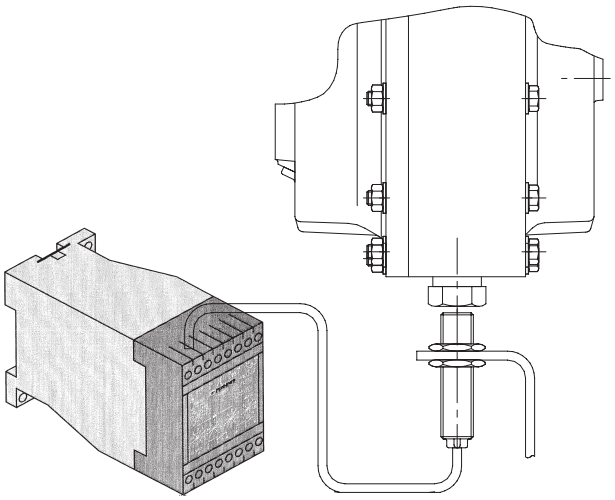
Operating Instructions

BA 4600.1 EN 07.05

FLUDEX-EOC system



FLENDER

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Caution!

Installation and start-up must be carried out by properly trained specialist personnel. Please read these operating instructions carefully before starting up. We accept no liability for personal injury or damage due to incorrect handling.

The EOC complete system must not be used in potentially explosive environments as defined in Guideline 94/9/EC!

1. Application

The "**E**lectronic **O**perating **C**ontrol" **(EOC)** system monitors the required operating condition of the FLUDEX coupling contactlessly and requires no maintenance. Spraying and loss of operating fluid if the coupling overheats and the pollution of the environment associated with it can be avoided. In the case of internal-gear drives the output speed (minimum value), in addition to the temperature, can be monitored. In this case the EOC system cuts out immediately the output speed falls below its required value or the drive stops even before the coupling overheats. The EOC system can be used on coupling sizes 297 and upward at peripheral speeds > 15 m/s. The transmitter is fitted to the coupling in place of the screw plug (163).

2. Operation

While the coupling is rotating and below the response temperature of 125 °C, each time the pick-up is passed the transmitter emits an impulse signal which is transmitted to the evaluating instrument. The pulse number is compared in the evaluating instrument with the required value set on the front plate and, when the pulse number is fallen below, causes the output relay to cut out.

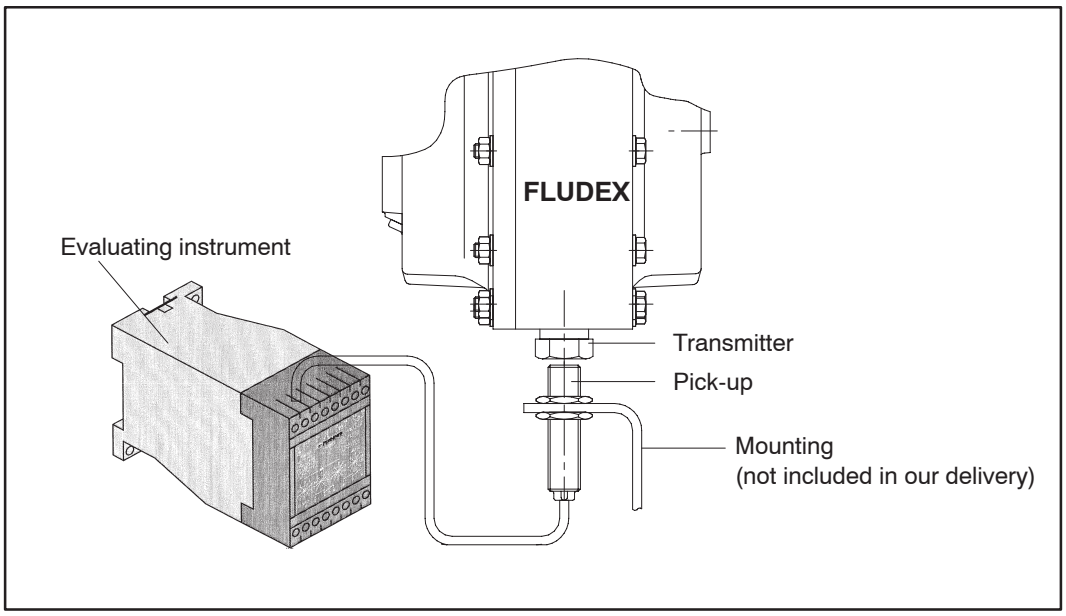
If as a result of an operating fault the response temperature (oil temperature) exceeds the actuating temperature of 125 °C, the transmitter stops emitting pulses and the output relay of the evaluating instrument drops out. The output relay can trigger a fault signal or trip the drive cut-out.

The evaluating instrument has a time delay which prevents a fault signal during the drive starting phase.

If the monitoring system has cut out, the operating fault must first be rectified. The transmitter must not be exchanged. After it has cooled down to below the actuating temperature, the coupling is once more ready to operate. Depending on the starting heating to be expected (moment of inertia of the drive unit), however, the drive should be switched on only at coupling temperatures under 90 °C.

Caution!

If the coupling is started up again without cooling down, as would be possible because of the time delay, the coupling may further heat up (starting heating), and there is a risk that the fusible safety plug will operate.

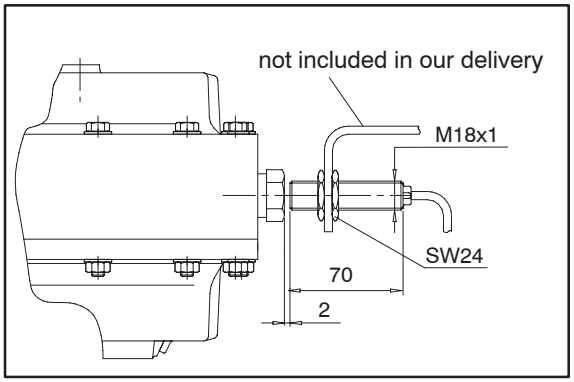


3. Fitting

The EOC system comprises the transmitter, the pick-up and the evaluating instrument. The transmitter is fitted to the coupling housing in place of the screw plug (163). The fusible safety plug (160 °C) remains in the coupling as an emergency safety device. The pick-up is positioned flush with the turning circle of the transmitter (see item 3.1), so that there is a gap of 2 mm between the end faces of the transmitter and the pick-up. The pick-up must be mounted vibrationfree on a firm bracket or part of the bell-housing. Flush-fitting in metal parts is also possible.

The evaluating instrument must preferably be installed in a switch cabinet of the control system provided.

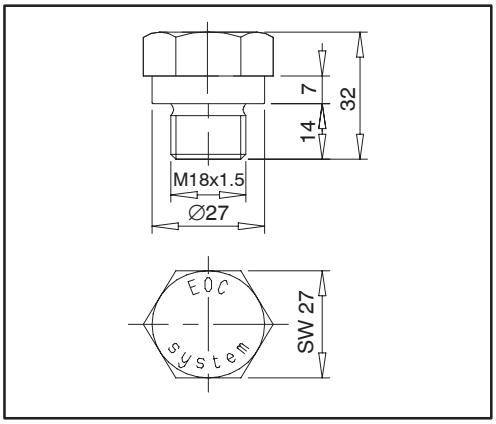
3.1 Fitting transmitter



Retrofitting of the EOC system in already installed FLUDEX couplings is possible without reworking in the case of sizes 297-755.

4. Component description

4.1 Transmitter

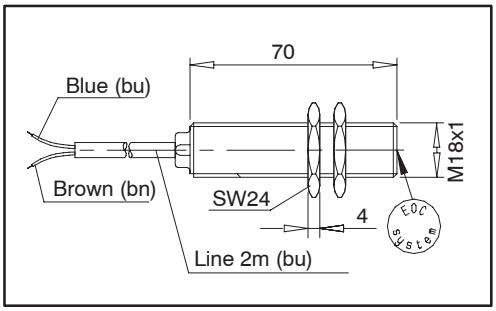


The transmitter comprises an AL bearer screw with an in-built magnet /system which changes its field strength according to the temperature. The magnet system is designed so that at a pick-up distance of 2 mm a cut-out temperature of 125 °C results. If the gap between the pick-up and the transmitter is greater, the EOC system switches at lower temperatures.

4.1.1 Technical data

Type designation	GEF 27
Type	M18x1.5

4.2 Pick-up



The pick-up records the magnetic field of the transmitter each time it is passed and, if there is sufficient field strength, sends a square-wave signal to the evaluating instrument. Below a fixed field-strength threshold (temperature switching point) no signal is sent.

4.2.1 Technical data

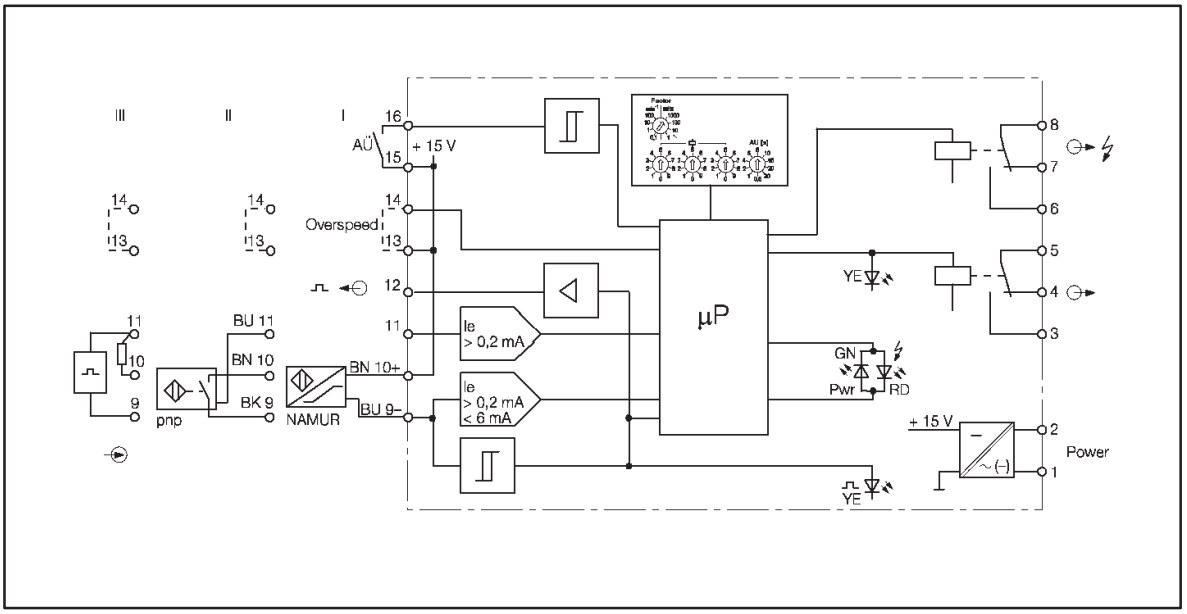
Type designation	BIM-G18-Y1/S926
Output signal	to EN 60947-5-6 (NAMUR)
Type	MS threaded tube chromed M18 x 1 x 70mm
Type of fitting	flush / not flush
Type of protection	IP67
Operating temperature	–25 °C to +70 °C
Approval for use in explosion-hazard areas according to Certificate of Conformity	KEMA 03 ATEX 1122 X

4.2.2 Connection

The connection between the pick-up and the evaluating instrument is established via a two-core conductor. The max. length of conductor with a conductor cross-sectional area of 1.0 mm^2 is 500 m. The feed line must always be laid separately and not with others in multi-core conductors (risk of coupling-in interfering voltages).

4.3 Connection, operation and setting of the evaluating instrument (speed monitor)

4.3.1 Terminal assignment



1 - 2 Operating voltage connection

3 - 5 Limit relay output

6 - 8 Fault signal relay, is de-energised in the event of a fault (wire breakage or short circuit)

9 - 11 Sensor connection in accordance with block diagram (III: $R_{10\text{-}11}$ = 1...10kΩ)
9 bu, 10 bn Pick-up connection EOC system

12 Continuous switching output for further transmission of the sensor switching condition

13 - 14 Programming the speed monitoring system:

- Open bridge:
  Monitoring for too low speed (EOC system), limit relay de-energised in the event of too low speed (excessive temperature of coupling).

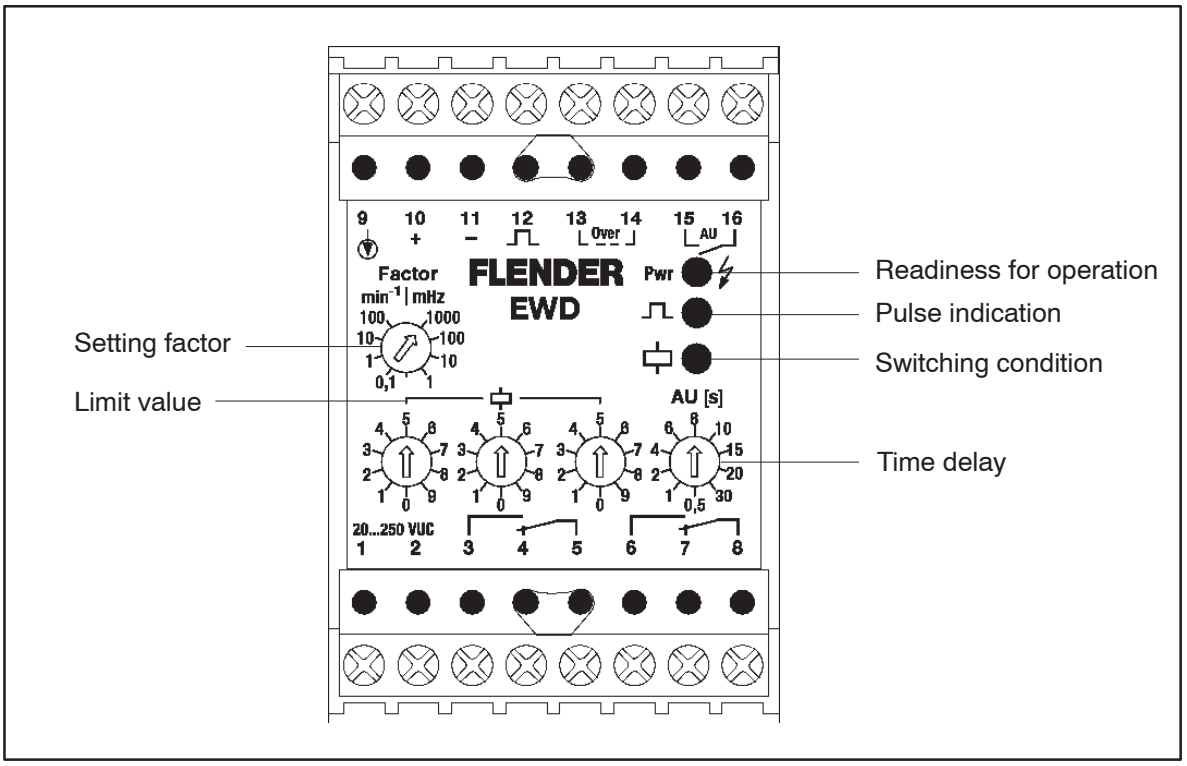
- Closed bridge:
  Monitoring for too high speed, limit relay de-energised in the event of too high speed (do not use function with EOC system!)

15 - 16 Delayed timing (only with monitoring for too low speed):

- If the operating voltage is switched on with the bridge closed or the bridge closed with the operating voltage on, the limit relay will be forcibly energised for the period of time set on the AU rotary switch and the ”Speed too low” signal blocked in the starting phase.

- Dynamic transmitter-circuit monitoring:
  If during the monitoring for excessive speed and with the bridge closed no pulses are emitted for the time set on the AU rotary switch, the two output relays are de-energised.

4.3.2 LED display function and function setting



4.3.2.1 LED display function

Readiness for operation Pwr

green:	Device is ready to use
rot:	Invalid switch setting, or in the case of NAMUR sensors wire breakage or short circuit, relay de-energised.

Pulse indication

yellow:	pnp switch closed NAMUR sensor or EOC pick-up not loaded.

Fault diagnosis in the case of NAMUR sensors:

yellow:	Wire breakage in sensor conductor
dark:	Short circuit of sensor conductor

Switching condition

yellow:	Limit relay energised (no excessive temperature on the coupling)

4.3.2.2 Function setting

Time delay AU [s]

Delay time:
If the value is ”too low”, the time in which the limit relay remains forcibly energised after activation of the time delay is set in seconds on the rotary switch.
Dynamic transmitter-circuit monitoring:
If the value is ”too high”, the time within which pulses must be received from the sensor is set in seconds on the rotary switch, otherwise both output relays are de-energised.

Setting factor (see item 4.3.2)

The rotary switch is used to set the multiplication factor and the unit of limit value (min^{-1} or mHz).

Limit value ⊏

The rotary switch is used to fix the limit value, multiplied by the setting factor.
(see Setting examples limit value, item 4.3.3)

4.3.3 Setting examples - Limit value

a) The three highest-value places of the limit value are set. The value 1000 is set with the 000 positions.

b) If necessary, a more precise setting of the limit value is possible by converting from min^{-1} <=> mHz.

c) In the case of limit values below 0.1 min^{-1} conversion (x16.67) to MHz must be carried out and this value set.

d) In the case of limit values above 1000 Hz conversion (x60) to min^{-1} must be carried out and this value set.

Example	Limit value	Setting factor	Multiplier (Limit value)
a	5.7 Hz	100 mHz	0 5 7
a	1540 min^{-1}	10 min^{-1}	1 5 4
b	1776 min^{-1}	10 min^{-1}	1 7 7
	more precisely:	100 mHz	2 9 6
c	0.06 min^{-1}	1 mHz	0 0 1
d	1200 Hz	100 min^{-1}	7 2 0

Caution!

Care must be taken that the rotary switches lock in the desired positions!

When monitoring the FLUDEX coupling for excessive temperature (normal operation) the evaluating instrument must be set to approx. 2/3 of the motor speed; otherwise, e.g. in the case of internal gear drives, the corresponding required value must be set.

The delay time must be set so as to be at least as long as the acceleration time!

The evaluating instrument has not been preset at the factory!

4.3.4 Technical data speed monitoring device

Type designation	EWD/20...250VUC
Operating voltage	20...250VAC/DC
Net frequency	40...70Hz
Power requirement	≥ 4.5VA
Monitoring range	0,01Hz ... 1660 Hz or 0.6 ... 100 000 min^{-1}
Input frequency	≤ 150 000 min^{-1}
Pulse time	≥ 0.2 ms
Pulse pause	≥ 0.2 ms
Hysteresis	approx. 10%
Delayed timing/start monitoring	0.5 ... 30 s (in 10 steps)
Reproducibility	≤ 0.1 %
Temperature drift	≤ 0.005 %/K
Air and surface leakage paths	
Input circuit to output circuit	≥ 4 mm
Input circuit to supply	≥ 4 mm (for 230 VAC)
Test voltage	2 kV (for 24 VDC 500 V)
Input circuits	NAMUR/three-wire, pulse-switching
NAMUR input terminal: 9/10	to EN 60947-5-6 (NAMUR)
Working values	U_0 = 8.2 V; I_k = 8.2 mA
Switching threshold	1.4 mA ≤ I_e ≤ 1.8 mA
Switching threshold	≤ 0.15 mA
Short circuit threshold	≥ 6 mA
Three-wire input	pulse-switching, terminals 9 ... 11
Working values	U ≤ 15 V; I ≤ 30 mA
0-signal	0 ... 5 VDC
1-signal	10 ... 30 VDC
Output circuit	two relay outputs and continuous-switching output
Relay output/fault signal output	1 changeover switch each
Switching voltage	≤ 250 V
Switching current	≤ 2 A
Switching power	≤ 500 VA/60 W
Contact material	AgCdO + 3 µ Au
Continuous-switching output	14 V/10 mA, (terminals 11/12) short-circuit-proof
Mounting housing	WxHxD: 50x75x110 mm, polycarbonat/ABS
Fixing	Floor mounting or snap-on fixture to top hat rail (DIN 50 022)
Connection	2 x 8 screw terminals
Terminal cross-section	≤ 2 x 2.5 mm^2 or 2 x 1.5 mm^2 with multi-core cable ends
Type of protection (IEC60529/EN60529)	IP 20
Operating temperature range	– 25 ... + 60 °C

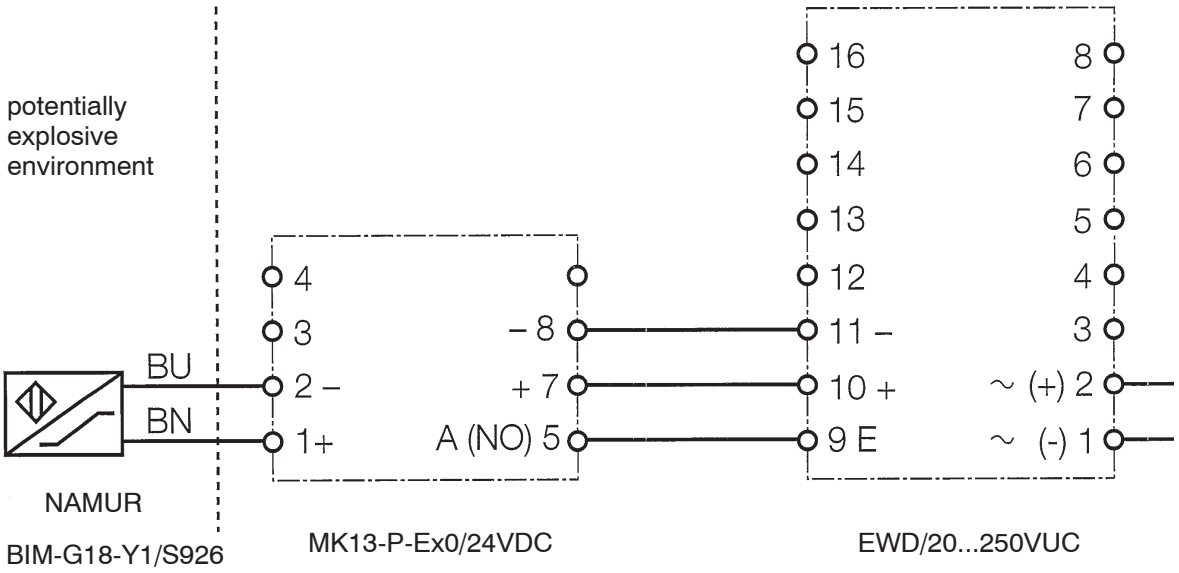
5. Use in potentially explosive environments

When using the EOC system in a potentially explosive environment, an isolation amplifier must be connected in series with the EWD/20...250VUC speed monitor (see item 5.1.1). Here only the pick-up current circuit is designed to be intrinsically safe (EEx-i). The isolation amplifier and speed monitor must not be located in the potentially explosive area.

If an isolation amplifier is used for the ”potentially explosive environment”, only the wire-breakage identification must be active for the power supply lines. Wire breakage and short circuit on the output conductor of the pick-up are not signalled via the fault signal relay but via the output relay through too low speed.

5.1 Isolation amplifier

5.1.1 Connection values



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5.1.2 Technical data isolating switch amplifier

Type designation	MK13-P-Ex0/24VDC
Operating voltage U_B	10...30VDC
Residual ripple W_{ss}	≤ 10%
Current requirement	approx. 20mA
Electrical isolation	Input circuit to output circuit and supply voltage for $250V_{eff}$, test voltage $2.5kV_{eff}$
Input circuit	to EN 60947-5-6 (NAMUR)
Working values	
Working voltage	8.2 V
Current	8.2 mA
Switching threshold	1.55 mA
Hysteresis	typically 0.4 mA
Wire breakage threshold	≤ 0.1 mA
Short circuit threshold	≥ 6 mA
Output circuit	two transistor outputs
Drop in voltage	≤ 2.5 V
Switching current per output	≤ 100 mA, short-circuit-proof, pulse-switching
Switching frequency	≤ 3 kHz
Approval for use in potentially explosive areas according to Certificate of Conformity	TÜV 03 ATEX 2235
Maximum values	
No-load voltage U_0	≤ 9.9 V
Short circuit current I_k	≤ 12 mA
Power P_0	≤ 30 mW
Max. external inductances/capacitances	
[EEx ia] IIB	2/10/20 mH/5/3.6/3.2 µF
[EEx ia] IIC	1/5/10mH/1.1/0.79/0.7 µF
Device identification	II (1) GD [EEx ia] IIC
LED-Anzeigen	
Readiness for operation	green
Switching condition/fault signal	yellow/red (two-colour LED)
Mounting housing	WxHxD: 18x89x70 mm, polycarbonat/ABS
Fixing	Floor mounting or snap-on fixture to top hat rail (DIN 50 022)
Type of protection	IP20
Terminal cross-section	≤ 2 x 2.5 mm^2 or 2 x 1.5 mm^2 with multi-core cable ends
Operating temperature	– 25...+ 70 °C