

Documentation

about
3D stainless steel limit switch box
 with
10 - 60 V DC P+F sensors NBB4-12GM45-E2-M
 for
rotary actuators



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1. Objectives and practical use

The positions of industrial valves represent an important piece of information for the course of action of a production. These valves are actuated with rotary actuators which the end position of the valve like **OPEN** and **CLOSED** is reported back to a control system. This is done via a mounted a limit switch box which is placed at the actuator, see images 1-3.



Image 1: Stainless steel limit switch box with 3D indicator, size.: 300x150x80mm.



Image 2+3: Inductive Pepperl+Fuchs sensors NBB4-12GM45-E2-M for position (left) 1x OPEN and 1x CLOSED and (right) 1x OPEN and 2x CLOSED with stainless steel/aluminium switching cams connected on 6 and 9-pole clamp.

2. Technical specifications

- Stainless steel housing, Aisi 304, size: 300x150x80mm, F05-slot, cover with 3D indicator for OPEN and CLOSED (mounted with screws 4x M8 are with screw protection-Loctite stuck)
- 2x and 3x inductive Pepperl+Fuchs sensors NBB4-12GM45-E2-M, 10 - 60 V DC, details in 7., page 5
- 6 and 9-pole clamp grey, wiring diagrams, mark of the sensors with OPEN and CLOSED
- 1x stainless steel cable gland M20x1,5mm, clamp range \varnothing 8,0 - 5,0 mm
- 1x and 2x stainless steel/aluminium switching cams for position 0° and 90°
- 1x stainless steel shaft for switching cams, 1x stainless steel shaft for 3D indicator
- 1x stainless steel ground plate, 1x stainless steel sensor fixture
- Weight limit switch box: 3,5 kg
- Protection class limit switch box: IP 65
- Temperature range limit switch box: - 35°C up to + 70°C

3. Mounting on the actuator

3.1 mechanical mounting: The limit switch box with 4x M6 hexagon bolts (F05-slot) will be mounted with the bracket on the rotary actuator.

3.2 electrical mounting: The limit switch box becomes electric by the stainless steel cable gland M20x1,5mm. The tightening torques = 10 Nm, check operating instructions cable gland 8., page 7. Connecting to the 6 and 9-pole clamps, check 5., wiring diagrams sensors, images 4+5, page 4.

Metal parts have to be grounded or the metal housing has to be connected to the equipotential bonding (2 connections are available).

4. Switching cams

The stainless steel/aluminium switching cams are solved or tightened with a screwed socket head screw M5, SW 2,5mm.

5. Wiring diagrams sensors

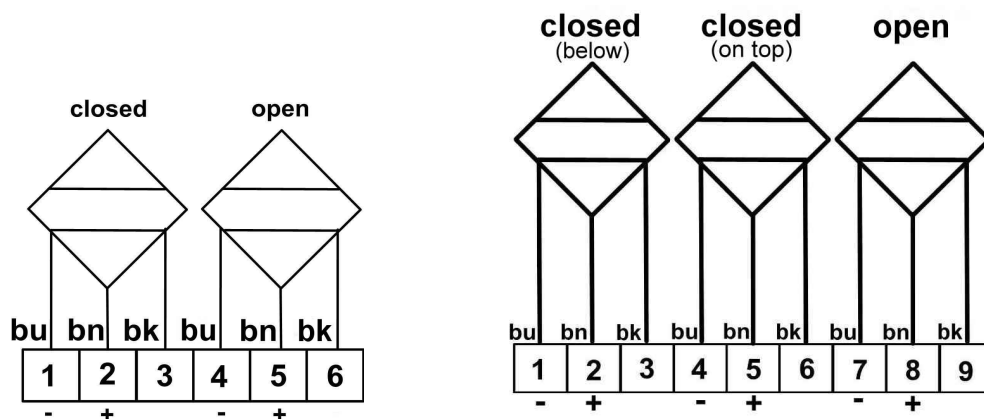


Image 4+5: Wiring diagrams 2x and 3x P+F sensors NBB4-12GM45-E2-M connected on 6 and 9-pole clamp

6. Cover mounting

Attention, mounted the 3D indicator shaft from the top rightness in the groove from the lower part housing shaft.
The cover then easily press and the 4x cover-locking bolts 1/2 rotations pull to the right.

7. Data sheet sensor

Inductive sensor

NBB4-12GM45-E2-M



Model Number

NBB4-12GM45-E2-M

Features

- Basic series
- 4 mm flush
- Increased operating distance
- Extended temperature range -40 ... +85 °C
- E1-Type approval
- Increased noise immunity 100 V/m

Accessories

EXG-12

Quick mounting bracket with dead stop

Technical Data

General specifications

Switching element function	PNP	NO
Rated operating distance	s_n	4 mm
Installation		flush
Output polarity		DC
Assured operating distance	s_a	0 ... 3.24 mm
Reduction factor r_{AJ}		0.39
Reduction factor r_{Cu}		0.35
Reduction factor r_{304}		0.75

Nominal ratings

Operating voltage	U_B	10 ... 60 V
Switching frequency	f	0 ... 800 Hz
Hysteresis	H	typ. 5 %
Reverse polarity protection		reverse polarity protected
Short-circuit protection		pulsing
Voltage drop	U_d	≤ 2.5 V
Rated insulation voltage	U_{BIS}	60 V
Operating current	I_L	0 ... 200 mA
Off-state current	I_r	0 ... 0.5 mA typ. 0.1 μ A
No-load supply current	I_0	≤ 15 mA
Time delay before availability	t_v	≤ 5 ms
Switching state indicator		LED, yellow

Functional safety related parameters

MTTF _d		1530 a
Mission Time (T_M)		20 a
Diagnostic Coverage (DC)		0 %

Ambient conditions

Ambient temperature		-40 ... 85 °C (-40 ... 185 °F)
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Mechanical specifications

Connection type		cable PUR, 2 m
Core cross-section		0.75 mm ²
Housing material		brass, nickel-plated
Sensing face		PBT
Degree of protection		IP69K
Mass		120 g

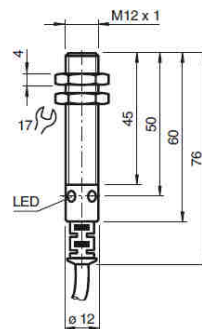
Compliance with standards and directives

Standard conformity		
Standards		EN 60947-5-2:2007 IEC 60947-5-2:2007

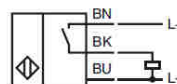
Approvals and certificates

Protection class		II
Rated insulation voltage	U_i	60 V
Design-impulse-voltage withstand	U_{imp}	800 V
UL approval		cULus Listed, General Purpose
CSA approval		cCSAus Listed, General Purpose
CCC approval		Certified by China Compulsory Certification (CCC)
E1 Type approval		10R-04

Dimensions



Electrical Connection



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Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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PF PEPPERL+FUCHS
SENSING YOUR NEEDS

1

Inductive sensor

NBB4-12GM45-E2-M

Installation Hint

Emitted interference and interference immunity in accordance with motor vehicle directive 2006/28/EG (e1 Type approval)
Interference immunity in accordance with DIN ISO 11452-2: 100 V/m
Frequency band 20 MHz up to 2 GHz

Mains-borne interference in accordance with ISO 7637-2: Pulse 1 2a 2b 3a 3b 4
Severity level III III III III III III
Failure criterion C A C A A A

EN 61000-4-2: CD: 8 kV / AD: 15 kV
Severity level IV IV
EN 61000-4-3: 30 V/m (80...2500 MHz)
Severity level IV
EN 61000-4-4: 2 kV
Severity level III
EN 61000-4-6: 10 V (0.01...80 MHz)
Severity level III
EN 55011: Class A

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8. Stainless steel cable gland

Betriebsanleitung · Operating instructions



CE 0102

Betriebsanleitung 3104X

U 28. UNI Ex e Edelstahl

Anwendung:

Die Kabelverschraubungen (KLE's) U 28. UNI Ex e, dienen zu Einführung von fest verlegten Kabeln und Leitungen in einen Anschlussraum oder in ein Gehäuse eines explosionsgeschützten elektrischen Betriebsmittels der Gerätegruppe II und der Kategorien 2 G/D und 3 G/D. Der Anschlussraum oder das Gehäuse müssen der Zündschutzart „Erhöhte Sicherheit – Ex „e“ nach den Normen EN 60079-0:2006, EN 60079-7:2007, EN 61241-0:2006 und EN 60241-1:2004 entsprechen. Die KLE ist für Betriebsmittel mit dem Grad der mechanischen Gefahr „hoch“ nach EN 60079-0 geeignet. Bei der Auswahl des Werkstoffes des Dichteinsatzes ist die Umgebungs-, die Oberflächen- und die Betriebstemperatur an der Einbaustelle zu beachten. Bei ordnungsgemäßer Montage der KLE kann die Schutzart IP 68 nach IEC 529 oder EN 60529 erreicht werden.

Kennzeichnung:

Die KLE U 28. UNI Ex e entspricht den Normen EN 60079-0:2006, EN 60079-7:2007, EN 61241-0:2006 und EN 61241-1:2004. Sie sind von der Physikalisch-Technischen Bundesanstalt (PTB) einer EG-Baumusterprüfung nach EG-Richtlinie 94/9/EG unterzogen worden. Sie sind deshalb wie folgt gekennzeichnet:

Kombiniert für Gas und Staub:

II 2 G/D Ex e II Ex tD A21 IP 68
PTB 01 ATEX 3104X xx CE 0102
(xx = Anschlussgewindeart und -größe, z. B. M25, Pg 21, NPT 3/4" oder G 1/2")

Für Gas:

II 2G Ex e II PTB 01 ATEX 3104X xx CE 0102

Für Staub:

II 2D Ex tD A21 IP 68

Extrem kleine Bauteile:

IP 68 xx CE 0102

Einsatztemperaturbereich

Material: TPE-V	Temperaturbereich: -40 °C bis +135 °C
TPE	Temperaturbereich: -40 °C bis +115 °C
LSR	Temperaturbereich: -60 °C bis +180 °C



Operating instruction 3104X

U 28. UNI Ex e stainless steel

Application:

The cable glands (KVs/CGs) U 28. UNI Ex e are used to insert permanently laid, screened lines and cables into a connection space or housing of an explosion-protected electrical operating material of the appliance group II and categories 2 G/D and 3 G/D.

The connection space or housing must conform to the ignition protective class "Increased safety – Ex e" in accordance with the standards EN 60079-0:2006, EN 60079-7:2007, EN 61241-0:2006, and EN 61241-1:2004. The KLE is suitable for operating material with the degree of mechanical risk "high" as per EN 60079-0.

In selecting the material for the sealing insert, the ambient, surface and operating temperature at the installation point is to be observed.

With proper assembly of the KLE, the protective class IP 68 according to IEC 529 or EN 60529 can be attained.

Designation:

The KLE U 28. UNI Ex e conforms with the standards EN 60079-0:2006, EN 60079-7:2007, EN 61241-0:2006 and EN 61241-1:2004. They were subjected to an EC design test in accordance with EC directive 94/9/EC by the Physical-Technical Federal Institute (PTB).

They are therefore designated as follows:

Combinated for Gas and Dust:

II 2 G/D Ex e II Ex tD A21 IP 68
PTB 01 ATEX 3104X xx CE 0102
(xx = connection thread type and size, e. g. M25, Pg 21, NPT 3/4" oder G 1/2")

Gas:

II 2G Ex e II PTB 01 ATEX 3104X xx CE 0102

Dust:

II 2D Ex tD A21 IP 68

Extremely small components:

IP 68 xx CE 0102

Application temperature range:

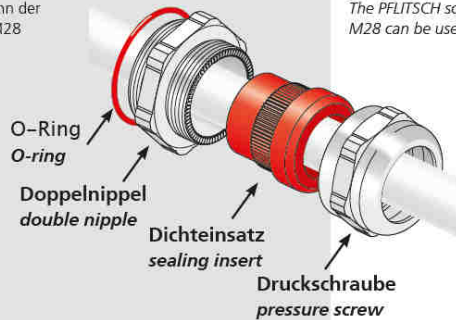
Material: TPE-V	Temperature range: -40 °C up to +135 °C
TPE	Temperature range: -40 °C up to +115 °C
LSR	Temperature range: -60 °C up to +180 °C

Betriebsanleitung U 28. UNI Ex e / Operating instruction U 28. UNI Ex e · 1



Montage

Als Montagewerkzeug kann der PFLITSCH Steckschlüssel M28 verwendet werden.



Assembly

The PFLITSCH socket spanner M28 can be used as a tool

Mindestwandstärken

- beim Einbau in Geräten mit Gewindebohrungen:
s = 5,0 mm (Kunststoff); 3,0 mm (Metall)
- beim Einbau in Geräten mit Durchgangsbohrungen:
s = 2,0 mm (Kunststoff); 1,0 mm (Metall)

Hinweis zur Zugentlastung der Kabelverschraubung:

Die KLE mit der Standard-Druckschraube ist nur für fest verlegte Leitungen und Kabel geeignet. Der Betreiber muss in diesem Fall für geeignete Maßnahmen sorgen um eine Zugentlastung zu gewähren.

Wichtig:

Dichtringe dürfen nicht mit dem Messer ausgeschnitten werden! Nicht benutzte Gehäusebohrungen sind mit einem Ex - Verschlussstopfen zu verschließen. KLE mit entsprechenden Gewindegrößen sind mit einem geschlossenen Dichteinsatz oder mit einem UNI Ex e - Blind - Dichteinsatz zu verschließen. Nicht benutzte Bohrungen von Mehrfach-Dichteinsätzen sind mit einem Bolzen zu verschließen.

Demontage:

Die Demontage erfolgt in umgekehrter Reihenfolge.

Instandhaltung:

Die Blindstopfen sind in die Kontrollen bei der Inspektion und Wartung der elektrischen Betriebsmittel einzubeziehen.

Anschlussmaße für Durchgangsbohrungen:

Metrisch/metric	M10	M12	M16	M20	M25	M32	M40	M50	M63	M72	M75	M80
d [mm] 0/+0,3	10,0	12,0	16,0	20,0	25,0	32,0	40,0	50,0	63,0	72,0	75,0	80,0
Pg	7	9	11	13,5	16	21	29	36	42	48	-	-
d [mm] 0/+0,3	12,5	15,5	19,0	20,5	22,5	28,5	37,0	47,0	54,0	59,5	-	-
NPT	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	-	-	-	-	-
d [mm] 0/+0,3	17,1	21,3	26,6	33,3	42,0	48,1	60,1	-	-	-	-	-

Anzugsmomente:

Gewinde / Thread	M10	M12	M16	M20	M25	M32	M40	M50	M63	M72	M75	M80
Nm	6	6	8	10	10	15	20	20	20	30	40	40
Gewinde / Thread	Pg7	-	Pg 9	Pg 11	Pg 13,5	Pg 16	Pg21	Pg 29	Pg 36	Pg42	Pg 48	-
Nm	6,25	-	3,75	3,75	3,75	6,25	7,5	7,5	7,5	10,0	-	-

Minimum wall thicknesses „s“:

- for installation in appliances with threaded holes:
s = 5,0 mm (plastic); 3,0 mm (metal)
- for installation in appliances with throughholes:
s = 2,0 mm (plastic); 1,0 mm (metal)

Pointer for strain relief of the cable gland:

The KLE with the standard pressure screw is only suitable for permanently laid lines and cables. In this case, the operator must adopt appropriate measures to ensure strain relief.

Important:

Sealing rings must not be cut out with a knife!
Housing holes that are not used must be sealed with an Ex closure plug. KLEs with corresponding thread sizes are to be sealed with a closed sealing insert or with a UNI Ex e blind sealing insert.
Non-used holes of multi-sealing inserts are to be sealed with a bolt.

Disassembly:

Disassembly is carried out in the reverse order.

Maintenance:

The KLEs are to be included in the inspection and maintenance of the electrical operating material.

Connection dimensions for throughholes

Tightening torques



Kompetenz im Kabelmanagement

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