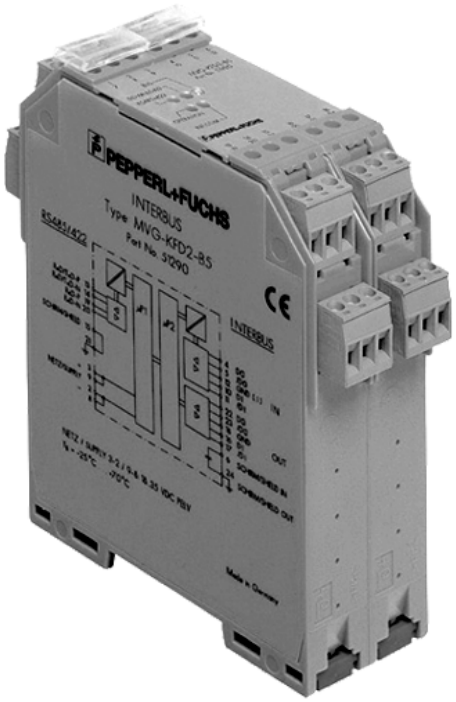
FACTORY AUTOMATION

Manual

MVG-KFD2-B5

Bus Coupler
IDENT-M System V ↔ InterBus



CE

PEPPERL+FUCHS

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1 Declaration of Conformity

The bus coupler MVG-KFD2-B5 within the microwave identification system IDENT-M System V has been developed and produced in accordance with the applicable European standards and directives.

Note

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

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

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ISO**9001**

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2 The Symbols Used

Warning

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

Attention

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

Note

This symbol indicates an important hint.

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3 General Information

3.1 Intended use

The bus coupler MVG-KFD2-B5 is used within the microwave identification system IDENT-M System V from Pepperl+Fuchs to link the control interface unit MVI-D2-2HRX to a higher-order computer (PLC, PC) via the standard INTERBUS. The bus coupler must only be operated with the system components of the IDENT-M System V from Pepperl+Fuchs.

Warning

The safety of the operating personnel and the system are not guaranteed when the bus coupler is not used in accordance with its intended use.

The device MVG-KFD2-B5 must only be operated by appropriately qualified personnel in accordance with this operating manual.

3.2 General safety information

Warning

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

The connection of the equipment and any maintenance work to be carried out while voltage is 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 must only be carried out by the manufacturer. Additions or modifications to the equipment are not allowed and void the warranty.

The responsibility for the adherence to local safety standards lies with the operator.

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3.3 Functional safety/monitoring

The bus coupler MVG-KFD2-B5 functions on a microprocessor basis. Device states, functional disturbances and equipment errors/faults are signalled with the LEDs on the front of the device.

It is also possible to perform a function control via the INTERBUS by querying the status information or by using special commands for testing the device and components connected to it. Device failure or, for example, 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".

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4 Product Description

4.1 Scope of delivery

The following are included with the delivery of the device:

- 1 operating manual
- 1 device MVG-KFD2-B5

4.2 System description

Bus systems, the INTERBUS in particular, make it possible to reduce the amount of cabling used and allow extensive data exchange over long distances.

The bus coupler MVG-KFD2-B5 establishes the connection between the INTERBUS and a control interface unit MVI-D2-2HRX to which up to two read/write heads can be connected.

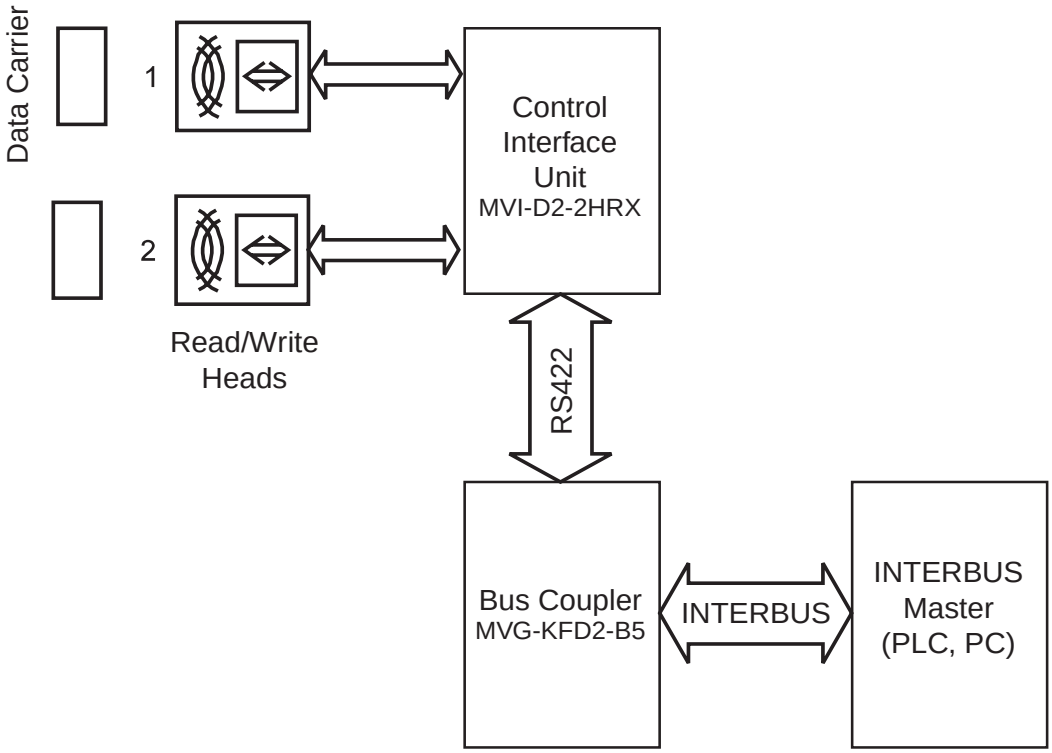

Fig. 4.1: Function of the bus coupler MVG-KFD2-B5 within the microwave identification system IDENT-M System V

The bus coupler operates as a passive subscriber of the system bus (slave). Only the cyclically read process-data channel is used. The data width is 4 words, each 16 bit.

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

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4.3 Device features and function

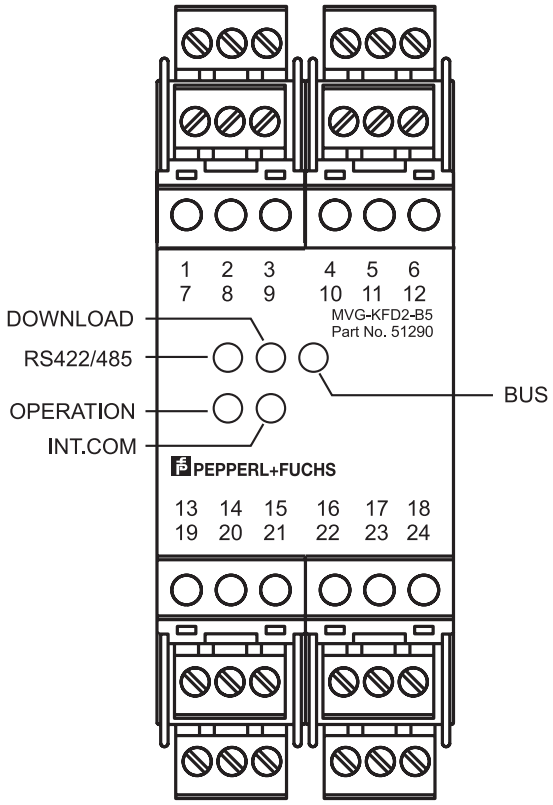

Fig. 4.2: Front view of the bus coupler MVG-KFD2-B5

Device features

- 40 mm wide KF-housing (terminal housing for top-hat-rail mounting)
- Supply voltage 18 … 35 VDC without electrical isolation.
- Combined RS 422/RS 485 interface: the RS 422 interface is connected to the RS 422 interface of the control interface unit.
- Bus wires "IN" electrically isolated from the device power supply
- Connecting the INTERBUS and the serial interfaces via detachable screw terminals.
- ID-code: 3
- Ident-side - 4 two-colour LEDs for
  - bus coupler voltage supply/device malfunctions
  - serial interface to the identification system
  - device-internal communication
  - download
- Field-bus-side - 1 two-colour LED for
  - bus-communication status

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Function

To couple the identification system IDENT-M System V to the INTERBUS, the serial interface (RS 422) of the bus coupler is connected to the control interface unit MVI-D2-2HRX of the identification system and the field bus connection of the bus coupler to the INTERBUS.

The bus coupler MVG-KFD2-B5 converts the commands sent via the INTERBUS into the command syntax of the control interface unit and outputs corresponding command responses from the control interface unit to the INTERBUS.

Note

At many points throughout this manual, cross references are made to specific locations in the "Microwave Identification System" handbook, 95 Edition, at which the commands, operating modes and error messages are documented in detail.

In order to achieve the fastest possible communication, the operating modes can be preset via the special commands 1 ... 7. This means that the commands that are transmitted via the INTERBUS are more compact than commands which are then sent to the control interface unit.

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4.4 Accessories/product family

The microwave identification system IDENT-M System V from Pepperl+Fuchs offers various possibilities to combine the individual components.

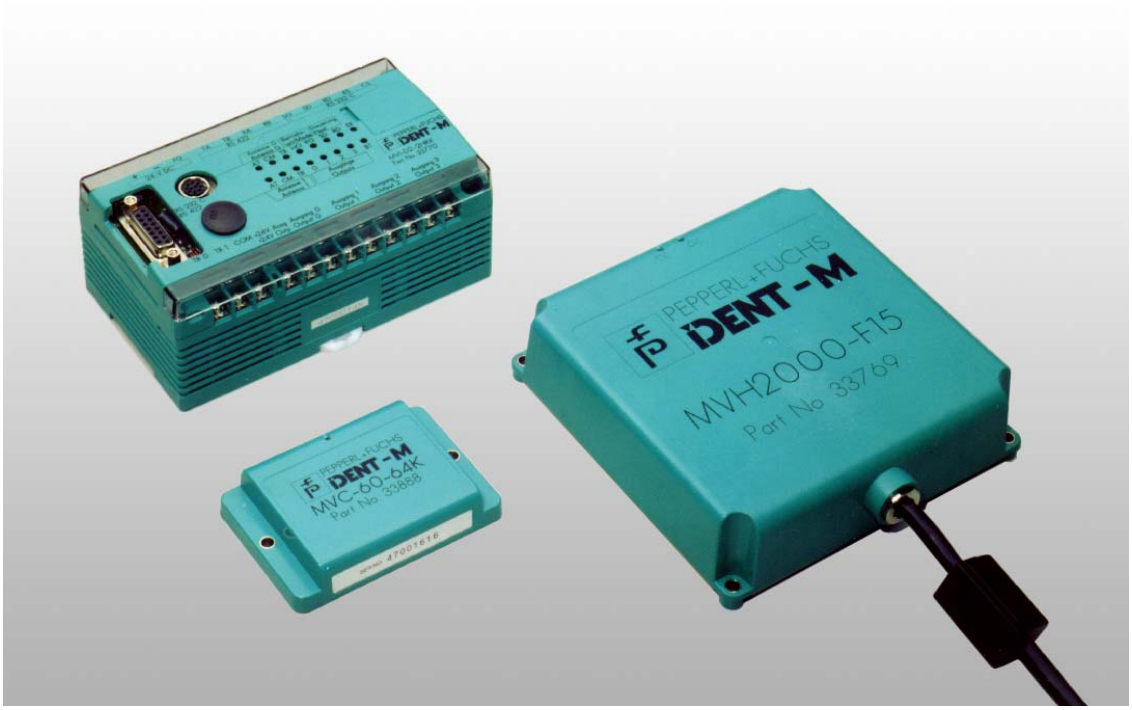

Fig. 4.3: Overview of the microwave identification system IDENT-M System V

Depending on installation requirements, read/write distance, environmental conditions and memory requirements, you can select appropriate data carriers and read/write heads.

Note

Further information on the components of the microwave identification system IDENT-M System V can be found in the Sensor Systems 1 catalogue.

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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 chapter 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:

- quantity delivered
- device type and version according to the name plate
- accessories
- handbook(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.

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5.3 Installation

5.3.1 Mounting on a top-hat rail

As with all systems in K-system housings from Pepperl+Fuchs, the bus coupler MVG-KFD2-B5 can be snapped onto the 35 mm, standard 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 bus coupler 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).

5.4 Electrical connection

Warning

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

Before connecting the device, ensure that the correct voltage is applied as indicated on the name plate .

A mains isolating device must be installed close to the device and labelled as such for the MVG-KFD2-B5.

5.4.1 Device connection

The electrical connection of the bus coupler is made with the detachable, self-opening screw terminals on the top and bottom of the unit, max. cross section 2 x 2.5 mm^2.

Connect the control interface unit, the INTERBUS and the supply voltage according to the connection diagram and the labelled configuration of the terminals.

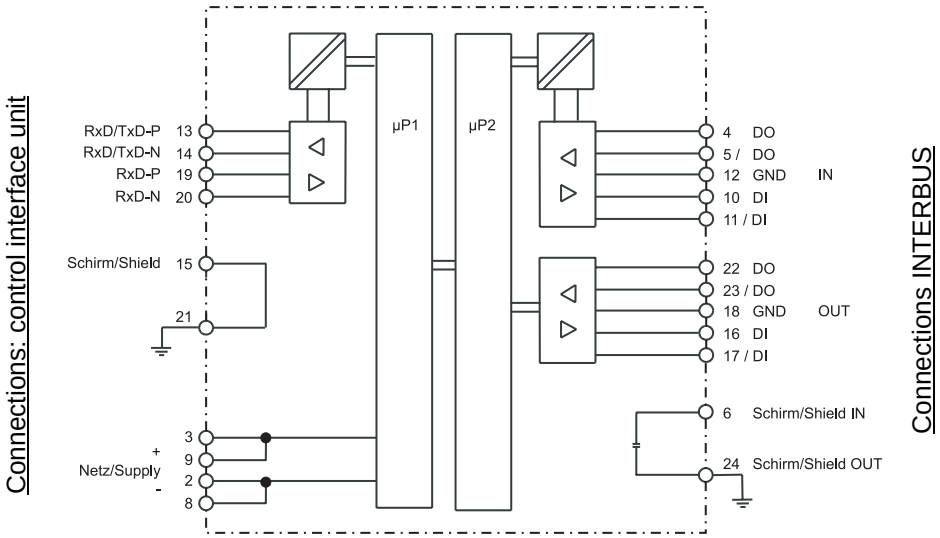

Fig. 5.1: Connection diagram of the bus coupler MVG-KFD2-B5

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Terminal assignment list

1	Reserved
2	supply voltage GND (connected internally to terminal 8)
3	supply voltage +24 V DC (connected internally to terminal 9)
4	DO INTERBUS IN
5	/DO INTERBUS IN
6	shieldingINTERBUS IN
7	Reserved
8	supply voltage GND (connected internally to terminal 2)
9	supply voltage +24 V DC (connected internally to terminal 3)
10	DI INTERBUS IN
11	/DI INTERBUS IN
12	GND INTERBUS IN
13	RS 422 interface, control interface unit, TxD-P
14	RS 422 interface, control interface unit, TxD-N
15	RS 422 interface, control interface unit, shielding (connected internally to terminal 21)
16	DI INTERBUS OUT
17	/DI INTERBUS OUT
18	GND INTERBUS OUT
19	RS 422 interface, control interface unit RxD-P
20	RS 422 interface, control interface unit RxD-N
21	RS 422 interface, control interface unit, ground (connected internally to terminal 15)
22	DO INTERBUS OUT
23	/DO INTERBUS OUT
24	INTERBUS, ground (connected internally capacitively to terminal 6)

Location of the connection terminals

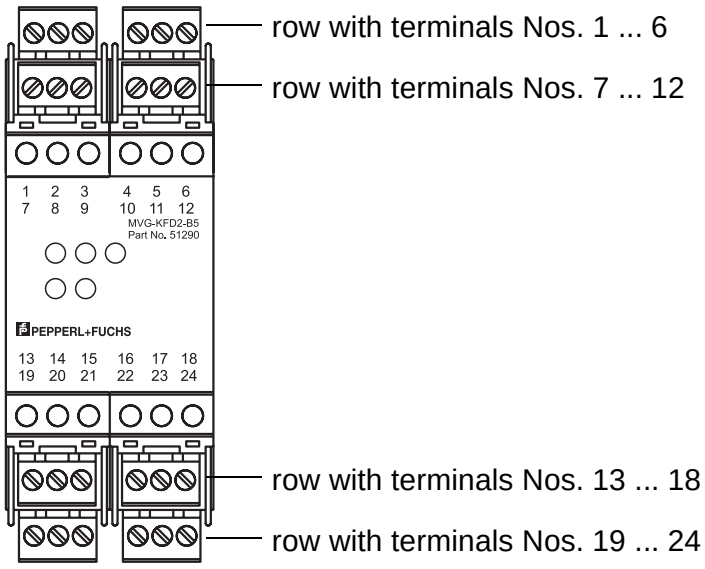

Fig. 5.2: Assignment of connection terminals

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5.4.2 Connecting to the control interface unit MVI-D2-2HRX

The control interface unit MVI-D2-2HRX is provided with a 15-channel Sub-D socket for the RS 422 interface. This means that you require a shielded, 4-wire cable (max. cable length 1200 m) with a 15-channel Sub-D plug on one end for the connection between the control interface unit and bus coupler.

RS 422 connection between bus coupler and control interface unit

Terminal, bus coupler			15-channel Sub-D plug, control interface unit	
13	TxD-P	↔	Pin 9	RA
14	TxD-N	↔	Pin 10	RB
19	RxD-P	↔	Pin 3	TA
20	RxD-N	↔	Pin 11	TB

The connections RS (Pin 12) and CS (Pin 8) of the control interface unit MVI-D2-2HRX must be connected to one another.

This is most easily achieved by means of a solder bridge in the 15-channel Sub-D plug of the RS 422 connection cable.

Transmission parameters

The control interface unit MVI-D2-2HRX is equipped with 4 rotary encoder and DIP switches for setting transmission parameters.

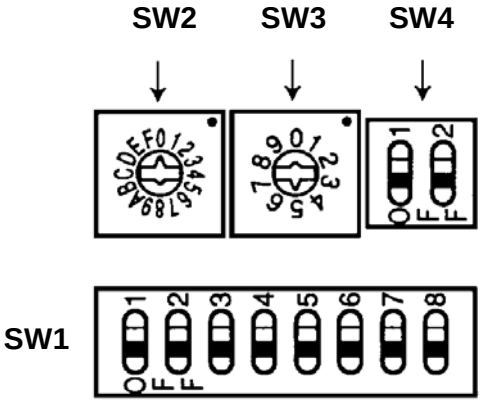

Fig. 5.3: Control interface unit MVI-D2-2HRX rotary encoder and DIP switches

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In order to communicate with the bus coupler MVG-KFD2-B5, switches SW1 ... SW4 of the control interface unit MVI-D2-2HRX must be set as follows:

DIP switch SW1

Switch	Switch position	Meaning
SW1-1	ON	8 data bits
SW1-2	OFF	no parity
SW1-3	OFF	no parity
SW1-4	OFF	1 stop bit
SW1-5	OFF	must always be set on OFF
SW1-6	ON	RS 422 (4-wire system)
SW1-7	OFF	RS 422 (4-wire system)
SW1-8	OFF	must always be set on OFF

Rotary encoder switch SW2

Switch position	Meaning
0	Station number "0"

Rotary encoder switch SW3

Switch position	Meaning
5	9600 kBit/s

DIP switch SW4

Switch	Switch position	Meaning
SW4-1	ON	terminator RS 422 active (2-wire)
SW4-2	ON	terminator RS 422 active (4-wire)

5.4.3 Special connection information for the INTERBUS

A characteristic feature of the INTERBUS system is its physical ring structure. Every connected device is positioned in the bus between two other subscribers. If this is not the case, e.g. at the end of a junction with a bus terminal, the ring line must be terminated in the respective device.

To do this, the rotary switch labelled "S1" for the ring closure must be moved into the proper position (see Figure 5.4).

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The ring closure switch is located on the side of the device housing.

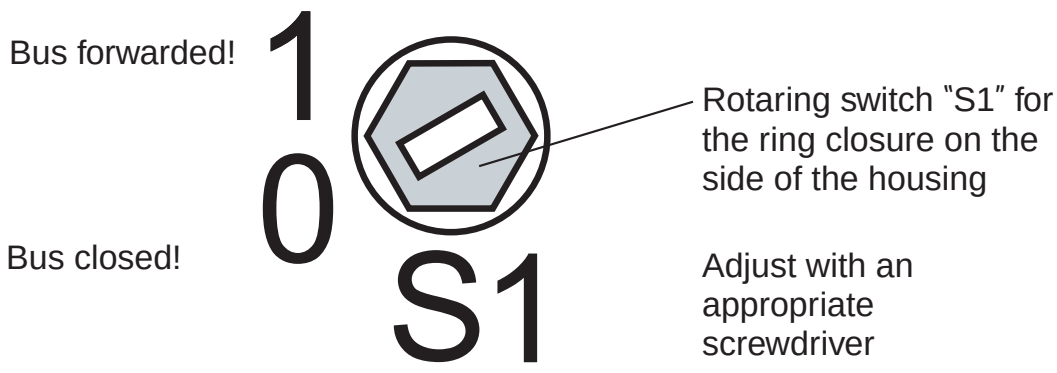

Fig. 5.4: Ring closure switch

Attention

The ring closure must only be activated when the device is positioned at an open junction end! Otherwise, all subsequently connected devices will be cut off from the communication.

Cable

The bus connecting cables must have the following characteristics:

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

Attention

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

Length of leads

Depending on the type of cable used and the magnitude of external sources of interference, the distance between two devices may be up to 400 metres. The total length of an INTERBUS system may extend up to 13 kilometres. The number of devices which may be connected to the bus is limited to 512.

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5.4.4 EMC shielding concept

The shielding of the cables serves to protect against electromagnetic interference. One end of the shielding is connected to a low-impedance connection to ground, whereas the other side is capacitively coupled. The devices in the K-housing, including the MVG-KFD2-B5, are provided with two ground terminals (21, 24).

When installing, connect these two terminals to ground. This is best carried out using large metallic objects with a galvanic ground connection, e.g. switching cabinets, high-bay storage posts, etc.

Make certain that the shielding of the RS 422 and INTERBUS cable are connected at the intended terminals (15, 6, 24) of the bus coupler.

Note

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

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

5.5 Disassembly, packing and disposal

Repacking

The device 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 the device.

The bus coupler MVG-KFD2-B5 contains absolutely no internal batteries which would need to be removed prior to disposal.

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6 Commissioning

Warning

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

Attention

Before proceeding with the commissioning, check all connections for correctness.

Prepare for the commissioning by familiarizing yourself with the communication between the INTERBUS master and the bus coupler (chapter 7 and 8 of this handbook). The commissioning requires a good knowledge of the INTERBUS and the programming of the master unit.

6.1 Preparation

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

A very important aspect for the operation of a microwave identification system using the bus coupler MVG-KFD2-B5 on the INTERBUS is the response time of the total system. The question, "After a data carrier is positioned in front of a read/write head, how much time is required for the data to be available in my computer?" can be answered using the following equation, provided the INTERBUS protocol structure is known.

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

t_t = transmission time	n = number of user data bytes (set only input or output data byte for each subscriber)
m = number of installed remote bus subscribers	
t_{Bit} = bit duration	t_{Bit} = 2 µs corresponds to 500 kBit/s
t_{SW} = software run time	t_{SW} = 200 µs

For larger projects or if you have limited experience with the configuration of an INTERBUS systems, you should construct a test system for your particular application and check the data transmission to the INTERBUS master.

Note

Numerous books, brochures and software packages are available for the design, commissioning and diagnosis of INTERBUS networks. Additional information is available from
INTERBUS Club e.V., Postfach 1108, 32817 Blomberg;
Telephone (+49) 05235/342100, Fax (+49) 05235/341234
http://www.interbusclub.com

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6.2 Switching on/self-test

After switching on the supply voltage, the bus coupler checks the internal memory area with a self-test.

Note

The LED "DOWNLOAD" flashes during this procedure for approx. 2 seconds. The bus coupler cannot be addressed via the INTERBUS during this time.

The LED "OPERATION" illuminates permanently green when the supply voltage is present at the device. If a hardware malfunction of the bus coupler electronics is detected during the self-test, it illuminates permanently red.

In the event of a device or transmission error, communication will not be activated.

Establishment of connection

The connection via the RS 422 interface with the control interface unit and via the INTERBUS is established automatically.

Note

The LED "BUS" illuminates green while data are exchanged with the bus coupler via the INTERBUS.
If a hardware malfunction has occurred, it illuminates red. If the data exchange is faulty, the LED flashes alternately 5 sec. red and 0.5 sec. green.

The LED "RS 422/485" illuminates green while data are exchanged with the identification system via the RS 422 interface.
If faulty telegrams are received from the identification system, it illuminates red.

If the device-internal communication is fault-free, the LED "INT.COM" illuminates green, otherwise red.

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7 Operation on INTERBUS

7.1 General information on the INTERBUS

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 be considered as an extensive introduction to the INTERBUS. For detailed information, the reader is referred to the INTERBUS standard DIN 19258 (EN 50254) and the relevant literature.

Note

The INTERBUS Club publishes informational brochures and an INTERBUS product catalogue. The address can be found on page 17.

7.2 Data structure

The bus coupler MVG-KFD2-B5 occupies a total of 4, 16-bit words (8 byte) in the INTERBUS frame protocol; 2 words (bytes 4 ... 7) of which are identification data from/ to the data carrier, 2 words (bytes 0 ... 3) are reserved for command data.

The data exchange is limited here to the cyclically transmitted process-data channel. This means that the parameter channel of the INTERBUS is not subject to additional load.

7.3 General communication information

Before using read and write commands, the operating modes can be set via the special commands 1 ... 7. Otherwise, the current valid data - or in the case of a device new start, the base settings (default values) are used.

A maximum of 2 words can be read or written. The "higher-value" bits are ignored.

Before changing the operating mode, the control interface unit must be reset (head-related).

When resuming INTERBUS communication, an acknowledge command (command code 0F0h) must be sent to the bus coupler – independent of what telegram is being sent. If data are then still queued in the bus coupler, they must be retrieved. The control interface unit must then be reset.

If too many commands are sent to the bus coupler in succession (without retrieving the responses), the commands are ignored. In this case, the bus coupler responds only to the acknowledge command.

New commands (head-related) may be sent to the bus coupler only after the confirmation to the command has been retrieved.

An invalid operating mode setting is noticed only after a command is sent to the control interface unit. A parameter error is displayed.

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7.4 Communication and commands

7.4.1 Communication sequence between INTERBUS and bus coupler

In order to send a new command to the bus coupler or identification system, the INTERBUS master must first write a command with a toggled, i.e. the opposite status of the preceding command, toggle bit in the INTERBUS data area. The bus coupler recognizes the inverted bit, reads the data area, including the command code, and interprets it.

If the command is directed at the identification system, it is processed accordingly and sent to the identification system. If the identification system receives the command correctly, it sends a reception confirmation and, after executing the command, also sends the result to the bus coupler.

If the bus coupler receives a reception confirmation from the identification system, it passes it on by writing the following in the code:

Byte	Contents	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	Command code							
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code 00…0FFh	ID 7				ID 6			
Byte 5	ID-code 00…0FFh	ID 5				ID 4			
Byte 6	ID-code 00…0FFh	ID 3				ID 2			
Byte 7	ID-code 00…0FFh	ID 1				ID 0			

The **toggle bit T** corresponds to the inverted toggle bit from the function call.

The **execution counter** is set to 0 and, starting from this point in time, incremented on every command result for this command.

The ID-code comes from the ID-code register of the control interface unit, which is written with, among others, command 37.

If the master has read data which originated from the identification system, it can attempt to retrieve additional data from the bus coupler by means of the acknowledge command. When the bus coupler receives this new acknowledge command and has new data, the bus coupler writes the new data in the data area. If the bus coupler has no new data for the field bus, it erases the data area and sets the command code and the toggle bit to 0. As soon as data are again present, they are written in the data area, i.e. a renewed acknowledgement is not necessary.

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A command result has the following format for all commands:

Byte	Contents	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	Command code							
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	ID-code/data 00…0FFh	ID-code/data							
Byte 5	ID-code/data 00…0FFh	ID-code/data							
Byte 6	ID-code/data 00…0FFh	ID-code/data							
Byte 7	ID-code/data 00…0FFh	ID-code/data							

The user data are stored in bytes 4 ... 7. If, e.g an ID-code is to be read, it is located in bytes 4 … 7; if data are requested, they occupy the fields starting at byte 4.

In principle, the data in the telegram from the control interface unit behind the data code (DCD) are written in the data area.

The commands which are directed directly at the bus coupler (e.g. operating mode settings) do, for reasons of consistency, also generate a reception confirmation and command result and are passed on to the field bus. They are synchronized with the reset command which is sent to the control interface unit to delete stored commands and have the same structure as the standard commands.

If an error occurs, i.e. if an incorrect command code is used or if a parameter lies outside of the valid range, the reception confirmation - command result sequence can be interrupted depending on whether the error is detected on reception or during execution. If the error is registered during reception, no command result is sent.

Errors which have occurred are displayed in the "Status" field. An error detected by the control interface unit is represented as follows:

Byte	Contents	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	Command code							
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Error position (page 13/4[1])	Error position							
Byte 5	Error code (page 13/4[1])	Error code							
Byte 6	No meaning	-							
Byte 7	No meaning	-							

[1] see handbook "Microwave Identification System", 95 Edition

Error positions and error codes are identification-system-specific data. If the bus coupler and not the control interface unit generates an error message, both of these fields remain empty.

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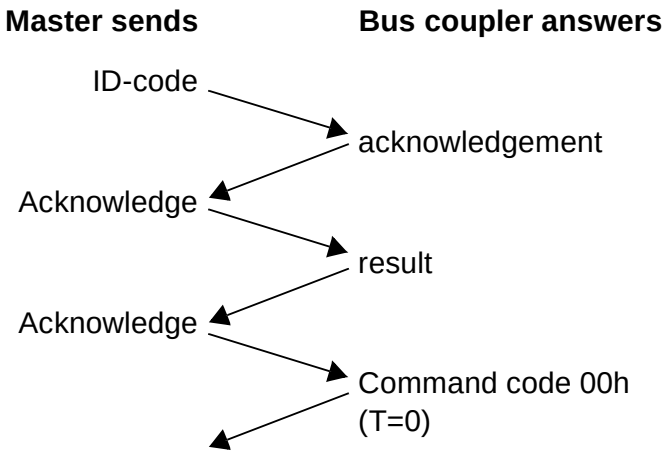
A command is only processed if the toggle bit has changed relative to the value at the last transmission. If the last command was transmitted with a toggle bit of 1, a new command must be sent with a toggle bit of 0.

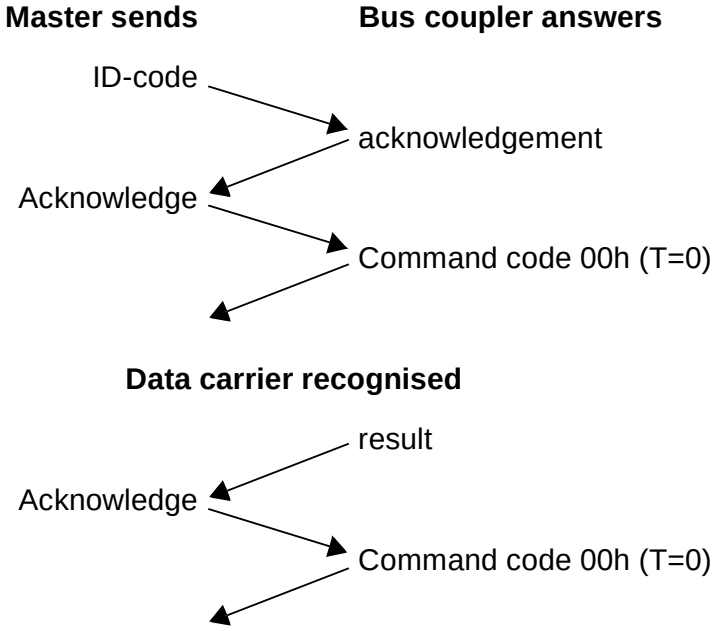
The acknowledgement is by means of the same command code, but with an inverted toggle bit.

The result(s) can be retrieved with the acknowledge command.

Acknowledge commands must be sent until no data are present. This can be recognised by the returned command code 00h. Only then may a new command be sent.



If the command code 00h is returned, the bus coupler can pass on new data received from the identification system without a new acknowledge command. If the control interface unit waits, e.g. indefinitely for a data carrier to appear, the sequence of commands could be as follows:



Here, the execution counter counts the answers for commands with multiple results, dependent on the communication system and attribute. Each new command resets the execution counter.

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7.4.2 Command overview

In the following table, all available commands for the IDENT-M System V are listed. For reasons of clarity, the commands are organized by category.

The abbreviations used have the following meanings:

Command code command code (decimal) with which the corresponding identification function can be called.

Bit pattern the bit pattern corresponding to the bus-coupler command code

P setting in the "Protect" operating mode is taken into account (*)

A setting in the "Attribute" operating mode is taken into account (*)

I setting in the "ID-code" operating mode is taken into account (*), or the ID-code must be written with the command (K), setting in the ID-code operating mode is overwritten

V setting in the "Verify" operating mode is taken into account (*)

IDENT-M System V command code of the identification systems (hexadecimal)

Category	Command	Bus coupler command code	Bit pattern	P	A	I	V	IDENT-M System V-command code
Special command	No command	0	00000000					-
Special command	Acknowledge	240	11110000					-
R/W	ID-code read, single read fixcode	1	00000001		*	K		12
R/W	ID-code write	43	00101011	*	*	*		22
R/W	Read data carrier, single read	16	00010000		*	K	*	11/10
R/W	Write data carrier, single write	64	01000000	*	*	*	*	20/21
Copy	Copy data carrier	52	00110100	*	*	*	*	40/41
Operating Modes	Mode of operation - Comm.-System	33	00100001					
Modes of operation	Mode of operation - Memory Protection (P)	34	00100010					Internal
Modes of operation	Mode of operation - Attribute (A)	35	00100011					Internal
Modes of operation	Mode of operation - ID-code (I)	37	00100101					Internal
Modes of operation	Mode of operation - Verify (V)	38	00100110					Internal
Transfer	Data carrier➔ read control interface unit	40	00101000		*	*	*	13/14
Transfer	Control interface unit ➔ write data carrier	44	00101100	*	*	*	*	23/24
Transfer	Control interface unit - read memory	41	00101001					15

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Category	Command	Bus coupler command code	Bit pattern	P	A	I	V	IDENT-M System V-command code
Transfer	Control interface unit - write memory	45	00101101					25
Time	Read date/time	42	00101010					16
Time	Write date/time	46	00101110					26
Reset/Init	Erase data carrier	47	00101111	*	*	*		30
Reset/Init	Initialize data carrier	49	00110001		*	K		31
Reset/Init	Erase control interface unit	50	00110010					35
Reset/Init	Initialize control interface unit	48	00110000					36
Reset/Init	Erase log	51	00110011					37
Reset/Init	Reset control interface unit	60	00111100					70
Test	Test data carrier	53	00110101		*	K		50
Test	Test ROM	54	00110110		*	K		51
Test	Test RAM	55	00110111		*	K		52
Test	Test battery of the data carrier	56	00111000		*	K		53
Test	Block test	58	00111010		*	K		60
Test	Test control interface unit	57	00111001					55
Output	Set outputs	62	00111110					72
Other	Read status	59	00111011					
Other	Query command result of the control interface unit	61	00111101					71

7.4.3 Detail description of the commands

Below, all available commands are listed by command code. The acknowledgement is sent in response to a command. The result of a command must be retrieved with an acknowledge command, where:

Command code command code (bit pattern) with which the corresponding identification function can be called

A number of the read/write head (antenna)

T toggle bit

ID-code ID-code of the data carrier in the address range 8040…8043h

Address memory address in the data carrier or control interface unit

Word count number of words which are to be read or written

Note

In the following tables of the command descriptions, you will find in the heading behind the command names in brackets a reference to the appropriate page in the handbook "Microwave Identification System", 95 Edition, e.g. "(11/26)" in the following command heading.

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1 Read ID-code (11/26)

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	0	0	0	0	0	1
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	Not relevant	-	-	-	-	-	-	-	-
Byte 3	Not relevant	-	-	-	-	-	-	-	-
Byte 4	Not relevant/ID-code	0/ID 7				0/ID 6			
Byte 5	Not relevant/ID-code	0/ID 5				0/ID 4			
Byte 6	Not relevant/ID-code	0/ID 3				0/ID 2			
Byte 7	Not relevant/ID-code	0/ID 1				0/ID 0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	0	0	0	0	0	1
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	0	0	0	0	0	1
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	ID-code (Address 8040h)	ID 7				ID 6			
Byte 5	ID-code (Address 8041h)	ID 5				ID 4			
Byte 6	ID-code (Address 8042h)	ID 3				ID 2			
Byte 7	ID-code (Address 8043h)	ID 1				ID 0			

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16 Read data carrier (11/25)

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	0	1	0	0	0	0
Byte 1	Word count 1...2 / antenna<A>/toggle<T>	Word count				0	0	A	T
Byte 2	Address	Address (high byte)							
Byte 3	Address	Address (low byte)							
Byte 4	Not relevant/ID-code	0/ID 7				0/ID 6			
Byte 5	Not relevant/ID-code	0/ID 5				0/ID 4			
Byte 6	Not relevant/ID-code	0/ID 3				0/ID 2			
Byte 7	Not relevant/ID-code	0/ID 1				0/ID 0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	0	1	0	0	0	0
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	0	1	0	0	0	0
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Data of the queried address + 0	Data							
Byte 5	Data of the queried address + 1	Data							
Byte 6	Data of the queried address + 2	Data							
Byte 7	Data of the queried address + 3	Data							

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33 Mode of operation - Communication Startup System (9/4)

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	0	0	0	1
Byte 1	Parameter 0…3 / antenna<A>/toggle<T>	Parameter				-	-	A	T
Byte 2	Not relevant	0				0			
Byte 3	Not relevant	0				0			
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	0	0	0	1
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	0	0	0	1
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

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34 Mode of operation - Memory Protection (11/16)

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	0	0	1	0
Byte 1	Parameter<0(off)/1…0Ah(area)>/ antenna<A>/toggle<T>	Parameter				-	-	A	T
Byte 2	Not relevant	0				0			
Byte 3	Not relevant	0				0			
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	0	0	1	0
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	0	0	1	0
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

Comment: This mode of operation affects the commands marked in the overview in field P with an asterisk.

Issue date 20.07.99

35 Mode of operation - Attribute

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	0	0	1	1
Byte 1	Parameter <0…3, A…D>/ antenna<A>/toggle<T>	Parameter				-	-	A	T
Byte 2	Not relevant	0				0			
Byte 3	Not relevant	0				0			
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	0	0	1	1
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	0	0	1	1
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

Comment: This mode of operation affects the commands marked in the overview in field A with an asterisk. Only the attributes 0 … 3 should be used. The attribute settings A … D achieve the same results when performed from the field bus. The difference lies in the ID-code which the control interface unit sends along to the bus coupler with attributes A … D with every read/write command but is not passed on to the field bus.

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37 Mode of operation - ID-code

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	0	1	0	1
Byte 1	-/antenna<A>/toggle<T>	-	-	-	-	-	-	A	T
Byte 2	Empty	-	-	-	-	-	-	-	-
Byte 3	Empty	-	-	-	-	-	-	-	-
Byte 4	ID-code 00…0FFh	ID 7				ID 6			
Byte 5	ID-code 00…0FFh	ID 5				ID 4			
Byte 6	ID-code 00…0FFh	ID 3				ID 2			
Byte 7	ID-code 00…0FFh	ID 1				ID 0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	0	1	0	1
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	0	1	0	1
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

Comment: This mode of operation affects the commands marked in field I with an asterisk. The ID-code must be specified when calling commands marked in the overview in field 1 with (K). The setting in the ID-code operating mode is overwritten with the transmitted ID-code.

If no ID-code is specified with these commands (ID-code 00000000), the ID-code in the operating mode setting is also overwritten.

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38 Verify operating mode

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	0	1	1	0
Byte 1	Verify <1(on)/0(off)>/ antenna<A>/toggle<T>	Parameter				-	-	A	T
Byte 2	Not relevant	0				0			
Byte 3	Not relevant	0				0			
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	0	1	1	0
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	0	1	1	0
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

Comment: This mode of operation affects the commands marked in the overview in field V with an asterisk.

Issue date 20.07.99

40 Data carrier→ control interface unit (11/27)

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	0	0	0
Byte 1	Word count 0…0Fh/ antenna<A>/toggle<T>	Word count				-	-	A	T
Byte 2	Target address 0000…0FFFFh	Target address (high byte)							
Byte 3	Target address 0000…0FFFFh	Target address (low byte)							
Byte 4	Source address 0000…0FFFFh	Source address (high byte)							
Byte 5	Source address 0000…0FFFFh	Source address (low byte)							
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	0	0	0
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	0	0	0
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

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41 Read control interface unit

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	0	0	1
Byte 1	Word count 1…2 / antenna<A>/toggle<T>	Word count				-	-	A	T
Byte 2	Address	Address (high byte)							
Byte 3	Address	Address (low byte)							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	0	0	1
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	0	0	1
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Data of the queried address + 0	Data							
Byte 5	Data of the queried address + 1	Data							
Byte 6	Data of the queried address + 2	Data							
Byte 7	Data of the queried address + 3	Data							

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42 Read date

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	0	1	0
Byte 1	-/antenna<A>/toggle<T>	-	-	-	-	-	-	A	T
Byte 2	Not relevant	0				0			
Byte 3	Not relevant	0				0			
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	0	1	0
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	0	1	0
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Year	BCD 00…99							
Byte 5	Month	BCD 01…12							
Byte 6	Day	BCD 01…31							
Byte 7	Weekday (Su…Sa)	BCD 00…06							

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43 Write ID-code

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	0	1	1
Byte 1	-/antenna<A>/toggle<T>	-	-	-	-	-	-	A	T
Byte 2	Empty	-	-	-	-	-	-	-	-
Byte 3	Empty	-	-	-	-	-	-	-	-
Byte 4	ID-code 00…0FFh	ID 7				ID 6			
Byte 5	ID-code 00…0FFh	ID 5				ID 4			
Byte 6	ID-code 00…0FFh	ID 3				ID 2			
Byte 7	ID-code 00…0FFh	ID 1				ID 0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	0	1	1
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	0	1	1
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

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44 Control interface unit → Data carrier

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	1	0	0
Byte 1	Word count 1…0Fh / antenna<A>/toggle<T>	Word count				-	-	A	T
Byte 2	Source address 00…0FFh	Source address (high byte)							
Byte 3	Source address 00…0FFh	Source address (low byte)							
Byte 4	Target address	Target address (high byte)							
Byte 5	Target address	Target address (low byte)							
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	1	0	0
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	1	0	0
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

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45 Write control interface unit

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	1	0	1
Byte 1	Word count 1…2 / antenna<A>/toggle<T>	Word count				-	-	A	T
Byte 2	Address 00…0FFh	Address (high byte)							
Byte 3	Address 00…0FFh	Address (low byte)							
Byte 4	Data 00…0FFh	Data							
Byte 5	Data 00…0FFh	Data							
Byte 6	Data 00…0FFh	Data							
Byte 7	Data 00…0FFh	Data							

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	1	0	1
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	1	0	1
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

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46 Write date/time (11/34)

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	1	1	0
Byte 1	-/antenna<A>/toggle<T>	-	-	-	-	-	-	A	T
Byte 2	Year	BCD 0 …99							
Byte 3	Month	BCD 01…12							
Byte 4	Day	BCD 01…31							
Byte 5	Weekday (Su...Sa)	BCD 00…06							
Byte 6	Hours	BCD 00…23							
Byte 7	Minutes	BCD 00…59							

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	1	1	0
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	1	1	0
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

Comment: In order to also use this command with a field-bus telegram length of 8 bytes, the seconds setting 00 is passed on to the control interface unit.

Issue date 20.07.99

47 Erase data carrier(11/35)

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	1	1	1
Byte 1	Word count 0…0Fh / antenna<A>/toggle<T>	Word count				-	-	A	T
Byte 2	Address	Address (high byte)							
Byte 3	Address	Address (low byte)							
Byte 4	Deletion pattern 00…0FFh	Deletion pattern							
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	1	1	1
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	0	1	1	1	1
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

Comment: 0 ... 15 words (0 ... 30 bytes) with the deletion pattern are written.

Issue date 20.07.99

48 Initialize control interface unit

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	0	0	0
Byte 1	-/antenna<A>/toggle<T>	-	-	-	-	-	-	A	T
Byte 5	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 5	Not relevant	0				0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	0	0	0
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	0	0	0
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

Issue date 20.07.99

49 Initialize data carrier(11/36)

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	0	0	1
Byte 1	-/antenna<A>/toggle<T>	-	-	-	-	-	-	A	T
Byte 2	Empty	0	0	0	0	0	0	0	0
Byte 3	Empty	0	0	0	0	0	0	0	0
Byte 4	Not relevant/ID-code	0/ID 7				0/ID 6			
Byte 5	Not relevant/ID-code	0/ID 5				0/ID 4			
Byte 6	Not relevant/ID-code	0/ID 3				0/ID 2			
Byte 7	Not relevant/ID-code	0/ID 1				0/ID 0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	0	0	1
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	0	0	1
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

Issue date 20.07.99

50 Erase control interface unit (11/37)

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	0	1	0
Byte 1	Word count 0…0Fh / antenna<A>/toggle<T>	Word count				-	-	A	T
Byte 2	Address	Address (high byte)							
Byte 3	Address	Address (low byte)							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	0	1	0
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	0	1	0
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

Comment: 0 ... 15 words (0 ... 30 bytes) are written with 00h.

Issue date 20.07.99

51 Erase log (11/39)

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	0	1	1
Byte 1	Area 0…2 / antenna<A>/toggle<T>	Parameter				-	-	A	T
Byte 2	Not relevant	0				0			
Byte 3	Not relevant	0				0			
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	0	1	1
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	0	1	1
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

Issue date 20.07.99

52 Copy data carrier (11/40)

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	1	0	0
Byte 1	Word count 0…0Fh / antenna<A>/toggle<T>	Word count				-	-	A	T
Byte 2	Source address 0000…0FFFFh	Source address (high byte)							
Byte 3	Source address 0000…0FFFFh	Source address (low byte)							
Byte 5	Target address 0000…0FFFFh	Target address (high byte)							
Byte 6	Target address 0000…0FFFFh	Target address (low byte)							
Byte 7	Empty	-	-	-	-	-	-	-	-
…	Empty	-	-	-	-	-	-	-	-

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	1	0	0
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	1	0	0
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

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53 Test data carrier (11/43)

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	1	0	1
Byte 1	Word count 1…0Fh / antenna<A>/toggle<T>	Word count				-	-	A	T
Byte 2	Address	Address (high byte)							
Byte 3	Address	Address (low byte)							
Byte 4	Not relevant/ID-code	0/ID 7				0/ID 6			
Byte 5	Not relevant/ID-code	0/ID 5				0/ID 4			
Byte 6	Not relevant/ID-code	0/ID 3				0/ID 2			
Byte 7	Not relevant/ID-code	0/ID 1				0/ID 0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	1	0	1
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	1	0	1
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Battery Use Ratio (11/43, 5/12) / error position (13/4)	Battery Use Ratio/error position							
Byte 5	Not relevant/error code (13/4)	0/error code							
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

Issue date 20.07.99

54 Test ROM (11/44)

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	1	1	0
Byte 1	-/antenna<A>/toggle<T>	-	-	-	-	-	-	A	T
Byte 2	Empty	-	-	-	-	-	-	-	-
Byte 3	Empty	-	-	-	-	-	-	-	-
Byte 4	Not relevant/ID-code	0/ID 7				0/ID 6			
Byte 5	Not relevant/ID-code	0/ID 5				0/ID 4			
Byte 6	Not relevant/ID-code	0/ID 3				0/ID 2			
Byte 7	Not relevant/ID-code	0/ID 1				0/ID 0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	1	1	0
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	1	1	0
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant/error position (13/4)	Error position							
Byte 5	Not relevant/error code (13/4)	Error code							
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

Issue date 20.07.99

55 Test RAM (11/44)

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	1	1	1
Byte 1	Word count 0…0Fh / antenna<A>/toggle<T>	Word count				-	-	A	T
Byte 2	Address	Address (high byte)							
Byte 3	Address	Address (low byte)							
Byte 4	Not relevant/ID-code	0/ID 7				0/ID 6			
Byte 5	Not relevant/ID-code	0/ID 5				0/ID 4			
Byte 6	Not relevant/ID-code	0/ID 3				0/ID 2			
Byte 7	Not relevant/ID-code	0/ID 1				0/ID 0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	1	1	1
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	0	1	1	1
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant/error position (13/4)	0/1				0/0 or 1			
Byte 5	Not relevant/error code (13/4)	0/3				0/0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

Issue date 20.07.99

56 Test battery (11/45)

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	1	0	0	0
Byte 1	/antenna<A>/toggle<T>	-	-	-	-	-	-	A	T
Byte 2	Empty	-	-	-	-	-	-	-	-
Byte 3	Empty	-	-	-	-	-	-	-	-
Byte 4	Not relevant/ID-code	0/ID 7				0/ID 6			
Byte 5	Not relevant/ID-code	0/ID 5				0/ID 4			
Byte 6	Not relevant/ID-code	0/ID 3				0/ID 2			
Byte 7	Not relevant/ID-code	0/ID 1				0/ID 0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	1	0	0	0
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	1	0	0	0
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Battery Use Ratio (11/43)	Battery Use Ratio							
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

Issue date 20.07.99

57 Test control interface unit (11/45)

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	1	0	0	1
Byte 1	-/antenna<A>/toggle<T>	-	-	-	-	-	-	A	T
Byte 2	Not relevant	0				0			
Byte 3	Not relevant	0				0			
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	1	0	0	1
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	1	0	0	1
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

Issue date 20.07.99

58 Block test (11/44)

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	1	0	1	0
Byte 1	Word count 0…0Fh / antenna<A>/toggle<T>	Word count				-	-	A	T
Byte 2	Address	Address (high byte)							
Byte 3	Address	Address (low byte)							
Byte 4	Not relevant/ID-code	0/ID 7				0/ID 6			
Byte 5	Not relevant/ID-code	0/ID 5				0/ID 4			
Byte 6	Not relevant/ID-code	0/ID 3				0/ID 2			
Byte 7	Not relevant/ID-code	0/ID 1				0/ID 0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	1	0	1	0
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	1	0	1	0
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

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59 Read status (11/47)

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	1	0	1	1
Byte 1	-/antenna<A>/toggle<T>	-	-	-	-	-	-	A	T
Byte 2	Not relevant	0				0			
Byte 3	Not relevant	0				0			
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	1	0	1	1
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	1	0	1	1
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

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60 Reset control interface unit

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	1	1	0	0
Byte 1	-/antenna<A>/toggle<T>	-	-	-	-	-	-	A	T
Byte 2	Not relevant	0				0			
Byte 3	Not relevant	0				0			
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	1	1	0	0
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	1	1	0	0
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

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61 Query command result (11/46)

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	1	1	0	1
Byte 1	Reserved/antenna<A>/toggle<T>	-	-	-	-	-	-	A	T
Byte 2	Not relevant	0				0			
Byte 3	Not relevant	0				0			
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	1	1	0	1
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	1	1	0	1
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

If no result is present (standard case), error code 69 is generated.

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62 Set outputs (11/47)

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	1	1	1	0
Byte 1	Output <A1,A2,A3,A4>/ antenna<A>/toggle<T>	A1	A2	A3	A4	-	-	A	T
Byte 2	Not relevant	0				0			
Byte 3	Not relevant	0				0			
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	1	1	1	0
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	0	1	1	1	1	1	0
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

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64 Write data carrier (11/30)

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	1	0	0	0	0	0	0
Byte 1	Word count 1...2 / antenna<A>/toggle<T>	Word count				-	-	A	T
Byte 2	Address	Address (high byte)							
Byte 3	Address	Address (low byte)							
Byte 4	Data 00…0FFh	Data							
Byte 5	Data 00…0FFh	Data							
Byte 6	Data 00…0FFh	Data							
Byte 7	Data 00…0FFh	Data							

	Slave to master aknowledgement	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	1	0	0	0	0	0	0
Byte 1	Reserved/antenna<A>/toggle<T>	0	0	0	0	0	0	A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	0	0	0	0	0	0	0	0
Byte 4	ID-code	ID 7				ID 6			
Byte 5	ID-code	ID 5				ID 4			
Byte 6	ID-code	ID 3				ID 2			
Byte 7	ID-code	ID 1				ID 0			

	Slave to master result	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	0	1	0	0	0	0	0	0
Byte 1	Reserved/antenna<A>/toggle<T>	Reserved						A	T
Byte 2	STATUS	STATUS							
Byte 3	Execution counter	Execution counter							
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

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240 Acknowledge

	Master to slave command	Bit No.							
		7	6	5	4	3	2	1	0
Byte 0	Command code	1	1	1	1	0	0	0	0
Byte 1	-/-/toggle<T>	-	-	-	-	-	-	-	T
Byte 2	Not relevant	0				0			
Byte 3	Not relevant	0				0			
Byte 4	Not relevant	0				0			
Byte 5	Not relevant	0				0			
Byte 6	Not relevant	0				0			
Byte 7	Not relevant	0				0			

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8 Fault diagnostics

8.1 LED error indicators

The state of the bus coupler MVG-KFD2-B5 is indicated by means of the 5 LEDs on the front side of the device:

LED	States	Description
OPERATION	Permanent GREEN	Mains on/ready
	Permanent RED	Hardware error on Ident-coupler circuit board
DOWNLOAD	2 s green flashing after switching on	Initialization/self-test/software-download
RS422/485	GREEN	Communication with the identification system active and fault-free
	RED	Reception of faulty telegrams from identification system
INT.COM	GREEN	Internal communication active and fault-free
	RED	Faulty telegrams
BUS	GREEN	Communication via the INTERBUS active and fault-free
	RED	Hardware error
	5 s RED / 0.5 s GREEN, flashing	Interrupted data exchange via the field bus

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8.2 Status messages

The following status messages are defined:

Status	Error Code	Meaning
00h	--	Command executed without error
01h	W0 ... W6	Battery weak (battery-operated code and data carriers only), command correctly executed (see IDENT-M System V handbook, page 13/8)
02h	--	Reserved
03h	--	Reserved
04h	10h	Incorrect or incomplete command or parameter not in valid range or timeout
05h	40h	Read or write error, no data carrier
06h	20h	Hardware error, read/write head 0, read/write head missing
07h	21h	Hardware error, read/write head 1, read/write head missing
08h	--	CRC error, incorrect telegram from the control interface unit
09h	--	Reserved
0Ah	--	Reserved
0Bh	--	Reserved
0Ch	--	Reserved
0Dh	--	Reserved
0Eh	--	Reserved
0Fh	--	Reserved
10h		other error messages, see Error code

8.3 Identification-system error messages

Note

The detailed description of the error messages for the identification system can be found in the "Microwave Identification System" handbook, 95 Edition, starting on page 13/1.

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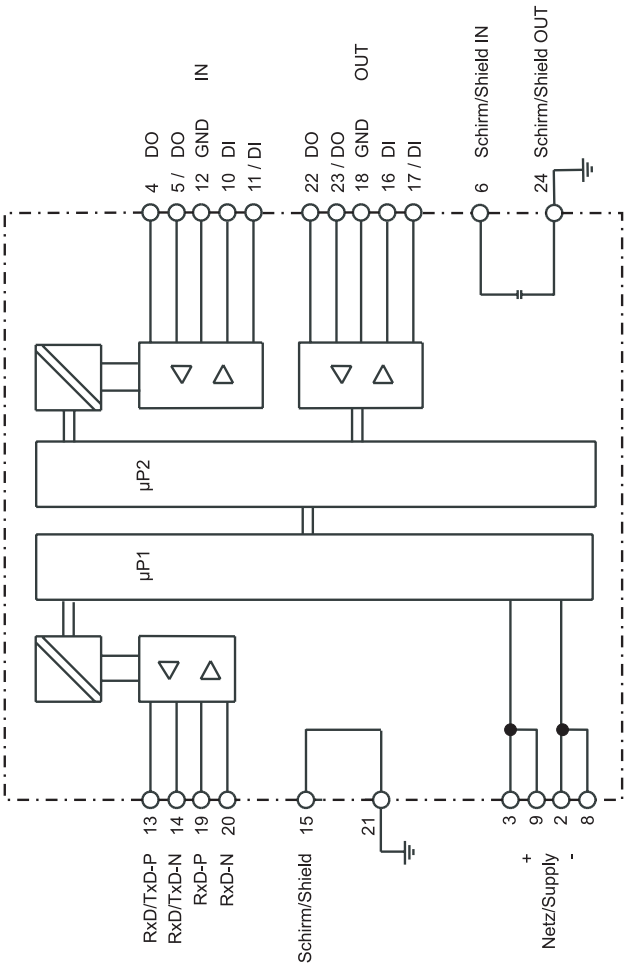
9 Technical Data

Bus Coupler for INTERBUS

- **can be connected to the INTERBUS remote bus**
- **Bus wires "IN" electrically isolated from the device power supply**
- **Field bus and serial interfaces connected via withdrawable terminals**

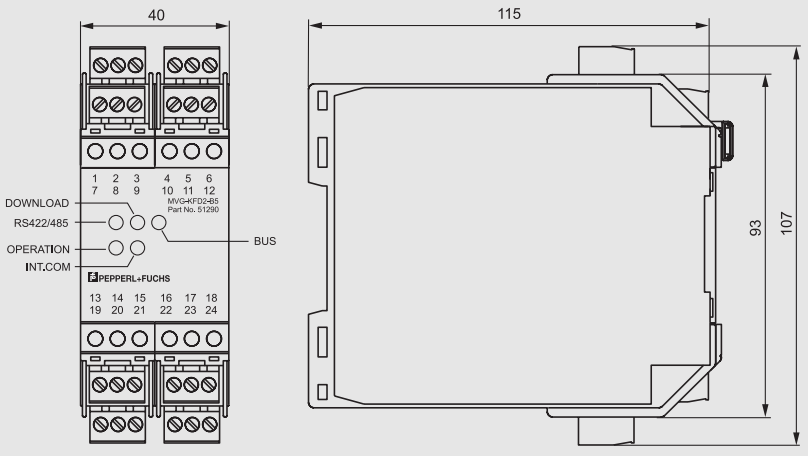
Function:
The bus coupler MVG-KFD2-B5 is a coupling module in the KF-housing via which the identification system IDENT-M System V can be operated on the INTERBUS. For this purpose, the serial interface (RS 422/RS 485) of the bus coupler is connected to the control interface unit of the identification system and the field bus connection is connected to the INTERBUS.
The identification system is operated as a slave on the INTERBUS and provides full read/write functionality.
2 words, each 16 bit, can be transmitted as data.

Connections INTERBUS



Connections: control interface unit

Dimensions



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Ordering code	**MVG-KFD2-B5**
Power supply	
Supply voltage	18 V DC ... 35 V DC PELV
Ripple	≤ 10 %
Current consumption	< 180 mA at 24 V DC
Quiescent current	< 110 mA (type)
Indicators	
Ident	4 LEDs (two-colour)
"OPERATION"	Power on/identification device error
"RS 422/485"	Serial interface
"INT.COM"	Device-internal communication
"DOWNLOAD"	Initialization/software-download
Bus	1 LED (two-colour)
"BUS"	Field bus communication/device error
Housing	K-system, 40 mm (2 TE)
Bus connection:	INTERBUS - remote bus subscriber
ID-code	3
Data width	4 words, each 16 bit, in the process-data channel The parameter channel is not used.
Environmental conditions	
Operating temperature	248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)
Storage temperature	248 Kelvin ... 358 Kelvin (-25 °C ... +85 °C)
Humidity	max. 75% rel. humidity
Protection class	IP 20 accord. to DIN 40050
Mechanical	
Construction	modular terminal housing constructed of Makrolon, combustibility class as per UL 94: V - 0
Mounting	can be snapped onto 35 mm standard rails accord. to DIN EN 50 022 or screwed on with 4 screws in removable brackets in a 90 mm grid.
Connection possibilities	self-opening device terminals, max. cross section 2 x 2.5 mm^2
Ring configuration:	Switch 1: 0 = Ring closed 1 = Bus forwarded 

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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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One Company, Two Divisions.

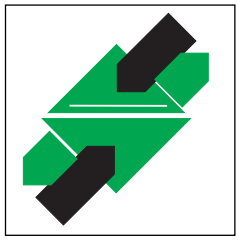
Factory Automation Division

Product Range

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

Areas of Application

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



Process Automation Division

Product Range

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

Areas of Application

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