

Documentation

about
Ex eb db ... - 55 °C 4 - 250 V AC/DC limit switch boxes
with
Bartec limit switches
for
pneumatic rotary- and linear atuators
acc. to
guidline 2014/34/EU, IExU 07 ATEX 1155

 **II 2G Ex eb db IIC T6 Gb**  **II 2D Ex tb 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 e.g. actuated with pneumatic rotary- and linear actuators at which the end position of the valve like **open** or **closed** is reported back to a control system. This is done via a mounted limit switch box which is placed on/at the actuator.



Low temperature limit switch boxes can be found in explosive areas as the extremely cold zones, equipment group II, category 2G, zones 1, 2 or 2D, zones 21, 22. Check images 1-3.



Image 1-3: Low temperature limit switch boxes with stainless steel bracket and stainless steel mounting set for rotary- and linear actuators, $-55\text{ °C} \leq T_a \leq +70\text{ °C}$, 175x80x57 mm, IP 65. Inner view with adjustable switching contacts.

2. Technical specification

Table 1: Technical specifications of the low temperature limit switch box with Bartec switches

Term / Identifier:	Technical specifications:
Materials and dimensions housings	Aluminium housing grey 175x80x57 mm 122x120x90 mm 160x160x90 mm 220x120x90 mm
Connection limit switch box to bracket	4x M6-winding at the bottom hole circle \varnothing 50 mm, F05-slot
Connection limit switch box to bracket for rotary actuator	acc. to VDI/VDE 3845, shaft height 20, 30 and 50 mm, hole spacing 80x30 mm and 130x30 mm
Connection limit switch box with aluminium plate to linear actuator	mounting set f. linear actuators acc to IEC 534
Ambient temperature range	- 55 °C ≤ T _a ≤ + 70 °C
Protection class	IP 65
ATEX identification	 II 2G Ex eb db IIC T6 Gb  II 2D Ex tb IIIC T80 °C Db
Temperature class	T6
Limit switch data bei AC: bei AC: bei AC: bei DC: bei DC: bei AC/DC: bei AC/DC:	rated voltage U _n = 400 V, rated current I _n = 3 A (ohmic load) rated voltage U _n = 400 V, rated current I _n = 2 A (inductive load) rated voltage U _n = 250 V, rated current I _n = 5 A (ohmic load) rated voltage U _n = 250 V, rated current I _n = 3 A (inductive load) rated voltage U _n = 250 V, rated current I _n = 0,4 A (ohmic load) rated voltage U _n = 250 V, rated current I _n = 0,03 A (inductive load) rated voltage U _n = 30 V, rated current I _n = 7 A (ohmic load) rated voltage U _n = 30 V, rated current I _n = 5 A (inductive load)
Cable glands	M20x1,5 mm, \varnothing 14,0-9,0 mm and \varnothing 9,0-5,0 mm, nickel-plated or stainless steel
Mini-Terminals	2x 3-pole, maximum 2,5 mm ²
- Weights limit switch boxes: - Weight stainless steel bracket - Weight aluminium plate and stainless steel mounting set	- aluminium limit switch box 175x80x57 mm = 0,82 kg - aluminium limit switch box 122x120x90 mm = 1,1 kg - aluminium limit switch box 160x160x90 mm = 2,1 kg - aluminium limit switch box 220x120x90 mm = 2,1 kg - 0,3 kg - 1,1 kg
Switching range	0° up to 90°, 0° up to 180°

3. Connection of the limit switches and adjusting the switching cams

During the cable glands limit switches will be connected acc to operating instructions page 9, tightening torque **M20x1,5 mm = 10 Nm**. Connecting to the mini-terminals acc to image 4. The wiring diagram is always fixed in the housing. Both aluminium switching cams are adjustable and are tighten with a hexagon socket screw M4, SW 2 mm in the switching cams..

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

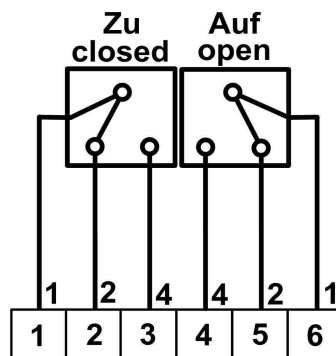


Image 4: Wiring diagram of the limit switches (changer) connected to the mini-terminals

3.1 Subplementary connection of solenoid valve

At the aluminium housing 122x120x90 mm and 220x120x90 mm are the possibility with subplementary mini-terminals and cable glands to connect a solenoid valve.

The max. rating voltage 400 V and the max. rating current 7 A (ohmic load) and 5 A (inductive load) do not overshoot at the mini-terminals for connection of the solenoid valve.

4. Components and parts lists

Table 2: Components and parts lists of the low temperature limit switch boxes with Bartec limit switches

Term/Identifier	Article-No.	Material	Comments
Aluminium empty housing with closed cover and 4x screw	AL-175L-T AL-122L-T AL-160L-T AL-220L-T	Aluminium-Si 12 Aluminium-Si 12 Aluminium-Si-12 Aluminium-Si-12	175x80x57mm, Bartec type: 07-5180 122x122x90mm, Bartec type: 07-5180 160x160x90mm, Bartec type: 07-1580 220x120x90mm, Bartec type: 07-5180 all cover sealings are heat resisting : -55 °C up to +100 °C
Cable glands, metal with silicone-O-ring	EB-Cg-Np	Nickel-plated	M20x1,5 mm, clamp range Ø 14-9 mm and Ø 9-5 mm Pflitsch-type: bg 220mshTex -55 °C up to +160 °C
Cable glands, metal with silicone-O-ring	EB-Cg-VA	Stainless steel	M20x1,5 mm, clamp range Ø 14-9 mm and Ø 9-5 mm Pflitsch-type: bg 220VAHTex -55 °C up to +160 °C
2x Mini-terminals 3-pole with clamp indicators	EB-MT	Thermoplastic and copper alloy	Maximum, 2,5 mm ² , grey, Bartec: 07-9702-0320/1
Ground plates: AL-122L, -160L, -220L	PL-122L, -220L, -160L	Stainless steel	106x105x1,5 mm and 207x107x1,5 mm
Screws, lock washers for ground plate, 4x	B-Sch, B-F	Stainless steel	M6x10 mm
Aluminium shaft bearing body: AL-175L	WA-1	Aluminium	Ø 64x13 mm, drawing-No.: 0029
O-Ring	O-1-WA-T	Silikon	Ø 57x2 mm and Ø 62x3 mm, heat resisting: -55 °C up to +200 °C
Aluminium shaft bearing body: AL-122L, AL-160L, AL-220L	WA-2	Aluminium	Ø 74x9 mm, drawing-No.: 0030
Shafts for housing	WO	Stainless steel	Ø 12x64/77 mm, drawing-No.: 005/0016
O-Ring for shaft	O-WE	NBR 70	Ø 9x1,5 mm, heat resistant: -55 °C up to +200 °C
Washer for shaft, 2x	U	Stainless steel	Ø 18 / Ø 12x1,2 mm
Lock washer for shaft, 2x	S	Stainless steel	DIN 6799-9
2x Switching cam with 1x M4	Sch	Aluminium	drawing-No.: 0017a
Mounting parts with screws for limit switches	B	Aluminium/ stainless steel	25x20x5 mm, 2x M3x32 mm
Wiring diagram/ limit switch label	Sch-S	Polyvinylchlorid self-adhesive	30x30 mm and 8x4 mm
Stainless steel data plate, fixed with groove pin	Typ-T	Stainless steel	65x35x0,5 mm, heat resisting: -55 °C up to +100 °C
Bartec limit switches: changer, closing switch or opening switch	EB-B-S	Contacts material: silver or gold coated	Bartec 07/1511-7330/01, contacts: silver Bartec 07/1511-8330/01, contacts: gold coated, data sheet page 6-8, ambient temperature range: -55 °C up to +75 °C
Isolating jacketing for limit switch cable	IS-T	Silicone	Bürklin type: 6,0x0,6-PVC, DIN 40628, Sil (F163.900), Ø 6 mm x 0,6 mm, heat resisting: -60 °C bis +200 °C
Stainless steel standard bracket for rotary actuators	EB-VA-b	Stainless steel	70x130x45/55 mm, for rotary actuators acc to VDI/VDE 3845
Aluminium plate for linear actuators with 4x screws	EB-Al-p	Aluminium	135x80x10 mm, drawin-No.: 061
Stainless steel mounting set for linear actuators	EB-VA-s	Stainless steel and aluminium	acc to NAMUR IEC 534

5. Data sheet limit switches

(Attention: left site insert switch will be used only in our limit switch boxes !!!)

Insert switch/limit switch



Insert switch with connection cores

This switching element can be universally used for switching, controlling and regulating operations within Ex-areas. The insert switch is audited to the latest EC guideline 94/9/EC. Devices equipped with these insert switches have to be approved by a testing authority, the switch itself needs not be retested. The cable cores are cast-in at the back of the switch. Their standard length is 500 mm; other lengths are available on request. To connect the cores we recommend the miniterminals from BARTEC.

Limit switch with connection cable

The limit switches have been developed for Ex-areas where safe and reliable signalling is required, for example on pumps, petrol pumps, as well as in mechanical and high-tech engineering. The switches must be mounted into the respective devices or systems in such a way as to guarantee mechanical protection. No further tests are required. The connection cable is cast-in on the back of the switch. For the connection in Ex-areas BARTEC provides a large variety of terminals and terminal boxes.

Explosion protection

Limit switch

ATEX	II 2G Ex d IIC T6, T5 Gb II 2D Ex tb IIIC T80°C, T95°C Db
Certification	EPS 14 ATEX 1 766 X
IECEX	Ex d IIC T6, T5 Gb Ex tb IIIC T80°C, T95°C Db
Certification	IECEX EPS 14.0092 X
Other approvals and certificates, see www.bartec.de	

Insert switch

ATEX	II 2G Ex d IIC Gb I M2 Ex d I Mb
Certification	EPS 14 ATEX 1 765 U
IECEX	Ex db IIC Gb Ex db I Mb
Certification	IECEX EPS 14.0091 U
Other approvals and certificates, see www.bartec.de	

Ambient temperature	-60 °C to +100 °C depending on the type and materials used
Ambient temperature limit switches	T6 to max. +75 °C depending on the rated current
Protection class	IP 66 (IEC/EN 60529)

Technical data

Ex d **insert switch/limit switch** DIN EN 60947-5-1/DIN EN 60947-1

Electrical data for control switch in accordance with DIN EN 60947-5-1	Rated operating voltage	AC 400 V
	Utilization category	AC-15 4 A 250 V
		AC-15 2 A 400 V
		DC-13 0.15 A 250 V
	Isolation voltage	400 V

Ambient temperature +40 °C

AC switching capacity

	ohmic load	inductive load $\cos \varphi = 0.6$
400 V	3 A	2 A
250 V	5 A	3 A
30 V	7 A	5 A

DC switching capacity

	ohmic load	inductive load L/R = 3 μ s
250 V	0.4 A	0.03 A
30 V	7 A	5 A

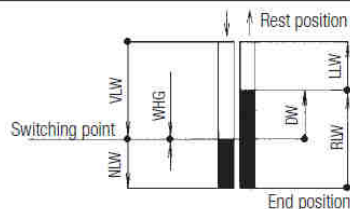
(further electrical data on request)

Tightening torque of fixing screws	0.6 Nm
Rating of gold-coated contacts	Voltage: min. 5 V/max. 30 V Current: min. 4 mA/max. 400 mA the product of voltage and current should not exceed 0.12 VA for alternating current these values have to be interpreted as peak values

Insert switch/limit switch



Contact Travels



Contact travels (in mm)

Pretravel	VLW	max. 0.9
Overtravel	NLW	min. 0.5
Differential value	DW	max. 0.45
Reset travel	RLW	0.9
No-load travel	LLW	0.1 bis 0.45
Repeat accuracy WHG (for repetitive actuation)		± 0.02

Service life

mechanical	>2 x 10 ⁶
electrical	dependent on load
max. switching rate	1000 operations/h

Switching actuation force

Single-break switch	max. 2.0 N
Double-break switch	max. 3.6 N

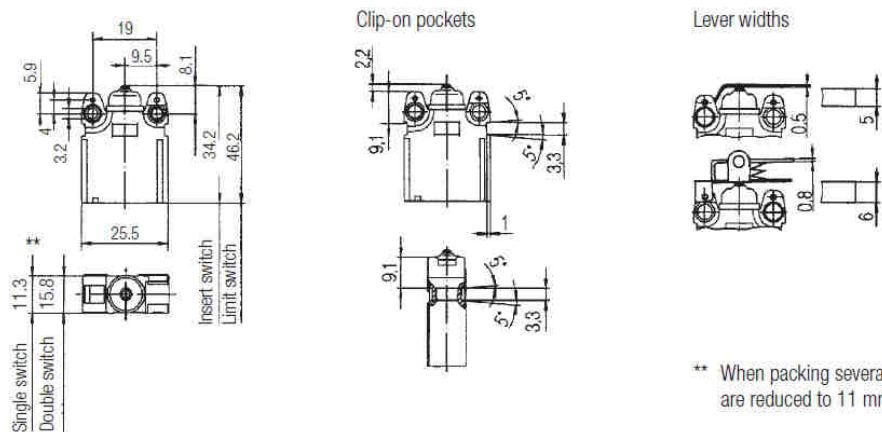
Reset force

Single-break switch	min. 0.4 N
Double-break switch	min. 0.8 N

Operating rate	≥ 10 μm/sec.
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Contact break distance	2 x ≥ 0.3 mm
Electrical connection	Insert switch cores 0.75 mm ² L07G-K/Radox Limit switch cable 0.75 mm ² H05VV-F/A05VV-F/ BETAflam other cores and cables on request
Conductor diameter	2-wire 6.1 ± 0.3 mm 3-wire 6.6 ± 0.3 mm 4-wire 6.7 ± 0.3 mm 6-wire 8.9 ± 0.3 mm
Contact element	snap-action contact element (double-break) as, normally-open, normally-closed, changeover contact as well as N/O + N/C contacts for circuits with equal potentials.
Contact material	Silver or gold-coated contacts (all contact elements have a standard protective gold-coating as standard)
Double-break switch (switch options)	simultaneous switch sequence: chamber I and II almost simultaneous defined switch sequence: chamber I switches mechanically safe 0.03 up to 0.3 mm before chamber II
Weight	Insert switch with 500 mm cores: single-break switch 35 g, double-break switch 70 g Limit switch with 3 m cable: single-break switch 210 g, double-break switch 415 g
Housing material	plastic (thermoplastics)
Plunger/additional actuator	stainless steel

Dimensions in mm



** When packing several switches, these dimensions are reduced to 11 mm resp. 15.5 mm

Technical data subject to change without notice.

Insert switch/limit switch



Selection chart Single-break switch

Type of contact	Code no.	Additional actuator*			
		Options	Code no.	Options	Code no.
	10	without additional actuator	00		44
			01		45
			02		46
	20		03		47
			04		48
			21		49
	30		22		61
			23		62
			24		63
			24		64
	40		41		66
			42		
			43		73

Complete order no.**

Please enter code number.

Technical data subject to change without notice.

07-□511-□□□□/□□□□

Length of connection cores

5 = 500 mm

Length of connection cable

3 = 3 m

Please specify greater lengths in plain text, code no. 0

() Code for connection cable

* Dimensions for additional actuator are reference values

** Standard product printing: ATEX and IECEx marking. Other international imprints obtainable on request. Please specify in plain text.

Insert switch with connection cores	1
Limit switch with connection cable	2

	Contact material	Ambient temperature (T _a)
1	Silver	-20 °C to +60 °C
3	Gold	-20 °C to +60 °C
5	Silver	-55 °C to +60 °C
6	Gold	-55 °C to +60 °C
7	Silver	-60 °C to +75 °C
8	Gold	-60 °C to +75 °C

6. Operating instruction cable glands

tightening torque **M20x1,5 mm = 10 Nm**

Betriebsanleitung · Operating instructions



PTB 11 ATEX 1007X

blueglobe HT Ex e

**Messing vernickelt/blank und
Edelstahl**

**Für Kabel- und Leitungseinführungen (KLE)
der Zündschutzart „Erhöhte Sicherheit – Ex „e“**

Anwendung:

Die Kabel- und Leitungseinführungen (KLEs) blueglobe HT Ex e dienen zur 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 muss der Zündschutzart „Erhöhte Sicherheit – Ex „e“ nach den Normen EN 60079-0:2012 + A11:2013, EN 60079-7:2015, EN 60079-31:2014 entsprechen.



Die KLE ist für Betriebsmittel mit dem Grad der mechanischen Gefahr „hoch“ nach EN 60079-0 geeignet. Bei ordnungsgemäßer Montage der KLE kann die Schutzart IP 66/68 nach IEC 529 oder EN 60529 erreicht werden.

Kennzeichnung:

Die Kabel- und Leitungseinführungen blueglobe HT Ex e entsprechen den Normen EN 60079-0:2012 + A11:2013, EN 60079-7:2015, EN 60079-31:2014. 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:



Kennzeichnung Zulassungsnummer und Kennzeichen der Prüfstelle:

  PTB 11 ATEX 1007X xx C E 0102

Kennzeichnung Gas:

  II 2G Ex e IIC Gb

Kennzeichnung Staub:

  II 2D Ex tb IIIC Db IP 66/68

Kennzeichnung extrem kleiner Bauteile*:

  II 2G/II 2D C E 0102

Weitere Zertifikate:

IECEX – IECEX PTB 11.0019X

EAC – RU C-DE.MLU06.B.00119

*Kennzeichnung auf Kabelverschraubung



PTB 11 ATEX 1007X

blueglobe HT Ex e

**brass nickel-plated, brass and stain-
less steel**

**For cable glands and cable entry systems (CG/CES) of the
ignition protective class Ex “e”**

Application:

The cable glands and cable entry systems (CG/CES) blueglobe HT Ex e are used to insert permanently laid 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 60079-0:2012 + A11:2013, EN 60079-7:2015 and EN 60079-31:2014. The CG/CES 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 66/68 according to IEC 529 or EN 60529 can be attained.

Designation:



The cable glands and cable entry systems (CG/CES) blueglobe HT Ex e conform with the standards EN 60079-0:2012 + A11:2013, EN 60079-7:2015, EN 60079-31:2014. 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:



ID of approval no. and ID of testing authority:

  PTB 11 ATEX 1007X xx C E 0102


Designation gas:

  II 2G Ex e IIC Gb

Designation dust:

  II 2D Ex tb IIIC Db IP 66/68

Designation of extremely small components*:

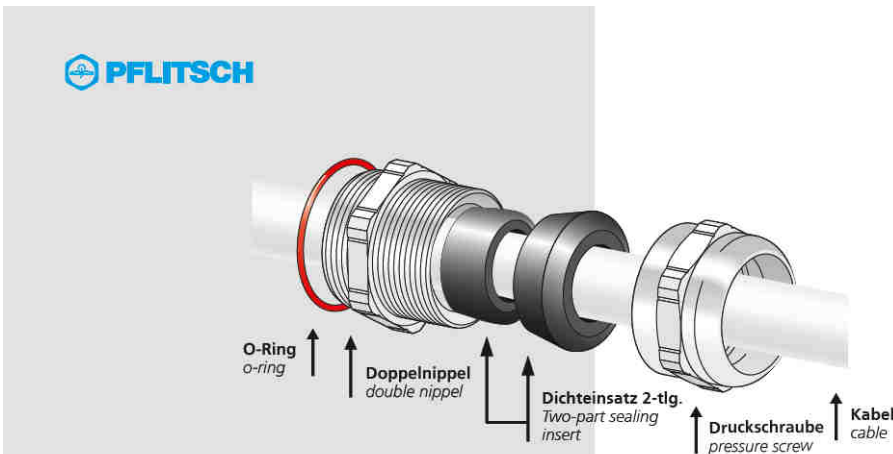
  II 2G/II 2D C E 0102

ID of Approval IECEX:

IECEX – IECEX PTB 11.0019X

EAC – RU C-DE.MLU06.B.00119

*Designation on cable gland



Montage

Als Montagewerkzeug kann der PFLITSCH Steckschlüssel M28 verwendet werden.

Einsatztemperaturbereich:

Temperaturbereich Silikon: -55 °C bis +160 °C

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 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!

Demontage:

Die Demontage erfolgt in umgekehrter Reihenfolge.

Instandhaltung:

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

Assembly

The PFLITSCH socket spanner M28 can be used as a tool

Application temperature range:

Temperature range silicone: -55 °C bis +160 °C

Minimum wall thicknesses

- 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 CG/CES are 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!

Disassembly:

Disassembly is carried out in the reverse order.

Maintenance:

The CG/CES are to be included in the inspection and maintenance of the electrical operating material.

Anschlussmaße für Durchgangsbohrungen:

Metrisch/metric	M12	M16	M20	M25	M32	M40			
d [mm] 0/+ 0,3	12,0	16,0	20,0	25,0	32,0	40,0			

Connection dimensions for throughholes:

Anzugsmomente:

Gewinde/Thread	M12	M16	M20	M25	M32	M40			
Nm	5	8	10	15	15	20			

Tightening torques:

Mechanische Festigkeit:

Gewinde/Thread	M12	M16	M20	M25	M32	M40			
Joule	7	7	7	7	7	7			

Mechanical strength:

2 · Betriebsanleitung 1007X bg HT Ex-e/Operating instruction 1007X bg HT Ex-e

7. Applicable standards

EN 60079-0: 2018

Explosive atmospheres - Part 0: Equipment - General requirements

EN 60079-1: 2015

Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"

EN 60079-7: 2016

Explosive atmospheres - Part 7: Equipment protection by increased safety "e"

EN 60079-31: 2016

Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"