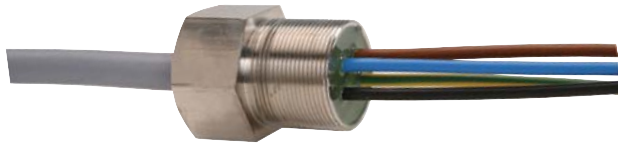


ATEX Cable Entries, Line Bushings DATASHEET

JUNHO 2013

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Cable entries

Features

- Ex e terminal boxes are dispensed with
- Suitable for cables with 1 to max. 25 cores
- Sleeves from M16 x 1.5 to M48 x 1.5
- Compact, space-saving design
- The cores are connected directly to the electrical load at the Ex d side, intermediate terminal positions are dispensed with
- Rated insulation voltage of up to 1000 V for small dimensions
- For Ex i circuits with blue cables
- Permanent heat resistance up to +110 °C

Description

Flameproof Ex d cable entries are elements which allow electrical cables to be introduced into an Ex d enclosure, without danger of explosion.

The additional Ex e terminal housing is not required. A main distribution box may be used or the connections can be made outside the Ex-zone.

The cable entry consists of a threaded metal sleeve, in which a sheathed cable is anchored and encapsulated. The individual cores are then connected directly inside the flameproof enclosure. The length of cores and cables are customer-tailored. All cables come with standard green-yellow earth leads. The length of engaged thread between the sleeve and the flameproof "d" enclosure must comply with DIN EN 60079-0: 2006 and DIN EN 60079-1.

The cable entry is normally inserted from the inside of the flameproof enclosure. A special version can be supplied for insertion from the outside, provided that removal is possible with a special tool only. After installation, the cable entry must be protected against turning and loosening, corresponding recommendations can be found under accessories.

All line bushings have been certified by the Federal Physical-Technical Institute in accordance with the European standards DIN EN 60079-0 and DIN EN 60079-1 concerning electrical operating equipment for hazardous areas for above-ground (II) and underground (I) according to ATEX.

When the 94/9/EC guideline comes into force on 01/07/2003, explosion protected operating equipment must be properly installed in accordance with DIN EN 60079-14.

Among other things, section 10.4.2 requires that cast, pressure-proof cable insertions according to DIN EN 60079-1: 2007 are used for operating equipment with an internal ignition source for the explosion sub-group IIC and operating equipment with an enclosure volume greater than 2 dm³ in Zone 1.

BARTEC offers a wide range of products with EC model test certification.

**Explosion protection**

Version	Standard	Ex protection type	Certification
Cable entry screwable	EN 60079-0 and EN 60079-1	Ex II 2G Ex d IIC T6/T4	PTB 97 ATEX 1079 X
Cable entry pluggable	EN 60079-0 and EN 60079-1	Ex II 2G Ex d IIC T6/T4	PTB 03 ATEX 1197 U

Electrical data

Nominal voltage	Cable	Cross section in mm ²	Threaded sleeve	Max. on-site temperature
300 V/500 V	H05RR-F H05RN-F	0.75 to 2.5	M16 x 1.5 to M 48 x 1.5	+60 °C
300 V/500 V	H05GG-F, Radox 125 Radox 155	0.75 to 6	M16 x 1.5 to M 48 x 1.5	+110 °C
300 V/500 V	Ölflex, H05VV-F	0.75 to 2.5	M16 x 1.5 to M 48 x 1.5	+70 °C
250 V	LiYY, LiYCY, Ölflex - EB (for intrinsically safe circuits)	0.5 to 2.5	M16 x 1.5 to M 48 x 1.5	+70 °C
450 V/750 V	H07RN-F A07RN-F	1.0 to 150	M24 x 1.5 to M 48 x 1.5	+60 °C
450 V/750 V	H07RN-F (Ozoflex-Plus)	1.5 to 90	M24 x 1.5 to M 48 x 1.5	+90 °C
1000 V	NSSH0u	1.5 to 120	M24 x 1.5 to M 48 x 1.5	+80 °C

Min. ambient temperature -55 °C. **Max. ambient temperature** depends on the conductor.

Core length: on request

Cable length: on request

Core marking:
in accordance with current standards

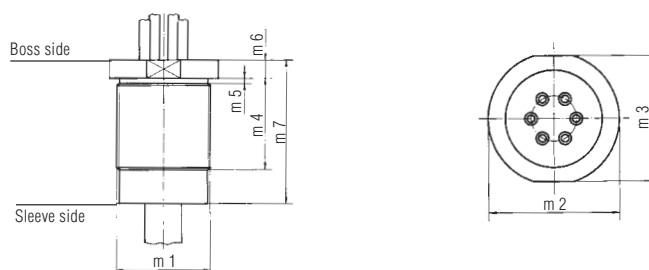
Other cables:
e.g. shielded or blue cable for intrinsically safe
circuits on request.



Selection chart cable H05RN-F or H05RR-F

Number of cores	Conductor cross section mm ²	Current carrying capacity (A) in continuous operation (rel. values) ¹⁾ Maximum on-site temperature +60 °C	Thread size	
3 5	0.75 0.75	9.5 A	M16 x 1.5 M24 x 1.5	
3 5	1.5 1.5	15 A	M24 x 1.5 M24 x 1.5	
3 5	2.5 2.5	20 A	M24 x 1.5 M36 x 1.5	

Dimensions for 300/500, 450/750 V, 1000 V in mm



m 1	m 5	m 6	m 4	m 7	m 2	m 3
M16 x 1.5	max. 2.5	5	30	46	Ø 21	AF 19 (lock nut)
M24 x 1.5	max. 2.5	5	30	46	Ø 29	AF 27 (lock nut)
M36 x 1.5	max. 2.5	7	35	55	Ø 42	AF 40
M48 x 1.5	max. 2.5	10	35	75	Ø 55	AF 52

¹⁾ When determining the maximum current carrying capacity of the cores, their self-heating and enclosure heating on site at maximum ambient temperature must be taken into consideration. **Other fittings and special sleeves on request.**



Selection charts

Ex d cable entries 300/500 V - cable H05VV-F or A05VV-F, Ölflex

Number of cores	Conductor cross section mm ²	Current carrying capacity (A) in continuous operation (rel.values) ¹⁾ Maximum on-site temperature +70 °C	Thread size kept in stock in bold types	
3 6 15 25	0.75 0.75 0.75 0.75	9.5 A	M16 x 1.5 M24 x 1.5 M36 x 1.5 M48 x1.5	
2 6 14 25	1.5 1.5 1.5 1.5	15 A	M16 x 1.5 M24 x 1.5 M36 x 1.5 M48 x 1.5	
3 7 18	2.5 2.5 2.5	20 A	M24 x 1.5 M36 x 1.5 M48 x 1.5	

Ex d cable entries 450/750 V - cable H07RN-F or A07RN-F

		Maximum on-site temperature +60 °C		
5 7	1.5 1.5	15 A	M24 x 1.5 M36 x 1.5	
3 7 19	2.5 2.5 2.5	20 A	M24 x 1.5 M36 x 1.5 M48 x 1.5	
5	4	27 A	M36 x 1.5	
5	6	35 A	M36 x 1.5	
5	10	49 A	M48 x 1.5	
5	16	65 A	M48 x 1.5	
1	25	103 A	M36 x 1.5	
1	35	126 A	M36 x 1.5	
1	50	157 A	M36 x 1.5	
1	70	195 A	M36 x 1.5	
1	95	232 A	M48 x 1.5	
1	120	274 A	M48 x 1.5	
1	150	311 A	M48 x 1.5	

Ex d cable entries 1000 V - cable NSSHÖU

		Maximum on-site temperature +80 °C		
5 10	1.5 1.5	20 A	M24 x 1.5 M36 x 1.5	
3 7 19	2.5 2.5 2.5	27 A	M24 x 1.5 M36 x 1.5 M48 x 1.5	
5	4	36 A	M36 x 1.5	
4 5	6 6	47 A	M36 x 1.5 M48 x 1.5	
5	10	65 A	M48 x 1.5	
5	16	87 A	M48 x 1.5	
1	25	137 A	M36 x 1.5	
1	35	168 A	M36 x 1.5	
1	50	210 A	M36 x 1.5	
1	70	260 A	M36 x 1.5	
1	95	310 A	M48 x 1.5	
1	120	365 A	M48 x 1.5	

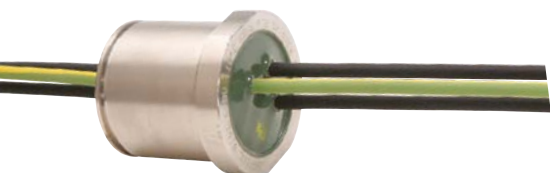
¹⁾ When determining the maximum current carrying capacity of the cores, their self-heating and enclosure heating on site at maximum ambient temperature must be taken into consideration. **Other fittings and special sleeves on request.**



Line bushings



*multi-core
with threaded sleeve*



*multi-core
with cylindrical sleeve*



*4-pole or 6-pole
with terminals*

Features

- Space-saving construction as many single cores are gathered in one single sleeve thus requiring only one cable entry hole.
- As all 6 cores are brought out, direct Y-switching. Is also possible on the motor terminal board of Ex d motors.
- Motor mains and thermoprotection cables can be exited in **one** common sleeve.
- Numbered cores simplify connections and eliminate the usual "Ring out" in larger control systems.
- On the Ex d side, the cores are connected directly to the electrical load, intermediate terminals are no longer necessary.
- Small dimensions allow a rated insulation voltage of up to 3 kV
- Blue cores for Ex i low power circuits
- Permanent heat-resistance of the cores up to +110 °C

Description

A line bushing is a component for the electrical connection between a flameproof "d" enclosure and an increased safety "e" terminal box. The bushing consists of a threaded or non-threaded metal sleeve encapsulating one or more cores providing a flameproof barrier. The lengths of these leads vary according to their applications.

The depth of engagement of the threaded sleeves and the joint length of the cylindrical sleeve in the wall of the "d" enclosure must correspond to the EN 60079-0 and EN 60079-1 standards.

After installation the bushing must be protected against rotation and accidental loosening. Recommendations are given under "Accessories". Our standard bushings come with threaded sleeves from M10 to M48 or with cylindrical sleeves. They are equipped with cores with a 0.2 to 95 mm² csa. and approved for nominal voltages between 250 V and 3 000 V. See also table "Electrical data".

For the connection of intrinsically safe circuits in the "d" area with the terminal strip in the connection compartment we provide **line bushings with blue cores for "i" low power circuits.**

Another product of our line-bushing range is the bushing with terminals. Combining Ex d line bushing with an Ex e terminal we designed an element which is hardly any bigger than a normal line bushing. This bushing plus terminals reduces the size of the terminal box and, at the same time, the installation costs. The bushings plus terminals are rated for 690 V and 1 000 V and PTB-certified. We supply them with 2 to 6 poles and threaded sleeves from M 24 to M 42.

All line bushings have been PTB and BVS tested and certified for their use in hazardous areas according to the European standards EN 50014, EN 50018, EN 50019. BARTEC also has numerous other international approvals for these line bushings.

All line bushings have been certified by the Federal Physical-Technical Institute in accordance with the European standards EN 60079-0, EN 60079-1 and EN 60079-7 concerning electrical operating equipment for explosion-endangered areas for above-ground (II) and underground (I) according to ATEX. BARTEC has furthermore obtained several foreign admissions for these line bushings (FM, UL).

When the 94/9/EC guideline comes into force on 01/07/2003, explosion protected operating equipment must be properly installed in accordance with EN 60079-14.

Among other things, section 10.4.2 requires that **cast, pressure-proof cable insertions according to EN 60079-1 are used for** operating equipment with an internal ignition source for the explosion subgroup IIC and operating equipment with an enclosure volume greater than 2 dm³ in zone 1.

BARTEC offers a wide range of products with EC type test certification.



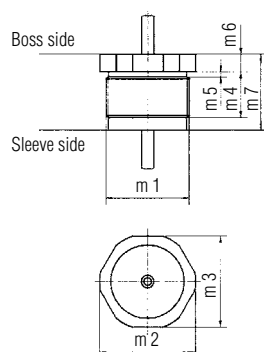
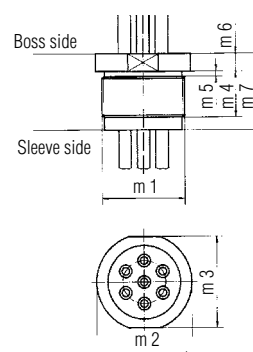
Line bushings in the
Ex e terminal box



Connection side of the
line bushing with terminals

Explosion protection		
Standard	Ex protection type	Certification
EN 60079-0 and EN 60079-1 UL 886, UL 2279; Class I, Zone 1 Class I, Group A, B, C, D Class II, Group E, F, G FMRC - 3615, -3600, -3810	<div> <div>II 2G Ex d II</div> <div>I M2 Ex d I</div> <div>Ex d II, Ex d I</div> <div>AEx d IIC</div> <div> <div>us</div> <div>us C</div> </div> <div>FM</div> </div>	Electrical bushings Type 07-91../.... PTB 97 ATEX 1047 U IECEx PTB 06.0093 U E225236 J.I.1Q5A5.AE
EN 60079-0 and EN 60079-1	<div>II 2G Ex de II</div> <div>I M2 Ex de I</div>	Fibre-optic cable bushings Type 57-91../.... PTB 99 ATEX 1090 U
EN 60079-0, EN 60079-1 EN 60079-7 and EN 60079-26	<div>II 1G Ex de II</div> <div>I M1 Ex de I</div> <div>Ex de II, Ex de I</div>	Bushings for Zone 0, Type 07-96../.... PTB 00 ATEX 1116 U IECEx PTB 06.0061U
EN 60079-0, EN 60079-1, EN 60079-7	<div>II 2G</div> <div>I M2 Ex de I</div>	Line bushings with terminals Type 07-93../.... PTB 00 ATEX 1034 U
IEC 60079-0: 2004, IEC 60079-1: 2001, IEC 60079-7: 2001	Ex de II, Ex de I	IECEx PTB 06.0035U
Min. ambient temperature: Depends on the conductor used, down to -55 °C		

Electrical data				
Nominal voltage	Cores	Cross section in mm²	Threaded sleeve	Max. on-site temperature
250 V	H05V-K/Radox H07V-K	0.25 to 1.5	M 10 x 1 to M 42 x 1.5	+70 °C/+110 °C
690 V	H07G-K/Radox	0.25 to 70	M 10 x 1 to M 42 x 1.5	+110 °C/+110 °C
1 000 V	NSGAFöu/Radox	1.5 to 95	M 16 x 1 to M 42 x 1.5	+90 °C/+110 °C
3 000 V	NSGAFöu	1.5 to 95	M 24 x 1.5 to M 42 x 1.5	+90 °C
for intrinsically safe circuits				
250 V	H05V-K, blue H07G-K, blue	0.5 to 1.5	M 10 x 1 to M 42 x 1.5	+70 °C/+110 °C
Line bushings with terminals				
690 V	H07G-K	0.75 to 6	M 24 x 1.5 to M 42 x 1.5	+110 °C
1000 V	NSGAFöu/Radox	1.5 to 6	M 33 x 1.5 to M 42 x 1.5	+90 °C/+110 °C

**Dimensions** in mm**Dimensions** in mm

m1	m2	m3	m4	m5	m6
M10 x 1	13.5	12	16	1.5	5
M12 x 1.5	16.5	15	17	2.0	5
M16 x 1	21	19	17	1.5	5
M16 x 1.5	21	19	17	2.0	5
M24 x 1.5	29	27	19	2.0	5
M25 x 1.5	29	27	19	2.0	5

m1	m2	m3	m4	m5	m6
M33 x 1.5	Ø 38	36	18	2.0	7
M36 x 1.5	Ø 42	40	25	2.0	7
M38 x 1.5	Ø 40	37	24	2.0	8
M42 x 1.5	Ø 48	46	25	2.0	7

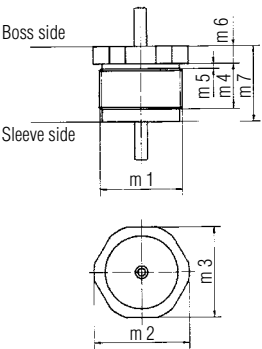
¹⁾ Maximum nominal voltage 275 V

²⁾ Maximum current carrying capacity of the cores on site depends on their own temperature and that of the enclosure at maximum ambient temperature.

Other equipment and special sleeves on request.

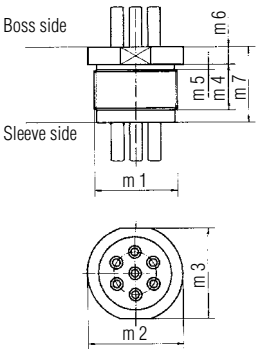


Dimensions in mm



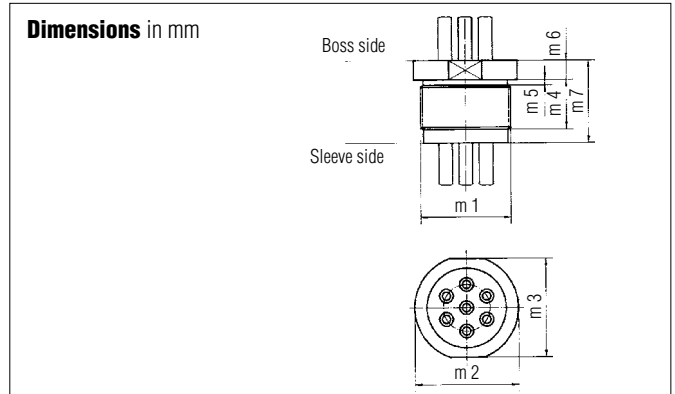
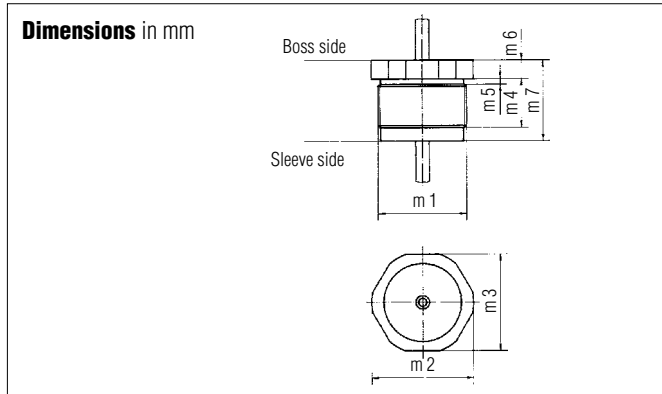
m1	m2	m3	m4	m5	m6
M16 x 1	21	19	22	1.5	5
M16 x 1.5	21	19	22	2.0	5
M24 x 1.5	29	27	22	2.0	5
M25 x 1.5	29	27	35	2.0	5

Dimensions in mm



m1	m2	m3	m4	m5	m6
M33 x 1.5	Ø 38	36	25	2.0	7
M36 x 1.5	Ø 42	40	25	2.0	7
M38 x 1.5	Ø 42	40	25	2.0	8
M42 x 1.5	Ø 48	46	25	2.0	7

¹⁾ Maximum nominal voltage 1 100 V
²⁾ Maximum current carrying capacity of the cores on site depends on their own temperature and that of the enclosure at maximum ambient temperature.
³⁾ Thread size M25 x 1.5 - dimensions m 7 = 46 mm
Other equipment, core combinations and special sleeves on request.



¹⁾ Maximum nominal current 3 300 V

²⁾ Maximum current carrying capacity of the cores on site depends on their temperature their own self heating and that of the enclosure at maximum ambient temperature.

³⁾ Thread size 25 x 1.5 - Dimensions m 7 = 46 mm

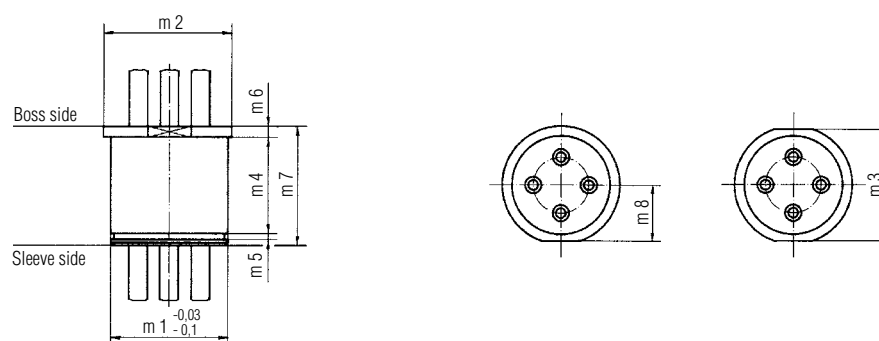
Other equipment, core combinations and special sleeves on request.



Line bushings 690 V¹⁾ with cylindrical sleeves

BARTEC

Dimensions in mm



Joint length L	m 1	m 2	m 3	m 4	m 5	m 6	m 8
15 mm	Ø 22	Ø 25	-	16.1	1.3	2	11.1 + 0.2
25 mm	Ø 22	Ø 25	-	26.1	1.3	2	11.1 + 0.2
25 mm	Ø 32	Ø 36	-	26.1	1.6	3	17.1 - 0.2
25 mm	Ø 36	Ø 42	SW 40	28.1	1.85	7	-

Other cross sections on request.

¹⁾ Maximum nominal voltage 750 V

²⁾ Maximum current carrying capacity of the cores on site depend on their own temperature and that of the enclosure at maximum ambient temperature.

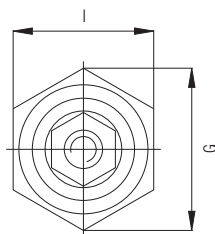


Bushing conductor studs

Features

- 16 A to 630 A
- 690 V, 1000 V and 1600 V
- Max. ambient temperature 130 °C
- Different types of terminals
- Standard thread M16 x 1.5 to M42 x 1.5

Dimensions



Description

A bushing conductor stud is a component with which the electrical connection between an enclosure in type of protection "Flameproof enclosure d" and its connection enclosure in type of protection "Increased Safety e" is established.

The cable bushing includes a threaded metal sleeve, a ceramic insulation, terminals and a stud.

Standard threaded sleeves from M16 to M42 are included in the delivery of bushing conductor studs.

The diameter of the stud depends on current and the terminal size on the cable diameter.

Thanks to different types of terminals, vertical as well as horizontal cable connection is possible. Special terminals are available on request.

After installation, the bushing conductor stud needs to be secured by means of a nut or adhesive to prevent self-loosening.



➤ Explosion protection

Ex protection type

⊕ Ex II 2G Ex de IIC Gb
⊕ Ex I M2 Ex de I Mb

Certification

PTB 04 ATEX 1099 U

Ambient temperature at place of installation

-50 °C to +130 °C

➤ Technical data

Protection class

EN 60079-0: 2009; EN 60079-1: 2007

Material

Insulation ceramic, C610

Stud

16 A to 250 A CuZn39Pb2

400 A to 630 A E-Cu

Current

16 A to 630 A

Voltage

690 V, 1000 V and 1600 V

Connection

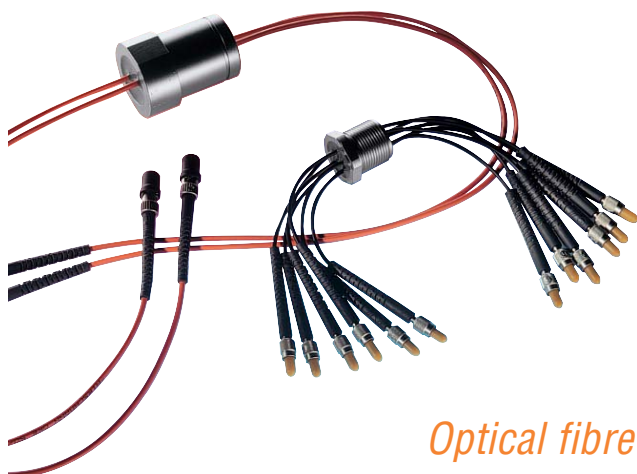
1.5 mm² to 300 mm²

Stud size

4 mm to 20 mm

Thread size

M16 x 1.5 to M42 x 1.5



Optical fibre bushings

Features

- Fast, interference free transmission of data in both directions
- Not affected by electromagnetic interference
- High transmission reliability
- High transmission speed
- Corrosion-free contacts
- Simple plug-in connection (low installation costs)
- Reliable signal transmission even over long distances
- Suitable for use under extreme conditions

Description

The optical fibre bushing is used as an optical fibre cable entry into flameproof enclosures located in hazardous areas. They can also be supplied with plug-in connectors.

The optical waveguiders - also known as fibres - are made of glass and resist to mechanical, climatic, chemical and electromagnetic influences. The optical waveguide is most commonly used for carrying signals in the form of electromagnetic waves in the frequency range of visible light.

The type and structure of the cable determines its transmission properties.

Explosion protection

Ex protection type

- Ex II 2G Ex d II
- Ex I M2 Ex d I

Certification

PTB 99 ATEX 1090 U

Technical data

Power limit

max. 5 mW/mm²

No. of optical waveguides

max. 16 fibres

Temperature against the optical fibre

max. +60 °C to +90 °C
-5 °C to +80 °C

Depending on the selected optical waveguide, the enclosure heating at the installation site at a max. ambient temperature has to be assumed when determining the maximum temperature.

Type and size of thread

M16 x 1.5 to M48 x 1.5

Installation instructions

Threaded entries for threaded bushings must conform to the minimum requirements of EN 60079-0 section 5.3. These optical fibre line bushings are suitable for installation in electrical flameproof enclosure devices of protection type "d", groups IIA, IIB, IIC.

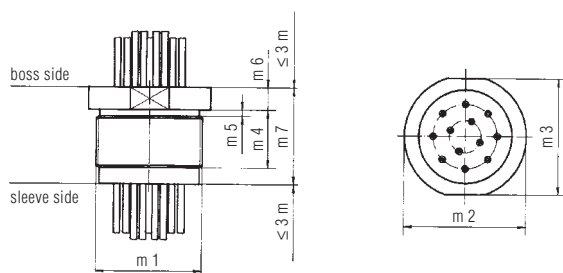
Note

The bushings must be secured against turning or loosening.



Dimensions								
Type		m1	m2	m3	m4	m5	m6	m7
Threaded	57-910.-...7	M48 x 1.5	Ø 55	52	30	2.0	7	50
	57-910.-...6	M42 x 1.5	Ø 48	46	25	2.0	7	35
	57-910.-...5	M38 x 1.5	Ø 42	40	25	2.0	7	35
	57-910.-...4	M36 x 1.5	Ø 42	40	25	2.0	7	35
	57-910.-...3	M33 x 1.5	Ø 38	36	18	2.0	7	30
	57-910.-...2	M24 x 1.5	Ø 29	27	19	2.0	5	26
	57-910.-...D	M16 x 1.5	Ø 21	19	17	1.5	5	25

Dimensions threaded



Complement		
Cable version		optical waveguide cable* 50/125; 62,5/125; 200/230
Type		max. number of cores
Threaded	57-910.-...7	16
	57-910.-...6	12
	57-910.-...5	8
	57-910.-...4	8
	57-910.-...3	6
	57-910.-...2	4
	57-910.-...D	1



Electrode line bushing



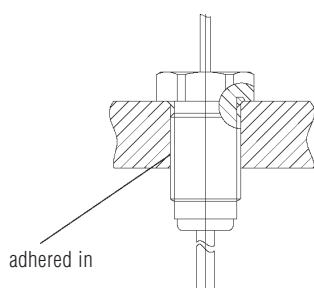
Description

Waste water pumps can be fully submersible units. The pump assembly and motor are often separated from each other by an oil fore-chamber sealed by mechanical seals. Any leaks in the shaft seals need to be registered in order to prevent malfunctions or failure of the motor and to arrange for inspections in good time.

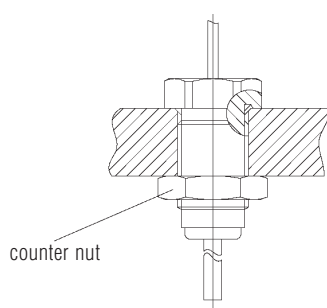
BARTEC's electrode line bushings Ex + sealed allow signals to be reliably transmitted through the walls of pressure-proof enclosed operating equipment, even in areas in which an explosion hazard exists.

Only electrical circuits certified as intrinsically safe may be connected to the electrode line bushing.

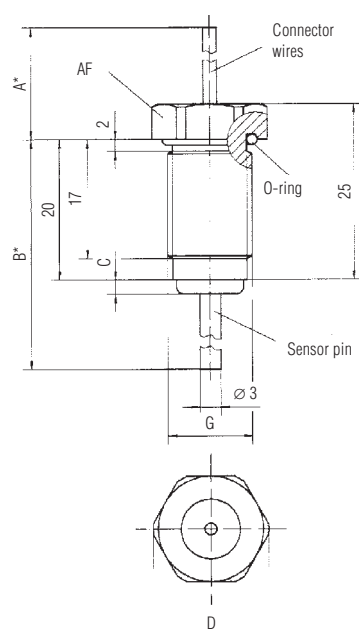
Example application



Example application



Dimensions



See table for standard lengths,
other lengths on request

Safety notice

Electrode line bushings that are damaged must be replaced. The electrode line bushing must be secured against twisting and self-loosening.

Explosion protection

Ex protection type

Ex I M2/II 2G Ex d I/II
◀FM▶

Certification

PTB 02 ATEX 1061 U
FMRC J.I. 1Q5A5AE

Ambient temperature at point of installation

to +70 °C resp. +110 °C

Technical data

Protection class

Ex d I; Ex d II

Material

Sleeve	Brass nickel-plated or stainless steel
Gauge	Brass or stainless steel
Thread	M10 x 1; M12 x 1; M16 x 1.5 others on request

Pressure on the Ex e side

≤ 6 bar

Rated insulation voltage

≤ 30 V

Rated constant current

≤ 1 A

Connection method

Cable wires 0.5 to 1.5 mm²



Bushing



Features

- Sleeve size M10 to Ø 250
- Cross-sections for 0.06 mm² or 185 mm²
- Ex d and pressure-sealed
- -55 °C to +150 °C
- Number of connection options

Description

These bushings II 1G in the series 07-96... serve not only as the electrical connecting element between a pressure-proof encapsulated enclosure and a housing in another recognised method of protection, but also as a gas diffusion-proof separating element to zone 0 (IG/IIG).

The core piece of this gas diffusion-proof lead-through is a metal plate in which the stud-type bushings are insulated with glass. The electrical connection on both sides of the lead-through can be set forth with metal duct bolts, cable wires or hose lines as required.

This connecting area is, or can additionally be, cast with a poured resin.

The connector studs, connecting wires or the hose line of the line bushing II 1G must be connected in enclosures which conform to a type of protection standardised according to DIN EN 60079-0.

The lead-through is compliant with the pertinent DIN EN 60079-0, DIN EN 60079-1 and DIN EN 60079-7 and DIN EN 60079-26 standards.

Explosion protection

Ex protection type

- Ⓔ II 1G Ex de II
- Ⓔ I M1 Ex de I

Certification

PTB 00 ATEX 1116 U
IECEx PTB 06.0061 U

Temperature during nominal operation

T_a -55 °C to +150 °C
(depending on the type of cable)

Technical data

Protection class

IEC 60529/EN 60529
without encapsulating IP 00

Material

Sleeve	metal
Insulator	glass
Pour	EP resin, PU resin
Bushing bolt	FeNi alloy steel, Niro steel

Rated insulation voltage

≤ AC 50 V/DC 75 V, 250 V, 690 V, 1 000 V

Rated uninterrupted current up to 200 A

Connection line 0.25 bis 6.0 mm²

Diameter flange Ø 10 mm to 250 mm

Thread size M10 x 1 to M72 x 1.5



Flameproof Enclosures

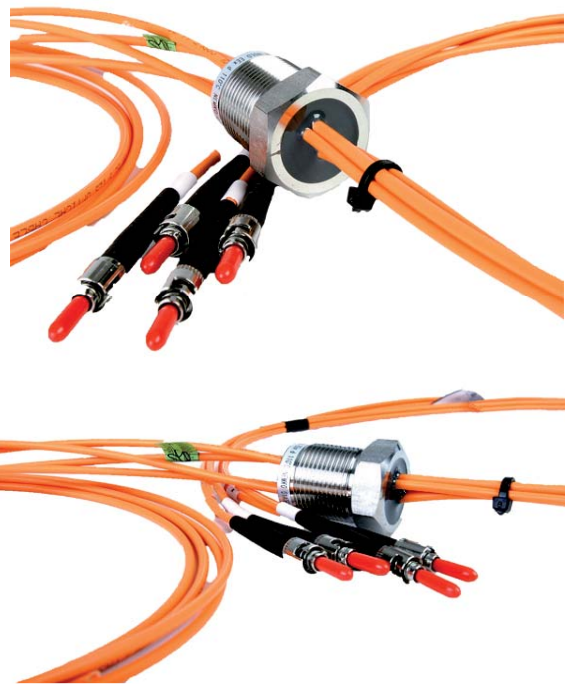
TNDLD (Fiber)

BARTEC **TECHNOR**

The TNDLDF range of fibre optic line bushings are designed as components for use in all Ex de enclosures to pass connection between the Ex d and Ex e compartment in combination Ex de enclosures. The TNDLDF is manufactured to order and can accommodate multiple fibre cores or a combination of fibre, wire conductor and coaxial cables.

Specifications

Material	Acid resistant Stainless steel AISI 316L
Temperature	
TNDLD/TNDLDC/ TNDLDE	-20°C to +76°C
Approvals	
- ATEX	NEMKO-01-ATEX-471U
- IECEx	IECEx NEM 09.0012U
Standards	EN/IEC: 60079-0, 60079-1
Ex-Code	Ex d II C Ex II 2 G and EPL Gb
Surface treatment	Machine treated
Rated voltage	Max 1000V
Options	Other lengths, colours and connectors upon request
Note:	Special conditions according to IEC/EN 60079-28 may apply for Zone 1/Gb



Ex d Fibre bushings, -20°C - +76°C

Type	Number of fibres	Fibre type	Thread size	Fibre length in mm Ex e / Ex d	Connector
TNDLDF 1X62.5/125	1	62.5/125	M24	750/750	ST
TNDLDF 2X62.5/125	2	62.5/125	M24	750/750	ST
TNDLDF 4X62.5/125	4	62.5/125	M24	750/750	ST

Ex d Multi fibre / line bushings, -20°C - +76°C

Type	Number of fibres	Fibre type	Thread size	Fibre/wire length in mm Ex e/Ex d	Connector	Number of cores	Wire size mm ²	Rated current A with T-amb 60°C
TNDLDF 4X62.5/ 125+10x0.75	4	62.5/ 125	M42	750/750	ST	10	0.75	9
TNDLDF 4X62.5/ 125+10x1.5	4	62.5/ 125	M42	750/750	ST	10	1.5	14



Flameproof Enclosures

TNDLD

BARTEC TECHNOR

The TNDLD range of line bushings are designed as components for use in all Ex de enclosures to pass connection between the Ex d and Ex e compartment in combination Ex de enclosures. The TNDLD is available in a wide range of standard configurations and can also be manufactured to order for custom or hybrid bushing requirements.

Specifications

Material	Acid resistant Stainless steel AISI 316L
Temperature	
TNDLD/TNDLDC/ TNDLDE	-40°C to 110°C
Approvals	
- ATEX	NEMKO-01-ATEX-471U
- IECEx	IECEx NEM 09.0012U
Standards	EN/IEC: 60079-0, 60079-1
Ex-Code	Ex d II C Ex II 2 G and EPL Gb
Surface treatment	Machine treated
Rated voltage	Max 1000V
Colour	Standard black or blue wires
Type of wire	Radox 125 halogen free 1250
Options	Other lengths and colours upon request



Type	Number of cores	Wire size mm ²	Thread size	Wire lenght in mm Ex e / Ex d	Rated current A with T-amb 60°C
TNDLD 4x0,75	4	0,75	M24	1000/1000	12
TNDLD 6x0,75	6	0,75	M24	1000/1000	11
TNDLD 12x0,75	12	0,75	M42	1000/1000	8
TNDLD 16x0,75	16	0,75	M42	1000/1000	8
TNDLD 21x0,75	21	0,75	M42	1000/1000	7
TNDLD 4X1,5	4	1,5	M24	1000/1000	19
TNDLD 6X1,5	6	1,5	M42	1000/1000	16
TNDLD 12X1,5	12	1,5	M42	1000/1000	13
TNDLD 16X1,5	16	1,5	M42	1000/1000	12
TNDLD 20X1,5	20	1,5	M42	1000/1000	11
TNDLD 4X2,5	4	2,5	M24	1000/1000	26
TNDLD 6X2,5	6	2,5	M42	1000/1000	23
TNDLD 12X2,5	12	2,5	M42	1000/1000	18
TNDLD 6x4	6	4	M42	1000/1000	31
TNDLD 6X6	6	6	M42	1000/1000	41
TNDLD 9X6	9	6	M42	1000/1000	37
TNDLD 3X10	3	10	M42	1000/1000	73
TNDLD 6X10	6	10	M42	1000/1000	59
TNDLD 3X16	3	16	M42	1000/1000	97
TNDLD 6X16	6	16	M42	1000/1000	79
TNDLD 3X25	3	25	M42	1000/1000	129
TNDLD 3X35	3	35	M42	1000/1000	163
TNDLD 3X50	3	50	M42	1000/1000	205
TNDLD 1X70	1	70	M42	1000/1000	372
TNDLD 1X95	1	95	M42	1000/1000	448
TNDLD 1X120	1	120	M42	1000/1000	523
TNDLD 1X185	1	185	M42	1000/1000	682

Ex d Line bushings blue, 1000V, -40°C - +110°C					
Type	Number of cores	Wire size mm ²	Thread size	Wire lenght in mm Ex e / Ex d	Rated current A with T-amb 60°C
TNDLD 6x0,75B	6	0,75	M24	1000/1000	11
TNDLD 16x0,75B	16	0,75	M42	1000/1000	8
TNDLD 21X0,75B	21	0,75	M42	1000/1000	7
TNDLD 4X1,5B	4	1,5	M24	1000/1000	19
TNDLD 6X1,5B	6	1,5	M42	1000/1000	16
TNDLD 12X1,5B	12	1,5	M42	1000/1000	13
TNDLD 20X1,5B	20	1,5	M42	1000/1000	11



Flameproof Enclosures

TNDLDE (Coax)

BARTEC **TECHNOR**

The TNDLDE range of line bushings are designed as components for use in all Ex de enclosures to pass connection between the Ex d and Ex e compartment in combination Ex de enclosures. The TNDLDE is designed to accommodate coaxial cables such as RG179 (50Ω) or can be manufactured to order for custom or hybrid bushing requirements.

Technical Data Construction

Centre conductor	Copper 2.25mm diameter
Dielectric	REX (Polyethylene cross-linked) 7.25mm diameter
Outer conductor	Copper, Silver plated, braid, 95%, 8.15mm diameter
Jacket	RADOX (LSFH), RAL 9005 – bk 10.3mm ±0.1
Print	HUBER+SUHNER GX 07272 50W (PA no.)

Electrical Data

Impedance	50W ±2
Max. Operating frequency	2 GHz
Capacitance	101 pF/m
Velocity of signal propagation	66 %
Signal delay	5.03 ns/m
Insulation resistance	>1 x 108MWm
Min. screening effectiveness	>41 dB (up to 2 GHz)
Max. operating voltage	5 kVrms (at sea level)
Test voltage	10 kVrms (50Hz/1 min)

Mechanical Data

Weight	16.1 kg/100 m
Min. bending radius	Static 55 mm
	Dynamic 154 mm

Environmental Data

Temperature range	-40°C to 110°
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Ex d Coax bushings, 50W, -40°C- +110°C										
Type	Number of coax	Coax type	Thread size	Coax length in mm Ex e/Ex d						
TNDLDE1x50	1	RG213U, 50Ω	M24	1000/1000						
TNDLDE2x50	2	RG213U, 50Ω	M24	1000/1000						
Ex d Multi fibre / Coax / line bushings, -20°C- +76°C										
Type	Number of fibers	Fiber type	Thread size	Conductor length in mm Ex e/Ex d	Connec-tor	Number of Coax	Coax type	Number of cores	Core size	Rated current [A] @Tamb 60°C
TNDLDF 2x62.5/125+ 10x0.75+2x50	2	62.5/125	M42	750/750	ST	2	RG213U, 50W	10	0.75	9



Bushings and cable entries, pressure and vacuum sealed

Features

- Economical, due to high packing density
- Space-saving, due to internal thread
- Fast installation with the small flange versions
- Corrosion-resistant due to high-quality sleeve material
- Bushing stems with suitable thermo material to ensure unimpaired signals from thermal sensors
- Wide temperature range from
-25 °C to +100 °C or
-70 °C to +150 °C

Description

Cable entries are a means of running electrical cables into enclosures and preserving a secure seal at the point of entry.

The standard version IP 68 is suitable for use in environments from 10^{-6} mbar to 63 bar over-pressure. Depending on the pressure and the medium to be sealed you can choose between two temperature ranges:

-25 °C to +100 °C
-70 °C to +150 °C

Depending on the pressure at the cable entry and the medium it must to be sealed, there are versions for up to 1000 bar. BARTEC IP 68 cable entries not only provide sealed cable sheath but also protected wire strands.

BARTEC cable entries basically consist of a sleeve fitted around resin encapsulated cables and conductors. Even the standard version satisfies most of the requirements for a seal made by modern process technologies. Higher demands are better met by versions with for $< 10^{-6}$ mbar and > 63 bar.

The BARTEC bushings have been tested with oil at 2000 bar.

Single-core non-sheathed cable

Technical data

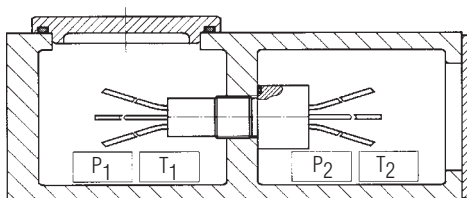
Temperature range
-70 °C to +150 °C

Pressure
up to 200 bar

Vacuum
10⁻⁶ mbar

Protection class
IP 65 to IP 68

Single-core non-sheathed cable



P₁ ≠ P₂
T₁ ≠ T₂

Cable Entries

Technical data

Temperature range
-70 °C to +150 °C

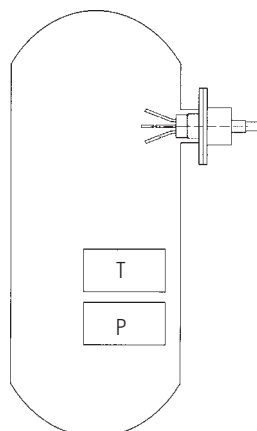
Pressure
up to 200 bar

Vacuum
10⁻⁶ mbar

Protection class
IP 65 to IP 68

Materials
nickel-plated brass
stainless steel
1.4305 or 1.4571

Cable Entries



Applications

Sealed electric distribution boxes; hydraulic plants; nuclear power plants; climatic chambers; nuclear engineering; pneumatic plants; split cage motors; submersible pumps; drying kilns; impregnation plants; vacuum presses; vacuum furnaces.

Electrical versions

The standard versions have cables with flexible cores of a 0.5 mm² to 35 mm² cross section. Larger and smaller cross sections are available on request.

Depending on version, fittings, temperature range and core insulation, a voltage range of up to 10 000 V is possible.

IP 68 versions used in temperature measurement circuits, the bushing stems are made of material with appropriate thermal characteristics.

Versions and dimensions

The standard threaded sleeve can be screwed into thread sizes from M24 x 1.5 to M50 x 1.5. Other dimensions and special threads such as NPT and Witworth pipe threads can be supplied on request. Versions with a plug-in flange can also be supplied.

The accommodation of several cables, which may have different core cross sections, in a common sleeve allows compact, dimensioning and economic constructions. Cables with up to 45 cores with cross sections of 0.5 mm² can be put in an M50 x 1.5 sleeve.

For versions with long cables, the screw-in solution is not the most advantageous. Here the plug-in versions with mounting flange considerably facilitate installation. The flange may be made to customer specifications.

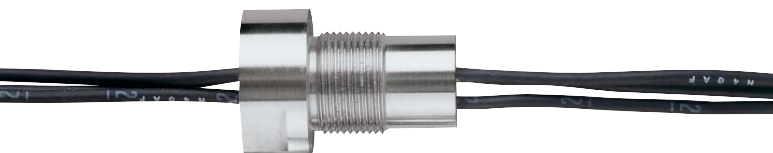
Insulation materials

BARTEC insulates with highly filled epoxy resins. Different formulations are used for the various pressure and temperature ranges.

The BARTEC epoxy casting material is characterized by its low outgassing. These material have been used most successfully for many years in industrial vacuum engineering. Their maximum baking temperature of +150 °C – depending on the material used – make them an ideal solution for almost all industrial applications.

The standard sealing washer is made of VITON. For special application, VITON-FEP-sheathed O-rings can be used. Also available are silicone sealing washers.

The versions for higher sealing requirements provide factory-made grooves in the sleeves for the sealing washers.



Line bushings with threaded sleeve

Description

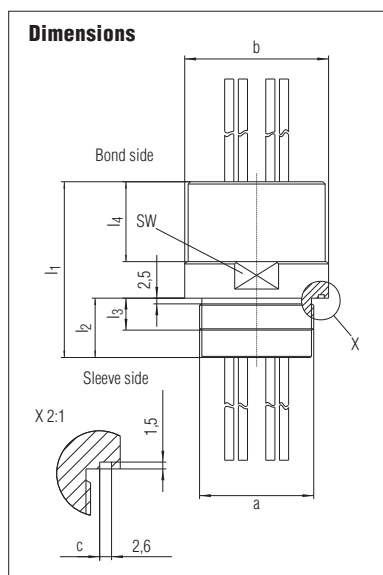
Industrial processes often take place within closed containers, under increased pressure or even vacuum conditions. It is therefore of utmost importance that no media leakages or pressure/vacuum drops occur when cables are led in or out. Our BARTEC pressure and vacuum sealed line bushings provide a simple and cost-effective solution to this problem. The line bushings essentially consist of a metal sleeve encapsulating the whole length of the electric conductors within epoxy-resin. This means that sealing is not only guaranteed for the whole length of the conductors but also through the stranded conductors themselves. Depending on their field of application, BARTEC pressure and vacuum sealed line bushings can be used at temperatures of -70 °C to +150 °C rising to short-term +180 °C. With regard to the actual temperature and surrounding media, pressures of 10⁻⁶ mbar to more than 200 bar can be withstood. Our BARTEC line bushings can also be used under conditions that differ from the basic technical data listed below.

They have **not** been approved for use in potentially explosive areas.

Explosion-proof and pressure-sealed versions (PTB 97 ATEX 1047 U).

Selection chart

Thread size	Dimensions in mm							Nominal conductor cross-section	max. number of conductors
	b	c	I ₁	I ₂	I ₃	I ₄	AF		
M24 x 1.5	Ø 36	Ø 28	50	34	17.5	0	32	0.5	9
								0.75 / 1 / 1.5	3
								2.5	1
								4	1
			85	49	17.5	20	32	6	1
								10	1
								16	1
								0.5	18
M33 x 1.5	Ø 43	Ø 35	50	34	17.5	0	41	0.75 / 1 / 1.5	8
								2.5	4
								4	1
								6	1
			85	49	17.5	20	41	25	1
								35	1
								0.5	22
								0.75 / 1 / 1.5	10
M36 x 1.5	Ø 46	Ø 38	50	34	17.5	0	41	2.5	6
								4	3
								6	3
								10 + (1.5)	3 + (3)
			85	49	17.5	20	41	0.5	30
								0.75 / 1 / 1.5	16
								2.5	8
								4	5
M42 x 1.5	Ø 55	Ø 45	50	34	17.5	0	50	6	5
								10 + (1.5)	3 + (6)
								16 + (1.5)	3 + (3)
								10 + (1.5)	4 + (4)
			85	49	17.5	20	50	0.5	45
								0.75 / 1 / 1.5	30
								2.5	13
								4	9
M50 x 1.5	Ø 63	Ø 54	77	26	14	35	60	6	9
								10 + (1.5)	3 + (6)
								16 + (1.5)	3 + (6)
								25 + (1.5)	3 + (6)
			97	36	14	45	60	35 + (1.5)	3 + (3)
								10 + (1.5)	4 + (4)
								16 + (1.5)	4 + (4)
								25 + (1.5)	4 + (4)
								0.5	45
								0.75 / 1 / 1.5	30
								2.5	13
								4	9
								6	9
								10 + (1.5)	3 + (6)



➤ Technical data

■ Basic version

Protection class

IP 68

Nominal voltage

450/750 V

Rated conductor cross section

0.35 mm² to 35 mm²

Temperature range

-25 °C to +100 °C

Nominal pressure

63 bar at RT (RT= +25 °C)

Test pressure

80 bar at RT (RT= +25 °C)

Core lengths

500 mm on both sides,
other lengths on request



Cable entries with threaded sleeves

Description

Industrial processes often take place within closed containers, under increased pressure or even vacuum conditions. It is therefore of utmost importance that no media leakages or pressure/vacuum drops occur when cables are led in. Our BARTEC pressure and vacuum sealed cable entries provide a simple and cost-effective solution to this problem. The cable entries essentially consist of a metal sleeve encapsulating the whole length of the electric conductors within epoxy-resin. This means that sealing is not only guaranteed for the whole length of the conductors but also through the stranded conductors themselves.

Depending on their field of application, BARTEC pressure and vacuum sealed cable entries can be used at temperatures of -70 °C to +150 °C rising to short-term +180 °C. With regard to the actual temperature and surrounding media, pressures of 10⁻⁶ mbar to more than 200 bar can be withstood. Our BARTEC cable entries can also be used under conditions that differ from the basic technical data listed below.

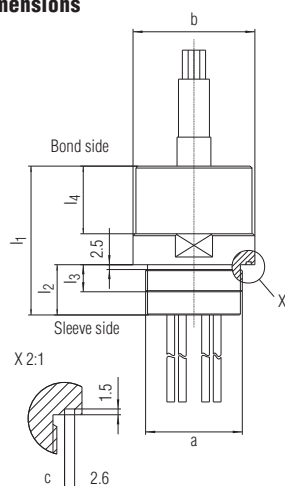
They have **not been** approved for use in potentially explosive areas.

Explosion-proof and pressure-sealed versions (PTB 97 ATEX 1047 U).

Selection chart									
Tread size	Dimensions in mm							Nominal conductor cross section	Number of cores (max.)
	b	c	I ₁	I ₂	I ₃	I ₄	AF		
M24 x 1.5	Ø 36	Ø 28	73	34	17.5	23	32	0.5	9
								0.75/1/1.5	3
								2.5	1
								4	1
								6	1
M33 x 1.5	Ø 43	Ø 35	83	34	17.5	33	41	0.5	18
								0.75/1/1.5	8
								2.5	4
								4	1
								6	1
M36 x 1.5	Ø 46	Ø 38	83	34	17.5	33	41	0.5	22
								0.75/1/1.5	10
								2.5	6
								4	3
								6	3
M42 x 1.5	Ø 55	Ø 45	83	34	17.5	33	50	0.5	30
								0.75/1/1.5	16
								2.5	8
								4	5
								6	5



Dimensions



Cable enters on boss side

Technical data

■ Basic version

Protection class

IP 68

Nominal voltage

450/750 V

Nominal conductor cross section

0.35 mm² to 6 mm²

Temperature range

-25 °C to +100 °C

Nominal pressure

63 bar at RT (RT= +25 °C)

Test pressure

80 bar at RT (RT= +25 °C)

Cable lengths

500 mm

Core lengths

2.5 m (other lengths on request)



Stud-type bushing with threaded sleeve

Description

Industrial processes often take place within closed containers, under increased pressure or even vacuum conditions. It is therefore of utmost importance that no media leakages or pressure/vacuum drops occur when electrical power or signals are led through the container wall. Our BARTEC pressure and vacuum sealed stud-type bushings provide a simple and cost-effective solution to this problem. The stud-type bushings essentially consist of a threaded metal sleeve and the stud forming one block by means of a creepage-proof insulation material.

The electrical connection can be made by the user himself with conventional connection systems. The seals can withstand pressures from 10 mbar abs. to 63 bar depending on the type used for the installation.

Depending on their field of application, BARTEC pressure and vacuum sealed stud-type bushings can be used at temperatures of -40 °C to +150 °C rising to short-term +180 °C. Our BARTEC stud-type bushings can also be used under conditions that differ from the basic technical data listed below.

They are **not** approved for the use in hazardous areas.

Technical data

Basic Version

Nominal voltage

400 V ²⁾

Stud thread

M8 to M16

Temperature range

-25 °C to +100 °C

Nominal pressure

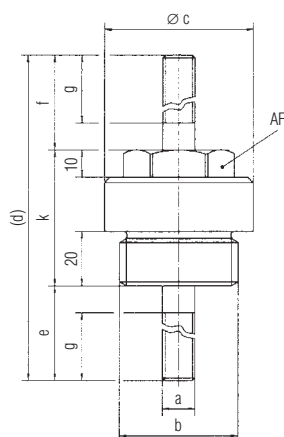
10 mbar abs. to 63 bar at RT ^{1) 3)}

Test pressure

80 bar at RT

Versions deviating from the basic technical data on request

Dimensions



Selection chart

Nominal current ⁴⁾

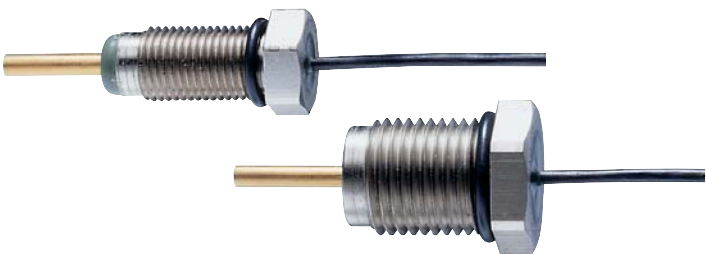
at +25 °C ambient temperature	100 A	250 A	315 A
Dimensions in mm			
a	M8	M12	M16
b	R 1"	R 1 1/4"	R 1 1/2"
c	41	55	60
d	100	150	160
e	35	50	55
f	30	50	55
g	22	40	40
AF	30	36	36
k	35	50	50

¹⁾ RT = +25 °C

²⁾ lower, depending on vacuum

³⁾ depending on outer seal

⁴⁾ stud: brass



Electrode line bushings with threaded sleeve

Description

In submersible sewage pumps, motor and pump assembly are often separated by an oil chamber sealed with mechanical seals. To prevent motor malfunctions or breakdowns it is absolutely necessary to detect possible leakages of the shaft seals and to carry out maintenance works in due time. Our BARTEC electrodes help you solve this problem most cost effectively. The electrode essentially consists of a threaded metal sleeve and a metal sensor rod forming one block by means of a creepage-proof insulation material. An appropriate evaluation unit indicates any existing leak or due maintenance in good time. Depending on type and application, BARTEC electrodes can be used for temperatures from -25 °C to +150 °C, rising to short-term +180 °C. They can also be used under conditions that deviate from the following basic technical data.

Technical data

Basic version

Nominal voltage
DC 30 V

Temperature range
-25 °C to +80 °C

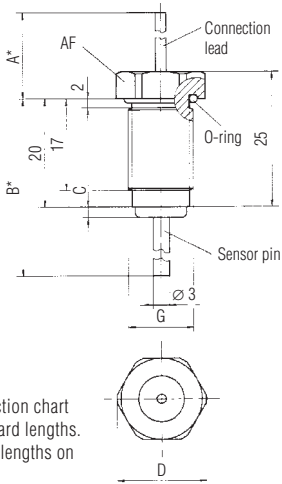
Protection class
IP 68 to 6 bar

Materials

- Threaded sleeve: nickel-plated brass
- Sensor rod: brass
- Connection core: 0.75 mm² FEP-insulated
- Encapsulation: Epoxy resin
- O-ring: VITON

Versions deviating from the basic technical data on request.

Dimensions



See selection chart for standard lengths. Different lengths on request.

Selection chart

Dimensions in mm							
G	C	D	AF	A	B	O-ring	
M10 x 1	2	14.5	13	500	36	9 x 1.5	
M12 x 1	2	16.5	15	500	36	10 x 1.5	
M16 x 1.5	2	21.0	19	500	36	14 x 2	



Cable entries with threaded sleeve

Description

BARTEC submersible cable entries maintain their seal even under extreme conditions. Major fields of application are submersible pumps for use areas such as:

- water treatment plants
- sewage treatment plants
- sewage disposal
- building sites

The cable sheath and cores are encapsulated in a special sealing compound. If the cable is damaged, no water can penetrate the cable entries causing a short-circuit.

Our BARTEC submersible cable entries are sealed over their whole length. BARTEC submersible cable entries are designed for depths with pressures up to 6 bar. The standard version is threaded, but flanged versions can also be supplied.

For these cable entries, BARTEC use as extremely robust NSSHÖU cable resistant to extreme stress such as sewage or chemically aggressive waste water. The basic versions have 4 x 1.5 mm² or 7 x 2.5 mm² cores. For special cables incorporating pilotlines, we offer versions with 7 x 1.5 mm² or 10 x 1.5 mm² when used with oil-filled motors, the cables can be provided with FEP-insulated stranded conductors. The standard version has nickel-plated brass threaded sleeves. For special applications, BARTEC offers threaded sleeves of stainless steel types.

Explosion-proof version (PTB 97 ATEX 1079 X).

Technical data

Basic version

Protection class
IP 68

Pressure seal
up to 6 bar

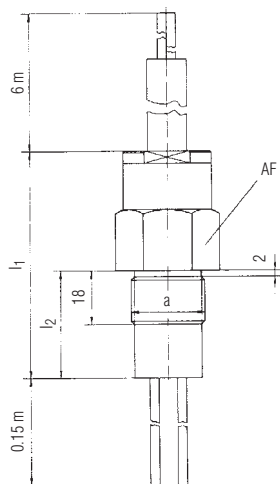
Temperature resistance
max. +100 °C at encapsulation

Voltage
up to 500 V for NSSHöU

Cable length outside
6 m¹⁾

Core length inside
0.15 m¹⁾

Dimensions

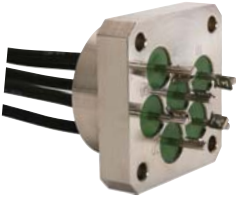




Selection chart

Thread a	Dimensions in mm			Connection ²⁾ number of cores x cross section	Cable ²⁾	Voltage	on request
	I ₁	I ₂	AF				
M36 x 1.5	85	45	41	7 x 4	NSSHöU	500 V	
				4 x 4	NSSHöU	500 V	
				7 x 2.5	NSSHöU	500 V	
				4 x 2.5	NSSHöU	500 V	
M24 x 1.5	75	35	30	3 x 2.5	NSSHöU	500 V	
				4 x 1.5	NSSHöU	500 V	

¹⁾ other lengths on request

²⁾ other cross sections and cables on request

Special versions	
Illustration	Description
	Stud plate Stud insulated in glass e. g. as pressure-proof motor connection
	Line bushings with flat-pin plug
	Prestressed-glass line bushings electrical

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