FACTORY AUTOMATION

Manual

IPT-FP with U-P6-B5-...

Read/write station with interface for INTERBUS

PEPPERL+FUCHS

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1 Declaration of conformity

The devices IPT-FP and U-P6-B5-... of the inductive identification system IDENT-I System P have been developed and manufactured with regard to the applicable European standards and directives.

Note

An appropriate declaration of conformity can be obtained from the manufacturer.

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

CE

ISO**9001**

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2 Symbols used in this document

Warning

This symbol warns of danger.

If this instruction is not heeded, there is a danger of the injury or death of personnel and damage to property or even its destruction.

Attention

This symbol warns of a possible fault.

If the instruction given in this warning is not heeded, the device and any plant or systems connected to it could develop a fault or even fail completely.

Note

This symbol directs attention to important information.

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3 Safety

3.1 Intended use

Warning

The protection of operating personnel and plant is not guaranteed if the equipment is used for a purpose for which it is not intended.

The devices IPT-FP and U-P6-B5-... must only be operated by authorised specialist personnel in accordance with these operating instructions.

3.2 General safety instructions

Warning

Operation of the devices other than described in these instructions will jeopardise the safety and function of the devices and the systems to which they are connected.

The connection of the device and maintenance work under power must only be carried out by a qualified electrical specialist.

If faults cannot be eliminated, the device is to be taken out of operation and protected against further unintentional operation.

Repairs must only be carried out by the manufacturer. Access inside the device and modifications to it are not permissible and render the guarantee null and void.

The operator is responsible for complying with local safety regulations.

3.3 Functional safety/monitoring

The devices IPT-FP and U-P6-B5-... of the inductive identification system IDENT-I System P operate on a microprocessor basis. The status of a device is indicated by means of LEDs on the front of the IPT-FP read station and in the terminal compartment in the lower section U-P6-B5-... (see section 4.3).

It is also possible to control the functions of a device via the INTERBUS, by interrogating the status information and by using special commands to test the device. Device errors and, for example, the failure of a read/write station, can be detected in this way and indicated by the INTERBUS-MASTER.

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4 Product description

Figure 4.1: IPT-FP with lower section U-P6-B5-...

4.1 Delivery package

The IPT-FP read/write station delivery package contains the following items:

- 1 Manual
- 1 Read/write station IPT-FP

The following is included in the delivery package of the lower section U-P6-B5-... that has to be ordered separately:

- 1 Product leaflet
- 1 Cover, with screws
- 1 Sticker for the bus address
- 1 Earthing screw
- 1 Serrated lock washer
- 2 Crimp connectors
- 1 Drilling template

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4.2 Range of application

The system is suitable for various applications, including the following:

- Automation
- Material flow control in production
- Acquisition of operating data
- Access control
- Identification of: Storage vessels, pallets, work piece carriers, refuse containers, tanks, etc.

4.3 Device characteristics and principle of operation

The lower section U-P6-B5-... is the interface to the INTERBUS remote bus and also connects U-P6-B5-V the read/write station with the INTERBUS installation remote bus.

- Supply voltage 20 ... 30 V DC, PELV.
- Data bus interfaces with function insulation to EN 50178.
- The field bus is connected via EMV-PG9 and screw terminals (U-P6-B5-...) or with an M23 round connector (U-P6-B5-V).
- Addressing by means of the physical position of the station in the system
- Display LEDs (On the front of the IPT-FP read/write station):

	Green	"Power on"
Identification side:	Yellow	"IPC detected"
Field bus side:	Red	Status, bus communication

- Diagnostic LEDs (In lower section terminal compartment) U-P6-B5-...)

US	Green	"Power on"
RC	Green	"Remote bus check"
BA	Green	"Bus active"
RD	Yellow	"Remote bus disabled"

- The lower section operates as a passive bus station (Slave). It is therefore restricted to use on the cyclically read process data channel. The device assigns 5 words to each 16 bits (10 bytes). The acyclically read parameter channel of the INTERBUS protocol is not assigned.

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4.4 Accessories/Product family

The inductive identification system IDENT-I System P from Pepperl+Fuchs offers various combination options using the individual components.

Figure 4.2: Overview of the structure of the inductive identification system IDENT-I System P.

Note

Detailed information on the components of the identification system IDENT-I System P can be found in the Sensor Systems 1 catalogue.

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5 Installation

5.1 Storage and transport

The device should be well packed for transportation and storage, so that protection is provided against shock and dampness. Optimum protection is afforded by the original packaging. The permissible ambient conditions should always be adhered to.(see section 8.1)

5.2 Unpacking

Inspect the contents for damage. In the event of damage, the postal service or goods transport service should be informed and the supplier notified.

Inspect the contents of the delivery package against your order and the delivery documents:

- Quantity supplied
- Device type and version in accordance with the type plate
- Accessories
- Operating instructions

Preserve the original packaging in case the device has to be stored or despatched at a later date.

Please address any queries to Pepperl+Fuchs.

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5.3 Connection of the devices U-P6-B5-...

The electrical connection of the lower section is made via screw terminals. The maximum core cross-section of the cable is 1.5 mm ^{2}.

Connect up the INTERBUS and the supply voltage as described in the connection diagram and in the terminal assignment list.

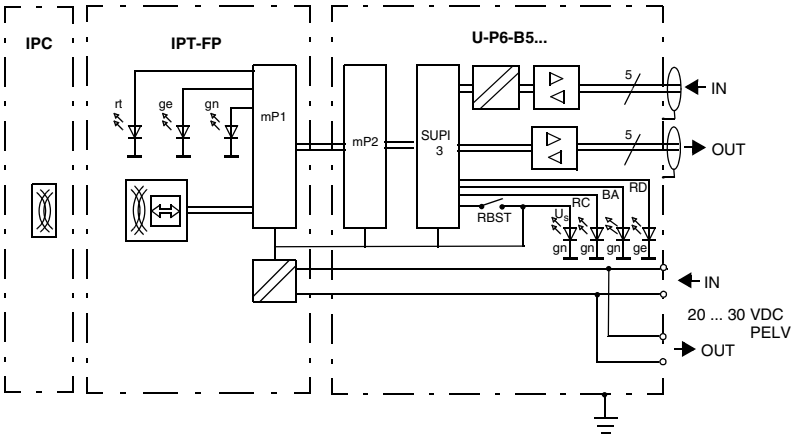

Figure 5.1: Block diagram

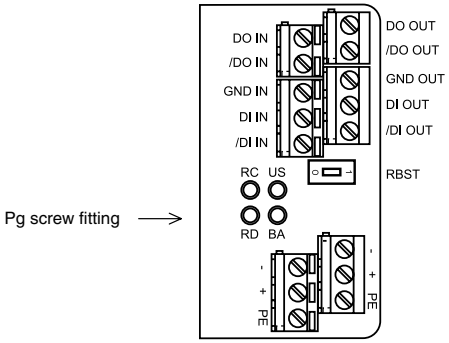

Figure 5.2: Terminal assignment

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5.3.1 INTERBUS ring termination

A characteristic of the INTERBUS system is its physical ring structure. Each connected device lies in the bus between two other stations. If this is not the case, for example at the end of a branch with a bus terminal, then the ring line must be closed in the respective device.

The DIP-switch for the ring termination, designated "RBST", must be set to the correct position (see Figure 5.3). The ring termination switch is located in the terminal compartment in the lower section U-P6-B5-....

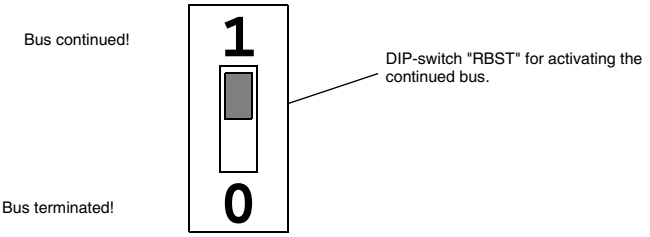

Figure 5.3: Ring termination switch

Attention

The ring termination must only be activated if the device is positioned at the end of an open branch! Otherwise all the following devices will be cut off from the communication.

5.3.2 Cable lengths

Depending on the type of cable used and the magnitude of the external interference, the distance between two devices can be up to 400 metres. The total expansion of an INTERBUS-System can be up to 12.8 kilometres. The number of devices connected to the bus is limited to 512.

5.3.3 Cable

The following INTERBUS remote bus cables should be used:

Parameter	Standard	Highly flexible	Cable suitable for laying underground
Cable construction	Twisted pairs/i. e. 2-core, common screening		
Conductor cross-section	3 x 2 x 0.22 mm^2	3 x 2 x 0.25 mm^2	3 x 2 x 0.22 mm^2
Operating capacity	60 pF/m		
Impedance	120 Ω at 64 KHz/100 Ω at 1 MHz		

Use only screened cables constructed as twisted pairs. The best possible EMC interference immunity can only be achieved by using screened cables.

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5.3.4 EMC screening

The screening of cables provides for the discharge of electromagnetic interference. When screening a cable, both sides of the screen must be connected to earth with low resistance and low inductance.

If cables with double screening are used, e.g. wire meshing and metallised foil, the screens must be connected together at the ends, with low resistance, when making up the cable.

Note

Power supply cables are the source of much interference, e.g. the starting current of 3-phase electric motors. For this reason, the parallel laying of power supply cables with data and signal cables should be avoided, particularly in the same cable duct.

In order to connect the screening with the PG cable gland on the lower section U-P6-B5-... and in so doing satisfy the EMC requirements in accordance with DIN VDE 0871/6.78 the following steps must be carried out:

- Strip the outer sheathing of the cable end over a length of approx. 10 mm.
- Lightly flare the screen (1) and slide it over the cone (2).
- Pull the seal insert (3) over the screen and cone.
- Screw on the PG cable gland.

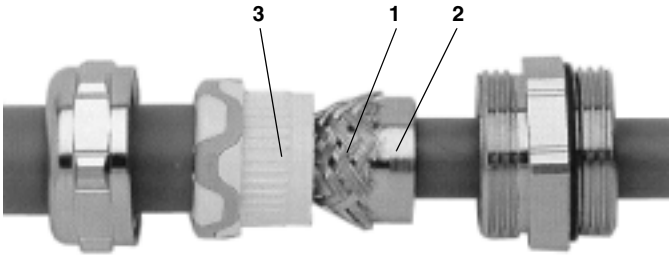

Figure 5.4: Correct EMC screening

In order to secure a conductive contact with the housing, the PG cable gland is fixed to the lower section U-P6-B5-... with a self-tapping nut.

Once unscrewed, self-tapping nuts cannot be used again!

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5.4 Connection of the devices U-P6-B5-V

The electrical connection of the lower section is achieved by means of an M23 round connector. The assignment of the individual pins is shown in the connection diagram.

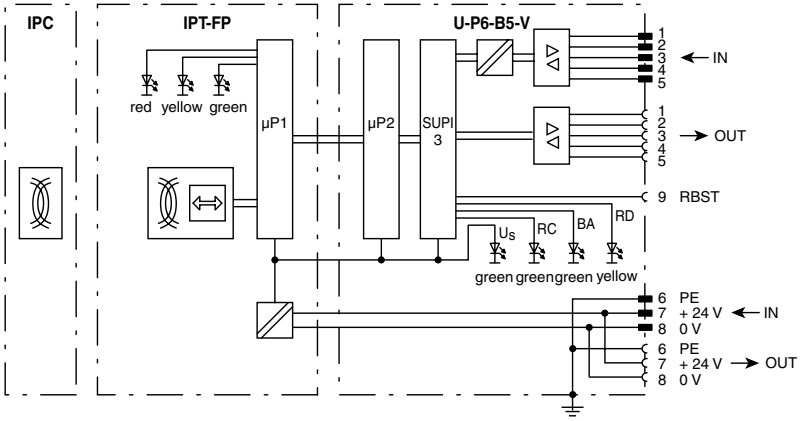

Figure 5.5: Block diagram

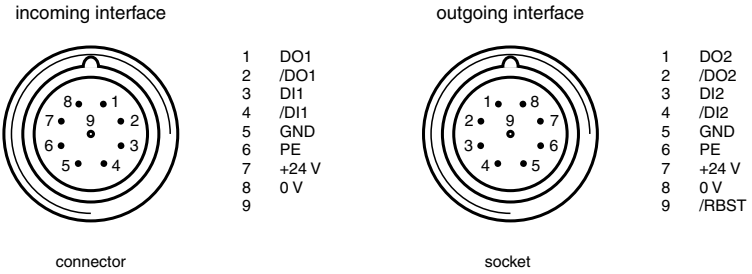

Figure 5.6: Connection diagrams

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5.4.1 INTERBUS ring termination

A characteristic of the INTERBUS system is its physical ring structure. Each connected device lies in the bus between two other stations. If this is not the case, for example at the end of a branch with a bus terminal, then the ring line must be closed.

The ring line in the lower section U-P6-B5-V is automatically closed. If the network of the installation remote bus is extended at the outgoing connection point using a suitable cable, the 0 V potential is laid to the "RBST" input, so that the ring line is automatically opened for the following devices.

5.4.2 Cable lengths

Depending on the type of cable used and the magnitude of the external interference, the total expansion of an INTERBUS installation remote bus can be up to 50 m. The number of devices connected to the bus is limited to 512.

5.4.3 Cable

The following INTERBUS installation remote bus cables should be used:

Parameter	Standard	Highly flexible	Cable suitable for laying underground
Conductor cross-section	3 x 2 x 0.22 mm^2 + 3 x 1 mm^2	3 x 2 x 0.25 mm^2 + 3 x 1 mm^2	3 x 2 x 0.22 mm^2 + 3 x 1 mm^2

The best possible EMC interference immunity can only be achieved by using screened cables.

5.4.4 EMC screening

The screening of cables provides for the discharge of electromagnetic interference. When screening a cable, both sides of the screen must be connected to earth with low resistance and low inductance.

The thread of the M23 round connector is connected conductively to the lower section housing. For correct EMC screening, cable should be used, whose screen is connected to the nut of the plug connector.

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5.4.5 Transfer rate changeover.

An internal slide switch enables the transfer rate to be adjusted to match that of the bus. This allows the two values of 500 kbit/s and 2 Mbit/s to be set (see Figure 5.7).

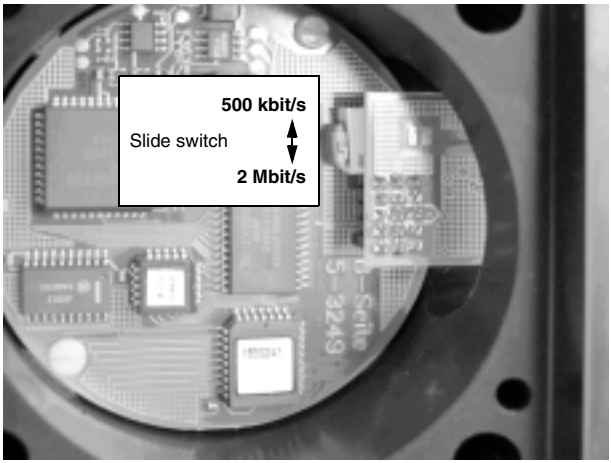

Figure 5.7: Transfer rate changeover

The delivery default setting is 2 Mbit/s.

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5.5 Earth connection

The internal PE connection of the U-P6-B5-... is conductively connected with the housing. However, from the point of view of screening, connection to the outside of the housing is preferable.

The external earthing connection of the lower section is located lower left, adjacent to the cable entries (U-P6-B5-...) or round connectors (U-P6-B5-V). The PE conductor is screwed to the housing with a crimp connector. In order to guarantee a safe earth, the serrated washer must be mounted between the crimp connector and the housing.

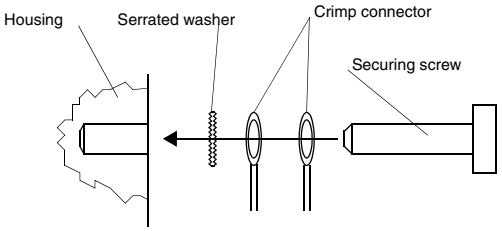

Figure 5.8: Earthing connection principle

With separate cabling the use of a PE conductor lead with a cross-section of at least 4 mm^2 is recommended.

Note

The "CMD" manufacturer-independent program is available for planning, commissioning and diagnosing INTERBUS networks. Details of this program and information on the general theme of INTERBUS are available from:

INTERBUS-Club, Postfach 11 08, 32817 Blomberg;
Tel: 0 52 35/34 21 00, Fax: 0 52 35/34 12 34

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6 Commissioning

Warning

Before commissioning, ensure that the plant to which the device is connected will not be put in danger, e.g. due to the initiation of an uncontrolled process.

6.1 Installation check

Attention

Before commissioning, check once again that the connections are correct.

Before commissioning, familiarise yourself with the system of communication between your INTERBUS and the read/write station (section 7 of this manual). Commissioning requires accurate knowledge of INTERBUS and the programming of your master device.

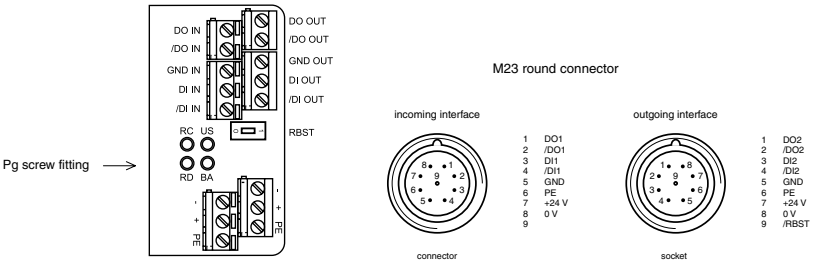

Figure 6.1: Connections to the lower section U-P6-B5-...

After connecting the supply voltage the green LED on the read station and the green "US" LED on the lower section must light. Configure the read/write station with the system commands described in section 7 "Autodetect" is set as the data carrier type.

The transfer speed on the INTERBUS 500 is kbit/s or 2 Mbit/s.

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6.2 Preliminary considerations

Due to the complexity of field bus programming with the INTERBUS it is very difficult to make generally valid statements about commissioning.

A very important aspect of the operation of an inductive identification system with the lower section U-P6-B5-... on the INTERBUS is the time response of the overall system. The question "How long after the positioning of a data carrier in front of a read/write station will the read data be available in my computer?" is answered with the aid of knowledge of the INTERBUS protocol structure and the following formula:

$$t_{ü} = [182 + 1.5 \times m] \times t_{bit} + t_{sw}$$

$t_{ü}$ = transfer time	
m = Number of remote bus stations installed	
t_{bit} = Bit duration	t_{bit} = 2 µs corresponding to 500 kbit/s or t_{bit} = 0.5 µs corresponding to 2 Mbit/s
t_{sw} = Software run time	t_{sw} = 200 µs

On large projects, or if you have little experience of programming an INTERBUS system, you should in any case construct a laboratory set up of your application and test the data transfer to the INTERBUS master before installing the system on the plant.

Note

The manufacturer-independent "CMD" program is available as an aid to planning, commissioning and diagnosing INTERBUS networks. Information on this program and on the subject of INTERBUS can be obtained from:

INTERBUS-Club, Postfach 11 08, 32817 Blomberg;
Tel: 0 52 35/34 21 00, Fax: 0 52 35/34 12 34

6.3 Self test

When the power supply is switched on the device executes a self test in its internal memory. If the error "RAM defect" or "ROM defect" occurs, the communication is not activated. If no error occurs, then the connection to the INTERBUS master is established automatically.

Note

When the bus connection with the device is established, the green "BA" LED lights and remains on.

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7 Operation on the INTERBUS

7.1 INTERBUS - General

The INTERBUS is a standardised field bus, which enables data exchange between PLCs, PCs, operating and observation devices and also sensors and actuators.

A comprehensive introduction to the INTERBUS is beyond the scope of this operating instruction. For detailed information reference should be made to the INTERBUS standard DIN 19258 and to the current literature on the subject.

Note

The INTERBUS Club publishes information brochures and an INTERBUS product catalogue.

7.2 Outline of the commands and data on the INTERBUS

The lower section U-P6-B5-... assigns 5 words to each 16 bits (10 bytes) in the framework protocol of the INTERBUS in both communication directions.

It is restricted in this to the cyclic transfer of the process data channel. This means:

- Even the instructions for the adjustment of the device are updated on every cycle.
- The parameter channel of the INTERBUS is not used.
- The control interface unit is designed as a remote bus station. The ID code is 03.

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7.3 General information on the commands

7.3.1 Software information

A command consists of the command code, a specified number of parameters, the toggle flag and the data relating to the command. The command is entered in the output data field of the master.

A response is read from the input data field of the master and consists of the echo of the command code, a parameter, the toggle flag, the status, an execution counter and the read data.

A number of commands do not use all the parameter and data fields. These unused data fields are then ignored by the device. The input and output fields are constructed as follows:

Output data field:

Byte 0	Command code
Byte 1	Parameter/Toggle flag
Byte 2	Parameter
Byte 3	Parameter
Byte 4	Write data
⋮	⋮
Byte N	Write data

Input data field:

Byte 0	Command code (Echo)
Byte 1	Parameter/Toggle flag (Echo)
Byte 2	Status
Byte 3	Execution counter
Byte 4	Read data
⋮	⋮
Byte N	Read data

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In order to send a new command to the device, the INTERBUS master must write a command in the output data field. The new command is executed when the data has changed relative to the last read-in. If the same command is to be executed a number of times, the toggle flag must be inverted, so that the device recognises that a new command has to be processed.

On the detection of a new command "Status" is set to FF_h. In addition, the execution counter is set to 00_h and on every further execution of this command it counts up. If the execution counter overruns, it starts again at 00_h. An overrun exists when the execution counter reading is equal to 00_h and the status is not equal to FF_h.

After the processing of commands by the identification system, the "Status" is output in accordance with the Status/Fault signal table (See Section 7.8).

The first two bytes of the response correspond to the first two bytes of the command call-up. Correspondingly, the toggle bit of the response is the same as the toggle bit of the command.

The commands "buffered..." and "enhanced buffered..." are executed repeatedly as long as the commands remain in the output data field. The execution is terminated when a new command is written in the data.

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7.3.2 Overview of commands

System commands

Command code	Description of command	Command abbreviation	
2	quit	qu	Page 25
4	change tag	ct	Page 26
3	version	ve	Page 27

Standard read/write commands

fixed code

Command code	Description of command	Command abbreviation	
1	single read fixed code	sf	Page 28
8	auto read fixed code	af	Page 29
9	buffered read fixed code	bf	Page 30
29	enhanced buffered read fixed code	ef	Page 31

Read data

Command code	Description of command	Command abbreviation	
16	single read	sr	Page 32
32	auto read	ar	Page 33
48	buffered read	br	Page 34
25	enhanced buffered read	er	Page 35

Write data

Command code	Description of command	Command abbreviation	
64	single write	sw	Page 36
80	auto write	aw	Page 37
96	buffered write	bw	Page 38
26	enhanced buffered write	ew	Page 39

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Special command modes

Password mode with IPC03

Command code	Description of command	Command abbreviation	
24	password mode	pm	Page 40
65	password change	pc	Page 41
66	password set	ps	Page 42

Configuration IPC03

Command code	Description of command	Command abbreviation	
18	single configure	sc	Page 45
19	auto configure	ac	Page 46
20	buffered configure	bc	Page 47
102	enhanced buffered configure	ec	Page 48
97	single get configuration	sg	Page 49
98	auto get configuration	ag	Page 50
99	buffered get configuration	bg	Page 51
104	enhanced buffered get configuration	eg	Page 52

Write fixed code IPC10

Command code	Description of command	Command abbreviation	
31	single write fixed code	sx	Page 53
100	auto write fixed code	ax	Page 54
101	buffered write fixed code	bx	Page 55
36	enhanced buffered write fixed code	ex	Page 39

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7.4 System commands

quit

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	0	0	0	1	0
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	0	0	0	1	0
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

The running buffered, enhanced-buffered or auto command of the specified read/write head is interrupted.

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change tag

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	0	0	1	0	0
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Data carrier type in ASCII	<Tagtype> (High Byte)							
Byte 3	Data carrier type in ASCII	<Tagtype> (Low Byte)							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	0	0	1	0	0
Byte 1	Reserved/Toggle bit	-	-	-	-				T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

This command tells the read head which code or data carrier to communicate with. The read head status on delivery is Type "00".

The following code and data carriers are currently supported:

TagType		Description	Chip		<WordAddr>	Bits
High byte	Low byte					
0	0	Auto detect				
0	1	IPC01	Philips PCF7930	R/W	00...18	768
0	2	IPC02	µEM V4001	fixed code		32
0	3	IPC03	µEM V4050/64	R/W	00...1D	928
1	0	IPC10	Nova	R/W	0	96

With <TagType> = "00" mixed operation of different code and data carriers is possible. Since the read head for the autodetect requires a significantly longer time, only static read and write is practical in this mode.

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version

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	0	0	0	1	1
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Parameter	<Parameter>							
Byte 3	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	0	0	0	1	1
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	Data 00 … FF_h	<VersionData> section 1							
⋮	Data 00 … FF_h	<VersionData> section ...							
Byte 9	Data 00 … FF_h	<VersionData> section 6							

The software version is transferred with this command. The complete software version message cannot be transferred with one command due to its length. The individual parts of the software version message are transferred by repeated execution of the command with the appropriate parameters.

<Parameter>	Meaning <VersionData>	Example
0; >8	Incorrect parameter; Status "04_h" Data = 0	000000
1	Identification system - Type	IPT-FP
2	Identification system - Part number	095725
3	Identification system - Software number	01I040
4	Identification system - Software date	170399
5	Bus system - Type	U-P6B5
6	Bus system - Part number	099100
7	Bus system - Software number	01K034
8	Bus system - Software date	170399

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7.5 Read/write commands

7.5.1 Fixcode

single read Fixcode

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	0	0	0	0	1
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	0	0	0	0	1
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	ID-Code 00 … FF_h	<ID-Code 4>[a]/<ID-Code 3>							
Byte 5	ID-Code 00 … FF_h	<ID-Code 3>[a]/<ID-Code 2>							
Byte 6	ID-Code 00 … FF_h	<ID-Code 2>[a]/<ID-Code 1>							
Byte 7	ID-Code 00 … FF_h	<ID-Code 1>[a]/<ID-Code 0>							
Byte 8	ID-Code 00 … FF_h [a]	<ID-Code 0>[a]							
Byte 9	not relevant	-	-	-	-	-	-	-	-

a) only with IPC02

A fixed code is read once.

Issue date 2003-08-26

auto read Fixcode

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	0	1	0	0	0
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	0	1	0	0	0
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	ID-Code 00 … FF$_h$	<ID-Code 4>[a)]/<ID-Code 3>							
Byte 5	ID-Code 00 … FF$_h$	<ID-Code 3>[a)]/<ID-Code 2>							
Byte 6	ID-Code 00 … FF$_h$	<ID-Code 2>[a)]/<ID-Code 1>							
Byte 7	ID-Code 00 … FF$_h$	<ID-Code 1>[a)]/<ID-Code 0>							
Byte 8	ID-Code 00 … FF$_h$ [a)]	<ID-Code 0>[a)]							
Byte 9	not relevant	-	-	-	-	-	-	-	-

a) only with IPC02

An attempt is made to read, until a fixed code has been read.

Issue date 2003-08-26

buffered read Fixcode

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	0	1	0	0	1
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	0	1	0	0	1
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	ID-Code 00 … FF$_h$	<ID-Code 4>[a]/<ID-Code 3>							
Byte 5	ID-Code 00 … FF$_h$	<ID-Code 3>[a]/<ID-Code 2>							
Byte 6	ID-Code 00 … FF$_h$	<ID-Code 2>[a]/<ID-Code 1>							
Byte 7	ID-Code 00 … FF$_h$	<ID-Code 1>[a]/<ID-Code 0>							
Byte 8	ID-Code 00 … FF$_h$ [a]	<ID-Code 0>[a]							
Byte 9	not relevant	-	-	-	-	-	-	-	-

a) only with IPC02

The fixed code continues to be read. Only changed data is transferred via the interface.

Issue date 2003-08-26

enhanced buffered read Fixcode

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	1	1	1	0	1
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	1	1	1	0	1
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	ID-Code 00 … FF$_h$	<ID-Code 4>[a]/<ID-Code 3>							
Byte 5	ID-Code 00 … FF$_h$	<ID-Code 3>[a]/<ID-Code 2>							
Byte 6	ID-Code 00 … FF$_h$	<ID-Code 2>[a]/<ID-Code 1>							
Byte 7	ID-Code 00 … FF$_h$	<ID-Code 1>[a]/<ID-Code 0>							
Byte 8	ID-Code 00 … FF$_h$ [a]	<ID-Code 0[a]>							
Byte 9	not relevant	-	-	-	-	-	-	-	-

a) only with IPC02

The fixed code continues to be read. Only changed data is transferred via the interface. If the code or data carrier leaves the read range, the status "05$_h$" is output.

Issue date 2003-06-26

7.5.2 Read data

single read

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	1	0	0	0	0
Byte 1	Number of words/Toggle bit	<WordNum>				-	-	-	T
Byte 2	Word address	<WordAddr> (High Byte)							
Byte 3	Word address	<WordAddr> (Low Byte)							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	1	0	0	0	0
Byte 1	Number of words/Toggle bit	<WordNum>				-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	Data 00 … FF_h	<Data 3>							
Byte 5	Data 00 … FF_h	<Data 2>							
Byte 6	Data 00 … FF_h	<Data 1>							
Byte 7	Data 00 … FF_h	<Data 0>							
Byte 8	not relevant	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

One attempt is made to read a 32 bit word (<WordNum> = "0001") from the address <WordAddr>.

Issue date 2003-08-26

auto read

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	1	0	0	0	0	0
Byte 1	Number of words/Toggle bit	<WordNum>				-	-	-	T
Byte 2	Word address	<WordAddr> (High Byte)							
Byte 3	Word address	<WordAddr> (Low Byte)							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	1	0	0	0	0	0
Byte 1	Number of words/Toggle bit	<WordNum>				-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	Data 00 … FF_h	<Data 3>							
Byte 5	Data 00 … FF_h	<Data 2>							
Byte 6	Data 00 … FF_h	<Data 1>							
Byte 7	Data 00 … FF_h	<Data 0>							
Byte 8	not relevant	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Repeated attempts are made, until a 32 bit word (<WordNum> = "0001") has been read from the address <WordAddr>.

Issue date 2003-08-26

buffered read

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	1	1	0	0	0	0
Byte 1	Number of words/Toggle bit	<WordNum>				-	-	-	T
Byte 2	Word address	<WordAddr> (High Byte)							
Byte 3	Word address	<WordAddr> (Low Byte)							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	1	1	0	0	0	0
Byte 1	Number of words/Toggle bit	<WordNum>				-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	Data 00 … FF$_h$	<Data 3>							
Byte 5	Data 00 … FF$_h$	<Data 2>							
Byte 6	Data 00 … FF$_h$	<Data 1>							
Byte 7	Data 00 … FF$_h$	<Data 0>							
Byte 8	not relevant	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Repeated attempts are made to read a 32 bit word (<WordNum> = "0001") from the address <WordAddr>. Only changed data are transferred via the interface, i. e. if the next data carrier is read, or if previously no data carrier was found in the read range, the new data carrier.

Issue date 2003-08-26

enhanced buffered read

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	1	1	0	0	1
Byte 1	Number of words/Toggle bit	<WordNum>				-	-	-	T
Byte 2	Word address	<WordAddr> (High Byte)							
Byte 3	Word address	<WordAddr> (Low Byte)							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	1	1	0	0	1
Byte 1	Number of words/Toggle bit	<WordNum>				-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	Data 00 … FF_h	<Data 3>							
Byte 5	Data 00 … FF_h	<Data 2>							
Byte 6	Data 00 … FF_h	<Data 1>							
Byte 7	Data 00 … FF_h	<Data 0>							
Byte 8	not relevant	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Repeated attempts are made to read a 32 bit word (<WordNum> = "0001") from the address <WordAddr>. Only changed data is transferred via the interface. When a data carrier leaves the read range, the status "05_h" is output.

Issue date 2003-06-26

7.5.3 Write data

single write

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	0	0	0	0	0	0
Byte 1	Number of words/Toggle bit	<WordNum>				-	-	-	T
Byte 2	Word address	<WordAddr> (High Byte)							
Byte 3	Word address	<WordAddr> (Low Byte)							
Byte 4	Data 00 … FF$_h$	<Data 3>							
Byte 5	Data 00 … FF$_h$	<Data 2>							
Byte 6	Data 00 … FF$_h$	<Data 1>							
Byte 7	Data 00 … FF$_h$	<Data 0>							
Byte 8	not relevant	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	0	0	0	0	0	0
Byte 1	Number of words/Toggle bit	<WordNum>				-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

One attempt is made, to write a 32 bit word (<WordNum> = "0001") from the address <WordAddr>. A maximum of 1 word = 4 bytes can be written.

Issue date 2003-08-26

auto write

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	0	1	0	0	0	0
Byte 1	Number of words/Toggle bit	<WordNum>				-	-	-	T
Byte 2	Word address	<WordAddr> (High Byte)							
Byte 3	Word address	<WordAddr> (Low Byte)							
Byte 4	Data 00 … FF$_h$	<Data 3>							
Byte 5	Data 00 … FF$_h$	<Data 2>							
Byte 6	Data 00 … FF$_h$	<Data 1>							
Byte 7	Data 00 … FF$_h$	<Data 0>							
Byte 8	not relevant	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	0	1	0	0	0	0
Byte 1	Number of words/Toggle bit	<WordNum>				-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Repeated attempts are made until a 32 bit word (<WordNum> = "0001") is written from the address <WordAddr>. A maximum of 1 word = 4 bytes can be written.

Issue date 2003-06-26

buffered write

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	1	0	0	0	0	0
Byte 1	Number of words/Toggle bit	<WordNum>				-	-	-	T
Byte 2	Word address	<WordAddr> (High Byte)							
Byte 3	Word address	<WordAddr> (Low Byte)							
Byte 4	Data 00 … FF$_h$	<Data 3>							
Byte 5	Data 00 … FF$_h$	<Data 2>							
Byte 6	Data 00 … FF$_h$	<Data 1>							
Byte 7	Data 00 … FF$_h$	<Data 0>							
Byte 8	not relevant	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	1	0	0	0	0	0
Byte 1	Number of words/Toggle bit	<WordNum>				-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

An attempt is now made to write a 32 bit word (<WordNum> = "0001") from the address <WordAddr>. After successful writing, the response is sent and then continuous reading continues. Then the same data carrier is read, until the data carrier has left the read/write range or a new data carrier appears in front of the read/write head. Then the command starts again with attempts to write.

A maximum of 1 word = 4 bytes can be written.

Issue date 2003-08-26

enhanced buffered write

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	1	1	0	1	0
Byte 1	Number of words/Toggle bit	<WordNum>				-	-	-	T
Byte 2	Word address	<WordAddr> (High Byte)							
Byte 3	Word address	<WordAddr> (Low Byte)							
Byte 4	Data 00 … FF$_h$	<Data 3>							
Byte 5	Data 00 … FF$_h$	<Data 2>							
Byte 6	Data 00 … FF$_h$	<Data 1>							
Byte 7	Data 00 … FF$_h$	<Data 0>							
Byte 8	not relevant	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	1	1	0	1	0
Byte 1	Number of words/Toggle bit	<WordNum>				-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

An attempt is now made to write a 32 bit word (<WordNum> = "0001") from the address <WordAddr>. After successful writing, the response is sent and then continuous reading continues. Then the same data carrier is read, until the data carrier has left the read/write range or a new data carrier appears in front of the read/write head. Then the command starts again with attempts to write. The status "05$_h$" is output if the data carrier leaves the read range.

A maximum of 1 word = 4 bytes can be written.

Issue date 2003-06-26

7.6 Special command modes

7.6.1 Password mode with IPC03

Hinweis

The password is a 32 bit word that is set to "0" before a new IPC03 data carrier leaves the factory. The password cannot be read. In order to write the passwords for the "Control-Word" and the "Protection-Word", the processing must always be in password mode.

password mode

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	1	1	0	0	0
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Mode (on:<F>on=1 or off=<F>0	0	0	0	0	0	0	0	<F>
Byte 3	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	1	1	0	0	0
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Status	<Status>							
Byte 3	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Activated (Mode <F> = "1") and deactivated (Mode <F> = "0"), the password mode of the read head. In the password mode, the password is transferred to the data carrier before each read/write access. If a data carrier is addressed with the wrong password, then even the data range, for which no password protection is set, cannot be accessed.

Issue date 2003-08-26

password change

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	0	0	0	0	0	1
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Old password 00 … FF$_h$	<PSW 3>							
Byte 3	Old password 00 … FF$_h$	<PSW 2>							
Byte 4	Old password 00 … FF$_h$	<PSW 1>							
Byte 5	Old password 00 … FF$_h$	<PSW 0>							
Byte 6	New password 00 … FF$_h$	<PSW 3>							
Byte 7	New password 00 … FF$_h$	<PSW 2>							
Byte 8	New password 00 … FF$_h$	<PSW 1>							
Byte 9	New password 00 … FF$_h$	<PSW 0>							

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	0	0	0	0	0	1
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Status	<Status>							
Byte 3	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Changes the password in a data carrier. Here, first the old and then the new password has to be entered. If the password has been successfully written, then the password in the read/write head is also changed. The command "Password set" is no longer necessary. The IPC03 password can also be changed when the password mode is deactivated.

Issue date 2003-08-26

password set

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	0	0	0	0	1	0
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	not relevant	-	-	-	-	-	-	-	-
Byte 3	not relevant	-	-	-	-	-	-	-	-
Byte 4	Password 00 … FF_h	<PSW 3>							
Byte 5	Password 00 … FF_h	<PSW 2>							
Byte 6	Password 00 … FF_h	<PSW 1>							
Byte 7	Password 00 … FF_h	<PSW 0>							
Byte 8	not relevant	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	0	0	0	0	1	0
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Status	<Status>							
Byte 3	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Sets the password, which the read/write head communicates to the data carrier in the password mode.

Issue date 2003-08-26

7.6.2 Configuration IPC03

Note

These commands can only be used when data carrier type 03 (IPC03) is set. They cannot be used in the autodetect mode (mixed operation, data carrier type 00)!

The memory of the data carrier IPC03 is constructed as follows:

Address	Meaning	<WordAddr>	<ConfAddr>	Remarks
Word 0	Password	-	-	Write only
Word 1	Protection word	-	"1"	Read/write
Word 2	Control word	-	"2"	Read/write
Word 3...31	Data range	"00" ... "1C"	-	Read/write
Word 32	Device serial number	"1D"	-	Read only
Word 33	Device identification	"1E"	-	Read only

Each "word" comprises 32 bits. The IPC03 has a "Protection word" and a "Control word". Access to both words can only be obtained with the correct password. The individual bits have the following meaning:

Control word		
Bit	**Meaning**	**Byte**
0...7	Read range-start	0
8...15	Read range-end	1
16	Password protection on/off	2
17	Read-after-Write operating mode on/off	
18...31	Freely usable	3

Protection word		
Bit	**Meaning**	**Byte**
0...7	First read-protected word	0
8...15	Last read-protected word	1
16...23	First write-protected word	2
24...31	Last write-protected word	3

Issue date 2003-08-26

"Default Read"

As soon as the data carrier is supplied with power, it sends out (bytes 0 and 1 in the control word) from the data range, as defined by the start and end of the read range. The data range between the start and the end of the read range can be read with the read commands "single read", "auto read", "buffered read" and "enhanced buffered read", if <WordAddr> is set to "0000" and <WordNum> is set to "00".

When the password protection is switched off, any data word can be written to that lies outside the write-protected range. If a word is to be written in this range, the "Protection Word" must be changed accordingly.

If the correct password has been set with the password-set-command and the password mode has been switched on with the password mode command,

- then, with the password protection switched on, any data word can be written to that lies outside the write-protected range and
- is active in the read-protected range with the password protection switched on.

If the password protection has been switched off, any data word can be read.

The read-after-write operating mode is not used by this read/write station, so that this bit has no significance here.

The start and end, respectively, of the read-protected and write-protected range are fixed with the "Protection word".

Issue date 2003-08-26

single configure

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	1	0	0	1	0
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	not relevant	-	-	-	-	-	-	-	-
Byte 3	Address in the configuration range	<RegAddr>							
Byte 4	Data 00 … FF$_h$	<Data>							
Byte 5	Data 00 … FF$_h$	<Data>							
Byte 6	Data 00 … FF$_h$	<Data>							
Byte 7	Data 00 … FF$_h$	<Data>							
Byte 8	not relevant	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	1	0	0	1	0
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

One attempt is made to write a word in the configuration range from the address <RegAddr>. In order to write in the configuration range, the password-mode must be active.

Issue date 2003-06-26

auto configure

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	1	0	0	1	1
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	not relevant	-	-	-	-	-	-	-	-
Byte 3	Address in the configuration range	<RegAddr>							
Byte 4	Data 00 … FF$_h$	<Data>							
Byte 5	Data 00 … FF$_h$	<Data>							
Byte 6	Data 00 … FF$_h$	<Data>							
Byte 7	Data 00 … FF$_h$	<Data>							
Byte 8	not relevant	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	1	0	0	1	1
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

An attempt is made until successful, to write a word in the configuration range from the address <RegAddr>. In order to write in the configuration range, the password-mode must be active.

Issue date 2003-08-26

buffered configure

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	1	0	1	0	0
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	not relevant	-	-	-	-	-	-	-	-
Byte 3	Address in the configuration range	<RegAddr>							
Byte 4	Data 00 … FF_h	<Data>							
Byte 5	Data 00 … FF_h	<Data>							
Byte 6	Data 00 … FF_h	<Data>							
Byte 7	Data 00 … FF_h	<Data>							
Byte 8	not relevant	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	1	0	1	0	0
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

One attempt is made to write a word in the configuration range from the address <RegAddr>. After each successful write, the response is sent and the system waits until a new data carrier is within the detection range. The command then starts again from the beginning. In order to write in the configuration range, the password-mode must be active.

Issue date 2003-08-26

enhanced buffered configure

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	1	0	0	1	1	0
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	not relevant	-	-	-	-	-	-	-	-
Byte 3	Address in the configuration range	<RegAddr>							
Byte 4	Data 00 … FF$_h$	<Data>							
Byte 5	Data 00 … FF$_h$	<Data>							
Byte 6	Data 00 … FF$_h$	<Data>							
Byte 7	Data 00 … FF$_h$	<Data>							
Byte 8	not relevant	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	1	0	0	1	1	0
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

One attempt is made to write a word in the configuration range from the address <RegAddr>. After each successful write, the response is sent and the system waits until a new data carrier is within the detection range. The command then starts again from the beginning. In order to write in the configuration range, the password-mode must be active. When the data carrier leaves the read range, the status "05$_h$" is output.

Issue date 2003-08-26

single get configuration

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	1	0	0	0	0	1
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Reserved	0	0	0	0	0	0	0	0
Byte 3	Register address	<RegAddr>							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	1	0	0	0	0	1
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	Data 00 … FF_h	<Data>							
Byte 5	Data 00 … FF_h	<Data>							
Byte 6	Data 00 … FF_h	<Data>							
Byte 7	Data 00 … FF_h	<Data>							
Byte 8	not relevant	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

One attempt is made to read a word in the configuration range ("Protection Word" or "Control Word") from the address <RegAddr>.

Issue date 2003-06-26

auto get configuration

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	1	0	0	0	1	0
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	reserved	0	0	0	0	0	0	0	0
Byte 3	Register address	<RegAddr>							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	1	0	0	0	1	0
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	Data 00 … FF$_h$	<Data>							
Byte 5	Data 00 … FF$_h$	<Data>							
Byte 6	Data 00 … FF$_h$	<Data>							
Byte 7	Data 00 … FF$_h$	<Data>							
Byte 8	not relevant	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

An attempt is made until successful, to read a word in the configuration range from the address <RegAddr>.

Issue date 2003-08-26

buffered get configuration

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	1	0	0	0	1	1
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Reserved	0	0	0	0	0	0	0	0
Byte 3	Register address	<RegAddr>							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	1	0	0	0	1	1
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	Data 00 … FF_h	<Data>							
Byte 5	Data 00 … FF_h	<Data>							
Byte 6	Data 00 … FF_h	<Data>							
Byte 7	Data 00 … FF_h	<Data>							
Byte 8	not relevant	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

A continuous attempt is made to read a word in the configuration range from the address <RegAddr>. Only changed data is transferred by the interface.

Issue date 2003-08-26

enhanced buffered get configuration

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	1	0	1	0	0	0
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Reserved	0	0	0	0	0	0	0	0
Byte 3	Register address	<RegAddr>							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	1	0	1	0	0	0
Byte 1	Reserved/Toggle bit	-	-	-	-	-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	Data 00 … FF$_h$	<Data>							
Byte 5	Data 00 … FF$_h$	<Data>							
Byte 6	Data 00 … FF$_h$	<Data>							
Byte 7	Data 00 … FF$_h$	<Data>							
Byte 8	not relevant	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

A continuous attempt is made to read a word in the configuration range from the address <RegAddr>. Only changed data is transferred via the interface. When the data carrier leaves the read range, the status "05$_h$" is output.

Issue date 2003-08-26

7.6.3 Write fixed code IPC10

single write Fixcode

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	1	1	1	1	1
Byte 1	FixLen/Toggle bit	<FixLen>				-	-	-	T
Byte 2	FixType	< FixType> (High Byte)							
Byte 3	FixType	< FixType> (Low Byte)							
Byte 4	Data 00 … FF$_h$	<Data>							
⋮	Data 00 … FF$_h$	<Data>							
Byte 9	Data 00 … FF$_h$	<Data>							

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	0	1	1	1	1	1
Byte 1	FixLen/Toggle bit	<FixLen>				-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

One attempt is made to write a fixed code. Here <FixType> is always "02" and <FixLen> is always "05$_h$", since 5 bytes must always be written.

Issue date 2003-06-26

auto write Fixcode

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	1	0	0	1	0	0
Byte 1	Fixlen/Toggle bit	<FixLen>				-	-	-	T
Byte 2	FixType	<FixType> (High Byte)							
Byte 3	FixType	<FixType> (Low Byte)							
Byte 4	Data 00 … FF$_h$	<Data>							
⋮	Data 00 … FF$_h$	<Data>							
Byte 9	Data 00 … FF$_h$	<Data>							

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	1	0	0	1	0	0
Byte 1	FixLen/Toggle bit	<FixLen>				-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

An attempt is made until successful, to write a fixed code.

Issue date 2003-08-26

buffered write Fixcode

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	1	0	0	1	0	1
Byte 1	FixLen/Toggle bit	<FixLen>				-	-	-	T
Byte 2	FixType	<FixType> (High Byte)							
Byte 3	FixType	<FixType> (Low Byte)							
Byte 4	Data 00 … FF_h	<Data>							
⋮	Data 00 … FF_h	<Data>							
Byte 9	Data 00 … FF_h	<Data>							

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	1	1	0	0	1	0	1
Byte 1	FixLen/Toggle bit	<FixLen>				-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

One attempt is made to write a fixed code. After each successful write, the response is sent and the system waits until a new data carrier is within the detection range. The command then starts again from the beginning.

Issue date 2003-06-26

enhanced buffered write fixed code, write ID-Code

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	1	0	0	1	0	0
Byte 1	FixLen/Toggle bit	<FixLen>				-	-	-	T
Byte 2	FixType	<FixType> (High Byte)							
Byte 3	FixType	<FixType> (Low Byte)							
Byte 4	Data 00 … FF_h	<Data>							
Byte	Data 00 … FF_h	<Data>							
Byte 9[a)]	Data 00 … FF_h	<Data>							

a) N = 4 x <WordNum>

Response:

Byte	Content	B7	B6	B5	B4	B3	B2	B1	B0
Byte 0	Command code	0	0	1	0	0	1	0	0
Byte 1	FixLen/Toggle bit	<FixLen>				-	-	-	T
Byte 2	Status	<Status>							
Byte 3	Execution counter	<ExecCounter>							
Byte 4	not relevant	-	-	-	-	-	-	-	-
⋮	⋮	-	-	-	-	-	-	-	-
Byte 9	not relevant	-	-	-	-	-	-	-	-

One attempt is made to write a fixed code. After each successful write, the response is sent and the system waits until a new data carrier is within the detection range. The command then starts again from the beginning. When the data carrier leaves the read range, the status "05_h" is output.

Issue date 2003-08-26

7.7 Legend:

<Status>:	Byte 1
<TagType>:	2 ASCII characters, example: For IPC02 "02" (32_h 30_h)
<WordAddr>:	4 Bytes Word initial address in the data carrier, range from "0000" to "FFFF" depending on data carrier type.
<WordNum>:	4 Bits Number of words to be read or written. 01_h ("0001") is used as the number of words. The following applies for IPC03: The number of words 00_h is used with the word address "0000" to read the preset data range on the data carrier.
<ExecCounter>:	1 Byte
<Data>:	<WordNum> x 4 bytes When communicating a word, the highest value byte is transferred first and the lowest value byte last.
<ConfAddr>:	Word start address in the configuration range of the data carrier. 1 ASCII character range from "0" to "F", depending on data carrier type. The following applies for IPC03: "1" = Protection Word "2" = Control Word
Mode <F>:	1 ASCII character, "0" or "1".
<FixLen>:	4 Bits
<FixType>:	2 ASCII characters, example: For IPC02 "02" (32_h 30_h)
<ID-Code>:	4 bytes 5 bytes for IPC02
<Parameter>:	1 byte, value range 01_h to 08_h see version command Table <Parameter> on page 27
<VersionData>:	6 ASCII characters, software version message
<RegAddr>:	4 bytes
<PSW>:	4 bytes

Issue date 2003-06-26

7.8 error/status messages

Status	Meaning
00h	Command has been executed without error.
FFh	Command being processed

Error messages, which triggered the identification system

Status	Meaning
02h	Switch-on message, Reset has been executed
03h	Reserved
04h	Incorrect or incomplete command or parameter not in the valid range.
05h	Read/write error, no data carrier
06h	Hardware fault, e.g. error on self test or read head defect
07h	Software error
08h	Reserved
09h	Reserved
0Ah	Reserved
0Bh	Reserved
0Ch	Reserved
0Dh	Reserved
0Eh	Reserved
0Fh	Reserved

Error messages, which triggered the U-P6-B5 lower section

Status	Meaning
10h	Reserved
20h	Reset has been executed
40h	Incorrect or incomplete command or parameter not in the valid range.
60h	Hardware fault, e.g. no communication with the identification system
70h	Software error

Issue date 2003-08-26

8 Technical data

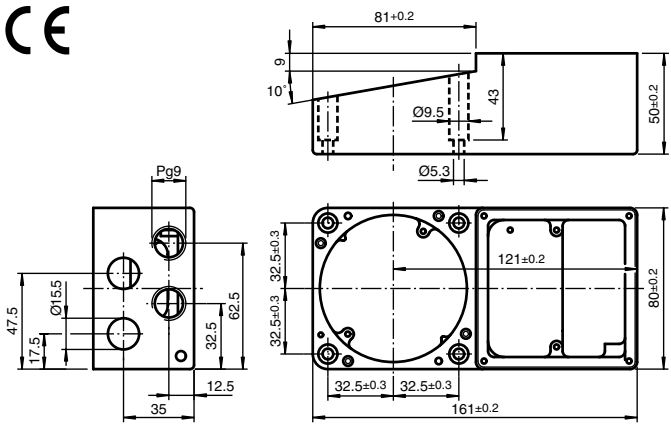
8.1 General data

Interface	U-P6-B5	U-P6-B5-V
Bus interface	INTERBUS remote bus	INTERBUS remote bus installation
BUS protocol	INTERBUS remote bus	
Interface	RS 485	
ID-Code	03	
Transfer rate	500 kbit/s	500 kbit/s or 2 Mbit/s - can be switched over internally
Ring termination	DIP switch	automatic via plug-in contact
Electrical data		
Rated operating voltage U_e	20 ... 30 V DC, ripple 10%$_{SS}$, PELV	
Current loading	< 300 mA (U_e = 24 V) with read/write station	
Power consumption	max. 5W with read/write station	
Galvanic isolation		
Operating voltage/Interface	Function isolation in accordance with DIN EN 50178, rated insulation voltage 50 V_{eff}	
Mechanical data		
Ambient temperature	-25 ... 70 °C (248 ... 343 K)	
Storage temperature	-40 ... 85 °C (233 ... 358 K)	
Protection class	IP 67 to EN60529	
	PG9 cable glands that are not used must be sealed with the plugs provided. The plugs are suitable for both the standard cable glands and the EMC cable glands.	
Housing material	Aluminium, black anodised	
Connection:		
BUS	Screw terminals via 2 x PG9 EMC cable glands 3 x 2 x 0.22 mm^2 or 3 x 2 x 0.25 mm^2 twisted pairs, screened	Round connector M23 8+1 pin 3 x 2 x 0.22 mm^2 + 3 x 1 mm^2 or 3 x 2 x 0.25 mm^2 + 3 x 1 mm^2
Voltage supply	Screw terminals via 2 x PG9 standard cable glands up to 3 x 1.5 mm^2	
PE:	Crimp connector > 4 mm^2	

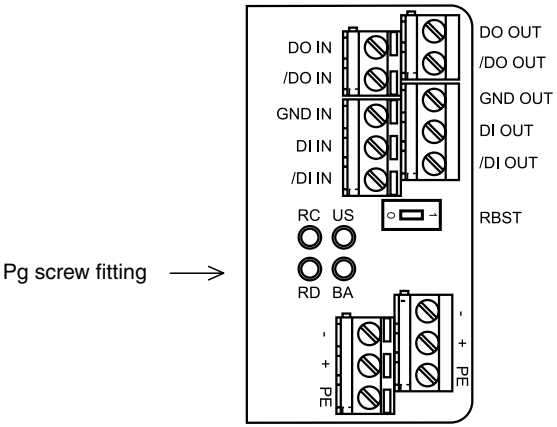
Mechanical data	IPT-FP
Ambient temperature	-25 ... 70 °C (248 ... 343 K)
Storage temperature	-40 ... 85 °C (233 ... 358 K)
Protection class	IP 67 to EN60529
Housing material	PTB

Issue date 2003-07-21

8.2 Lower section U-P6-B5

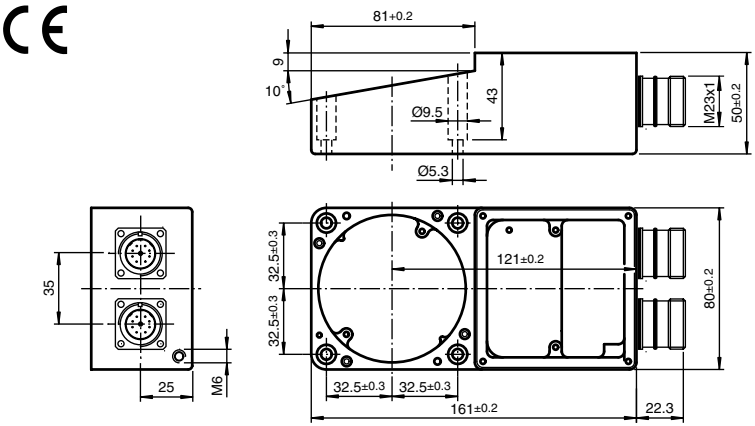


Connection:



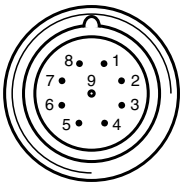
Issue date 2003-07-21

8.3 Lower section U-P6-B5-V



Connection:

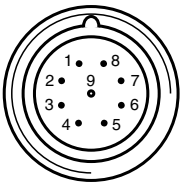
incoming interface



connector

1	DO1
2	/DO1
3	DI1
4	/DI1
5	GND
6	PE
7	+24 V
8	0 V
9	

outgoing interface

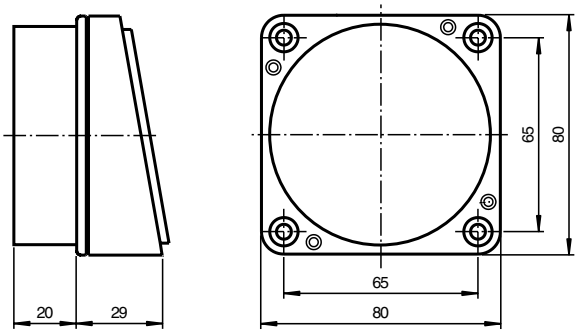


socket

1	DO2
2	/DO2
3	DI2
4	/DI2
5	GND
6	PE
7	+24 V
8	0 V
9	/RBST

Issue date 2003-07-21

8.4 Read/write station IPT-FP



Distances		in air
Read distance with	IPC02-20W	0 mm ... 40 mm
Read distance with	IPC02-30W	0 mm ... 50 mm
Read distance with	IPC02-50W	0 mm ... 80 mm
Read distance with	IPC02-C1	0 mm ... 80 mm
Read distance with	IPC02-68-T5	0 mm ... 50 mm
Read distance with	IPC03-20W	0 mm ... 30 mm
Write distance with	IPC03-20W	0 mm ... 25 mm
Read distance with	IPC03-30W	0 mm ... 40 mm
Write distance with	IPC03-30W	0 mm ... 30 mm
Read distance with	IPC03-50W	0 mm ... 60 mm
Write distance with	IPC03-50W	0 mm ... 45 mm
Read distance with	IPC03-C1	0 mm ... 60 mm
Write distance with	IPC03-C1	0 mm ... 45 mm
Read distance with	IPC10-20	0 mm ... 30 mm
Write distance with	IPC10-20	0 mm ... 25 mm

Issue date 2003-07-21

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.v",
including the supplementary clause "Extended reservation of title".

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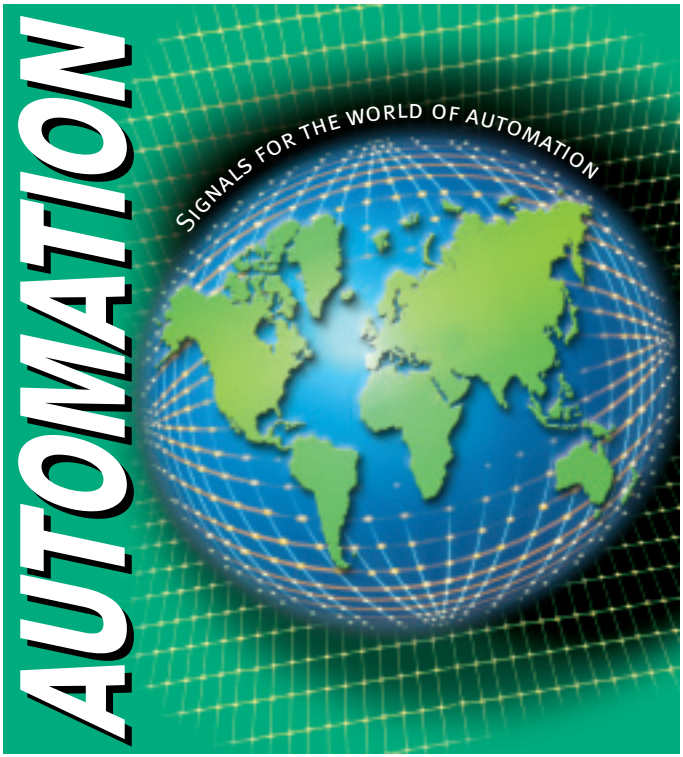
For this reason, this printed matter is produced on paper bleached without the use of chlorine.



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