



## Explosion-Proof Devices 2022 / 2023

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# TPK



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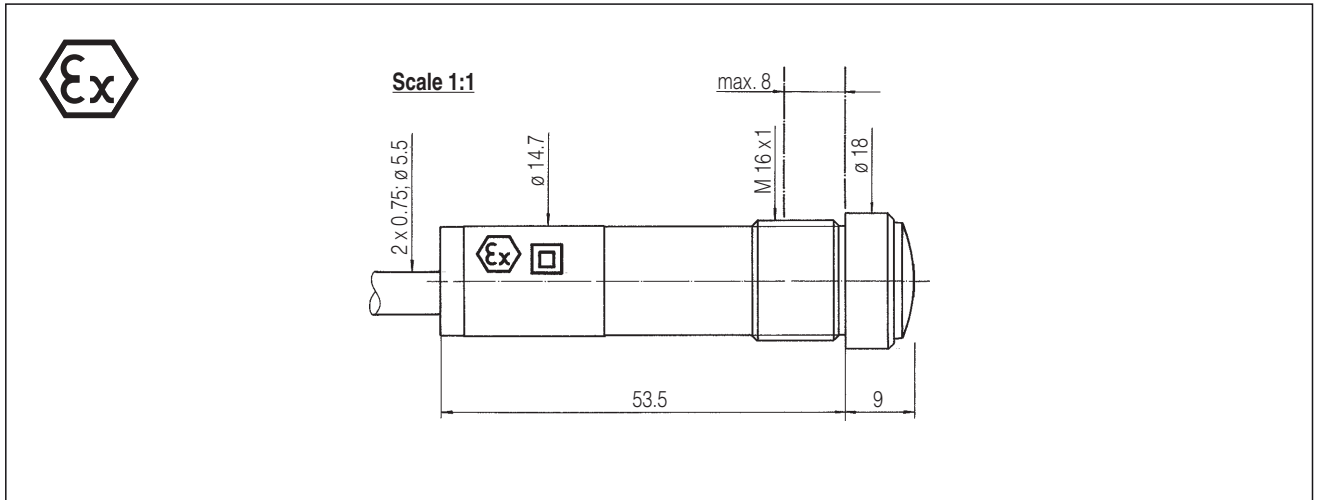
We look forward to sending you the German version of this catalogue for free.

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We look forward to sending you the German version of this catalogue for free.





**DESCRIPTION**

The explosion-proof mini-LED offers an extraordinarily high luminous intensity, and with its M 16 thread it is not bigger than indicator lamps with a normal construction. The construction of this mini-LED combines latest technology in a narrow space and highest explosion proofness.

The extreme brightness is obtained by using several super-bright LEDs. In opposition to indicator lamps with incandescent lamps, no expensive replacement of lamps is required. The life of the LEDs is at least 10 years, regardless of vibration.

Due to the low power consumption of approx. 0.5 W, the generated dissipation heat is negligible.

The mini-LED can be operated with a DC or AC voltage between 16 V and 33 V. An integrated current source guarantees constant brightness over the entire voltage range.

The hermetically sealed encapsulation provides a minimum degree of protection of IP 68.

**TECHNICAL DATA**

Type of protection	Ex II 2 G Ex mb IIC T6 Gb Ex II 2 D Ex mb IIIC T80°C Db IP68 BVS 14 ATEX E 086 X
Operating voltage	min. 16 V ≅ max. 33 V ≅
Power consumption	12 mA at 16 V 13 mA at 33 V
Back-up fuse	max. 5 A
Luminance	min. 250 mcd/cm <sup>2</sup>
Ambient temperature	-20 to +60 °C
Protection class	IP 68 (IEC 144)
Mounting nut	Ø max. 18 mm, plastic
Housing	Nickel brass Clear PC cap
Weight	Approx. 110 g
Electrical connection	2 x 0.75 mm <sup>2</sup> 1.5 m long (or other length)
Polarity	any
Wire colours	brown blue

**Ordering information**

Mini-LED, type mS73M-65

Luminous colour	Order no.:
white	7330
red	7331
yellow (orange)	7332
green	7333
blue	7334

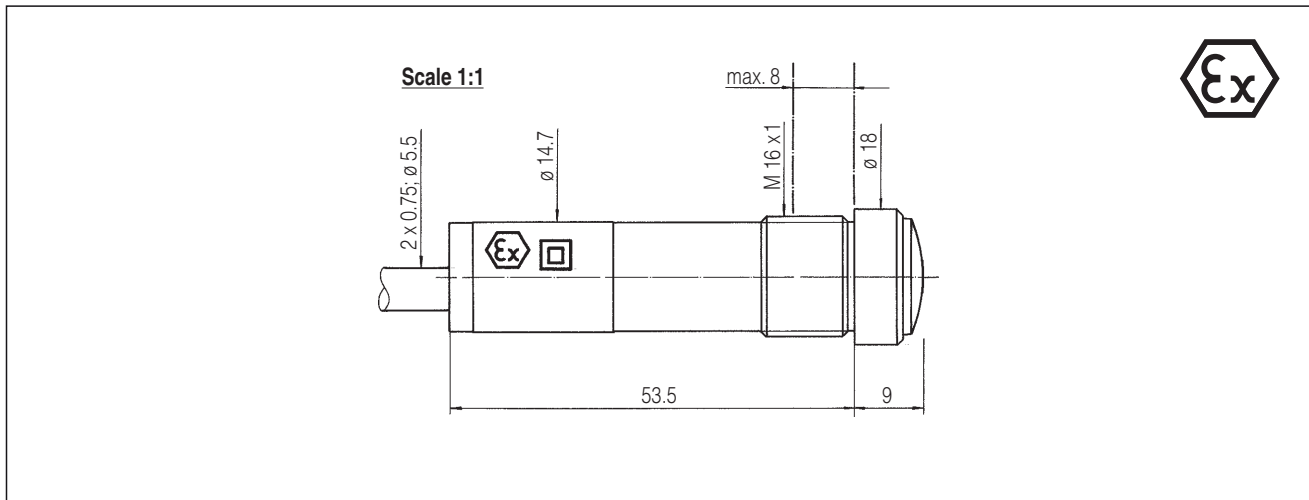
Please indicate cable length if other than 1.5 m (3 m, 5 m or longer) in clear text.

# Miniled 230 V

T P K

## Alarm indicator lamp with LED for 230 V

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### DESCRIPTION

By implementing the brightest possible LED an explosion-proof illuminated indicator could be manufactured that achieves maximum luminance at low power consumption.

The low power consumption allows a circuit that does not require an additional back-up fuse. The existing fuse must only be sized so as to protect the supply line (0.75 mm<sup>2</sup>).

The housing is made of brass, nickel-plated and the cap of practically indestructible polycarbonate. Protection type IP 68 permits operation even where flooding may be anticipated. The high protection type is achieved by hermetic sealing.

For mounting purposes only a standard drill hole of 16 mm is necessary, the plastic nut is supplied in the scope of delivery.

The Miniled 230 V is totally insulated, thus a protective conductor in the connecting cable and the connection of a wire in the terminal box is dispensed with.

If reduced luminance is sufficient, the Miniled 230 V may also be operated at 110 V.

### TECHNICAL DATA

Type of protection	Ex II 2 G Ex mb IIC T6 Gb Ex II 2 D Ex mb IIIC T80°C Db IP68 BVS 14 ATEX E 086 X
Operating voltage	max. 230 V ≅ 50-60 Hz
Power consumption	Approx. 5 mA
Back-up fuse	Not required
Ambient temperature	-20 to +40 °C
Protection class	IP 68 ( IEC 144)
Mounting nut	Plastic Ø max. 18 mm
Housing	Nickel-plated brass
Cap	Polycarbonate
Weight	Approx. 110 g
Electrical connection	2 x 0.75 mm <sup>2</sup> 1.5 m long (or other length)
Polarity	any
Wire colours	brown blue

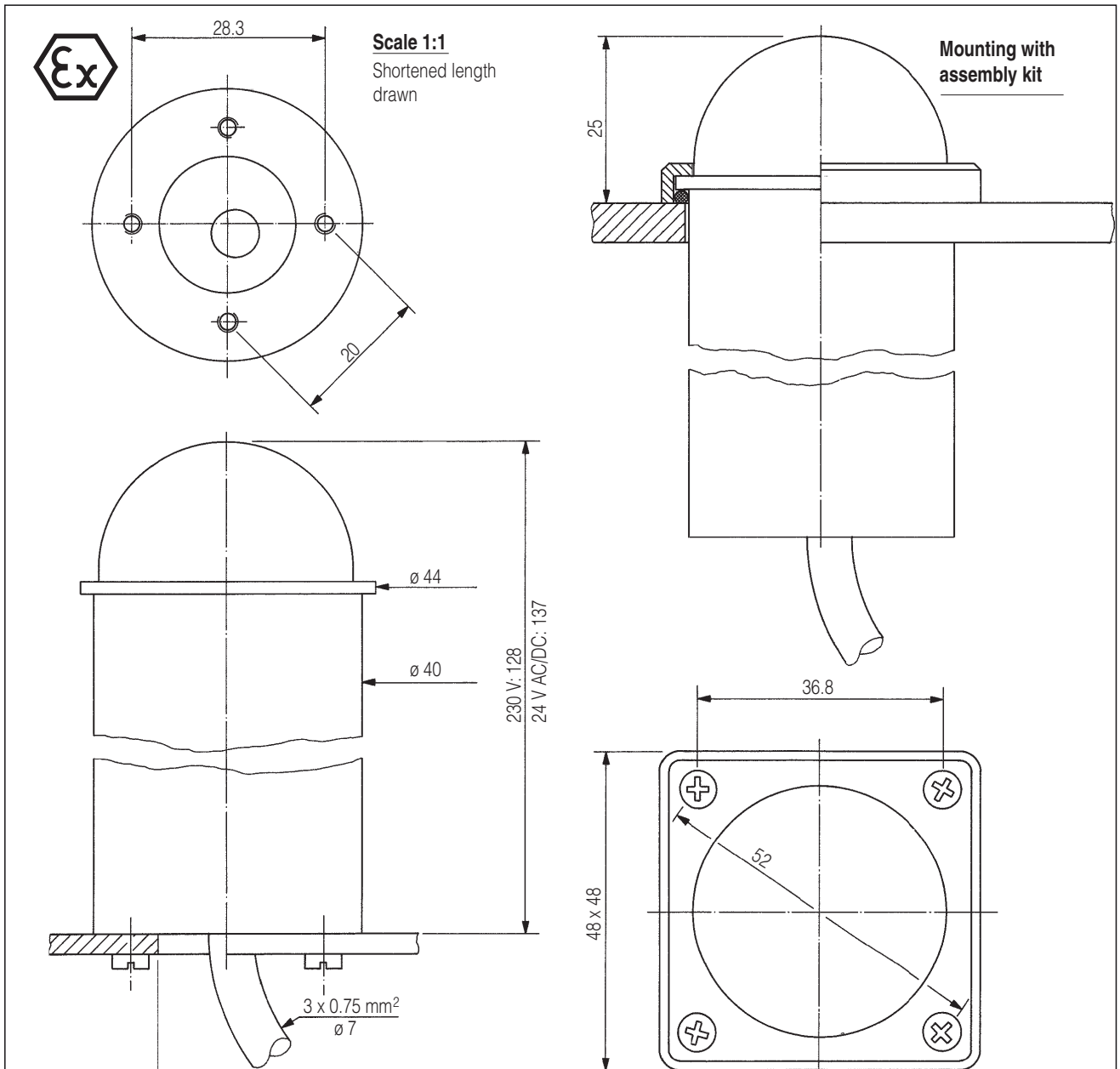
### Ordering information

Miniled 230, type mS72M-64

Luminous colour	Order no.:
white	7210
red	7211
yellow (orange)	7212
green	7213
blue	7214

Please indicate cable length if other than 1.5 m (3 m, 5 m or longer) in clear text.

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**DESCRIPTION**

The MiniFlash is a small, high-intensity flashlamp indicator for mounting on or inside a device. It is used for signalling in a loud environment, if an acoustic alarm cannot be heard or if it is undesired in a control room. Moreover, the position of a flashlight can be found more easily than that of an acoustic source. The high-intensity flashtube and the electronics are incorporated in a very small, hermetically sealed EEx d housing. The electrical connection is via cable ends.

The device is maintenance-free and durable. Spare parts are not required. A back-up fuse is built in.

In addition to the 230 V AC version, a 24 V DC/AC version is also available.

The following mounting possibilities are provided for:

1. Screwed on the wall of a control cabinet,  
or
2. By means of a mounting bracket (to be ordered separately), up to three MiniFlashes can be mounted side by side on a wall,  
or
3. Inserted in a drilled hole in the front panel, e.g. in a flow chart or control panel. With this kind of mounting, only the dome and the supporting frame (standard dimension 48 mm x 48 mm) can be seen from the outside. The mounting set for this kind of mounting must be ordered separately.

The device is fixed with four M3 screws.

## Ordering information

MiniFlash

Type dS63A-1. 40 BL

Order no.:

63120

- 1 = red
  - 2 = yellow
  - 3 = green
  - 4 = blue
  - 6 = colourless
- 
- 1 = 230 VAC
  - 5 = 24 VDC

## Mounting set

For mounting in a drilled hole, consisting of supporting frame (aluminium, hard-coated), O-ring, four M3 screws, nuts and lock washers made of VA.

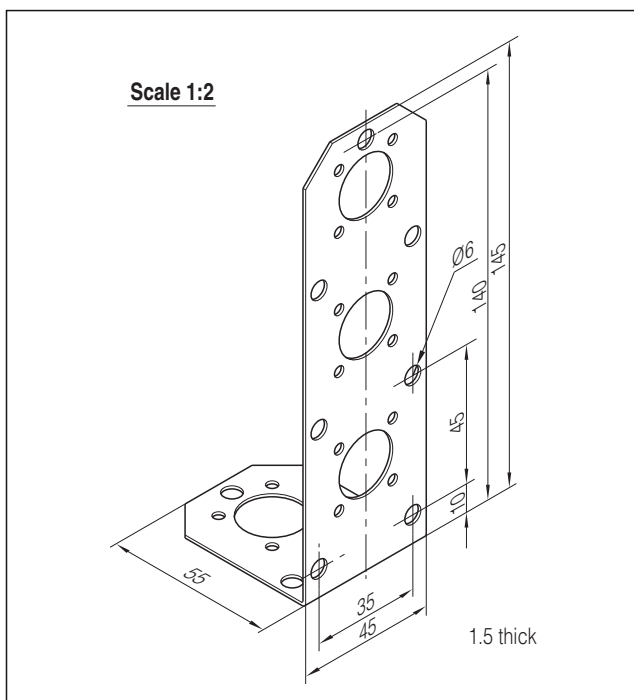
Order no.: 99 63 05

## Mounting bracket

For mounting 1 to 3 devices on a wall.

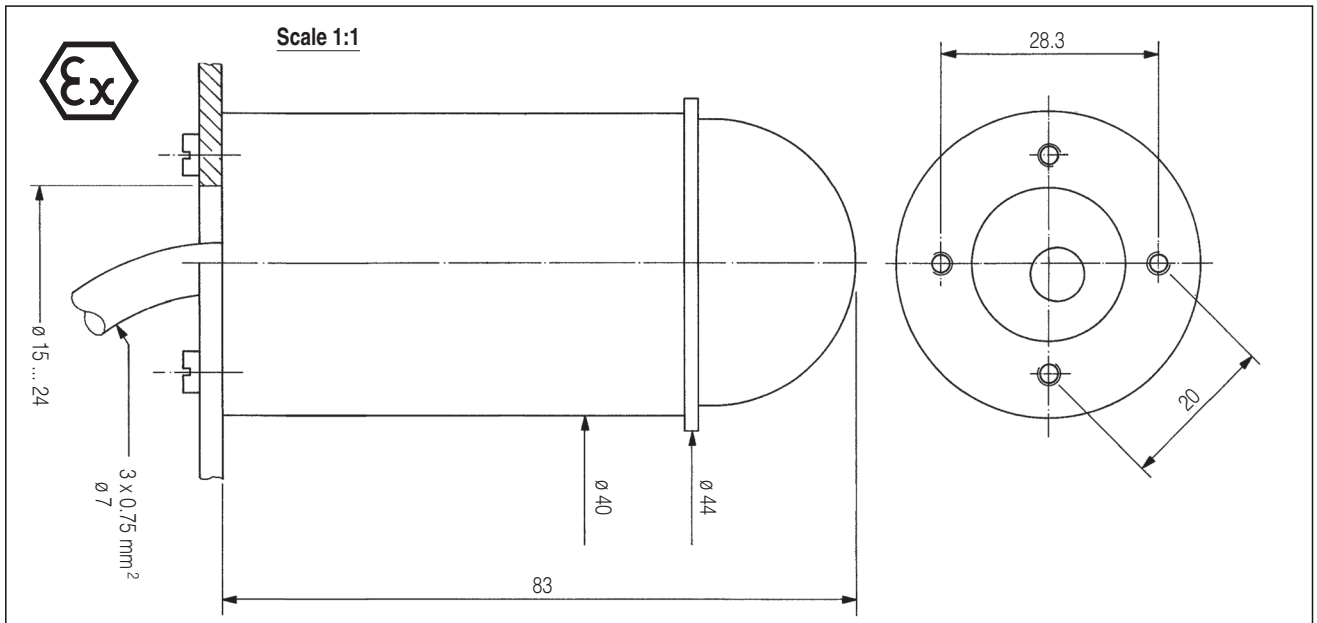
The bracket is made of VA, with matching drilled holes, 145 mm x 55 mm large and 45 mm wide. The scope of delivery includes 8 pieces of M3 screws and lock washers made of VA.

Order no.: 99 63 06



## TECHNICAL DATA

Type of protection	EEx d IIC T6 CE 0044 II 2 GD T80°C IP 68 PTB 03 ATEX 1131
Operating voltage	230 V AC +10 % Approx. 30 mA consumption
Functional limit	150 VAC
or	
Operating voltage	15...30 VDC/AC 0.2 A consumption
Special voltage on request	
Flash energy	2.5 J (Ws)
Flashing sequence	1 Hz (60 flashes/min)
Duty cycle	100 % (continuous operation)
Life	8,000,000 flashes for 3 dB luminous intensity
Ambient temperature	-20 to +40 °C
Protection class	IP 68 ( IEC 144)
Housing	Aluminium, hard-coated Plastic dome, shock resistance 7 Nm
Colour	Transparent, yellow, red or green
Weight	Approx. 250 g
Electrical connection	3 x 0.75 mm <sup>2</sup> 1.5 m long (or other length)
Polarity	any
Wire colours	brown blue
Protective conductor	green / yellow



**DESCRIPTION**

The MaxiLed is an exceptionally bright and large alarm indicator that is clearly visible from all sides, in many cases it offers a low-cost alternative to a flash light.

The light source is provided by three parallel branches with 20 built-in ultra-bright LEDs whereby unusually high luminance is achieved with a low power consumption.

Operation with d.c. or a.c. voltage is possible. Built-in power stabilisation assures uniform brightness across the entire voltage range.

Due to the highest type of protection operation is possible without limitation in zone 1 and 2, as well as 21 and 22.

The rugged housing is made of hard-coated aluminium, the cap of practically indestructible polycarbonate. Protection type IP 68 permits operation even where flooding may be anticipated. The high protection type is achieved by sealing and O-ring gasket.

The shallow insertion depth permits mounting in flat control boxes. The MaxiLed features the same, universal mounting options and the same mounting accessories as the MiniFlash.

**Accessories**

Assembly kit for mounting in a drill hole, consisting of a retaining frame (aluminium hard-coated), O-ring, four M3 screws, nuts and lock washers in VA.

Order no.: 99 63 05

Mounting bracket in VA for the wall mounting of 1 to 3 devices, suitably drilled, 45 mm wide, 145 or 55 mm side length. The scope of delivery includes 8 M3 screws and lock washers in VA.

Order no.: 99 63 06

**TECHNICAL DATA**

Type of protection	EEx d IIC T6 CE 0044 II 2 GD T80°C IP 68 PTB 03 ATEX 1131
Operating voltage	min. 18 V ≅ max. 33 V ≅ (other voltage possible)
Power consumption	Approx. 50 mA
Ambient temperature	-20 to +50 °C
Protection class	IP 68 (EN 60529)
Housing	Aluminium, hard-coated Cap polycarbonate, impact-proof 7 Nm
Weight	Approx. 350 g
Electrical connection	3 x 0.75 mm <sup>2</sup> 1.5 m long (or other length)
Polarity	any
Wire colours	brown blue

**Ordering information**

MaxiLed, type dS63A-8340

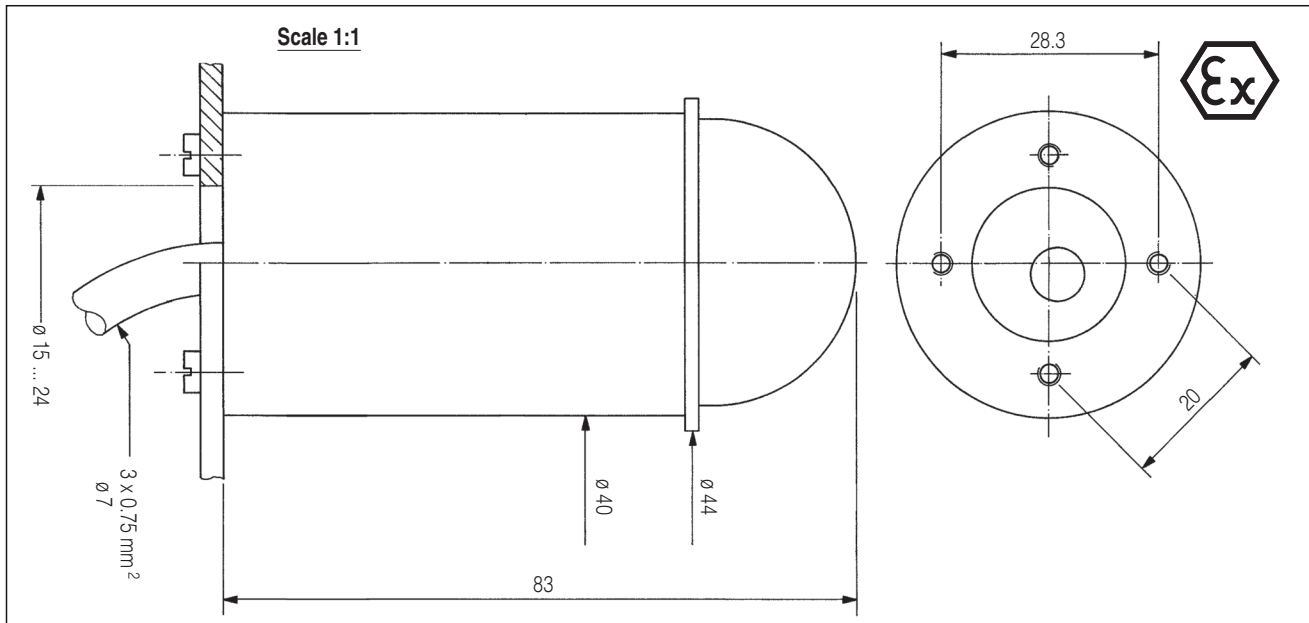
Luminous colour	Order no.:
white	631 255 0
red	631 255 1
yellow (orange)	631 255 2
green	631 255 3
blue	631 255 4

# MaxiLed 230 V

T P K

## Large indicator lamp with LED

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### DESCRIPTION

The MaxiLed 230 V is an extremely bright and large alarm indicator that is clearly visible from all sides, in many cases it offers a low-cost alternative to a flash light.

The light source is provided by approx. 20 built-in ultra-bright LEDs whereby unusually high luminance is achieved with a low power consumption.

Operation is only possible with a.c. voltage. A mechanically identical version is available for operation with 24 V d.c. voltage.

Due to the highest type of protection operation is possible without limitation in zone 1 and 2 but not for underground workings.

The rugged housing is made of hard-coated aluminium, the cap of practically indestructible polycarbonate. Protection type IP 68 permits operation even where flooding may be anticipated. The high protection type is achieved by sealing and O-ring gasket.

The shallow insertion depth permits mounting in flat control boxes. The MaxiLed features the same, universal mounting options and the same mounting accessories as the MiniFlash.

### Accessories

Assembly kit for mounting in a drill hole, consisting of a retaining frame (aluminium hard-coated), O-ring, four M3 screws, nuts and lock washers in VA.

Order no.: 99 63 05

Mounting bracket in VA for the wall mounting of 1 to 3 devices, suitably drilled, 45 mm wide, 145 or 55 mm side length. The scope of delivery includes 8 M3 screws and lock washers in VA.

Order no.: 99 63 06

### TECHNICAL DATA

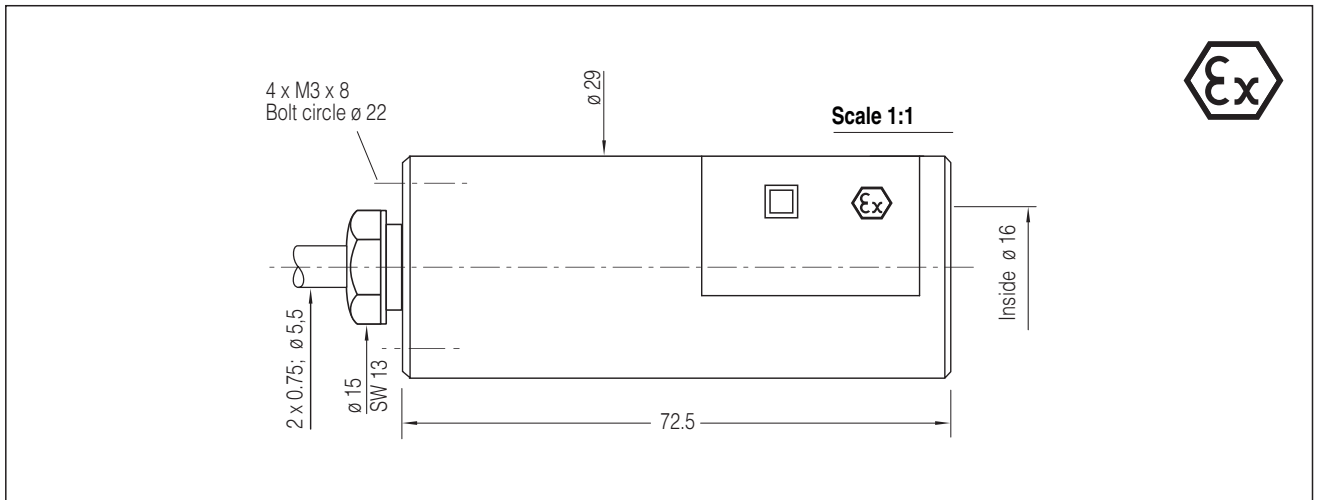
Type of protection	EEx d IIC T6 CE 0044 II 2 GD T80°C IP 68 PTB 03 ATEX 1131
Operating voltage	230 V ~ +15 %, min. 100 V ~ with linear reduced luminance (other voltage possible) A back-up fuse is built-in
Power consumption	Approx. 30 mA
Ambient temperature	-20 to +50 °C
Protection class	IP 68 (EN 60529)
Housing	Aluminium, hard-coated Cap polycarbonate, impact-proof 7 Nm
Weight	Approx. 350 g
Electrical connection	3 x 0.75 mm <sup>2</sup> 1.5 m long (or other length)
Polarity	any
Wire colours	brown blue
Protective conductor	green / yellow

### Ordering information

MaxiLed, type dS63A-8340

Luminous colour	Order no.:
white	631 251 0
red	631 251 1
yellow (orange)	631 251 2
green	631 251 3
blue	631 251 4

Please indicate cable length in clear text. Standard lengths are 1.5 m, 3 m and 5 m.



**DESCRIPTION**

The LedSpotlight is a very small and very bright long-lasting lamp. It is used for illuminating small containers or also for lighting of danger zones.

Ten super-radiant LEDs are integrated in a robust metal housing of stainless steel in protection type “flameproof enclosure (d)”. The glass pane is impact resistant.

Potted cable end is provided for connection. The device is protective insulated, therefore two wires are enough.

Please note: The LedSpotlight must be connected correctly with the poles. If the polarity is wrong for more than one minute, the device can be completely destroyed, but it is always explosion-proof.

The mounting is done via four thread-holes on the back.

The housing achieves the IP 68 class of protection by potting and bonding.

The device is durable and maintenance-free.

**TECHNICAL DATA**

Type of protection	EEx d IIC T6 CE 0044 II 2 GD T80°C IP 68 PTB 03 ATEX 1130
Operating voltage	24 V +10 % operable from 20 V with reduced brightness
Power consumption	Approx. 50 mA at 24 V
Luminous colour	Warm white, other colours possible as options
Ambient temperature	-20 to +40°C
Protection class	IP 68
Housing Pane	VA Glass, impact resistant
Weight	Approx. 250 g
Electrical connection	2 x 0.75 mm² 1.5 m long (or other length)
Polarity	brown= + blue = - Connect correctly with the poles, wrong polarity longer as 1 minute could cause irrevocable damage to the device.

**Ordering information**

LedSpotlight	Type dS64V-7329	Order no.: 64011
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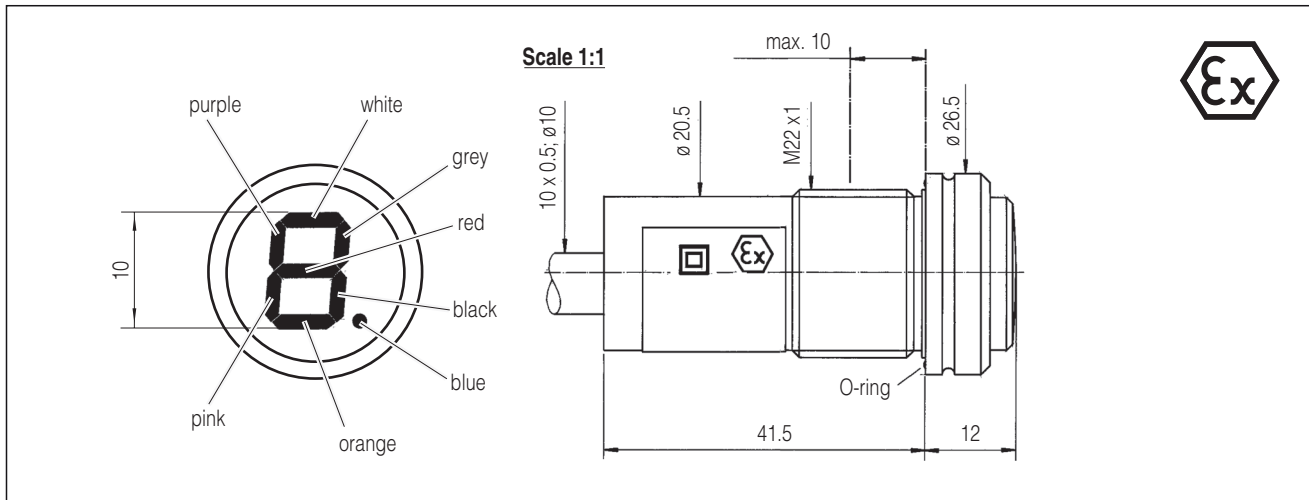
Please indicate cable length if other than 1.5 m (3 m, 5 m or longer) in clear text.

# Numerical indicator22

T P K

## Seven-segment indicator in VA

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### DESCRIPTION

The explosion-proof numerical indicator22 permits digital display in hazardous area category 2 (= zone 1 and 2 as well as zone 21 and 22) endangered by gas or dust. The 10 mm high 7-segment display with ultra bright, long-life LEDs is also highly legible even from the greatest distance.

Each segment and the decimal point are brought out separately via a series resistor so that operation with 7-segment-code is problem-free.

The shallow insertion depth permits mounting in flat control enclosures, for instance in lifts.

For mounting purposes only a standard drill hole of 22 mm is necessary, the plastic nut is supplied in the scope of delivery.

The enclosure is in VA, the cap in practically indestructible polycarbonate. Protection type IP 68 permits operation even where flooding may be anticipated. The high protection type is achieved by hermetic sealing.

Front plate sealing is provided by an O-ring in a groove. As such, the front plate also achieves IP 68 standard effortlessly.

All wires of the connecting cable are totally insulated against the enclosure.

### TECHNICAL DATA

Type of protection	EEx d II C T6/T5 CE 0044 II 2 GD T80°C IP 68 PTB 02 ATEX 1152 X
--------------------	---

Operating voltage	24 V= max. 30 V (other voltage possible)
-------------------	--

Current of segment	Approx. 3 mA at 24 V
--------------------	----------------------

Luminous colour	Red (other colour possible)
-----------------	-----------------------------

Ambient temperature	-20 to +55 °C
---------------------	---------------

Protection class	IP 68 (IEC 60529)
------------------	-------------------

Mounting nut	Plastic Ø max. 29.5 mm
--------------	------------------------

Housing	VA
---------	----

Weight	Approx. 240 g
--------	---------------

Cap	Polycarbonate
-----	---------------

Electrical connection	10 x 0.5 mm <sup>2</sup> 1.5 m long (or other length)
-----------------------	---

brown (br) common cathode (-)

### Ordering information

Numerical indicator22, type dS84V-5322

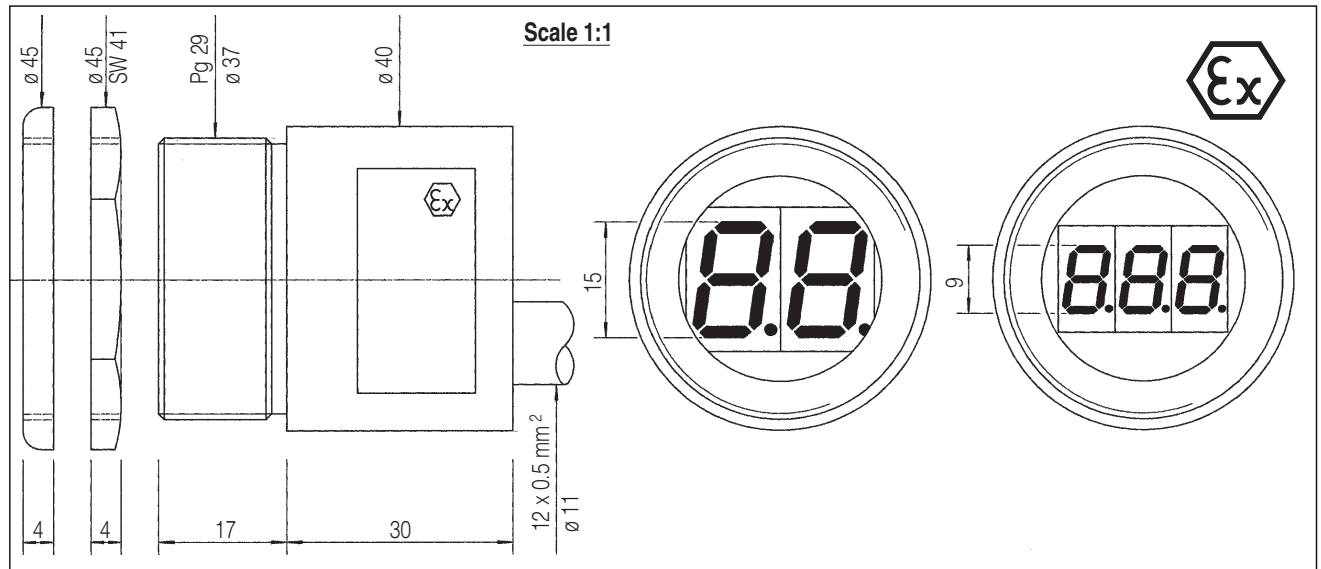
Luminous colour red Order no.: 84001

Please indicate cable length if other than 1.5 m (3 m, 5 m or longer) in clear text.



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Two-digit and three-digit



**DESCRIPTION**

The indication of preset and measured values is most easily performed with a numerical indicator. The hitherto existing solutions, however, require great mounting and wiring efforts.

The two- or three digit numerical indicator requires only one hole for mounting. The wiring efforts are greatly reduced by multiplex operation; only 12 wires are necessary for the three-digit indicator.

The device can be connected directly to the 24 V outputs of a PLC. Thanks to the hermetically sealed, flameproof enclosure with cable ends, no intrinsically safe circuits are required.

The super-bright seven segment LED indicators use a special colour filter for excellent legibility even in bright environment.

**Ordering information**

Numerical indicator, type dS64M-0440-Zi

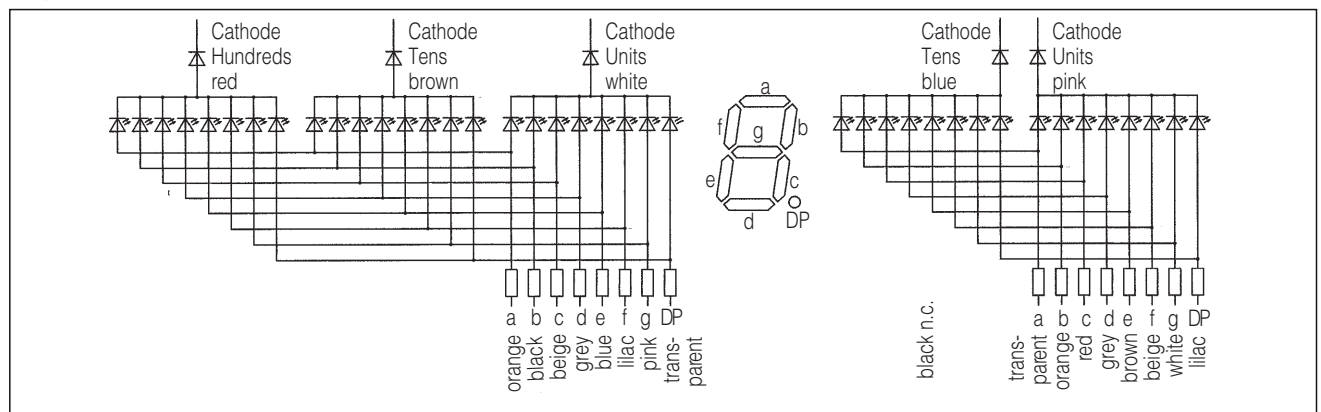
Two-digit Order no.: 6420  
 Three-digit Order no.: 6421

Please indicate cable length if other than 1.5 m (3 m, 5 m or longer) in clear text.

**TECHNICAL DATA**

Type of protection	EEx d IIC T6 CE 0044 II 2 GD T80°C IP 68 PTB 03 ATEX 1130
Voltage	24 V Other voltage possible
Internal resistance	2.2 kOhms
Power dissipation	2.6 W maximum
Ambient temperature	-20 to +40 °C
Protection class	IP 68 (IEC 144)
Housing	Nickelated brass Plastic pane
Weight	Approx. 350 g
Electrical connection	12 x 0.5 mm <sup>2</sup> 1.5 m long (or other length)

\* A version with only one digit and 10-wire connection is also available.

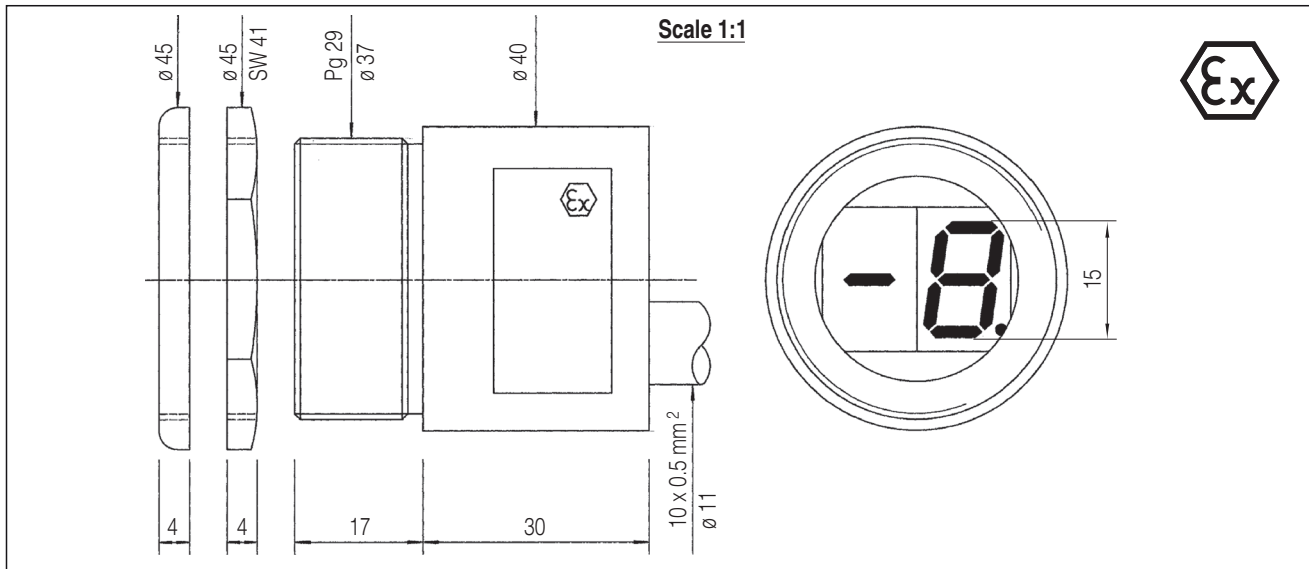


# Numerical indicator

T P K

## One digit and minus

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### DESCRIPTION

The indication of preset and measured values is most easily performed with a numerical indicator. The hitherto existing solutions, however, require great mounting and wiring efforts.

The numerical indicator requires only one drill hole for mounting. Since each segment is brought out separately, multiplex operation is not required.

Thanks to the low current consumption the device can, e.g., be connected directly to the 24 V outputs of a PLC. Thanks to the hermetically sealed, flameproof enclosure with cable ends, no intrinsically safe circuits are required.

The super-bright seven segment LED indicators use a special colour filter for excellent legibility even in bright environment.

### Ordering information

Numerical indicator, type dS64M-0440-Zi

One digit and minus Order no.: 6422

Please indicate cable length if other than 1.5 m (3 m, 5 m or longer) in clear text.

### TECHNICAL DATA

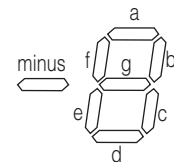
Type of protection	EEx d IIC T6 CE 0044 II 2 GD T80°C IP 68 PTB 03 ATEX 1130
Voltage	24 V Other voltage possible
Internal resistance	2.2 kOhms
Power dissipation	2.6 W maximum
Ambient temperature	-20 to +40 °C
Protection class	IP 68 (IEC 144)
Housing	Nickel plated brass Plastic pane
Weight	Approx. 350 g
Electrical connection	10 x 0.5 mm <sup>2</sup> 1.5 m long (or other length)

### Segment

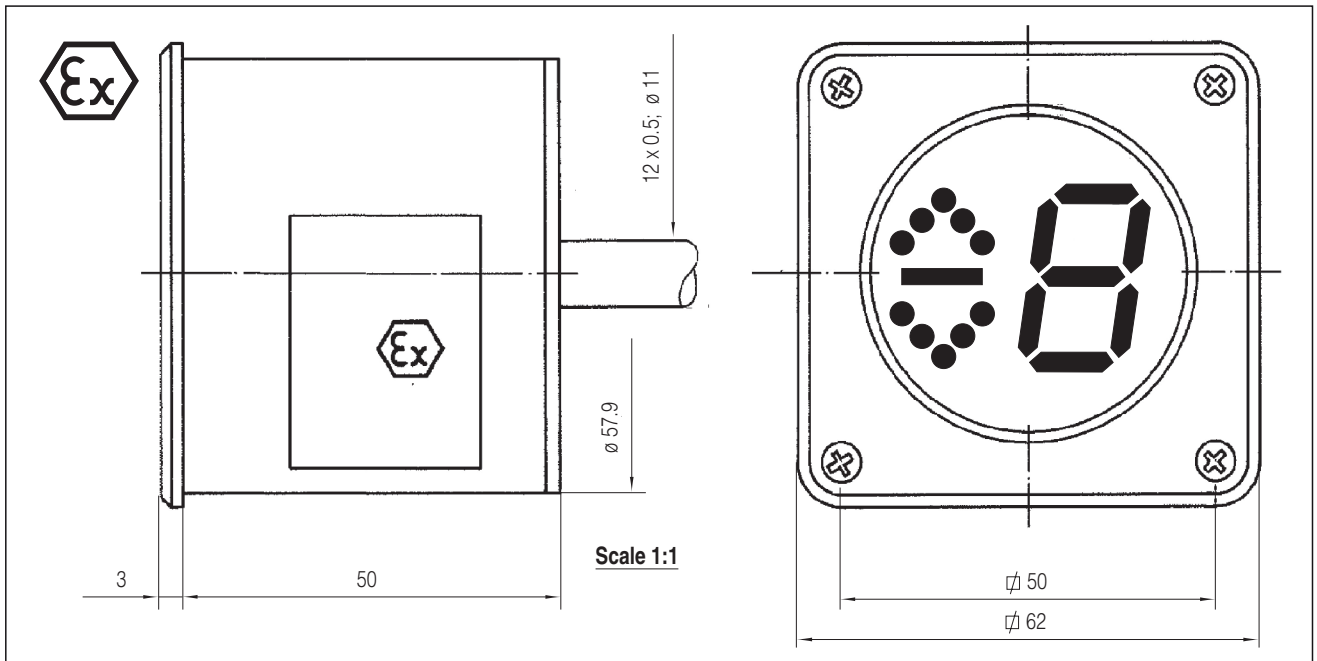
a  
b  
c  
d  
e  
f  
g  
Minus sign  
Common cathode

### Connection colour

black  
orange  
red  
grey  
brown  
pink  
white  
lilac  
blue



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**DESCRIPTION**

The explosion-proof numerical indicator25 permits digital display in hazardous area category 2 and 3 (= zone 1 and 2 as well as zone 21 and 22) endangered by gas or dust. The 25 mm high 7-segment display with ultra bright, long-life LEDs is also highly legible even from the greatest distance.

Moreover an arrow "up" and an arrow "down" as well as a minus sign can be displayed. Each sign and each segment can be triggered with 24 V d.c. voltage. The cathode (negative terminal) is the common cathode of all signs.

The shallow insertion depth permits mounting in flat control enclosures, for instance in lifts.

Protection type IP 68 permits operation even where flooding may be anticipated. The high protection type is achieved by sealing.

**Ordering information**

Numerical indicator25, type dS63A-5358

Order no.: 631 41 51

Please indicate cable length in clear text. Standard lengths are 1.5 m, 3 m and 5 m.

**TECHNICAL DATA**

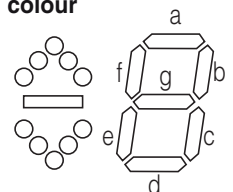
Type of protection	EEx d IIC T6/T5 CE 0044 II 2 GD T80/95°C IP 68 PTB 03 ATEX 1131
Operating voltage	24 V = ±15 %
Current consumption	up to 70 mA
Current of segment	7.5 mA
up / down / minus sign	5 mA
Luminous colour	Red (other colour on request)
Ambient temperature	-20 to +50 °C
Protection class	IP 68 (EN 60529)
Housing	Aluminium, front black, anodised Frame colourless, anodised
Pane	Modified PC
Weight	Approx. 350 g
Electrical connection	12 x 0.5 mm <sup>2</sup> 1.5 m long (or other length)

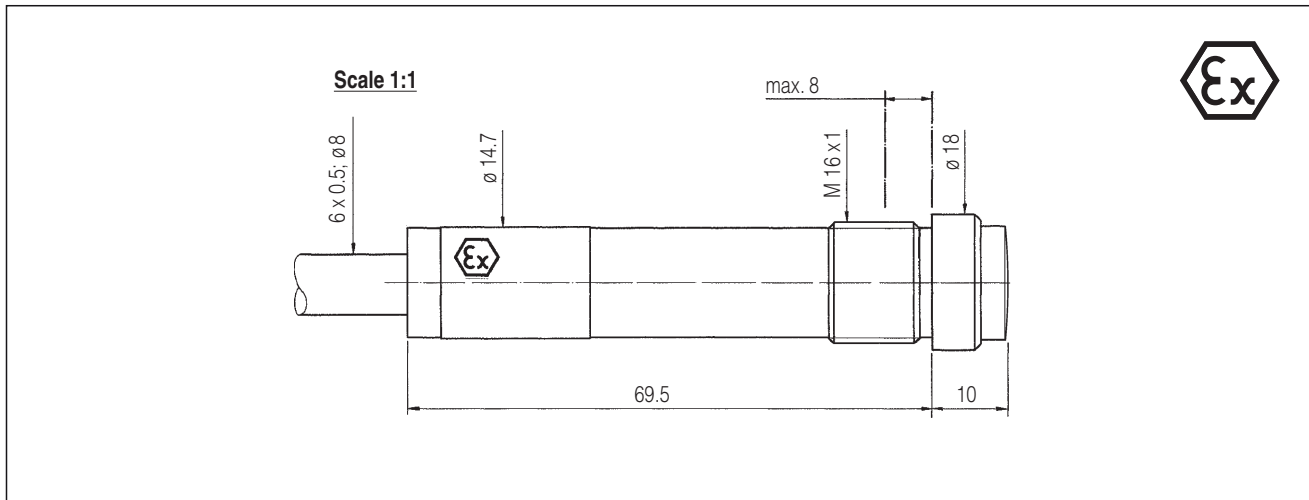
**Segment**

- Common cathode
- Minus sign
- Up
- Down
- A
- B
- C
- D
- E
- F
- G
- SL

**Connection colour**

- blue
- beige
- white
- black
- lilac
- transparent
- red
- grey
- brown
- pink
- orange
- green-yellow





## DESCRIPTION

By consequently further developing our existing "M 16 range", we have succeeded in manufacturing an explosion-proof lighted pushbutton with a 16 mm mounting diameter and a snap-action switching element.

With the five super-bright LEDs, a very high brightness is obtained. The life of the light source is at least 10 years, regardless of vibration.

Due to the low power consumption of approx. 0.6 W, the generated dissipation heat is so low that an ambient temperature as high as 60 °C is admissible. The LEDs can be powered with 24 V DC. A reverse polarity protection is incorporated.

The switching element is a snap-action switch with a slide contact which provides not only a perfect contact-making but also a positive feeling of the switching action.

The IP 54 sealing is more than sufficient for operation in control rooms etc. For outdoor use, however, we recommend our single devices "Mini-LED" and "mini-pushbutton" or the lighted pushbutton22 with protection class IP 68.

## Ordering information

Lighted mini-pushbutton, type mS71M-7916

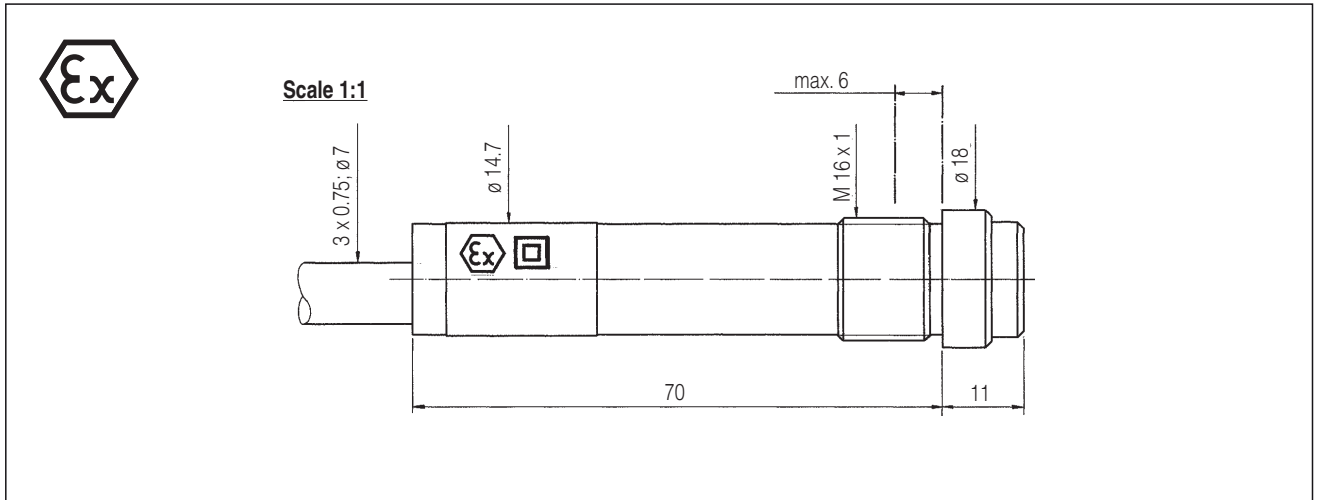
Luminous colour	Order no.:
white	7100
red	7101
yellow (orange)	7102
green	7103
blue	7104

Please indicate cable length in clear text. Standard lengths are 1.5 m, 3 m and 5 m.

## TECHNICAL DATA

Type of protection	CE 0044 II 2 G Ex mb d IIC T6 Gb PTB 02 ATEX 2001 X		
Operating voltage	24 V DC ±10 %		
Power consumption	Approx. 15 mA		
Electrical rating	36 V	1 A	AC-21
	28 V	1 A	DC-21
Contact	Gold-plated fine silver change-over switch Snap-action with slide contact		
Actuation	Travel approx. 1,5 mm Force approx. 4 N		
Ambient temperature	-20 to +60 °C		
Protection class	IP 54		
Mounting nut	Ø max. 18 mm, plastic		
Housing	Nicked brass		
Cap	Polycarbonate		
Electrical connection	6 x 0.5 mm <sup>2</sup> 1.5 long (or other length)		
LEDs:	24 V DC		
white +			
grey -			
Change-over contact:	Common		
blue	Make contact		
brown	Break contact		
black	Protective conductor		
green-yellow			

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**DESCRIPTION**

The explosion-proof mini-pushbutton allows to build small, elegant control panels and control devices.

With an outside diameter of only 18 mm, it is even possible to mount the pushbuttons in standard distances (19 mm) for keyboards.

The cable ends are hermetically sealed, and the plunger has an O-ring sealing, thus reaching an IP 68 degree of protection.

The contact is designed for double throw. The switching voltage of 250 V enables a direct control of relay circuits. Gold contacts are available as an alternative, especially for low voltage applications.

A coloured, engravable plastic disk is glued in the actuator button. For working with aggressive solvents, aluminium plates anodised in different colours can also be used.

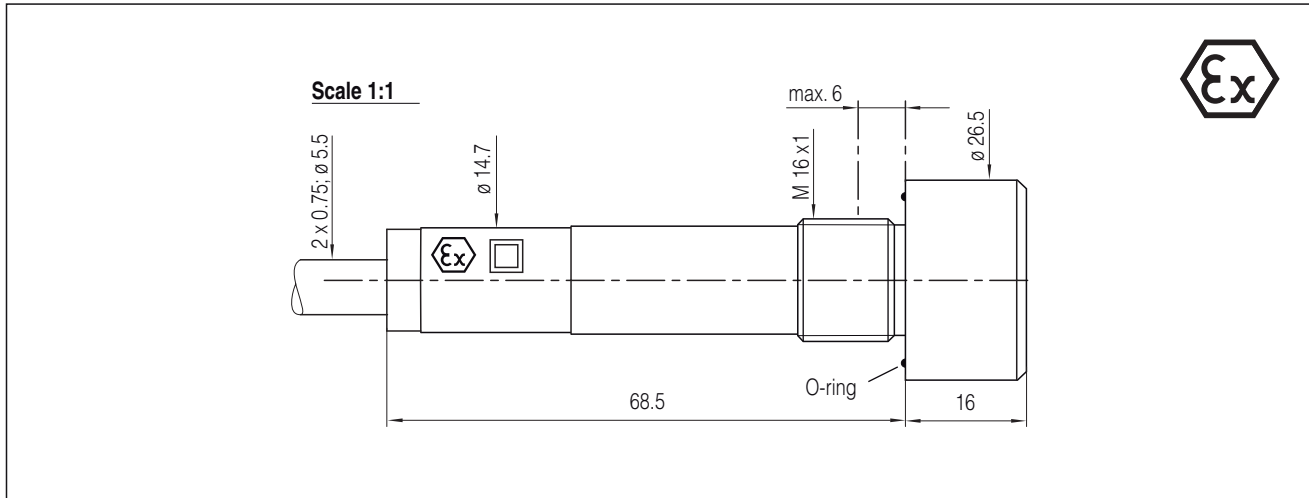
**TECHNICAL DATA**

Type of protection	EEx d IIC T6 CE 0044 II 2 GD T80°C ZELM 02 ATEX 0113		
Electrical rating	250 V 24 V	1.5 A 1.5 A	AC-21 DC-21
Contact	Double throw, massive silver (gold contact possible)		
Life	> 6 million operations		
Actuation	Travel approx. 3.5 mm Force approx. 10 N		
Ambient temperature	-20 to +60 °C		
Protection class	IP 68		
Mounting nut	Ø max. 18 mm		
Housing	Nicked brass		
Electrical connection	3 x 0.75 mm <sup>2</sup> 1.5 m long (or other length)		
black	Break contact		
brown	Make contact		
blue	Common contact		

**Ordering information**

Mini-pushbutton, type dS77M-81

Version Momentary action      Order no.: 770



## DESCRIPTION

The explosion-proof signal transmitter combines small size (M 16 x 1 bushing), low current consumption (only 6 mA) and high volume (90 dBA).

In modern equipment, dangerous conditions must be clearly signalled. Due to its low current consumption, the signal transmitter can be supplied directly from the control.

The sound transducer operates piezoelectrically and without contacts. The sound is generated by the bending vibrations of the membrane.

Even in large control rooms, the signal transmitter's acute singing tone is clearly heard.

The drive electronics and the sound transducer are encapsulated; due to the sound outlet hole, the metal membrane's degree of protection is IP 30.

The membrane and the piezo-ceramics cannot be made explosion-proof by potting; therefore, an intrinsically safe circuit is only produced in the potted interior of the signal transmitter. This circuit is not conducted to the outside and thus needs not be considered during the setup.

## TECHNICAL DATA

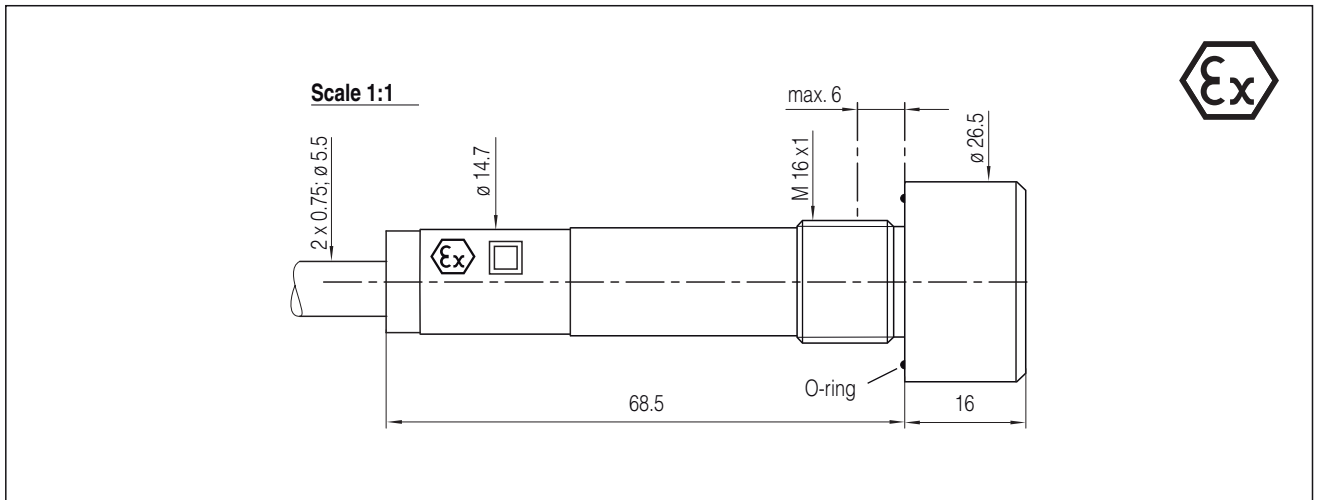
Type of protection	II 2 G Ex mb IIC T6 $-35^{\circ}\text{C} \leq T_a \leq 60^{\circ}\text{C}$ Gb II 2 D Ex mb IIIC T80°C $-35^{\circ}\text{C} \leq T_a \leq 60^{\circ}\text{C}$ Db PTB 02 ATEX 2119
Operating voltage	min. 19 V DC max. 33 V DC at reduced volume operable from 5 V
Power consumption	Approx. 6 mA at 24 VDC Approx. 11 mA at 33 VDC
Volume	90 dBA at a distance of 30 cm
Frequency	Approx. 4 kHz
Ambient temperature	$-35$ to $+60$ °C
Protection class	IP 68 (IEC 60529) Membrane IP 30
Mounting nut	Ø max. 18 mm
Housing	Nickel brass
Electrical connection	2 x 0.75 mm <sup>2</sup> 1.5 m long (or other length) blue - brown +

## Ordering information

Signal transmitter, type mS75M-83

Order no.: 753

Please indicate cable length if other than 1.5 m (3 m, 5 m or longer) in clear text.



**DESCRIPTION**

The explosion-proof signal transmitter combines small size (M 16 x 1 bushing), low current consumption (only 6 mA) and high volume (90 dBA).

In modern equipment, dangerous conditions must be clearly signalled. As its power consumption is low, generation of an intrinsically safe circuit is easy.

The intrinsically safe circuit with  $U_i$  (off-load voltage)  $\leq 33$  V is not affected by the signal transmitter;  $C_i$  and  $L_i$  are small enough to be neglected. Please take into consideration the supply line capacity (guide value 0.2 nF/m)

Neither  $I_i$  (short-circuit current) nor  $P_i$  (max. output power) do affect the safety of the signal transmitter.

The sound transducer operates piezoelectrically and without contacts. The sound is generated by the bending vibrations of the membrane.

Even in large control rooms, the signal transmitter's acute singing tone is clearly heard.

The drive electronics and the sound transducer are encapsulated; due to the sound outlet hole, the metal membrane's degree of protection is IP 30.

**TECHNICAL DATA**

Type of protection	<p> II 2 G Ex ib IIC T6 Gb  <math>-35^{\circ}\text{C} \leq T_a \leq 60^{\circ}\text{C}</math></p> <p> II 2 D Ex ib IIIC T80°C Db  <math>-35^{\circ}\text{C} \leq T_a \leq 60^{\circ}\text{C}</math>                  PTB 02 ATEX 2119</p>
Operating voltage Intrinsically safe	<p>Off-load voltage <math>U_i \leq 33</math> V                  min. 19 V DC                  max. 33 V DC                  at reduced volume                  operable from 6 V  <math>C_i</math> and <math>L_i</math> negligible</p>
Power consumption	<p>Approx. 6 mA at 24 VDC                  Approx. 11 mA at 33 VDC</p>
Volume	90 dBA at a distance of 30 cm
Frequency	Approx. 4 kHz
Ambient temperature	$-35$ to $+60$ °C
Protection class	IP 68 (IEC 60529) Membrane IP 30
Mounting nut	$\varnothing$ max. 18 mm
Housing	Nickel plated brass
Electrical connection	<p>2 x 0.75 mm<sup>2</sup>                  1.5 m long                  (or other length)                  blue -                  brown +</p>

**Ordering information**

Signal transmitter, type iS75M-83

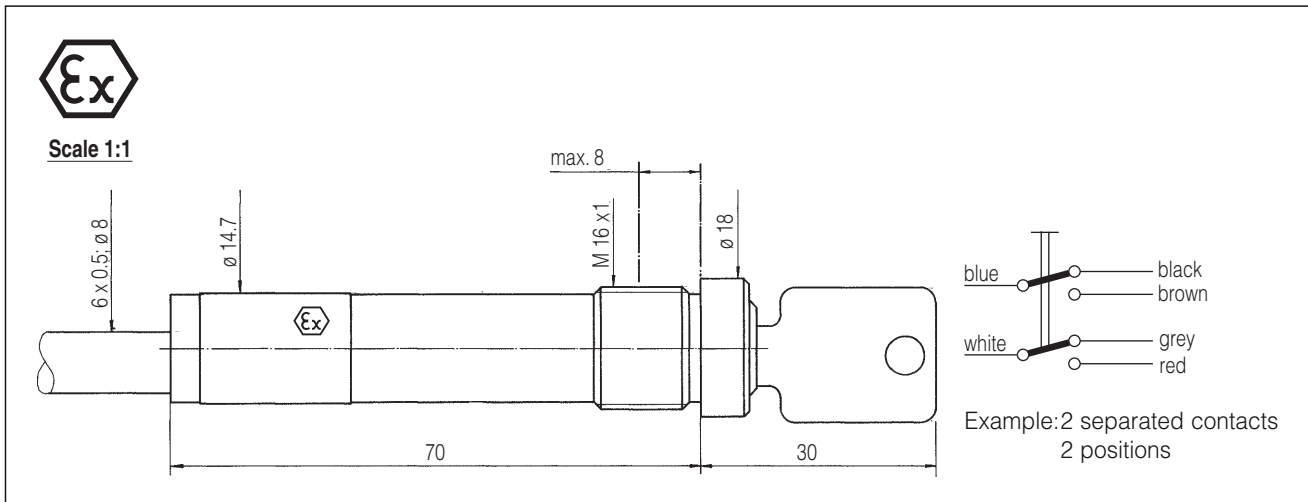
Order no.: 754

Please indicate cable length if other than 1.5 m (3 m, 5 m or longer) in clear text.

# Keylock switch

TPK

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## DESCRIPTION

Despite minimum dimensions the keylock switch is explosion and water-proof (IP 68).

The IP 68 degree of protection is obtained by a hermetic potting of the wires and the O-ring seal of the internal actuating shaft.

A precision rotary switch is flameproofly enclosed in the rugged metal housing (nickel plated brass) with M 16 x 1 bushing. The actuation is performed by a precision cylinder with a reversing key. Closing equipment can be realised.

Since the maximum outside diameter is only 18 mm, especially the mounting in small control panels and flow charts is unproblematic.

When ordering, you can choose if the key can be taken off in one position, in two adjacent positions or in each position. If there are two levels (contacts) the key can only be removed from one position.

The 2- and 3-position versions are also available for momentary or maintained action as well as for maintained action with two separate contact elements.

## Ordering information

Keylock switch, type dS79M-7616 DS

	Order no.:
2 Positions, maintained action	7922
3 Positions, maintained action	7923
4 Positions, maintained action	7924

2 Positions, maintained action	7922 1
3 Positions, maintained action	7923 1

Two separate contacts:	
2 Positions, maintained action	7922 2
3 Positions, maintained action	7923 2

Spare key 997905 Please indicate key

Please indicate cable length in clear text. Standard lengths are 1.5 m, 3 m and 5 m.

## TECHNICAL DATA

Type of protection	EEx d IIC T6 CE 0044 II 2 GD T80°C ZELM 02 ATEX 0113	
Electrical rating	AC/DC 21: 28 V; 0.2 A AC 21: 60 V; 0.15 A AC 21: 250 V; 75 mA	
Contact	Gold contact; lock-in angle 90°, 1 x 2 up to 1 x 4 positions	
Two separate contacts	Gold contact; lock-in angle 60°, 2 x 2 or 2 x 3 positions	
Ambient temperature	-20 to +60 °C	
Protection class	IP 68	
Mounting nut	M 16 x 1 Ø max. 18 mm	
Housing	Nickel plated brass	
Lock	Micro-precision-cylinder with a reversing key and one, two or four take-off positions.	
Electrical connection	1.5 m long (or other length)	
	One contact	Two contacts
2 positions:	4 x 0.75 mm <sup>2</sup>	7 x 0.5 mm <sup>2</sup>
3 positions:	5 x 0.5 mm <sup>2</sup>	10 x 0.5 mm <sup>2</sup>
4 positions:	6 x 0.5 mm <sup>2</sup>	
Green-yellow	Protective conductor	

	No. of positions						
	One single contact element			Cont. 1	Cont. 2	Cont. 1	Cont. 2
Position	2	3	4	2		3	
Common	blue	blue	blue	blue	white	blue	white
1	black	black	black	black	grey	black	orange
2	brown	brown	brown	brown	red	brown	pink
3	-	grey	grey	-	-	grey	lilac
4	-	-	white	-	-	-	-

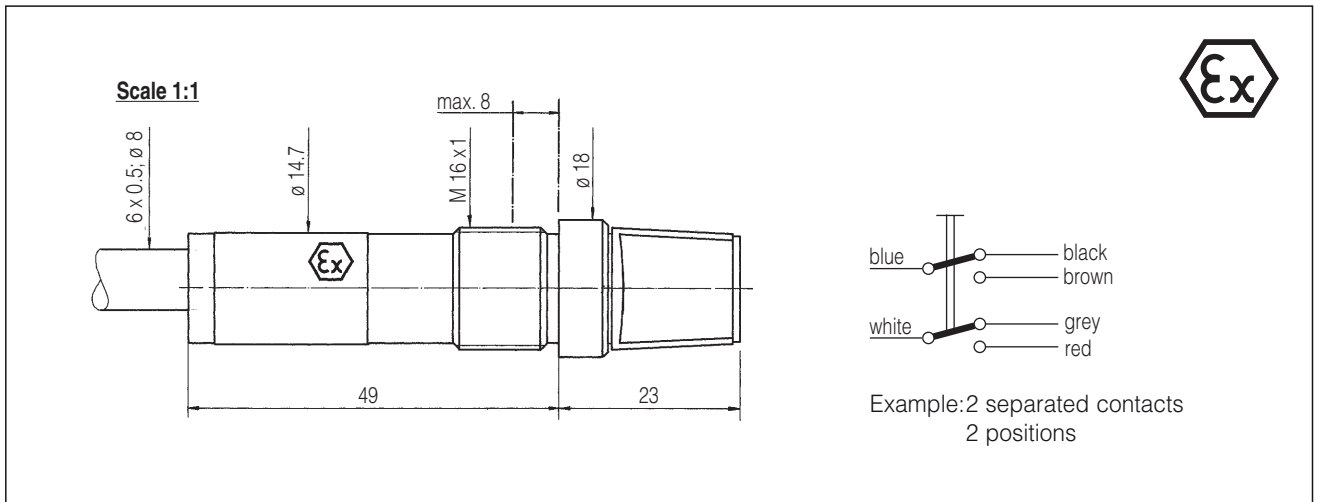
sw = black  
Position 1 = key turned in anti-clockwise direction.

Only the version with 4 positions may be fully rotated. A version with a stop is however possible on request.



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2 to 4 positions



**DESCRIPTION**

Despite minimum dimensions, the rotary switch with knob actuation and 60° or 90° lock-in angle is explosion and water-proof (IP 68).

The IP 68 degree of protection is obtained by a hermetic potting of the wires and the O-ring seal of the actuating shaft.

A precision rotary switch is flameproofly enclosed in the rugged metal housing (nickel brass) with M 16 x 1 bushing.

Since the maximum outside diameter is only 18 mm, especially the mounting in small control panels and flow charts is unproblematic.

The 2- and 3-position versions are also available for momentary or maintained action as well as for maintained action with two separate contact elements.

The actuator knob is fixed to the shaft with a collet chuck. This allows to turn the button to any desired position, even after mounting (take off the cover plate of the knob, then unscrew).

**Ordering information**

Rotary switch, type dS79M-5616 D

	Order no.:
2 Positions, maintained action	7902
3 Positions, maintained action	7903
4 Positions, maintained action	7904
2 Positions, maintained action	7902 1
3 Positions, maintained action	7903 1
Two separate contacts:	
2 Positions, maintained action	7902 2
3 Positions, maintained action	7903 2

Please indicate cable length in clear text. Standard lengths are 1.5 m, 3 m and 5 m.

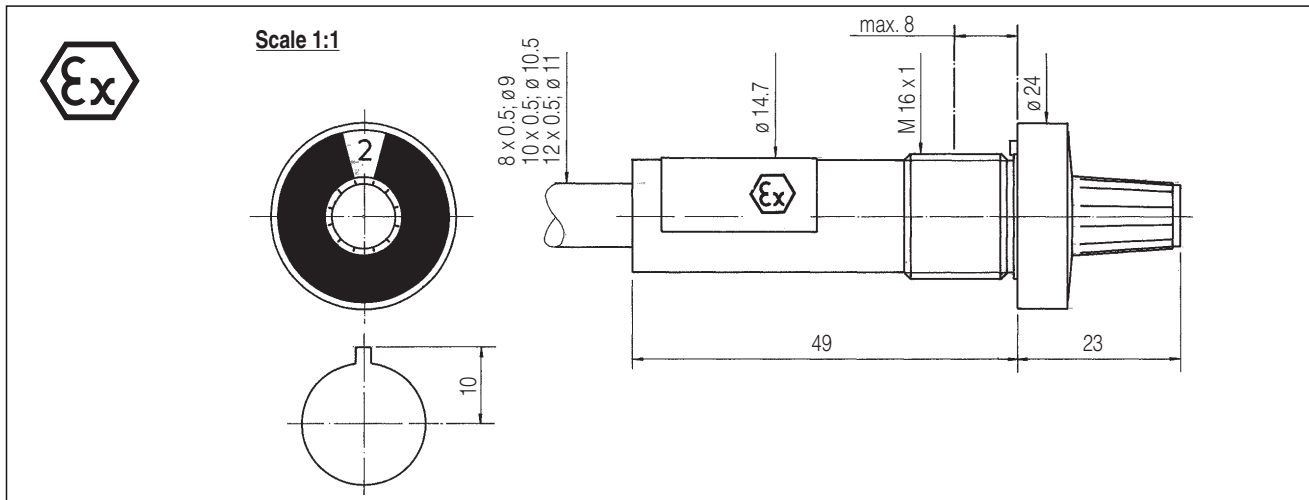
**TECHNICAL DATA**

Type of protection	EEx d IIC T6 CE 0044 II 2 GD T80°C ZELM 02 ATEX 0113	
Electrical rating	AC/DC 21: 28 V; 0.2 A AC 21: 60 V; 0.15 A AC 21: 250 V; 75 mA	
Contact	Gold contact; lock-in angle 90°, 1 x 2 up to 1 x 4 positions	
Two separate contacts	Gold contact; lock-in angle 60°, 2 x 2 or 2 x 3 positions	
Ambient temperature	-20 to +60 °C	
Protection class	IP 68	
Mounting nut	M 16 x 1 Ø max. 18 mm	
Housing	Nickel brass	
Knob	Novodur, dark grey	
Electrical connection	1.5 m long (or other length)	
	One contact	Two contacts
2 positions:	4 x 0.75 mm <sup>2</sup>	7 x 0.5 mm <sup>2</sup>
3 positions:	5 x 0.5 mm <sup>2</sup>	10 x 0.5 mm <sup>2</sup>
4 positions:	6 x 0.5 mm <sup>2</sup>	
Green-yellow	Protective conductor	

Position	No. of positions						
	One single contact element			Cont. 1	Cont. 2	Cont. 1	Cont. 2
Common	2	3	4	2	3		
1	blue	blue	blue	blue	white	blue	white
2	black	black	black	black	grey	black	orange
3	brown	brown	brown	brown	red	brown	pink
4	-	grey	grey	-	-	grey	lilac
5	-	-	white	-	-	-	-

sw = black  
 Position 1 = knob turned in anti-clockwise direction.

Only the version with 4 positions may be fully rotated. A version with a stop is however possible on request.



## DESCRIPTION

The explosion-proof step switch with a lock-in angle of 36 ° is available with 5 to 10 switching positions. For 2 to 4 positions, we recommend our rotary switch.

A precision rotary switch is flameproofly enclosed in the rugged metal housing (nickel brass) with M 16 x 1 bushing and anti-rotation feature against the front panel.

Despite the small size, not only the Ex-requirements of the European standard are met, but also the IP 68 degree of protection (water-proof).

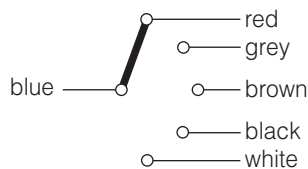
The control knob and the dial (inscription 0 to 9) are already mounted. The dial can be turned, such that a 5-position step switch can indicate both 0 to 5 and e.g. 1 to 6.

The step switches don't allow full rotation. Only the version with 10 switching positions is available with full rotation as an option.

The number of wires depends on the number of switching positions. With 7 and 9 positions, one wire is not connected.

## TECHNICAL DATA

Type of protection	EEx d IIC T6 CE 0044 II 2 GD T80°C ZELM 02 ATEX 0113
Electrical rating	60 V; 0.15 A; AC 21
Contact	Gold contact Lock-in angle 36° 5 to 10 positions
Ambient temperature	-20 to +60 °C
Test voltage	500 V AC referred to housing
Protection class	IP 68
Housing	Nickel brass
Plastic	Knob, dark grey
Weight	Approx. 290 g
Electrical connection	7 x 0.5 mm <sup>2</sup> up to 12 x 0.5 mm <sup>2</sup> , 1.5 long (or other length) Common contact: Blue



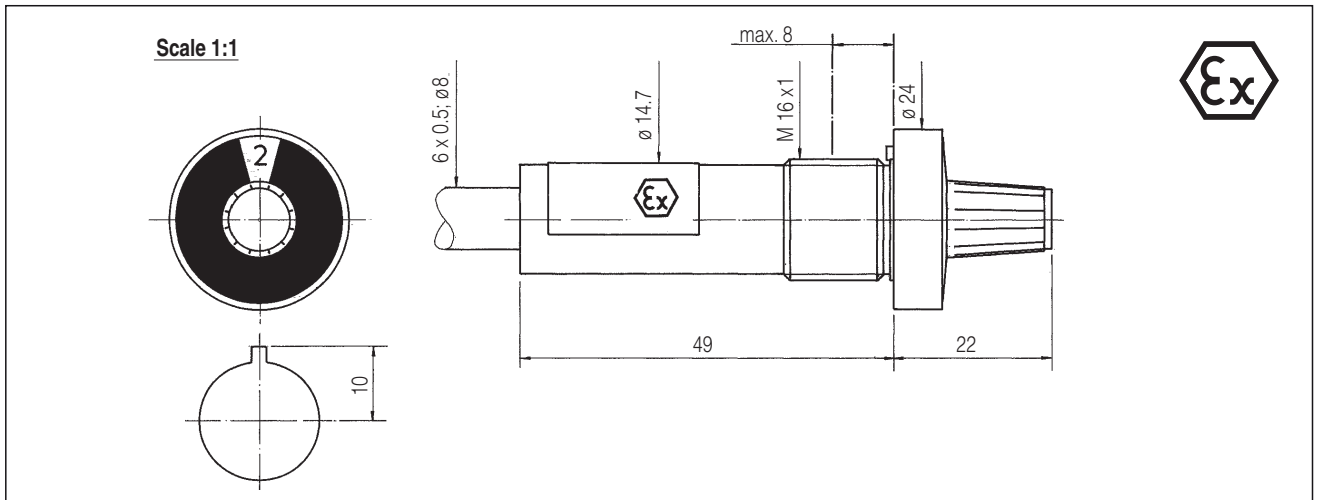
Example for 5 positions

## Ordering information

Mini step switch, type dS79M-5716 D

5 positions	Order no.: 79005
6 positions	Order no.: 79006
7 positions	Order no.: 79007
8 positions	Order no.: 79008
9 positions	Order no.: 79009
10 positions	Order no.: 79010

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**DESCRIPTION**

The explosion-proof BCD mini-switch with a lock-in angle of 22.5 ° is available with up to 16 switching positions.

A precision rotary switch with BSC code is flameproofly enclosed in the rugged metal housing (nickel plated brass) with M 16 x 1 bushing and anti-rotation feature against the front panel.

Despite the small size, not only the Ex-requirements of the European standard are met, but also the IP 68 degree of protection (water-proof).

The 6-wire connecting cable contains, in addition to the protective conductor and the common contact of the switch, the outputs 2° (1) to 23° (8). The version with 16 positions uses all possible codes (0000 to 1111). The 10-position version has free codes from 1010 to 1111.

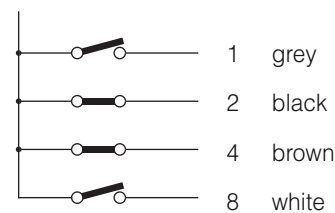
The control knob and the dial (inscription 0 to 15) are already mounted. The dial can be turned, such that a 10-position BCD mini-switch can indicate both 0 to 9 and e.g. 1 to 10. This does not change the code.

The BCD mini-switches with up to 15 positions do not allow full rotation. The 16-position version without full rotation is only available as an option.

**TECHNICAL DATA**

Type of protection	EEx d IIC T6 CE 0044 II 2 GD T80°C ZELM 02 ATEX 0113
Electrical rating	60 V; 0.15 A; AC 21
Contact	Gold contact Lock-in angle 22.5° 10 or 16 positions
Ambient temperature	-20 to +60 °C
Test voltage	500 V AC referred to housing
Protection class	IP 68
Housing	Nickel plated brass
Plastic	Knob, dark grey
Weight	Approx. 210 g
Electrical connection	6 x 0.5 mm², 1.5 long (or other length)

blue



Represented in position 6

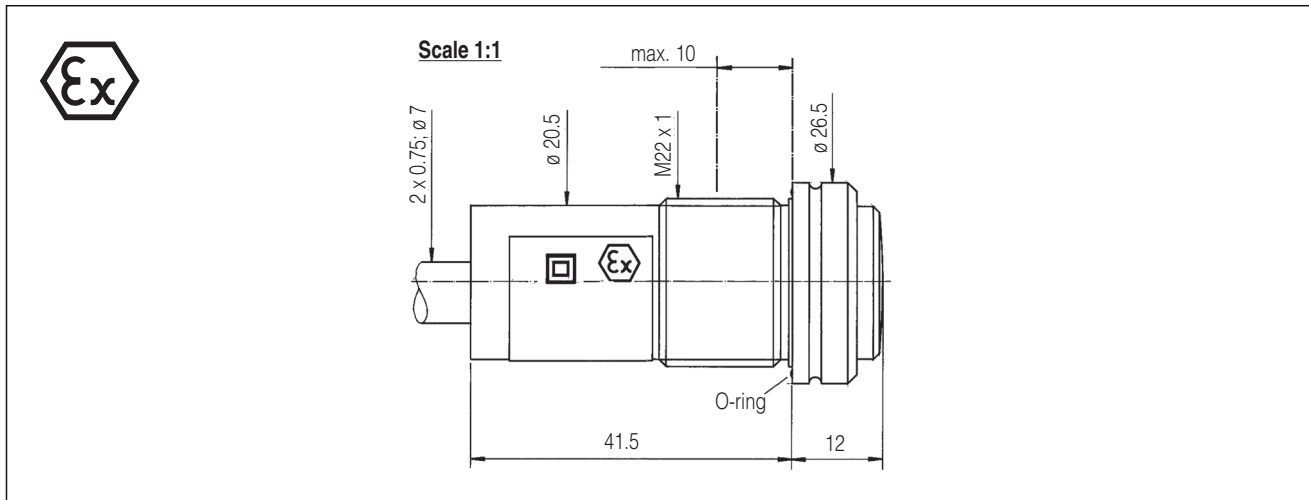
**Ordering information**

BCD mini-switch, type dS79M-5716 BCD

10 positions                      Order no.: 79110  
 16 positions                      Order no.: 79116

## Indicator lamp in VA with LEDs

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### DESCRIPTION

Led22 offers exceptionally high luminance and is extremely rugged. Due to the highest type of protection operation is possible without limitation in zone 1 and 2 but not for underground workings.

The shallow insertion depth permits mounting in flat control enclosures, for instance in lifts.

The enclosure is in VA, the cap in practically indestructible polycarbonate. Protection type IP 68 permits operation even where flooding may be anticipated. The high protection type is achieved by hermetic sealing.

A standard 22 mm drill hole is required for mounting purposes, the plastic nut is included in the scope of delivery.

Led22 is totally insulated, the protective conductor in the connection lead and connection in the terminal box are thus dispensed with.

Operation with d.c. or a.c. voltage is possible. Built-in power stabilisation assures uniform brightness across the entire voltage range.

A two-colour version in red and green with three-wire connecting cable and only for operation with d.c. current is also available.

### Ordering information

Led22, type dS83V-5322

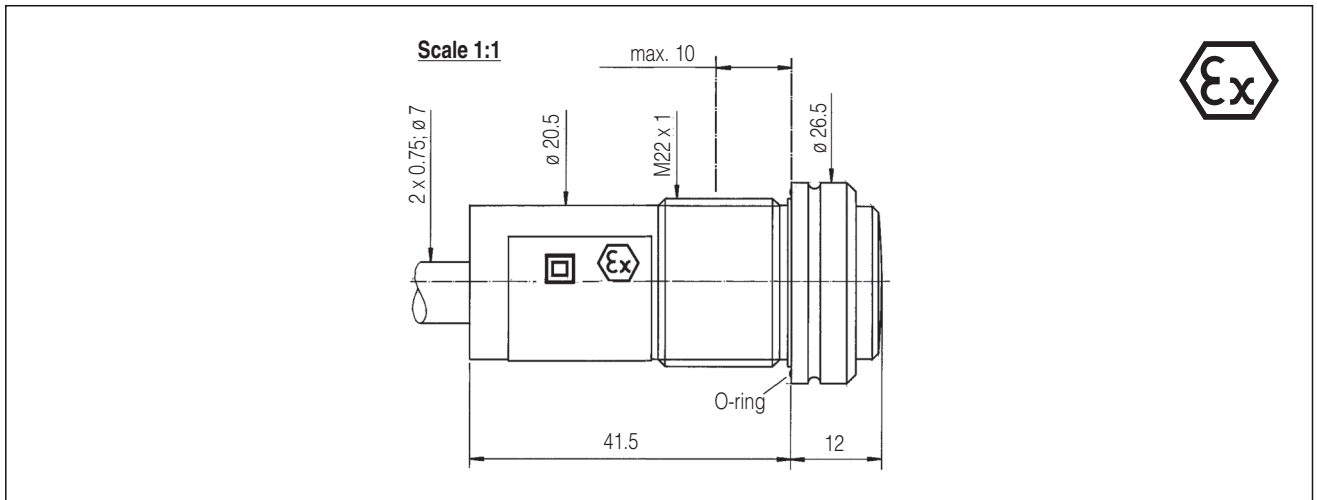
Luminous colour	Order no.:
White	830 0 0
Red	830 0 1
Yellow (Orange)	830 0 2
Green	830 0 3
Blue	830 0 4

Two-colour Red/Yellow	830 1 2
Two-colour Red/Green	830 1 3
Two-colour Yellow/Green	830 2 3

Please indicate cable length in clear text. Standard lengths are 1.5 m, 3 m and 5 m.

### TECHNICAL DATA

Type of protection	EEx d IIC T6/T5 CE 0044 II 2 GD T80°C IP 68 PTB 02 ATEX 1152 X
Operating voltage	min. 16 V $\cong$ max. 33 V $\cong$ (other voltage possible)
Power consumption	Approx. 15 mA at 16 V Approx. 18 mA at 33 V
Luminance	min. 250 mcd/cm <sup>2</sup>
Ambient temperature	-20 to +55 °C
Protection class	IP 68 (IEC144)
Mounting nut	Plastic $\varnothing$ max. 29.5 mm
Housing	VA
Cap	Polycarbonate
Electrical connection	1.5 m long (or other length)
One-colour version blue (blue) brown (br)	2 x 0.75 mm <sup>2</sup> No fixed polarity
Two-colour version blue (blue) brown (br) black (sw)	3 x 0.75 mm <sup>2</sup> - common + Luminous colour red + Luminous colour green



**DESCRIPTION**

Led22 offers exceptionally high luminance and is extremely rugged. Due to the highest type of protection operation is possible without limitation in zone 1 and 2 but not for underground workings.

The low power consumption allows a circuit that does not require an additional back-up fuse. The existing fuse must only be sized so as to protect the supply line (0.75 mm²).

The enclosure is in VA, the cap in practically indestructible polycarbonate. Protection type IP 68 permits operation even where flooding may be anticipated. The high protection type is achieved by hermetic sealing.

The shallow insertion depth permits mounting in flat control enclosures, for instance in lifts.

A standard 22 mm drill hole is required for mounting purposes, the plastic nut is included in the scope of delivery.

Led22 is totally insulated, the protective conductor in the connection lead and connection in the terminal box are thus dispensed with.

Operation with d.c. or a.c. voltage is possible.

**Ordering information**

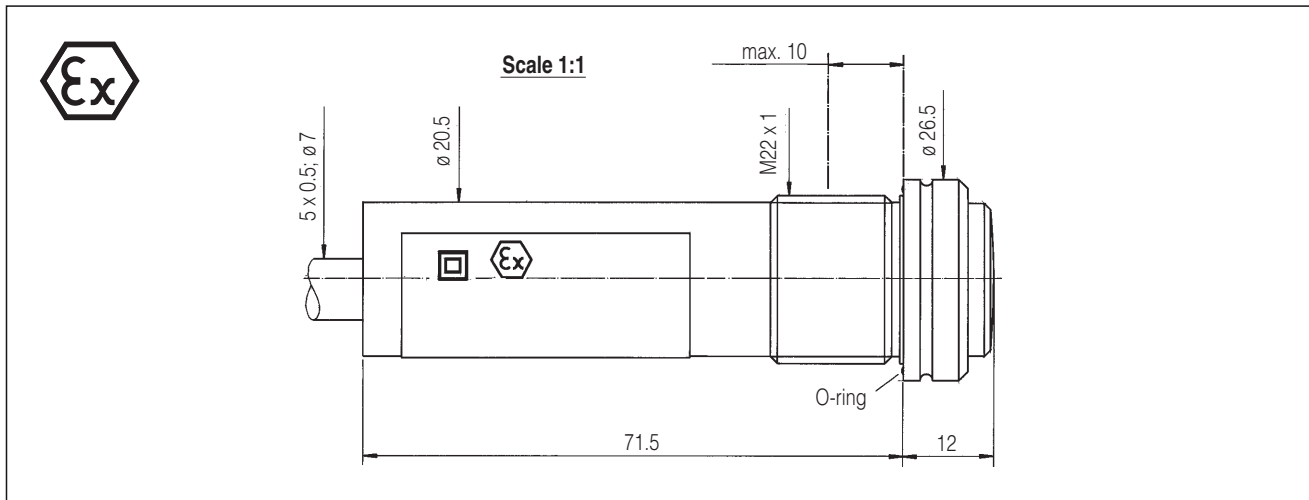
Led22 230V, type dS83V-5322

Luminous colour	Order no.:
White	831 0 0
Red	831 0 1
Yellow (Orange)	831 0 2
Green	831 0 3
Blue	831 0 4

Please indicate cable length in clear text. Standard lengths are 1.5 m, 3 m and 5 m.

**TECHNICAL DATA**

Type of protection	EEx d IIC T6/T5 CE 0044 II 2 GD T80°C IP 68 PTB 02 ATEX 1152 X
Operating voltage	min. 100 V (reduced brightness) max. 230 V +10 % ≅
Power consumption	Approx. 5 mA at 230 V
Ambient temperature	-20 to +55 °C
Protection class	IP 68 (IEC144)
Mounting nut	Plastic Ø max. 29.5 mm
Housing	VA
Cap	Polycarbonate
Electrical connection	1.5 m long (or other length) 2 x 0.75 mm² No fixed polarity
blue (blue) brown (br)	



## DESCRIPTION

In addition to the lighted mini-pushbutton with M 16 x 1 bushing, which we have been manufacturing since 1983, a slightly bigger variant with an M 22 x 1 thread is now available.

Eight LEDs provide great brightness, long life and low power consumption; the supply voltage is 24 V. A reverse polarity protection is built-in.

The snap-action switch guarantees perfect contact-making, a positive feeling of the switching action, and it can switch up to 250 V and 1.5 A.

The IP 68 sealing allows unlimited use with regard to the influence of water and dust.

The housing is made of VA, thus avoiding the building-up of an element (electric corrosion) when mounted in a stainless-steel control cabinet.

Since the lighted pushbutton22 is totally insulated, the connecting line has no protective conductor.

The lighted pushbutton22 with the two luminous colours red and green can replace two pushbuttons and two indicator lamps.

## Ordering information

Lighted pushbutton22, type dS81V-8322

Luminous colour	Push button	Order no.:
White		81 00 0
Red		81 00 1
Yellow (Orange)		81 00 2
Green		81 00 3
Blue		81 00 4
Red / Green two-colour		81 01 3

Please indicate cable length in clear text. Standard lengths are 1.5 m, 3 m and 5 m.

## TECHNICAL DATA

Type of protection EEx d IIC T6  
 CE 0044 II 2 GD T80°C IP 68  
 PTB 02 ATEX 1152 X

Operating voltage LEDs: 20 to 30 V DC

Power consumption 16 mA at 20 V  
 30 mA at 30 V

Electrical rating 250 V 1.5 A AC-21  
 24 V 1.5 A DC-21

Contact Change-over, massive silver  
 (gold contact possible)

Life > 2 million operations

Actuation Travel approx. 3.5 mm  
 Force approx. 17 N

Ambient temperature -20 to +55 °C

Protection class IP 68 ( IEC 144)

Mounting nut Plastic Ø max. 29.5 mm

Housing VA; clear PC cap

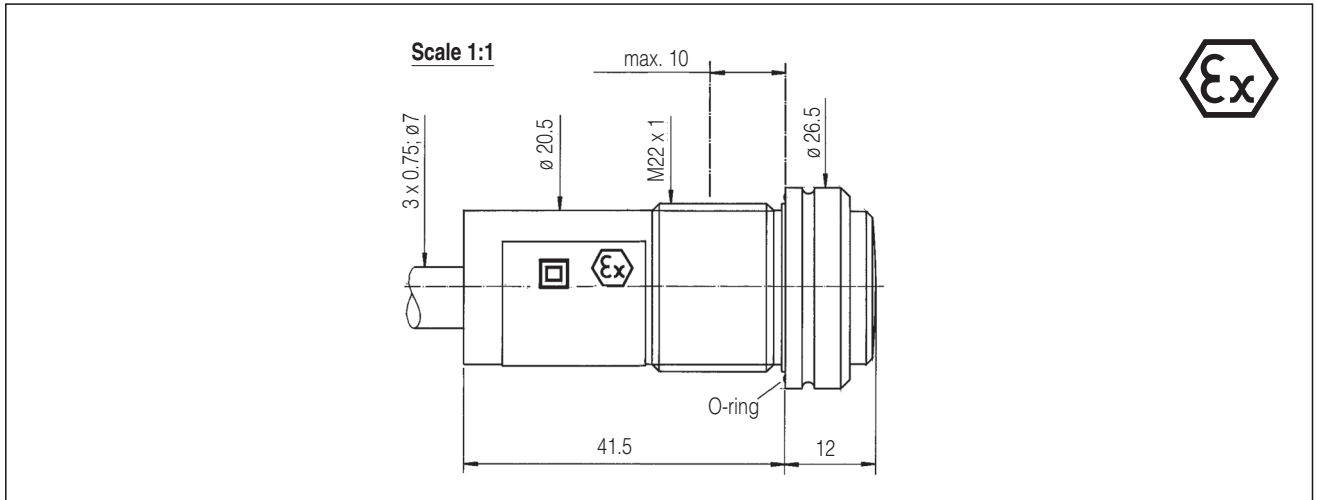
Weight Approx. 245 g

Electrical connection 5 x 0.5 mm<sup>2</sup>  
 6 x 0.5 mm<sup>2</sup> two-colour  
 1.5 m long (or other length)

LEDs white + 24 V  
 grey -

LEDs two-colour Luminous colour red white +  
 Luminous colour green orange +  
 common orange +  
 grey -

Change-over contact blue Common  
 brown Make contact  
 black Break contact



**DESCRIPTION**

Pushbutton22 was developed for operating rooms where exceptional ruggedness is demanded and the possible insertion depth is limited.

The enclosure and pushbutton are made of VA and thus extremely durable mechanically and chemically. Protection type IP 68 permits mounting even where flooding may be anticipated. The high protection type is achieved via O-ring sealing of the plunger and hermetic sealing of the connection lead.

A standard 22 mm drill hole is required for mounting purposes, the plastic nut is included in the scope of delivery.

Pushbutton22 is totally insulated, dispensing with the protective conductor in the connecting cable and terminal box.

The switching contact is designed as a change-over switch; a version with separate break and make contacts with 4-wire connection lead is also available.

Due to the high switching voltage of 250 V direct control of the contactor circuits is possible.

A coloured engraved plastic disk is glued into the pushbutton. If aggressive solvents are used, coloured anodised metal signs may also be used.

**Ordering information**

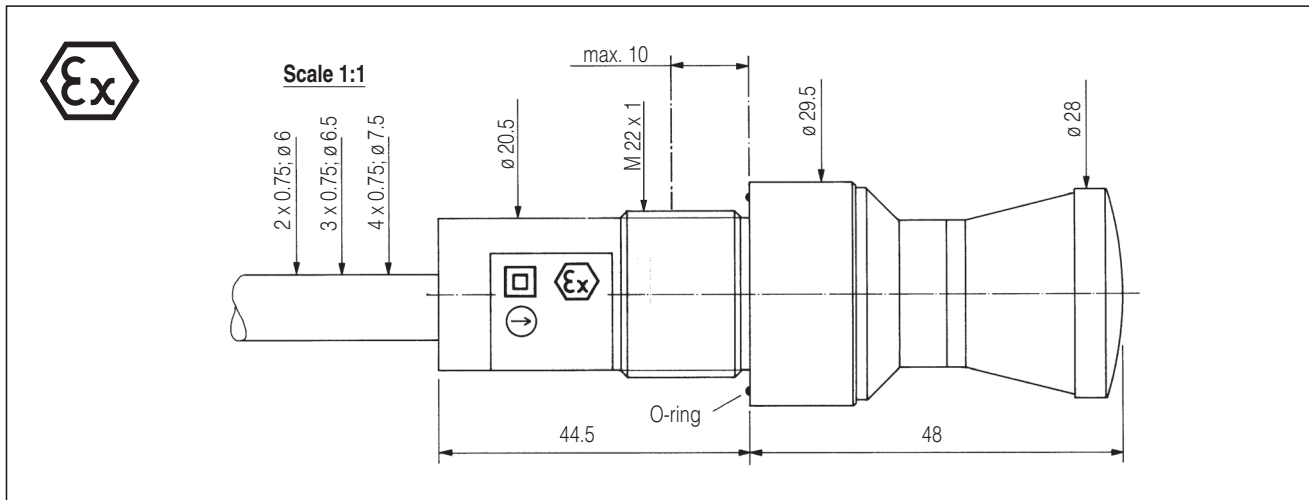
Pushbutton22, type dS87V-5322

Type	Order no.:
with c/o contact	87 0 00
separate break and make contacts	87 3 00
Anodised colour coding	99 87 03

Please indicate cable length in clear text. Standard lengths are 1.5 m, 3 m and 5 m.

**TECHNICAL DATA**

Type of protection	EEx d IIC T6/T5 CE 0044 II 2 GD T80°C IP 68 PTB 02 ATEX 1152 X
Electrical rating	250 V 1.5 A AC-21 24 V 1.5 A DC-21
Contact	Double throw, gold-plated silver Snap action with slide contact
Life	> 6 million operations
Actuation	Travel approx. 3.5 mm Force approx. 5 N
Ambient temperature	-20 to +55 °C
Protection class	IP 68 (IEC144)
Mounting nut	Plastic Ø max. 29.5 mm
Housing	VA
Weight	Approx. 160 g
Electrical connection	1.5 m long (or other length)
Change-over contact	Standard: 3 x 0.75 mm <sup>2</sup> blue (bl) Common contact (C) brown (br) Make contact (NO) black (sw) Break contact (NC)
Make and break contact	separated: 4 x 0.75 mm <sup>2</sup> blue (bl) Make contact (NO) brown (br) Make contact (NO) black (sw) Break contact (NC) grey (gr) Break contact (NC)



## DESCRIPTION

Emergency off button22 features a red or black (as an option) mushroom head, yellow sleeve and green ring as switching position indicator. The outwit safe snap action feature may be unlocked by turning to the right or left.

The contact is positive opening. If the positive opening function is not required the device may be supplied with two-way contact or separate break and make contact or with two separate break contacts.

The emergency off button22 is approved for gas and dust explosion-endangered areas.

The enclosure is made of VA, the actuator in practically indestructible plastic. Protection type IP 68 permits operation even where flooding may be anticipated. The high protection type is achieved with O-ring sealing of the plunger and hermetic sealing.

A standard 22 mm drill hole is required for mounting purposes, a plastic nut is included in the delivery scope.

### Life:

Switching element, mechanical: > 10 million operations  
Knob only: > 100 000 operations

The snap action feature of the knob may fail, but the actuation of the switching element is still possible.

The knob is available separately as spare part in red or black and can be mounted in hazardous area.

## Ordering information

Emergency off button22, type dS87V-8722

Type	Order no.:
with positive opener	87 50 2
with two-way contact	87 00 1
with separate break and make contacts	87 30 1
with two separate break contacts	87 40 1
Spare knob red	99 87 15
Spare knob black	99 87 06
Contrast label, yellow Ø 60	99 87 01

Please indicate cable length in clear text. Standard lengths are 1.5 m, 3 m and 5 m.

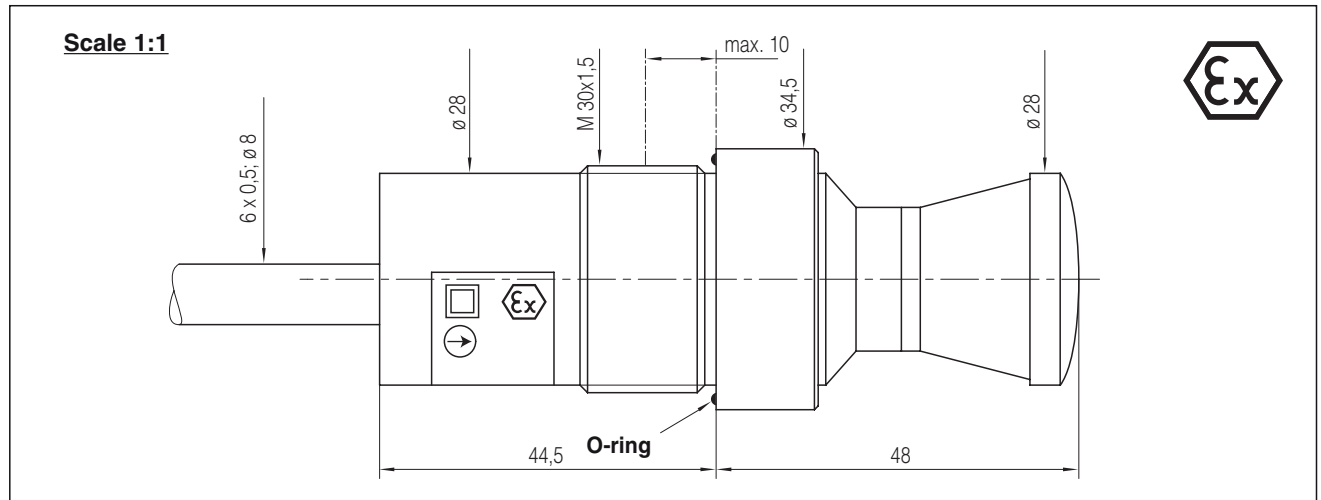
## TECHNICAL DATA

Type of protection	EEx d IIC T6/T5 CE 0044 II 2 GD 80°C or T5 95°C IP68 PTB 02 ATEX 1152 X
Electrical rating	250 V 1 A AC 15 5 A thermal current
Operating force	Approx. 16 N
Ambient temperature	-20 to +55 °C
Protection class	IP 68 (IEC 60529)
Mounting nut	Plastic Ø max. 29.5 mm
Housing	VA
Actuator (knob)	Plastic
Weight	Approx. 190 g
Electrical connection	1.5 m long (or other length)
Blue and brown	Positive opener 2 x 0.75 mm <sup>2</sup>
blue (bl) brown (br) black (sw)	Two-way contact 3 x 0.75 mm <sup>2</sup> - common Make contact (NO) Break contact (NC)
blue and brown black and grey	Separate break and make contacts 4 x 0.75 mm <sup>2</sup> Make contact (NO) Break contact (NC)



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Emergency off button made of VA with 3 contacts



**DESCRIPTION**

The new safety standards require Emergency off buttons with several positive openers. The Emergency off button30 has either three positive openers or two positive openers and one make contact. All contacts are entirely electrically isolated from each other.

Emergency off button30 features a red or black (as an option) mushroom head, yellow sleeve and green ring as switching position indicator. The outwit safe snap action feature may be unlocked by turning to the right or left.

The emergency off button30 is approved for gas and dust explosion-endangered areas.

The shallow insertion depth even permits mounting in flat control enclosures.

The enclosure is made of VA, the actuator in practically indestructible plastic. Protection type IP 68 permits operation even where flooding may be anticipated. The high protection type is achieved with O-ring sealing of the plunger and hermetic encapsulation.

Emergency off button30 is totally insulated, the protective conductor in the connection lead and connection in the terminal box are thus dispensed with.

The knob is available separately as spare part in red or black and can be replaced in hazardous area.

A standard drill hole of Ø 30 mm is required for mounting purposes. A plastic nut is included in the delivery scope.

**Ordering information**

Emergency off button30, type dS64V-8730

	Order no.:
with 3 positive opener	87 70 7
with 2 positive openers and 1 make contact	87 70 8
Spare knob red	99 87 15
Spare knob black	99 87 06
Contrast label, yellowØ90	99 87 10

Please indicate cable length in clear text. Standard lengths are 1.5 m, 3 m and 5 m.

**TECHNICAL DATA**

Type of protection	EEx d IIC T6/T5 CE II 2 GD 80°C PTB 03 ATEX 1130
Electrical rating	250 V 1 A AC 15 5 A thermal current
Contact	Multi-layer contact, 2 µm gold-plated
Operating force	Approx. 16 N
Ambient temperature	-20 to +50 °C (T5 up to 55 °C)
Protection class	IP 68 (IEC 60529)
Mounting nut	Plastic Ø max. 36 mm
Housing	VA
Actuator (knob)	Plastic
Weight	Approx. 240 g
Electrical connection	6 x 0.5 mm <sup>2</sup> , 1.5 m long (or other length)
Positive opener 1	white and grey
Positive opener 2	blue and brown
Positive opener 3 or make contact	black and orange

**Product life:**

Switching element, mechanical: > 10 000 000 operations  
 Knob only: > 100 000 operations

The snap action feature of the knob may fail, but the actuation of the switching element is still possible.

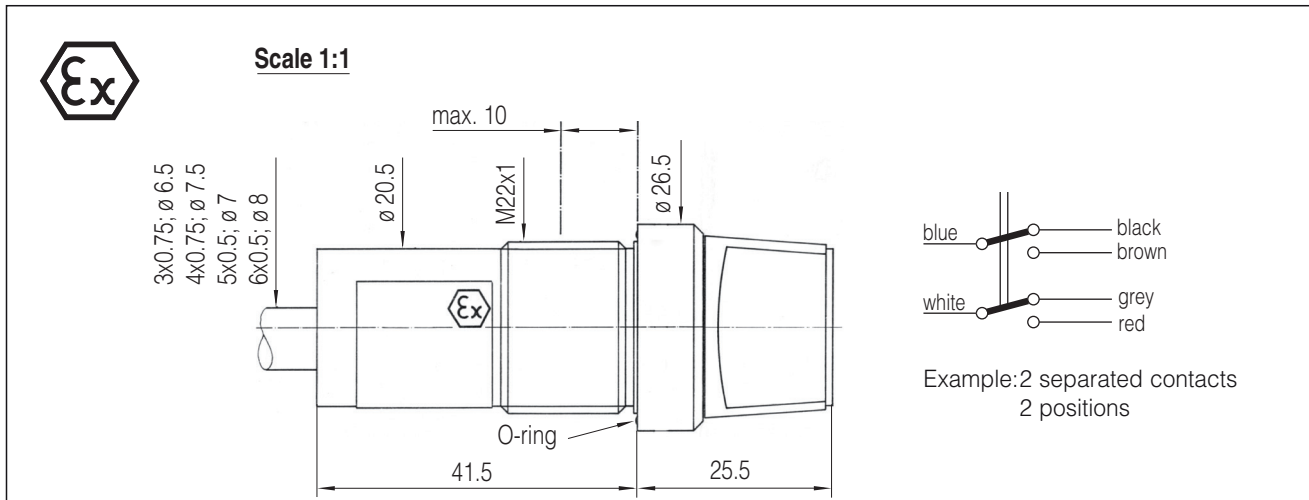
The knob is available separately as spare part and can be replaced in hazardous area.

# Rotary switch22

TPK

## Rotary switch in VA with 2 to 4 positions

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### DESCRIPTION

The explosion-proof rotary switch22 with knob actuation and 60° or 90° lock-in angle is rugged and water-proof. Due to the highest type of protection operation is possible without limitation in zone 1 and 2, as well as 21 and 22 (= dust-Ex) but not for underground workings.

Protection type IP 68 permits operation even where flooding may be anticipated. The high protection type is achieved by hermetic sealing and O-ring gasket on the shaft.

Due to the O-ring on the contact area, front plate sealing is also provided; moreover this O-ring dispenses with the need for a mechanical anti-rotation feature with a groove that is awkward to furnish.

The shallow insertion depth permits mounting in flat control enclosures, for instance in lifts; a 22 mm standard drill hole only is required for mounting, the plastic nut is included in the scope of delivery.

The actuator knob is fixed to the shaft with a collet chuck. This allows to turn the button to any desired position, even after mounting (take off the cover plate of the knob, then unscrew).

The 2- and 3-position versions are also available for momentary or maintained action as well as for maintained action with two separate contact elements.

### Ordering information

Rotary switch22, type dS89V-5322

	Order no.:
2 Positions, maintained action	8902
3 Positions, maintained action	8903
4 Positions, maintained action	8904
2 Positions, maintained action	8902 1
3 Positions, maintained action	8903 1
Two separate contacts:	
2 Positions, maintained action	8902 2
3 Positions, maintained action	8903 2

Please indicate cable length in clear text. Standard lengths are 1.5 m, 3 m and 5 m.

### TECHNICAL DATA

Type of protection	EEx d IIC T6 CE 0044 II 2 GD T80°C IP68 PTB 02 ATEX 1152 X	
Electrical rating	AC/DC 21: 28 V; 0.2 A AC 21: 60 V; 0.15 A AC 21: 250 V; 75 mA	
Contact	Gold contact; lock-in angle 90°, 1 x 2 to 1 x 4 positions	
Two separate contacts	Gold contact; lock-in angle 60°, 2 x 2 or 2 x 3 positions	
Ambient temperature	-20 to +55 °C	
Protection class	IP 68 (IEC 60529)	
Mounting nut	Plastic Ø max. 29.5 mm	
Housing	VA	
Electrical connection	1.5 m long (or other length)	
	One contact	Two contacts
2 positions:	4 x 0.75 mm <sup>2</sup>	7 x 0.5 mm <sup>2</sup>
3 positions:	5 x 0.5 mm <sup>2</sup>	10 x 0.5 mm <sup>2</sup>
4 positions:	6 x 0.5 mm <sup>2</sup>	
Green-yellow	Protective conductor	

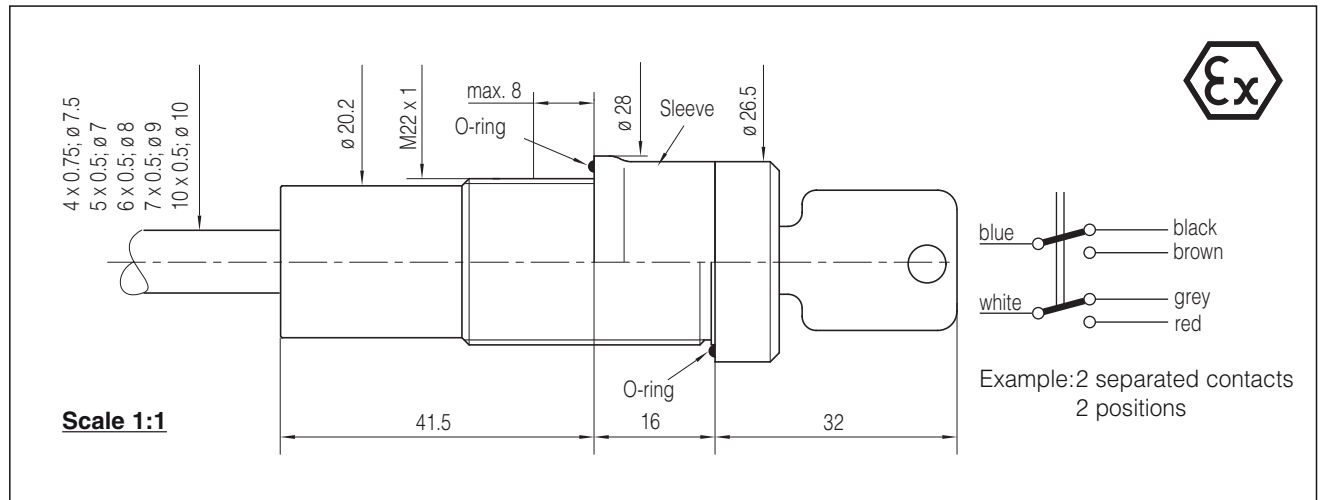
Position	No. of positions						
	One single contact element			Cont. 1	Cont. 2	Cont. 1	Cont. 2
Common	blue	blue	blue	blue	white	blue	white
1	black	black	black	black	grey	black	orange
2	brown	brown	brown	brown	red	brown	pink
3	-	grey	grey	-	-	grey	lilac
4	-	-	white	-	-	-	-

sw = black  
Position 1 = knob turned in anti-clockwise direction.

Only the version with 4 positions may be fully rotated. A version with a stop is however possible on request.

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Keylock switch in VA with 2 to 4 positions



**DESCRIPTION**

The explosion-proof Keylock switch22 with 60° or 90° lock-in angle is rugged and water-proof. Due to the highest type of protection operation is possible without limitation in zone1 and 2, as well as 21 and 22 (= dust-Ex) but not for underground workings.

Protection type IP 68 permits operation even where flooding may be anticipated. The high protection type is achieved by hermetic sealing and, inside, by an O-ring gasket.

The O-ring on the contact area provides front plate sealing and dispenses with the need for a mechanical anti-rotation feature. For mounting purposes only a standard drill hole of 22 mm is necessary, the plastic nut is supplied in the scope of delivery.

If shallow insertion depth is required, as for Pushbutton22 and Led22, an additional sleeve can be used for mounting which is also equipped with an O-ring on the contact area.

The 2- and 3-position versions are also available for momentary or maintained action as well as for maintained action with two separate contact elements.

**Ordering information**

Keylock switch22, type dS89V-6622

	Order no.:
2 Positions, maintained action	8922
3 Positions, maintained action	8923
4 Positions, maintained action	8924

2 Positions, maintained action	8922 1
3 Positions, maintained action	8923 1

Two separate contacts:	
2 Positions, maintained action	8922 2
3 Positions, maintained action	8923 2

Sleeve	998901
Spare key	997905
	Please indicate key number

Please indicate cable length in clear text. Standard lengths are 1.5 m, 3 m and 5 m.

**TECHNICAL DATA**

Type of protection EEx d IIC T6  
 CE 0044 II 2 GD T80°C IP 68  
 PTB 02 ATEX 1152 X

Electrical rating AC/DC 21: 28 V; 0.2 A  
 AC 21: 60 V; 0.15 A  
 AC 21: 250 V; 75 mA

Contact Gold contact; lock-in angle 90°,  
 1 x 2 up to 1 x 4 positions

Two separate contacts Gold contact; lock-in angle 60°,  
 2 x 2 or 2 x 3 positions

Ambient temperature -20 to +55 °C

Protection class IP 68 (IEC 60529)

Mounting nut Plastic Ø max. 29.5 mm

Housing VA

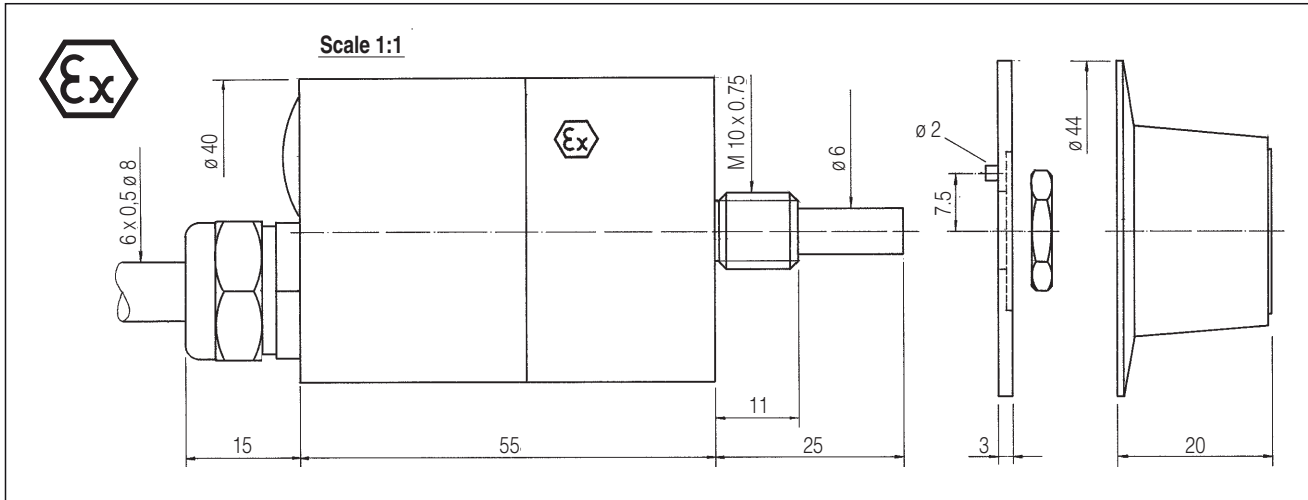
Electrical connection 1.5 m long (or other length)

	One contact	Two contacts
2 positions:	4 x 0.75 mm <sup>2</sup>	7 x 0.5 mm <sup>2</sup>
3 positions:	5 x 0.5 mm <sup>2</sup>	10 x 0.5 mm <sup>2</sup>
4 positions:	6 x 0.5 mm <sup>2</sup>	
Green-yellow	Protective conductor	

Position	No. of positions						
	One single contact element			Cont. 1	Cont. 2	Cont. 1	Cont. 2
Common	2	3	4	2	3	3	3
1	blue	blue	blue	blue	white	blue	white
2	black	black	black	black	grey	black	orange
3	brown	brown	brown	brown	red	brown	pink
4	-	grey	grey	-	-	grey	lilac
5	-	-	white	-	-	-	-

sw = black  
 Position 1 = key turned in anti-clockwise direction.

Only the version with 4 positions may be fully rotated. A version with a stop is however possible on request.



## DESCRIPTION

The BCD switch allows to enter data directly into digital systems. The control knob indicates the set number (0-9) very legibly. The number is 5 mm high.

A full-rotation precision rotary switch is enclosed in a metal housing with "powder filling (q)" protection.

In the firmly connected cable end, those wires are connected to the common wire (blue), the logic state of which is 1.

The M 10 x 0.75 standard thread allows an unproblematic mounting. An O-ring sealing of the shaft, combined with other measures, guarantees the IP 66 degree of protection.

The control knob with the dial, included in the delivery, covers the mounting nut and can be easily and safely mounted thanks to the collet chuck.

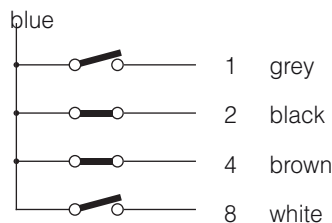
## Ordering information

BCD switch, type qS32M-5540 BCD	Order no.: 3205
Spare control knob, cpl.	99 32 05

Please indicate cable length if other than 1.5 m (3 m, 5 m or longer) in clear text.

## TECHNICAL DATA

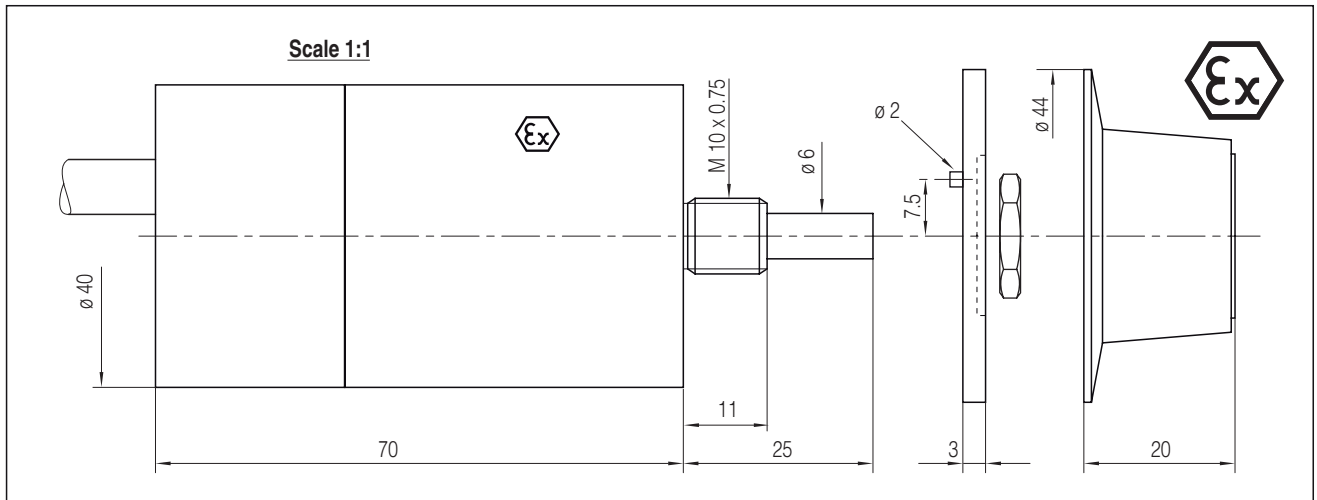
Type of protection	EEx q II T6 CE 0044 II 2 GD T85°C IP66 ZELM 02 ATEX 0111
Electrical rating	60 V; 0.15 A; AC 21
Contact	Gold-plated silver, lock-in angle 36° 10 positions, full rotation
Ambient temperature	-20 to +40 °C
Test voltage	1000 V AC referred to housing
Protection class	IP 66 (IEC 144)
Housing	Nickel brass Plastic knob Collet chuck mounting Ms
Weight	Approx. 480 g
Electrical connection	6 x 0.5 mm <sup>2</sup> , 1.5 m long (or other length)



Represented in position 6

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with 1 to 3 levels



**DESCRIPTION**

A precision rotary switch is mounted into a metal housing with "Flameproof enclosure (d)" type of protection.

The explosion-proof step switch with a 30° lock-in angle is available in various versions with 2 to 12 switching positions and with up to three levels. Only the version with 12 positions is, as an option, available as a full-rotation version.

Potted cable end is provided for connection. The number of wires depends on the number of switching positions and levels.

The M10 x 0.75 standard thread allows an unproblematic mounting. The O-ring sealing of the shaft in combination with the potting guarantees the IP 68 degree of protection.

The control knob with the dial, included in the delivery, covers the mounting nut and can be easily and safely mounted thanks to the collet chuck. The numbers on the dial face (0 to 11) are big (4 mm) and easy to read.

**TECHNICAL DATA**

Type of protection	EEx d IIC T6 CE 0044 II 2 GD T80°C IP68 PTB 03 ATEX 1130
Electrical rating	42 V; 0.5 A; AC/DC 21
Contact	Gold-plated, 3 µm Does not short-circuit
Ambient temperature	-20 to +40 °C
Test voltage	500 VDC
Protection class	IP 68
Housing	Nickel brass Plastic knob Shaft made of VA
Weight	Approx. 450 g
Electrical connection	4 x 0.75 mm <sup>2</sup> up to 16 x 0.5 mm <sup>2</sup> , 1.5 m long (or other length)

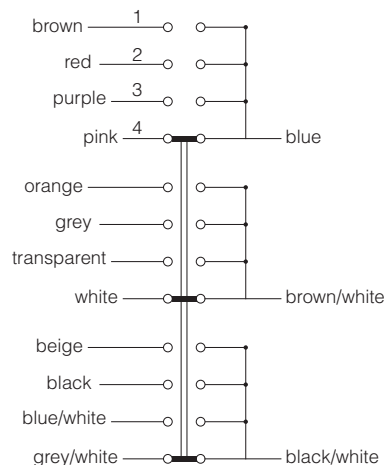
**Ordering information**

Step switch, type dS64M-7040 St		
Positions	Levels	Order no.:
2 up to 12	1	6415 1 . .
2 up to 6	2	6415 2 . .
2 up to 4	3	6415 3 . .
	No. of positions	_____

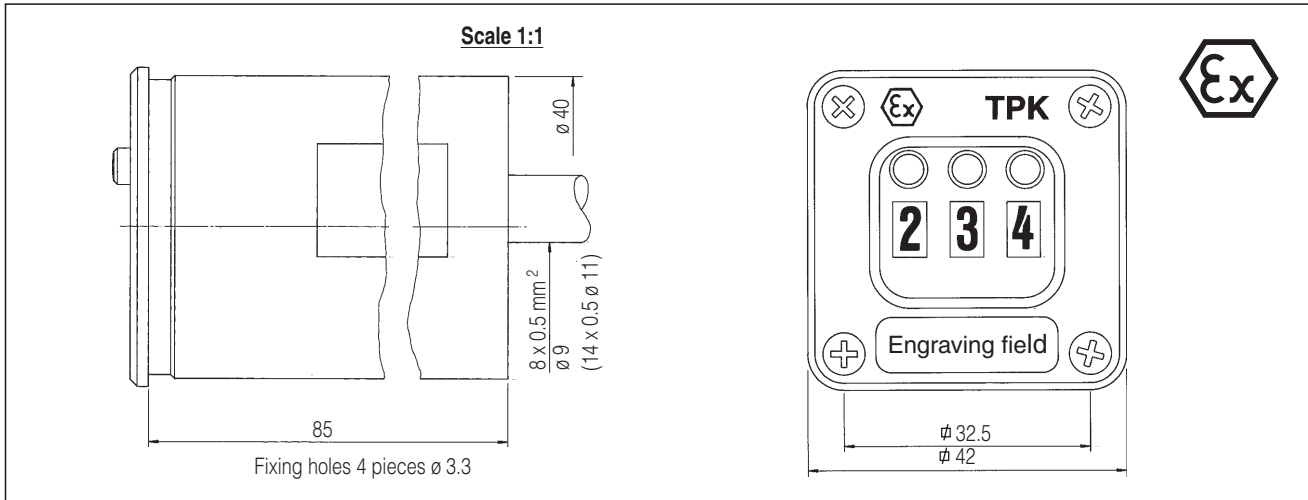
Number of wires = Number of positions x Number of levels  
 + Number of levels + Protective conductor

Please indicate cable length if other than 1.5 m (3 m, 5 m or longer) in clear text.

Example: 4 positions, 3 levels



front view, cw



## DESCRIPTION

The BCD decade is a 3-digit momentary-action switch with BCD code. Each decimal position can be adjusted in the minus-direction with a plunger. The desired number (000 to 999) can be quickly and repeatably adjusted and read directly.

The normal version is intended for multiplex operation and thus does with only 8 connection wires. The necessary decoupling diodes are built-in.

A version with a common wire and 12 data outputs (14 x 0.5 cable) for static operation is also available.

## Ordering information

BCD decade, type dS64A-9040-BCD  
 for multiplex operation

Order no.: 6408

BCD decade, type dS64A-9040-BCD-14  
 for static operation

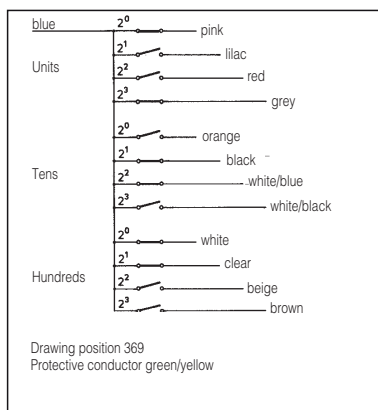
Order no.: 6414

## TECHNICAL DATA

Type of protection	EEx d IIC T6 CE 0044 II 2 G PTB 03 ATEX 1130
Electrical rating	42 V; 0.1 A; 3 VA
Contact	Solid gold on nickel
Ambient temperature	-20 to +40 °C (T5: up to +55 °C)
Test voltage	500 V AC referred to housing
Protection class	IP 54
Housing	Aluminium, hard-coated Plastic pane
Mounting	4 screws M 3 are included in the scope of delivery
Weight	350 g
Electrical connection	8 x 0.5 mm <sup>2</sup> or 14 x 0.5 mm <sup>2</sup> , 1.5 long (or other length)

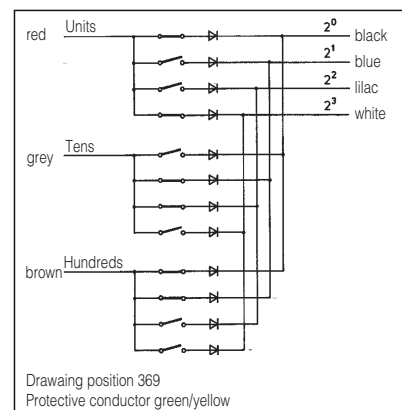
BCD decade  
 for static operation  
 type dS64A-9040-BCD-14

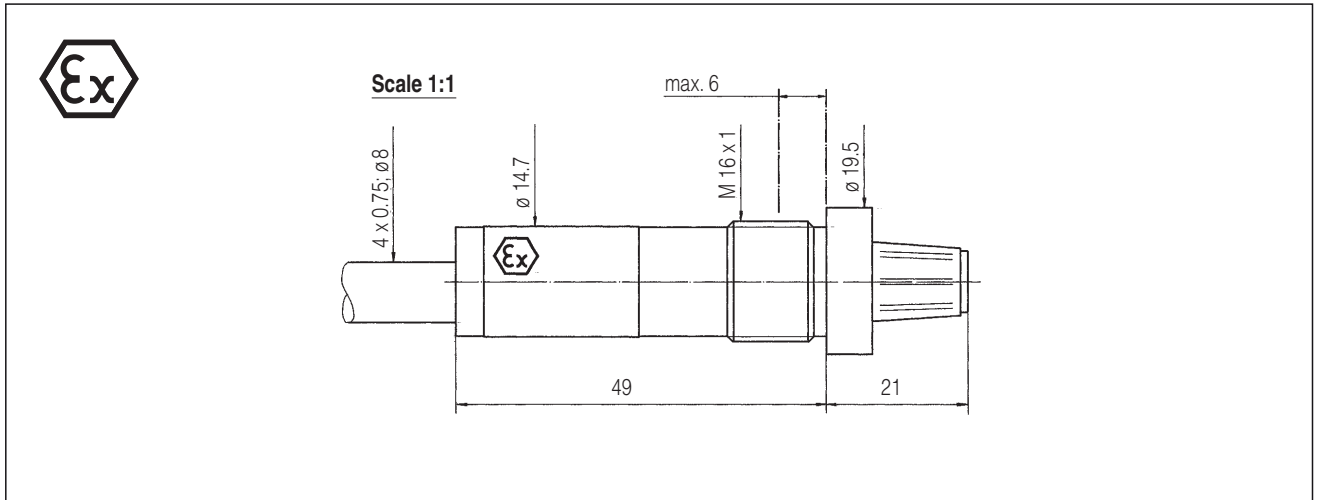
Order no.: 6414



BCD decade  
 for multiplex operation  
 type dS64A-9040-BCD

Order no.: 6408





**DESCRIPTION**

The mini-potentiometer is an explosion-proof potentiometer with an external bushing of only M 16 x 1.

Moreover, the ATEX-certified minipot withstands an ambient temperature of up to 60 °C with a power loss of up to 0.75 W or up to 40 °C ambient temperature and up to 1 W.

The dial (0–10) and the dark-grey plastic knob are mounted and form a unit with the potentiometer.

The IP 68 degree of protection is achieved by hermetically potting the cable and by the O-ring seal of the shaft.

**Ordering information**

Minipot, type dS79M-5516 P

Order no.: 794

Please indicate cable length if other than 1.5 m (3 m, 5 m or longer) and ohmic value in clear text.

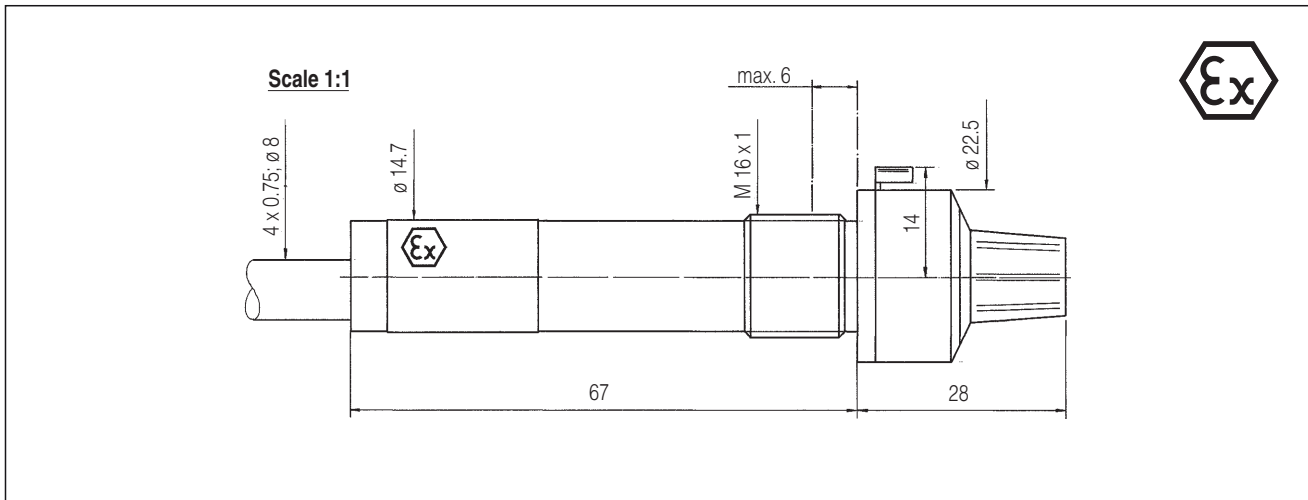
**TECHNICAL DATA**

Type of protection	EEx d IIC T6 CE 0044 II 2 GD T80°C ZELM 02 ATEX 0113
Ohmic values	Series E 3 (100, 220, 470, 1000, ... )
Range	100 Ohms to 1 MOhm linear
Tolerance	max. ±20 %
Temp. coefficient	max. ±500 x 10 <sup>-6</sup> /°C (±100 x 10 <sup>-6</sup> /°C on request)
Power rating	Ambient temp. up to 40 °C: max. 1.5 W; Ambient temp. up to 60 °C: max. 0.5 W
Rotation angle	Approx. 285°
Torque	max. 1.5 Ncm
Resistance of stop	min. 40 Ncm
Test voltage	500 V AC referred to housing
Protection class	IP 68
Housing	Nickelated brass Dark-grey polycarb. knob
Electrical connection	4 x 0.75 mm 1.5 m (or other length)
green-yellow	Protective conductor
blue	Slider
brown	Beginning (ccw = counter-clock-wise)
black	End (cw = clock wise)

# 10-turn mini-potentiometer

T P K

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## DESCRIPTION

An explosion-proof 10-turn potentiometer with a maximum housing diameter of only M 16 x 1, certified to the ATEX standard and approved for an ambient temperature of up to 60 °C, can certainly be referred to as an outstanding achievement of modern explosion protection.

The potentiometer and the smooth running, backlash-free 10-turn knob with a fixing lever are delivered as an assembled unit.

The mounting requires only one hole (Ø 16 mm), fixing is performed with the ring nut included in the delivery.

The IP 68 degree of protection is achieved by hermetically potting the cable and by the O-ring seal of the shaft.

## Ordering information

Order no.:  
10-turn mini-potentiometer, type dS79M-7716 P 796  
Spare control knob, cpl 99 79 61

Please indicate cable length if other than 1.5 m (3 m, 5 m or longer) and ohmic value in clear text.

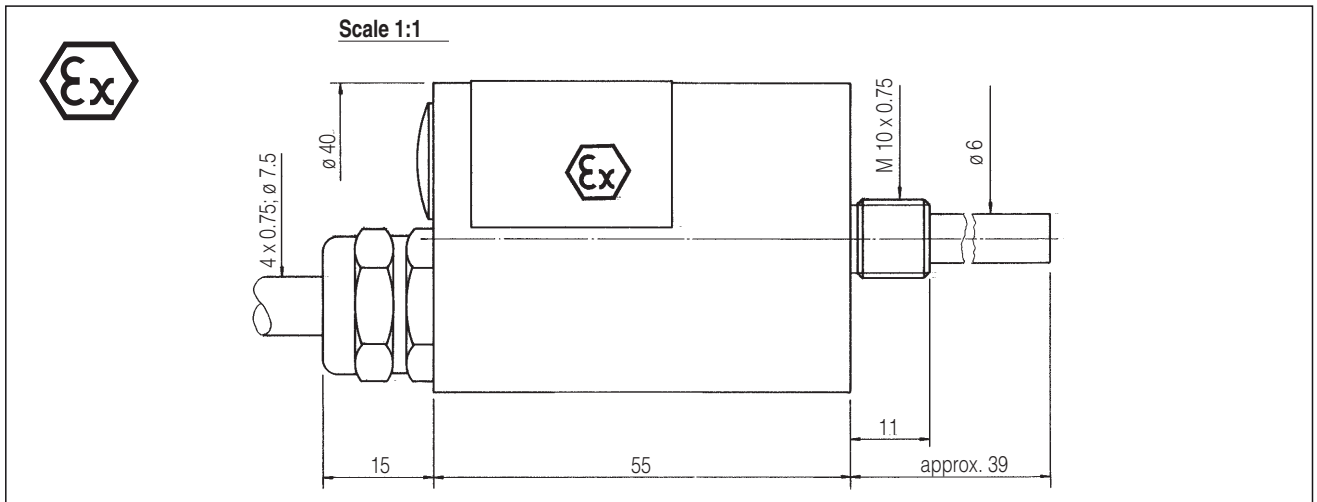
## TECHNICAL DATA

Type of protection	EEx d IIC T6 CE 0044 II 2 GD T80°C ZELM 02 ATEX 0113
Ohmic values	20, 50, 100, 200, ...
Range	20 Ohms to 50 kOhms
Tolerance	max. ±3 %
Linearity deviation	max. ±0.3 %
Resolution	min. 0.015 %
Temp. coefficient	±20 up to ±700 x 10 <sup>-6</sup> /°C depending on ohmic value
Power rating	Ambient temp. up to 40 °C: max. 1.5 W; Ambient temp. up to 60 °C: max. 0.5 W
Rotation angle	360° (10 turns)
Torque	max. 1.5 Ncm
Resistance of stop	min. 20 Ncm
Test voltage	500 V AC referred to housing
Protection class	IP 68
Housing	Nickel plated brass Plastic knob / alum.
Electrical connection	4 x 0.75 mm <sup>2</sup> 1.5 m long (or other length)
green-yellow	Protective conductor
blue	Slider
brown	Beginning (ccw = counter-clock-wise)
black	End (cw = clock wise)



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1-turn potentiometer



**DESCRIPTION**

A graphite potentiometer is enclosed in a metal housing with powder filling (q) protection.

The M 10 x 0.75 standard thread allows an unproblematic mounting. An O-ring sealing of the shaft, combined with other measures, guarantees the IP 66 degree of protection.

The graphite potentiometer offers an almost infinite resolution.

Special versions are also available in a similar housing, e.g. potentiometers with a very long life, or potentiometers without mechanical stop (full rotation).

The accessories available include a self-adhesive dial (Ø 40 mm and inscription 0 to 100) and a grey plastic knob available with (Ø 13 mm) collet fixing.

**Ordering information**

Ex potentiometer, type qS32M-5540

Order no.: 3200

Dial and control knob  
 Order no.: 99 32 01

Please indicate cable length if other than 1.5 m (3 m, 5 m or longer) and ohmic value in clear text.

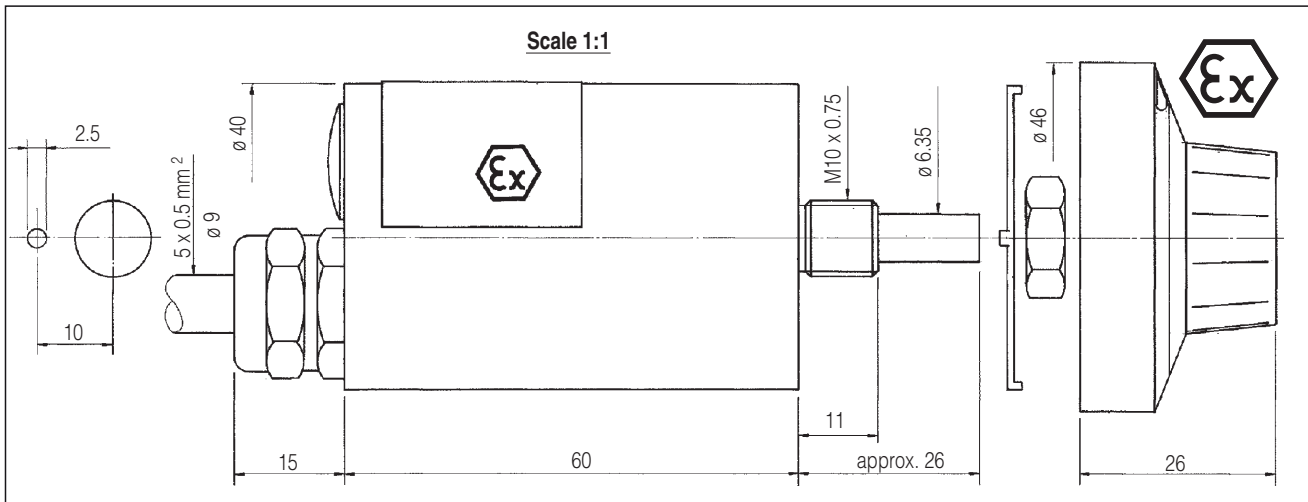
**TECHNICAL DATA**

Type of protection	EEx q II T6 CE 0044 II 2 GD T85°C ZELM 02 ATEX 0111
Ohmic values	100 Ohms to 2 MOhms ±20 % Series: 1 / 2.2 / 4.7 / 10 .. (narrower tolerance possible)
Resolution	Almost infinite
Power rating	max. 2 W
Ambient temperature	-20 to +40 °C
Rotation angle	270°
Resistance of stop	min. 100 Ncm
Test voltage	1000 V AC referred to housing
Protection class	IP 66 (IEC 144)
Housing	Nickel plated brass Shaft made of VA
Weight	Approx. 480 g
Electrical connection	4 x 0.75 mm <sup>2</sup> 1.5 m long (or other length)
blue	Slider
brown	Beginning (ccw = counter-clockwise)
black	End (cw = clock wise)

# Ex 10-turn potentiometer

T P K

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## DESCRIPTION

A precision potentiometer with 10 turns is enclosed in a metal housing with powder filling (q) protection.

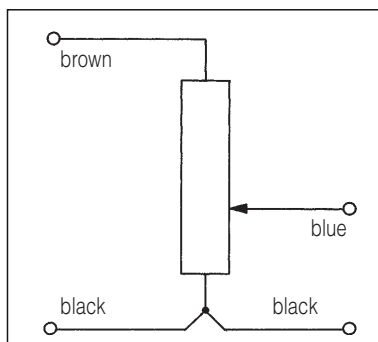
The M 10 x 0.75 standard thread allows an unproblematic mounting. The 10-turn knob with a counter for the number of turns, mounting accessories as well as two M 10 x 0.75 nuts are included in the delivery.

The control knob can be locked in place using a fixing lever.

Thanks to the large dial, an adjustment with an error of less than 0.1 % can be easily obtained; the use as a robust and precise set-point transmitter is the outstanding application.

An O-ring sealing of the shaft, combined with other measures, guarantees the IP 68 degree of protection.

Other ohmic values are available as an option.



## TECHNICAL DATA

Type of protection	EEx q II T6 CE 0044 II 2 GD T85°C ZELM 02 ATEX 0111
Ohmic values	100 Ohms / 1 / 5 / 10 k ±3 % (or other values)
Resolution	min. 0.055 %
Linearity deviation	max. ±0.2 %
Temp. coefficient	80 ppm/°C (100 Ohms) 20 ppm/°C (1 to 10 k)
Power rating	max. 3 W
Ambient temperature	-20 to +40 °C
Rotation angle	3600° (10 turns)
Resistance of stop	min. 80 Ncm
Protection class	IP 66 (EN 60529)
Housing	Nickel plated brass Knob: plastic/alum.
Weight	Approx. 550 g
Electrical connection	5 x 0.5 mm², 1.5 long (or other length)

## Ordering information

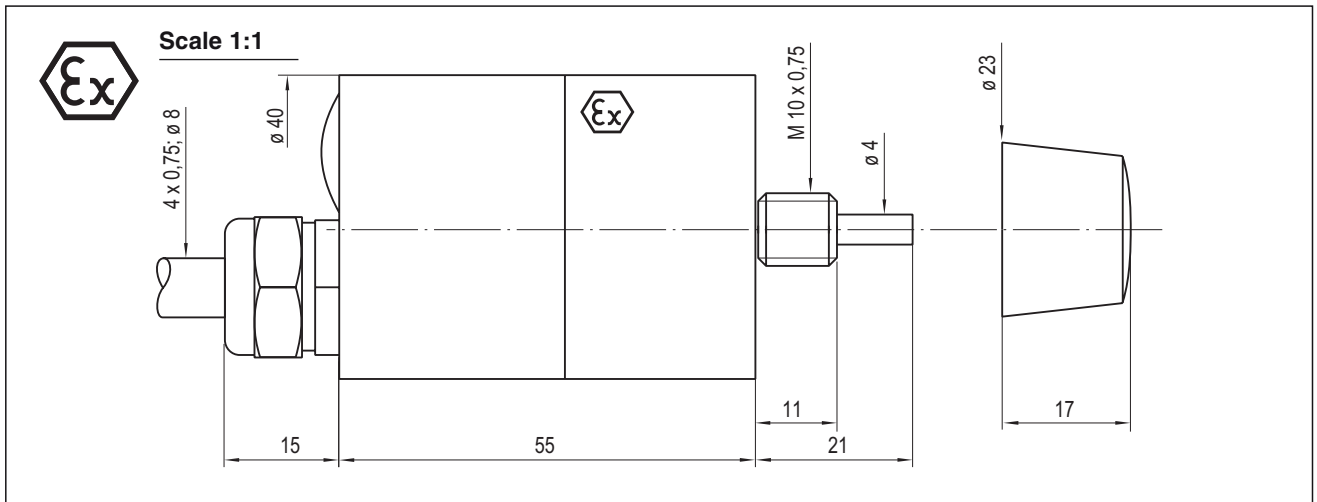
Ex-10-turn potentiometer with knob, type qS32M-6040

100 Ohms	Order no.: 32021
1 kOhm	Order no.: 32031
5 kOhm	Order no.: 32032
10 kOhm	Order no.: 32041
Spare control knob	Order no.: 99 32 02

Please indicate cable length if other than 1.5 m (3 m, 5 m or longer) in clear text.

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Electric handwheel



**DESCRIPTION**

The rotary pulse encoder is a mechanical precision switch including two contacts, A and B. When turned clockwise, contact A closes 90° before contact B. This makes it easy to tell the sense of rotation.

When in lock position, both contacts are open.

Due to the gold contacts used the switching voltage can be as low as 10 mV. Make sure to use pure ohmic switching load so as not to shorten the lifespan.

Due to the highest type of protection operation is possible without limitation in zone 1 and 2- both for explosive gas and also explosive dust areas but not for underground workings.

The rugged housing is made of nickered brass, the control knob is made of plastic.

The M10 x 0.75 standard thread allows an unproblematic mounting. An O-ring sealing of the shaft, combined with other measures, guarantees the IP 66 degree of protection.

**Ordering information**

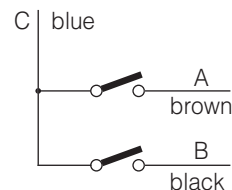
Rotary pulse encoder, type qS32M-5540 Di

Order no.: 3210

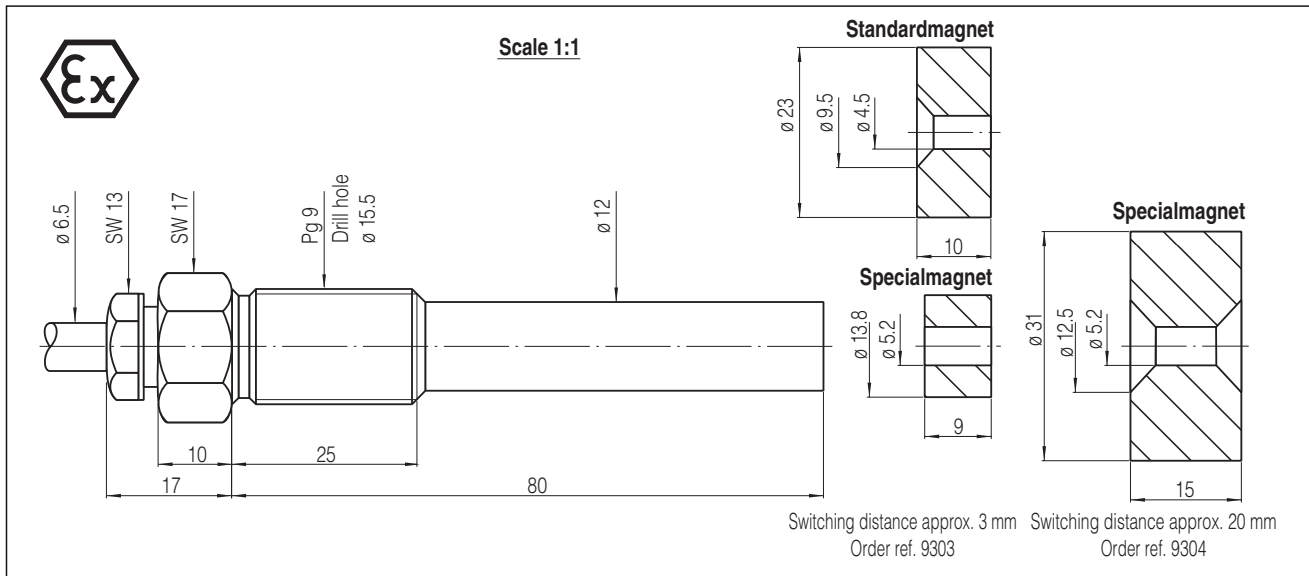
Please indicate cable length in clear text. Standard lengths are 1.5 m, 3 m and 5 m.

**TECHNICAL DATA**

Type of protection	EEx q II T6 CE 0044 II 2 GD T80°C IP66 ZELM 02 ATEX 0111
Electrical rating	Up to 30 V; 0.1 A
Contact	Gold Lock-in angle 22.5° = 16 per rd. Pulse / pause ratio: approx. 1 : 1
Flow resistance	< 0.3 ohms
Life	> 10 <sup>5</sup> Rounds > 1.6 x 10 <sup>6</sup> changes of position
Protection class	IP 66 (EN 60529)
Housing	Nickered brass Plastic knob Collet chuck mounting Ms
Weight	Approx. 480 g
Electrical connection	4 x 0.75 mm <sup>2</sup> , 1.5 long (or other length)



No fixed polarity  
 Protective conductor green / yellow



## DESCRIPTION

Beside the well-known advantages of the reed contacts, our explosion-proof magnetic switch has a solid metal housing made of VA; thanks to the version with "protective insulation", a protective conductor connection is nevertheless not required.

Magnetically actuated reed contacts (magnetic switches) are independent of the position, reliable (no electronics), suitable for DC and AC voltages up to 250 V, and they require no auxiliary energy.

Unlike e.g. inductive proximity switches, they do not react on any metal parts, but only on a sufficiently strong magnetic field.

For changing the sensing distance (and thus the hysteresis), a smaller and a bigger magnet are available.

The user-friendly, rugged metal housing simplifies the mounting. Since the actuation can be from several directions and the operating point remains stable, the switch is particularly suited for use in machinery with harsh environmental conditions, as a rapid precision limit switch with a long life.

The extremely long life of the reed contact can only be reached, if the switch is operated with a purely resistive charge, within the limit values. Especially for switching inductive loads (e.g. relay coils), capacitive loads or filament lamps, measures for protecting the contacts are necessary.

The VA enclosure is machined in one piece; therefore implementation in high pressure plants is also possible.

The pressing screw is also made of VA, the rubber seal of Viton. The magnetic switch is highly resistant both chemically and mechanically.

## TECHNICAL DATA

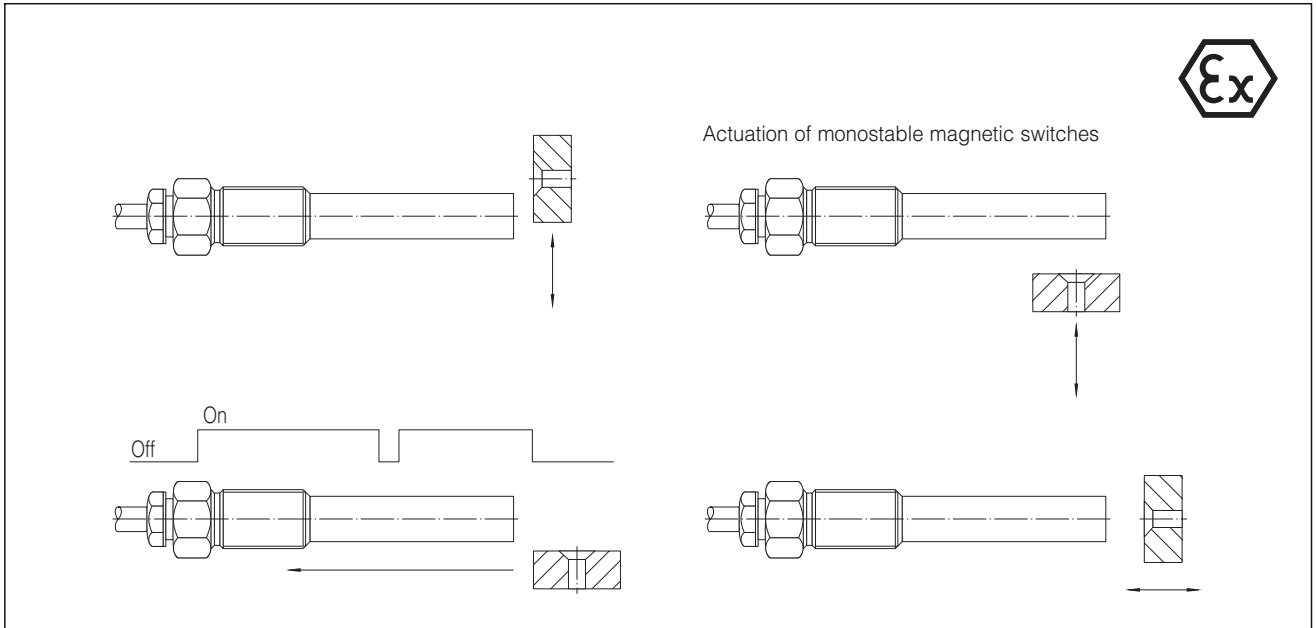
Type of protection	EEx d IIC T6 CE 0044 II 2 GD T80°C ZELM 02 ATEX 0118
Electrical rating	250 V; 1.5 A; 50 VA resistive load
Switching frequency	max. 300 Hz
Contact	Change-over, monostable
Product life	min. 109 switching cycles (with optimum contact protection)
Sensing distance	Approx. 10 mm with standard magnet
Ambient temperature	-20 to +75 °C
Protection class	IP 68
Fastening thread	Pg 9 (Ø 15.2 mm)
Housing	VA 1.4404
Pressing screw	VA 1.4404
Electrical connection	3 x 0.75 mm <sup>2</sup> 1.5 m long (or other length)
black	Break contact
brown	Make contact
blue	Common contact

## Ordering information

Magnetic switch, type dS93V-9012	Order no.: 931
Special magnet Ø 13.8	Order no.: 93 03
Special magnet Ø 31	Order no.: 93 04

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Application



**MEASURES FOR CONTACT PROTECTION**

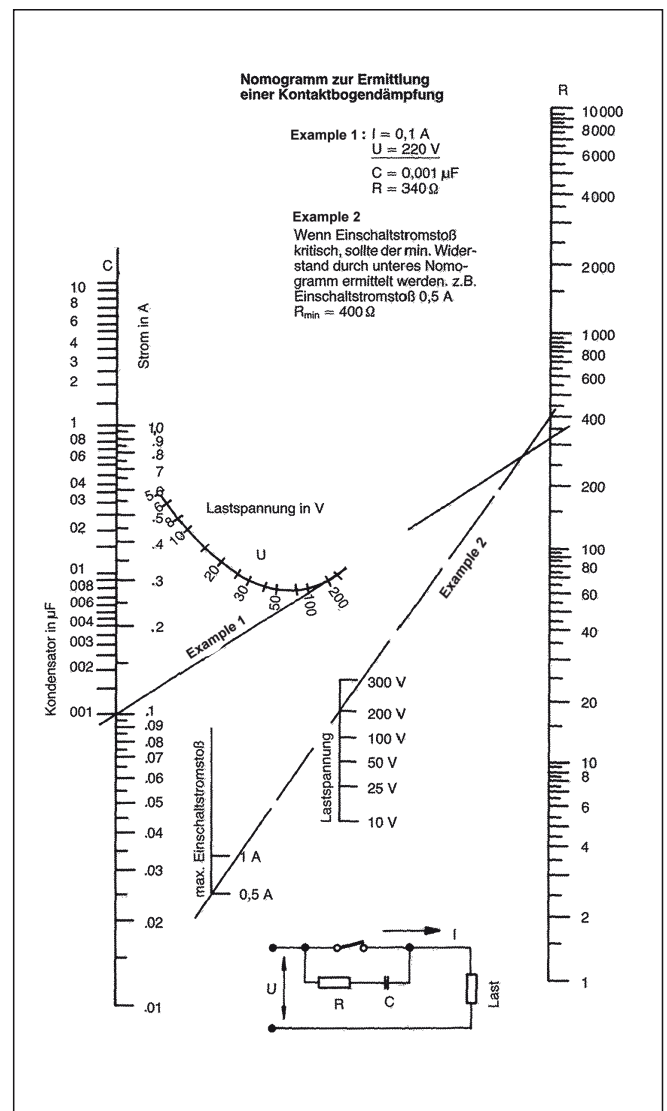
**Inductive load in DC operation.** A diode must be connected in parallel with the coil, such that it blocks with the normal operating voltage but short-circuits the reverse-polarity voltage peak generated during the switch-off.

**Inductive load in AC operation.** At a low operating voltage (up to approx. 60 V), a suitable voltage depending resistor (VDR) in parallel with the coil is sufficient. At higher voltages, a contact protection circuit in parallel with the reed contact is required. Please contact us for dimensioning advice!

**Capacitive loads.** The charging current pulse must not exceed the maximum admissible current. Therefore, a resistor must be connected in series with the contact, in order to avoid this current peak.

**Filament lamp loads.** The starting current inrush filament lamps is up to 10 times the normal operating current. Also this current pulse must not exceed the admissible maximum current. Beside a limiting resistor in series with the filament lamp, the filament can be continuously heated via a resistor in parallel with the contact, exactly such that the filament lamp does not yet start to glow. This protective measure also increases the life of the filament lamp.

If you have any doubts, please contact us!

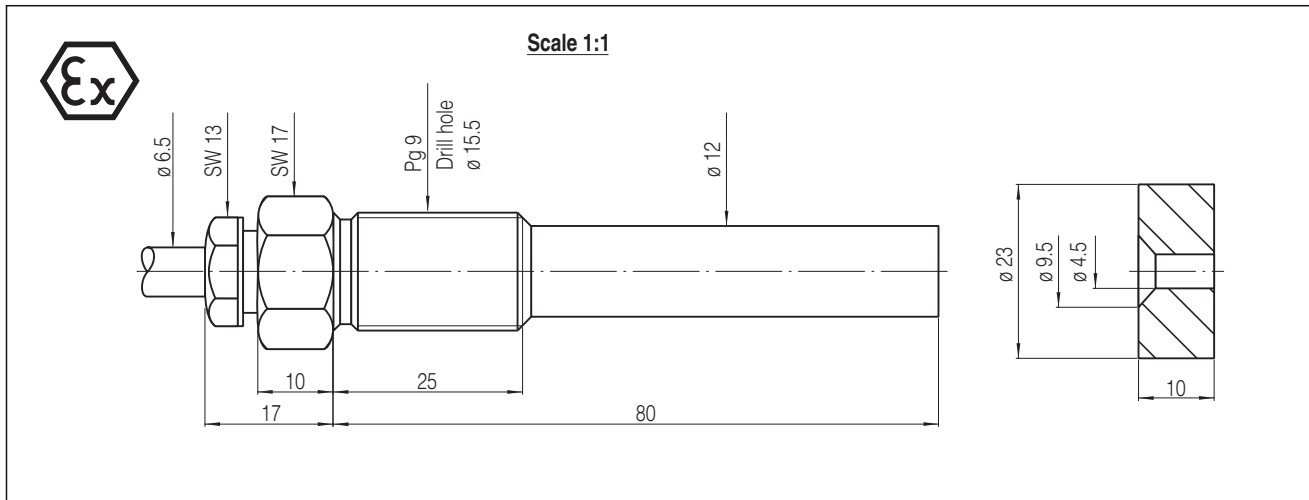


# Magnetic switch

TPK

Bistable

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## DESCRIPTION

The bistable magnetic switch is the complement to our magnetic switches with monostable operation. The dimensions and data are the same, except for the sensing distance.

With magnetic switches in monostable version, a field acting in any direction excites the contact; the contact remains closed only as long as the magnetic field is strong enough.

Bistable switches are only excited by a field with a pre-determined direction; the contact remains closed even after removing the magnet. For a change-over of the contact, a magnetic field in the opposite direction is required.

The field in the opposite direction can be generated by:

- a second magnet
- reversing the magnet
- approaching the magnet on the thread side.

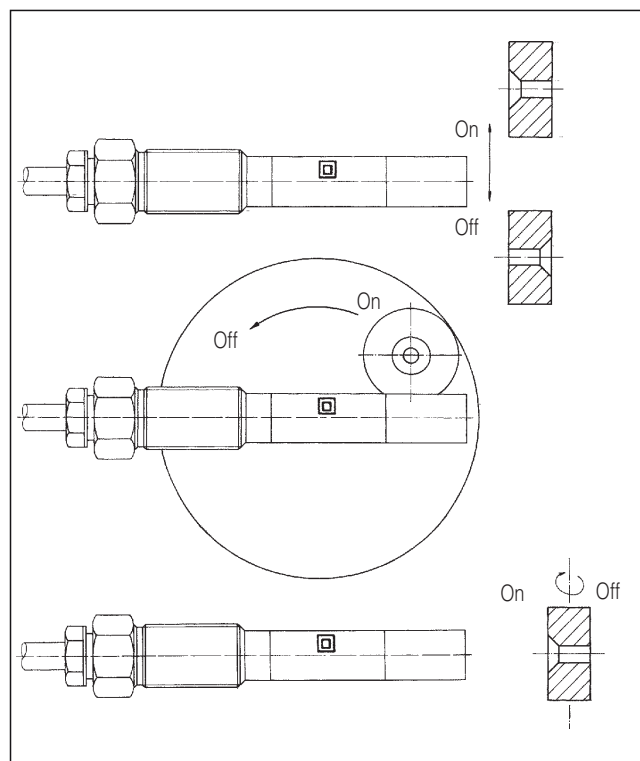
## Advantages over the monostable version:

- During a cycle, the contact can remain closed as long as needed
- Very low hysteresis is possible with two magnets mounted closely together
- The hysteresis can be increased as desired by increasing distance between the two magnets
- Very long sensing distance is possible

## Ordering information

Magnetic switch, type dS93V-9012 bistable with EEx d IIC T6 protection Order no.: 933

Special magnet Ø 13.8 Order no.: 93 03  
Special magnet Ø 31 Order no.: 93 04

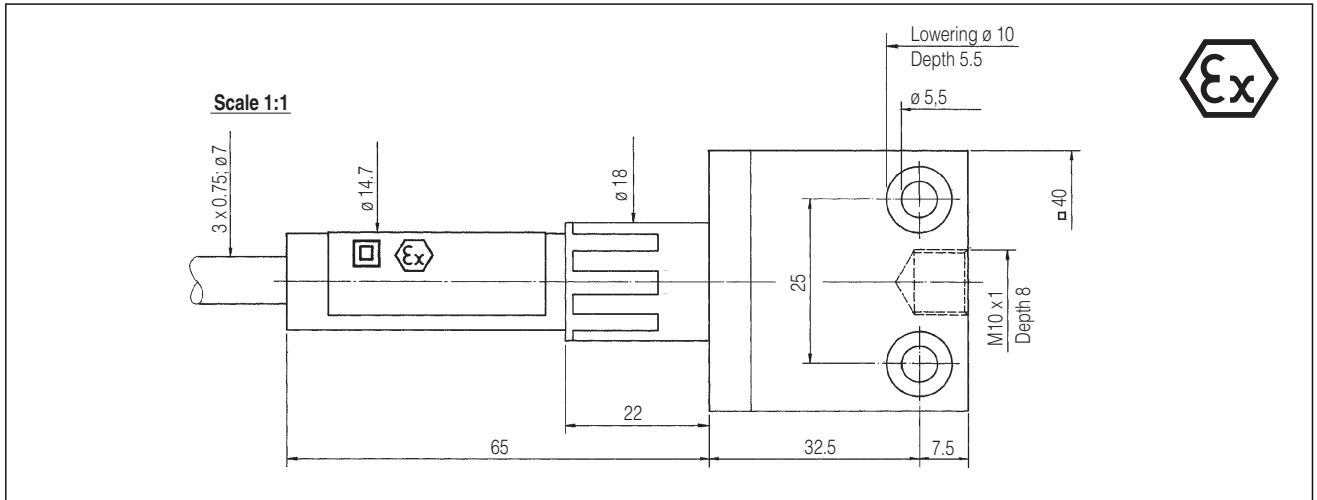


## TECHNICAL DATA

Sensing distance Approx. 40 mm with standard magnet

All other data See magnetic switch EEx d

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**DESCRIPTION**

The explosion-proof PE-switch is a combination of our proven mini-pushbutton and a specially adapted pneumatic cylinder.

The pressure port with M 10 x 1 standard thread enables the use of commercially available connecting parts.

The wide pressure range allows especially the use as a pressure indicator and interface between pneumatics and electronic control. A frequent application is the signalling of "pneumatic pressure sufficient" to the controller and the counting of pressure pulses at cylinders or valves.

The response pressure of 0.5 bars can be increased to 6 bar max. upon request.

For low-voltage applications gold contacts are available as an option. The standard version (250 V/1 A) can switch small electric consumers directly.

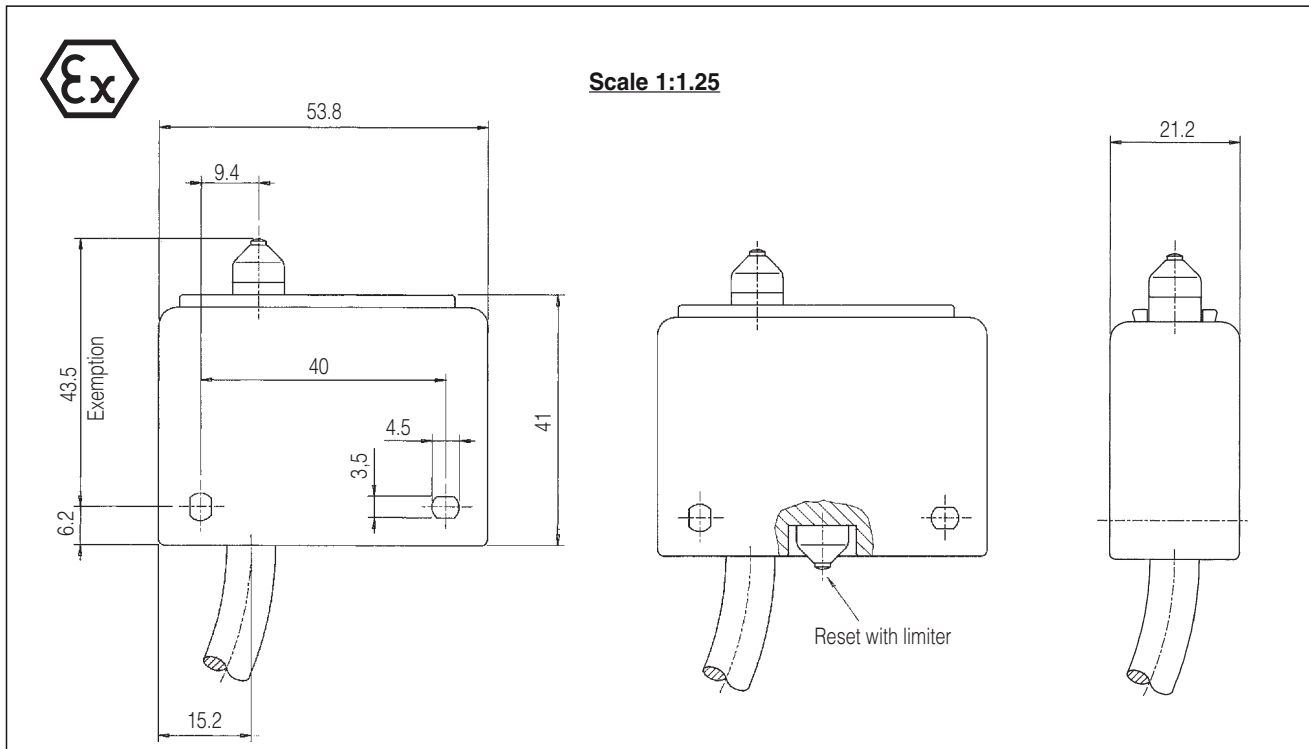
**TECHNICAL DATA**

Type of protection	EEx d IIC T6 CE 0044 II 2 GD T80°C ZELM 02 ATEX 0113
Electrical rating	250 V 1.5 A AC-21 24 V 1.5 A DC-21
Contact	Change-over, massive silver (gold contact possible)
Life	> 6 million operations
Actuating pressure	min. 0.5 bars (higher values possible) 12 bars max. admissible
Ambient temperature	-20 to +60 °C
Protection class	IP 68 (IEC 144)
Housing	Red anodised aluminium Nickered brass
Weight	Approx. 330 g
Electrical connection	3 x 0.75 mm <sup>2</sup> 1.5 m long (or other length)
blue	Common contact
brown	Make contact
black	Break contact

**Ordering information**

PE-switch, type dS77M-81/PE

Silver contact                      Order no.: 7701



## DESCRIPTION

The series d.20K microswitch or limiter is an explosion-proof switching device with many variation possibilities.

The microswitch with cable-ends or EEx-e-connection chamber is completely certified. Switches with connection by single wires, however, can only be U-certified; the fitting of the switch requires a new test for approval.

All devices must be mounted in such a manner that they are protected against damage. This can be achieved not only by mounting them in a machine or a housing, but also with a metal bracket.

The device is assembled by using the following, up to four subassemblies - each subassembly having its own order no.:

- Switching element (not for limiter)
- Version
- Connection (not for version with EEx-e-connection chamber)
- Lever

## SWITCHING ELEMENT

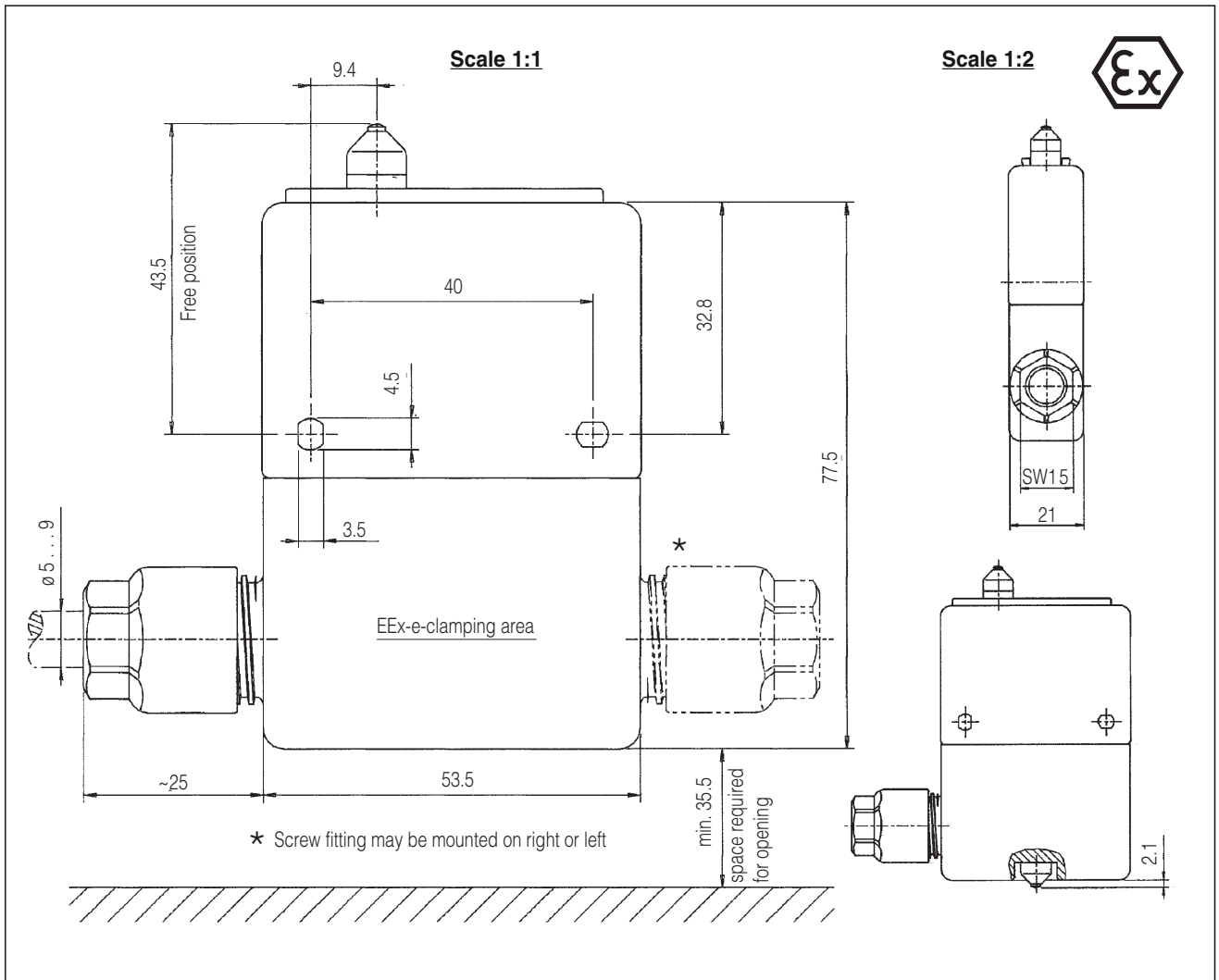
(Not applicable for limiter)

In addition to the "limiter" version, you can choose from the following five switching elements:

- Standard switching element  
 Rating 15 A / 400 V  
 Differential travel 10 to 50 microns  
 Order no.: 9920 00 (standard version)
- Short differential travel  
 Differential travel 5 to 10 microns  
 Order no.: 9920 01
- Short differential travel + gold contact  
 Order no.: 9920 10
- Low operating force  
 Operating force  $\leq 1.2$  N  
 Order no.: 9920 03
- High current capability  
 Current up to 30 A possible  
 Order no.: 9920 30



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**VERSION**

The housing material is polycarbonate (PC). Other housing materials are available upon request. The metal parts of the switch are made of VA.

Order no. for the version

- 2000 0
- 0 = Cable ends
  - 1 = with Ex-e-connection chamber
  - 2 = Wire connector
- 0 = Microswitch  
 1 = Limiter

**CONNECTION**

In addition to the listed standard lengths, any other length is also possible.

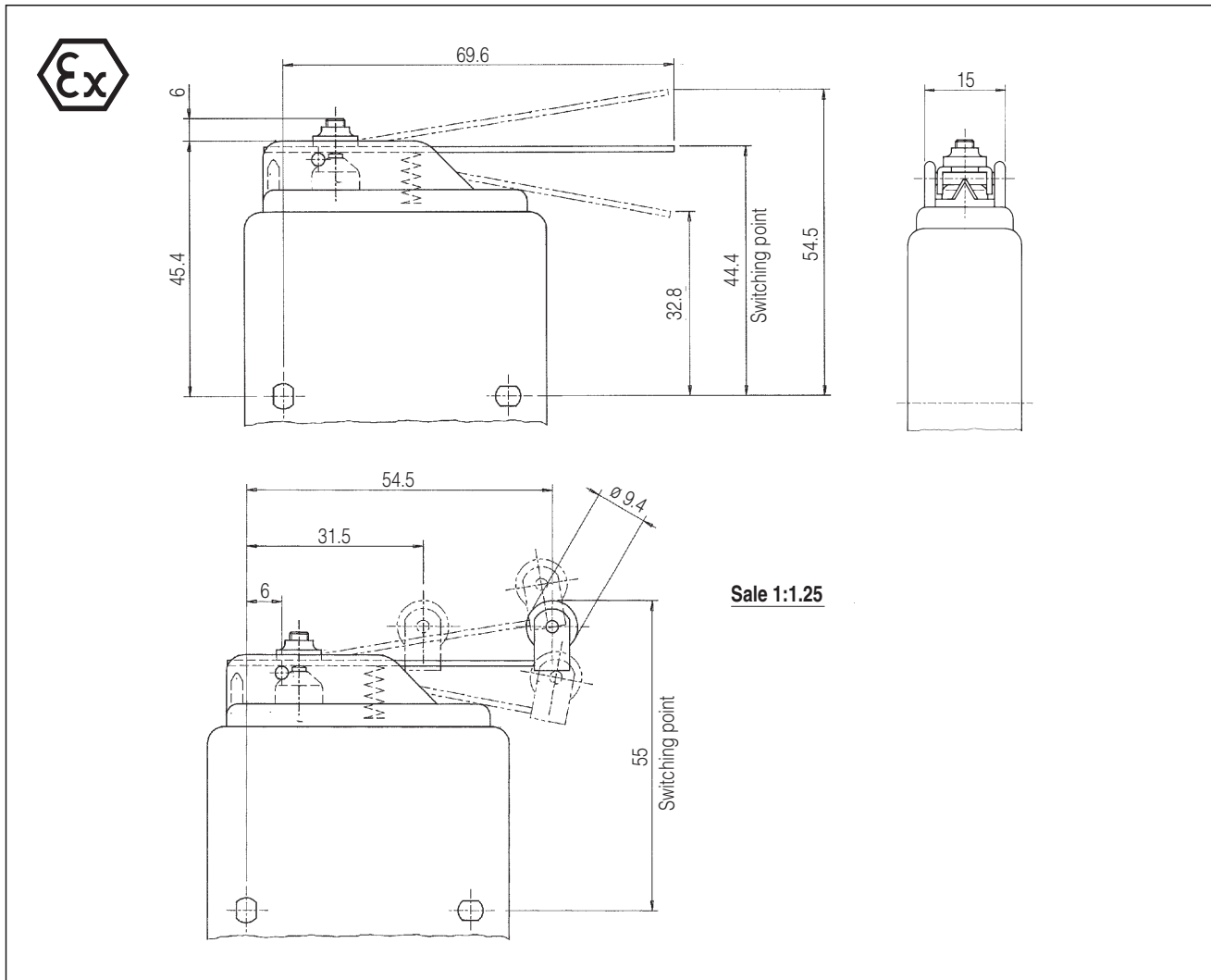
- Hose line (cable ends)  
 Two-wire (NO or NC)  
 0.75 / 1.5 / 2.5 mm<sup>2</sup>
- Three-wire (change-over)\*  
 0.75\* / 1.5 mm<sup>2</sup>  
 Length respectively 1.5 m\* / 3 m / 5 m
- blue Common  
 brown Make contact  
 black Break contact
- Wires  
 0.75\* / 1.5 / 2.5 mm<sup>2</sup>  
 Length 50 cm\* / 100 / 200 cm

Heat-resistant tube cord for high ambient temperatures and highest current capability is available upon request.

\* = Preferred stock item

## Lever

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## LEVER

The standard version of the switch has no actuating lever, but all levers fit all switches and limiter types.

The lever unit consists of the supporting part of PC, the shaft and the spring made of VA and the lever or the roller made of steel with a treated surface.

A later mounting of the lever unit is possible; then however, the clipped-on supporting part cannot be removed any more.

Thanks to the possibility of adjusting each lever, the operating position can be individually adjusted.

Please note that when screwing-in the adjusting screw, the overtravel can be excessively increased.

## Order numbers for lever(s):

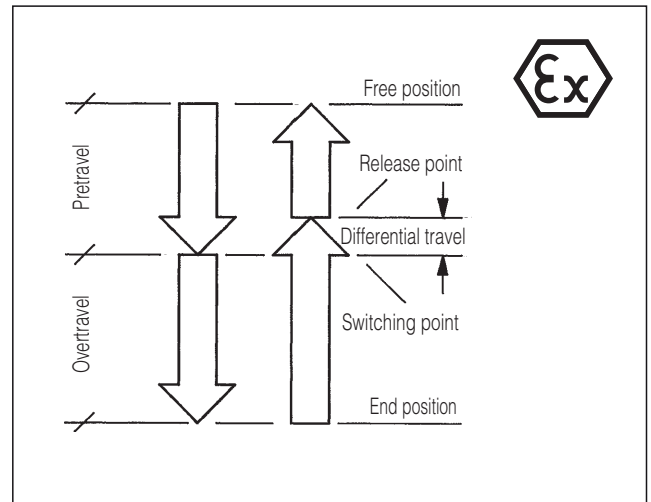
Lever, flat and long	9920 007
Roller, short	9920 013
Roller, long	9920 017

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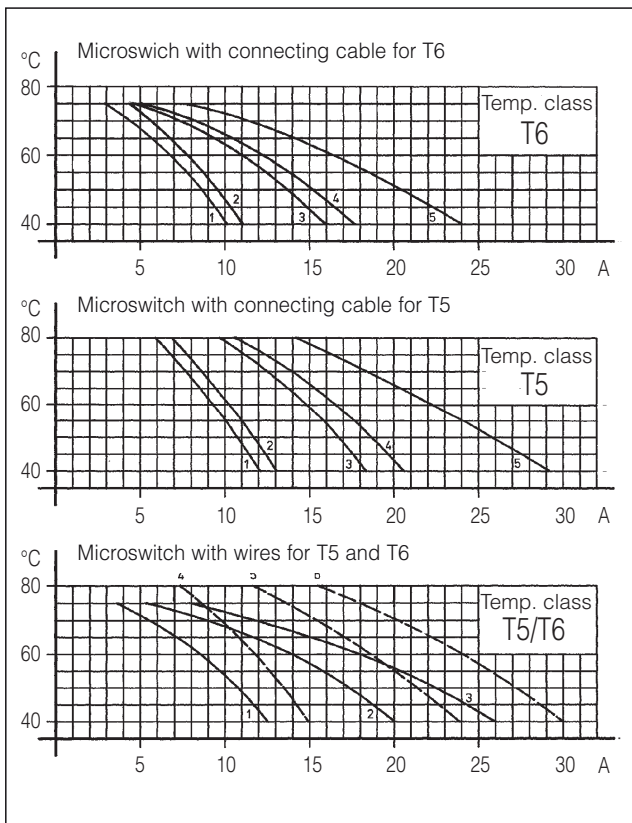
Data

**Technical data**

PTB no. for version: with cable ends	EEx d IIC T6/T5 CE 0044 II 2 GD IP 66 PTB 02 ATEX 1154 X
with wire connection	PTB 02 ATEX 1153 U CE 0044 II 2 G
with EEx-e-connection chamber	EEx de IIC T6/T5 CE 0044 II 2 GD IP 66 PTB 02 ATEX 1154 X
Housing material	Plastic Modified PC
Ambient temperature	-20 to +80 °C
Protection class	IP 66



		Switching element					
		Standard	Short diff. travel	Gold contact	Low force	High current	Limiter
Pretravel	mm	0.4	0.3	0.3	0.3	0.4	0.3
Differential travel	mm	0.05	0.01	0.01	0.013	0.025	-
Overtravel	≥ mm	0.13	0.13	0.13	0.13	0.13	0.13
Operating force	N	3.7	2.6	2.6	1.2	2.8	9
Release force	≥ N	1.0	1.0	1.0	0.7	1.2	6
Electrical rating: AC 21 A/V		15/400	15/400	1/125	10/400	22/400	12/400 (NC)



The curves represent the maximum continuous current capability due to the temperature rise of the conductors as a function of the ambient temperature.

However, observe the relevant prescriptions especially those regarding the back-up fuse.

**Microswitch with connecting cable:**

The built-in tube cord resists to continuous temperatures up to 80 °C. For cables with a lower heat-proofness, the load must be reduced.

- 1 = 2 x 0.75 mm<sup>2</sup>      2 = 3 x 0.75 mm<sup>2</sup>
- 3 = 2 x 1.5 mm<sup>2</sup>      4 = 3 x 1.5 mm<sup>2</sup>
- 5 = 2 x 2.5 mm<sup>2</sup>

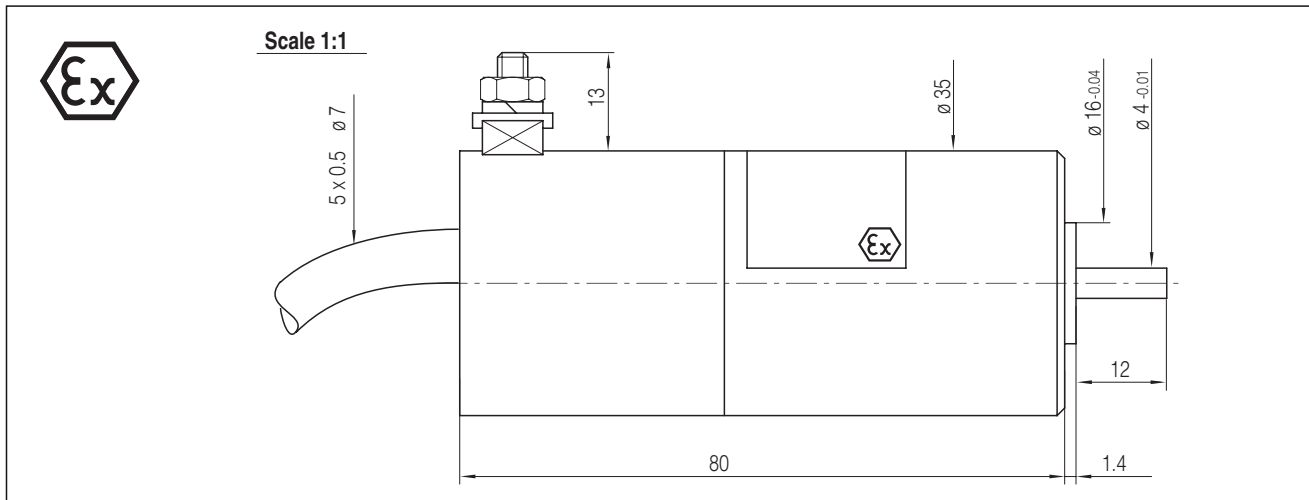
For cables with a continuous heat-proofness up to 105 °C and hazardous material of temperature class T1 to T5, the curve at left is applicable.

**Microswitch with single wires:**

- T6 (continuous curves):
  - 1 = 0.75 mm<sup>2</sup>;      2 = 1.5 mm<sup>2</sup>
  - 3 = 2.5 mm<sup>2</sup>
- T5 (dashed curves):
  - 4 = 0.75 mm<sup>2</sup>;      5 = 1.5 mm<sup>2</sup>
  - 6 = 2.5 mm<sup>2</sup>

## Small motor with ironless armature (skew wound ironless rotorcoil armature)

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### DESCRIPTION

The Motor35 is an explosion-proof precision DC motor with ironless armature. The specific advantages of our Motor35:

High acceleration due to low rotor weight

High efficiency (75 % at 4.8 W output power) as there are no core losses

Very good linear, easy to calculate motor behaviour and low no-load speed (4900 rpm at 24 V)

Shaft mounted in pre-loaded ball races.

Gearboxes with transmission ratios from 3.71 : 1 to 1526 : 1 and with a constant torque of up to 10 Nm are available.

Due to the high housing temperature, the Motor35 is protected by two built-in thermal cut-outs that cannot be reset. Connection using grey and brown (directly to the motor, without thermal protection) requires checking by an appropriately qualified specialist.

Operation with only one thermal cut-out is allowed. It is possible to fit additional temperature sensors (Pt 100 etc.) on request.

If the motor is operated in an ambient temperature up to 40°C with  $U_{rated}$  24 V current-limited to 0.5 A, the housing temperature cannot exceed the allowed limits. The mechanical shaft power can be up to 9 W in this case.

The Motor35 without a gearbox is only available on request.

### Ordering information

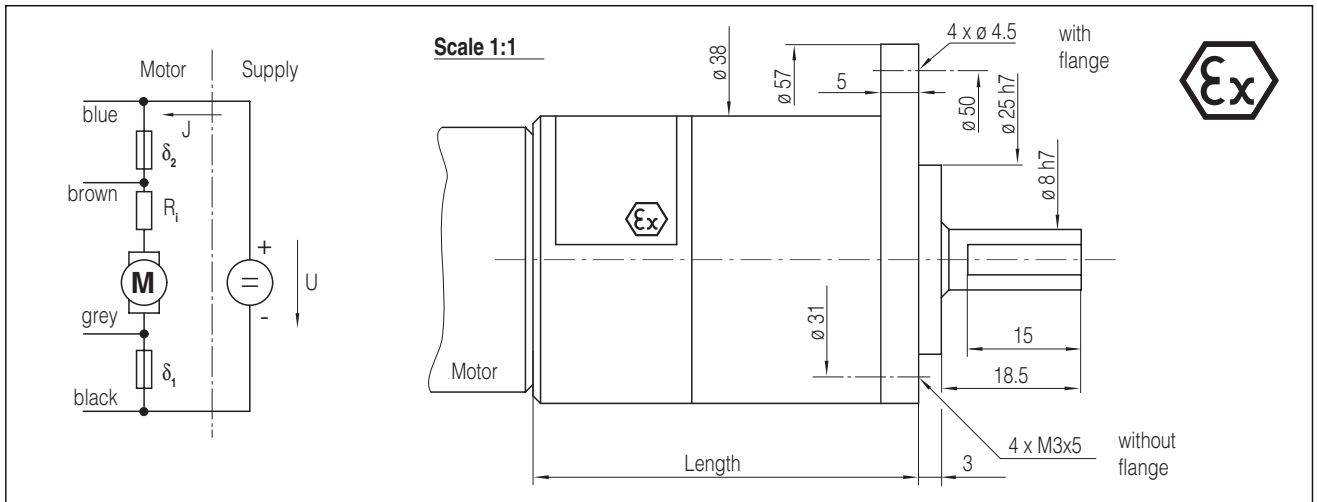
Motor35, type dS63V-8035      Order no.:  
631 3510

Please indicate cable length in clear text. Standard lengths are 1.5 m, 3 m and 5 m.

### TECHNICAL DATA

Type of protection with gearbox	EEx d IIC T5 CE II 2 GD T5 80/95°C PTB 03 ATEX 1131 Temperature class T6 on request
Rated voltage	24 V DC
No-load current	35 mA without gearbox
Rated current	Up to 0.5 A continuous load at 40°C
Internal resistance	11.5 Ohm
Motor constant	0.046 Vs = Nm/A
Rotor temperature	max. 125°C
Thermal resistance	1.5 K/W
Thermal time const.	8 s
Housing temperature	max. 70°C
Thermal resistance	11 K/W
Thermal time const	1000 s
Ambient temperature	-20 to +40°C
Protection class	Connection and motor housing IP 68 Motor shaft IP 54
Shaft load radial axial	max. 7 N max. 3 N
Direction of rotation with poles correctly electrical connection	As required Clockwise, at the shaft as seen from the front
Housing	Galvanised steel and anodised aluminium
Weight	Approx. 350 g
Electrical connection	5 x 0.5 mm <sup>2</sup> , 1.5 m long (or other length)
Motor direct*	grey- and brown +
Thermal fuse 1	grey and black
Thermal fuse 2	brown and blue

\* If the motor is operated using the grey and brown cores, the two thermal cut-outs are ineffective! This operating mode is to be checked by an appropriately qualified specialist!



**Motor calculation**

It is easy to perform calculations on the Motor35 using a few simple formulas and 3 motor constants as the non-linear iron losses are (almost) negligible.

In a simplified representation the motor contains a generator; the speed-dependent voltage from this generator acts against the driving voltage. There is an ohmic resistance in series with the generator.

The current is converted into torque that comprises shaft torque and friction torque. The no-load current represents the friction torque.

The motor behaviour is described by a constant B. This constant has the units Vs and Nm/A; the two units are equivalents!

A calculation example for a total current J of 0.4 A at 24 V (only these two parameters need to be measured, all other figures can be calculated sufficiently accurately):

The torque at the shaft is calculated as:  
 $M_w = (J - J_l) \times B$   
 $M_w = \text{Shaft torque [Nm]}$   
 $J = \text{Total current [A]}$   
 $J_l = \text{No-load current [A] } 0.035 \text{ A}$   
 $B = 0.046 \text{ [Nm/A = Vs]}$   
 $J = 0.4 \text{ A} \quad J_l = 0.035 \text{ A} \quad \underline{M_w = 0.0168 \text{ Nm}}$

The motor circuit is described by the formula:  
 $U = J \times R_i + B \times \text{rpm} \times \text{Pi}/30$  or re-arranged  
 $\text{rpm} = (U - J \times R_i) / (B \times \text{Pi}/30)$   
 $R_i = \text{Motor resistance [ohms]}$   
 $\text{rpm} = \text{Speed [rev/min]}$   
 $\text{Pi}/30 = \text{Conversion factor approx. } 0.105$   
 $J = 0.4 \text{ A} \quad U = 24 \text{ V} \quad R_i = 11.5 \text{ ohms} \quad \underline{\text{rpm} = 4027 \text{ rev/min}}$

The power input Pin is given by:  
 $\text{Pin} = U \times J$   
 $J = 0.4 \text{ A} \quad U = 24 \text{ V} \quad \underline{\text{Pin} = 9.6 \text{ W}}$

The power output Pout results from:  
 $\text{Pout} = M_w \times \text{rpm} \times \text{Pi}/30$  or  
 $\text{Pout} = (J - J_l) \times (U - J \times R_i)$   
 $M_w = 0.0168 \text{ Nm} \quad \text{rpm} = 4027 \text{ U/min} \quad \underline{\text{Pout} = 7.081 \text{ W}}$

And finally the efficiency:  
 $\text{Eta} = 100 \times \text{Pout} / \text{Pin}$   
 $\text{Pin} = 9.6 \text{ W} \quad \text{Paut} = 7.081 \text{ W} \quad \text{Eta} = 73.76 \%$

**TECHNICAL DATA GEARBOXES**

The following transmission ratios are available:

	Length mm	Weight g	Torque Nm	Efficiency %	Order- Stages no.	Order- no.
3.71 : 1	32.3	166	6.0	88	1	63136 04.
14 : 1	40.1	215	10	80	2	63136 08.
43 : 1	47.9	268	10	70	3	63136 12.
66 : 1	47.9	268	10	70	3	63136 16.
134 g 1	55.7	318	10	60	4	63136 20.
159 : 1	55.7	320	10	60	4	63136 24.
246 : 1	55.7	320	10	60	4	63136 28.
415 : 1	63.5	372	10	55	5	63136 32.
592 : 1	63.5	372	10	55	5	63136 36.
989 : 1	63.5	374	10	55	5	63136 40.
1526 : 1	63.5	378	10	55	5	63136 44.

Length, weight and efficiency without motor!

The gearbox can only be fitted in the factory. The motor without a gearbox is only available on request.

**Gearbox calculation**

The gearbox output speed [Grpm] is calculated as follows:  
 $\text{Grpm} = \text{rpm} / i$

$i = \text{Transmission ratio}$   
 $\text{rpm} = 4027 \text{ rev/min} \quad i = 246 \quad \underline{\text{Grpm} = 16.37 \text{ rev/min}}$

The gearbox output torque [Mg]:  
 $\text{Mg} = M_w \times i \times \text{Geta} / 100$   
 $\text{Geta} = \text{Gearbox efficiency}$   
 $M_w = 0.0168 \text{ Nm} \quad \text{Geta} = 60 \% \quad i = 246 \quad \underline{\text{Mg} = 2.48 \text{ Nm}}$

**Ordering information**

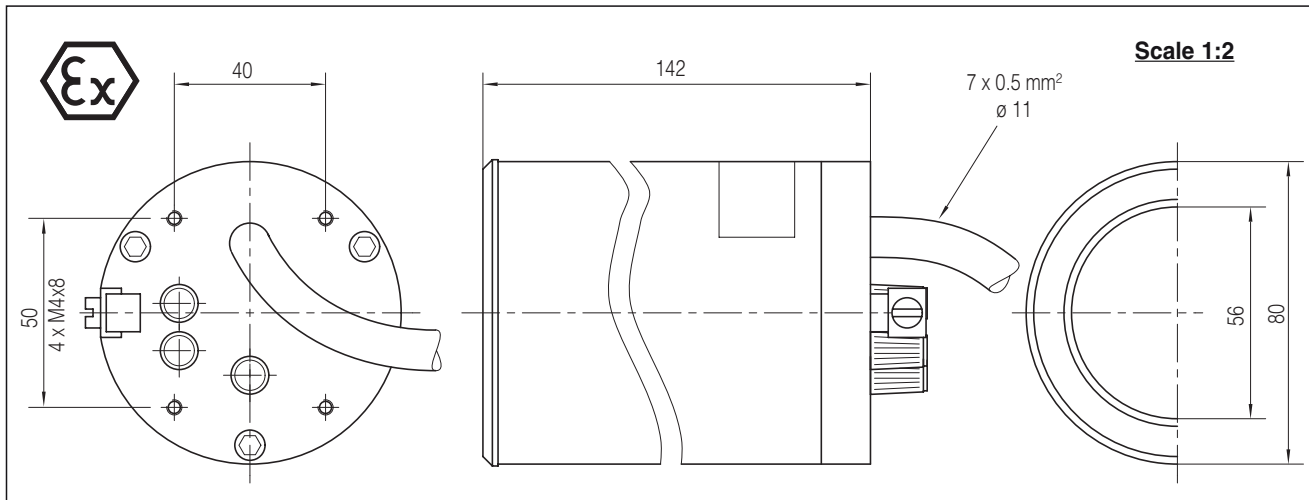
Gearbox38	Order no.:	63136	.
	Speed reduction	_____	
	Without flange		0
	With flange		1

# Stroboscope

T P K

For implementation in hazardous area

Kapfer GmbH  
Tel. ++49 (0) 62 98 / 70 62  
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## DESCRIPTION

Our eyes cannot detect fast movements. If these movements run with continuous speed, they can be visualised by a stroboscope.

For this purpose the stroboscope must send exactly one light pulse per cycle so that our eyes only see the same spot of the moving part which then seems to stand still.

The shorter the light pulse, the sharper the picture our eyes see, but the brightness of the stroboscope decreases. Since the ideal pulse duration depends on several factors, setting is possible.

The movement sequence and the stroboscope must have (at least approximately) the same frequency. The easiest way is the synchronisation by a pulse which is sent by the machine control unit, always at the same time during the sequence.

The integrated delay feature which can be set individually allows visualising sequences after the sync pulse.

If such a pulse is not available, the stroboscope is operated by the built-in individually adjustable generator. The generator starts automatically if there is no pulse for 4 seconds.

An external Ex-potentiometer with 10 kOhms can be connected for the fine adjustment of this frequency. We recommend our Mini-potentiometer.

## Ordering information

Stroboscope, type dS63V-1480  
Order no.: 6315550

## Accessories

Assembly kit in VA, adjustable in 2 levels  
Order no.: 996310-S

## TECHNICAL DATA

Type of protection	EEx d IIC T6/T5 CE 0044 II 2 GD T80/95°C IP 68 PTB 03 ATEX 1131
Operating voltage	24 V DC or AC -20 +10 %
Power consumption	max. 150 mA
Sync pulse	min. +20 V min. 1 ms long Input is electrically isolated
Delay	4 ms to 50 ms
Frequency	4 Hz to 100 Hz corresponds to 250 ms ... 10 ms pulse cycle time external fine adjustment approx. ±10 %
Beam angle	Approx. 10°
Ambient temperature	-20 to +50°C
Protection class	IP 68 (EN 60529)
Housing	VA Glass pane, shock resistance 7 Nm
Weight	Approx. 2,800 g
Electrical connection	Cable ends 7 x 0.5 mm² Shielded; the shield is connected to the housing
1 and 2	Operating voltage 24 V
3	Pot right stop
4	Pot center position
5	Pot left stop
6	Sync pulse -
7	Sync pulse +
Shield	Protective conductor connected to housing

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For implementation in hazardous area

**Operating instructions**

**General**

The red control knob has 3 positions: Off, Stroboscope operation, Continuous operation.

These instructions are based on a moving part (=object) which is rotating. The basic function is the same for conveyor-belt operations.

The two adjusting devices (black and grey) on the rear side have 18 turns and no stops. Overwinding therefore is not possible.

Frequency and delay are only adjusted by one adjusting device (grey colour), since only either the frequency of the free running generator or the delay is needed.

Delay (only for operation with sync pulse): turn clockwise  
 = delay decreases

Frequency (only for free running operation): turn clockwise  
 = Frequency increases

The adjusting device "Pulse" (black with yellow cap) changes the duration of the light pulse. The shorter the light pulse, the clearer the view of the object. However, a short light pulse also means less brightness. Therefore the result is better if the object is protected from the ambient light.

Turn "Pulse" clockwise  
 = pulse takes longer

First turn both adjusting devices approx. 20 turns clockwise. The delay then is minimal, the frequency for the free running mode is maximal and the light pulse very long.

**Operation with sync pulse**

The fine adjustment is not required. Please connect the wires 3, 4 and 5 together.

The input for the sync pulse is electrically isolated from the operating voltage within the stroboscope.

The sync pulse has to be present at the input once per turn. The flashlight is triggered by the rising edge of the sync pulse.

If the sync pulse exceeds 10 V permanently, the stroboscope is switched off.

If no sync pulse is detected (sync pulse too short, amplitude too small, or negative polarity), the stroboscope activates the internal generator after 4 seconds automatically, but reacts immediately if there is a sufficient positive sync pulse.

When the flashlights are triggered by sync pulse, the object seems to stand still.

Then turn the adjusting device "Pulse" anti-clockwise (=darker) until the best proportion of sharpness and brightness is adjusted.

The adjusting device "Delay" allows to delay the sync pulse. So the object seems to be turned.

During the delay, the sync pulse input is blocked. If the set delay exceeds one cycle, the following sync pulse is disabled. This allows to suppress sync pulses when the control unit triggers more than one pulse per turn.

**Free running operation, without sync pulse**

During the free running operation it is hardly possible to avoid that, from time to time, the object turns slowly. This is due to the fact that the speed is mostly not constant and that the speed of the free running generator can drift a little. A readjustment is always possible with the optional fine adjustment on-site. We recommend our Ex-mini-potentiometer with 10kOhms.

For the fine adjustment connect the Ex-mini-potentiometer (10 kOhms) to 4, 5 and 6 and turn to the neutral position. If the fine adjustment is not necessary, connect the wires 3, 4 and 5 together.

The sync pulse is not required. Please connect the wires 6 and 7 together.

If the grey adjustment device "Frequency and delay" has been turned clockwise, light pulses with the highest possible frequency, which can be reduced by the adjusting device.

First, the frequency of the stroboscope is higher than the speed of the object. Slowly reduce the frequency (turn anti-clockwise). If, for example, the frequency is the double of the speed of the object, the image stands still, but front and back are visible at the same time.

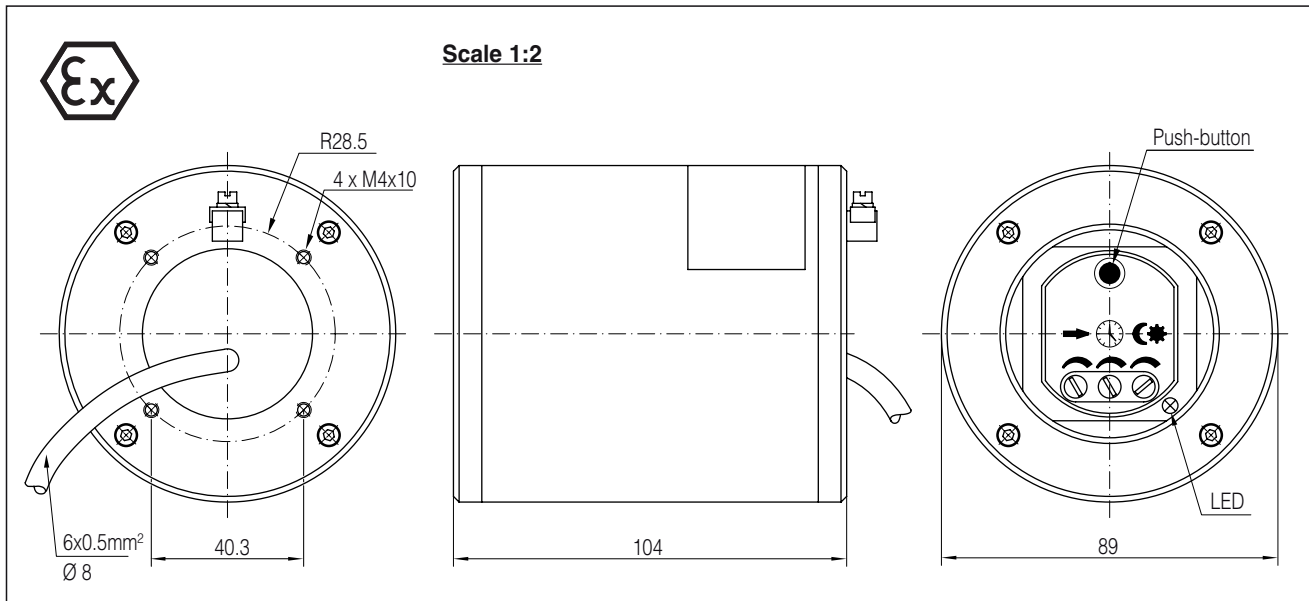
If the frequency is half as high as the speed, the object seems to stand still as if with the right frequency. Since the light pulses only illuminate at every second turn, the object is very dark.

Particularly for uniform objects (e.g. gear-wheels), it might be difficult to find the right frequency. An irregular sign (e.g. applied with felt pen) on the object makes adjusting much more easy.

It might also be helpful to shorten the pulse (black adjusting device turned anti-clockwise) until the brightness is just about to be sufficient.

If the right frequency is set, turn the adjusting device "Pulse" (anti-clockwise =darker) until the best proportion of sharpness and brightness is adjusted.





## DESCRIPTION

The active HF motion detector switch switches a potential-free contact if there is anything moving in the detection area.

The device is ready for operation 60 s after switching on. In the meantime the relay is energised.

**Function:** The HF motion detector switch emits HF and receives the echo. Even in case of very small movements changes are detected. Thin, non-conductive walls (glass, plastic, wood) do not intermit detection. For this reason, invisible mounting is possible (sabotage-proof and vandal-resistant).

Since detection is only triggered by moving, the switch is immune against light sources and thermal radiation as well as against vapour and fog. The responsivity and thus the range is adjustable.

Limit brightness and switch-off delay can be set for contact-less switching.

All control elements are only accessible when the housing is open. The open device is not explosion-proof!

A back-up fuse is built-in for the sensor.

Due to the highest type of protection operation is possible without limitation in zone 1 and 2, as well as 21 and 22 (= dust-Ex) but not for underground workings.

Protection type IP 68 permits operation even where flooding may be anticipated. The high protection type is achieved by sealing and O-ring gasket.

## Ordering information

HF Motion detector switch, type dS63A-1089  
Order no.: 631 60 10

Please indicate cable length in clear text. Standard lengths are 1.5 m, 3 m and 5 m.

## TECHNICAL DATA

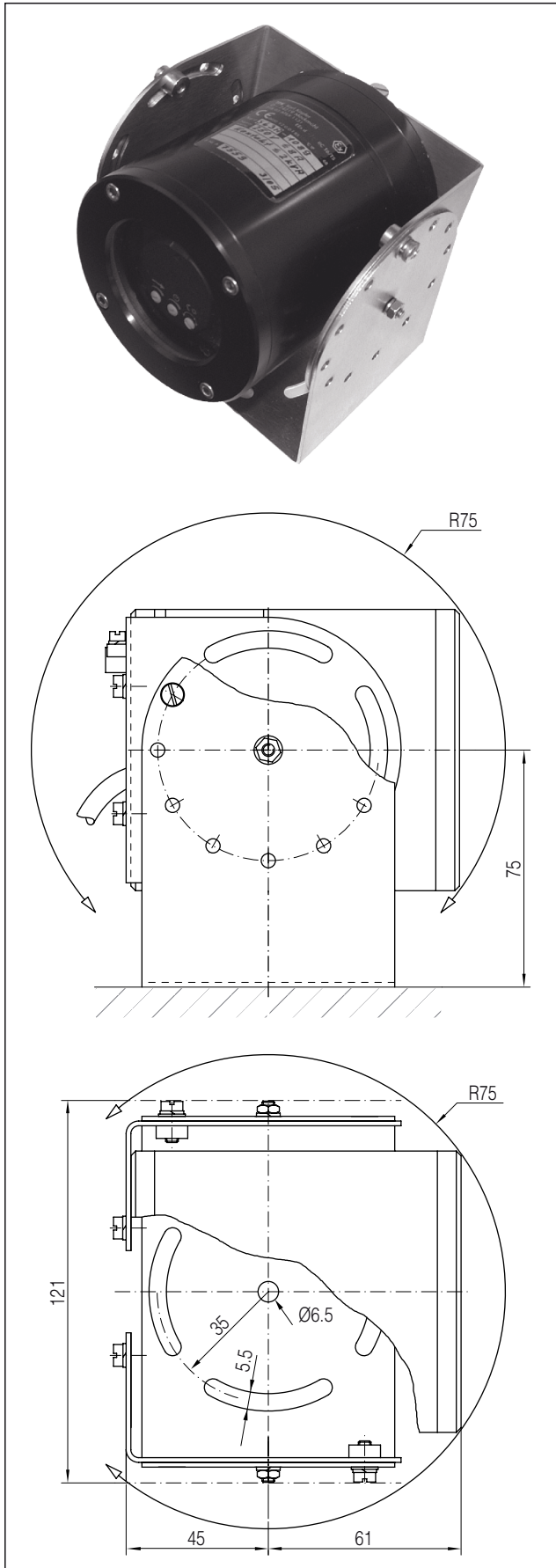
Type of protection	EEx d IIC T6/T5 CE 0044 II 2 GD T80/95°C IP68 PTB 03 ATEX 1131			
Operating voltage	230 V ~ ±15 %, 50 to 60 Hz			
Power consumption	Approx. 30 mA			
Electrical rating	250 V	2 A	1 kVA	AC 21
Contact	Gold-plated silver change-over switch			
Detection angle	160° horizontally			
Beam width	140° vertically			
Range	1 to 8 m continuously adjustable			
Twilight setting	2 to 2000 Lux			
Follow-up time	10 s to 30 min.			
Ambient temperature	-20 to +50 °C			
Protection class	IP 68 (EN 60529)			
Housing	Aluminium, black anodised			
Pane	Polycarbonate, impact-proof 7 Nm			
Weight	Approx. 1,700 g			
Electrical connection	6 x 0.5 mm <sup>2</sup> , 1.5 long (or other length)			

brown	L	blue	N
green-yellow	Protective conductor	black	Break contact
grey	make cont.	white	Common

## Accessories

Assembly kit in VA, adjustable 360° horizontally and vertically.  
Order no.: 99 63 10





### OPERATING INSTRUCTIONS

**Commissioning:** Observe safety instructions. Examine connection once again. All regulators and pushbuttons are only accessible when the housing is open. **The opened device is not explosion-proof!** If explosion hazard cannot be excluded, undertake adjustments when the device is switched off. Before switching on the device, close housing correctly! The device is ready for operation 60 s after switching on. In the meantime the relay is energised.

**Mechanical alignment:** The detection area is approx. spherical. The range increases with the speed, size and conductivity of the object.

The device should aim at approx. half the height of the object (approx. 1m for adults) in the required triggering distance.

**Initial values for the regulators:** Range (arrow) at left stop = min. responsivity (range approx. 1m).

Switch-off delay (clock) at left stop = shortest time (approx. 10 s).

Twilight setting (moon, sun) at right stop = max. brightness (approx. 2000 Lux), the device works despite daylight.

The **top middle pushbutton** (actuate with pin of approx.  $\varnothing$  2.5 mm) switches the relay independently from the sensor:

1 x short: Relay is energised during 4 hours, the red LED at the bottom on the right shines continuously. When pressing the button shortly again, sensor operation is reactivated.

1 x 3 seconds: The sensor is deactivated, the relay is never energised, the LED flashes. When pressing the button shortly again, sensor operation is reactivated.

The red LED must be off during normal operation!

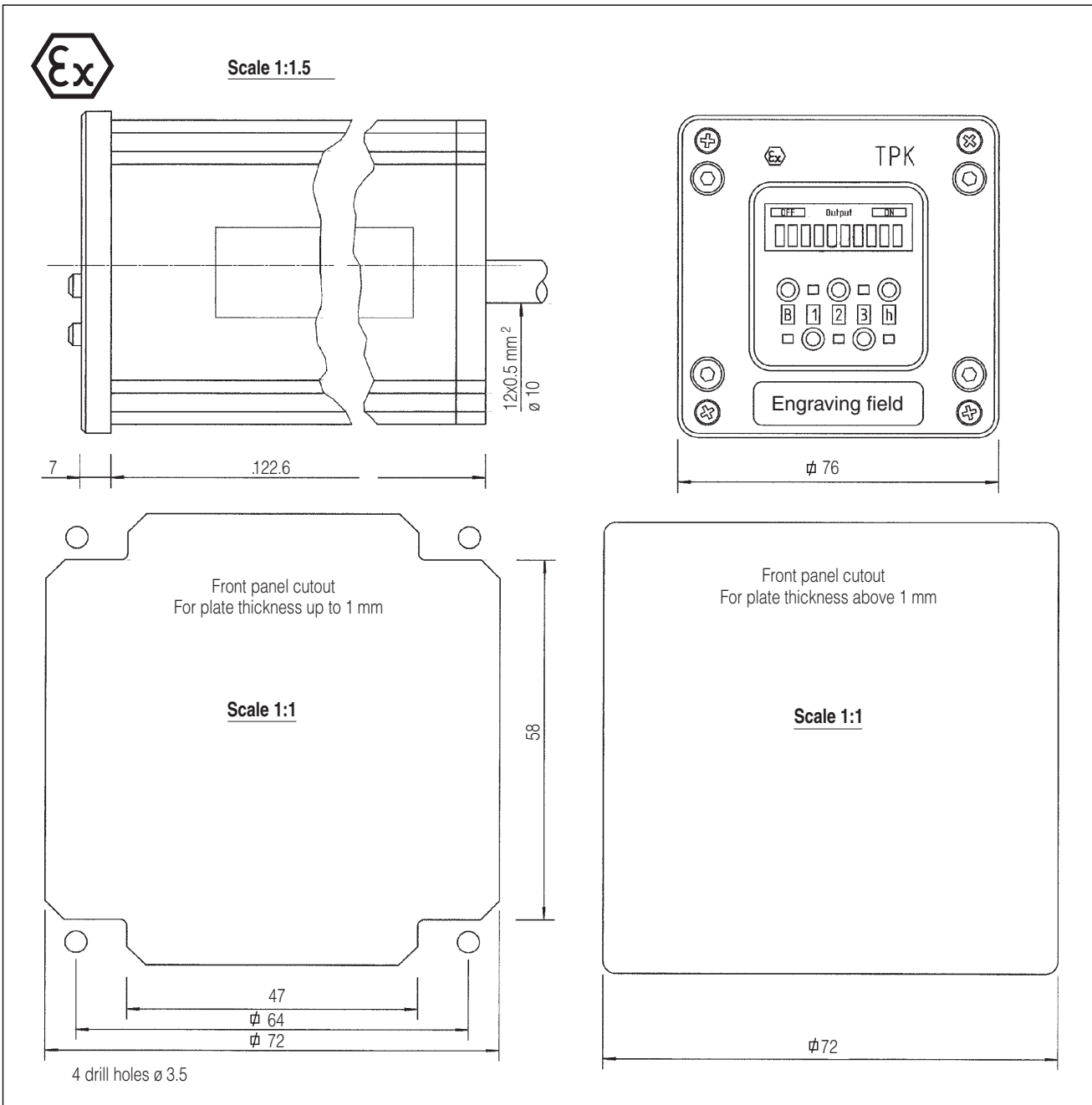
### Troubleshooting:

#### Switch **doesn't switch on:**

- LED flashes, switch off with pushbutton.
- Set range is too small, turn regulator to the right.
- Twilight setting is on Night Service, turn regulator to the right.
- No power supply: The simplest control with built-in LED and pushbutton is only possible if there is no explosion hazard!

#### Switch **doesn't switch off**, or switches on again unintentionally:

- LED shines, switch off with pushbutton.
- Set switch-off delay is too long, turn regulator to the left. Every movement during the switch-off delay starts the delay time again!
- Movements are detected within the range; adjust switch mechanically, reduce range (turn regulator to the left). The switch detects movements even through isolating walls (glass, plastic, wood), e.g. dripping raindrops on the window!



## DESCRIPTION

A multifunctional time relay is integrated in an explosion-proof, flameproof housing with a pane.

The time relay can be set from the front; operation and relay position are visible.

The nominal supply voltage can be between 12 and 240 V DC and between 24 and 240 V AC, without switching-over.

For mounting, the device is pushed into the front panel cutout and fixed with four M 3 screws and the included brackets.

For marking the piece of equipment, a let-in engraving plate is provided.

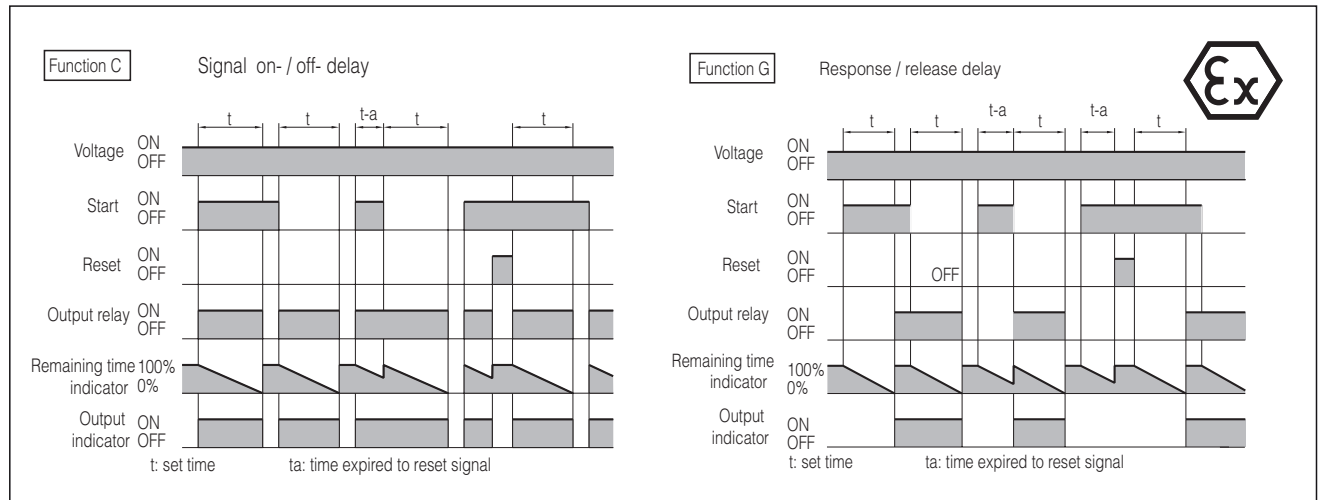
The explosion proofness is ensured by the mounting in a flameproof housing.

The housing can be opened, the time relay is contacted via a socket; this allows a replacement of the time relay, just like the replacement of the integrated fuses.

The time relay is **not disconnected from the power supply**. Therefore, the control inputs (3 to 7) can have mains potential!

For functional reasons, the setting of the time relay is only allowed when the supply voltage is switched-off.

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**Functions, common features**

**Method I:** When the supply voltage is switched-on, the time relay can be started with a start signal,

or

**Method II:**When the start input is permanently “on” (6 connected to 3), one can start by switching-on the supply voltage.

The reset input always has priority. When the reset input is “on”, the relay is always de-energised. The inhibiting input only stops the elapsing of time as long as it is “on”.

If the check input is “switched-on”, the relay operates as if the started time had elapsed and remains in this position.

**A) ON delay**

**Method I:**The start signal starts the delay. After it has elapsed, the relay is energised and remains energised until the reset signal. The length of the start signal does not affect the time.

**Method II (6 connected to 3!):**The switching-on of the supply voltage starts the delay. After it has elapsed, the relay is energised and remains energised until the reset signal or until the supply voltage is switched-off.

**B) Flicker operation**

**Method I:**The start signal starts the pause time. After the pause time has elapsed, the relay is energised during the duration of the delay, and so on. The start pushbutton does not affect the course. The reset immediately interrupts the course. Pause and pulse are equally long.

**Method II (6 connected to 3!):**The course starts when switching-on the supply voltage.

**C) Signal On/Off delay**

**Only method I:**Rising and falling edge of the start signal make the relay energise immediately for the duration of the delay; the delay is set to 100 % again at each edge. Switching on and off in intervals shorter than the delay keeps the relay energised.

**D) OFF delay**

**(Pulse stretching)**

**Only method I:** The rising edge of the start signal makes the relay energise immediately and sets the delay to 100 %. Only the falling edge of the start signal starts the delay; after this delay, the relay is de-energised again. Switching-on in intervals shorter than the delay keeps the relay energised.

**E) Interval operation**

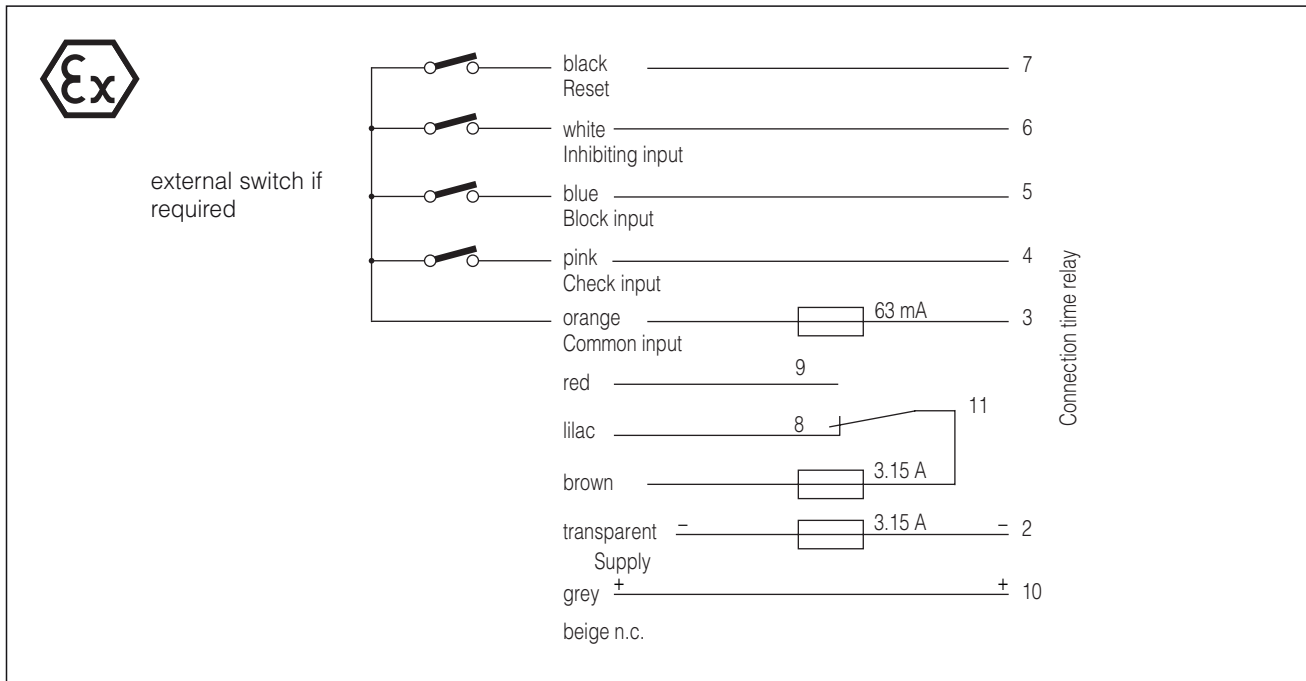
**Method I:**The rising edge of the start signal makes the relay energise immediately and starts the delay once; after this delay, the relay is de-energised again. The length of the start pulse does not affect the course. A restart is only possible after a reset.

**Method II (6 connected to 3!):**When the supply voltage is switched-on, the relay is immediately energised; after the delay it is de-energised again.

**F) One shot and flicker operation**

**Method I:** The rising edge of the start signal starts the delay. Then the relay is energised, remains energised during the delay and is de-energised again. The length of the start pulse does not affect the course. A restart is only possible after a reset.

**Method II (6 connected to 3!):** When the supply voltage is switched-on, a cycle is initiated (pause, pulse, off).



### G) ON/OFF delay

**Only method I:** The rising edge of the start signal starts the ON delay. After the delay has elapsed, the relay is energised but remains only energised as long as the start signal remains "on".

The falling edge starts the OFF delay. The relay remains energised during the delay, and is de-energised again as long as the start signal is "off".

If the start signal changes during the delay, the relay reacts immediately.

### H) Signal Off delay

**Only method I:** The falling edge of the start signal immediately makes the relay energised, and it remains energised during the delay. The rising edge of the start signal immediately makes the relay de-energised.

### Ordering information

Time relay, type dS63A-1372-ZRO  
Order no.: 63110

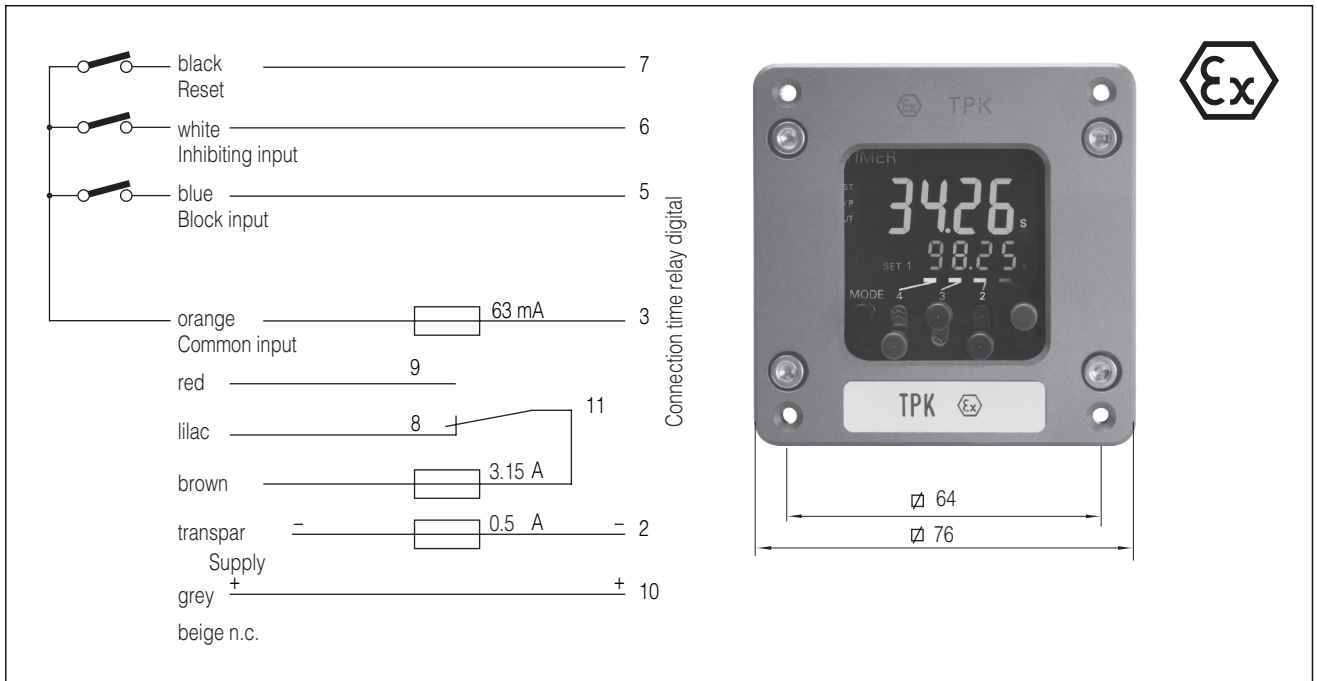
Please indicate cable length if other than 1.5 m (3 m, 5 m or longer) in clear text.

### TECHNICAL DATA

Type of protection	EEx d IIC T6 CE 0044 II 2 G PTB 03 ATEX 1131
Operating voltage	24 to 240 V AC ±10 % 12 to 240 V DC ±10 %
Power consumption	24 V DC approx. 10 mA 240 V AC approx. 15 mA (3 VA)
Contact	Change-over, 250 V, 3 A, AC21
Time adjustable	3-digit, from 0.1 s to 9990 hours
Ranges	0.1/1 s; 0.1/1 m; 0.1/1/10 h
Time error	max. ±0.3 % ±0.05 s
Adjustment error	max. ±0.5 % ±0.05 s
Reset time	max. 0.5 s
Ambient temperature	-10 to +50 °C
Protection class	IP 54 (IEC 144)
Housing	Aluminium, hard-coated
Weight	Approx. 1100 g
Electrical connection	12 x 0.5 mm <sup>2</sup> 1.5 m long (or other length)

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for operation in hazardous area



**DESCRIPTION**

A H5CX digital time relay manufactured by Omron is enclosed in a housing with the same dimensions as the analogue time relay.

You can actuate the adjustment buttons 1 to 4 and the mode buttons through the pane. If equipped without plunger, the device fulfils IP68 and is approved for dust explosion-endangered areas.

The broad range of functions can be programmed via buttons. The buttons can be blocked completely or for parts of functions by means of a password.

Both times can be set independently for flashing operation.

The 7-segment indicator for the current value is four-digit, red and has a size of 11.5 mm. The indicator for the set value is also four digit, but has a green colour and a size of 6 mm.

The remaining time or the time expired is shown on the upper display, the set time is shown below.

The control inputs 3, 5, 6 and 7 are not electrically isolated from the supply voltage.

Although the device can be powered with DC and AC, it must be connected correctly with the poles in DC operation.

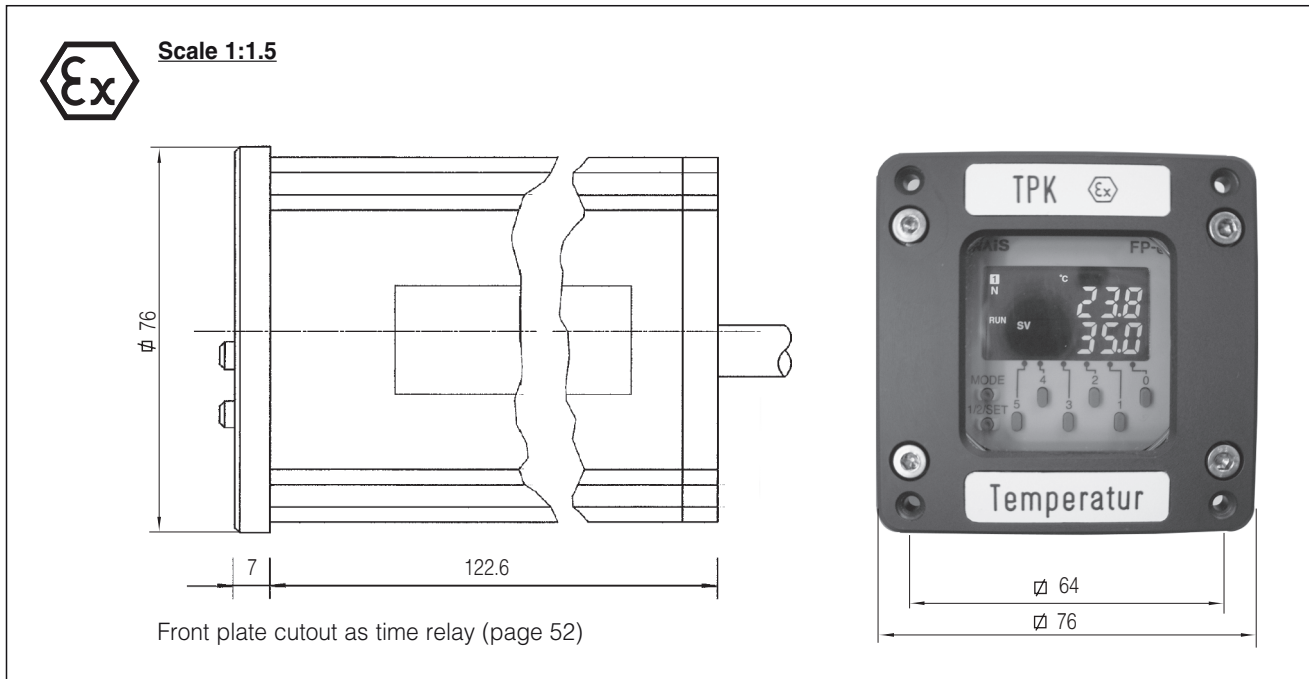
**Ordering information**

Time relay digital, type dS63A-1372-ZRD  
 Order no.: 631 11 50

Please indicate cable length if other than 1.5 m (3 m, 5 m or longer) in clear text.

**TECHNICAL DATA**

Type of protection	EEx d IIC T6 CE 0044 II 2 G (with plunger) CE 0044 II 2 G D T80°C IP68 (only without plunger) PTB 03 ATEX 1131
Operating voltage	10.8 to 26.4 V DC/AC < 200 mA
Contact	Change-over, 250 V, 3 A, AC21
Time adjustable Resolution	4-digit, up to 9999 hours 10 ranges, from 0.001 s to 1 hour
Time error	±0.01 % ±50 ms
Life	mechanical > 10,000,000 with Ohm resistive load 250 V, 3 A > 150 000
Ambient temperature	-10 to +50 °C
Protection class	IP 68 (EN 60529) without plunger IP 54 with plunger
Housing	Aluminium, hard-coated Pane in modified PC
Weight	Approx. 1100 g
Electrical connection	Cable ends 12 x 0.5 mm <sup>2</sup> 1.5 m long (or other length)



## DESCRIPTION

User programmable controls are very often mounted in control cabinets outside hazardous areas. On-the-site-display and entry possibilities in hazardous area are very complex.

Especially simple tasks for entry and display can be completed in a cost-effective way with our user programmable control.

The control unit type FP-e from Matsushita Nais is plugged into a Ex-d housing with a pane. The two-line display is clearly visible through the pane. If necessary, plungers can be built-in to allow actuating the pushbuttons of the control in hazardous area.

### Available features:

Real-time clock, timer (with integrated buffer battery)

PID controller

Pulse emission, Pulse width function

Fast counter (10 kHz max.) for 2 shafts (for positioning tasks)

8 Inputs, 24 V, input resistance approx. 5 kOhms, isolated by optocoupler

2 thermocouple inputs type K (NiCr-Ni)

5 transistor outputs, isolated by optocoupler resistant to 0.5 A max.

1 relay contact output 30 V DC up to 2 A or 250 V AC up to 2 A

Com Port RS 232/485 for program entry and monitoring, FPO programming

Program memory EEPROM 2720 steps

## TECHNICAL DATA

Type of protection	EEx d IIC T6 CE 0044 II 2 G (with plunger) CE 0044 II 2 G D T80°C IP 68 (only without plunger) PTB 03 ATEX 1131
Operating voltage	24 V DC $\pm 10\%$ < 200 mA
Display	3 colours, 2 lines, 5 characters each
Ambient temperature	-20 to +50 °C
Protection class	IP 68 (EN 60 529) without plunger IP 54 with plunger
Housing	Aluminium, hard-coated Pane in modified PC
Weight	Approx. 1100 g
Electrical connection	Cable ends 10 x 0.5 mm <sup>2</sup> Depending on requirements 1.5 m long (or other length)

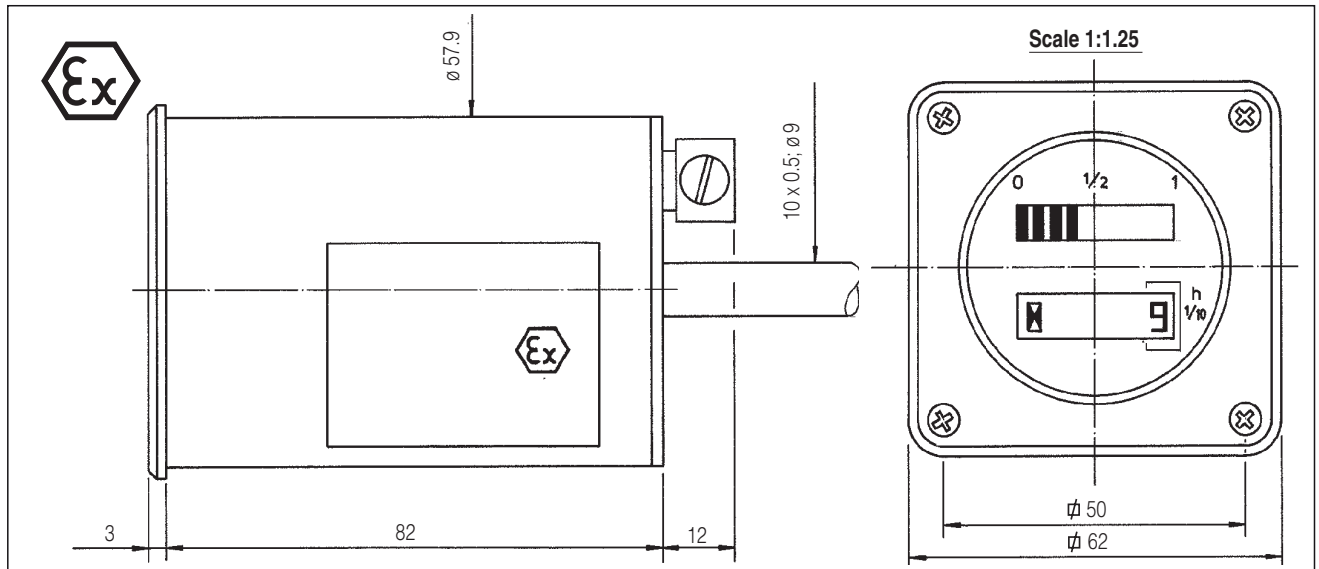
## Ordering information

User programmable control, type dS63A-1372-FP-e  
Order no.: 631121

Please indicate cable length if other than 1.5 m (3 m, 5 m or longer) in clear text.

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Battery tester & working hour meter



**DESCRIPTION**

Especially for enclosing customer-specific devices, we have developed a range of housings with “flameproof” protection. The combined instrument as well as our time relay is an application example for the numerous possibilities. Please ask us, if your device is supposed to be operated in hazardous areas!

The combined instrument contains a Combi-Controller 803 from Curtis (we look forward to sending you the original datasheet). It combines the functions of a battery tester (the discharge curve can also be adjusted in hazardous areas) and a working hour meter with a resolution of 0.1 h.

When the battery is disconnected, the actual charging state and also the working hours are stored in an EEPROM.

The aesthetic, flameproof housing is well adapted to the harsh environmental conditions with the IP 68 degree of protection.

**Ordering information**

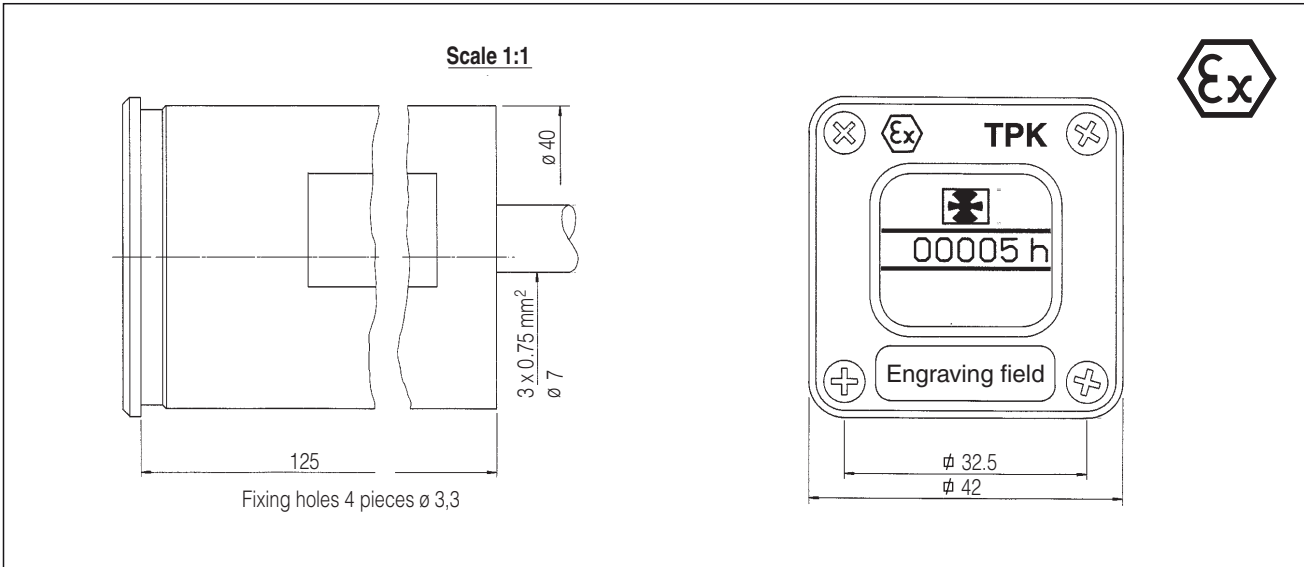
Combined instrument, type dS63A-8558 CUR  
 Order no.: 63140

Please indicate supply voltage, switching-off relay contact and cable length in clear text. Standard lengths are 1.5 m, 3 m and 5 m.

**TECHNICAL DATA**

Type of protection	EEx d IIC T6 CE 0044 II 2 GD T80°C IP 68 PTB 03 ATEX 1131
Operating voltage	12 to 80 V in steps of 2 V
Curve	1.57 to 1.93 V/cell adjustable on the site
Working hour meter	up to 99 999.9 h Resolution 0.1 h Measuring uncertainty ±0.1 %
Switching contact	1 A
Ambient temperature	-20 to +55 °C
Protection class	IP 68 (IEC 144)
Housing	Aluminium, black front Housing anodised colourless
Weight	Approx. 300 g
Electrical connection	10 x 0.5 mm <sup>2</sup> 1.5 m long (or other length)
lilac	(1) Start input -
white	(2) Keylock switch +
black	(3) Cutoff relay +
brown	(4) Cutoff relay -
blue	(5) Battery voltage -
pink	(6) Start input +
orange	(7) Battery + low
red	(8) Battery + high
grey	Not connected
green-yellow	Protective conductor





## DESCRIPTION

Important pieces of equipment such as drive motors, pumps, filters and valves need regular preventive maintenance.

A working hour meter provides clear information on the operation time of the device, at any time.

The meter has no reset, and thus cannot be manipulated.

Mounting is very easy: A drilled hole of  $\varnothing 40$  mm and four through-holes for the mounting screws (M 3) in the front panel are sufficient.

For marking the piece of equipment, an engraving plate is provided, which is glued in a depression.

Thanks to the very small size, even a later mounting is unproblematic.

The explosion proofness is ensured by the mounting in a hermetically sealed, flameproof housing with cable ends. The device is driven by non-intrinsically safe circuits, 230 V AC or 24 V DC. Other voltages are available, if required.

## Ordering information

Working hour meter, type dS64A - 1240 - BE

230 V AC	Order no.: 6425
60 to 140 V AC	Order no.: 6426
24 V DC	Order no.: 6427

## TECHNICAL DATA

Type of protection	EEx d IIC T6 $\text{CE}$ 0044 II 2 GD T80°C IP 68 PTB 03 ATEX 1130
--------------------	--

Operating voltage	230 V AC Approx. 8 mA consumption
-------------------	--------------------------------------

or	60 to 140 V AC Approx. 8 mA consumption
----	--

or	10 to 27 V DC 5 to 37 mA consumption Other voltages possible
----	--

Display	Up to 9999.9 hours
---------	--------------------

Resolution	0.1 hours
------------	-----------

Ambient temperature	-20 to +50 °C
---------------------	---------------

Protection class	IP 68 (IEC 144)
------------------	-----------------

Housing	Aluminium, hard-coated
---------	------------------------

Weight	Approx. 250 g
--------	---------------

Electrical connection	3 x 0.75 mm <sup>2</sup> 1.5 long (or other length)
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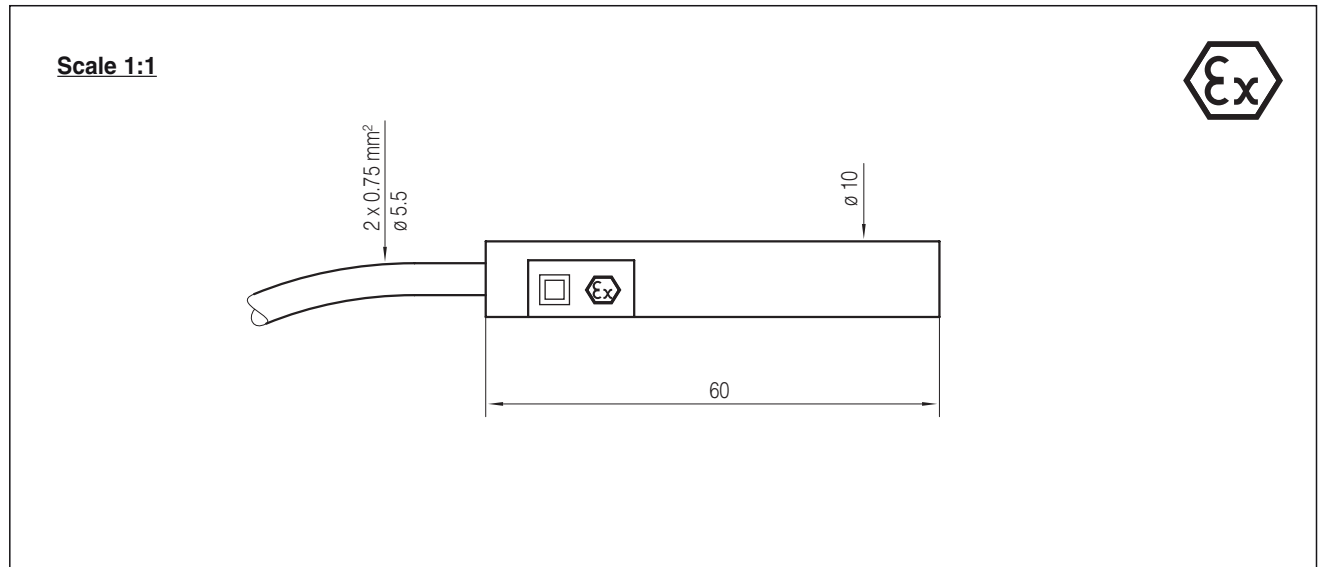
DC version:  
 brown + blue -

Protective conductor  
 green-yellow



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for temperature monitoring of mechanical devices



**DESCRIPTION**

The EU brought us the mechanical explosion protection. It is surely possible to be in two minds about this measure as well as of most of the EU Directives. But even if this directive might maybe not make much sense, it has to be observed.

Especially for machines which have to be operated in temperature class T5 or T6, it is difficult to limit the temperature safely (e.g. of a bearing) in case of fault.

Our thermal fuse includes a heat-sensitive element. In the easiest case, it is a thermal fuse which triggers at a set temperature. Thermostats, e.g., are also possible. The selection can essentially be undertaken according to your requirements.

The small size allows mounting the thermal fuse very close to the element to be monitored. If the temperature is exceeded, the thermal fuse triggers and the control can safely stop the machine.

Please contact us, if you have problems with temperature monitoring! We are also capable of producing special devices as an individual piece.

**TECHNICAL DATA**

Type of protection	EEx d IIC T6 CE 0044 II 2 GD T80°C IP 68 ZELM 02 ATEX 0118
Electrical rating	up to 250 V 0.1 A up to 24 V 5 A Depending on built-in temperature-sensitive element
Protective insulation	Yes
Ambient temperature	-20 to +75 °C
Protection class	IP 68 (EN 60529)
Housing	VA
Weight	Approx. 100 g
Electrical connection	Cable ends 2 x 0.75 mm² 1.5 long (or other length)

**Ordering information**

Thermal fuse, type dS93V - 6010  
 Order no.: 9391

Please indicate cable length if other than 1.5 m (3 m, 5 m or longer) in clear text.

# Front-panel sealing unit sealing element, blind plug

T P K

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## Front-panel sealing unit for M16x1 devices

The front-panel sealing unit provides a safe sealing between front panel and device, and it offers a good twisting protection. With the silicone cap and a second O-ring, the front of the device is fully encapsulated.

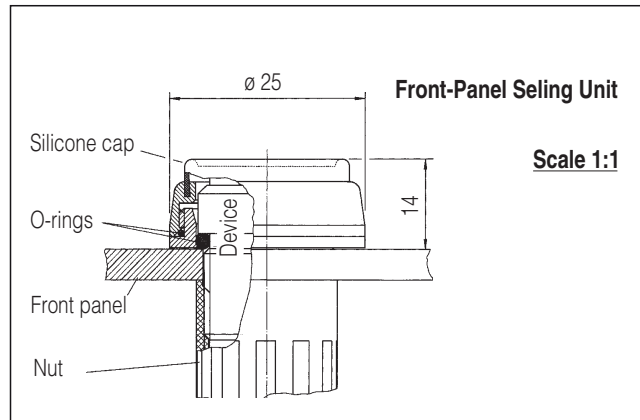
The front-panel sealing unit consists of a ring nut (anodised aluminium), a thin O-ring, a cover (anodised aluminium) with a pressed-in silicone cap and a thicker O-ring.

**Mounting:** The thicker O-ring is pushed over the connection cable, or slid over from the front. The aluminium ring nut must be pushed over the connection cable. Please note that the thread must be in the forward direction.

The thicker O-ring must be lodged completely in the groove of the device. Then the aluminium ring nut must be pushed on it; using some water, oil or grease makes it very easy.

The thinner O-ring is placed into the groove of the aluminium ring nut.

Now the device is fixed in the front panel with the nut. The cap is screwed-on at the end.

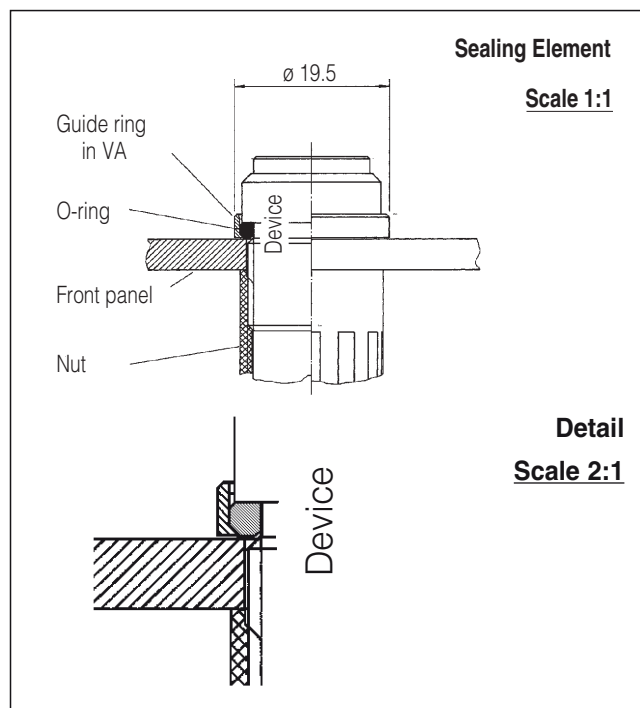


## Sealing element for M16x1 devices

The sealing element provides a safe sealing between front panel and device. In addition, it offers a good twisting protection. It consists of a VA and an O-ring.

**Mounting:** The O-ring is pushed over the connection cable, or slid over from the front. The VA ring must be pushed over the connection cable. Please note that the projection pointing to the inside at the inside diameter must be in the backward direction (towards the connection cable).

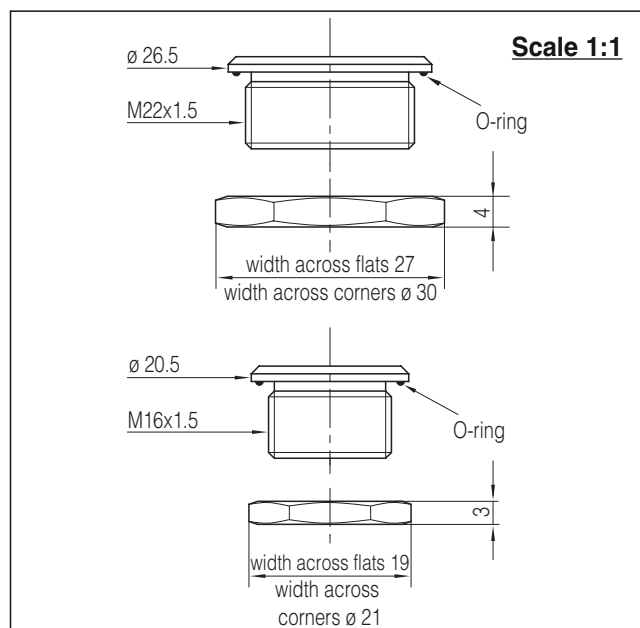
The O-ring must be lodged completely in the groove of the device. Then the VA ring must be pushed on it; using some water, oil or grease makes it very easy.



## Blind plug

The blind plugs in VA with integrated O-ring seal the spare drilled holes in the control cabinet such that the IP degree of protection and the impact resistance do not change.

Appropriate nuts in VA are also available.

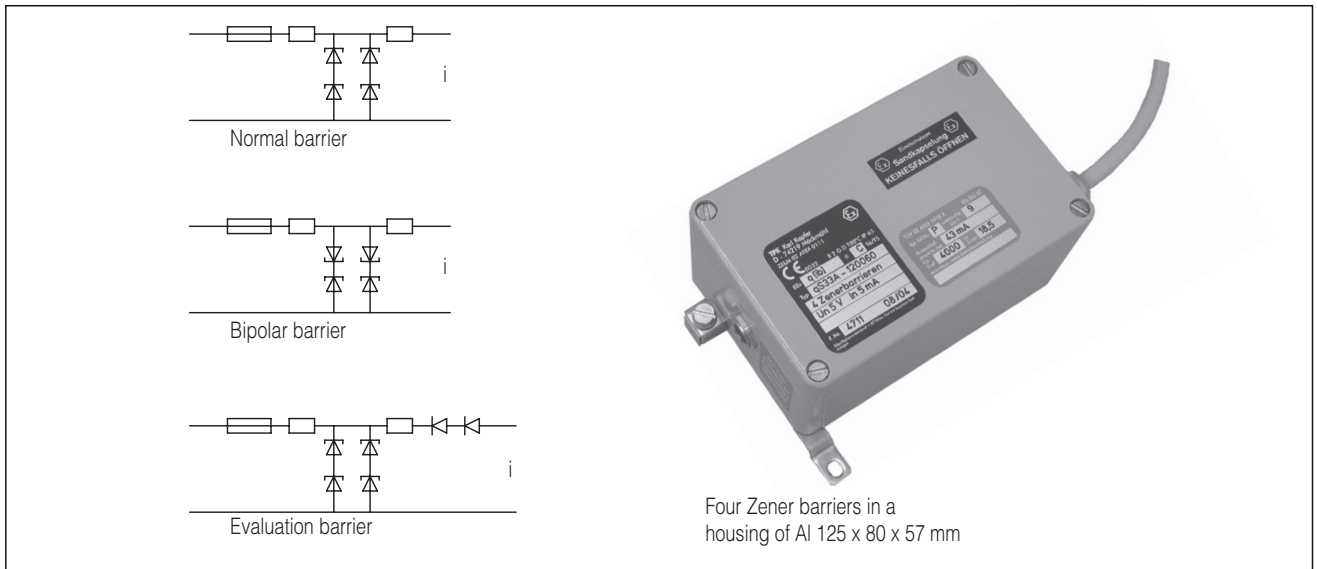


## Ordering information

	Order no.:
Front-panel sealing unit	99 000 31
Sealing element	99 000 61
Blind plug M16 x 1.5 VA	99 000 15
Nut M16 x 1.5 VA	99 000 55
Blind plug M22 x 1.5 VA	99 000 16
Nut M22 x 1.5 VA	99 000 56

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For implementation in hazardous area



Four Zener barriers in a housing of Al 125 x 80 x 57 mm

**DESCRIPTION**

Many applications require the provision of intrinsically safe circuits in ex-areas.

Barriers required to assure intrinsic safety must be set up outside the ex-area as the non-intrinsically safe side of the barrier is not explosion-proof.

If barriers are required for metrological reasons or erection in ex-areas the barriers must be designed additionally as explosion-proof, e.g. by mounting in a pressure-resistant enclosure.

Specially for implementation in zone 1 and 21 we offer barriers mounted in a powder enclosure.

In particular, when several barriers are required (load cells, four-wire temperature gauging...) we aim for very small sizes.

Connection is performed via cable ends. In the case of intrinsically safe circuits, plug connectors may also be mounted.

As we manufacture the barriers ourselves we can also fulfil special requirements (e.g. tolerance and temperature dependence of the series resistance) even for very small quantities.

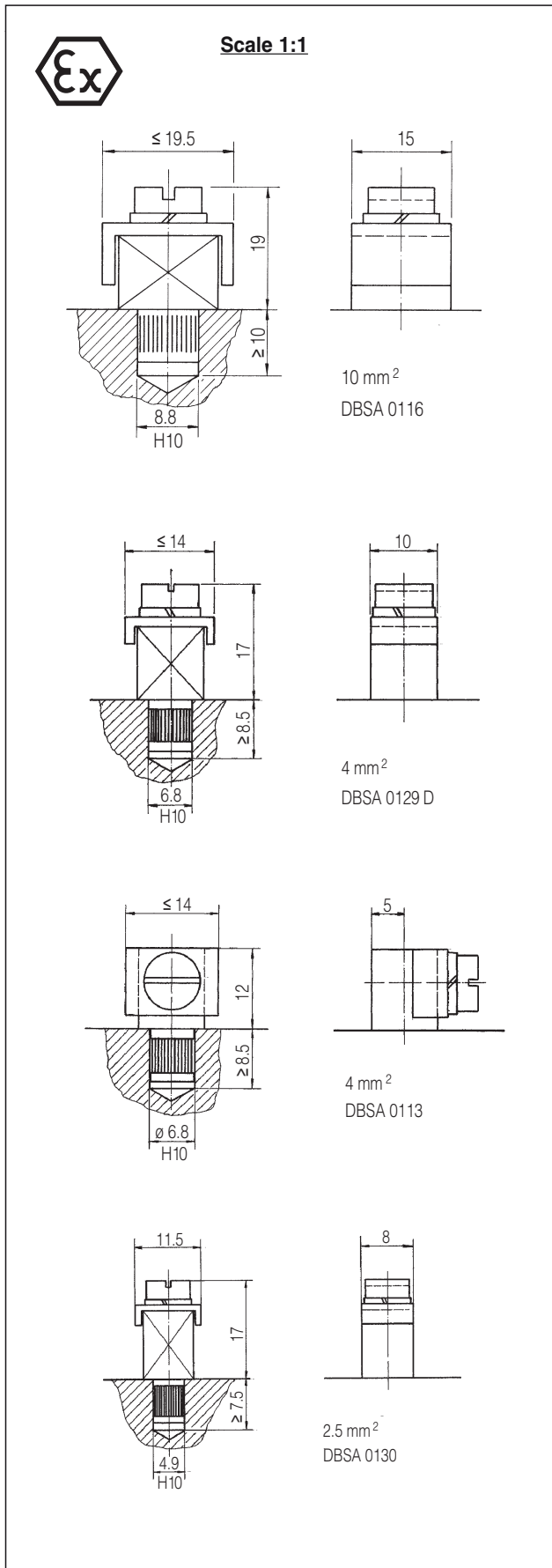
**Ordering information**

Zener barrier type iU35L-....; housing type qS33-....

Zener barriers are manufactured to customer wishes. Please also ask us about individual pieces!

**TECHNICAL DATA**

Type of protection	EEx q[i]b] IIC/IIB T6/T5 CE 0044 II 2 GD T80°C IP 68 TÜV 12 ATEX 108 033 X ZELM 02 ATEX 0111
Barrier types	Curve always linear; Normal barriers and Evaluation barrier positive / negative and bipolar barriers
Limit data	U <sub>0</sub> to 42 V I <sub>0</sub> to 456 mA U <sub>m</sub> 250 V
Ambient temperature	-20 to +50 °C
Protection class	IP 68 (EN 60529)
Housing	Al, lacquered or polyester impact-proof 7 Nm
Electrical connection	Cable end blue and grey For intrinsically safe circuits plug connectors may be mounted



## DESCRIPTION

Devices with metal housings need an earth-wire screw terminal outside and in the connection chamber.

With explosion-proof devices, these terminals must also be safe. Therefore, they are also tested during the type examination of the device.

The PTB does not issue certificates for small accessories. However, all the earth-wire screw terminals presented here have been examined together with complete devices and considered suitable.

- PTB-tested, terminals accept 2 x 10 mm<sup>2</sup> (DBSA 0116), 2 x 4 mm<sup>2</sup> (DBSA 0129 D and 0113) or 2.5 mm<sup>2</sup> (DBSA 0130).
- Easy mounting by pressing into a pocket hole (H9 = twist drill precision)
- Knurled trunnion offers good contact, safe snug fit and twisting protection
- Auxiliary measures against twisting, such as a milled shoulder, sprue or twisting protection part, are not required.
- Twisting protection of clamping saddle through square profile
- Loosening protection of the screw through lock washer
- Clamping body galvanised and passivated steel; screw, saddle and lock washer made of VA
- All versions are also available completely made of VA
- No possible thread deformation in trunnion, since solid material
- All types with an optional impressed earth symbol (DIN 40011)

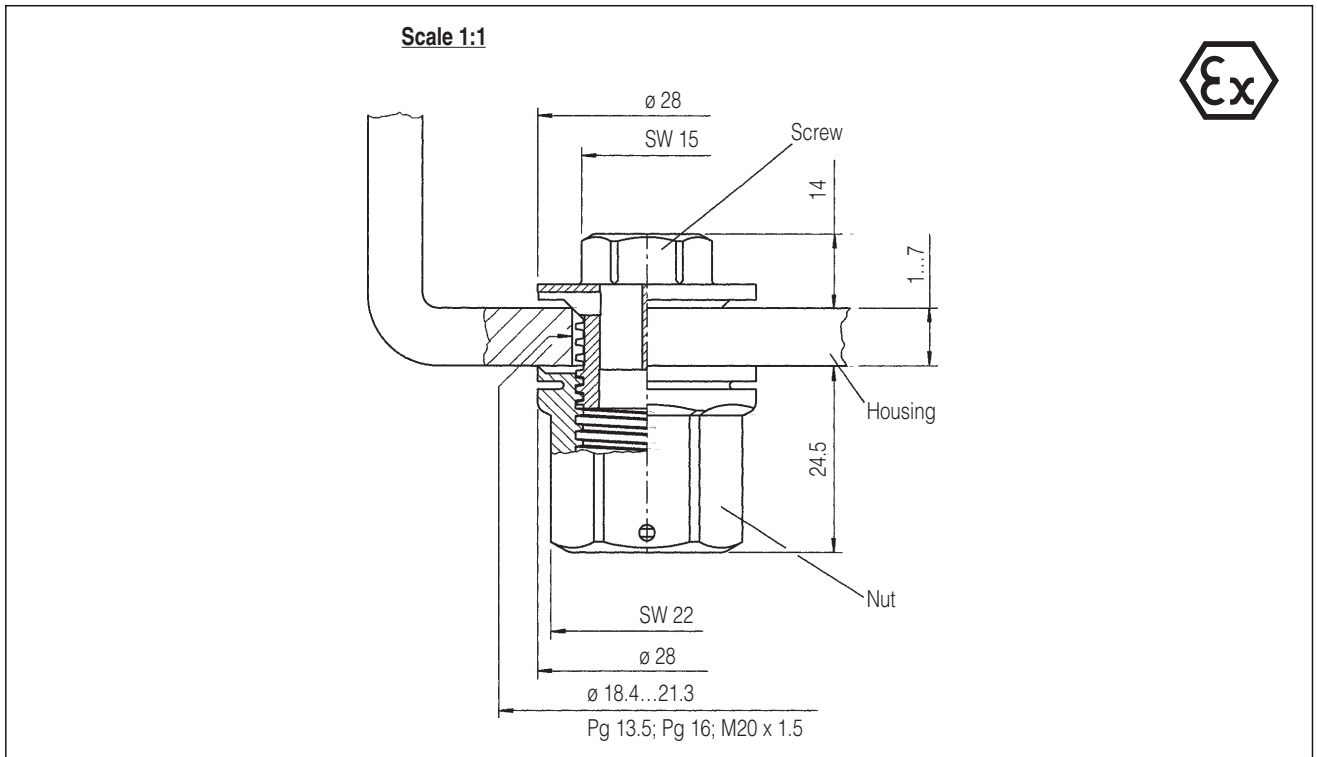
## Ordering information

Earth-wire screw terminal

Type	Order no.:
DBSA 0116	1298
DBSA 0116 VA	1299
DBSA 0113	1134
DBSA 0113 VA	1135
DBSA 0129 D	1292
DBSA 0129 D VA	1296
DBSA 0130	1304
DBSA 0130 VA	1305

If you desire version with earth symbol, please indicate in clear text.

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**DESCRIPTION**

Especially in housings, which are mounted in the open air, condensed water is formed or rain-water enters through damaged gaskets. If the water cannot drain off, it will lead to a damage of the built-in parts or to a short circuit.

On the one hand, the venting enables a good exchange of air thus acting against condensation of water; on the other hand, penetrated water can drain off without causing any damage.

A labyrinth construction ensures that water cannot penetrate through the venting device; a porous plastic disk protects against dust.

Due to the two-piece construction, one through-hole in the connection chamber is sufficient; the wide range of clamping, however, also allows mounting in threaded holes.

**Hints for mounting**

In order to allow the penetrated water to drain off, the venting device must be inserted in the bottom of the housing.

The part with the screw thread and 15 mm across flats is mounted inside the connection chamber.

We recommend a tightening torque of 3 to 4 Nm.

**Ordering information**

Venting device, type DBEL 0112

Order no.: 1120

**TECHNICAL DATA**

Type of protection	EEx e II CE 0044 II 2 G PTB Nr. 00 ATEX 3109 X
Ambient temperature	-20 to +75 °C
Protection class	IP 54 (IEC 144)
Material	Polyamide, impact-proof 7 Nm Filter PE
Colour	grey
Please note:	Admissible wall thickness of the connection chamber: 1 to 7 mm
Bore diameter:	18.4 to 21.3 mm
Threaded hole:	Pg 13.5; Pg 16 or M 20 x 1.5
Weight	Approx. 10.7 g

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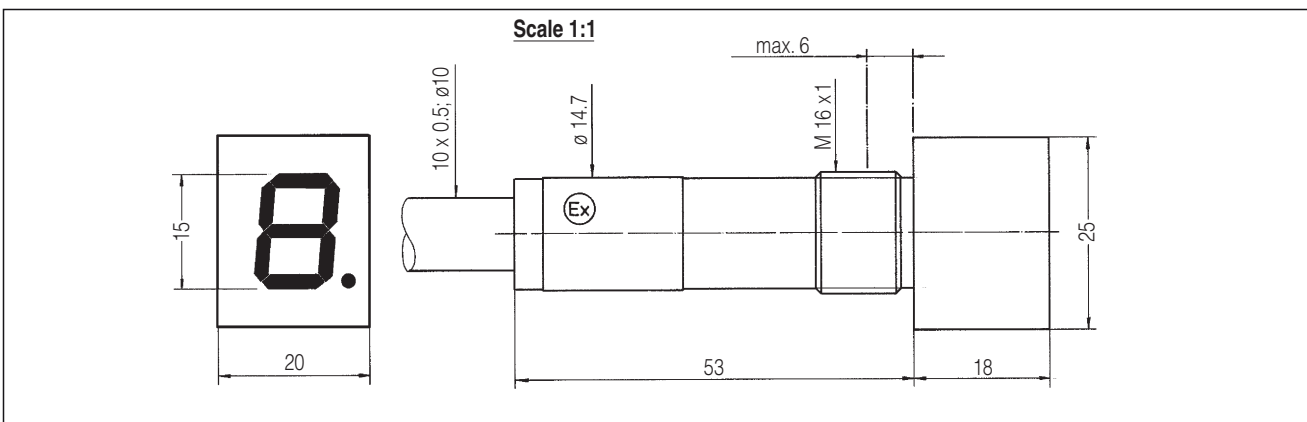
## Numerical indicator type mS74M-71

### (Ex) s G5

The seven-segment indicator is triggered via built-in standard 24 V series resistors; other voltages are possible.

A wire is assigned to each segment.

A version with BCD decoder and 5 V operating voltage is also available.



## Text indicator type qS82K-1607

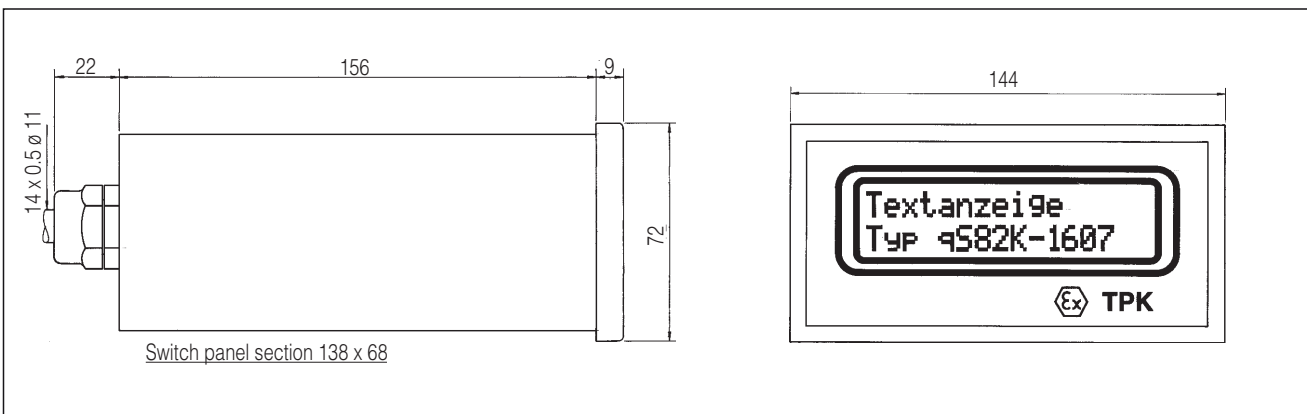
### EEx q [ib] IIC T6

A two-line illuminated LCD indicator with 16 characters per line indicates texts saved in an EPROM.

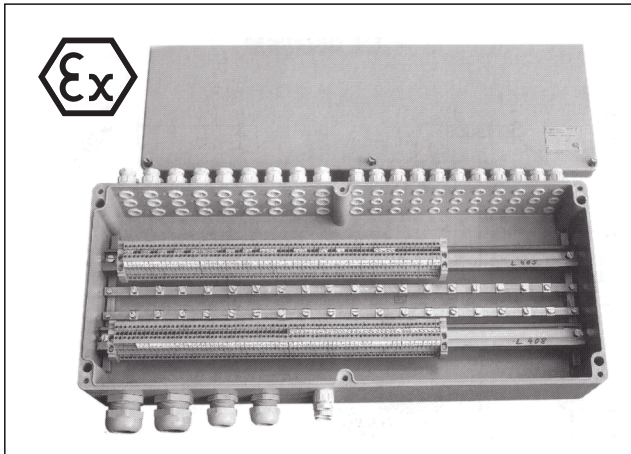
The max. 256 texts are selected via an 8 bit data line.

Triggering and supplying are performed via standard 24 V circuits.

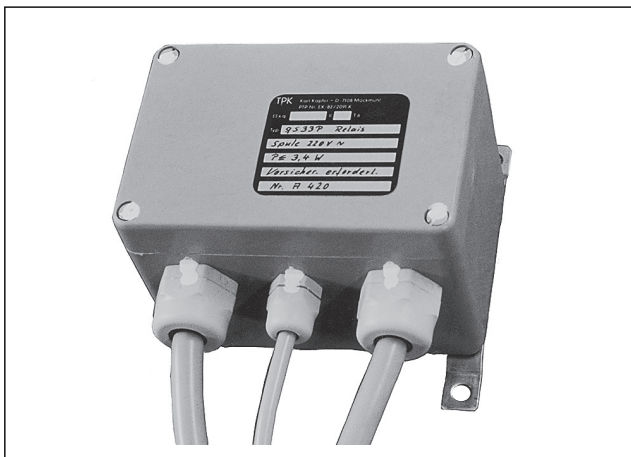
Due to the simple manner of triggering, relay controls may also be used for text selection.



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EEx e connection box, aluminium, 600 x 230 x 110 mm.



Powder-filling protection of a four-pole change-over relay, polyester housing 110 x 75 x 75 mm.



Powder-filling protection with cable ends of a light sensor. Polyester housing, 75 x 80 x 55 mm.

**DESCRIPTION**

Our technical literature shows standard devices. However, we also manufacture tailored versions in series or as single pieces.

**1. EEx e connection boxes**

certified to ATEX for gas and dust explosion-endangered areas of zones 1 and 2, 21 and 22 (= category 2 und 3)

Type of protection EEx e II T6,

CE II 2 GD T80°C

ZELM 02 ATEX 0093

Sealing IP 54 or IP 66

Nominal voltage up to 1000 V, cross section up to 120 mm<sup>2</sup>

Aluminium housing:

Size 64 x 58 x 34 mm to 600 x 230 x 110 mm

Polyester housing:

Size 75 x 80 x 50 to 600 x 250 x 120 mm

VA housing:

Size 150 x 150 x 80 to 760 x 760 x 300 mm

Optional outfit with EEx e terminals.

**2. EEx i connection boxes**

for intrinsically safe circuits

Same version as the EEx e connection boxes, but with blue cable glands and blue terminals.

**3. Devices with powder-filling protection.**

With the "powder-filling" protection (symbol "q" according to ATEX), the remaining hollow space inside the housing is filled with fine glass balls (glass sand in the past).

Thanks to skilful combination with other types of protection (d, e, i), many devices can be elegantly and cost-effectively made explosion-proof; this is particularly easy with transducers, adaptation and transforming circuits.

Two different constructions are manufactured, which differ in the type of electrical connection. Connection through **Cable ends** (any desired length).

This version provides the smallest and most cost-effective device.

The cable ends are connected in an EEx e connection box on the site.

Control elements are always accessible.





Powder-filling protection with cable ends of a firmly adjusted time relay with a built-in start pushbutton.  
 Polyester housing, 110 x 75 x 75 mm



Powder-filling protection with two cable ends.  
 A cut-off relay is installed  
 Polyester housing, 110 x 75 x 75 mm.



Ex control box  
 325 x 160 x 90 mm



Aluminium housing 220 x 120 x 80 mm with power module, acoustic signal indicator and potentiometer

### Connection via flanged **EEx e connection box**

A connection box with EEx e protection is firmly fixed to the powder enclosure. For a better appearance, the connection box is usually chosen with the same width as the powder enclosure.

It is also possible to flange-mount two connection boxes on one powder enclosure, this allows to accommodate e.g. intrinsically safe circuits in a separate box.

Control elements are always accessible.



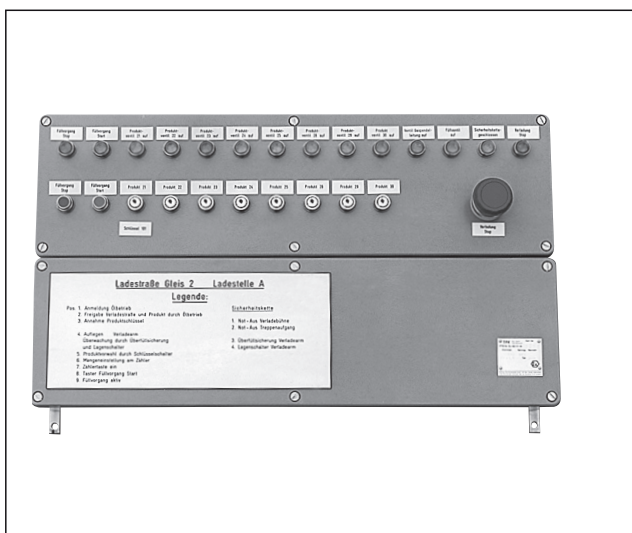
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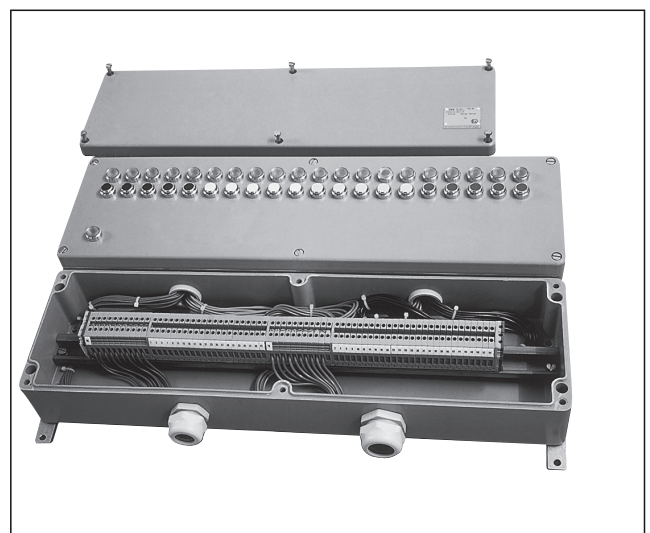
Ex control box  
 360 x 160 x 90 mm



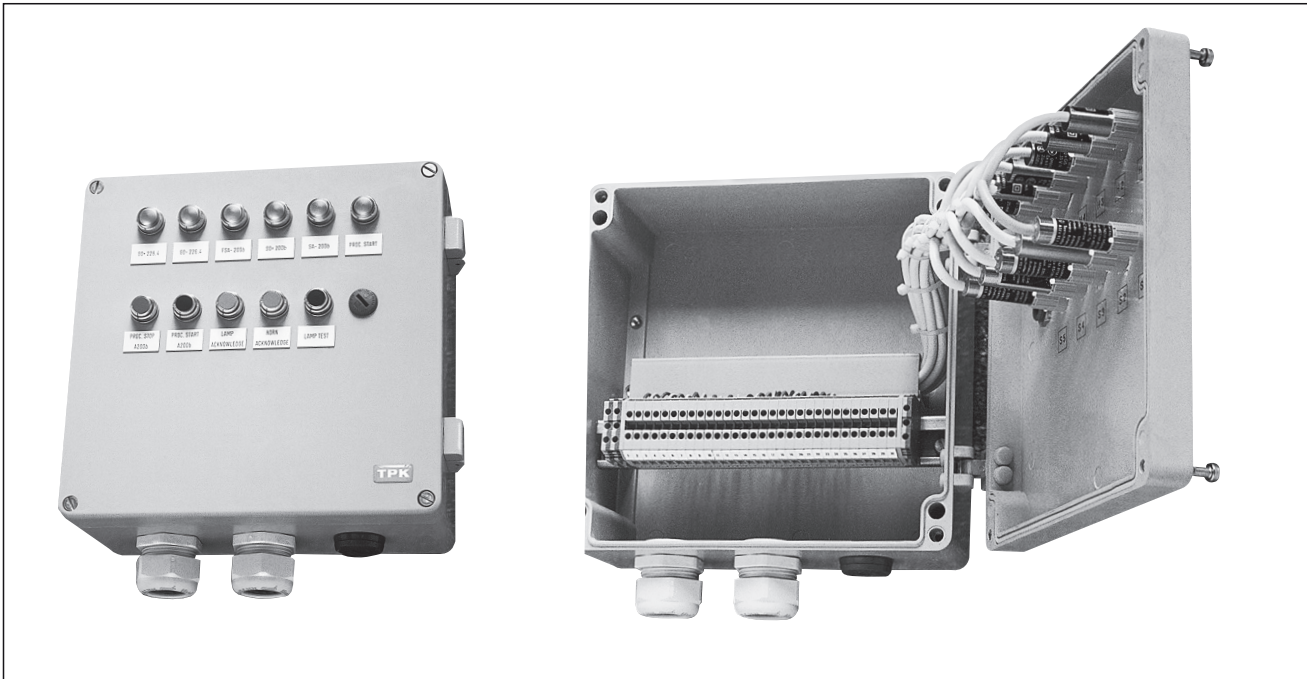
Ex control box  
 260 x 160 x 90 mm



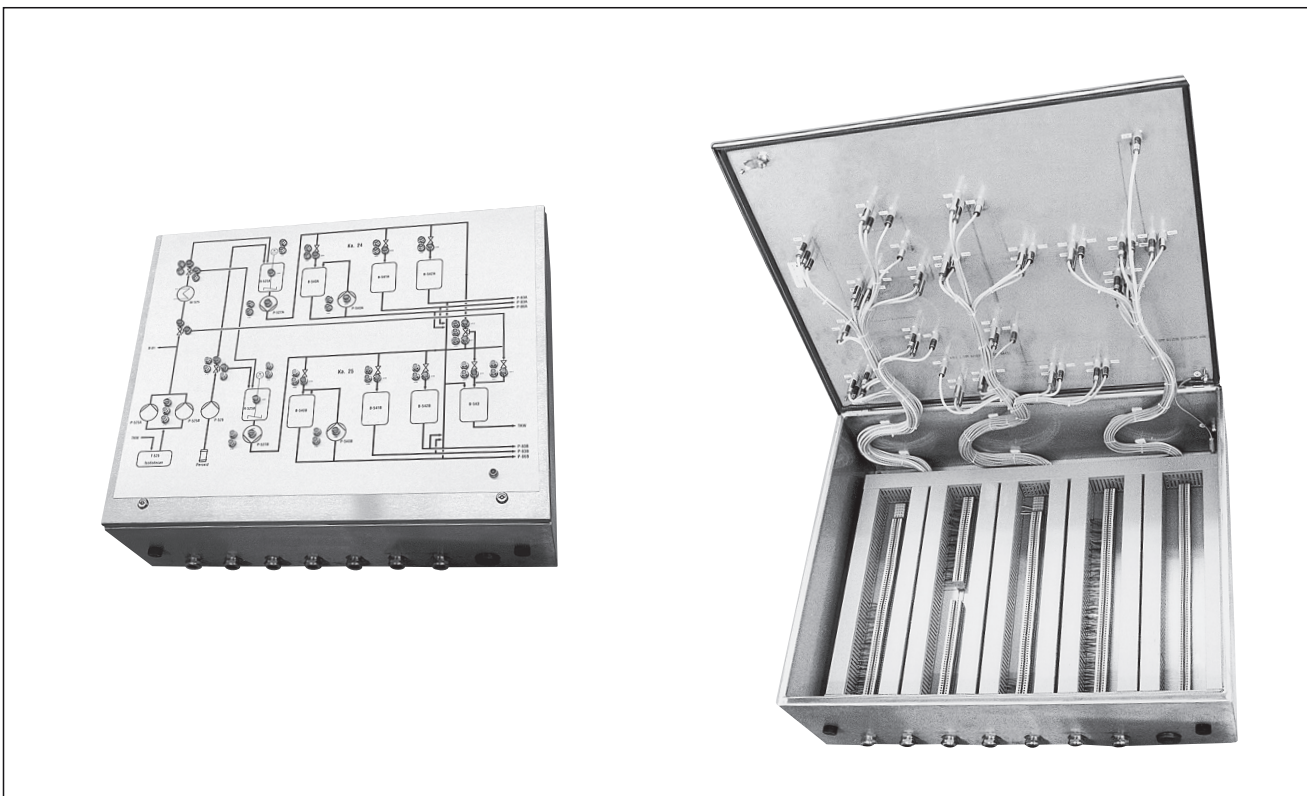
Ex control box made of polyester, with flanged connection box, overall dimensions 560 x 325 x 90 mm.



Ex control box made of polyester, with flanged connection box, overall dimensions 560 x 325 x 90 mm.

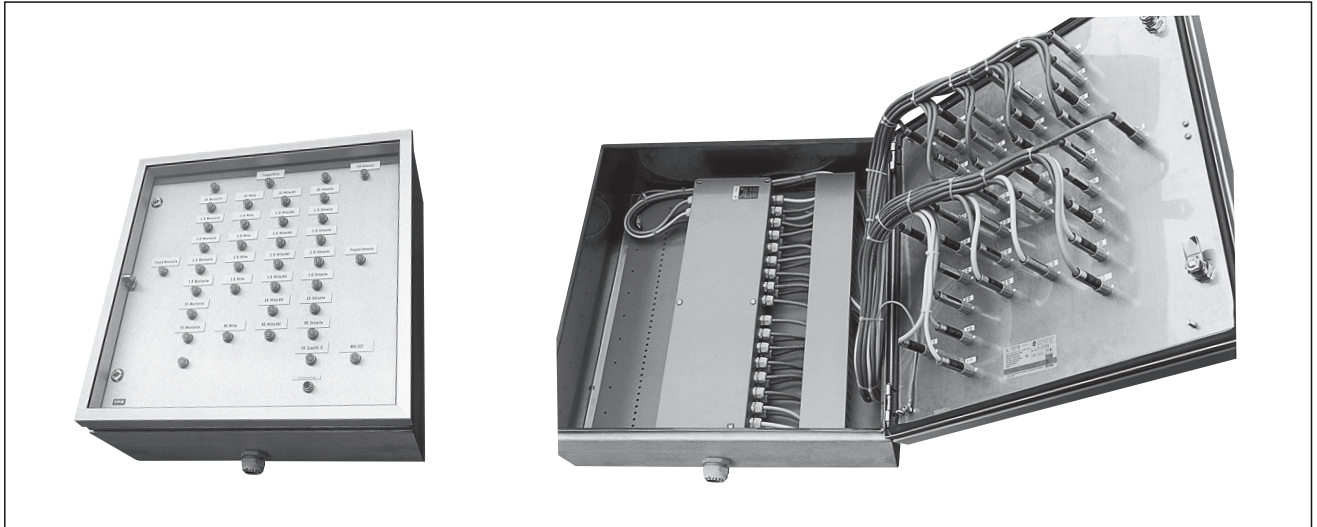


Ex control box made of polyester, with built-in EEx e terminals, dimensions 250 x 255 x 120 mm.

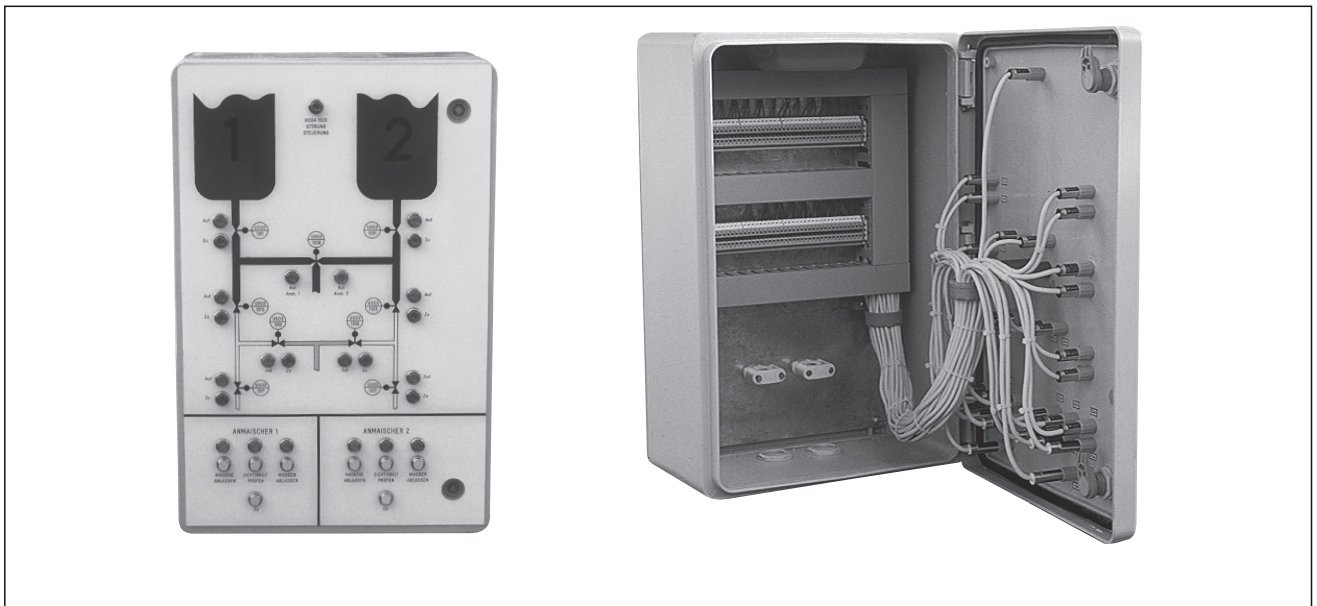


Ex control unit in a VA housing, engraved Resopal front panel with 19 mini-LEDs and 44 mini-pushbuttons. Dimensions 1000 x 800 x 300 mm.

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Ex-control unit for a varnish filling plant with 36 illuminated pushbuttons, 800 x 800 x 250 mm with built-in EEx-e terminal box and safety door over the front panel.



Ex control cabinet made of plastic, dimensions 600 x 350 x 250 mm, equipped with indicator lamps and mini-pushbuttons.





**Keylock switch**  
Typ dS79M-7616 DS  
Page 20



**Keylock switch2**  
Typ dS89V-6622  
Page 31

**Mini step switch**  
Typ dS79M-5716 D  
Page 22



**10-turn mini-potentiometer**  
Typ dS79M-7716 P  
Page 36



**Mini-potentiometer**  
Typ dS79M-5516 P  
Page 35



**LedSpotlight**  
Typ dS64V-7329  
Page 11



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