

Documentation

about
Ex i ... 8 V DC stainless steel limit switch boxes
with
Pepperl+Fuchs NJ4-12GK-SN
for
valve actuators
acc to
guidline 2014/34/EU, IExU 04 ATEX 1211



II 2G Ex ia/ib IIB T6 Gb



II 2D Ex ia/ib IIIC T 80°C Db

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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 or linear actuators at which the end position of the valve like “**OPEN**” or “**CLOSED**” or other positions are reported back to a control system. This is done via a mounted a limit switch box which is placed above/at the actuator, see images 1-4.

Use of the above mentioned limit switch boxes can be found in endangered explosive areas as in the chemicals industry or other industry areas, equipment group II, category 2G, zones 1 or 2 as well as the zones 21 and 22.



Image 1+2: Stainless steel limit switch boxes, AiSi 304, size: 300x150x80mm and 150x150x80mm, cover with 3D-indicator OPEN/CLOSED

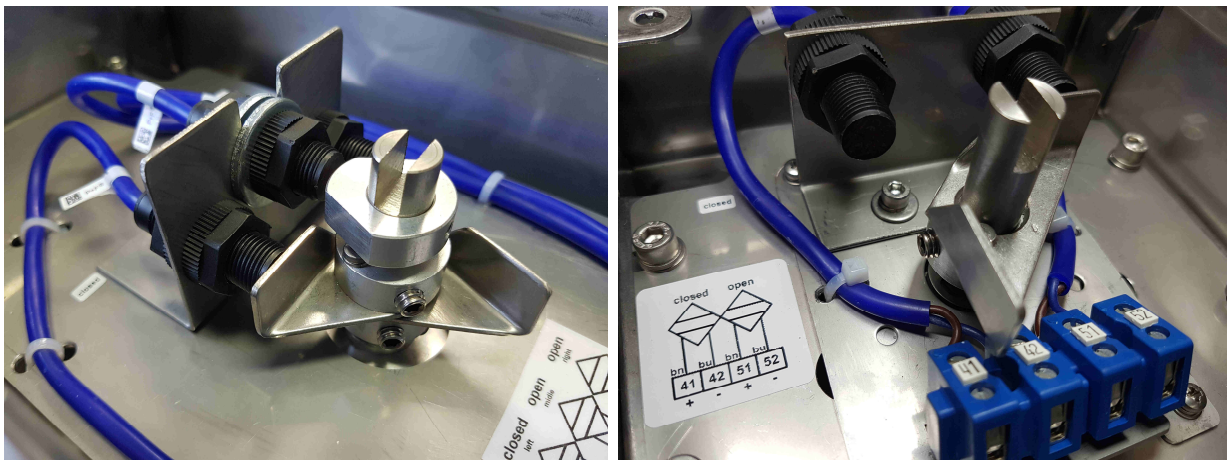




Image 3+4: 3x P+F NJ4-12GK-SN with adjustable stainless steel/aluminium switching cams and 1x adjustable aluminium switching contact, 2x P+F NJ4-12GK-SN with stainless steel/aluminium switching cam 0° and 90°

2. Technical specification

Table 1: Technical specifications as well as conditions of use for the limit switch boxes equipment group II, category 2G, zones 1, 2 or 2D, zones 21, 22

Term / Identifier:	Technical specifications:
Potential recyclables and measurements	AiSi 304, 300x150x80mm and 150x150x80mm
Interface for mounting	4xM6-winding at the bottom hole circle \varnothing 50 mm, F05-slot
Surrounding temperature array	$-35^{\circ}\text{C} \leq T_a \leq +70^{\circ}\text{C}$
Protection class of the housings	IP 65
Ignition protection class	 II 2G Ex ia/ib IIB T6 Gb  II 2D Ex ia/ib IIIC T 80°C Db
Temperature class	T6
<ul style="list-style-type: none"> Nominal voltage Nominal current Power 	$U_i = 16\text{ V}$ $I_i = 25\text{ mA}$ $P_i = 34\text{ mW}$
Bush and cable entry points	M20x1,5mm, \varnothing 8,0-5,0mm
Joint clamp	max. 2,5 mm ²
Weight limit switch boxes	3,2 kg and 2,2 kg
Display and switching range	0° up to 180°, 0° and 90°

3. Mounting actuator / connection sensors / switching cams / cover mounting

3.1 Mechanical mounting: The limit switch boxes are mounted via the F05-slot, 4x M6 hole space.

3.2 Electrical connection: The limit switch boxes are electrically mounted to the connection clamps within the housing through the bush and cable gland, tightening torque for M20x1,5mm = **10 Nm** (see images 5+6, see page 7).

3.3 Switching cams/switching contact: The adjustable switching cams and the 0° and 90° switching cam are mounted with a inside hexagonal key SW 3mm. The adjustable switching contact is mounted with a inside hexagonal key SW 2mm.

3.4 Cover mounting: Necessary turn the cover locking pins correctly into the housing lock!

Metal parts have to be grounded or the metal housing has to be connected to the equipotential bonding.

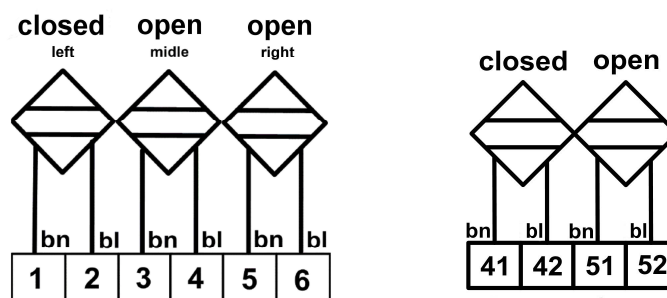


Image 5+6: Wiring diagram 3x P+F NJ4-12GK-SN connecting on 6-pole clamp and 2x P+F NJ4-12GK-SN connecting on 4-pole clamp

4. Components and parts lists

Table 2: Components and parts list of limit switch boxes equipment group II, category 2G, zones 1, 2 or 2D, zones 21, 22

Term/Identifier:	Idend-No.:	Material:	Technical specifications:
Stainless steel housing with closed cover with sealing and 4x cover locking pins, O-ring 5x2mm, plastic bush with O-ring 13x3mm	SB-VA-L-300	Aisi 304	300x150x80mm
Stainless steel housing with closed cover with sealing and 4x cover locking pins, O-ring 5x2mm, plastic bush with O-ring 13x3mm	EB-VA-L-150	Aisi 304	150x150x80mm
3D-indicator OPEN/CLOSED, 0° and 90° with O-ring 60x3,5mm, 4x M8 screws	SB-3D	Polyester	Ø60x75mm
Shaft for 3D-indicator	SB-W-3D	Stainless steel	Drawing-No.: 0001 Ø12x78mm
Shaft system for 3D	SB-WA-3D	Aluminium	Ø100x10mm
Shaft system for shafts and F05-slot with 4x M3 screws	SB-AL-E	Aluminium	Drawing-No.: 030 Ø75x17mm
Cable gland with 2x hexagon nut M20x1,5mm and Silikon O-ring	SB-KL-VA	Stainless steel	M20x1,5mm, clamp range Ø8,0-5,0mm
2x 3-pole and 2x 2-pole clamp with M3 screws	SB-V	Polyester	2,5mm ² , blue
Plate for cylindrical sensors	SB-zy	Stainless steel	Drawing-No.: 004 93x70x1mm
Ground plate for housing 300x150x80mm	SB-PL-300	Stainless steel	Drawing-No.: 100 289x125x2mm
4x inside hexagon screws with washer and spring rock washer	SB-SK	Stainless steel	M5
Ground plate for housing 150x150x80mm	SB-PL-150	Stainless steel	Drawing-No.: 021 125x79x1mm
4x inside hexagon screws with washer and spring rock washer	SB-SK	Stainless steel	M5
4x screws for plate	SB-B	Stainless steel	M3
Shaft for sensors	SB-W	Stainless steel	Drawing-No.: 0002 Ø12x91mm
2x O-ring for shaft	SB-O	Silicon	9x1,5mm
O-ring for shaft system	SB-O-1	Silicon	65x3mm
O-ring for shaft system	SB-O-2	Silicon	94x2mm
2x Washer for shaft	SB-U	Stainless steel	Ø18/Ø12mm
2x Washer for sensor	SB-U-S	Stainless steel	Ø24/Ø13x2,5mm
4x Locking rings for shafts	SB-S	Stainless steel	RS 9
Switching cam 0° and 90° with M6 inside hexagon screw SW 3mm	SB-Scha	AiSi/ Aluminium	for shaft Ø12mm
2x adjustable switching cam 0° up to 180° with M6 inside hexagon screw SW 3mm	SB-Schal	AiSi/ Aluminium	for shaft Ø12mm
Sensor fixture for 3x sensors	SB-S-Ha	Stainless steel	60x50x35x1mm
Adjustable switching contact for sensor with M4 inside hexagon screw SW 2mm	SB-Sch	Aluminium	Drawing-No.: 111
Clamp fixture with 2x M4 screws	SB-B-S-q	Aluminium	70x15x10mm
Cable binder	SK-K	Nylon	99x2,5mm
Wiring diagram and sensor sign	SB-Sch-S	PVC	40x30/30x32mm and 8x4mm
2x and 3x Pepperl+Fuchs sensor NJ4-12GK-SN with nuts	SB-Sen	Crastin, PBTB	M12x35mm

5. Data sheet sensor (Extract from Pepperl+Fuchs data sheet page 1)

 Inductive sensor

NJ4-12GK-SN



Model Number

NJ4-12GK-SN

Features

- 4 mm non-flush
- Usable up to SIL 3 acc. to IEC 61508
- ATEX approval Ex-i and Ex-nA/tc for zone 0-2 and zone 20-22
- Degree of protection IP68

Application



Danger!

In safety-related applications the sensor must be operated with a qualified fail safe interface from Pepperl+Fuchs, such as KFD2-SH-EX1. Consider the "exida Functional Safety Assessment" document which is available on www.pepperl-fuchs.com as an integral part of this product's documentation.

Accessories

BF 12
Mounting flange, 12 mm
EXG-12
Quick mounting bracket with dead stop

Release date: 2017-04-12 10:40 Date of issue: 2017-04-12 250927_eng.xml

Technical Data

General specifications

Switching function	Normally closed (NC)
Output type	NAMUR with safety function
Rated operating distance	s_n 4 mm
Installation	non-flush
Assured operating distance	s_a 0 ... 3.24 mm
Reduction factor r_{A1}	0.4
Reduction factor r_{C0}	0.3
Reduction factor r_{304}	0.85
Output type	2-wire

Nominal ratings

Nominal voltage	U_o 8.2 V
Switching frequency	f 0 ... 1500 Hz

Current consumption

Measuring plate not detected	≥ 3 mA
Measuring plate detected	≤ 1 mA

Functional safety related parameters

MTTF _d	10660 a
Mission Time (T_{M1})	20 a
Diagnostic Coverage (DC)	0%

Ambient conditions

Ambient temperature	-50 ... 100 °C (-58 ... 212 °F)
Safety application:	-40 ... 100°C

Mechanical specifications

Connection type	cable silicone, 2 m
Core cross-section	0.34 mm ²
Housing material	Crastin (PBTB), black
Sensing face	Crastin (PBTB), black
Degree of protection	IP68
Cable	
Bending radius	> 10 x cable diameter
Note	Security relevant only up to -40°C

General information

Use in the hazardous area	see instruction manuals
Category	1G; 2G; 3G; 1D; 3D

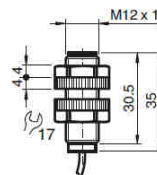
Compliance with standards and directives

Standard conformity	
NAMUR	EN 60947-5-6:2000 IEC 60947-5-6:1999
Standards	EN 60947-5-2:2007 EN 60947-5-2/A1:2012 IEC 60947-5-2:2007 IEC 60947-5-2:AMD 1:2012

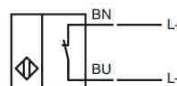
Approvals and certificates

FM approval	
Control drawing	116-0165
UL approval	cULUS Listed, General Purpose
CCC approval	CCC approval / marking not required for products rated ≤ 36 V

Dimensions



Electrical Connection



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

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1

6. Operating instruction 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:

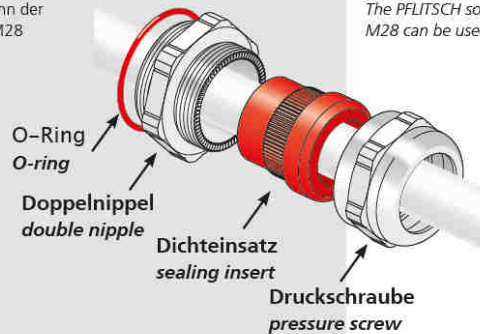
Material:	TPE-V	Temperature range: -40 °C up to +135 °C
	TPE	Temperature range: -40 °C up to +115 °C
	LSR	Temperature range: -60 °C up to +180 °C

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)

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)

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.

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.

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.

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.

Demontage:

Die Demontage erfolgt in umgekehrter Reihenfolge.

Disassembly:

Disassembly is carried out in the reverse order.

Instandhaltung:

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

Maintenance:

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

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	-	-	-	-	-

Connection dimensions for throughholes

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	Pg 21	Pg 29	Pg 36	Pg 42	Pg 48	-
Nm	6,25	-	3,75	3,75	3,75	6,25	7,5	7,5	7,5	10,0	-	-

Tightening torques



Kompetenz im Kabelmanagement

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2 - Betriebsanleitung U 28. UNI Ex e / Operating instruction U 28. UNI Ex e

Betriebsanleitung_3104x_U28_e_e.D_GB_61096_09_2011/Stand: 28.09.2012; PFLITSCH GmbH & Co. KG

7. Applicable standards

EN 60079-0: 2012+A11: 2013 Explosive atmospheres - Part 0:
Equipment - General requirements

EN 60079-11: 2012 Explosive atmospheres - Part 11:
Equipment protection by intrinsic safety „i“