GEMÜ LSC

Limit switch box for quarter turn actuators

EN **Operating instructions**

further information
webcode: GW-LSC

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1 General information

1.1 Information

- The descriptions and instructions apply to the standard versions. For special versions not described in this document the basic information contained herein applies in combination with any additional special documentation.
- Correct installation, operation, maintenance and repair work ensure faultless operation of the product.
- Should there be any doubts or misunderstandings, the German version is the authoritative document.
- Contact us at the address on the last page for staff training information.

1.2 Symbols used

The following symbols are used in this document:

Symbol	Meaning
●	Tasks to be performed
▶	Response(s) to tasks
–	Lists

The following LED symbols are used in the documentation:

Symbol	LED conditions
○	Off
●	Lit (on)
☼	Flashing

1.3 Warning notes

Wherever possible, warning notes are organised according to the following scheme:

SIGNAL WORD	
Possible symbol for the specific danger	Type and source of the danger ▶ Possible consequences of non-observance. ● Measures for avoiding danger.

Warning notes are always marked with a signal word and sometimes also with a symbol for the specific danger.

The following signal words and danger levels are used:

⚠ DANGER

Imminent danger!

▶ Non-observance can cause death or severe injury.

⚠ WARNING

Potentially dangerous situation!

▶ Non-observance can cause death or severe injury.

⚠ CAUTION

Potentially dangerous situation!

▶ Non-observance can cause moderate to light injury.

NOTICE

Potentially dangerous situation!

▶ Non-observance can cause damage to property.

The following symbols for the specific dangers can be used within a warning note:

Symbol	Meaning
	Danger of explosion
	Electric shock by high voltage

2 Safety information

The safety information in this document refers only to an individual product. Potentially dangerous conditions can arise in combination with other plant components, which need to be considered on the basis of a risk analysis. The operator is responsible for the production of the risk analysis and for compliance with the resulting precautionary measures and regional safety regulations.

The document contains fundamental safety information that must be observed during commissioning, operation and maintenance. Non-compliance with these instructions may cause:

- Personal hazard due to electrical, mechanical and chemical effects.
- Hazard to nearby equipment.
- Failure of important functions.
- Hazard to the environment due to the leakage of dangerous substances.

The safety information does not take into account:

- Unexpected incidents and events, which may occur during installation, operation and maintenance.
- Local safety regulations which must be adhered to by the operator and by any additional installation personnel.

Prior to commissioning:

1. Transport and store the product correctly.
2. Do not paint the bolts and plastic parts of the product.
3. Carry out installation and commissioning using trained personnel.
4. Provide adequate training for installation and operating personnel.
5. Ensure that the contents of the document have been fully understood by the responsible personnel.
6. Define the areas of responsibility.
7. Observe the safety data sheets.
8. Observe the safety regulations for the media used.

During operation:

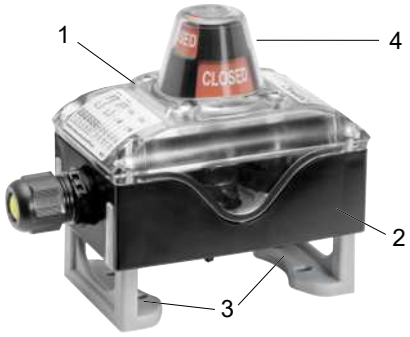
9. Keep this document available at the place of use.
10. Observe the safety information.
11. Operate the product in accordance with this document.
12. Operate the product in accordance with the specifications.
13. Maintain the product correctly.
14. Do not carry out any maintenance work and repairs not described in this document without consulting the manufacturer first.

In cases of uncertainty:

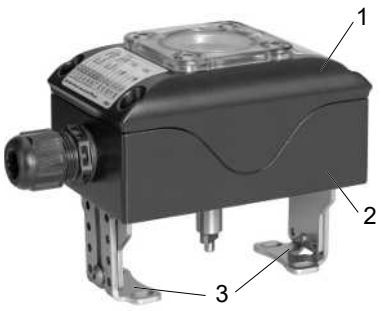
15. Consult the nearest GEMÜ sales office.

3 Product description

3.1 Construction



Item	Name	Materials
1	Housing cover	PC or Vestamid (ATEX version)
2	Housing base	PA6 or Vestamid (ATEX version)
3	Mounting kit	Code KK = PA6 Code KE, AE = Stainless steel 1.4305
4	3D display (option code 4D)	PC or Vestamid (ATEX version)
	Seals	EPDM, NBR



Item	Name	Materials
1	Housing cover	Aluminium
2	Housing base	Aluminium
3	Mounting kit	Stainless steel 1.4305
	Seals	EPDM, NBR

3.2 Description

The GEMÜ LSC limit switch box is suitable for mounting to manually and pneumatically operated quarter turn valves. It is also fitted with an optical position indicator for visual confirmation of position.

3.3 Function

Limit switch boxes are used to feed back and verify the position of valves, whether operated manually or with pneumatic quarter turn actuators. Depending on the version, the limit switch box GEMÜ LSC is equipped with 1 to 4 proximity sensors, Reed sensors or microswitches. The shaft of the limit switch box is positively connected to the shaft of the quarter turn actuator and is turned with the rotary movement of the quarter turn actuator. The trip cams fastened to the shaft then actuate the integrated sensors, which are used for electronic signal transmission.

3.4 Product label

The serial number can be found under the CE mark. This consists of the year of manufacture and the respective order number.

4 Correct use

⚠ DANGER

Danger of explosion

- ► Danger of death or severe injury.
- ● Only use the product in potentially explosive zones confirmed in the declaration of conformity.

⚠ WARNING

Improper use of the product

- ► Risk of severe injury or death.
- ► Manufacturer liability and guarantee will be void.
- ● Only use the product in accordance with the operating conditions specified in the contract documentation and in this document.

The GEMÜ LSC product is suitable for use in non-explosive as well as explosive atmospheres. The permissible ambient temperature is between -20 °C and +80 °C. When using suitable components, use at an ambient temperature as low as -40 °C can also be permitted. Various sensors and microswitches can be installed in the various limit switch boxes made of aluminium, polyamide or polycarbonate. The electrical data varies depending on the switch type.

4.1 Product with special function X

The product GEMÜ LSC is intended for use in potentially explosive areas of zones 1 and 2 with gases, mists or vapours and zones 21 and 22 with combustible dusts in accordance with EU directive 2014/34/EU (ATEX).

The product has the following explosion protection marking:

Switch: Code 110, 205, 208, 209, 212, 214

Gas:	Ⓔx II 2G Ex ia IIC / IIB T6 / T4 Gb
Dust:	Ⓔx II 2D Ex ia IIIC T80°C / T110°C Db
Certificate:	IBExU 11 ATEX 1154

For the 31MA or 31MB electrical connection, only pilot valves/solenoid valves with the Ex ia type of ignition protection may be used.

Switch: Code 120, 121, 122

Gas:	Ⓔx II 2G Ex db eb IIC/IIB T6 Gb
Dust:	Ⓔx II 2D Ex tb IIIC T80 °C Db
Certificate:	IBExU 12 ATEX 1022 X

For the 31MA or 31MB electrical connection, only pilot valves/solenoid valves with the Ex d, Ex dm or Ex m types of ignition protection may be used.

Switch: Code 322

Dust:	Ⓔx II 2D Ex tb IIIC T80°C Db Ⓔx II 3D Ex tc IIIC T80°C Dc
Certificate:	IBExU 12 ATEX 1022 X

For the 31MA or 31MB electrical connection, only pilot valves/solenoid valves with the Ex d, Ex dm or Ex m for Dust-Ex Ex nA types of ignition protection may be used.

To operate ATEX position indicators, observe the chapter on product conformities (see “Product conformities“, page 9).

5 Order data

The order data provide an overview of standard configurations.

Please check the availability before ordering. Other configurations available on request.

Products ordered with **bold marked ordering options** are so-called preferred series.

Order codes

1 Type	Code
Limit switch box for quarter turn valves	LSC

2 Switch	Code
Change-over contact, microswitch, 5-250V AC/DC ZF, D41X-SPDT, gold contacts	104
Change-over contact, microswitch, 12-250V AC/DC ZF, D44X-SPDT	**105**
Change-over contact, microswitch, 24-250 V AC/DC CROUZET, 83161.8-DPDT Gold: 0.1 A (250 V AC), 0.1 A (24V DC) Silver: 10 A (250 V AC), 2.5 A (24V DC)	108
Change-over contact, microswitch, 12-250V AC/DC ZF, D44X-DPDT	109
Change-over contact, microswitch, ATEX ia ZF, D41X-SPST Ui:30VDC/Ii:15mA/Pi:35mW	110
Change-over contact, microswitch, 5-250V AC/DC ZF, D41X-DPDT, gold contacts	111
Change-over contact, microswitch 24-250V AC/DC, ATEX de,t Bartec, 07-1511-1030	120
Change-over contact, microswitch 24-250V AC/DC, ATEX de,t Bartec, 07-1511-3530	121
Change-over contact, microswitch, 24-250 V AC/DC, ATEX de,t Crouzet, 831391-SPDT	122
Proximity switch, 2-wire, NAMUR, ATEX ia IFM, NS5002	**205**
Proximity switch, 2-wire, break contact/make contact, PNP/NPN, 5-36VDC IFM, IS5026	207
Proximity switch, 2-wire, NAMUR, ATEX ia P+F, SJ 3.5 N	208
Proximity switch, 2-wire, NAMUR, ATEX ia P+F, NJ2-V3-N	209
Proximity switch, 2-wire, NAMUR, ATEX ia P+F, NJ2-12GK-SN	212
Proximity switch, 2-wire, make contact, 5-60VDC P+F, NBB3-V3-Z4	213
Proximity switch, 2-wire, NAMUR, ATEX ia P+F, NJ3-18GK-S1N	214
Proximity switch, 2-wire, make contact, 20-250V AC Turck, BI2-Q10S-AZ31X	220
Proximity switch, 2-wire, make contact, 3.7–30 V DC P+F, NBB2-V3-Z4L	222
Proximity switch, 3-wire, make contact, PNP, 10-30VDC IFM, IS5001	**305**
Proximity switch, 3-wire, make contact, PNP, 10-30VDC P+F, NBB2-V3-E2	306

2 Switch	Code
Proximity switch, 3-wire, make contact, NPN, 10-36VDC IFM, IS5003	320
Proximity switch, 3-wire, dual make contact, PNP, 10-30VDC, ATEX tb, tc IFM, IN511A	322
Reed sensor, 3-wire, SPDT-CO (form C), 30 V AC/DC, ZF, MP200703	R01

3 Accessory	Code
Accessory	Z

4 Housing/mounting kit material	Code
Plastic housing Plastic mounting kit	**KK**
Plastic housing Stainless steel mounting kit	KE
Aluminium housing Stainless steel mounting kit	AE
Plastic housing for manually operated ball valves	KM

5 Electrical connection	Code
M12 plug, 5-pin	1112
M12 plug, 8-pin M20 x 1.5 for 1 solenoid valve connection with 500 mm cable	12MA
M20 x 1.5 cable gland, plastic	**3101**
M20 x 1.5 cable gland, stainless steel	3107
M20 x 1.5 cable gland, nickel-plated brass	3112
M20 x 1.5 cable gland, plastic M20 x 1.5 for 1 solenoid valve connection with 500 mm cable	31MA
M20 x 1.5 cable gland, plastic M20 x 1.5 for 2 solenoid valve connections with 500 mm cable	31MB
NPT ½ threaded connection	3201
2 x NPT ½ threaded connection	32MN
Hirschmann plug N6RAM	HM6R
Harting plug HS25199 Housing: Han 3A-EG-QB-M20 Pin: Han 7D-STI-C Crimp contact: R 15-STI-C-1 QMM (AU)	HM7D
Harting plug PE-HSM20-8PM Housing: Han 3M-eg-QB-M20 Pin: Han 8D-M Crimp contact: R 15-STI-C-1,5 QMM	HM8D

6 Option	Code
Without	00
3D display with pressure compensating element for outdoor use	3A
3D display	3D
3D display for L-port	3L
Large 3D display	**4D**
Pressure compensating element for outdoor use	DA

6 Option	Code
Extended ambient temperature -25 °C to +120 °C	HT
LED display for OPEN/CLOSE max. 24VDC	LD
Extended ambient temperature -40 °C.....	NT

7 SIL	Code
SIL 1–3 (IEC 61508:2010)	S

8 Approval	Code
Without	
ATEX (2014/34/EU), IECEx	X

Order example

Ordering option	Code	Description
1 Type	LSC	Limit switch box for quarter turn valves
2 Switch	105	Change-over contact, microswitch, 12-250V AC/DC ZF, D44X-SPDT
3 Accessory	Z	Accessory
4 Housing/mounting kit material	KK	Plastic housing Plastic mounting kit
5 Electrical connection	3101	M20 x 1.5 cable gland, plastic
6 Option	00	Without
7 SIL	S	SIL 1–3 (IEC 61508:2010)
8 Approval		Without

6 Technical data

6.1 Temperature

Ambient temperature:

Switch (code)	Housing material	
	Polyamide/aluminium	Vestamid/aluminium (ATEX version)
104, 105, 108, 109, 111, R01	-25 – 80 °C	-
207, 213, 220, 222, 305, 306, 320	-25 – 70 °C	-
120, 121, 122, 322	-	Vestamid: -20 – 40 °C Aluminium: -20 – 60 °C
110, 205*, 208, 209, 212, 214	-	-25 – 70 °C

*Switch (code 205) to -20 °C

Storage temperature:

Switch (code)	Housing material	
	Polyamide/aluminium	Vestamid/aluminium (ATEX version)
104, 105, 108, 109, 111, R01	-25 – 80 °C	-
207, 213, 220, 222, 305, 306, 320	-25 – 70 °C	-
120, 121, 122, 322	-	Vestamid: -20 – 40 °C Aluminium: -20 – 60 °C
110, 205*, 208, 209, 212, 214	-	-25 – 70 °C

*Switch (code 205) to -20 °C

6.2 Product conformities

EMC Directive: 2014/30/EU

Explosion protection: ATEX (2014/34/EU) and IECEx, order code Special version X

ATEX marking:

Switch: Code 110, 205, 208, 209, 212, 214

Gas:	Ⓔx II 2G Ex ia IIC / IIB T6 / T4 Gb
Dust:	Ⓔx II 2D Ex ia IIIC T80°C / T110°C Db
Certificate:	IBExU 11 ATEX 1154

For the 31MA or 31MB electrical connection, only pilot valves/solenoid valves with the Ex ia type of ignition protection may be used.

Switch: Code 120, 121, 122

Gas:	Ⓔx II 2G Ex db eb IIC/IIB T6 Gb
Dust:	Ⓔx II 2D Ex tb IIIC T80 °C Db
Certificate:	IBExU 12 ATEX 1022 X

For the 31MA or 31MB electrical connection, only pilot valves/solenoid valves with the Ex d, Ex dm or Ex m types of ignition protection may be used.

Switch: Code 322

Dust:	Ⓔx II 2D Ex tb IIIC T80°C Db Ⓔx II 3D Ex tc IIIC T80°C Dc
Certificate:	IBExU 12 ATEX 1022 X

For the 31MA or 31MB electrical connection, only pilot valves/solenoid valves with the Ex d, Ex dm or Ex m for Dust-Ex Ex nA types of ignition protection may be used.

IECEx marking:

Switch: Code 110, 205, 208, 209, 212, 214

Gas:	Ⓔx Ex ia IIC/IIB T6/T4 Gb
Dust:	Ⓔx Ex ia IIIC T80°C/T110°C Db
Certificate:	IECEx IBE 13.0042

For the 31MA or 31MB electrical connection, only pilot valves/solenoid valves with the Ex ia type of ignition protection may be used.

Switch: Code 120, 121, 122

Gas:	Ⓔx Ex db eb IIC/IIB T6 Gb
Dust:	Ⓔx tb IIIC T80°C Db
Certificate:	IECEx IBE 13.0041 X

For the 31MA or 31MB electrical connection, only pilot valves/solenoid valves with the Ex d, Ex dm or Ex m types of ignition protection may be used.

Switch: Code 322

Dust:	Ⓔx Ex tb IIIC T80°C Db Ⓔx Ex ts IIIC T80°C Dc
Certificate:	IECEX IBE 13.0041 X

For the 31MA or 31MB electrical connection, only pilot valves/solenoid valves with the Ex d, Ex dm or Ex m for Dust-Ex Ex nA types of ignition protection may be used.

SIL:

Product description:	GEMÜ electrical position indicator LSC
Type of valve:	A
Fail safe function:	The end position is reported at the right time within the defined limits.
HFT (Hardware Fault Tolerance):	0

Further information and calculated values available on request

6.3 Mechanical data

Installation position: Optional

Weight: 780 g

Protection class: IP66, IP67 (code AE)
IP67 (code KK, KE, KM)

Measuring range radial: 0 to 90 °

6.4 Electrical data

Electrical connection type:

M12 plug, 5-pin (code 1112)

M12 plug, 8-pin and solenoid valve connection (code 12MA)

M20 x 1.5 cable gland for cables with a diameter of 6 to 12 mm (code 3101)

M20 x 1.5 stainless steel cable gland for cables with a diameter of 6–12 mm (code 3107)

M20 x 1.5 nickel-plated brass cable gland for cables with a diameter of 6–12 mm (code 3112)

M20 x 1.5 cable gland for cables with a diameter of 6 to 12 mm and solenoid valve connection (code 31MA)

M20 x 1.5 plastic cable gland and two solenoid valve connections (code 31 MB)

NPT ½ threaded connection (code 3201)

Two NPT ½ threaded connections (code 32MN)

Hirschmann plug N6RAM (code HM6R)

Harting plug HS25199 with housing Han 3A-EG-QB-M20 and pin Han 7D-STI-C as well as crimp contact R 15-STI-C-1 QMM (AU) (code HM7D)

Harting plug PE-HSM20-8PM with housing Han 3M-eg-QB-M20 and pin Han 8D-M as well as crimp contact R 15-STI-C-1,5 QMM (code HM8D)

6.4.1 Microswitch

Switch type:

Switch (code)	Type
104, 105, 120, 121, 122	SPDT
110	SPST
108, 109, 111	DPDT

Supply voltage:

Switch (code)	Supply voltage
105, 109	12–250 V AC/DC
108, 120, 121, 122*	24–250 V AC/DC
110	30 V DC
104, 111	5–250 V AC/DC

*Code 122 only up to 240 V AC/DC

Current consumption:

Switch (code)	Current consumption
105, 109	250 V AC: 0.1–10 A 24 V DC: 0.1–2.5 A
108	Silver: 250 V AC: 0.1–10 A 24 V DC: 0.1–2.5 A Gold: 250 V AC: 0.01–0.1 A 24 V DC: 0.01–0.1 A
110	15 mA
104, 111	250 V AC: 0.01–0.1 A 24 V DC: 0.01–0.1 A
120	0.1–4 A
121	20–400 mA
122	0.15–4 A

6.4.2 Magnetic reed sensor

Switch type:

Switch (code)	Type
R01	SPDT-CO

Supply voltage:

Switch (code)	Supply voltage
R01	Max. 30 V AC/DC

Current consumption:

Switch (code)	Current consumption
R01	Max. 200 mA

6.4.3 2-wire proximity switch

Switch type:

Switch (code)	Type
205, 208, 209, 212, 214	2-wire NAMUR
207, 213, 220, 222	2-wire, make contact

Supply voltage:

Switch (code)	Supply voltage
205, 208, 209, 212, 214	8.2 V DC
207	5–36 V DC
220	20–250 V AC 10–300 V DC
222	3.7–30 V DC

Current consumption:

Switch (code)	Current consumption
205	≤ 1 mA (damped) ≤ 2.1 mA (undamped)
208, 209, 212, 214	≤ 1 mA (damped) ≤ 3 mA (undamped)
207	Max. 200 mA
213, 220	Max. 100 mA
222	Max. 30 mA

6.4.4 3-wire proximity switch

Switch type:

Switch (code)	Type
305, 306, 322	3-wire, make contact, PNP
320	3-wire, make contact, NPN

Supply voltage:

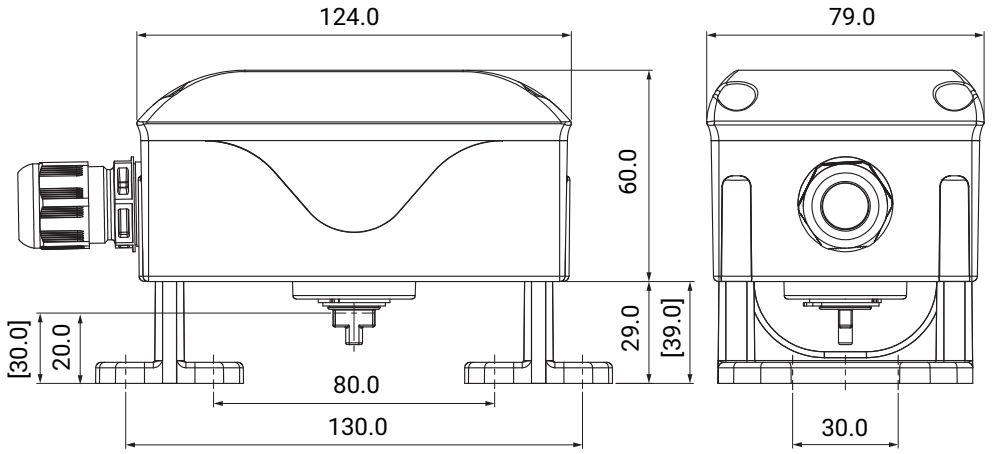
Switch (code)	Supply voltage
305, 306	10 - 30 V DC
320, 322	10 - 36 V DC

Current consumption:

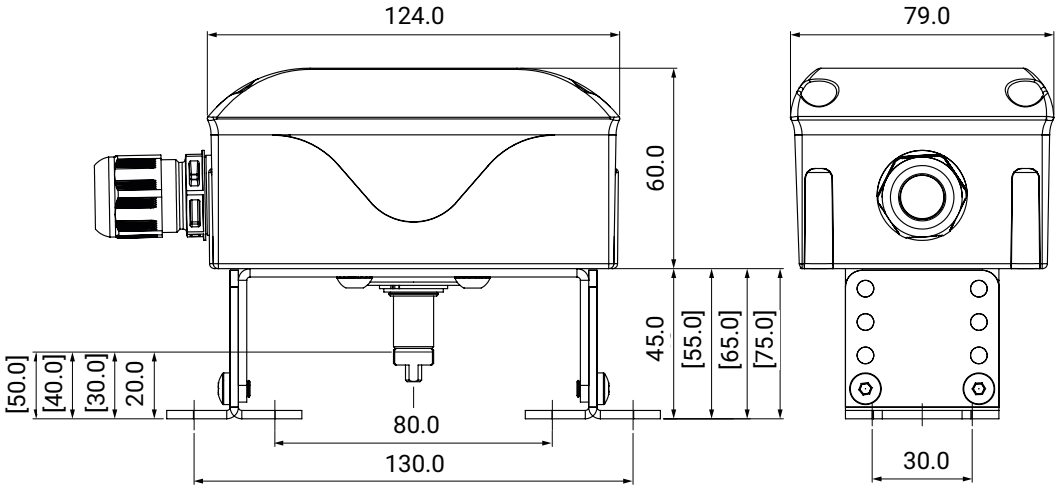
Switch (code)	Current consumption
305, 320	Max. 200 mA
306	Max. 100 mA
322	Max. 250 mA

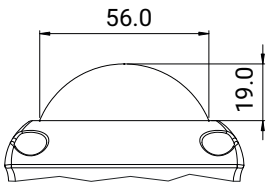
7 Dimensions

Housing/mounting kit material (code KK)

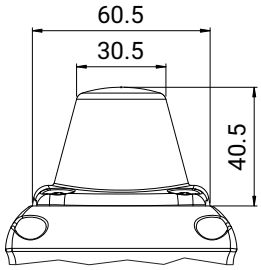


Housing/mounting kit material (code KE, AE)





"Option" ordering option, code 3D



"Option" ordering option, code 4D

Dimensions in mm

Various borehole patterns are available for installation on the pneumatic quarter turn actuators:

Borehole pattern	Housing/mounting kit material (code KK)	Housing/mounting kit material (code KE, AE)
80 x 30 x 20	X	X
80 x 30 x 30	X	X
130 x 30 x 30	X	X
130 x 30 x 50	-	X

For installation on manually operated valves, an LSC with material code KM and mounting kit LSFS01 must be entered. The correct selection is made via the GEMÜ accessories configurator.

Dimensions in mm

8 Manufacturer's information

8.1 Delivery

- Check that all parts are present and check for any damage immediately upon receipt.

The product's performance is tested at the factory. The scope of delivery is apparent from the dispatch documents and the design from the order number.

8.2 Packaging

The product is packaged in a cardboard box which can be recycled as paper.

8.3 Transport

1. Only transport the product by suitable means. Do not drop. Handle carefully.
2. After the installation dispose of transport packaging material according to relevant local or national disposal regulations / environmental protection laws.

8.4 Storage

1. Store the product free from dust and moisture in its original packaging.
2. Avoid UV rays and direct sunlight.
3. Do not exceed the maximum storage temperature (see chapter "Technical data").
4. Do not store solvents, chemicals, acids, fuels or similar fluids in the same room as GEMÜ products and their spare parts.

9 Assembly and installation

9.1 Installation on manually operated valves

The products with F05 connection in the bottom of the housing can also be installed with our mounting kit "LSC S01 Z" on manually operated valves. It is important that the manual valve has a top flange in accordance with ISO 5211 and a thread bolt hole in the shaft.

Install the mounting kit as follows:

1. Assemble the base of the mounting kit on the manual valve.
2. Mount the lock nut supplied with the product on the actuator.
3. Screw the actuator into the central threaded hole of the manual valve.
4. Position the upper section of the mounting kit on the previously assembled base.
   ⇨ The bolt holes allow a rough height alignment to the valve used. The mounting bracket can be set to the following heights:

- F03-F07: 60, 70, 80, 90, 100 mm
- F10-F12: 80, 90, 100, 110, 120 mm

5. Fasten the cover to the base.
   ⇨ Use the enclosed bolts and perforated washers for this.
6. Assemble the limit switch box on the cover.
7. Adjust the height of the actuator so that the shaft of the limit switch box engages in the actuator.
8. Fix in position with the lock nut.
9. Carry out a visual inspection of the complete subassembly and a functional test of the position feedback.

9.2 Installation on pneumatic actuators

9.2.1 Preparations for installation of the actuator

1. Unscrew the bolt from the trigger cam.
2. Pull off the trigger cam.

9.2.2 Installation of the limit switch box

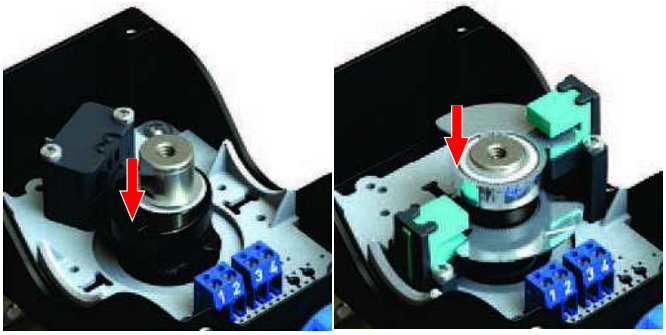
The modules can be mounted quickly and easily on the intended actuator using the supplied fastening fixtures in accordance with VDI/VDE 3845.

1. Place the actuator in the end position in which the groove of the actuator shaft is parallel to the actuator housing.
2. Place the box on the actuator using the appropriate mounting kit.
3. Mount the mounting kit with the supplied locking screws (x4) on the actuator.
4. Loosen the cover screws (x4) and open the housing.
   ⇨ Do not unscrew the bolts too far; leave them connected to the cover.
5. Guide the disconnected system cable through the cable gland into the housing and connect the wires to the terminal block.
   ⇨ Observe the wiring diagram on the corresponding datasheet or in the housing cover and connect the housing to the potential equalisation.
6. Close off the housing with the cover.
   ⇨ When fitting the cover, make sure that the gasket is in the correct position.
7. Tighten the cover screws.

9.3 Adjusting the switch/travel range

The actuators are set by GEMÜ to a travel range of 0-90°. If another travel range is required for the application, please follow the following steps:

1. Place the actuator in the desired end position **1** and adjust the lower actuator.



   ⇨ Press down the actuator on the outer ring and turn into the position in which the switch is actuated.
2. Allow the actuator to engage in the teeth above.
3. Place the actuator in the desired end position **2** and adjust the upper actuator.
   ⇨ Press down the actuator on the outer ring and turn into the position in which the switch is actuated.
4. Allow the actuator to engage in the teeth above.
5. Check the presetting by repeatedly switching the quarter turn actuator.

10 Electrical connection

For explosion-proof applications/designs, please observe the information from the "Product conformities" chapter.

⚠ CAUTION

Electric shock by high voltage

- ► Danger of injury or death caused by electric shock.
- ● Power supply varies depending on version.
- ● Switch off power to the product when working on the product.
- ● Work on electrical connections only by qualified trained personnel.

You can find the permissible cable diameter in the associated datasheet for the product. The wiring diagram for the wiring can be found on the housing cover or in the associated datasheet for the product. Each sensor has its own separate intrinsically safe electric circuit.

NOTICE

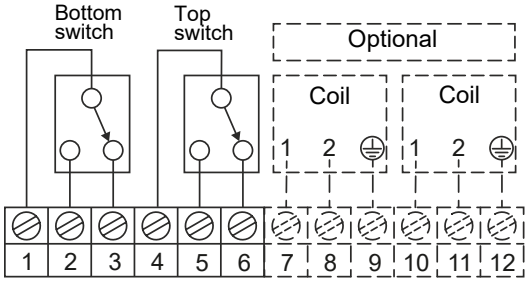
Incorrect sealing of the product

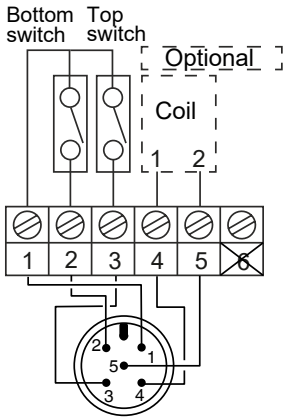
- ► When tightening the cable gland, ensure that the basic body of the cable gland does not also turn.
- ► As a result, the gasket may slip and then no longer seals correctly.
- ► Use two open-end wrenches – one to secure the basic body and one to tighten the nut.

Terminal	Manufacturer	Wire cross section	Tightening torque	Stripping length	Colour
AK100...	PTR	Single-wire, rigid: 0.2 to 4.0 mm²	0.45 to 0.50 Nm	7 mm	light blue
		Fine-wire, flexible: 0.2 to 2.5 mm²			
		With multicore cable end: 0.2 to 2.5 mm²			

10.1 Microswitch

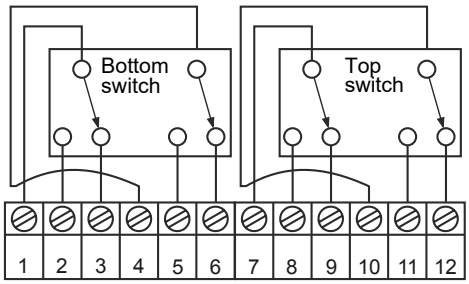
10.1.1 SPDT, switch ordering option, code 104, 105





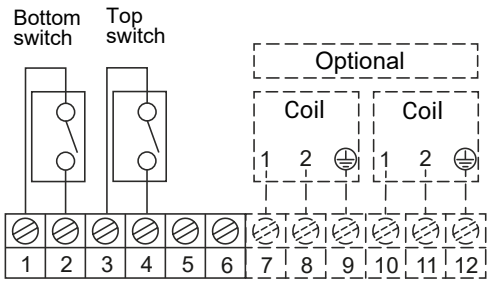
M12 connection options

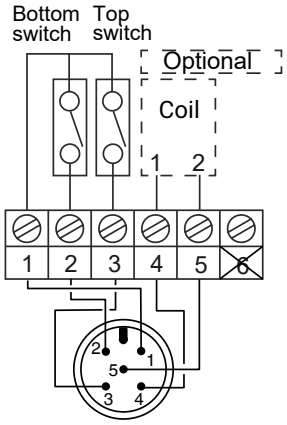
10.1.2 DPDT, switch ordering option, code 108, 109, 111



Note: Solenoid valve connection not possible

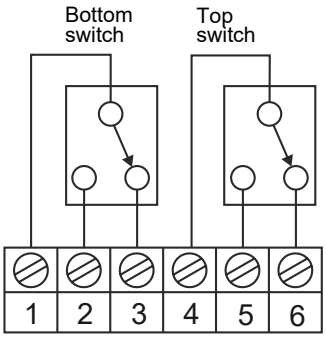
10.1.3 SPST, switch ordering option, code 110





M12 connection options

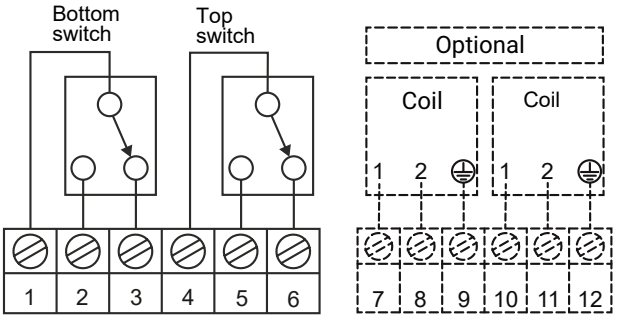
10.1.4 SPDT, switch ordering option, code 120, 121, 122



Note: Solenoid valve connection not possible

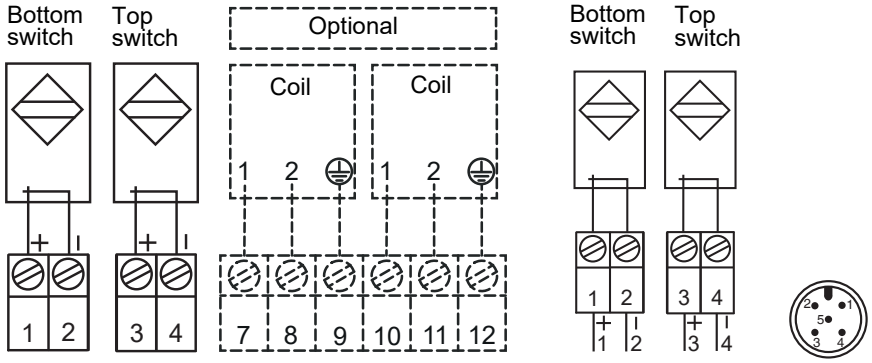
10.2 Magnetic reed sensor

10.2.1 SPDT-CO, switch ordering option, code R01



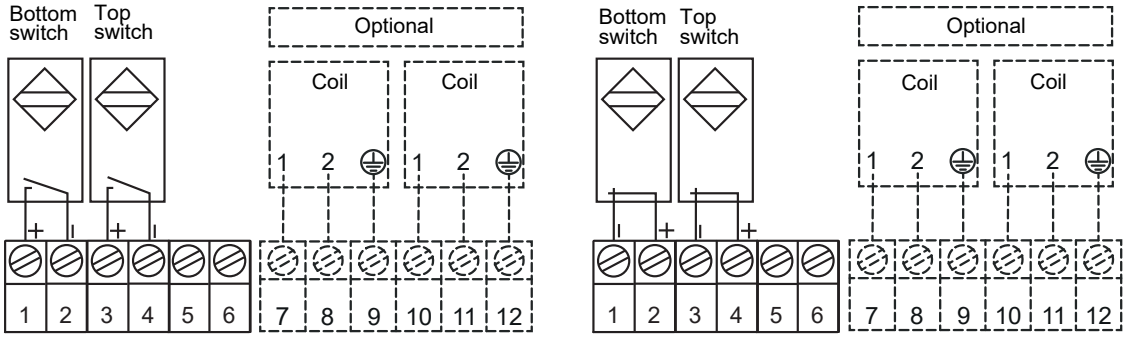
10.3 2-wire proximity switch

10.3.1 NAMUR, switch ordering option, code 205, 208, 209

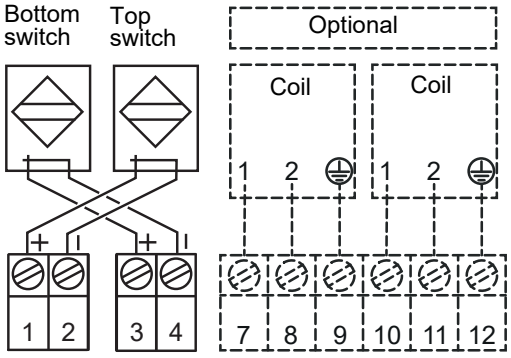


M12 connection options

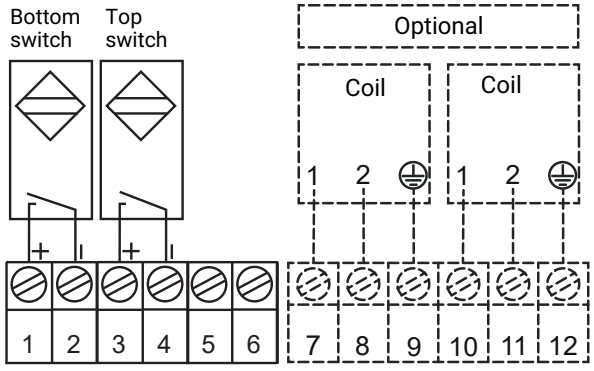
10.3.2 Make contact, switch ordering option, code 207



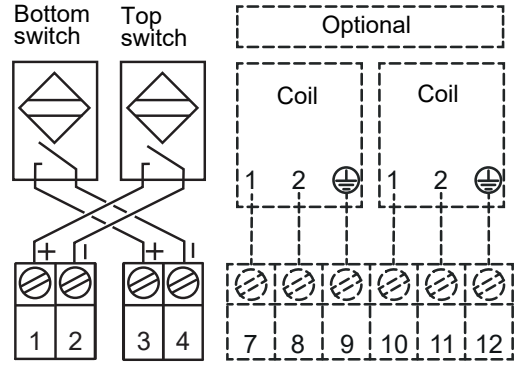
10.3.3 NAMUR, switch ordering option, code 212



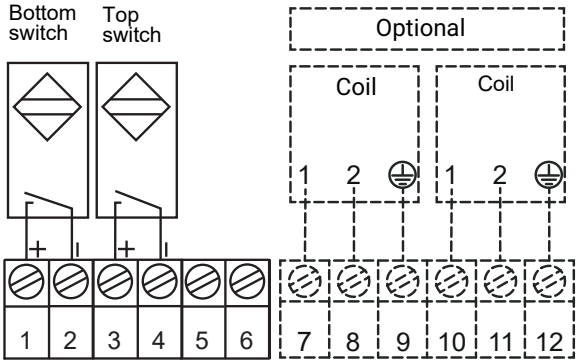
10.3.4 Make contact, switch ordering option, code 213



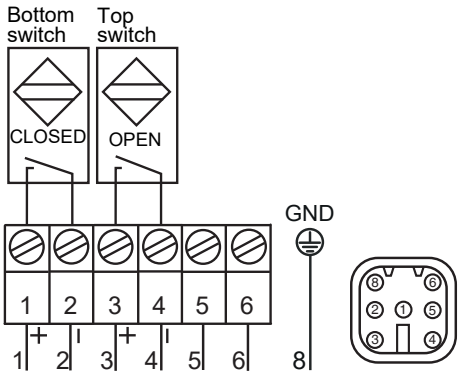
10.3.5 NAMUR with fail safe function, make contact, switch ordering option, code 214



10.3.6 Make contact, AC/DC, switch ordering option, code 220

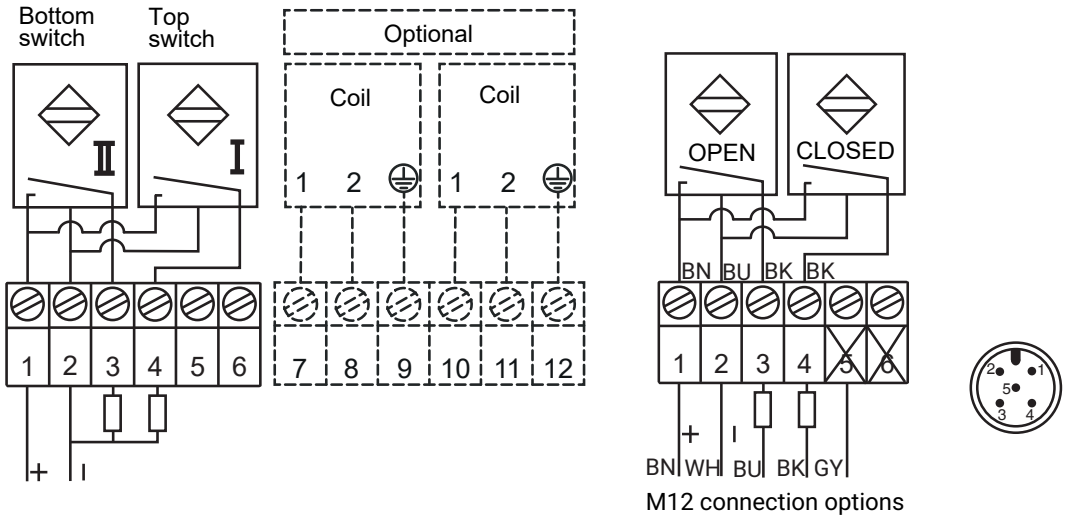


10.3.7 Make contact, switch ordering option, code 222 with Harting plug (HM8D)

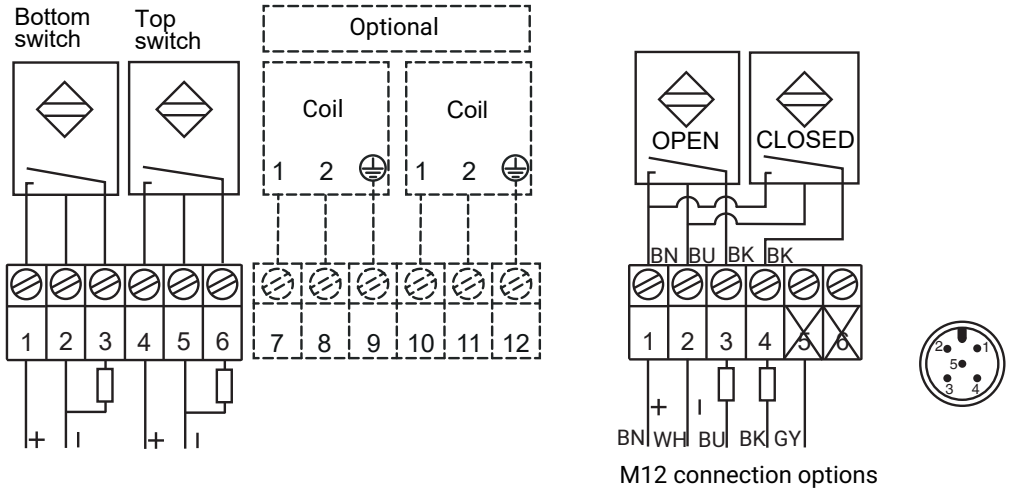


10.4 3-wire proximity switch

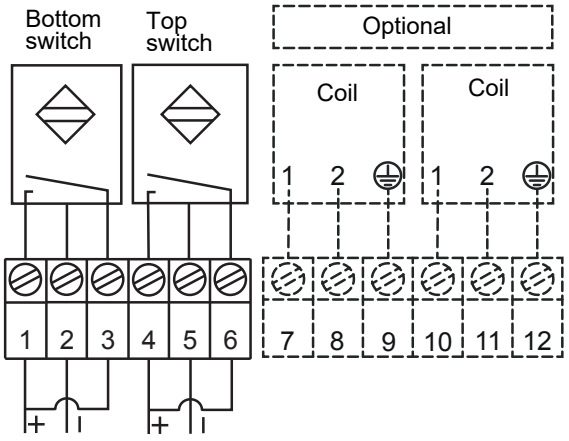
10.4.1 Make contact, PNP, switch ordering option, code 305



10.4.2 Make contact, PNP, switch ordering option, code 306, 322



10.4.3 Make contact, NPN, switch ordering option, code 320



11 Troubleshooting

In case of faults, check the cables, cable connections and cam position. Check whether condensation water has collected in the housing and whether the valve/quarter turn actuator is functioning correctly. If the fault is not remedied by this, disconnect the housing from the supply voltage and contact authorized and trained personnel from the manufacturer.

12 Inspection and maintenance

⚠ CAUTION

Use of incorrect spare parts!

- ► Damage to the product.
- ► Manufacturer liability and guarantee will be void.
- ● Only use genuine parts.

NOTICE

Unauthorized maintenance work!

- ► Damage to the product.
- ● Any maintenance work and repairs not described in these operating instructions must not be performed without consulting the manufacturer first.

13 Disassembly

1. Disassemble in reverse order to assembly.
2. Unscrew the electrical wiring.
3. Disassemble the product. Observe warning notes and safety information.

14 Disposal

1. Pay attention to adhered residual material and gas diffusion from penetrated media.
2. Dispose of all parts in accordance with the disposal regulations/environmental protection laws.

15 Returns

Legal regulations for the protection of the environment and personnel require that the completed and signed return delivery note is included with the dispatch documents. Returned goods can be processed only when this note is completed. If no return delivery note is included with the product, GEMÜ cannot process credits or repair work but will dispose of the goods at the operator's expense.

1. Clean the product.
2. Request a return delivery note from GEMÜ.
3. Complete the return delivery note.
4. Send the product with a completed return delivery note to GEMÜ.

16 Declaration of conformity according to 2006/42/EC (Machinery Directive)

Declaration of Incorporation

according to the EC Machinery Directive 2006/42/EC, Annex II, 1.B for partly completed machinery

We, the company

GEMÜ Gebr. Müller Apparatebau GmbH & Co. KG
Fritz-Müller-Strasse 6–8
74653 Ingelfingen-Criesbach, Germany

declare that the following product

Make: GEMÜ

Commercial name: GEMÜ LSC

meets the Essential Safety and Health Requirements of the Machinery Directive 2006/42/EC.

We also declare that the specific technical documentation has been compiled in accordance with part B of Annex VII.

The manufacturer or his authorised representative undertake to transmit, in response to a reasoned request by the national authorities, relevant information on the partly completed machinery. This transmission takes place:

Electronically

Authorised documentation officer

GEMÜ Gebr. Müller Apparatebau GmbH & Co. KG
Fritz-Müller-Straße 6-8
74653 Ingelfingen, Germany

This does not affect the industrial property rights!

Important note! The partly completed machinery may be put into service only if it was determined, where appropriate, that the machinery into which the partly completed machinery is to be installed meets the provisions of this Directive.

Compliance with the following directives which also apply to the product is declared:

- EMC Directive 2014/30/EU
- Low Voltage Directive 2014/35/EU

Harmonized standards used:

DIN EN ISO 12100 Safety of machinery – General principles for design
- Risk assessment and risk reduction ISO 12100:2010
- German version EN ISO 12100:2010

2022-06-20

Joachim Brien
Head of Technical Department

17 Declaration of conformity according to 2014/30/EU (EMC Directive)

EU Declaration of Conformity

in accordance with 2014/30/EU (EMC Directive)

We, the company GEMÜ Gebr. Müller Apparatebau GmbH & Co. KG
Fritz-Müller-Strasse 6–8
74653 Ingelfingen-Criesbach, Germany

declare that the product listed below complies with the safety requirements of the EMC Directive 2014/30/EU.

Description of the product: Electrical position indicator GEMÜ LSC

2022-06-20

Joachim Brien
Head of Technical Department

18 EU Declaration of conformity according to 2014/34/EU (ATEX)

EUROTEC Antriebszubehör GmbH

EU-Declaration of Conformity
according to the Directive 2014/34/EU (ATEX-Directive)

We herewith confirm that the follwing named equipment for the use in hazardous areas does fullfill the requirements of the Directive 2014/34/EU in the delivered version:

EV...IA...	wave limit switch box. Housing Vestamid
EA...IA...	wave limit switch box. Housing Aluminum
EV...IA...-DB...	wave limit switch box. Housing Vestamid with junction box Vestamid
EA...IA...-DB...	wave limit switch box. Housing Aluminum with junction box Aluminum
EV...IA...-3D...	wave limit switch box. Housing Vestamid with Polycarbonate cover (IIB)

The equipment has been developed and designed in consideration of the following harmonised standards:

EN 60079-0:2012+A11:2013 IEC 60079-0, Ed. 6	Explosive atmospheres - Part 0: Equipment - General requirements
EN 60079-11:2012 IEC 60079-11, Ed. 6	Explosive atmospheres - Teil 11: Equipment protection by intrinsic safety "i"

Kennzeichnung: Ⓔx II 2G Ex ia IIC/IIB T6 Gb

Ⓔx II 2D Ex ia IIIC T80°C/T110°C Db

EG-Type Examination Certificate: **IBExU 11 ATEX 1154**
IBExU Institut für Sicherheitstechnik GmbH
Fuchsmühlenweg 7, 09599 Freiberg,
Ident.-No.: 0637

EG-Certificate Quality Assurance: **EPS 13 ATEX Q 534**
Bureau Veritas Consumer Products Services Germany GmbH
Businesspark A96, DE-86842 Türkheim
Ident.-No.: 2004

2017-30-11
Date

General Manager: Knut Berge

EUROTEC Antriebszubehör GmbH | Heidachstraße 70/5 | DE-88079 Kressbronn | Tel. +49 (0) 7543 93463 0 | Fax. +49 (0) 7543 93463 10 |
sales@eurotec-shop.com | www.eurotec-shop.com | www.eurotec1996.com

19 Operating instructions for ATEX position indicators

BA_X001
Operating instructions

Product group:	Limit switch box wave	**Product type:**	EV...-IA / EA...-IA	wave	**EN**
Certifications:	CE Ex IECEx EAC				

		
EVP-IA	**EVE-IA**	**EAE-IA**

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2. Intended use 2
3. Labeling 2
4. Safe activation 3
5. Assembly on actuators 3
6. Mounting on manual valves 3
7. Electrical connection 3
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12. Maintenance 5
13. Malfunctions 5
14. Item number 6

BA_X001
Operating instructions

Thank you for choosing a EUROTEC product. In doing so, you have chosen a quality product.
To ensure functionality and your own safety, please read these operating instructions carefully before beginning with the installation.
Nevertheless, should you have any further questions, please contact:

EUROTEC Antriebszubehör GmbH
Tel. +49 (0) 7543 93463 - 0 | Fax. - 10 | sales@eurotec-shop.com | www.eurotec-shop.com

1. Device description

Limit switch boxes serve to provide feedback and control the position of industrial valves, which are activated using pneumatic actuators. The shaft of the limit switch box has a positive connection with the shaft of the actuator and is rotated with the rotational movement of the actuator. The actuating cams attached to the shaft, activate the installed sensors, which support the electronic signal transmission.

The wave Ex ia limit switch boxes of the types EV and EA are, depending on the model, equipped with 1 potentiometer or 1 to 4 mechanical limit switches or intrinsically safe proximity switches. Which contain 1-4 V3 proximity switches, 1-3 slot type sensors, 1-2 cylindrical sensors, 1 dual sensor.

2. Intended use

The wave Ex ia limit switch boxes from EUROTEC Antriebszubehör GmbH are, in combination with intrinsically safe circuits according to DIN EN 60079-25:2010, suitable for use in hazardous areas of zone 1 and 2 with gas, mist, or steam and for use in zone 21 and 22 with combustible dust.

Ex II 2G Ex ia IIC/IIB T4/T6 Gb
Ex II 2D Ex ia IIIC T80°C/T110°C Db

IBExU 11 ATEX 1154 / IECEx IBE 13.0042 / TC RU C-DE. ПБ98.B.00059

The following ambient temperature is approved:

Vestamid:	-25°C...+70°C
Aluminium:	-50°C/-40°C/-25°C...+70°C/+100°C

The approved ambient temperature varies, depending on the sealing compound and the installed switch type. You can find the ambient temperature in the corresponding data sheet and on the product label. A lower temperature range down to -50°C or -40°C and a higher temperature range up to 100°C applies to limit switch boxes, which are made of components, that are at least suitable for this temperature.

3. Labeling

The labeling on the housing is shown in Fig. 1 and varies depending on the installed switch type. You can find the number of the indicated responsible office for the QM system and the serial number below the CE mark. It consists of the year of manufacture and the respective order number.

Fig. 1: Labeling

	**The housings are not intended to be used as stepladders, to climb into the system. This can lead to damaging them and having a negative effect on their function. If the housing is damaged, water as well as dirt and combustible material can accumulate inside the housing. This can lead to a short circuit. Furthermore, the device can heat up severely due to the accumulation and can cause an explosion.**

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Operating instructions

4. Safe activation

To avoid mistakes, only specialists are permitted to set up, connect and put the devices into operation. The specialists must have expertise in the intrinsic safety (Ex ia/ib/ic) types as well as in all relevant regulations and provisions for operating materials in explosive areas.

The limit switch boxes are developed in compliance with the following harmonised standards:

EN 60079-0:2012+A11:2013 / IEC 60079-0, Ed. 6
EN 60079-11:2012 / IEC 60079-11, Ed. 6

It is imperative to observe the following safety instructions prior to initial operation:

Failure to observe the safety instructions in these operating instructions and using or handling the device improperly, releases us from any liability.
Furthermore, the warranty for the devices and accessory components will expire.

- Check on the labeling, whether or not the existing device is suitable for your case of application.
- Observe national regulations and provisions as well as the corresponding installation specifications.
- Take suitable measures, to prevent unintentional activation or improper interferences with the device.
- Remove any existing sealing plugs just before inserting the wires to avoid dirt in the housing.
- Make sure the strain is sufficiently relieved on the connecting cables or lay them securely.
- Check the approved conductor cross-sections as well as the approved tightening torques in the documentation for Cable connections
- Effectively protect the devices and cables against damages.
- Avoid static charge on plastic parts and cables.
- Housing components made of metal must be included in the potential equalisation by means of appropriate assembly.
- This device may only be operated in a fully assembled condition.
- Never disconnect the connector cables while they have power.
- Connect the switch box to intrinsically safe circuits, that are certified with a type examination certificate and which do not exceed the maximum values of the proximity switches Ui, Ii, Pi, Ci and Li.
- Each sensor inside the switch box housing has it's own separated intrinsically safe circuit. For two sensors inside the switch box we recommend as associated electrical equipment one of the following 2-channel barriers:
  IFM, N0533A
  P+F, KFD2-SR2-Ex2.W
  Turck, IM1-22EX-R
  Turck, IM36-11EX-U/24VDC (for potentiometer)

5. Assembly on actuators

Using the enclosed mounting material, the modules can be quickly and easily assembled to the provided actuator according to VDI//VDE 3845 (Association of German Engineers/German Electrical Engineering Association).

1. Adjust your actuator to the final position, in which the groove of the drive shaft is parallel to the drive housing.
2. Now, place the box with the appropriate mounting bracket on the actuator.
3. The mounting bracket can now be screwed tightly onto the actuator using the provided lock screws.
4. Unscrew the four cover screws and open the housing. Make sure you do not unscrew the screws too far; they should remain in the cover.
5. Insert the system cable into the housing through the cable gland and connect the individual wires to the terminal block. When doing so, please refer to the terminal diagram on the respective data sheet or on the cover of the housing and connect the housing to the equipotential bonding.
6. Close the housing using the cover. When attaching the cover, please make sure that the seal is correctly positioned and tighten the cover screws.

6. Mounting on manual valves

The limit switch boxes with F05 interface at the bottom side of the housing can also be mounted on manual valves by using our mounting kit "MSH". Thereto your manual valve needs a top flange according to ISO 5211 (F03 - F16) and a threaded bore hole in the valve shaft. For detailed assembly instructions please consider the operation manual of the "MSH".

7. Electrical connection

You can find the approved cable diameter in the corresponding data sheet for the limit switch box. You can find the terminal diagram for the wiring either on or in the cover of the housing as well as on the corresponding data sheet for the limit switch box. Each sensor inside the switch box housing has it's own separated intrinsically safe circuit.

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Operating instructions

	**When tightening the cable gland, please make sure that the base body of the cable gland, which is screwed in place in the housing, does not rotate as well. This could make the sealing washer shift and it would then no longer provide proper sealing. It is best to use 2 open-ended spanners for this purpose. One to secure the base body of the cable gland and one to tighten the screw nut.**

Standard terminals:

Terminal	Producer	Wire cross-section	Thightening torque	Stripping length	Colour
AK100...	PTR	single-wire fixed: 0,2 - 4,0 mm² fine-wire flexible: 0,2 - 2,5 mm² With end ferrule: 0,2 - 2,5 mm²	0,45 - 0,50 Nm	7 mm	light blue

8. Disassembly

During dismantling you must observe the instructions in Chapter 4.

1. Disconnect the device from the power supply.
2. Open the cover of the housing by unscrewing the 4 cover screws. Make sure that you do not unscrew the screws too far; they should remain in the cover and not be able to fall out.
3. Disconnect the cables in the system from the terminal strip in the limit switch box.
4. Now, unscrew the 4 screws with which the bracket of the box is attached to the actuator and remove the limit switch box from the actuator.

9. Adjusting the swivel range

The cams are always preset to a swivel range of 0-90° by the EUROTEC Antriebszubehör GmbH. Should you require a different swivel range for your application, please carry out the following steps:

1. Rectangular V3 limit switches and slot type sensors

a. Bring the actuator in the desired end position 1. Adjust the lower cam first. Press the cam down and turn it into the position in which it actuates the switch. Now let the cam engage again with the gearing. (Fig. 2)
b. Bring the actuator in the desired end position 2. Press the upper cam down and turn it into the position in which it actuates the switch. Now let the cam engage again with the gearing.
c. Finally verify your presetting through repeated switching of the actuator.

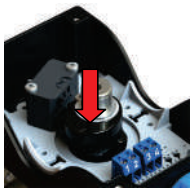

Fig. 2: Setting of cams

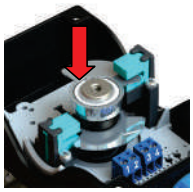

Fig. 3: Slot type cams

2. Cylindrical limit switches

a. Loosen the M6 nut screw and remove the upper cam. (Fig. 4)
b. Unfasten the threaded rod, bring the actuator in the desired end position 1, and adjust the lower cam. Then tighten the threaded rod again firmly. (Fig. 5)
c. Bring the actuator in the desired end position 2, adjust the upper cam and tighten it again by means of the nut screw. (Fig. 6)
d. Finally verify your presetting through repeated switching of the actuator.

Fig. 4: Loosen nut screw

Fig. 5: Fixation of cam 1

Fig. 6: Fixation of cam 2

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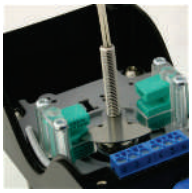
Operating instructions

	**Danger of injury! During the switching process of the actuator you might squeeze body parts between switch and cam. Stay far enough away from the source of danger when switching the actuator!** **Attention, the switch can be damaged by the cams in the event of a wrong presetting. Take care that the cam does not hit the switch when switching the actuator.**

3. *Slot type sensors old type with threaded rod*

a. Release the M6 screw nut and remove the upper cam. (Fig.7)
b. Now unfasten the thread rod by means of an allen key, bring the actuator in the desired end position 1, and adjust the lower cam. Then tighten the thread rod again firmly. (Fig. 8)
c. Bring the actuator in the desired end position 2, adjust the upper cam, and tighten it again by means of the M6 screw nut . (Fig. 9)
d. Finally verify your presetting through repeated switching.

		
Fig. 7: loosen nut screw	Fig. 8: Fixation of cam 1	Fig. 9: Fixation of cam 2

10. Connecting magnetic coils

Depending on the model, the wave Ex ia limit switch boxes of EUROTEC provide the possibility to connect one or two intrinsically safe solenoid coils (Ex i) inside the housing.
The suitable switch boxes for one coil are marked with an additional '-MA' in their part number. This version has a cable with a length of 500mm that is connected to the terminal block inside the housing and lead outside the housing through a cable gland. The leads of this cable have to be wired to the plug connector of the solenoid coil. Please consider the coil manufacturer's operation manual and the circuit diagram on or inside the limit switch box cover or on the according technical data sheet. The same applies to the connection of two solenoid coils. This version is marked with an additional '-2MA' in it's part number and provides two cables with a length of 500mm each.
With the models "-2KV" and "-2NPT1/2" the solenoid valve connection (Ex i) is optional on poles 7-9.

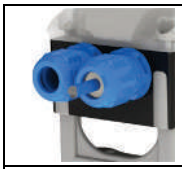


Fig. 10: -MA	Fig. 11: -2MA	Fig. 12: -2KV	Fig. 13: -2NPT1/2	Fig. 14: -2M12-MA12

11. Outdoor use

If you would like to use the limit switch boxes outdoors (outdoor installation), the limit switch boxes should be equipped with a pressure compensating element. The pressure compensating element prevents water condensation in the housing in the event of outdoor temperature fluctuations. Please check whether or not there is a pressure compensating element. If not, you have to order respective limit switch boxes. In this case, the addition to the item number is "-DAE".

12. Maintenance

The limit switch boxes for ATEX areas may be opened during operation or in an existing explosive atmosphere. Maintenance work is possible inside of the Ex area due to intrinsically safe circuits. With the long-term outdoor use of the switch boxes and with extremely high or low ambient temperatures, the cover and shaft sealings can become porous. A safe use can only be guaranteed with a leak-proof housing. Sealings need to be replaced as soon as they are worn out, but no later than after 5 years. The necessary sealings can be ordered from EUROTEC. In addition to that the cover screws can loosen in the event of strong vibrations or temperature fluctuations. Retighten the screws every two years. Any other modifications to the device are prohibited!

13. Malfunctions

In the event of malfunctions, please check the lines, line connectors and the position of the cams. Furthermore, please check whether condensation has accumulated in the housing and whether the valve and the actuator are functioning properly. Rectify any possible errors.

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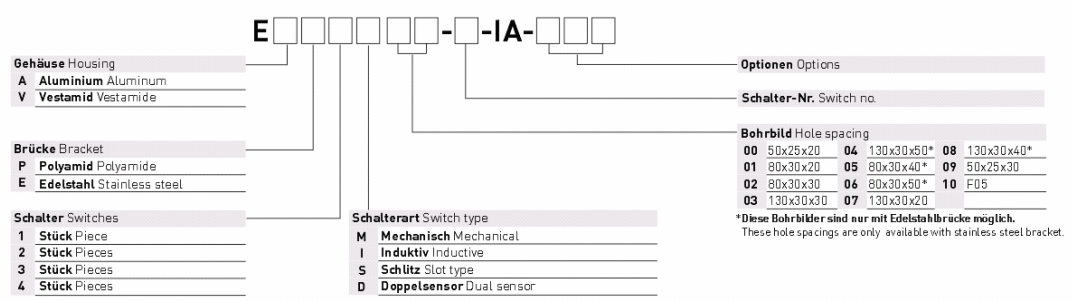
Operating instructions

If this does not rectify the malfunction, disconnect the housing from the power supply voltage and contact one of the manufacturer's authorised and trained specialists.

14. Item number



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