

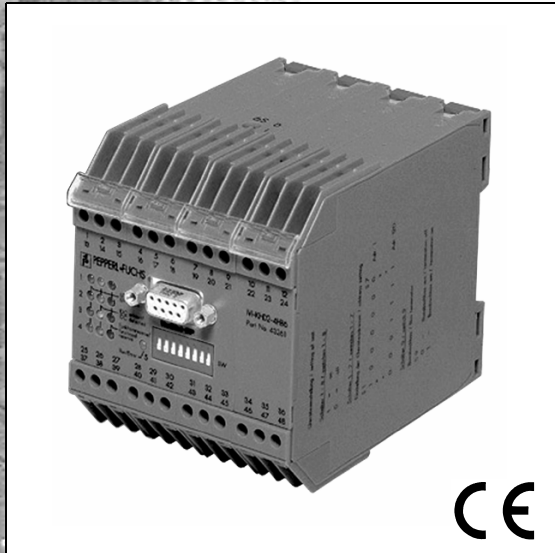


FACTORY AUTOMATION

MANUAL

IVI-KHD2-4HB6, IVI-KHA6-4HB6

CONTROL INTERFACE UNIT FOR
PROFIBUS-DP



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.

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1 Declaration of Conformity

The control interfaces IVI-KHD2-4HB6 and IVI-KHA6-4HB6 have been developed and produced in accordance with the applicable European standards and directives.



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

Note

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



IDENT-I • IVI-KHD2-4HB6, IVI-KHA6-4HB6 Declaration of Conformity

Date of issue 19.07.2001

2 General Information



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.

Warning



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.

Attention



This symbol gives the user important hints.

Note

IDENT-I • IVI-KHD2-4HB6, IVI-KHA6-4HB6

General Information

Date of issue 19.07.2001

3 Safety

3.1 Intended Use

The control interface units IVI-KHD2-4HB6/IVI-KHA6-4HB6 serve as part of the inductive identification system IDENT-I from Pepperl+Fuchs to connect to a high order computer (PLC, PC) with the PROFIBUS-DP interface (DIN 19245 T1 + T2, EN 50170). The control interface units are only to be used with the read/write heads and the code/data carriers from Pepperl+Fuchs.



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.

Warning *The devices IVI-KHD2-4HB6/IVI-KHA6-4HB6 may only be operated by appropriately qualified personnel in accordance with this operating manual.*

3.2 General safety information



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

Warning *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 case that a failure cannot be repaired, 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 allowed and void the warranty. The responsibility for the observance to local safety standards lies with the operator.

3.3 Functional safety/monitoring

The control interface units IVI-KHD2-4HB6/IVI-KHA6-4HB6 operate on a microprocessor basis. Functional disturbances and equipment errors/faults are signalled with the LED "Run/Error" on the front of the device.

In addition function control via the PROFIBUS is possible by interrogating the diagnosis/status information. 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 chapter 8 "Fault Diagnostics".

IDENT-I • IVI-KHD2-4HB6, IVI-KHA6-4HB6

Safety

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4 Product Description

4.1 Scope of delivery

The following is included with the delivery of the device:

- 1 device IVI-KHD2-4HB6/IVI-KHA6-4HB6
- 1 terminal block
- 1 CD ROM including the manuals as PDF-file (german, english) and the GSD-file

4.2 Range of application

Bus systems, especially the PROFIBUS, make the reduction of interconnection cabling possible and allow large data exchange over long distances. The control interface units IVI-KHD2-4HB6/IVI-KHA6-4HB6 with a PROFIBUS connection are 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

4.3 System description

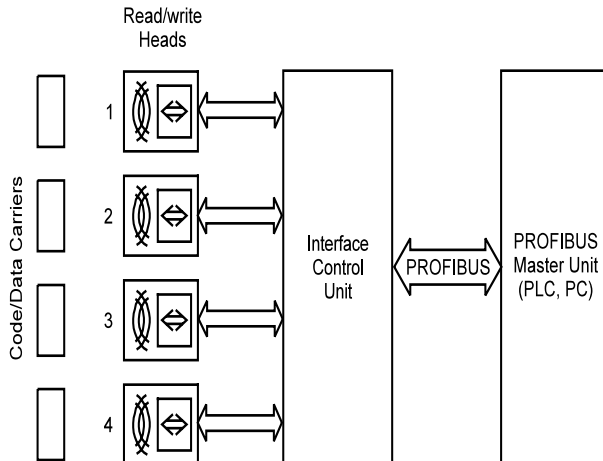


Figure 4.1 Function of the control interface unit IRI-KHD2-4HB6/IRI-KHA6-4HB6 in the Inductive Identification System R

IDENT-I • IVI-KHD2-4HB6, IVI-KHA6-4HB6

Product Description

The control interface unit IVI-KHD2-4HB6/IVI-KHA6-4HB6 takes over the control of the connected read/write heads that implement the data transmission with the code or data carriers, prepares the read/write information and controls the communication and data transmission with a PROFIBUS master unit.

It is possible to connect up to 4 read/write heads to a single IVI-KHD2-4HB6/IVI-KHA6-4HB6 unit.

With the PROFIBUS, the complete read/write functionality is available. The control interface unit operates as a passive subscriber of the system bus (slave).

Overview of commands

The following commands for the reading and writing of data are available with the control interface unit IVI-KHD2-4HB6/IVI-KHA6-4HB6:

1. Reading fixcode carriers

Command	Function	Description
SF	Single Read Fixcode	All active parameterised read/write heads or read heads will be activated once. If multiple heads could successfully read the data, then all read data are transmitted.
AF	Auto Read Fixcode	All active parameterised read/write heads or read heads are activated for such a time until one fixcode carrier is read.
BF	Buffered Read Fixcode	All active parameterised read/write heads or read heads are activated continuously.
EF	Enhanced Buffered Read Fixcode	All active parameterised read/write heads or read heads are activated continuously. If the code/data carrier leaves the reading area, Status 5 is transmitted.

2. Reading data carriers

Command	Function	Description
SR	Single Read	All active parameterised read/write heads will be activated once. If multiple heads could successfully read the data, all read data is transmitted.
AR	Auto Read	All active parameterised read/write heads will be activated, until the data of one data carrier could be read.
BR	Buffered Read	All active parameterised read/write heads will be continually activated.
ER	Enhanced Buffered Read	All active parameterised read/write heads will be continually activated. If the code/data carrier leaves the reading area, Status 5 is transmitted.

3. Blockwise reading of data carriers

The functions for blockwise reading SB/AB/BB are obtained by analogy with SR/AR/BR, but only for 1k data carriers. The four blocks, each with 16 words, are read blockwise "in one piece", which considerably increases the reading speed in comparison with that for individual words.

Command	Function	Description
SB	Single Read Block	All active parameterised read/write heads will be activated once. If multiple heads could successfully read the data, all read data is transmitted.
AB	Auto Read Block	All active parameterised read/write heads will be activated, until the data of one data carrier could be read.
BB	Buffered Auto Read Block	All active parameterised read/write heads will be continually activated.

Addressing:

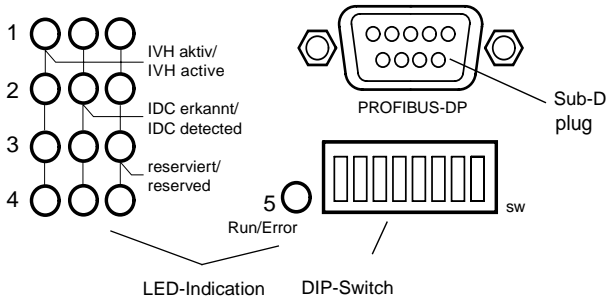
Block	Word
0	0 ... 15
1	16 ... 31
2	32 ... 47
3	48 ... 63

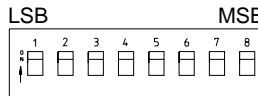
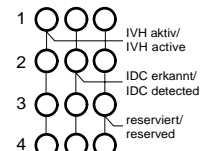
4. Writing data carriers

Command	Function	Description
SW	Single Write	All active parameterised read/write heads are activated in succession for such a time until one head has successfully written or all heads have been activated once.
AW	Auto Write	All active parameterised read/write heads are activated for such a time until one data carrier could be written.
BW	Buffered Write	All active parameterised read/write heads will be continually activated.
EW	Enhanced Buffered Write	All active parameterised read/write heads will be continually activated. If the code/data carrier leaves the reading area, Status 5 is transmitted.

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
4.4 Indicators and operators



<p>DIP-switch (on the front side)</p>	 <p>Switches 1 ... 7: subscriber address Switch 8: no function</p>
<p>LED-indication (on the front side)</p>	

Structure and functioning

Indicators	Description
<p>Ident</p> <p>LED green LED yellow LED red</p>	<p>3 LEDs per read head status</p> <p>Read/write head active (4 LEDs, 1 per head) Code carrier detected (4 LEDs, 1 per head) Functional reserved (4 LEDs, 1 per head)</p>
<p>Bus</p> <p>Run/Error LED green Run/Error LED red red-green blinking</p>	<p>1 LED system status (two-coloured)</p> <p>device ready for operation/communication active device error device ready for operation/communication faulty</p>

<p>Bus termination (on the top side)</p>	 <p>Switch S9: (Bus termination)</p> <p>0 = OFF 1 = ON</p>
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4.5 Structure and functioning

The control interface unit IVI-KHD2-4HB6/IVI-KHA6-4HB6 is the link between the read heads and the PROFIBUS master (PLC, PC, etc.). Two independently operating microprocessors, which are connected to each other via an interface, take over the data exchange between the read heads and the PROFIBUS master.

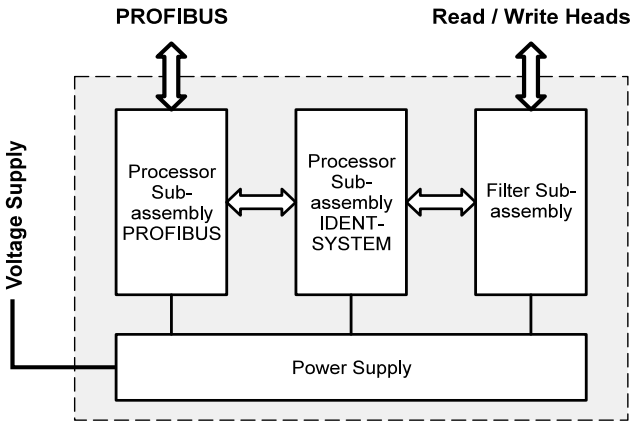


Figure 4.2 Block diagram of the control interface unit IVI-KHD2-4HB6/IVI-KHA6-4HB6

Both the supply voltage and the RS 485 interface of the PROFIBUS are galvanically isolated within the system.

Up to 14 words (DP) of user data can be transmitted in a single telegram.

4.6 System variants

The control interface unit IVI-KHD2-4HB6/IVI-KHA6-4HB6 comes in two versions which vary only in their supply voltage.

Variant	Supply Voltage
IVI-KHD2-4HB6	18 V DC ... 32 V DC
IVI-KHA6-4HB6	85 V AC ... 253 V AC, 50 Hz ... 60 Hz

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4.7 Accessories/product family

The inductive identification system IDENT-I from Pepperl+Fuchs offers many different possibilities to combine single components.

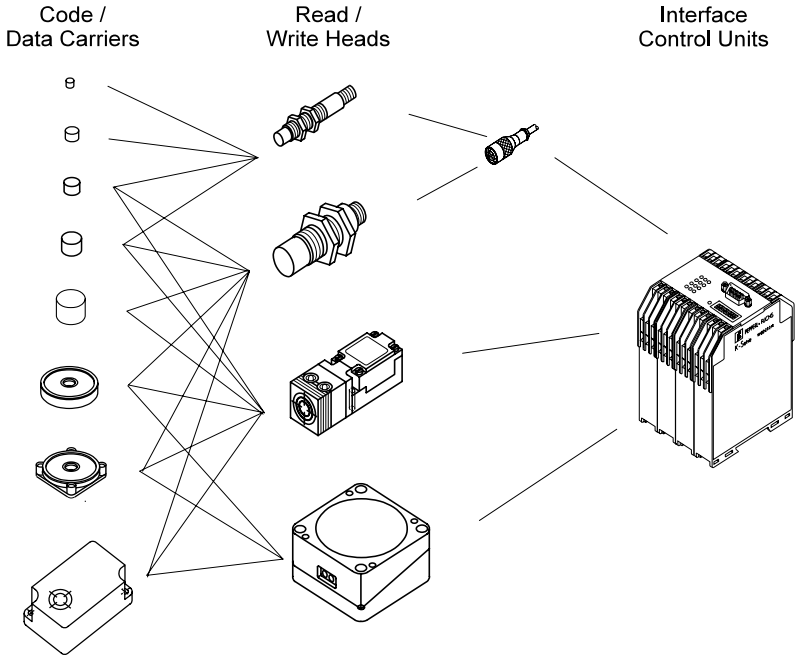


Figure 4.3 Overview of the inductive identification system structure

According to installation requirements, read/write distance, environmental conditions and memory requirements, one can select appropriate code/data carriers and read/write heads.



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

Note

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Product Description

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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 optimal protection.

The necessary environmental conditions also must be satisfied (see chap. 9 "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 deliverer.

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

- correct number of parts
- device type and version according to the name plate
- accessories
- manual(s)

Keep the original packaging in case the device must be repacked and stored or re-shipped.

For any further questions please contact Pepperl+Fuchs GmbH.

5.3 Mounting

5.3.1 Mounting to a top-hat rail

As with all systems in K-system housings from Pepperl+Fuchs, the control interface unit IVI-KHD2-4HB6/IVI-KHA6-4HB6 can be snapped onto the 35 mm standard top-hat rail according to DIN EN 50022

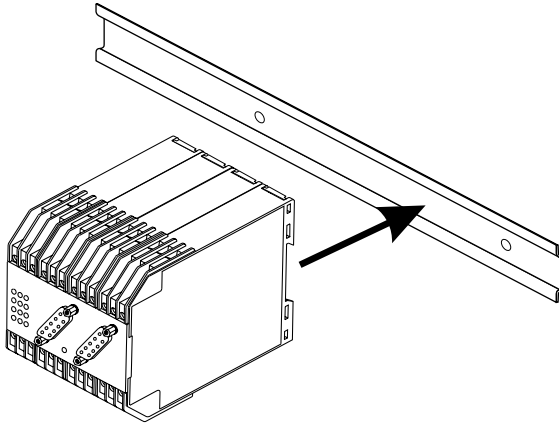


Figure 5.1 Mounting to the top-hat rail according to DIN EN 50022

Hang the unit over the top part of the top-hat rail and press the bottom part of the housing against the rail until it snaps onto the railing. Check that the unit sits firmly on the railing.

5.3.2 Wall mounting

The control interface unit can also be mounted on the wall using four screws. Simply pull out the four outer brackets on the back side of the unit. The unit can be easily screwed onto the wall through the holes in the brackets. The screw pair spacing is 90 mm (max. screw diameter M5).

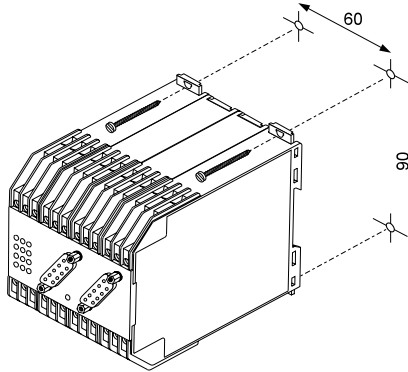


Figure 5.2 Wall mounting

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 according to the name plate of the unit.

A mains isolating device must be installed close to the device and labeled as such for the IVI-KHD2-4HB6/IVI-KHA6-4HB6.

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. cross section 2 x 2.5 mm².

The PROFIBUS connection must be carried out according to the PROFIBUS specification via the 9-pole Sub-D sockets on the front of the device. Additionally, the bus connections (RxD/TxD - P, RxD/TxD-N, shield) are also available on the screw terminals.

Connect the read heads and the supply voltage according to the connection diagram and the labelled configuration of the terminals.

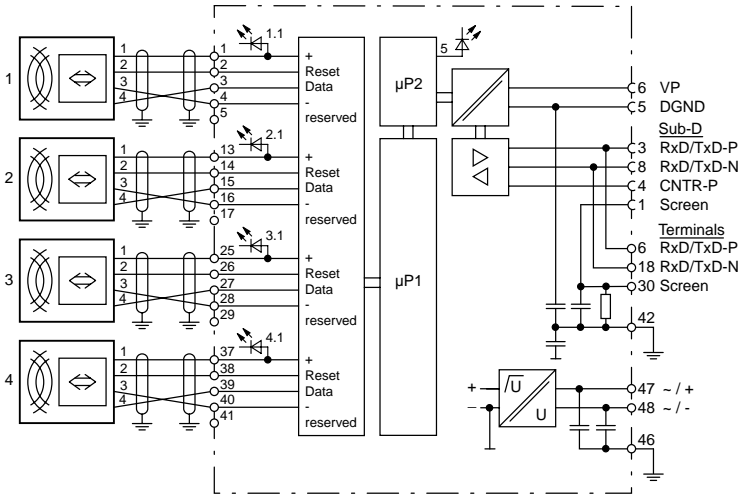


Figure 5.3 Connection diagram for the control interface unit IVI-KHD2-4HB6/IVI-KHA6-4HB6

Location of the connection terminals

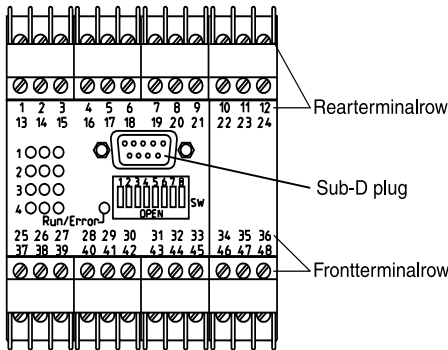


Figure 5.4 Assignment of connection terminals

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List of terminal assignments

Terminal	Function
1	supply voltage read/write head 1 positive
2	"direction" read/write head 1
3	"data" read/write head 1
4	supply voltage read/write head 1 negative
5	reserved
6	PROFIBUS RxD/TxD-P
7	reserved
8	reserved
9	reserved
10	reserved
11	reserved
12	reserved
13	supply voltage read/write head 2 positive
14	"direction" read/write head 2
15	"data" read/write head 2
16	supply voltage read/write head 2 negative
17	reserved
18	PROFIBUS RxD/TxD-N
19	reserved
20	reserved
21	reserved
22	reserved
23	reserved
24	reserved
25	supply voltage read/write head 3 positive
26	"direction" read/write head 3
27	"data" read/write head 3
28	supply voltage read/write head 3 negative
29	reserved
30	reserved
31	reserved
32	reserved
33	reserved
34	reserved
35	reserved
36	reserved
37	supply voltage read/write head 4 positive
38	"direction" read/write head 4

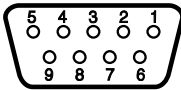
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Installation

Terminal	Function
----------	----------

39	"data" read/write head 4
40	supply voltage read/write head 4 negative
41	reserved
42	ground bus/identification system
43	reserved
44	reserved
45	reserved
46	ground power supply
47	L+ (IVI-KHD2-4HB6) or L (IVI-KHA6-4HB6)
48	L- (IVI-KHD2-4HB6) or N (IVI-KHA6-4HB6)

Assignment of the 9-pole Sub-D socket



PIN	Function
-----	----------

1	shield PROFIBUS cable (connect to metal casing of Sub-D connector)
2	reserved
3	PROFIBUS RxD/TxD-P
4	CNTR-P
5	DGND
6	VP
7	reserved
8	PROFIBUS RxD/TxD-N
9	reserved



If leads with double shielding are used, e.g. metallic wire mesh and metallic foil, they must be connected to each other using a low impedance connection at one end of the cable.

Note

Many noise impulses come from the supply cables, e.g. switch-on current of a motor. For this reason, running the supply cables in parallel with the data/signal cables, especially in the same cable duct, should be avoided.

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 head lead is connected on both sides to earth (PE) with low resistance and low induction. For that the attached terminal block can be used (see figure 5.5.). Please make sure that the screen is kept as small as possible.

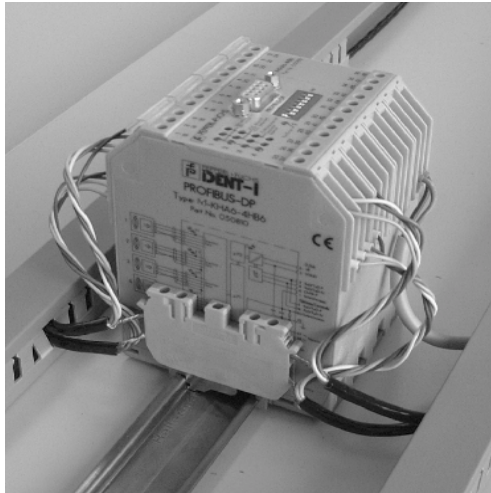


Figure 5.5 Terminal block with connecting cables

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

up to 50 m read head cable: cross sectional area of at least $4 \times 0.25 \text{ mm}^2$
maximum resistance 78 Ohm/km
maximum capacitance 90 pF/m
(e.g. LIYC11C, Mukkenhaut & Nusselt MUNFLEX C11Y)

up to 100 m read head cable: cross sectional area of at least $4 \times 0.5 \text{ mm}^2$
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 read heads.

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



If leads with double shielding are used, e.g. metallic wire mesh and metallic foil, they must be connected to each other using a low impedance connection at one end of the cable.

Note

Many noise impulses come from the supply cables, e.g. switch-on current of a motor. For this reason, running the supply cables in parallel with the data/signal cables, especially in the same cable duct, should be avoided.

5.4.3 Special connection information for the PROFIBUS cable

The connecting lead for the bus is specified in the EN 50170 as type A cable and can be used in accordance with the following table. Line parameters and lengths for a type B cable are also included in the following tables for the sake of completeness. Only cable of type A should be used in new designs because of the longer overall length of leads in systems.

Line parameters as follows:

Parameter	Line A	Line B*
cable design	two-wire twisted, shielded	two-wire twisted, shielded
capacitance per unit length		
(pF/m)	< 30	< 60
surge impedance		
(Ω)	135 ... 165	100 ... 130
loop resistance		
(Ω)	110	-*)
lead diameter		
(mm)	0.64	> 0.53
cross sectional area		
(mm ²)	> 0.34	> 0.22

Line B*) not to be used in future, if possible.



Attention

Use only twisted pair, shielded cable. In this case, the noise immunity will be optimised.

Transmission rates

The following transmission rates are supported:

9.6 kbit/s, 19.2 kbit/s, 44.44 kbit/s, 93.75 kbit/s, 187.5 kbit/s, 500 kbit/s and 1.5 Mbit/s.

The setting of the transmission rate required is self-synchronising.

Length of leads

The reliable lengths of the transmission leads in a bus segment are determined from the following:

- type of bus cables used
- influence of external noise
- transmission rate
- number of bus subscribers

The maximum total lead length of a bus segment as a function of the transmission rate for maximum number of subscribers (32) is:

Transmission rate in kbit/s	9.6	19.2	44.44	93.75	187.5	500	1500
Line type A (in m)	1200	1200	1200	1200	1000	400	200
Line type B (in m)	1200	1200	1200	1200	600	200	•••



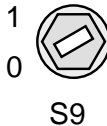
By breaking into multiple bus segments and the application of repeaters, the transmission length can be increased. A maximum of three repeaters between two communicating bus subscribers can be used.

Note

Bus termination

With the PROFIBUS, every bus segment must be terminated via terminating resistances at both ends of the bus leads.

Bus termination
aktiv
Bus termination
not aktiv



Rotation switch "S9" for the Bus termination of the system on top side.
Adjust with an appropriate screwdriver.

Figure 5.6 Rotating switch S9 for the termination of the bus

The control interface unit IVI-KHD2-4HB6/IVI-KHA6-4HB6 has built-in, switchable bus termination. The bus termination can be activated by turning the rotating switch S9 on the left hand side of the unit housing with an appropriate screwdriver.



If leads with double shielding are used, e.g. metallic wire mesh and metallic foil, they must be connected to each other using a low impedance connection at one end of the cable.

Note

Many noise impulses come from the supply cables, e.g. switch-on current of a motor. For this reason, running the supply cables in parallel with the data/signal cables, especially in the same cable duct, should be avoided.

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 optimal protection.

Disposal



Note

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

The control interface unit IVI-KHD2-4HB6/IVI-KHA6-4HB6 does not contain internal batteries which must be removed before disposal.

6 Commissioning



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

Warning



Attention

Check again all connections before proceeding with the commissioning. Prepare for the commissioning by familiarising yourself with the communication between the PROFIBUS master and the control interface unit (see chap. 7). The commissioning requires a good knowledge of the PROFIBUS and the programming of the master unit.

6.1 Preparation

Due to the complexity of field bus programming with the PROFIBUS, 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-KHD2-4HB6/IVI-KHA6-4HB6 on the PROFIBUS 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 code carrier is positioned in front of the read head?" cannot be correctly answered in general.

The important factors in respect to response time are:

- type of high order host system, e.g. PLC or PC
- type of PROFIBUS master, e.g. pre-defined transmission rate
- communication between the PROFIBUS master and the host system
- the number of PROFIBUS subscribers
- the number of control interface units on the PROFIBUS
- the number and type of read/write heads connected
- type of code or data carriers used
- type of access of the communications objects of the control interface unit
- type of commands on the identification system
- structure of the user program

For this reason, you should construct a test system for your particular application and check the transmission to the PROFIBUS master or host system if you have little experience with the design of a PROFIBUS system.



A complete series of design tools exist that allow a PROFIBUS user to plan and commission a network, even if he/she has no knowledge of the fundamental communication sequences.

Note

There are PC programs and PROFIBUS PC connector cards which help determine the communication relationships and your parameters, and can clearly display bus telegrams on the screen.

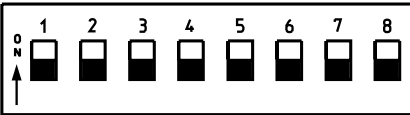
The system software of programmable logic controllers (PLC) with a PROFIBUS communication processor often offer network configuration and management possibilities.

6.2 Main procedure

Before the commissioning, the system address of the control interface unit and, if necessary, of the bus termination (chapter 5.4.3 "Special connection information for the PROFIBUS cable") must be set.

Setting of the unit address

Select a device address not already occupied by another bus subscriber (between 0 and 126) and set this address using the DIP switch on the front of the device.



DIP-Switch "SW" on the front side of the unit to adjust the PROFIBUS device

Device address	S1	S2	S3	S4	S5	S6	S7	S8
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•
126	OFF	ON	ON	ON	ON	ON	ON	OFF

Figure 6.1 Setting the device address



Attention

The device address 127 is reserved for a special PROFIBUS service. If the address 127 is set on a slave unit, it will not function.

After connecting to voltage, the control interface unit automatically adjusts its transmission rate to that of the master. The supported rates are:

- 9.6 kbit/s
- 19.2 kbit/s
- 44.44 kbit/s
- 93.75 kbit/s
- 187.5 kbit/s
- 500 kbit/s
- 1.5 Mbit/s

Configuration of the network master(s) for DP operation

The configuration data required for the control interface unit IVI-KHD2-4HB6/IVI-KHA6-4HB6 can be found in the GSD file supplied and the network master is configured accordingly. If you have a configuration tool, then the network master is configured automatically by using the configuration tool to read the GSD file.

The device address must be entered to do this.

Self test

After switching on the supply voltage, the control interface unit checks the internal memory area with a self test. If a device error or transmission error occurs, or if an incorrect device address is set, communication will not be activated. The error is indicated with the LED "Run/Error" (see chap. 8 "Fault Diagnostics").

Interconnection structure

The interconnection structure is established automatically in DP mode



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

Note

It is now possible to communicate with the control interface unit IVI-KHD2-4HB6/IVI-KHA6-4HB6 using the PROFIBUS master.

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7 Operation with the PROFIBUS

7.1 General information on the PROFIBUS

The INTERBUS is a standardized 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 not be considered as an extensive introduction to the PROFIBUS. For substantial information, one is referred to the PROFIBUS standard DIN 19245 or EN 50170 and the relevant literature.



Information brochures and a PROFIBUS product catalogue is available from the PROFIBUS User Organisation e.V. (PNO), Karlsruhe .

Note

Performance features PROFIBUS-DP

The important PROFIBUS-DP performance features of the control interface unit IVI-KHD2-4HB6/IVI-KHA6-4HB6 are as follows:

- full DP slave functionality with the functions Data_Exchange, RD_Inp, RD_Outp, Slave_Diag, Set_Prm, Chk_Cfg, Get_Cfg, Global_Control, Set_Slave_Add
- modular DP slave device with one module each for read and write data
- transmission rates 9.6 kbit/s, 19.2 kbit/s, 44.44 kbits/s, 93.75 kbit/s, 187.5 kbit/s, 500 kbit/s and 1.5 Mbit/s self-synchronising
- switchable bus termination
- adjustable system address 0 ... 126

7.2 PROFIBUS-DP

7.2.1 PROFIBUS DP communication parameters

The communication parameters can be found in the master data file (GSD) for the device. The name of the GSD-file is **p&f_0840.gsd**.

7.2.2 PROFIBUS DP functions

Function	Description	Master
Set_Slave_Add	Change the address of a DP slave	Class 2
Set_Prm	Transfer parameterisation data to a DP slave	Class 1
Chk_Cfg	Transfer configuration data to a DP slave to check	Class 1
Get_Cfg	Read configuration data from a DP slave	Class 2
Data_Exchange	Send output data to a DP slave device and request input data from a DP slave	Class 1
RD_Inp	Read input data from a DP slave	Class 2
RD_Outp	Read output data from a DP slave	Class 2
Global_Control	Send special commands to one or more DP slaves	Class 1
Slave_Diag	Read diagnostic information from a DP slave	Class 1

7.2.3 Device identification/software version message for PROFIBUS DP

Transmission of device identification and the software version is by the DP function "device-specific diagnosis"

Byte	Description
0	Station status 1
1	Station status 2
2	Station status 3
3	Model station number
4	Manufacturing designation (high Byte)
5	Manufacturing designation (low Byte)
from 6	Other specific diagnostic data (header byte, data length)
7 ... 12	"IVI-B6"
13	blank
14	Identification of the bus software
15	Index for the bus software
16	blank
17	Identification of the identification system software
18	Index for the identification system software

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7.2.4 Definition of PROFIBUS DP modules

For the transmission of the entry data (read, data from slave to DP-master) and output data (write, data from DP-master to slave) are an input and output module defined.

The size of the input module and output module is variable. At this way, the quantity (from Firmware-Version **1801K017 from the 22nd June 1998**) of the data is optimized for the actual application. This avoided an unnecessary load of the bus through not-used data.

For using the variable length of the module, you need the master data file **P&F_0840.GSD Revision 1.2 from the 10th July 1998**. In this file, the input module with a word length from 2 to 16 and the output module with a word length up to 16 are predefined.



At projecting, select only one input module and one output module from the table.

Note

The size of the module you need is dependent from the application. The output module (data from DP-master to slave) contains one or two commands and up to 14 words data.

The input module (data from slave to DP-master) always contains two words status and up to 14 words data.

Examples:

Command "Single/Auto/Buffered Read Fixcode"

Only one word commands and command parameters are transmitted. A data carrier word address or write data are not used. Here you can still use the "1 Word Output" module.

The length of the fixcode-data which reads the code carrier amounts to 4 words. Because always two words status are additional transmitted, the minimum size of the input module must be 6 words. You must choose the "6 Words Input" module.

Command "Single/Auto/Buffered Write", write data-length 14 words

Here are two words for the commands (command, parameter and data carrier word address) required. Together with the 14 words write data the maximum output module length results in 16 words (16 words output).

For valid read commands, the control interface unit responds only with the status command, so the input module size of two words is enough (2 Words Input).

Command "Single/Auto/Buffered Read", read data-length 8 words

For the transmission of the read commands are two words necessary (commands, command parameters and data carrier word address), so module "2 Words Output" is enough.

For the transmission of the read commands and the two words status commands are totally 10 words necessary, so modul "10 Words Input" is fit.

The structure of the 16 data words for the communication direction from DP master to control interface unit and from control interface unit to DP master is described in the following two chapters.

7.2.5 Communication direction: PROFIBUS DP ⇒ control interface unit

The transmitted data are depending from the length of the chosen output mode.

In the following, only the structure of the necessary words are shown. If, depending from the module size, further words are generated, these words contain no valid data.

Reading Fixcode

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

Commands and command parameters are transmitted in word 0.

Reading data

Word 0	Commands and parameters															
Bit No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Description	B4	B3	B2	B1	DS	0	T2	T1	N4	N3	N2	N1	K3	K2	K1	T
Word 1	Word address/Block address (Block commands SB/AB/BB)															

Commands and command parameters are transmitted in word 0. Word 1 contains the starting memory address for the data carrier, as of which the data are read or written.

Writing data

Word 0	Commands and parameters															
Bit No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Description	B4	B3	B2	B1	DS	0	T2	T1	N4	N3	N2	N1	K3	K2	K1	T
Word 1	Word address/Block address (Block commands SB/AB/BB)															
Words 2 ... n	Write data															

Depending from the chosen modul size is n maximum 16.

Commands and command parameters are transmitted in word 0. Word 1 contains the starting memory address for the data carrier, as of which the data are read or written.

The words 2 ... 15 include the data to be written for write commands. For read commands, the words 2 ... 15 do not contain valid data.

Toggle flag (T)

The toggle flag serves to unambiguously identify a new command which is valid. A new command is only then accepted by the control interface unit and executed provided this flag does not have the same status as the preceding command, i.e. when it is toggled.

In the acknowledgment from the control interface unit to the DP master, the toggle flag does not change and serves to indicate to the user that the command was received by the control interface and has been processed.



Execution of the command is finished, when the execution counter became $\neq 0$.

Note

Command identification (B4 ... B1)

The desired command is defined by the command parameters B4 ... B1.

A detailed description of these commands is given in chapter 4.3 "System description".

Command identification B4 ... B1				
15	14	13	12	Bit No.
B4	B3	B2	B1	Designation
0	0	0	0	No command
0	0	0	1	SF
0	0	1	0	AF
0	0	1	1	BF
0	1	0	0	SR
0	1	0	1	AR
0	1	1	0	BR
0	1	1	1	SW
1	0	0	0	AW
1	0	0	1	BW
1	0	1	0	SB
1	0	1	1	AB
1	1	0	0	BB
1	1	0	1	EF
1	1	1	0	ER
1	1	1	1	EW

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Double-side mode (DS)

This function enables double-side reading/writing.

If this bit is set (DS = 1), code/data carriers of the types ICC-50, IDC-50 and IDC-CARD can be read and written from both sides.

Otherwise code/data carriers are only read from the inscribed side.



In the double-side mode the operating time for reading/writing will be longer as in the normal mode.

Note

Data carrier type (T2, T1)

The data carrier type is defined by the parameters T1 and T2

Type of data carrier T1, T2		
9	8	Bit No.
T2	T1	Type
0	0	IDC-1k
0	1	IMC40-64k
1	0	IMC40-256k
1	1	not defined

Number of words (N4 ... N1)

The number of words to be read or written is defined by the parameters N4 ... N1 (max. 14 words).

Number of words N4 - N1				
7	6	5	4	Bit No.
N4	N3	N2	N1	Number of words
0	0	0	0	not defined
0	0	0	1	1
0	0	1	0	2
0	0	1	1	3
0	1	0	0	4
0	1	0	1	5
0	1	1	0	6
0	1	1	1	7
1	0	0	0	8
1	0	0	1	9
1	0	1	0	10
1	0	1	1	11
1	1	0	0	12
1	1	0	1	13
1	1	1	0	14
1	1	1	1	not defined

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Head number (K3 ... K1)

The parameters K3 ... K1 define which read/write head(s) shall be activated

Head number K3 ... K1			
3	2	1	Bit No.
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

Word address (word 1)

The starting memory address of the data to be read or written in the data carrier is given in this word.

Type of data carrier	Address range (hex)	
	Word address	Block address (SB/AB/BB)
IDC-1k	0000 ... 003F	0000 ... 003F
IMC40-64k	0000 ... 0FFF	0000 ... 0FFF
IMC40-256k	0000 ... 3FFF	0000 ... 3FFF

7.2.6 Communication direction: control interface unit ⇒ PROFIBUS DP

The transmitted data are depending from the length of the chosen output mode.

In the following, only the structure of the necessary words are shown. If, depending from the module size, further words are generated, these words contain no valid data.

Reading Fixcode

Word 0	Command, parameter and toggle flag mirrored															
Bit No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Designation	B4	B3	B2	B1	DS	0	T2	T1	N4	N3	N2	N1	K3	K2	K1	T
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	A4	A3	A2	A1	H4	H3	H2	H1	S4	S3	S2	S1
Word 2 ... 15	Read data															

Commands and command parameters already sent are repeated in word 0 as an acknowledgment.

Word 1 includes status information, the execution counter and the assigned head number. The bits H4 ... H1 are only use for the command EF in the "Enhanced Buffered Read Fixcode" mode.

H_i=1 means, that the read head is activ

H_i=0 means, that the read head is not activ.

The words 2 ... 15 contain the data read for the read commands. For write commands, the words 2 ... 15 do not contain valid data.

Reading data

Word 0	Command, parameter and toggle flag mirrored															
Bit No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Designation	B4	B3	B2	B1	DS	0	T2	T1	N4	N3	N2	N1	K3	K2	K1	T
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	A4	A3	A2	A1	H4	H3	H2	H1	S4	S3	S2	S1
Word 2 ... n	Read data															

Depending from the chosen modul size is n maximum 15.

Commands and command parameters already sent are repeated in word 0 as an acknowledgment.

Word 1 includes status information, the execution counter and the assigned head number. The bits H4 ... H1 are only use for the command ER in the "Enhanced Buffered Read " mode.

$H_i=1$ means, that the read head is activ

$H_i=0$ means, that the read head is not activ.

The words 2 ... 15 contain read commands.

Writing data

Word 0	Command, parameter and toggle flag mirrored															
Bit No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Designation	B4	B3	B2	B1	DS	0	T2	T1	N4	N3	N2	N1	K3	K2	K1	T
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	A4	A3	A2	A1	H4	H3	H2	H1	S4	S3	S2	S1

Commands and command parameters already sent are repeated in word 0 as an acknowledgment.

Word 1 includes status information, the execution counter and the assigned head number.

Head number (K3 ... K1)

000_b = head 1

001_b = head 2

010_b = head 3

011_b = head 4

Should "all" heads respond, then the heads are successively read out or written in the sequence 1, 2, 3 and 4.

Execution counter (A4 ... A1)

The execution counter is reset for command start and incremented each time as soon as new status values or data are available.



The fields, head number, status and the words 2 to 15 do not contain valid data as long as the counter remains at 0.

Note

Head activity (H4 ... H1)

The bits H4 ... H1 are only use for the command EW in the "Enhanced Buffered Write" mode.

H_i=1 means, that the read head is activ

H_i=0 means, that the read head is not activ.

Status indicator (S4 ... S1)

General status and error messages are defined by the parameters S4 ... S1.

Status Indicator S4 ... S1				
3	2	1	0	bit No.
S4	S3	S2	S1	status
0	0	0	0	error-free execution of command
0	0	0	1	battery weak (IMC-40 only), correct execution of command
0	1	0	0	incorrect command, invalid parameter or timeout
0	1	0	1	read or write error
0	1	1	0	hardware fault (read head defective)

7.2.7 PROFIBUS DP command sequence, example

The execution of the command commences as soon as a valid command has been written in the register with a toggled flag "T". After reception of the command, this flag, together with the remaining fields of the word 0, are passed back to the master as acknowledgement.

Anfangszustand:

Head number (K3...1)	0
Execution counter (N4...1)	0
Status (S4...1)	0
4 x read error flags (ERR)	0 for SF, AF, BF; 1 for EF
4 x read numbers (L3...1)	0
4 x fixcode data (C28...1)	0

The execution counter is incremented on each command from the IDENT system. All the same time, the fields head number, status, read error flag, read numbers and fixcode data are set in accordance with the IDENT system message. The handling of the read error flag also depends on the command.

The read numbers are incremented when read data has been received from the IDENT system (Status 0). Only the read number of the data field is incremented, that is assigned to the head number sent by the IDENT system. The read number is not incremented if the IDENT system reports an error (Status 4, 5, 6).

The read error flag is not operated for the commands SF, AF und BF and always remains at 0.

The following applies to the command EF: The read error flag is reset (=0) as soon as read data has been received from the IDENT system (Status 0). The read error flag is set as soon as the IDENT system reports a read error (Status 5), and remains unchanged for other error messages (Status 4, 6).

A command sequence is shown in the following example.

Command: "Single Read Fixcode" with Head 2, without doubleside mode

Command from the DP master

Command (B4 ... B1)	0001 _b	SF (Single Read Fixcode)
Doubleside (DS)	0 _b	doubleside mode OFF
Data carrier type (T2, T1)	00 _b	IDC-1k
Number of words (N4 ... N1)	0100 _b	4 words = 8 bytes (the 8th byte is of no significance as the fixcode comprises 7 bytes)
Head number (K3 ... K1)	001 _b	head number 2 responds
Toggle flag (T)	1 _b	(or 0, depending on the previous status, for first command or when switched on = 1)

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Word 0	Commands and parameters															
	B4	B3	B2	B1	DS	0	T2	T1	N4	N3	N2	N1	K3	K2	K1	T
	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	1

= 1043_{hex}



Note

The words 1 ... 15 do not contain valid data. This only applies however for fixcode carriers. For data carriers, the word 1 would contain the starting memory address and the words 2 ... 15 (for write commands) the data to be written.

Response from the control interface unit to the DP master

Single commands are executed once and the result (success or error) is output.

	Word 0	Word 1	Word 2	Word 3	Word 4	Word 5	
	1043 (hex)	1105 (hex)	xxxx	xxxx	xxxx	xxxx	if no code carrier in front of head
or	1043 (hex)	1106 (hex)	xxxx	xxxx	xxxx	xxxx	if head not connected or is defective
or	1043 (hex)	1100 (hex)	4235 (hex)	3433 (hex)	3634 (hex)	32xx (hex)	if code carrier includes "B543642" (ASCII) in front of head

Word 0: command and parameters mirror-imaged

Word 1: status/execution counter/head number (see below)

Words 2 ... 5: for successful reading, the corresponding data from the code carrier are given here.

Words 6 ... 15: no valid data

Word 1	Status/execution counterhead number															
	-	K3	K2	K1	A4	A3	A2	A1	-	-	-	-	S4	S3	S2	S1
	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	1
or	0	0	0	1	0	0	0	1	0	0	0	0	0	1	1	0
or	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0

Head number (K3 ... K1) 001_b read by head 2

Execution counter (A4 ... A1) 0001_b executed once

Status (S4 ... S1) 0101_b read or write error

or 0110_b hardware fault

or 0000_b error-free execution of command

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8 Fault Diagnostics

The "Run/Error" LED indicates the status of the control interface unit IVI-KHD2-4HB6/IVI-KHA6-4HB6:

Status of the "Run/Error" LED	Description
permanently green	device ready for operation/communication active
5 s red, 0,5 s green blinking	device ready for operation/communication faulty
permanently red	device error

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Fault Diagnostics

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9 Technical Data

9.1 General specifications

The control interface unit is operated as a slave on the PROFIBUS-DP. The device makes available the complete read/write functionality. Up to 32 bytes are transmitted per cycle. Of these, up to 14 words for data, each with 16 bits, plus 2 words for command are available to the user. The size of the input and output modules is variable. As a result, it is possible, by means of appropriate selections in the GSD file, to optimize the quantity of transmitted data for the given application.

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

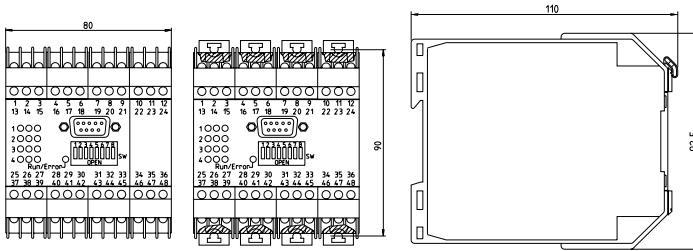
The address is set via DIP switches, and the terminating resistor for the bus is connected via a rotary switch.

Number of read/write heads	max. 4
Interface	RS 485
Protocol	PROFIBUS-DP accord. to DIN EN 50170
Transmission rate	9.6, 19.2, 4.44, 93.75, 187.5, 500, 1500 kBit/s self-synchronising
Address adjustment	DIP switches

9.2 Electrical data

Order code	IVI-KHD2-4HB6	IVI-KHA6-4HB6
Power supply		
Supply voltage	18 V DC ... 32 V DC	85 V AC ... 253 V AC, 50 Hz ... 60 Hz
Ripple	≤ 10 %	
Current	250 mA	60 mA
Quiescent current	120 mA (type.)	35 mA (type.)
with activ heads	190 mA	45 mA
Power consumption	6 W	12 W

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	device status
permanently green	device ready for operation/communication active
red-green blinking	device ready for operation/communication faulty
permanently red	device error
DIP-switches	setting the station address
Rotary switch (S9)	Bus termination 0 = not activ (OFF) 1 = aktiv (ON)

9.5 Software

Software	The GSD file is included in the scope of delivery.
Terminal block	is included in the scope of delivery

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10 Appendix

10.1 List of abbreviations

ACI	-	acyclic control interval
ALI	-	application layer interface
BRCT	-	PROFIBUS connection type: broadcast
CRC	-	cyclic redundancy check
DIP	-	dual in-line package, housing type
EEPROM	-	electronically erasable and programmable ROM
FMS	-	fieldbus message specification
HEX	-	hexadecimal
LED	-	light emitting diode
MIN_TSDR	-	minimal station delay time
MSAZ	-	PROFIBUS connection type: master-slave acyclic
MSZY	-	PROFIBUS connection type: master-slave cyclic
MULT	-	PROFIBUS connection type: multicast
PC	-	personal computer
PDU	-	protocol data unit
PLC	-	programmable logic controller
PNO	-	PROFIBUS User Organisation
RAC	-	read acknowledge request counter
RAM	-	random access memory
RCC	-	read confirmed request counter
ROM	-	read only memory
SAC	-	send acknowledge request counter
SAP	-	service access point
SCC	-	send confirmed request counter

10.2 Example of commissioning

In this chapter is shown a commissioning of an SPS SIMATIC S5 135 with an IM308C assembly module.

10.2.1 Brief description

The Pepperl+Fuchs IVI-KH□□-4HB6 interface unit (bus address 3) is connected to the S5 via the IM308C PROFIBUS master (bus address 1). The interface is used to exchange 16 words input data and 16 words output data via the PROFIBUS. Parameter assignment of the IM308C is carried out with the COM PROFIBUS program.

The 16 words input data and 16 words output data are read from the interface unit into the DB830 data module, using the FB192 function module and written to the interface unit from the DB31 data module.

10.2.2 Components used

- S5 135U SIEMENS
- CPU 928B SIEMENS
- IM308C SIEMENS
- IVI-KH□□-4HB6 Pepperl+Fuchs GmbH
- PG 740 SIEMENS
- FB 192 SIEMENS
- COM Profibus program SIEMENS

PROFIBUS-DP address 3 settings on the IVI-KH□□-4HB6, using DIP switches 1 ... 8:

- Switch 1 ON
- Switch 2 ON
- Switch 3 OFF
- Switch 4 OFF
- Switch 5 OFF
- Switch 6 OFF
- Switch 7 OFF
- Switch 8 OFF



Note

In the display driver blocks BB1 and BB2, the data modules DB30 and DB31 can be inspected under 'Variables control'.

10.2.3 Parameter assignment of the IM308C with COM PROFIBUS

After starting the COM PROFIBUS program, the GSD file provided with it must now be read-in via the menu item 'File', unless this has already been carried out. The program interface unit is referenced under 'other' devices. Parameter assignment of the IM308C can now be started for a new project. The individual steps required are summarised briefly in the following. To start a new project, select 'File -> New' from the menu.

First the PROFIBUS master is defined. In the example, the IM308C card is used as the master, with bus address 1 and an S5-135U with a CPU928B is used as the S5 station. The appropriate selection is accepted by pressing the OK button.



Figure 10.1

By double-clicking on master system a window is opened, on the right side of which a PROFIBUS slave selection table appears. The interface unit can now be inserted as 'another' slave. In the example, address 3 is set as the bus address. As before, the settings are accepted by pressing the OK button.

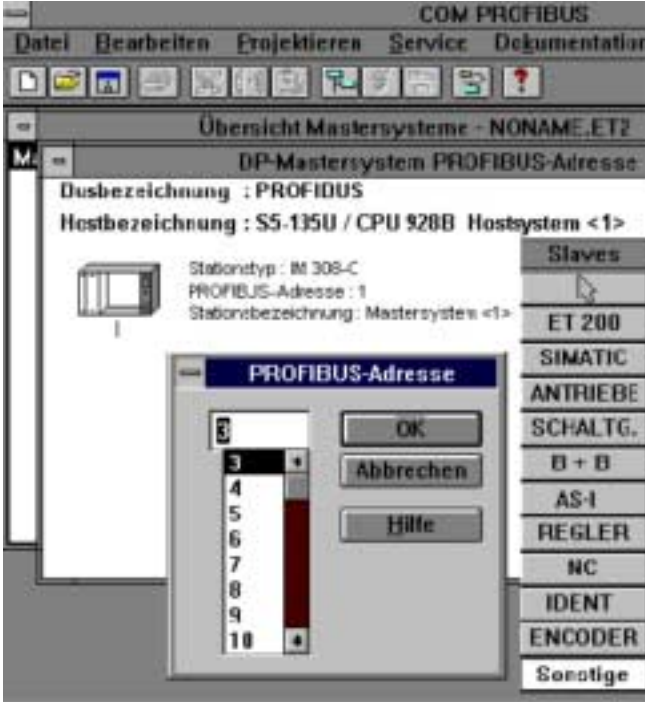


Figure 10.2

The IVI-KH□□-4HB6 interface unit must now be selected from the list of alternative slaves in the window which has now appeared.

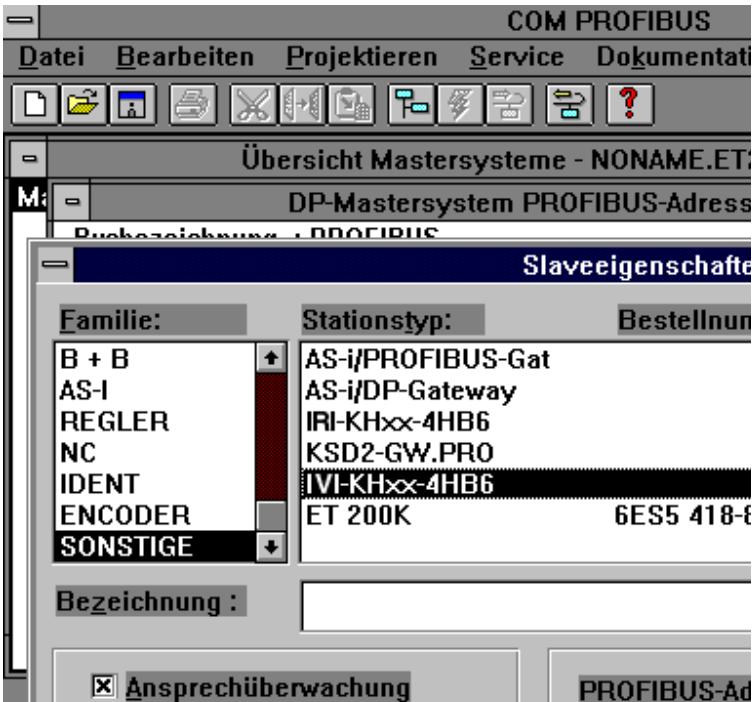


Figure 10.3

On successful selection, the DP-Master system window appears in which the PROFIBUS string is represented.

If the previous settings have been made correctly, the identification of the interface unit appears in the rectangle with bus address 3.

Data transfer with the interface unit can now be configured by double-clicking on this rectangle.

On selecting the Order Number button, a window opens in which the fixed input/output data are presented. This information relates to the COM PROFIBUS program from the GSD file.

A 16 words input (see Figure 10.4) and a 16 words output (see Figure 10.5) have to be selected for the configuration and accepted by actuating the appropriate button. The window can then be closed.

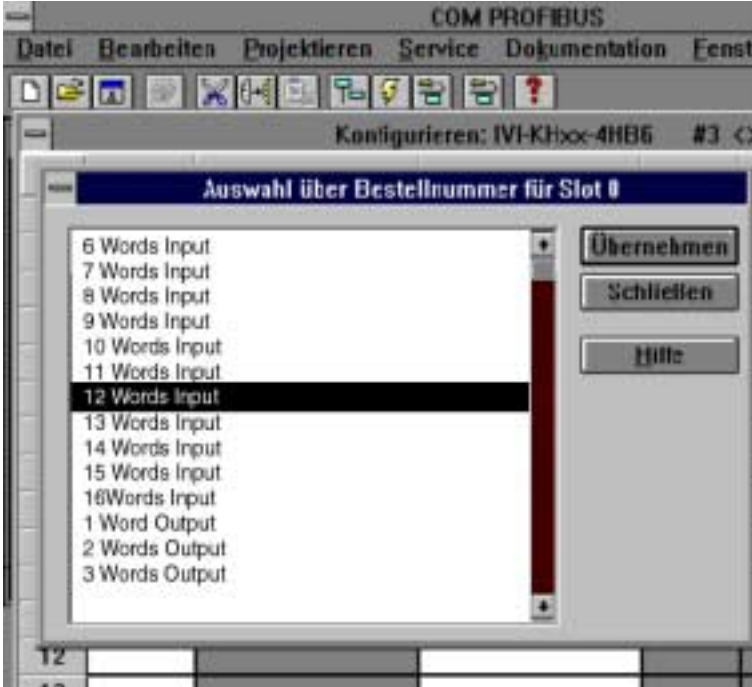


Figure 10.4

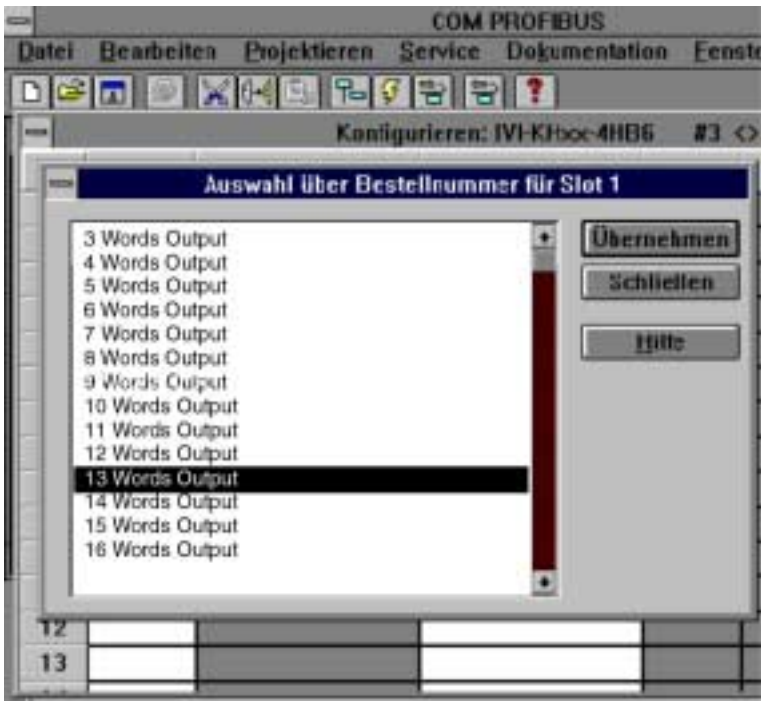


Figure 10.5

The numbers 223 and 239 should now be entered under the term 'Code'. These two numbers represent the transfer parameters shown in figure 10.6 and figure 10.7.

16 words of input data are transferred from the interface unit and 16 words of output data are transferred to the interface unit via the PROFIBUS. This transfer must take place consistent with the assembly module. As a consequence of this, the data cannot be accessed directly via the input/output address range. The function module FB192 must be used for the transfer, in conjunction with data modules for acceptance of the data.

The FB192 provides data communication between the S5CPU and the IM308C.



Figure 10.6



Figure 10.7

This concludes the configuration for the PROFIBUS system with the interface unit. It can now be transferred to the IM308C memory card.

After successful storage on the memory card, this can be inserted in the IM308C.

As soon as the interface unit is correctly connected to the IM308C, the green LED lights.

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10.2.4 Program

OB 1

SPA	FB 3
NAME: IVI-DP	
SPA	FB 4
NAME: IVI-DP	
BE	

FB 3

NAME: IVI-DP	
A	DB 30
SPA	FB 192
NAME: IM308C	
DPAD: KH F800	
IMST: KY 0,3	Slave adresse 3
FCT: KC RI	RI Read Data command
GCGR: KM 00000000 00000000	
TYP: KY 0,30	Number of data module DB 30
STAD: KF +0	Offset for first data word, here 0
LENG: KF -1	
ERR: MW 200	Marker for FB 192 messages
BE	

FB 4

NAME: IVI-DP	
A	DB 31
SPA	FB 192
NAME: IM308C	
DPAD: KH F800	
IMST: KY 0,3	Slave Adresse 3
FCT: KC WO	WO Write Date command
GCGR: KM 00000000 00000000	
TYP: KY 0,31	Number of data module DB 31
STAD: KF +0	Offset for first data word, here 0
LENG: KF -1	
ERR: MW 202	Merker for FB 192 messages
BE	

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DB 30

- 0: KH 3045
- 1: KH 2004
- 2: KH 0000
- 3: KH 0000
- 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

DB 31

- 0: KH 3045
- 1: KH 0000
- 2: KH 0000
- 3: KH 0000
- 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

10.2.5 Examples

Commands can be sent to the interface unit by changing the data word **DW0** of the **DB31**.



Attention

When sending commands, care should be taken that bit 0 of the data word DW0 is always toggled, in order to give the card validity.

T = 0, if previously 1

T = 1, if previously 0

For the 1st command the toggle bit (T) must be 1.

Continuous read-in of a fixcode with read head No. 3 (Buffered-Auto-Read Fixcode)

Output data:

DB31 DW 0 PROFIBUS master command to the interface 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	1	0	0	0	1	0	T

DB31 DW 1 ... 15 are not considered.

Input data:

DB30 DW 0 Mirror imaging of the command from the interface unit to the PROFIBUS 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	1	0	0	0	1	0	T

DB30 DW 1 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

DB30 DW 2 ... DW5: Read data

Continuous reading of a type IDC-1k data carrier at address 0000h, 2 words, with read head No. 2 (Buffered-Auto-Read)

Output data:

DB31 DW 0 PROFIBUS master command to the interface 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

DB31 DW 1

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

DB31 DW 1-15 are not considered.

Input data:

DB30 DW 0 Mirror image of the command from the interface unit to the PROFIBUS 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

DB30 DW 1 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

DB30 DW 2 ... DW3: Read data

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"

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