FLENDER COUPLINGS

FLUDEX EOC - System

Operating instructions 4600.1 en
Edition 10/2017

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Operating instructions

Translation of the original operating instructions

Edition 10/2017

Legal notes

Warning note concept

This manual comprises notes which must be observed for your personal safety and for preventing material damage. Notes for your personal safety are marked with a warning triangle or an "Ex" symbol (when applying Directive 2014/34/EU), those only for preventing material damage with a "STOP" sign.

WARNING! Imminent **explosion!**

The notes indicated by this symbol are given to prevent **explosion damage.**
Disregarding these notes may result in serious injury or death.

WARNING! Imminent **personal injury!**

The notes indicated by this symbol are given to prevent **personal injury.**
Disregarding these notes may result in serious injury or death.

WARNING! Imminent **damage to the product!**

The notes indicated by this symbol are given to prevent **damage to the product.**
Disregarding these notes may result in material damage.

NOTE!

The notes indicated by this symbol must be treated as general **operating information**.
Disregarding these notes may result in undesirable results or conditions.

WARNING! Hot surfaces!

The notes indicated by this symbol are made to prevent **risk of burns due to hot surfaces** and must always be observed.
Disregarding these notes may result in light or serious injury.

Where there is more than one hazard, the warning note for whichever hazard is the most serious is always used. If in a warning note a warning triangle is used to warn of possible personal injury, a warning of material damage may be added to the same warning note.

Qualified personnel

The product/system to which this documentation relates may be handled only by **persons qualified** for the work concerned and in accordance with the documentation relating to the work concerned, particularly the safety and warning notes contained in those documents.
Qualified personnel must be specially trained and have the experience necessary to recognise risks associated with these products and to avoid possible hazards.

Proper use of Flender products

Observe also the following:

Flender products must be used only for the applications provided for in the catalogue and the relevant technical documentation. If products and components of other makes are used, they must be recommended or approved by Flender. The faultfree, safe operation of the products calls for proper transport, proper storage, erection, assembly, installation, start-up, operation and maintenance. The permissible ambient conditions must be adhered to. Notes in the relevant documentations must be observed.

Trade marks

All designations to which the registered industrial property mark ® is appended are registered trademarks of Flender GmbH. Other designations used in this document may be trademarks the use of which by third parties for their own purposes may infringe holders' rights.

Exclusion of liability

We have checked the content of the document for compliance with the hard- and software described. Nevertheless, variances may occur, and so we can offer no warranty for complete agreement. The information given in this document is regularly checked, and any necessary corrections are included in subsequent editions.

Explanation regarding Machinery Directive 2006/42/EC

The couplings described here are "components" in accordance with the Machinery Directive and do not require a declaration of incorporation.

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Contents

Installation and start-up must be carried out by properly trained specialist personnel. Please read these operating instructions carefully before starting up. Flender accepts 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 Directive 2014/34/EU.

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. Fitting the EOC system can prevent leakage and loss of hydraulic fluid as well as environmental hazards and contamination caused by an overheated coupling.
In 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 starting from a coupling size 297 at peripheral speeds of > 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 EOC 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.

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.

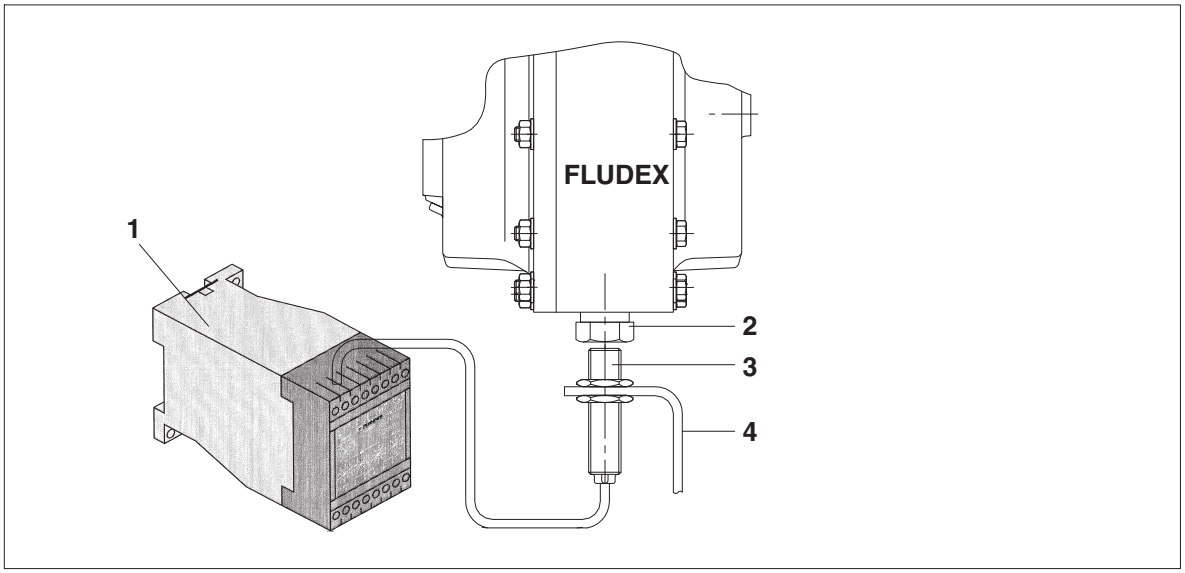

Fig. 1: Detail view of the EOC system

1	Evaluating instrument	3	Pick-up
2	Transmitter	4	Fastening (not part of the delivery)

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 fitted 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

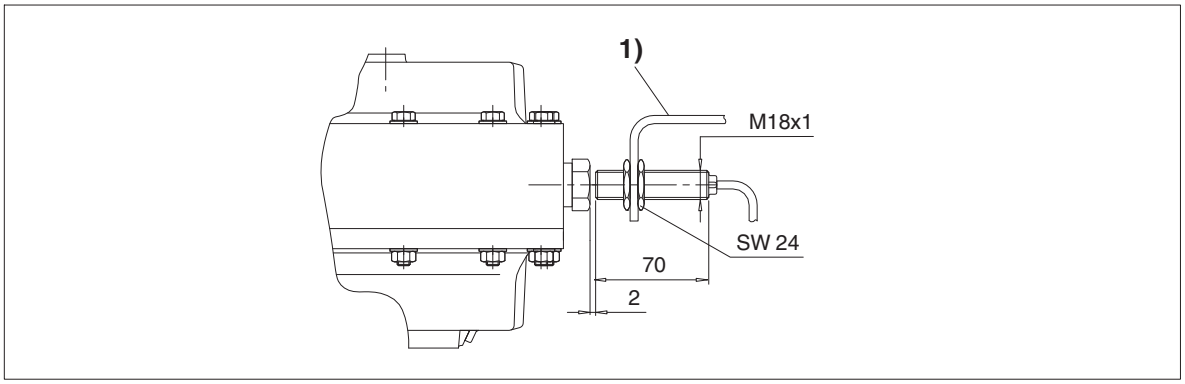

Fig. 2: Assembly drawing of the transmitter

1) is not part of the delivery

Retrofitting of the EOC system in already installed FLUDEX couplings is possible without reworking in case of sizes 297 to 887.

4. Component description

4.1 Transmitter

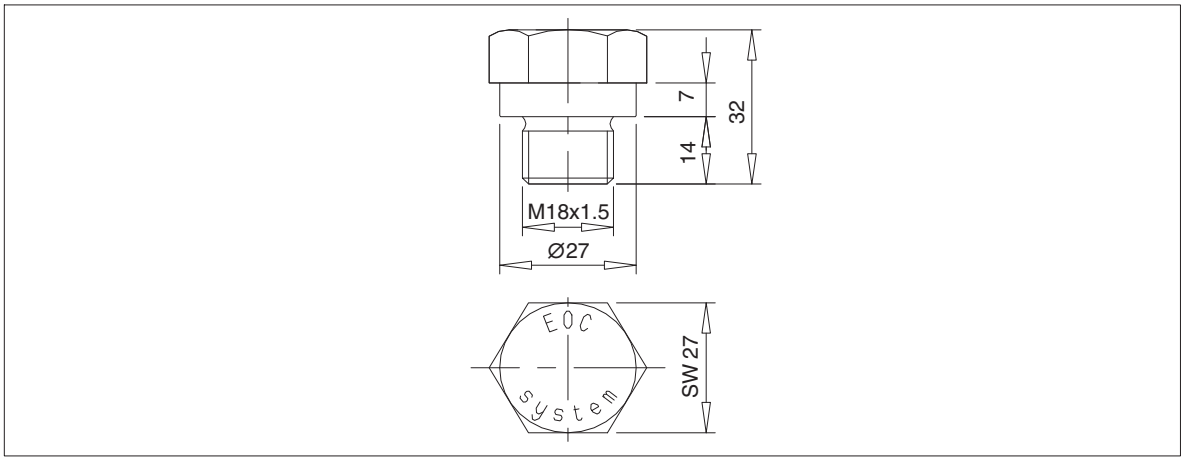

Fig. 3: Dimensioned drawing of the transmitter

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
Tightening torque	60 Nm

4.2 Pick-up

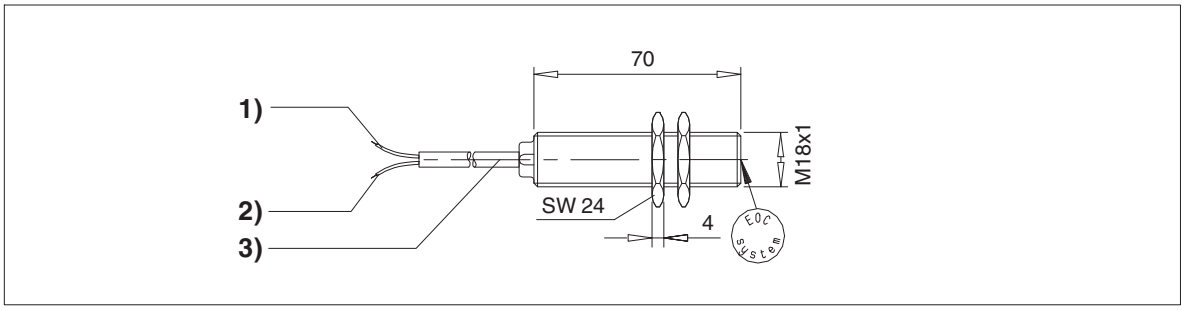

Fig. 4: Dimensioned drawing of the pick-up

1) blue (bu)

2) brown (bn)

3) Lead length 2 m (bu)

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 switch point) no signal is sent.

4.2.1 Technical data

Type designation	BIM-G18-Y1/S926
Output signal	according to EN 60947-5-6 (NAMUR)
Type	MS-threaded tube, chrome-plated M18x1x70 mm
Fitting type	flush or not flush
Tightening torque housing nut	25 Nm
Protection class	IP 67
Operating temperature	- 25 °C to + 70 °C
Ex-approval according to conformity certificate	KEMA 03 ATEX 1122 X issue no. 2
Internal capacity (Ci)	0 nF
Inductivity (Li)	0 µH
Identification of the device	II 1 G Ex ia IIC T6Ga II 2 D Ex ia IIIC T85°C Db (maximum U_i = 16 V; I_i = 20 mA; P_i = 200 mW)

4.2.2 Connection

The pick-up and the evaluation device are connected by a twin-core cable. The max. cable length is 1.0 mm^2 cross section 500 m. The feed cable is always separate and must not be incorporated into multi-core cables (risk of coupling disturbing voltages in).

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

4.3.1 Terminal assignment

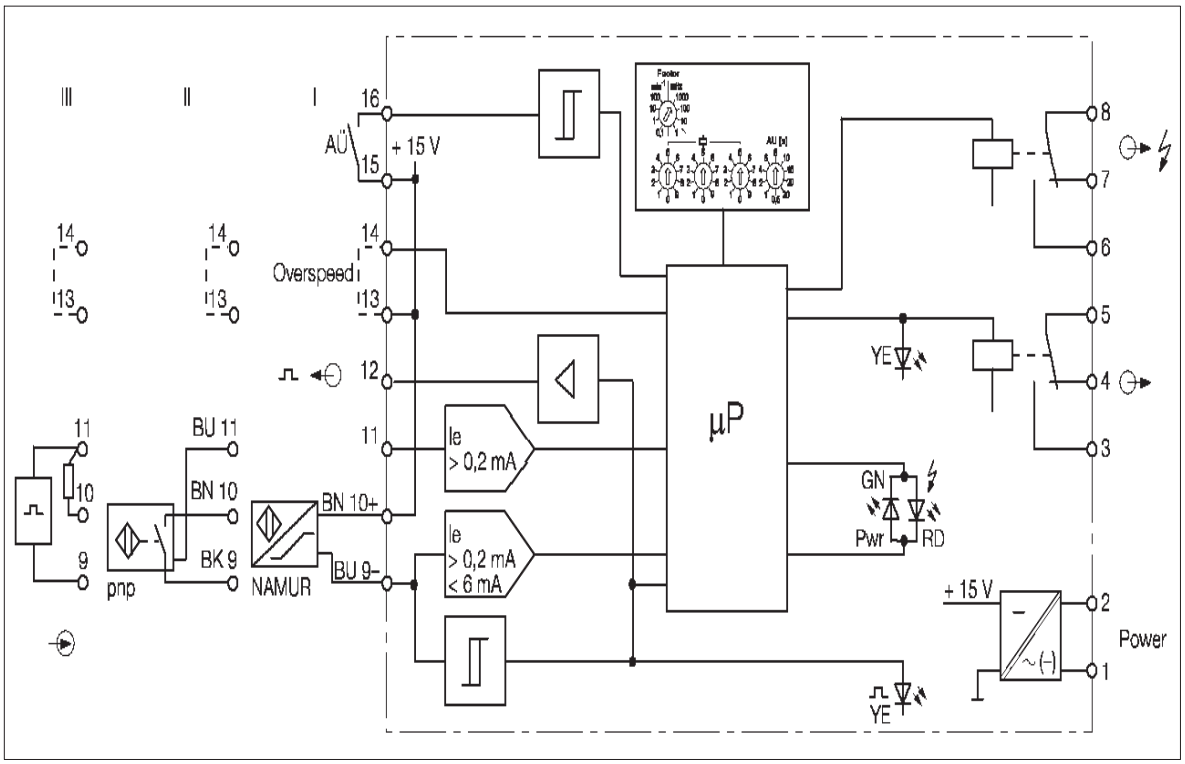

Fig. 5: The terminal diagram of the evaluation instrument (speed monitor)

1 to 2 operating voltage connection

3 to 5 limit relay output

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

9 to 11 sensor connection according to block diagram (III: $R_{10\text{-}11}$ = 1...10 kΩ)
9 bu, 10 bn pick-up connection EOC system

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

13 to 14 programming and speed monitoring:

– 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 to 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

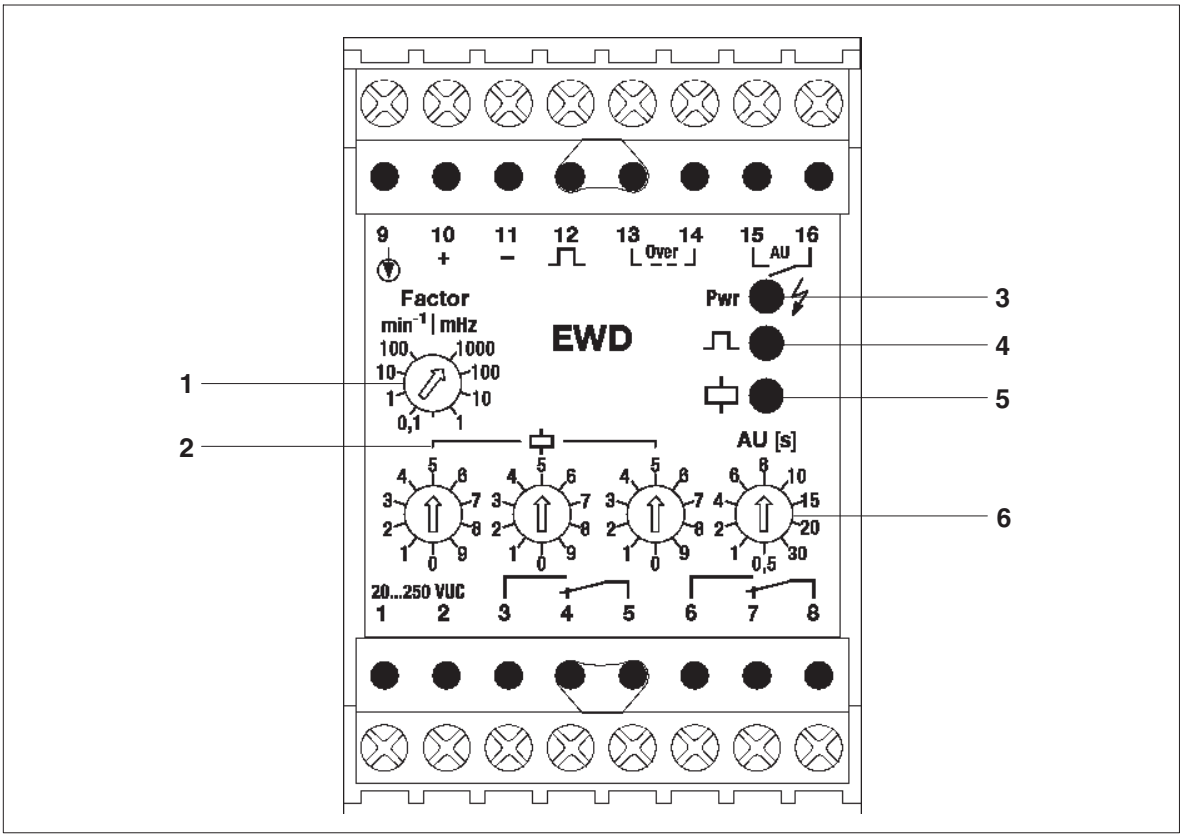

Fig. 6: LED display function and function setting

1 Setting factor
2 Limit value
3 Readiness for operation
4 Impulse display
5 Switching condition
6 Delayed timing

4.3.2.1 LED display function

Readiness for operation Pwr

– green: device is ready for use
red: invalid switch setting, or in case of NAMUR sensors wire breakage or short circuit, relay de-energised.

Pulse indication

– yellow: pnp-switch is off
NAMUR sensor or EOC pick-up not loaded.

Error diagnosis with 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 Examples of limit value settings

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 case of limit values below 0.1 min^{-1} a conversion (x 16.67) to MHz must be carried out and this value set.

d) In case of limit values above 1000 Hz conversion (x 60) in min^{-1} must be carried out and this value set.

Table 1: Examples of limit value settings

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

STOP

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 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.

The system can only be checked if the components are installed correctly. The passing speed of the transmitter must be > 15 m/s. For the control of the function, the distance of the pick-up and the transmitter can be slowly increased until the limit relay of the evaluation instrument turns off.

4.3.4 Technical data speed monitor

Type designation	EWD / 20 ... 250 VUC
Operating voltage	20 ... 250 VAC/DC
Network frequency	40 ... 70 Hz
Power requirement	≥ 4.5 VA
Monitoring range	0.01 Hz ... 1660 Hz or 0.6 ... 100 000 min^{-1}
Input frequency	≤ 150 000 min^{-1}
Impulse time	≥ 0.2 ms
Impulse pause	≥ 0.2 ms
Hysteresis	approx. 10 %
Delayed timing/start monitoring	0.5 ... 30 seconds (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 (at 230 VAC)
Test voltage	2 kV (at 24 VDC 500 V)
Input circuits	NAMUR/three-wire, pulse-switching
NAMUR input terminal: 9/10	according to EN 60947-5-6 (NAMUR)
– Operating values	U_0 = 8.2 V; I_k = 8.2 mA
– Switch threshold	1.4 mA ≤ I_e ≤ 1.8 mA
– Wire breakage threshold	≤ 0.15 mA
– Short circuit threshold	≥ 6 mA
Three-wire input	pulse-switching, terminals 9 ... 11
– Operating 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
Relays output / error 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) resistant to short circuits
Mounting housing	W x H x D: 50 x 75 x 110 mm, polycarbonate / ABS
Mounting	Floor mounting or snap-on fixture on top head rail (DIN 50 022)
Connection	2 x 8 screw terminals
Connection cross section	≤ 2 x 2.5 mm^2 or 2 x 1.5 mm^2 with wire-end ferrules
Protection type (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

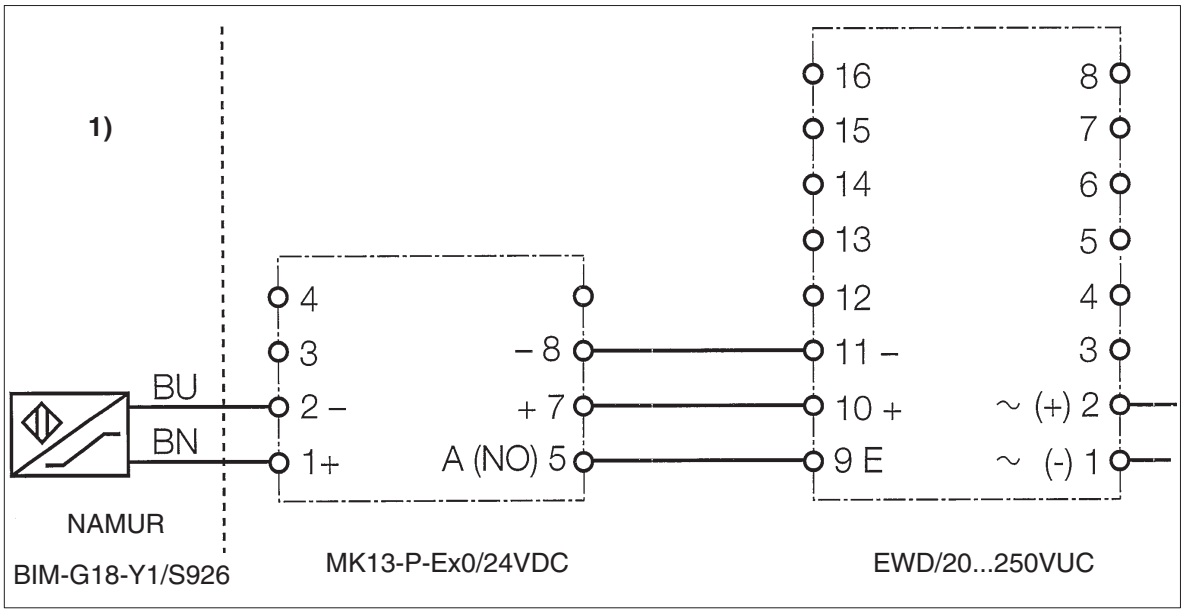

Fig. 7: Terminal plan connection designation

1) Potentially explosive area

STOP **The EWD complete system must not be used in potentially explosive environments as defined in Directive 2014/34/EU.**

5.1.2 Technical data isolation amplifier

Type designation	MK13-P-Ex0/24VDC
Operating voltage U_B	10 ... 30 VDC
Residual ripple W_{ss}	≤ 10 %
Current requirement	approx. 20 mA
Electrical isolation	Input circuit to output circuit and supply voltage for 250 V_{eff}, test voltage 2.5 kV_{eff}
Input circuit	according to EN 60947-5-6 (NAMUR)
Working values	
– Voltage	8.2 V
– Power	8.2 mA
– Switching threshold	1.55 mA
– Hysteresis	typical 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, resistant to short circuits, pulse-switching
Switching frequency	≤ 3 kHz
Ex-approval according to conformity certificate	TÜV 03 ATEX 2235
Maximum values	
– Switching 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	1/5/10 mH/1.1/0.79/0.7 µF
Identification of the device	II (1) GD [EEx ia] IIC
LED displays	
– Operating readiness	green
– Switching condition/fault signal	yellow / red (two-colour LED)
Mounting housing	W x H x D: 18 x 89 x 70 mm, polycarbonate / ABS
Mounting	Floor mounting or snap-on fixture on top head rail (DIN 50 022)
Protection class	IP 20
Connection cross section	≤ 2 x 2.5 mm^2 or 2 x 1.5 mm^2 with wire-end terminals
Operating temperature range	- 25 ... + 70 °C

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