or a controller expansion unit (CEU).

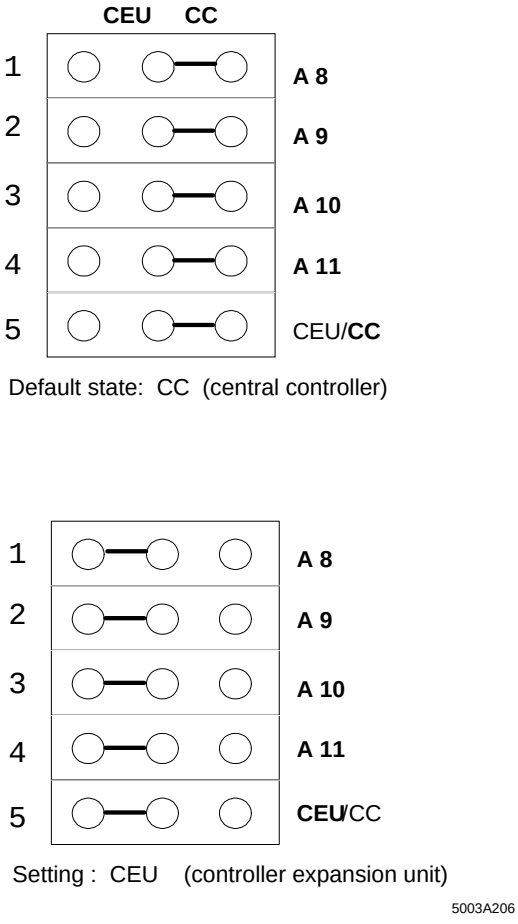


Figure 2-11: Jumper J 1 configures the use in a CC or CEU

The settings shown must always be kept. Mixed (alternate) settings are not permitted!

The default state of the jumper below must be kept.

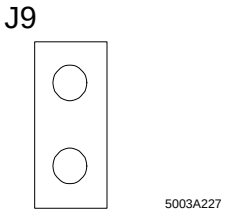


Figure 2-12: Jumper **J 9** in the default state

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2.6.3 Startup and Operating Mode Selection

Switch SW6 can be used to configure the operating mode and the startup of the host controller board.

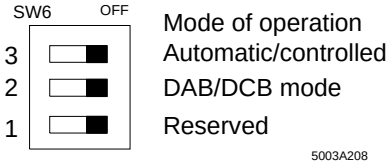


Figure 2-13: Default setting of SW6

Automatic start

In this mode of operation an automatic start sequence is processed.

- After the voltage of the PLC has been switched on, the host controller board runs its self-test and answers with "READY".
- The modules are addressed with regard to their physical order.
- The addresses are automatically stored in the decoder's EEPROM.
- Bus operation is started.

When the automatic start is used, the set window lengths for the I/O address area of the modules is not checked for its correct setting !

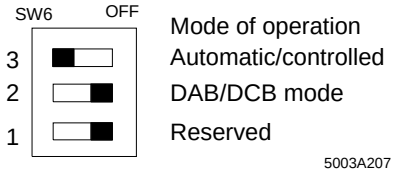


Figure 2-14: Position of DIP switch SW6 which selects the automatic start mode

Controlled start

This mode of operation depends on which type of EEPROM is fitted (memory card inserted). The EEPROM determines the startup behavior of the host controller board.
A controlled start sequence is processed.

- After the voltage of the PLC has been switched on, the host controller board runs its self-test and answers with "READY".
- The start sequence which follows is either specified by an EEPROM or by the PLC (with functions blocks).
- The modules are addressed in accordance with the starting sequence in their physical or logical order.
- After the modules have been addressed the addresses are automatically stored in the decoder's EEPROM.
- Bus operation is started.

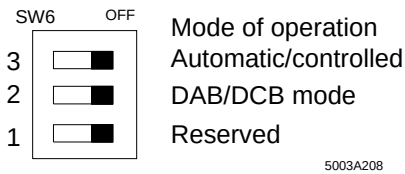


Figure 2-15: Position of DIP switch SW6 which selects the controlled start mode

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Operation with and without EEPROM card

The EEPROM card stores the startup behavior in a non-volatile way, and addresses and controls the bus system. The programmed sequences can be started by means of output bits.
If no card is used, the startup behavior must be specified by the PLC. This is done with the ISFP function block package.

Without card: The host controller board waits for the start sequence from the PLC. (addressing with FBs during startup/cycle)

With card: The start sequence which is stored in the EEPROM memory card is processed. The start sequence is programmed using bit 0.
The programming takes place through the V.24 (RS-232) interface. The IBS SYS SWT program is to be used as parameterization software.

If an EEPROM card is fitted on the controller board, the operating mode CONTROLLED START is to be selected.

DCB and DAB modes:

In principle, the controller board is for the PLC an I/O module with a variable address area.
There are two types of addressing between the controller board and the PLC:

- Setting by means of switches (physical addressing)
- Setting by means of address lists (logical addressing)

The controller board stores the addresses which have been set in a decoder EEPROM.
The address area which the controller board occupies can be addressed by the PLC in the usual way ("L IW", "L PW", "L QW", "T OW", "T PW", "T QW","U I", "S O",...).
When the PLC starts operation after the voltage has been switched on or the STOP/RUN switch has been actuated, the following startup results.

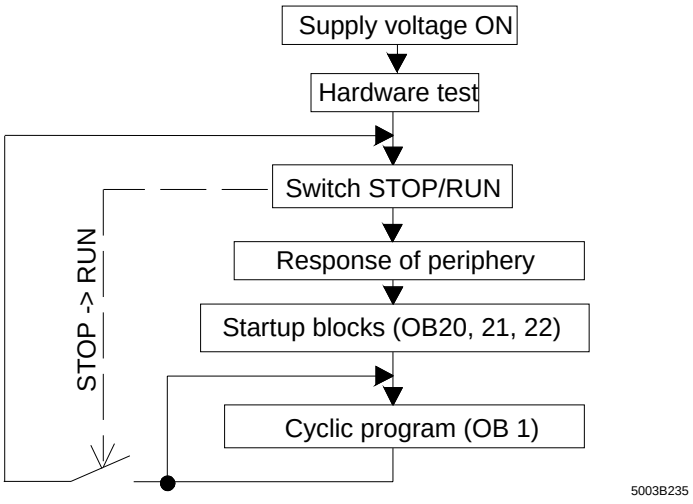


Figure 2-16: PLC startup

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Under the menu item "Addressing the Periphery" the correctly connected I/O modules indicate their readiness and the PLC recognizes the addresses stored in the decoder EEPROM. They are entered in the PLC as existing I/O modules.

Please observe, that there are two special cases when the addresses are changed in the bus system (for example by removing or adding bus stations) and the application program thus calls address which it did not recognize during startup.

Special case a):
When the PLC starts again, it recognizes first the **old** addresses in the decoder EEPROM (addressing the I/O modules).
Then, the controller board updates the contents of the decoder EEPROM by adding the **new** addresses.

The PLC cannot recognize these address changes in the decoder EEPROM anymore. This results in an acknowledgment delay or the non-recognition of the changed addresses!

This may also occur during the first startup, because each controller board has been tested at the factory so that the decoder EEPROM contains valid addresses.

Remedy for case a) : Press the STOP/RUN switch of the PLC again. Then the PLC is communicated the new addresses and the application program can recognize them.

Special case b):
When you set the communication register (=window 3, 4 bytes inputs, 4 bytes outputs) to addresses which have previously been occupied by other modules, the ADDRESS and INITIB function blocks of the ISFP software (software to simplify INTERBUS-S operation, see Chapter 8) cannot address the controller board.

Remedies for case b):
1) Switch off the voltage
2) Set the controller board to the automatic start mode
   (hardware switch SW6, switch 3 to ON, switch 2 to OFF, see Figure 2-17)
3) Set the base addresses of window 1 and window 2 to valid addresses
   (hardware switches SW1 and SW3)
4) Change the PLC to the STOP mode and switch on the voltage
   (indication on the board: the READY, BASP and RUN LEDs light up)
5) Switch off the voltage
6) Parameterize the controller board and, for logical addressing, the address lists
7) Switch on the voltage and change switch from STOP to RUN mode (cold restart)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The acknowledgment behavior of the host controller board is determined by the mode (DCB/DAB) and the start (automatic/controlled). This connection becomes important when the application dynamically changes the bus system and, therefore, enlarges and/or reduces the address area which the IBS modules represent.

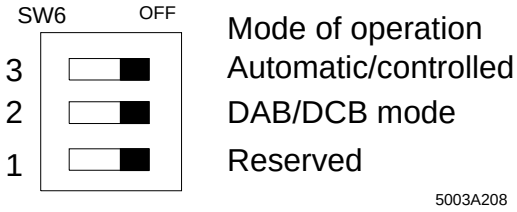


Figure 2-17: Setting the operating modes DCB or DAB

DCB mode:
In this operating mode all addresses which are occupied by INTERBUS-S I/O modules and registers will be acknowledged to the PLC in the cyclic part.

a) Automatic start:
Starting at the base addresses of windows 1 and 2, all modules are addressed and acknowledged. The address area of the I/Os depends on the space requirement of the modules. The setting of the window area refers to the input and output area of the PLC. The set window lengths must be shorter than the address area of the modules. The diagnostic registers are located below the base addresses.

When the automatic start is used, the set window lengths for the I/O address area of the modules is not checked for its correct setting !

b) Controlled start:
All module and register addresses (e.g. diagnostic registers) are defined with the logical addressing. Only the **defined addresses will be acknowledged** to the PLC (the smallest unit is 1 word, an even base address is permitted)

DAB mode:
In this operating mode all addresses are acknowledged which were previously defined with the window settings.

a) Automatic start:
Starting at the base addresses of windows 1 and 2, all modules are addressed and acknowledged. The address area of the I/Os depends on the space requirement of the modules. The setting of the window area refers to the I/O area of the PLC. The diagnostic registers are located below the base addresses. If the length specification of the windows is larger than the space requirement of the modules, the **unassigned addresses will also be acknowledged**.

When the automatic start is used, the set window lengths for the I/O address area of the modules is not checked for its correct setting !

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

b) Controlled start:
All module and register addresses (e.g. diagnostic registers) must be defined within the window area by means of logical addressing. **All window addresses are acknowledged**.

The communication registers (window 3) must be set independently of the start (automatic/controlled) and mode setting (DAB/DCB).

2.6.3.1 INTERBUS-S in the PLC's Address Area

INTERBUS-S occupies one part of the PLC's I/O address area. The size of the address area which is occupied depends on the INTERBUS-S configuration. This address area can be accessed in the same way ("L IW", "T OW", "U I", "S O", "L PW", "T PW", "L QW", "T QW") as system-contained boards. For the INTERBUS-S system the address area required for the I/O modules is addressed centrally on the host controller board. The setting of the required addresses depends on the operating mode of the controller board (SW 6).

Automatic start/ DCB mode
In this operating mode the host controller board automatically puts the addresses of the INTERBUS-S modules into the specified address windows after the voltage has been switched on. The set window lengths must be shorter than the address area of the modules. Moreover, registers for bus system diagnostics will be overlaid at fixed positions in the PLC's input area.

When the automatic start is used, the set window lengths for the I/O address area of the modules is not checked for its correct setting !

Controlled start/ DCB mode
In this mode of operation, the host controller board runs through an initialization phase in order to address INTERBUS-S modules after the voltage has been switched on. The programmer can freely assign the addresses of the modules as well as the diagnostic registers in the PLC's address area. The programming is done either during the PLC startup, by means of a software package or on the host controller board by means of a programmed EEPROM.

Automatic and controlled start/ DAB mode
In this mode of operation the host controller board puts the addresses of the INTERBUS-S modules automatically and/or by means of logical addressing into the specified address windows after the voltage has been switched on. In the controlled start mode, the registers (e.g. diagnostic registers) must be addressed in the address windows.
Besides the setting of the I/O addresses of the INTERBUS-S system a register (window 3) is put in the I/O area of the PLC. Via these registers, INTERBUS-S is controlled and synchronized with the PLC. The input word 0 of the PLC is an alarm message word.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2.6.3.2 Address Locations for Automatic Start in the DCB Mode

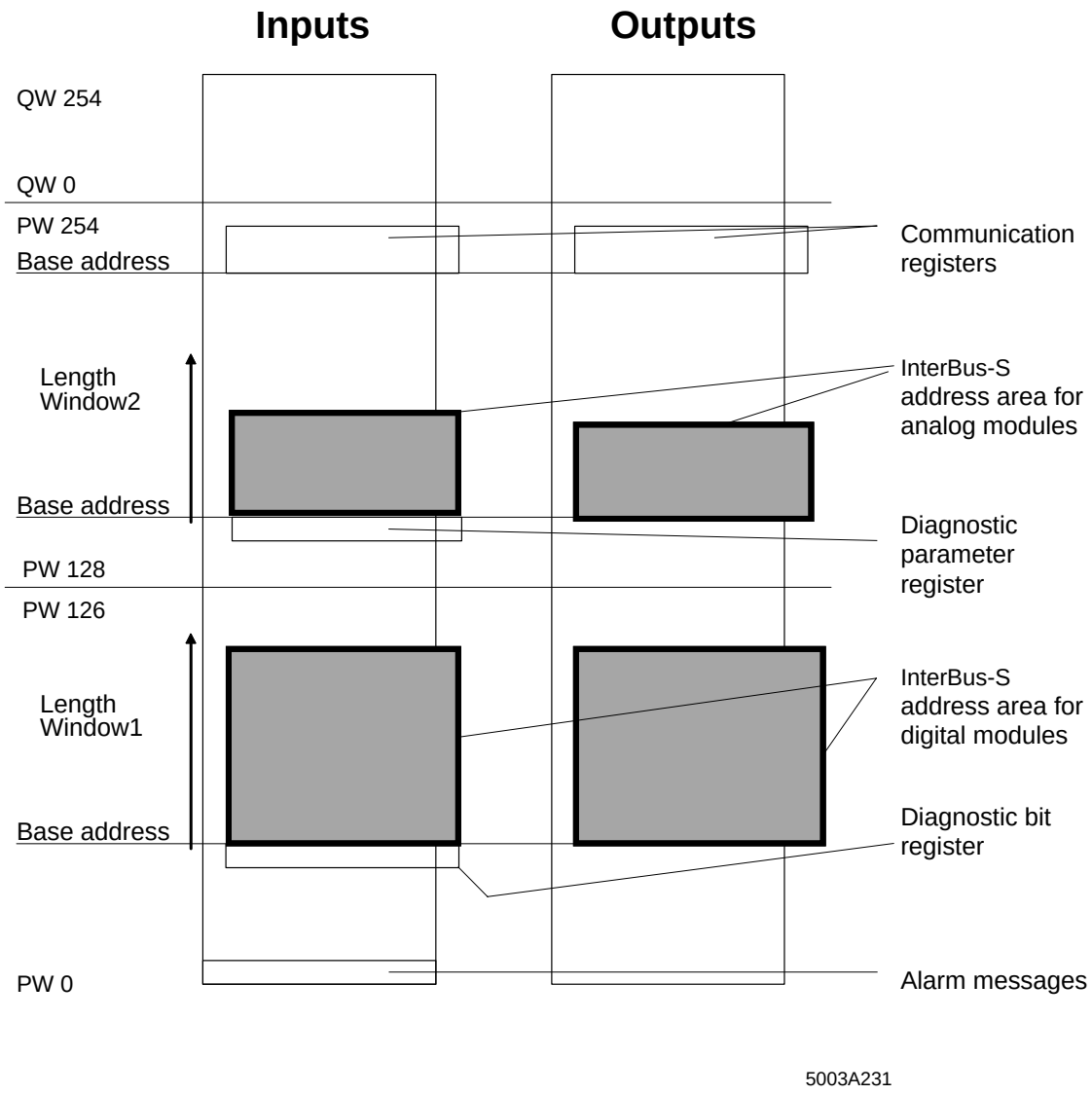


Figure 2-18: Address locations for automatic start in the DCB mode

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2.6.3.3 Address Locations for Controlled Start in the DCB Mode

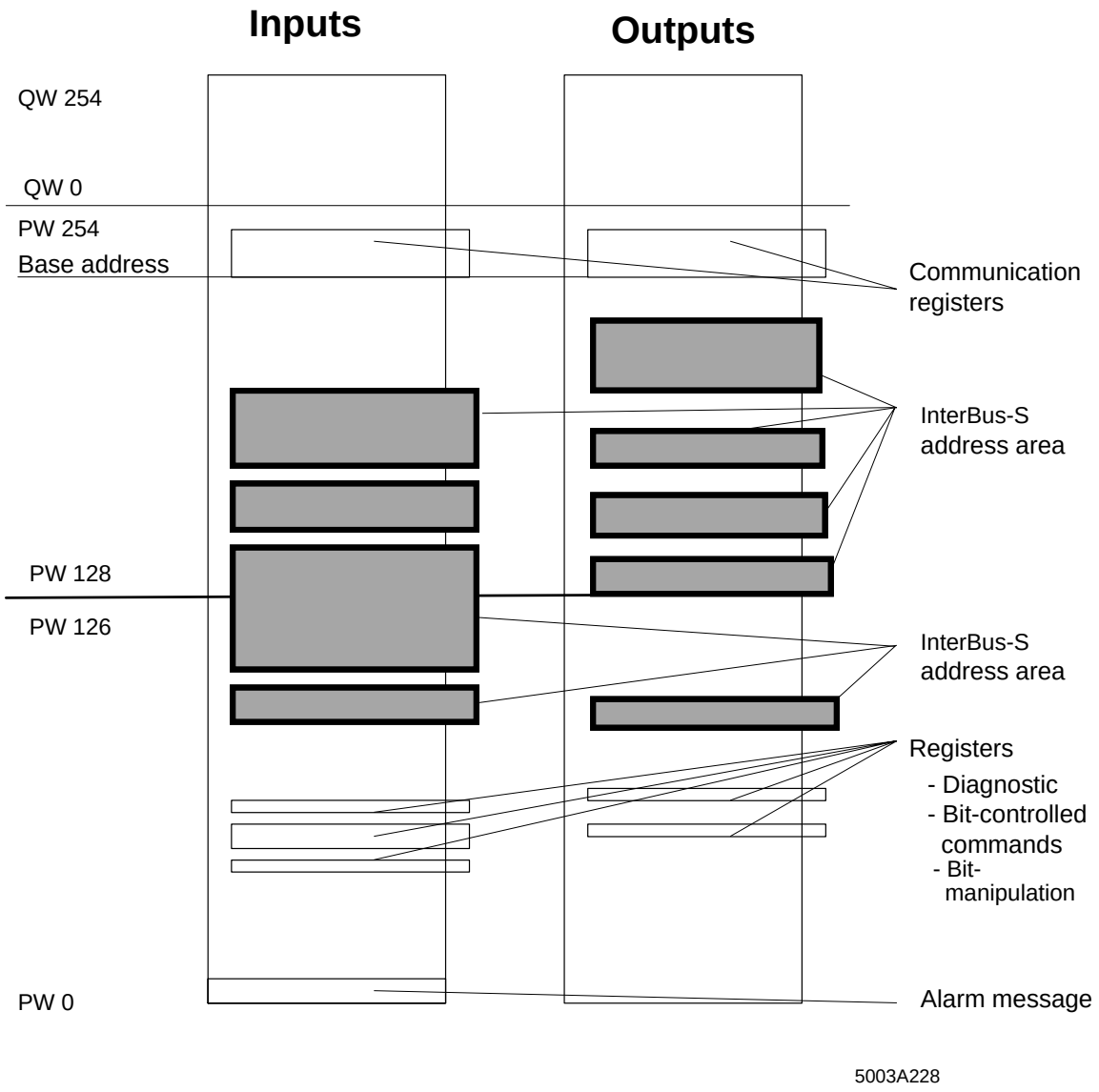


Figure 2-19: Address locations for controlled start in the DCB mode

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2.6.3.4 Address Locations for Automatic Start in the DAB Mode

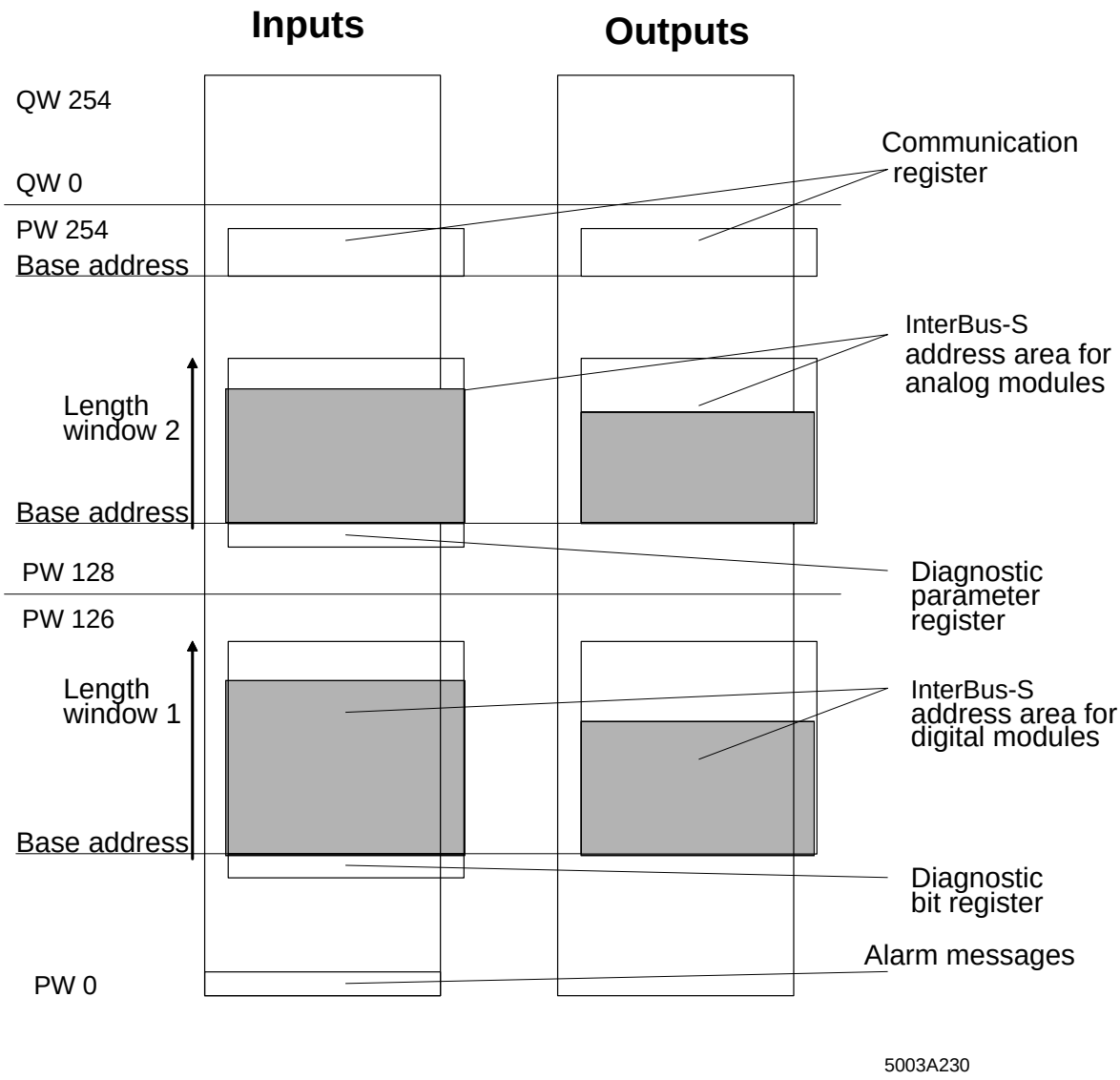


Figure 2-20: Address locations for automatic start in the DAB mode

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2.6.3.5 Address Locations for Controlled Start in the DAB Mode

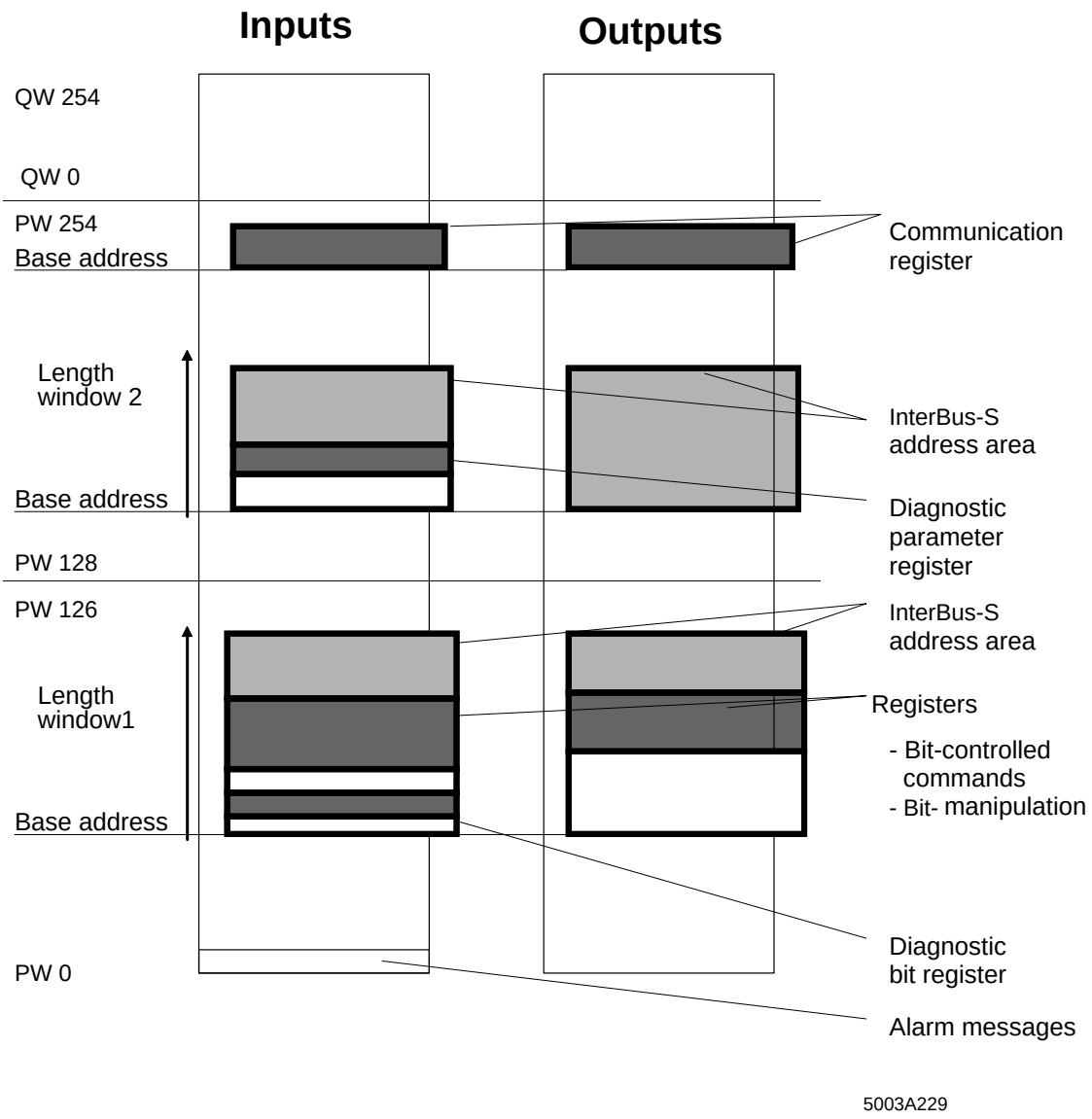


Figure 2-21: Address locations for controlled start in the DAB mode

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2.6.4 Address Windows

Three windows are occupied in the PLC's address area.

For an automatic start or in the DAB mode, the size of the first two windows depends on the INTERBUS-S system expansion. The address area should be calculated so that there is enough space for the module addresses and possible INTERBUS-S system expansions. The set address area occupies a part of the I/O area of the PLC.
The address area which is set for INTERBUS-S is occupied in the PLC's I/O area and must not be used by other modules (observe mode and operating mode setting).
Window 1 must be in the P area of the PLC and is reserved for digital I/O modules. Window 2 can be put in the P area (addresses 128 - 255) and/or in the Q area (addresses Q0 to Q255). Window 3 occupies 4 bytes in the PLC's I/O area. It is used as a communication register between the PLC and the host controller board. The communication register must not be processed.
The DIP switches indicate the base address and the length of the window.

Length:
The length of the window is limited to 256 bytes and is set as a **quantity in bytes**.
The length of window 3 is an exception because it is permanently set.

Permanent setting: 4 bytes inputs
4 bytes outputs

Base address:
The base address is the start address of the window. The base address must be an **even byte address**.

Setting the windows 1 and 2:
The beginning of the process data's address area can be determined with the base address of the respective window. The end address of the process data area results from the window size (length) and/or from the start/mode setting. The windows occupy the PLC's I/O area.
Besides the addresses for the I/O data, the host controller board also occupies two input words as a diagnostic register and two I/O words as a communication register. The two diagnostic registers occupy one word each.

Please refer to Table 2-2 for the lowest base address.

Table 2-2: Lowest base addresses for windows 1 and 2

Window	Registers	Area	Address (dec.)
Window 1	Automatic start	P	2
Window 1	Controlled start	P	0
Window 2	Automatic start	P	128
Window 2	Controlled start	P	0

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Communication registers (window 3):

The base address of the communication registers (window 3) is to be selected so that they are located outside of the PLC's I/O image **and** do not extend from the P to the Q area). Thus, the base address of the communication register can be set from address 128 to address 252 in the P area and from address 0 to address 252 in the Q area. The base address must be divisible by 4. If the communication registers are located in the Q area, the driver blocks have to be called with the letter "Q". This distinction is necessary because the load and transfer commands in the driver blocks differ.

Table 2-3: Location of the communication registers

Location of the communication registers		
Area	Base address	FB ending
P	P 128 to P 252	None
Q	Q 0 to Q 252	Q

The following is required for automatic and controlled start:
Window 3 must always be set.
The application must neither write nor read window 3. Write/read access is only permitted through the driver blocks.
The base address must be divisible by four.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Setting the windows:

Window 1:

I/O area	(Digital I/O modules)	
Settings	Base address:	SW 1
	Length:	SW 2

Window 2:

I/O area	(Analog I/O modules)	
Settings	Base address:	SW 3
	Length:	SW 4

Window 3:

I/O area for the communication between the host controller board and the driver blocks of the PLC.

Settings:	Base address:	SW 5 (divisible by 4)
	Length:	4 bytes

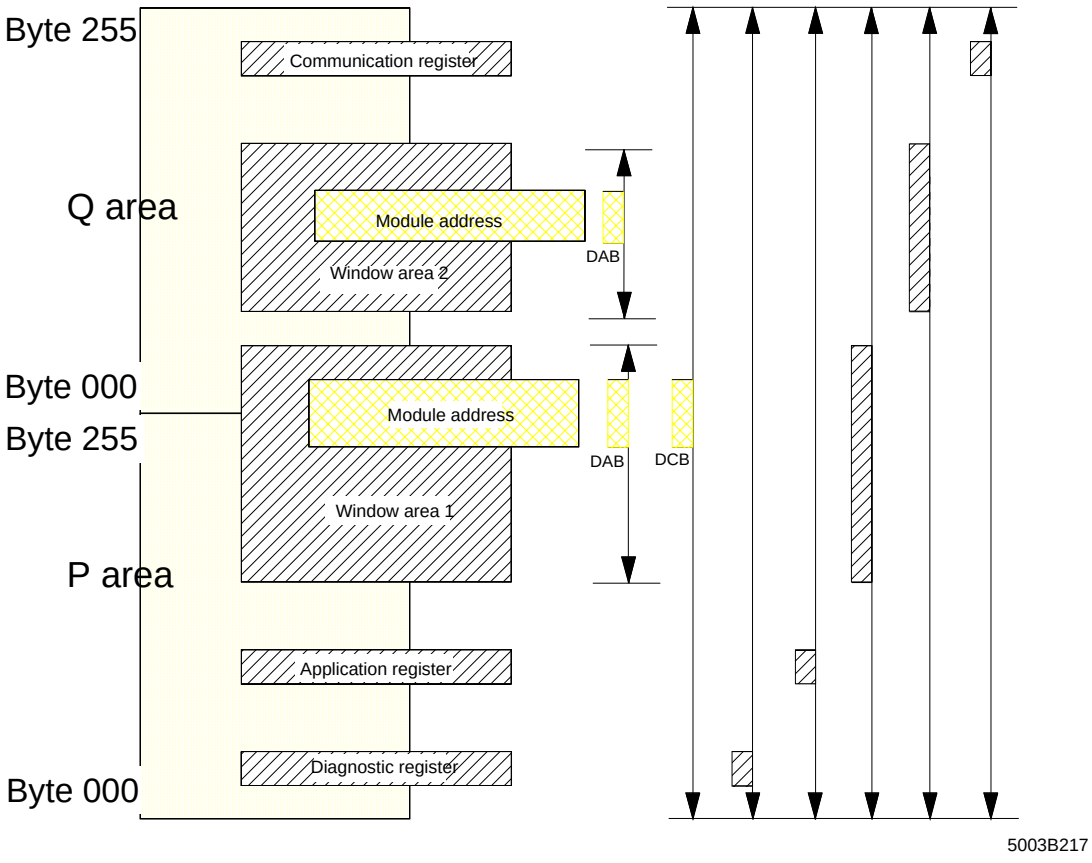


Figure 2-22: Variable locations for registers and window areas

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The location of the windows is to be selected in such a way that the windows neither overlap nor that other modules occupy the address area of the window areas and registers. **Double addressing is not permitted !!**

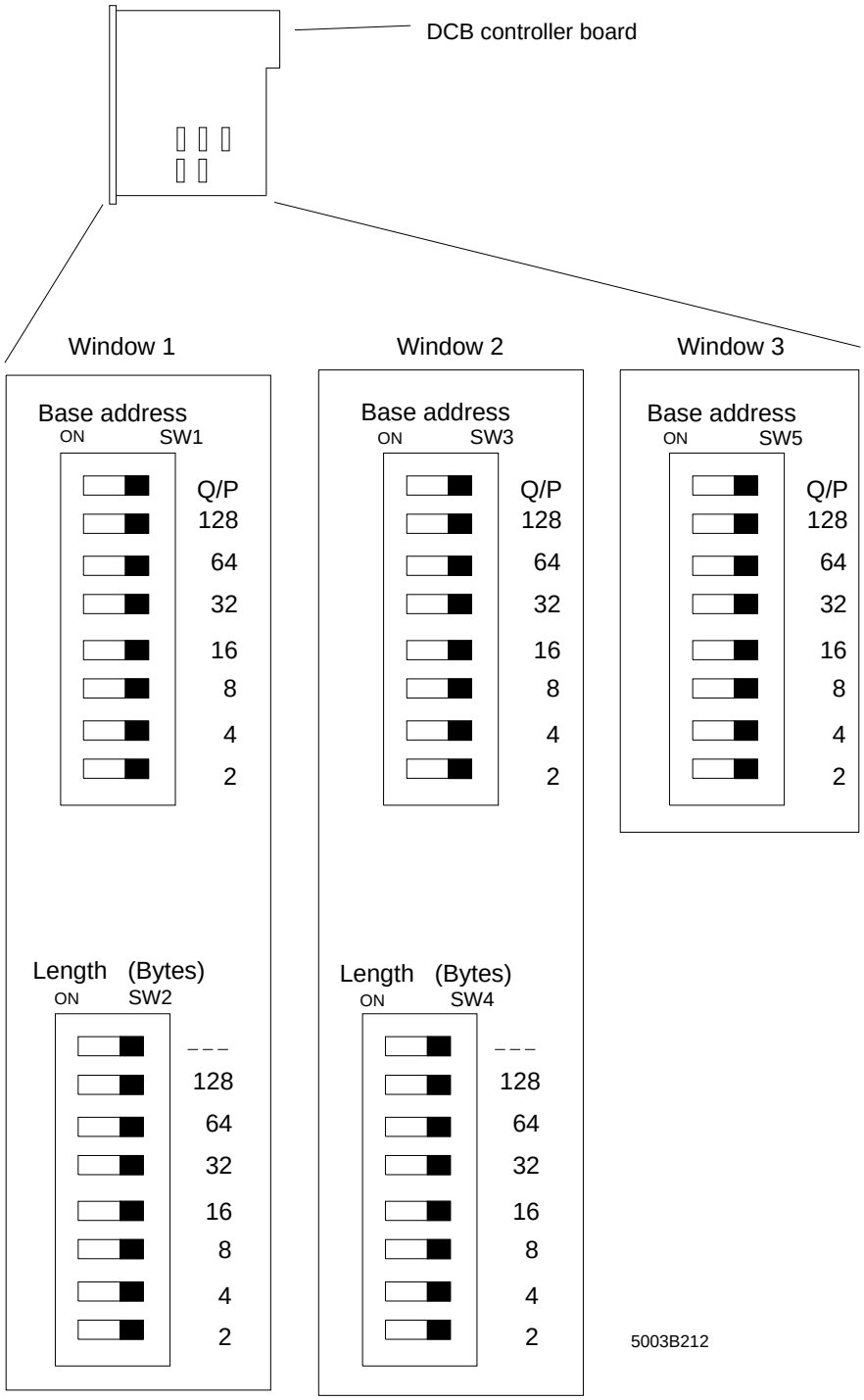


Figure 2-23: Setting the INTERBUS-S windows

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Example for automatic start (DAB and DCB modes):

Window 1:	Base address = 32	(SW1)
	Length = 18 bytes	(SW2)
Window 2:	Base address = 132	(SW3)
	Length = 20 bytes	(SW4)
Window 3:	Base address = 160	(SW5)

Automatic start:
Diagnostic bit register = Bytes 30 and 31
Diagnostic parameter register = Bytes 130 and 131

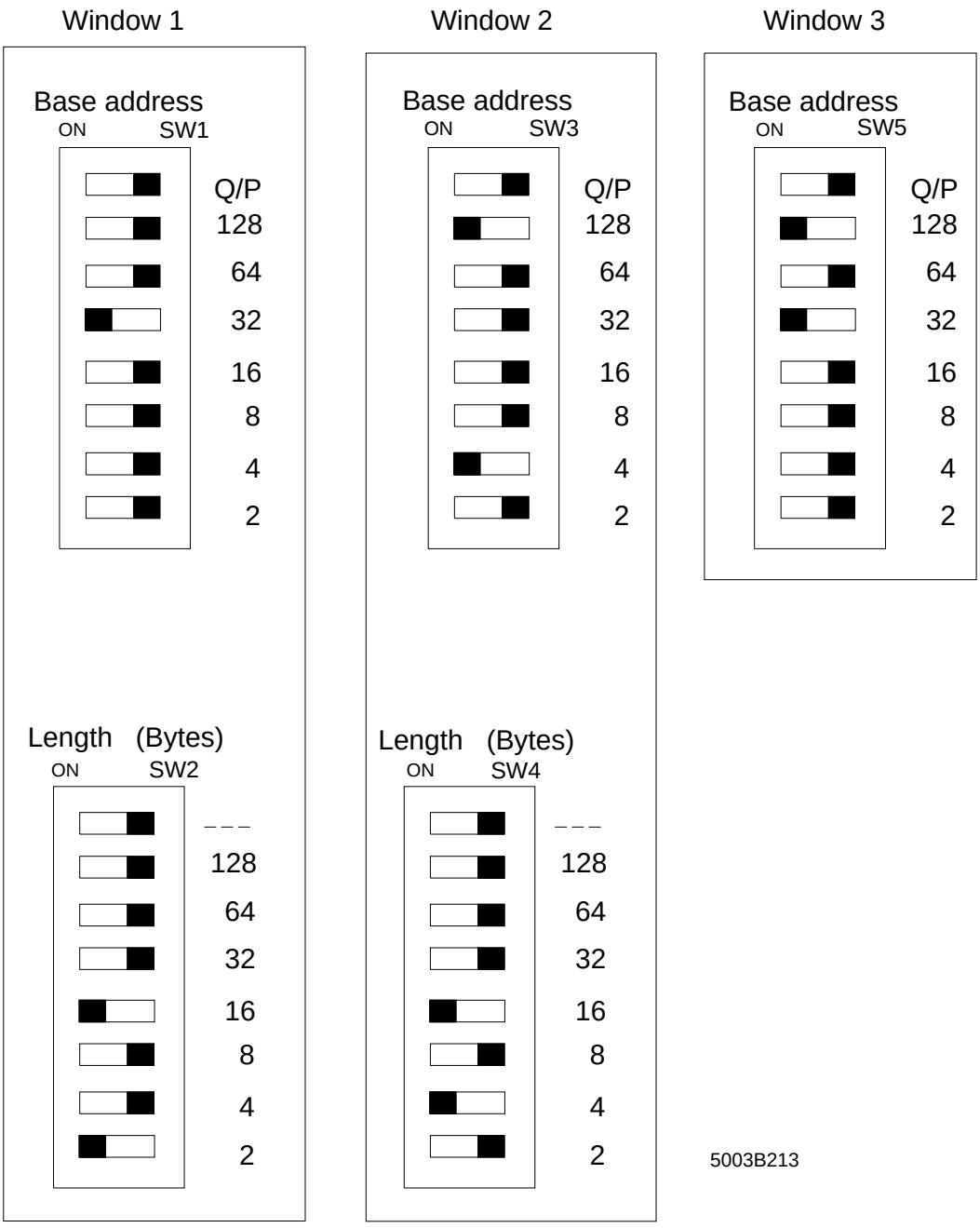


Figure 2-24: Example setting of the INTERBUS-S windows

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Settings for the example:

Window 1:	Base address = 32	(SW1) 32
	Length = 18 bytes	(SW2) 16 + 2
Window 2:	Base address = 132	(SW3) 128 + 4
	Length = 20 bytes	(SW4) 16 + 4
Window 3:	Base address = 160	(SW5) 128 + 32

Automatic start:

Diagnostic bit register = Bytes 30 and 31
Diagnostic parameter register = Bytes 130 and 131

Table 2-4: Address assignment in the PLC

Windows	First Byte		Last Byte	
	Inputs	Outputs	Inputs	Outputs
Window 1	32	32	49	49
Window 2	132	132	151	151
Window 3	160	160	163	163

Windows which extend from the P to the Q area :

If a window extends from the P to the Q area, a correct programming has to be ensured.

Example:
In this example the base address of the second window is set to address 200 and the length is specified with 106 bytes.

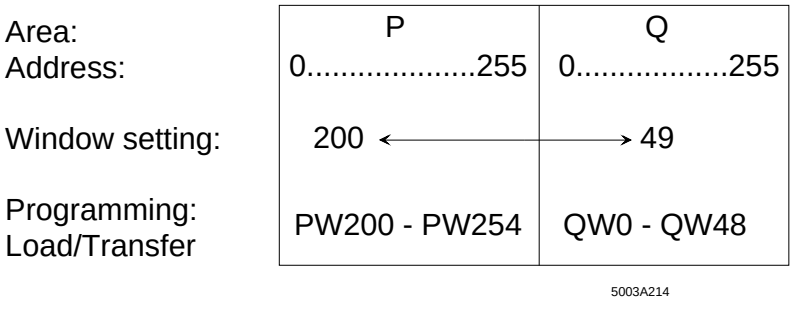


Figure 2-25: Example for a window setting which extends over two areas

When the PLC accommodates SIMATIC I/O modules in the central controller, the addresses used by these modules are located in the P and Q area, respectively (see the user manuals for SIMATIC PLCs).

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2.6.5 Interrupt Processing

The INTERBUS-S host controller board is an intelligent bus controller which receives commands from the PLC and sends messages to the PLC. This type of communication is performed with fixed addresses in the I/O area of the PLC (communication register, window 3) and is supported by function blocks.

Interrupt processing is not supported.

2.6.5.1 Settings for Interrupt Processing

The jumpers marked with * (J3, J5, J6, J7, J8) are not available in the hardware with revision C. In all higher revisions the default state is to be kept.

The interrupt line to the PLC can be enabled or disabled with jumper J3.
Access to the peripheral word 0 is possible when the interrupt is enabled.

Jumper: **J 3 (*)**

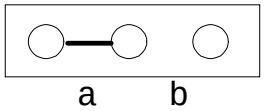


Figure 2-26: Interrupt is disabled when jumper J3 is in position a-b

The default state is to be kept.
(PW 0 is not used by the host controller board.)

Jumper 7 sets the interrupt functionality to master or slave.

Jumper: **J 7 (*)**

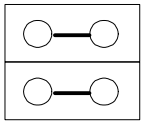


Figure 2-27: Default state of jumper J7

The default state is to be kept.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Settings for board identification

Jumper J8 selects the data bit in the peripheral byte 0 for the board identification.
When only one interrupt-providing controller board is operated in every PLC, the setting of the default state is to be kept.

Jumper: **J 8 (*)**

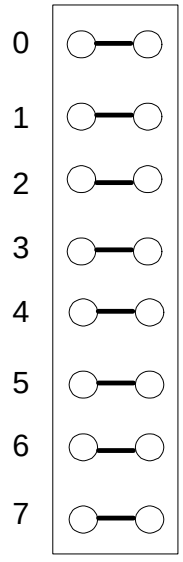


Figure 2-28: Board identification by means of jumper J8 for selecting the data bit in the peripheral byte 0

The default state is to be kept.

Interrupt line selection

The interrupt line depends on the type of the PLC. A selection is made with jumper J 6.
The letters A through D represent the hardware interrupt lines of the S5 system connector.

Switch: **J 6 (*)**

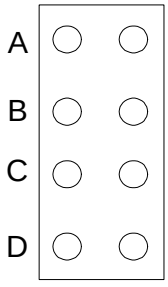


Figure 2-29: Selection of the interrupt lines depending on the PLC type

The default state is to be kept.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2.6.5.2 Different Interrupt Sources

There are three interrupt sources on the host controller board. The interrupt source can be selected with the jumper field J 5.

Jumper: **J 5 (*)**

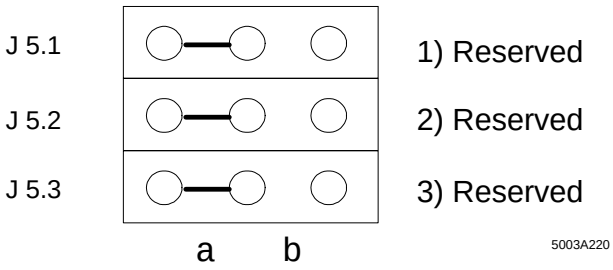


Figure 2-30: Selection of the interrupt sources with the jumper field J5 (default state)

2.6.6 Acknowledgment Delay Message

In some applications it is desirable to put the PLC directly into the STOP state when certain events occur. This state can be reached by preventing the access acknowledgment which the PLC is expecting. The PLC is stopped with an acknowledgment delay. The events can be selected with jumper field J 4.

Jumper: **J 4**

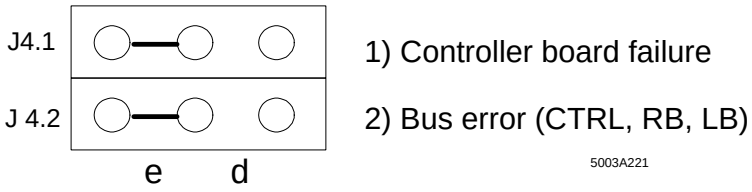


Figure 2-31: Preventing the access acknowledgment with the jumper field J4

Controller board failure

An acknowledgment delay is caused when a hardware error (mounting locations 1-3) occurs on the host controller board.

Jumper: J4.1

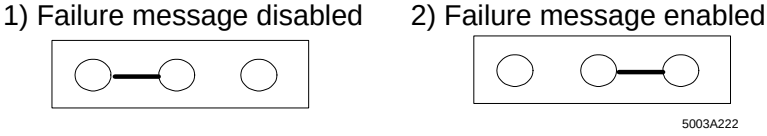


Figure 2-32: Jumper J4.1 allows to disable and enable the message in the case of a failure

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Bus error

An acknowledgment delay is caused when a fault occurs in the INTERBUS-S system.
Reasons:

CTRL	Error on the controller board
RB	Remote bus error
LB	Local bus error

Jumper: J4.2

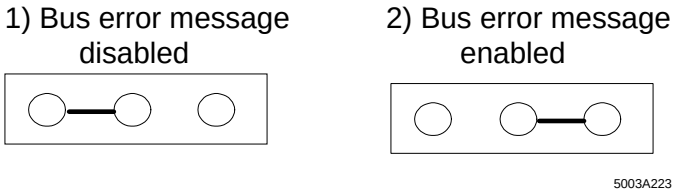
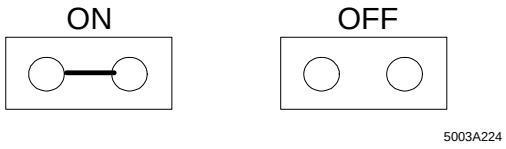


Figure 2-33: Enabling and disabling of bus error messages

2.6.7 Disconnecting the RESET Button

The RESET button is located on the front plate of the PLC, below the RS-232 interface. When actuating the button (only possible with a tool) the host controller board and the connected INTERBUS-S will be reset.
During the startup phase it might be necessary to reset the host controller board for test purposes. During start, however, it is not desirable to press the RESET button.
Jumper J 10 allows to disable the RESET button.

Jumper: **J 10**



Default state

Figure 2-34: Disabling the RESET button with jumper J10

A RESET must only be performed when the PLC is in the STOP state. When the host controller board runs its self-test, no up to date inputs are read and no outputs are set. In the controlled start mode, the bus cycle is **not** re-started (no RUN). All parameter settings are lost (log. addressing, event definitions, ...). When an EEPROM card is inserted, the boot sequence is run through.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2.7 Data Sheet

Designation: IBS S5 DCB/I-T

Basic specifications

Control system: SIMATIC S5 PLCs
Types: S5 115 U S5 130 WB
S5 135 U S5 150 U, 150 S
S5 155 U
Others upon request

Bus system

Sensor/actuator: INTERBUS-S
Bus: INTERBUS-S compatible modules

Types: Different I/O modules
Manufacturer: Phoenix Contact
Third-party: Inquiries to
INTERBUS-S-Club

Expansion:
Max. 256 local busses
(incl. bus terminal modules with I/O function
and installation remote bus modules)
Max. 320 modules (incl. BKs and PCP stations)
Max. 256 INTERBUS-S words
Max. 62 PCP stations

Diagnostics: Overall system diagnostics by means of
- front plate diagnostics
- diagnostic registers - software-diagnostics via
the PLC
RS-232 and PC monitor

Interfaces:
Two-wire remote bus connection
9-pos. D-SUB female connector
RS-232 connection
9-pos. D-SUB male connector

Hardware

Size: The controller board occupies two narrow slots
115 U with adaptation casing
130 U - 155 U directly pluggable

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Address area:		P area Q area
Multiprocessor operation:		Yes
Interrupt operation:		No
Current consumption:		1.3 A typ. at +5 volts max. 2.5 A
Temperature	Operation:	0 °C to 60 °C
	Storage:	-25 °C to 80 °C
Humidity	Operation:	70 %
	Storage:	95 %
EEPROM:		16 - 64 kbytes (memory card format)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Chapter 3

User Interfaces

This chapter provides information on

- how the INTERBUS-S controller board and the PLC exchange process data
- the identification of modules in the bus configuration
- the two basic method of addressing the I/O modules
- the input and output, as well as the allocation of digital and analog I/O data

3 User Interfaces 3-1

3.1 ID Code of the Modules 3-3
3.2 Process Data Interface 3-8
3.2.1 Example Configuration 3-9
3.2.2 Order of the Modules on the Bus 3-11
3.3 Physical Addressing (DCB Mode) 3-12
3.3.1 Function 3-12
3.3.2 Addressing 3-12
3.3.3 Address Orientation 3-14
3.4 Logical Addressing (DCB Mode) 3-17
3.4.1 Function 3-17
3.4.2 Structure of an INTERBUS-S Address List 3-18
3.4.3 Addressing 3-19
3.5 Access to INTERBUS-S Modules 3-23
3.5.1 Digital Modules with 16 Inputs 3-24
3.5.2 LC Modules with 16 Digital Inputs 3-25
3.5.3 Digital Modules with 32 Inputs 3-26
3.5.4 Digital Modules with 16 Outputs 3-27
3.5.5 LC Modules with 16 Digital Outputs 3-28
3.5.6 Digital Modules with 32 Outputs 3-29
3.5.7 Digital Modules with 16 Inputs and 16 Outputs 3-30
3.5.8 Four-Channel Analog-Input Module with Programmable Gain 3-31
3.5.9 Four-Channel Analog-Output Modules 3-34
3.5.10 Relais Modules 3-36
3.5.11 Communication Interface Boards 3-37
3.5.12 Modules for Thermocouples 3-38

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3 User Interfaces

The following intelligent host controller boards are available for Siemens S5 PLCs: the IBS S5 DCB/I-T (with electrical isolation) and the IBS S5 DCB-T (without electrical isolation) boards. Both types have three software interfaces which are accessible from the PLC side. They can be used by the user without additional tools.

Process data interface:

This interface
- can be used in the two operating modes: AUTOMATIC START and CONTROLLED START,
- consists of the INTERBUS-S window 1 and the INTERBUS-S window 2, and
- allows to access in real-time the states of sensors and actuators of the connected processes.

Communication Interface:

The standard function blocks of the INTERBUS-S use the communication interface:
- for initializing the controller board and the connected INTERBUS-S system
- for controling the INTERBUS-S system during operation
- for evaluating the error states
- for addressing communication stations through a PMS connection (PMS = **P**eripherals **M**essage **S**pecification). The associated protocol is called **P**eripherals **C**ommunication **P**rotocol (PCP). Therefore, INTERBUS-S modules which can be addressed in this way are called PCP stations.
- as an extended communication interface. When a PC is used, system and PCP communication can be used through this RS-232 interface.

Diagnostic interface:

- It is always activated in the AUTOMATIC START and optionally in the CONTROLLED START mode.

- It allows to evaluate the controller board indicators for the operating mode and the error type by means of software.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

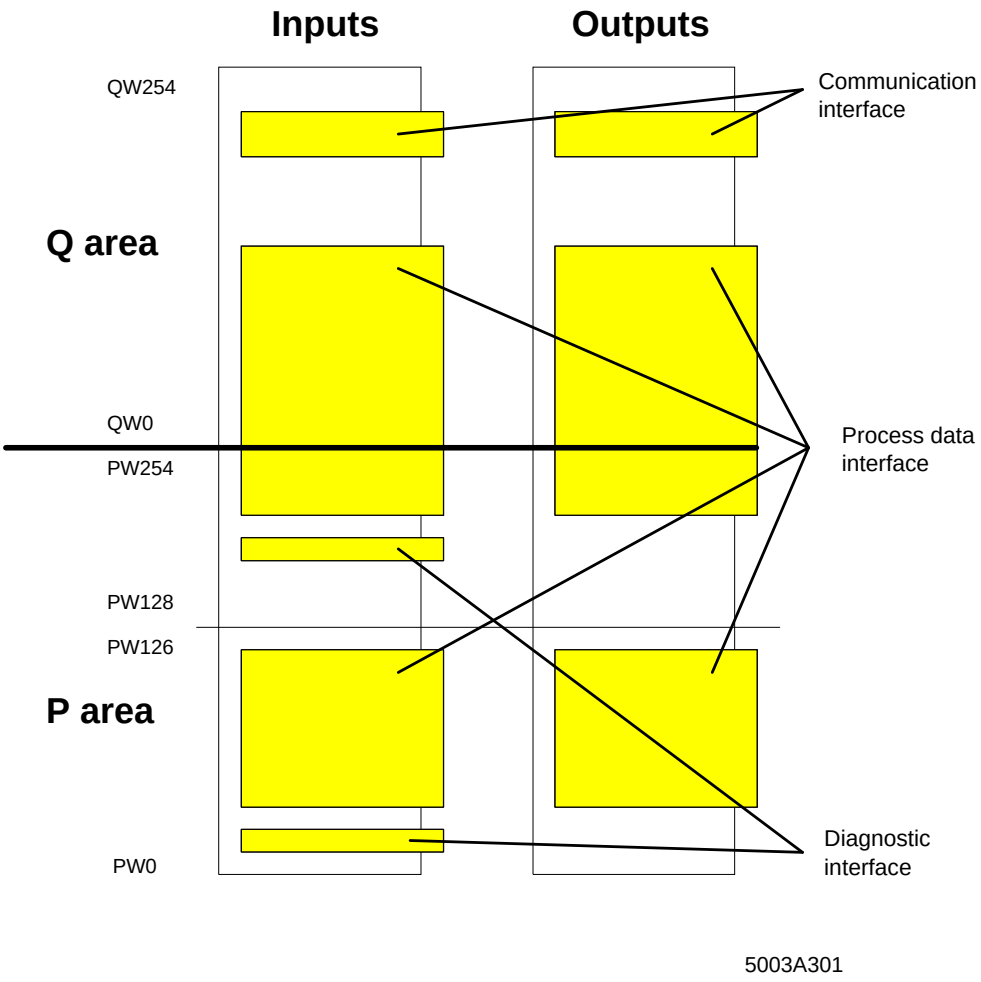


Figure 3-1: Positions of the software interfaces in the PLC's address area

online

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.1 ID Code of the Modules

A table (ID code list) describes the complete INTERBUS-S system with the help of the module characteristics. Each module is specified with three characteristics:

- physical location of the module in the bus topology
- ID code of the module
- length code (address space requirement in the PLC) of the module

The INTERBUS modules and the bus segments are counted as follows:

The first module of a bus segment is a bus terminal module (BK) or a remote bus station with I/Os. All other modules are I/O modules. The first I/O module is coupled to the BK, the second I/O module is coupled to the first module, etc.

The bus segment connected first is the bus segment the BK of which is connected to the PLC through the remote bus. The next bus segment is coupled to the BK of the previous bus segment through the remote bus, etc.
The bus segments can be freely numbered.

Table 3-1: Meaning of the parameters of an ID code list using the example of the data block n

DW	m+0	KY=	**000,**	**k**	Parameter count
	m+1	KY=	**zzz,**	**xxx**	ID code module 0
	m+2	KY=	**zzz,**	**xxx**	ID code module 1
	m+3	KY=	**zzz,**	**xxx**	ID code module 2
			...,	**...**	
	m+k	KY=	**zzz,**	**xxx**	ID code module k
			Length code of the module	**ID no. of the module**	

The following abbreviations were used in the table:

n	=	Number of the data block (DB) in which the parameter list is stored
m	=	Number of the data word (DW) with which the parameter list starts
k	=	Quantity of the subsequent parameters (here module quantity)
zzz	=	Length code
xxx	=	ID code for modules

The INTERBUS-S configuration is entered in the list. To do this, the ID numbers and the length codes of the individual I/O modules and BKs (Table 3-2) have to be known.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Table 3-2: Overview of INTERBUS-S stations (modules)

IB-S station (Module type)	Local/ **R**emote	**Physical address.**	**ID code** (dec.)	(hex)	**Length code**	**IN-AR** (bytes)	**OUT-AR** (bytes)	**PCP-AR** (bytes)	**Register-width**
Digital Input									
IBS 24 DI	L	Window1	130	82h	1	2	-	-	2
IBS 60 DI	L	"	130	82h	1	2	-	-	2
IBS 24 DI/LC	L	"	150	96h	1	2	-	-	2
IBS 24 DI/32	L	"	142	8Eh	2	4	-	-	4
IBS 24 DI/32(/F2)	L	"	142	8Eh	2	4	-	-	4
IBS 24 DI/I	L	"	146	92h	1	2	-	-	2
IBS 120 DI	L	"	138	8Ah	1	2	-	-	2
IBS 230 DI	L	"	134	86h	1	2	-	-	2
IBS IP CDI 1/24-F	R	"	10	Ah	129	1	-	-	1
IBS IP CDI 2/24-F	R	"	10	Ah	129	1	-	-	1
IB ST 24 DI 32/2	L	"	190	BEh	2	4	-	-	2
IB ST 24 DI 16/4	L	"	190	BEh	1	2	-	-	1
Digital Output									
IBS 24 DO a. (1)	L	Window1	129	81h	1	-	2		2
IBS 24 DO-B	L	Window1	129	81h	1	-	2		2
IBS 24 DO/LC	L	"	149	95h	1	-	2	-	2
IBS 24 DO/32	L	"	141	8Dh	2	-	4	-	4
IBS 24 DO/32-B	L	"	141	8Dh	2	-	4	-	4
IBS 24 DO/32/F2	L	"	141	8Dh	2	-	4	-	4
IBS 24 RELS	L	"	145	91h	1	-	2	-	2
IBS 60 RELS	L	"	157	9Dh	1	-	2	-	2
IBS 24 DO/R	L	"	161	A1h	1	-	2	-	2
IBS 120 DO	L	"	137	89h	1	-	2	-	2
IBS 230 DO	L	"	133	85h	1	-	2	-	2
IBS IP CDO 1/24-F	R	"	9	9h	129	-	1	-	1
IBS IP CDO 2/24-F	R	"	9	9h	129	-	1	-	1
IB ST 24 DO 32/2	L	"	189	BDh	2	-	4	-	2
IB ST 24 DO 16/3	L	"	189	BDh	1	-	2	-	1
IB ST 24 DO 8/3-2A	L	"	185	B9	81* 1**	-	2	-	1

* For controller boards with a firmware version that allows the manual combination (with logical addressing) of two IB ST 24 DO 8/3-2A modules.

** For controller boards with a firmware version that does not allow a manual combination (with logical addressing) of two IB ST 24 DO 8/3-2A modules.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Table 3-3: Overview of the INTERBUS-S stations (slave boards, BKs, etc.)

IB-S station (Module type)	Local/ Remote	**Physical address.**	**ID code** (dec.)	(hex)	**Length code**	**IN-AR** (bytes)	**OUT-AR** (bytes)	**PCP-AR** (bytes)	**Register-width**
Analog Input									
IBS AI	L	Window2	67	43h	4	8	8	-	8
IBS AI 3	L	"	71	47h	4	8	8	-	8
IBS AI/I	L	"	75	4Bh	4	8	8	-	8
IBS AI 1/8	L	"	207	CFh	1	2	2	2	4
IBS PT 100 A/2	L	"	66	42h	4	8	-	-	8
IBS PT 100 A/4	L	"	70	46h	4	8	-	-	8
IB ST 24 AI 4/SF	L	"	126	7Eh	4	8	-	-	8
Analog Output									
IBS AO 1	L	Window2	65	41h	4	-	8	-	8
IBS AO 2	L	"	73	49h	4	-	8	-	8
IBS AO 3	L	"	69	45h	4	-	8	-	8
IBS AO 4/8	L	Window2	211	3Dh	1	2	2	2	4
IB ST 24 AO 4/SF	L	"	125	7Dh	4	-	8	-	8
Slave Boards									
IBS S5/SL	R	Window1	43	2Bh	4/8	8/16	8/16	-	8/16
IBS S5/SL/I	R	Window1	43	2Bh	4/8	8/16	8/16	-	8/16
IBS S5/SL-LB	L	"	171	ABh	4/8	8/16	8/16	-	8/16
IBS BA/SL	R	"	43	2Bh	4/8	8/16	8/16	-	8/16
IBS PC AT-T	R	"	43	2Bh	1/2	2/2	2/4	-	2/4
IBS PC AT/I-T	R	"	43	2Bh	1/2	2/2	2/4	-	2/4
Bus Terminal Modules									
IBS IP CBK 1/24-F	R	-	12	Ch	0	-	-	-	0
IBS 230 BK	R	-	32	20h	0	-	-	-	0
IBS 230 BK Vers. A	R	-	36	24h	0	-	-	-	0
IBS 24 BK	R	-	40	28h	0	-	-	-	0
IBS 24 BK/LC a. LC 2	R	-	48	30h	0	-	-	-	0
IBS 24 BK-T	R	-	52	34h	0	-	-	-	0
IBS 24 BK Vers. A	R	-	44	23h	0	-	-	-	0
IBS 24 BK-LWL-K	R	-	52	34h	0	-	-	-	0
IBS ST 24 BK-T	R	-	8	8h	0	-	-	-	0
IBS ST 24 BK-LK	R	-	8	8h	0	-	-	-	0
I/O BKs									
IBS 24 BK-I/O-T	R	Window1	11	Bh	1	2	2	-	2
IBS 24 BK-I/O	R	"	35	23h	1	2	2	-	2
IBS 24 BK-I/O Vers. A	R	"	39	27h	1	2	2	-	2
IBS IP DIO 1/24 (-F, -P)	R	"	7	7h	1	2	2	-	2
IBS IP DIO 2/24..	R	"	7	7h	1	2	2	-	2
IBS IP BDIO 1/24 (-F, -P)	R	"	7	7h	1	2	2	-	2
IBS 24 IP DIO BB1/E-T	R	"	7	7h	2	4	2	-	3
IBS 24 IP DIO BB1/Rels-T	R	"	15	Fh	1	2	2	-	2

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

IBS 24 IP DIO BB1-T	R	"	15	Fh	2	4	2	-	4
Operator Interfaces									
IBS BT	R	Window1	47	2Fh	1	2	2	-	2
IBS BT KB-T	R	"	47	2Fh	1	2	2	-	2
PCP Modules									
IBS CNT	L	Window2	199	C7h	1	2	2	2	4
IBS V.24	L	"	203	CBh	0	-	-	2	2
IBS AI 3/16	L	"	207	CFh	1	2	2	2	4
IBS AI 5/8	L	"	207	CFh	1	2	2	2	4
IBS AI 6/8	L	"	207	CFh	1	2	2	2	4
IBS UTH-J	L	"	207	CFh	1	2	2	2	4
IBS UTH-K	L	"	207	CFh	1	2	2	2	4

Local/**R**emote: states whether the IB-S station is a local or remote bus station
Physical address. states whether the IB-S station is located in window 1 or window 2 when physical addressing is used
ID code: ID code in a decimal and hexadecimal form
Length code:
IN-AR: specifies the address area which a module occupies with its IN addresses
OUT-AR: specifies the address area which a module occupies with its OUT addresses
PCP-AR: specifies the address area which a module specifies with its PCP addresses
Register width: Quantity of bytes which an IB-S station uses in the data ring

This information facilitates the address assignment and provides information on the bus utilization. The maximum INTERBUS-S extension has 256 data words. This information refers to the physical bus structure. The quantity of words results from the sum of the register widths (quantity in bytes)

Bus utilization
The quantity of PCP bytes must be considered when the bus utilization is determined as it influences the scan time.

Table 3-4: Special ID codes

Designation	**ID code** (decimal)	(hex)	**Length code**	**IN-AR** (bytes)	**OUT-AR** (bytes)
Diagnostic bit register	16	10h	0	2	-
Diagnostic parameter register	17	11h	0	2	-
Bit-controlled command register	18	12h	0	4	2
Bit-manipulation register	19	13h	0	-	2
Special ID code for word reservation in the MPM	21	15h	0	2	2

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The special ID codes are appended to the ID code list. The ID codes for the bit manipulation registers can be assigned several times.

With the help of the special ID codes 0015h an output and input word is reserved in the MPM. The contents of the output word output on the yellow LEDs by means of the coding switch position 93xx. The value xx (decimal, value range 0-99) is written into the input word. When the configuration is input the special ID code is appended to the actual configuration by means of the Check-Physical-Configuration (0058h) service. It must occur only once in the configuration. You may use the logical addressing to place the two words at any address in the MPM.

INTERBUS-S devices from third party manufacturers

Apart from this module overview, the INTERBUS-S User Groups DRIVECOM, ENCOM and other manufacturers of INTERBUS-S-compatible devices offer a wide range of remote and local bus stations.

A description of these bus stations can be obtained from the respective manufacturer. Please have the following information at hand:

- ID code
- Length code
- PCP byte quantity

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.2 Process Data Interface

The INTERBUS-S system occupies a certain portion of the PLC's I/O address area. The size of this address area depends on the bus topology. This INTERBUS-S address area can be accessed with the same commands ("L IW", "T OW", "U I", "S O", "L PW", "T PW", "L QW", "T QW" etc.) as for system-internal boards.

The address area which is required for the I/O modules of the INTERBUS-S system is set on the controller board. The setting of the required addresses depends on the mode of operation of the controller board (switch SW 6).

Two types of addressing are possible.

PHYSICAL ADDRESSING
In this mode of operation the host controller board puts the addresses of the INTERBUS-S modules, in accordance with the physical order of the modules in the bus topology ,automatically into the set address windows after the voltage has been switched on. Additionally, registers for bus system diagnostics are overlaid at fixed locations in the PLC's input area.

LOGICAL ADDRESSING
For this mode of operation, the programmer can freely assign the addresses of the modules and of the diagnostic registers in the address area of the PLC. After power on, the controller board addresses the INTERBUS-S modules in the way that was programmed in the software package or EEPROM before.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.2.1 Example Configuration

The examples given on the following pages describe the different types of addressing. The INTERBUS-S topology shown there is the same in all examples and comprises the following:

BUS CONFIGURATION

Host controller board: IBS S5 DCB/I-T

I/O modules:

IBS 24 BK-T
IBS 24 DI
IBS AO 1
IBS 24 DO
IBS PT 100 A/2

IBS DIO 1/24-P

IBS IP CBK 1/24-F
IBS IP CDI 1/24-F
IBS IP CDO 1/24-F
IBS IP CDI 1/24-F

IBS 24 BK I/O T
IBS 24 DI/32
IBS AI 3

ADDRESS SETTING

Window 1:

Base address:	32
Length:	14 bytes

Window 2:

Base address:	132
Length:	16 bytes

Window 3:

Base address:	160
Length:	4 bytes

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

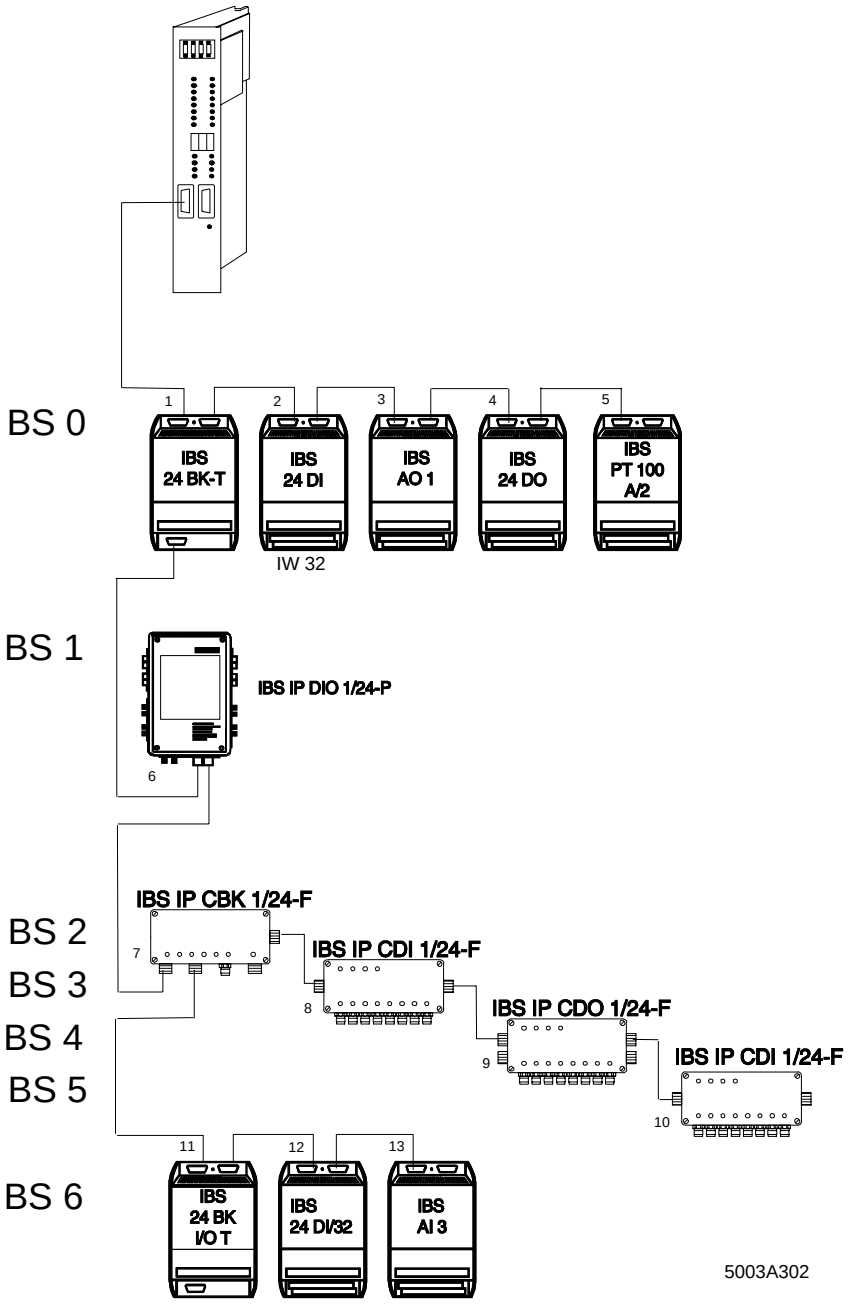


Figure 3-2: Example configuration

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.2.2 Order of the Modules on the Bus

The physical addressing of the I/O modules depends on the order of the modules in the bus topology.

Counting direction and order of the modules
The first module of a bus segment is a bus terminal module (BK). All other modules are I/O modules. The first I/O module is coupled to the BK, the second I/O module is coupled to the first module, etc.

Counting direction and order for the local buses and installation remote buses
Bus segment 0 (BS 0) is the bus segment the BK of which is directly coupled to the controller board in the PLC through the remote bus. Bus segment 1 is coupled to the BK of bus segment 0 through the remote bus, etc.

Bus terminal modules with I/O functions, BKs for the installation remote bus and installation remote bus modules have their own bus segment number (BS) as shown in Figure 3-2 (BS=7-10).

Table 3-5: Counting direction/order for the entire bus configuration

Module	Bus segment (BS)	Module number
1	0	0
2	0	1
3	0	2
...	0	to n
n	1	0
n+1	1	1
n+2	1	2
...	1	...

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.3 Physical Addressing (DCB Mode)

The bus topology in the example for the PHYSICAL ADDRESSING is identical with Figure 3-2.

3.3.1 Function

The controller board starts automatically in the startup of the PLC. To ensure that the INTERBUS-S system is ready for operation when the cyclic program is started, the INTERBUS-S standard block INIT_IB must be called in the startup organization blocks of the PLC.

When the PHYSICAL ADDRESSING is used, the addresses of the INTERBUS-S I/O modules result from the physical structure of the system.

When the addresses are assigned for the INTERBUS-S I/O modules, the digital inputs, the digital outputs, the analog inputs, and the analog outputs have to be considered separately.

The digital inputs and outputs occupy the first window and the analog I/O the second window in the PLC's address area.

In the ID code list, the parameter WINDOW specifies in which window the respective module appears.

In the PLC address area, the module addresses are put into the window starting at the base address. The size of the address area which every module occupies depends on the module.

If one or several stations are removed from the bus configuration when the bus is stopped, the controller board does not recognize this modification when the physical addressing is used. Depending on the application, this may cause dangerous situations in the process run.

3.3.2 Addressing

Addressing digital inputs:
The first word of the first I/O module with digital inputs in the INTERBUS-S system is assigned the base address (even word address) set in the controller board of the first window. The next I/O module with digital inputs on the bus is given the next available address (even word or byte address; observe address orientation), etc.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Addressing digital outputs:
The same is true for the digital outputs. The first word of the first I/O module with digital outputs in the INTERBUS-S system is assigned the base address set in the controller board (even word address) of the first window. The next I/O module with digital outputs which occurs on the bus is given the next available address (even word or byte address; observe address orientation), etc.

Addressing analog inputs:
The first word of the first I/O module with analog inputs in INTERBUS-S system is assigned the base address set on the controller board (even word address) of the second window. The next I/O module with analog inputs on the bus is given the available free address (even word address), etc.

Addressing analog outputs:
The first word of the first I/O module with analog outputs in the INTERBUS-S system is assigned the base address set on the controller board of the second window. The next I/O module with analog outputs on the bus is given the next available address (even word address) etc.

Some modules have input and output addresses.

The IBS AI analog input module, for instance, occupies
- four words in the input field (one word for each analog input channel)
- four words in the output field (one word per channel for the gain).

Possible addresses would be, e.g. input: PW 132
output PW 140

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.3.3 Address Orientation

Word-oriented addressing
Assign an even byte address to modules whose the address areas contain complete words.

Table 3-6: Example for word-oriented addressing

Module number	Address area	E.g. address
n	Input: 1 word	IB 30
n+1	Input: 1 word	IB 32
n+3	Output: 4 words	OB 30
n+4	Input: 1 word	IB 34
n+5	Output: 1 word	OB 38

Byte-oriented addressing
Modules the address area of which contain an odd number of bytes are assigned an **even byte address,** if:

- the previous module is a word-oriented module,
- the previous module is located in another I/O area,
  e.g. the module is an input module, the previous module is an output module.

Table 3-7: Example for byte-oriented addressing with even byte addresses

Module number	Address area	E.g. address
n	Input: 1 word	IB 30
n+1	**Input: 1 byte**	**IB 32**
n+3	Output: 1 byte	OB 30
n+4	**Input: 1 byte**	**IB 34**
n+5	Output: 1 byte	OB 32
n+6	**Input: 1 byte**	**IB 36**

Modules the address area of which contains an odd number of bytes are assigned an **odd byte address** if:

- the previous module is a byte-oriented module with the same area and has an even base address (filling up the words).

Table 3-8: Example for byte-oriented addressing with odd byte addresses

Module number	Address area	E.g. address
n	Input: 1 word	IB 30
n+1	Input: 1 byte	IB 32
n+2	**Input: 1 byte**	**IB 33**
n+4	Input: 1 byte	IB 34
n+5	Output: 1 byte	OB 32
n+6	**Output: 1 byte**	**OB 33**

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

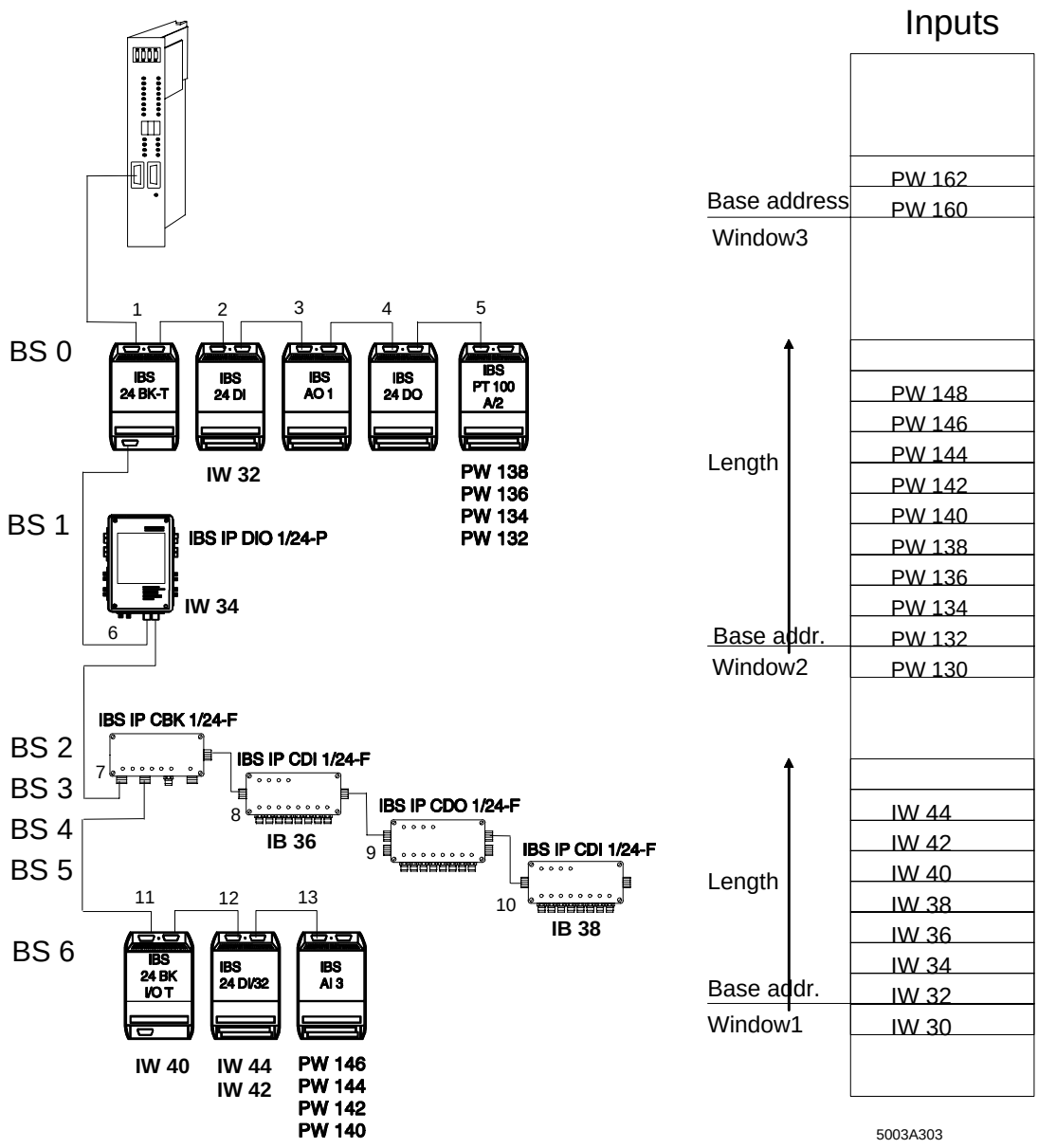


Figure 3-3: Physical addressing of the inputs (DCB mode)

PW130: Diagnostic parameter register
IW 30: Diagnostic bit register

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

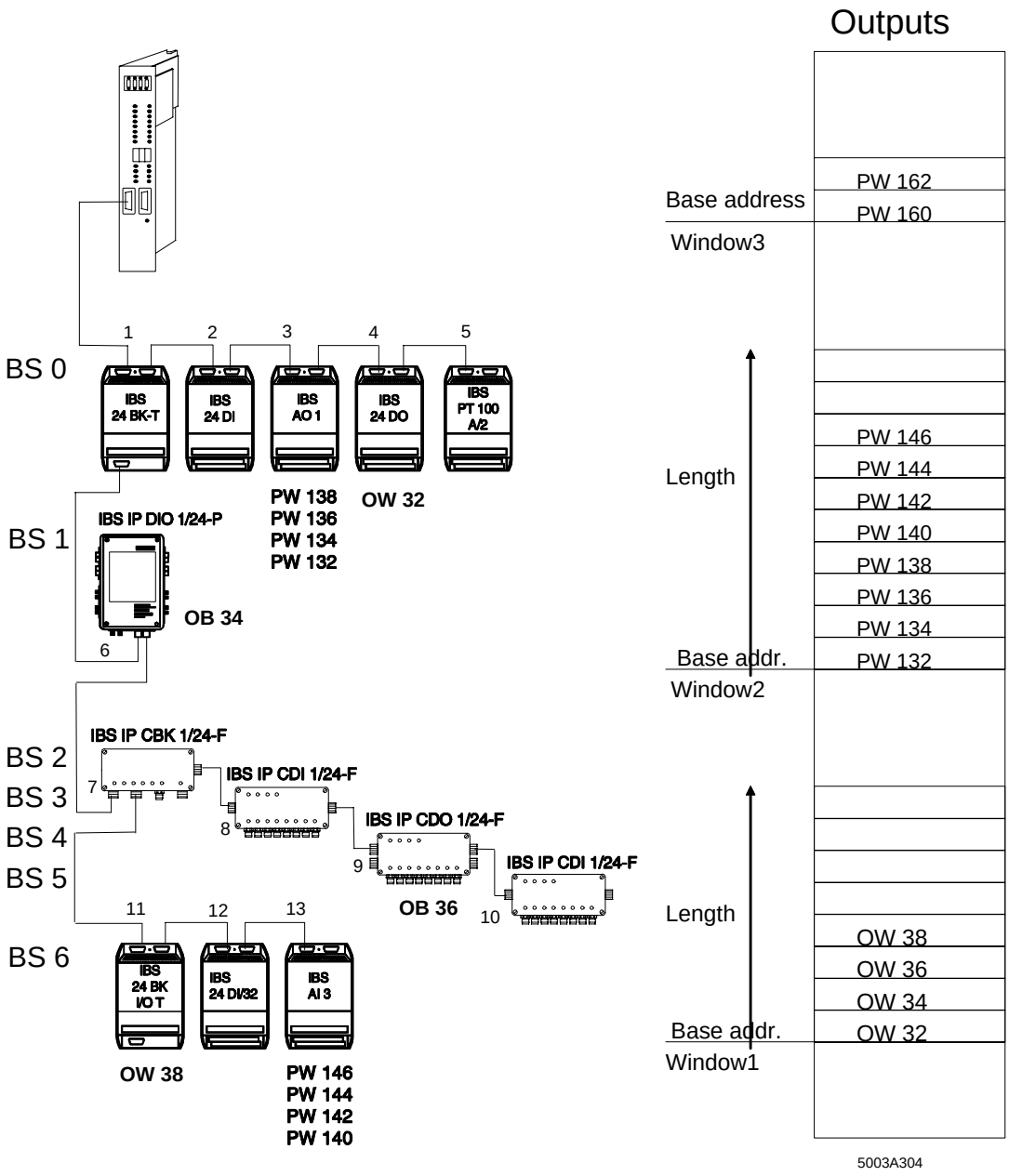


Figure 3-4: Physical addressing of the outputs (DCB mode)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.4 Logical Addressing (DCB Mode)

The bus topology in this example for the LOGICAL ADDRESSING is identical with Figure 3-2.

3.4.1 Function

In contrast to the PHYSICAL ADDRESSING, the addresses for the INTERBUS-S modules are assigned independently of the two windows when LOGICAL ADDRESSING is used.

The addresses of the individual I/O modules can be freely selected when logical addressing is used. The address area in the PLC for the modules must not be used by other devices.

The free selection of the addresses facilitates the insertion and removal of modules, as the modules keep their addresses and the addresses are not shifted.

Address list link the physical and the logical address configurations. The address lists are stored as data blocks in the PLC or as an address list in the EEPROM memory card. When the PLC or the controller board are started, the address lists address the I/O modules in the PLC's I/O area. With the help of a programmer (under MS DOS) you may enter constants for the address lists in the data blocks or the EEPROM card.

When the LOGICAL ADDRESSING is used, the addresses of the modules are not determined by the bus topology, but the user can freely assign them for every module. The link of the digital modules to window 1 and the analog modules to window 2 is removed for the LOGICAL ADDRESSING. All addresses which have been entered in the following lists should be regarded as examples and can certainly be assigned in a different order.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.4.2 Structure of an INTERBUS-S Address List

The address lists which determine the assignments of the logical addresses for the INTERBUS-S modules are stored in the data blocks of the PLC or, via the PC, in the EEPROM memory card. The address lists are established according to a typical pattern which is also used for other INTERBUS-S definition lists. The entries of an address list are called parameters.

- The first parameter of a definition list is the parameter COUNTER. It indicates how many parameters follow. In most address this value equals the number of modules which are connected to the INTERBUS-S system.

- All parameters of a definition list have to be entered one after another. The must be no gaps within one list.

- The position of a parameter in a definition list corresponds to the location number of the module in the INTERBUS-S system to which the entry of this parameters has been assigned. That means that the first parameter of the first list after the COUNTER parameter refers to the first module in the system. The second parameter after the COUNTER parameter refers to the second parameter, etc.

Data words used	Data block structure		Location number on INTERBUS
	DB n		
DW m	m:	KY = 0,a	**-**
DW m+1	m+1:	KY = **x**,**y**	1
DW m+2	m+2:	KY = **x**,**y**	2
DW m+3	m+3:	KY = **x**,**y**	3
.	.	.	.
.	.	.	.
.	.	.	.
DW m+a-1	m+a-1:	KY = **x**,**y**	a-1
DW m+a	m+a:	KY = **x**,**y**	a

Abbreviations:
a: Quantity of modules in the INTERBUS-S system
n: Number of the data block used
m: Number of the first data word used

x: Details of the address area
P area = 0
Q area = 1
y: Start address for the module which is located at this position in the INTERBUS-S system

Figure 3-5: Structure of the parameter lists for the addressing

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.4.3 Addressing

The bus topology in this example for the LOGICAL ADDRESSING is identical with Figure 3-2. The following example shows two data blocks which have been completely filled in. The addresses which have been used in these data blocks lead to the address distribution shown in the two figures. The settings of the DIP switches from the example for the physical addressing were kept.

The assignment of the addresses is independent of the set INTERBUS-S windows 1 and 2. All modules which are connected to the bus and the registers (diagnostic and bit-controlled command registers) which INTERBUS-S makes available can be addressed in the entire I/O area of the PLC. The addresses which have been addressed in such a way must not be used by SIMATIC I/O modules.

For modules which occupy addresses in the input field as well as in the output field, it is now possible to use the same address for the respective input and output words.

Data words	Data block structure	InterBus-S modules	
		Location no.	Module type
	DB 12		
DW 0	0: KY = **0,13**		Module quantity
DW 1	1: KY = **0,0**	1	IBS 24 BK-T
DW 2	2: KY = **0,20**	2	IBS 24 DI
DW 3	3: KY = **0,0**	3	IBS AO 1
DW 4	4: KY = **0,0**	4	IBS 24 DO
DW 5	5: KY = **0,140**	5	IBS PT 100 A2
DW 6	6: KY = **0,28**	6	IBS IP DIO 1/24-P
DW 7	7: KY = **0,0**	7	IBS IP CBK1/24F
DW 8	8: KY = **0,30**	8	IBS IP CDI1/24F
DW 9	9: KY = **0,0**	9	IBS IP CDO1/24F
DW 10	10: KY = **0,31**	10	IBS IP CDI1/24F
DW 11	11: KY = **0,46**	15	IBS 24 BK I/O-T
DW 12	12: KY = **0,38**	16	IBS 24 DI/32
DW 13	13: KY = **0,164**	13	IBS AI 3
DW 14	14 KY = **0,126**	14	Diagnostic bit register
DW 15	15 KY = **0,128**	15	Diagnostic parameter register

Figure 3-6: Data block with input addresses

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

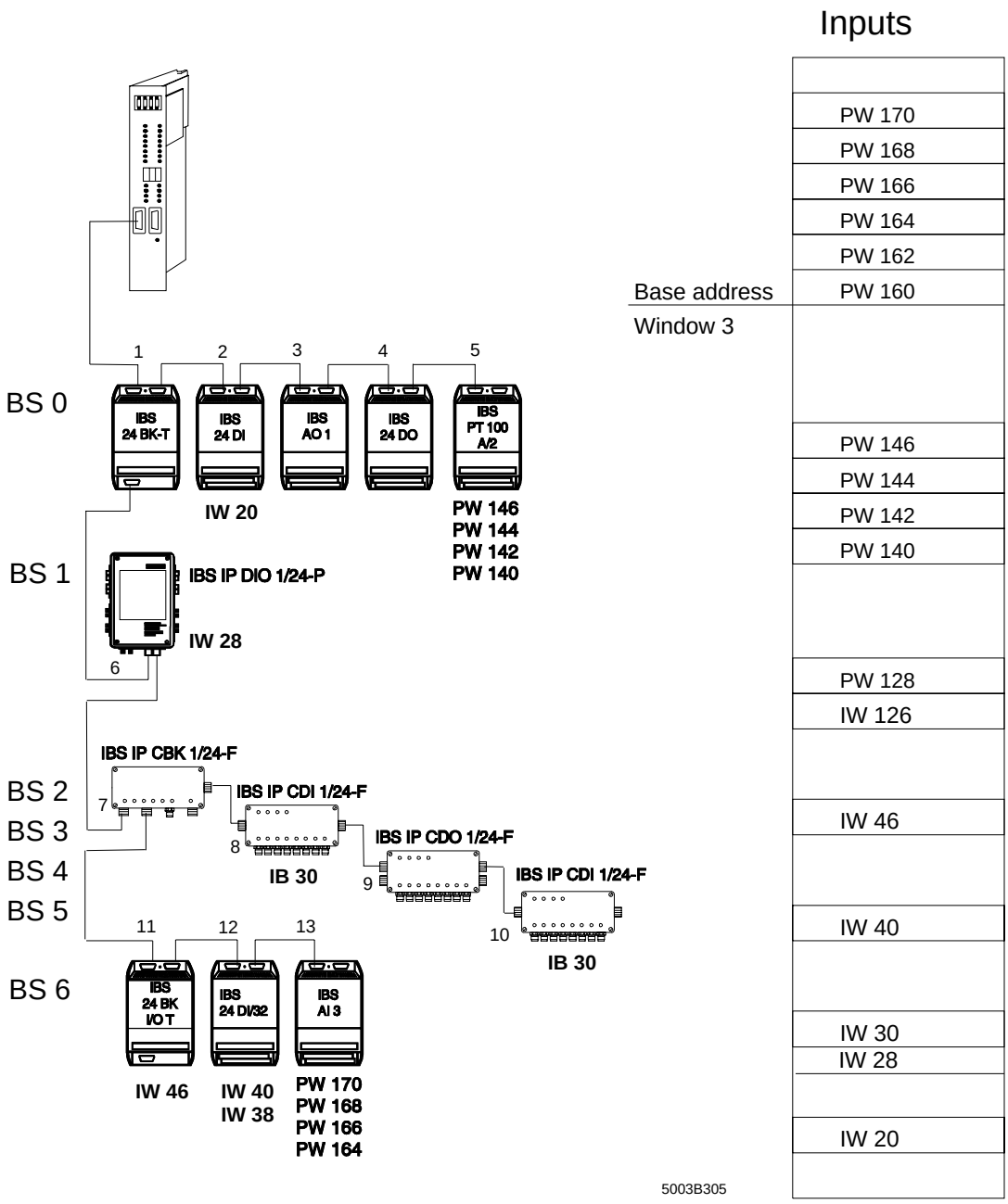


Figure 3-7: Logical addressing of the inputs (DCB mode)

IW 126: Diagnostic bit register
PW 128: Diagnostic parameter register

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

For one module all input and output addresses always belong together, as only the start address of the address area is given which has been assigned to the module. When the addresses are assigned logically, modules which have only a byte address area can be assigned odd byte addresses. There are no restrictions with regard to the filling up of peripheral words for modules which are addressed byte by byte. However, modules which have to be addressed word by word must only be assigned even byte addresses.

Data words	Data block structure	INTERBUS-S modules	
		Location no.	Module type
	DB 13 **15**		
DW 0	0: KY = **0,13**		Module quantity
DW 1	1: KY = **0,0**	1	IBS 24 BK-T
DW 2	2: KY = **0,0**	2	IBS 24 DI
DW 3	3: KY = **0,132**	3	IBS AO 1
DW 4	4: KY = **0,32**	4	IBS 24 DO
DW 5	5: KY = **0,0**	5	IBS PT 100 A2
DW 6	6: KY = **0,28**	6	IBS IP DIO 1/24-P
DW 7	7: KY = **0,0**	7	IBS IP CBK1/24F
DW 8	8: KY = **0,0**	8	IBS IP CDI1/24F
DW 9	9: KY = **0,29**	9	IBS IP CDO1/24F
DW 10	10: KY = **0,0**	10	IBS IP CDI1/24F
DW 11	11: KY = **0,46**	15	IBS 24 BK I/O-T
DW 12	12: KY = **0,0**	16	IBS 24 DI/32
DW 13	13: KY = **0,164**	13	IBS AI 3
DW 14	14: KY = **0,000**	14	Diagnostic bit register
DW 15	15: KY = **0,000**	15	Diagnostic parameter register

Figure 3-8: Data block with output addresses

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

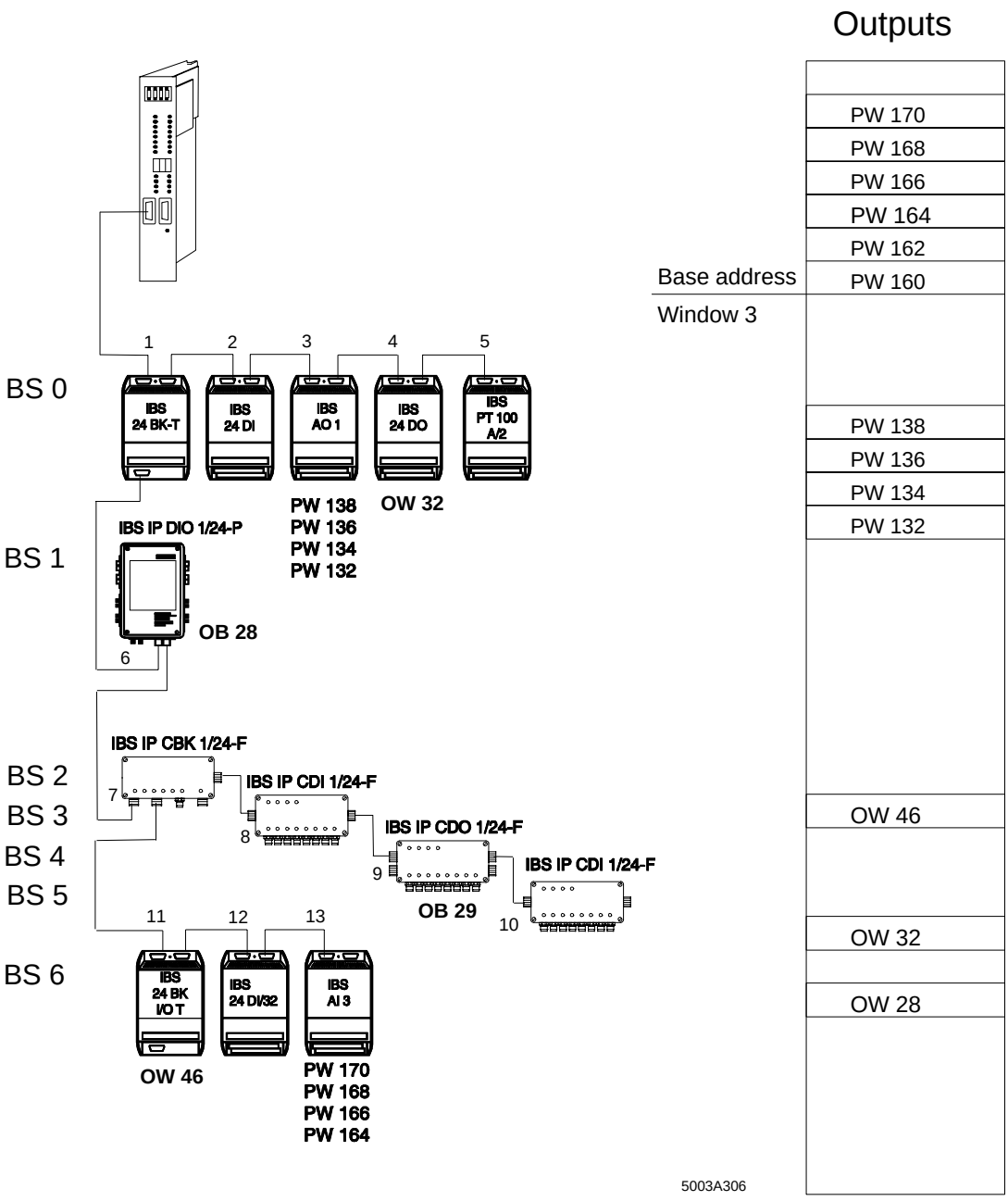


Figure 3-9: Logical addressing of the outputs (DCB mode)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.5 Access to INTERBUS-S Modules

The controller board cyclically reads the states of the INTERBUS-S module inputs and stores them in the **M**ULTI-**P**ORT **M**EMORY (MPM). At the same time it transfers the data which is determined for the module outputs from the MPM to the modules. The INTERBUS-S cycle runs continuously and independent of the PLC cycle.

The controller board puts the addresses of the INTERBUS-S modules and registers in the PLC's I/O address area, so that the PLC handles these addresses like system-internal I/O boards.

If an address is located in the address area PB 0 to PB 127, the PLC includes this portion in its process image. For modules which are addressed in this area, the familiar bit commands ("AI", "OI", "= O" etc.), byte command ("L IB", "T OB" etc.) and also word and double word commands ("L IW", "T OW", etc.) can be used. Addresses which are located outside of this area will not be included in the process image. In this area the module data is accessed with commands like "L PW", "L QW", "T PW", "T QW" etc.

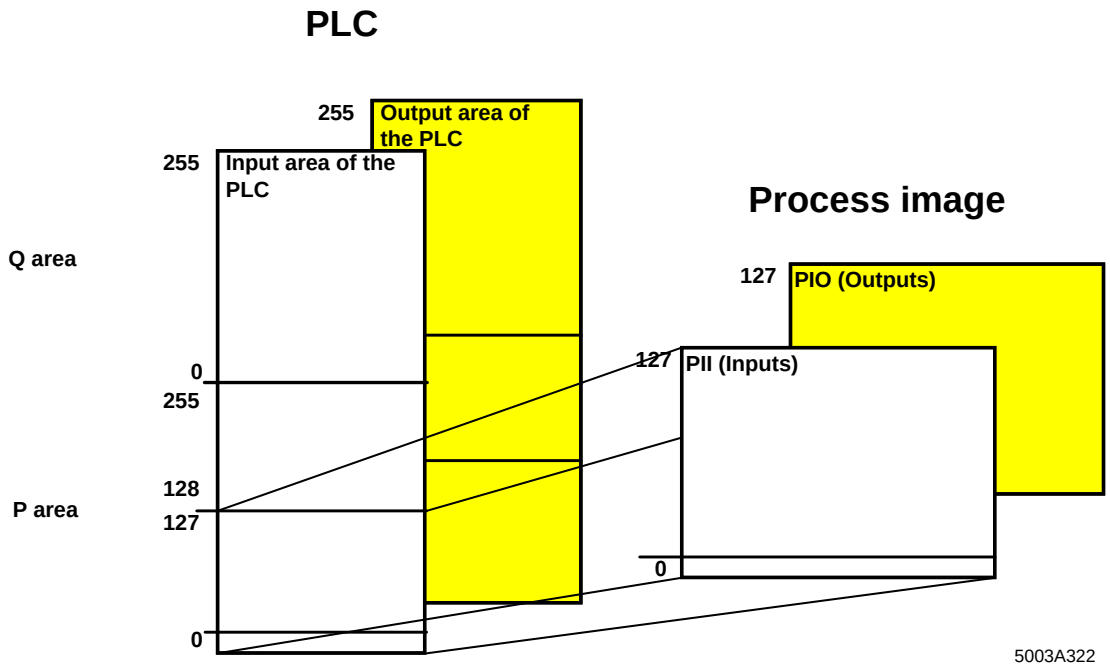


Figure 3-10: PLC I/O area

The following pages provide a description of the INTERBUS-S modules in various groups. A schematic diagram shows the relevant module terminals and the address location of the associated bits in the PLC.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.5.1 Digital Modules with 16 Inputs

Modules: IBS 24 DI
IBS 230 DI
IBS 120 DI

Access: The up to date data of the modules is made available in the MPM of the controller board. Data is linked with the familiar commands ("AI", "OI" etc.).

Addressing: When LOGICAL ADDRESSING is used, enter an even base address n for every module. Address the digital modules so that their addresses are located in the process image (PB 0 to PB 127). The following figure shows schematically the module terminals and the address location of the associated bits in the PLC.

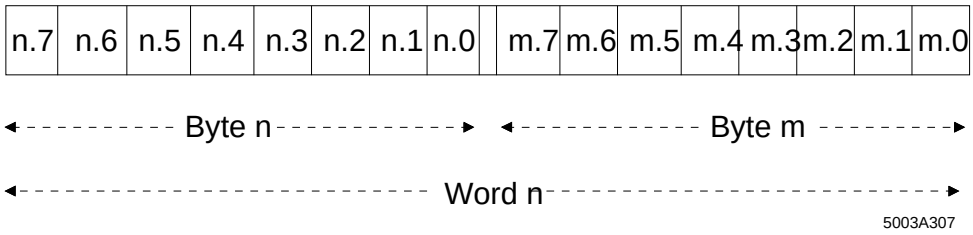


Figure 3-11: Address assignment for digital modules with 16 inputs

n = Even input address
m = n+1

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.5.2 LC Modules with 16 Digital Inputs

Modules: IBS 24 DI/LC

Access: The up to date data of the modules is made available in the MPM of the controller board. Data is linked with the familiar commands "AI", "OI" etc.

Addressing: When LOGICAL ADDRESSING is used, enter an even base address n for every module. Address the digital modules so that their addresses are located in the process image (PB 0 to PB 127). The following figure shows schematically the module terminals and the address location of the associated bits in the PLC.

n.7	n.6	n.5	n.4	n.3	n.2	n.1	n.0	**Byte n**	Word n
m.7	m.6	m.5	m.4	m.3	m.2	m.1	m.0	**Byte m**	

Figure 3-12: Address assignment for digital LC modules with 16 inputs

n = Even input address
m = n + 1

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.5.3 Digital Modules with 32 Inputs

Modules: IBS 24 DI/32

Access: The up to date data of the modules is made available in the MPM of the controller board. Data is linked with the familiar commands "AI", "OI" etc.

Addressing: When LOGICAL ADDRESSING is used, enter an even base address n for every module. Address the digital modules so that their addresses are located in the process image (PB 0 to PB 127). The following figure shows schematically the module terminals and the address location of the associated bits in the PLC.

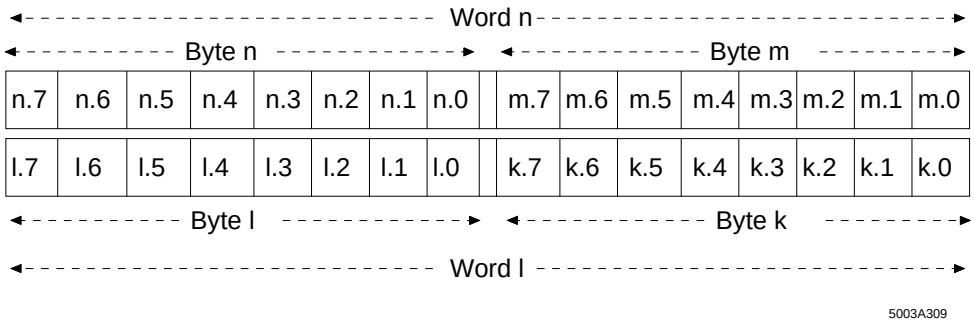


Figure 3-13: Address assignment for digital modules with 32 inputs

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.5.4 Digital Modules with 16 Outputs

Modules: IBS 24 DO
IBS 230 DO
IBS 120 DO

Access: The up to date data of the modules is made available in the MPM of the controller board. Data is linked with the familiar commands "=O", "S O" etc.

Addressing: When LOGICAL ADDRESSING is used, enter an even base address n for every module. Address the digital modules so that their addresses are located in the process image (PB 0 to PB 127). The following figure shows schematically the module terminals and the address location of the associated bits in the PLC.

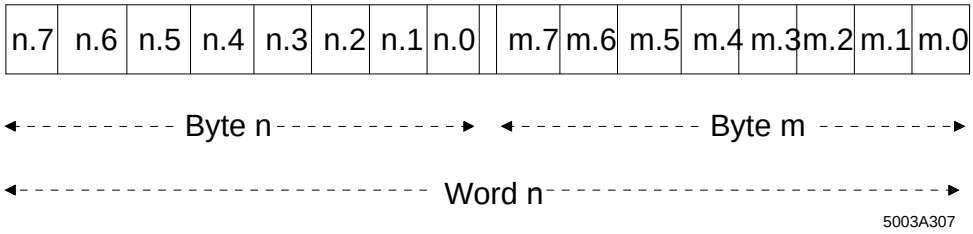


Figure 3-14: Address assignment for digital modules with 16 outputs

n = Even output address
m = n + 1

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.5.5 LC Modules with 16 Digital Outputs

Modules: IBS 24 DO/LC

Access: The up to date data of the modules is made available in the MPM of the controller board. Data is linked with the familiar commands "=O", "S O" etc.

Addressing: When LOGICAL ADDRESSING is used, enter an even base address n for every module. Address the digital modules so that their addresses are located in the process image (PB 0 to PB 127). The following figure shows schematically the module terminals and the address location of the associated bits in the PLC.

Word n	**Byte n**	n.7	n.6	n.5	n.4	n.3	n.2	n.1	n.0
	Byte m	m.7	m.6	m.5	m.4	m.3	m.2	m.1	m.0

Figure 3-15: Address assignment for digital LC modules with 16 outputs

n = Even output address
m = n + 1

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.5.6 Digital Modules with 32 Outputs

Modules: IBS 24 DO/32

Access: The up to date data of the modules is made available in the MPM of the controller board. Data is linked with the familiar commands "=O", "S O" etc.

Addressing: When LOGICAL ADDRESSING is used, enter an even base address n for every module. Address the digital modules so that their addresses are located in the process image (PB 0 to PB 127). The following figure shows schematically the module terminals and the address location of the associated bits in the PLC.

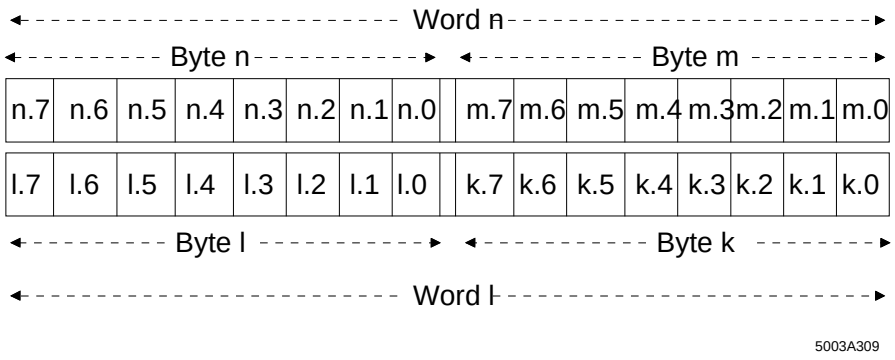


Figure 3-16: Address assignment for digital modules with 32 outputs

n = Even output address
m = n + 1
l = n + 2
k = n + 3

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.5.7 Digital Modules with 16 Inputs and 16 Outputs

Modules: IBS 24-BK-I/O-T

Access: The up to date data of the modules is made available in the MPM of the controller board. Data is linked with the familiar commands "AI", "S O" etc.

Addressing: When LOGICAL ADDRESSING is used, enter an input address n and the output address l for every module. Address the digital modules so that their addresses are located in the process image (PB 0 to PB 127).The following figure shows schematically the module terminals and the address location of the associated bits in the PLC.

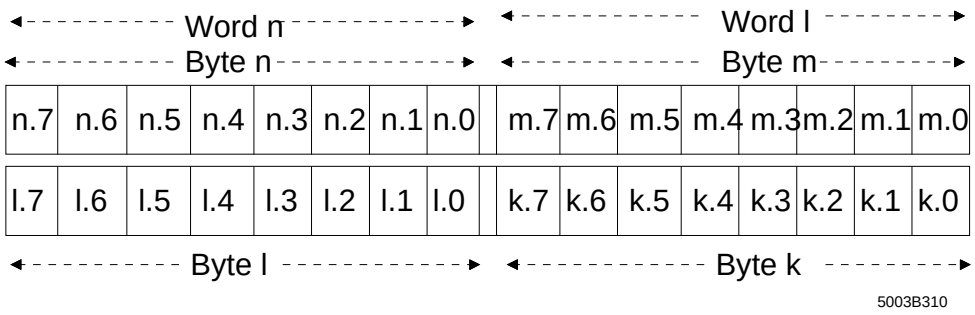


Figure 3-17: Address assignment for digital modules with 16 inputs and 16 outputs

n	=	Even input address
m	=	n + 1
l	=	Even output address
k	=	l + 1

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.5.8 Four-Channel Analog Input Modules with Programmable Gain

Modules: IBS AI
IBS AI 3

Access: The modules occupy four word addresses in the input area and four word addresses in the output area. If this is the case, data is accessed with the familiar commands ("L PW", "T PW", "L QW", "T QW", etc.).

Addressing: When LOGICAL ADDRESSING is used, enter the input address n and the output address m for every module. Address the analog modules so that their addresses are located outside the process image. Every analog channel has a 16-bit OUT register which is used to program the gain and a 16-bit IN register out of which the analog value can be read. The following figure shows schematically the address location of the analog channels and the associated gain and analog registers.

Channel	0	1	2	3
Gain register	n	n+2	n+4	n+6
Analog value reg.	m	m+2	m+4	m+6

Figure 3-18: Address assignment of the analog channels

n = Even output address
m = Even input address

The gain registers allow to set a gain of 1, 10 or 100 for every analog channel. The bits in the gain registers have the following meanings:

	Bit 15	**Bit 14**	**Bit 13 ... Bit 0**
Gain			
1	0	0	Any
10	0	1	
100	1	0	
Invalid	1	1	

Figure 3-19: Meaning of the bits in an 16-bit gain register

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

If the gain register of channel 0 has the address 140, the gain is programmed with the following commands.

```
Gain 1:      L  KH 0000
             T  PW 140
Gain 10:     L  KH 4000
             T  PW 140
Gain 100:    L  KH 8000
             T  PW 140
```

When a channel is to be used as current input it has to be programmed with a gain of 10.

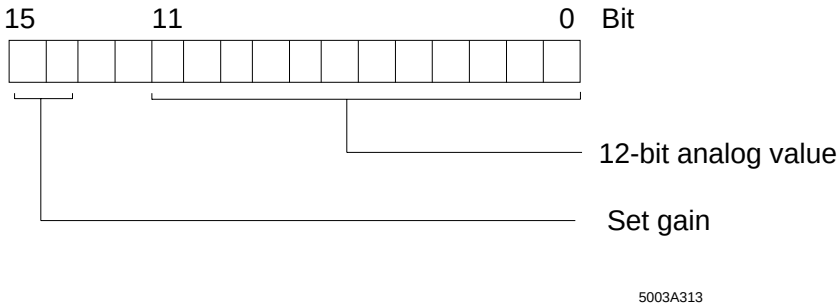


Figure 3-20: Structure of a 16-bit analog register

onlinecomponents

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

If the analog register has, for example, the address 132, the value is read in the accumulator of the PLC using the command "L PW 132".

Depending on the module type, the 12-bit analog value is encoded in binary code or two's complement.

Binary	
11------------------ 0	**Bit**
1 1 1 1 1 1 1 1 1 1 1 1	**Positive end value**
1 1 1 1 1 1 1 1 1 1 1 0	**Last but one positive end value**
.....	
0 0 0 0 0 0 0 0 0 0 0 1	
0 0 0 0 0 0 0 0 0 0 0 0	**Null**

Figure 3-21: The 12-bit analog value in binary code

Two's complement	
11 ----------------- 0	**Bit**
0 1 1 1 1 1 1 1 1 1 1 1	**Positive end value**
0 1 1 1 1 1 1 1 1 1 1 0	**Last but one positive end value**
.....	
0 0 0 0 0 0 0 0 0 0 0 1	**First positive value**
0 0 0 0 0 0 0 0 0 0 0 0	**Null**
1 1 1 1 1 1 1 1 1 1 1 1	**First negative value**
.....	
1 0 0 0 0 0 0 0 0 0 0 1	**Last but one negative end value**
1 0 0 0 0 0 0 0 0 0 0 0	**Negative end value**

Figure 3-22: The 12-bit analog value as two's complement

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.5.9 Four-Channel Analog-Output Modules

Modules: IBS AO1
IBS AO2
IBS AO3

Access: The modules occupy four word addresses in the output area. Data is accessed with the familiar commands ("L PW", "T PW", "L QW", "T QW" etc.).

Addressing: The four-channel analog output modules occupy only output addresses. Address the analog modules so that their addresses are located outside the process image. Every analog channel has a 16-bit OUT register in which the analog value is written. The following figure shows schematically the address location of the analog channels at the terminal strip.

Channel	0	1	2	3
OUT register	n	n+2	n+4	n+6

Figure 3-23: Address assignment of the analog channels

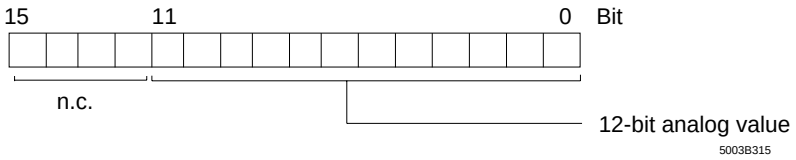


Figure 3-24: Structure of a 16-bit OUT register

If the analog register, for example, has the address 132, the value is written from the accumulator of the PLC to the module using the command "T PW 132".

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Depending on the type of module, the 12-bit analog value is encoded in binary code or two's complement.

Binary	
11------------------ 0	**Bit**
1 1 1 1 1 1 1 1 1 1 1 1	**Positive end value**
1 1 1 1 1 1 1 1 1 1 1 0	
.....	
0 0 0 0 0 0 0 0 0 0 0 1	
0 0 0 0 0 0 0 0 0 0 0 0	**Null**

Figure 3-25: The 12-bit analog value in binary code

Two' s complement	
11 ------------------ 0	**Bit**
0 1 1 1 1 1 1 1 1 1 1 1	**Positive end value**
0 1 1 1 1 1 1 1 1 1 1 0	
.....	
0 0 0 0 0 0 0 0 0 0 0 0	**Null**
1 1 1 1 1 1 1 1 1 1 1 1	
.....	
1 0 0 0 0 0 0 0 0 0 0 1	
1 0 0 0 0 0 0 0 0 0 0 0	**Negative end value**

Figure 3-26: The 12-bit analog value as two's complement

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.5.10 Relay Modules

Modules: IBS 24 RELS

Access: The up to date data of the modules is made available in the MPM of the controller board. Data is linked with the familiar commands "=O", "S O" etc.

Addressing: When LOGICAL ADDRESSING is used, enter an even base address n for every module. Address the digital modules so that their addresses are located in the process image (PB 0 to PB 127).The following figure shows schematically the module terminals and the address location of the associated bits in the PLC. There are eight relays on the module, up to eight further relays can be connected with an expansion unit. The module always occupies two bytes, regardless of whether the expansion unit is connected or not.

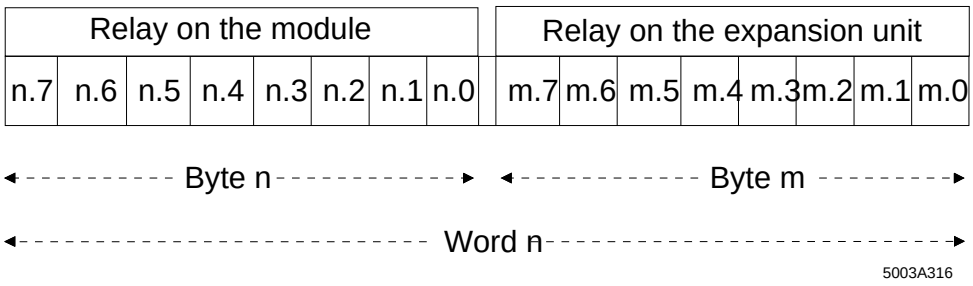


Figure 3-27: Address assignment for relay modules

n = Even output address
m = n + 1

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.5.11 Communication Interface Boards

Boards: IBS S5/SL
IBS S5/SL/I
IBS BA/SL
IBS BA/SL/I

Access: The controller board in the master PLC treats a communication interface board in a slave PLC like an I/O bus terminal module with 8- or 16-byte output and input addresses. The master PLC writes IBS output data into registers on the communication interface board and is able to read IBS input data from the registers of the communication interface board.

Addressing: Set the address of the communication interface board (slave PLC) with the DIP switches on the interface board. The size of the address area (8 or 16 bytes) is set with a jumper. Please refer to the user manual for your communication interface board to get more detailed information.

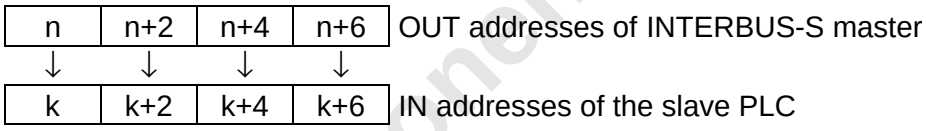


Figure 3-28: Communication path from the master PLC (with DAB or DCB board) to the slave PLC (with communication interface board)

n: INTERBUS-S output address (must be specified for LOGICAL ADDRESSING)
k: Input address of the slave PLC (is set with the DIP switches on the interface board)

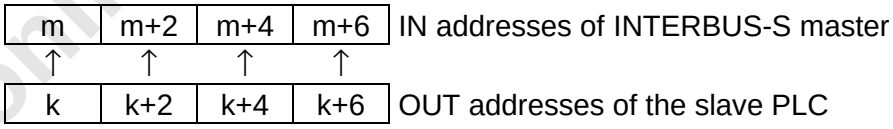


Figure 3-29: Communication path from the slave PLC (with communication interface board) to the master PLC (with DAB or DCB board)

k: Output address of the slave PLC (is set with DIP switches on the interface board).
m: INTERBUS-S input address (must be specified for LOGICAL ADDRESSING)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

3.5.12 Modules for Thermocouples

Modules: IBS PT100A/2
IBS PT100A/4

Access: The modules occupy four word addresses in the input area. Address the analog modules so that the addresses are outside the process image. Data from these modules can be accessed with the familiar commands ("L PW", "T PW", "L QW", "T QW", etc.). Every channel has a 16-bit IN register, out of which the pending analog value can be read.

Addressing: When LOGICAL ADDRESSING is used enter an input address n for every module. The following figure shows the address assignment of the analog channels at the terminal strip.

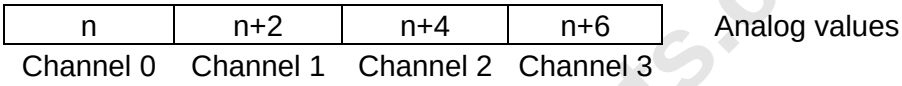


Figure 3-30: Address assignment for digital modules with 16 inputs

n: Even input address

Code table

The IBS PT100A module converts the measured temperatures into a 12-bit binary code. The following table shows the allocation of some temperatures to the corresponding data words. This table is for modules with a measuring range of 0...600 °C. With other measuring ranges, there will be a different allocation between the codes which are output by the module and the measures temperatures.

Table 3-9: Temperature allocation for a measuring range of 0...600°C

Temperature	Scale	Binary code MSB LSB	Hex. code MSB LSB
+599.8535°C	FS-1LSB	1111 1111 1111b	FFFh
+450.0000°C	3/4 FS	1100 0000 0000b	C00h
+300.0000°C	1/2 FS	1000 0000 0000b	800h
+150.0000°C	1/4 FS	0100 0000 0000b	400h
+ 0.1465°C	+1 LSB	0000 0000 0001b	001h
0.0000°C	ZERO	0000 0000 0000b	000h

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Moreover, the IN data words provide the controller board with coded information on the measuring range of the respective module. Only the decoding of this measuring range information allows to select an appropriate algorithm for converting the 12-bit data words into temperature values.

The measuring range information is transferred in bits 12...14 of the IN data words. It is the same for all channels of an IBS PT100A module.

The open circuit detection sets bit 15 (MSB), when the connection to the measuring resistor (shunt) is interrupted or no sensor is connected to the measuring channel. In this case, the measured and transmitted temperature value is to be ignored.

Bits 0...11 contain the digitized temperature value of the respective measuring channel.

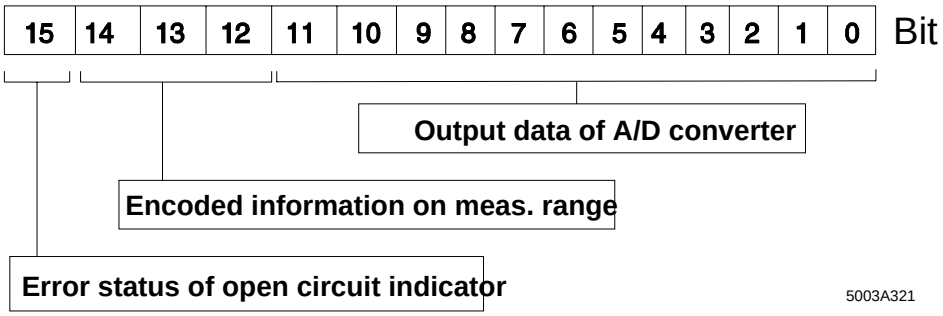


Figure 3-31: Allocation of the bits in the IN data word

onlineco...

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Determination of the transmitted temperature value

First, the temperature value has to be determined from the data words which were transmitted by the IBS PT100A. This value is then available in the controller for a further processing.

Second, bit 15 of the IN data word is to be checked. If it is set, the open circuit indicator of the respective measuring channel responded and the transferred measuring value does not need to be processed any further.

Afterwards, the measuring range to which the transferred measuring value refers is to be determined from bits 12...14. At present, modules are available with a measuring range from 0...600°C:

Table 3-10: Measuring range and encodings

	Bit 14	Bit 13	Bit 12
Measur. range [°C]			
0...600	0	0	0

Lastly, the measuring value which was transmitted in bits 0...11 is used for the calculation. It is output in the straight binary code, which means that there is no sign bit. Even when bit 11 is set, this does not mean that there is a negative measuring value!

The temperature is calculated according to the following formula:

$$\text{Temperature}\left[^{\circ}\text{C}\right] = MLL + \left[MV * \frac{MUL - MLL}{4096}\right]$$

with MLL = **M**easuring range **L**ower **L**imit (from bits 12...14)
MUL = **M**easuring range **U**pper **L**imit (from bits 12...14)
MV = **M**easuring **V**alue (from bits 00...11)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Chapter 4

Diagnostic Interfaces

This chapter provides information on

- the possibilities for hard- and software-supported diagnostics on the controller board
- the I/O status indications in the connected bus system
- the diagnostic functions on modules and bus terminal modules
- the use of the Hand Held Monitor and the monitor program for diagnostic support

4 Diagnostic Interfaces 4-1

4.1 Diagnostics on the Controller Board's Front Plate 4-2
4.1.1 Operating Indicators 4-4
4.1.2 Error Indication 4-5
4.1.3 Error Codes for Controller Errors (CTRL) 4-8

4.2 Notes on Error Diagnostics 4-11
4.2.1 Indication of Errors on the Front Plate 4-12
4.2.2 Example of a System Documentation 4-19

4.3 Diagnostic Registers 4-23
4.3.1 Diagnostic Bit Register 4-23
4.3.2 Diagnostic Parameter Register 4-23
4.3.3 Diagnostic Register Locations 4-24

4.4 I/O Status Indicators 4-26

4.5 Startup and Acknowledgment Displays 4-28
4.5.1 Host Controller Board Startup 4-28
4.5.2 Acknowledgment after an Error 4-29

4.6 Diagnostics on the Modules 4-30
4.6.1 Diagnostic Functions on I/O Modules 4-31
4.6.2 Diagnostic Functions on Bus Terminal Modules 4-32
4.6.3 Diagnostics on Third-Party Devices 4-32

4.7 Using the Hand Held Monitor 4-33

4.8 Using the Monitor Program for INTERBUS-S on the PC 4-34

4.9 CTRL Error Displays 4-35
4.9.1 List of Errors 4-36

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

4 Diagnostic Interfaces

This chapter describes the different diagnostic options of the IBS DCB controller board.

1. Diagnostics on the controller board’s front plate

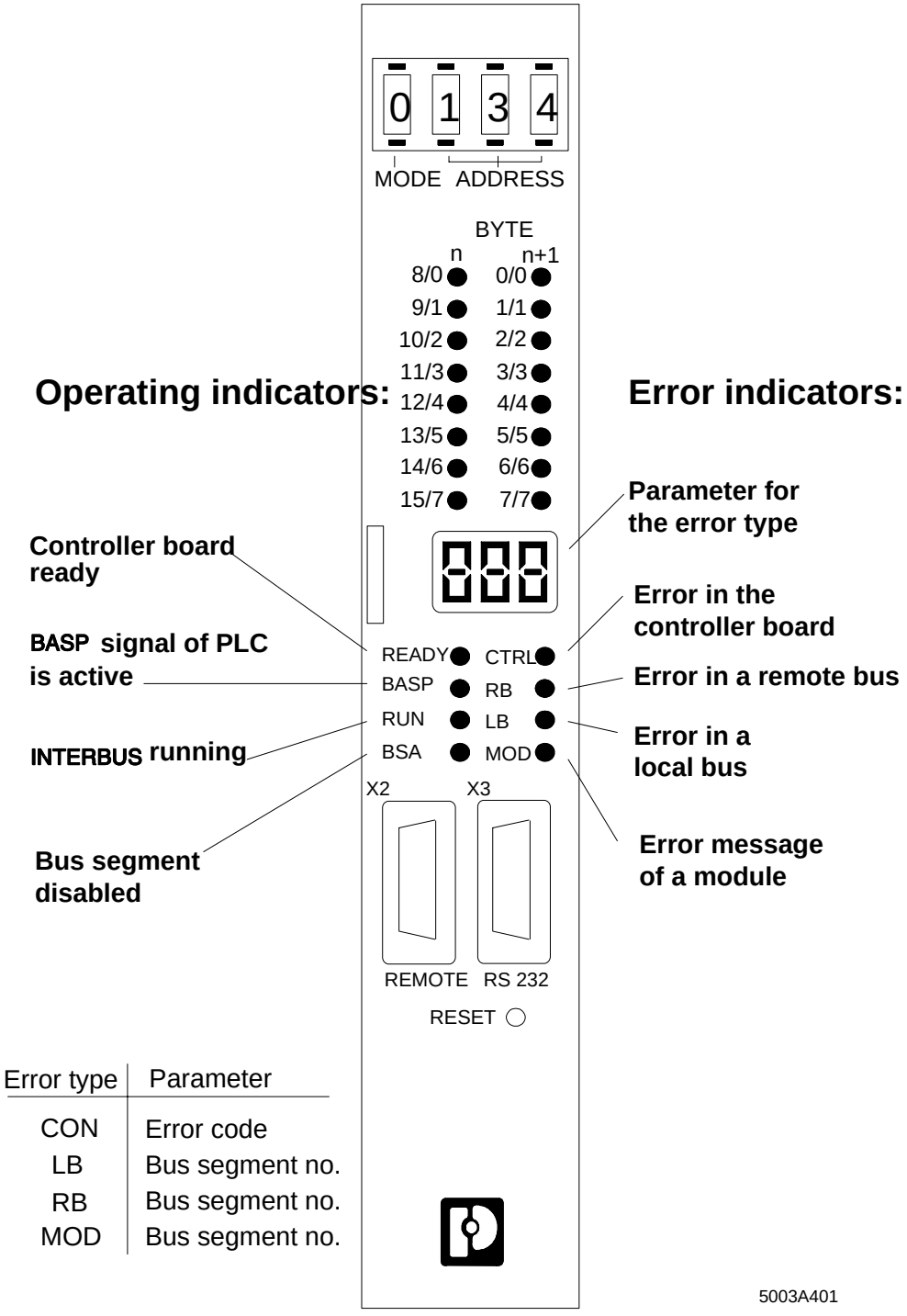
2. Software diagnostics
   Diagnostic bit register
   Diagnose parameter register

3. Diagnostics on the I/O modules

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

4.1 Diagnostics on the Controller Board's Front Plate



Error type	Parameter
CON	Error code
LB	Bus segment no.
RB	Bus segment no.
MOD	Bus segment no.

Figure 4-1: Diagnostics on the controller board's front plate

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Diagnostics on the controller board's front plate is subdivided into:

- Operating indicators and
- Error indicators.

The various LEDs indicate the operating status of the INTERBUS-S systems. The current status is shown in a coded form on a three-digit seven-segment display.

The display shows the following characters and parameters:

-| |-	STOP of the controller board
- -	Run state of the controller board
Ad	Invalid address setting
XXX	A parameter is output in case of an error

Software diagnostics:
The diagnostic registers contain an image of the operating and error indicators (LEDs) as well as the error parameters (display) on the front plate.

Further information can be recalled by means of the SYSERROR (FB 73) and ERRINFO (FB 74) functions blocks during the PLC cycle or with a PC which is connected to the V.24 (RS-232) interface.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

4.1.1 Operating Indicators

Four LEDs indicate the operating state of INTERBUS-S and the PLC. The LEDs are designated READY, BASP, RUN and BSA. Further information is indicated on the display.

READY
The controller board has completed the self-test without errors occurring and is ready for operation.

BASP
The PLC has activated the BASP signal (**B**efehls **A**usgabe **SP**erren = disable command output) and is in the STOP state. In this operating state, INTERBUS-S resets all outputs.

This signal is activated by the PLC. All outputs of the INTERBUS-S system are reset.

RUN
When INTERBUS-S is active, the RUN LED lights up.

BSA
The BSA signal (**B**us **S**egment **Ab**geschaltet = bus segment disabled) indicates that one or several bus segments is/are disabled. The remaining bus configuration is running properly.

The I/O data of disabled local buses does not correspond to the up to date signal states. There must be no access to the bus addresses concerned.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

4.1.2 Error Indication

Four red LEDs indicate INTERBUS-S and PLC malfunctions. The LEDs are designated CTRL, LB ERROR, RB ERROR and MOD ERROR. Further information is indicated on the display.

LB ERR
A defective local bus (**L**ocal **B**us Error) has been diagnosed. The display and the diagnostic parameter register indicate the number of the defective local bus segment.

Remedies: Error in the indicated local bus
- check I/O stations
- too many or not enough stations on the local bus
- check the cabling

This error leads to the stopping of the bus. The I/O data does not correspond to the up to date status of the signal states. There must be no access to the bus addresses concerned.

RB ERR
A defective remote bus (**R**emote **B**us Error) or a defective installation remote bus module has been diagnosed. The seven-segment display and/or the diagnostic parameter register indicate the number of the defective remote bus segment or installation remote bus module.

Remedies: Error in the indicated remote bus segment
- check bus terminal module
- check the voltage supply
- check the remote bus cable coming from the controller board
- too many stations in the remote bus

The error leads to the stopping of the bus. The I/O data does not correspond to the up to date signal states. There must be no access to the bus addresses concerned.

The RB ERR LED indicates additional group error messages (messages: E1, E2, E4, E5, E6). The following table lists the possible error causes.

online-components.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

7-segment display on the front panel FW state 3.5	Meaning	Error cause	Remedy
E1	After the error has occurred, no error was detected when the configuration was acquired and compared.	Cabling error; shielding error	- Check remote and local bus cabling - Check voltage supply - Tool: IBS SYS SWT
E2	The maximum possible configuration has been exceeded.	The number of stations or the register locations is too large.	- Check the addressing lists and the configuration (Observe: max. 320 stations and max. 256 register words)
E4	The configuration could not be detected.	The station does not respond.	Check voltage supply for failures
E5	All groups have been switched off	Error in the application program	Check application program
E6	No error has been detected when the configuration was acquired and compared, but no data cycle is possible	Module error	- Tool: IBS SYS SWT - Please inform the technical support at Phoenix Contact.

Information about IBS SYS SWT: The IBS SYS SWT program package offers a comprehensive diagnostic environment. For the error detection it uses an additional diagnostic function on the controller board which monitors the system while the bus is running. A PC evaluates the data and displays them.

MOD ERR

The MOD ERR (**Mod**ule Error) occurs in the event of an error in an INTERBUS-S module. The display and/or the diagnostic parameter register indicate the number of the bus segment in which the reporting module is located. The error is indicated only for modules with a bus acknowledgment. The error does not lead to the stopping of the bus.

The I/O data of the reporting local bus module does not correspond to the up to data signal states. There must be no access to the bus addresses concerned.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Display of errors:
The different error types have different priorities. If several errors occur simultaneously, the error with the highest priority will be displayed. If several errors occur with the same priority, the error which occurred first will be displayed. Priority 1 is always the highest.

Table 4-1: Priorities of error types

Error type	Parameter	Priority
CTRL ERR	Error code (hex.)	1
RB ERR	Bus segment no. (dec.)	1
LB ERR	Bus segment no. (dec.)	1
MOD ERR	Bus segment no. (dec.)	2

CTRL ERR
The CTRL ERR (**C**on**tr**o**l**ler **Err**or) reports an error that is limited to the controller board or to its parameterization. The display and the diagnostic parameter register indicate the error number as a parameter (hex). The parameters will be further described in the following chapter.

The error can lead to the stopping of the bus. The I/O data does not correspond to the up to date signal states. There must be no access to the bus addresses concerned.

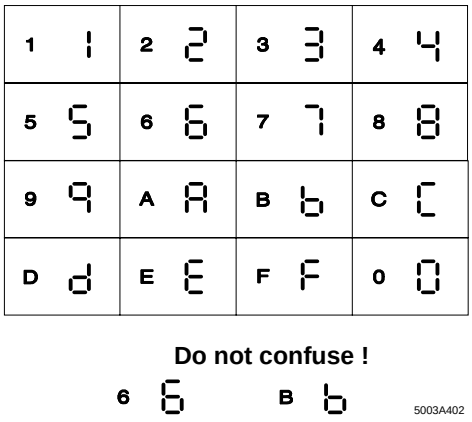


Figure 4-2: The seven-segment display

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

4.1.3 Error Codes for Controller Errors (CTRL)

Table 4-2: Error codes for controller errors

Code	Meaning	Error Location	Remedy
00	Firmware error	Controller board	Send in controller board
..	Not available		
05	Firmware error	Controller board	Send in controller board
06	Firmware error	Controller board	"
07	Undefined command	User program	Remove undefined command
08	Missing parameter	User program	Add parameter
09	Communication error	User program	Check window setting of window 3
0A	Undefined command	User program	Remove undefined command
0b	Firmware error	Controller board	Send in controller board
0C	Command acknowledgment not received in time	User program	Keep timeout
0d	Parameters are missing	User program	Complete parameters, keep timeout
..	Not available		
23	Bus error causes the triggering of the watchdog	Controller board	Check bus configuration
24	Interferences on the address bus or addressing error of the controller board	Controller board	Localize and remove interferences and/or addressing errors
25	Not available		
26	Hardware error	Controller board	Send in controller board
27	Hardware error	"	"
28	Hardware error	"	"
29	Hardware error	"	"
2A	Unknown IB module		Order new firmware, inquire at Phoenix Contact
2b	Address list error	User program	Check address lists
..	Not available		
3b	Cycle end due to external signal	Controller board	Check bus configuration for interferences
3C	FIFO overflow error	Controller board	Perform RESET
3d	Hardware error	Controller board	Perform RESET
3E	Firmware error	Controller board	Send in controller board
3F	Firmware error	"	Send in controller board
40	Firmware error	"	"
41	Firmware error	"	"
42	Firmware error	"	"
43	Firmware error	"	"
44	Firmware error	"	"
45	Firmware error	"	"
46	Invalid base address	Base add window 1	Change base address of window 1

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Table 4-2: Error codes for controller errors (cont'd)

Code	Meaning	Error location	Remedy
47	Invalid base address	Base addr. window 2	Correct base address of window 2
48	Invalid address length	Address length window 1	Correct address length of window 1
49	Invalid address length	Address length window 2	Correct address length of window 2
4A	Differences between ID list and existing bus configuration	ID list or bus	Compare the ID list and the existing bus configuration
4b	Too many parameters in the command	User program	Reduce parameter quantity
4C	Error in event list	User program	Check event list
4d	Hardware error	Controller board	Perform RESET
4E	Too many PLC commands sent within a short time	User program	Reduce number of sent PLC commands per time
4F	Not available		
50	Firmware error	Controller board	Send in controller board
51	Firmware error	"	"
55	Group definition error	User program	Check group definitions
56	Not available		
57	Firmware error	Controller board	Send in controller board
58	Firmware error	"	"
59	Undefined group no.	User program	Check definitions of group numbers
5A	Undefined BK alarm set	User program	Check local bus addresses and/or parameter quantity
5b	Invalid ID code or invalid I/O word length	User program	Check the RECEIVE-PHYSICAL-CONFIGURATION-MAP and CHECK-PHYSICAL-CONFIGURATION commands
..	Not available		
65	Too many communication modules	User error	Reduce number of communication modules
66	Invalid communication reference or invalid parameter quantity	User error	Check RECEIVE-COMMUNI-CATION-REFERENCE command
67	Not available		
68	Differences between ID list and existing bus configuration	ID list or bus	Compare ID list and existing bus configuration
69	Communication was not initialized	User program	Initialize communication
6A	Base address for window 3 is not set correctly	Controller board (DIP switch)	Check base address for window 3
6b	Hardware error	Controller board	Perform a RESET
6c	Checksum error EEPROM card	EEPROM card	Check/re-program EEPROM card

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

All errors described here are only valid when the CTRL LED is active. The error codes are described in further detail at the end of this chapter. The error codes E01 and E02 were previously described in the "RB ERR" section.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

4.2 Notes on Error Diagnostics

This chapter deals with typical error causes and sequences which simplify the error detection. Chapter 4.2.2 includes forms for system documentation which you can use for a diagnostic description of your system.

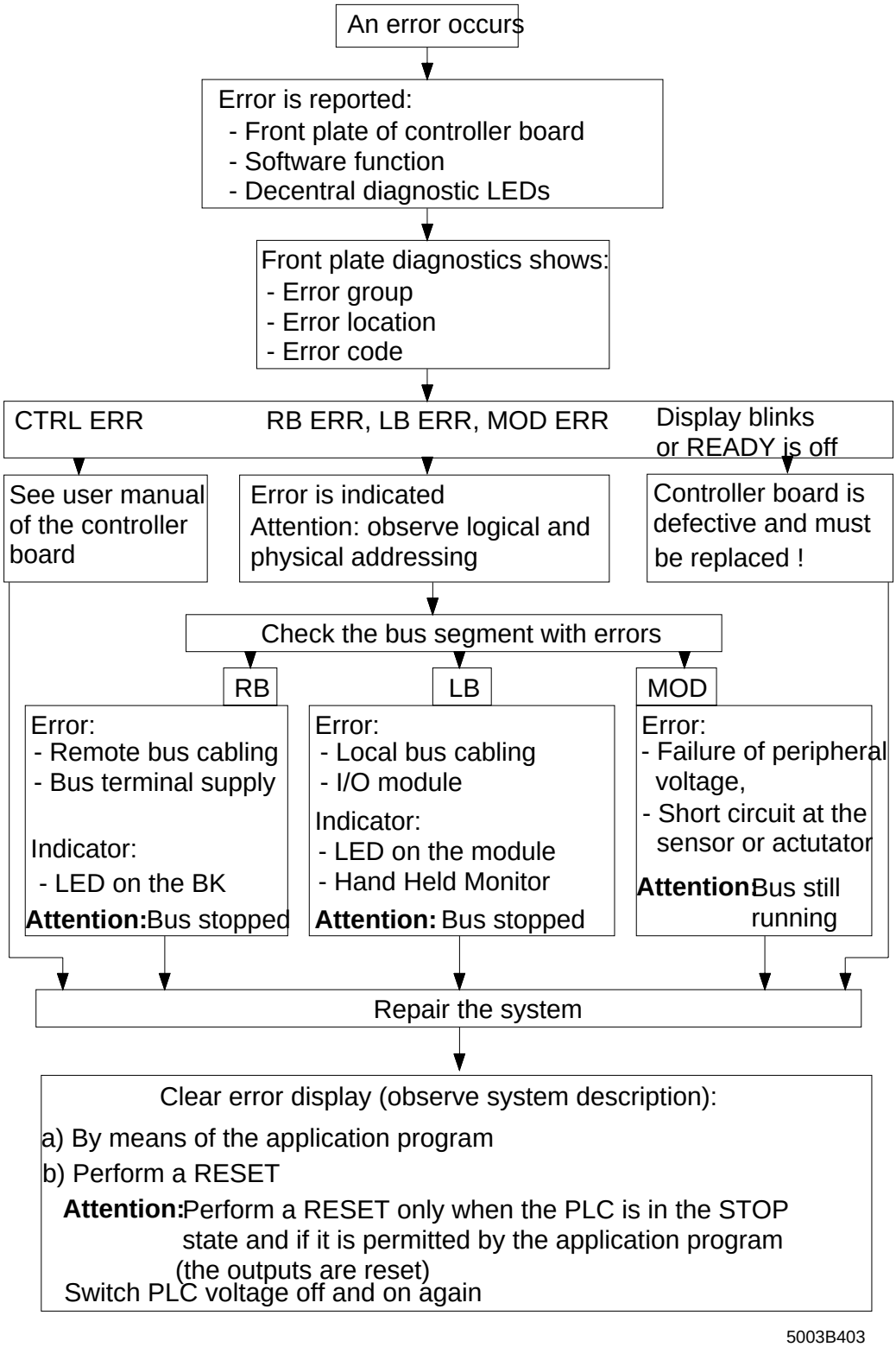


Figure 4-3: Sequence diagram for error diagnostics

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

4.2.1 Indication of Errors on the Front Plate

Different indicators of the front plate will be described in the following and what happens when they are on or off.

Figure 4-4 shows how the LEDs are represented in the following drawings of the front plate.

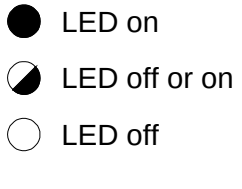
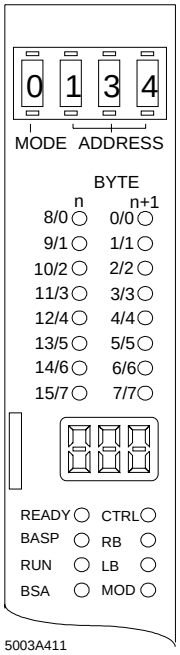


Figure 4-4: Representation of the LEDs in the drawings

Host controller board check

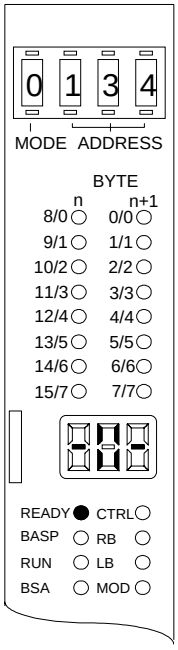


Display	Description	Outputs	Bus
Blinking numbers (decimal)	The READY LED is off. There is a hardware error on the host controller board. ⇒ Replace the board When you send the board in for repairs, please include a note with the number indicated by the display.	00	STOP

Figure 4-5: Host controller board check

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Display after the self-test



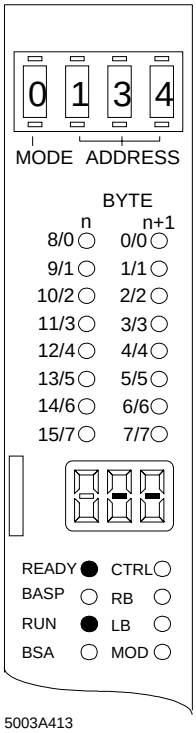
Display	Description	Outputs	Bus
-| |-	The controller board has completed the self-test without errors occurring and is now waiting. (Operating mode: controlled start) a) The board waits for a command from the PLC or the EEPROM card. ⇒ Check the software and/or the EEPROM card. b) The logical addressing detected an error in an address list. ⇒ The list number is specified in detail in the EREG byte of the addressing block	00	STOP

Figure 4-6: Display after the self-test

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Display with an active bus



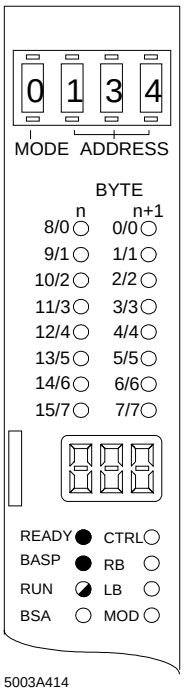
Display	Description	Outputs	Bus
	The INTERBUS-S system is in operation. • Input data can be processed • Outputs can be set	XX	RUN
- -	INTERBUS-S is active		
Ad	INTERBUS-S is active The setting of the code switches is incorrect: • Invalid address area (mode) • Odd address setting • The set address is not occupied by an IBS module, or the associated module is in a bus segment which has been switched off. ⇒ Check the setting of the ADDRESS and/or MODE decade switches. Modes 0 to 3 are permitted. **Attention:** Modes 4 to 9 must **not** be set.		

Figure 4-7: Active bus

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

STOP request of PLC



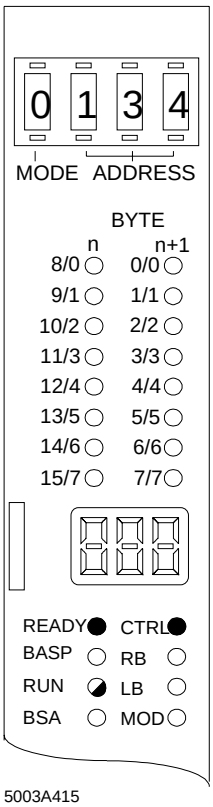
Display	Description	Outputs	Bus
X X	The programmable controller is in the STOP state • With the active BASP signal (= disable command output) all bus stations are instructed to set their output to 0. • All output modules are instructed to set their outputs to 0. • Data transmission on the bus continues. • The PLC cannot evaluate the inputs because it is not in the STOP state. ⇒ The cause of the STOP state lies in the application program.	00	Previous state

Figure 4-8: STOP request of the PLC

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Parameterization error



5003A415

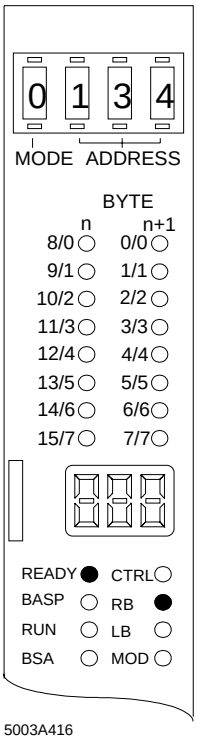
Display	Description	Outputs and bus
	CTRL indicates a parameterization error. The display gives an error number (hexadecimal), which is described further in Chapter 4-8.	Acc. to table
09 (hex.)	a) The board is in the controlled start mode and expects commands from the PLC (ISFP blocks) or the EEPROM card. • The ISFP blocks were not called. • The EEPROM card was not programmed. • The hardware setting of window 3 does not correspond with the parameterization (ISFP) of the INITIB block. b) The PLC has accessed the communication registers (window 3). • Double addressing of window 3 with other PLC modules • Access to window 3 via the application program • Base address of window 3 is in the process image of the PLC • A command was written without parameters.	
0C (hex.)	The controller board has transmitted a message (error message, acknowledgment to a command) and did not get it from the PLC within 5 seconds (ISFP block CON/IND). ⇒ Insert the CON/IND block in the application program or disable the message (with the DISABLE ALL MESSAGES command, see Chapter 9 "Commands and Messages", or the INITIB function block by means of AV=3).	
2b (hex.)	Addressing error during logical addressing ⇒ Check the LB-, IN- and OUT address list (With the EREG byte the addressing block indicates the erroneous list)	
68 (hex.)	The hardware configuration (modules in the bus architecture) does not agree with the ID code list. ⇒ Observe the EREG byte of the addressing block.	

Figure 4-9: Parameterization error

online-components.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Remote bus error



5003A416

Display	Description	Outputs	Bus
0-255 (Decimal)	INTERBUS-S operation was disturbed and the bus was stopped. All outputs were reset. The display indicates the number of the defective remote bus segment. ⇒ Check for the remote bus segment: • the voltage supply of the remote bus module • the cabling to the remote bus module (with the help of the LEDs on the BK)	00	STOP
E01	Remote bus error due to a short interruption of the bus. After the diagnostic procedure the bus is recognized as being ready for operation. Possible causes: • Missing or incorrect shielding of the data line • Voltage dips at the logic supply (U) of the remote bus modules		
E02	Remote bus error due to defective hardware or invalid hardware configuration ⇒ Check the definition list, the ID and length codes for the addressing Acknowledgement: a. Via the addressing blocks (addressing the system from the PLC) b. Via the EEPROM card with the start sequence for addressing c. Automatic start (power-up/reset)		

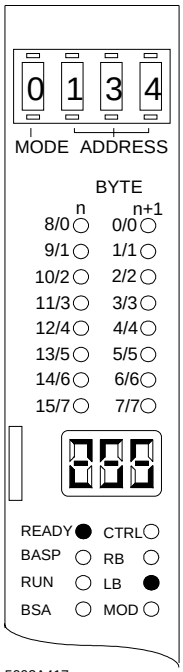
Figure 4-10: Remote bus error

Further remote bus error descriptions (E4-E6) are given in Chapter 4.1.2, "Error Indicators" in the subsection "RB ERR"

The RESET must only be performed when the PLC is in the STOP state. While the controller board is running through its self-test no up to date inputs are read and no up to date outputs are set. In the controlled start mode, the bus cycle is **not** re-started (no RUN). All parameter settings are lost (log. addressing, event definitions, ...).

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Local bus error



Display	Description	Outputs	Bus
0-255	INTERBUS-S operation was disturbed and the bus was stopped. All outputs were reset. The display indicates the number or the defective local bus. Possible causes: • Defective module • Defective connection between the modules Help for remedy • LEDs at the modules • HAND HELD MONITOR (HHM) • PC monitor program Acknowledgment: a. Via the addressing block (addressing the system from the PLC) b. Via the EEPROM card with the start sequence for addressing c. Automatic start (power up/reset)	XX	RUN

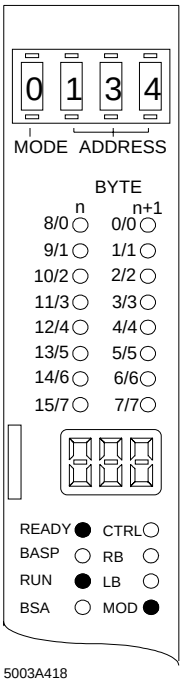
Figure 4-11: Local bus errors

A RESET must only be performed when the PLC is in the STOP state. While the PLC is running through its self-test not up to date inputs are read and no up to date outputs are set. In the controlled start mode the bus cycle is **not** re-started (no RUN). All parameter settings are lost (log. addressing, event definitions, ...).

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Module error



Display	Description	Outputs	Bus
0-255 (decimal)	The module error (MOD) indicates an error at the peripheral side of an I/O module. Possible causes: • Failure of peripheral voltage of the module (indicated with a green LED) • Short-circuit of an output (E-LED) The error cause influences the performance at the outputs of a module with an error. A short-circuit at an actuator can - depending on its power consumption the other outputs of the group concerned. Note: • The bus which is not affected by the module error continues to operate. • The error is indicated on the controller board. • The error message is generated with an edge and lasts even after the error has been removed (Clear the message with the CLEAR-DISPLAY-REQUEST, SEND-MODULE-ERROR-REQUEST commands, see Chapter 9).	XX	RUN

Figure 4-12: Module error

online-components.com

4.2.2 Example of a System Documentation

Using the bus topology which has already been described in Chapter 3, the following example describes the documentation of system parts of an INTERBUS-S system.

Figure 4-13 gives an overview of the demo system. Figure 4-14 lists the bus segments (BS) 1 through 6 in a table. You may use the following form (Figure 4-15) to enter modules of your own system.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

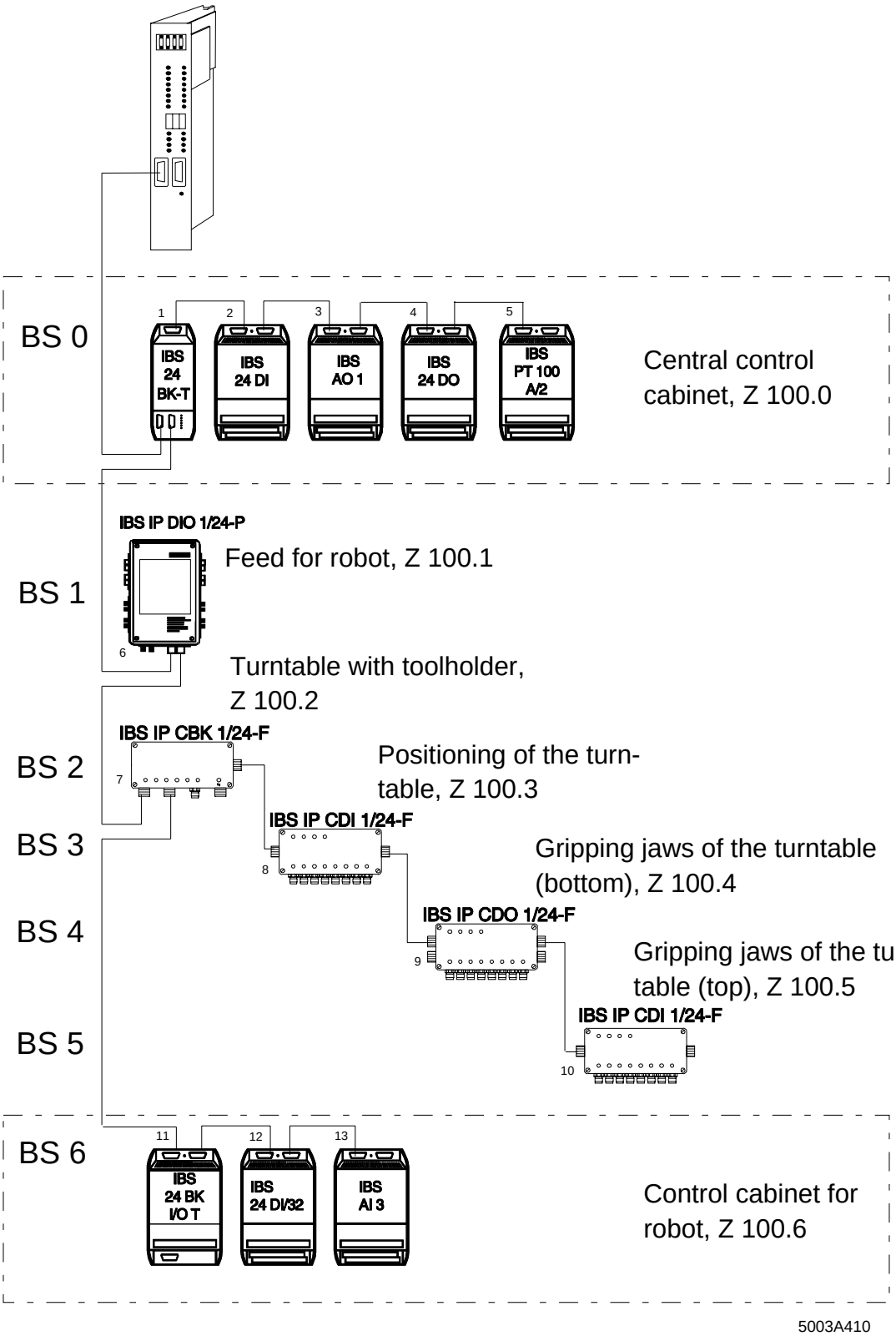
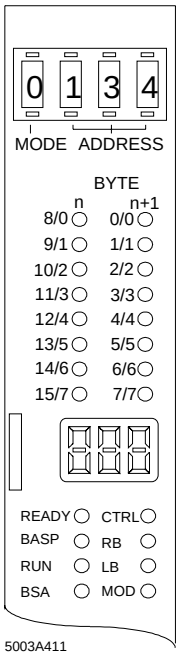


Figure 4-13: Demo system (corresponds to the topology from Chapter 3)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS



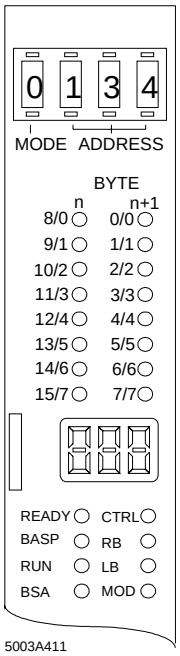
Display (Bus segment number)	Description	Marking
0	Central control cabinet	Z100.0
1	Feed for robot	Z100.1
2	Turntable with toolholder	Z100.2
3	Positioning of the turntable	Z100.3
4	Gripping jaws of turntable (bottom)	Z100.4
5	Gripping jaws of turntable (top)	Z100.5
6	Control cabinet for robot	Z100.6

Project: No.: 08154711
Page: 1/1
Name: NN

Figure 4-14: Description for the example configuration

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS



Display (Bus segment number)	Description	Marking

Project:
Page:
Name:

Figure 4-15: Form for your own system

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

4.3 Diagnostic Registers

The host controller board has two registers for evaluating the error indications through the PLC. The registers occupy one word each in the PLC's input area and are an image of the diagnostic indicators (LEDs, display) on the controller board.

4.3.1 Diagnostic Bit Register

The diagnostic bit register represents the operating and error states of the controller board and corresponds to the LEDs on the front plate. Every error bit indicates a certain type of error (MOD, LB, RB, CTRL). When the bit is logically 1, the corresponding status is active.

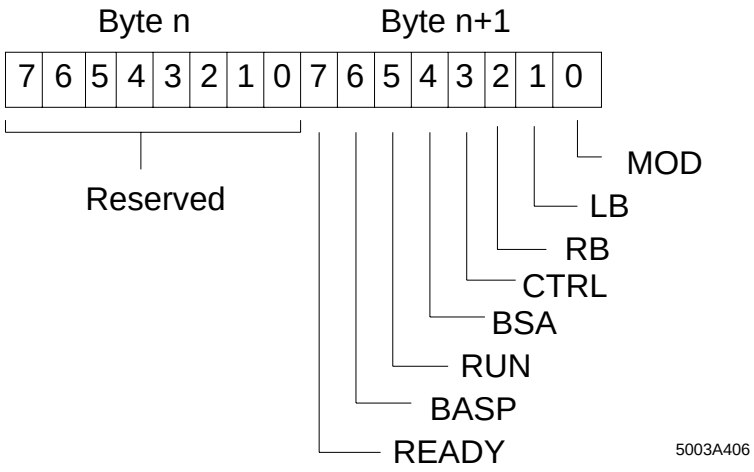


Figure 4-16: Diagnostic bit register

4.3.2 Diagnostic Parameter Register

The diagnostic parameter register provides additional information about the type of error or the error location. It corresponds to the seven-segment display on the front plate.

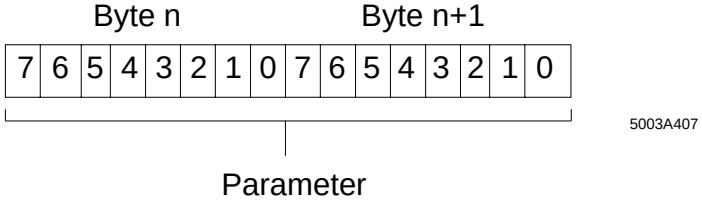


Figure 4-17: Diagnostic parameter register

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

4.3.3 Diagnostic Register Locations

The locations of the registers depend on the controller board's type of operation. Permissible types of operation are the automatic and the controlled start.

Automatic start

When the automatic start is used, the diagnostic registers are placed below the input area of the two INTERBUS-S windows. The diagnostic bit register is located below the base address of window 1 (register address = base address minus 2).

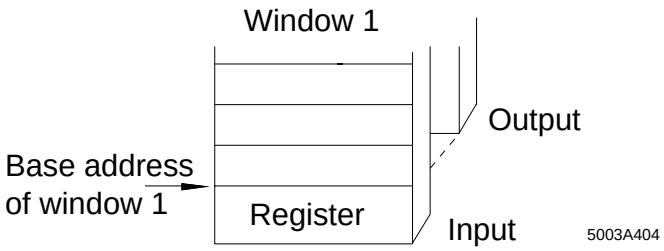


Figure 4-18: Diagnostic bit register

The diagnostic parameter register is located below the base address of window 2 (register address = base address minus 2).

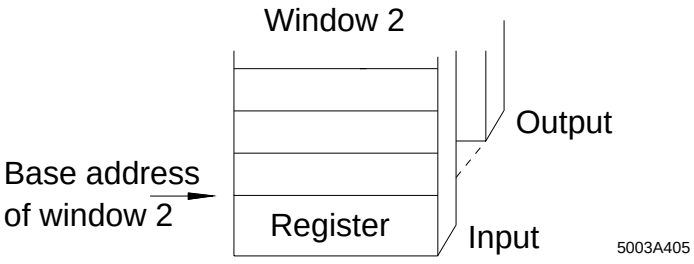


Figure 4-19: Diagnostic parameter register

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Controlled start

When the controlled start is used, the diagnostic registers in the input area of the two INTERBUS-S windows can be freely assigned. The addresses are assigned by means of an ID code in the logical addressing.

ID code:

- Diagnostic bit register: ID = 16
- Diagnostic parameter register: ID = 17

The logical addressing assigns an address to the ID code at which the corresponding register is located.

Example:

ID List	IN Address List
KY = 000,016	KY = 000.032
KY = 000,017	KY = 000.034

Diagnostic bit register:	IW 32
Diagnostic parameter register:	IW 34

Enter ID codes for the diagnostic registers at the end of the ID code list.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

4.4 I/O Status Indicators

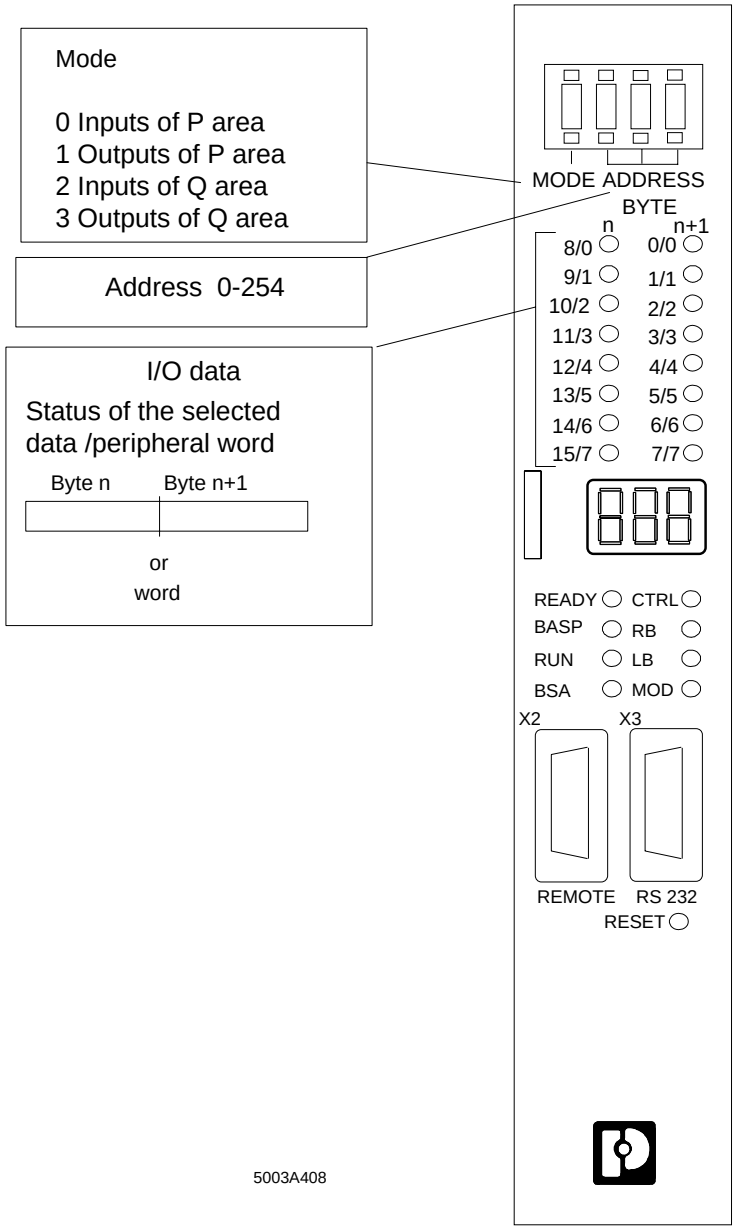


Figure 4-20: INTERBUS-S status indicators

I/O status indicators

The I/O data of the INTERBUS-S modules can be displayed on the front plate. The module's address is entered by means of code switches.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

MODE

Table 4-3: Address area selection

MODE	Input/Output	Area
0	Inputs	P area
1	Outputs	P area
2	Inputs	Q area
3	Outputs	Q area
4-9	**Forbidden**	

MODE 4 through MODE 9 must **not** be set.

ADDRESS

The required address is set by means of these three code switches. Only a word address (even address from 0 to 254) is accepted as a valid address.

An invalid address setting is indicated with "**Ad"** in the display.

Status display

The data item of the set address is output as a 16-bit word.

Display

- -	A valid module address was set with the coding switch.
Ad	An invalid address was set with the coding switch. Remedy: -Set only addresses which are occupied by modules. -Set an even module address.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

4.5 Startup and Acknowledgment Displays

4.5.1 Host Controller Board Startup

In order to detect hardware and firmware errors the INTERBUS-S host controller board runs through several test routines after a RESET or after POWER ON. The number of the routine is indicated in decimal on the seven-segment display (see Table 4-4). This results in a startup countdown. After the successful completion, only the green READY LED is on and the display indicates the symbols "**- -**", "**-||-**" or "**Ad**", or an error code depending on the type of operation and the INTERBUS-S cabling .

Table 4-4: The seven-segment displays during startup

Startup Routine	Seven-Segment Display
Start of hardware startup, all LEDs on	8.8.
Test of motherboard	9
CPU self-test	8
Test of EPROM and checksum	7
RAM test	6
Initialize vectors	5
Test interrupt logic	4
MPM test	3
Function test of the IPMS	2
Function test of the DUART	1
General initialization phase	00
INTERBUS-S operation STOP	- | | -
INTERBUS-S operation RUN	- -

When an error is detected, the seven-segment display blinks. Several routines provide additional information about the error which is then alternately blinking with the number of the routine.

When the display blinks replace the controller board (Please specify the display values when you send in the board for repairs).

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

4.5.2 Acknowledgment after an Error

The diagnostic indicators on the front plate of the controller board indicate errors of the INTERBUS-S system. The red LEDs indicate the type of error. The seven-segment display further classifies the error. Except for the module error (MOD), INTERBUS-S is always stopped after an error occurred (RUN LED is off).

If the bus is in the STOP state the I/O data does not correspond to the up to date signal states. There must be no access to the bus address.

After the error has been removed INTERBUS-S can be started again. The start behavior depends on the selected mode and the error cause.

Clearing the error display and automatic start
In the automatic start mode INTERBUS-S can either be started by applying the PLC's supply voltage (power up) or by pushing the RESET button.

A RESET must only be performed when the PLC is in the STOP state. While the controller board performs its self-test no up to date inputs are read and no up to date outputs are set. In the controlled start mode, the bus cycle is **not** re-started (no RUN). All parameter settings (logical addressing, event definitions, ...) are lost.

Clearing the error display and controlled start
In the controlled start mode INTERBUS-S can be started by means of the ADDRESS startup block or by means of the EEPROM card.

The I/O data of disabled local buses does not correspond to the up to date signal states. There must be no access to the bus addresses concerned.

As long as the controller board does the addressing no up to date inputs are read and no up to date outputs are set.

Clearing the display of a module error (MOD) while the system is running
After a module error the application program or the EEPROM card can clear the display with the following commands.

- CLEAR-DISPLAY (CONTROL block, function 4) or
- MODULE-ERROR (ERRINFO block, function 3)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

4.6 Diagnostics on the Modules

In order to allow fast "local" diagnostics the modules feature status and diagnostic LEDs. The error indicators provide information about the type and location of an error. Other LEDs indicate the I/O states.

Indicators on the I/O modules:

- Supply voltage
- Output overload/short circuit (group by group, single DI/DO)
- Status LED for each I/O channel

Indicators on the bus terminal modules:

- Supply voltage
- Remote bus monitoring
- Local bus monitoring
- Operating indication for INTERBUS-S

On some bus terminal modules, there is an additional pushbutton (**Rec**onfiguration) that triggers a message to the controller board (re-initialization of the bus system). This is possible when operation continues, e.g. after the repair of a local bus.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

4.6.1 Diagnostic Functions on I/O Modules

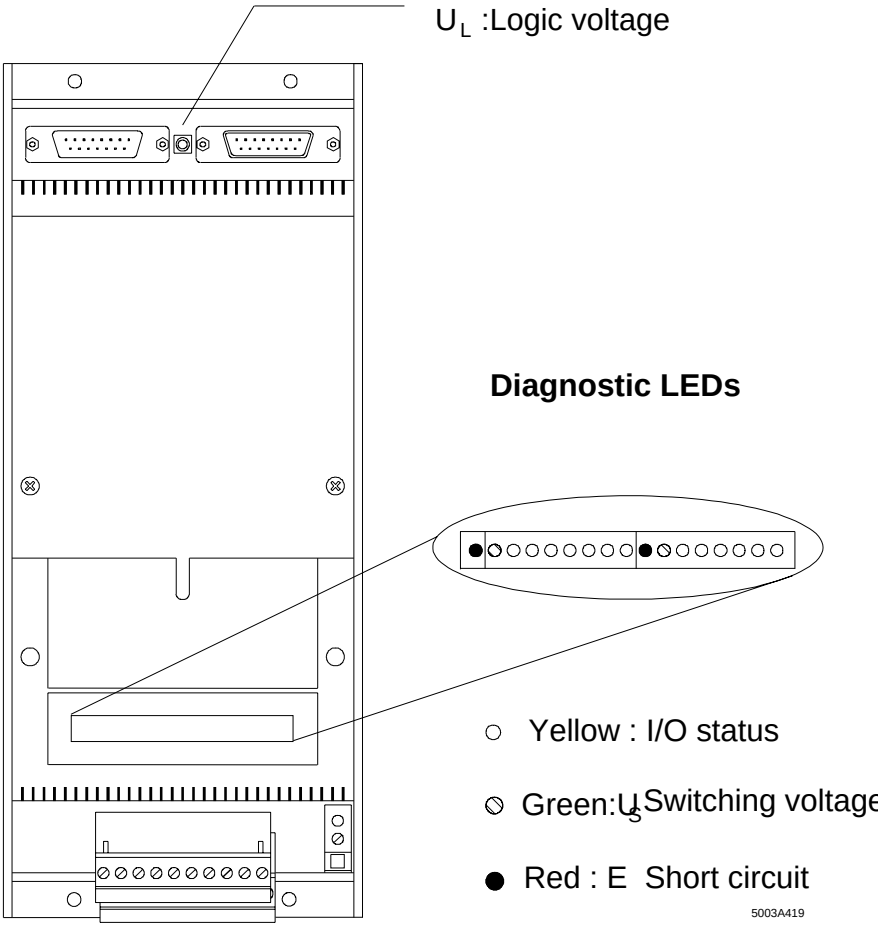


Figure 4-21: Example for LED diagnostics on an I/O module

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

4.6.2 Diagnostic Functions on Bus Terminal Modules

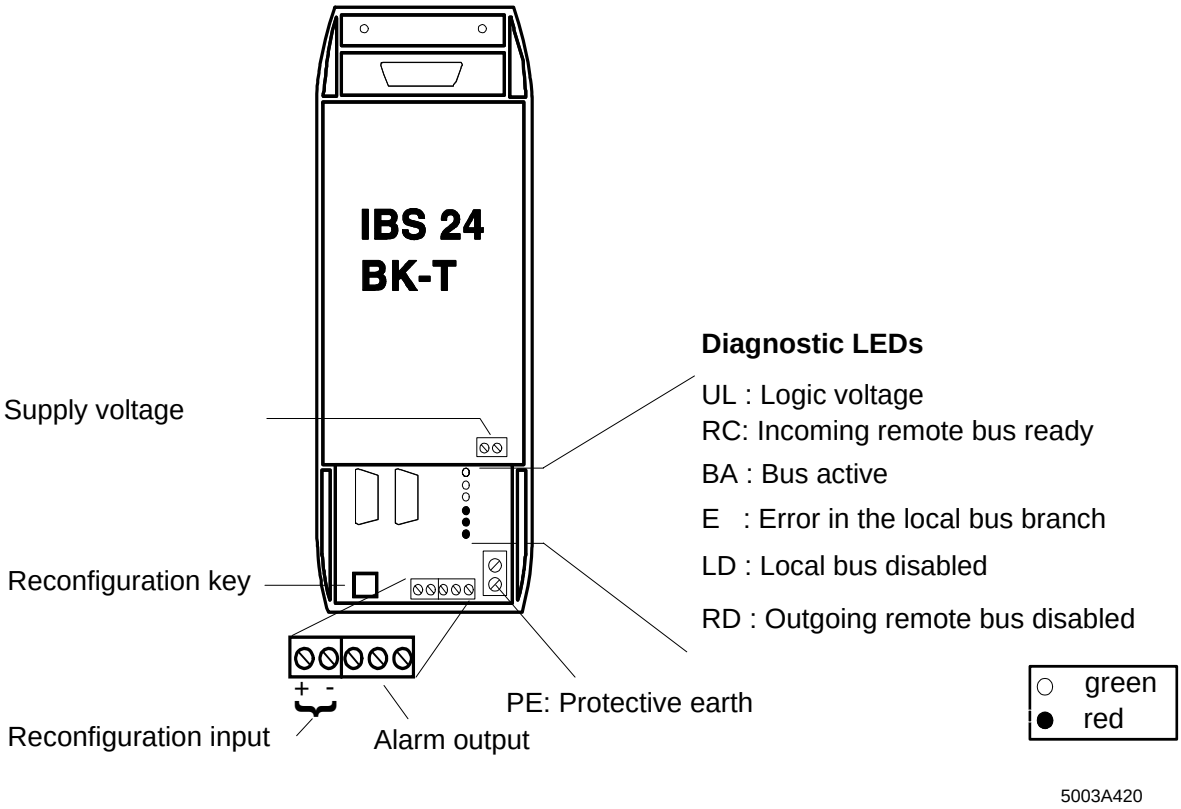


Figure 4-22: Example for LED diagnostics on a bus terminal module

4.6.3 Diagnostics on Third-Party Devices

There are two types of diagnostic indicators on third-party devices:

Device-specific indicators
The indications depend on the device and are described in the device manual or can be obtained from the manufacturer.

Bus-specific indicators
The indicators comply with the Phoenix I/O module diagnostics.

- LED diagnostics on I/O modules
- LED diagnostics on bus terminal modules

If other messages are displayed they will be described in the device manual or can be obtained from the manufacturer.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

4.7 Using the Hand Held Monitor

For startup or servicing, the Hand Held Monitor (HHM) facilitates the checking of individual bus stations in relation to their functions and correct connection to the periphery.

The monitor is accommodated in a handy and sturdy plastic housing. The connection to INTERBUS-S is established through the local bus interface. The connecting cable is plugged between the bus terminal connector and the outgoing local bus cable. Therefore, the monitor does not require an external power supply because it obtains its operating voltage through the connected bus terminal module. A clearly arranged key pad allows user-friendly handling of the diagnostic unit in conjunction with the four-line alphanumeric liquid crystal display (LCD). The menu-prompted interface allows the user to read inputs and to set the outputs directly on the spot and without communication with the PLC. Connected in this way, the HHM is the master for the local bus. This guarantees a large number of diagnostic functions which are indicated in clear text on the LCD.

After the monitor has been started, operation of one single bus segment can be started to enable a gradual and error-free startup.

Starting individual modules:

- Test of the I/O modules
- Test of the sensor/actuators cabling
- Test of the sensors and actuators themselves

Troubleshooting in individual modules:

- Local bus cable errors
- Module errors
- Cabling faults (short or open circuit)
- Failure of sensors and actuators

With the Hand Held Monitor, the PLC and service technician has a mobile measuring instrument for checking machine and system cabling.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

4.8 Using the Monitor Program for INTERBUS-S on the PC

If INTERBUS-S is controlled by a PC, the IBS-MONI monitor program offers a comprehensive test environment, It can be used to check installation of the INTERBUS-S modules, the bus cabling, as well as the wiring of sensors and actuators. In contrast to the Hand Held Monitor, these functions are called from a central location (PC).

The menu-driven program offers the following utilities:

- Starting an INTERBUS-S system on the PC.
- Testing an INTERBUS-S system on the PC.
- Checking the connected configuration.
- Setting digital and analog outputs.
- Displaying the statuses of digital and analog inputs.
- Resetting the INTERBUS-S system (outputs = 0).

Using the cursor keys, each module connected on the bus can be selected through its I/O address. The local bus number, the module number, the selected channel and the module type are specified (in clear text) for each module. Another field specifies the physical address of the module on the bus. The IN data of the selected module is indicated in binary or hexadecimal code. Just like the IN data, the OUT data can be entered and edited in two number formats. Changes are acknowledged by pressing the ENTER key and are accepted by the bus. INTERBUS-S can be reset with a function key. The resetting sets all outputs to the value zero.

Use of the IBS-MONI program supports a structured startup and simplifies troubleshooting.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

4.9 CTRL Error Displays

The following information is given for the errors listed below:

Error name **(Error code)**

The code is given in a hexadecimal form. The letters A to F are represented as capital or small letters in accordance with the display.

Error type: User, hardware or firmware error

Error LED: Indicates which of the red error LEDs is active on the host controller board.

IB data cycle: Indicates whether the INTERBUS-S data cycle is running (RUN LED on) or has been stopped (RUN LED off).

IB reset: Indicates whether a reset has been triggered on INTERBUS-S or not.

Further errors: Indicates any follow-up errors.

Cause: Describes the cause of the error in more detail.

Remedy: Gives information on how to remove the error cause and the error.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

4.9.1 List of Errors

No-Command-Code **(0007)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	On
IB reset:	-
Further error:	-

Cause: An undefined command code has been sent to the controller board.

Remedy: Check the application program (e.g. PCP commands)

Command-Write **(0008)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	On
IB reset:	-
Further error:	-

Cause: Instead of a parameter still expected, a command has been sent to the host controller board.

Remedy: Check the application program (e.g. PCP commands)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Parameter-Write **(0009)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	On
IB reset:	-
Further error:	-

Causes:

1. No program has been loaded into the PLC.
2. Communication registers are overwritten.
3. Pointer in the ADDRESS function block points to incorrect data words.
4. A command with parameters has been sent and the parameter count was 0.
5. A parameter without command has been sent to the controller board.
6. The host sends one parameter, although no parameter is expected, because, for example, the command does not require any parameters.

Remedies:

1. Load a program.
2. Check the setting of window 3 on the hardware (DIP switches) and on the software (FB INITIB) side. The lowest permissible base address is PW 128.

3.-6. Check the parameters.

During the PLC startup every I/O address is addressed (case 4-6). At the beginning of the addressing, the display must be cleared either by means of the INITIB function block or the EEPROM card.

No-Command-Parameter **(000A)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	On
IB reset:	-
Further error:	-

Cause: An undefined command has been sent.

Remedy: Check the application program (e.g. PCP commands).

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

No-Error-Code **(000b)**

Error type:	Firmware error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Cause: The error management on the controller board has been addressed with an unknown error code.

Remedy: Please contact Phoenix Contact.

Controller-Parameter-Timeout **(000C)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	On
IB reset:	-
Further error:	-

Causes: The error message is triggered, when:

- the PLC has not enabled the message communication handshake for the controller board within the preset time (5 sec).
- the controller board has sent one further message to the host, although the last pending message has not yet been fetched.

Remedies: Check whether the CON/IND message driver is called in the cycle. The application program can disable messages (CONTROL function block, function 5, DISABLE ALL MESSAGES command).

The error message is written regardless of the handshake. If this error message interrupts receipt of another message, the message which has already been partly received is no longer valid because it is overwritten by the error message.

online-components.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Host-Parameter-Timeout **(000d)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	On
IB reset:	-
Further error:	-

Cause: The host controller board is still expecting parameters that were not sent within the specified time of 5 s.

Remedy: Check the application program (e.g. PCP services). The PLC is in the STOP state. A command which has just been written has not yet been transferred completely.

The timeout can be set with the SET-PARAMETER-TIMEOUT-CONSTANT command. It has been specified to 7.88 s. If required, the time can be set to a higher or lower value.

The error message is written regardless of the handshake. If this error message interrupts receipt of another message, the message which has already been partly received is no longer valid because it is overwritten by the error message.

Bus-Error **(0023)**

Error type:	Hardware error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Cause: Triggering of the watchdog

Remedy: Please contact Phoenix Contact.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Add-Error **(0024)**

Error type:	Hardware error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Causes: Addressing error on the host controller board or interferences on the address bus of the controller board.

Remedies: Check the addressing list on the controller board.
In the case of interferences please contact Phoenix Contact.

CHK-Zerodiv-Error **(0026)**

Error type:	Hardware error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Cause: A division by zero took place. The processor is outside of the address area which was defined by the CHK command.

Remedy: Please contact Phoenix Contact.

Perform a RESET before using the controller board again.

Bad-Exception-Error **(0027)**

Error type:	Hardware error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Remedy: Please contact Phoenix Contact.

Perform a RESET before using the controller board again.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Not-IMP-Error **(0028)**

Error type:	Hardware error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Cause: The CPU of the controller board has triggered an interrupt which has not been used.

Remedy: Please contact Phoenix Contact.

Perform a RESET before using the controller board again.

ILL-Error **(0029)**

Error type:	Hardware/firmware error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Cause: The CPU received a machine instruction which has not yet been implemented.

Remedy: Please contact Phoenix Contact.

Perform a RESET before using the controller board again.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Logical-Address-Error **(002b)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	-
Further error:	-

Cause: During checking, an error has been detected in the logical addressing lists sent to the controller board (for example, the consistency for a module is incorrect).

The bus changes without RESET to the STOP state. The outputs are not reset.

Remedy: Check the logical addressing lists.

- The EREG register of the addressing block indicates the erroneous list.
- In the addressing sequence (EEPROM) an error is output which can be fetched by the parameterization software (via the V.24/RS-232 interface).

The erroneous parameter can be displayed with the SEND-LOGICAL-ADDRESS-ERROR command.

INTERBUS-S-System-Error **(0038)**

Error type:	INTERBUS-S error
Error LED	-
IB data cycle:	On
IB reset:	-
Further error:	-

Cause: An error has occurred in the INTERBUS-S system that leads to a situation in which a system is no longer executable with the last configuration. This error is reported immediately by the controller board. A test routine is then running to localize the error in the system. The LBERR LED or RBERR LED becomes active.

The error is only sent as a message. The diagnostics indicates an LB or RB error found after the routine was executed. While the error is located the bus does not run a data cycle.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

IPMS-Extern-Error **(003b)**

Error type:	Hardware error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Causes: The IPMS protocol chip has detected an external error or the INTERBUS-S cycle has been terminated by an external signal.

Remedies: Please contact Phoenix Contact.

Perform a RESET before using the controller board again.

IPMS-FIFO-Error **(003C)**

Error type::	Hardware error
Error LED:	Controller error in the event of multiple errors
IB data cycle:	On (Off in the event of multiple errors)
IB reset:	Only in the event of multiple errors
Further error:	-

Cause: The IPMS protocol chip has detected a FIFO overflow error.

Remedy: Please contact Phoenix Contact.

Perform a RESET before using the controller board again.

IPMS-Undefined-Error **(003d)**

Error type:	Hardware error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Cause: The IPMS protocol chip has sent an undefined error.

Remedy: Please contact Phoenix Contact.

Perform a RESET before using the controller board again.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Invalid-DCF-Condition-Error **(003E)**

Error type:	Firmware error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Remedy: Please contact Phoenix Contact.

Perform a RESET before using the controller board again.

Invalid-DCF-State-Error **(003F)**

Error type:	Firmware error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Remedy: Please contact Phoenix Contact.

Perform a RESET before using the controller board again.

Impossible-MC-Condition-Error **(0040)**

Error type:	Firmware error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Remedy: Please contact Phoenix Contact.

Perform a RESET before using the controller board again.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Invalid-MC-State-Error **(0041)**

Error type:	Firmware error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Remedy: Please contact Phoenix Contact.

Perform a RESET before using the controller board again.

Invalid-UC-State-Error **(0042)**

Error type:	Firmware error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Remedy: Please contact Phoenix Contact.

Perform a RESET before using the controller board again.

Wrong-Base-Address-Window1 **(0046)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Cause: The user has not set the start address for window 1 correctly.

Remedy: Check the base address of window 1.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Wrong-Base-Address-Window2 **(0047)**

Error type:	User error
Error LED:	Controller Error
IB data cycle;	Off
IB reset:	RESET
Further error:	-

Cause: The user has not set the start address for window 2 correctly.

Remedy: Check the base address of window 2.

Wrong-Length-Window1 **(0048)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Cause: The user has not set the correct area length of window 1.

Remedy: Check the length setting of window 1 for
- sufficient lengths for all modules and
- address overlaps with window 2 or window 3.

Wrong-Length-Window2 **(0049)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Cause: The user has not set the correct area length of window 2.

Remedy: Check the length setting of window 2 for
- sufficient length of all modules and
- address overlaps with window 1 or window 3.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

No-Executable-Configuration-Error **(004A)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	On
IB reset:	-
Further error:	-

Cause: A non-existent INTERBUS-S configuration was sent to the host controller board.

Remedy: Check the connection of the INTERBUS-S cable at the controller board and restart the board.

Command-Parameter-Error **(004b)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	On
IB reset:	-
Further error	-

Cause: The quantity of parameters lies outside the quantity range defined for the command.

Execution of commands is aborted.

Remedy: Check the parameterization list which was sent last for an incorrect number of parameters.

Event-Error **(004C)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	On
IB reset:	-
Further error:	-

Cause: An error has been detected when the parameter for programming the events was checked.

Remedy: Check the event parameterization list which was sent last for an incorrect number of parameters and non-existent event definitions.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

IPMS-No-Error **(004D)**

Error type:	Hardware/INTERBUS-S error
Error LED:	Controller error in the event of multiple errors
IB data cycle:	On (Off in the event of multiple errors)
IB reset:	Only for multiple errors
Further error:	-

Remedy: Please contact Phoenix Contact.

Cause: The IPMS protocol chip has detected a BUS error, however, no bit was set in the IPMS error register.

Perform a RESET before using the controller board again.

Communication-Invalid **(004E)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	On
IB reset:	-
Further error:	-

Cause: The controller board uses a limited memory space for processing commands. This error message is generated if the resources are exhausted. This may be the case, for instance, if the PLC sends a large number of commands in a short time, but the controller board is not capable of processing them fast enough.

Remedy: Check the application program.

Invalid-D-State **(0050)**

Error type:	Firmware error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Remedy: Please contact Phoenix Contact.

Perform a RESET before using the controller board again.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Invalid-D-Condition **(0051)**

Error type:	Firmware error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Remedy: Please contact Phoenix Contact.

Perform a RESET before using the controller board again.

Receive-Group-Number-Failed **(0055)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	On
IB reset:	-
Further error:	-

Causes: The list which was transferred with the RECEIVE-GROUP-NUMBERS-REQUEST (code 0049) command contains erroneous entries.
Error causes may be:

- Invalid local bus numbers.
- Multiple assignment of local bus numbers.
- Invalid group number.
- Combining several modules with bus terminal functionality to one group by using modules with bus terminal functionality without outgoing interfaces (local bus, remote bus etc.).
- Incorrect number of parameters

Remedy: Check the definition lists of the group definitions.

Invalid-EC-State **(0057)**

Error type:	Firmware error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Remedy: Please contact Phoenix Contact.

Perform a RESET before using the controller board again.

online components.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Invalid-EC-State **(0058)**

Error type:	Firmware error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Remedy: Please contact Phoenix Contact.

Perform a RESET before using the controller board again.

Unexpected-Group-Number **(0059)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	On
IB reset:	-
Further error:	-

Causes:

- When a group is enabled or disabled, a group number was specified that had not been defined beforehand.
- The transferred group number is outside of the permissible area.
- It is attempted to disable a module with process data and remote bus connection which cannot be disabled .

This error is only reported and does not influence the further response of the controller board.

Remedy: Check the application program for non-existent group numbers and incorrect numbers of parameters.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

BK-Alarm-Failed **(005A)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	On
IB reset:	-
Further error:	-
Causes:	One of the following command was not executed successfully: • SET-BK-ALARM-LOGICAL (0024) • RESET-BK-ALARM-LOGICAL (0025) • SET-BK-ALARM-PHYSICAL (0026) • RESET-BK-ALARM-PHYSICAL (0027) Errors which cause this message are: • no parameter, or more than one parameter specified. • non-existent local bus addresses.
Remedy:	Check the application program for non-existing local bus addresses and incorrect numbers of parameters.

Unknown-INTERBUS-S-Module **(005b)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	On
IB reset:	-
Further error:	-
Causes:	• Unknown ID numbers were used in the RECEIVE-PHYSICAL-CONFIGURATION-MAP command. • An invalid I/O word length has been specified in the CHECK-PHYSICAL-CONFIGURATION (code 0058) command. • An invalid number of process data has been specified. • The first module does not have bus terminal functionality.
Remedies:	Check the parameterization lists of the ID numbers for non-existent length codes and the numbers of process data.

The bus changes without RESET to the stop state. Output data is not reset. The data cycle of the bus can only be re-initialized with the WARMSTART command or the RESET button.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Too-Many-K-Modules **(0065)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	On
IB reset:	-
Further error:	-

Cause: The maximum number of communication modules has been exceeded.

Remedy: Check the parameterization lists of the communication references (KR) for permitted KR (2 to 62). A continuous ascending order is to be kept (2, 3, 4, ...).

The surplus communication modules are not served.

Receive-CR-Error **(0066)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	On
IB reset:	-
Further error:	-

Cause: When the RECEIVE-COMMUNICATION-REFERENCE command is checked, this error is sent when

- an invalid communication reference has been used
- too many parameters were sent
- too few parameters were sent.

Remedy: Check the parameterization lists of the communication references (KR) for permitted KR (2 to 62). A continuous ascending order is to be kept (2, 3, 4, ...). The first parameter indicates the number of definitions.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Check-Configuration-Error **(0068)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	On
IB reset:	-
Further error:	-

Cause: This error is reported if the sent and existing configurations do not agree after the CHECK-PHYSICAL-CONFIGURATION (ID code list) command has been used.

Remedy: Check the ID list for:

- the number of parameters,
- sequence of ID numbers and the modules as well as
- the locations of registers and special ID codes.

Communication-Not-Ready **(0069)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	On
IB reset:	-
Further error:	-

Cause: A request or response command has been sent although communication is not yet initialized.

Remedy: Initialize communication by:

- specifying the KR addressing list with the FB address in the PLC or
- sending the INIT-COMMUNICATION command with the help of the EEPROM card.

online-components.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Wrong-Base-Address-Window **(006A)**

Error type:	User error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Cause: The user did not set the start address for window 3 correctly. The READY LED is off when this error occurs.

Remedy: Check the base address for window 3. The lowest permissible base address is PW 128.

Defective-Address-Decoder **(006b)**

Error type:	Hardware error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Cause: Hardware error of address decoding.

Remedy: Please contact Phoenix Contact.

Perform a RESET before using the controller board again.

Defective-EEPROM **(006c)**

Error type:	Hardware or software error
Error LED:	Controller error
IB data cycle:	Off
IB reset:	RESET
Further error:	-

Cause: Checksum error due to a falsified or missing checksum.

Remedy: Please contact Phoenix Contact.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Chapter 5

System Interfaces

This chapter provides information on

- the different hardware and software interfaces which change the controller board's functionality
- the structure and the functions of the ISFP and IBS SYS SWT software

5 System Interfaces 5-1

5.1 Interface Description 5-1
5.1.1 Interface Function 5-2
5.1.2 Interface Classification 5-3

5.2 Command and Message Structure 5-4
5.2.1 Structure of Commands and Messages 5-4

5.3 Interface Description 5-5
5.3.1 ISFP 5-5
5.3.1.1 Program Structure 5-6
5.3.1.2 INTERBUS-S System Control 5-8
5.3.1.3 Function Overview 5-10
5.3.2 Bit-Controlled Command Execution 5-13
5.3.2.1 Description 5-13
5.3.2.2 Access to the Bit-Controlled Command Sequences 5-13
5.3.3 IBS SYS SWT 5-16
5.3.3.1 Description 5-16
5.3.3.2 Commands 5-18

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

5 System Interfaces

5.1 Interface Description

The system interface links the application to the INTERBUS-S system. This interface consists of several interfaces which may be accessed from the process or by the user.

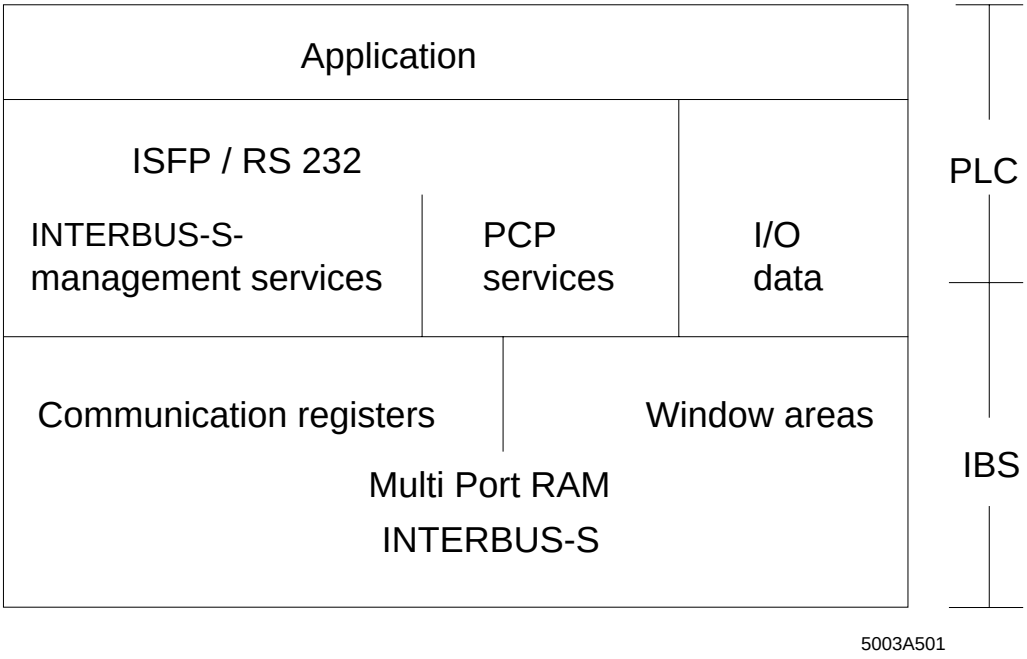


Figure 5-1: Structure of the application/INTERBUS interface

System interfaces are the areas which are designated ISFP and RS-232.
With these interfaces you may exploit the intelligence of the controller board. Besides logical addressing, bus commands (Stop INTERBUS-S, Start INTERBUS-S, ...), event handling and extensive diagnostic possibilities, there is also a PCP communication interface available. Modules which are capable of communications (counter, V.24, parameterization of the frequency inverters,...) can be operated via this interface.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

5.1.1 Interface Function

Commands and messages can be exchanged between the host controller board and the PLC.
An application-oriented programming interface ensures simple operation. The 'INTERBUS-S **S**ystem **F**unctions for the **P**LC' (abbreviated **ISFP** below) interface represents an INTERBUS-S operating system for the user. The ISFP interface allows to trigger and execute complex functions (e.g. logical addressing) by means of a signal edge.
Besides this interface which allows a parameterization by means of the PLC, the user can directly influence the controller board's functions via a serial interface. This can be done with a **RS-232 connection** to the PC or to a programming unit. A monitor software allows to send commands (similar to ISFP) to the controller board. Messages are received and processed in a way that is suitable for the screen.
In addition, programming sequences such as logical addressing or clearing of the diagnostic display can be created with the PC and stored on the controller board in a non-volatile way (in the EEPROM card). The individual sequences can be started by means of an output bit in the PLC (**bit-controlled command register)**.
Thus, the INTERBUS-S system can be configured and controlled in different ways. This chapter describes the programming interfaces and explains how they are used together.
The previous general description of the interrelations will be clarified with the help of an example.
Example: **Logical addressing**

For the logical addressing it is useful to program the start sequence (allocation of address lists and start of INTERBUS-S) via the EEPROM. The programming can be done so that the program executes the bus system start once during start-up (start sequence no. 0 and initialization block) of the PLC and additionally also in the PLC's cycle (with bit-controlled command execution). During operation, messages (e.g. error messages) are received in the cycle (with ISFP) to evaluate them with the application program.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

5.1.2 Interface Classification

The term "system interface" stands for hardware such as the communication registers, the registers for the bit-controlled command execution and the RS-232 interface (link to the PC). This hardware helps to control the INTERBUS-S system in the start phase and during operation.

1) Communication registers

Window 3 of the controller board is called communication register. The application program is not allowed to read or write the register areas. Access is exclusively done via standard function blocks. The function blocks are included in a software package called **ISFP**. The software includes two driver blocks which send commands to the controller board (FB: REQ/RES) and receive messages (such as error and control messages) from the board (FB: CON/IND). These components ensure simple operation of the communication registers.

2) Bit-controlled command register

Input and output words are defined as registers for bit-controlled commands. The register areas which are addressed by means of an ID code are divided into two input words and one output word. Every bit (0-15) represents a program sequence (e.g. logical addressing) which has been stored in the EEPROM card. The program sequence can be started with an output bit (so-called activation bit) and the execution can be monitored with two input bits (BUSY and RETURN). These registers allow simple operation of complex program sequences during startup or in the PLC cycle.

3) Serial interface RS-232

This interface can be used to couple a programming interface to the controller board. A 9-pos. D-SUB connector is provided on the controller board’s front plate for this.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

5.2 Command and Message Structure

5.2.1 Structure of Commands and Messages

The structure of the commands and messages is reflected in a frame structure (Figure 5-2). This parameter frame includes the command or message code (CODE), the number of parameters (parameter count) and the dedicated user data (parameters no. 0 to n).

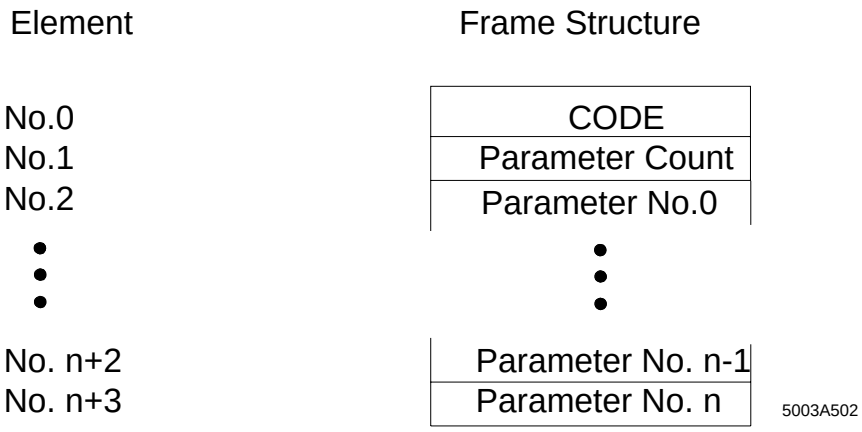


Figure 5-2: Frame structure of the commands and messages

The are still two types of commands: commands or messages with parameters and commands or messages without parameters (Figure 5-3).

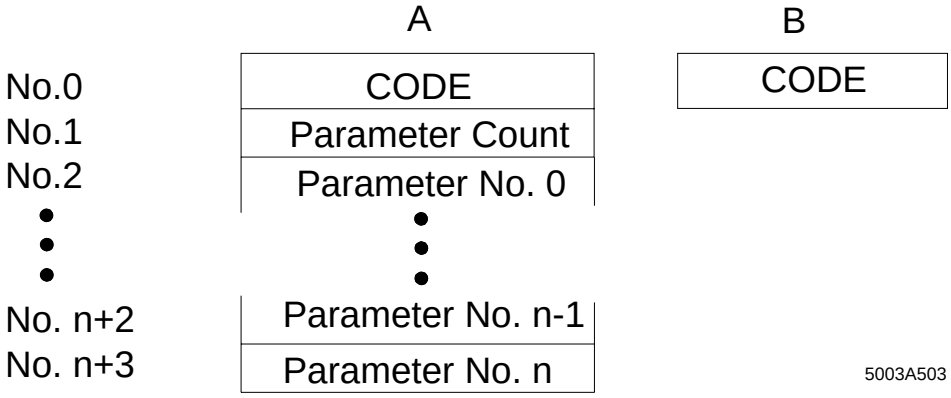


Figure 5-3: Two command types - (A) with and (B) without parameters

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

5.3 Interface Description

Two different interfaces connect the application and the controller board. Both interfaces feature the command/message structure.

Interfaces:

ISFP	on the PLC
IBS SYS SWT	on the PC

5.3.1 ISFP

Interface description:

The **I**NTERBUS-S **S**ystem **F**unctions for the **P**LC (**ISFP**) are a software interface which is available to the users to help them managing the INTERBUS-S management services on the PLC. This interface is described in Chapter 8.
Besides the I/O interface which is implemented by means of a Dual-Port RAM and to which the user has direct access, communication registers have been implemented on the controller board for the INTERBUS-S command/message interface.
The hardware of the interface comprises 4 word registers (window 3), which are located in the I/O area of the PLC. A protocol has been defined for communication between the PLC and the PLC and the INTERBUS-S controller board. These are commands which the PLC sends to the host controller board and error codes or messages which are received by the PLC. A command and/or message consists of a 16-bit code which can be followed by several word parameters.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

5.3.1.1 Program Structure

In order to avoid larger cycle times the INTERBUS-S system functions for the PLC (ISFP) are specifically tailored to the respective PLC and the program has been optimized and structured. Operation of the ISFP interface (by setting single bits) was kept simple to reduce the programming expense for the user. The interface consists of three types of function blocks. The blocks are available as standard function blocks.

Block types:

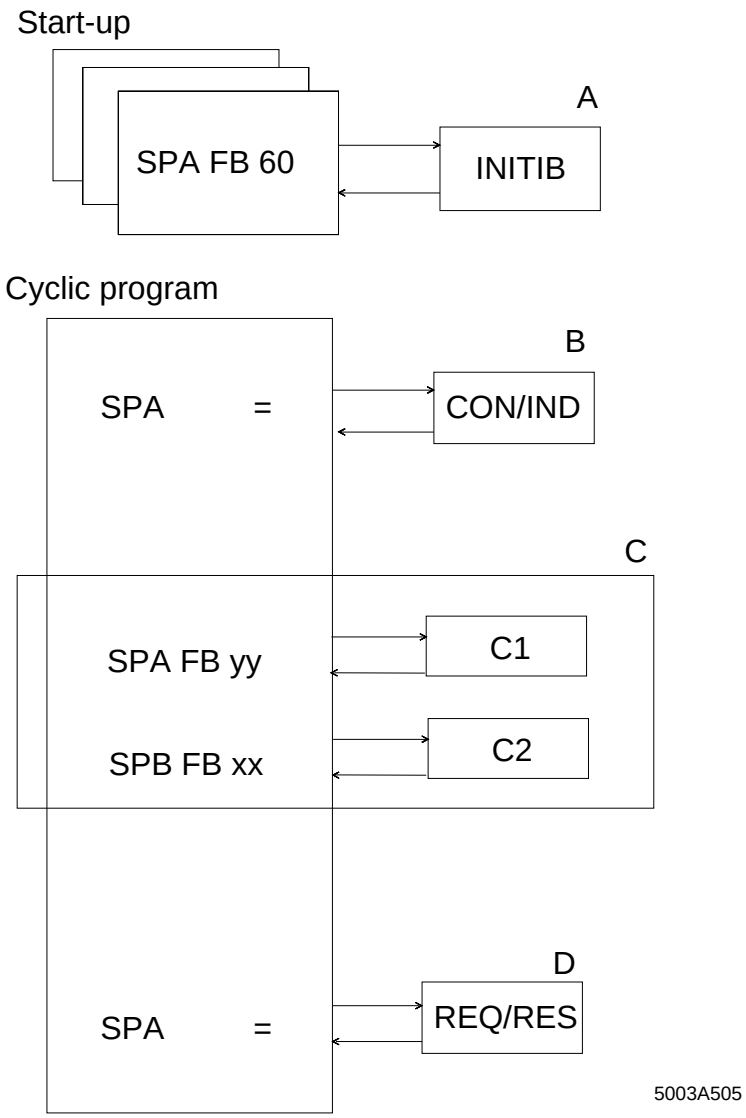
- Initialization block
- Receive/send blocks (interface driver)
- Function blocks

Apart from an initialization block, which must only be called during the PLC's startup, there are two function blocks which are permanently addressed.
These blocks are called receive and send block. They form the link between the PLC (ISFP interface) and the controller board. The blocks (interface drivers) become only active when commands are sent or messages are received. The third group of blocks is related to the application. That means that only the function blocks which are currently required are called (e.g. for addressing, system information, event handling...).

A description of the flag bits, times and data blocks used by the function blocks is given in the Appendix.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS



A = Initialization block
B = Interface driver
C = Application program (function blocks)
C1 = Event signalling block (passive block)
C2 = Command block (active block)
D = Interface driver

Figure 5-4: Principle call structure of the blocks

The structure shows the position of the different blocks and their calls in the program.

Description of the structure:

During the PLC startup the program calls the initialization block. This block synchronizes the controller board with the PLC and does presettings for the command and message structure. These settings also establish the interface for PCP stations (communication modules, e.g. counter,...).

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The receive and send blocks are not accessible from the application. They are exclusively used by the function blocks of the ISFP interface and control the communication interface (communication registers). With the help of these blocks, commands are sent and messages are received. Their positions in the program and how to call them are important.

Block	Position	Call
CON/IND	Beginning of cycle	Unconditional
REQ/RES	End of cycle	Unconditional

Call the CON/IND and REQ/RES blocks once in every cycle to ensure that commands and messages are correctly processed.

The third group of blocks provides a tool with which INTERBUS-S can be controlled and monitored.
The function blocks can be divided into passive and active blocks.
Passive blocks receive messages from the controller board or show errors in the INTERBUS-S system.
The active blocks are called by the application program and perform certain functions. Chapter 8, "ISFP", describes the variety of functions and messages.

5.3.1.2 INTERBUS-S System Control

Structure of the functions

The functions are implemented in function blocks. The function blocks are written in the STEP 5 language. They are supplied with different parameters, depending on their function. The first parameter to be given is IBDB. IBDB is a data block with a length of 200 data words and which is used by the software as main memory.
The BUSY bit activates the function blocks in the cyclic program. This bit must be set **once** by means of an edge trigger flag. The called function block resets the bit. A reset BUSY bit indicates that the function has been terminated.

The function blocks may be active during several cycles.
Some functions receive parameters from the controller board. These may be additional error information, but also configuration data or PCP data.

The parameter information DB and DW causes the function blocks to write the data sets received in defined data blocks.
The RETURN bit is always the last parameter of the activation blocks.
When the block has been processed and no errors occurred, the value of the RETURN bit is zero.
If an error occurs, this bit is set to one. Errors can occur due to invalid parameters or when the communication between the PLC and the controller board gets "stuck".
A timeout monitors the communication between the PLC and the controller board. Should the timeout respond the TIMEOUT bit is also set when the RETURN bit is set.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

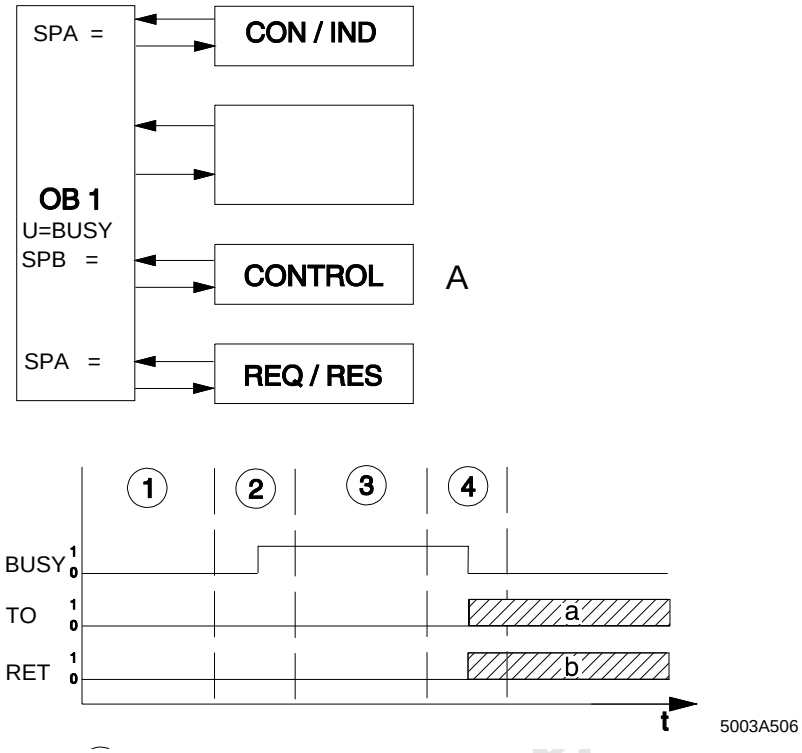


Figure 5-5: Function call and timing

Explanation of Figure 5-5:

A = The function is activated with an edge
1 = Enter function number / FCT = 1
2 = The function is activated when the busy bit is set / CONTROL
3= The function works in several cycles /INTERBUS-S is started
4 = The function has been terminated; BUSY = 0
In the case of an error : a) TO = 1; timeout of the function has elapsed
b) RET = 1; the function could not be executed.

onlinecomponents

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

5.3.1.3 Function Overview

Activation blocks

CONTROL FB 68	
No.	**Function**
0	Configure INTERBUS-S
1	Start INTERBUS-S Cycle
2	Stop INTERBUS-S Cycle
3	Alarm Stop
4	Clear Display
5	Disable All Messages
6	Implement All Logical Address Map
7	Init Communication
8	INTERBUS Delay
9	Quit Module Error All
10	Enable all Messages
11	Reserved

DEFINE FB 69	
No.	**Function**
0	Physical Configuration Map
1	Logical Local Bus Address Map
2	Logical IN Address Map
3	Logical OUT Address Map
4	Communication Reference
5	Event Map
6	Group Numbers
7	Parameter Timeout Constant
8	Receive KBL
9	Receive Bit Manipulation
10	Group Error Characteristics
11	Quit Module Error

SYSINFO FB 70	
No.	**Function**
0	Physical Configuration Map
1	Software Revision
2	Switch Information
3	INTERBUS-S Cycle Counter
4	Logical Address Error

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

ON/OFF FB 71		
No.	**Function**	
		No.
0	Group ON	0 - 255
1	Group OFF	0 - 255
2	BK-Alarm ON	0 - 255
3	BK-Alarm OFF	0 - 255
		Bit
4	Event ON	1 - 16
5	Event OFF	1 - 16
4	All Events ON	0
5	All Events OFF	0

ADDRESS FB 72	
Parameters	**Function**
IDDB (DB n)	DB number ID code list
IDDW (KF)	Pointer DW ID code list
LBDB (DB n)	DB number local bus list
LBDB (KF)	Pointer DW local bus list
INDB (DB n)	DB number IN address list
INDW (KF)	Pointer DW IN address list
OUDB (DB n)	DB number OUT address list
OUDW (KF)	Pointer DW OUT address list
KRDB (DB n)	DB number KR list
KRDW (KF)	Pointer DW KR list
GRDB (DB n)	DB number group no. list
GRDW (KF)	DB number group no. list

Function block: FB 72 ’ADDRESS’
Pointer for DB: 1 - 255, 0 => No list (0 function)
Pointer for DW: 0 - 255
KR = Communication reference

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

ERRINFO FB 74	
No.	**Function**
0	Controller Error Code (only with SYSERROR)
1	Bus Information
2	Defect Group
3	Module Error
4	Local Bus Module Error

Event signaling blocks

SYSERROR FB 73	
Parameters	**Function**
IBDB (DB)	No. of the IB data block
CON (BI)	Controller error
BUS (BI)	Bus error (INTERBUS-S in STOP state)
MOD (BI)	Module error (INTERBUS-S in RUN state)

RECONFIG FB 75	
Parameters	**Function**
IBDB (DB)	No. of the IB data block
RECO (BI)	REC triggered
POSS (BI) = RECO	
GR (BY)	Group
LB (BY)	Local bus

EVENT FB 76	
Parameters	**Function**
IBDB (DB)	No. of IB data block
EV (BI)	Event
EVKN (W)	Event identification

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

5.3.2 Bit-Controlled Command Execution

5.3.2.1 Description

The bit-controlled command execution allows to start program sequences (such as logical addressing/parameterization of a communication module) by means of individual bits. The user activates a previously defined command or program sequence through a bit.

Sequence:

1) With the help of logical addressing the registers for the bit-controlled command execution are overlaid in the I/O area of the PLC .

2) Creating the program sequence with the IBS SYS SWT program.

3) Programming the EEPROM.
During the programming every single program sequence is assigned to a bit in the register for the bit-controlled command execution. (Description in the user manual for the IBS SYS SWT software)

4) Activating the sequence via the application by setting the programmed bits in the I/O area of the PLC (Bit 0 = boot sequence for power up).

5.3.2.2 Access to Bit-Controlled Command Sequences

The ID code 18 overlays three register words in the I/O area of the PLC. The addresses are assigned by means of logical addressing. The registers available are:

Two words as input registers
- Busy bit register
- Return bit register

One word as output register
- Activation bit register

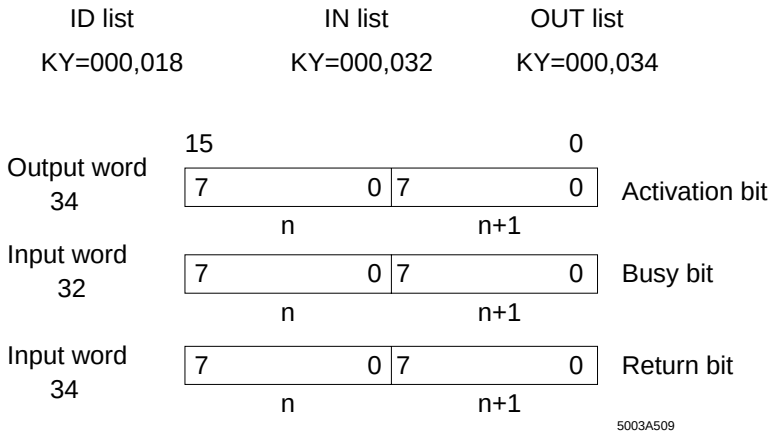


Figure 5-6: Exemplary assignment of the input and output words for the activation, busy and return bits for a Siemens PLC

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

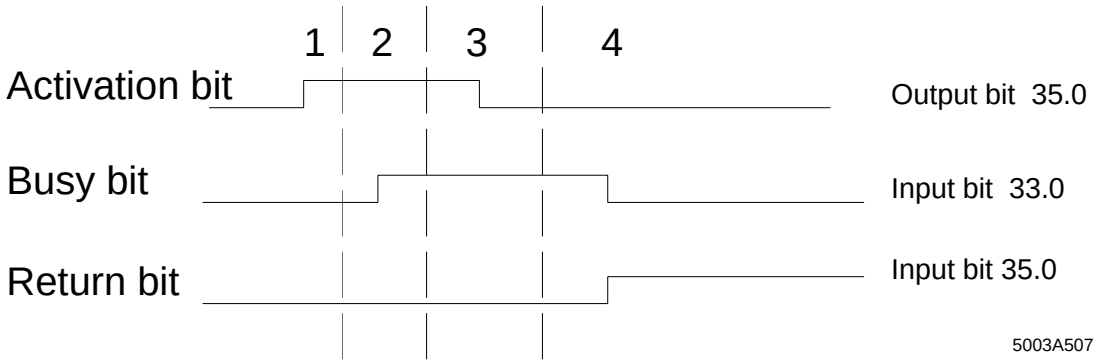


Figure 5-7: Bit-controlled function processing using the example of Figure 5-6

Explanations for Figure 5-4:

1 The Siemens PLC sets the activation bit (output) 35.0. The rising edge starts the command sequence which is stored in the EEPROM and assigned to this output.

2 The controller board reports the PLC via the busy bit 33.0, that the controller board has recognized the activation and that the command sequence is now processed.

3 The PLC recognizes from the busy bit 33.0 that the command sequence was started by the controller board. The PLC must reset the activation bit (output) 35.0 which it has set before.

4 The controller board terminates the processing when the controller board has completely processed the command sequence and the PLC has already reset the activation bit (output) 35.0. The PLC can now evaluate the return bit (input) 35.0.
0 => No error
1 => Error during processing

The programming sequence below clarifies the steps 1 to 3:

```
...
U   E   x      ( x = any input word that is combined with the outputs word
                   35.0)
S   A   35.0   (Step 1)
U   E   33.0   (Step 2)
R   A   35.0   (Step 3)
...
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Structure of the initial configuration

Command sequence

Stored programming

Bit 0

Quit_Error
Configure_INTERBUS-S
Start_INTERBUS-S_Cycle

Bit 1

Alarm_Stop

Bit 2

Clear_Display

Bit 3

Send_All_Module_Error

Bit 4 to 15 are not programmed

The command sequence "0" is at the same time the power on or start sequence. The controller board starts this sequence automatically after every voltage recovery or a reset.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

5.3.3 IBS SYS SWT

5.3.3.1 Description

IBS SYS SWT provides the user interface of the controller board on the PC. With this program the functions of the INTERBUS-S controller board and the modules connected to INTERBUS-S can be used without programming expense.
The PC is coupled to the controller board via the serial interface (RS-232) of the two devices.

The program functions in detail:

- Transfer of INTERBUS-S commands to the INTERBUS-S controller board.
- Receipt of INTERBUS-S messages from the INTERBUS-S controller board.
- Logging of the messages received and the command transferred.
- Storing of the INTERBUS-S commands and transfer of the stored commands to the controller board.
- Programming of the EEPROM (and/or the memory card) of the controller board.
- Diagnostics and evaluation of bus operation

Serial interface

The serial interface of the controller board is used to send commands to the controller board and to receive messages from it. The commands or the modules connected to the bus generate messages. The messages are displayed immediately after they have been received, provided that the display has not been explicitly switched off (menu: option).
Whether the controller board accepts transferred command and processes them at all depends on two conditions:

- Commands which are not available on the host controller board will be rejected.
- The controller board is preset in such a way that it receives the commands after a reset or power-up via the serial interface only until the PLC sends a command to the controller board.

This process is described symbolically in Figure 5-5 on the next page.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

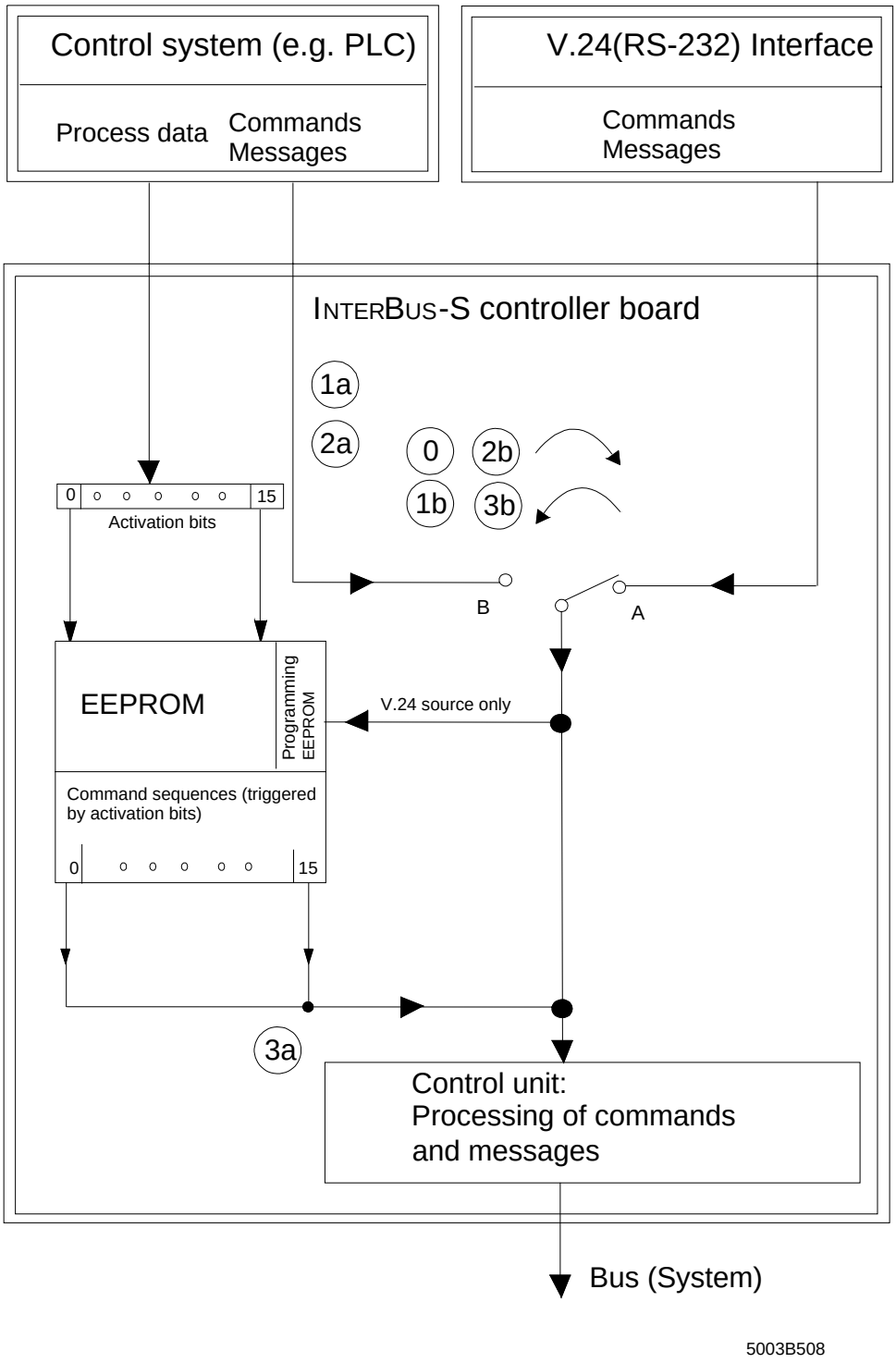


Figure 5-8: Function diagram for the processing of commands and messages

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

0 : After power-up the "switch" returns to the initial position A and provides the connection between the control unit and the V.24 (RS-232) interface.
1a: The first command which the PLC sends sets the switch permanently to position B (process 1b)
2a: The "Disable All Messages" command resets the switch to position A (process 2b)
3a: The "Enable All Messages" command (activated by the EEPROM card via a corresponding activation bit) sets the switch in position B (process 3b); this is necessary if no commands are to be sent with ISFP but messages are to be received .

5.3.3.2 Commands

The commands are described in Chapter 9, "Commands and Messages".
A short description is available in the IBS SYS SWT monitor program.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Chapter 6

Startup

This chapter provides information on

- the possibilities of automatic and controlled start
- how to do the logical and physical addressing
- the address area assignment and the address orientation

6 Startup 6-1

6.1 Introduction 6-1
6.1.1 General Information About Physical Addressing 6-1
6.1.2 General Information About Logical Addressing 6-2
6.1.3 Modes of Operation 6-2
6.1.4 Startup Behavior 6-3
6.1.5 Acknowledgment Behavior 6-4
6.2 Hardware Setting 6-5
6.3 Software Setting 6-6

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

6 Startup

6.1 Introduction

6.1.1 General Information About Physical Addressing

For the physical addressing, the assignment of the addresses for the I/O modules depends on the order of the modules in the bus topology. Thus, the counting direction and the order of modules, local buses and installation remote buses have to be observed.

If one or several modules area removed from the bus topology and physical addressing is used the controller board cannot recognize this modification. Depending on your application this may lead to dangerous situations.

The local buses and INTERBUS modules are counted as follows:

The first module of a local bus is a bus terminal module (BK). All other modules are I/O modules. The first I/O module is coupled to the BK, the second I/O module is coupled to the first I/O module, etc.

Local bus 0 (LB 0) is the local bus the BK of which is connected to the PLC by means of the remote bus. Local bus 1 is coupled to the bus terminal of local bus 0 through the remote bus, etc.

BKs with I/O functions, BKs for the installation remote bus and installation remote bus modules have their own remote bus segment number (RBS).

When addresses are allocated to the modules a difference is to be made between digital and analog I/Os.

Digital I/Os occupy the first window in the PLC's address area and analog I/O the second window.

In the ID code list the WINDOW parameter specifies in which window the respective module appears (see Tables 3-2 and 3-3).

Starting with the base address, the module addresses are stored in the respective window in the PLC's address area. The size of the address area which every module occupies depends on the module.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

6.1.2 General Information About Logical Addressing

When logical addressing is used, the addresses of the individual I/O modules can be freely assigned. The address area in the PLC which has been allocated to the modules must not be used by other devices.

The physical and logical address configuration are combined with address lists. The address lists are stored as data blocks in the PLC or as address lists in the EEPROM memory card. When the PLC and/or the controller board is started, the address lists address the I/O modules in the I/O area of the PLC. With the help of the programming unit the constants for the address lists can be entered in the data blocks or the EEPROM memory card.
When logical addressing is used, the link of the digital modules to window 1 and the analog modules to window 2 is not applicable anymore.

The structure of an INTERBUS-S address list is described in Chapter 3.4.2.

6.1.3 Modes of Operation

Automatic start:

In this mode of operation an automatic start sequence is processed.

- After the voltage of the PLC has been switched on, the controller board runs its self test and answers with "READY".
- The modules are addressed with regard to their physical order in the bus.
- The addresses are automatically stored in the decoder's EEPROM.
- Bus operation is started. (The READY and RUN LEDs are on.)

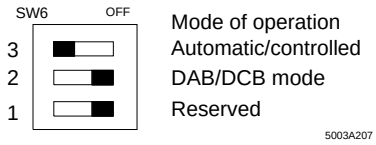


Figure 6-1: Setting of DIP switch SW6 which is used to select the automatic start mode

Controlled start:

The startup in this mode of operation depends on the type of EEPROM which is fitted. The EEPROM determines the controller board's startup behavior.
A controlled start sequence is processed.

- After the voltage of the PLC has been switched on the host controller board runs through its self-test and answers with "READY".
- The start sequence which follows is either determined by an EEPROM or by the PLC (with function blocks).

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

- The modules are addressed in accordance with the start sequence in their physical or logical order.
- After the modules have been addressed the addresses are automatically stored in the decoder's EEPROM.
- Bus operation is started.

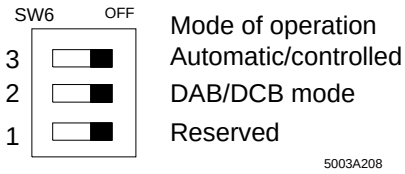


Figure 6-2: Setting of DIP switch SW6 which is used to select the controlled start mode

6.1.4 Startup Behavior

In principle, the controller board is for the PLC an I/O module with a variable address area. The address area which the controller board occupies can be addressed by the PLC in the usual way (L IW, L PW, L QW, T OW, T PW, T QW, U I, S O,...).
When the PLC starts operation after the voltage has been switched on or the STOP/RUN switch has been actuated, the following startup results.

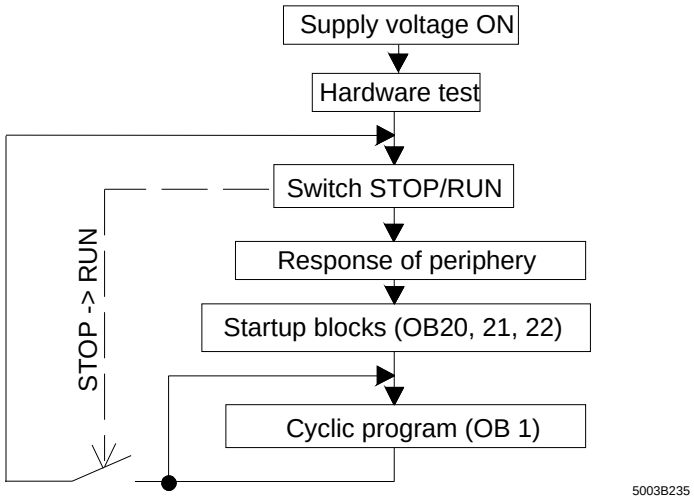


Figure 6-3: PLC startup

Under the menu item "Addressing the Periphery" all correctly connected I/O modules indicate their readiness. They are entered in the PLC as existing I/O components. These addresses are copied cyclically into the process image of the inputs and outputs. As soon as the application program addresses an address which was not recognized during startup, an error message is output depending on the PLC.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

6.1.5 Acknowledgment Behavior

The acknowledgement behavior of the controller board is determined by the mode (DCB or DAB) and the start (automatic/controlled). This connection becomes important when the application dynamically changes the bus system and, therefore, enlarges and/or reduces the address area which the IBS modules represent.

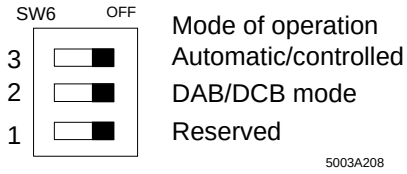


Figure 6-4: Setting of the operating modes DCB or DAB

Free addressing (DCB mode):
In this mode of operation all addresses which are occupied by INTERBUS-S I/O modules and registers will be acknowledged to the PLC in the cyclic part.

a) Automatic start:
Starting at the base addresses of the windows 1 and 2 all modules are addressed and acknowledged. The length specification depends on the space requirement of the modules. The setting of the window area refers to the I/O area of the PLC. The diagnostic registers are located below the base addresses. The set window lengths must not be shorter than the address area of the modules. If the length specification of the windows is larger than the space requirement of the modules, the **unassigned addresses will not be acknowledged**.

b) Controlled start:
All module and register addresses (e.g. diagnostic registers) are defined by means of logical addressing. Only the **defined addresses will be acknowledged** to the PLC (smallest unit 1 word, an even base address is permitted).

Addressing with fixed area (DAB mode):
In this mode of operation all addresses are acknowledged which were defined with the window settings before.

a) Automatic start:
Starting at the base addresses of the windows 1 and 2, all modules are addressed and acknowledged. The length specification depends on the space requirement of the modules. The setting of the window area refers to the I/O area of the PLC. The diagnostic registers are located below the base addresses. The set window lengths must not be shorter than the address area of the modules. If the length setting of the windows is larger than the space requirement of the modules, the **unassigned addresses will also be acknowledged**.

b) Controlled start:
All module and register addresses (e.g. diagnostic registers) must be defined within the window area by means of logical addressing. **All window addresses are acknowledged**.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The communication registers (window 3) must be set independently of the start (automatic/controlled) and mode setting (DAB/DCB) They always occupy two words in the I/O area of the PLC.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

6.2 Hardware Setting

Table 6-1 shows how to set switch SW6 in order to get the required type of operation and addressing as it was described before.
The switch positions also show whether the settings require another determination of the base addresses and the window lengths with switches SW1 to SW4.
The given setting options of jumpers 1 to 10 and switch SW5 are described in detail in Chapter 2. These default settings have to be kept for a quick startup when extended functions are not required.

Table 6-1: Setting the types of operation and addressing with switch SW6

Description					Setting
Operation:	Automatic		Controlled		
Addressing: (Mode)	Fixed areas (DAB)	Free (DCB)	Fixed areas (DAB)	Free (DCB)	Switch 6
	3 2 1 ON	3 2 1 ON	3 2 1 ON	3 2 1 ON	
Window: 1					
Base:	YES	YES	YES	NO	Switch 1
Length:	YES	YES	YES	NO	Switch 2
Window: 2					
Base:	YES	YES	YES	NO	Switch 3
Length:	YES	YES	YES	NO	Switch 4

YES =to be set NO = not relevant

Setting: Communication register	Switch 5
Installation: Central controller Controller expansion unit	Jumper 1
Interrupt ON/OFF	Jumper 3
Error message but acknowledgment delay	Jumper 4
Interrupt source	Jumper 5
Interrupt destination	Jumper 6
Interrupt master/slave	Jumper 7
Interrupt identification	Jumper 8
Reset button active/passive	Jumper 10

5003B602

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

6.3 Software Setting

When the setting of switch SW6 has determined a certain type of operation and addressing the software may be set afterwards. This setting depends on the different operational requirements made on the bus system.

These requirements are:

1) The startup behavior of the controller board (has already been determined in the hardware setting): either automatic or controlled start.

2) The start characteristics of the bus system in the PLC: a difference is made between the start of the INTERBUS-S system during PLC startup and in the cyclic program part. The initial start during startup is coordinated and monitored with the startup OBs 20, 21 and 22.

3) The necessity to do switching operations through the application program. This includes the enabling and disabling of bus segments in the cyclic program, the demand of diagnostic data, and the parameterization of modules which are capable of PCP communications (PCP= **P**eripherals **C**ommunication **P**rotocol).

4) The request to program the bus system. This is either possible with the help of the PLC and function blocks or the EEPROM card and the controller board.

The following pages show example bus structures (topology, ID code and I/O address assignment) and the program sequences belonging to them. They are based on an overview table which lists on the next page the possible combinations of the above-mentioned requirements and the hardware settings which you have already done.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The two-part Table 6-2 helps to find out quickly on which page you will find the example that matches your application.
The first part only relates to automatic start with physical addressing.
The second part relates to the startup behavior and the possibility for PCP communication when the bus is controlled with function blocks or the EEPROM memory card.
The lines include:

- the name of the example; this name also marks the page belonging to it
- a distinctive number which stands for the necessary set of hardware components
  "1" = IBS S5 DCB + ISFP + user manual
  "2" = IBS S5 DCB + ISFP + SYS SWT + EEPROM + programming cable+ user manual

Table 6-2: Overview of the programming examples for different system starts and control and operating modes

Automatic start with physical addressing	Example/ Page : DCBPHY/6-8 Hardware: 1	Hardware setting Page 6-8

Controlled start with logical addressing for I/O modules	Control via function blocks (ISFP)	Control via memory card (EEPROM)	Hardware settings
System start during startup	Example/ Page: DCBADR / 6-12 Hardware : 1	Example/ Page: DCBEEP/ 6-22 Hardware : 2	Page 6-11
System start in the PLC cycle	Example/ Page: DCBZYK / 6-26 Hardware : 1	Example/ Page: DCBEEP / 6-22 Hardware : 2	Page 6-11
Additionally with PCP communication	Example/ Page: DCBCP / 6-40 Hardware: 1	Example/Page: DCBECP / 6-54 Hardware: 2	Page 6-11

online components.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Hardware setting for the DCBPHY example

DCBPHY

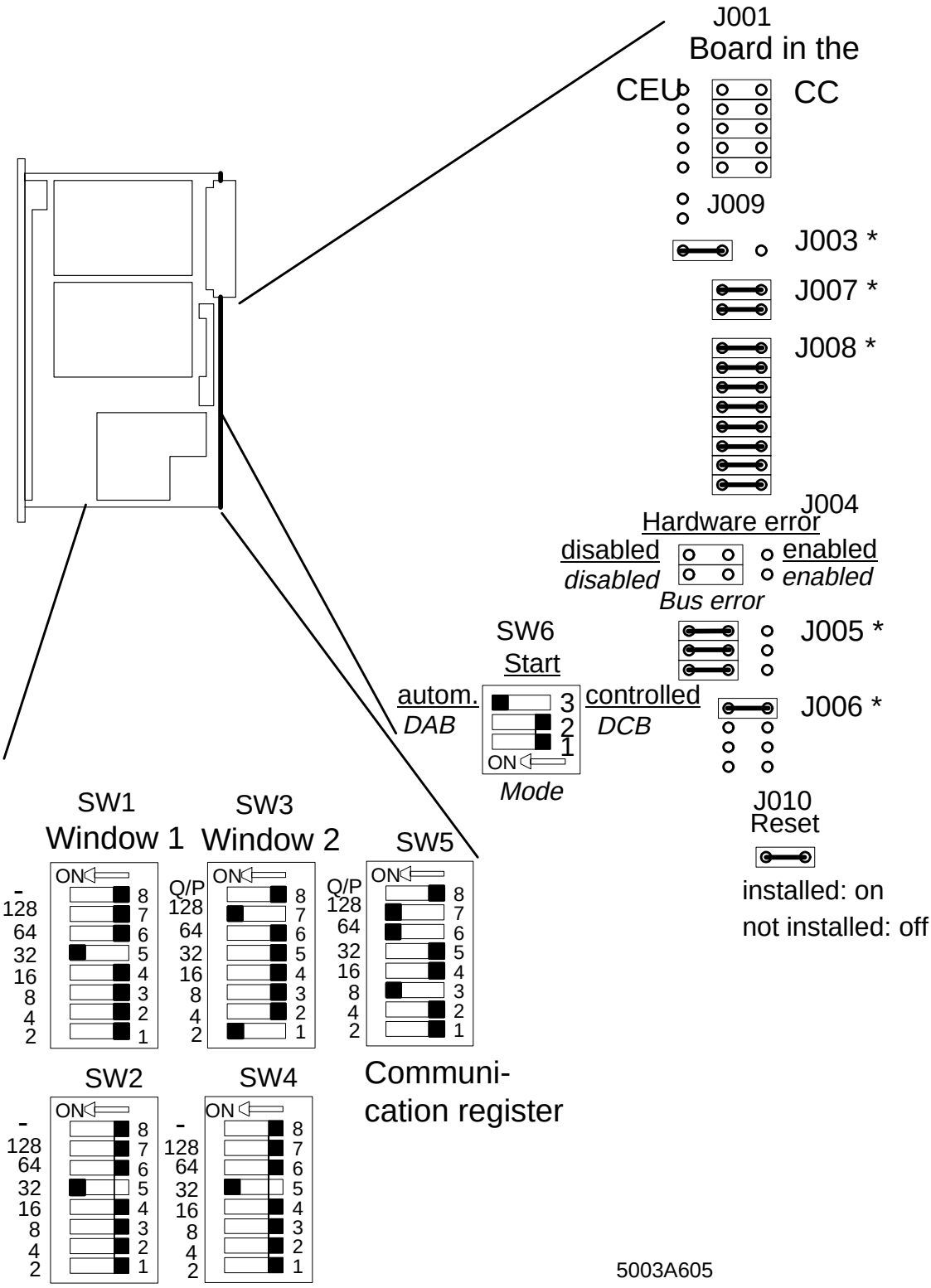


Figure 6-5: Hardware setting for automatic start with physical addressing

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Bus topology for the DCBPHY example

DCBPHY

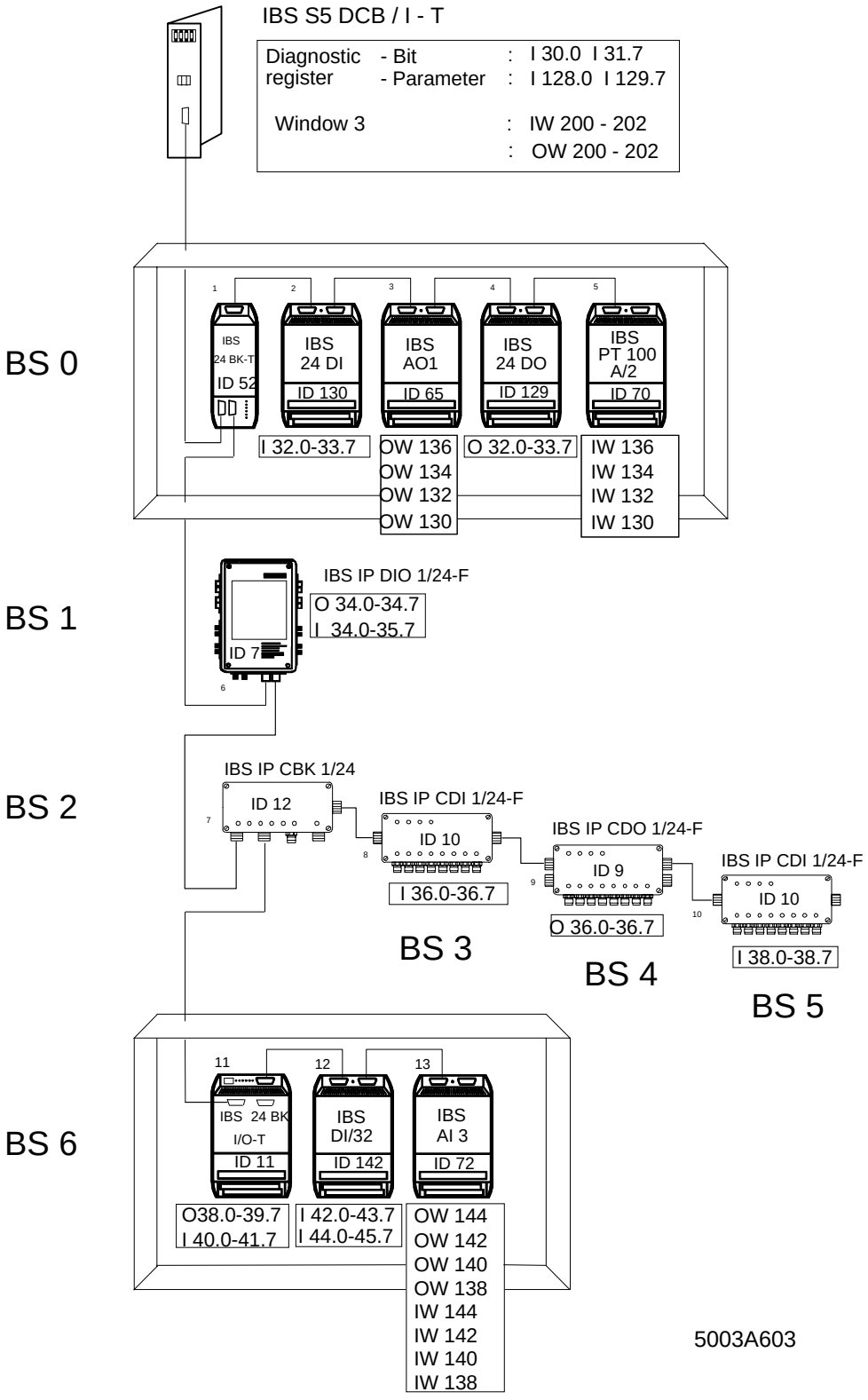


Figure 6-6: Exemplary I/O address allocation for the DCBPHY example (automatic start with physical addressing)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DCBPHY software setting for automatic start with physical addressing

DCBPHY

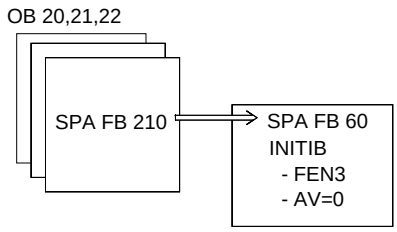
a) Short description of physical addressing

When the controller board is started (power up, RESET), physical addressing is activated in the automatic start mode.
The controller board puts the connected bus configuration into operation and assigns an I/O address to every I/O module.
The assignment of the PLC's address area depends on the window setting of the controller board.
The digital I/O modules are put into the first window and the analog I/O modules in the second window.
The allocation of the window starts at the set base address of the window.
The related program file is called DCBPHYST.S5D. It is stored on the floppy disk.

Diagnostics:
The function of the system can be monitored with the diagnostic registers (diagnostic bit register: below window 1; diagnostic parameter register: below window 2). In this mode of operation, the positions of the registers depend on the base addresses of windows 1 and 2.

Windows to be set:	DAB	DCB
F1: Base address	Yes	Yes
Length	Yes	Yes
F2: Base address	Yes	Yes
Length	Yes	Yes
F3: Base address	Yes	Yes
See also Figure 6-5		

b) Program structure of the example



5003a606

c) Program example

```
OB 20/21/22
                :SPA FB 210
NAME             :ANLAUF
                :BE

FB 210
NETWORK 1
NAME :ANLAUF

                  :SPA FB  60
NAME            :INITIB
IBDB              :DB   0    InterBus data block
FEN3              :KF +200   Base address of window 3
AV                :KF +0     Automatic start
RRST              :DB   0    REQ/RES standard DB
CIST              :DB   0    CON/IND standard DB
RRMW              :KF +0     Activation word
CIMW              :KF +0     Signal word
CIFB              :FB   0    Auxiliary driver
T                 :T    0    Timer
STEP              :MB   0    Internal flag byte
BUSY              :M   10.0  Activation bit
TO                :M   10.1  Timeout
RET               :M   10.2  Return value
                             :UN  M  10.2
                :BEB
                 :STP
                 :BE
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Hardware setting for the examples DCBADR, DCBEEP, DCBZYK, DCBCP, DCBECP

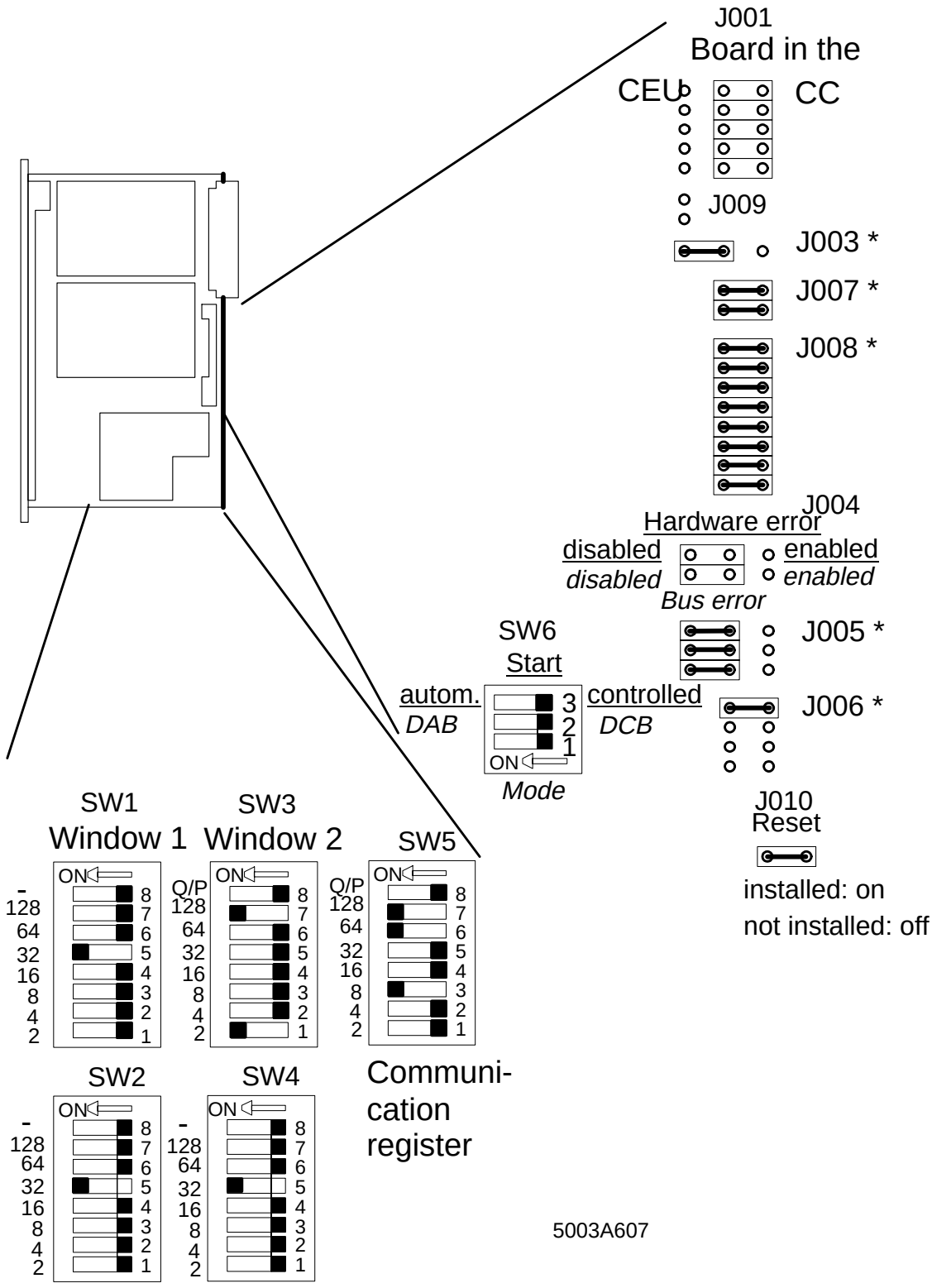


Figure 6-7: Hardware setting for different system start and bus control methods (examples DCBADR, DCBEEP, DCBZYK, DCBCP, DCBECP. The jumpers marked with * do not exist on the board with revision C. Chapter 2.3.2 shows how to find out the revision of your board. These jumpers settings must not be changed.)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Bus topology for the DCBADR example

DCBADR

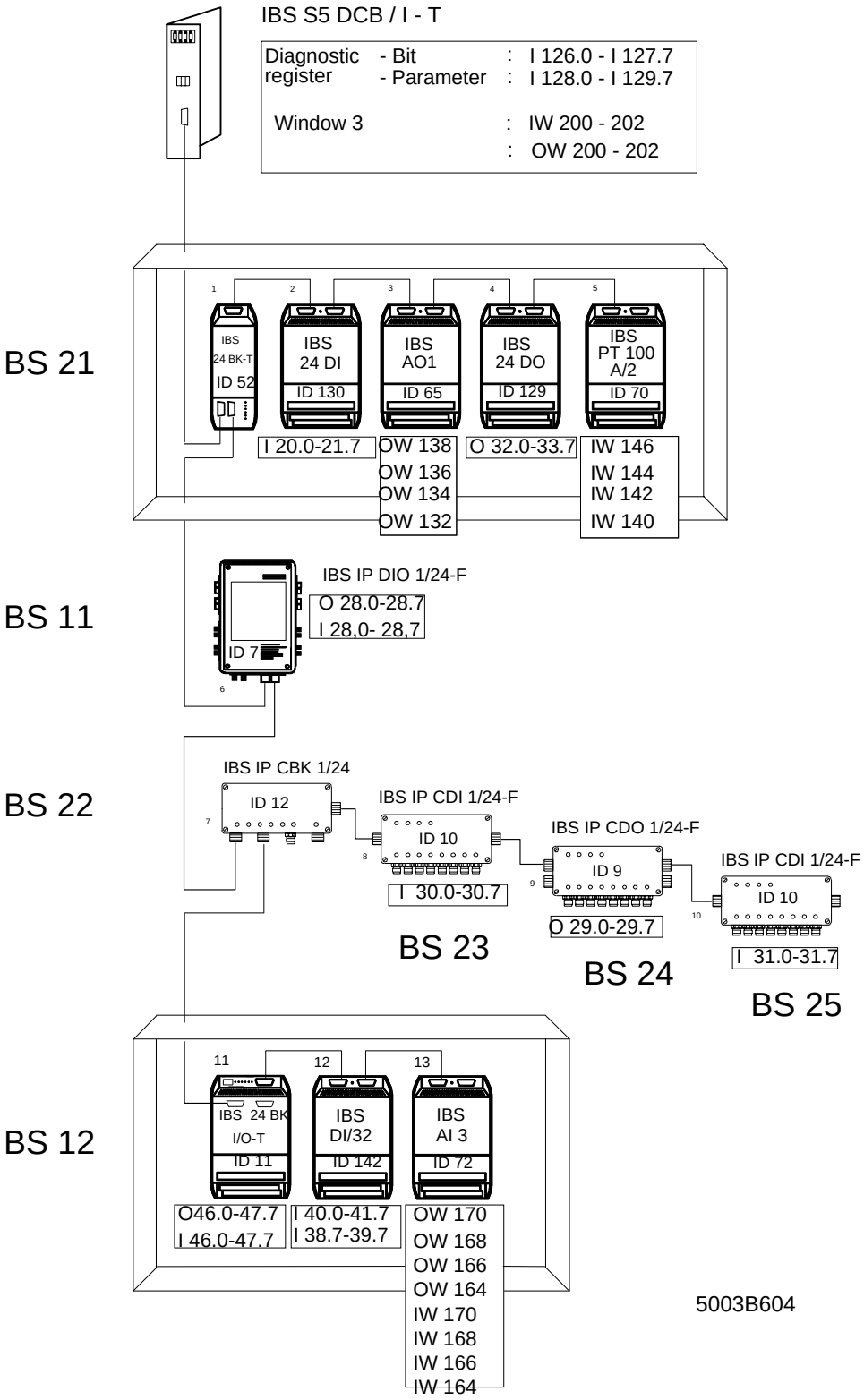


Figure 6-8: Exemplary I/O address allocation for the DCBADR example (controlled start, logical addressing and system start during PLC startup)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DCBADR software setting for controlled start with logical addressing for a system start during startup

DCBADR

a) Short description of logical addressing during startup

This function block initiates the logical addressing of the INTERBUS-S system. It includes an initialization block (INITIB), two driver blocks (REQ/RES, CON/IND), an auxiliary driver (CIH) and the addressing block (ADDRESS).

Windows to be set:	DAB	DCB
F1: Base address	Yes	No
Length	Yes	No
F2: Base address	Yes	No
Length	Yes	No
F3: Base address	Yes	Yes
See also Figure 6-7		

In this example digital and analog I/O modules are addressed. The addressing block transfers the logical address lists to the controller board where they are checked. The related program file is called DCBADR.S5D. It is stored on the floppy disk.

Data blocks of the example:

ID code list:	DB 10
Bus segment list:	DB 11
IN address list:	DB 12
OUT address list:	DB 13

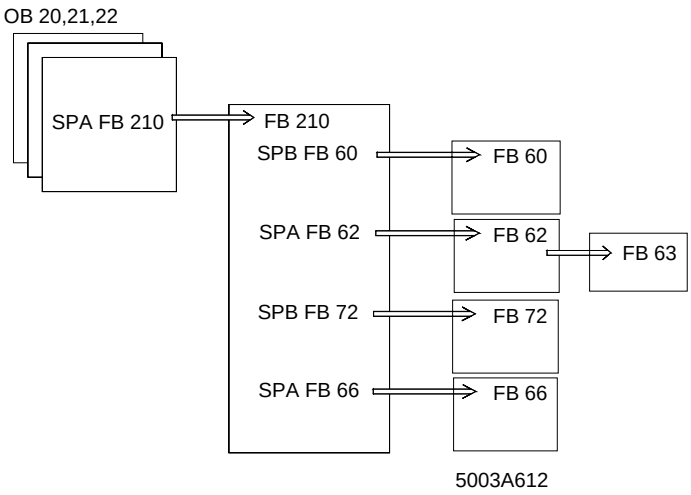
After the system start and the disabling of the messages from the controller board to the PLC (AV = 3) the startup block is exited.
In the cyclic program the application can now access the defined module addresses.

Diagnostics:
The function of the system can be monitored via the diagnostic registers (diagnostic bit register, diagnostic parameter register). The diagnostic registers have to be defined by means of logical addressing.
If diagnostics through function blocks is requested, the messages have to be enabled (AV = 1). In order to get the message, the CON/IND driver block (FB 62) and its CIH auxiliary driver (FB63) must be linked to the OB1 (same parameterization as for the startup).

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

b) Program structure of the example



c) Schematized program example

Startup Block FB 210

```
: U      M   8.0
: ON     M   8.0
: S      M   8.0
: S      M  10.0
:
LOOP: U      M   8.0
: SPB    FB 60 ---> INITIB
:                     - FEN3
:                     - AV=3
:
:
:
:
:
:
: SPA    FB 62 ---> CON/IND
:
:
:
: UN     M   8.0
: U      M  10.0
: SPB    FB72  ---> ADDRESS
:                     - ID code list
:                     - Bus segment list
:                     - IN address list
:                     - OUT address list
:
:
:
: SPA    FB 66 ---> REQ/RES
:
:
:
: U      M   8.0
: O      M  10.0
:  SPB = LOOP
:
```

5003B613

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

d) Detailed program example with organization, function and data blocks

```
OB 20/21/22

          :SPA FB 210
NAME      :ANLAUF
          :BE


FB 210
          :U  M  8.0
          :ON M  8.0
          :S  M  8.0  Activation bit: INITIB
          :S  M 10.0  ADDRESS
          :L  KY 0,0  CON/IND,REQ/RES
          :T  MW  18  DB PCP header tables
LOOP      :U  M  8.0
          :SPB FB 60
NAME      :INITIB
IBDB      :   DB 9    InterBus data block
FEN3      :   KF +200 Base address of window 3
AV        :   KF +3   Controlled start/disable message
RRST      :   DB 0    REQ/RES standard DB
CIST      :   DB 0    CON/IND standard DB
RRMW      :   KF +0   Activation word
CIMW      :   KF +0   Signal word
CIFB      :   FB 63   CON/IND auxiliary driver
T         :   T  0    Timer
STEP      :   MB 9    Internal flag byte
BUSY      :   M  8.0  Activation bit
TO        :   M  8.1  Timeout
RET       :   M  8.2  Return value
          :U  M  8.0
          :ON M  8.2
          :SPB=ADR
          :STP
          :BEA
      ADR:
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS


```
ADR       :SPA FB  62
NAME      :CON/IND
IBDB      :   DB  9    InterBus data block
CIDB      :   MB 18    CON/IND data block
T:        :   T   1    Timer
TO        :   M  8.3   Timeout
          :UN M  8.0
          :U  M 10.0
          :SPB FB 72
NAME      :ADDRESS
IBDB      :   DB 9    InterBus data block
BUSY      :   M  10.0 Activation bit
T         :   T   2   Timer
IDDB      :   DB 10   DB: ID code list
IDDW      :   KF +0   DW:
LBDB      :   DB 11   DB: Bus segment list
LBDW      :   KF +0   DW:
INDB      :   DB 12   DB: IN address list
INDW      :   KF +0   DW:
OUDB      :   DB 13   DB: OUT address list
OUDW      :   KF +0   DW:
KRDB      :   DB  0   DB: KR address list
KRDW      :   KF +0   DW:
GRDB      :   DB  0   DB: Group definitions
GRDW      :   KF +0   DW:
MODE      :   M  10.5 Mode of display
EREG      :   MW 12   Error register
TO        :   M  10.1 Timeout
RET       :   M  10.2 Return value
          :
          :SPA FB  66
NAME      :REQ/RES
IBDB      :   DB  9   InterBus data block
RRDB      :   MB 19   Header DB for REQ/RES
T         :   T   3   Timer
TO        :   M  8.4  Timeout
          :U  M  8.0  INITIB
          :O  M 10.0  ADDRESS
          :SPB =LOOP
          :UN M 10.2
          :BEB
          :STP
          :BE
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DB10

Identification code list:

The ID code address list includes the physical bus configuration. The configuration is described with the help of the ID numbers of the modules and their length codes. The modules are counted beginning from the controller board and through the entire bus configuration. The list is completed with the entry of the special ID codes.

In the example:

ID 16 = Diagnostic bit register
ID 17 = Diagnostic parameter register

Structure of the list:

DB x

DW y	KY=	000, PC	Parameter count
DW y+1	KY=	LC , ID	1st module
DW y+2	KY=	LC , ID	2nd module
....	.....		.....
DW y+n-2	KY=	LC , ID	nth module
DW y+n-1	KY=	000, SID	Special ID code
DW y+n	kY=	000, SID	Special ID code

Key:

PC = Quantity of subsequent parameters (n)
LC = Length code of the module (*)
ID = Identification code of the module (*)
SID = Special ID code (**)

(*) To be taken from the module description of the manufacturer
(**) Permitted codes:

ID: 16 = Diagnostic bit register
17 = Diagnostic parameter register
18 = Bit-controlled command register
19 = Bit manipulation register

```
DB10

0:      KY = 000,015;     Parameter count
1:      KY = 000,052;     IBS 24 BK-T
2:      KY = 001,130;     IBS 24 DI
3:      KY = 004,065;     IBS AO 1
4:      KY = 001,129;     IBS 24 DO
5:      KY = 004,066;     IBS PT 100 A/2
6:      KY = 001,007;     IBS IP DIO 1/24
7:      KY = 000,012;     IBS IP CBK 1/24 F
8:      KY = 129,010;     IBS IP CDI 1/24 F
9:      KY = 129,009;     IBS IP CDO 1/24 F
10:     KY = 129,010;     IBS IP CDI 1/24 F
11:     KY = 001,011;     IBS 24 BK-I/O-T
12:     KY = 002,142;     IBS 24 DI 32
13:     KY = 004,071;     IBS AI 3
14:     KY = 000,016;     Diagnostic bit register
15:     KY = 000,017;     Diagnostic parameter register
16:
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DB11

Bus segment list:

The bus segment list describes the logical assignment between the physical segment structure (with the help of the module position) and the logical segment numbering. Another parameter is used to define the remote bus structure (installation depth).

A bus segment consists of:

a) Bus terminal module with connected local bus
b) Remote bus modules with I/O
c) IBS ST; bus terminal module
d) Installation remote bus module

The logical numbering of the segments is done by the bus terminal module. The list structure (parameter count) is adapted to the ID code list. The segment number (0 to 255) is entered in the list at every bus terminal module location.

Installation depth:

The remote bus structure is divided into the main remote bus line (installation depth = 0) and the installation remote bus (installation depth =16).

Structure of the list:

DB x

DW y	KY=	000, PC	Parameter count
DW y+1	KY=	IT, SN	1st module (BK)
DW y+2	KY=	000, 000	
....	.....		...
DW y+n-2	KY=	IT, SN	nth module (BK)
DW y+n-1	KY=	000, SID	Special ID code
DW y+n	kY=	000, SID	Special ID code

Key:

PC = Quantity of subsequent parameters (n)		SN = Bus segment no. (0 - 255)
IT = Installation depth	0 = Main line	16 = Installation remote bus

```
DB11
0:      KY = 000,015;     Parameter count
1:      KY = 000,021;     IBS 24 BK-T
2:      KY = 000,000;     IBS 24 DI
3:      KY = 000,000;     IBS AO 1
4:      KY = 000,000;     IBS 24 DO
5:      KY = 000,000;     IBS PT 100 A/2
6:      KY = 000,011;     IBS IP DIO 1/24
7:      KY = 000,022;     IBS IP CBK 1/24-F
8:      KY = 016,023;     IBS IP CDI 1/24-F
9:      KY = 016,024;     IBS IP CDO 1/24-F
10:     KY = 016,025;     IBS IP CDI 1/24-F
11:     KY = 000,012;     IBS BK-I/O-T
12:     KY = 000,000;     IBS 24 DI/32
13:     KY = 000,000;     IBS AI 3
14:     KY = 000,000;     Diagnostic bit register
15:     KY = 000,000;     Diagnostic parameter register
16:
```

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DB12

IN address list:

The IN address list includes the logical input addresses of the modules. The list is an image of the ID code list. Every place in the list which is occupied by an input module is allocated an input address. This address is the base of the module in the PLC.

In the example:

DW 12 KY = 000 , 038 IBS 24 DI/32

The digital input module with 32 inputs becomes visible in the PLC in input words 38 and 40.

Structure of the list:

DB x

DW y	KY= 000, PC	Parameter count
DW y+1	KY= B , ADR	1st module
DW y+2	KY= B , ADR	2nd module
....	...	...
DW y+n-2	KY= B , ADR	nth module
DW y+n-1	KY= B , ADR	Special ID code
DW y+n	kY= B , ADR	Special ID code

Key:

PC = Quantity of subsequent parameters (n)

B = Address area 0 = P area of the PLC
1 = Q area of the PLC

ADR = Base address of the module (0 - 255)
Base address: word-oriented module = even address
byte-oriented module = odd/even address

```
DB 12

 0:      KY = 000,015;     Parameter count
 1:      KY = 000,000;     IBS 24 BK-T
 2:      KY = 000,020;     IBS 24 DI
 3:      KY = 000,000;     IBS AO 1
 4:      KY = 000,000;     IBS 24 DO
 5:      KY = 000,140;     IBS PT 100 A/2
 6:      KY = 000,028;     IBS IP DIO 1/24
 7:      KY = 000,000;     IBS IP CBK 1/24-F
 8:      KY = 000,030;     IBS IP CDI 1/24-F
 9:      KY = 000,000;     IBS IP CDO 1/24-F
10:      KY = 000,031;     IBS IP CDI 1/24-F
11:      KY = 000,046;     IBS 24 BK-I/O-T
12:      KY = 000,038;     IBS 24 DI/32
13:      KY = 000,164;     IBS AI 3
14:      KY = 000,126;     Diagnostic bit register
15:      KY = 000,128;     Diagnostic parameter register
16:
```

online-components.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DB13

OUT address list:

The OUT address list includes the logical output addresses of the modules. The list is an image of the ID code list. Every place in the list which is occupied with an output module is allocated an output address. This address is the base of the module in the PLC.

In the example:

DW 4 KY = 000 , 032 IBS 24 DO

The digital output module with 16 outputs becomes visible in the PLC in output word 32.

Structure of the list:

DB x

DW y	KY= 000, PC	Parameter count
DW y+1	KY= B , ADR	1st module
DW y+2	KY= B , ADR	2nd module
....	.....	...
DW y+n-2	KY= B , ADR	nth module
DW y+n-1	KY= B , ADR	Special ID code
DW y+n	kY= B , ADR	Special ID code

Key:

PC = Quantity of subsequent parameters (n)

B = Address area 0 = P area of the PLC
1 = Q area of the PLC

ADR = Base address of the module (0 - 255)
Base address: word-oriented module = even address
byte-oriented module = odd/even address

```
DB13

 0:       KY = 000,015;     Parameter count
 1:       KY = 000,000;     IBS 24 BK-T
 2:       KY = 000,000;     IBS 24 DI
 3:       KY = 000,132;     IBS AO 1
 4:       KY = 000,032;     IBS 24 DO
 5:       KY = 000,000;     IBS PT 100 A/2
 6:       KY = 000,028;     IBS IP DIO 1/24
 7:       KY = 000,000;     IBS IP CBK 1/24-F
 8:       KY = 000,000;     IBS IP CDI 1/24-F
 9:       KY = 000,029;     IBS IP CDO 1/24-F
10:       KY = 000,000;     IBS IP CDI 1/24-F
11:       KY = 000,046;     IBS 24 BK-I/O-T
12:       KY = 000,000;     IBS 24 DI/32
13:       KY = 000,146;     IBS AI 3
14:       KY = 000,000;     Diagnostic bit register
15:       KY = 000,000;     Diagnostic parameter register
16:
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The DCBEEP example is given on the next page in order to avoid having to turn over between the pages "Bus topology...." and "Software setting..."

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Bus topology for the DCBEEP example

DCBEEP

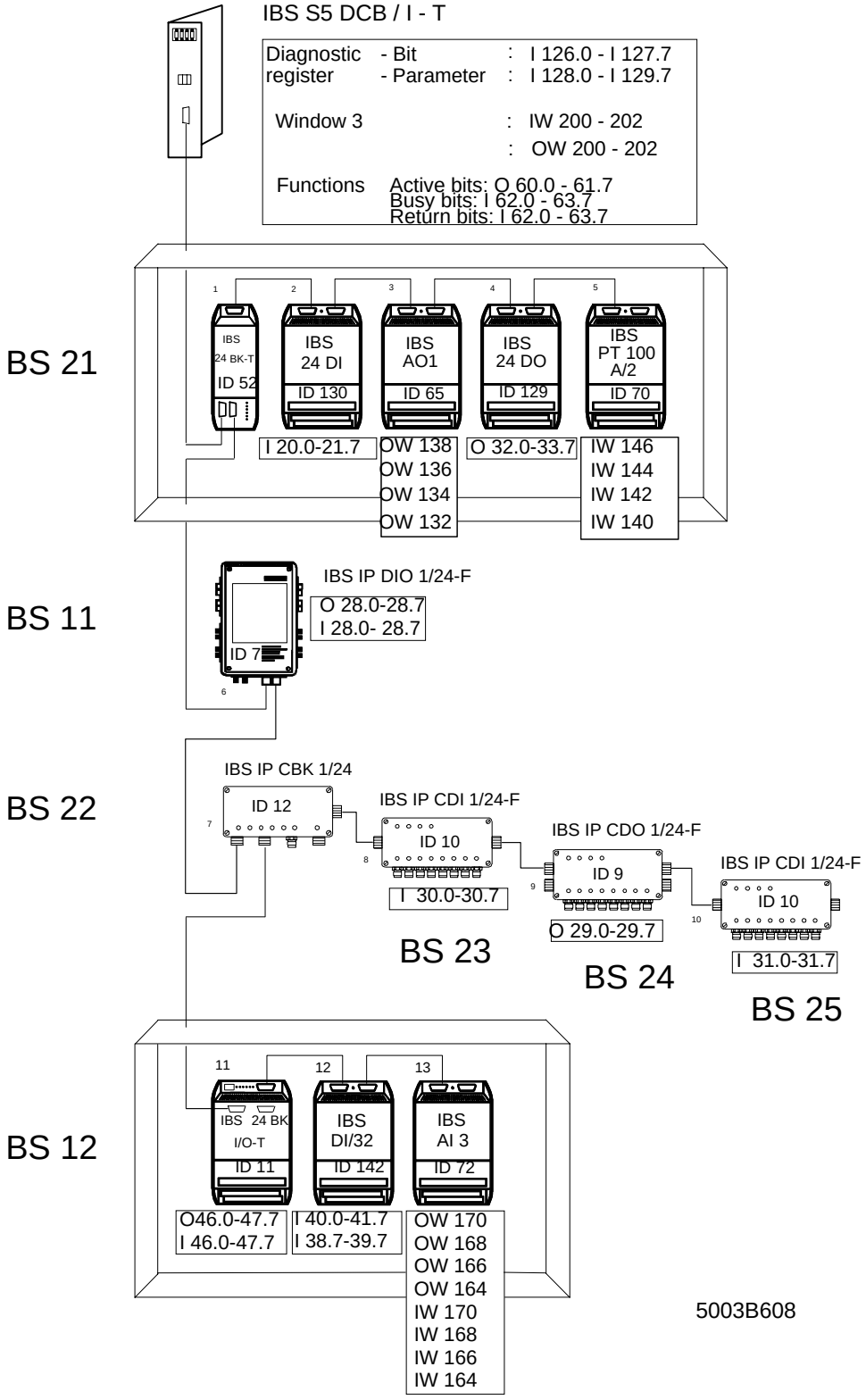


Figure 6-9: Exemplary I/O address allocation for the DCBEEP example (controlled start, logical addressing, system start during PLC startup or program, control via memory card)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DCBEEP software setting for controlled start with logical addressing for a system start during PLC startup or program, control via memory card

a) Short description of logical addressing with EEPROM during startup

The logical addressing of the INTERBUS-S system after power up or reset is initiated by means of the start sequence (Bit 0) of the EEPROM card. The following function retains the PLC in its startup block until the controller board in the RUN operation. To this end, an initialization block (INITIB) is called.

Windows to be set:	DAB	DCB
F1: Base address	Yes	No
Length	Yes	No
F2: Base address	Yes	No
Length	Yes	No
F3: Base address	Yes	Yes
See also Figure 6-7		

In this example digital and analog I/O modules are addressed. The logical address lists are transferred via the EEPROM card to the bus control where they are checked. The address list can be projected by means of the IBS SYS SWT configuration software. The input scheme corresponds - according to the structure - to the following lists (address lists of the example):

No.	Name	Module		Bus segment		Group	Input		Output	
		PD length	ID	Level 0/1	No.	Number	P=0/Q=1	Adr.	P=0/Q=1	Adr.
1	BK T	0	52	0	21	0	0	0	0	0
2	DI	1	130	0	0	0	0	20	0	0
3	AO 1	4	65	0	0	0	0	0	0	132
4	24 DO	1	129	0	0	0	0	0	0	32
5	PT100	4	66	0	0	0	0	140	0	0
6	DIO	1	7	0	11	0	0	28	0	28
7	CBK	0	12	0	22	0	0	0	0	0
8	DI	129	10	1	23	0	0	30	0	0
9	DO	129	9	1	24	0	0	0	0	29
10	DI	129	10	1	25	0	0	31	0	0
11	BK-I/O-	1	11	0	12	0	0	46	0	46
12	24 DI/32	2	142	0	0	0	0	38	0	0
13	AI 3	4	72	0	0	0	0	164	0	164
14	Diag. Bit	0	16	0	0	0	0	126	0	0
15	Diag.Para.	0	17	0	0	0	0	128	0	0
16	Bitc.Comm	0	18	0	0	0	0	60	0	60

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

After the system has been started and the messages from the controller board to the PLC have been disabled the startup block is exited.
In the cyclic program the application can then access the defined module addresses.

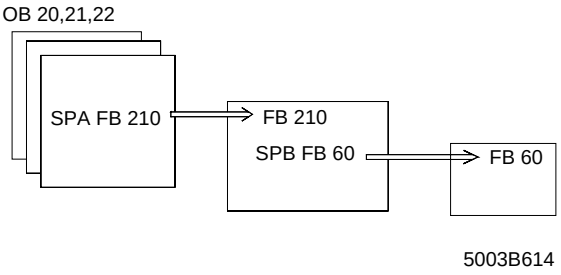
Application register:
With the register for bit-controlled commands the program sequences stored in the EEPROM are initiated.

Register allocation:

OW Activation bit	The sequence (0...15) is initiated.
IW BUSY bit	A set busy bit indicates a tested sequence or one which has just been processed.
IW RETurn bit	Value=0: Sequence processed without errors Value=1: Sequence processed with errors

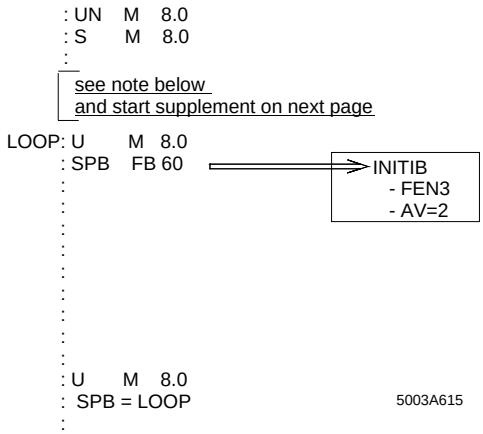
Diagnostics:
The function of the system can be monitored by means of the diagnostic registers (diagnostic bit/parameter registers). The diagnostic registers have to be defined by means of logical addressing.
If diagnostics through function blocks is requested, the messages have to be enabled. In order to get the message, the CON/IND driver block must be linked to the OB1 and a valid data block must be entered in the IBDB parameter.

b) Program structure of the example



c) Schematized program example

Startup block FB 210



The start sequence (bit 0 of the EEPROM card) is only activated by resetting the host controller board or by switching the PLC off and on. If the host controller board is to start with STOP/RUN as well, the start sequence (bit 0) in the OB 20 and OB 21 have to be called before the INITIB driver is called. The associated program code is listed after the following program example (OB 20, FB 210). It is called "Start supplement". Its position in the FB 210 can be taken from the schematized program example under item C) or the program example itself.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

d) Detailed program example with organization, function and data blocks

```
OB 20/21/22
          :SPA FB 210
NAME      :ANLAUF
          :BE

FB210
          :UN M  8.0
          :S  M  8.0  Activation bit: INITIB

          :           At this point the start supplement
                      listed below would be inserted (see
                      note on previous page).

INIT      :U  M  8.0
          :SPB FB 60
NAME      :INITIB
IBDB      :   DB  0   InterBus data block
FEN3      :   KF +200 Base address of window 3
AV        :   KF +2   EEPROM operation
RRST      :   DB  0   REQ/RES standard DB
CIST      :   DB  0   CON/IND standard DB
RRMW      :   KF +0   Activation word
CIMW      :   KF +0   Signal word
CIFB      :   FB  60  CON/IND auxiliary driver
T         :   T   0   Timer
STEP      :   MB  9   Internal flag byte
BUSY      :   M   8.0 Activation bit
TO        :   M   8.1 Timeout
RET       :   M  8.2  Return value
          :U  M  8.0
          :SPB =INIT
          :UN M   8.2
          :BEB
          :STP
          :BE
```

Start supplement:

```
          :L  KM  00000000 00000001   Bit 0 activated
          :T  PW  60                  Activation bit
                                      -Set register
AKTI      :L  PW  60                  Read busy bit register
          :T  MW  240
          :UN M   241.0               Busy bit not active?
          :SPB = AKTI
          :L  KH  0000
          :T  PW  60                  Activation bit
                                      -Reset register
BUSY      :L  PW  60                  Read busy bit register
          :T  MW  240
          :U  M   241.0               Busy-Bit-0 active?
          :SPB = BUSY
          :
```

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Bus topology for the DCBZYK example

DCBZYK

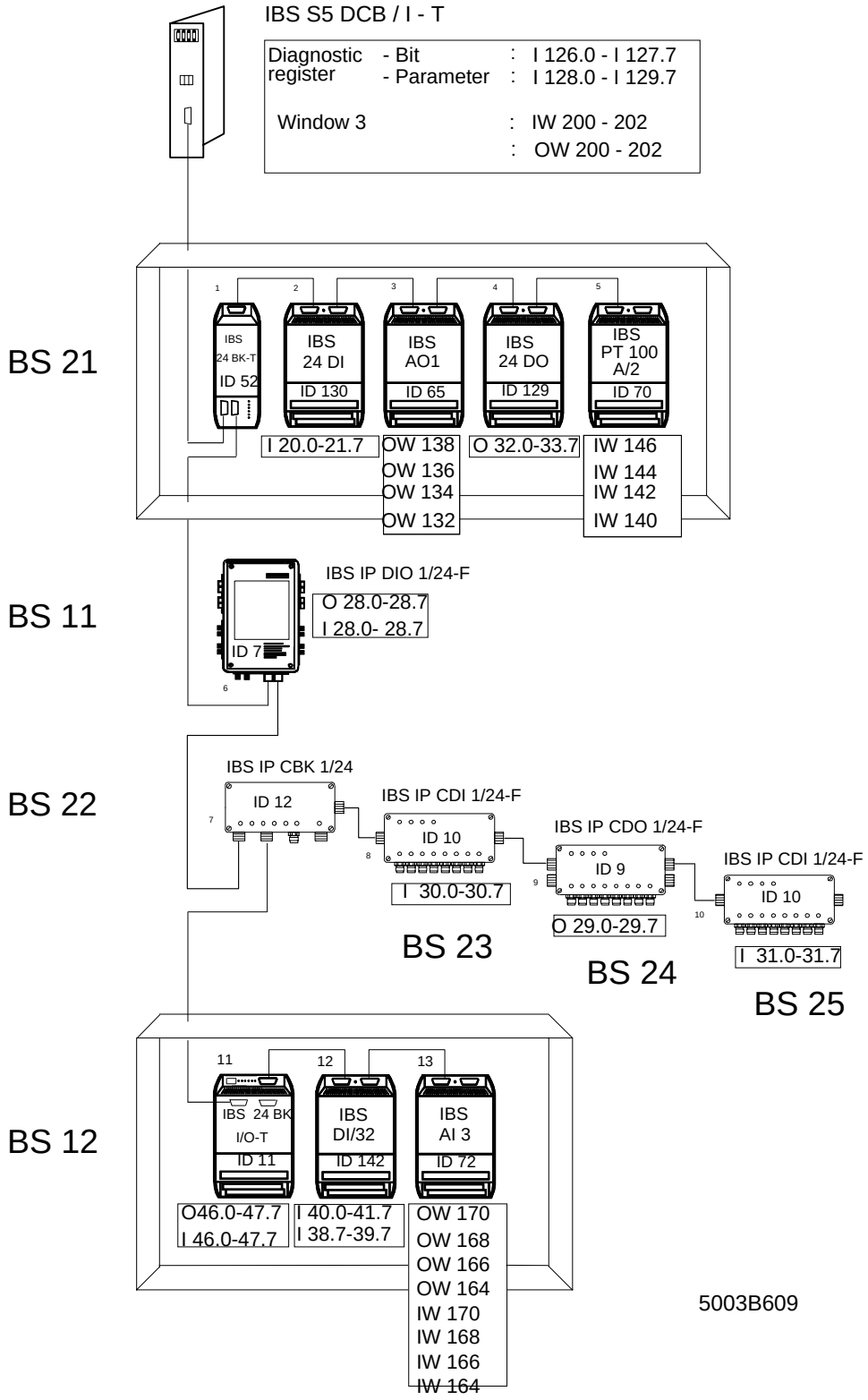


Figure 6-10: Exemplary I/O address allocation for the DCBZYK example (controlled start, logical addressing, system start in the PLC program, control via function blocks)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DCBZYK software setting for controlled start with logical addressing during system start in the PLC program, control via function blocks

DCBZYK

a) Short description of logical addressing during startup

The logical addressing of the INTERBUS-S system is initiated with the FB 210 function block. It includes an initialization block (INITIB), two driver blocks (REQ/RES, CON/IND), an auxiliary driver (CIH), and the addressing block (ADDRESS).

Windows to be set:	DAB	DCB
F1: Base address	Yes	No
Length	Yes	No
F2: Base address	Yes	No
Length	Yes	No
F3: Base address	Yes	Yes
See also Figure 6-7		

In this example digital and analog I/O modules are addressed.
After the initalization of the controller board and the driver blocks the PLC startup is exited. Afterwards, the logical addressing is started in the cyclic program. The application must be disabled in the cycle until the addressing block has been processed without errors occurring (BUSY=RET=0).
In the cyclic program the application can now access the defined module addresses.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS


```
OB 20,21,22
          :SPA FB 210
NAME      :ANLAUF
          :BE


FB 210
          :U  M  8.0
          :ON M  8.0
          :S  M  8.0  Activation bit: INITIB
          :S  M  10.0 ADDRESS
          :L  KY 0,0  CON/IND,REQ/RES
          :T  MW 18   DB PCP header tables
LOOP      :U  M  8.0
          :SPB FB  60
NAME      :INITIB
IBDB      :   DB  9   InterBus data block
FEN3      :   KF +200 Base address of window 3
AV        :   KF +1   Controlled start/message enabled
RRST      :   DB  0   REQ/RES standard DB
CIST      :   DB  0   CON/IND standard DB
RRMW      :   KF +0   Activation word
CIMW      :   KF +0   Signal word
CIFB      :   FB 63   CON/IND auxiliary driver
T         :   T   0   Timer
STEP      :   MB  9   Internal flag byte
BUSY      :   M   8.0 Activation bit
TO        :   M   8.1 Time OUT
RET       :   M   8.2 Return value
          :SPA FB 62
NAME      :CON/IND
IBDB      :   DB  9   InterBus data block
CIDB      :   MB 18   CON/IND header DB
T         :   T   1   Timer
TO        :   M   8.3 Timeout
          :SPA FB 66
NAME      :REQ/RES
IBDB      :   DB  9   InterBus data block
RRDB      :   MB  19  REQ/RES header DB
T         :   T   3   Timer
TO        :   M   8.4 Timeout
          :U  M   8.0 INITIB
          :SPB =LOOP
          :UN M   8.2
          :BEB
          :STP
          :BE
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

OB1

Cyclic program

This program example starts the INTERBUS-S system in the cyclic program. The addressing block transfers the logical address lists to the controller board where they are checked.

Data blocks of the example:

ID code list:	DB 10	Bus segment list:	DB 11
IN adddress list:	DB 12	OUT address list:	DB 13

After the logical addressing the application can now access the defined module addresses. The messages are not disabled (AV = 1) because the message driver (CON/IND) is processed cyclically.

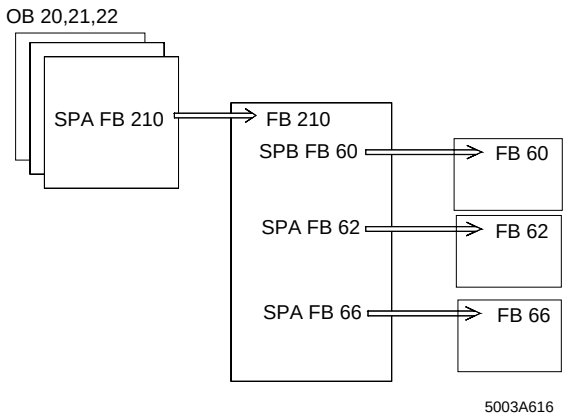
Diagnostics:

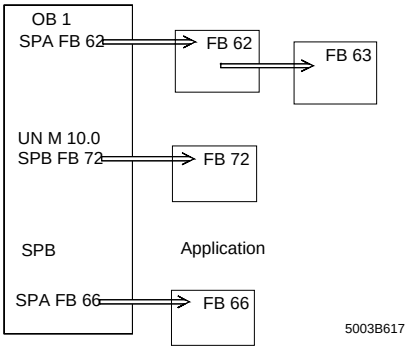
The function of the system can be monitored with the diagnostic registers (diagnostic bit/parameter registers).

Conditions for activating the application:

ADDRESS:	BUSY = 0	Activation bit RET = 0 Return value is positive
Diagnostic bit register:	RUN = 1	INTERBUS-S in the cycle

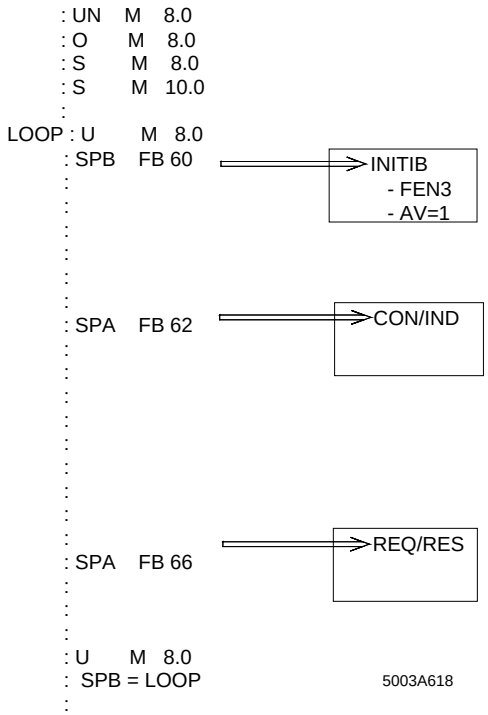
b) Program structure of the example





c) Schematized program example

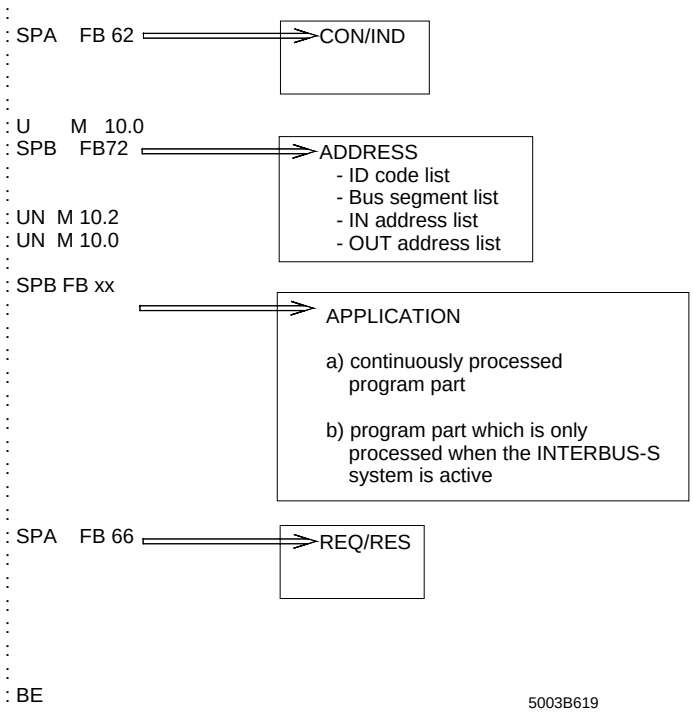
Startup Block FB 210



onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

c) Schematized program example

Cyclic Program OB1



Besides the activation of the bus, the application is also entered in the cyclic program (observe marginal conditions !). Examplary for this are the FB 10 and/or FB 11 function blocks of the above example.
The function blocks are divided into two program areas.
One area is only run through when the INTERBUS-S system is active (area of application). The other area is continuously processed.
Additionally, an example for error acknowledgment was integrated into the blocks.

Acknowledgment	LB/RB error	MOD error
Example FB:	FB 10	FB 11
Blocks:	ADDRESS	ADDRESS + ERRINFO

In this example the acknowledgment is initiated by means of two Simatic inputs. There is also a interlock (error detection) via the diagnostic bit registers.

LB/RB error	I 4.0 in FB 10 and FB 11
MOD error	I 4.1 only in FB 11

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

d) Detailed program example with organization, function, and data blocks

```
OB 1
          :SPA FB 62
NAME      :CON/IND
IBDB      :   DB  9   InterBus data block
CIDB      :   MB 18   CON/IND header DB
T         :   T   1   Timer
TO        :   M   8.3 Timeout
          :
          :U  M   10.0
          :SPB FB 72
NAME      :ADDRESS
IBDB      :   DB  9    InterBus data block
BUSY      :   M   10.0 Activation bit
T         :   T   2    Timer
IDDB      :   DB 10    DB: ID code list
IDDW      :   KF +0    DW:
LBDB      :   DB 11    DB: Bus segment list
LBDW      :   KF +0    DW:
INDB      :   DB 12    DB: IN address list
INDW      :   KF +0    DW:
OUDB      :   DB 13    DB: OUT address list
OUDW      :   KF +0    DW:
KRDB      :   DB  0    DB: KR address list
KRDW      :   KF +0    DW:
GRDB      :   DB  0    DB: Group definitions
GRDW      :   KF +0    DW:
MODE      :   M   10.5 Mode of display
EREG      :   MW  12   Error register
TO        :   M   10.1 Timeout
RET       :   M   10.2 Return value
          :UN M   10.2
          :UN M   10.0
          :
          :SPB FB 10   A P P L I C A T I O N
NAME      :ANWEND
          :
          :
          :SPA FB  66
NAME      :REQ/RES
IBDB      :   DB  9    InterBus data block
RRDB      :   MB  19   REQ/RES header DB
T         :   T   3    Timer
TO        :   M   8.4  Timeout
          :BE
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

e) Description of the function blocks FB 10 and/or FB 11 as example applications:

Both function blocks are exemplary for the application. FB 11 differs from FB 10 only in the fact that when a module error occurs it updates the front plate displays and the registers as well as enters the list of the reported local bus segments. (This additional feature is marked in bold face in the example listing.)

Structure:
The function of the block is divided into two areas.

1) Always active
This area of the block is also run through when the INTERBUS-S system has stopped. In the example error states such as RB and LB errors are acknowledged.
Entry condition: None

2) Active, when IBS is OK
This area of the block is only run though when the INTERBUS-S system is in the RUN state.

Entry condition:	ADDRESS block has been completed	BUSY = 0
		RET = 0
	INTERBUS-S system is in the RUN state	
	Diagnostic bit register	RUN = 1

Diagnostics:
With the diagnostic register the application can recognize the current bus status and respond to it.

Diagnostic registers of the example:

- Diagnostic bit register	IW 126
- Diagnostic parameter register	PW 128

Further functions:
When a bus error occurs (RB-/LB error = STOP of the system), INTERBUS-S can be started with an input edge (Example: SIMATIC I 4.0) which activates the addressing block.

I 4.0 => BUSY ADDRESS
a) No bus error has occurred.
- The front plate and the diagnostic registers are cleared.
- The INTERBUS-S system is active.

b) A bus error has occurred.
- The front plate and the diagnostic registers are updated.
- The INTERBUS-S system is in the STOP state.
- The outputs are reset (OUT = 0).

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Supplement to FB11:
When a module error occurs (peripheral voltage failure or a short circuit in a module; only for modules with bus acknowledgment), the display can be updated via an input edge (Example: SIMATIC I 4.1).

I 4.1 => BUSY ADDRESS

a) No module error message is active

- The front plate and the diagnostic registers are cleared

b) A module error message is active

- The front plate and the diagnostic registers are updated
- The list of the reported local bus segments is entered in a data block.

	Parameter	Example
Data block:	DB	DB 9
First data word of the list:	DW	DW 200

Structure of the list:

DB	DW n	KY = 000, PC
	DW n+1	KY = 000, BS
	DW n+2	KY = 000, BS
	...	
	DW n+PC	KY = 000, BS

Key:

PC = Quantity of subsequent parameters
DB = Data block of the message
n = First data word of the message

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

f) Detailed program example with organization, function, and data blocks

FB10 and/or FB 11 (supplement printed in bold face)

```
                :                  ===== Always active =====
                :
                :                  ----- IBS acknowledgment -----
                :                  - RB error
                :                  - LB error
                :
                :U  E   4.0        Acknowledgment button RB/LB error
                :UN M   4.0        Edge trigger flag
                :UN E   127.5      RUN bit diagnostic register
                :S  M   4.0
                :S  M   10.0       BUSY bit of addressing
                :UN E   4.0
                :R  M   4.0        ---------------------------
                :
                :
                :O  M   10.0       ADDRESS: BUSY bit
                :O  M   10.2       RET bit
                :ON E   127.5      Diagnostic bit register: RUN bit
                :BEB
                :                  ===== Active when IBS OK =====
                :
                :U  E   4.1        Acknowledgment button MOD error
                :UN M   4.1        Edge trigger flag
                :S  M   4.1
                :S  M   50.0       BUSY bit of the ERRINFO
                :UN E   4.1
                :R  M   4.1
                :
                :L  KB 200         Pointer: DW of the message
                :T  MB  54
                :L  KB  3    Function: module error
                :T  MB  51
                :L  KB  0    Parameter no.: none
                :T  MB  52
                :
                :U  M   50.0
                :SPB FB  74
   NAME         :ERRINFO
   IBDB         :   DB  9    InterBus data block
   T            :   T   2    Timer used
   FKT          :   MB  51   Function no.
   NR           :   MB  52   Parameter no.
   DB           :   DB  9    DB of the message
   DW           :   MB  54   First DW of the message
   BUSY         :   M   50.0 Activation bit
   TO           :   M   50.1 Return value
   RET          :   M   50.2 Timeout
                :
                :
                :
                :
                :BE
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DB10

Identification code list:
The ID code address list includes the physical bus structure.
The structure is described with the help of the ID numbers and their length codes. The modules are counted starting from the controller board and through the entire bus structure.
The list is completed with the special ID code entries .

In the example:
ID 16 = Diagnostic bit register ID 17 = Diagnostic parameter register

Structure of the list:

DB x

DW y	KY= 000, PC	Parameter count
DW y+1	KY= LC , ID	1st module
DW y+2	KY= LC , ID	2nd module
...	...	...
DW y+n-2	KY= LC , ID	nth module
DW y+n-1	KY= 000, SID	Special ID code
DW y+n	KY= 000, SID	Special ID code

Key:

PC = Quantity of the subsequent parameters (n)
LC = Length code of the module (*)
ID = Identification code of the module (*)
SID = Special ID code (**)

(*) To be taken from the module description of the manufacturer
(**) Permitted codes:
ID: 16 = Diagnostic bit register
17 = Diagnostic parameter register
18 = Bit-controlled command register
19 = Bit manipulation register

```
DB10
      0:  KY = 000,015;      Parameter count
      1:  KY = 000,052;      IBS 24 BK-T
      2:  KY = 001,130;      IBS 24 DI
      3:  KY = 004,065;      IBS AO 1
      4:  KY = 001,129;      IBS 24 DO
      5:  KY = 004,066;      IBS PT 100 A/2
      6:  KY = 001,007;      IBS IP DIO 1/24
      7:  KY = 000,012;      IBS IP CBK 1/24 F
      8:  KY = 129,010;      IBS IP CDI 1/24 F
      9:  KY = 129,009;      IBS IP CDO 1/24 F
      10: KY = 129,010;      IBS IP CDI 1/24 F
      11: KY = 001,011;      IBS 24 BK-I/O-T
      12: KY = 002,142;      IBS 24 DI 32
      13: KY = 004,071;      IBS AI 3
      14: KY = 000,016;      Diagnostic bit register
      15: KY = 000,017;      Diagnostic parameter regist.
      16:
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DB11

Bus segment list:

The bus segment list describes the logical assignment between the physical segment structure (with the help of the module positions) and the logical segment numbering. The remote bus structure (installation depth) is defined with another parameter.

A bus segment consists of :

a) BK with connected local bus
b) Remote bus module with inputs/outputs
c) IBS ST; bus terminal module
d) Installation remote bus module

The logical numbering of the segments is done with the bus terminal module. The list structure (parameter number) is adapted to the ID code list. The segment number (0 to 255) is entered in the list at every bus terminal location.

Installation depth:

The remote bus structure is divided into the main remote bus line (installation depth = 0) and the installation remote bus (installation depth =16).

Structure of the list:

DB x

DW y	KY= 000, PC	Parameter count
DW y+1	KY= IT, SN	1st module (BK)
DW y+2	KY= 000, 000	
...	...	...
DW y+n-2	KY= IT, SN	nth module (BK)
DW y+n-1	KY= 000, 000	Special ID code
DW y+n	KY= 000, 000	Special ID code

Key:

PC = Quantity of subsequent parameters (n)
SN = Bus segment no. (0 - 255)
IT = Installation depth 0 = Main line 16 = Installation remote bus

DB11

```
0:      KY = 000,015;    Parameter count
1:      KY = 000,021;    IBS 24 BK-T
2:      KY = 000,000;    IBS 24 DI
3:      KY = 000,000;    IBS AO 1
4:      KY = 000,000;    IBS 24 DO
5:      KY = 000,000;    IBS PT 100 A/2
6:      KY = 000,011;    IBS IP DIO 1/24
7:      KY = 000,022;    IBS IP CBK 1/24-F
8:      KY = 016,023;    IBS IP CDI 1/24-F
9:      KY = 016,024;    IBS IP CDO 1/24-F
10:     KY = 016,025;    IBS IP CDI 1/24-F
11:     KY = 000,012;    IBS BK-I/O-T
12:     KY = 000,000;    IBS 24 DI/32
13:     KY = 000,000;    IBS AI 3
14:     KY = 000,000;    Diagnostic bit register
15:     KY = 000,000;    Diagnostic parameter register
16:
```

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DB12

IN address list:

The IN address list includes the logical input addresses of the modules. The list is an image of the ID code list.

Every place in the list which is occupied by an input module is allocated an input address. This address is the base of the module in the PLC.

In the example:

DW 12 KY = 000 , 038 IBS 24 DI/32

The digital input module becomes visible in the PLC in the input words 38 and 40 .

Structure of the list:

DB x

DW y	KY= 000, PC	Parameter count
DW y+1	KY= B , ADR	1st module
DW y+2	KY= B , ADR	2nd module
...	... ...	
DW y+n-2	KY= B , ADR	nth module
DW y+n-1	KY= B , ADR	Special ID code
DW y+n	KY= B , ADR	Special ID code

Key:

PC = Quantity of subsequent parameters (n)

B = Address area 0 = P area of the PLC
1 = Q area of the PLC

ADR = Base address of the module (0 - 255)

Base address:word-oriented module = even address
byte-oriented module = odd/even address

```
DB12

0:      KY = 000,015;     Parameter count
1:      KY = 000,000;     IBS 24 BK-T
2:      KY = 000,020;     IBS 24 DI
3:      KY = 000,000;     IBS AO 1
4:      KY = 000,000;     IBS 24 DO
5:      KY = 000,140;     IBS PT 100 A/2
6:      KY = 000,028;     IBS IP DIO 1/24
7:      KY = 000,000;     IBS IP CBK 1/24-F
8:      KY = 000,030;     IBS IP CDI 1/24-F
9:      KY = 000,000;     IBS IP CDO 1/24-F
10:     KY = 000,031;     IBS IP CDI 1/24-F
11:     KY = 000,046;     IBS 24 BK-I/O-T
12:     KY = 000,038;     IBS 24 DI/32
13:     KY = 000,164;     IBS AI 3
14:     KY = 000,126;     Diagnostic bit register
15:     KY = 000,128;     Diagnostic parameter register
16:
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DB13

OUT address list:

The OUT address list includes the logical output addresses of the modules. The list is an image of the ID code list.

Every place in the list which is occupied by an output module is allocated an output address. This address is the base of the module in the PLC.

In the example:

DW 4 KY = 000 , 032 IBS 24 DO

The digital output module becomes visible in the PLC in output word 32.

Structure of the list:

DB x

DW y	KY= 000, PC	Parameter count
DW y+1	KY= B , ADR	1st module
DW y+2	KY= B , ADR	2nd module
...	...	...
DW y+n-2	KY= B , ADR	nth module
DW y+n-1	KY= B , ADR	Special ID code
DW y+n	KY= B , ADR	Special ID code

Key:

PC = Quantity of the subsequent parameters

B = Address area 0 = P area of the PLC
1 = Q area of the PLC

ADR = Base address of the module (0 - 255)

Base address:word-oriented module = even address
byte-oriented module = odd/even address

```
DB13

0:      KY = 000,015;     Parameter count
1:      KY = 000,000;     IBS 24 BK-T
2:      KY = 000,000;     IBS 24 DI
3:      KY = 000,132;     IBS AO 1
4:      KY = 000,032;     IBS 24 DO
5:      KY = 000,000;     IBS PT 100 A/2
6:      KY = 000,028;     IBS IP DIO 1/24
7:      KY = 000,000;     IBS IP CBK 1/24-F
8:      KY = 000,000;     IBS IP CDI 1/24-F
9:      KY = 000,029;     IBS IP CDO 1/24-F
10:     KY = 000,000;     IBS IP CDI 1/24-F
11:     KY = 000,046;     IBS 24 BK-I/O-T
12:     KY = 000,000;     IBS 24 DI/32
13:     KY = 000,146;     IBS AI 3
14:     KY = 000,000;     Diagnostic bit register
15:     KY = 000,000;     Diagnostic parameter register
16:
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The DCBCP example is given on the next page in order to avoid having to turn over between the pages "Bus topology...." and "Software setting..."

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Bus topology for the DCBCP example

DCBCP

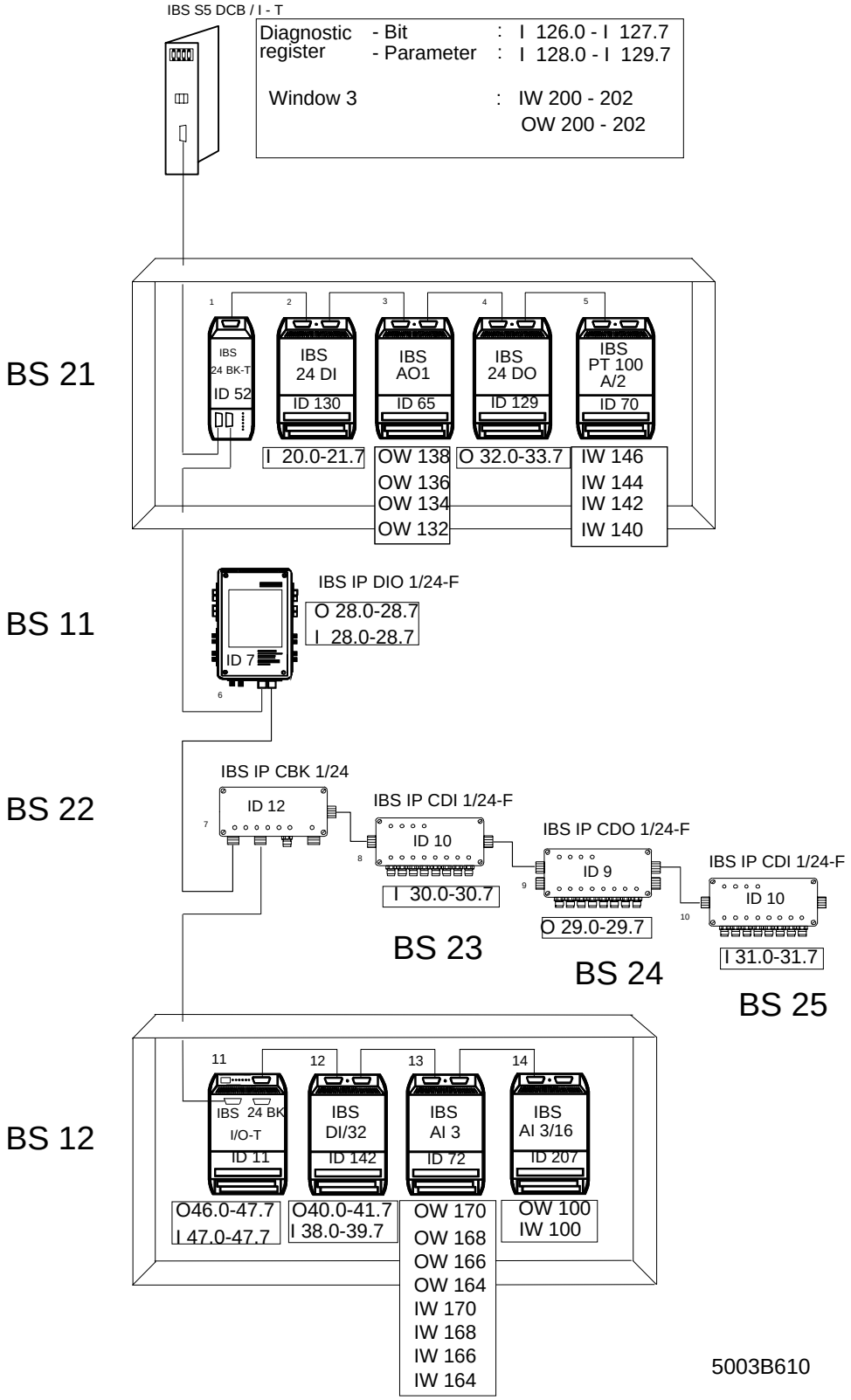


Figure 6-11: Exemplary I/O address allocation for the DCBCP example (controlled start, logical addressing, system start in the PLC's program or startup, control via function blocks with additional PCP communication)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DCBCP software setting for controlled start with logical addressing during system start in the PLC's program or startup, control via function blocks with additional PCP communication

DCBCP

a) Short description of logical addressing during startup with PCP communication

This function block initiates the logical addressing of the INTERBUS-S system. It includes the initialization block (INITIB), two driver blocks (REQ/RES, CON/IND), an auxiliary driver (CIH), and the addressing block (ADDRESS).

Windows to be set:	DAB	DCB
F1: Base address	Yes	No
Length	Yes	No
F2: Base address	Yes	No
Length	Yes	No
F3: Base address	Yes	Yes
See also Figure 6-7		

In this example digital and analog I/O modules are addressed. The address block transfers the logical address lists to the controller board where they are checked.

Data block of the example:

ID code list:	DB 10
Bus segment list:	DB 11
IN address list:	DB 12
OUT address list:	DB 13
KR address list	DB 14

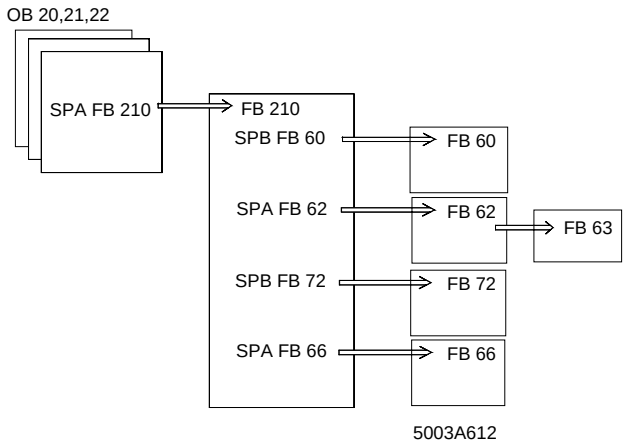
After the system has been started and the messages from the controller board to the PLC (AV =1) have been disabled, the startup block is exited.
In the cyclic program the application can now access the defined module addresses.
The PCP interface in the driver blocks is also activated.

Diagnostics:
The function of the system can be monitored with the diagnostic registers (diagnostic bit/parameter registers). The diagnostic registers have to be defined by means of logical addressing.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

b) Program structure of the example



c) Schematized program example

Startup Block FB 210

```
    : U     M   8.0
    : ON    M   8.0
    : S     M   8.0
    : S     M  10.0
    :
LOOP : U     M  8.0
    : SPB   FB 60 ==> INITIB
    :                   - FEN3
    :                   - AV=1
    :
    :
    :
    :
    :
    : SPA   FB 62 ==> CON/IND
    :
    :
    :
    : UN    M   8.0
    : U     M  10.0
    : SPB   FB72 ==> ADDRESS
    :                  - ID code list
    :                  - Bus segment list
    :                  - IN address list
    :                  - OUT address list
    :
    :
    :
    : SPA   FB 66 ==> REQ/RES
    :
    :
    :
    : U     M  8.0
    : O     M 10.0
    : SPB = LOOP
    :
```

5003B620

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

d) Detailed program example with organization, function and data blocks

```
OB 20,21,22
          :SPA FB 210
NAME      :ANLAUF
          :BE


FB 210
          :U  M  8.0
          :ON M  8.0
          :S  M  8.0  Activation bit:      INITIB
          :S  M 10.0                       ADDRESS
          :L  KY 20,22 CON/IND,REQ/RES
          :T  MW  18  DB PCP header tables
LOOP      :U  M  8.0
          :SPB FB 60
NAME      :INITIB
IBDB      :   DB 9    InterBus data block
FEN3      :   KF +200 Base address of window 3
AV        :   KF +1   Controlled start/message enabled
RRST      :   DB 21   REQ/RES standard DB
CIST      :   DB 23   CON/IND standard DB
RRMW      :   KF +20  Activation word
CIMW      :   KF +22  Signal word
CIFB      :   FB 63   Auxiliary driver CON/IND
T         :   T  0    Timer
STEP      :   MB 9    Internal flag byte
BUSY      :   M  8.0  Activation bit
TO        :   M  8.1  Timeout
RET       :   M  8.2  Return value
          :U  M  8.0
          :ON M  8.2
          :SPB=ADR
          :STP
          :BEA
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS


```
ADR       :SPA FB  62
NAME      :CON/IND
IBDB      :   DB  9    InterBus data block
CIDB      :   MB 18    Timer
T         :   T  1
TO        :   M  8.3   Timeout
          :UN M  8.0
          :U  M 10.0
          :SPB FB 72
NAME      :ADDRESS
IBDB      :   DB 9    InterBus data block
BUSY      :   M  10.0 Activation bit
T         :   T   2   Timer
IDDB      :   DB 10   DB: ID code list
IDDW      :   KF +0   DW:
LBDB      :   DB 11   DB: Bus segment list
LBDW      :   KF +0   DW:
INDB      :   DB 12   DB: IN address list
INDW      :   KF +0   DW:
OUDB      :   DB 13   DB: OUT address list
OUDW      :   KF +0   DW:
KRDB      :   DB  0   DB: KR address list
KRDW      :   KF +0   DW:
GRDB      :   DB  0   DB: Group definitions
GRDW      :   KF +0   DW:
MODE      :   M  10.5 Mode of display
EREG      :   MW 12   Error register
TO        :   M  10.1 Timeout
RET       :   M  10.2 Return value
          :
          :SPA FB  66
NAME      :REQ/RES
IBDB      :   DB  9   InterBus data block
RRDB      :   MB 19   REQ/RES header DB
T         :   T   3   Timer
TO        :   M  8.4  Timeout
          :U  M  8.0  INITIB
          :O  M 10.0  ADDRESS
          :SPB =LOOP
          :UN M 10.2
          :BEB
          :STP
          :BE
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DB10

Identification code list:

The ID code address list includes the physical bus structure.
The structure is described with the help of the ID numbers of the modules and their length codes. The modules are counted starting from the controller board and through the entire bus structure.
The list is completed with the special ID code entries.

In the example:

ID 16 = Diagnostic bit register ID 17 = Diagnostic parameter register

Structure of the list:

DB x

DW y	KY= 000, PC	Parameter count
DW y+1	KY= LC , ID	1st module
DW y+2	KY= LC , ID	2nd module
...	...	...
DW y+n-2	KY= LC , ID	nth module
DW y+n-1	KY= 000, SID	Special ID code
DW y+n	KY= 000, SID	Special ID code

Key:

PC = Quantity of subsequent parameters (n)
LC = Length code of the module (*)
ID = Identification code of the module (*)
SID = Special ID code (**)
(*) To be taken from the module description of the manufacturer
(**) Permitted codes:
ID: 16 = Diagnostic bit register
17 = Diagnostic parameter register
18 = Bit-controlled command register
19 = Bit manipulation register

```
DB10
        0:  KY = 000,016;      Parameter count
        1:  KY = 000,052;      IBS 24 BK-T
        2:  KY = 001,130;      IBS 24 DI
        3:  KY = 004,065;      IBS AO 1
        4:  KY = 001,129;      IBS 24 DO
        5:  KY = 004,066;      IBS PT 100 A/2
        6:  KY = 001,007;      IBS IP DIO 1/24
        7:  KY = 000,012;      IBS IP CBK 1/24 F
        8:  KY = 129,010;      IBS IP CDI 1/24 F
        9:  KY = 129,009;      IBS IP CDO 1/24 F
        10: KY = 129,010;      IBS IP CDI 1/24 F
        11: KY = 001,011;      IBS 24 BK-I/O-T
        12: KY = 002,142;      IBS 24 DI 32
        13: KY = 004,071;      IBS AI 3
        14: KY = 001,207;      IBS AI 3/16
        15: KY = 000,016;      Diagnostic bit register
        16: KY = 000,017;      Diagnostic parameter regist.
        17:
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DB11

Bus segment list:

The bus segment list describes the logical assignment between the physical segment structure (with the help of the module position) and the logical segment numbering. Another parameter defines the remote bus structure (installation depth).

A bus segment consists of:

a) BK with connected local bus
b) Remote bus modules with inputs/outputs
c) IBS ST; bus terminal module
d) Installation remote bus module

The logical numbering of the segments is done with the bus terminal module. The structure of the list (parameter count) is adapted to the ID code list. The segment number (0 to 255) is entered at every bus terminal location in the list.

Installation depth:

The remote bus structure is divided into the main remote bus line (installation depth = 0) and the installation remote bus (installation depth =16).

Structure of the list:

DB x

DW y	KY= 000, PC	Parameter count
DW y+1	KY= IT, SN	1st module (BK)
DW y+2	KY= 000, 000	
...	...	...
DW y+n-2	KY= IT, SN	nth module (BK)
DW y+n-1	KY= 000, 000	Special ID code
DW y+n	KY= 000, 000	Special ID code

Key:

PC = Quantity of subsequent parameters (n)
SN = Bus segment no. (0 - 255)
IT = Installation depth 0 = Main line
16 = Installation remote bus

```
DB11
0:      KY = 000,016;    Parameter count
1:      KY = 000,021;    IBS 24 BK-T
2:      KY = 000,000;    IBS 24 DI
3:      KY = 000,000;    IBS AO 1
4:      KY = 000,000;    IBS 24 DO
5:      KY = 000,000;    IBS PT 100 A/2
6:      KY = 000,011;    IBS IP DIO 1/24
7:      KY = 000,022;    IBS IP CBK 1/24-F
8:      KY = 016,023;    IBS IP CDI 1/24-F
9:      KY = 016,024;    IBS IP CDO 1/24-F
10:     KY = 016,025;    IBS IP CDI 1/24-F
11:     KY = 000,012;    IBS BK-I/O-T
12:     KY = 000,000;    IBS 24 DI/32
13:     KY = 000,000;    IBS AI 3
14:     KY = 000,000;    IBS AI 3/16
15:     KY = 000,000;    Diagnostic bit register
16:     KY = 000,000;    Diagnostic parameter register
17:
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DB12

IN address list:

The IN address list includes the logical input addresses of the modules. The list is an image of the ID code list.

Every place in the list which is occupied by an input module is allocated an input address. This address is the base of the module in the PLC.

In the example:

DW 12 KY = 000 , 038 IBS 24 DI/32

The digital input module becomes visible in the PLC in the input words 38 and 40.

Structure of the list:

DB x

DW y	KY= 000, PC	Parameter count
DW y+1	KY= B , ADR	1st module
DW y+2	KY= B , ADR	2nd module
...	...	...
DW y+n-2	KY= B , ADR	nth module
DW y+n-1	KY= B , ADR	Special ID code
DW y+n	KY= B , ADR	Special ID code

Key:

PC = Quantity of subsequent parameters (n)

B = Address area 0 = P area of the PLC
1 = Q area of the PLC

ADR = Base address of the module (0 - 255)

Base address:word-oriented module = even address
byte-oriented module = odd/even address

```
DB12

0:      KY = 000,016;     Parameter count
1:      KY = 000,000;     IBS 24 BK-T
2:      KY = 000,020;     IBS 24 DI
3:      KY = 000,000;     IBS AO 1
4:      KY = 000,000;     IBS 24 DO
5:      KY = 000,140;     IBS PT 100 A/2
6:      KY = 000,028;     IBS IP DIO 1/24
7:      KY = 000,000;     IBS IP CBK 1/24-F
8:      KY = 000,030;     IBS IP CDI 1/24-F
9:      KY = 000,000;     IBS IP CDO 1/24-F
10:     KY = 000,031;     IBS IP CDI 1/24-F
11:     KY = 000,046;     IBS 24 BK-I/O-T
12:     KY = 000,038;     IBS 24 DI/32
13:     KY = 000,164;     IBS AI 3
14:     KY = 000,100;     IBS AI 3/16
15:     KY = 000,126;     Diagnostic bit register
16:     KY = 000,128;     Diagnostic parameter register
17:
```

online-components.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DB13

OUT address list:

The OUT address list includes the logical output addresses of the modules. The list is an image of the ID code list.

Every place in the list which is occupied by an input module is allocated an output address. This address is the base of the module in the PLC.

In the example:

DW 4 KY = 000 , 032 IBS 24 DO

The digital output module becomes visible in the PLC in the output word 32.

Structure of the list:

DB x

DW y	KY= 000, PC	Parameter count
DW y+1	KY= B , ADR	1st module
DW y+2	KY= B , ADR	2nd module
...	...	...
DW y+n-2	KY= B , ADR	nth module
DW y+n-1	KY= B , ADR	Special ID code
DW y+n	KY= B , ADR	Special ID code

Key:

PC = Quantity of subsequent parameters (n)

B = Address area 0 = P area of the PLC
1 = Q area of the PLC

ADR = Base address of the module (0 - 255)

Base address: word-oriented module = even address
byte-oriented module = odd/even address

```
DB13

0:      KY = 000,016;     Parameter count
1:      KY = 000,000;     IBS 24 BK-T
2:      KY = 000,000;     IBS 24 DI
3:      KY = 000,132;     IBS AO 1
4:      KY = 000,032;     IBS 24 DO
5:      KY = 000,000;     IBS PT 100 A/2
6:      KY = 000,028;     IBS IP DIO 1/24
7:      KY = 000,000;     IBS IP CBK 1/24-F
8:      KY = 000,000;     IBS IP CDI 1/24-F
9:      KY = 000,029;     IBS IP CDO 1/24-F
10:     KY = 000,000;     IBS IP CDI 1/24-F
11:     KY = 000,046;     IBS 24 BK-I/O-T
12:     KY = 000,000;     IBS 24 DI/32
13:     KY = 000,146;     IBS AI 3
14:     KY = 000,100;     IBS AI 3/16
15:     KY = 000,000;     Diagnostic bit register
16:     KY = 000,000;     Diagnostic parameter register
17:
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DB14

KR address list:

The KR address list contains the communication allocation (PCP) of the stations. Each PCP station is assigned a module number for PCP (communication reference KR). This KR (valid: 2 to 63) must be assigned in an continuously ascending order.

Every place in the list which is occupied by a communication module (PCP), is given a communication reference.

Structure of the list:

DB x

DW y	KY= 000, PC	Quantity of modules
DW y+1	KY= 000 , KR	1st module
DW y+2	KY= 000 , KR	2nd module
...	...	...
DW y+n-2	KY= 000 , KR	n. module
DW y+n-1	KY= 000 , 000	Special ID code
DW y+n	KY= 000 , 000	Special ID code

Key:

PC = Quantity of subsequent parameters (n)
KR = Communication reference (2-63)

```
DB14

0:        KY = 000,016;    Parameter count
1:        KY = 000,000;    IBS 24 BK-T
2:        KY = 000,000;    IBS 24 DI
3:        KY = 000,000;    IBS AO 1
4:        KY = 000,000;    IBS 24 DO
5:        KY = 000,000;    IBS PT 100 A/2
6:        KY = 000,000;    IBS IP DIO 1/24
7:        KY = 000,000;    IBS IP CBK 1/24-F
8:        KY = 000,000;    IBS IP CDI 1/24-F
9:        KY = 000,000;    IBS IP CDO 1/24-F
10:       KY = 000,000;    IBS IP CDI 1/24-F
11:       KY = 000,000;    IBS 24 BK-I/O-T
12:       KY = 000,000;    IBS 24 DI/32
13:       KY = 000,000;    IBS AI 3
14:       KY = 000,002;    IBS AI 3/16
15:       KY = 000,000;    Diagnostic bit register
16:       KY = 000,000;    Diagnostic parameter register
17:
```

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS


```
OB 1
     Cyclic program
          :SPA FB  62
NAME      :CON/IND
IBDB      :   DB  9   InterBus data block
CIDB      :   MB  18  CON/IND header table
T         :   T   1   Timer
TO        :   M   8.3 Timeout
          :
          :
          :SPA FB 66
NAME      :REQ/RES
IBDB      :   DB  9   InterBus data block
RRDB      :   MB  19  REQ/RES header table
T         :   T   3   Timer
TO        :   M   8.4 Timeout
          :BE
```

DB20

Data block: CON/IND header table

The service headers which are indicated by the message bits 1- 15 are entered into this data block.

Description:

```
+------------  Signal bit no.
!
```

1st CODE;	----	Service code
PC ;	----	Quantity of subsequent parameters
KR ;	----	Communication reference
DB,DW;	----	Pointer to body with data block and data word

```
0:      KH = 0000;        1st CODE;
1:      KH = 0000;        PC ;
2:      KH = 0000;        KR ;
3:      KY = 000,000;     DB,DW;
4:      KH = 0000;        2nd CODE;
5:      KH = 0000;        PC ;
6:      KH = 0000;        KR ;
7:      KY = 000,000;     DB,DW;

...
56:     KH = 0000;        15thCODE;
57:     KH = 0000;        PC ;
58:     KH = 0000;        KR ;
59:     KY = 000,000;     DB,DW;
60:     KH = 0000;
61:
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DB21

REQ/RES standard DB:
A service and a service body can be entered into this data block. The service is activated by means of the activation bit 0.

Structure:

CODE ;	------	Service code
PC ;	------	Quantity of subsequent parameters
KR ;	------	Communication reference
Body;	------	Module-dependent service body

```
0:        KH = 0000;   CODE ;
1:        KH = 0000;  PC  ;
2:        KH = 0000;  KR  ;
3:        KH = 0000;  Body;
4:        KH = 0000;
5:        KH = 0000;
6:        KH = 0000;
7:        KH = 0000;
8:        KH = 0000;
9:        KH = 0000;
10:       KH = 0000;
11:       KH = 0000;
12:       KH = 0000;
13:       KH = 0000;
14:       KH = 0000;
15:       KH = 0000;
16:
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DB22

Data block: REQ/RES header table

The service headers are entered into this data blocks which are initiated by the activation bits 1 - 15.

Description:

+---------- Activation bit no.
!

Structure:

CODE ;	------	Service code
PC ;	------	Quantity of subsequent parameters
KR ;	------	Communication reference
DB,DW;	------	Pointer to the body with the data block and data word

```
0:        KH = 0000;         1st CODE;
1:        KH = 0000;         PC ;
2:        KH = 0000;         KR ;
3:        KY = 000,000;      DB,DW;
4:        KH = 0000;         2nd CODE;
5:        KH = 0000;         PC ;
6:        KH = 0000;         KR ;
7:        KY = 000,000;      DB,DW;
...
52:       KH = 0000;         14thCODE;
53:       KH = 0000;         PC ;
54:       KH = 0000;         KR ;
55:       KY = 000,000;      DB,DW;
56:       KH = 0000;         15thCODE;
57:       KH = 0000;         PC ;
58:       KH = 0000;         KR ;
59:       KY = 000,000;      DB,DW;
60:       KH = 0000;
61:
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DB23

CON/IND standard DB:
Unexpected services and service bodies are entered into this data block. A service which was entered is indicated with the message bit 0.

Structure:

CODE ;	------	Service code
PC ;	------	Quantity of subsequent parameters
KR ;	------	Communication reference
Body;	------	Module-dependent service body

```
0:      KH = 0000;      CODE ;
1:      KH = 0000;      PC  ;
2:      KH = 0000;      KR  ;
3:      KH = 0000;      Body;
4:      KH = 0000;
5:      KH = 0000;
6:      KH = 0000;
7:      KH = 0000;
8:      KH = 0000;
9:      KH = 0000;
10:     KH = 0000;
11:     KH = 0000;
12:     KH = 0000;
13:     KH = 0000;
14:     KH = 0000;
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Bus topology for the DCBECP example

DCBECP

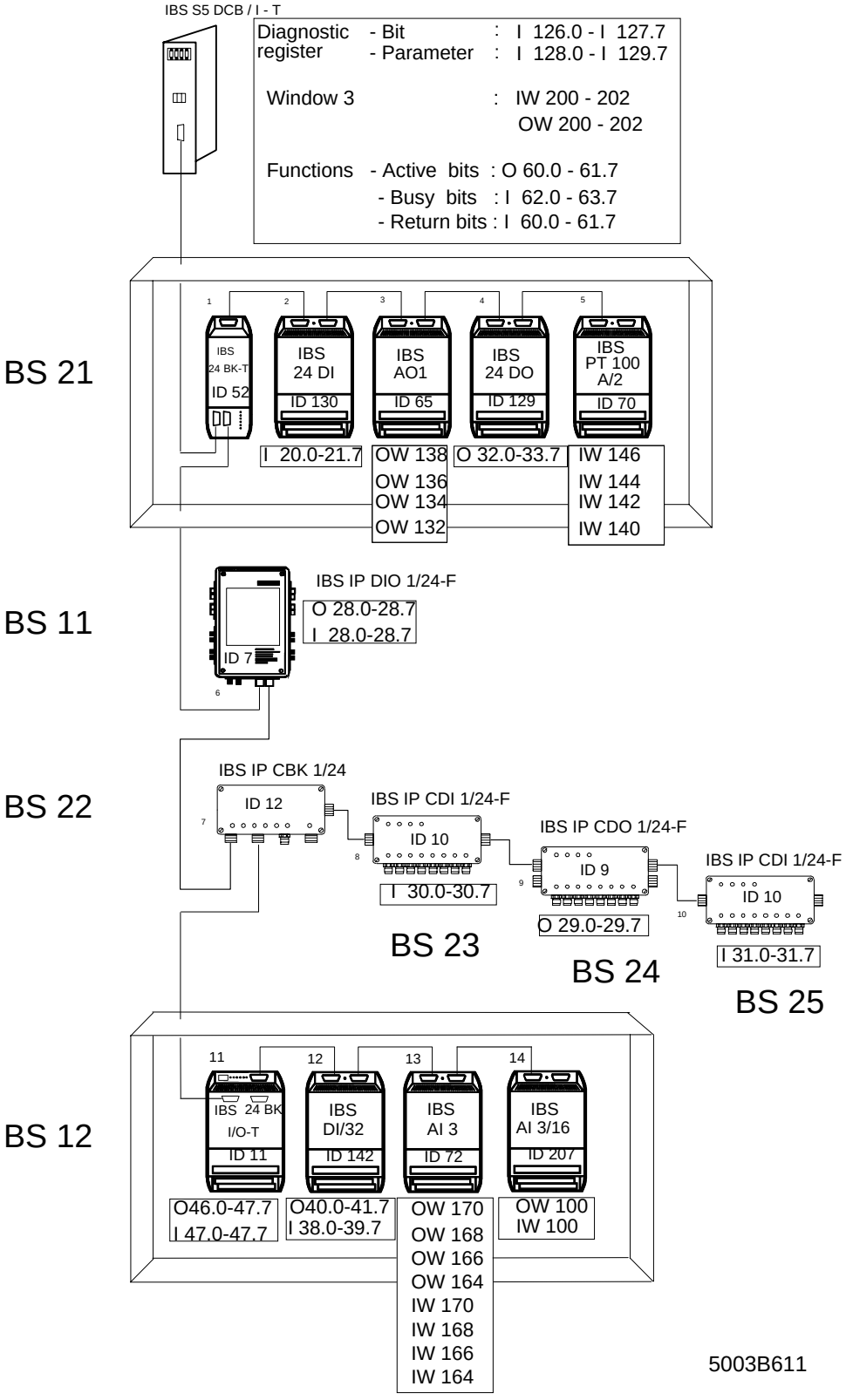


Figure 6-12: Exemplary I/O address allocation for the DCBECP example (controlled start, logical addressing, system start in the PLC's program or startup, control with memory card and additional PCP communication)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DCBECP software setting for controlled start with logical addressing for a system start in the PLC's program or startup, control via memory card and additional PCP communication

DCBECP

FB 210

a) Short description of logical addressing during startup with EEPROM and PCP

The start sequence (bit 0) on the EEPROM card initiates the logical addressing of the INTERBUS-S system after power up or reset. The following functions retains the PLC in its startup blocks until the controller board is in the RUN state. To this end, an initialization block (INITIB) is called.

When the PLC is put into operation with STOP/RUN the boot sequence must be initiated and evaluated through the PLC.

Windows to be set:	DAB	DCB
F1: Base address	Yes	No
Length	Yes	No
F2: Base address	Yes	No
Length	Yes	No
F3: Base address	Yes	Yes
See also Figure 6-7		

In this example, digital and analog I/O modules are addressed. The EEPROM card transfers the logical address lists to the bus control where they are checked. The address lists are projected by means of the IBS SYS SWT program.

No.	Name	Module		Bus segment		Group	Input		Output		
		PD length	ID	Level 0/1	No.	No.	P=0/ Q=1	Adr.	P=0/ Q=1	Adr.	KR.
1	BK T	0	52	0	21	0	0	0	0	0	0
2	DI	1	130	0	0	0	0	20	0	0	0
3	AO 1	4	65	0	0	0	0	0	0	132	0
4	24 DO	1	129	0	0	0	0	0	0	32	0
5	PT100	4	66	0	0	0	0	140	0	0	0
6	DIO	1	7	0	11	0	0	28	0	28	0
7	CBK	0	12	0	22	0	0	0	0	0	0
8	DI	129	10	1	23	0	0	30	0	0	0
9	DO	129	9	1	24	0	0	0	0	29	0
10	DI	129	10	1	25	0	0	31	0	0	0
11	BK-I/O-	1	11	0	12	0	0	46	0	46	0
12	24 DI/32	2	142	0	0	0	0	38	0	0	0
13	AI 3	4	72	0	0	0	0	164	0	164	0
14	AI 3/16	1	207	0	0	0	0	100	0	100	2
15	Diag. Bit	0	16	0	0	0	0	126	0	0	0
16	Diag.Para.	0	17	0	0	0	0	128	0	0	0
17	Bitg.Comm	0	18	0	0	0	0	60	0	60	0

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Address lists of the example:

ID code list:	Bus segment list:	IN address list:
OUT address list:	KR address list:	

After the start of the system and the enabling of the messages from the controller board to the PLC the startup block is exited.
In the cyclic program the application can now access the defined module addresses. The messages must be enabled by means of the program sequence.

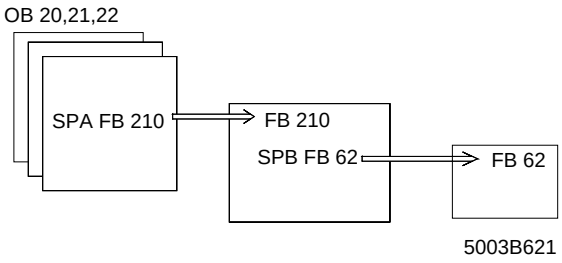
Application register:
The program sequences which have been stored in the EEPROM can be initiated with the register for bit-controlled commands.

Register assignment:

OW Activation bit:	The sequence (0...15) is initiated.
IW BUSY bit	A set busy bit indicates a tested sequence, or one which has just been processed.
IW RETURN bit	Value=0: Sequence was processed without errors Value=1: Sequence was processed with errors

Diagnostics:
The function of the system can be monitored with the diagnostic registers (diagnostic bit/parameter register). The diagnostic registers have to be defined by means of logical addressing.

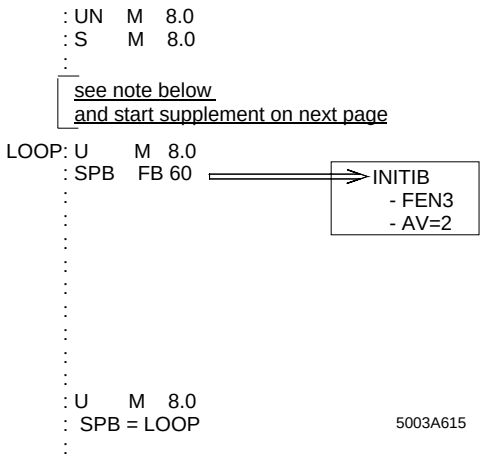
b) Program structure of the example



The start sequence (bit 0 of the EEPROM card) is only activated by resetting the controller board or by switching the PLC off and on. If the controller board is to start with STOP/RUN as well, the start sequence (bit 0) in the OB 20 and OB 21 must be called before the INITIB driver is called. The associated program code is listed below the following program example (OB 20, FB 210). It is called "Start supplement". Its position in the FB 210 is given in the schematized program example under item c) or the program example itself.

c) Schematized program example

Startup block FB 210



onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

d) Detailed program example with organization, function, and data blocks

```
OB 20
          :SPA FB 210
NAME      :ANLAUF
          :BE


FB 210
          :UN M   8.0
          :S  M   8.0  Activation bit: INITIB
          :L  KY 20,22 CON/IND, REQ/RES
          :T  MW  18   DB PCP header tables
LOOP      :U  M   8.0
          :SPB FB  60
NAME      :INITIB
IBDB      :   DB  9    InterBus data block
FEN3      :   KF +200  Base address of window 3
AV        :   KF +2    EEPROM operation
RRST      :   DB  23   REQ/RES standard DB
CIST      :   DB  21   CON/IND standard DB
RRMW      :   KF +20   Activation word
CIMW      :   KF +22   Signal word
CIFB      :   FB  63   Auxiliary driver CON/IND
T         :   T   0    Timer
STEP      :   MB  9    Internal flag byte
BUSY      :   M   8.0  Activation bit
TO        :   M   8.1  Timeout
RET       :   M   8.2  Return value
          :U  M   8.0
          :SPB =LOOP
          :UN M   8.2
          :BEB
          :STP
          :BE
```

Start supplement:

```
          :L  KM  00000000 00000001   Bit 0 activated
          :T  PW  60                  Activation bit
                                      -Set register
AKTI      :L  PW  60                  Read busy bit register
          :T  MW  240
          :UN M   241.0               Busy bit not active?
          :SPB = AKTI
          :L  KH  0000
          :T  PW  60                  Activation bit
                                      -Reset register
BUSY      :L  PW  60                  Read busy bit register
          :T  MW  240
          :U  M   241.0               Busy-Bit-0 active?
          :SPB = BUSY
          :
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS


```
OB 1
          :SPA FB  62
NAME      :CON/IND
IBDB      :   DB  9   InterBus data block
CIDB      :   MB  18  CON/IND header table
T         :   T   1   Timer
TO        :   M   8.3 Timeout
          :
          :
          :
          :
          :SPA FB 66
NAME      :REQ/RES
IBDB      :   DB  9   InterBus data block
RRDB      :   MB  19  REQ/RES header table
T         :   T   3   Timer
TO        :   M   8.4 Timeout
          :BE
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DB20

Data block: CON/IND header table

The service headers which are indicated by the message bits 1 - 15 are entered into this data block.

Description:

```
                +-------------          Signal bit no.
                !
                1. CODE;      ----      Service code
                PC ;          ----      Quantity of subsequent parameters
                KR ;          ----      Communication reference
                DB,DW;        ----      Pointer to the body with data block
                                        and data word


0:  KH = 0000;          1st CODE;
1:  KH = 0000;          PC ;
2:  KH = 0000;          KR ;
3:  KY = 000,000;       DB,DW;
4:  KH = 0000;          2nd CODE;
5:  KH = 0000;          PC ;
6:  KH = 0000;          KR ;
7:  KY = 000,000;       DB,DW;
8:  KH = 0000;          3rd CODE;
9:  KH = 0000;          PC ;
10: KH = 0000;          KR ;
11: KY = 000,000;       DB,DW;
12: KH = 0000;          4th CODE;
13: KH = 0000;          PC ;
14: KH = 0000;          KR ;
...
56:     KH = 0000;      15th CODE;
57:     KH = 0000;      PC ;
58:     KH = 0000;      KR ;
59:     KY = 000,000;   DB,DW;
60:     KH = 0000;
61:
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DB21

REQ/RES standard DB:

A service and service body can be entered in this data block. The service is activated with the activation bit 0.

Structure:

CODE ;	------	Service code
PC ;	------	Quantity of subsequent parameters
KR ;	------	Communication reference
Body;	------	Module-dependent service body

```
0     KH = 0000;     CODE ;
1:    KH = 0000;     PC   ;
2:    KH = 0000;     KR   ;
3:    KH = 0000;     Body;
4:    KH = 0000;
5:    KH = 0000;
6:    KH = 0000;
7:    KH = 0000;
8:    KH = 0000;
9:    KH = 0000;
10:   KH = 0000;
11:   KH = 0000;
12:   KH = 0000;
13:   KH = 0000;
14:   KH = 0000;
15:   KH = 0000;
16:
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DB22

Data block: REQ/RES header table

The service headers are entered in this data block which are initiated with the activation bits 1 - 15.

Description:

+---------- Activation bit no.
!

1. CODE; ---- Service code
PC ; ---- Quantity of subsequent parameters
KR ; ---- Communication reference
DB,DW; ---- Pointer to the body with data block and data word

```
0:  KH = 0000;          1st CODE;
1:  KH = 0000;          PC ;
2:  KH = 0000;          KR ;
3:  KY = 000,000;       DB,DW;
4:  KH = 0000;          2nd CODE;
5:  KH = 0000;          PC ;
6:  KH = 0000;          KR ;
7:  KY = 000,000;       DB,DW;
8:  KH = 0000;          3rd CODE;
9:  KH = 0000;          PC ;
10: KH = 0000;          KR ;
...
56: KH = 0000;          15thCODE;
57: KH = 0000;          PC ;
58: KH = 0000;          KR ;
59: KY = 000,000;       DB,DW;
60: KH = 0000;
61:
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DB23

CON/IND standard DB:

Unexpected services and service bodies are entered in this data block. A service which has been entered is indicated with the message bit 0.

Structure:

CODE ;	------	Service code
PC ;	------	Quantity of subsequent parameters
KR ;	------	Communication reference
Body;	------	Module-dependent service body

```
0 KH = 0000;          CODE ;
1:    KH = 0000;      PC   ;
2:    KH = 0000;      KR   ;
3:    KH = 0000;      Body;
4:    KH = 0000;
5:    KH = 0000;
6:    KH = 0000;
7:    KH = 0000;
8:    KH = 0000;
9:    KH = 0000;
10:   KH = 0000;
11:   KH = 0000;
12:   KH = 0000;
13:   KH = 0000;
14:   KH = 0000;
15:   KH = 0000;
16:
```

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Chapter 7

Installation

This chapter provides information on

- the possible slots and the correct connection of the controller board to the various Siemens PLCs
- the correct connection of the host controller board to the remote bus cable
- the V.24 (RS-232) connection of the controller board to a Siemens programming unit by means of an adapter cable

7 Installation 7-1

7.1 Slots for the Controller Board 7-1
7.2 Cable Installation 7-2
7.3 Pin Assignment of the Hardware Interfaces 7-3
7.3.1 System Connector 7-4
7.3.2 Remote Bus Interface 7-5
7.3.3 Serial Interface (V.24/RS-232) 7-6
7.3.4 Ordering Information 7-8

onlinecomponents.com

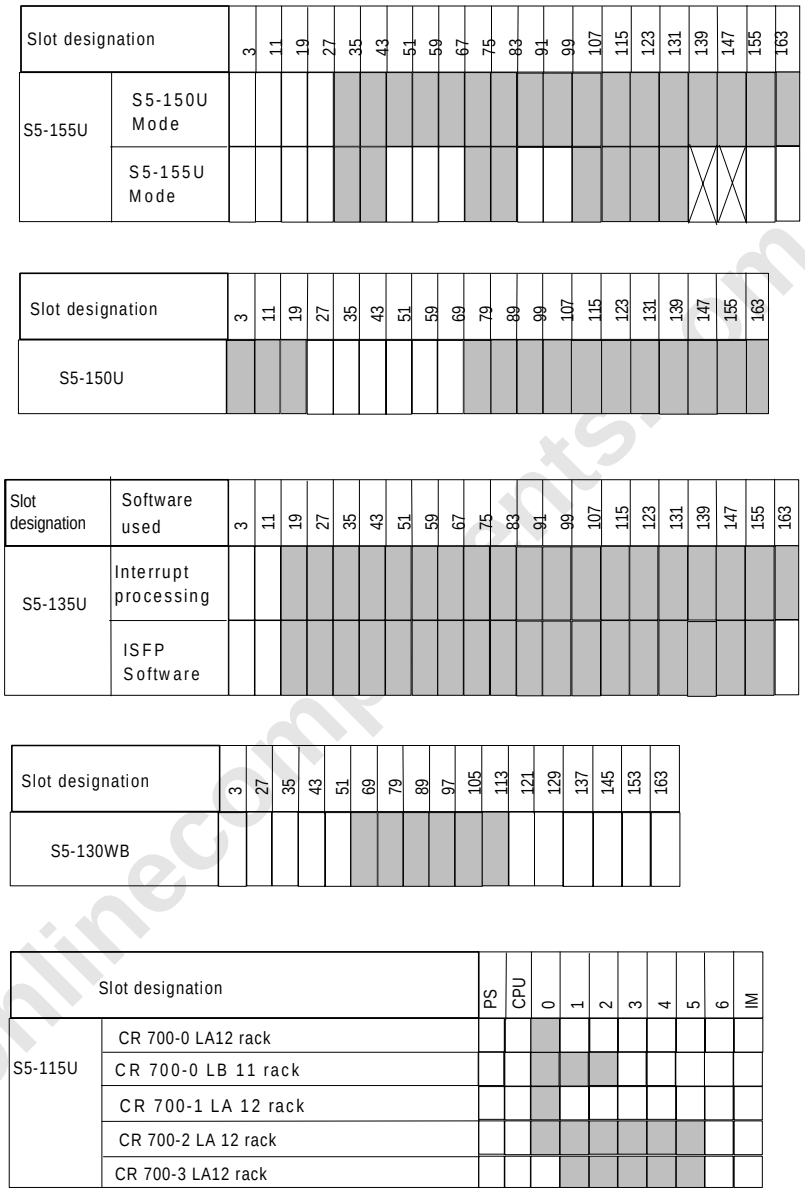
onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

7 Installation

7.1 Slots for the Controller Board



Installation possible

Installation possible if bridge BR7, at the back of the rack, is installed.
(see Siemens S5 155 U user manual)

5003A236

Figure 7-1: Permissible slots for the DCB controller board in the Siemens racks S5-115U-155U

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

7.2 Cable Installation

There are two ways to connect the DCB controller board to the following components of the INTERBUS-S system.
You may either select one of the preassembled cables from Phoenix Contact (see catalog) or you can assemble the required cables by yourself.

Depending on the components to be connected, there are different types of cables available. For further information, please refer to the installation user manual (Order number: 27 54 80 4).

For the correct cable laying in the plant the guidelines given in VDE 0100 are authoritative.

For information concerning the installation please refer to the installation user manual. This manual also describes measures for shielding the INTERBUS-S connections.
The Chapter "Recommended Cabling" in the installation user manual provides further instructions for the INTERBUS-S system installation, in particular for the potential equalization and lightning protection of the plant.
The manual also includes explanations of the voltage supply for the INTERBUS-S system.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

7.3 Pin Assignment of the Hardware Interfaces

Hardware interfaces of the controller board

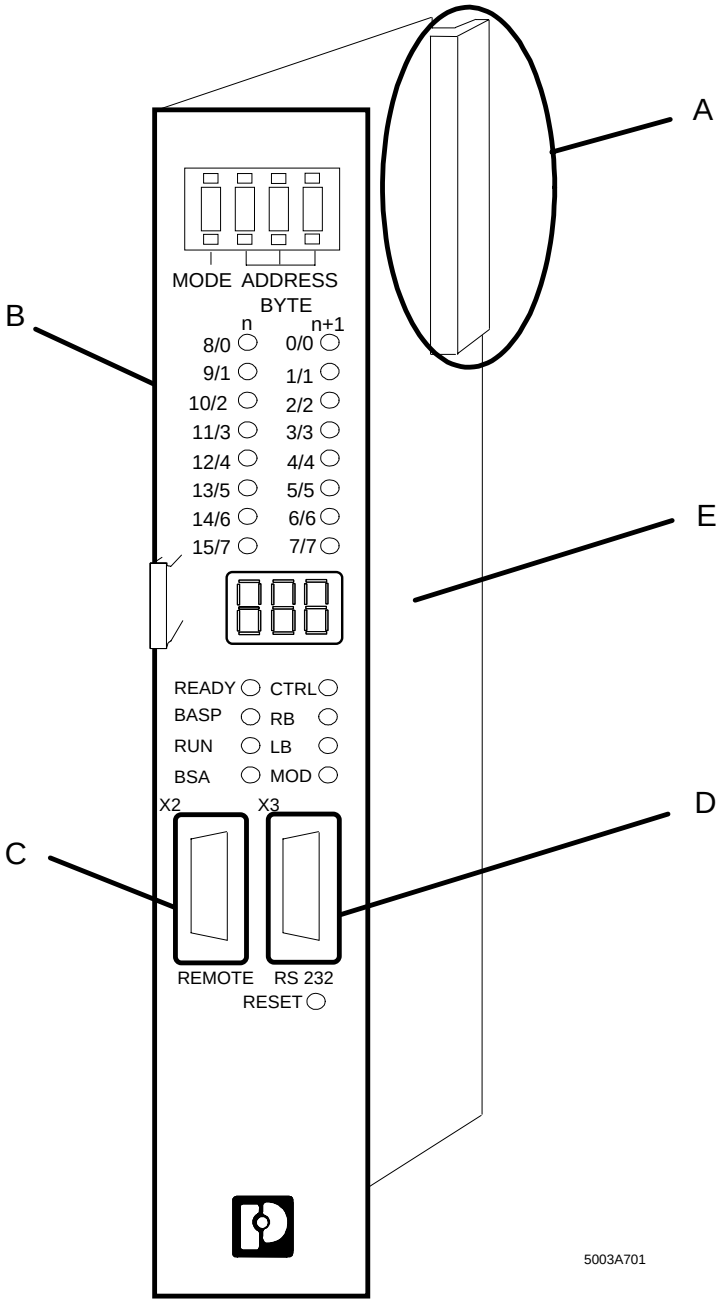


Figure 7-2: Hardware interfaces of the IBS S5 DCB controller board

A = System connector
B = Front plate
C = Remote bus interface
D = Serial V.24 (RS-232) interface
E = Printed circuit board

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

7.3.1 System Connector

The system connector connects the PLC and the controller board. It is plugged into the backplane bus of the PLC.

Table 7-1 shows the system connector assignment:

Table 7-1: Signal assignment of the system connector

Pin	z	b	d
2	+5V	0V	
4		PESP	
6		ADB 0	
8	/MEMR	ADB 1	
10	/MEMW	ADB 2	
12	/RDY	ADB 3	
14	DB 0	ADB 4	/IRA
16	DB 1	ADB 5	/IRB
18	DB 2	ADB 6	/IRC
20	DB 3	ADB 7	/IRD
22	DB 4	ADB 8	
24	DB 5	ADB 9	
26	DB 6	ADB 10	
28	DB 7	ADB 11	
30		BASP	
32		0V	

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

7.3.2 Remote Bus Interface

The following may be connected to the remote bus connector (female):

- up to 256 local bus segments
- up to 320 modules (including BKs)
- up to 256 INTERBUS-S words.

Figure 7-3 shows the pin assignment for the remote bus connector (female) and the male connector belonging to it as well as important information for the shielding.

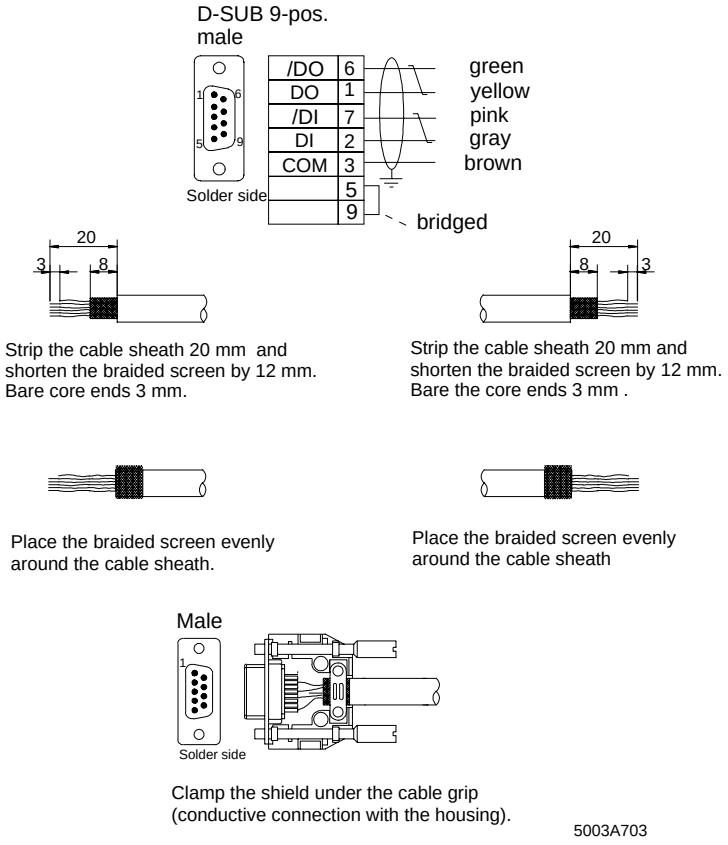


Figure 7-3: Pin assignment of the 9-pos. female D-SUB remote bus connector and the male connector belonging to it for the 2-wire technology (with information about shielding)

Please ensure that the PE connection of the female D-SUB remote bus connector is connected to the PE connection of the PLC.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

7.3.3 Serial Interface (V.24/RS-232)

The serial interface is designed as a 9-pos. male D-SUB connector.
The assignment of this connector with the V.24 (RS-232) signals is described in Table 7-2.

Table 7-2: Signal assignment of the V.24 (RS-232) interface

Pin	Signal	Direction	Function
1	nc		
2	TXD	Driver	Data sent by the controller board
3	RXD	Receiver	Data received by the controller board
4	VCC		+5 V (short-circuit proof), 50 mA (for TTY adapter, see below)
5	GND		Ground
6	nc		
7	CTS	Receiver	Clear to Send (is not supported by the firmware)
8	RTS	Driver	Request to Send (is not supported by the firmware)

A programming unit (e.g. a Siemens PG 750) can be connected to this interface by means of an appropriate adapter cable (PSM-KA-V24/TTY-P/PA/BB, Order No. 27 61 70 3 or PSM-KA-V24/TTY-P/PA/SB, Order No. 27 62 20 3 from Phoenix Contact; the letters **BB** and/or **SB** indicate whether the V.24- and/or TTY-side connector is a male (**S**tecker) or female (**B**uchse) connector. Figure 7-4 shows the connection between the programming unit and the controller board.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

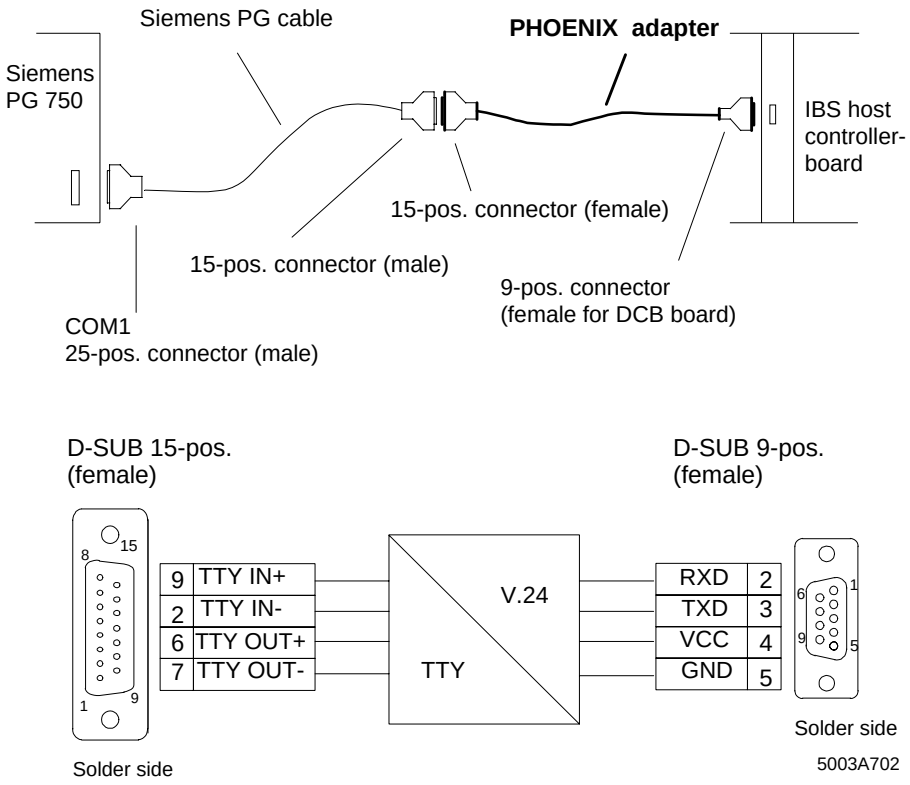


Figure 7-4: Connection between programming unit and the controller board as well as the pin assignment of the adapter cable PSM-KA-V24/TTY-P/PA/BB

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

7.3.4 Ordering Information

This chapter provides an overview of other available INTERBUS-S products in connection with the DCB controller board.
These products serve for a more convenient diagnostics of the DCB controller board used and they also allow a complete use of the capabilities of the controller board.
(The respective item designations and order numbers are given in parentheses)
You may get a basic or advanced package assembled from the individual products:

Basic package

- DCB controller board: IBS S5 DCB-T, (28 06 21 5)
  IBS S5 DCB/I-T, (27 58 15 6)
- ISFP software: IBS S5 SWD, (28 06 22 8)

With this package INTERBUS-S is exclusively operated via the connected PLC.

Advanced package

- Basic package and
- EEPROM memory in credit-card format, IBS MC 64k (27 58 96 5)
- IBS SYS SWT software (27 80 88 1)
- Connecting cable for direct connection of a PC to the DCB controller board, IBS PRG CAB (28 06 86 2)

This package allows the operation of INTERBUS on the PLC **and** PC side. In the case of operation on the PC-side, the parameterization data can be stored in the EEPROM memory.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The following individually available products simplify operating and error diagnostics:

Hand Held Monitor, IBS HHM (Order No.: 27 84 16 2):

For the start-up or in the case of a service, the IBS HHM Hand Held Monitor checks the functions of individual bus modules and the correct connection of the periphery.
Current supply and connection to INTERBUS-S is done through the local bus interface (see Figure 7-5).
Communication with the programmable controller is not required.
The HHM can be operated on all modules which allow the connection of a 15-pos. female D-SUB connector and which do not belong to the group of the communication modules (such as the V.24 or counter module). Communication modules must be operated with PCP (Peripherals Communication Protocol) software which is not supported by the HHM.
The HHM offers the following diagnostic functions which are described further in the user manual of the HHM:

1. Off-line startup of individual stations with test
   - of the I/O modules,
   - of the cabling to the sensors and actuators, as well as
   - of the sensors and actuators themselves.
2. Off-line troubleshooting in single stations to detect
   - local bus cable errors,
   - module errors,
   - cabling faults (short and open circuits), as well as
   - failure of the sensors and actuators.
3. Display of the respective local bus modules with their identification number (ID no.).

The HHM can be obtained from the address given at the end of this chapter. Figure 7-5 shows where the HHM is used.

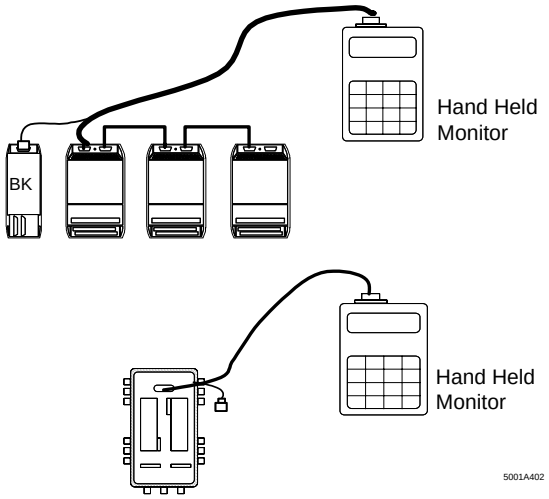


Figure 7-5: Connection possibilities of the HHM

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

PC boards

IBS PC AT-T (27 58 05 9)
IBS PC AT/I-T (27 58 06 2)
IBS PC CB/COP/I-T (27 54 51 6)
IBS PC CB/I-T (27 80 84 9)
with monitor program of the suitable driver software
IBS TS CC for Microsoft C (27 67 07 9)
IBS TS TP for Borland Turbo Pascal (27 84 80 3)

The respective monitor software provides the following services:

- Start-up of an INTERBUS-S system on the PC
- Test of an INTERBUS-S system on the PC
- Control of the connected configuration
- Address assignment of the I/O words
- Setting of outputs (binary)
- Setting of output words (hex)
- Displaying the input statuses (binary and hex)
- Resetting the INTERBUS-S system

c) IBS SYS SWT (27 80 88 1) and the connecting cable IBS PRG CAB (28 06 86 2)
IBS SYS SWT provides the user interface of the controller board on the PC. This allows to use the functions of the INTERBUS-S controller board and the modules connected to INTERBUS without any additional programming expense.
The PC is coupled to the controller board through the serial interfaces of both devices.

The program functions in detail:

- Transferring the INTERBUS-S commands to the INTERBUS-S controller board
- Receiving the INTERBUS-S messages from the INTERBUS-S controller board
- Listing the received messages and the transferred commands
- Storing the INTERBUS-S commands and transferring the stored commands to the controller board
- Programming the controller board’s EEPROM

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Chapter 8

ISFP – INTERBUS-S System Functions for the PLC

This chapter provides information on

– the software interface for INTERBUS-S system control via the PLC
– the PCP services (command and message functions)
– the use of communications (PCP services for INTERBUS-S control)
– the error messages

8 ISFP 8-1

8.1 Interface Description 8-1
8.1.1 Program Structure 8-2
8.1.2 Inclusion of the Interface Drivers 8-5
8.1.2.1 INITIB (FB 60) 8-6
8.1.2.2 CON/IND 8-10
8.1.2.3 REQ/RES 8-12
8.1.2.4 INTERBUS Data Block (IBDB) 8-14
8.1.3 INTERBUS-S System Control 8-16
8.1.3.1 Structure of the Functions 8-18
8.1.3.2 Overview of Functions 8-20

8.2 Command Functions 8-24
8.2.1 CONTROL (FB 68) 8-24
8.2.1.1 Configure INTERBUS-S (FKT 0) 8-26
8.2.1.2 Start INTERBUS-S Cycle (FKT 1) 8-26
8.2.1.3 Stop InterBus-S Cycle (FKT 2) 8-26
8.2.1.4 Alarm Stop (FKT 3) 8-26
8.2.1.5 Clear Display (FKT 4) 8-26
8.2.1.6 Disable All Messages (FKT 5) 8-27
8.2.1.7 Implement All Logical Address Map (FKT 6) 8-27
8.2.1.8 Init Communication (FKT 7) 8-27
8.2.1.9 INTERBUS-S Delay (FKT 8) 8-27
8.2.1.10 Quit Module Error All (FKT 9) 8-27
8.2.2 DEFINE (FB 69) 8-28
8.2.2.1 Physical Configuration Map (FKT 0) 8-30
8.2.2.2 Logical Local Bus Address Map (FKT 1) 8-31
8.2.2.3 Logical IN Address Map (FKT 2) 8-32
8.2.2.4 Logical OUT Address Map (FKT 3) 8-33
8.2.2.5 Communication Reference (FKT 4) 8-34
8.2.2.6 Event Map (FKT 5) 8-35
8.2.2.7 Group Numbers (FKT 6) 8-37
8.2.2.8 Parameter Timeout Constant (FKT 7) 8-38
8.2.2.9 Receive KBL (FKT 8) 8-39
8.2.2.10 Receive Bit Manipulation (FKT 9) 8-41
8.2.2.11 Group Error Characteristics (FKT 10) 8-50
8.2.2.12 Quit Module Error (FKT 11) 8-52

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.3 SYSINFO (FB 70) 8-53
8.2.3.1 Physical Configuration Map (FKT 0) 8-55
8.2.3.2 Software Revision (FKT 1) 8-55
8.2.3.3 Switch Information (FKT 2) 8-56
8.2.3.4 INTERBUS-S Cycle Counter (FKT 3) 8-56
8.2.3.5 Logical Address Error (FKT 4) 8-57
8.2.4 ON/OFF (FB 71) 8-58
8.2.4.1 Group ON (FKT 0) 8-60
8.2.4.2 Group OFF (FKT 1) 8-60
8.2.4.3 BK-Alarm ON (FKT 2) 8-60
8.2.4.4 BK-Alarm OFF (FKT 3) 8-61
8.2.4.5 Event ON (FKT 4) 8-61
8.2.4.6 Event OFF (FKT 5) 8-61
8.2.5 ADDRESS (FB 72) 8-62
8.2.5.1 ID Code List 8-66
8.2.5.2 Bus Segment Address List 8-67
8.2.5.3 IN Address List 8-68
8.2.5.4 OUT Address List 8-69
8.2.5.5 Group No. List 8-70
8.2.5.6 Group Error Characteristics 8-72
8.2.5.7 Communication Reference List 8-73
8.2.6 ERRINFO (FB 74) 8-74
8.2.6.1 Controller Error Code (FKT 0) 8-76
8.2.6.2 Bus Information (FKT 1) 8-76
8.2.6.3 Defective Group (FKT 2) 8-77
8.2.6.4 Module Error (FKT 3) 8-78
8.2.6.5 Local Bus Module Error (FKT 4) 8-79

8.3 Message Functions 8-80
8.3.1 SYSERROR (FB 73) 8-80
8.3.2 RECONFIG (FB 75) 8-82
8.3.3 EVENT (FB 76) 8-83

8.4 Working with Communication 8-84
8.4.1 Introduction 8-84
8.4.1.1 Control During Communication 8-86
8.4.1.2 Call Structure of the Function Blocks 8-86
8.4.1.3 Initialization/Addressing 8-87
8.4.1.4 Service Structure 8-89
8.4.1.5 Service Execution 8-90
8.4.1.6 Activation Flag Service 8-90
8.4.1.7 Message Flag Service 8-92
8.4.1.8 Principal Service Sequence 8-94
8.4.1.9 Example of a Service 8-96
8.4.2 Request/Confirmation 8-97
8.4.2.1 Read Request 8-100
8.4.2.2 Write Request 8-100
8.4.2.3 Start Request 8-100
8.4.2.4 Stop Request 8-100
8.4.2.5 Information Report Request 8-101
8.4.2.6 Status Request 8-101
8.4.2.7 Identify Request 8-101
8.4.2.8 Initiate Request 8-101
8.4.2.9 Abort Request 8-102

© onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.4.2.10 Read Confirmation ... 8-102
8.4.2.11 Write Confirmation ... 8-102
8.4.2.12 Start Confirmation ... 8-103
8.4.2.13 Stop Confirmation ... 8-103
8.4.2.14 Status Confirmation ... 8-103
8.4.2.15 Identify Confirmation ... 8-104
8.4.2.16 Initiate Confirmation ... 8-104
8.4.2.17 Initiate Error Confirmation ... 8-104
8.4.3 Response/Indication ... 8-106
8.4.3.1 Abort Indication ... 8-106
8.4.3.2 Reject Indication ... 8-106
8.4.3.3 Start Indication ... 8-106
8.4.3.4 Stop Indication ... 8-106
8.4.3.5 Information Report Indication ... 8-107
8.4.3.6 Read Indication ... 8-107
8.4.3.7 Write Indication ... 8-107
8.4.3.8 Initiate Indication ... 8-108
8.4.3.9 Read Response ... 8-108
8.4.3.10 Write Response ... 8-108
8.4.3.11 Start Response ... 8-109
8.4.3.12 Stop Response ... 8-109
8.4.4 Application of Communication ... 8-110
8.4.5 Communication Error Messages ... 8-113
8.4.5.1 Error Messages for a Connection Abort ... 8-113
8.4.5.2 Error Messages for the Reject Service ... 8-115
8.4.5.3 Additional Error Messages ... 8-116
8.4.5.4 Description of the Service-Specific Error Messages ... 8-116

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8 ISFP

8.1 Interface Description

The **I**NTERBUS-S **S**ystem **F**unctions for the **P**LC (**ISFP**) are a software interface, which is made available to the users to allow them to control INTERBUS-S via the PLC. Along with the I/O interface which is implemented with an MPM (Multi-Port Memory) and to which the user has direct access, a communication register is also implemented on the controller board for the INTERBUS-S command/message interface. The hardware of this interface consists of four word registers which are located in the I/O area of the PLC. A protocol was defined to link the PLC and the INTERBUS-S controller board. This protocol comprises commands which the PLC sends to the controller board and messages which the PLC receives.

The INTERBUS-S system functions are based on the command/message interface and offer the user self-contained functions as INTERBUS-S management services.

INTERBUS-S management functions, for instance, are:

- re-configuration,
- switching groups off,
- error recovery,
- re-addressing,
- clearing of the display,
- starting,
- stopping, etc.

Besides the system services, the **PCP** (**P**eripherals **C**ommunication **P**rotocol) services also use the communication registers as an interface to the controller board. This is the reason why the use of the PCP services is integrated into the interface.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.1.1 Program Structure

An interface, which includes extensive functions, is represented by software which consists of different components.

To avoid longer scan times, the INTERBUS-S System Functions for the PLC (ISFP) have been tailored specifically to the respective PLC and optimized and structured from the point of view of the program. Operation of the ISFP interface (by setting individual bits) is kept simple to reduce the programming effort on the part of the user.

The interface consists of three types of function blocks:

- Initialization block
- Receive/send blocks (interface drivers)
- Function blocks

These blocks are available as standard function blocks and have to be ordered in addition to the respective controller board.

Besides an **initialization block** which is only called when the PLC is started, there are two function blocks which are addressed continuously. These are the **receive** and the **send block**, which establish the link between the PLC (ISFP interface) and the controller board. The blocks (interface drivers) only ever become active when commands are sent or messages are received.

The third type of blocks is related to the application and must be integrated by the user. That is to say: Only those function blocks are called that are currently needed (e.g. for: addressing, system information, event handling...).

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Principle call structure:

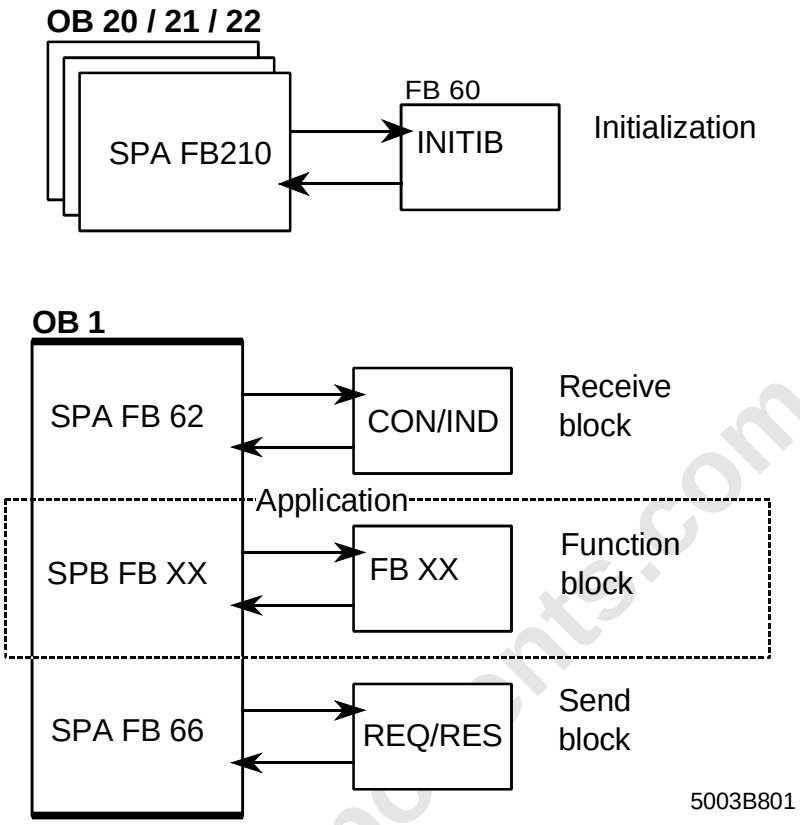


Figure 8-1: Locations of the various blocks and their calls in the program

Description of the structure:

An initialization block is called during startup of the PLC. This block synchronizes the controller board with the PLC and makes presettings for the command/message structure. These settings specify and set up the interface for the PCP stations (communication modules, counters, V.24, ...). All further settings are carried out in the cyclic program.

The receive and send blocks are not accessible from the application. They are used exclusively by the function blocks of the ISFP interface and serve the communication interface (communication registers). By means of these blocks commands are sent and messages are received. Their locations in the program and how to call them are important.

Block	Location	Call
CON/IND	Beginning of cycle	Unconditional
REQ/RES	End of cycle	Unconditional

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The CON/IND and REQ/RES blocks must be called once in every cycle to ensure a correct processing of commands and messages.

A detailed description of the CON/IND and REQ/RES function blocks is given in Chapter 8.1.2.2, "CON/IND“ (Page 10ff)

The third type of blocks provides the users with a tool with which they can control and monitor INTERBUS-S. The function blocks are subdivided into passive and active function blocks.

Passive blocks receive messages from the controller board or indicate errors in the INTERBUS-S system.

The active blocks are initiated by the user program and execute specific functions.

The variety of functions and messages is described in Chapter 8.1.3 "INTERBUS-S System Control“ (Page 16ff).

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.1.2 Inclusion of the Interface Drivers

The CON/IND and REQ/RES function blocks are referred to as interface drivers. The receive block (CON/IND) and the send block (REQ/RES) are called unconditionally in the program. To get an optimized response with respect to time, the receive block (CON/IND) should be called at the start of the cyclic program and the send block (REQ/RES) should be called at the end. Depending on the length of the command or message (number of words), the blocks may also be active for several cycles.

The blocks are not accessible to the user. They are addressed exclusively by the standard function blocks.

The function blocks CON/IND and REQ/RES must always be called unconditionally. The CON/IND block has an auxiliary block (CIH), which must exist in the PLC.

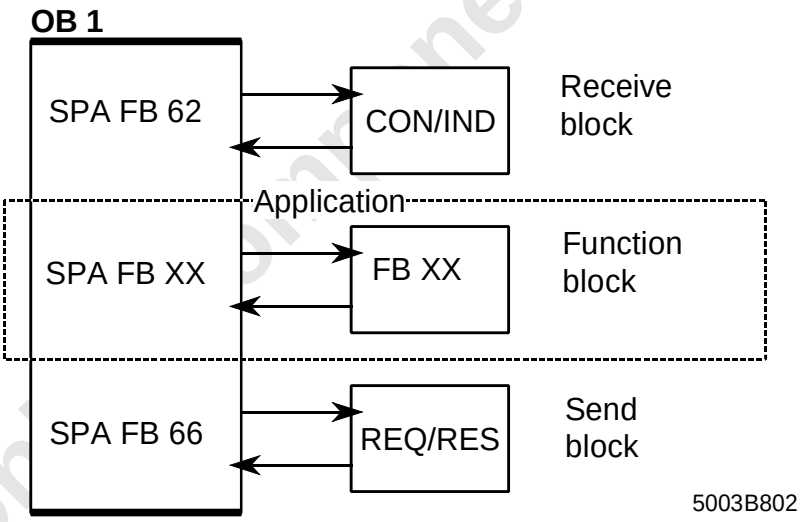


Figure 8-2: Inclusion of the interface drivers

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.1.2.1 INITIB (FB 60)

The INITIB (FB 60) initialization block is called during initialization of the PLC (OB 20…22). This function block realizes some basic software settings for the following blocks. It also ensures a synchronization between the PLC and INTERBUS-S. The routine is not terminated until INTERBUS–S is in the "READY“ state or the bus has been activated.

The controller board allows the following three modes of operation:

- automatic start
- controlled start
- controlled start with EEPROM

In the **automatic start** mode, the INITIB function performs the synchronization between the PLC and INTERBUS-S. The bus system is started automatically. The controller board reports READY and RUN.

In the **controlled start** mode, the INITIB function monitors the controller board in the initialization phase. If the board reports "READY" the IBDB data block is given presettings and the function is terminated.

In the **controlled start mode with EEPROM** the controller board is monitored with the INITIB function during the initialization. If it reports "READY" the IBDB data block is given presettings. Only after the board is in the RUN state (addressing via EEPROM card) will the function be terminated.

The address location of the communication registers determines the selection of the driver blocks

Addresses	Block	FB No.
P area	INITIB	FB 60
Q area	INITIBQ	FB 61

The INITIB initialization block operates independently when the automatic start or the controlled start with EEPROM card are used.

However, if the board is addressed cyclically (controlled start) via the function blocks, the CON/IND and REQ/RES driver blocks must be loaded.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

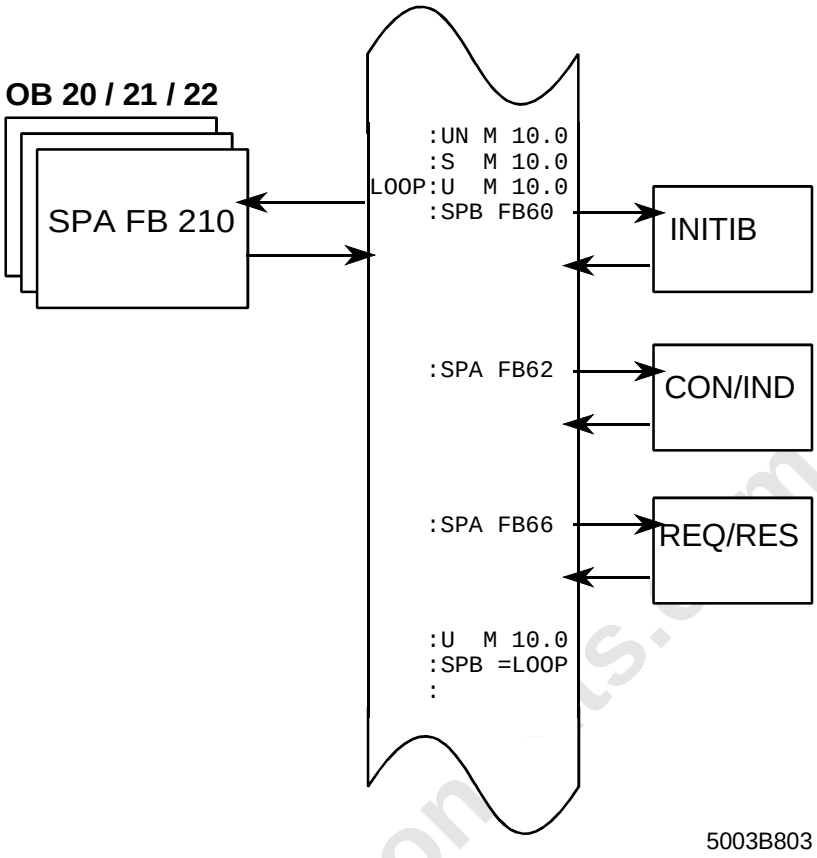


Figure 8-3: Call with a driver

With the help of the driver blocks, the initialization block accesses the controller board. The artificial cycle (U M 10.0 => SPB = LOOP) is terminated after the INITIB function block has synchronized the controller board with the PLC.

When the INITIB function block has been completed without errors, the RETURN bit is set to the value ZERO (RET = 0). If an error occurred during the function block execution, the RETURN bit is set to the value ONE (RET = 1).

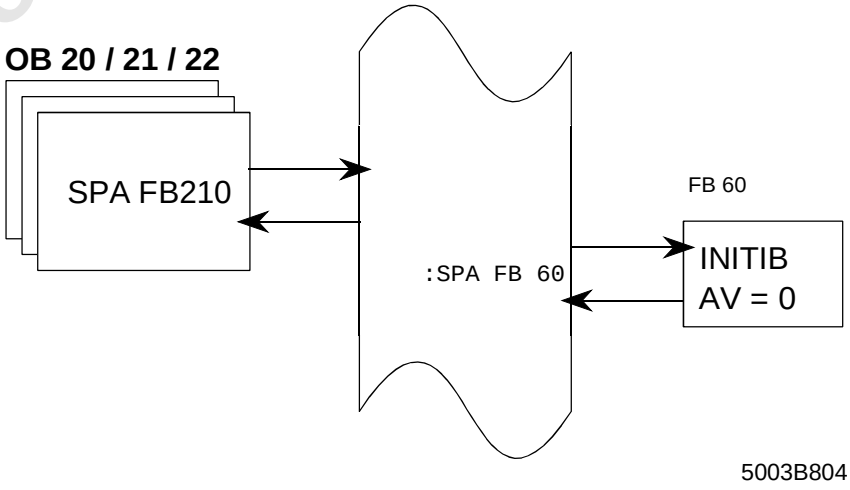


Figure 8-4: Call without a driver

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Table 8-1: Parameter description of the INITIB function block (FB61 or FB60)

Name	Attr.	Type	Designation
IBDB	B	DB	INTERBUS data block No. of a data block (DB 2 … 255). The data block must be created by the user. (Length: DW 0 … DW 199)
FEN3	D	KF	Start address of window 3 Setting of switch 5
AV	D	KF	Startup behavior (cf. Table "Startup behavior“ below)
RRST	B	DB	Standard DB for Request/Response (PCP)
CIST	B	DB	Standard DB for Confirmation/Indication (PCP)
RRMW	D	KF	Request/Response activation word (PCP)
CIMW	D	KF	Confirmation/Indication signal word (PCP)
CIFB	B	FB	Number of the CIH auxiliary block
T	T		Timer occupied by the function
STEP	E	BY	Internal flag byte
BUSY	E	BI	By setting the BUSY bits (BUSY = 1) the function is activated. After the function has been completed the block resets the BUSY bit (BUSY = 0)
TO	A	BI	TIMEOUT bit: 1 Timeout of the function has elapsed; error at the communication interface 0 No transmission error
RET	A	BI	Return value of the function: 0 Function terminated positively/without errors. 1 Function terminated negatively

Table 8-2: Startup behavior

AV	Start mode	Startup behavior (e.g. error messages which are evaluated by the message blocks)
0	Automatic start	The controller board does not transfer messages to the PLC. (cf. Figure 8-4)
1	Controlled start	The controller board transfers messages to the PLC. (cf. Figure 8-3)
2	Controlled start with EEPROM card	The controller board transfers messages to the PLC. (cf. Figure 8-3) The controller board does not transfer messages to the PLC, when the "Disable All Messages" command is sent via the EEPROM card. (cf. Figure 8-4)
3	Controlled start	The controller board does **not** transfer messages to the PLC. This state is canceled after the PLC has sent a command. (cf. Figure 8-3)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The parameters marked **(PCP)** are needed only if PCP stations (Counter, V24,...) are to be addressed. (Cf. Chapter 8.4 "Use of Communication"). These parameters are assigned a 0 (DB 0, KF +0), if there are only I/O modules in the INTERBUS-S system.

Enter the number of the activation and message words (1-4) to be used into the memory location DL 18 of the IBDB.

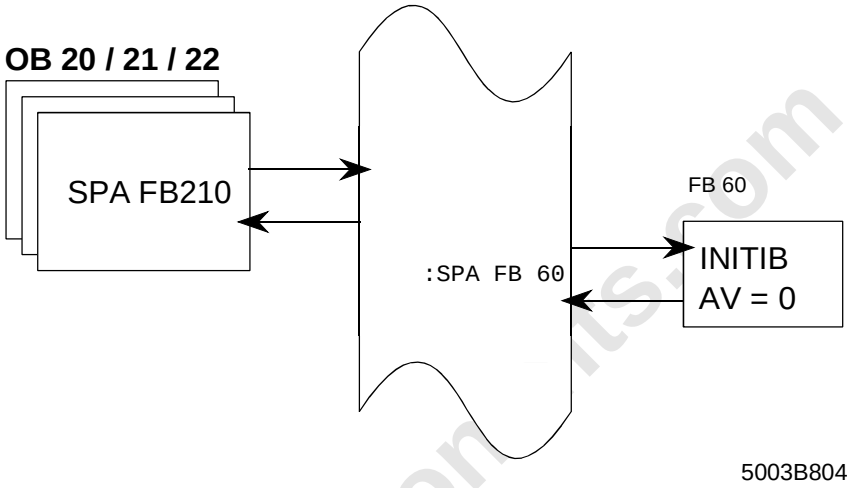


Figure 8-5: The INITIB initialization block (FB60 or FB61)

```
    :U   M  12.7
    :SPB FB  60
NAME:INITIB
IBDB:    DB   9    INTERBUS data block
FEN3:    KF 160    Base address of window 3
AV  :    KF  +1    Controlled start
RRST:    DB   0    Standard DB for REQ/RES
CIST:    DB   0    Standard DB for CON/IND
RRMW:    KF  +0    REQ/RES activation word
CIMW:    KF  +0    CON/IND signal word
CIFB:    FB  63    CON/IND auxiliary block
T   :    T    0    Occupied timer
STEP:    MB  12    Internal flag byte
BUSY:    M 12.7    Activation bit
TO  :    M 13.7    Timeout bit
RET :    M 14.7    Return value
    :
```

Figure 8-6: Call (OB 20, 21, 22)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.1.2.2 CON/IND

The CON/IND function block (FB62 or FB64) is the receive block for the link between the PLC and the controller board. With the help of the communication registers/window 3, it collects messages from the controller board.

The address location of the communication registers determines the selection of the driver blocks.

Addresses	Block	FB No.
P area	CON/IND	FB 62
Q area	CON/INDQ	FB 64

To get an optimized response with respect to time, this block must be called unconditionally at the start of the cyclic program. By way of default, the block receives 20 words from the interface in each cycle. The user can modify the quantity of parameters.

The quantity of parameters can be modified in the INTERBUS data block (IBDB) after the INITIB (FB60) function block has been called. The standard setting is 20 data words.

IBDB DL4 Quantity of data words which are transferred for every call of the CON/IND (FB62) function block.

Up to one message is received in every cycle, even if the message is shorter than the set parameter quantity to be received. When a message is received which is longer than the set parameters quantity, it takes at least two PLC cycles.

The received message is evaluated by the higher-level message function or is represented as a PCP confirmation and/or indication service.

The CON/IND (FB62) function block collaborates with the CIH (FB63) auxiliary block. The number of the auxiliary block is entered as a CIFB parameter in the INITIB (FB60) function block.

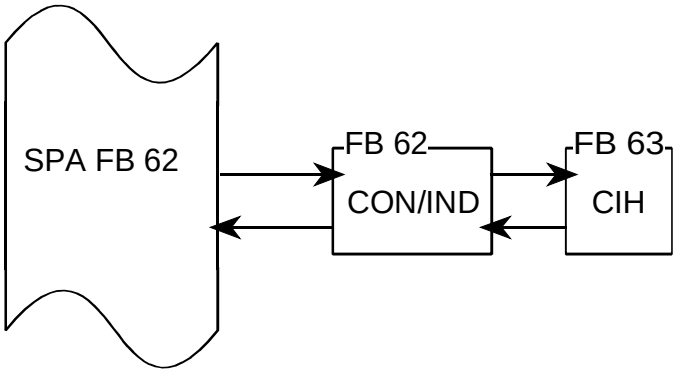


Figure 8-7: Structure of the CON/IND function block (FB62 or FB64)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Confirmations or indications expected from the PLC are indicated with bits 1 through 63. A message is indicated by resetting the bits. All unexpected or activated services are written into the standard confirmation/indication buffer. After such a service occurred, the data in the buffer must be evaluated or saved in the same PLC cycle. A new service which overwrites the buffer may occur in the next cycle. The data is received by the 'CON/IND' function block.

Table 8-3: Description of the parameters of the CON/IND function block (FB62 or FB64)

Name	Attr.	Type	Designation
IBDB	B	DB	INTERBUS data block No. of a data block (DB 2 … 255). The data block must be created by the user (Length: DW 0 … DW 199)
CIDB	E	BY	DB for Confirmation/Indication header table (PCP)
T	T		Timer occupied by the function
TO	A	BI	TIMEOUT bit: 1 Timeout of the function has elapsed; error at the communication interface 0 The function is active

```
    :
    :SPA FB  62
NAME:CON/IND
IBDB:    DB   9    INTERBUS data block
CIDB:    MB  24    Standard DB for CON/IND (PCP)
T   :    T    1    Occupied timer
TO  :    M  4.5    Timeout bit
    :
```

Figure 8-8: Call of the CON/IND function block (FB62 or FB64)

The parameters marked **(PCP)** are needed only if PCP stations (Counter, V24,...) are to be addressed. (Cf. Chapter 8.4 "Use of Communication"). These parameters are assigned a 0 (DB 0, KF +0), if there are only I/O modules in the INTERBUS-S system. By means of an entry into the memory location DL 18 of the IBDB you may use up to 64 PCP message bits (Enter "4" into DL 18 (=4 PCP words)).

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.1.2.3 REQ/RES

The REQ/RES function block (FB66 or FB67) is the send block to link the PLC and the controller board. With the help of the communication registers/window 3 it sends a command to the controller board.

The address location of the communication registers determines the selection of the driver blocks.

Addresses	Block	FB No.
P area	REQ/RES	FB 66
Q area	REQ/RESQ	FB 67

To get an optimized response with respect to time, this block must be called unconditionally at the end of the cyclic program. By way of default, the block sends 20 data words in every cycle. The user can modify the quantity of parameters in the INTERBUS data block IBDB after the INITIB function block (FB60) has been called.

IBDB DL27 Quantity of data words which are transferred with every call of the CON/IND (FB62) function block.

Up to one command is sent in every cycle, even if the command is shorter than the set quantity of parameters. Therefore, the sending of a command which is longer than the set parameter quantity takes at least two PLC cycles.

The REQ/RES block is activated by the higher-level INTERBUS-S command functions in order to send commands. This block is also needed to send PCP services (Request/Response).

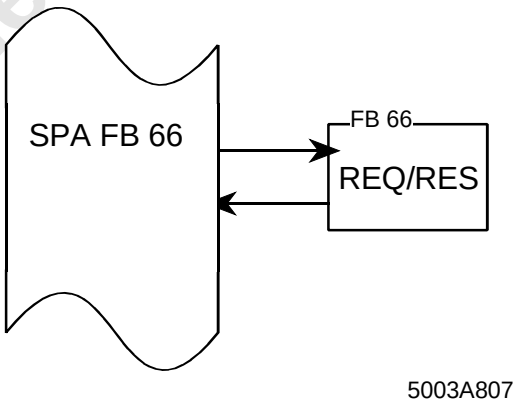


Figure 8-9: Structure of the REQ/RES function block (FB66 or FB67)

If a Request or Response service is to be executed, the service parameters have to be entered into the Request/Response standard buffer (RRST). When bit 0 of the RRMW flag word is set, the request or the response is sent.

The Request or Response services can also be stored in the form of a table in the data block. Up to 63 service headers may be entered in the "RRDB" data block. The 4th

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

parameter in this table is a pointer which points to the service body. The services may be activated with bits 1 through 63 or an edge flag. After the service has been sent the bit is automatically reset. A change of the pointers allows to send different service bodies with the same service header. A change of the communication references in the table allows to send the same bodies (data) to different stations.
You select the "RRMW" flag word and the "RRST" buffer by parameterizing the initialization block.

Table 8-4: Description of the parameters of the REQ/RES function block (FB66 or FB67)

Name	Attr.	Type	Designation
IBDB	B	DB	INTERBUS data block No. of a data block (DB 2 - 255). The data block must be created by the user (Length: DW 0 - DW 199)
RRDB	E	BY	DB for Request/Response header table (PCP)
T	T		Timer occupied by the function
TO	A	BI	TIMEOUT bit: 1 Timeout of the function has elapsed; error at the communication interface 0 The function is active

```
    :
    :SPA FB  66
NAME:REQ/RES
IBDB:    DB   9    INTERBUS data block
CIDB:    MB  25    Standard DB for REQ/RES (PCP)
T   :    T    3    Occupied timer
TO  :    M  4.6    Timeout bit
    :
```

Figure 8-10: Call of the REQ/RES function block (FB66 or FB67)

The parameters marked **(PCP)** are needed only if PCP stations (Counter, V24,...) are to be addressed. (Cf. Chapter 8.4 "Use of Communication“). These parameters are assigned a 0 (DB 0, KF +0), if there are only I/O modules in the INTERBUS-S system. By means of an entry into the memory location DL 18 of the IBDB you may use up to 64 PCP message bits (Enter "4" into DL 18 (=4 PCP words)).

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.1.2.4 INTERBUS Data Block (IBDB)

The controlled start mode of INTERBUS-S requires a data block which includes presettings or is used as a working block. This data block must have a block length of 200 data words. The block is to be created before the software is called. It is written to and loaded while the PLC is in operation.

This block must not be programmed into an EEPROM !

The data block can be created with the following program sequence:

```
:L KB 200
:E DB   9
```

```
DW0     KH = 0000
DW1     KH = 0000
...
DW199   KH = 0000
```

Figure 8-11: DB 9 structure

The data block is preset through the INITIB initialization block.

Contents of the IBDB

The data block is used exclusively by the ISFP software and must not be modified by the application program. However, the user may change some parameters once. These parameters **must be set directly after** the INITIB initialization block was called.

1. Parameter quantity (data words of the definition lists) which the driver blocks transfer in every cycle.

   With every call of a driver block, one part of a command or a message between the controller board and the PLC is copied (cf. DEFINE function block). The quantity of the parameters (data words) to be copied is preset to 20 parameters by the initialization block (INITIB). If the user requires a different data throughput this default value can be changed once after the initialization block has been called.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

2. Quantity of the PCP activation or message bits to be used

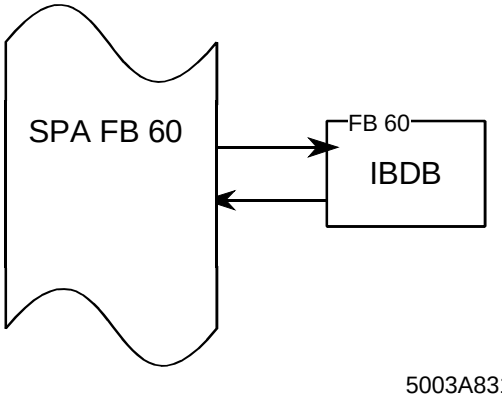


Figure 8-12: Structure of the INTERBUS data block (IBDB)

The INTERBUS data block (IBDB) allows to set the parameters of the CON/IND function block which are to be sent or the parameters of the REQ/RES data block which are to be received.

In the program listing the parameter quantity of the CON/IND function block, which is to be sent, is set to 8 for each call. The parameter quantity of the REQ/RES function block is set to 16 for each call.

```
 SPB FB 60
 ...
:A DB    9
:L KB    8     8 Parameters
:T DL    4     CON/IND
:L KB   16     16 Parameters
:T DL   27     REQ/RES
```

Figure 8-13: Call of the IBDB data block

3. Error in the instruction lists.

Some errors in the instruction lists for bit manipulation are indicated with the IBDB. The error is indicated in the data word 62 (DW 62) of the IBDB. The data word contains the error code in the left byte (DL) and the number of line with the error in the right byte (DR).

The description of the functions for bit manipulation is given in Chapter 8.2.4.2 "DEFINE (FB 69)" .

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.1.3 INTERBUS-S System Control

The INTERBUS-S functions consist of function blocks. They are called by the user at startup and in the cyclic program by means of conditional or unconditional jumps. The function blocks are written in STEP 5.

The INITIB initialization block is called at startup of the PLC (OB 20 - 22). Some basic software settings are carried out with the INITIB function block (FB60). It also performs synchronization between the PLC and INTERBUS-S. The routine is not terminated until INTERBUS-S is in the "READY" state, i.e. is ready for operation.

In the cyclic program, the receive and send blocks are called unconditionally. To get an optimized response with respect to time, the receive block (CON/IND) should be called at the start of the cyclic program and the send block (REQ/RES) should be called at the end. Depending on the length of the command or message (quantity of data words), the blocks may also be active for several cycles.

The function blocks for the system messages are called after the receive block. The command functions are called at the end of the cyclic program before the send block. The command and message functions are activated by flag bits. **Each function may only be called up in one position of the program**.

A function is started by setting its parameters and activation bit (BUSY bit). If a function is to be used in several parts of the user program, the parameters and the activation bit have to be set.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

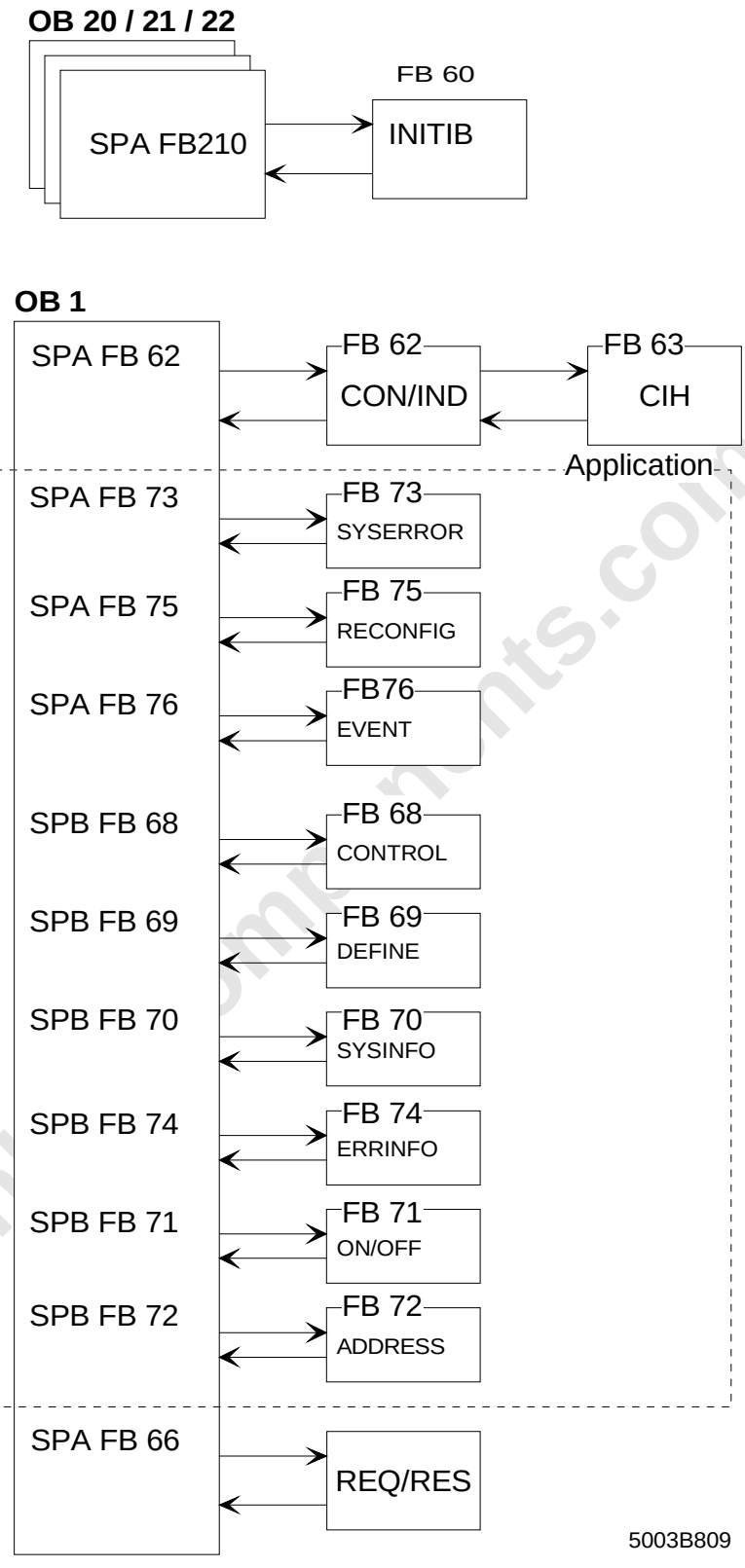


Figure 8-14: Program structuring

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.1.3.1 Structure of the Functions

The functions are realized in function blocks (FB). Different parameters are assigned to the function blocks depending on their functions. The INTERBUS data block (IBDB) is to be specified as the first parameter. The IBDB is a data block which is used as main memory by the software. It has a length of 200 data words.

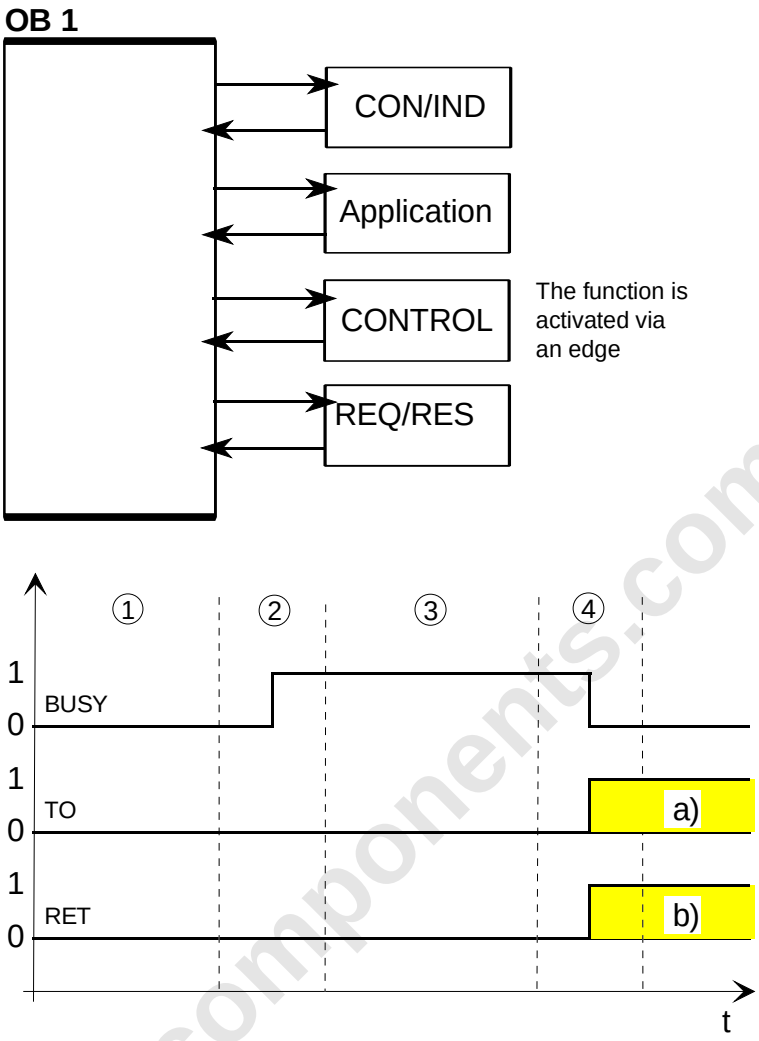
The RETURN bit is always the last parameter of the activation blocks. This RETURN bit has the value ZERO (RET = 0) when the block has been run without errors. It is set to ONE (RET = 1) should an error occur.

Errors may result, for example, from invalid parameters or a 'jamming' of the communication between the PLC and the controller board. This is monitored by a timeout. If the timeout has elapsed, the TIMEOUT bit is also set when the RETURN bit is set.

The function blocks in the cyclic program area are activated by the activation bit (BUSY bit). This bit must be set **once** by an edge flag. It is reset by the called function block. As the function blocks may be active for more than one cycle, termination of a function is recognized by virtue of the fact that the activation bit (BUSY bit) is reset.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS



① Enter function number/ FKT = 1

② The function is activated when the BUSY bit is set/ CONTROL

③ The function works in several cycles/
INTERBUS is started

④ The function is terminated / BUSY = 0

In the event of an error:

a) TO = 1 - Timeout of the function.

b) RET = 1 - The function could not be executed.

5003A810

Figure 8-15: Function call and timing

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.1.3.2 Overview of Functions

The CONTROL function block

FB68	No.	Function
	0	Configure INTERBUS-S
	1	Start INTERBUS-S Cycle
	2	Stop INTERBUS-S Cycle
	3	Alarm Stop
	4	Clear Display
	5	Disable All Messages
	6	Implement All Logical Address Map
	7	Init Communication
	8	INTERBUS-S Delay
	9	Quit Module Error All
	10	Enable all Messages

The DEFINE function block

FB69	No.	Function
	0	Physical Configuration Map
	1	Logical Local Bus Address Map
	2	Logical IN Address Map
	3	Logical OUT Address Map
	4	Communication Reference
	5	Event Map
	6	Group Numbers
	7	Parameter Timeout Constant
	8	Receive KBL (= communication relationship list)
	9	Receive Bit Manipulation
	10	Group Error Characteristics
	11	Quit Module Error

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The SYSINFO function block

FB70	No.	Function
	0	Physical Configuration Map
	1	Software Revision
	2	Switch Information
	3	INTERBUS-S Cycle Counter
	4	Logical Address Error

The ON/OFF function block

FB71	No.	Function		
	0	Group ON	No.	0...255
	1	Group OFF		0…255
	2	BK-Alarm ON		0…255
	3	BK-Alarm OFF		0…255
	4	Event ON	Bit	1…16
	5	Event OFF		1…16
	4	All Events ON		0
	5	All Events OFF		0

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The ADDRESS function block

FB72	Parameter		Function	
	IDDB	DB *n*	DB Number	ID code list
	IDDW	KF	Pointer DW	ID code list
	LBDB	DB *n*	DB Number	Local bus list
	LBDB	KF	Pointer DW	Local bus list
	INDB	DB *n*	DB Number	IN address list
	INDW	KF	Pointer DW	IN address list
	OUDB	DB *n*	DB Number	OUT address list
	OUDW	KF	Pointer DW	OUT address list
	KRDB	DB *n*	DB Number	KR list
	KRDW	KF	Pointer DW	KR list
	GRDB	DB *n*	DB Number	Group no. list
	GRDW	KF	Pointer DW	Group no. list

ADDRESS function block FB 72
Pointer for DB: 1…255, 0 = no list (0 Function)
Pointer for DW: 0…255

KR = Communication reference

The SYSERROR function block

FB73	Parameter		Function
	IBDB	DB	No. of the IB Data Block
	CON	BI	Controller Error
	BUS	BI	Bus Error (INTERBUS-S in STOP state)
	MOD	BI	Module Error (INTERBUS-S in RUN state)

The ERRINFO function block

FB74	No.	Function
	0	Controller Error Code
	1	Bus Information
	2	Defect Group
	3	Module Error
	4	Local Bus Module Error

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The RECONFIG function block

FB75	Parameter		Function
	IBDB	DB	No. of the IB Data Block
	RECO	BI	REC triggered
	POSS	BI	Reconfig. not possible/possible
	GR	BY	Group
	LB	BY	Local Bus

The EVENT function block

FB76	Parameter		Function
	IBDB	DB	No. of the IB Data Block
	EV	BI	Event
	EVKN	W	Event Identifier

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2 Command Functions

Definition:

Command functions are control functions which allow the user to specifically influence the bus system.

8.2.1 CONTROL (FB 68)

The user can activate this function with the BUSY bit. After the CONTROL function (FB 68) has been terminated without errors, the RETURN bit is set to the value ZERO (RET = 0). In the event of an error, the RETURN bit is set to the value ONE (RET = 1).

Table 8-5 shows the functions which can be executed with the CONTROL (FB68) block. The functions which are activated with this block are instructions to the controller board. The commands require no parameters.

Table 8-5: Functions of the CONTROL (FB 68) function block

No.	Function
0	Configure INTERBUS-S
1	Start INTERBUS-S Cycle
2	Stop INTERBUS-S Cycle
3	Alarm Stop
4	Clear Display
5	Disable All Messages
6	Implement All Logical Address Map
7	Init Communication
8	INTERBUS-S Delay
9	Quit Module Error All
10	Enable all Messages
11	*Reserved*

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

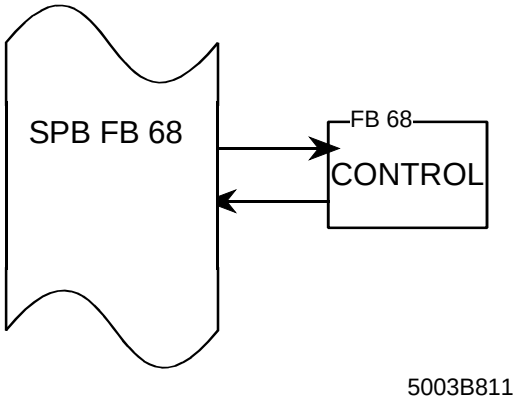


Figure 8-16: Structure of the FB 68 function block (CONTROL)

Table 8-6: Parameters of the CONTROL function block (FB 68)

Name	Attr.	Type	Designation
IBDB	B	DB	INTERBUS data block No. of a data block (DB 0 ... 255). The data block must be created by the user (Length: DW 0 ... DW 199)
T	T		Timer occupied by the function
FKT	E	BY	Code of the function to be executed
BUSY	E	BI	1 The function is activated by setting the BUSY bit. 0 After termination of the function, the BUSY bit is reset automatically by the function block.
TO	A	BI	TIMEOUT bit. 1 Timeout of the function has elapsed; the function could not be activated. 0 The function is active
RET	A	BI	Return value of the function. 0 Function terminated positively 1 Function terminated negatively

```
     U   M  12.1
     SPB FB  68
NAME:CONTROL
IBDB:    DB   9    INTERBUS data block
T   :    T    2    Occupied timer
FKT :    MB  15    Function
BUSY:    M 12.1    Activation bit
TO  :    M 13.1    Timeout bit
RET :    M 14.1    Return bit
    :
```

Figure 8-17: Call of the CONTROL function block (FB 68)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.1.1 Configure INTERBUS-S (FKT 0)

The controller board is caused to configure the connected INTERBUS-S system. This configuration is declared to be the "initial" configuration. Previously sent group definitions, logical address lists or event definitions are no longer valid.

8.2.1.2 Start INTERBUS-S Cycle (FKT 1)

The INTERBUS-S cycle is started when a permissible bus configuration is connected. From this time on, the controller board stores a cyclic data image of the INTERBUS-S system in the DPM.

INTERBUS-S will not be started if it is not allowed after an error (e.g. a hardware error), or if all groups are deactivated.

The yellow "BSA" LED is activated when a bus segment has been deactivated.

8.2.1.3 Stop INTERBUS-S Cycle (FKT 2)

The ’Stop INTERBUS-S Cycle’ function stops the running of INTERBUS-S cycles. The IBRUN LED is switched off.

The last statuses of the outputs remain unchanged. The ALARM STOP (FKT 3) command must be used if the outputs of the OUT module are to be set to zero.

8.2.1.4 Alarm Stop (FKT 3)

The ’Alarm Stop’ function triggers a reset on INTERBUS-S. This sets all module outputs to zero and the INTERBUS-S cycle is stopped.

If the bus is then to be restarted, it must be configured beforehand by a reset or with the ’Configure INTERBUS-S’ function (FKT 0).

8.2.1.5 Clear Display (FKT 4)

The ’Clear Display’ function acknowledges an error message of the controller board. This function clears simultaneously the red error LEDs and resets the seven-segment display. Only then can new errors be reported on the seven-segment display.

The error source is still available after the clearing !

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.1.6 Disable All Messages (FKT 5)

The 'Disable All Messages' function disables all messages from the controller board.

The disabling of messages is canceled by calling any other function.

8.2.1.7 Implement All Logical Address Map (FKT 6)

With the 'Implement All Logical Address Map' function, logical address lists become valid which were previously sent to the PLC. From then on, they are used to address the INTERBUS-S modules.

This function must only be sent when the bus is in the stop state as no RESET will be triggered on the bus if an error should occur. Otherwise, the pending output data on the modules would not be cleared in the event of an error.

The error location in the previously sent address list can be obtained with the 'Logical Address Error' (FB 70, FKT 4) function.

8.2.1.8 Init Communication (FKT 7)

The 'Init Communication' function initializes the communication layers and enables communication.

The bus must be started before this command.
(cf. Chapter 8.2.1.1, "Start INTERBUS-S Cycle")

Error causes: The 'Init Communication' function reports an error, if ...

- the bus was not started,
- the KBL (communication relationship list) contains an invalid communication reference,
- an invalid remote bus address was specified in the KBL (e.g.: double allocation)

8.2.1.9 INTERBUS-S Delay (FKT 8)

With the 'INTERBUS-S Delay' function, the delay time during operation with communication can be deactivated. The time is set after switching on the voltage.

8.2.1.10 Quit Module Error All (FKT 9)

With the 'Quit Module Error All' function, the module errors of the currently accessible configuration are acknowledged.

This command function is effective for all modules with a stored module error.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.2 DEFINE (FB 69)

The user can activate the individual functions of the DEFINE function block (FB 69) by setting the BUSY bit (BUSY = 1).

After the function has been successfully terminated, the RETURN bit is set to the value ZERO (RET = 0). If an error occurred during the function execution, the RETURN bit is set to the value ONE (RET = 1).

The TIMEOUT bit is set (TO = 1), when a function of the DEFINE function block (FB 69) could not be processed within the specified time.

The functions of this block demand a list of parameters. The pointers DB and DW point to the memory area into which this parameter list is mapped. The DB pointer contains the number of the data block which contains the parameter list. The DW pointer points to the data word with which the parameter list begins.

Table 8-7: Structure of the DEFINE function block (FB 69)

No.	Function
0	Physical Configuration Map
1	Logical Local Bus Address Map
2	Logical IN Address Map
3	Logical OUT Address Map
4	Communication Reference
5	Event Map
6	Group Numbers
7	Parameter Timeout Constant
8	Receive KBL
9	Receive Bit Manipulation
10	Group Error Characteristics
11	Quit Module Error

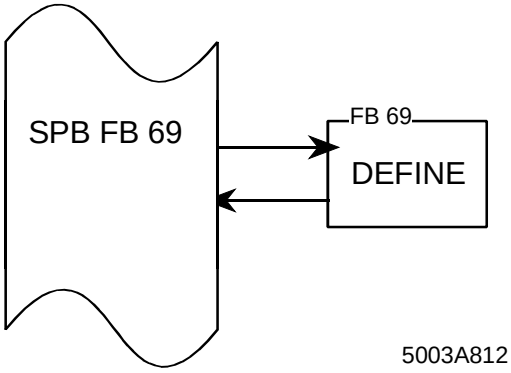


Figure 8-18: Structure of the DEFINE function block (FB 69)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The functions 8…11 of the DEFINE function block can send an error message with parameters, which are stored in the INTERBUS data block (IBDB) starting at the data word 69 (DW = 69) and may be evaluated there within the current cycle. If the return value is negative (RET=1, see Table 8-8) the data words must be checked.

Table 8-8: Parameters of the DEFINE function block (FB 69)

Name	Attr.	Type	Designation
IBDB	B	DB	INTERBUS data block No. of a data block (DB 0 ... 255). The data block must be created by the user (Length: DW 0 ... DW 199)
T	T		Timer occupied by the function.
FKT	E	BY	Code of the function to be executed
DB	E	BY	Pointer to the data block
DW	E	BY	Pointer to the data word
BUSY	E	BI	1 The function is activated when the BUSY bit is set. 0 After termination of the function, the BUSY bit is reset automatically by the function block.
TO	A	BI	TIMEOUT bit. 1 Timeout of the function has elapsed; the function could not be activated. 0 The function is active
RET	A	BI	Return value of the function. 0 Function terminated positively 1 Function terminated negatively

```
     U   M   12.2
     SPB FB  69
NAME:DEFINE
IBDB:    DB   9    INTERBUS data block
T   :    T    2    Occupied timer
FKT :    MB  15    Function
DB  :    MB  16    Pointer to the data block
DW  :    MB  17    Pointer to the data word
BUSY:    M 12.2    Activation bit
TO  :    M 13.2    Timeout bit
RET :    M 14.2    Return bit
    :
```

Figure 8-19: Call of the DEFINE function block (FB 69)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.2.1 Physical Configuration Map (FKT 0)

When this function is used, the INTERBUS-S system must be in the STOP state.

The 'Physical Configuration Map' function communicates a configuration in the form of ID numbers and length codes of the modules to the controller board.

This configuration is compared with the connected bus configuration. The RETURN bit is cleared (RET = 0) if both configurations are identical. The RETURN bit is set (RET = 1) if the read and sent configurations differ.

The TIMEOUT bit is set to ZERO (TO = 0), if the function could be executed. The specified configuration is taken as the initial configuration by the controller board. **An INTERBUS-S error must be expected if the bus is now started.** The TIMEOUT bit is set (TO = 1), if the function could not be processed within the specified time.

Parameter meanings (example):

DB	n				
DW	m+0	KY =	000,	**XXX**	
	m+1	KY =	**ZZZ**,	**YYY**	*Length and ID codes of module 0*
	m+2	KY =	**ZZZ**,	**YYY**	*Length and ID codes of module 1*
	m+3	KY =	**ZZZ**,	**YYY**	*Length and ID codes of module 2*
			...	**...**	
	m+k	KY =	**ZZZ**,	**YYY**	*Length and ID codes of module k*

n	No. of the DB in which the parameter list is stored
m	No. of the DW with which the parameter lists begins
k	Quantity of subsequent parameters
ZZZ	Length code of the module (address width)
YYY	Module identification code (ID no. of the module)
XXX	Parameter count

The list of the module identification codes (ID codes) and the length codes can be found in Chapter 3 "User Interfaces".

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.2.2 Logical Local Bus Address Map (FKT 1)

The 'Logical Local Bus Address Map' function communicates the list of logical bus segment numbers to the controller board. The bus segment numbers (logical local bus address) are entered in the parameter list in such a way that the index in the parameter list corresponds to the physical location of the respective module in the INTERBUS-S system. The number of parameters in the bus segment number list equals the number of parameters in the ID code list. (cf. FKT 0 of this block)

The list does not become valid until the "Implement All Logical Address Map" CONTROL function (FB 68, FKT 6) is activated.

Parameter meanings (example):

DB	n				
DW	m+0	KY =	000,	00**K**	
	m+1	KY =	00**Y**,	0**XX**	*Bus terminal module*
	m+2	KY =	00**Y**,	000	*Local bus module (IN addresses only)*
	m+3	KY =	00**Y**,	000	*Local bus module (OUT addresses only)*
	m+4	KY =	00**Y**,	000	*Local bus module (OUT addresses only)*
	m+5	KY =	00**Y**,	000	*Local bus module (IN and OUT addresses)*
	m+6	KY =	00**Y**,	000	*Local bus module (IN addresses only)*
			...	...	
	m+k-2	KY =	00**Y**,	0**XX**	*Bus terminal module*
	m+k-1	KY =	00**Y**,	000	*Local bus module (OUT addresses only)*
	m+k	KY =	00**Y**,	000	*Local bus module (IN and OUT addresses)*

In the bus configuration, the 1st and (k-2)th module is a bus terminal module.

- n No. of the DB in which the parameter list is stored
- m No. of the DW with which the parameter list begins
- **K** Quantity of the subsequent bytes (in this case, quantity of modules)
- **XX** Bus segment number (0 - 255)
- **YY** Installation depth: 0 for modules in the remote bus line
  16 for modules in the installation remote bus line

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.2.3 Logical IN Address Map (FKT 2)

The 'Logical IN Address Map' function communicates the list of the logical IN addresses of the modules in the INTERBUS-S topology to the controller board.

The addresses are entered in a parameter list in such a way that the index in the parameter list corresponds to the physical position of the modules in the INTERBUS-S system. The values of the remaining parameters are not relevant. The number of parameters in the list of the logical input addresses equals the number of parameters in the ID code list. (cf. FKT 0 of this block)

The list does not become valid until the 'Implement All Logical Address Map' CONTROL function (FB 68, FKT 6) is activated.

Parameter meanings (example)

DB	n				
DW	m+0	KY =	000,	00**K**	
	m+1	KY =	000,	000	*Bus terminal module*
	m+2	KY =	00**Y**,	**XXX**	*Local bus module (**IN addresses** only)*
	m+3	KY =	000,	000	*Local bus module (OUT addresses only)*
	m+4	KY =	000,	000	*Local bus module (OUT addresses only)*
	m+5	KY =	00**Y**,	**XXX**	*Local bus module (**IN** and OUT addresses)*
	m+6	KY =	00**Y**,	**XXX**	*Local bus module (**IN addresses** only)*
			...	...	
	m+k-2	KY =	000,	000	*Bus terminal module*
	m+k-1	KY =	000,	000	*Local bus module (OUT addresses only)*
	m+k	KY =	00**Y**,	**XXX**	*Local bus module (**IN** and OUT addresses)*

In the bus configuration the 2nd, 5th, 6th, and kth module have IN addresses.

n No. of the DB in which the parameter list is stored

m No. of the DW with which the parameter list begins

K Quantity of the subsequent parameters (in this case, quantity of modules)

Y If you use bus stations which exceed a data width of 16 bits or the data of which is accessed in the MPM in steps of 8 bits, you should set the Y value in accordance with the following table in order to keep the data consistency when the PLC accesses the MPM:

Y value		Data width
P area	Q area	
0	1	Standard setting: 16-bit consistency (2-byte access)
64	65	32-bit consistency (4-byte access)
128	129	8-bit or 16-bit consistency (single access)
192	193	48-bit consistency (6-byte access)

XXX IN address for the process data
(Word modules even addresses only
byte modules any address)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.2.4 Logical OUT Address Map (FKT 3)

The 'Logical OUT Address Map' function communicates the list of logical OUT addresses of the modules in the INTERBUS-S system to the controller board.

The addresses are entered into the parameter list in such a way, that the index in the parameter list corresponds to the physical position of the modules in the INTERBUS-S system. The values of the remaining parameters are not relevant. The number of parameters in the list of logical OUT parameters equals the number of parameters in the ID code list. (cf. FKT 0 of this block)

This list does not become valid until the 'Implement All Logical Address Map' CONTROL function (FB 68, FKT 6) is activated.

Parameter meanings (example)

DB	n				
DW	m+0	KY =	000,	00**K**	
	m+1	KY =	000,	000	*Bus terminal module*
	m+2	KY =	000,	000	*Local bus module (IN addresses only)*
	m+3	KY =	00**Y**,	**XXX**	*Local bus module (**OUT addresses** only)*
	m+4	KY =	00**Y**,	**XXX**	*Local bus module (**OUT addresse**s only)*
	m+5	KY =	00**Y**,	**XXX**	*Local bus module (IN and **OUT addresses**)*
	m+6	KY =	000,	000	*Local bus module (IN addresses only)*
			...	...	
	m+k-2	KY =	000,	000	*Bus terminal module*
	m+k-1	KY =	00**Y**,	**XXX**	*Local bus module (**OUT addresses** only)*
	m+k	KY =	00**Y**,	XXX	*Local bus module (IN and **OUT addresses**)*

In the bus configuration, the 3rd,4th, 5th, (k-1)th, and kth module has OUT addresses.

- n No. of the DB in which the parameter list is stored
- m No. of the DW with which the parameter list begins
- **K** Quantity of subsequent parameters (in this case, module quantity)
- **Y** If you use bus stations which exceed a data width of 16 bits or the data of which is accessed in the MPM in steps of 8 bits, you should set the Y value in accordance with the following table in order to keep the data consistency when the PLC accesses the MPM:

Y value		Data width
P area	Q area	
0	1	Standard setting: 16-bit consistency (2-byte access)
64	65	32-bit consistency (4-byte access)
128	129	8-bit or 16-bit consistency (single access)
192	193	48-bit consistency (6-byte access)

- **XXX** OUT address of the process data
  (Word modules even addresses only
  byte modules any address)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.2.5 Communication Reference (FKT 4)

The 'Communication Reference' function communicates the list of communication references (KRs) to the controller board. A communication reference is the logical address of the communication stations in the INTERBUS-S system.

The communication references are entered in the parameter list in such a way that the index in the parameters list corresponds to the physical position of the modules in the INTERBUS-S system. The values of the remaining parameters are not relevant. The number of parameters in the list of the communication references equals the number of parameters in the ID code list. (cf. FKT 0 of this block)

Only values between 2 and 63 may be entered. The values have to be allocated in an ascending order starting with 2.

The list does not become valid until the 'Init Communication' CONTROL function (FB 68, FKT 7) is activated.

Parameter meanings:

DB	n				
DW	m+0	KY =	000,	00**K**	
	m+1	KY =	000,	000	Module without KR
	m+2	KY =	000,	000	Module without KR
	m+3	KY =	000,	0**XX**	Module **with** KR
			...	...	
	m+k	KY =	000,	0**XX**	Module **with** KR

In the bus configuration, the 3rd and kth modules are communication stations.

- n No. of the DB in which the parameter list is stored
- m No. of the DW with which the parameter list begins
- **K** Quantity of subsequent parameters (in this case, module quantity)
- **XX** Communication reference (2 - 63)

online-components.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.2.6 Event Map (FKT 5)

An event indicates level changes of a predefined input. Events for digital input modules are programmed with this function's parameters.

If 'Event Map' function has been executed without errors, the RETURN bit is set to the value ZERO (RET = 0). If an error occurred when the function was executed, the RETURN bit is set to the value ONE (RET = 1).

The TIMEOUT bit is set (TO = 1) if the function could not be activated in the specified time.

The events do not yet take effect after definition of the event map. Any existing event definitions are canceled by execution of this command.

After the definition, the events must also be activated by means of the ON/OFF (FB 71, FKT 4) function block.

Parameter meanings:

DB	n			
DW	m+0	KY =	000, 00**K**	
	m+(0*5)+1	KM =	**XXXX XXXX XXXX XXXX**	*Identifier event 1*
	m+(0*5)+2	KH =	**0004**	*Event code*
	m+(0*5)+3	KY =	000, **AAA**	*Address*
	m+(0*5)+4	KM =	**PPPP PPPP PPPP PPPP**	*Mask 1*
	m+(0*5)+5	KM =	**NNNN NNNN NNNN NNNN**	*Mask 2*
	m+(1*5)+1	KM =	**XXXX XXXX XXXX XXXX**	*Identifier event 2*
	m+(1*5)+2	KH =	**0004**	*Event code*
	m+(1*5)+3	KY =	000, **AAA**	*Address*
	m+(1*5)+4	KM =	**PPPP PPPP PPPP PPPP**	*Mask 1*
	m+(1*5)+5	KM =	**NNNN NNNN NNNN NNNN**	*Mask 2*
	...	...	...	
	m+((v-1)*5)+1	KM =	**XXXX XXXX XXXX XXXX**	*Identifier event v*
	m+((v-1)*5)+2	KH =	**0004**	*Event code*
	m+((v-1)*5)+3	KY =	000, **AAA**	*Address*
	m+((v-1)*5)+4	KM =	**PPPP PPPP PPPP PPPP**	*Mask 1*
	m+((v-1)*5)+5	KM =	**NNNN NNNN NNNN NNNN**	*Mask 2*

n No. of the DB in which the parameter list is stored

m No. of the DW with which the parameter list begins

online-components.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The parameter block listed above defines an event. Up to 15 further events in the form shown above (parameters 1 to 5) can be programmed with the subsequent parameters.

The parameter count which is to be entered into the data word is 10 for 2 event definitions, or 15 for 3 event definitions, etc.

- An **identifier** is assigned in the first parameter of each block. As the identifier, one bit in the data block must be set to 1 and the rest must be set to 0. Thus, for example:

...	KM =	0000 0000 0000 0001	*Identifier event 1*
...	KM =	0000 0000 0000 0010	*Identifier event 2*
...	...		
...	KM =	0100 0000 0000 0000	*Identifier event 15*

  Each identifier must be assigned only once. During the program routine, the identifier is reported if an event occurs. Several bits may be set if several events occur in one INTERBUS-S cycle (the identifiers are ORed)

- The 2nd parameter is the **event code**. At the moment, only events for digital inputs can be defined. The code is KH = 0004.
- The 3rd parameter contains the logical **IN address** of the word that is to report an event in response to an edge change. Each address must be assigned only once.
- The 4th parameter is the **mask 1** for positive edges. A "1" means that an edge change from zero to one for this bit is reported as an event. 0 to 16 bits can be identified. If a zero appears, no edge check takes place for the bit concerned.
- The 5th parameter is the **mask 2** for negative edges. A "1" means that an edge change from one to zero is reported as an event for the bit concerned. 0 to 16 bits can be identified. If a zero appears, no edge check takes place for the bit concerned.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.2.7 Group Numbers (FKT 6)

Several local buses can be combined to one group. If no groups have been defined, all local buses belong to one group. To be able to deactivate a single local bus or installation remote bus, this bus must be assigned a group of its own. The group's number can be freely chosen between 0 and 255. Equally, several installation remote buses can be combined in one group.

Bus stations which have only one remote bus connection, such as the IBS IP ... modules, can only form a group of their own. (This does not apply to bus stations of the type IBS BK I/O T and IBS BB1 ...)

The 'Group Numbers' function communicates the list of group definitions to the controller board. The controller board does not accept the list until after a test.

This test checks whether

- the addresses are valid,
- the addresses do not occur several times,
- the group numbers are within the range from 0 to 255,
- I/O BKs or similar modules are only defined singly in one group.

If the 'Group Numbers' function has been executed without errors, the RETURN bit is set to the value ZERO (RET = 0). If an error occurred during the function execution, the RETURN bit is set to the value ONE (RET = 1).

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Parameter meanings:

DB	n				
DW	m+0	KY =	000,	00**K**	*Parameter count*
	m+1	KY =	000,	0**XX**	*Local bus address*
	m+2	KY =	000,	0**XX**	*Group no. (0 ... 255)*
	m+3	KY =	000,	0**XX**	*Local bus address*
	m+4	KY =	000,	0**XX**	*Group no. (0 ... 255)*
	...		...		...
	m+k-1	KY =	000,	0**XX**	*Local bus address*
	m+k	KY =	000,	0**XX**	*Group no. (0 ... 255)*

- n No. of the DB in which the parameter list is stored
- m No. of the DW with which the parameter list begins
- **K** Parameter count (local buses * 2)
- **XX** Local bus address
- **YY** Group number of the previous local bus

8.2.2.8 Parameter Timeout Constant (FKT 7)

The "Parameter Timeout Constant" function initializes the timeout constant, after which the 'Controller Parameter Timeout Error' message is reported. The error occurs if the acknowledgment for a command could not be retrieved in time. The function expects 2 parameters containing the timeout in milliseconds (hex).

Parameter meanings:

DB	n				
DW	m+0	KY =	000,	00**K**	
	m+1	KH =	00xx		*Most significant word*
	m+2	KH =	xxxx		*Least significant word*

- n No. of the DB in which the parameter list is stored
- m No. of the DW with which the parameter list begins

The timeout constant is limited to the value $FFFFFF_{hex}$
This value corresponds to a time of approximately 4.7 hours.
The default value is $13FF_{hex}$ (approx. 5.12 sec).

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.2.9 Receive KBL (FKT 8)

The "Receive KBL" function allows to change the entries of the communication relationship list (KBL) on the controller board.

The parameters of this function are split into 2 bytes. The left bytes shows the parameter's number, the right byte shows the parameter setting for the station (KR). Not all parameters need to be communicated when executing the function. Owing to the numbering of the parameters, a subset of the parameters in the KBL may only be modified. **However, the parameter with the number "zero", the communication reference, must always be transferred.**

The "Receive KBL" function must only be executed whenever communication has **not yet been initialized** (FB 68, FKT 7).

Parameter meanings:

DB	n						
DW	m+0	KY =	000,	00**K**	*Parameter count*		
	m+1	KY =	000,	**XXX**	*Communication reference*		
	m+2	KY =	001,	**XXX**	*Remote address*		
	m+3	KY =	002,	**XXX**	*Connection type*	|	
	m+4	KY =	003,	**XXX**	*Max send conf req counter*	|	
	m+5	KY =	004,	**XXX**	*Max rec conf req counter*	|	*Do*
	m+6	KY =	005,	**XXX**	*Max send ack req counter*	|	*not*
	m+7	KY =	006,	**XXX**	*Max rec ack req counter*	|	*change !*
	m+8	KY =	007,	**XXX**	*Acyclic control interval*	|	
	m+9	KY =	008,	**XXX**	*Type of connection*		
	m+10:	KY =	009,	**XXX**	*Request length high*		
	m+11	KY =	010,	**XXX**	*Request length low (51-246) **		
	m+12	KY =	011,	**XXX**	*Indication length high*		
	m+13	KY =	012,	**XXX**	*Indication length low (51-246) ***		
	m+14	KY =	013,	006			
	m+15	KM =	**XXXX XXXX XXXX XXXX |** Nibble by nibble description				
	m+16	KM =	**XXXX XXXX XXXX XXXX |** "Supported *services bit fields"*				
	m+17	KM =	**XXXX XXXX XXXX XXXX |**				
	m+18	KY =	014,	**XXX**	*Max outstanding client server*	|	
	m+19	KY =	015,	**XXX**	*Max outstanding server server*	|	*Do*
	m+20	KY =	016,	**XXX**	*Type of communication*	|	*not*
	m+21	KY =	017,	**LLL**	*Symbol length*	|	*change!*
	m+22	KC =	**S, S, ...**		*Symbol*		

- n No. of the DB in which the parameter list is stored
- m No. of the DW with which the parameter list begins
- **K** Parameter count
- **L** Quantity of the transmitted symbols (S) in bytes

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

*/** The value for Request Length Low/Indication Length Low must correspond to the Send-Low value/Receive Low value of the Initiate Error Confirmation (see 8.4.2.17), provided that this confirmation caused an error message.

The set bits of the parameter m+15 (bit 0..15) and the set first eight bits (bits 16 to 23) of the parameter m+16 represent in an encoded form the available client services of the specified PCP station (parameter m+1) (=3 bytes).

The set last eight bit of the parameter m+16 (bits 24 to 31) and the set bits of the parameter m+17 (bits 32 to 47) represent in an encoded form the available server services of the specified PCP station.

Only bits 0, 8, 10, 11 and 16 are of importance for the indication of the supported client services.

Only bits 24, 32, 34, 35 and 40 are of importance for the indication of the supported server services.

All other bits must be 0.

The following Table 0-1 shows which services are activated or indicated by the bits mentioned.

Table 0-1: Supported Client/Server services of the Supported Services Bit Fields

Bit number	0	8	8	10	11	16
Client service	Get-OV	Start	Stop	Read	Write	Information Report
Bit number	24	32	32	34	35	40
Server service	Get-OV	Start	Stop	Read	Write	Information Report

The bits for the client services are always all set, while bit 32 for the server services is not set by default. If the used PCP station supports the server services "Start" and "Stop", you must additionally set bit 32 with the "Receive-KBL" function and the associated data block.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.2.10 Receive Bit Manipulation (FKT 9)

In some applications it is expedient to react swiftly to signal changes of the inputs. The response time to a signal change depends on the scan time (when is the signal change recognized) or the intelligence (programmed response) of a controller board. The INTERBUS-S controller board offers the possibility of responding to signal changes at the inputs. If a signal change is detected, it can

- be reported to the PLC for further processing, or
- cause a direct response of the controller board to an output.

The direct response of the controller board to an output is described in the following description. The description of messages relating to signal changes can be found in the user manual under EVENT processing.

Manipulation of OUT words

Manipulation of OUT words is required to have the ability to respond quickly to changes of inputs.

Processing takes place exclusively on the controller board and is programmed by way of a standard function block. For this purpose, a list containing instructions and further parameters is transferred to the controller board. Processing begins automatically after the list has been checked.

If the controller board detected a signal change, the programmed output is set immediately to a defined state. The output remains in this state until the PLC resets it.

Responses to signal changes:

Receive bit manipulation
Quantity of subsequent words
1st instruction
. . .
nth instruction

Figure 8-20: General command structure

The command allows the bit manipulation of the INTERBUS-S process output data by means of programmable instructions, automatically executed by the PLC, which work on corresponding addresses.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

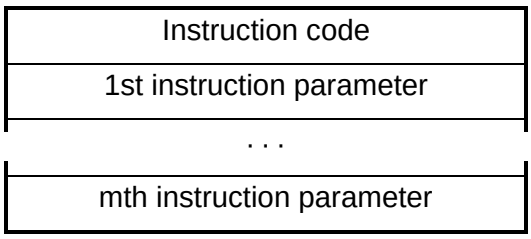


Figure 8-21: General instruction structure

If the "Receive Bit Manipulation" function was executed without errors, the RETURN bit of the DEFINE function block (FB69) is set to the value ZERO (RET = 0). All instructions listed are now accepted and appended to a possibly existing list. If an error occurred when the function was executed, the RETURN bit is set to the value ONE (RET = 1) and the sent list is not accepted.

The error cause is described in the INTERBUS data block (IBDB) in the data word 62 (DW 62).

Instructions with invalid addresses will not be executed. No special message is sent in this case.

Addresses (and thus instructions) become invalid:

- with logical addressing,
  when previously used addresses do no longer exist, or
- with deactivated groups,
  when the address is within the range of the deactivated group.

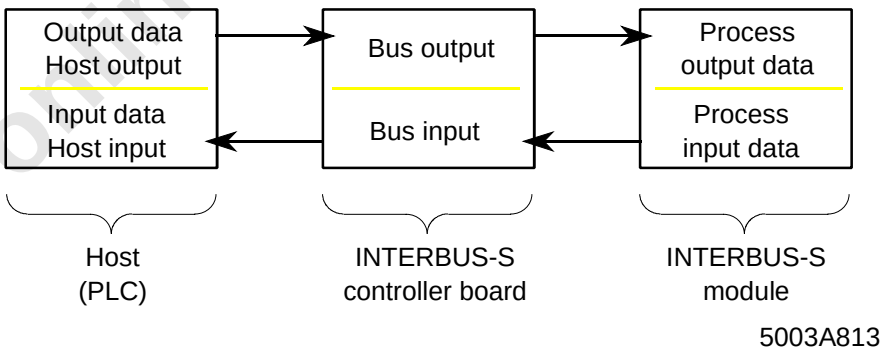


Figure 8-22: Bit manipulation

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Function groups of the bit manipulation

Up to 300 instructions can be communicated with this command. Bit manipulation prolongs the INTERBUS-S scan time by maximally 40 µs * quantity of instructions.

The instructions are stored in an instruction list on the controller board. The instructions given in this command are added to the list when the first parameter is not zero. A possibly existing instruction list is deleted by setting the first parameter = 0.

In the case of the command parameters, the addresses have to be given in a special format.

The "logical address" is the address which is used with INTERBUS-S to address the process data, such as the address of a byte for byte-oriented modules or a word for word-oriented modules.

The "bit number" used designates the bit within process data item which has been specified by the logical address. The bits are counted like addresses (see figure above).

Bit manipulation is only possible in the address area of the binary I/Os.

The meaning of the addresses and their structures are given in the description of the individual commands.

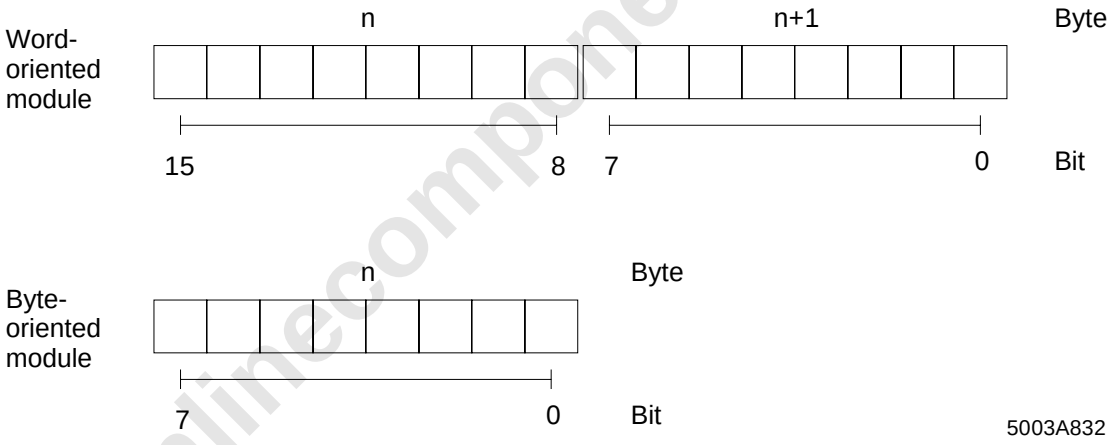


Figure 8-23: Word orientation/byte orientation

One input bit and one output bit are defined for each bit manipulation. The base address and the bit number of the input/output are used for the definition.

Two designations are used for the output bit manipulation.

1. Bus output bit — Output of the INTERBUS-S module
2. Host output bit — Output of the PLC which sets the bus output via INTERBUS-S.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Sequence:

1. Definition of bit manipulation
2. Setting a defined output (host output bit) by the PLC.
   The module output (bus output bit) is set via INTERBUS-S.
   Bit manipulation is activated when the signal changes from 0 ⇒ 1. In each INTERBUS-S cycle the controller board monitors the defined input.
3. The defined edge (e.g. from 0 ⇒ 1) is recognized at the bus input bit. The bus output bit is reset in the next INTERBUS-S cycle.

General functions of the instructions:

The instructions control the setting or resetting of a process output data bit (bus output bit) in view of a process input data bit (bus input bit) and the output data (host output data bit) written by the host (PLC).

The bus output bit is reset (Bit = 0) in the event of an edge of the bus input bit which can be freely selected.

Instruction	Edge of the bus input bit
Reset-OUT-IN01	**0 → 1**
Reset-OUT-IN10	**1 → 0**

Description of the instructions :

The bus output bit is reset after the edge of the bus input bit has been evaluated. The evaluation of the bus input bit is determined by the instruction.

The bus output bit is set by setting the host output bit. As long as the bus output bit has not yet been reset as a result of the evaluation of the bus input bit, the bus output bit is determined by the host output bit only.

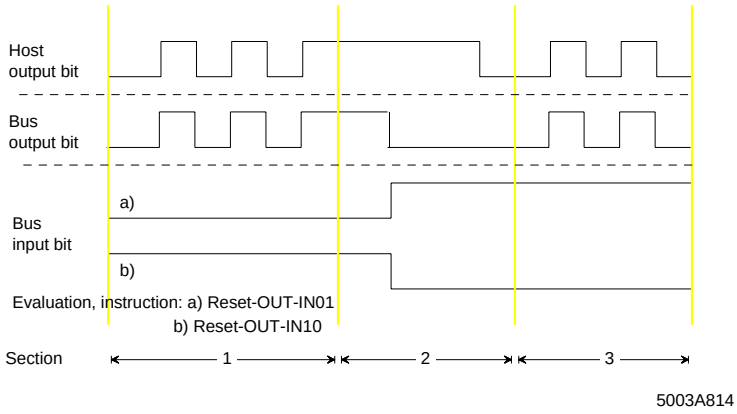


Figure 8-24: Bit manipulation

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The following commands are implemented:

Name	Value (hex)	Input signal
I_Code1	0005	Signal change from 0 → 1
I_Code2	0006	Signal change from 1 → 0
I_Code3	0007	Signal change from 0 → 1
I_Code4	0008	Signal change from 1 → 0
I_Code5	0009	Signal change from 0 → 1 switched
I_Code6	000A	Signal change from 1 → 0 switched

Bit manipulation

Numbering of the bits of an address:

	Output address														
	Input address														
Bit	**15**	**14**	**13**	**12**	**...**								**2**	**1**	**0**

Meaning of the bits of an address

Bit	Meaning	Values (hex)
0 ... 7	Logical address	
8	Address in the P area Address in the Q area	0 1
9 ... 11	Reserved	
12 ... 15	Bit number	0 ... F

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

a) **Reset-OUT-IN01 / Reset-OUT-IN10** instructions

Structure of the "Reset-OUT-IN01" instruction

Reset-OUT-IN01	**0005_{hex}**
Output address	ADR
Input address	ADR

Structure of the "Reset-OUT-IN10" instruction

Reset-OUT-IN10	**0006_{hex}**
Output address	ADR
Input address	ADR

b) **Reset2-Out-In01 / Reset2-Out-In10** instructions

Structure of the "Reset-OUT-IN01" instruction

Reset2-OUT-IN01	**0007_{hex}**
Output address	ADR
Bit number output address	B
Input address	ADR
Bit number input address	B

Structure of the "Reset-OUT-IN10" instruction

Reset2-OUT-IN10	**0008_{hex}**
Output address	ADR
Bit number output address	B
Input address	ADR
Bit number input address	B

B Bit number, 0000_{hex} ... $000F_{hex}$

ADR I/O address, 0_{dec} ... 255_{dec}

The Reset2-OUT-IN01 and Reset2-OUT-IN10 instructions have the same functions as the Reset-OUT-IN01 and Reset-OUT-IN10 instructions. Only the instruction format is 5 words long. Thus, 16 bit addresses are available.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

c) **Reset-OUT-IN01-Switch** / **Reset-OUT-IN10-Switch** instructions

Structure of the "Reset-OUT-IN01-Switch" instruction

Reset2-OUT-IN01	**0009_{hex}**
Address bit manipulation register	ADR
Bit number bit manipulation register	B
Output address	ADR
Bit number output address	B
Input address	ADR
Bit number input address	B

Structure of the "Reset-OUT-IN10-Switch" instruction

Reset2-OUT-IN10	**$000A_{hex}$**
Address bit manipulation register	ADR
Bit number bit manipulation register	B
Output address	ADR
Bit number output address	B
Input address	ADR
Bit number input address	B

B Bit number is to be specified as number, 0000_{hex} ... $000F_{hex}$

ADR I/O address, 0_{dec} ... 255_{dec}

If the specified bit in the bit manipulation register is set, the instructions act like Reset-OUT-IN01 and Reset-OUT-IN10. If the specified bit in the bit manipulation register is not set, the command is not effective and no bit manipulation takes place.

The bit manipulation register is to be defined with logical addressing before the two commands are used.

ID code register bit manipulation ID 19

Up to 15 register can be defined.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Instruction list structure:

The controller board is programmed by means of an instruction list in which the edge type (I_CODE1/2), the output bit, and the input bit are described.

The commands are appended to the existing list once they have been communicated. Thus, it is possible to communicate commands individually and to test the result.

If the first sent parameter is a 0, any list existing in the controller board is deleted before subsequent parameters are checked.

Appending a list:

```
        n       Parameter count
        C       I_CODE instruction 1
BIT,    ADR     Output bit
BIT,    ADR     Input bit
        C       I_CODE instruction 2
BIT,    ADR     Output bit
BIT,    ADR     Input bit
                ...
BIT,    ADR     Input bit
```

Deleting of the old list and transferring a new one:

```
        n       Parameter count
        0       0 = Deleting the old list
        C       I_CODE instruction 1
BIT,    ADR     Output bit
BIT,    ADR     Input bit
        C       I_CODE instruction 2
BIT,    ADR     Output bit
BIT,    ADR     Input bit
                ...
BIT,    ADR     Input bit
```

n	Parameter count
C	I_CODE for the edge (5 or 6)
BIT	IN or OUT bit
ADR	IN or OUT word address

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Handling the instructions:

Influences on the programmed instructions:

The transferred lists are canceled by all commands and errors that influence addressing of the IN or OUT addresses.

This can be avoided if all commands that influence logical addressing and transfer of the command lists are executed before INTERBUS-S is started.

If commands are used to switch groups on or off, the application program running on the host must take this into account.

Behavior in the event of disconnected groups:

If parts of the bus are switched off by the program (by a command) or by an error during operation, it may occur that the IN or OUT addresses specified in the instruction lists are no longer available. If this case should occur, the corresponding instructions will no longer be executed. No special message is sent to the PLC.

If an error is detected in a list, this is indicated from data word 68 (DW 68) of the INTERBUS-S data blocks (IBDB).

Error description:

DW	68	KH =	**MMMM**		*Message code*
	69	KY =	000,	**002**	*Parameter count*
	70	KY =	000,	00**X**	*Error no.*
	71	KY =	000,	0**YY**	*Parameter no.*

MMMM Message code

YY The **parameter no.** specifies the line no. in which an error has been detected in the instruction list.

X

Error No.	Meaning
1	No more instructions can be accepted
2	Unknown instruction code
3	Too few parameters
4	No internal RAM free
5	Logical OUT address does not exist
6	OUT address does not exist in the INTERBUS ring
7	Logical IN address does not exist

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.2.11 Group Error Characteristics (FKT 10)

A prerequisite for using the "Group Error Characteristics" function is a group definition.

The group is initiated with the DEFINE function block (FB69, FKT 6). If no group definition was performed, all local buses belong to one group. The group number can be freely selected between 0 and 255. Several local buses can be combined in one group. To disconnect a local bus, it must be assigned its own group.

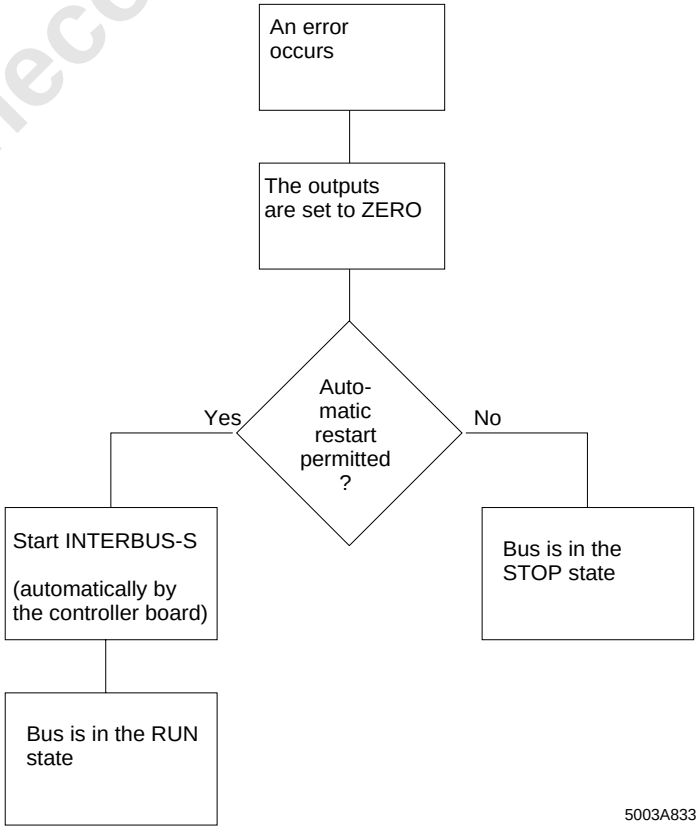
If a bus error occurs, the defined group is disconnected from the INTERBUS-S ring and the bus is stopped. **The outputs of the group are set to ZERO.** Further cycles without the disconnected group can only be run with the start command in the CONTROL (FB 68, FKT 1) function block.

The bus system is only started automatically, if the disconnectible groups have been specifically identified. Disconnectible groups are groups whose malfunction does not lead to the automatic restart of the bus.

The "Group Error Characteristics“ function communicates the list of the groups to the controller board, the failure of which is to lead to the automatic restart of the bus. The controller board only takes over the list after a test.

If this function was executed without errors, the RETURN bit is set to the value ZERO (RET = 0). If an error occurred during function execution, the RETURN bit is set to the value ONE (RET = 1). The input bit is set (TO = 1), if the "Group Error Characteristics“ function could not be activated within the specified time.

Sequence:



onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Parameter meanings:

DB	n				
DW	m+0	KY =	000,	00**K**	
	m+1	KY =	**XXX**,	0**YY**	*Group no. (0 ... 255)*
	m+2	KY =	**XXX**,	0**YY**	*Group no. (0 ... 255)*
	m+3	KY =	**XXX**,	0**YY**	*Group no. (0 ... 255)*
	m+4	KY =	**XXX**,	0**YY**	*Group no. (0 ... 255)*
	...	...	...	...	
	m+k-1	KY =	**XXX**,	0**YY**	*Group no. (0 ... 255)*
	m+k	KY =	**XXX**,	0**YY**	*Group no. (0 ... 255)*

n No. of the data block (DB) in which the parameter list is stored

m No of the data word (DW) with which the parameter list begins

K Quantity of parameters

XXX 0 = Stop / 128 = automatic restart

YY Group number

Errors in the instruction list are listed in the IBDB data block from DW 69 onwards.

DW	68	KH =	**MMMM**		*Message code*
	69	KY =	000,	**002**	*Parameter count*
	70	KY =	000,	00**X**	*Error no.*
	71	KY =	000,	0**YY**	*Parameter no.*

MMMM Message code

YY The **parameter no.** indicates the line no. in which an error has been detected in the instruction list.

X

Error No.	Meaning
0	No error
1	Element exists twice
2	Group does not exist

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.2.12 Quit Module Error (FKT 11)

The "Quit Module Error“ function clears the module errors of the named modules on the respective modules. This applies only for modules which have a module error acknowledgment. The **logical local bus address** and the desired **module number** in the local bus are to be specified as parameters. The module number 0 is reserved for the bus terminal module or the installation remote bus station.

Parameter meanings:

DB	n				
DW	m+0	KY =	000,	00**K**	
	m+1	KY =	000,	**YYY**	*Local bus address*
	m+2	KY =	000,	00**X**	*Module no.*
	...	...	...	....	
	m+k-1	KY =	000,	**YYY**	*Local bus address*
	m+k	KY =	000,	00**X**	*Module no.*

n No. of the DB in which the parameter list is stored

m No. of the DW with which the parameter list begins

K Quantity of parameters

X Module no. in the specified local bus

YYY Local bus no.

The error in the instruction list is specified in the data block (**IBDB)** from the data word 69 (**DW 69**).

DW	68	KH =	**MMMM**		*Message code*
DW	69	KY =	000,	00**2**	*Parameter count*
	70	KY =	000,	**YYY**	*Parameter no.*
	71	KY =	000,	00**X**	*Error no.*

MMMM Message code

YYY The **parameter no.** indicates the line no. in which the error has been detected in the instruction list.

X

Error No.	Meaning
0	No error
1	Odd number of parameters
2	Unknown logical local bus number
3	Specified module (number) does not exist
4	Module can currently not be addressed (e.g. group was switched off)
5	Transmission error

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.3 SYSINFO (FB 70)

The functions of the SYSINFO function block request a list of parameters from the controller board. The pointers DB and DW point to the memory area in which this parameter list is to be stored. The DB pointer contains the number of the data block (IBDB) which is to include the parameter list. The pointer DW points to a data word at which the parameter list is started.

Table 8-10 lists the functions which can be executed with the SYSINFO function block. Each of these functions can be activated by setting the BUSY bit.

If the activated function has been executed without errors, the RETURN bit is set to the value ZERO (RET = 0). If an error occurred during function execution, the RETURN bit is set to the value ONE (RET = 1). The error register (EREG) describes the cause of the error. The error register is mapped into the INTERBUS data block (IBDB) on the data word 62 (DW 62).

The TIMEOUT bit is set (TO = 1), if the function could not be activated within the specified time.

Table 8-10: Functions of the SYSINFO function block (FB 70)

No.	Function
0	Physical Configuration Map
1	Software Revision
2	Switch Information
3	INTERBUS-S Cycle Counter
4	Logical Address Error

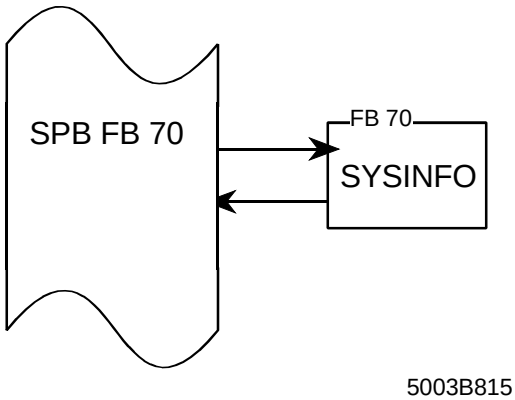


Figure 8-25: Structure of the SYSINFO function block (FB 70)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Table 8-9: Parameters of the SYSINFO function block (FB 70)

Name	Attr.	Type	Designation
IBDB	B	DB	INTERBUS data block No. of a data block (DB 0 ... 255). The data block must be created by the user. (Length: DW 0 ... DW 199)
T	T	T	Timer occupied by the function
FKT	E	BY	Function no.
DB	E	BY	Pointer to the data block (0-255) in which the parameters of the function are to be stored
DW	E	BY	Pointer to the data word (0-254) in which the first parameter is to be stored
BUSY	E	BI	BUSY bit 1 The function is activated by setting BUSY bit. 0 After termination of the function, the function block automatically resets the BUSY bit.
TO	A	BI	TIMEOUT bit. 1 The timeout of the function has elapsed. The function could not be activated. 0 The function was activated.
RET	A	BI	RETURN bit of the function. 0 Function terminated positively 1 Function terminated negatively

```
     U   M   12.3
     SPB FB  70
NAME:SYSINFO
IBDB:    DB   9    INTERBUS data block
T   :    T    2    Occupied timer
FKT :    MB  15    Function no.
DB  :    MB  16    Pointer to the data block of the message
DW  :    MB  17    Pointer to the first data word of the message
BUSY:    M 12.3    Activation bit
TO  :    M 13.3    Timeout bit
RET :    M 14.3    Return bit
    :
```

Figure 8-26: Call of the SYSINFO function block (FB70)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.3.1 Physical Configuration Map (FKT 0)

The "Physical Configuration Map“ function requests the physical INTERBUS-S configuration in the form of identification codes and the length codes. The function writes the configuration list into the memory area of a data block (IBDB) defined by the DB and DW parameters. The quantity of the free data words must be equal to the quantity of connected modules plus one.

Parameter meanings:

DB	n				
DW	m+0	KY =	000,	00**K**	
	m+1	KY =	**YYY**,	**XXX**	*Module 1*
	m+2	KY =	**YYY**,	**XXX**	*Module 2*
	m+3	KY =	**YYY**,	**XXX**	*Module 3*
	m+k	KY =	**YYY**,	**XXX**	*Module k*

The bus configuration contains k INTERBUS-S modules (including bus terminal modules)

- n No. of the DB in which the parameter list is stored
- m No. of the DW with which the parameter list begins
- **K** Quantity of subsequent parameters
- **XXX** Module identification code
- **YYY** Length code of the modules (memory requirement)

8.2.3.2 Software Revision (FKT 1)

The "Software Revision" function requests the version of the host controller board firmware. The reported parameters of the function contain the version information in ASCII code.

Parameter meanings:

DB	n			
DW	m +0	KY =	000, 075	*Parameter count*
	m+1	KC =	FFFFFFFF	*Company name*
	m+9	KC =	HHHHHHHHHHHHHHHH	*Host type*
	m+25	KC =	TTTTTTTTTTTTTTTT	*Controller board type*
	m+41	KC =	OOOOOOOOOOOO	*Controller board option*
	m+57	KC =	RRRRRR	*Release no.*
	m+64	KC =	DDDDDDDDDDDD	*Data item*

- n No. of the DB in which the parameter list is stored
- m No. of the DW with which the parameter list begins

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.3.3 Switch Information (FKT 2)

The "Switch Information" function requests the set values of the start addresses and area lengths of the controller board. After successful termination of the function, the values are available.

Parameter meanings:

DB	n				
DW	m+0	KY =	000,	00**5**	*Parameter count*
	m+1	KY =	00**Y**,	**XXX**	*Start address of window 1*
	m+2	KY =	000,	**XXX**	*Length of window 1*
	m+3	KY =	00**Y**,	**XXX**	*Start address of window 2*
	m+4	KY =	000,	**XXX**	*Length of window 2*
	m+5	KY =	00**Y**,	**XXX**	*Start address of window 3*

n No. of the DB in which the parameter list is stored

m No. of the DW with which the parameter list begins

Y 0 – Address in the P area
1 – Address in the Q area

8.2.3.4 INTERBUS-S Cycle Counter (FKT 3)

The "INTERBUS-S Cycle Counter" function requests the current status of the INTERBUS-S cycle counter.

A 32-bit counter , which counts the INTERBUS-S cycles continuously, runs on the controller board. It is started after power on or after a reset of the controller board. After successful termination of the function, the counter is available.

Parameter meanings:

DB	n			
DW	m+0	KY =	000, 002	*Parameter count (in this case: 2 parameters)*
	m+1	KH =	**XXXX**	*Most significant word*
	m+2	KH =	**XXXX**	*Least significant word*

n No. of the DB in which the parameter list is stored

m No. of the DW with which the parameter list begins

XXXX Counted cycles

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.3.5 Logical Address Error (FKT 4)

The "Logical Address Error“ function sends the errors which are included in the list after the functions "Implement All Logical Address Map“ (FB 68, FKT 6) or "Physical Configuration Map“ (FB 68, FKT 0) have been implemented.

Parameter meanings:

DB	n				
DW	m+0	KY =	000,	003	*Parameter count (in this case: 3 parameters)*
	m+1	KY =	000,	00**X**	*List code*
	m+2	KY =	000,	00**Y**	*Parameter no.*
	m+3	KY =	000,	00**Z**	*Error no.*

n No. of the DB in which the parameter list is stored

m No. of the DW with which the parameter list begins

X

List Code	Meaning
1	Logical bus segment list
2	Logical IN address list
3	Logical OUT address list
4	Logical bus segment list

Y The parameter no. specifies the line no. in which an error has been detected in the instruction list.

Z

Error no.	Meaning
0	Not defined
1	Too few entries in the list
2	Too many entries in the list
3	Log. local bus address outside the permissible range
4	Log. local bus address exists several times
5	Log. address not located in window 1
6	Log. address not located in window 2
7	Two address areas overlap
8	Invalid even address
9	Bus register length not permitted
10	ID codes are different
11	Byte addresses are located in the same word
12	Addressing not permitted

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.4 ON/OFF (FB 71)

The functions of the ON/OFF block can activate or deactivate events, groups or bus terminal alarms. A parameter (NR) determines which event, which group or which bus terminal alarm is to be switched.

Table 8-12 contains the functions which can be executed with the ON/OFF function block. Each of these functions can be activated by setting the BUSY bit.

If the respective function has been executed without errors, the RETURN bit is set to the value ZERO (RET = 0). If an error occurred during function executed, the RETURN bit is set to the value ONE (RET = 1).

The TIMEOUT bit is set (TO = 1), if the function could not be activated within the specified time.

Table 8-10: Functions of the ON/OFF function block (FB 71)

No.	Function	No. Code	
0	Group ON	No.	0 ... 255
1	Group OFF		0 ... 255
2	BK-Alarm ON		0 ... 255
3	BK-Alarm OFF		0 ... 255
4	Event ON	Bit(s)	1 .. 15
	All Events ON		0
5	Event OFF		1 ... 15
	All Events OFF		0

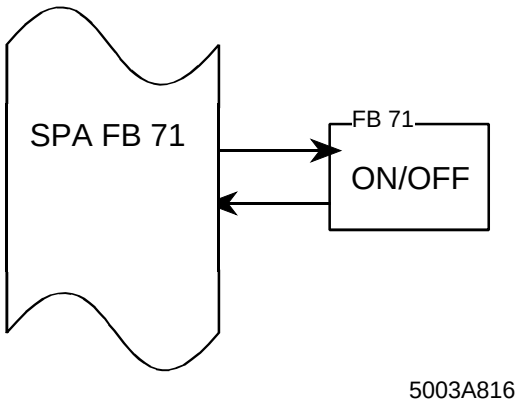


Figure 8-27: Structure of the ON/OFF function block (FB 71)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Table 8-11: Parameters of the ON/OFF function block (FB 71)

Name	Attr.	Type	Designation
IBDB	B	DB	INTERBUS data block No. of a data block (DB 0 ... 255). The data block must be created by the user (Length: DW 0 ... DW 199)
T	T	T	Timer occupied by the function
FKT	E	BY	Function no.
NR	E	W	Number of the local bus, BK alarm or events which is to be activated or deactivated
BUSY	E	BI	BUSY bit: 1 The function is activated by setting the BUSY bit. 0 After termination of the function, the BUSY bit is reset automatically by the function block.
TO	A	BI	TIMEOUT bit. 1 The timeout of the function has elapsed; the function could not be executed. 0 The timeout has not elapsed.
RET	A	BI	RETURN bit 0 Function terminated positively 1 Function terminated negatively

```
    :U   M   12.5
    :SPB FB  71
NAME:ON/OFF
IBDB:    DB   9    INTERBUS data block
T   :    T    2    Occupied timer
FKT :    MB  15    Function
NR  :    MW  18    Number
BUSY:    M 12.5    Activation bit
TO  :    M 13.5    Timeout bit
RET :    M 14.5    Return bit
    :
```

Figure 8-28: Call of the ON/OFF function block (FB 71)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.4.1 Group ON (FKT 0)

The "Group ON" function allows to activate a previously defined group of local buses (FB 72/ FB 69, FKT 6). The number of the group is to be passed to this function as a parameter.

If the "Group ON" function has been executed without errors, the RETURN bit is set to the value ZERO (RET = 0). If an error occurred during the function execution, the RETURN bit is set to the value ONE (RET = 1).

Common error causes are:

- the use of an unknown group number,
- the use of a group number which is not within the permissible range (0 to 255).

Result:

The bus is stopped and the outputs are reset. The "Start INTERBUS-S Cycle" function from the CONTROL function block (FB 68, FKT 1) can be used to restart the bus.

The TIMEOUT bit is set (TO = 1), if the function could not be activated within the specified timeout.

8.2.4.2 Group OFF (FKT 1)

The "Group OFF" function allows to deactivate a group of local buses which has been defined before (FB 72/FB 69, FKT 6). The number of this group is to be passed to the function as a parameter.

If the "Group OFF" function has been executed without errors, the RETURN bit is set to the value ZERO (RET = 0). The group is put into operation and can be addressed via the application program.

When an error occurred during function execution, the RETURN bit is set to the value ONE (RET = 1).

Common error causes are:

- the use of an unknown group number, or
- the use of a group number which lies not within the permissible range (0 to 255).

The TIMEOUT bit is set (TO = 1), if the function could not been activated within the set time.

8.2.4.3 BK-Alarm ON (FKT 2)

The "BK-Alarm ON" function sets the bus terminal alarm output. The bus segment number of the local bus in which the bus terminal module is located is specified as a parameter.

If the function has been executed without errors, the RETURN bit is set to the value ZERO (RET = 0). If an error occurred during function execution, the RETURN bit is set to the value ONE (RET = 1).

Possible error causes are the use of an unknown bus segment number, or an address which does not lie in the permissible range (0 to 255).

The TIMEOUT bit is set (TO = 1), if the function could not be forwarded to the controller board.

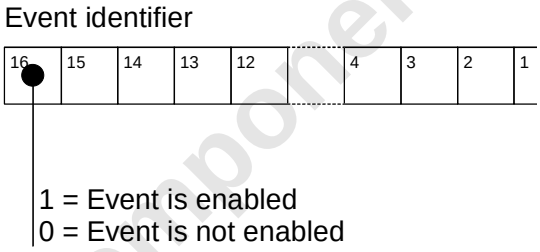
onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.4.4 BK-Alarm OFF (FKT 3)

The "BK-Alarm OFF" function resets the bus terminal alarm output. The bus segment number of the local bus, in which the bus terminal module is located, is specified as a parameter.
If the function has been executed without errors, the RETURN bit is set to the value ZERO (RET = 0). If an error occurred during function execution, the RETURN bit is set to the value ONE (RET = 1).
Possible error causes are the use of an unknown bus segment number, or an address which does not lie in the permissible range (0 to 255).
The TIMEOUT bit is set (TO = 1), if the function could not be forwarded to the controller board.

8.2.4.5 Event ON (FKT 4)

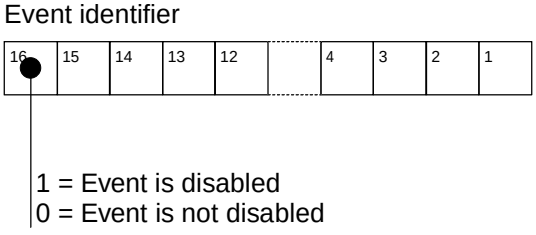
The "Event ON" function enables a previously defined event (FB 69, FKT 5). The event identifier is to be specified in the **NR** parameter. If the parameter has the value $FFFF_{hex}$, all defined events are enabled.



If the function has been executed without errors, the RETURN bit is set to the value ZERO (RET = 0). If an error occurred during function execution, the RETURN bit is set to the value ONE (RET = 1).
The TIMEOUT bit is set (TO = 1), if the function could not activated within the set time.

8.2.4.6 Event OFF (FKT 5)

The "Event OFF" function disables a previously defined event (FB 69, FKT 5). The event identifier is to be specified in the **NR** parameter. If the parameter has the value $FFFF_{hex}$, all defined events are enabled.



If the function has been executed without errors, the RETURN bit is set to the value ZERO (RET = 0). If an error occurred during function execution, the RETURN bit is set to the value ONE (RET = 1).
The TIMEOUT bit is set (TO = 1), if the function could not activated within the set time.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.5 ADDRESS (FB 72)

The ADDRESS function block is used exclusively to address the module. By means of this function block, the set addressing functions are called and the bus is started. The ADDRESS function block simplifies the logical addressing for the user by communicating all necessary address lists to the controller board by means of a function call. The user specifies the length of the address lists by pointers. This list is not transferred if the value zero is specified for the data block's pointer. The function can also be activated repeatedly in the cyclic program.

The functions of the ADDRESS function block are activated after the BUSY bit was set to the value ONE (BUSY = 1). If the function was executed without errors, the RETURN bit is set to the value ZERO (RET = 0). If an error occurred, the RETURN bit is set to the value ONE (RET = 1). The error cause is described in the EREG error register.

The function block contains different individual functions:

• Alarmstop INTERBUS-S Cycle Request	CONTROL	FB 68, FKT 3
• Configure INTERBUS-S Request	CONTROL	FB 68, FKT 0
• Physical Configuration Map Request	DEFINE	FB 69, FKT 0
• Logical Local Bus Address Map Request	DEFINE	FB 69, FKT 1
• Implement All Logical Address Map Request	CONTROL	FB 68, FKT 6
• Logical IN Address Map Request	DEFINE	FB 69, FKT 2
• Implement All Logical Address Map Request	CONTROL	FB 68, FKT 6
• Logical OUT Address Map Request	DEFINE	FB 69, FKT 3
• Implement All Logical Address Map Request	CONTROL	FB 68, FKT 6
• Communication Reference Request	DEFINE	FB 69, FKT 4
• Group Numbers Request	DEFINE	FB 69, FKT 6
• Clear Display Request	CONTROL	FB 68, FKT 4
• Start INTERBUS-S Cycle Request	CONTROL	FB 68, FKT 1
• Init Communication Request	CONTROL	FB 68, FKT 7
• Disable All Messages Request	CONTROL	FB 68, FKT 5

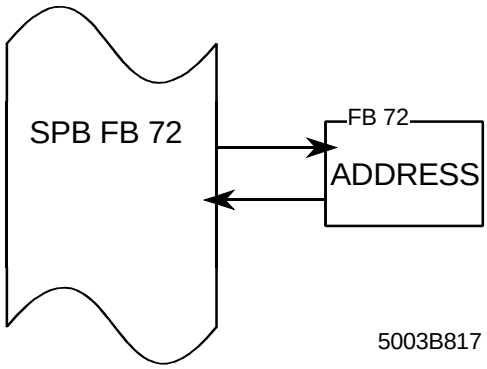


Figure 8-29: Structure of the ADDRESS function block (FB 72)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Table 8-14:arameters of the ADDRESS function block (FB 72)

Name	Attr.	Type	Designation
IBDB	B	DB	INTERBUS data block. No. of a data block (DB 0 ... 255) The data block must be created by the user. (Length: DW 0 ... DW 199)
BUSY	E	BI	BUSY bit: 1 The function is activated by setting the BUSY bit. 0 After termination of the function, the BUSY bit is reset automatically by the function block.
T	T		Timer occupied by the function
IDDB	B	DB	Data block number in ID code list (DB 1 ... DB 255)
IDDW	D	KF	Pointer to 1st data word of ID code list
LBDB	B	DB	Data block number in LB address list (DB 1 ... DB 255)
LBDW	D	KF	Pointer to 1st data word of LB address list
INDB	B	DB	Data block number in IN address list (DB 1 ... DB 255)
INDW	D	KF	Pointer to 1st data word of IN address list
OUDB	B	DB	Data block number in OUT address list (DB 1 ... DB 255)
OUDW	D	KF	Pointer to 1st data word of OUT address list
KRDB	B	DB	Data block number in KR address list (DB 1 ... DB 255)
KRDW	D	KF	Pointer to 1st data word of KR address list
GRDB	B	DB	Data block number in group list (DB 1 ... DB 255)
GRDW	D	KF	Pointer to 1st data word of group list
MODE	E	BI	Mode selection (see also explanations below)
EREG	A	BY	Error register (cf. explanations below)
TO	A	BI	TIMEOUT bit 1 The timeout of the function has elapsed; the function could not be executed 0 The function is active
RET	A	BI	RETURN bit 0 Function terminated positively 1 Function terminated negatively

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The MODE parameter:

The MODE parameter allows to toggle the display between controller board errors (CON ERR) and bus errors (RB ERR and LB ERR).

MODE = 0 This is the setting that should be chosen during normal operation of the PLC. For example, if the stored list with the ID codes of the expected bus configuration is not identical with the configuration detected by the controller board, a corresponding local bus error (LB ERR) or remote bus error (RB ERR) will be indicated.

MODE = 1 A discrepancy between the bus connected to the controller board and the lists stored in the data blocks may occur during initialization of the INTERBUS-S system. An error in the ID code list, for example, would be indicated as a local bus error (RB ERR) or local bus error (LB ERR) if the MODE = 0 were set. If MODE = 1 is set, however, such a discrepancy is reported as CON ERR (in this case with the display 68 hex).

The EREG parameter:

If an error occurred when the function block was executed, the RETURN bit is set to the value ONE (RET = 1). The error cause is described with the error register (EREG).

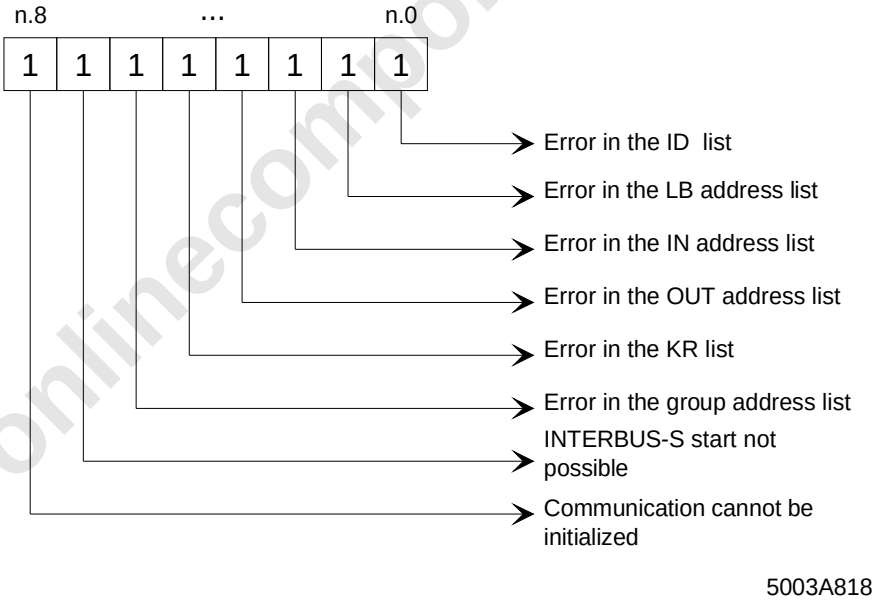


Figure 8-30: Assignment of the error register (EREG)

During addressing – i.e. the ADDRESS function block (FB 72) is active – none of the I/O addresses on the controller board must be accessed, because the I/O does no correspond to the inputs/outputs when the bus is stopped.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS


```
     :U    M  12.0
     :SPB  FB 72
NAME :ADDRESS
IBDB :     DB  9      INTERBUS data block
BUSY :     M  12.0    Activation bit
T    :     T   2      Timer
IDDB :     DB 10      DB ID code list
IDDW :     KF +0      1st data word of the ID list
LBDB :     DB 11      DB LB address list
LBDW :     KF +0      1st data word of the LB list
INDB :     DB 12      DB IN address list
INDW :     KF +0      1st data word of the IN list
OUDB :     DB 13      DB OUT address list
OUDW :     KF +0      1st data word of the OUT list
KRDB :     DB 10      DB KR address list
KRDW :     KF +0      1st data word of the KR list
GRDB :     DB +0      DB group no. list
GRDW :     KF +0      1st data word of the group no. list
MODE :     M  10.5    MODE setting
EREG :     MB  8      Error register
TO   :     M  13.1    Timeout bit
RET  :     M  14.2    Return value
     :
```

Figure 8-31: Call of the ADDRESS function block (FB 72)

Parameter meanings:

The required address lists of the ADDRESS function are described on the following pages.

If an address list is not to be transferred, the value ZERO must be entered for the pointer to the data block (DB 0).

Using the lists:

The following table shows when definition lists have to be sent to the controller board, depending on the communication register setting, the addressing mode, and the use of PCP communication.

Operating mode	Addressing	Lists						
		ID	LB	IN	OUT	GR	GRK	KR
Automatic	Physical	0	0	0	0	0	0	0
Controlled	Physical	X	X	0	0	X	X	X
Controlled	Logical	X	X	1	1	X	X	X

Key:

0	No list	IN	IN address list
1	List	OUT	OUT address list
X	List only when required	GR	Group definition list
ID	Identification code list	GRK	Group definition error characteristics
LB	Local bus/bus segment list	KR	Communication reference list

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.5.1 ID Code List

The physical bus structure is entered in this list with reference to its ID codes.

Local bus 0 (**LB_0**) is the local bus, the bus terminal module of which is linked to the PLC through the remote bus. Local bus 1 (**LB_1**) is coupled through the remote bus to the bus terminal module of local bus 0. Local bus 2 (**LB_2**) is coupled through the remote bus to the terminal bus module of local bus 1, etc.

The first module **M_0** of a local bus is a bus terminal module. All further modules $M_1 ... M_k$ area input/output modules (I/O modules). Up to 8 modules are allowed on one local bus. The first I/O module **M_1** is coupled to the first bus terminal module **M_0**, the second I/O module **M_2** is coupled to the first one, etc.

The address length in words occupied by the module is entered in the left byte. Only the number of I/O addresses is taken into account. (e.g. IBS DO/32 = 2; two words)

Parameter meanings:

DB	n				
DW	m+0	KY =	000,	**XXX**	*Parameter count*
	m+1	KY =	**ZZZ**,	**YYY**	*ID code module 0*
	m+2	KY =	**ZZZ**,	**YYY**	*ID code module 1*
	m+3	KY =	**ZZZ**,	**YYY**	*ID code module 2*
	...	...	...	...	
	m+k	KY =	**ZZZ**,	**YYY**	*ID code module k-1*

n	No. of the data block (DB) in which the parameter list is stored
m	Data word (DW) with which the parameter list begins
ZZZ	Length code (the address length in words occupied by the module)
YYY	Module identification code
XXX	Parameter count

A list with the ID codes of the IBS modules can be found in Chapter 3 "User Interfaces".

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.5.2 Bus Segment Address List

Addresses — i.e. the logical numbers — of the local buses are entered in this list. This list is drawn up on the basis of the physical bus structure. An entry is made only at the position occupied by a bus terminal module. Each further module is represented by a 0. The parameter quantity (module quantity) is entered in the first data word (m+0).

Parameter meanings:

DB	n				
DW	m+0	KY =	000,	00**K**	*Parameter count*
	m+1	KY =	000,	0**XX**	***LB$_0$, bus terminal module** (module M$_0$)*
	m+2	KY =	000,	000	*Local bus module M$_1$, (OUT addresses)*
	m+3	KY =	000,	000	*Local bus module M$_2$, (IN/OUT addresses)*
	m+4	KY =	000,	000	*Local bus module M$_3$, (IN addresses)*
	m+5	KY =	000,	0**XX**	***LB$_1$: bus terminal module** (module M$_4$)*
	m+6	KY =	000,	000	*Local bus module M$_5$, (OUT addresses)*
	m+7	KY =	000,	000	*Local bus module M$_6$, (IN/OUT addresses)*
	m+8	KY =	000,	000	*Local bus module M$_7$, (IN addresses)*
	m+9	KY =	000,	000	*Local bus module M$_8$, (IN addresses)*
	...	...	...	...	
	m+k-1	KY =	000,	0**XX**	***LB$_n$: bus terminal module** (module M$_{k-2}$)*
	m+k	KY =	000,	000	*Local bus module M$_{k-1}$, (OUT addresses)*

In the bus configuration, the 1st module M_0, the 5th module M_4 and the (k-1)th module M_{k-2} is a bus terminal module.

- n — No. of the DB in which the parameter list is stored
- m — No. of the DW with which the parameter list begins
- **K** — Quantity of subsequent parameters (in this case, module quantity)
- **XX** — Address of the local bus (0 - 255)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.5.3 IN Address List

The input addresses (IN) are only entered for the modules that also occupy IN addresses. No entry is made for all other modules. The first byte address of the module must be specified as its address. Besides the address, the address location — P or Q area — is entered. **Make sure that no address overlaps occur**. The parameter count (module quantity) is entered in the data word m+0 of the IN address list.

Parameter meanings:

DB	n				
DW	m+0	KY =	000,	00**K**	*Parameter count*
	m+1	KY =	000,	000	*LB_0, bus terminal module (module M_0)*
	m+2	KY =	000,	000	*Local bus module M_1, (OUT addresses)*
	m+3	KY =	00**Y,**	**XXX**	***Local bus module** M_2, (**IN**/OUT addresses)*
	m+4	KY =	00Y**,**	**XXX**	***Local bus module** M_3, (I**N** addresses)*
	m+5	KY =	000,	000	*LB_1: bus terminal module (module M_4)*
	m+6	KY =	000,	000	*Local bus module M_5, (OUT addresses)*
	m+7	KY =	00**Y,**	**XXX**	***Local bus module** M_6, (**IN**/OUT addresses)*
	m+8	KY =	00**Y,**	**XXX**	***Local bus module** M_7, (**IN** addresses)*
	m+9	KY =	00**Y,**	**XXX**	***Local bus module** M_8, (**IN** addresses)*
	...	...	...	...	
	m+k-1	KY =	000,	000	*LB_n: bus terminal module (module M_{k-2})*
	m+k	KY =	000,	000	*Local bus module M_{k-1}, (OUT addresses)*

In the bus configuration, the 3rd module M_2, the 4th module M_3, the 7th module M_6, the 8th module M_7 and the 9th module M_8 have IN addresses.

- n — No. of the DB in which the parameter list is stored
- m — No. of the DW with which the parameter list begins
- **K** — Quantity of subsequent parameters (in this case, module quantity)
- **Y** — 0 – Address in the P area,
  1 – Address in the Q area
- **XXX** — IN address of the process data
  (word modules only even addresses, and byte modules any address)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.5.4 OUT Address List

The output addresses (OUT) are only entered for the modules that also occupy OUT addresses. No entry is made for the other modules. The first byte address of the module must be specified as its address. Besides the address, the address location, P or Q area, is also entered. The parameter count (module quantity) is entered in data word m+0.

Parameter meanings:

DB	n				
DW	m+0	KY =	000,	00**K**	*Parameter count*
	m+1	KY =	000,	000	*LB_0, bus terminal module (module M_0)*
	m+2	KY =	00**Y,**	**XXX**	***Local bus module*** *M_1, (**OUT** addresses)*
	m+3	KY =	00**Y,**	**XXX**	***Local bus module*** *M_2, (IN/**OUT** addresses)*
	m+4	KY =	000,	000	*Local bus module M_3, (IN addresses)*
	m+5	KY =	000,	000	*LB_1, bus terminal module (module M_4)*
	m+6	KY =	00**Y,**	**XXX**	***Local bus module*** *M_5, (**OUT** addresses)*
	m+7	KY =	00**Y,**	**XXX**	***Local bus module*** *M_6, (IN/**OUT** addresses)*
	m+8	KY =	000,	000	*Local bus module M_7, (IN addresses)*
	m+9	KY =	000,	000	*Local bus module M_8, (IN addresses)*
	...	...	...	...	
	m+k-1	KY =	000,	000	*LB_n, bus terminal module (module M_{k-2})*
	m+k	KY =	00**Y,**	**XXX**	***Local bus module*** *M_{k-1}, (**OUT** addresses)*

In the bus configuration, the 2nd module (M_1), the 3rd module (M_3), the 6th module (M_5), the 7th module (M_6), and kth module (M_{k-1}) have OUT addresses.

- **n** No. of the DB in which the parameter list is stored
- **m** No. of the DW with which the parameter list begins
- **K** Quantity of subsequent parameters (in this case, module quantity)
- **Y** 0 – Address in the P area,
  1 – Address in the Q area
- **XXX** Logical OUT address of the process data
  (word modules only even addresses and byte modules any address)

online-components.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.5.5 Group Nos. List

It is possible to define groups in order to support applications in which several local buses are operated in one INTERBUS-S system. The following figure shows the composition of a group.

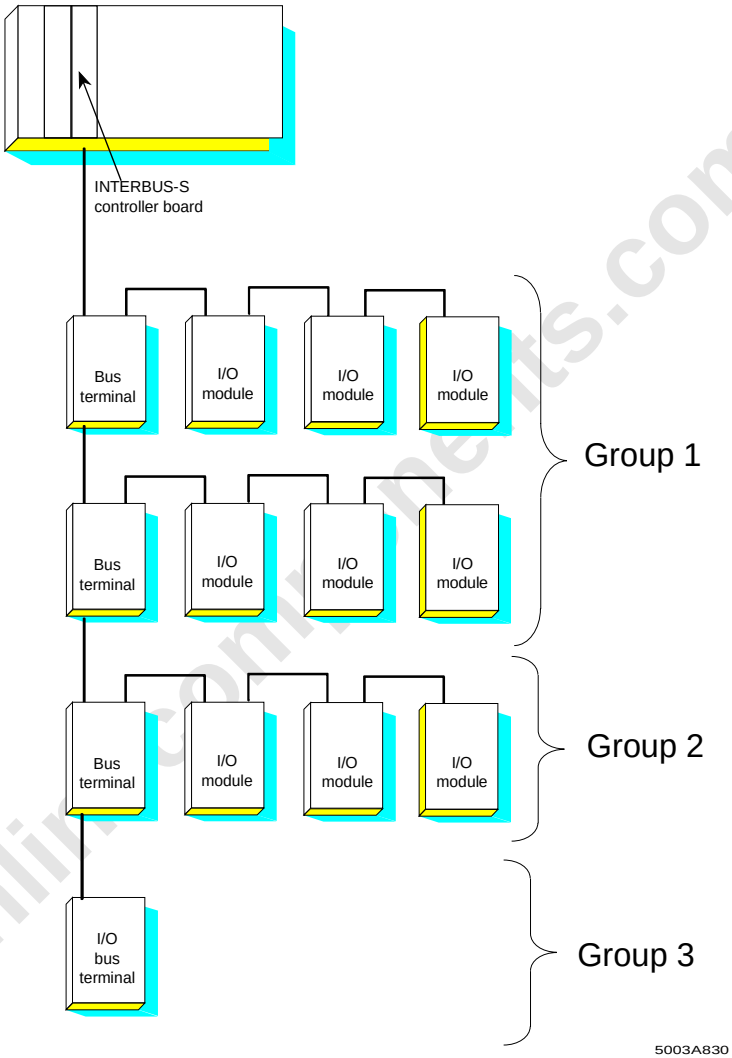


Figure 8-32: Topology of a group definition

Provided that you set up the group nos. list and the bus segment address list before, each local bus is assigned its own group (corresponding to the physical arrangement of local buses from 0 up to 255) after power on. Thus, all local buses which belong to one group are independent of local buses that belong to another group.

Allocation of several local buses to one group defines that these local buses can only be operated together. If several local buses are combined in a group, the same group number must be entered for these local buses. **Each local bus may be assigned to one group only.** Group numbers from 0 to 255 are permitted. All local bus elements (modules)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

belonging to one group are switched on or off when the group is disconnected or connected. If an error (LB/RB error) occurs in this group, the bus is stopped and the defective group is disconnected, provided that this group was identified as "disconnectible" beforehand. The remaining bus parts can be put into operation again with the "Start INTERBUS-S" command.

I/O bus terminal modules, communication interface boards (slave boards) or similar modules, the I/O words of which cannot be defined and disconnected as a local bus must not be combined in a group with other bus elements !

Parameter meanings:

DB	n				
DW	m+0	KY =	000,	00**K**	*Parameter count*
	m+1	KY =	000,	0**XX**	*Local bus address*
	m+2	KY =	000,	0**YY**	*Group no. (0 ... 255)*
	m+3	KY =	000,	0**XX**	*Local bus address*
	m+4	KY =	000,	0**YY**	*Group no. (0 ... 255)*
	...	...	...	...	
	m+k-1	KY =	000,	0**XX**	*Local bus address*
	m+k	KY =	000,	0**YY**	*Group no. (0 ... 255)*

- n No. of the DB in which the parameter list is stored
- m No. of the DW with which the parameter list begins
- **K** Quantity of parameters (local buses * 2)
- **XXX** Local bus address
- **YYY** Group number of the previous local bus

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.5.6 Group Error Characteristics

Prerequisite: Group definition.

The combining of several local buses to one group determines that these local buses can only be operated together. If an error (LB/RB error) occurs in a group, the defective group is automatically disconnected provided that it has been identified as "disconnectible" beforehand. The INTERBUS-S system does not need to be started again. If none of the groups is identified as "disconnectible", the bus changes to the "STOP" state.

Parameter meanings:

DB	n				
DW	m+0	KY =	000,	00**K**	*Parameter count*
	m+1	KY =	**Y**00,	0**XX**	*Characteristics/Local bus address*
	m+2	KY =	**Y**00,	0**XX**	*Characteristics/Local bus address*
	m+k	KY =	**Y**00,	0**XX**	*Characteristics/Local bus address*

- n No. of the DB in which the parameter list is stored
- m No. of the DW with which the parameter list begins
- **K** Quantity of parameters (local buses * 2)
- **XX** Local bus address/group number of the previous local bus
- **Y** Characteristics: 1 – Operation continues
  0 – Disconnection (default)

For the sequence schematic refer to the DEFINE function block and its "Group Error Characteristics" function (FB 69, FKT 10).

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.5.7 Communication Reference List

The communication reference (KR) is the "address designation“ of each PCP station. It designates each station and simplifies allocation.

The KR addresses are entered for PCP stations only. No entry is made for the other modules. KR numbers from 2 to 63 are allowed. KR numbers must be assigned continuously (without gaps; 2, 3, 4,...) starting with KR = 2.

The parameter count — i.e. the module quantity — is entered in data word m+0.

Parameter meanings:

DB	n				
DW	m+0	KY =	000,	00**K**	*Parameter count*
	m+1	KY =	000,	000	*Module without KR*
	m+2	KY =	000,	000	*Module without KR*
	m+3	KY =	000,	0**XX**	*Module **with** KR*
	m+4	KY =	000,	000	*Module without KR*
	...	...	...	...	
	m+k	KY =	000,	0**XX**	*Module **with** KR*

In the bus configuration, the 3rd and kth modules are communication stations

- n No. of the DB in which the parameter list is stored
- m No. of the DW with which parameter list begins
- **K** Quantity of subsequent parameters (in this case; module quantity)
- **XX** Communication reference (2 - 63)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.6 ERRINFO (FB 74)

The functions of the ERRINFO block (FB74) request a list of parameters from the controller board. This list specifies an error reported by the SYSERROR function block (FB73) in further detail. By means of the DB and DW pointers, the user points to the memory area in which the information is to be stored.

The function of the ERRINFO function block to be executed is activated after the BUSY bit is set to the value ONE (BUSY = 1). If the function has been executed without errors, the RETURN bit is set to the value ZERO (RET = 0). If an error occurred during function execution the RETURN bit is set to the value ONE (RET = 1).

Table 8-125: Functions of the ERRINFO function block (FB74)

No.	Function
0	Controller Error Code
1	Bus Information
2	Defective Group
3	Module Error
4	Local Bus Module Error

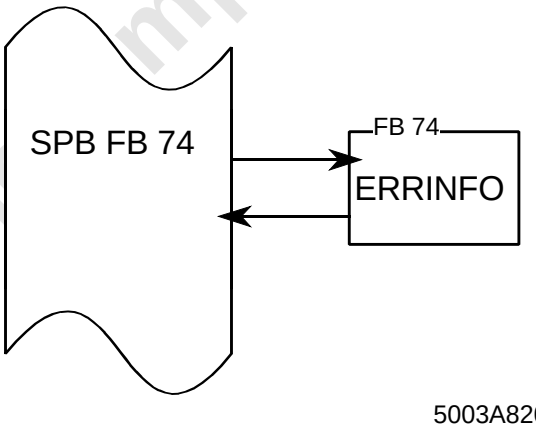


Figure 8-33: Structure of the ERRINFO function block (FB 74)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Table 8-13: Parameters of the ERRINFO function block (FB74)

Name	Attr.	Type	Designation
IBDB	B	DB	INTERBUS data block No. of a data block (DB 0 ... 255). The data block must be created by the user. (Length: DW 0 ... DW 199)
T	T		Timer occupied by the function
FKT	E	BY	Code of the function to be executed (cf. table)
NR	E	BY	No. of the local bus (0 ... 255)
DB	B	DB	Data block
DW	E	BY	Pointer to the data word
BUSY	E	BI	1 The function is activated by setting the BUSY bits. 0 After termination of the function, the BUSY bit is automatically reset by the function block.
TO	A	BI	TIMEOUT bit 1 Timeout of the function has elapsed. The function could not be activated. 0 The function is active.
RET	A	BI	Return bit: 0 Function terminated positively. 1 Function terminated negatively

```
     U   M  12.4
     SPB FB 74
NAME:ERRINFO
IBDB:    DB   9    INTERBUS data block
T   :    T    2    Occupied timer
FKT :    MB  15    Function no.                  (must be entered by the user)
NR  :    MB  21    No. of the local bus                        (same as above)
DB  :    DB  13    Pointer to the data block                   (same as above)
DW  :    MB  14    Pointer to the data word                    (same as above)
BUSY:    M 12.4    Activation bit
TO  :    M 12.5    Timeout bit
RET :    M 12.6    Return bit
    :
```

Figure 8-34: Call of the "ERRINFO“ function block (FB74)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.6.1 Controller Error Code (FKT 0)

After the SYSERROR function block has signaled a controller error by means of the CON bit, the "Controller Error Code“ function can be used to recall the error's code. The error code is stored in the data word defined by the DB and DW parameters.

DB	n				
DW	m+0	KY =	000,	001	*Parameter count*
	m+1	KY =	XXXX		*Controller error code*

n No. of the DB in which the parameter list is stored
m No. of the DW with which the parameter list begins

8.2.6.2 Bus Information (FKT 1)

After the SYSERROR function block has signaled a bus error by means of the BUS bit, the "Bus Information" function can be used to recall the bus errors. The "Bus Information" function reports 5 parameters. The errors are stored in the data words defined by the DB and DW parameters.

Exception: More than one defective local bus has been detected in the event of a bus malfunction. In this case, the number of returned parameters is increased by the additionally detected local bus errors.

If an error occurred in the system, the RETURN bit is set to the value ZERO (RET = 0). If the system runs without bus errors, the RETURN bit is set to the value ONE (RET = 1), i.e. the query of an error cause results in a negative acknowledgment of the "Bus Information“ function .

DB	n				
DW	m+0	KY =	000,	00**K**	*Parameter count*
	m+1	KY =	00**A**,	00**B**	*IBOK, fatal error*
	m+2	KY =	0**CC**,	0**DD**	*Error quantity (remote bus, local bus)*
	m+3	KY =	0**YY**,	000	*Cause of the fatal error*
	m+4	KY =	0**YY**,	0**RR**	*Error cause, no. of remote bus*
	m+5	KY =	0**YY**,	0**LL**	*Error cause, no. of local bus*

n No. of the DB in which the parameter list is stored
m No. of the DW with which the parameter list begins
A 0 IBOK 1 Error
B 0 OK 1 Fatal error, when E04-E06 occurs then the low nibble=1 and the high nibble=4..6.
CC Quantity of (installation) remote bus errors
DD Quantity of local bus errors
RR (Installation) remote bus number
LL Local bus number

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

YY	Code	Error cause
	01	Invalid bus terminal module ID code
	02	Invalid I/O module ID code
	03	Specified local bus missing
	04	Local bus is longer than specified
	05	Local bus is shorter than specified
	06	Invalid local bus module
	07	Configuration could not be read in
	08	Local bus in wrong position
	09	Remote bus is shorter than expected
	0A	Identifier for multiplexer error
	0B	Configuration longer than expected
	0C	Maximum configuration exceeded

8.2.6.3 Defective Group (FKT 2)

After the SYSERROR function block has signaled a bus error by means of the BUS bit, the "Defective Group" function can be used to recall the number of the defective groups. The pointers DB and DW point to the memory area in which the numbers of the defective groups are stored.

If a bus error occurred in the system, the RETURN bit is set to the value ZERO (RET = 0). If the system runs without bus errors, the RETURN bit is set to the value ONE (RET = 1), i.e. the query of the error cause results in a negative acknowledgment of the "Defective Group" function.

DB	n				
DW	m+0	KY =	000,	00**K**	*Parameter count*
	m+1	KY =	000,	**XXX**	*Group number*
	m+2	KY =	000,	**XXX**	*Group number*
	...	...	...	...	
	m+3	KY =	000,	**XXX**	*Group number*

n No. of the DB in which the parameter list is stored

m No. of the DW with which the parameter list begins

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.6.4 Module Error (FKT 3)

After the SYSERROR function block has signaled a module error by means of the MOD bit, the "Module Error" function can be used to recall the local bus numbers in which one or several module errors have occurred. The pointers DB and DW point to the memory area, in which the local bus numbers are stored. Each time this function is called, all current module errors on INTERBUS-S are reported.

If an error occurred in the system, the RETURN bit is set to the value ZERO (RET = 0) and the message is entered in the data block. If the system runs without module errors, the RETURN bit is set to the value ONE (RET = 1), i.e. the query of the error cause results in a negative acknowledgment of the "Module Error" function.

The "old" values of the data blocks are kept in the case of a negative acknowledgment.

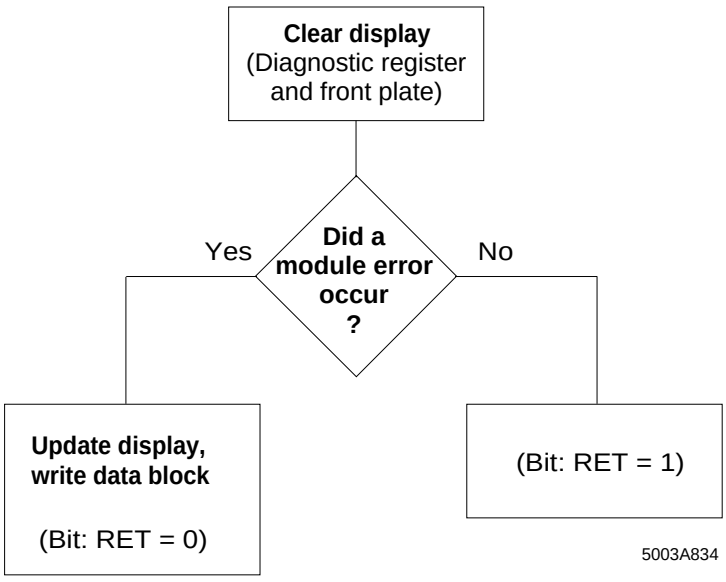
DB	n				
DW	m+0	KY =	000,	00**K**	*Parameter count*
	m+1	KY =	000,	0**XX**	*1st local bus with module error*
	m+2	KY =	000,	0**XX**	*2nd local bus with module error*
	m+3	KY =	000,	0**XX**	*3rd local bus with module error*
	...	...	...	...	
	m+k	KY =	000,	0**XX**	*kth local bus with module error*

n No. of the DB in which the parameter list is stored

m No. of the DW with which the parameter list begins

XX Local bus number with defective module

Functional sequence:



onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.2.6.5 Local Bus Module Error (FKT 4)

With the "Local Bus Module Error" function, the modules that have reported a module error can be recalled for each local bus.

The number of the local bus is entered in the flag byte number of the block.

Two parameters are returned for each module. The first parameter contains the number of the module in the local bus (0 ... 7). The bus terminal module has always the number 0. The second parameter contains the identification code (ID code) of the defective module.

If an error occurred in the system, the RETURN bit is set to the value ZERO (RET = 0). If the system runs without bus errors, the RETURN bit is set to the value ONE (RET = 1), i.e. the query of the error source results in a negative acknowledgment of the "Module Error" function.

DB	n			
DW	m+0	KY = 000,	00**K**	*Parameter count*
	m+(**1***2)-1	KY = 000,	00**X**	*No. of the module in the local bus*
	m+(**1***2)	KY = 000,	**YYY**	*ID code of the module*
	m+(**2***2)-1	KY = 000,	00**X**	*No. of the module in the local bus*
	m+(**2***2)	KY = 000,	**YYY**	*ID code of the module*
	... ...	... ...		
	m+(**L***2)-1	KY = 000,	00**X**	*No. of the module in the local bus*
	m+(**L***2)	KY = 000,	**YYY**	*ID code of the module*

n	No. of the DB in which the parameter list is stored
m	No. of the DW with which the parameter list begins
K	Quantity of parameters
X	No. of the module which reports a module error
L	Quantity of modules which report a module error
YYY	ID code of the module that has reported a module error

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.3 Message Functions

Definition:

Message functions are functions that indicate the status of the controller board, the bus or events. This is why the functions are always called unconditionally.

8.3.1 SYSERROR (FB 73)

The SYSERROR function block indicates errors of the INTERBUS-S system to the user by means of the CON, BUS and MOD bits.

CON: Errors of the controller board are identified by setting the **CON** error bit.

BUS: If the bus is no longer executable in the configuration specified by the user (owing to an open circuit, module failure or an excessive data transmission error rate), it is stopped (STOP state), all outputs are reset and the error is reported by setting the **BUS** error bit.

MOD: Error of the modules (I/O part), like the failure of the module's peripheral voltage or a short circuit at the input or output are indicated by setting the **MOD** error bit. These errors do not cause the stopping of INTERBUS. The system is still in the RUN status.

In the event of an error, the SYSERROR function block (FB 73) sets the CON, BUS and MOD bits. **The bits can be only reset by the user.**

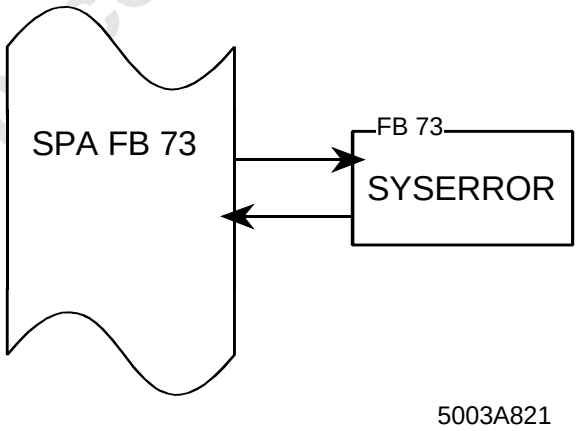


Figure 8-35: Structure of the SYSERROR function block (FB 73)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Table 8-14: Parameters of the SYSERROR function block (FB73)

Name	Attr.	Type	Designation
IBDB	B	DB	INTERBUS data block No. of a data block (DB 0 ... 255) The data block must be specified by the user. (Length: DW 0 ... DW 199)
CON	A	BI	Controller board error
BUS	A	BI	Bus error (INTERBUS-S in the STOP state)
MOD	A	BI	Module error (INTERBUS-S in the RUN state)

```
     SPA FB 73
NAME:SYSERROR
IBDB:    DB 9      INTERBUS data block
CON :    M  4.0    Error on the controller board
BUS :    M  4.1    Bus error signal bit
MOD :    M  4.2    Module error signal bit
    :
```

Figure 8-36: Call of the SYSERROR function block (FB73)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.3.2 RECONFIG (FB 75)

The RECONFIG function block (FB75) indicates a reconfiguration to the user by setting the RECO bit. This configuration has been triggered by pressing the reconfiguration key on the bus terminal module. The RECO bit is set to the value ONE (RECO = 1) if the reconfiguration was successful. Otherwise, the RECO bit is set to the value ZERO (RECO = 0). The GR parameter indicates the number of the group, while the LB parameter indicates the number of the local bus in which the reconfiguration was triggered.

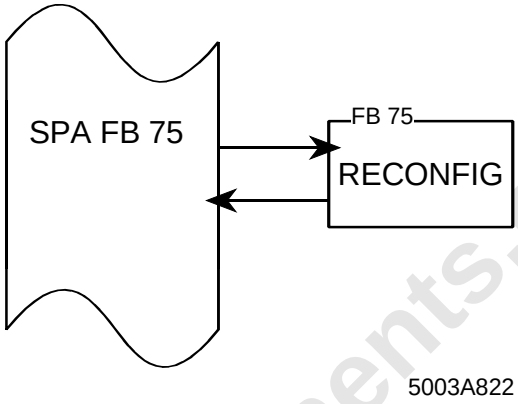


Figure 8-37: Structure of the RECONFIG function block (FB 75)

Table 8-15: Parameters of the RECONFIG function block (FB 75)

Name	Attr.	Type	Designation
IBDB	B	DB	INTERBUS data block No. of a data block (DB 0 ... 255) The data block must be created by the user. (Length: DW 0 ... DW 199)
RECO	A	BI	1 Reconfiguration was triggered. The REC key on a bus terminal was actuated. 0 No reconfiguration was actuated.
POSS	A	BI	Like RECO
GR	A	BY	Group no. of the reporting group
LB	A	BY	Local bus no. of the reporting local bus

```
     SPA FB 75
NAME:RECONFIG
IBDB:   DB  9     INTERBUS data block
RECO:   M   4.3   Signal bit for REC key
POSS:   M   4.4   Signal bit for local/group status
GR  :   MB 20     Reporting group no.
LB  :   MB 21     Reporting logical local bus no.
    :
```

Figure 8-38: Call of the RECONFIG function block (FB75)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.3.3 EVENT (FB 76)

The EVENT function block (FB76) indicates an event to the user by setting the EV bit. Which of the predefined events has occurred is identified in the EVKN parameter. Cf. "DEFINE“ (FB69), "Event Map" (FKT 5)

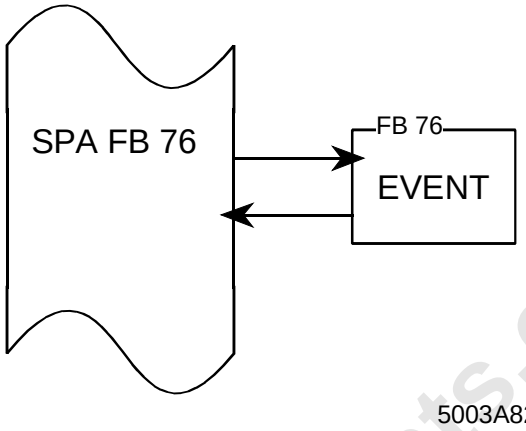


Figure 8-39: Structure of the EVENT function block (FB 76)

Table 8-16: Parameters of the EVENT function block (FB 76)

Name	Attr.	Type	Designation
IBDB	B	DB	INTERBUS data block No. of a data block (DB 0 ... 255) The data block must be created by the user. (Length: DW 0 ... DW 199)
EV	A	BI	1 Event has occurred (Cf. identifier) 0 No event occurred
EVKN	A	W	Event identifier of the events which occurred. The identifiers are **ORed** if several events occur.

```
     SPA FB 76
NAME:EVENT
IBDB:    DB  9     INTERBUS data block
EV  :    M   4.7   Event message
EVKN:    MW 18     Event identification
    :
```

Figure 8-40: Call of the EVENT function block (FB 76)

Onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.4 Working with Communication

8.4.1 Introduction

Communication is a term used to describe the fact of **'being able to talk to each other and understand each other'.** A prerequisite is that both partners speak the same language and are able to contact each other. Besides dedicated communication, its 'direction' is also defined in order to perform a specific task.

The sequence can be described as follows:

- Two partners are always required for successful communication. On the one side, orders are issued and on the other side, they are executed.
- An order is not issued until it is certain that the entity entrusted with the order is also capable of executing it.
- After execution of the order, its success or failure is reported back to the one who ordered.
- In an equivalent relationship, both partners can order.

When transferring the sequence to the communication protocol, the following is understood to constitute communication:

- Being able to talk to each other ...
  - Establishment of a communication relationship
  - Definition of a communication channel
- ... and understanding each other:
  - The recipient of a message should also be capable of translating it.

Communication

As far as communication is concerned, a distinction is made between client and server. Within the meaning of communication, a client is a user process that issues orders. The server is the user process executing the order. In principle, a user process can be both a server and a client.

In the client, the issuing of an order is described by the Request service primitive and the acceptance of the service's order acknowledgment is described by Confirmation service primitive. In the server, the arrival of the order is represented by the Indication service primitive and the issuing of the order confirmation is represented by the Response service primitive.

As a rule the application program on the PLC works as a client. From firmware 3.5 onwards the PLC can also support a server functionality with the help of a default object dictionary (e.g. for a V.24 client).

Taking the fields of application into account, the PCP communication system provides the user with some services for use of open communication. The following services are available to the user:

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

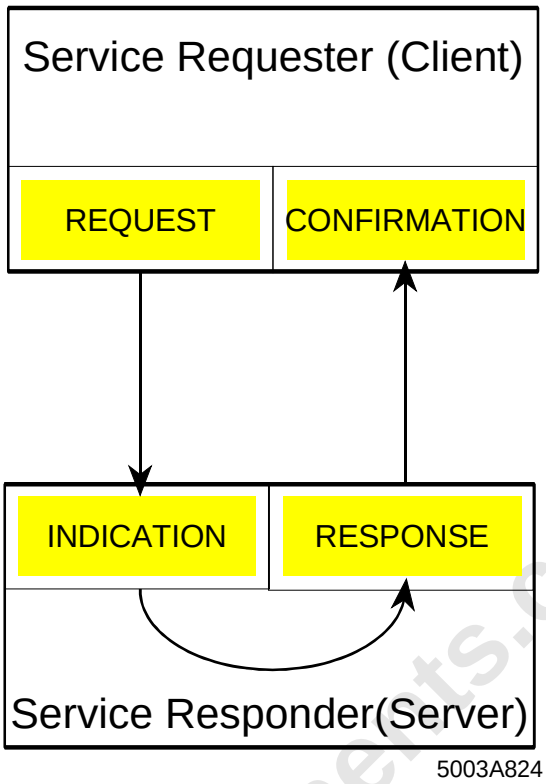


Figure 8-41: PCP service primitives

Table 8-20: PCP service primitives

Request Primitives	Confirmation Primitives	Indication Primitives	Response Primitives
Read Request	Read Confirmation	Read Indication	Read Response
Write Request	Write Confirmation	Write Indication	Write Response
Start Request	Start Confirmation	Start Indication	Start Response
Stop Request	Stop Confirmation	Stop Indication	Stop Response
Information Report Request	*Unconfirmed*		
Status Request	Status Confirmation		
Identify Request	Identify Confirmation		
Initiate Request	Initiate Confirmation	Initiate Indication	Initiate Response
	Initiate Error Confirmation	Initiate Error Indication	Initiate Error Response
Abort Request	*Unconfirmed*	Abort Indication	

The individual service primitives are described in Chapter 9 "Commands and Messages“.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.4.1.1 Control During Communication

Process data

When using the INTERBUS-S system, the process data occupies part of the PLC's I/O address area. The size of the address area occupied by INTERBUS-S depends on the INTERBUS-S system's capacity. This address area is treated by the PLC as if S5 modules were plugged into it.

For the INTERBUS-S system, the address area required by the process data is reserved centrally on the controller board.

Communication data

Unlike the process data, the communication data of the PCP stations is not mapped into the PLC's I/O address area. It is kept in the data blocks of the PLC. The data is exchanged between the PLC and the controller board. The communication registers serve as the hardware interface for this purpose. The registers occupy 4 bytes in the PLC's I/O address area. The addresses are located above the process data's window 2. In the PLC, handling of communication between the PLC and the controller board is realized by function blocks which are integrated into the user program.

8.4.1.2 Call Structure of the Function Blocks

The interface between the application and PCP consists of function blocks. These function blocks serve the communication registers.

The user calls them during startup and in the cyclic program by means of conditional jumps. The function blocks were written for the SIMATIC S5 in STEP 5.

The INITIB initialization block (FB 60) is called during startup of the PLC (OB 20…22). This function block carries out some basic software settings. It also controls the synchronization between the PLC and INTERBUS-S. The routine is not terminated until INTERBUS-S is in the READY state, or the bus was activated.

A receive block (FB66) and a send block (FB62 or FB 64) are called in the cyclic program. To arrive at an optimized response with respect to time, the receive block (CON/IND) should be called at the start of the cyclic program and the send block (REQ/RES) at the end.

The ADDRESS addressing block must be processed before the application is started in the cyclic program. This block addresses the INTERBUS-S stations, performs PCP initialization, and starts the bus afterwards.

The application can be started once the addressing block has ended. For PCP communication, the receive and send block are activated from the application program by means of flag bits.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

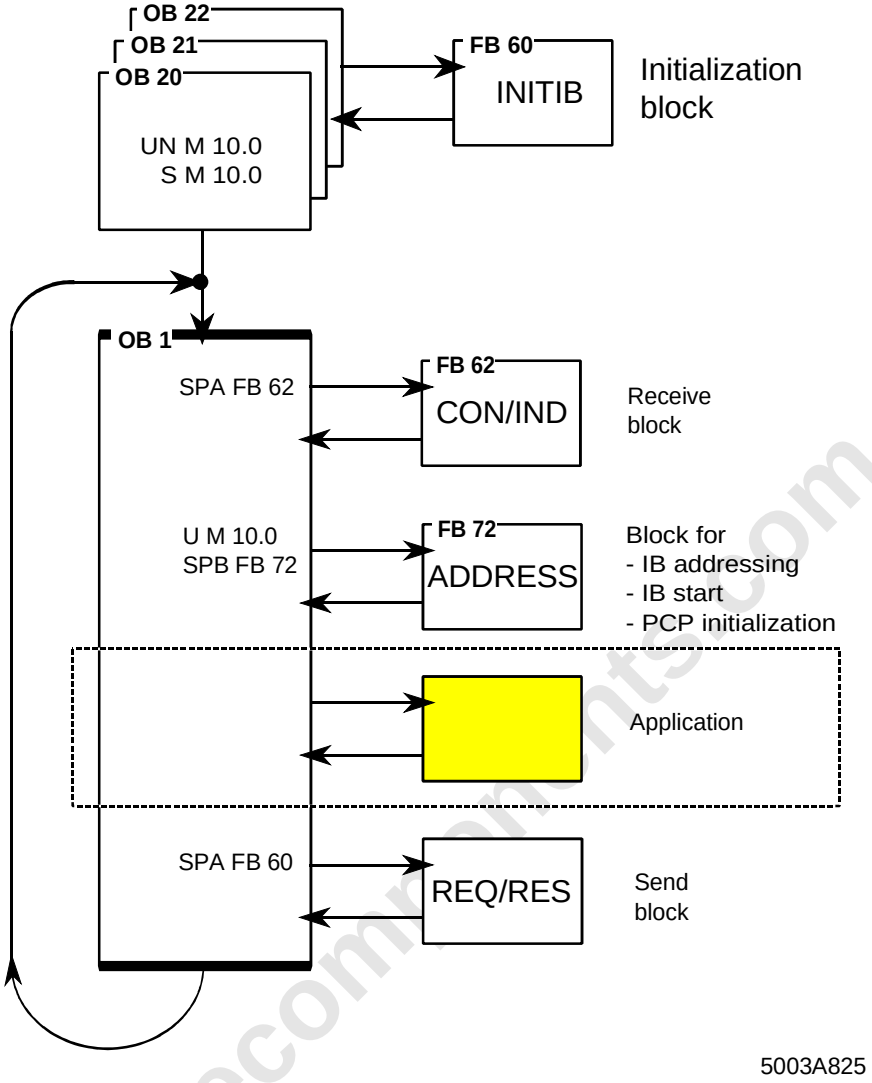


Figure 8-42: Structure of PCP communication

8.4.1.3 Initialization/Addressing

Prerequisites for using communication:

- The controller board is in the controlled start mode, because the communication registers are activated in this mode.
  (Cf. FB60, "INITIB“)
- Initialization of the standard DBs and the activation words
- Inclusion of the interface drivers
  (Cf. Chapter 8.1.2)
- Definition of the communication references
  (Cf. FB69/FKT4, "Communication Reference")

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Initialization

With the communication registers activated, the controller board is initialized during startup of the PLC. Besides defining the IBDB (INTERBUS data block), this initialization also defines two further blocks and two flag words.

Data blocks		
RRST	Request/Response standard data block	The service request or response is entered in this data block.
CIST	Confirmation/Indication standard data block	The service confirmation or indication is entered in this data block.
Flag words		
RRMW	Request/Response flag word	The services are activated by way of this flag word.
CIMW	Confirmation/Indication flag word	This flag word indicates execution of the order.

Interface drivers

The two function blocks CON/IND (FB62) and REQ/RES (FB66) are referred to as interface drivers. Commands are sent to the controller board and messages are fetched from it by means of these function blocks.

To achieve an optimized behavior with respect to time, their locations in the cyclic program are important.

Placing the blocks:

- The CON/IND function block is called conditionally at the start of the cycle.
- The REQ/RES function block is called conditionally at the end of the cycle.

The communication services are also operated by way of these driver blocks. The **ISFP** interface (**I**NTERBUS-**S** **F**unctions for the **P**LC) was developed to provide the user with the possibility of using the services easily for open communication. Part of this interface consists of two data blocks which must be specified by way of parameters of the interface drivers.

RRDB REQ/RES header blocks

CIDB CON/IND header blocks

Addressing/Communication reference

The communication references (KR) are transferred by the ADDRESS function block (FB 72). Each module which is capable of communication is assigned one KR. All communication stations are unambiguously identified with this communication reference. The communication references of the modules are entered in a communication reference list.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Parameter meanings:

DB	n				
DW	m+0	KY =	000,	00**K**	*Parameter count*
	m+1	KY =	000	000	*Module without KR*
	m+2	KY =	000	000	*Module without KR*
	m+3	KY =	000	00**2**	*Module **with** KR*
	...	...	...	...	
	m+k	KY =	000,	0**XX**	*Module **with** KR*

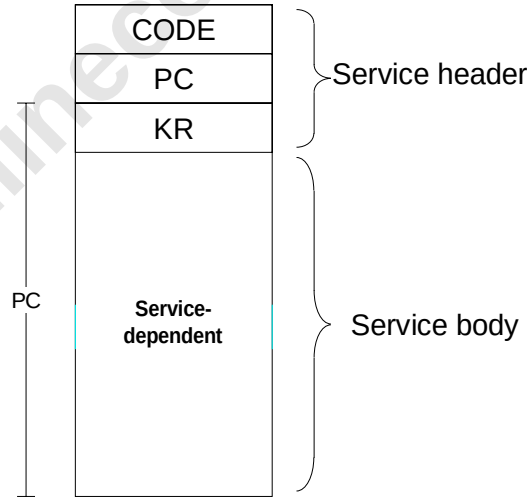
In this bus configuration, the 3rd, and the kth module are communication stations.

- n No. of the DB in which the parameter list is stored
- m No. of the DW with which the parameter list begins
- **K** Quantity of the subsequent parameters (in this case, module quantity)
- **XX** Communication references (2 - 63)

The number of the communication relationships between the controller board and the third module is KR = 2 and between the controller board and the kth module KR = XX.

8.4.1.4 Service Structure

In the PLC, a service is stored in the form of data words in data blocks. The service is subdivided into a service header and a service body. The service header consists of three words and the length of the body depends on the specific service.



CODE = Selection of the service primitive

PC = Parameter count
(Number of words of the body -1)

KR = Communication reference
(Number of the communication reference)

5003A826

Figure 8-43: PCP service structure in the PLC

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The first word of the header contains the code by means of which the service primitive is selected (e.g. the code 8081_{hex} identifies "READ REQUEST" service primitive). The number of words belonging to the body plus one is entered in the second word of the header. The third word contains the communication reference, with which all communication stations can be addressed.

The data of the service body depends on the selected service.

8.4.1.5 Service Execution

The INTERBUS-S function blocks offer the user the possibility of using the services of open communications in an easy way. The following chapters show how to run PCP orders and order confirmations by setting or checking flag bits.

8.4.1.6 Service Activation Flag

If it is intended to execute a request or response primitive of a service, the service's parameters must be entered in the Request/Response data block (DB). The order or the acknowledgment is sent using the REQ/RES (FB66 or FB67) function block by setting bit 0 of the RRMW flag word. Once the order or acknowledgment has been ended, the data of a new order or a new order acknowledgment can be copied into the standard buffer and sending of the new data can be activated. A free data block is recognized by the zero status of the RRMW bit 0. The bit for activating the service must only be set by means of an edge flag.

Alternatively to the standard buffer, service orders or acknowledgments can already be stored in data blocks in the form of a table. Up to 15 service headers can be entered in the RRDB data block. In this table, a pointer pointing to the body of the service follows as the 4th parameter.

Example:

	DW 3	...	
	DW 4	Code	
Header 2	DW5	PC	
	DW6	KR	
	DW7	DB	DW
	DW 8	...	

The services can be activated by means of bits 1 to 15 of the RRMW flag word. They are activated by means of an edge flag. The bit is reset automatically once sending has been concluded. By modifying the pointers, various service bodies can be sent with the same service header. For a Write Request, for example, this means that different data is sent successively to the same station. By modifying the KR in this table, identical bodies (data) can be sent to different stations, etc.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

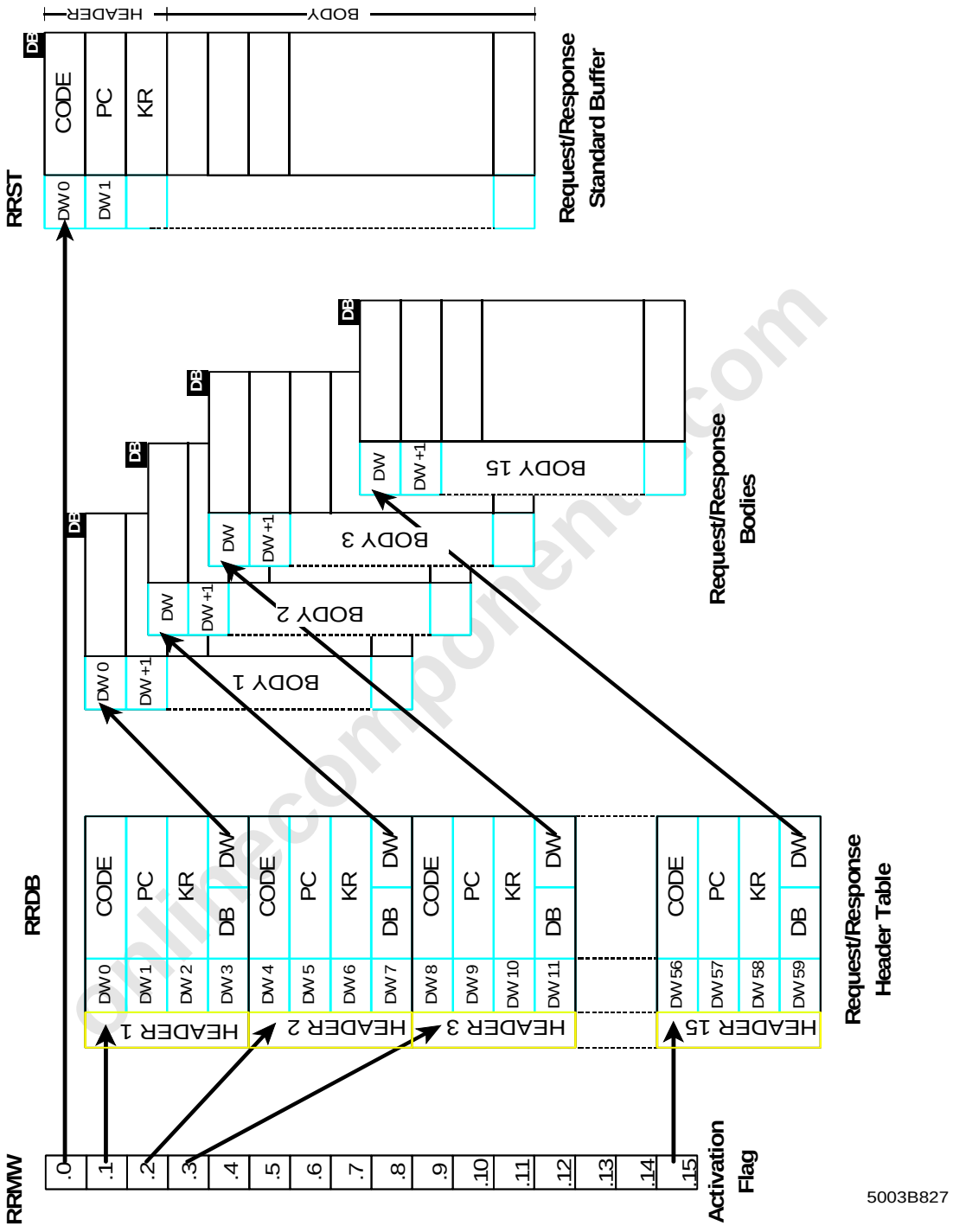


Figure 8-44: PCP activation flag (Request/Response)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.4.1.7 Service Message Flag

Confirmations or indications are reported by way of the bits belonging to the CIMW flag word. If bits 1 to 15 have the value zero, all services are written into the standard confirmation/indication buffer. Once such as service has arrived, the user must evaluate or save the data in the buffer within the same PLC cycle. In the next cycle, a new service may arrive that will overwrite the buffer. The data is received by the CON/IND function block (FB62 or FB64).

By means of a pointer to the entries of the service headers belonging to expected services in the CIDB data block, it is possible to specify the data area into which the service bodies should be written. For an expected service, the application activates the flag bit belonging to a data header for this purpose. If a data with the code entered in the table and the associated KR is received by the CON/IND receive block, the service body is written into the data area identified by the pointer. Reception of data is indicated to the application by resetting of the flag bit. Thus, the data requested by a Read Request, for example, is transferred directly to its destination by the entry in the table and not indirectly through the standard buffer.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

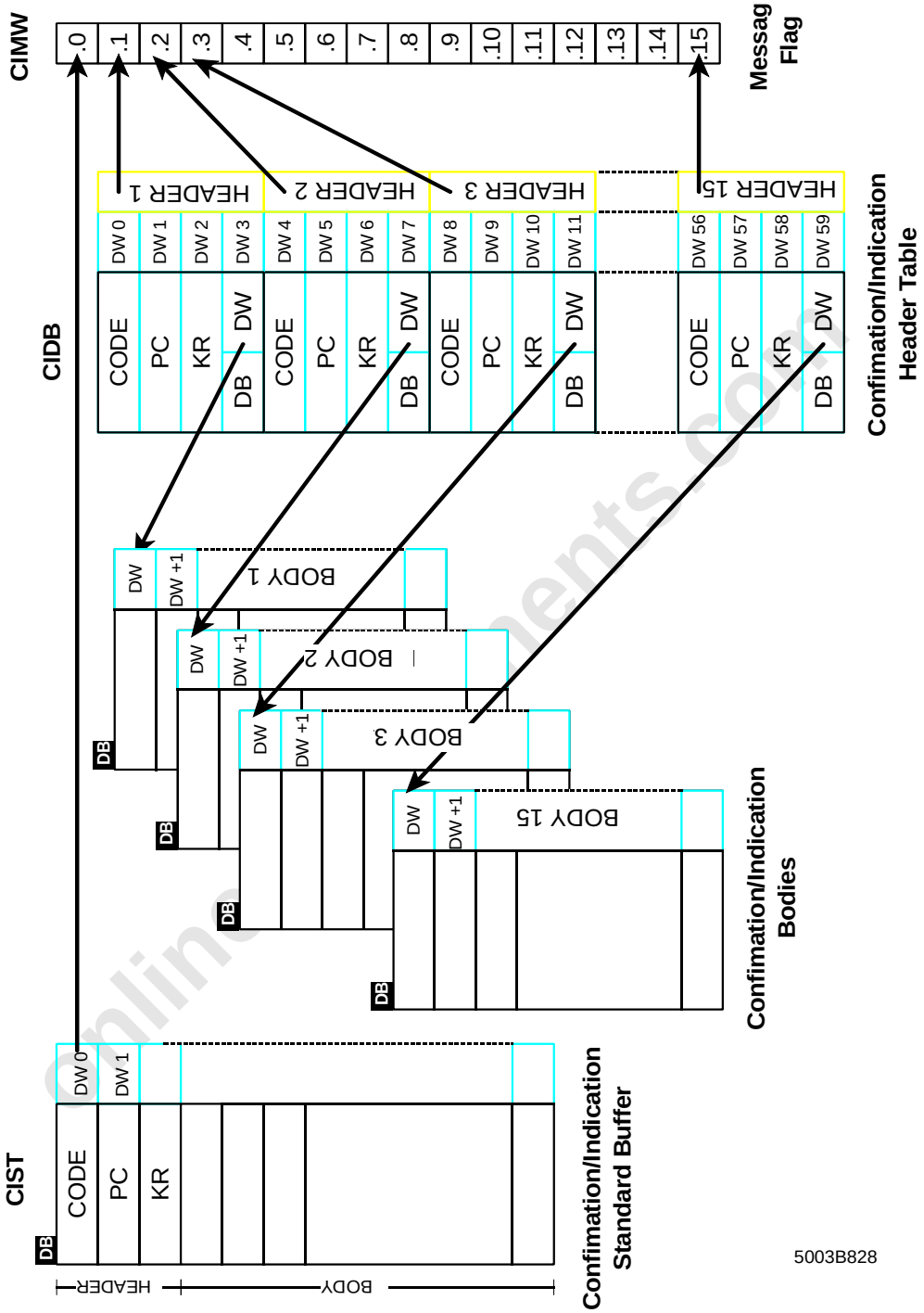


Figure 8-45: PCP message flag (Confirmation/Indication)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.4.1.8 Principle Service Sequence

1. Enter service
2. Enter expected message and set message flag
3. Initiate service by setting the activation flag (BUSY bit)

Enter service

If a service is to be executed, it must either be entered in the standard data block RRST or in the header data block RRDB

- RRST (example)

DB (RRST)			
	DW 0	Code	*Service header*
	DW 1	PC	
	DW 2	KR	
	DW 3	....	*Service body (service-dependent)*

- RRDB (example)

DB (RRDB)				
	DW 3	...		
	DW 4	Code		*Service header*
	DW 5	PC		
	DW 6	KR		
	DW 7	DB	DW	
	DW 8	...		

DB **DB**n			
		...	
	DW **DW**	...	
	DW+1	...	*Service body*
	DW+2	...	*(service-dependent)*
	...	...	

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Enter expected message and set message flag

On the receiving end, the message is stored either in the CIST standard data block, or in a data block defined by the message header (in the CIDB header data block).

- Message in the CIST standard data block
  - In the CIMW message flag, only bit 0 is set.

    If bit 0 = 0, the message has arrived and must be fetched in the same cycle. The message may be overwritten by another one of it is not processed in the same cycle.
- Message in the CIDB data block
  - The expected message is entered in the header data block together with the message code, KR and the pointer setting (pointing to the DB body and the data word in the body).
  - The bit pointing to the header of the message is set in the CIMW message word.

Bit of CIMW	Message header
1	DW 0 of CIDB
2	DW 4 of CIDB
3	DW 8 of CIDB
...	....
15	DW 56 of CIDB

If the bit is reset, the message has arrived and has been entered in the corresponding data block.

Initiate service

The individual services are initiated by way of the RRMW activation flag. The bits must be set by means of a signal edge.

Bit of 'RRMW'	Service
0	Header and body in the RRST standard data block
1	Header in DW 0 of CIDB
2	Header in DW 4 of CIDB
3	Header in DW 8 of CIDB
...	....
15	Header in DW 56 of CIDB

The service has been sent if the bit is reset.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.4.1.9 Example of a Service

Figure 8-46 (see below) shows the composition of the parameters belonging to the READ REQUEST service primitive.

In this example, the counter statuses of an INTERBUS-S counter module will be read. The service header of the Read Request service primitive is created for this purpose. As its first parameter, the service header contains the code for selecting the service, in this case 8081_{hex}. The parameter count (PC) is set to 3 data words in the service body (2 parameters plus the communication reference). The number of the communication reference (KR) between the controller board and the INTERBUS-S counter module will be 2 in this example. Therefore, 2 is entered as KR. The service body of the Read Request primitive consists of the index and the subindex, by means of which the counter's statuses can be recalled.

The request is sent from the PLC to the IBS counter module with the parameters described above.

The PLC receives 10 parameters as confirmation. It consists of the code of the service primitive, the parameter count (PC) and the communication reference. The service body consists of 7 parameters. The statuses of the 5 counter registers are preceded by the index, the subindex, and the length. The length specifies the number of bytes read. In this example, the number is 10 because each value of a counter register is communicated in 2 bytes.

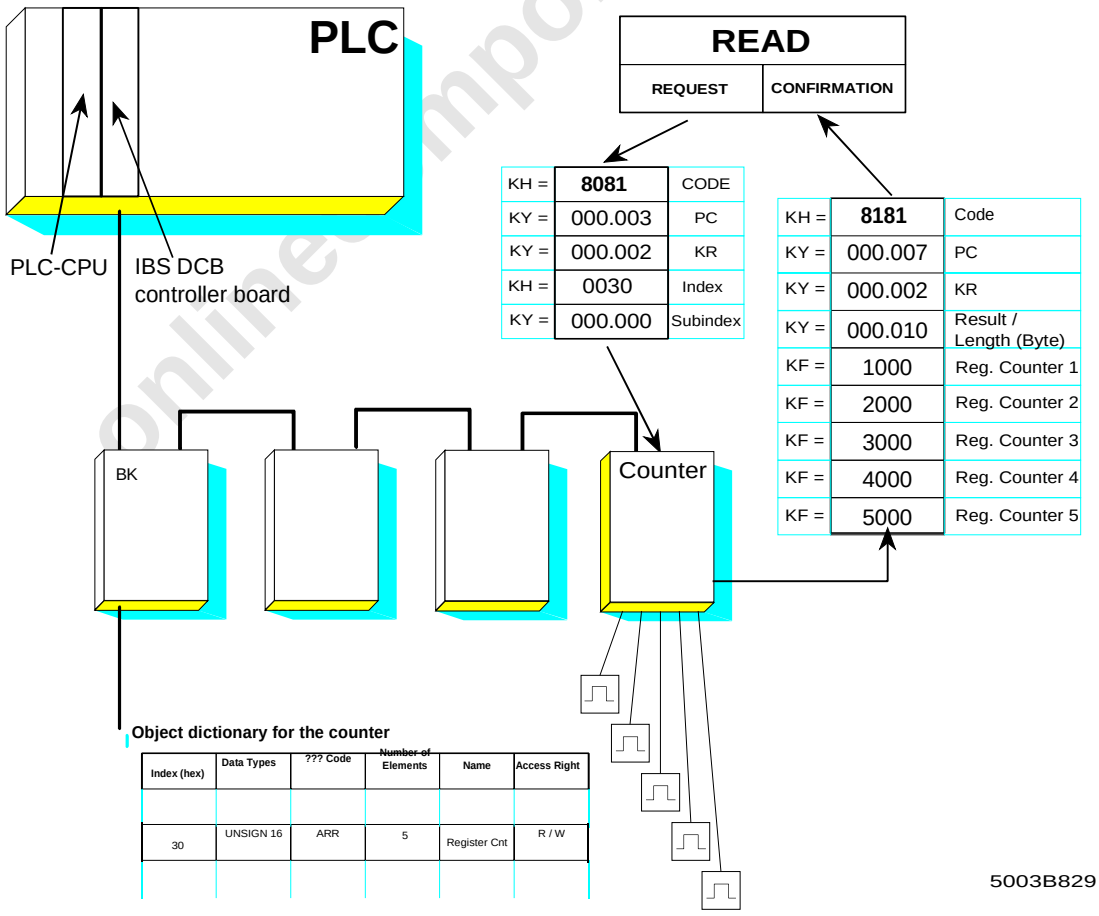


Figure 8-46: Example of a READ service

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.4.2 Request/Confirmation

The following services are available to the user:

Primitive	Commands		Messages	
	Request	Response	Indication	Confirmation
READ	8081_{HEX}	$80A1_{HEX}$	$81A1_{HEX}$	8181_{HEX}
WRITE	8082_{HEX}	$80A2_{HEX}$	$81A2_{HEX}$	8182_{HEX}
START	8083_{HEX}	$80A3_{HEX}$	$81A3_{HEX}$	8183_{HEX}
STOP	8084_{HEX}	$80A4_{HEX}$	$81A4_{HEX}$	8184_{HEX}
INFORMATION REPORT	8085_{HEX}	8085_{HEX}	$81A5_{HEX}$	*unconfirmed*
STATUS	8086_{HEX}	8086_{HEX}		8186_{HEX}
IDENTIFY	8087_{HEX}	$80AB_{HEX}$		8187_{HEX}
INITIATE	$808B_{HEX}$	$80AC_{HEX}$	$81AB_{HEX}$	$818B_{HEX}$
INITIATE ERROR		$80AD_{HEX}$		$818C_{HEX}$
ABORT	$808D_{HEX}$	$80AD_{HEX}$	$81AD_{HEX}$	*unconfirmed*
REJECT			$81AE_{HEX}$	

The individual primitives are described in Chapter 9 "Commands and Messages".

The service structure of the individual services is described on the following pages. The parameter entries depend on the modules addressed. Their meanings are as follows:

Name	Type	Explanation
Abort	S	Service to abort the communication connection
Abort Detail	BY	Application-specific, detailed designation for the abort
Access Groups	BY	Identification about the allocation of group access
Add Code	W	Application-specific, detailed designation of the error
Client	D	Service requester; the communication partner who requests an order.
Confirmation	D	Order confirmation which the service provider sends to the service requester (client).
Detected Here	BY	Indication of the error location: (Layer 7) local station = 00, remote station = FF
Error Class	BY	Classification number of an error
Error Code	BY	Error number of the service
ID	D	

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Index	BY	Name, under which a communication object is addressed, pointer to a variable/field
Initiate	S	Service to establish a communication relationship
Invoke ID	BY	Order identification, request no. of the service to a station.
KBL (communication relationship list)	D	This list contains definitions regarding the communication channels. Contents: permitted services, read- and write memory size
Communication object	D	Data, programs or variables which may be processed or executed.
KR (communication reference)	BY	Name or module number of a station. This number is allocated a communication connection.
Communication connection	D	Link between two application processes via which the data is accessed.
Length	BY	Quantity of the following user data in bytes.
Locally Generated	BY	Indication of the error location: local station =00, remote station = FF
OV (object dictionary)	D	List which contains descriptions of all communication objects (data, programs or variables).
Original Invoke ID	BY	Invoke ID of the service which causes a reject.
Password	BY	Password for the access control (*)
PDU (Process Data Unit)	D	Process data unit, protocol data unit (Request, Response, Confirmation, Indication)
PDU Type (Process Data Unit)	D	What caused the reject: 1 =Request, 2 =Response
PI-State	BY	Indication of program states on the module (STOP, RUN, START, RUNNING, ..)
Primitive	D	Basic operations of a service (Context Management, Variable Access)
Protection	BY	The value of the access check, protection: 00 = off, FF = on
Reason Code	BY	Error code for the connection release
Receive High	BY	Buffer size: high-priority send buffer (always 00)
Receive Low	BY	Buffer size: low-priority send buffer (buffer size in bytes)
Response	D	Sending of the order confirmation by the server after the order has been executed.
Reject	S	Service, designation of the service type which indicates a non-allowable access to a station.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Reject Code	BY	Designation of the error cause which initiated the reject.
Result	BY	Acknowledgment result of a service, value: 00 = positive, 01 to FF = negative
Request	D	Service request by the client.
Service	W	Service (Read, Write, Initiate, Start, Stop,...)
Server	D	Service provider; it executes the incoming service.
Status Phy.	BY	Status of the module hardware (defective, maintenance, ..)
Status Log.	BY	Status of the program/software (ready for communication, ..)
Send High	BY	Buffer size: high-priority send buffer (always 00)
Send Low	BY	Buffer size: low-priority send buffer (buffer size in bytes)
Subindex	BY	Pointer to a location in a variable/field. Index: 0 complete field 1 one element of the field
String of Vendor	S	Manufacturer's name, data string which a length as specified with the "length" parameter.
String of Module	S	Module type designation, data string with a length as specified with the "length" parameter.
String of Revision	S	Module revision, data string with a length as specified under the "length" parameter.
Supported Services	S	Coding of the supported services. (6 words = XX XX XX XX XX XX, Write, Read, Start, Stop)
String of Profile	W	Module profile (DRIVECOM, ENCOM,..) data string with the length as specified under the "length" parameter (always 2)
Version	W	Application-specific version designation
VFD (Virtual Field Device)	D	Represents that part of an application process, that is visible and can be manipulated by the services.

Key:

D	Designator
S	Service
BY	Byte
W	Word

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.4.2.1 Read Request

Structure:

8081 *(Command Code)*	
Parameter Count	
Invoke ID	Communication Reference
Index	
Subindex	

8.4.2.2 Write Request

Structure:

8082 (Command Code)	
Parameter Count	
Invoke ID	Communication Reference
Index	
Subindex	Data Length
Data	...
...	Data

8.4.2.3 Start Request

Structure:

8083 (Command Code)	
Parameter Count	
Invoke ID	Communication Reference
Index	

8.4.2.4 Stop Request

Structure:

8084 (Command Code)	
Parameter Count	
Invoke ID	Communication Reference
Index	

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.4.2.5 Information Report Request

Structure:

8085 (Command Code)	
Parameter Count	
	Communication Reference
Index	
Subindex	Length
Data	...
...	Data

8.4.2.6 Status Request

Structure:

8086 (Command Code)	
Parameter Count	
Invoke ID	Communication Reference

8.4.2.7 Identify Request

Structure:

8087 (Command Code)	
Parameter Count	
Invoke ID	Communication Reference

8.4.2.8 Initiate Request

Structure:

808B (Command Code)	
Parameter Count	
Invoke ID	Communication Reference
Password	Access Groups

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.4.2.9 Abort Request

Structure:

808D (Command Code)	
Parameter Count	
	Communication Reference
Locally Generated	Abort ID
Reason Code	Abort Detail

8.4.2.10 Read Confirmation

Structure:

Positive

8181 (Message Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (+)	Length
Data	....
...	Data

Negative

8181 (Message Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (-)	Error Class
Error Code	Add. Code
Add. Code	

8.4.2.11 Write Confirmation

Structure:

Positive

8182 (Message Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (+)	

Negative

8182 (Message Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (-)	Error Class
Error Code	Add. Code
Add. Code	

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.4.2.12 Start Confirmation

Structure:

Positive

8183 (Message Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (+)	

Negative

8183 (Message Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (-)	Error Class
Error Code	Add. Code
Add. Code	PI State

8.4.2.13 Stop Confirmation

Structure:

Positive

8184 (Message Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (+)	

Negative

8184 (Message Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (-)	Error Class
Error Code	Add. Code
Add. Code	PI State

8.4.2.14 Status Confirmation

Structure:

Positive

8186 (Message Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (+)	Logical Status
Physical Status	Length
String of Local Detail ...	
...	

Negative

8186 (Message Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (-)	Error Class
Error Code	Add. Code
Add. Code	

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.4.2.15 Identify Confirmation

Structure:

Positive

8186 (Message Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (+)	Logical Status
Physical Status	Length
String of Vendor Name ...	
...	
....	Length
String of Model Name ...	
...	
...	
	Length
String of Revision ...	
...	
...	

Negative

8186 (Message Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (-)	Error Class
Error Code	Add. Code
Add. Code	

8.4.2.16 Initiate Confirmation

Structure:

Positive

818B (Message Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (+)	Version
Version	Length
String of Profile ...	
...	
...	
Protection	Password
Access Groups	

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.4.2.17 Initiate Error Confirmation

Structure:

Negative

818C (Message Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (-)	Error Class
Error Code	Add. Code
Add. Code	Send.-High
Send.-Low	Receive High
Receive low	Supported ...
...	...
...	Services

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.4.3 Response/Indication

8.4.3.1 Abort Indication

Structure:

81AD (Message Code)	
Parameter Count	
	Communication Reference
Locally Generated	Abort ID
Reason Code	Abort Detail

8.4.3.2 Reject Indication

Structure:

81AE (Message Code)	
Parameter Count	
	Communication Reference
Detected here	Original Invoke ID
Reject PDU Type	Reject Code

8.4.3.3 Start Indication

Structure:

81A3 (Message Code)	
Parameter Count	
Invoke ID	Communication Reference
Index	

8.4.3.4 Stop Indication

Structure:

81A4 (Message Code)	
Parameter Count	
Invoke ID	Communication Reference
Index	

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.4.3.5 Information Report Indication

Structure:

81A5 (Message Code)	
Parameter Count	
	Communication Reference
Index	
Subindex	Length
Data	...
...	Data

8.4.3.6 Read Indication

Structure:

81A1 (Message Code)	
Parameter Count	
Invoke-ID	Communication Reference
Index	
Subindex	

8.4.3.7 Write Indication

Structure:

81A2 (Message Code)	
Parameter Count	
Invoke-ID	Communication Reference
Index	
Subindex	Length
Data	...
...	Data

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.4.3.8 Initiate Indication

Structure:

81AB (Message Code)	
Parameter Count	
Invoke-ID	Communication Reference
Version	
Length	String of
Profile	
Protection	Password
Access_groups	

8.4.3.9 Read Response

Structure:

Positive

80A1 (Command Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (+)	Length
Data	....
...	Data

Negative

80A1 (Command Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (-)	Error Class
Error Code	Add. Code
Add. Code	

8.4.3.10 Write Response

Structure:

Positive

80A2 (Message Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (+)	

Negative

80A2 (Message Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (-)	Error Class
Error Code	Add. Code

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.4.3.11 Start Response

Structure:

Positive

80A3 (Command Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (+)	

Negative

80A3 (Command Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (-)	Error Class
Error Code	Add. Code
Add. Code	

8.4.3.12 Stop Response

Structure:

Positive

80A4 (Command Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (+)	

Negative

80A4 (Command Code)	
Parameter Count	
Invoke ID	Communication Reference
Result (-)	Error Class
Error Code	Add. Code

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.4.4 Use of Communication

Prerequisites:

- Mode of operation: controlled start
- Software: ISFP (CON/IND and REQ/RES blocks in the cyclic program)

Initialization:

- Startup
  - The INITIB function block must be called during startup. It performs initialization for all further standard function blocks.
  - The standard data blocks RRST, CIST and the flag words RRMW and CIMW must be specified in the INITIB function block.
- Interface drivers
  - The two interface drivers must be called conditionally in the cyclic program.

    CON/IND is called at the start of the organization block (OB) 1.

    REQ/RES is called at the end of the organization block (OB) 1.
- Addressing
  - Addressing is initiated by way of the ADDRESS function block.
  - One KR is assigned to each module that is capable of communication. Counting begins with KR = 2, in the direction of the physical bus structure, up to a maximum of KR = 63.
  - Communication is initialized once all lists have been transferred by the ADDRESS function block. Once all commands have been acknowledged positively, the bus is capable of communication and is in the RUN mode.

Application

Further communication commands depend on the connected hardware. Not every module is capable of processing all commands. The parameters belonging to the command differ.

The commands are sent to the controller board by means of the REQ/RES function block. The controller board then receives the expected message by means of the CON/IND function block.

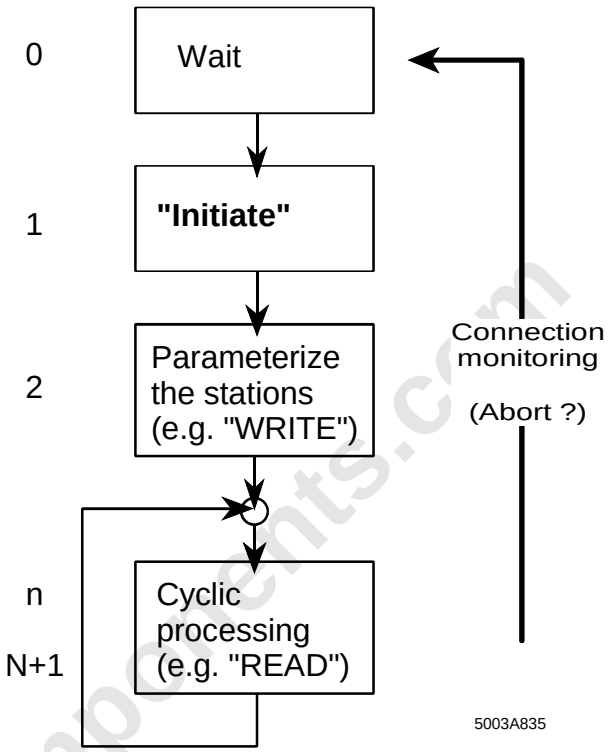
The structure of the commands and messages have been described in the previous chapters. Refer to the module descriptions for details of the individual commands' parameters.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Sequence diagram (example)

A station is addressed once and afterwards cyclically processed. (e.g.: IBS AI 3/16: Parameterization is done first, followed by the reading out of the analog inputs).



After a communication abort, the controller board needs some time (30 ms) to clear the communication layers and to synchronize itself with the station. When fast CPUs or short cycle times are used, a wait loop should be run through. The length of the wait loop depends on the PLC cycle time. If the waiting time is to short, the controller board always responds with an ABORT to a connection establishment only until a synchronization took place.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Example:

Addressing a communication module:

- Connection establishment.
  Connection is established with the Initiate Request service primitive
- Program-dependent service requests (Request/Response).
  The commands used depend on the specific module and application.
- Connection abort
  Connection is aborted with the ABORT Request service primitive.

Every connection established requires a certain amount of administration on the PLC. To minimize this work, unnecessary connections should be avoided.

It is expedient to abort a connection whenever a PCP station is addressed seldom. For example, when a frequency inverter is parameterized once, it is not necessary to maintain the connection any longer.

It is not expedient to abort connections of highly frequented PCP stations because renewed establishment of a connection takes an unnecessarily long time.

Examples will elucidate the sequence of communication and the program structure needed. The programs created for this purpose are included with the standard software.

- Example for a Count: File: IBSCNTST.S5D
- Example for a V.24 module: File: IBSV24ST.S5D

The connection has to be monitored during the entire program run. After the connection has been aborted (ABORT) the station cannot be addressed until the connection has been established again (INITIATE).

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.4.5 Communication Error Messages

8.4.5.1 Error Messages for a Connection Abort

If an existing connection has been disconnected with the Abort service, the reason for aborting is specified with the aid of several parameters.

Abort Identifier	**Abort ID**	This parameter indicates where the cause of the connection abort was detected.
Reason Code	**RC**	This parameter specifies the reason for the abort.

Table 8-17: Error messages for a connection abort

Abort ID	RC	Explanation
0 (User)	1	• The PMS user clears the connection. (Disconnect)
1 (PMS)	1	• Initiate Request was received by the PMS user. The connection could not be established, because an error was detected during a check of the KBL parameters. Solution: Check KBL
1	2	• An invalid or defective service primitive was received by the user. Example: The connection has not yet been established with Initiate, but an attempt was nevertheless made to send a service.
1	3	• System error*
1	4	• System error*
1	5	• System error*
1	6	• System error**
1	7	• System error of the remote PCP station • Service is not supported as a server (Service not supported)
1	8	• When sending the service, an invalid Invoke ID was specified in the local PCP station. • The specified Invoke ID does not exist in the PCP partner
1	9	• System error of the remote PCP station. More service requests were sent than were defined in the KBL (Max Services Overflow)
1	10	• System error*
2 LLI	0	• Negative context check (Abort Detail contains the LLI-Context - only partly implemented) • LLI parts of the KBLs do not agree Remedy: Check KBL entries
2	1	• Invalid LLI-PDU in the connection establishment or abort phase
2	2	• Connection at the remote partner still established.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Table 8-18: Error messages for a connection abort (cont'd)

Abort ID	RC	Explanation
2	3	• System error
2	4	• System error
2	5	• System error
2	6	--
2	7	--
2	8	• System error **
2	9	--
2	10	• Timer 3 (connection monitoring) has elapsed Remedy: Cf. 'Timeout error during connection monitoring'
2	11	see RC 10
2	12	
2	13	
2	14	
2	15	
2	16	
2	17	• System error --> *1
2	18	• System error --> *1
2	19	
2	20	• Conflict during connection establishment. Two PCP stations have attempted to establish the mutual connection absolutely simultaneously. In this case, the controller always wins. The error can only occur in a PCP module
2	21	
2	22	• System error*
2	23	
2	24	
2	25	
3 (Layer 2)	2	RR (Remote Resources) • Layer 2 of the remote PCP station is not active • The addressed station does not respond
3	17	NA (No Acknowledge) • Remote device exists, but does not respond
3	18	DS (Disconnect) • Layers 2 are unsuccessfully attempting to synchronize • A multiple CRC error occurred Remedy: Repeat the service after a waiting time of approx. 30 ms. (If this error occurs continuously in Layer 2, please contact the manufacturer)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Table 8-19: Error messages for a connection abort (cont'd)

Abort ID	RC	Explanation
3	20	LR (Local Resource Not Available) • (System error* or PMS (Page 8-122)
3	21	IV (Invalid) • (System error*)
3	32	• CRC error. Transmitted data contains errors Cause: Perhaps interferences on the data line

* Please inform the manufacturer of the local PCP station.

** Please inform the manufacturer of the remote PCP station.

8.4.5.2 Error Messages for the Reject Service

The reject code specifies the reason why the PDU (message) was rejected.

Table 8-20: Error messages for the reject service

Reject code	Explanation
1	Invoke-ID-Exists. Cause: An Invoke ID already in use has been used again.
2	Max-Services-Overflow (confirmed services only) Cause: More service requests were sent than defined in the KBL (e.g. 2 Read requests to the same station without having waited for the confirmation).
3	Service-Not-Supported (connection-oriented only) Cause: The service sent is not supported as a client.
4	*Reserved*
5	PDU-Size Cause: The maximum PDU length (message length) has been exceeded
6	*Reserved*
7	Max-Services-Overflow (unconfirmed services only) Cause: IBS-specific: no resources free
0	Other Cause: Other reasons

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

8.4.5.3 Additional Error Messages

Optional, and additional error messages.

Table 8-21: Additional error messages

Abort detail/ additional detail	Explanation
3	Error during sending

8.4.5.4 Description of the Service-Specific Error Messages

The service-specific error messages are indicated in error classes and error codes.

Error class: This parameter specifies the error type.

Error code: This parameter gives further specific information within the scope of the error type.

Error class 0 (Initiate)

This error type is reported in the event of connection establishment errors.

Table 8-22: Service-specific error messages, error class 0 (Initiate)

Error code	Explanation
1	Max-PDU-Size-Insufficient Cause: The specified maximum PDU size does not suffice for communication. Remedy: Adapt the communication relationship list with the "Receive-KBL" command (parameters m+11 and m+13) in accordance with the indication in the negative Initiate-Error-Confirmation.
2	Services-Not-Supported Cause: The requested service is not supported by the server. Remedy: Adapt the entries in the Receive KBL in accordance with the Initiate-Error-Confirmation.
3	Version-OV-Incompatible Cause: The version of the OV (object dictionary) is not the correct one.
4	User-Initiate-Denied Cause: The PMS user rejects the Initiate service.
0	Other Cause: The error cannot be assigned to an error code.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Error class 1 (VFD state)

The service could not be executed owing to the VFD state.

Table 8-23: Service-specific error messages, error class 1 (VFD state)

Error code	Explanation
0	Other Cause: The error cannot be assigned to an error code.

Error class 2 (application reference)

This type of error refers to the communication relationship through which the service is run.

Table 8-24: Service-specific error messages, error class 2 (application reference)

Error code	Explanation
1	Application-Unreachable Cause: The application process is not accessible.
0	Other Cause: The error cannot be assigned to an error code.

Error class 3 (definition)

Discrepancies with objects.

Table 8-25: Service-specific error messages, error class 3 (definition)

Error code	Explanation
1	Object undefined Cause: The objects required do not exist.
2	Object-Attribute-Inconsistent Cause: The given object has been specified with inconsistent attributes.
3	Name-Already-Exists Cause: The name already exists.
0	Other Cause: The error cannot be assigned to an error code.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Error class 4 (resource)

Existing capacities are exceeded.

Table 8-30: Service-specific error messages, error class 4 (resource)

Error code	Explanation
1	Memory-Unavailable Cause: No more memory is available to execute the service.
2	Max-Outstanding-Services-Overflow Cause: More service requests without a confirmation were sent than have been specified in the KBL.
0	Other Cause: The error cannot be assigned to an error code.

Error class 5 (service)

This type of errors is reported if a service contains an error.

Table 8-26: Service-specific error messages, error class 5 (service)

Error code	Explanation
1	Object-State-Conflict Cause: The current state of the object is preventing execution of the service
2	PDU-Size Cause: The message length has been exceeded.
3	Object-Constraint-Conflict Cause: The service can currently not be executed.
4	Parameter-Inconsistent Cause: The service contains inconsistent parameters
5	Illegal Parameter Cause: A parameter has assumed an invalid value.
0	Other Cause: The error cannot be assigned to an error code.

online-components.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Error class 6 (access)

This type of errors is reported if access involves errors.

Table 8-27: Service-specific error messages, error class 6 (access)

Error code	Explanation
1	Object-Invalidated Cause: The access refers to a defined object that has an undefined reference attribute; this represents a permanent error in relation to access to this object.
2	Hardware-Fault Cause: Access to the object has failed owing to a hardware fault
3	Object-Access-Denied Cause: The PMS client has no adequate access privileges for the object.
4	Address-Invalid Cause: The specified address lies outside of the valid area
5	Object-Attribute-Inconsistent Cause: The specified object attributes are inconsistent
6	Object-Access-Unsupported Cause: The object has not been defined for the intended access.
7	Object-Non-Existent Cause: The object does not exist.
8	Type-Conflict Cause: Access is rejected owing to an invalid data type.
9	Names-Access-Unsupported Cause: Access with a name is not supported.
0	Other Cause: The error cannot be assigned to an error code.

The documentation of PCP station from third-party manufacturers or profile documentation contains detailed error descriptions on the returned values of the negative confirmations (e.g. DRIVECOM profile. etc.)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Error class 7 (OV error)

Changes to the object dictionary involve errors

Table 8-28: Service-specific error messages, error class 7 (OV error)

Error code	Explanation
1	Name-Length-Overflow Cause: The permissible name length is exceeded.
2	OV-Overflow Cause: The permissible object dictionary length has been exceeded.
3	OV-Write-Protected Cause: The object dictionary is write protected
4	Extension-Length-Overflow Cause: The permissible extension length is exceeded
5	Object-Description-Length-Overflow Cause: The permissible length of one single object description has been exceeded.
6	Operational-Problem Cause: The object dictionary just loaded contains errors.
0	Other Cause: The error cannot be assigned to an error code.

Error class 8 (other)

This type of error is reporting in the event of other errors occurring

Table 8-29: Service-specific error messages, error class 8 (other)

Error code	Explanation
0	Other Cause: The error cannot be assigned to an error code.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

A

ABORT, 8-120
Abort ID, 8-122
Abort Identifier, 8-122
Abort Indication, 8-118
Abort Request, 8-113
ABORT-Request, 8-121
Access, 8-129
Activation flag, 8-103; 8-108
Additional error messages, 8-125
ADDRESS, 8-23; 8-69; 8-98; 8-101; 8-119
Address length, 8-74
Addressing, 8-100; 8-101; 8-119
Addressing block, 8-98
Alarm Stop, 8-29
Application reference, 8-127
Automatic start, 8-6
Auxiliary block, 8-5

B

Bit
MOD, 8-88
Bit manipulation, 8-46
Bit manipulation register, 8-50
Bit number, 8-46
BK-Alarm OFF, 8-67
BK-Alarm ON, 8-67
BUS bit, 8-85; 8-87; 8-91
Bus Information, 8-85
Bus output bit, 8-46
Bus segment address list, 8-75
Bus segment number, 8-67
Bus segment numbers, 8-35
Bus structure (physical), 8-74
Bus terminal alarm output, 8-67
BUSY bit, 8-17
Busy bit, 8-19
Byte orientation, 8-46

C

Call structure, 8-3
CIDB, 101; 8-108
CIDB (data block), 8-105
CIH, 8-5; 8-10
CIMW, 8-105; 8-108; 8-119
CIST, 8-108; 8-119
Clear Display, 8-29
Client, 8-96
Command functions, 8-25
Command list, 8-51
Communication, 8-96; 8-98; 8-119
Communication abort, 8-120
Communication data, 8-98
Communication Reference, 8-38
Communication reference, 8-101; 8-102; 8-109
Communication reference list, 8-81
Communication references, 8-38
Communication registers, 8-98
Communication relation ship list, 8-43
Communication stations, 8-102
CON bit, 8-84; 8-91
CON/IND, 8-4; 8-10; 8-15; 8-17; 8-98; 8-100; 8-105; 8-119
CON/IND header blocks, 8-101
Configure InterBus-S, 8-28
Confirmation service primitive, 8-96
Confirmations, 8-105
Connection abort, 8-121
Connection establishment, 8-121
CONTROL, 8-26
Control, 8-17; 8-21; 8-98
Controlled start, 8-6
Controlled start with EEPROM, 8-6
Controller Error Code, 8-84
Controller Parameter Timeout Error, 8-42
Counter, 8-62

D

Data block
header data block, 8-107; 8-108
standard data block, 8-107; 8-108
Defective Group, 8-87
DEFINE, 8-21; 8-32; 8-53
Definition, 8-127
Disable All Messages, 8-29
disconnectible, 8-80
Driver blocks, 8-101

E

EREG, 8-71
ERRINFO, 8-24; 8-82
Error classes, 8-126
Error codes, 8-126
Error messages, 8-122
EVENT, 8-24; 8-95
Event code, 8-40
Event identifier, 8-40; 8-68
Event Map, 8-39
Event OFF, 8-68

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Event ON, 8-68

F

Function block, 8-2
Function blocks, 8-98

G

Group definition, 8-78
Group Error Characteristics, 8-53; 8-80
Group nos. list, 8-78
Group Numbers, 8-41
Group OFF, 8-66
Group ON, 8-66

H

Hilfsfunktionsbaustein, 8-10
Host output bit, 8-46

I

I/O address area, 8-98
IBDB, 8-10; 8-14; 8-15; 8-19; 8-52; 8-56; 8-71
ID code, 8-74
ID code list, 8-74
ID numbers, 8-34
Identification codes, 8-59
Identify Confirmation, 8-116
Identify Request, 8-113
Implement All Logical Address Map, 8-30; 8-35; 8-36; 8-37; 8-63
IN address, 8-40
IN address list, 8-76
Indication service primitive, 8-96
Indications, 8-105
Information Report Request, 8-112
Init Communication, 8-30; 8-38
Initialization, 100; 8-119
Initialization block, 8-2; 8-98
Initiate, 8-126
Initiate Confirmation, 8-116
Initiate Error Confirmation, 8-117
Initiate Request, 8-113
Initiate.Request, 8-121
INITIB, 8-6; 8-8; 8-98; 8-119
Input addresses, 8-76
Input bit, 8-46
Installation remote bus station, 8-56
INTERBUS data block, 8-19; 8-52
InterBus data block, 8-10
INTERBUS-S Cycle Counter, 8-62
InterBus-S Delay, 8-31
InterBus-S management functions, 8-1
Interface drivers, 8-119
ISFP interface, 8-101

L

LB ERR, 8-71
Length codes, 8-34; 8-59
Local bus, 8-78
Local Bus Module Error, 8-89
Local buses, 8-41
Logical Address Error, 8-63
Logical IN Address Map, 8-36
Logical IN addresses, 8-36
Logical local bus address, 8-56
Logical Local Bus Address Map, 8-35
logical numbers, 8-75
Logical OUT Address Map, 8-37
Logical OUT addresses, 8-37

M

Manipulation of OUT words, 8-44
Mask 1, 8-40
Mask 2, 8-40
Message flag, 8-108
Message functions, 8-90
Message header, 8-108
MOD bit, 8-91
MODE, 8-71
Module Error, 8-88
Module identification code, 8-34
Module number, 8-56

O

ON/OFF, 8-22; 8-64
Organization block, 8-119
Other, 8-130
OUT address list, 8-77
Output addresses, 8-77
Output bit, 8-46
OV-Error, 8-130

P

Parameter Timeout Constant, 8-42
PCP activation flag, 8-104
PCP communication system, 8-96

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

PCP message flag, 8-106
PCP services, 8-110
PCP stations, 8-98
Physical Configuration Map, 8-34; 8-59
Physical Configuration Map, 8-63
Process data, 8-98

Q

Quit Module Error, 8-56
Quit Module Error All, 8-31

R

RB ERR, 8-71
RC, 8-122
Read Confirmation, 8-114
Read Request, 8-111
READ service (Exmp.), 8-109
Reason Code, 8-122
Receive Bit Manipulation, 8-44
Receive block, 8-2; 8-98
Receive KBL, 8-43
RECO bit, 8-93
RECONFIG, 8-24; 8-93
Reject Indication, 8-118
Reject Service, 8-125
REQ/RES, 8-4; 8-12; 8-15; 8-17; 8-98; 8-100; 8-119
REQ/RES header blocks, 8-101
Request service primitive, 8-96
Reset-Out-In01, 8-49
Reset-Out-In01-Switch, 8-50
Reset-Out-In10, 8-49
Reset-Out-In10-Switch, 8-50
Reset2-Out-In01, 8-49
Reset2-Out-In10, 8-49
Resource, 8-128
Response service primitive, 8-96
Restart (automatic), 8-53
Return bit, 8-19
RRDB, 8-101; 8-103; 8-107
RRMW, 8-103; 8-108; 8-119
RRST, 8-107; 8-108; 8-119

S

Send block, 8-2; 8-98
Server, 8-96
Service, 8-128
Service execution, 8-102
Service Message Flag, 8-105
  Service primitive, 8-102
  Confirmation, 8-105; 8-109
  Indication, 8-105
Service request, 8-121
Service Structure, 8-102
  Service primitive
  Request, 8-109
Service-specific error messages, 8-126
Signal changes, 8-44
Simatic S5, 8-98
Software Revision, 8-60
Start Confirmation, 8-114
Start InterBus-S Cycle, 8-28
Start Request, 8-111
Startup, 8-119
Status Confirmation, 8-115
Status Request, 8-112
Stop Confirmation, 8-115
Stop InterBus-S Cycle,8-28
Stop Request, 8-112
Switch Information, 8-61
Synchronization, 8-98
SYSERROR, 8-23; 8-82; 8-91
SYSINFO, 8-22; 8-57

T

TIMEOUT bit, 8-19

U

Use, 8-119
User process, 8-96

V

VFD-State, 8-126

W

Write Confirmation, 8-114
Write Request, 8-111

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Chapter 9

Commands and Messages

This chapter provides information on

- commands which are required to control the controller board for different tasks (e.g. configuration, addressing, etc.).
- messages which the controller board sends to the programmable controller as an acknowledgment for received commands or after events.

9 Commands and Messages 9-1

9.1 Controller Board Commands 9-5
9.1.1 Commands for Bus Operation 9-6
9.1.2 Commands for Configuration 9-9
9.1.3 Commands for Error Recovery 9-18
9.1.4 Commands for System Control 9-24
9.1.5 Commands for Addressing 9-25
9.1.6 Commands for Process Data Linkage 9-27
9.1.7 Commands for Event Processing 9-34
9.1.8 Commands for Communication 9-38
9.1.9 Commands for the EEPROM Management 9-38

9.2 Controller Board Messages 9-40
9.2.1 Messages of the User Interface 9-41
9.2.2 Messages for Bus Operation 9-41
9.2.3 Messages for Configuration 9-43
9.2.4 Messages for Error Recovery 9-49
9.2.5 Messages for System Control 9-60
9.2.6 Messages for Addressing 9-61
9.2.7 Messages for Process Data Linkage 9-63
9.2.8 Messages for Event Processing 9-65
9.2.9 Messages for Communication 9-66
9.2.10 Messages for the EEPROM Management 9-67

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

9 Commands and Messages

Table 9-1: Overview of the commands

Code	Command	Page
(0001)	Start-Bus-Cycle-Request	9-6
(0002)	Stop-Bus-Cycle-Request	9-7
(0008)	Send-Software-Revision-Request	9-24
(0009)	Send-Software-Revision-V24-Request	9-24
(0020)	Switch-Group-On-Request	9-13
(0021)	Switch-Group-Off-Request	9-14
(0023)	Configure-Bus-Request	9-9
(0024)	Set-BK-Alarm-Logical-Request	9-23
(0025)	Reset-BK-Alarm-Logical-Request	9-23
(002A)	Receive-Events-Request	9-34
(002b)	Enable-Event-Number-Request	9-36
(002C)	Disable-Event-Number-Request	9-36
(002d)	Enable-All-Event-Request	9-37
(002E)	Disable-All-Event-Request	9-37
(0040)	Implement-All-Logical-Address-Maps-Request	9-26
(0049)	Receive-Group-Numbers-Request	9-12
(004A)	Alarm-Stop-Request	9-8
(004E)	Clear-Display-Request	9-18
(0050)	Send-Switch-Information-Request	9-24
(0058)	Check-Physical-Configuration-Request	9-11
(005A)	Send-Bus-Error-Information-Request	9-18
(005b)	Send-Local-Bus-Module-Error-Request	9-19
(005C)	Send-All-Module-Error-Request	9-19
(005d)	Receive-Processing-Instructions-Request	9-27
(005E)	Send-Physical-Configuration-Request	9-10
(005F)	Send-Log-Address-Error-Request	9-26
(0060)	Define-Groups-Error-Characteristics-Request	9-15
(0061)	EEPROM-Management	9-38
(0064)	Quit-Module-Error-Request	9-22
(0065)	Quit-Module-Error-All-Request	9-22
(0069)	Receive-Local-Bus-Code-Map-Request	9-25
(0106)	Send-Group-Number-Request	9-16
(0107)	Send-Group-State-Request	9-17
(0108)	Send-Local-Bus-Code-Map-Request	9-17
(0109)	Send-Located-Error-Counter-Request	9-20
(010A)	Send-Located-Error-Counter-V24-Request	9-20
(010B)	Send-Last-Module-Status-Error-Request	9-20
(010C)	Send-Last-Module-Status-V24-Error-Request	9-21
(010D)	Send-Actual-Configuration-Request	9-21
(010E)	Send-Actual-V24-Configuration-Request	9-21
(0112)	Read-KBL-Loc-Request	9-38

The commands listed on the following pages are error indications for the CTRL error. They are indicated with a CTRL error on the front plate and entered in the diagnostic registers. Chapter 4 "Diagnostic Interfaces" describes these messages in detail.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Table 9-2: Overview of the messages for a CTRL error

Code	Message	
(0007)	No-Command-Code-Indication	
(0009)	Parameter-Write-Error-Indication	
(000b)	No-Error-Code-Indication	
(000C)	Controller-Parameter-Timeout-Indication	
(000d)	Host-Parameter-Timeout-Indication	
(0023)	CPU-Bus-Error-Indication	
(0024)	CPU-Address-Error-Indication	
(0026)	CPU-Zerodivision-Indication	
(0027)	Bad-Exception-Indication	
(0028)	CPU-Not-Implemented-Interrupt-Indication	
(0029)	CPU-Illegal-Instruction-Indication	
(002b)	Logical-Address-Error-Confirmation	
(0038)	Bus-System-Error-Indication	
(003b)	IPMS-Extern-Error-Indication	
(003C)	IPMS-FiFo-Overflow-Error-Indication	
(003d)	IPMS-Undefined-Error-Indication	
(003E)	Invalid-DCF-Condition-Indication	see
(003F)	Invalid-DCF-State-Indication	Chapter 4
(0040)	Impossible-MC-Condition-Indication	
(0041)	Invalid-MC-State-Indication	
(0042)	Invalid-UC-State-Indication	
(0046/47)	Wrong Base Address Window 1/2	
(0048/49)	Wrong Length Window 1/2	
(004A)	No-Executable-Configuration-Confirmation	
(004b)	Command-Parameter-Error-Confirmation	
(004d)	IPMS-No-Error-Indication	
(004E)	Communication-Invalid-Indication	
(0050)	Invalid-D-State-Indication	
(0051)	Invalid-D-Condition-Indication	
(0055)	Receive-Group-Numbers-Failed-Confirmation	
(0057)	Invalid-EC-State-Indication	
(0058)	Invalid-EC-Status-Indication	
(0059)	Unexpected-Group-Number-Confirmation	
(005A)	BK-Alarm-Failed-Confirmation	
(005b)	Unknown-Bus-Module-Confirmation	
(0065)	Too-Many-K-Modules-Indication	
(0066)	Receive-CR-Error-Confirmation	
(0068)	Check-Configuration-Error-Confirmation	
(0069)	Communication-Not-Ready-Indication	
(006A)	Wrong-Base-Address-Window-Indication	
(006b)	Defective-Address-Decoder-Indication	

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Table 9-3: Overview of the messages

Code	Message	Page
(002B)	Logical-Address-Error-Confirmation	9-61
(004C)	Event-Error-Confirmation	9-65
(0088)	Start-Bus-Confirmation	9-41
(009C)	Command-Disabled-Confirmation	9-41
(00Ab)	Physical-Configuration-Map-Valid-Confirmation	9-44
(00bd)	Quit-Receive-Group-Numbers-Confirmation	9-44
(00C6)	Stop-Bus-Confirmation	9-42
(00CA)	Quit-Configure-Bus-Confirmation	9-44
(00Cb)	Quit-Set-BK-Alarm-Logical-Confirmation	9-49
(00CC)	Quit-Reset-BK-Alarm-Logical-Confirmation	9-49
(00CE)	Quit-Reset-BK-Alarm-Physical-Confirmation	9-50
(00d0)	Quit-Receive-LLA-Confirmation	9-61
(00d3)	Quit-Implement-Confirmation	9-61
(00d8)	Quit-Alarm-Stop-Confirmation	9-42
(00dA)	Quit-Enable-Event-Number-Confirmation	9-65
(00db)	Quit-Disable-Number-Confirmation	9-65
(00dC)	Quit-Enable-All-Events-Confirmation	9-65
(00dd)	Quit-Disable-All-Events-Confirmation	9-65
(00E2)	Quit-Clear-Display-Confirmation	9-50
(00E3)	Start-Bus-Not-Possible-Confirmation	9-42
(00E4)	Quit-Receive-Logical-Addresses-Confirmation	9-61
(00Ed)	No-Map-Entry-Confirmation	9-50
(00F2)	Quit-Receive-Instructions-Confirmation	9-63
(00F6)	Quit-Groups-Error-Characteristics-Confirmation	9-45
(00F8)	Quit-EEPROM-Management-Confirmation	9-67
(00FA)	Quit-EEPROM-Programming-Confirmation	9-67
(00FE)	Quit-Module-Error-OK-Confirmation	9-50
(0105)	Quit-Receive-Local-Bus-Code-Map-Confirmation	9-63
(8087)	Send-Software-Revision-Confirmation	9-60
(8089)	Send-Software-Revision-V24-Confirmation	9-60
(809d)	Switch-Group-Off-Confirmation	9-45
(809E)	Switch-Group-On-Confirmation	9-44
(80A0)	Module-Error-Indication	9-51
(80A1)	Power-Fail-Indication	9-51
(80A2)	Battery-Indication	9-52
(80A3)	Module-Request-Indication	9-52
(80C4)	Bus-Error-Information-Indication	9-53
(80C5)	Switch-Group-On-Failed-Confirmation	9-44
(80E5)	Switch-Information-Confirmation	9-63
(80EE)	Local-Bus-Module-Error-Confirmation	9-57
(80EF)	Send-All-Module-Error-Confirmation	9-56
(80F3)	Processing-Instructions-Error-Confirmation	9-63
(80F4)	Send-Physical-Configuration-Confirmation	9-43

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

(80F5)	Send-Log-Address-Error-Confirmation	9-61
(80F7)	Groups-Error-Characteristics-Failed-Confirmation	9-45
(80F8)	Quit-EEPROM-Management-Confirmation	9-66
(80F9)	EEPROM-Management-Error-Confirmation	9-67
(80FB)	EEPROM-Programming-Error-Confirmation	9-68
(80FF)	Quit-Module-Error-Not-Possible-Confirmation	9-50
(8106)	Reconfiguration-Indication	9-46
(8112)	Send-Group-Number-Confirmation	9-46
(8113)	Send-Group-Status-Confirmation	9-47
(8114)	Send-Local-Bus-Code-Map-Confirmation	9-47
(8115)	Send-Located-Error-Counter-Confirmation	9-57
(8116)	Send-Located-Error-Counter-V24-Confirmation	9-58
(8117)	Send-Last-Module-Status-Error-Confirmation	9-58
(8118)	Send-Last-Module-Status-Error-V24-Confirmation	9-59
(8119)	Send-Actual-Configuration-Confirmation	9-59
(811A)	Send-Actual-Configuration-V24-Confirmation	9-60
(811B)	Read-KBL-Loc-Confirmation	9-66

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

9.1 Controller Board Commands

Chapter 9.1 describes the commands for the controller board. The descriptions follow the schematic below. The command code is given in a hexadecimal form. The letters A through F are shown as upper or lower case letters like they are displayed on the seven-segment display.

Name of the command **(Code)**

Function: *Describes the task of the command.*

Requirement: *All requirements which must be met before a command is called to allow its successful processing.*

Messages:

Positive acknowledgement:	*Message which confirms a positive execution of the command.*
Meaning:	*Explanation of the message.*
Remark:	*Further information on the message.*
Negative acknowledgment:	*Message which indicates that an error occurred while the command was executed.*
Meaning:	*Explanation of the error reason.*
Remark:	*Further information on the message.*

The syntax of a command with parameters is as follows:

Syntax:

Name of the command	*Code*
Structure	
of the	
command	

The key explains the parameters which have been used for the syntax description.

Key:

Dummy variable	Description of the parameter

The syntax of a command without parameters is described as follows.

Syntax:

Name of the command	*Code*

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

9.1.1 Commands for Bus Operation

Start-Bus-Cycle-Request (0001)

Function: The command activates the cyclic data traffic on the bus. Depending on the previously loaded definitions (e.g. logical addressing, group definitions) the controller board puts the bus configuration into operation and makes the I/O addresses available to the PLC.

Prerequisite: Logical addressing of local bus error for group definition

Messages:

Positive acknowledgment: Start-Bus-Confirmation (0088)
Remark: The IB RUN LED is illuminated
Meaning: The system could be started. The controller board starts the cyclic reading and setting of inputs and outputs.

Negative acknowledgment: Start-Bus-Not-Possible-Confirmation (00E3)
Remark: The IB RUN LED is not illuminated
Meaning:
- all groups are switched off
- the maximum possible bus configuration has been exceeded
- hardware error of the controller board

Negative acknowledgment: Bus-System-Error-Indication (0038)
Meaning: An error has occurred which does not permit further bus operation.
Remark: The general message Bus-Error-Information-Indication (80C4) provides a detailed error description.

Further details: The data traffic is not stopped in the event of the Module-Error-Indication (80A0) error message which may occur after a positive or negative acknowledgment.

The BSA LED is illuminated when the bus is started after a local bus or installation remote bus error. A prerequisite for this is the group definition.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Stop-Bus-Cycle-Request **(0002)**

Function: The command stops the cyclic data traffic on the bus.

Prerequisite: None

Effects:

Process data channel:
- The cyclic data traffic is stopped. The existing process data image of the modules connected to the bus is statically kept and not renewed.
- The command does **not** switch the process output data in the safe state (reset of the outputs). This is only possible with the Alarm-Stop-Request (004A) command.

PCP channel:
- The Peripherals Communication Protocol (PCP) is not used further.
- The established connections are **not** automatically aborted. Services which are possibly to be expected are processed further after the data traffic has started again.

Messages:

Positive acknowledgment: Stop-Bus-Confirmation (00C6)

Meaning: The process data channel and the possibly used (PCP) channel are no longer used.

Remark:
- The IB RUN LED goes off.
- The parameter list is not deleted.

Syntax:

Stop-Bus-Cycle-Request	0002

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Alarm-Stop-Request **(004A)**

Function: The command causes a RESET on the bus. The data traffic on the bus is stopped. Modules with process data set their output values to 0. The command is executed immediately after the running data cycle has been completed.

Effects:

Process data channel:
- The cyclic data traffic on the bus is stopped. The existing process data image of the modules connected to the bus is kept statically and is not renewed.
- The command switches the process output data to a safe state (reset of the outputs).

PCP channel:
- The Peripherals Communication Protocol (PCP) is not used further.
- The established connections are **not** automatically aborted. Services which are possibly to be expected are processed further after the data traffic has started again.

Further operation: The following definitions are deleted:
- Logical address lists
- Group definition
- Bit manipulation
- Event definition

Messages:

Positive acknowledgment: Quit-Alarm-Stop-Confirmation (00d8)
Meaning: The data traffic on the bus is stopped.
Remark: The parameter list is deleted.

Syntax:

Alarm-Stop-Request	004A

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

9.1.2 Commands for Configuration

Configure-Bus-Request (0023)

Function: This command causes the controller board to reject all previously defined definitions and to read in the up to date bus configuration. This configuration is valid from now on and is declared as "initial configuration".

Effects: The following definitions are deleted:
- Logical address lists
- Group definition
- Bit manipulation
- Event definition

Prerequisite: When this command is used, the INTERBUS-S cycle must have been stopped.

Further operation: Further bus operation is initiated with logical addressing.

Messages: Positive acknowledgment: Quit-Configure-Bus-Confirmation (00CA)

Error: Defective bus parts are reported as errors (LEDs, messages) in the order of the physical bus structure or are indicated on the diagnostics display.

Syntax:

Configure-Bus-Request	0023

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Send-Physical-Configuration-Request (005E)

Function: The command reads out the bus configuration, which has been stored as valid configuration on the controller board in the form of ID codes and length codes.

Prerequisite: If the up to date bus configuration is to be read out, the following commands must be executed before the Send-Physical-Configuration-Request command is called:
- Configure-Bus-Request (command code 0023)
- Warmstart-Request (command code 004c)

If the "initial" bus configuration is to be read out, the Check-Physical-Configuration-Request must be executed before the Send-Physical-Configuration-Request command is called.

Messages:

Positive acknowledgment:	Send-Physical-Configuration-Confirmation (80F4)
Meaning:	The acknowledgment transmits the physical bus configuration including the number of registers which are used for the process data (bus register).
Negative acknowledgment:	No-Executable-Configuration-Confirmation (004A)
Meaning:	No bus system was connected during hardware startup.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Check-Physical-Configuration-Request (0058)

Function: The command transmits the bus configuration which is demanded for operation in the form of ID codes and length codes. The requested bus configuration is first compared with the connected bus configuration and, if possible, stored as "initial configuration".

Remark: If there are one or several installation remote buses, the location of the module in the bus system (installation depth) must be declared with the Receive-Local-Bus-Code-Map-Request (0069) and Implement-All-Logical-Address-Maps-Request (0040) commands. Only then is the configuration complete.

Prerequisite: When this command is used, the INTERBUS-S cycle must have been stopped.

Messages:

Positive acknowledgment: Physical-Configuration-Map-Valid-Confirmation (00Ab)

Meaning: The requested bus configuration agrees with the connected one and was stored on the controller board as "initial configuration".

Negative acknowledgment: Check-Configuration-Error-Confirmation (0068)

Meaning: Requested and connected bus configuration are not identical.

Remark: Nevertheless, the controller board attempts to store the requested configuration as "initial configuration". If this is possible, the board returns the message Check-Configuration-Error-Confirmation 0068.

Neg.acknowledg.: Unknown-Bus-Module-Confirmation (005b)

Meaning:
- The first module in the bus configuration is not a bus terminal module.
- A number of process data words was specified which is not permitted.

Remark: Only in this case is the requested configuration not stored as "initial configuration".

Syntax:

	Check-Physical-Configuration-Request	0058
	Quantity of subsequent words	PC
1	1st module	ppii
	...	
n	nth module: Number of process data/ID code	ppii

Key:

PC: Parameter count (Quantity of subsequent words, corresponds to the quantity of modules)

pp: Current number of the module's process data.

ii: ID code (is printed on the modules)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Receive-Group-Numbers-Request **(0049)**

Function: The segmentation of the bus structure in groups allows to switch on or off the bus segments (local bus, installation remote bus) which branch off from the main bus line (commands: Switch-Group-Off-Request or Switch-Group-On-Request). A group may consist of one or several bus segments.
Assign all bus segments, except for the segments in installation remote buses, to one group! In the initial state (after the voltage has been switched on, after the RESET button has been used or Configure-INTERBUS-Request has been called), all bus segments are combined in group 0.

Prerequisite: When this command is used, the INTERBUS-S cycle must have been stopped.

Messages:

Positive acknowledgment:	Quit-Receive-Group-Numbers-Confirmation (00bd)
Meaning:	The group definition was accepted and is valid
Negative acknowledgment:	Receive-Group-Numbers-Failed-Confirmation (0055)
Meaning:	An error was detected when the list was checked.

Remote bus stations which cannot be disconnected (e.g. bus terminal modules with I/O functions) must be assigned their own group number.

- Depending on the selected type of addressing, enter the logical or physical address in the LOGICAL BUS SEGMENT ADDRESS parameter.
- All bus segments (BS), except for the segments in the installation remote buses, are to be assigned to groups.
- BS addresses must only exist once!
- Group numbers may be assigned several times.

Syntax:

	Receive-Group-Numbers-Request	0049
	Quantity of subsequent words	PC
1	Logical bus segment address 1	00xx
2	Group number for BS 1	00xx
	...	
2∗n-1	Logical bus segment address n	00xx
2∗n	Group number for BS n	00xx

Key:

PC:	Parameter count = 2 ∗ n, where n is the quantity of local buses.
xx:	00 ≤ xx ≤ FF (hex), corresponds to 000 - 255 (decimal)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Switch-Group-On-Request **(0020)**

Function: The command switches on a group of bus segments which has been defined by the Receive-Group-Numbers-Request (0049) command before. The segments which have been switched on are not checked.

Prerequisite: The groups have to be defined before this command is called.

Messages:

Positive acknowledgment: Switch-Group-On-Confirmation (809E)

Remark: The bus system continues to run with the groups that have been switched on. If no groups are switched off the BSA LED goes off.

If a group which has been switched on is defective, the error messages Bus-System-Error-Indication (0038) and Bus-Error-Information-Indication (80C4) may follow.

Negative acknowledgment: Unexpected-Group-Number-Confirmation (0059)

Meaning: An unknown group number was used or the number is not within the permissible range.

Negative acknowledgment: Switch-Group-On-Failed-Confirmation (80C5)

Meaning: The group could not be switched on because the configuration was changed or the group has already been operated.

The process output data which have been used for bit manipulation might have been reset when a group has been switched on. Ensure by means of the application program that this data is set to the correct state.

Syntax:

	Switch-Group-On-Request	0020
	Quantity of subsequent words	1
1	Group number of the group to be switched on	00xx

Key: xx: 00 ≤ xx ≤ FF (hex), corresponds to 000 - 255 (decimal)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Switch-Group-Off-Request **(0021)**

Function: The command switches off a group of bus segments which has been defined before. The outputs of all IBS stations in those bus segments are set to 0.

Prerequisite: The groups must have been defined before this command is called.

The process output data which have been used for bit manipulation might have been reset when a group has been switched on. Ensure by means of the application program that this data is set to the correct state.

Messages:

Positive acknowledgment:	Switch-Group-Off-Confirmation (809d)
Remark:	The yellow BSA LED on the front plate is illuminated.
Negative acknowledgment:	Unexpected-Group-Number-Confirmation (0059)
Meaning:	• Unknown or invalid group numbers

Syntax:

	Switch-Group-Off-Request	0021
	Quantity of subsequent words	1
1	Group number of the group to be switched on	00xx

Key: xx: 00 ≤ xx ≤ FF (hex), corresponds to 000 - 255 (decimal)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Define-Groups-Error-Characteristics-Request (0060)

Function: This command defines the operating state of the bus system after an error has occurred. Groups which are not directly affected by an error which leads to the switching off of groups may be operated further on request.

Prerequisite: Use the Receive-Group-Numbers-Request command for the group definitions before calling this command.

Messages:

Positive acknowledgment:	Quit-Groups-Error-Characteristics-Confirmation (00F6)
Negative acknowledgment:	Groups-Error-Characteristics-Failed-Confirmation (80F7)
Remark:	In the event of a negative acknowledgment, the definitions which have been made and positively acknowledged by this command are still valid!

Parameter:

MODE = 0	If an error occurs in the group which has been assigned to the GROUP NUMBER parameter, the data traffic on the bus is stopped.
MODE = 1	If an error occurs in the group which has been assigned to the GROUP NUMBER parameter, this group is switched off and the remaining system is started. Groups which have not been specified are switched off in the event of an error.

If an error occurs in the bus system, the output data of the stations is reset in the INTERBUS-S system. After the defective bus segment has been identified, the Groups-Error-Characteristics determines whether the remaining bus configuration is to be activated or not.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The error in the bus system is reported with the Bus-System-Error-Indication (0038) and Bus-Error-Information-Indication (80C4) messages (further information is given where the messages are described). Depending on the selected mode, the defective group is switched off and the process data traffic is started or the bus remains in the STOP state.

The process output data which has been used for bit manipulation might be reset when a group is switched on. Ensure by means of the application program that this data is set to the correct state.

Syntax:

	Define-Groups-Error-Characteristics-Request			0060
	Quantity of subsequent words			PC
1	Mode	Group number 1	M | Gr	
	...			
n	Mode	Group number n		M | Gr
	15	14 0		Bit

Key:

PC:	Parameter count:, maximum value = 255
M:	Bit 15 only

Handling the groups in the event of an error:
Bit 15
Value = 0: switch off.
Value = 1: continue operation.

(Bits 14 to 0:)
Gr: 00 ≤ Gr ≤ FF (hex), corresponds to 000 - 255 (decimal)

Send-Group-Number-Request **(0106)**

Function: This command allows to read out which groups have been defined.

Prerequisite: Use the Receive-Group-Numbers-Request command toi define the groups before you call this command.

Messages:
Positive acknowledgment: Send-Group-Number-Confirmation (8112)

Negative acknowledgment: Send-Group-Number-Confirmation (8112)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Send-Group-State-Request **(0107)**

Function: This command allows to read out which groups are switched on or off.

Prerequisite: Use the Receive-Group-Numbers-Request command to define the groups before this command is called.

Messages:
Positive acknowledgment: Send-Group-State-Confirmation (8113)

Negative acknowledgment: Send-Group-State-Confirmation (8113)

Send-Local-Bus-Code-Request **(0108)**

Function: This command reads out the local bus addresses (with information on the installation depth) from the controller board.

Prerequisite: Use the Receive-Local-Bus-Code-Map-Request command before calling this command.

Remark: If the Send-Local-Bus-Code-Request command has not yet been used after power on or a Configure-Bus-Request (0023), the presettings of the controller are used.

Messages:
Positive acknowledgment: Send-Local-Bus-Code-Map-Confirmation (8114)

Negative acknowledgment: Send-Local-Bus-Code-Map-Confirmation (8114)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

9.1.3 Commands for Error Recovery

Clear-Display-Request (004E)

Function: This command causes the error LEDs of the front plate to go off. The diagnostic code which belongs to the error indication is also cleared from the display. Since the diagnostic bit parameter and the diagnostic parameter reflect the front plate indicators, all entries are reset here as well.

Prerequisite: None

Messages: Positive
acknowledgment: Quit-Clear-Display-Confirmation (00E2).

Syntax:

Clear-Display-Request	004E

Send-Bus-Error-Information-Request (005A)

Function: The last bus error message is sent with the Bus-Error-Information-Indication (80C4) message to the controller board.

Prerequisite: This command should only be used after the Bus-Data-Error (0038) error message occurred. It is not checked if the error status of the bus has changed or if the contents of the last Bus-Error-Information-Map message is still up to date.

Messages: Positive
acknowledgment: Bus-Error-Information-Indication (80C4)

Negative
acknowledgment: No-Map-Entry-Confirmation (00Ed)
Meaning: There are no entries.

Syntax:

Send-Bus-Error Information-Request	005A

online-components.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Send-Local-Bus-Module-Error-Request **(005b)**

Function: The local bus with the specified local bus address is searched for modules with a module error.

Prerequisite: The module error message with the specification of the local bus (Send-All-Module-Error Request) was received

Messages:

Positive acknowledgment: Local-Bus-Module-Error-Confirmation (80EE)
Meaning: A list with the module numbers and the ID codes of all modules, in which a module error occurred, is sent to the controller board.

Negative acknowledgment: No-Map-Entry-Confirmation (00Ed)
Meaning: No module errors were detected.

Syntax:

	Send-Local-Bus-Module-Error-Request	005b
	Quantity of subsequent words	1
1	Logical local bus address	00xx

Send-All-Module-Error-Request **(005C)**

Function: This command first clears the diagnostic display on the front plate. Afterwards, while the bus system is active, it checks all modules for error messages and updates the module error indications.

Prerequisite: Module error

Messages:

Positive acknowledgment: Send-All-Module-Error-Confirmation (80EF)
Meaning: This acknowledgment transmits a list of all local buses with module errors.

Negative acknowledgment: No-Map-Entry-Confirmation (00Ed)
Meaning: There are no module errors. The error indications on the front plate and at the diagnostic interface are reset.

Syntax:

Send-All-Module-Error-Request	005C

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Send-Located-Error-Counter-Request (0109)

Function: This command determines the 10 module to which the most transmission errors can be assigned. After every configuration, the data is automatically reset, newly determined and can be scanned with the command call.

Remark: The error indication includes malfunction in the periphery and on the transmission path. Bus cycles with errors as a result of malfunctions in the periphery are also counted as transmission errors.
The module numbers of the ten modules with the most errors can be displayed one after another on the seven-segment display with the coding switch position 918x (beginning with the module with the most errors).

Messages: Positive acknowledgment: Send-Located-Error-Counter-Confirmation (8115)

Syntax:

Send-Located-Error-Counter-Request	0109

Send-Located-Error-Counter-V24-Request (010A)

Function: This function corresponds to the Send-Located-Error-Counter-Request. The only difference is the data is exclusively transmitted via the V.24 (RS-232) interface.

Remark: See remark on Send-Located-Error-Counter-Request

Messages: Positive acknowledgment: Send-Located-Error-Counter-V24-Confirmation (8116)

Syntax:

Send-Located-Error-Counter-V24-Request	010A

Send-Last-Module-Status-Error-Request (010B)

Function: This command returns the local bus numbers of the ten module which reported the last ten module status errors.

Remark: The local bus numbers can be displayed one after another on the seven-segment display (coding switch setting 919x).

Messages: Positive acknowledgment: Send-Last-Module-Status-Error-Confirmation (8117)

Syntax:

Send-Last-Module-Error-Request	010B

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Send-Last-Module-Status-Error-V24-Request (010C)

Function: This function corresponds to the Send-Last-Module-Status-Error-Request command. The only difference is that the data is exclusively transmitted via the V.24 (RS-232) interface.

Remark: See remark on Send-Last-Module-Status-Error-Request

Messages: Positive acknowledgment: Send-Last-Module-Status-Error-V24-Confirmation (8118)

Syntax:

Send-Last-Module-Status-Error-Request	010C

Send-Actual-Configuration-Request (010D)

Function: This command request the current configuration in the form of an ID code list. In contrast to the Send-Physical-Configuration-Request (005E) service, the currently connected configuration is indicated and not the "initial configuration".

Remark: If the bus is in the STOP mode, this command cannot detect later changes to the configuration. These changes are only taken into consideration after the bus has been started again or the system has been configured again (with Configure-Bus-Request, 0023 or Check-Physical-Configuration-Request, 0058).
However, if the bus changes from the RUN state to the STOP state as a result of a configuration change, Send-Actual-Configuration-Request can show the new (and incorrect) configuration.
The current configuration can also be displayed on the seven-segment display (coding switch positions 94xx-99xx).

Messages: Positive acknowl.: Send-Actual-Configuration-Confirmation (8119)

Syntax:

Send-Actual-Configuration-Request	010D

Send-Actual-Configuration-V24-Request (010E)

Function: The function corresponds to the Send-Actual-Configuration-Request command. The only difference is that the data is transmitted exclusively via the V.24 (RS-232) interface.

Remark: See remark on Send-Actual-Configuration-Request

Messages: Positive acknowl.: Send-Actual-Configuration-V24-Confirmation (811A)

Syntax:

Send-Actual-Configuration-V24-Request	010E

online-components.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Quit-Module-Error-Request (0064)

Function: Modules with a storage display continue to indicate the error even if the error has been removed. Therefore, the error message must be acknowledged. This command acknowledges the module errors of the specified modules. The logical local bus address and the requested module number are specified in pairs as parameters.

Prerequisite: Module error on a module with a storage display.

Remark: Even error LEDs on the module go out.

Messages: Positive acknowledgment: Quit-Module-Error-OK-Confirmation (00FE)
Negative acknowledgment: Quit-Module-Error-Not-Possible-Confirmation (80FF)

Syntax:

	Quit-Module-Error-Request	0064
	Quantity of subsequent words	PC
1	1st logical local bus address	
2	1st module number	
	...	
2∗n-1	nth logical local bus number	
2∗n	nth module number	

Key: PC: Parameter count (module quantity multiplied with 2)

Quit-Module-Error-All-Request (0065)

Function: This command acknowledges the message of the module errors of all modules with storage display in the currently accessible bus configuration.

Prerequisite: Module error on module with storage display

Remark: Even error LEDs on the module go out.

Messages: Positive acknowledgment: Quit-Module-Error-OK-Confirmation (00FE)

Negative acknowledgment: Quit-Module-Error-Not-Possible-Confirmation (80FF)
Remark: The PARAMETER NUMBER and ERROR NUMBER parameters are passed on.

Syntax:

Quit-Module-Error-All-Request	0065

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Set-BK-Alarm-Logical-Request **(0024)**

Function: The command sets the alarm output of a bus terminal module (BK).

Prerequisite: There must be an alarm output on the addressed BK.

Messages: Positive
acknowledgment: Quit-Set-BK-Alarm-Logical-Confirmation (00cb)
Remark: Parameter 1 identifies the BK whose output is set.

Negative
acknowledgment: BK-Alarm-Failed-Confirmation (005A)
Meaning: Invalid local bus address.

If the addressed module does not have an alarm output, the positive acknowledgment is generated!

Syntax:

	Set-BK-Alarm-Logical-Request	0024
	Quantity of subsequent words	1
1	Logical local bus address	00xx

Key: xx: 00 ≤ xx ≤ FF (hex), corresponds to 000 - 255 (decimal)

Reset-BK-Alarm-Logical-Request **(0025)**

Function: The command resets the alarm output of a BK.

Prerequisite: The alarm output of the addressed BK must have been activated.

Messages: Positive
acknowledgment: Quit-Reset-BK-Alarm-Logical-Confirmation (00CC)
Remark: Parameter 1 identifies the BK whose alarm output is to be reset.

Negative
acknowledgment: BK-Alarm-Failed-Confirmation (005A)
Meaning: Invalid local bus address

Syntax:

	Reset-BK-Alarm-Logical-Request	0025
	Quantity of subsequent words	1
1	Logical local bus address	00xx

Key: xx: 00 ≤ xx ≤ FF (hex), corresponds to 000 - 255 (decimal)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

9.1.4 Commands for System Control

Send-Software-Revision-Request (0008)

Function: The command requests the firmware version of the controller board.

Prerequisite: None

Messages: Positive acknowledgment: Send-Software-Revision-Confirmation (8087)

Syntax:

Send-Software-Revision-Request	0008

Send-Software-Revision-V24-Request (0009)

Function: This function corresponds to the Send-Software-Revision-Request command. The only difference is that the data is transmitted exclusively via the V.24 (RS-232) interface.

Prerequisites: None

Messages: Positive acknowledgment: Send-Software-Revision-V24-Confirmation (8089)

Syntax:

Send-Software-Revision-V24-Request	0009

Send-Switch-Information-Request (0050)

Function: The command reads the values of the switches which are needed for the address setting.

Messages: Positive acknowledgment: Switch-Information-Confirmation (80E5)
Meaning: The result is given with this message (see Chapter 9.2).

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

9.1.5 Commands for Addressing

Receive-Local-Bus-Code-Map-Request (0069)

Function: This command transmits the bus segment addresses (BS address) with the associated installation depth to the controller board. Enter the local bus addresses in the parameter list by keeping the physical order of the modules on the bus. One parameter always corresponds to one module. Parameters are only entered where there are modules with bus terminal functionality. Thus, the quantity of the parameters to be transmitted equals the quantity of modules on the bus.

Prerequisite: None

Messages: Positive acknowledgment: Receive-Local-Bus-Code-Map-Confirmation (0105)

The information is not valid until its has been checked with the Implement-All-Logical-Address-Maps-Request (0040) command.

Syntax:

	Receive-Local-Bus-Code-Map-Request	0069
	Quantity of subsequent words	n
1	Local bus code	x0xx
	...	
n	Local bus code	x0xx

Key: x0xx

Bit	15 ... 12	11 ... 8	7 ... 0
Contents	Installation depth	0000	BS address

FB level: 0 for main line
1 for secondary line (installation remote bus)

BS address: 00 ≤ xx ≤ FF (hex), corresponds to 000 - 255 (decimal)

- Addresses from 0 to 255 are permitted
- Each address must only be assigned once!
- The entries follow the order of the physical bus configuration.
- Enter all bus stations. Only the entries for BKs are evaluated.
- After a hardware startup, the bus segments are numbered starting with 0, in accordance with the physical bus configuration.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Implement-All-Logical-Address-Maps-Request (0040)

Function:

Messages:

Positive acknowledgment:	Quit-Implement-Confirmation (00d3)
Meaning:	The addresses are valid and have been accepted.
Negative acknowledgment:	Logical-Address-Error-Confirmation (002b)
Meaning:	There are incorrect values in the lists to be implemented (logical addresses). The data traffic on the bus is stopped. The process output data is **not** switched to a defined, safe state!

The command may only be used when there are no data cycles on the bus! The lists with the addresses of the process data which have been sent before are checked and accepted if they are correct.

Send-Log-Address-Error-Request (005F)

Function: Request of the result of a command which has been executed before:

- Implement-All-Logical-Address-Maps-Request (0040)
- Check-Physical-Configuration-Request (0058)

Messages:

Positive acknowledgment:	Send-Log-Address-Error-Confirmation (80F5)
Meaning:	The result is given with this message (see Chapter 9.2).

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

9.1.6 Commands for Process Data Linkage

Receive-Processing-Instructions-Request (005d)

Function: This command allows the bit manipulation of the process output data connected to the bus by means of programmable instructions which are automatically executed by the controller board.

Messages:

Positive acknowledgment:	Quit-Receive-Instructions-Confirmation (00F2)
Meaning:	There are no errors in the parameters. All listed instructions have been accepted and are appended to a possibly existing list.
Negative acknowledgment:	Processing-Instructions-Error-Confirmation (80F3)
Meaning:	There are errors in the parameters. The sent list must not be accepted.

Transfer the command lists before the INTERBUS-S system is started and -if used- after the Implement-All-Logical-Address-Maps-Request command. The bit manipulation must not be re-defined during operation and must not be used in connection with the group definitions, because the process output data used for the bit manipulation might by reset.

A memory of 1,000 entries is available for the instructions, because the instructions can have a different number of entries. Up to

- 332 instructions with the instruction code 5 or 6,
- 199 instructions with the instruction code 7 or 8

are possible.

Commands with invalid addresses are not executed. There will be no special message for this case.
Addresses (and therefore instructions) become invalid with

- logical addressing, if previously used addresses do no longer exist, or
- switched off groups, if the address is in the area of the disconnected group.

online-components.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

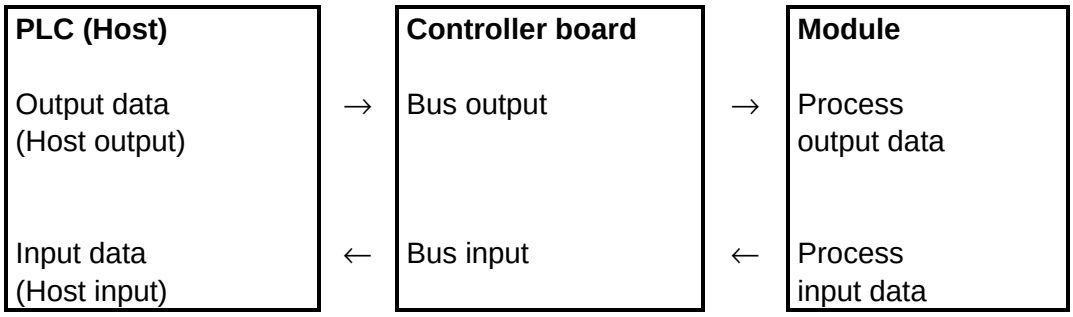


Figure 9-1: Function groups of bit manipulation

Bit manipulation prolongs the cycle time of the data traffic on the bus up to 40 µs for each instruction.

The instructions are stored in an instruction list on the controller board. This list is extended by the instructions given in this command when the first parameter is unequal to 0. A possibly existing command list is deleted by setting the first parameter to 0.

Specify the addresses in a special format for the instruction parameters. The LOGICAL ADDRESS is the address of the process data on the bus which is currently effective (e.g. the address of a byte for byte-oriented modules or a word for word-oriented modules). The bit number used there identifies the bit within the process data item specified by the logical address. The bits are counted in the same way as the addresses (see above figure).

Bit manipulation is only possible in the address area of the inputs and outputs.

The meanings of the addresses and their structure are given where the individual instructions are described.

Syntax:

	Receive-Processing-Instructions-Request	005d
	Quantity of subsequent words	PC
1	1st instruction	
	...	
	nth instruction	

Key:

PC: Parameter count (sum of the individual instruction lengths)

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

General structure of an instruction

Syntax:		
	1	Instruction code
	2	1st instruction parameter
		...
	m	mth instruction parameter

General function of all instructions

The instructions control determinable bits of the process output data (bus output bit) taking into account determinable bits of the process input data (bus input bit) and output data (host output data) written by the PLC (host).

Specify the address of the bus output bit in the OUTPUT ADDRESS parameter and the address of the bus input parameter in the INPUT ADDRESS parameter. Depending on a freely selectable edge of the bus input bit, the bus output bit 0 is reset.

General function of the RESET instructions:

The bus output bit is reset after the edge of the bus input bit has been reset (section 2 in the figure). The command determines the evaluation of the bus input bit. The bus output bit is set by setting the host output bit (sections 1 and 3 in the figure). As long as the bus output bit is not reset upon evaluation of the bus input bit, the bus output bit is only determined by the host output bit (sections 1 and 3 in the figure).

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

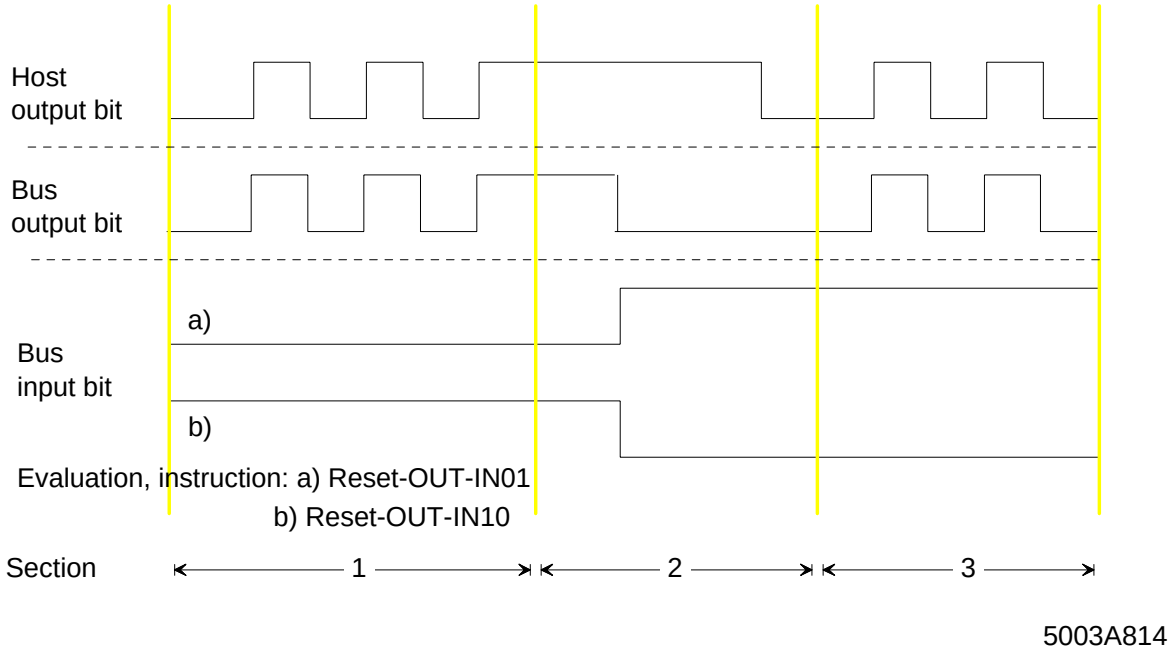


Figure 9-2: Bit manipulation: instructions RESET...01, RESET...10

onlinecompo

Numbering of the bits of an address:

Bit	15 0
	Output address
	Input address

Meaning of the bits of an address for the instructions Reset-Out-In01 and Reset-Out-In10

Bit	15 ... 12	11	10 ... 0
Meaning	Bit number	Reserved	Logical address
Values	0 ... F (hex)	-	

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Structure of the Reset-Out-In01 instruction

Syntax:			
	1	Reset-Out-In01	0005
	2	Output address	
	3	Input address	

Structure of the Reset-Out-In10 instruction

Syntax:			
	1	Reset-Out-In10	0006
	2	Output address	
	3	Input address	

Structure of the Reset 2-Out-In01 instruction

Syntax:			
	1	Reset2-Out-In01	0007
	2	Output address	
	3	Bit number for the output address	B
	4	Input address	
	5	Bit number for the input address	B

Key: B: Bit number, 0000 hex to 000F hex

Structure of the Reset2-Out-In10 instruction

Syntax:			
	1	Reset2-Out-In10	0008
	2	Output address	
	3	Bit number for the output address	B
	4	Input address	
	5	Bit number for the input address	B

Key: B: Bit number, 0000 hex to 000F hex

Function of the Reset 2-Out-In10 and Reset 2-Out-In 01 instructions

The instructions Reset 2-Out-In01 and Reset 2-Out-In10 have the same functions as the instructions Reset-Out-In01 and Reset-Out-In10. The instruction format is 5 words long so that 16 bit addresses are available.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Structure of the Reset-Out-In01-Switch (0009) instruction

Syntax:			
	1	Reset-Out-In01-Switch	0009
	2	Address of the bit manipulation register	
	3	Bit number of the bit manipulation register	B
	4	Output address	
	5	Bit number for the output address	B
	6	Input address	
	7	Bit number for the input address	B

Key: B: Bit number, 0000 hex to 000F hex

Structure of the Reset-Out-In10-Switch (000A) instruction

Syntax:			
	1	Reset-Out-In10-Switch	000A
	2	Address of the bit manipulation register	
	3	Bit number of the bit manipulation register	B
	4	Output address	
	5	Bit number for the output address	B
	6	Input address	
	7	Bit number for the input address	B

Key: B: Bit number, 0000 hex to 000F hex

Function of the Reset-Out-In01-Switch and Reset-Out-In10-Switch instructions

The instructions Reset-Out-In01-Switch and Reset-Out-In10-Switch have the same function as the previous instructions, however with the difference that the specified bit of the bit manipulation register is additionally tested. If this bit is 0, the respective instruction is not effective.
Several bit manipulation registers may be defined. Bit manipulation registers are addressed by defining a "pseudo module" (ID code 0013h) as the last module of the configuration using the "Check-Physical-Configuration-Request" service. Afterwards this module is assigned the address of the bit manipulation register using the logical addressing.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Structure of the Bit-Copy (000D) instruction

Syntax:			
	1	Bit-Copy	000D
	2	Output address	
	3	Bit number for the output address	B
	4	Input address	
	5	Bit number for the input address	B

Key: B: Bit number, 0000 hex to 000F hex

Function of the Bit-Copy instruction

This instruction copies the input bit specified with the input address and the following bit number to the output bit specified with the output address and the following bit number.

Structure of the Word-Copy-Bit-Mask (000E) instruction

Syntax:			
	1	Word-Copy	000E
	2	Output address	
	3	Input address	
	4	Bit mask	B

Key: B: Bit number, 0000 hex to 000F hex

Function of the Word-Copy-instruction

This command copies the input word specified with the input address to the output word specified by the output address after the word has been AND together with the bit mask before.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

9.1.7 Commands for Event Processing

Receive-Events-Request **(002A)**

Function: The parameters of the command allow to program up to 16 events. Each event definition occupies 5 words.

Messages:

Positive acknowledgment:	Quit-Receive-Event-Confirmation (00bF)
Meaning:	The event definitions were accepted.
Remark:	Event definitions which have possibly been defined with this command are overwritten.
Negative acknowledgment:	Event-Error-Confirmation (004C)
Meaning:	Error during the event definition.
Remark:	There are no valid event definitions, old definitions have been deleted.

Syntax:

	Receive-Events-Request	002A
	Quantity of subsequent words	PC
1 2 3 4 5	1st event definition	
5∗(n-4) 5∗(n-3) 5∗(n-2) 5∗(n-1) 5∗n	nth event definition	

Key:

PC:	Parameter count
n:	1 ≤ n ≤ 16 (dec), number of the event definitions for up to 16 possible events

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Structure of the event definitions:

Syntax:			
	5*n-4	nth event identifier	aaaa
	5*n-3	Event code (data preprocessing code)	0004
	5*n-2	Address	0bbb
	5*n-1	Mask 1 (positive edge)	cccc
	5*n	Mask 2 (negative edge)	dddd

Key:		
	aaaa	Event identifier. It identifies the individual events. Assign the event identifier unambigiously, because it is returned with the event message and thus allows to distinguish different events.
	0004	Event code (data preprocessing code). It determines the setting up of the event. Firmware 3.3 only allows to detect bit state changes on digital modules (event code 0004 (hex)).
	0bbb	Logical or physical address (depending on the type of addressing of the digital input module)
	cccc	Mask 1 specifies the bits of the data word which has been determined by the address. These bits should report an event when a positive edge occurs.
	dddd	Mask 2 specifies the bits of the data word which has been determined by the address. These bits should report an event when a negative edge occurs.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Enable-Event-Number-Request **(002b)**

Function: The command enables a certain event definition.

Prerequisite: The corresponding event definition must exist and be valid (Receive-Events-Request (002A) command).

Messages:

Positive acknowledgment: Quit-Enable-Event-Number-Confirmation (00dA)
Meaning: The event definition is enabled.

Negative acknowledgment: Event-Error-Confirmation (004C)
Meaning: Error during the event definition.
Remark: There are invalid event definitions, old definitions have been deleted.

Syntax:

	Enable-Event-Number-Request	002b
	Quantity of subsequent words	1
1	Event identifier	

Disable-Event-Number-Request **(002C)**

Function: The command disables a certain event definition.

Prerequisite: The corresponding event definition must exist and be valid (Receive-Events-Request (002A) command).

Messages:

Positive acknowledgment: Quit-Disable-Event-Number-Confirmation (00db)
Meaning: The event definition is disabled.

Negative acknowledgment: Event-Error-Confirmation (004C)
Meaning: Error during the event definition.
Remark: There are invalid event definitions, old definitions have been deleted.

Syntax:

	Disable-Event-Number-Request	002c
	Quantity of subsequent words	1
1	Event identifier	

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Enable-All-Event-Request **(002d)**

Function: This command enables all previously defined event definitions.

Prerequisite: The corresponding event definitions must exist and be valid (Receive-Events-Request (002A) command).

Messages:

Positive acknowledgment: Quit-Enable-All Events-Confirmation (00dC)
Meaning: All existing event definitions are enabled.

Negative acknowledgment: Event-Error-Confirmation (004C)
Meaning: Error during the event definition.
Remark: There are invalid event definitions, old definitions have been deleted.

Syntax:

Enable-All-Events-Request	002d

Disable-All-Event-Request **(002E)**

Function: The command disables all previously defined event definitions.

Prerequisite: The corresponding event definitions must exist and be valid (Receive-Events-Request (002A) command).

Messages:

Positive acknowledgment: Quit-Enable-All Events-Confirmation (00dC)
Meaning: All existing event definitions are disabled.

Negative acknowledgment: Event-Error-Confirmation (004C)
Meaning: Error during the event definition.
Remark: There are invalid event definitions, old definitions have been deleted.

Syntax:

Disable-All-Events-Request	002E

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

9.1.8 Commands for Communication

Read-KBL-Loc-Request **(0112)**

Function: This command allows to read out an entry of the communication relationship list or the header of this list.

Prerequisite: A communication relationship list must have been previously defined.

Messages: Positive acknowledgment: Read-KBL-Loc-Confirmation (811B)
Negative acknowledgment: Read-KBL-Loc-Confirmation (811B)

Syntax:

Read-KBL-Loc-Request	0112
Parameter block length	1
KR	00xx

9.1.9 Commands for the EEPROM Management

EEPROM-Management-Request **(0061)**

Function: This service is used to,
- start the programming of service request sequences,
- end the programming of service request sequences,
- delete service request sequences which have already been programmed,
- restore the initial configuration,
- write or read out character strings of up to 100 characters into the EEPROM.

Prerequisite: The bus must be in the STOP state while this service is executed, as no other processes are supported during the programming and thus no bus cycles are run.

Remark: The command syntax varies depending on the desired function.

Syntax:

EEPROM-Management-Request	0061
Parameter block length	
Mode	
Bit number	
String	

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Parameter description:

Mode: This parameter controls the programming.
Possible modes are:

1 - Start programming
2 - End programming
3 - Delete programmed service request sequences
4 - Establish default state
5 - Write character string
6 - Read out character string

Bit number: This parameter is only relevant for mode 1. It indicates with which bit number the service sequence to be programmed can be activated. Value range: 0-15

String: In the service request primitive, this parameter is only relevant for mode 5 . It includes the character string to be written with the maximum length of 100. Characters which are not used are filled up internally with zeros.
In the service confirmation primitive this parameter is only relevant for mode 6.
It includes the read out character string of the maximum length of 100.

Remark: The character string stored in the EEPROM cannot be cleared with mode 3.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

9.2 Controller Board Messages

Chapter 9.2 describes the messages of the controller board. The descriptions follow the schematic below. The code is given in a hexadecimal form. The letters A through F are shown as upper or lower case letters like they are displayed on the seven-segment display.

Name of the message **(Code)**

Meaning: *Describes the meaning of the message.*

The syntax describes the structure of a message.

Syntax:

Name of the message	Code

The key explains the parameters which have been used for the syntax description.

Key:

Dummy variable	Description of the parameter

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

9.2.1 Messages of the User Interface

Command-Disabled-Confirmation (009C)

Meaning: The previously sent command has not been enabled.

A description of the following messages is given in Chapter 4.

No-Command-Code-Indication (0007)

Parameter-Write-Error-Indication (0009)

Controller-Parameter-Timeout-Indication (000C)

Host-Parameter-Timeout-Indication (000d)

Command-Parameter-Error (004b)

These messages are displayed with a CTRL error on the front plate and entered in the diagnostic registers.

9.2.2 Messages for Bus Operation

Start-Bus-Confirmation (0088)

Meaning: The data cycle of the bus has been started. From this point in time, the controller board operates the process data channel and the PCP channel, if necessary.

Process data: Cyclic preparation of the process input data image of the modules for the PLC. Cyclic transfer process output data from the PLC to the modules connected to the bus.

PCP channel: Operation of the Peripherals Communication Protocol for modules with integrated PCP.

For group definitions and defective local bus or installation remote bus segments the bus is run without the defective and switched off segment. The BSA LED is then illuminated.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Stop-Bus-Confirmation (00C6)

Meaning: The process data and the possibly used PCP channel are not operated any longer.

Process data:
- The cyclic data traffic on the bus is stopped. The existing process data image of the modules connected to the bus is statically kept and is not renewed.
- The process output data can only be changed to the safe state by means of the Alarm-Stop-Request (004A) command (resetting of the outputs).

PCP channel:
- The Peripherals Communication Protocol (PCP) is not used further.
- The established connections are not automatically aborted. Possibly pending services are not processed until the data traffic is started again.

Quit-Alarm-Stop-Confirmation (00d8)

Meaning: The Alarm-Stop-Request (004A) command was successfully executed.

Start-Bus-Not-Possible-Confirmation (00E3)

Meaning: This is a negative acknowledgment of the Start-Bus-Cycle-Request (0001) command. It is sent if no data traffic operation is possible.

Cause:
- Hardware error on the controller board.
- All groups are switched off.
- Configuration change in the remote bus.

online components.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

9.2.3 Messages for Configuration

Send-Physical-Configuration-Confirmation (80F4)

Meaning: Positive acknowledgment of the Send-Physical-Configuration-Request (005E).

Syntax:

	Send-Physical-Configuration-Request		80F4
	Quantity of subsequent words		PC
1	Bus register	ID code	rrii
	...		
n	Bus register	ID code	rrii
	15	0	

Key:

PC:	Parameter count (quantity of the connected modules)
rrii:	Number of registers 0 ≤ rr ≤ 127.
ID code	0 ≤ ii ≤ FF (hex), corresponds to 000 - 255 (decimal)

The parameters 1 to n provide information on the physical bus configuration.

The BUS REGISTER parameter gives the number of registers (bus registers) used for the process data on the bus. The number is always given in accordance with the data type of the registers. With byte-oriented modules bit 15 is set to 1.

The ID NUMBER parameter gives the identification code of the connected modules in the order of the module installation.

Example: A byte-oriented module with 2 bytes has two bus registers. A module with two words has also two registers.

Syntax:

	80F4 hex	
	0003 hex	
(1)	01 dec (01 hex)	129 dec (81 hex)
(2)	04 hex (04 hex)	67 dec (43 hex)
(3)	01 hex (01 hex)	207 dec (CF hex)

1	IBS 24 DO,	1 data word
2	IBS AI,	4 data words
3	IBS AI 3/16,	1 data word
4	IBS IP CDO	1 data byte

The bus register number of communication modules only includes the number of the process data words.

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Quit-Configure-Bus-Confirmation **(00CA)**

Meaning: The Configure-Bus-Request (0023) command was executed.

Physical-Configuration-Map-Valid-Confirmation **(00Ab)**

Meaning: The bus configuration which has been communicated to the controller board by means of the Receive-Physical-Configuration-Map-Request command are not identical with the connected configuration.

Quit-Receive-Group-Numbers-Confirmation **(00bd)**

Meaning: The Receive-Group-Numbers-Request (0049) command was successfully executed.

Switch-Group-On-Confirmation **(809E)**

Meaning: A group of bus segments was switched on. The number of group which was switched on is given as a parameter.

Syntax:

	Switch-Group-On-Confirmation	809E
	Quantity of subsequent words	1
1	Group number of the switched on group	

Switch-Group-On-Failed-Confirmation **(80C5)**

Meaning: The attempt to switch on a group was not successful. The group number is given as a parameter.

Syntax:

	Switch-Group-On-Failed-Confirmation	80C5
	Quantity of subsequent words	1
1	Group number	

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Switch-Group-Off-Confirmation (809d)

Meaning: A group of bus segments was switched off. The number of this group is transferred as a parameter.

Syntax:

	Switch-Group-Off-Confirmation	809d
	Quantity of subsequent words	1
1	Group number of the switched off group	

Quit-Groups-Error-Characteristics-Confirmation (00F6)

Meaning: This message acknowledges the Define-Groups-Error-Characteristics-Request (0060) command.

Groups-Error-Characteristics-Failed-Confirmation (80F7)

Syntax:

	Groups-Error-Characteristics-Failed-Confirmation	80F7
	Quantity of subsequent words	2
1	Error number	
2	Parameter number	

The Define-Groups-Error-Characteristics-Request (0060) command was not executed without errors. The information given in the command have not been accepted. The error number specifies the error type. The parameter number identifies the erroneous parameter.

Meaning of the ERROR NUMBER parameter:

1 Elements exist twice.
2 Group number does not exist.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Reconfiguration-Indication **(8106)**

Meaning: The reconfiguration key (REC) of a bus terminal module was actuated.

Syntax:

	Reconfiguration-Indication	8106
	Quantity of subsequent words	2
1	Group number	
2	Local bus address	

GROUP NUMBER parameter
This parameter contains the group number of the connected local bus.
Value range: 0 to 255

LOCAL BUS ADDRESS parameter
This parameter contains the local bus address of the connected local bus.
Value range: 0 to 255

Send-Group-Number-Confirmation **(8112)**

Meaning: Depending on the result, this message returns the local bus address(es) and the associated group number(s) in a word-oriented form or an error code when the command could not be executed.

Positive message:
Syntax:

	Send-Group-Number-Confirmation		8112
	Quantity of subsequent words		2n+1
1	Result +	-	00xx
2	Local bus address-1		xxxx
3	Group number-1		xxxx
	....		xxxx
2n	Local bus address-n		xxxx
2n+1	Group number-n		xxxx

LOCAL BUS ADDRESS parameter : This parameter contains the local bus address of the connected local bus. (value range: 0 to 255)
GROUP NUMBER parameter: This parameter contains the group number of the connected local bus (value range: 0 - 255).

Negative message:
Syntax:

	Send-Group-Number-Confirmation		8112
	Quantity of subsequent words		3
1	Result -	Error code	FFxx
2	Error code	Additional code	xxxx
3	Additional code	-	xxxx

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Send-Group-Status-Confirmation (8113)

Meaning: Depending on the result, this message indicates which of the defined groups are switched on or off.

Positive message:

Syntax:

	Send-Group-Status-Confirmation		8113
	Quantity of subsequent words		n+1
1	Result +	-	00xx
2	Switching state group-1		xx0x
	....		
n+1	Switching state group-n		xx0x

SWITCHING STATE GROUP parameter : Bits 8-15 of this parameter indicate the group number and bit 0 informs about the switching state of this group (0= switched off, 1= switched on)

Negative message:

Syntax:

	Send-Group-State-Confirmation		8113
	Quantity of subsequent words		3
1	Result -	Error code	FFxx
2	Error code	Additional code	xxxx
3	Additional code	-	xxxx

Send-Local-Bus-Code-Map-Confirmation (8114)

Meaning: When the result is positive, this message indicates the local bus addresses with information on the installation depth requested with the Send-Local-Bus-Code-Map command.

Positive message:

Syntax:

	Send-Local-Bus-Code-Map-Confirmation		8114
	Quantity of subsequent words		n+1
1	Result +	-	00xx
2	Local bus code		x0xx
	....		
n+1	Local bus code		x0xx

LOCAL BUS CODE parameter: Bits 0-11 indicate the local bus number. Bits 12-15 indicate the installation depth (value 0 = main line, 1 = secondary line) of the local bus.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Negative message:

Syntax:

	Send-Local-Bus-Code-Map-Confirmation		8114
	Quantity of subsequent words		3
1	Result -	Error code	FFxx
2	Error code	Additional code	xxxx
3	Additional code	-	xxxx

Explanations for the following errors are given in Chapter 4.

Check-Configuration-Error-Confirmation (0068)

Unknown-Bus-Module-Confirmation (005b)

No-Executable-Configuration-Confirmation (004A)

Receive-Group-Numbers-Failed-Confirmation (0055)

Unexpected-Group-Number-Confirmation (0059)

The messages are indicated with a CTRL error on the front plate and entered in the diagnostic registers.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

9.2.4 Messages for Error Recovery

Explanations for the following errors are given in Chapter 4.

No-Error-Code-Indication	(000b)
CPU-Bus-Error-Indication	(0023)
CPU-Address-Error-Indication	(0024)
CPU-Zerodivision-Indication	(0026)
CPU-Bad-Exception-Indication	(0027)
CPU-Not-Implemented-Interrupt-Indication	(0028)
CPU-Illegal-Instruction-Indication	(0029)
Bus-System-Error-Indication	(0038)
IPMS-External-Error-Indication	(003b)
IPMS-FiFo-Overflow-Error-Indication	(003C)
IPMS-Undefined-Error-Indication	(003d)
Invalid-DCF-Condition-Indication	(003E)
Invalid-DCF-State-Indication	(003F)
Impossible-MC-Condition-Indication	(0040)
Invalid-MC-State-Indication	(0041)
Invalid-UC-State-Indication	(0042)
IPMS-No-Error-Indication	(004d)
Communication-Invalid-Indication	(004E)
Invalid-D-State-Indication	(0050)
Invalid-D-Condition-Indication	(0051)
Invalid-EC-State-Indication	(0057)
Invalid-EC-Status-Indication	(0058)
BK-Alarm-Failed	(005A)
Too-Many-K-Modules-Indication	(0065)

These messages are indicated as a CTRL error on the front plate and entered in the diagnostic registers.

Quit-Set-BK-Alarm-Logical-Confirmation (00Cb)

Meaning: The Set-BK-Alarm-Logical-Request (0024) was executed.

Quit-Reset-BK-Alarm-Logical-Confirmation (00CC)

Meaning: The Reset-BK-Alarm-Logical-Request (code 0025) command was executed.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Quit-Reset-BK-Alarm-Physical-Confirmation (00CE)

Meaning: The Reset-BK-Alarm-Physical-Request (0027) command was executed.

Quit-Clear-Display-Confirmation (00E2)

Meaning: The command Clear-Display-Request (004E) command was executed.

No-Map-Entry-Confirmation (00Ed)

Meaning: This message is sent when there are no entries for command which have to send a list or table in any form.

Quit-Module-Error-OK-Confirmation (00FE)

Meaning: This message is the positive acknowledgment of the commands Quit-Module-Error-Request (0064) and Quit-Module-Error-All-Request (0065).

Quit-Module-Error-Not-Possible-Confirmation (80FF)

Meaning: This message is the negative acknowledgment of the commands Quit-Module-Error-Request (0064) and Quit-Module-Error-All-Request (0065).

Syntax:

	Quit-Module-Error-Not-Possible-Confirmation	80FF
	Quantity of subsequent words	2
1	Parameter number	
2	Error number	

The ERROR NUMBER parameter gives the type of error. The parameter number identifies the erroneous parameter.

Meaning of the ERROR NUMBER parameter:

1 Odd number of parameters (parameter number equals 1).
2 Unknown logical local bus address.
3 The specified module (number) does not exist.
4 The specified module cannot be addressed at the moment, because the corresponding segment has been switched off.
5 The necessary ID cycles could not run without errors.

The error number 5 is the only response used for the Quit-Module-Error-All-Request (0065) command.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Module-Error-Indication **(80A0)**

Meaning: An error was detected on a module with bus acknowledgment.

Syntax:

	Module-Error-Indication	80A0
	Quantity of subsequent words	PC
1	Logical local bus address 1	xxxx
	...	
n	Logical local bus address n	xxxx

Key:

PC:	Parameter count (local bus quantity)
xxxx:	Logical local bus address

Possible errors:
- Failure of the I/O voltage
- Defective fuse
- Responding of the current limit control

Parameters 1 to n give the logical addresses of local buses which contain modules.

Power-Fail-Indication **(80A1)**

Meaning: The supply voltage (9 volts) of a local bus failed on a bus terminal module. The parameter gives the logical address of the local bus concerned.

Remark: This message applies only to some older types of bus terminal modules. The types concerned can be taken from the table which follows the next message description.

Syntax:

	Power-Fail-Indication	80A1
	Quantity of subsequent words	1
1	Logical local bus address	

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Battery-Indication **(80A2)**

Meaning: On some special modules, the 24 V supply voltage is battery-buffered. If this supply voltage fails, this message indicates the change to battery operation. The parameter gives the logical or physical local bus address of the bus terminal module concerned.

Remark: This message only applies to some older types of bus terminal modules. The types concerned are listed in the following table.

Syntax:

	Battery-Indication	80A2
	Quantity of subsequent words	1
1	Logical local bus address	

Older types of bus terminal modules which are recognized by the Power-Fail-Indication (80A1) and Battery-Indication (80A2) messages.

Bus terminal module	Identification code of the bus terminal (hex.)
IBS 220 BK	20
IBS 220 BK Version A	24
IBS 24 BK	28
IBS 24 BK-I/O	23
IBS 24 BK-I/O Version A	27
IBS 24 BK Version A	2C

Module-Request-Indication **(80A3)**

Meaning: A module request was reported by an I/O module with module request function. Parameter 1 gives the logical local bus address of the module concerned.

Syntax:

	Module-Request-Indication	80A3
	Quantity of subsequent words	1
1	Logical local bus address	

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Bus-Error-Information-Indication (80C4)

The general structure of the command is given first. The structure depends on the ERROR TYPE parameter which is described in detail below.

Meaning: The message comes after the Bus-System-Error-Indication error message. It provides detailed information on the error status of the bus system. Parameter 1 specifies the error type. Depending on the error type, other parameters classify the error as follow-up information.

Effect: The bus is stopped and the outputs are set to 0.

Syntax:

	Bus-Error-Information-Indication	80C4
	Quantity of subsequent words	PC
1	ERROR TYPE	EE0x
j-n	Optional follow-up information	xxxx

Key:

PC: Parameter count

EE0x Error type (x = 1 to 6)

1 Multiple ID cycle error
2 Maximum possible configuration exceeded
3 During the error analysis a bus error was analyzed the exact cause and location of which are given in the error number and structure (see below)
4 The configuration could not be detected
5 The last group which was still switched on was switched off
6 Multiple data cycle error

Error type: EE01

Meaning: When the bus is checked, no error was detected in the currently permissible configuration. However, there is an error in the bus installation.

Cause: A short interference of data transmission.

Remedy: Check the system for:

- missing or incorrectly applied shielding of the bus cable (connectors),
- missing or incorrect PE connection,
- voltage dips in the logic supply of remote bus stations.

Syntax:

	Bus-Error-Information	80C4
	Quantity of subsequent words	1
1	Error type	EE01

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Error Type: EE02

Meaning: The maximum possible configuration has been exceeded, because there are too many stations in the INTERBUS-S system.

Syntax:

	Bus-Error-Information	
	Quantity of subsequent words	2
1	Error type	EE02
2	Error number	

Key: Error number: see table below

The individual system errors are encoded as an error number in parameter 2. The table below lists all possible error numbers and gives a brief description of the error.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Error type: EE03

Syntax:

Bus-Error-Information-Indication	80C4
Quantity of subsequent words	
Defective bus	EE03
GROUPS parameter block	FF01
Group quantity	<nnnn>
1st group number	<aaaa>
...	
nth group number	<bbbb>
REMOTE BUS block	FF02
Remote bus quantity	<mmmm>
1st remote bus number	<cccc>
1st error number	<dddd>
...	
mth RB number	<eeee>
mth error number	<ffff>
LOCAL BUS block	FF03
Local bus quantity	<pppp>
1st local bus number	<gggg>
1st error number	<hhhh>
...	
pth local bus number	<iiii>
pth error number	<jjjj>

Key:

PC:	Parameter count; (is generated automatically)
nnnn:	Quantity of the groups which have been switched off
aaaa:	Number of the 1st group that was switched off
bbbb:	Number of the nth group that was switched off
mmmm:	Quantity of remote buses with errors
cccc:	Number of the 1st remote bus with errors
dddd:	Error number of the 1st remote bus with errors (see table below)
eeee:	Number of the mth remote bus with errors
ffff:	Error number of the mth remote bus with errors (see table below)
FF03:	LOCAL BUS parameter block
pppp:	Quantity of local buses with errors
gggg:	Number of the 1st local bus with errors
hhhh:	Error number of the 1st local bus with errors (see table below)
iiii:	Number of the pth local bus with errors
jjjj:	Error number of the pth local bus with errors (see table below)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The length of the blocks GROUP, REMOTE BUS and LOCAL BUS depends on the length of the errors which occurred.

Response in the event of group definitions (Group-Error-Characteristics)

An error occurs while data is transmitted on the bus. The cause of the error is an electrical change of the bus configuration (e.g. open circuit).

The groups in which an error was detected are automatically switched off. The other parts of the bus can still be run after this message. The data cycle is stopped when this standard error recovery has not been changed (Define-Groups-Error-Characteristics-Request (0060) command). The data traffic can be started again with the start command.

Table 9-4: Error numbers used

Error number	Error name	Meaning
dd01	Unexpected-BK	Invalid BK ID code
dd02	Unexpected-IO-BK	Invalid BK I/O ID code
dd03	Local-Bus-Awaited	Specified local bus is missing
dd04	Local-Bus-Too-Long	Local bus is longer than specified
dd05	Local-Bus-Too-Short	Local bus is shorter than specified
dd06	Unexpected-Local-Bus-Module	Wrong local bus module
dd07	No-Remote-Bus-Detected	Configuration could not be read in
dd08	Unexpected-Local-Bus	Local bus at wrong position
dd09	Remote-Bus-Awaited	Remote bus is shorter than expected
dd0A	Multiple-Data-Error	Identification of a multiple error
dd0b	Configuration-Too-Long	Configuration longer than expected
dd0C	Unexpected-Configuration	Maximum configuration exceeded
dd11	Defective-Remote-Bus	Wrong length in the ID code or the data register is interrupted on the remote bus
dd12	Defective-Local-Bus	Wrong length in the ID code or the data register is interrupted on the local bus

Send-All-Module-Error-Confirmation (80EF)

Meaning: This message is initiated by the Send-All-Module-Error-Request (005C) command. The list contains all bus segments in which a module reports an error. The bus segments are identified with bus segment numbers.

Syntax:

	Send-All-Module-Error-Confirmation	80EF
	Quantity of subsequent words	PC
1	1st bus segment address	aaaa
	...	
n	nth bus segment address	aaaa

Key:

PC:	Parameter count (quantity of parameters in which a module reports an error)
aaaa:	Local bus address

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Local-Bus-Module-Error-Confirmation (80EE)

Meaning: This message is initiated by the Send-Local-Bus-Module-Error-Request (005b) command. It sends a list of all modules of the requested local bus which report an error to the PLC, including module number and ID code.

Syntax:

	Local-Bus-Module-Error-Confirmation	80EE
	Quantity of subsequent words	PC
1	1st module, module number	
2	ID code	
2∗n-1	nth module, module number	
2∗n	ID code	

Key: PC: Parameter count (module quantity multiplied with 2)

Send-Located-Error-Counter-Confirmation (8115)

Function: This message is sent after the Send-Located-Error-Counter-Request (0109) command has been called. It returns the first ten modules to which the most transmission error could be assigned. In addition to the module number (physical location in the IBS ring beginning at 0 for the first module) the respective error counter is also given.

Remark: If there are less then 10 modules to which an error could be assigned then less than 10 modules will be displayed. CRC-Last-Way errors are specified with the module number 0xffff.

Syntax:

	Send-Located-Error-Counter-Confirmation	8115
	Quantity of subsequent words	PC
1	Result	0000
2	Module number (with the most errors)	xxxx
3	Error counter (high byte)	xxxx
4	Error counter (low byte)	xxxx
	...	
	Module number (with the 10 most errors)	xxxx
3∗n	Error counter (high byte)	xxxx
3∗n+1	Error counter (low byte)	xxxx

Key: n: Quantity of modules to which errors may be assigned (up to 10)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Send-Located-Error-Counter-V24-Confirmation (8116)

Function: This function corresponds to the Send-Located-Error-Counter-Confirmation message. The only difference is that the data is transmitted exclusively via the V.24 (RS-232) interface.

Remark: See remark on Send-Located-Error-Counter-Confirmation

Syntax:

	Send-Located-Error-Counter-Confirmation	8116
	Quantity of subsequent words	PC
1	Result	0000
2	Module number (with the most errors)	xxxx
3	Error counter (high byte)	xxxx
4	Error counter (low byte)	xxxx
	...	
	Module number (with the 10. most errors)	xxxx
3∗n	Error counter (high byte)	xxxx
3∗n+1	Error counter (low byte)	xxxx

Key: n: Quantity of modules to which an error could be assigned (maximum: 10)

Send-Last-Module-Status-Error-Confirmation (8117)

Function: This message is sent after the Send-Last-Module-Status-Error-Request (010B) commands has been called. It communicates a list with the numbers of the local buses in which one of the last 10 module status errors has been detected.

Remark: The order of the up to 10 entries in the list corresponds to the occurrence of the module status error .

Syntax:

	Send-Last-Module-Status-Error-Confirmation	8117
	Quantity of subsequent words	PC
1	Result	0000
2	Local bus number (with the last module status error)	xxxx
	...	
n	Local bus number (with the first of the last 10 module status errors)	xxxx

Key: n: Quantity of module status errors (up to 10)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Send-Last-Module-Status-Error-V24-Confirmation (8118)

Function: The function corresponds to the Send-Last-Module-Error-Confirmation message. The only difference is that the data is transmitted exclusively via the V.24 (RS-232) interface.

Remark: See remark on Send-Last-Module-Error-Confirmation

Syntax:

	Send-Last-Module-Status-Error-V24-Confirmation	8118
	Quantity of subsequent words	PC
1	Result	0000
2	Local bus number (with the last module status error)	xxxx
	...	
n	Local bus number (with the first of the last 10 module status errors)	xxxx

Key: n: Quantity of module status errors (up to 10)

Send-Actual-Configuration-Confirmation (8119)

Function: This message is send after the Send-Actual-Configuration-Request (010D) has been called. It communicates the ID code list of the currently connected configuration.

Remark: When the bus is in the STOP mode, changes in the configuration will not be detected or communicated.

Syntax:

	Send-Actual-Configuration-Confirmation	8119
	Quantity of subsequent words	PC
1	ID	0000
	...	
n	ID	xxxx

Key: n: Quantity of the connected bus stations

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Send-Actual-Configuration-V24-Confirmation (811A)

Function: This function corresponds to the Send-Actual-Configuration-Confirmation message. The only difference is that the data is transmitted exclusively via the V.24 (RS-232) interface.

Remark: See remark on Send-Actual-Configuration-Confirmation message

Syntax:

	Send-Actual-Configuration-V24-Confirmation	811A
	Quantity of subsequent words	PC
1	ID	0000
	...	
n	ID	xxxx

Key: n: Quantity of the connected bus stations

9.2.5 Messages for System Control

Send-Software-Revision-Confirmation (8087)

Meaning: The description of the host controller board version is given with this message. The parameter data is encoded in ASCII.

Syntax:

	Software-Revision-Confirmation	8087
	Quantity of subsequent words	77
1- 8	Company name	
9-24	Host type	
25-40	Controller board type	
41-56	Controller board option	
57-63	Firmware version number	
64-77	Date of the firmware version	

Send-Software-Revision-V24-Confirmation (8089)

Meaning: This function corresponds to the Software-Revision-Confirmation message. The only difference is that the data is transmitted exclusively via the V.24 (RS-232) interface.

Syntax:

	Same as Software-Revision-Confirmation	8089

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

9.2.6 Messages for Addressing

Logical-Address-Error-Confirmation (002b)

See Chapter 4.

The messages are indicated with a CTRL error on the front plate and entered in the diagnostic registers.

Quit-Receive-LLA-Confirmation (00d0)

Meaning: The Receive-Logical-Local-Bus-Address-Map-Request (0039) command was executed.

Quit-Implement-Confirmation (00d3)

Meaning: The Implement-All-Logical-Address-Maps-Request (0040) command was executed. The previously defined address list is now valid.

Quit-Receive-Logical-Addresses-Confirmation (00E4)

Meaning: The Receive-Logical-Addresses-Request (004F) command was executed.

Send-Log-Address-Error-Confirmation (80F5)

Meaning: The positive acknowledgment of the Send-Log-Address-Error-Request (005F) command communicates the error which was found last during the logical addressing. All parameters are 0, if no addressing error has been detected.

Syntax:

	Send-Log-Address-Error-Confirmation	80F5
	Quantity of subsequent words	3
1	List	
2	Parameter number	
3	Error number	

The LIST parameter names the list with errors.
The PARAMETER NUMBER parameter identifies the parameter with errors.
The error number names the error type.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Meaning of the LIST parameter:

0 The Implement-All-Log-Address-Maps (0040) command was executed while data was transmitted. The following parameters are invalid.
1 Logical local bus addresses
4 ID list
5 Logical address list
6 Logical local bus address list, including the remote bus level

Meaning of the PARAMETER NUMBER parameters:

- If the error number is 1, PARAMETER NUMBER gives the number of the first missing parameter in the list of logical addresses.
- If the error number is 2, PARAMETER NUMBER gives the number of the first parameter in the list of logical addresses which has been specified in excess.
- In all other cases the number of the faulty entry is entered.

Table 9-5: Error numbers used

Error number	Meaning
0	Not defined
1	Not enough entries in the list which was sent with the command with the error.
2	Too many entries in the list which was sent with the command with the error.
3	Logical local bus address not in the permissible range
4	Logical local bus address exists more than once
5	Logical address is outside the permissible address range
7	Two address areas overlap
8	Illegal odd address
9	Illegal bus register length
10	ID codes differ
11	Byte addresses of IN and OUT modules are in the same word
12	The specified address is illegal
13	The IN word is located before the OUT word in a module location address.
14	Remote bus level outside the value range (0,1)
15	Remote bus level 1 is not possible at this point (no installation remote bus)
16	Implementation not possible as the bus is in the RUN state. In this case, list code and parameter number are 0.
17	Incorrect consistency declaration in the logical address list

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Switch-Information-Confirmation (80E5)

Meaning: The set base node address and the number of the following nodes is sent to the host upon request of the Send-Switch-Information-Request (0050) command.

Syntax:

	Switch-Information-Confirmation	80E5
	Quantity of subsequent words	2
1	Base address of window 1	BE, ADR
2	Length of window 1	00, LE
3	Base address of window 2	BE, ADR
4	Length of window 2	00, LE
5	Base address of window 3	BE, ADR

Key:

BE:	Area (P = 0, Q = 1)
ADR:	Base address (SW1,SW3, SW5)
LE:	Window length in bytes

Quit-Receive-Local-Bus-Code-Map-Confirmation (0105)

Meaning: The Receive-Local-Bus-Code-Map-Request (0069) command was executed.

9.2.7 Messages for Process Data Linkage

Quit-Receive-Instructions-Confirmation (00F2)

Meaning: Positive acknowledgment of the Receive-Processing-Instructions-Request (005d) command.

Processing-Instructions-Error-Confirmation (80F3)

Meaning: Negative acknowledgment of the Receive-Processing-Instructions-Request (005d) command.

Syntax:

	Processing-Instructions-Error-Confirmation	80F3
	Quantity of subsequent words	2
1	Error number	xxaa
2	Parameter number	xxbb

Key:

xxaa:	Error number acc. to table
xxbb:	Parameter number, 00 ≤ bb ≤ FF (hex), corresponds to 000 - 255 (decimal)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The error number gives the error type.
The parameter number identifies the parameter with the error.

Meaning of the error number:

1 All memory occupied, no instructions can be accepted, parameter number = 0
2 Unknown instruction code
3 Not enough parameters in the last instruction, parameter number = 0
4 No internal RAM free
5 Reserved
6 Logical output address does not exist
7 Logical input address does not exist
8 Invalid bit number. A bit number larger than 15 (for words) or larger than 7 (for bytes) was specified.

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

9.2.8 Messages for Event Processing

Quit-Enable-Event-Number-Confirmation **(00dA)**

Meaning: The event definition was enabled with the Enable-Event-Number-Request (002b) command.

Syntax: | Enable-Event-Number-Request | 00dA

Quit-Disable-Number-Confirmation **(00db)**

Meaning: The event definition was disabled with the Disable-Event-Number-Request (002C) command.

Syntax: | Disable-Event-Number-Request | 00db

Quit-Enable-All-Events-Confirmation **(00dC)**

Meaning: All existing event definitions are enabled with the Enable-All-Events-Request (002d) command.

Syntax: | Quit-Enable-All-Events-Confirmation | 00dC

Quit-Disable-All-Events-Confirmation **(00dd)**

Meaning: All existing event definitions were disabled with the Disable-All-Events-Request (002E) command.

Syntax: | Quit-Disable-All Events-Confirmation | 00dd

Event-Error-Confirmation **(004C)**

Meaning: Error during the event definition. There are invalid event definitions, old definitions have been deleted.

Syntax: | Event-Error-Confirmation | 004C

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

9.2.9 Messages for Communication

Read-KBL-Loc-Confirmation (811B)

Meaning: Negative/positive acknowledgment of the Read-KBL-Loc-Request (0112) command.

Remark: Depending on the entry of the KR parameter (KR=0 or <>0) in the Read-KBL-Loc-Request command, the positive acknowledgment may have one of the two following structures.

Positive messages:

For KR=0:

Syntax:

	Read-KBL-Loc-Confirmation		811B
	Quantity of subsequent words		3
1	Result +	-	00xx
2	Com_ref=0	Size	00xx
3	Symbol Length	vfd_ptr_supp	xxxx

For KR<>0 and symbol length=12:

Syntax:

	Read-KBL-Loc-Confirmation		811B
	Quantity of subsequent words		3
1	Result +	-	00xx
	Com_ref<>0	Remote Address	xxxx
	Type	max SCC	xxxx
	max RCC	max SAC	xxxx
	max RAC	max aci	xxxx
	connection attr	-	xxxx
	req_len_h	req_len_l	xxxx
	ind_len_h	ind_len_l	xxxx
	serv_sup0	serv_sup1	xxxx
	serv_sup2	serv_sup3	xxxx
	serv_sup4	serv_sup5	xxxx
	out_serv_client	out_serv_server	xxxx
	comm type	-	xxxx
	symbol 0	symbol 1	xxxx
	symbol 2	symbol 3	xxxx
	symbol 4	symbol 5	xxxx
	symbol 6	symbol 7	xxxx
2	symbol 8	symbol 9	xxxx
3	symbol10	symbol11	xxxx

Negative message:

Syntax:

	Read-KBL-Loc-Confirmation		811B
	Quantity of subsequent words		3
1	Result +	Err_Class	
2	Err_ Code	Add_Code	
3	Add Code	-	

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

9.2.10 Messages for the EEPROM-Management

Quit-EEPROM-Management-Confirmation (00F8)

Meaning: Positive acknowledgment of the EEPROM-Management-Request (0061) command.

Remark: Depending on the entry of the mode parameter in the EEPROM-Management-Request command, the positive acknowledgment may have one of the following two structures.

Positive messages:
For mode= 1 to 6:

Syntax:

	Quit-EEPROM-Management-Confirmation	00F8

For mode = 6:

Syntax:

	Quit-EEPROM-Management-Confirmation	80F8
	Parameter block length	50
1	String	xxxx
	....	
50	String	xxxx

Quit-EEPROM-Programming-Confirmation (00FA)

Meaning: After a positive acknowledgment of the EEPROM-Management-Request, this message is sent as a positive transmission confirmation to every successfully transmitted command to the EEPROM.

Positive message :

Syntax:

	Quit-EEPROM-Programming-Confirmation	00FA

EEPROM-Management-Error-Confirmation (80F9)

Meaning: Negative acknowledgment of the EEPROM-Management-Request (0061) command.

Negative message:

Syntax:

	EEPROM-Management-Error-Confirmation	80F9
	Parameter block length	1
	Error number	xxxx

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Parameter description:

Error number:

1. Programming started
2. Programming not started
3. Unknown mode
4. Invalid bit number
5. EEPROM or memory card defective or write-protected
6. Memory card not plugged in

EEPROM-Programming-Error-Confirmation (80FB)

Meaning: Negative acknowledgment of a command that has been unsuccessfully transmitted to the EEPROM.

Negative message:

Syntax:

EEPROM-Programming-Error-Confirmation	80F9
Parameter block length	1
Error number	xxxx

Parameter description:

Error number:

1. Maximum number of service requests reached
2. Memory space completely occupied
3. Controller-specific hardware problem (EEPROM or memory card)
4. Memory card not plugged
5. The Warmstart-Service was programmed on bit 0

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Chapter 10

Appendix

This chapter provides information on

- the marking of different revisions on the controller boards
- the technical data of the controller board
- the contents of the data diskette

10 Appendix 10-1

10.1 Overview of the DCB Revisions 10-1
10.2 Technical Data 10-5
10.3 Contents of the Data Diskette 10-6

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

10

10 Appendix

10.1 Overview of the DCB Revisions

There are different versions (revisions) of the DCB host controller board for Siemens S5 PLCs. These versions differ in the location and function of the jumpers.

The revision of your DCB controller board is given with the last letter in the serial number of the motherboard. The location of the serial numbers is given in the following figure.

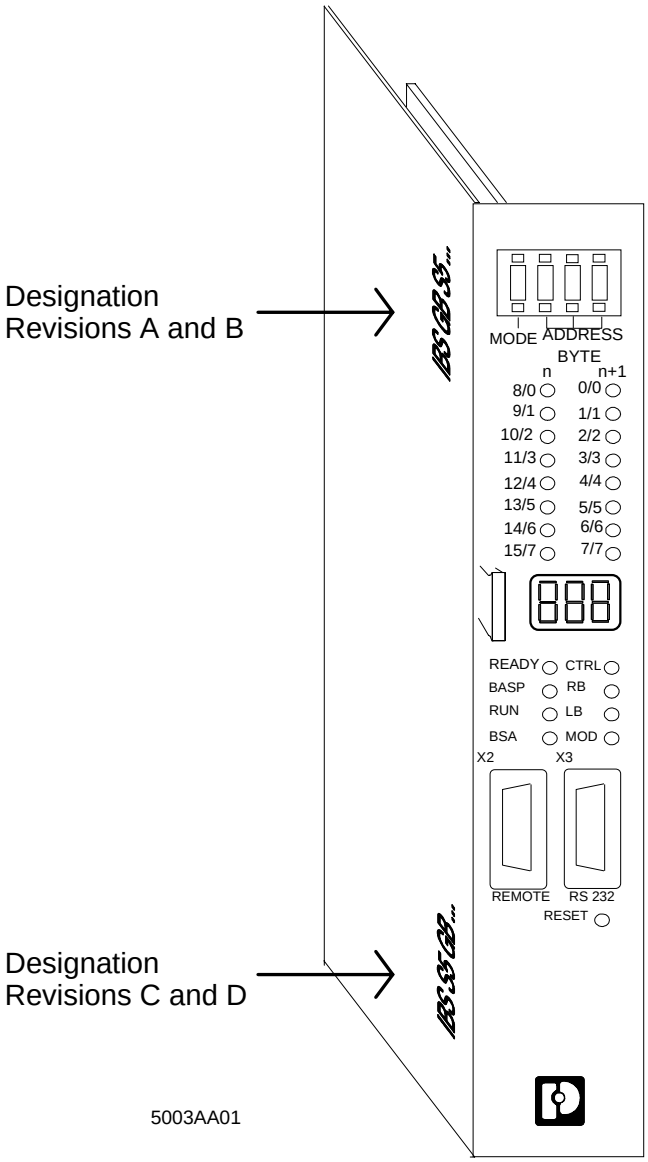


Figure 10-1: Location of the serial numbers on the motherboard of the DCB controller board

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

The revisions A to C are shown in the following.

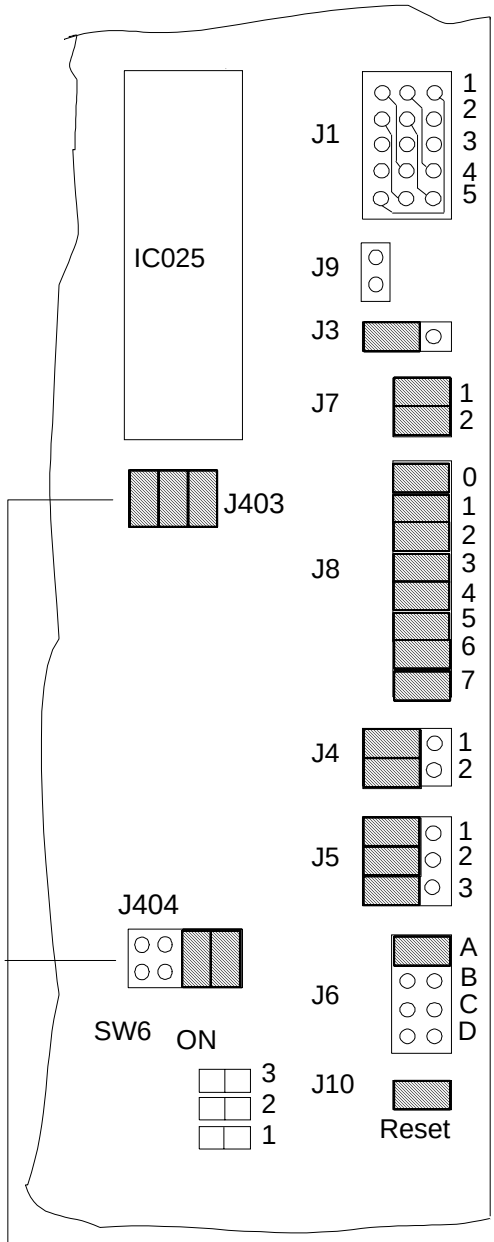


Figure 10-2: Revision A of the DCB controller board

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

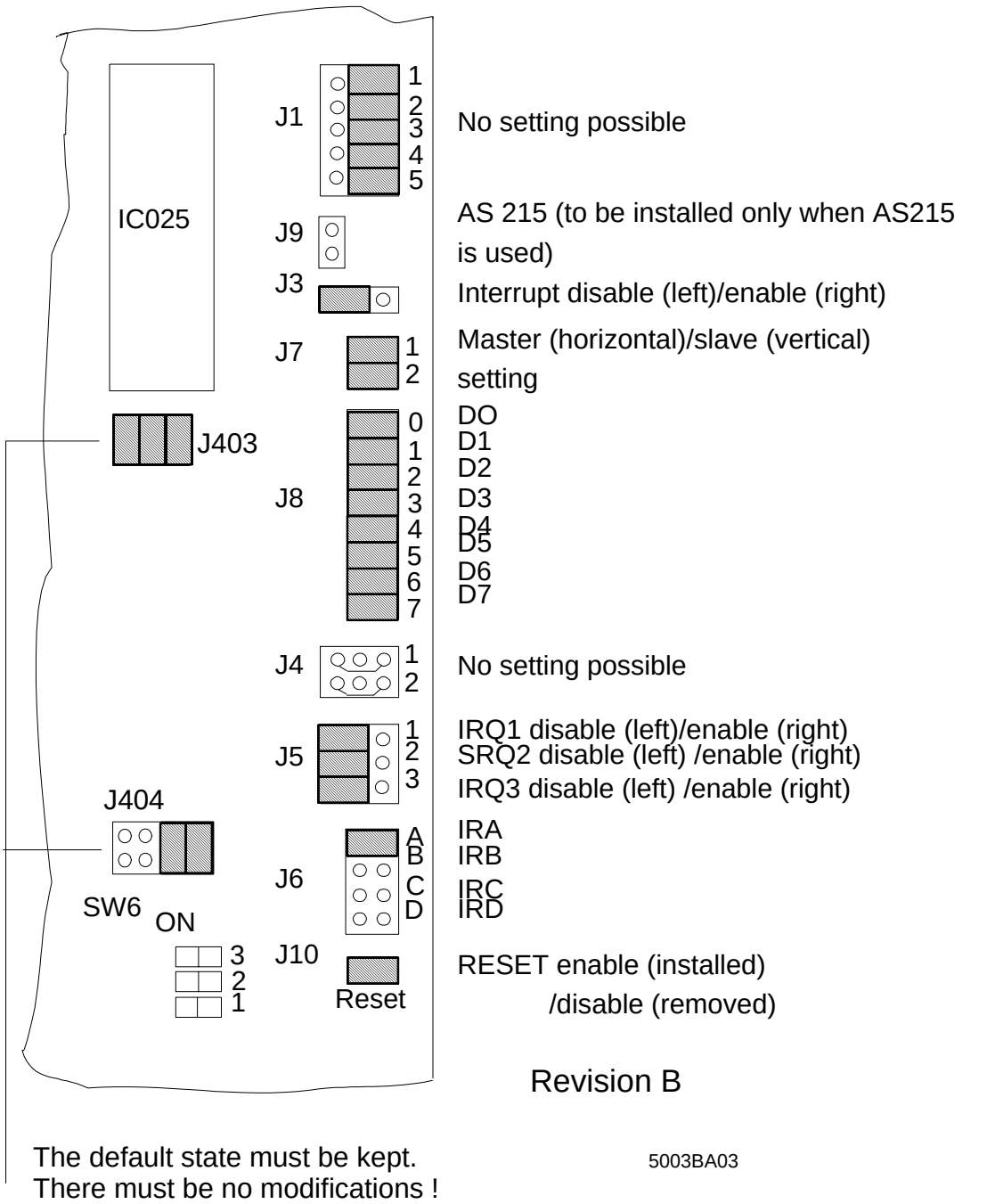


Figure 10-3: Revision B of the DCB controller board

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

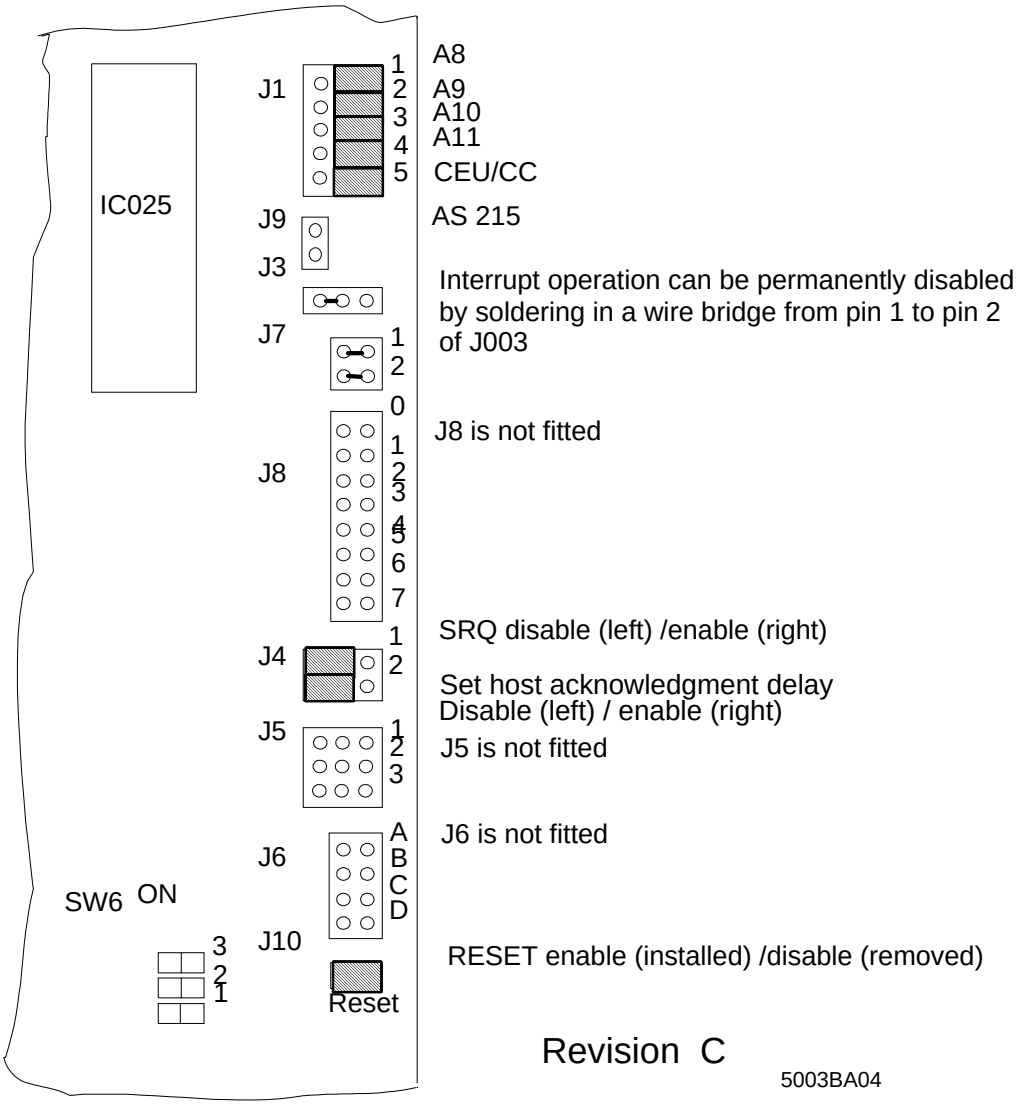


Figure 10-4: Revision C of the DCB controller board

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

10.2 Technical Data

Data sheet

Designation: IBS S5 DCB/I-T

Basic specifications:

Control system: SIMATIC S5 PLCs
Types: S5 115 U S5 130 WB
S5 135 U S5 150 U, 150 S
S5 155 U
Others upon request

Bus system:

Sensor/Actuator Bus: INTERBUS-S
INTERBUS-S compatible modules

Types: Different I/O modules
Manufacturer: Phoenix Contact
Third party: Inquiries to
INTERBUS-S Club

System expansion:
Max. 256 local buses
(incl. BKs with I/O function
and installation remote bus modules)
Max. 320 modules (incl. BKs and PCP stations)
Max. 256 INTERBUS-S words
Max. 62 PCP stations

Diagnostics: Overall system diagnostics by means of
- front plate diagnostics
- diagnostic registers- software diagnostics via the PLC
RS 232 via PC monitor

Interfaces:
Two-wire remote bus connection
9-pos D-SUB connector (female)
RS-232 connection
9-pos. D-SUB connector (male)

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Hardware:

Size:	The controller board occupies two narrow slots. 115 U with adaptation casing 130 U - 155 U directly pluggable
Address area:	P area Q area
Multiprocessor operation:	Yes
Interrupt operation:	No
Current consumption:	1.3 A at +5 volts
Temperature: Operation:	0 °C to 60 °C
Storage:	-25 °C to 80 °C
Humidity: Operation:	70 %
Storage:	95 %
EEPROM:	16 - 64 kbytes (memory card format)

10.3 Contents of the Data Diskette

The files listed below are stored on the diskette which is included in the delivery. These files contain example programs, which are mentioned and explained in Chapter 6. They illustrate the addressing and programming methods shown in Chapter 6. All files should only be used for SIMATIC S5 PLCs.

a) DCBPHYST.S5D
DCBADRST.S5D
DCBEEPST.S5D
DCBZYKST.S5D
DCBCP@ST.S5D
DCBECPST.S5D

The following files are not mentioned in the user manual.
However, they are useful when counter modules, V.24 modules or communication-compatible analog input modules have to be addressed.

b) DCBCNFST.S5D
DCBCNTST.S5D
DCBV24ST.S5D
DCBAI@ST.S5D

The diskette also contains a file with the ISFP software V2.2.

c) ISFP22ST.S5D

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Tables

Chapter 1

Table 1-1: Example for testing the load capacity of an installation remote bus 1-15

Chapter 2

Table 2-1: Permissible slots for the S5-155U, -130 WB, - 135 U, - 150 U, -155 U SIMATIC PLCs 2-10
Table 2-2: Lowest base addresses for windows 1 and 2 2-30
Table 2-3: Location of the communication registers 2-31
Table 2-4: Address assignment in the PLC 2-35

Chapter 3

Table 3-1: Meaning of the parameters of an ID code list using the example of the data block n 3-3
Table 3-2: Overview of INTERBUS-S stations (modules) 3-4
Table 3-3: Overview of INTERBUS-S stations (slave boards, BKs, etc.) 3-5
Table 3-4: Special ID codes 3-6
Table 3-5: Counting direction/order for the entire bus configuration 3-11
Table 3-6: Example for word-oriented addressing 3-14
Table 3-7: Example for byte-oriented addressing with even byte addresses 3-14
Table 3-8: Example for byte-oriented addressing with odd byte addresses 3-14
Table 3-9: Temperature allocation for a measuring range of 0...600°C 3-38
Table 3-10: Measuring range and encodings 3-40

Chapter 4

Table 4-1: Priorities of error types 4-7
Table 4-2: Error codes for controller errors 4-8
Table 4-3: Address area selection 4-27
Table 4-4: The seven-segment display during startup 4-28

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Chapter 6

Table 6-1: Setting the types of operation and addressing with switch SW6 6-5

Table 6-2: Overview of the programming examples for different system starts and control and operating modes 6-7

Chapter 7

Table 7-1: Signal assignment of the system connector 7-4

Table 7-2: Signal assignment of the V.24 interface 7-6

Chapter 8

Table 8-1: Parameter description of the INITIB function block (FB61 or FB60) 8-8

Table 8-2: Startup behavior 8-8

Table 8-3: Description of the parameters of the CON/IND function block (FB62 or FB64) 8-11

Table 8-4: Description of the parameters of the REQ/RES function block (FB66 or FB67) 8-13

Table 8-5: Functions of the CONTROL (FB 68) function block 8-24

Table 8-6: Parameters of the CONTROL function block (FB 68) 8-25

Table 8-7: Structure of the DEFINE function block (FB 69) 8-28

Table 8-8: Parameters of the DEFINE function block (FB 69) 8-29

Table 8-9: Supported Client/Server services of the Supported Services Bit Fields 8-40

Table 8-10: Functions of the SYSINFO function block (FB 70) 8-53

Table 8-11: Parameters of the SYSINFO function block (FB 70) 8-54

Table 8-12: Functions of the ON/OFF function block (FB 71) 8-58

Table 8-13: Parameters of the ON/OFF function block (FB 71) 8-59

Table 8-14: Parameters of the ADDRESS function block (FB 72) 8-63

Table 8-15: Functions of the ERRINFO function block (FB74) 8-75

Table 8-16: Parameters of the ERRINFO function block (FB74) 8-75

Table 8-17: Parameters of the SYSERROR function block (FB73) 8-81

Table 8-18: Parameters of the RECONFIG function block (FB 75) 8-82

Table 8-19: Parameters of the EVENT function block (FB 76) 8-83

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Table 8-20: PCP service primitives 8-85
Table 8-21: Error messages for a connection abort 8-113
Table 8-22: Error messages for a connection abort (cont'd) 8-114
Table 8-23: Error messages for a connection abort (cont'd) 8-115
Table 8-24: Error messages for the reject service 8-115
Table 8-25: Additional error messages 8-116
Table 8-26: Service-specific error messages, error class 0 (initiate) 8-116
Table 8-27: Service-specific error messages, error class 1 (VFD state) 8-117
Table 8-28: Service-specific error messages, error class 2 (application reference) 8-117
Table 8-29: Service-specific error messages, error class 3 (definition) 8-117
Table 8-30: Service-specific error messages, error class 4 (resource) 8-118
Table 8-31: Service-specific error messages, error class 5 (service) 8-118
Table 8-32: Service-specific error messages, error class 6 (access) 8-119
Table 8-33: Service-specific error messages, error class 7 (OV error) 8-120
Table 8-34: Service-specific error messages, error class 8 (other) 8-120

Chapter 9

Table 9-1: Overview of the commands 9-1
Table 9-2: Overview of the messages for a CTRL error 9-2
Table 9-3: Overview of the messages 9-3
Table 9-4: Error numbers used 9-56
Table 9-5: Error numbers used 9-62

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Index

The figures marked in bold indicate the page on which a definition or short description of the term can be found.

A

Abort ID, 8-113
Abort Identifier, 8-113
Abort Indication, 8-106
Abort Request, 8-102; 8-112
ABORT, 8-111
Access, 8-119
Acknowledgement behavior of the controller board, 2-24; 6-4
Acknowledgement delay message, 2-38
Acknowledgement delay, 2-18
Activation bit register, 5-13
Activation blocks, 5-10
Activation flag, 8-90; 8-95
Adapter cable, 7-6
Additional error messages, 8-116
Address
  allocation for the modules, 6-1
  length, 8-66
  list, **6-2**
Address locations
  for automatic start in the DAB mode, 2-28
  for automatic start in the DCB mode, 2-26
  for controlled start and the DAB mode, 2-29
  for controlled start in the DCB mode, 2-27
ADDRESS, **2-5;** 4-27; 8-22; 8-62; 8-86; 8-88; 8-110
Addresses of the individual I/O modules, 6-2
Addressing 8-87; 8-88; 8-110
  analog inputs; 3-13
  analog outputs, 3-13
  block, 8-86
  byte-oriented, 3-15
  digital inputs, 3-12
  digital outputs, 3-13
  logical, 3-8; 3-18; 3-23/29
  physical, 3-8; 3-12
  slot-oriented, 3-12
  word-oriented, 3-14
Advanced package, 7-8
Alarm stop, 8-26
Application reference, 8-117
Application registers, **2-13**
Area of application of the host controller board, **2-2**
Asynchronous communication, 2-2
Automatic diagnostics, 2-18
Automatic start, **2-21**; 2-24; **6-2**; 6-4; 8-6
Auxiliary function block, 8-5; 8-10

B

Base address
  with even base address, 3-14
  with odd base address, 3-14
Base address, 2-30
Basic package, 7-8
Basic specifications, 2-40
Basic system specifications, 1-10
BASP, **2-6; 4-4**
Beginning of the process data's address area, 2-30
Bit
  MOD, 8-80
  manipulation register, 8-47
  manipulation, 8-43
  number, 8-43
  -controlled command register, 5-3
BK for the installation remote bus, 6-1
BK-Alarm OFF, 8-61
BK-Alarm ON, 8-60
Blocks
  active, **5-8**
  passive, **5-8**
Block types, 5-6
Board with system connector, 2-3
BSA, **2-6; 4-4**
Bus
  address, 4-29
  cable length, 1-13
  cable, **1-1**
  cycle, 2-7; 2-39
  display with an active, 4-13
  error, 2-18; 2-39
  information, 8-76
  in the STOP, 4-28
  output bit, 8-43
  segment address list, 8-67
  segment number, 8-31; 8-60; 8-61
  stopping of the bus, 4-5
  structure (physical), 8-66
  system start, 5-2
Bus stations
  overview of the, 3-4

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Bus terminal
alarm output, 8-60; 8-61
functions, 1-15
module, 1-3, 1-13; **1-15**
module with I/O functions, 6-1
BUS bit, 8-76; 8-77; 8-80
Busy bit register, 5-13
Busy bit, **5-8;** 8-16; 8-18
Byte orientation, 8-43

C

Cable installation, 7-2
Cable types, 7-2
Cabling error, 4-5
Call structure, 8-3
CIDB (data block), 8-92; 8-88; 8-95
CIH, 8-5; 8-10
CIMW, 8-92; 8-95; 8-110
CIST, 8-95; 8-110
Clear Display, 8-26
Client, 8-84
Code switches, 4-26
Coding
binary, 3-33; 3-35
two's complement, 3-33; 3-35
Command
block, 5-7
execution; bit-controlled; **5-13**
functions, 8-24
list, 8-48
Commands and Messages
overview of the; 9-1; 9-2; 9-3
structure of the, 5-4
Communication, 8-84; 8-86; 8-90; 8-96; 8-110
abort, 8-111
data, 8-86
reference, 8-34; 8-88;
reference list, 8-73
register (window 3), 2-25; 2-31; 6-4
registers, **2-13;** 2-30; 5-3; 8-86
relationship list, 8-39
stations, 8-90
CON bit, 8-76; 8-80
CON/IND block, 5-8
CON/IND header blocks, 8-88
CON/IND, 8-4; 8-10; 8-15/16; 8-86; 8-88; 8-92; 8-110
Configuration of the controller board, 2-11
Configure INTERBUS-S, 8-26
Configuring the default setting, 2-13
Confirmation service primitive, 8-84
Confirmations, 8-92
Connection abort, 8-112
Connection establishment, 8-112
Control, 8-16; 8-20; 8-86
CONTROL, 8-24
Controlled start with EEPROM, 8-6
Controlled start, **2-21**; 2-24; 2-25; **6-2**; **6-**4; 8-6
Controller board, 1-2; 1-4; 1-5; **1-11**; 2-2; 3-23; 4-28; 5-1; 5-15; 5-16; 7-6
check, 4-11
components, 2-8
configuration of the, 2-11
diagnostics on the front plate, 4-2
error, 2-18
error codes for, 4-7
hardware interfaces of the, 7-3
initialization of the, 3-1
operating and error states of the, 4-23
operating mode of the, 3-8
slots for the, 7-1
startup, 4-28
stop, 2-6
Controller error code, 8-76
Controller errors (CTRL)
error codes for; 4-8
Controller parameter timeout error, 8-38
Correct data transfer, 1-3
Counter, 8-56
Counting local buses and INTERBUS modules, 6-1
CRC, 1-4
CTRL Error, **4-7**
CTRL, **2-7**
Current consumption, 2-41
Cycle, erroneous, 1-3

D

D-SUB-remote bus connector
PE connection of the, 7-5
DAB mode, **2-24; 6-4**
Data block
header, 8-94; 8-95
standard, 8-94; 8-95
Data cycle, **1-3;** 2-6
Data preprocessing, 2-1
Data sheet, 2-40
Data traffic, cyclic, 1-11
DCB controller board, 7-8
DCB mode, **2-24; 6-4**
Defective Group, 8-77
Defective local bus (Local Bus Error), **2-7**
Defective remote bus (Remote Bus Error), 2-7

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

DEFINE, 8-20; 8-28; 8-50
Definition of I/O addresses, 2-13
Definition, 8-117
Detection of an operating or error status, 2-18
Diagnostic
  functions on bus terminal modules, 4-32
  functions on I/O modules, 4-31
  interface, 3-1
  possibilities, 5-1
  registers locations, 4-24
  registers, **2-13**; 2-18; 2-30; 4-23
Diagnostics
  on third-party devices, 4-32
DIAGNOSTICS, **2-6**
Different interrupt sources, 2-38
Differential signal transfer (RS 485), 1-4
DIP switches, 2-30
Disable All Messages, 8-27
Disconnecting the RESET button, 2-39
Display of diagnostic data, 2-18
Double addressing, 2-33
Driver blocks, 8-88
Dual Port RAM, 5-5

E

EEPROM memory card, **2-1**; **2-22;** 6-2
EEPROM, 2-41; 5-2; 5-13
EREG, 8-64
ERRINFO, 8-22; 8-74
Error
  classes, 8-116
  code, 4-35; 8-116
  detection, 1-11
  diagnostics, notes on, 4-10
  displays, 4-35
  free-data transmission, 1-3
  indication, **2-7; 4-5**
  in local bus, 4-18
  in remote bus, 4-17
  in the module, 4-19
  LED, 4-35
  list of, 4-36
  messages, 8-113
  protection mechanisms, 1-4
  type, 4-35
Errors
  display of, 4-6
Event
  code, 8-36
  handling, 5-1
  identifier, 8-36; 8-61
  map, 8-35
Event OFF, 8-61
Event ON, 8-61
Event signaling blocks, 5-12
EVENT, 8-23; 8-83
Extended address area, 2-11

F

Front plate components, 2-4
Front plate, 2-3
Function block, **2-1;** 8-2; 8-86

G

Gain register, 3-31
General method of operation, 1-3
Group definition, 8-70
Group Error Characteristics, 8-50; 8-72
Group Nos. List, 8-70
Group Numbers, 8-37
Group OFF, 8-60
Group ON, 8-60
Guidelines of VDE 0100, 7-2

H

Hand Held Monitor, 7-9
  using the, 4-33
Hardware interfaces
  pin assignments of the, 7-3
Hardware settings, 2-15; 2-19
Host controller board, 1-2; 1-4; 1-5; **1-11;** 2-2
  diagnostics, 2-18
  functions, 1-11
  installation, **2-9**
  operation, **2-1**
  startup, 2-17
Host output bit, 8-43
Humidity, 2-41

I

I/O address area, 2-11; 8-86
I/O area of the PLC with IBS S5 DCB I/, 2-12
I/O data of disabled local buses, 4-4
I/O DATA, **2-5**
I/O status Indicator, 2-5; 4-26
IB data cycle, 4-35
IB reset, 4-35

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

IBDB, 8-10; 8-14; 8-18; 8-49; 8-52
IBS 24 RELS, 3-36
IBS BA/SL, 3-37
IBS PT 100, 3-38
  measuring range of the, 3-38
  temperature calculation for the, 3-40
IBS SYS SWT, 2-22; 5-13; **5-16;** 7-10
ID code, 4-25; 5-18; **5-13;** 8-66
ID code list, 6-1, 8-66
ID cycle, **1-3**
ID numbers, 8-30
Identification codes, 8-55
Identify Confirmation, 8-104
Identify Request, 8-101
Implement All Logical Address Map, 8-27; 8-31; 8-32; 8-33; 8-57
IN address list, 8-68
IN address, 8-36
Indication service primitive, 8-84
Indications, 8-92
  for operating mode and error type, 3-1
Indicators
  bus-specific, 4-32
  device-specific, 4-32
Information Report Request, 8-101; 8-107; 8-108
Init Communication, 8-27; 8-34
Initial configuration
  structure of the, 5-16
Initialization block, 5-6; **5-7;** 8-2; 8-86
Initialization, 8-87; 8-88; 8-110
Initiate Confirmation, 8-104
Initiate Error Confirmation, 8-105
Initiate Request, 8-101
Initiate, 8-116
Initiate.Request, 8-112
INITIB, 8-6; 8-8; 8-86; 8-110
Input addresses, 8-68
Input and output area of the PLC, **2-12**
Input bit, 8-43
Input byte 0 in the PLC's I/O area, **2-12**
Installation remote bus, 1-3, 1-10/13/14/16
  cable, 1-13
  modules, 6-1
  number of I/O modules in the, 1-14
  station, 8-52
Installation user manual, 7-2
Installation, 2-9; 7-1
INTERBUS data block, 8-10; 8-18; 8-49
INTERBUS-S
  diagnostics, 4-29
  address list, structure of a, 3-19
  cycle counter, 8-56
  delay, 8-27
  I/O modules, **1-18**
  in the PLC's address area, 2-25
  management functions, 8-1
  protocol chip (IPMS), **2-1**
  protocol sequence, 1-5
  remote bus connector, **2-1**
  scan time calculation, 1-6
  system, voltage supply of the, 7-2
  system control, 5-8
  system expansion, 2-30
  system functions for the PLC, 5-2; 5-5
  systems installation, 7-2
Interface description, 5-1
Interface driver, 5-6, 5-7; 8-110
Interfaces, 2-7; 2-40
Interrupt line of the controller board, 2-12
Interrupt line selection, 2-37
Interrupt operation, 2-41
Interrupt processing, 2-36
Invalid address set with the coding switch, 2-6
ISFP, 5-1; 5-3; 5-5
  function block package, 2-22
  interface, 8-88
  software program, 2-18

L

LB ERR, 8-64
LB error, **4-5**
LB, **2-7**
Length codes, 8-30; 8-55
Local bus, 1-3; 1-10; **1-16**; 1-17; 8-37; 8-70
  module error, 8-79
  modules, 1-18
Location of windows, 2-33
Logical address error, 8-57
Logical addressing, 2-1; 2-14
Logical IN addresses, 8-32
Logical IN address map, 8-32
Logical local bus address map, 8-31
Logical local bus address, 8-52
logical numbers, 8-67
Logical OUT address map, 8-33
Logical OUT addresses, 8-33
Loopback word, 1-4

M

Manipulation of OUT words, 8-41
Mask 1, 8-36
Mask 2, 8-36

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Master PLC, 3-37
Master-slave access method, 1-3
Maximum INTERBUS-S expansion, 3-7
Memory component (MPM), 2-1
Message flag, 8-95
Message functions, 8-80
Message header, 8-95
Messages
  overview of the, 9-1; 9-2; 9-3
MOD, **2-7**
MOD bit, 8-80
MOD ERR (MODule Error), 2-7; **4-6**
MODE, **2-5;** 4-27; 8-64
MODE 4 to 9, 4-27
Module
  addresses, **2-13**
  error, 2-18; 8-78
  identification code, 8-30
  number, 8-52
Modules
  byte-oriented, 3-14
  capable of communication, 5-1
  with bus acknowledgement, 4-6
  word-oriented, 3-14
Monitor software, 5-2
Mounting positions of the jumpers, 2-19
Multiprocessor operation, 2-41

O

ON/OFF, 8-21; 8-58
Operating and diagnostic indicators, **2-2**
Operating indicators, 2-6; **4-4**
Operating mode of the controller board, 2-25
Operating/addressing modes, 2-15
Operation in the central controller and controller expansion unit, 2-20
Operation with and without EEPROM card, 2-22
Ordering information, 7-8
Organization block, 8-110
Other, 8-120
OUT address list, 8-69
Output addresses, 8-69
Output bit, 8-43
OV-Error, 8-120
Overview of commands and messages, 9-1; 9-2; 9-3

P

Parameter
  counter, **3-18**
  list, 3-3
  frame, **5-4**
  settings, 2-*7*; 2-39
  timeout constant, 8-38
Parameterization software, 2-22
Parameterization of the host controller board, 2-7
PC board, 7-10
PCP
  activation flag, 8-91
  communication interface, 5-1
  communication system, 8-84
  message flag, 8-93
  services, 8-97
  stations, 5-7
  stations, 8-86
Peripherals Message Specification 3-1
Physical addressing, 2-14
  of the input/output modules, 3-11
Physical configuration map, 8-30; 8-55, 8-57
PLC, 2-15
  address area, 2-11
  startup of the, 3-8, 4-36
  STOP request of, 4-14
  STOP state of the, 4-15, 4-17, 4-28
Process data, 8-86
Process data interface, 3-1; 3-8
Process image of the inputs and outputs, 2-11
Program packages, 2-16
Programming unit, 7-6

Q

Quit Module Error All, 8-27
Quit Module Error, 8-52

R

RB error, **4-5**
RB ERR, 8-64
RB, **2-7**
RC, 8-113
Read Confirmation, 8-102; 8-108
Read Request, 8-100
READ service (Exmp.), 8-96
READY, **2-6; 4-4**
Reason code, 8-113
Receive bit manipulation, 8-41
Receive block, 5-6; **5-8;** 8-2; 8-86
Receive KBL, 8-39
RECO bit, 8-82

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

RECONFIG, 8-23; 8-82
Reject Indication, 8-106
Reject service, 8-115
Remote bus, 1-2; 1-10; **1-12**; 1-16
  check, 1-4
  connector, **2-2**
  error 'RB ERR', 1-4
  interface, 7-5
  module with two-wire interface, 1-14
  segment: error message for the, 1-15
REMOTE, **2-7**
Representation "Ad", 2-5
REQ/RES header blocks, 8-88
REQ/RES, 5-8; 8-4; 8-12; 8-15; 8-16; 8-86; 8-88; 8-110
Request service primitive, 8-84
  Request, 8-96
RESET, 1-4
RESET, 2-7; 2-39; 4-17; 4-18; 4-28/29; 4-40-45; 4-48ff; 4-54
Reset-Out-In01, 8-46
Reset-Out-In01-Switch, 8-47
Reset-Out-In10, 8-46
Reset-Out-In10-Switch, 8-47
Reset2-Out-In01, 8-46
Reset2-Out-In10, 8-46
Resource, 8-118
Response service primitive, 8-84
Restart (automatic), 8-50
Return bit register, 5-13
RETURN bit, 5-8
Return bit, 8-18
RRDB, 8-88; 8-90; 8-94
RRMW, 8-90; 8-95; 8-110
RRST, 8-94; 8-95; 8-110
RS 232, **2-7-,** 5-1
Run status of the controller board, 2-6
RUN, **2-6; 4-4**

S

Scan time, 1-6
Secondary diagnostic functions, 2-18
Segment, **1-12**
Selection of the address area, 2-5
Self-test, 2-6
  display after the, 4-13
Send block, 5-6; **5-8;** 8-2; 8-86
Serial interface RS-232, 5-3
Serial interface, 2-7; 5-2; 5-16; 7-6
Server, 8-84
Service, 8-118
  execution, 8-90
  message flag, 8-92
  primitive, 8-90
  request, 8-112
  structure, 8-89
Service-specific error messages, 8-116
Settings for board identification, 2-37
Settings for central controller and controller expansion unit, 2-20; 2-21; 2-24; 2-25
Seven-segment display, **2-6**; 2-7
Signal changes, 8-41
Signal states
  up to date, 4-5; 4-29
Signaling behavior of the host controller board, 2-15
Signaling block, 5-7
SIMATIC S5, 8-86
Slave PLC, 3-37
Slot allocation, 2-9
Slots, **2-9**
Software
  interfaces, 3-1
  requirements, 2-16
  revision, 8-55
  runtime, 1-6
Standard data block, 8-94, 8-95
Standard function blocks, 5-3
Start
  automatic, 3-1, 4-24; 4-29
  behavior, 4-29
  confirmation, 8-103; 8-109
  controlled, 3-1; 4-25; 4-29
  INTERBUS-S Cycle, 8-26
  request, 8-100
Startup, 8-110
  and operating mode selection, 2-21
  behavior, 6-3
  organization blocks, 3-12
  performance, 2-16; 2-22
  with physical addressing, 6-1
Status Confirmation, 8-103
Status display, 4-27
Status Request, 8-101
Stop Confirmation, 8-103; 8-109
Stop INTERBUS-S Cycle, 8-26
Stop Request, 8-100
STOP state, 2-6; 2-7
Supply voltage
  failure of the, 1-18
Switch Information, 8-56
Switch SW6, **2-21**
Synchronization, 8-86
SYSERROR, 8-22; 8-74; 8-80
SYSINFO, 8-21; 8-53
System connector, **2-1,** 7-4
System interface, 5-1; **5-3**

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

T

Temperature, 2-41
Test routines, 1-4
TIMEOUT bit, **5-8**
Timeout bit, 8-18
Transfer method, 1-13
Transfer time, 1-6
Transmission cycle, 1-4
Transmission medium, 1-13
Two-wire INTERBUS-S system, 2-2
Two-wire remote bus, 2-7
Types of addressing, 2-13

U

Use, 8-110
User process, 8-84

V

V.24 interface, 2-18
VFD-State, 8-117

W

Window 3, 2-31
Window areas, **2-13**
Windows which extend from the P to the Q area, 2-35
Write Confirmation, 8-102; 8-108
Write Request, 8-100

onlinecomponents.com

onlinecomponents.com
THE ONLINE DISTRIBUTOR OF ELECTRONIC COMPONENTS

onlinecomponents.com