Device manual

PKV 30-DPS

Protocol converter for PROFIBUS-DP slave

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Index	Date	Device	Device number	Chapter	Revision
1	16.08.96	PKV 30-DPS	9604001	all	translated from german manual
2	22.08.96	PKV 30-DPS	9604002	2	PROFIBUS-DP slave address selectable by code switch pictures and tables updated
3	06.05.98	PKV 30-DPS	9604002	2	Activation of the diagnostic/configuration mode described mor detailed
4	29.01.99	PKV 30-DPS	9604002	2.4	revision
5	16.11.01	PKV 30-DPS	9604002	2.1.2	Selection of the Bootstart Mode or Normal Mode

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We reserve the right to modify our products and their specifiactions at any time in as far as this contributes to technical progress. The version of the manual supplied with the appliance applies.

1 Introduction

1.1 Purpose

There is often a need to transfer data between controllers from different manufacturers or exchange them with a higher level host computer. Each system has its own transfer protocol. Implementation of an alien protocol is often impossible or only possible at great cost. This results from the following background conditions:

- The interface drivers do not match
- The interface controller does not meet the requirements
- Insufficient or lacking computer power
- Real time requirements cannot be fulfilled
- No facility for making additional configuration data available
- Missing or insufficient commissioning and diagnosis aids

In some cases, the protocol is only required for a single system. Nevertheless the implementation has to satisfy extreme quality demands. The effects of a software error in the transfer protocol can lead to faults ranging up to the standstill of the entire system and thus cause unpredictable costs.

Experience shows that implementation testing and inspection in particular only take place in the laboratory or on a system which is hardly capable of functioning. In spite of the greatest possible care, it then happens that an error only becomes apparent when the plant is in service. Particularly when the error occurs sporadically or depends on particular plant conditions, location of the error without an integrated diagnostic function is a matter of luck.

Practical experience shows that most problems are created not by errors in the implementation but by inadequate agreements on the user level. Message matching between the linked units is in some cases incomplete or is not complied with. As a result, messages which have not been sent are expected, or messages are sometimes mixed up. If the message traffic can be transcribed, the problem can be rapidly rectified.

The protocol converter is a device developed specifically for these problems, whose operating system provides all functions necessary for the rational and reliable implementation of coupling protocols.

The device is supplied in various versions. The protocol converter PKV 30-DPS has two communications interfaces and one of them is for PROFIBUS-DP slave and the other one is for general protocols.

2 General Device Description

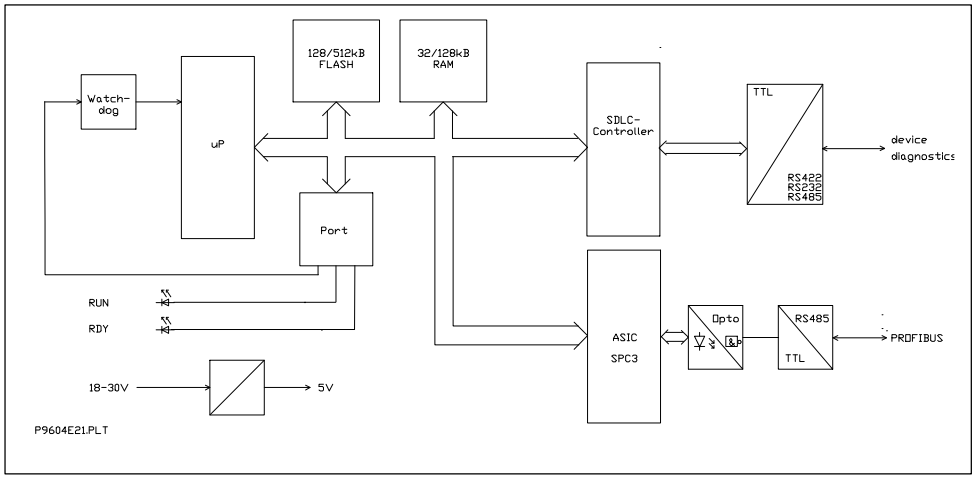
The protocol converter consist of a main board and a power supply board, with the DC/DC converter which generates all internal voltages.

The main board has an 80C188 microprocessor. It has an internal timer, interrupt and DMA controllers, and therefore requires only a few external components. The computing power is sufficient to process even large quantities of data. In addition, the 16-bit processor facilitates efficient software development in a high level language. The firmware and the configuration data are stored in a flash EPROM. This can be programmed in the circuit and retains its data even when the power supply is switched off.
The serial interfaces are realized by the SCC controller AM85C30 and the ASIC SPC3. For the connection of a device with the converter there is a non-isolated interface wich can be configured as RS232, RS422 or RS485-type. The second isolated interface is designed for the PROFIBUS-DP.

The correct function of the protocol converter and its internal power supply are monitored by a watchdog circuit with the MAX 705 component. In the case of error, this triggers a reset on the processor.

The internal power supply is provided by a switching controller. Its input voltage is filtered through a current compensated annular core reactor and filter capacitors. A transient diode is provided as overvoltage and reverse polarity protection. In the case of a fault, the internal semiconductor fuse switch off until the fault disappears. In addition, there is a charging capacitor which blocks voltage drops such as those which occur on switching of contactors.

Valid operation and an error state from the serial interfaces are displayed by LEDs.

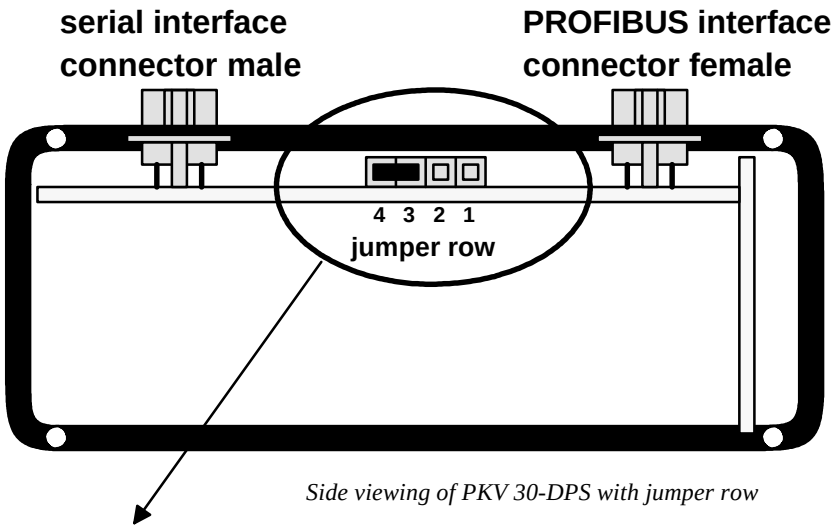


Block diagram of the protocol converter PKV 30-DPS

2.1 Configuration

2.1.1 Selection of Serial Interface Type

The hardware of the converter has jumper J2, to switch between the different types of serial interfaces. This jumper is accessable if you open the side plate on the side where there are both serial interfaces. This is be done by removing four screws. The following picture will show the position of the jumper seeing from the side of the converter. With the help of the table you can chose the right type of interface.



Side viewing of PKV 30-DPS with jumper row

selection	jumper J2	interface
	open	RS232
	3-4	RS485
	1-2, 3-4	RS422

4 3 2 1

Selection of serial interface type

2.1.2 Selection of the Bootstart Mode or Normal Mode

Setting J1	Meaning
open	Normal Mode (Default Setting)
closed	Bootstart

J1 is open in the default setting. The device starts the normal mode (communication mode) after the power supply was switched on.

To activate the diagnostic/configuration mode see the description in section *Activation of the Diagnostic/Configuration Mode* in this manual. In this mode the firmware and the configuration can be downloaded.

The bootstart mode can be activated when J1 is closed. The device activates the bootstart mode when the power supply is reconnected. In this mode only a firmwaredownload can be done. Other functions are not possible in this mode.

Jumper J1 can be reached by opening the housing from the bottom side.

2.1.3 Selection of the PROFIBUS Slave Station Address

The selcetion of the slave address is done with two code switches. Please refer to chapter 'Physical dimensions' in this manual.

2.2 Connection of the Power Supply (X1)

The protocol converter requires a 24V power supply. For maximum load of the current see chapter technical data in this manual. A three-phase rectifier or simple rectifier circuit with charging capacitor are sufficient. The power supply must be earth grounded.

The power supply are connected by means of a plug-in screw terminal. A 3-way COMBICON plug from PHOENIX (MSTB 2.5/3-ST-5.08) is used.

pin	symbol	signal
1	+24V	+24V supply voltage
2	0V	reference potential
3	PE	earth ground

Pin assignment of the X1 power supply connector

2.3 Serial Interfaces

The PKV 30-DPS has two independent serial interfaces.

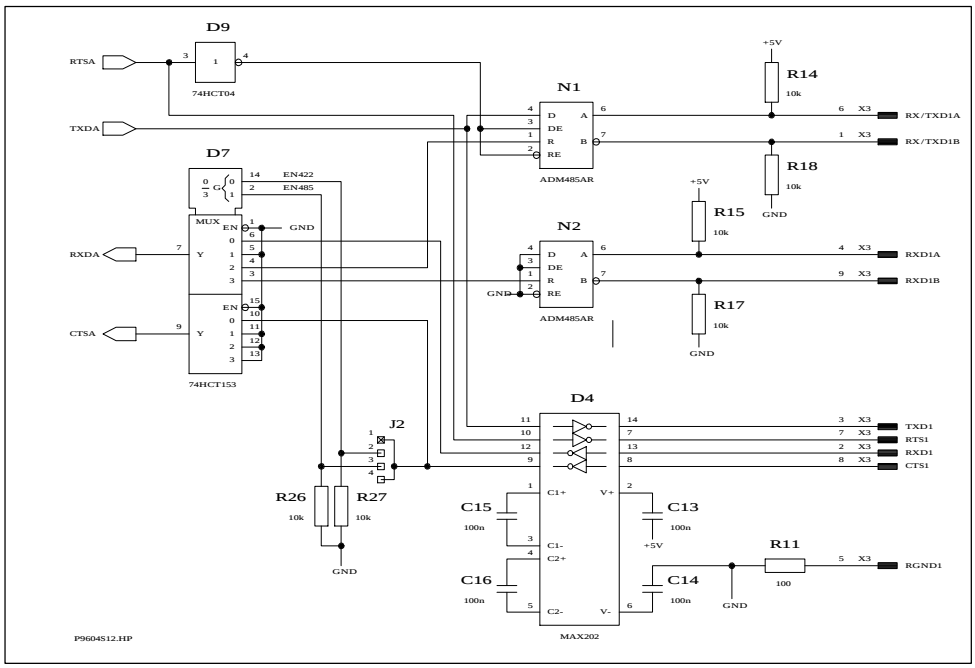
First serial interface (X3). The first interface can be used for communication to another device as RS232, RS422, or RS485 interface or for diagnostic/configuration. The settings of the communication interface as RS232, RS422, or RS485 interface is done with jumper J2. (see chapter configuration).

Second serial interfcae (X2). The second interface is the connection for the DP slave to the PROFIBUS network.

2.3.1 First Serial Interface (X3)

The serial interface uses a pin D-Sub connector for the connection to an device with a serial RS232, RS422, or RS485 interfaces. The interface is configurable with jumpers.

This interface is also used for diagnostic/configuration of the protocol converter. The activation of the diagnostic/configuration mode is described in chapter *activation of the diagnostic/configuration mode* in this manual.



Output scematic of the serial device interface at connector X3

The resistors R14, R18 and R15, R17 are necessary to get a defined potential on the RS485/RS422-bus if there is no active transmitter or the connector is left open. All resistance have a value of 10 kOhm.
The following table describes the signals of the different kind of interfaces. It is not allowed to make any connections to the other signals of the not used kind of interfaces.

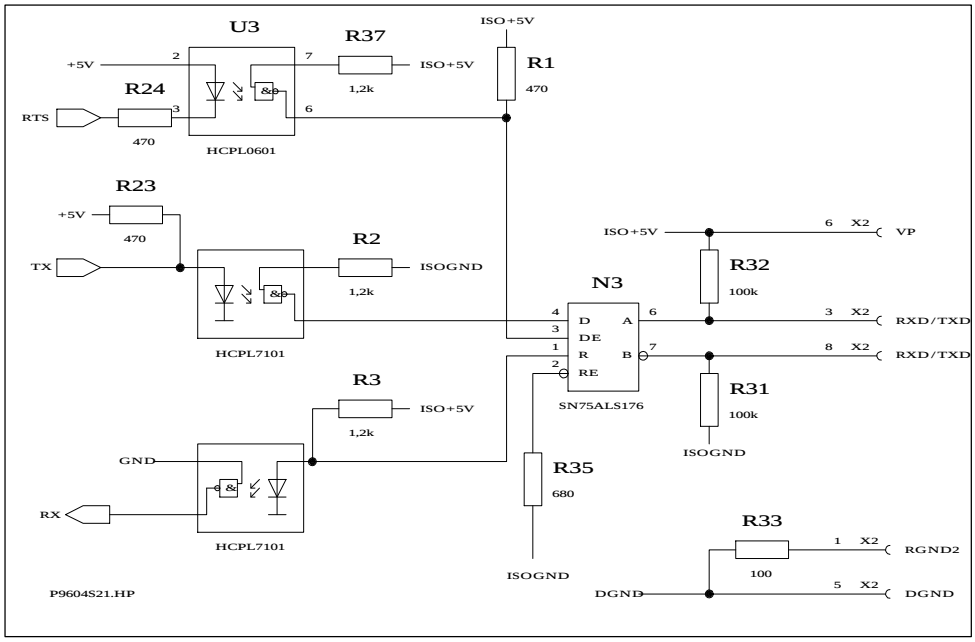
pin	input/ output	signal name	signal	RS 485	RS 422	RS 232
1	input/ output	RXD/TXD-N TXD-N	transmit data inverted RS 422 data inverted RS485	✓	✓	
2	input	RXD	receive data RS 232			✓
3	output	TXD	transmit data RS 232			✓
4	input	RXD-P	receive data RS 422		✓	
5		RGND	reference potential accros 100 Ohm	✓	✓	✓
6	input/ output	RXD/TXD-P TXD-P	transmit data RS 422 data RS 485	✓	✓	
7	output	RTS	ready to send			✓
8	input	CTS	clear to send			✓
9	input	RXD-N	receive data inverted RS 422		✓	

Pin assignment of the serial device interface X3

Using the RS232 interface use the pins only that are marked with a check in the table.

2.3.2 Potential free RS485 PROFIBUS Interface (X2)

The RS485-interface has the connector with the pinout in accordance with the PROFIBUS standard EN 50170. There is no configuration necessary.



RS485-PROFIBUS-interface at connector X2

Resistors R31 and R32 set a closed level on the RS485 bus. This ensures a defined level when the plugs are removed.

The PROFIBUS can only connected at connector X2.

The cable shield of the bus plug is directly connected to the case of the converter. The grounding follows over the chasis of the PKV.

Pin	Signal	Symbol	Type
1	reference potential over 100 Ohm resistor	RGND2	
2	not connected		
3	send / receive data	RxD/TxD-P	RS485
4	not connected		
5	reference potential	DGND	
6	positive supply voltage	VP	
7	not connected		
8	send / receive data inverted	RxD/TxD-N	RS485
9	not connected		

Pinning of the 9-way D-Sub plug for the PROFIBUS-DP on X2

Pin 1 in **not** for the connection of the protection earth for earthing the shield.

2.4 Diagnostic Interface

This interface facilitates the connection of a PC to the protocol converter. It conforms to the RS232C standard to CCITT or DIN. Only the necessary signals are provided.

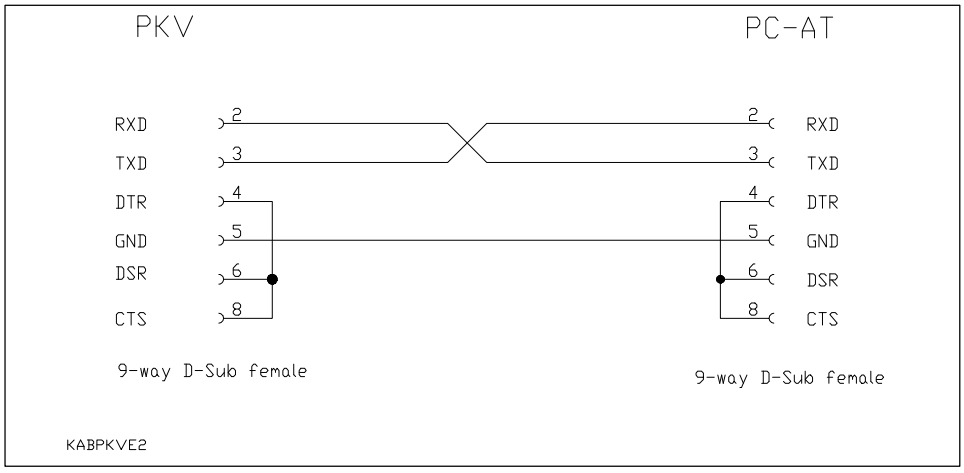
The control signals are produced and evaluated as follows:

- RTS is switched to high on readiness for operation and not changed.
- CTS must be connected internal with Pin 4 and 8 of D-Sub connector

A 9-way D-Sub connector to DIN 41652 is used.

Data transfer between the PC and the protocol converter takes place at 9600 Baud and uses the following data format: 8 data bits, 1 stop bit and even parity. The 3964R protocol is used as the transfer protocol.

The PC is connected by a three-way cable which must not be longer than 15 m. The wiring of the cable is shown below.



Diagnostic cable between the protocol converter and the PC

The interface on connector X3 of the PKV 30-DPS is designed for

- communication

respectively for

- diagnostic/configuration

If the interface is configured as RS422 or RS485 it is **not necessary** to change for the diagnostic mode.

If the power of the protocol converter is switched on, it checks the serial interface if the diagnostic/configuration mode should be activated, otherwise it starts the communication mode.

2.4.1 Activation of the Diagnostic/Configuration Mode

Connect the diagnostic cable on X3 of the protocol converter and to COM1 (or COM2) of the PC.

Start the program ComPro

`COMPRO /S:1` respectively. `COMPRO /S:2`

(for COM1 respectively COM2).

Select menu *online - system - bootstart.* A windows appears that shows *The system will be reseted and the bootloader becomes active without starting any firmware*.

Turn off power of the protocol converter and wait at least 10 seconds.

Accept the message *The system will be reseted and the bootloader becomes active without starting any firmware* with press the Enter key. A red window appears that shows *Waiting for hardware receipt*.

Power on the protocol converter.

The red window disappears.

To test if the protocol converter is in diagnostic/configuration mode select menu *online system - firmware.* If a window appears and shows the name of the firmware, then the diagnostic/configuration mode is active. If the message *Connection could not be established or connection lost* appears, then try to activate the diagnostic/configuration mode again according to the steps described above.

2.5 Status Displays - LED

On the PKV 30-DPS exists 4 LEDs.

Anzeige	Farbe	Zustand	Bedeutung
RDY	yellow	on flashing cyclic flashing non cyclic off	PKV ready bootstrap loader active hardware or system error hardware error
RUN	green	on flashing non cyclic (see below) off	communication running parameter error no communication
ERR1, ERR2	red	on	error on serial line

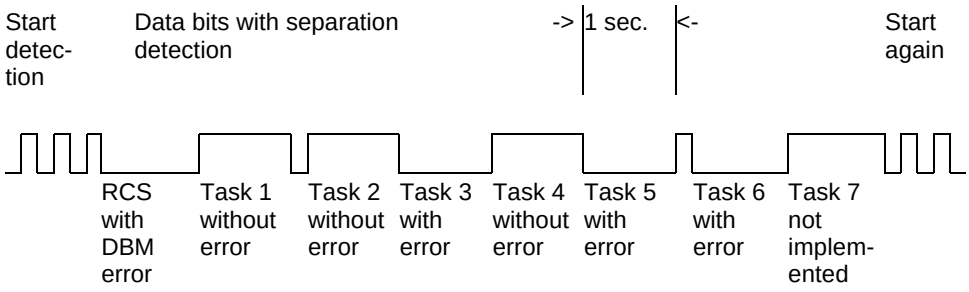
If the device is defective, it is possible that the watchdog responds cyclically, what results also in a cyclically flashing of the RDY-LED.

When switched on, the PKV performs a self-test. If this is performed without error, the yellow RDY LED is switched on. Otherwise, the LED starts to flash, and further running of the program is aborted.
If no firmware has been loaded in the PKV, the bootstraploader displays this by regular flashing of the RDY LED at one second intervals. The flash frequency is increased to approx. 5 Hz while the firmware is being loaded.
Stays the LED off the may be a defect.

If a parameterization error is detected by a protocol task, the task is displayed by the RUN LED as shown in the illustration below.
If no error occurs and communication has started, the RUN LED is switched on. Is this LED blinking cyclic, no parameterization error has been detected, but the communication on the bus has not been established.
If communication is blocked, e.g. by the 'System start' parameter, the RUN LED remains off.

The red LED ERR1 and ERR2 displays data transfer errors at the communications interface to the connected devide.

Display by the LED is from left to right

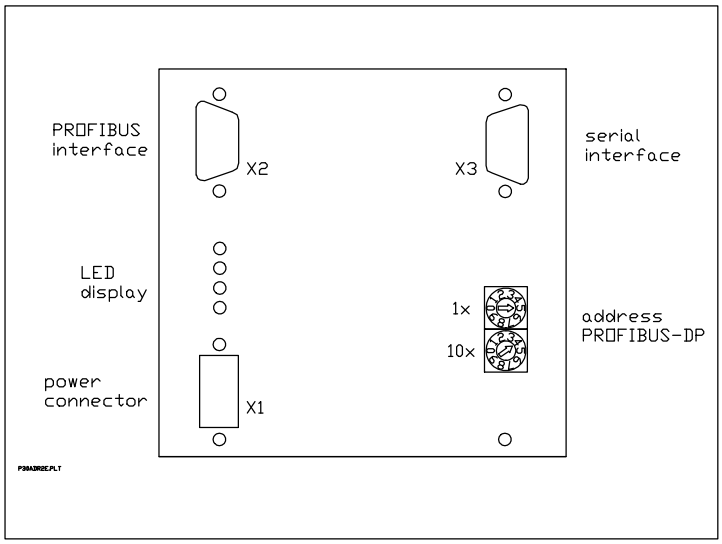


Display of the task which reports a parameterization error

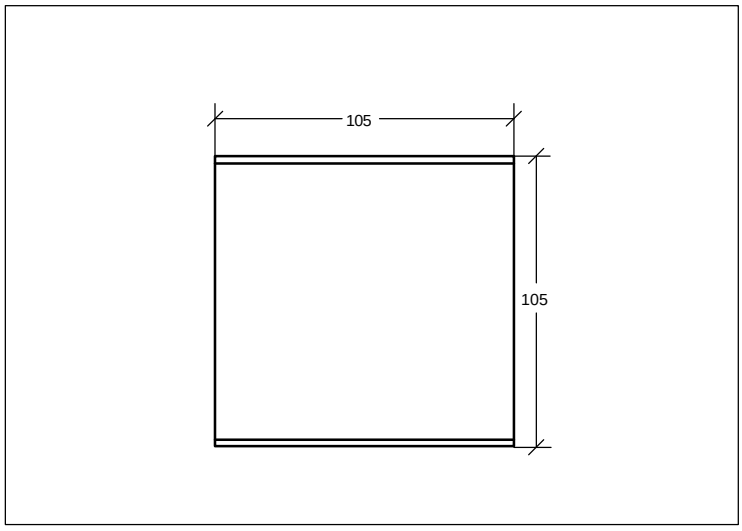
2.6 Physical Dimensions

The protocol converter is installed in an aluminium enclosure. This facilitates direct installation in the cabinet on a mounting rail (TS35 to DIN EN 50022). As an alternative, an enclosure variant for direct screw fitting on an assembly wall is available.
The physical dimensions and the arrangement of the plug connectors are shown in the drawings below.

Open the top of the protocol converter if you want to change the serial interface type ---------->



Connector arrangement on the protocol converter



Physical dimensions of the protocol converter for snap mounting to a mounting rail

The overall height of the converter is approx. 80 mm.

3 Appendix

3.1 Technical Data

Processor	16 Bit with timer, interrupt and DMA controllers
Memory range	32 / 128 kByte RAM, 128 / 512 kByte FLASH
Serial interface	configurable as RS232C, RS422, RS485-interface, non-isolated, max. data transmission 19.2 kBaud, asynchronous, synchronous, NRZ, NRZ, SDLC, HDLC also used as diagnostic interface
PROFIBUS interface	RS485 PROFIBUS DP interface, potential-free, max. data transmission 12 MBaud
Display-LEDs	system running and communication running, or communication error on serial interface
Operating voltages	18V - 30V, max. 0,15 A at 24 V
Operating temperature	0 to 50 degrees Celsius
Safety type	IP50
Dimensions (LxHxD)	105 x 105 x 80 mm
Mounting	rail mounting DIN EN 50022