FACTORY AUTOMATION

MANUAL

IVI-KHD2-4HB5, IVI-KHA6-4HB5

CONTROL INTERFACE UNIT FOR INTERBUS

PEPPERL+FUCHS

Table of Contents

Date of issue 27. 07.2001

Dtae of issue 27. 07.2001

1 Declaration of Conformity

The control interfaces IVI-KHD2-4HB5 and IVI-KHA6-4HB5 have been developed and produced in accordance with the applicable European standards and directives.

Note

A corresponding declaration of conformity can be requested from the manufacturer.

The manufacturer of the product, Pepperl+Fuchs GmbH in D-68301 Mannheim, possesses a certified quality assurance system in accordance with ISO 9001.

CE

ISO**9001**

Date of issue 27.07.2001

Date of issue 27.07.2001

2 General Information

Warning

This symbol warns the user of possible danger. Failure to heed this warning can lead to personal injury or death and/or damage to equipment.

Attention

This symbol warns the user of a possible failure. Failure to heed this warning can lead to total failure of the equipment or any other connected equipment.

Note

This symbol gives the user important hints.

Date of issue 27.07.2001

Date of issue 27.07.2001

3 Safety

3.1 Intended use

The control interface unit IVI-KHD2-4HB5/IVI-KHA6-4HB5 serves as part of the inductive identification system IDENT-I from Pepperl+Fuchs to connect to a higher order computer (PLC, PC) with the INTERBUS interface (DIN 19258). The control interface units are only to be used with read heads and code carriers from Pepperl+Fuchs.

Warning

The protection of operating personnel and the system against possible danger is not guaranteed if the control interface unit is not operated in accordance with its intended use.

The device IVI-KHD2-4HB5/IVI-KHA6-4HB5 may only be operated by appropriately qualified personnel in accordance with this operating manual.

3.2 General safety information

Warning

Safety and correct functioning of the device cannot be guaranteed if any operation other than that described in this operating manual is performed.

The connection of the equipment and any maintenance work to be carried out with voltage applied to the equipment must only be performed by appropriately qualified electro-technical personnel.

In the event that a failure cannot be rectified, the device must be taken out of operation and protected against inadvertently being put back into operation.

Repair work may only be carried out by the manufacturer. Additions or modifications to the equipment are not permissible and render the warranty invalid.

The responsibility for the observance of local safety standards lies with the operator.

3.3 Functional safety/monitoring

The control interface unit IVI-KHD2-4HB5/IVI-KHA6-4HB5 operates on a microprocessor basis. Functional disturbances and equipment errors/faults are signalled via the "Run/Error" LED on the front of the device.

Next to the LED is a function controller for the INTERBUS, with which an information field can be requested. Device failure or breakdown of a read/write head can be detected and indicated by the master unit.

Note

More detailed information can be found in Section 7 "Error Diagnosis".

Date of issue 19.07.2001

Date of issue 19.07.2001

4 Product Description

4.1 Delivery package

The delivery package includes the following items:

- IVI-KHD2-4HB5/IVI-KHA6-4HB5 device
- 1 terminal adapter
- 1 CD-ROM including manuals as PDF files (german, english) and the unit description for the commissioning software

4.2 Areas of application

Bus systems, especially the INTERBUS, enable the amount of interconnection cabling to be reduced and allow a greater exchange of data over long distances. The control interface unit IVI-KHD2-4HB5/IVI-KHA6-4HB5 with an INTERBUS connection is unsurpassed when applied in large systems with many distant and distributed reading stations. Typical areas of application are:

- high-bay storage systems
- driverless transport systems
- interlinked production lines
- automatic container identification

Date of issue 27.08.2001

4.3 System description

The control interface unit IVI-KHD2-4HB5/IVI-KHA6-4HB5 assumes control of the connected read/write heads that implement the data transmission with the code and data carriers, prepares the read information and controls the communication and data transmission with an INTERBUS master unit.

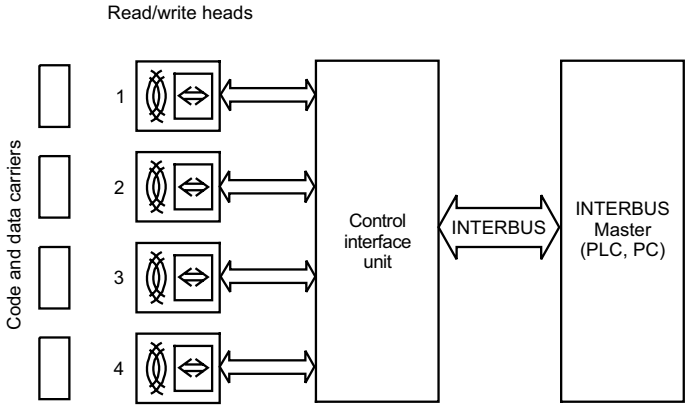


Figure 4.1 Function of the control interface unit IVI-KHD2-4HB5/IVI-KHA6-4HB5 in the IDENT-I System V inductive identification system

It is possible to connect up to 4 read heads to a single IVI-KHD2-4HB5/IVI-KHA6-4HB5 unit.

The control interface unit operates as a passive device (slave) in the system bus. Its use is, therefore, limited to the cyclically read process-data channel.

The control interface unit is assigned 4 words (8 bytes).

The acyclically read parameter channel of the INTERBUS protocol is not used.

Note

A detailed description of all commands can be found in chapter 7 "Operation with the INTERBUS".

Date of issue 27.08.2001

4.4 LED displays

Read heads

The following three LED display indicators, summarized below, are provided for each read head:

LED colour	Function
green	Read/write head active
yellow	Code and data carrier detected
red	Reserved

Run/Error

The two-colour (red/green) LED between the Sub-D connections for the bus lines indicates error conditions.

The status of devices is indicated on the red/green "Run/Error" LED, as follows:

LED continuously red:	Device defect
LED 5 s red, 0.5 s green, flashing:	Device ready for operation, no bus communication
LED green:	Device ready for operation, bus communication operative

4.5 Structure and operation

The control interface unit IVI-KHD2-4HB5/IVI-KHA6-4HB5 is the link between the read/write heads and the INTERBUS master (PLC, PC, etc.) Two independently operating microprocessors, which are connected to each other via an interface, cater for the data exchange between the read/write heads and the INTERBUS master.

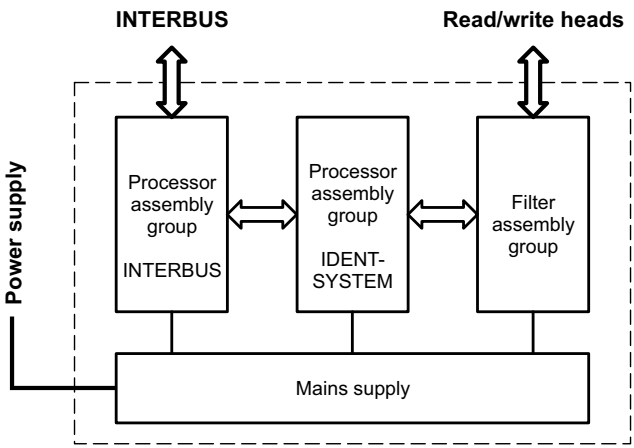


Figure 4.2 Block diagram of the IRI-KHD2-4HB5/IVI-KHA6-4HB5 control interface unit

Both the supply voltage and the bus segments themselves are galvanically isolated within the system.

Date of issue 27.08.2001

4.6 Accessories/product family

The IDENT-I inductive identification system from Pepperl+Fuchs offers many different options in combining the individual components.

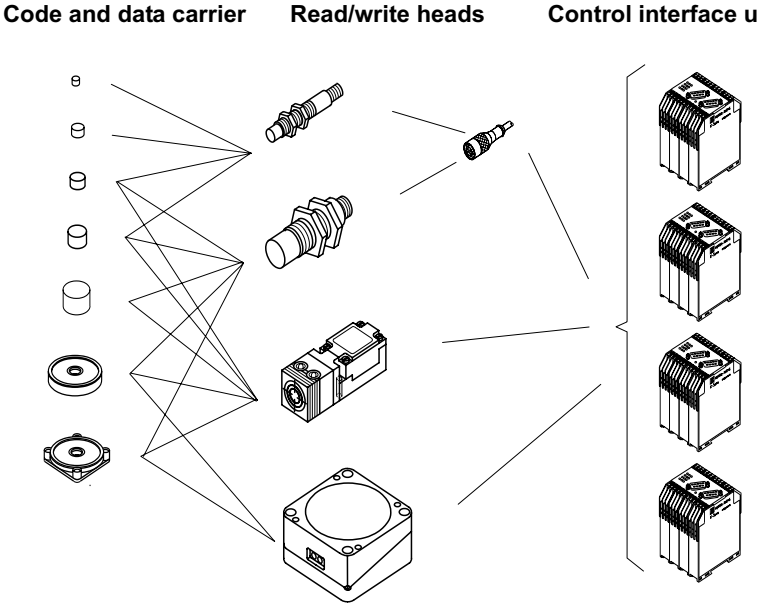


Figure 4.3 Overview of the inductive identification system components

Appropriate code carriers and read heads can be selected to suit installation requirements, read distance and environmental conditions.

Note

Further information on the inductive identification system with read functioning (System R) can be found in the Sensor Systems 1 catalogue

Date of issue 27.08.2001

5 Installation

5.1 Storage and transport

The device must be packed for storage and transport so that it is shock-resistant and protected against humidity. The original packaging offers optimum protection. The necessary environmental conditions must also be satisfied (see Technical Data).

5.2 Unpacking

Check that the contents are not damaged. In case of damage, notify the postal service or the forwarding agent and inform the carrier.

Check the contents of the package with respect to your order and the delivery documents for:

- correct number of parts
- device type and version compatible with the name plate on the device
- accessories
- handbook(s)

Keep the original packaging in case the device has to be repacked and stored or transported.

In the event of further queries, please contact Pepperl+Fuchs GmbH.

Date of issue 26.07.2001

5.3 Mounting

5.3.1 Mounting on a top-hat rail

As with all systems in K-system housings from Pepperl+Fuchs, the control interface unit IVI-KHD2-4HB5/IVI-KHA6-4HB5 can be snapped onto the 35 mm standard top-hat rail (to DIN EN 50022).

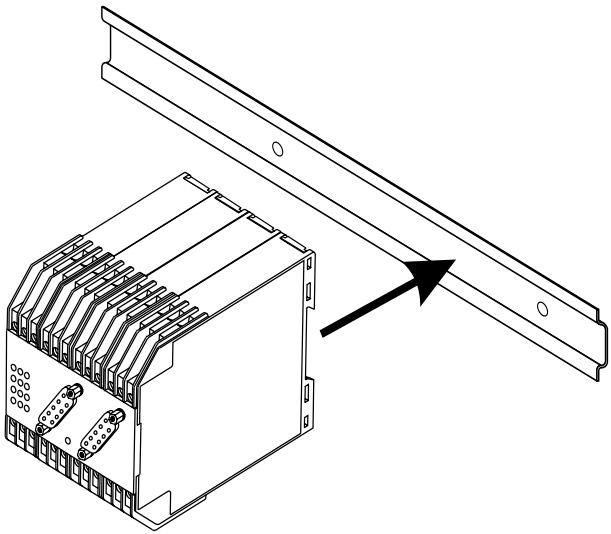


Figure 5.1 Mounting to the top-hat rail (to DIN EN 50022)

Position the unit over the top edge of the top-hat rail and press the bottom section of the housing against the rail until it snaps into position. Check that the unit sits firmly on the rail.

Date of issue 26.07.2001

5.3.2 Wall mounting

The control interface unit can also be wall mounted, using four screws. Simply extend the four outer brackets on the base of the unit. The unit can then be easily screwed onto the wall through the holes in the brackets. The screw pitch dimension is 90 mm (max. screw diameter M5).

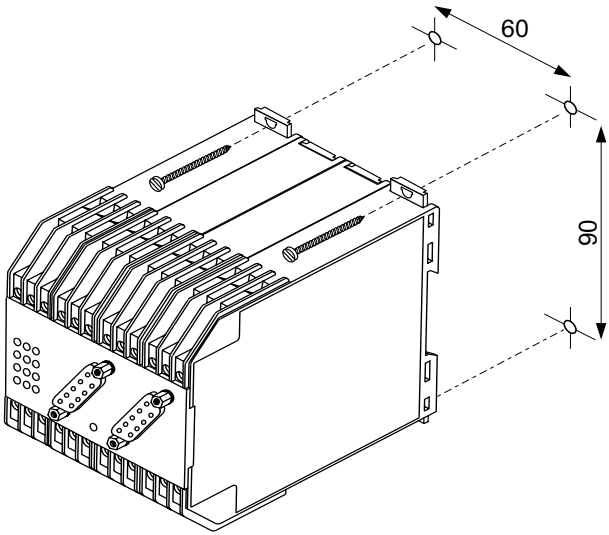


Figure 5.2 Wall mounting

5.4 Electrical connection

Warning

Only qualified personnel are permitted to carry out work under voltage and make electrical connection to the mains.

Ensure that the correct voltage is applied, as stated on the unit name plate.

A mains isolating device must be installed close to the device and labelled as such for the IVI-KHD2-4HB5/IVI-KHA6-4HB5.

Date of issue 26.07.2001

5.4.1 Equipment connection

The electrical connection of the control interface unit is made with the self-opening screw terminals on the top and bottom of the unit. Max. conductor cross section: 2 x 2.5 mm^2.

The INTERBUS connection must be carried out according to the INTERBUS specification, via the 9-pole Sub-D sockets on the front of the device. Additionally, the bus connections (DI, /DI, DO, /DO, GND) are also available on the screw terminals.

Connect the read/write heads and the supply voltage in accordance with the connection diagram and the labelled configuration of the terminals.

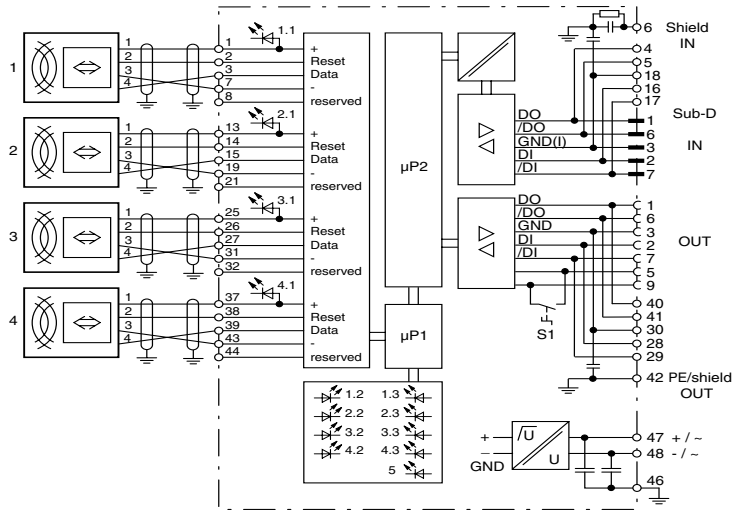


Figure 5.3 Connection diagram for the IVI-KHD2-4HB5/IVI-KHA6-4HB5 control interface unit

Location of the connection terminals

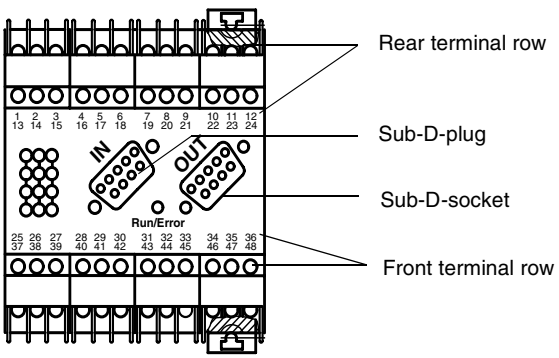


Figure 5.4 Assignment of connection terminals

Date of issue 26.07.2001

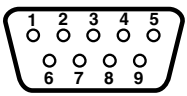
List of terminal assignments

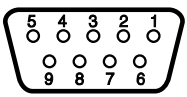
Terminal	Function
1	supply voltage read head 1 positive
2	„direction“ read head 1
3	„data“ read head 1
4	DO INTERBUS IN
5	/DO INTERBUS IN
6	Shield INTERBUS IN
7	supply voltage read head 1 negative
8	reserved
9	reserved
10	reserved
11	reserved
12	reserved
13	supply voltage read head 2 positive
14	„direction“ read head 2
15	„data“ read head 2
16	DO INTERBUS IN
17	/DO INTERBUS IN
18	GND INTERBUS IN
19	supply voltage read head 2 negative
20	reserved
21	reserved
22	reserved
23	reserved
24	reserved
25	supply voltage read head 3 positive
26	„direction“ read head 3
27	„data“ read head 3
28	DO INTERBUS OUT
29	/DO INTERBUS OUT
30	Shield INTERBUS OUT
31	supply voltage read head 3 negative
32	reserved
33	reserved
34	reserved
35	reserved
36	reserved
37	supply voltage read head 4 positive
38	„direction“ read head 4

Date of issue 26.07.2001

Terminal	Function
39	„data“ read head 4
40	DO INTERBUS OUT
41	/DO INTERBUS OUT
42	protective earth PE / Shield INTERBUS OUT
43	supply voltage read head 4 negative
44	reserved
45	reserved
46	ground power supply
47	power supply +
48	power supply -

Assignment of the 9-pole Sub-D plug and socket





PIN	INTERBUS IN	INTERBUS OUT
1	DO	DO
2	DI	DI
3	GND	GND
4	reserved	reserved
5	reserved	reserved
6	/DO	/DO
7	/DI	/DI
8	reserved	reserved
9	reserved	ring closure

Date of issue 26.07.2001

5.4.2 Information for connecting the read/write head cable

The connecting cables to the read/write heads must be shielded. The cross section of the cables must be at least 0.14 mm^2.

The screen of the read/write head lead is connected on both sides to earth (PE) with low resistence and low induction. For that the attached terminal block can be used (see Figure 5.5).

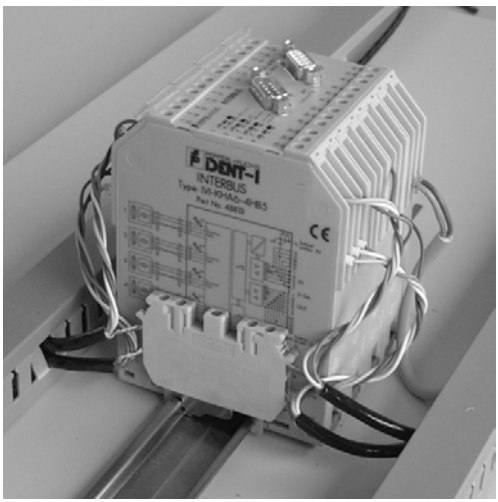


Figure 5.5 Terminal block with connecting cables

Read/write head cable lengths up to 50 m or 100 m are possible if the following conditions are satisfied.

up to 50 m read/write head cable:	cross sectional area of at least 4 x 0.25 mm^2 maximum resistance 78 Ohm/km maximum capacitance 90 pF/m (e.g. LIYC11C, Mukkenhaut & Nusselt MUNFLEX C11Y)
up to 100 m read/write head cable:	cross sectional area of at least 4 x 0.5 mm^2 maximum resistance 37 Ohm/km maximum capacitance 90 pF/m

Attention

With a cable length of 100 m, a series resistor of 82 Ohm must be fitted in the cable connected to the 'Reset' terminal of the heads.

Since more EM interference can result with longer cable lengths, the maximum cable lengths given above might not be possible for some applications.

Date of issue 26.07.2001

5.4.3 Special connection information for the INTERBUS cable

Ring closure switch

A key feature of the INTERBUS system is its physical ring structure. Each connected unit lies in the bus between two other stations. If this is not the case, e.g. a bus terminal at the end of a branch, the ring line in the affected unit must be closed.

This ring closure takes place automatically when the Sub-D connections are used. If the screw terminals on the IVI-KHD2-4HB5/IVI-KHA6-4HB5 are used to connect the bus line, the rotary switch for the ring closure, labelled "S1", must be moved to the appropriate position (see Figure 4.5). The ring closure switch is located on the top of the unit.

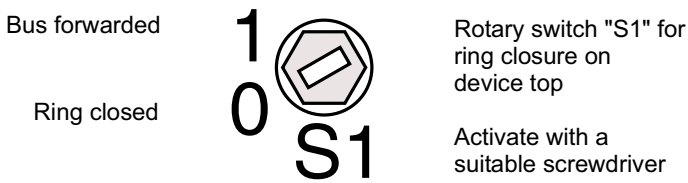


Figure 5.6 Ring closure switch

The ring closure must only be activated at an open branch end! All subsequent units will otherwise be cut off from communications.

Date of issue 26.07.2001

Cable

The bus connecting cables must have the following characteristics:

• cable construction	1 + 2 x 2, twisted pairs
• cross sectional area	≥ 0.25 mm^2
• intrinsic impedance	100 ... 130 Ω (f > 100 kHz)
• capacitance per unit length	≤ 120 nF/km
• DC resistance	≤ 150 Ω/km

Use only shielded cables consisting of two twisted cable pairs.
Only by using shielded cables can the noise immunity be optimised.

Length of leads

Depending of the type of cable used and the extent of external noise sources, the distance between two units can be up to 400 meters. The total length of an INTERBUS system can extend up to 13 kilometers. The number of units connected to the bus is limited to 512.

Date of issue 26.07.2001

5.5 Disassembly, packing and disposal

Repacking

The unit must be protected against humidity and shock when packing for later use. The original packaging offers optimum protection.

Disposal

Note

Electronic waste can be hazardous. Pay attention to local regulations when disposing of this unit.

The control interface unit IVI-KHD2-4HB5/IVI-KHA6-4HB5 does not contain internal batteries which must be removed before disposal.

Date of issue 26.07.2001

6 Commissioning

Warning

Before proceeding with the commissioning, ensure that no danger to the system can arise from the device, e.g. due to uncontrolled processes.

Attention

Check again all connections before proceeding with the commissioning.

Prepare for the commissioning by familiarising yourself with the communication between the INTERBUS master and the control interface unit (Section 6 and 7 of this handbook). The commissioning requires a good knowledge of the INTERBUS and the programming of the master unit.

6.1 Preparation

Due to the complexity of field bus programming with the INTERBUS, it is, unfortunately, difficult to give a valid general description on how to perform the commissioning.

A very important aspect for the operation of an inductive identification system using the control interface unit IVI-KHD2-4HB5/IVI-KHA6-4HB5 on the INTERBUS is the response time of the total system. The question "How much time is required for data to be available in my computer once the data carrier is positioned in front of the read/write head?" can be determined from the design of the INTERBUS protocol, using the following formula:

$$= [13 \cdot (6 + n) + 1,5 \cdot m] \cdot t_{Bit} + t_{SW} + t_{PH}$$

t_t = transmission time	
m = number of installed external bus stations	
t_{Bit} = bit length 3	t_{Bit} = 2 µs at 500 kBit/s
t_{sw} = software runtime	t_{sw} = 200 µs
t_{PH} = runtime on the transmission medium	
for cupper t_{PH} = 0,016 ms * l/km	
l - length of the remote bus cable in km	

On larger projects, or in the event of limited experience in setting up a project with an INTERBUS system, a test system should first be constructed for the particular application, to test the transmission of data to the INTERBUS master.

Note

The manufacturer-independent program "CMD" is available for planning, commissioning and diagnosing INTERBUS networks. For additional information regarding this program and other relevant INTERBUS topics, contact :
INTERBUS-Club, Postfach 1108, 32817 Blomberg, GERMANY;
Telephone (+49)5235/342100, Fax (+49)5235/341234

Date of issue 19.07.2001

6.2 Self-test

After switching on the supply voltage, the control interface unit checks the internal memory area with a self-test. If a "RAM failure" or "ROM failure" error occurs, communication is not activated. If no error is present, the connection to the INTERBUS master is made automatically.

Note

If the bus connection to the control interface unit is made, the LED "Run/Error" will be green and permanently illuminated.

Date of issue 19.07.2001

7 Operation with the INTERBUS

7.1 General information on the INTERBUS

The INTERBUS is a standardised field bus that can exchange data between PLCs, PCs, operating and monitoring systems, as well as sensors and actuators.

The framework of this operating manual can be considered as an extensive introduction to the INTERBUS. For additional information, reference should be made to the INTERBUS standard DIN 19258 and the relevant literature.

Note

The INTERBUS-Club publishes information brochures and an INTERBUS product catalogue. The address can be found on page 24.

7.2 Representation of commands and data on INTERBUS

The IVI-KHD2-4HB5/IVI-KHA6-4HB5 control interface unit occupies 4 words, each with 16 bits, in the INTERBUS framework protocol, in both communication directions. It is therefore restricted to the cyclically transferred process data channel. This means:

The commands for setting the interface unit are also updated on each cycle.

The INTERBUS parameter channel is not used.

The control interface unit is designed as a remote bus station.

The ID Code is 03.

Date of issue 19.07.2001

7.2.1 Communication INTERBUS master ⇒ Control interface unit

In the INTERBUS master to control interface unit direction, the words are assigned as follows:

Bit No.	15	**14**	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Designation	B4	**B3**	B2	B1	DS	SF	T2	T1	N4	N3	N2	N1	K3	K2	K1	T

B4..1: Command code

B4	B3	B2	B1	Command	Meaning
0	0	0	0	No command	
0	0	0	1	SF	Single-Read Fixcode
0	0	1	0	AF	Auto-Read Fixcode
0	0	1	1	BF	Buffered-Auto-Read Fixcode
0	1	0	0	SR	Single-Read
0	1	0	1	AR	Auto-Read
0	1	1	0	BR	Buffered-Auto-Read
0	1	1	1	SW	Single-Write
1	0	0	0	AW	Auto-Write
1	0	0	1	BW	Buffered-Auto Write
1	0	1	0	not defined	
1	0	1	1	not defined	
1	1	0	0	not defined	
1	1	0	1	not defined	
1	1	1	0	not defined	
1	1	1	1	Code interrogation	

- DS: Double-Side Mode ON/OFF (Double-side read/write, only for IDC/ICC-50)
- SF: Security-Flag ON/OFF (Data carrier can be read as a code carrier)
- T2,1: Data carrier type

T2	T1	Type
0	0	IDC-1k
0	1	IMC40-64k
1	0	IMC40-256k
1	1	not defined

When a code carrier is read, the data carrier type is ignored.

Date of issue 19.07.2001

- N3..1: Total number of words to be read or written (at present, maximum of two);

N4	N3	N2	N1	Number of words
0	0	0	0	reserved **
0	0	0	1	1
0	0	1	0	2
0	0	1	1	reserved
0	1	0	0	reserved
0	1	0	1	reserved
⋮	⋮	⋮	⋮	⋮
1	1	1	0	reserved
1	1	1	1	reserved

** (up to 16 in future extensions)

- K3..1: Head number

K3	K2	K1	Head
0	0	0	1
0	0	1	2
0	1	0	3
0	1	1	4
1	0	0	all
1	0	1	all
1	1	0	all
1	1	1	all

- T: Toggle flag

The toggle flag provides an indication for the user that the command has arrived at the control interface unit and is being/has been processed.
On the first command, T must equal 1.

Word 1:	Initial address of word in the data carrier. On reading a fix code the content is ignored
Word 2+3:	data to be written

Date of issue 19.07.2001

7.2.2 Communication control interface unit ⇒ INTERBUS master

In the direction control interface unit to INTERBUS master, the words are assigned as follows:

Word 0: Command + Parameter + Toggle flag
Word 1: Status/execution counter/head number

Bit No.	15	**14**	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Designation	-	**K3**	K2	K1	N4	N3	N2	N1	-	-	-	-	S4	S3	S2	S1

K3..1: Read head number (head 1...4, s.o.)
N4..1: 4 bit execution counter
S4..1: Status/error message, s.a.

Nr.	S4	S3	S2	S1	Meaning
0	0	0	0	0	Command was executed with no error
1	0	0	0	1	Battery low (only IMC-40), command was not correctly executed
2	0	0	1	0	* Self test ok, device is ready for operation (only for switch-on message)
3	0	0	1	1	* Internal error, device is ready for operation again (Watchdog reset, only for switch-on message)
4	0	1	0	0	Incorrect or incomplete command or parameter not in valid range or timeout
5	0	1	0	1	Read or write error
6	0	1	1	0	Hardware error (* µC / * RAM / * ROM / * EEPROM / Read head)

The status messages indicated by * are not represented in the INTERBUS control interface unit.

Word 2+3: read data

The execution of the command commences as soon as a valid command with toggled flag "T" has been written in the code. On receipt of the command, this flag is sent back by the control interface unit as an acknowledgement, and likewise with the remaining fields of word 0.

The execution counter is reset at the start of the command execution and then incremented when the command has been fully executed, in order to indicate the availability of the status message and the read data, if required. In the buffered mode, the execution counter is incremented on each successful read or write operation.

Date of issue 19.07.2001

7.2.3 Detailed description of the commands

Fixcode commands

In the case of the fixcode SF, AF and BF, the following data is obtained as a response in words 2 and 3:

Word 2:

Bit No.	15	**14**	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	-0	**0**	0	0	C28	C27	C25	C25	C24	C23	C22	C21	C20	C19	C18	C17

Word 3:

Bit No.	15	**14**	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	C16	**C15**	C14	C13	C12	C11	C10	C9	C8	C7	C6	C5	C4	C3	C2	C1

C28...C1 : 28 bit code carrier fixcode

The word start address in Word 1 is ignored.

Data carrier write commands

On writing, in Words 2 and 3, the data to be written is transferred to the control interface unit. The content of Words 2 and 3 is not defined in the response.

Valid word starting addresses in Word 1 are summarised in the following table:

Data carrier type	Address range (hex)
1DC-1k	0000 ... 003F
IMC40-64k	0000 ... 0FFF
IMC40-356k	0000 ... 3FFF

Data carrier read commands

On a read command, the content of Words 2 and 3 are ignored by the control interface unit. The response contains the read data.

Valid word starting addresses in Word 1 are summarised in the following table:

Data carrier type	Dress range (hex)
1DC-1k	0000 ... 003F
IMC40-64k	0000 ... 0FFF
IMC40-356k	0000 ... 3FFF

Date of issue 19.07.2001

Device code/software version message:

The device code (identifier) and software version are demanded via the command B4...B1 = 1111.
The control interface unit transfers this data to Words 2 and 3.

Word 2: Device code: "V5" for IVI-KHxx-4HB5

Bit	15...8	7...0
	"V“	"5“

Word 3: Software index ident/bus software

Bit	15...8	7...0
	Index Ident ("A"... "Z")	Index Bus ("A" ... "Z")

Date of issue 19.07.2001

8 Error Diagnostics

LED error indication

The status of the IVI-KHD2-4HB5/IVI-KHA6-4HB5 control interface unit is indicated on the "Run/Error" LED

Signal	Meaning
permanently green	device ready for operation/ communication active
once 0,5 s green; 5 s red	communication error

The following figure illustrates the LED signals:

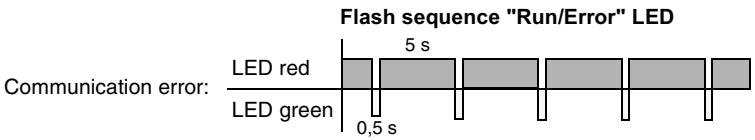


Figure 8.1 Flashing sequence of the "Run/Error" LED

Date of issue 19.07.2001

Date of issue 19.07.2001

9 Technical Data

9.1 General specifications

The control interface unit is operated as an INTERBUS remote bus subscriber. The control interface unit uses 16 bytes in the INTERBUS frame protocol; 4 words, each with 16 bits in both directions of communication. Of these, 2 words are available to the user for user data. Only the cyclically transmitted process data channel is used; the parameter channel is not used.

Up to 4 read heads can be connected to the control interface unit.

The subscriber description for the INTERBUS software CMD-tools is supplied, making it possible to easily insert the control interface unit into the CMD subscriber database.

Features

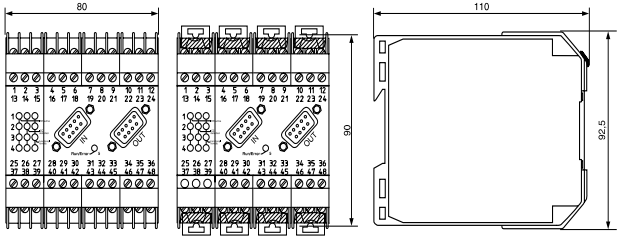
- INTERBUS-remote bus subscriber
- Complete read/write functionality via the INTERBUS
- 4 read/write heads connectable
- Transmission of 2 words, 16 bit each, in one cycle
- 3 LED as function indicators for each read/write head
- LED for power on / bus communication
- Simple commissioning possible with CMD-tools INTERBUS software
- RS 485 interface
- ID-code: 03

9.2 Electrical data

Order code	IVI-KHD2-4HB5	IVI-KHA6-4HB5
Power supply		
Supply voltage	18 V DC ... 32 V DC	85 V AC ... 253 V AC, 50 Hz ... 60 Hz
Ripple	≤ 10 %	
Current	200 mA	50 mA
Quiescent current	≤ 110 mA / 24 V DC (typ)	
Power consumption	5 W	10 VA

Date of issue 27.08.2001

9.3 Mechanical data



Ambient conditions	
Operating temperature	-25 °C ... +70 °C (248 Kelvin ... 343 Kelvin
Storage temperature	-25 °C ... +85 °C (248 Kelvin ... 358 Kelvin)
Humidity	max. 75 % rel. humidity
Mechanical specifications	
Protection degree	IP20 acc. EN 60529
Connection possibilities	self-opening apparatus terminals, max. cross sectional area 2 x 2.5 mm^2 9-pin Sub-D built-in connector
Housing material	Makrolon 6485
Construction type	K-System, 80 mm (4 TE)
Mounting	snaps onto 35 mm standard rail according to DIN EN 50022 or screw-mountable with 2 screws through pull-out brackets in 90 mm spacing

9.4 Indicating/operating means

LED green	Read/write head active (4 LEDs, 1 per head)
LED yellow	Code carrier detected (4 LEDs, 1 per head)
LED red	Functional reserved (4 LEDs, 1 per head)
LED red/green permanently green red-green blinking permanently red	device status device ready for operation/communication activev device ready for operation/communication error device error
Rotary switch	ring termination 0 = closed 1 = bus continued

9.5 Software

Software	The unit description for the commissioning software is included in the scope of delivery.

Date of issue 27.08.2001

10 Appendix

10.1 List of abbreviations

BIN	-	binary
EEPROM	-	electronically erasable and programmable ROM
EMC	-	electromagnetic compatibility
HEX	-	hexadecimal
L	-	line, phase for mains connection (230 V AC)
LED	-	light emitting diode
µP	-	microprocessor
N	-	neutral for mains connection (230 V AC)
PC	-	personal computer
PE	-	protective earth
RAM	-	random access memory
ROM	-	read only memory
PLC	-	programmable logic controller

Date of issue 19.07.2001

10.2 Table of ASCII characters

hex	dez.	ASCII	hex	dez.	ASCII	hex	dez.	ASCII	hex	dez.	ASCII
00	0	NUL	20	32	Space	40	64	@	**60**	**96**	‘
01	1	SOH	21	33	!	41	65	A	**61**	**97**	**a**
02	2	STX	22	34	“	42	66	B	**62**	**98**	**b**
03	3	ETX	23	35	#	43	67	C	**63**	**99**	**c**
04	4	EOT	24	36	$	44	68	D	**64**	**100**	**d**
05	5	ENQ	25	37	%	45	69	E	**65**	**101**	**e**
06	6	ACK	26	38	&	46	70	F	**66**	**102**	**f**
07	7	BEL	27	39	‘	47	71	G	**67**	**103**	**g**
08	8	BS	28	40	(	48	72	H	**68**	**104**	**h**
09	9	HT	29	41	)	49	73	I	**69**	**105**	**i**
0A	10	LF	2A	42	*	4A	74	J	**6A**	**106**	**j**
0B	11	VT	2B	43	+	4B	75	K	**6B**	**107**	**k**
0C	12	FF	2C	44	,	4C	76	L	**6C**	**108**	**l**
0D	13	CR	2D	45	-	4D	77	M	**6D**	**109**	**m**
0E	14	SO	2E	46	.	4E	78	N	**6E**	**110**	**n**
0F	15	SI	2F	47	/	4F	79	O	**6F**	**111**	**o**
10	16	DLE	30	48	0	50	80	P	**70**	**112**	**p**
11	17	DC1	31	49	1	51	81	Q	**71**	**113**	**q**
12	18	DC2	32	50	2	52	82	R	**72**	**114**	**r**
13	19	DC3	33	51	3	53	83	S	**73**	**115**	**s**
14	20	DC4	34	52	4	54	84	T	**74**	**116**	**t**
15	21	NAK	35	53	5	55	85	U	**75**	**117**	**u**
16	22	SYN	36	54	6	56	86	V	**76**	**118**	**v**
17	23	ETB	37	55	7	57	87	W	**77**	**119**	**w**
18	24	CAN	38	56	8	58	88	X	**78**	**120**	**x**
19	25	EM	39	57	9	59	89	Y	**79**	**121**	**y**
1A	26	SUB	3A	58	:	5A	90	Z	**7A**	**122**	**z**
1B	27	ESC	3B	59	;	5B	91	[	**7B**	**123**	**{**
1C	28	FS	3C	60	<	5C	92	\	**7C**	**124**	**|**
1D	29	GS	3D	61	=	5D	93	]	**7D**	**125**	**}**
1E	30	RS	3E	62	>	5E	94	^	**7E**	**126**	**~**
1F	31	US	3F	63	?	5F	95	_	**7F**	**127**	**DEL**

Date of issue 19.07.2001

11 Commissioning an S5 135U with INTERBUS-S interface

11.1 Short Description

The IVI_B5ST.s5d program initializes and starts the INTERBUS-S system in the cyclic program.

The logical address lists are transmitted to the interface module via the addressing block for checking.

Following the initialization of the interface module and of the driver block, startup of the control system is initiated. The logical addressing is then activated in the cyclic program. The application must remain locked in the cyclic program until the addressing block has been processed fault-free (BUSY=RET=0).

The defined module addresses can be accessed in the cyclic program by the application.

11.2 Setting the INTERBUS-S interface

Controlled operation with logical addressing on system start.

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

11.3 Used hardware

Automation device	SIEMENS	Type: 135U
CPU	SIEMENS	Type: 928 B
Programming device	SIEMENS	Type: PG 740
INTERBUS-S Interface	Phoenix Contact	Type: IBS S5 DCB-T
Ident-I Analyser Unit	Pepperl+Fuchs	Type: IVI-KHD2-4HB5

Date of issue 30.07.2001

11.4 Program

11.4.1 Logical addressing on startup

The logical addressing of the INTERBUS-S System is activated via the FB 210 function block. It includes an initialization block (INITIB), two driver blocks (REQ/RES, CON/IND), an auxiliary block (CIH) and the addressing block (ADDRESS).

Note

The base address set as window 3 on the INTERBUS-S interface unit is to be used as parameter FEN3 of the FB 60 function block.

11.4.2 Cyclic program OB1

The INTERBUS-S System is started here. The addressing block transmits the logical address lists for the purpose of checking the interface module.

Following the logical addressing, the application can access the defined module addresses.

As the message driver (CON/IND) is cyclically accessed, the messages are not disabled.

The function of the system can be monitored via the diagnosis register (diagnose-bit/ parameter-register).

Used blocks:

FB 210	Start	
FB 60	INITIB	Initialization block
FB 62	CON/IND	Driver block
FB 66	REQ/RES	Driver block
FB 63	CIH	Auxiliary block
FB 72	ADDRESS	Addressing block
FB 11	ANWEND	Application

Used data blocks:

DB 9	Interbus-S block
DB 10	Ident-Code list
DB 11	Bus segment list
DB 12	IN-address list
DB 13	OUT-address list

Date of issue 30.07.2001

Activation condition for the application

ADDRESS block:		
BUSY	= 0	Activation bit
RET	= 0	Return value is positive
Diagnosis-bit register:		
RUN	= 1	INTERBUS-S in the cycle

11.4.3 DB 10: Ident-Code list

The ID-Code address list includes the physical bus structure.

This is described by the ID-numbers of the modules and by their length codes.

The counting order of the modules begins with the interface module and continues over the entire bus structure. The list is completed with the entry of the special ID codes.

In the example:

ID 16 = diagnosis-bit register

ID 17 = diagnosis-parameter register

List structure:

DW y	KY=	000,PC	Number of parameters
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

Legend:

PC = Number of following parameters

LC = Length code of the module (data words to be transmitted)

ID = Ident-Code of the module

SID = Special Ident-Code

16 = diagnosis-bit register

17 = diagnosis-parameter register

18 = register for bit-controlled commands

19 = bit-manipulation register

Date of issue 30.07.2001

DB 10:

```
Ident-Code list
0:    KY 0,3     ;number of parameters
1:    KY 4,3     ;IVI- ... -4HB5
2:    KY 0,16    ;diagnosis-bit register
3:    KY 0,17    ;diagnosis-parameter register
```

11.4.4 DB 11: bus-segment list

The bus-segment list describes the logical relationship between the physical segment structure (module positions) and the logical segment numbering.

The remote-bus structure is defined by an additional parameter (installation depth).

Installation depth:

The remote-bus structure is divided into the primary remote-bus branch (installation depth = 0) and the installation remote bus (installation depth = 16).

List structure:

DW y	KY=	000,PC	Number of parameters
DW y+1	KY=	IT,SN	1st module
DW y+2	KY=	000,000	
⋮	⋮	⋮	
DW y+n-2	KY=	IT,SN	nth module
DW y+n-1	KY=	000,000	Special ID-Code
DW y+n	KY=	000,000	Special ID-Code

Legend:

PC = Number of following parameters
SN = Bus segment no. (0 - 255)
IT = Installation depth (primary branch = 0, secondary branch 16)

DB 11:

```
;bus-segment list
0:    KY 0,3  ;number of parameters
1:    KY 0,0  ;IVI- ... -4HB5
2:    KY 0,0  ;diagnosis-bit register
3:    KY 0,0  ;diagnosis-parameter register
```

Date of issue 30.07.2001

11.4.5 DB 12: IN-address list

The IN-address list contains the logical input addresses of the subscribers. The list is an image of the Ident-Code list.

Each list position which is occupied by an input module is provided with an input address. This forms the basis of the module in the control system.

In the example:

DW 1 KY 000,020 IVI-4HB5

The analyser unit is assigned input words 20 - 26 in the control system.

List structure:

DW y	KY=	000,PC	Number of parameters
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

Legend:

PC =	Number of following parameters	
B =	Address range	0 = P - range of the control system
		1 = Q - range of the control system
ADR =	Base address of the module (0 - 255)	
	Word-oriented module = even address	
	Byte-oriented module = odd/even address	

DB 12:

```
;IN-address list
0:    KY 0,3      ;Number of parameters
1:    KY 0,20     ;IVI- ... -4HB5
2:    KY 0,126    ;diagnosis-bit register
3:    KY 0,128    ;diagnosis-parameter register
```

Date of issue 30.07.2001

11.4.6 DB 13: Out-address list

The OUT-address list contains the logical output addresses of the subscribers. The list is an image of the Ident-Code list.

Each list position which is occupied by an output module is provided with an output address. This forms the basis of the module in the control system.

In the example:

DW 1 KY 000,030 IVI-4HB5

The analyser unit is assigned output words 30 - 36 in the control system.

List structure:

DW y	KY=	000,PC	Number of parameters
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

Legend:

PC =	Number of following parameters	
B =	Address range	0 = P - range of the control system
		1 = Q - range of the control system
ADR =	Base address of the module (0 - 255)	
	Word-oriented module = even address	
	Byte-oriented module = odd/even address	

```
;OUT-address list
0:    KY 0,3     ;number of parameters
1:    KY 0,30    ;IVI- ... -4HB5
2:    KY 0,0     ;diagnosis-bit register
3:    KY 0,0     ;diagnosis-parameter register
```

Date of issue 30.07.2001

11.4.7 BB1: image block

Input words 20 ... 26 and output words 30 ... 36 are displayed by calling up image block BB 1 in the PG function "Control variables".

The input and output data of the analyser unit can be interpreted here.

The appropriate commands can be sent to the analyser unit by changing the output words.

The handbook for the analyser unit is to be used for interpreting the contents.

Output word OW 30 must follow output words OW 32 ... OW 36 so that the parameters are written to the appropriate output words before a command is transmitted.

11.5 Blocks

11.5.1 OB1 structure

```
;cyclic program
          SPA       FB 62
NAME:     CON/IND
IBDB:     DB 9
CIDB      MB 18                 ;InterBus data blocks
T  :      T 1                   ;Head-DB-CON/IND
TO :      M 8.3                 ;Timer
                                ;Timeout
          U         M 10.0
          SPB       FB 72
NAME:     ADDRESS
IBDB      DB 9
BUSY      M 10.=                ;InterBus data block
T  :      T 2                   ;Activation-Bit
IDDB:     DB 10                 ;Timer
IDDW:     KF +0                 ;DB: ID-code list
LBDB      DB 11                 ;DW:
LBDW      KF +0                 ;DB: Bus-segment list
INDB:     DB 12                 ;DW:
INDW      KF +0                 ;DB: IN-address list
OUDB:     DB 13                 ;DW:
OUDW      KF +0                 ;DB: OUT-address list
KRDB      DB 0                  ;DW:
KRDW:     KF +0                 ;DB: KR-address list
GRDB:     DB 0                  ;DW:
GRDW:     KF +0                 ;DB: group definitions
MODE:     M 10.5                ;DW:
EREG:     MB 12                 ;indicator mode
```

Date of issue 30.07.2001

```
TO :    M 10.1              ;Error-register
RET:    M 10.2              ;Timeout
                            ;Return value
        UN      M 10.0
        UN      M 10.2
        SPB     FB 11
NAME:   ANWEND
        SPA     FB 66
NAME:   REQ/RES
IBDB:   DB 9                ;InterBus data block
RRDB:   MB 19               ;Head-DB-REQ/RES
T  :    T 3                 ;Timer
TO :    M 8.4               ;Timeout
        BE
```

11.5.2 OB20 / OB 21 / OB 22 structure

```
        SPA     FB 210
NAME::  ANLAUF
        BE
```

11.5.3 FB210 structure

```
;Logical addressing in the cycle
NAME:   ANLAUF

        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/UND,REQ/RES
        T       MW 18       ;DB PCP head tables

LOOP:   U       M 8.0
        SPB     FB 60
NAME    INITIB
IBDB    DB 9                ;InterBus data block
FEN3    KF +248             ;Base address: Window 3
AV:     KF +1               ;cont. Operating/Mess. enable
```

Date of issue 30.07.2001

```
RRST:   DB 0                ;REQ/RES Standard DB
CIST:   DB 0                ;CON/IND Standard DB
RRMW:   KF +0               ;Activation word
CIMW:   KF +0               ;Message word
CIFB:   FB 63               ;Auxiliary block CON/IND
T  :    T 0                 ;Timer
STEP:   MB 9                ;Internal identifier byte
BUSY:   M 8.0               ;Activation bit
TO :    M 8.1               ;Timeout
RET:    M 8.2               ;Return value

        SPA     FB 62
NAME:   CON/IND
IBDB:   DB 9                ;InterBus data block
CIDB:   MB 18               ;Head-DB-CON/IND
T  :    T 1                 ;Timer
:       M 8.3               ;Timeout

        SPA     FB 66
NAME:   REQ/RES
IBDB:   DB 9                ;InterBus data block
RRDB:   MB 19               ;Head-DB-REQ/RES
T  :    T 3                 ;Timer
TO :    M 8.4               ;Timeout
        U       M 8.0       ;INITIB
        SPB     =LOOP
        UN      M 8.2
        BEB
        STP
BE
```

Date of issue 30.07.2001

11.5.4 FB11 structure

```
;Application II
NAME:   ANWEND

                                ;===== always Aktiv =====

                                ;—— Acknowledgment IBS ——
        S                       ; - RB error
                                ; - LB error

        U       M 100           ;Acknowledgment button RB/LB Error
        UN      M 4.0           ;Edge identifier
        UN      E 127.5         ;RUN-bit diagnosis register
        S       M 4.0
        S       M 10.0          ;BUSY-Bit der Adressierung
        UN      M 100.0
        R       M 4.0           ;————————————————————

        O       M 10.0          ;ADDRESS: BUSY-Bit
        O       M 10.2          ;RET-Bit
        ON      E 127.5         ;RUN-Bit diagnosis register
        BEB
                                ;===== active when IBS OK =====

        U       M 100.1         ;Acknowledgement button MOD Error
        UN      M 4.1           ;Edge identifier
        S       M 4.1
        S       M 50.0          ;ERRINFO BUSY-Bit
        UN      M 100.1
        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 1     MB 52

        U       M 50.0
        SPB     FB 74
```

Date of issue 30.07.2001

```
NAME:   ERRINFO
IBDB:   DB 9            ;InterBus data block
T  :    T 2             ;Used timer
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    t     Return value
RET:    M 50.2          ;Timeout

                        ;————————————————————

        BE
```

11.6 Additional documents

- Handbook IVI- ...-4HB5
- INTERBUS-S User Handbook Diagnosis Interface Module for SIEMENS SIMATIC S5
- SIEMENS handbooks for SIMATIC S5

11.7 Examples

Commands can be sent to the analyser unit by changing output word OW 30.

When transmitting commands, note that bit 0 of output word OW 10 must always be toggled in order for the command to become valid.
T = 0, when previously 1
T = 1, when previously 0
with 1st command, toggle-bit T must be equal to 1.

Date of issue 30.07.2001

11.7.1 Continuous reading of a fixcode with read head no. 3 (Buffered-Auto-Read Fixcode)

Output data:

OW 30 Command INTERBUS-S-Master to analyser unit

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	0	1	1	0	0	0	0	0	0	1	0	0	1	0	T

OW 32 ... 36 are not taken into consideration.

Input data:

IW 20 Mirroring of the command from the analyser unit to the INTERBUS-S-Master

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	0	1	1	0	0	0	0	0	0	1	0	0	1	0	T

IW 22 Status/execution counter/head number

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	-	K3	K2	K1	N4	N3	N2	N1	-	-	-	-	S4	S3	S2	S1

K3...1: Read-head number

N4...1: 4-bit execution counter

S4...1: Status-/error message

IW 24 and 26 read data

11.7.2 Continuous reading of a data medium of type IDC-1k at address 0000h with read head no. 2 (buffered auto-read)

Output data:

OW 30 Command INTERBUS-S-Master to analyser unit

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	1	1	0	0	0	0	0	0	0	1	0	0	0	1	T

OW 32

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

OW 34 ... 36 are not taken into consideration.

Date of issue 30.07.2001

Input data:

IW 20 Mirroring of the command from the analyser unit to the INTERBUS-S-Master

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	1	1	0	0	0	0	0	0	0	1	0	0	0	1	T

IW 22 Status/execution counter/head number

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	-	K3	K2	K1	N4	N3	N2	N1	-	-	-	-	S4	S3	S2	S1

K3...1: Read-head number

N4...1: 4-bit execution counter

S4...1: Status-/error message

IW 24 and 26 read data

11.7.3 Writing a data medium of type IDC-1k at address 0024h with read head no. 4 (Auto-Write)

After transmitting the command to the analyser unit, read head no. 4 is switched on.

As soon as a data medium enters the range of read head no. 4, the data are stored on the data medium. The read head is then switched back off.

The data to be written in the example are 1234h and 5678h.

Output data:

OW 30 Command INTERBUS-S-Master to analyser unit

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	1	0	0	0	0	0	0	0	0	0	1	0	0	1	1	T

OW 32

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0

OW 34

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	0	0	1	0	0	1	0	0	0	1	1	0	1	0	0

OW 36

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	1	0	1	0	1	1	0	0	1	1	1	1	0	0	0

Date of issue 30.07.2001

Input data:

IW 20 Mirroring of the command from the analyser unit to the INTERBUS-S-Master

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	1	0	0	0	0	0	0	0	0	0	1	0	0	1	1	T

IW 22 Status/execution counter/head number

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	-	K3	K2	K1	N4	N3	N2	N1	-	-	-	-	S4	S3	S2	S1

K3...1: Read-head number

N4...1: 4-bit execution counter

S4...1: Status-/error message

IW 24 and 26 read data

11.7.4 Reading a data medium of type IDC-1k at address 0024h with read head no. 1 (Auto-Read)

After transmitting the command to the analyser unit, read head no. 1 is switched on. As soon as a data medium enters the range of read head no. 1, the data are read from the data medium. The read head is then switched back off.

Output data:

IW 30 Command INTERBUS-S-Master to analyser unit

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	T

IW 32

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0

IW 34 ... 36 are not taken into consideration.

Date of issue 30.07.2001

Input data:

IW 20 Mirroring of the command from the analyser unit to the INTERBUS-S-Master

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	T

IW 22 Status/execution counter/head number

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	-	K3	K2	K1	N4	N3	N2	N1	-	-	-	-	S4	S3	S2	S1

K3...1: Read-head number

N4...1: 4-bit execution counter

S4...1: Status-/error message

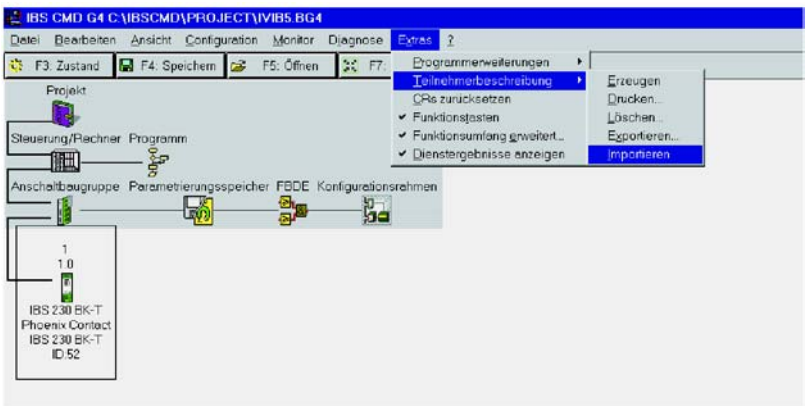
IW 24 and 26 read data

11.8 Inserting the subscriber description

in the subscriber database IBS CMD G4

If the subscriber descriptions of the analyser units IRI-KH❑❑-4HB5 (read-only) or IVI-KH❑❑-4HB5 (read/write) are not yet in the CMD subscriber database, these subscriber descriptions can be imported from diskette.

- Insert the diskette with the subscriber descriptions in drive A.
- Select the menu option Options/Subscriber Description/Import



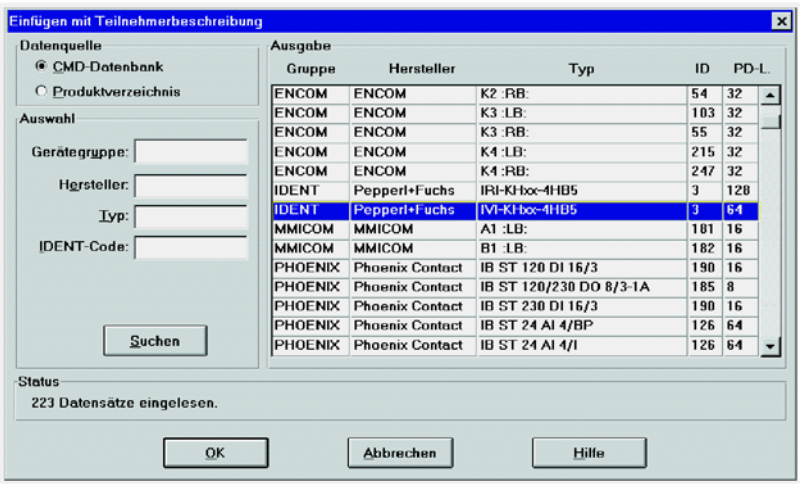
Date of issue 30.07.2001

CMD opens a window with the title "Import Subscriber Descriptions".

- In the field "Load from drive", select diskette A:.
- If necessary, click the field "Manufacture Name", to initiate loading of the directory contents.
- Select the desired device type and conclude with "OK".

The device is now available in the CMD subscriber database.

The analyser unit can be selected as usual with the function "Insert with subscriber description".



Date of issue 30.07.2001

Date of issue 19.07.2001

Notes

Date of issue 19.07.2001

Date of issue 19.07.2001

Notes

Date of issue 19.07.2001

With regard to the supply of products, the current issue of the following document is applicable:
The General Terms of Delivery for Products and Services of the Electrical Industry, as published by the Central Association of the 'Elektrotechnik und Elektroindustrie (ZVEI) e.V.',
including the supplementary clause "Extended reservation of title"

We at Pepperl+Fuchs recognise a duty to make a contribution to the future.
For this reason, this printed matter is produced on paper bleached without the use of chlorine.

One Company, Two Divisions.

Factory Automation Division

Product Range

- Digital and analogue sensors
- in different technologies
  - Inductive and capacitive sensors
  - Magnetic sensors
  - Ultrasonic sensors
  - Photoelectric sensors
- Incremental and absolute rotary encoders
- Counters and control equipment
- Identification Systems
- AS-Interface

Areas of Application

- Machine engineering
- Conveyor or transport
- Packaging and bottling
- Automotive industry

Process Automation Division

Product Range

- Signal conditioners
- Intrinsically safe interface modules
- Remote Process Interface (RPI)
- Intrinsically safe field bus solutions
- Level control sensors
- Process measuring and control systems engineering at the interface level
- Intrinsic safety training

Areas of Application

- Chemical industry
- Industrial and community sewage
- Oil, gas and petrochemical industry
- PLC and process control systems
- Engineering companies for process systems

Service Area

Worldwide sales, customer service and consultation via competent and reliable Pepperl+Fuchs associates ensure that you can contact us wherever or whenever you need us. We have subsidiaries worldwide for your convenience.

The Pepperl+Fuchs Group

USA Headquarters
Pepperl+Fuchs Inc. • 1600 Enterprise Parkway
Twinsburg, Ohio 44087 • Cleveland-USA
Tel. (330) 4 25 35 55 • Fax (330) 4 25 93 85
e-mail: sales@us.pepperl-fuchs.com

Asia Pacific Headquarters
Pepperl+Fuchs Pte Ltd. • P+F Building
18 Ayer Rajah Crescent • Singapore 139942
Tel. (65) 7 79 90 91 • Fax (65) 8 73 16 37
e-mail: sales@sg.pepperl-fuchs.com

Worldwide Headquarters
Pepperl+Fuchs GmbH • Königsberger Allee 87
68307 Mannheim • Germany
Tel. +49 621 7 76-0 • Fax +49 621 7 76-10 00
http://www.pepperl-fuchs.com
e-mail: fa-info@de.pepperl-fuchs.com

PEPPERL+FUCHS