

# Position Switches and Multiple Limit Switches



**EUCHNER**

More than safety.

# EUCHNER

More than safety.



Headquarters in Leinfelden-Echterdingen



Logistics center in Leinfelden-Echterdingen



Production location in Unterböhringen

## Internationally successful – the EUCHNER company

EUCHNER GmbH + Co. KG is a world-leading company in the area of industrial safety technology. EUCHNER has been developing and producing high-quality switching systems for mechanical and systems engineering for more than 60 years.

The medium-sized family-operated company based in Leinfelden, Germany, employs around 750 people around the world.

18 subsidiaries and other sales partners in Germany and abroad work for our international success on the market.

## Quality and innovation – the EUCHNER products

A look into the past shows EUCHNER to be a company with a great inventive spirit. We take the technological and ecological challenges of the future as an incentive for extraordinary product developments.

EUCHNER safety switches monitor safety doors on machines and installations, help to minimize dangers and risks and thereby reliably protect people and processes. Today, our products range from electromechanical and electronic components to intelligent integrated safety solutions. Safety for people, machines and products is one of our dominant themes.

We define future safety technology with the highest quality standards and reliable technology. Extraordinary solutions ensure the great satisfaction of our customers. The product ranges are subdivided as follows:

- ▶ Transponder-coded Safety Switches
- ▶ Transponder-coded Safety Switches with guard locking
- ▶ Multifunctional Gate Box MGB
- ▶ Access management systems (Electronic-Key-System EKS)
- ▶ Electromechanical Safety Switches
- ▶ Magnetically coded Safety Switches
- ▶ Enabling Switches
- ▶ Safety Relays
- ▶ Emergency Stop Devices
- ▶ Hand-Held Pendant Stations and Handwheels
- ▶ Safety Switches with AS-Interface
- ▶ Joystick Switches
- ▶ Position Switches



## Position Switches and Multiple Limit Switches

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**Position switches** **Chapter A**

**A**

**Position switches according to EN 50041** **Chapter B**

**B**

**Multiple limit switches, trip rails and trip dogs** **Chapter C**

**C**



# Position Switches

A



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## Position Switches

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## General information

### Precision single hole fixing limit switches with reed contact or snap-action switching element

EUCHNER precision single hole fixing limit switches are technically sophisticated command switches, which have been proving their reliability, day in and day out, for decades in harsh industrial applications.

These mechanically actuated precision single hole fixing limit switches are IP 67 rated and are entirely maintenance-free.

EUCHNER precision single hole fixing limit switches feature a thread on the upper part and can thus be inserted or screwed through the mounting hole either from the cable end or from the actuator end. Setting the position of the operating point opposite the part of the machine to be sensed is easy with this thread.

The compact overall size and the round design allow installation directly at the sensing points. This feature dispenses with the complicated levers or linkages associated with a high level of design complexity and expense.



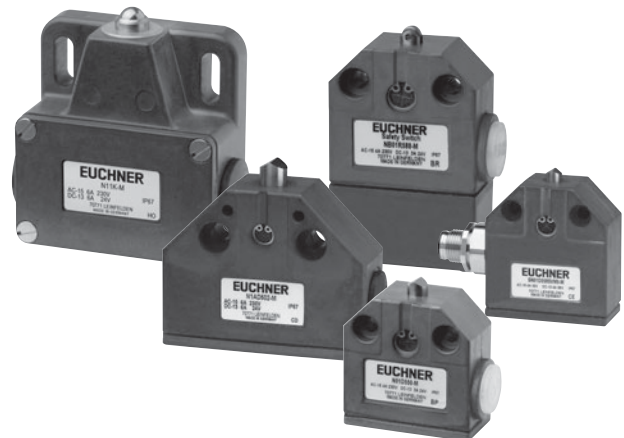
### Precision single limit switches

EUCHNER precision single limit switches are technically precise command switches, which have been developed on the basis of practical requirements in close collaboration with machine tool manufacturers.

The use of high-quality materials, the interplay of sophisticated technology and practically oriented design guarantee operation under even the toughest conditions.

EUCHNER precision single limit switches are used for positioning and controlling machines and in industrial installations.

The different designs, with a choice of five different types of plunger, and easy adjustability from longitudinal to transverse actuation offer the user a broad range of individual applications.

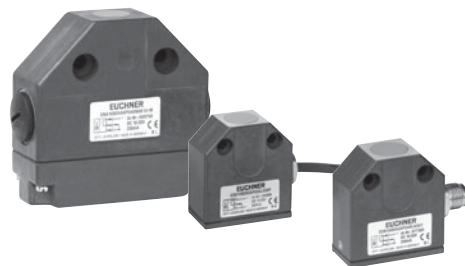


### Inductive single limit switches

Inductive single limit switches are used for positioning and control in all areas of mechanical and systems engineering. Inductive single limit switches are used for automation tasks in machinery in the wood, textile and plastics industries.

Due to their non-contact and thus wear-free principle of operation, inductive single limit switches are insensitive to heavy vibration, heavy soiling and have an above average mechanical life even in aggressive ambient conditions.

Interchangeability with mechanical single limit switches means that it is possible to straightforwardly modify machines. The switches can therefore be retrofitted on existing machine installations to take full advantage of the benefits of non-contact switches.

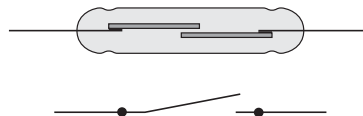




## Switching elements with reed contact

### Reed contact

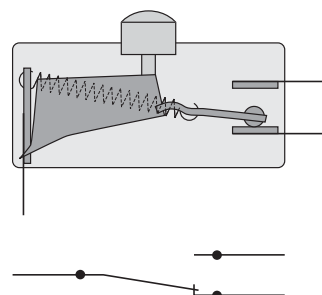
The reed contact comprises two ferromagnetic contacts in a glass bulb. When the reed contact is placed in a magnetic field, the contacts adopt opposite polarities and are closed. For series EGT with reed contact.



## Mechanical switching elements

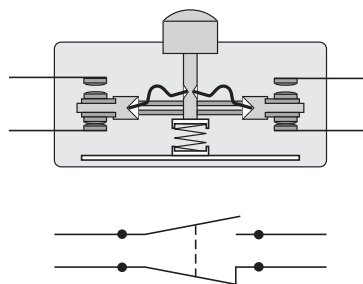
### Changeover contact with snap-action function

Snap-action switching element<sup>1)</sup> with single gap and three connections. For series EGT with snap-action switch and series N01, NB01, SN01 with soldered connection.



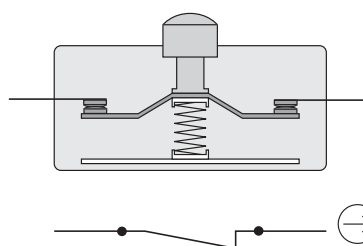
### Snap-action switching element<sup>1)</sup> with one normally open contact (NO) and one normally closed contact (NC)

With double gap and electrically isolated switching bridge. The two moving contacts are electrically isolated from each other. Switching element with four connections. For series SN01 with soldered connection and series N1A, N10, N11.



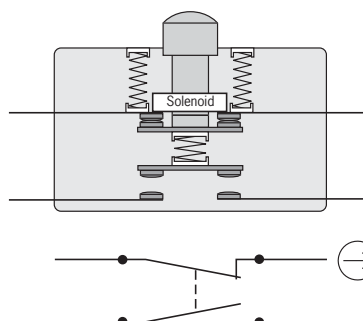
### Safety switching element with slow-action switching contact<sup>2)</sup>

With one positively driven contact and double gap. Switching contact with two connections. For use in single limit switches with safety function. For series NB01 with safety function and series N1A with safety function.



### Safety switching element with snap-action switching contact<sup>1)</sup>

With one positively driven contact and one NO contact. Double gap and electrically isolated switching bridge. Switching contact with four connections. For use in single limit switches with safety function. For series N1A with safety function.



1) A snap-action contact element has a switching contact that opens and closes independently of the approach speed during actuation.

2) A slow-action contact element has a switching contact that opens and closes depending on the approach speed during actuation.

## Positively driven contacts

Positively driven contacts are used in some switching elements. These are special switching contacts that are designed to ensure the switching contacts are always reliably separated. Even if contacts are welded together, the connection is opened by the actuating force.

It is a common feature of all safety switching elements that at least one switching contact is designed as a positively driven contact. Often two positively driven contacts are employed to increase safety using the principle of duplicated design (redundancy). This dual-channel design ensures that on the failure of one channel or on a fault in the control circuit (e.g. in the machine wiring), the interlocking can still be provided with the aid of the second channel.

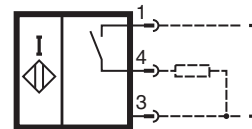


**Positively driven position switch.**  
**Safety switching elements marked with this symbol are not available as replacement switching elements.**

## Inductive switching elements

### NO function

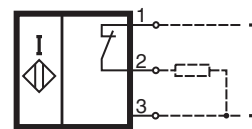
The NO function means that the load current flows when the active face of the inductive switching element is activated and that no current flows when the active face is not activated.



DC NO contact, PNP

### NC function

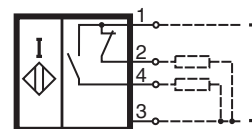
The NC function means that the load current does not flow when the active face of the inductive switching element is activated and that current flows when the active face is not activated.



DC NC contact, PNP

### NO + NC function

The NO + NC function incorporates both an NO function and an NC function. Associated circuit diagrams and wiring diagrams are given in the technical data.



DC NO + NC contacts, PNP

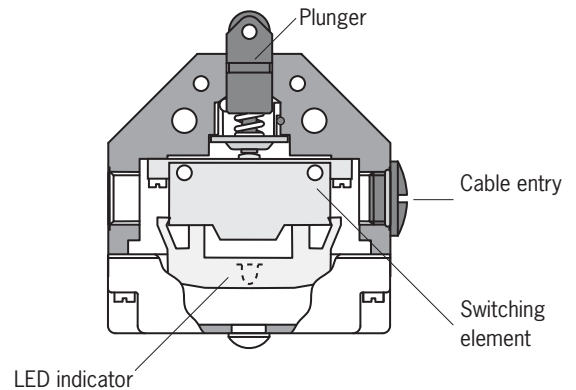
## Precision single limit switches

### Layout

The die-cast aluminum housings for the EUCHNER single limit switches have been proven in even the harshest conditions with their high strength and resistance to corrosion.

They do not require a protective paint finish, but can be painted at any time without prior treatment.

Depending on the design, the hardened plungers made of stainless steel run precisely in either the anodized guide bore in the housing or in a sintered bronze sleeve. These maintenance-free sliding elements make a key contribution to the reliability and correct operation of the switches. Even beyond the guaranteed mechanical life.

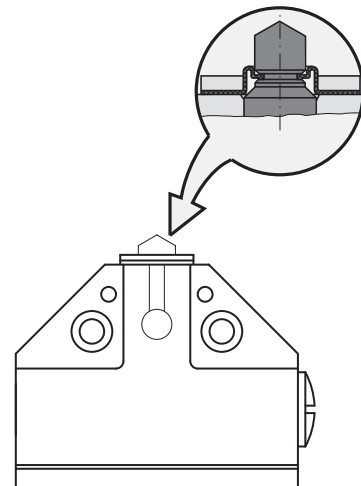


### Exterior diaphragm

To provide protection against resinous cooling lubricants and against the penetration of very small particles, e.g. saw dust, graphite and glass dust, and to provide protection against freezing in the low temperature range, a series with an exterior diaphragm is available.

The exterior diaphragm provides additional sealing of the plunger outside the housing.

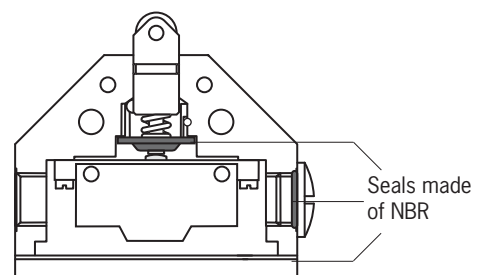
The plunger guides in the housing are thus reliably protected from the penetration of the cooling lubricant. Plunger sticking is prevented, and the replacement of the switch or plunger is unnecessary. Technical data for this series: see page A-37.



### Seals

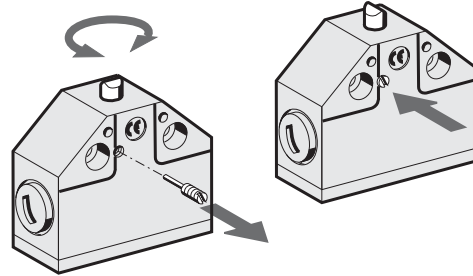
EUCHNER uses high-quality and proven acrylonitrile-butadiene rubber (NBR) for all seals and sealed areas. This material is resistant to oils, greases, fuels, hydraulic fluids and most known cooling lubricants. Moreover, NBR possesses high mechanical strength over a wide temperature range and so it is perfectly suitable for the highly stressed diaphragm seal, which separates the plunger compartment and the interior of the switch.

The material of the diaphragm seal is a key criterion for the quality, mechanical life and precision of the EUCHNER precision multiple limit switches. The same material is used for the cover seal and the cable entry. Seals made of Viton or silicone are available on request for special applications.



## Adjustability

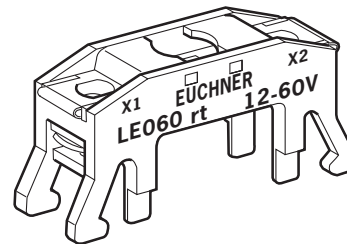
On the chisel plungers and the roller plungers (normal and extended) the approach direction can be changed by 90° at any time. After unscrewing the locking pin, the plunger can be rotated by 90°.



## LED function display

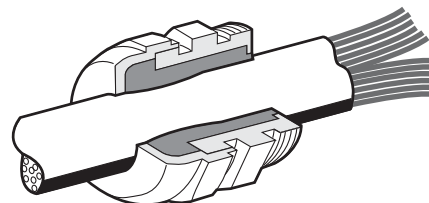
If required, the EUCHNER single limit switches of design N1A can be equipped with an LED function display (AC/DC 10 - 60 V or AC 110/230 V, color red).

Built-in electronic regulation ensures that the luminosity remains constant independent of the voltage applied.



## Cable connection

EUCHNER position switches are tested to degree of protection IP 67 in accordance with IEC 60529. In order to obtain this degree of protection, only high-quality metal cable glands with a captive sealing ring are used. A selection for different cable diameters is listed on page A-47.



## Single hole fixing limit switches – cylindrical design

The round design with simple, single-hole assembly allows installation of the command switches directly at the scanning points. Exact adjustment is permitted by means of the precision metric thread. The limit switches with inert gas contact (reed contact) can be operated up to a water column pressure of 30 meters with degree of protection IP 68.

### Features

- ▶ Six basic types M12 x 1 to M18 x 1.5
- ▶ Housing of nickel-plated brass or stainless steel
- ▶ Mechanical life up to 30 million operating cycles
- ▶ Degree of protection IP 68/IP 67
- ▶ Operating point accuracy  $\pm 0.01$  mm max.
- ▶ With hard-wired cable or with M12 plug connection
- ▶ Temperature range  $-30$  °C to  $+120$  °C



## Precision single hole fixing limit switches

- ▶ With reed contact and protective diode
- ▶ Plunger material stainless steel
- ▶ Any installation position

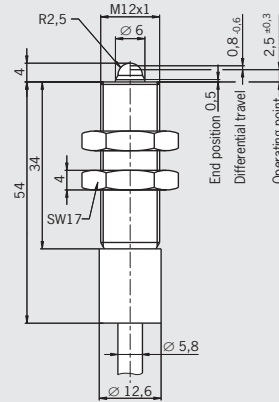


Ambient temperature up to 120 °C

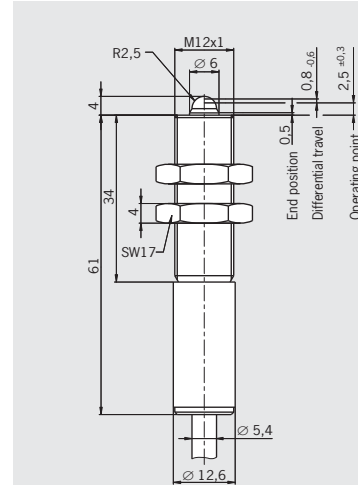


**Design EGT12, M12 x 1, dome plunger**  
Connecting cable, double insulated

### Dimension drawings

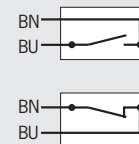
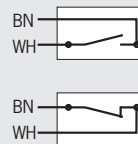


**Design EGT12, M12 x 1, dome plunger**  
Connecting cable, double insulated



⚠ Never switch incandescent lamps. Not even for test purposes.  
Single hole fixing limit switches must not be used as an end stop.

### Wiring diagrams



### Technical data

Housing material	Sleeve	Stainless steel	Plastic
	Threaded section	Stainless steel	Stainless steel
Degree of protection acc. to IEC 60529		IP 65	IP 68
Ambient temperature	[°C]	-25 <sup>1)</sup> ... +120	-25 <sup>1)</sup> ... +80
Approach speed, max.	[m/min]	8	8
Mechanical life	axial actuation	30 x 10 <sup>6</sup> operating cycles (1 x 10 <sup>6</sup> at 120 °C)	30 x 10 <sup>6</sup> operating cycles
	radial actuation	-	1 x 10 <sup>6</sup> operating cycles (dog 30°)
Operating point accuracy <sup>2)</sup>	[mm]	± 0.01	± 0.01
Actuating force (end position)	[N]	Approx. 16 (3 on request)	Approx. 16 (3 on request)
Switching element		Reed contact	Reed contact
Switching contact		1 NO or 1 NC	1 NO or 1 NC
Contact material		Rhodium	Rhodium
Rated insulation voltage U <sub>i</sub>	[V]	50	50
Utilization category acc. to IEC 60947-5-1		AC-12 U <sub>e</sub> 30 V I <sub>e</sub> 0.3 A	AC-12 U <sub>e</sub> 30 V I <sub>e</sub> 0.3 A
		DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.3 A	DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.3 A
Switching current, min., at 24 V	[mA]	1	1
Switching voltage, min.	[V DC]	1	1
Short circuit protection (control circuit fuse)	[A gG]	0.4	0.4
Connection		Silicone cable 2 x 0.5 mm <sup>2</sup>	PUR cable 2 x 0.5 mm <sup>2</sup>

1) Cable hard wired.

2) The reproducible operating point accuracy relates to axial actuation, after run-in of approx. 2,000 operating cycles.

3) Mating connector see page A-44 to A-46.

### Ordering table

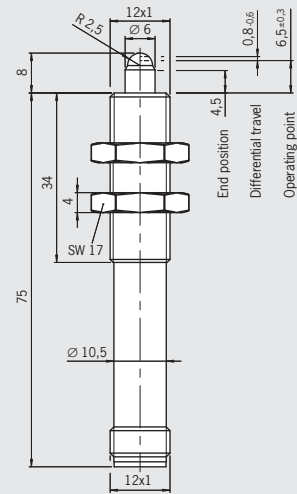
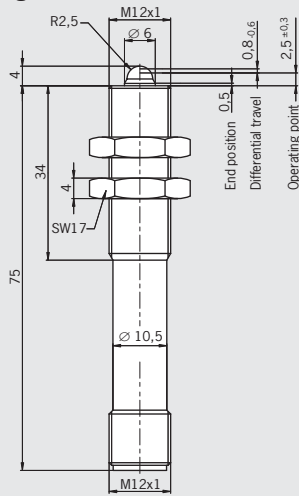
1 NO	Connecting cable 3 m	<b>104223</b> EGT12A3000C2250	-
	Connecting cable 5 m	-	<b>082201</b> EGT12A5000
	Plug connector	-	-
1 NC	Connecting cable 3 m	-	-
	Connecting cable 5 m	On request	<b>078848</b> EGT12R5000
	Plug connector	-	-



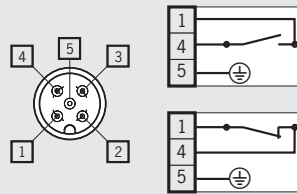
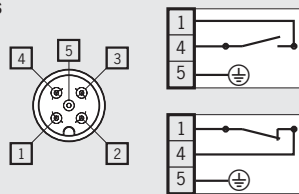
**Design EGT12, M12 x 1, dome plunger**  
Plug connector M12 with PE connection

**Design EGT12, M12 x 1, dome plunger**  
Plug connector M12, long plunger

**Dimension drawings**



**Wiring diagrams**



Brass, nickel-plated	Brass, nickel-plated
Stainless steel	Stainless steel
IP 67	IP 67
Mating connector inserted and screwed tight	Mating connector inserted and screwed tight
-25 ... +80	-25 ... +80
8	5
30 x 10 <sup>6</sup> operating cycles	5 x 10 <sup>6</sup> operating cycles
1 x 10 <sup>6</sup> operating cycles (dog 30°)	
± 0.01	± 0.01
Approx. 16	Approx. 16
Reed contact	Reed contact
1 NO or 1 NC	1 NO or 1 NC
Rhodium	Rhodium
50	50
AC-12 U <sub>e</sub> 30 V I <sub>e</sub> 0.3 A	AC-12 U <sub>e</sub> 30 V I <sub>e</sub> 0.3 A
DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.3 A	DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.3 A
1	1
1	1
0.4	0.4
Plug connector M12 <sup>3)</sup>	Plug connector M12 <sup>3)</sup>

-	-
-	-
<b>075426</b> EGT12ASFM5	<b>095112</b> EGT12ASFM5C2083
-	-
-	-
<b>075427</b> EGT12RSFM5	-

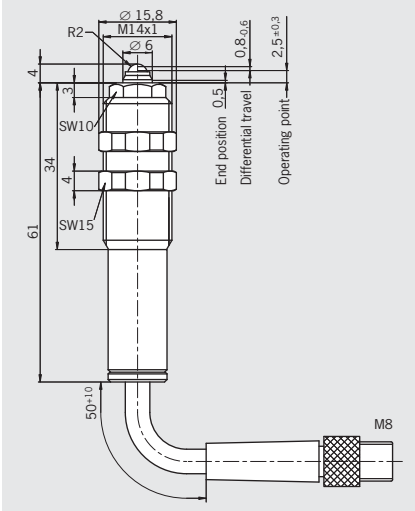
## Precision single hole fixing limit switches

- ▶ With reed contact and protective diode
- ▶ Plunger material stainless steel
- ▶ Any installation position

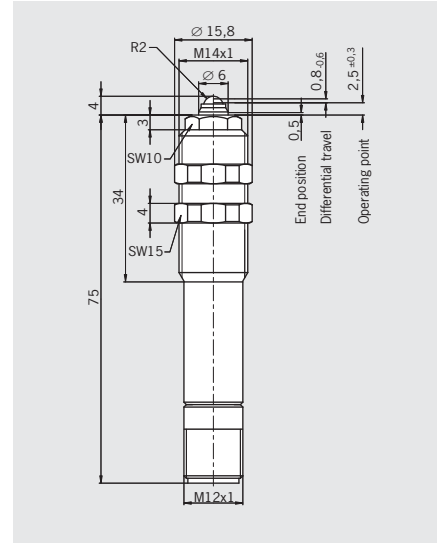


**Design EGT11, M14 x 1, ball plunger**  
Connecting cable 0.5 m with plug connector M8

### Dimension drawings

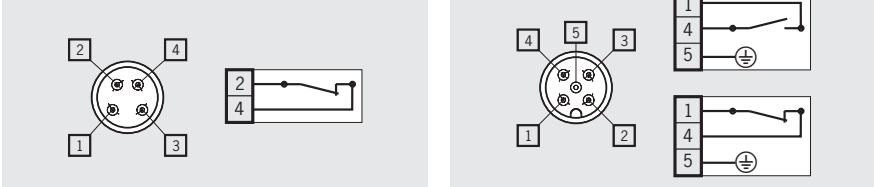


**Design EGT11, M14 x 1, ball plunger**  
Plug connector M12 with PE connection



⚠ Never switch incandescent lamps. Not even for test purposes.  
Single hole fixing limit switches must not be used as an end stop.

### Wiring diagrams



### Technical data

		Brass, nickel-plated Stainless steel	Brass, nickel-plated Stainless steel
Housing material	Sleeve Threaded section		
Degree of protection acc. to IEC 60529		IP 67 Mating connector inserted and screwed tight	IP 67 Mating connector inserted and screwed tight
Ambient temperature	[°C]	-5 ... +65	-25 ... +80
Approach speed, max.	[m/min]	60	60
Mechanical life	axial actuation	30 x 10 <sup>6</sup> operating cycles	30 x 10 <sup>6</sup> operating cycles
	radial actuation	-	5 x 10 <sup>6</sup> operating cycles (dog 15°)
Operating point accuracy <sup>2)</sup>	[mm]	± 0.01	± 0.01
Actuating force (end position)	[N]	Approx. 2	Approx. 3
Switching element		Reed contact	Reed contact
Switching contact		1 NC	1 NO or 1 NC
Contact material		Rhodium	Rhodium
Rated insulation voltage U <sub>i</sub>	[V]	50	50
Utilization category acc. to IEC 60947-5-1		AC-12 U <sub>e</sub> 30 V I <sub>e</sub> 0.3 A	AC-12 U <sub>e</sub> 30 V I <sub>e</sub> 0.3 A
		DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.3 A	DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.3 A
Switching current, min., at 24 V	[mA]	1	1
Switching voltage, min.	[V DC]	1	1
Short circuit protection (control circuit fuse)	[A gG]	0.4	0.4
Connection		Plug connector M8 <sup>3)</sup>	Plug connector M12 <sup>3)</sup>

1) Cable hard wired.

2) The reproducible operating point accuracy relates to axial actuation, after run-in of approx. 2,000 operating cycles.

3) Mating connector see page A-44 to A-46.

### Ordering table

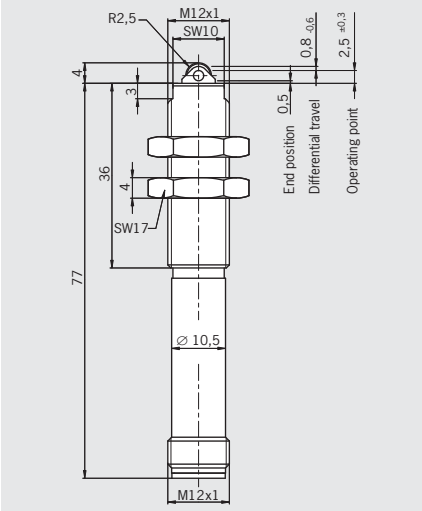
1 NO	Connecting cable 0.5 m with plug connector M8	-	-
	Connecting cable 5 m	-	-
	Plug connector	-	<b>093352</b> EGT11A2NSFM5
1 NC	Connecting cable 0.5 m with plug connector M8	<b>084000</b> EGT11R2N50SAM4	-
	Connecting cable 5 m	-	-
	Plug connector	-	<b>091848</b> EGT11R2NSFM5



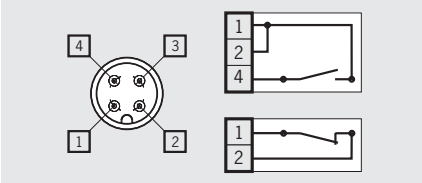


**Design EGT12, M12 x 1, roller plunger**  
 Plug connector M12, double insulated

**Dimension drawings**



**Wiring diagrams**



Brass, nickel-plated
Stainless steel
IP 67
Mating connector inserted and screwed tight
-25 ... +80
20
30 x 10 <sup>6</sup> operating cycles
± 0.01
Approx. 16
Reed contact
1 NO or 1 NC
Rhodium
50
AC-12 U <sub>e</sub> 30 V I <sub>e</sub> 0.3 A
DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.3 A
1
1
0.4
Plug connector M12 <sup>2)</sup>

-
-
<b>078483</b>
EGT12ARSEM4C1888
-
-
<b>079139</b>
EGT12RRSEM4C1888



## Precision single hole fixing limit switches

- ▶ With reed contact
- ▶ Plunger material stainless steel
- ▶ Any installation position



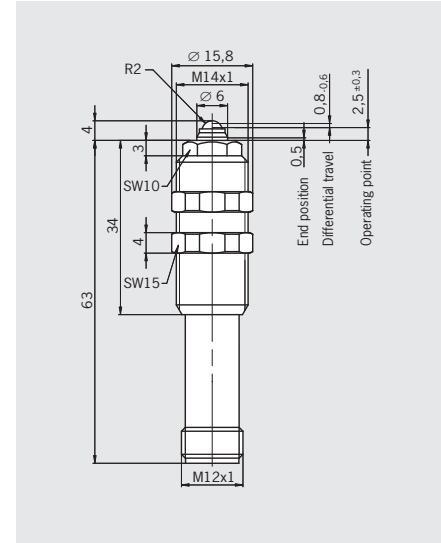
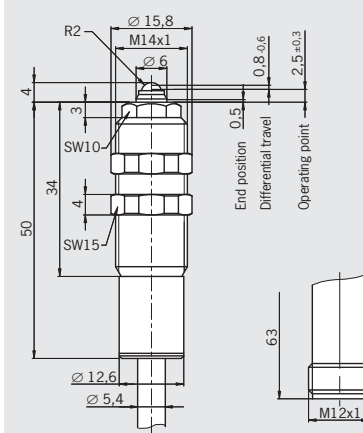
For mating connector with LED display



**Design EGT1/4, M14 x 1, ball plunger**  
Connecting cable, double insulated/plug con. M12

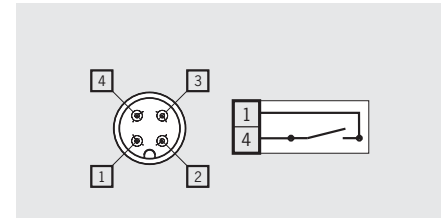
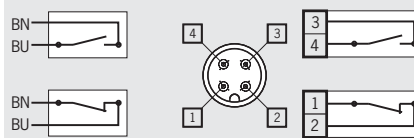
**Design EGT1/4, M14 x 1, ball plunger**  
Plug connector M12

### Dimension drawings



⚠ Never switch incandescent lamps. Not even for test purposes.  
Single hole fixing limit switches must not be used as an end stop.

### Wiring diagrams



### Technical data

Housing material	Sleeve	Plastic	Brass, nickel-plated	Brass, nickel-plated
	Threaded section	Stainless steel		Stainless steel
Degree of protection acc. to IEC 60529		IP 68	IP 67 <sup>4)</sup>	IP 67 Mating connector inserted and screwed tight
Ambient temperature	[°C]	-25 <sup>1)</sup> ... +80	-25 ... +80	-25 ... +80
Approach speed, max.	[m/min]	8		8
Mechanical life (axial)		30 x 10 <sup>6</sup> operating cycles		30 x 10 <sup>6</sup> operating cycles
Operating point accuracy <sup>2)</sup>	[mm]	± 0.01		± 0.01
Actuating force (end position)	[N]	Approx. 16 / 3 on request		Approx. 16 / 3 on request
Switching element		Reed contact		Reed contact
Switching contact		1 NO or 1 NC		1 NO
Contact material		Rhodium		Rhodium
Rated insulation voltage U <sub>i</sub>	[V]	250 □	50	50
Utilization category acc. to IEC 60947-5-1	AC-12	U <sub>e</sub> 230 V I <sub>e</sub> 0.03 A	U <sub>e</sub> 30 V I <sub>e</sub> 0.3 A	AC-12 U <sub>e</sub> 30 V I <sub>e</sub> 0.3 A
	DC-13	U <sub>e</sub> 24 V I <sub>e</sub> 0.3 A	U <sub>e</sub> 24 V I <sub>e</sub> 0.3 A	DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.3 A
Switching current, min., at 24 V	[mA]	1		1
Switching voltage, min.	[V DC]	1		1
Short circuit protection (control circuit fuse)	[A gG]	0.4		0.4
Connection		PUR cable 2 x 0.5 mm <sup>2</sup> , encapsulated	Plug connector M12 <sup>3)</sup>	Plug connector M12 <sup>3)</sup>

1) Cable hard wired.  
2) The reproducible operating point accuracy relates to axial actuation, after run-in of approx. 2,000 operating cycles.  
3) Mating connector see page A-44 to A-46.  
4) Mating connector inserted and screwed tight

### Ordering table

Switching element	Ordering code	Product description
1 NO	<b>001366</b>	EGT1/4A2000
	<b>001368</b>	EGT1/4A5000
	<b>033976</b>	EGT1/4ASEM4
1 NC	<b>001371</b>	EGT1/4R2000
	<b>001372</b>	EGT1/4R5000
	<b>033982</b>	EGT1/4RSEM4

Made of high-quality stainless steel



With scraper made of PU



With scraper made of PU

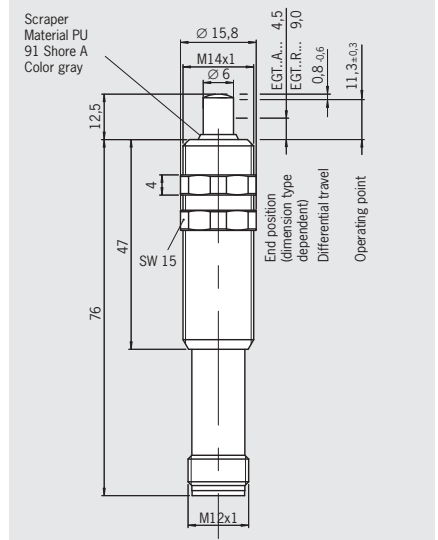
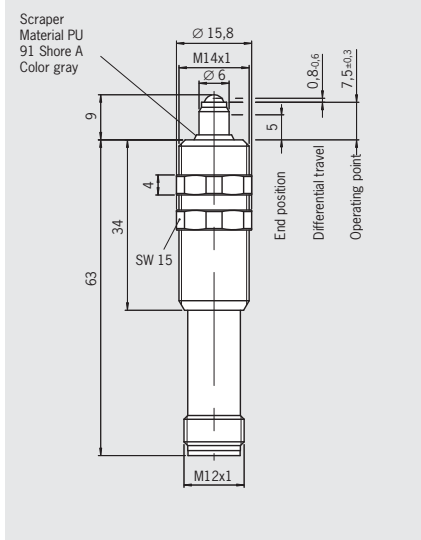
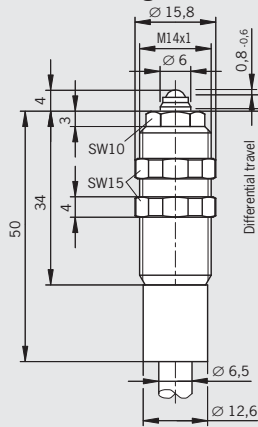


**Design EGT1/4, M14 x 1, ball plunger**  
Connecting cable, max. pressure 300 kPa

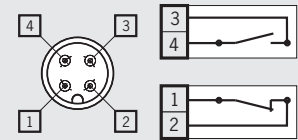
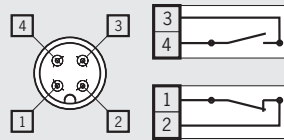
**Design EGT1/4, M14 x 1, ball plunger**  
Plug connector M12

**Design EGT1/4, M14 x 1, dome plunger**  
Plug connector M12

### Dimension drawings



### Wiring diagrams



High-quality stainless steel	Brass, nickel-plated Stainless steel	Brass, nickel-plated Stainless steel
IP 68	IP 67	IP 67
-25 ... +80	-25 ... +80	-25 ... +80
8	Approx. 16	8
30 x 10 <sup>6</sup> operating cycles	5 x 10 <sup>6</sup> operating cycles	30 x 10 <sup>6</sup> operating cycles
± 0.01	± 0.01	± 0.01
Approx. 16	Approx. 16	Approx. 16
Reed contact	Reed contact	Reed contact
1 NO	1 NO or 1 NC	1 NO or 1 NC
Rhodium	Rhodium	Rhodium
50	50	50
AC-12 U <sub>e</sub> 30 V I <sub>e</sub> 0.3 A	AC-12 U <sub>e</sub> 30 V I <sub>e</sub> 0.3 A	AC-12 U <sub>e</sub> 30 V I <sub>e</sub> 0.3 A
DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.3 A	DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.3 A	DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.3 A
1	1	1
1	1	1
0.4	0.4	0.4
Hydrofirm cable 2 x 0.5 mm <sup>2</sup> , encapsulated	Plug connector M12 <sup>3)</sup>	Plug connector M12 <sup>3)</sup>

<b>094982</b> EGT1/4A2000C2079	-	<b>102476</b> EGT1/4A2000C2137
-	-	-
-	<b>095278</b> EGT1/4ASEM4C2088	<b>098071</b> EGT1/4ASEM4C2137
-	-	-
-	-	-
-	<b>104316</b> EGT1/4RSEM4C2088	<b>104372</b> EGT1/4RSEM4C2137

## Precision single hole fixing limit switches

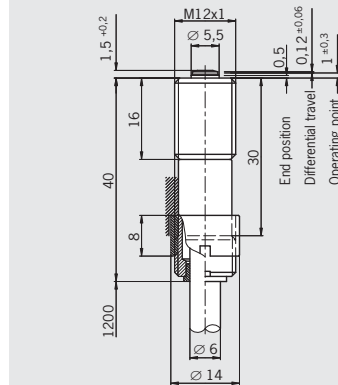
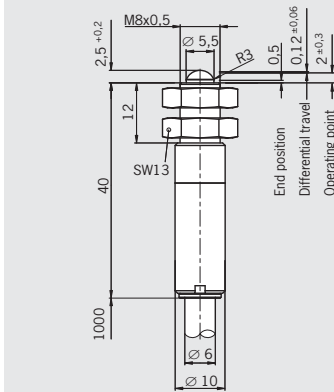
- ▶ With snap-action switching element
- ▶ Plunger material stainless steel
- ▶ Any installation position



**Design EGM8, M8 x 0.5, dome plunger**  
Connecting cable, double insulated

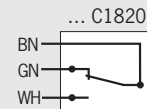
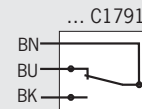
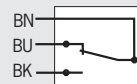
**Design EGM12, M12 x 1, flat plunger**  
Connecting cable, double insulated

### Dimension drawings



⚠ Single hole fixing limit switches must not be used as an end stop.

### Wiring diagrams



### Technical data

	Stainless steel	Stainless steel
Housing material	Stainless steel	Stainless steel
Degree of protection acc. to IEC 60529	IP 65	IP 65
Ambient temperature [°C]	-20 <sup>1)</sup> ... +80	-20 <sup>1)</sup> ... +80
Approach speed, max. [m/min]	8	8
Mechanical life (axial)	1 x 10 <sup>6</sup> operating cycles	1 x 10 <sup>6</sup> operating cycles
Operating point accuracy <sup>2)</sup> [mm]	± 0.01	± 0.01
Actuating force (end position) [N]	Approx. 16	Approx. 16
Switching element	Snap-action switching contact	Snap-action switching contact
Switching contact	1 changeover contact	1 changeover contact
Contact material	Fine silver, gold-plated	Silver alloy, gold-plated
Rated insulation voltage U <sub>i</sub> [V]	250 $\square$	250 $\square$
Rated impulse withstand voltage U <sub>imp</sub>	2.5	2.5
Utilization category acc. to IEC 60947-5-1	AC-15 U <sub>e</sub> 230 V I <sub>e</sub> 0.5 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.6 A	AC-15 U <sub>e</sub> 230 V I <sub>e</sub> 0.5 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.6 A
Switching current, min., at 24 V [mA]	10	10
Switching voltage, min. [V DC]	12	12
Short circuit protection (control circuit fuse) [A gG]	2	2
Connection	PUR cable 3 x 0.5 mm <sup>2</sup>	PUR cable 3 x 0.5 mm <sup>2</sup> Silicone cable 3 x 0.5 mm <sup>2</sup>

1) Cable hard wired.  
2) The reproducible operating point accuracy relates to axial actuation, after run-in of approx. 2,000 operating cycles.  
3) Mating connector see page A-44 to A-46.

### Ordering table

	119345 EGM8-1000C2396	075556 EGM12-1200C1791	076464 EGM12-1200C1820
Connecting cable 1 m	-	-	-
Connecting cable 1.2 m	-	-	-
Connecting cable 2 m	-	-	-
1 changeover contact	-	-	-
Connecting cable 2.5 m	-	-	-
Connecting cable 4 m	-	076154 EGM12-4000C1791	-
Connecting cable 5 m	-	-	-
Plug connector	-	-	-

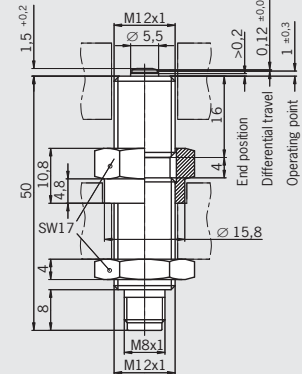
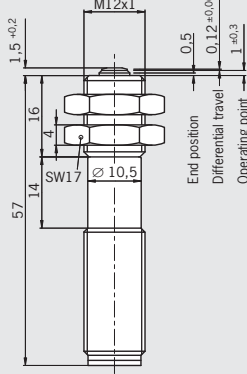
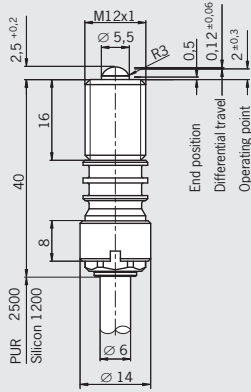


**Design EGM12, M12 x 1, dome plunger**  
For sealing with O-rings

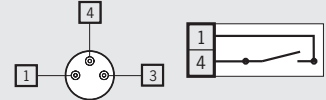
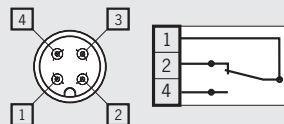
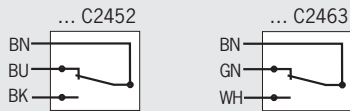
**Design EGM12, M12 x 1, flat plunger**  
Plug connector M12

**Design EGM12, M12 x 1, flat plunger**  
Plug connector M8

**Dimension drawings**



**Wiring diagrams**



Stainless steel IP 65		Stainless steel IP 65 Mating connector inserted and screwed tight		Stainless steel IP 65 Mating connector inserted and screwed tight	
-20 <sup>1)</sup> ... +80	-30 ... +80	-20 ... +80	-30 ... +85	-20 ... +85	-20 ... +85
8	8	8	8	8	8
1 x 10 <sup>6</sup> operating cycles ± 0.01	1 x 10 <sup>6</sup> operating cycles ± 0.01	1 x 10 <sup>6</sup> operating cycles ± 0.01	1 x 10 <sup>6</sup> operating cycles ± 0.01	1 x 10 <sup>6</sup> operating cycles ± 0.01	1 x 10 <sup>6</sup> operating cycles ± 0.01
Approx. 16	Approx. 16	Approx. 16	Approx. 16	Approx. 16	Approx. 16
Snap-action switching contact 1 changeover contact Fine silver, gold-plated	Snap-action switching contact 1 changeover contact Silver alloy, gold-plated	Snap-action switching contact 1 changeover contact Silver alloy, gold-plated	Snap-action switching contact 1 changeover contact Silver alloy, gold-plated	Snap-action switching contact 1 NO Silver alloy, gold-plated	Snap-action switching contact 1 NO Silver alloy, gold-plated
250 □ 2.5	50 1.5	50 1.5	50 1.5	50 1.5	50 1.5
AC-15 U <sub>e</sub> 230 V I <sub>e</sub> 0.5 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.6 A	AC-15 U <sub>e</sub> 50 V I <sub>e</sub> 0.5 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.6 A	AC-15 U <sub>e</sub> 50 V I <sub>e</sub> 0.5 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.6 A	AC-15 U <sub>e</sub> 50 V I <sub>e</sub> 0.5 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.6 A	AC-15 U <sub>e</sub> 24 V I <sub>e</sub> 0.5 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.6 A	AC-15 U <sub>e</sub> 24 V I <sub>e</sub> 0.5 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.6 A
10	10	10	10	10	10
12	12	12	12	12	12
2	2	2	2	2	2
PUR cable 3 x 0.5 mm <sup>2</sup>	Silicone cable 3 x 0.5 mm <sup>2</sup>	Plug connector M12 <sup>3)</sup>		Plug connector M8 <sup>3)</sup>	

-	-	-	-	-
-	<b>128196</b> EGM12-1200C2463	-	-	-
-	-	-	-	-
<b>126384</b> EGM12-2500C2452	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	<b>082205</b> EGM12SEM4	<b>093733</b> EGM12SEM4C1820	<b>077228</b> EGM12SAM3C1868

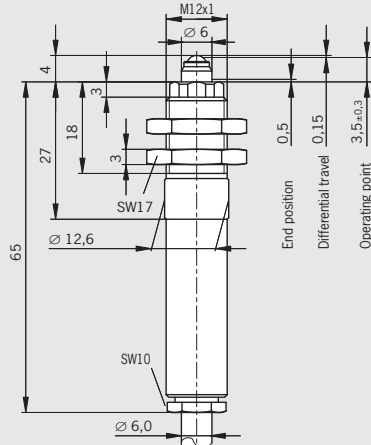
## Precision single hole fixing limit switches

- ▶ With snap-action switching element
- ▶ Plunger material stainless steel
- ▶ Any installation position

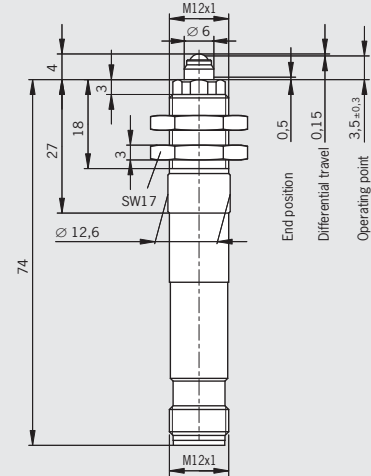


### Design EGT1, M12 x 1, ball plunger Connecting cable with PE connection

#### Dimension drawings

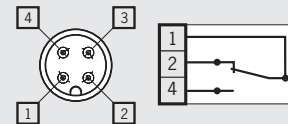
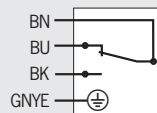


### Design EGT1, M12 x 1, ball plunger Plug connector M12



⚠ Single hole fixing limit switches must not be used as an end stop.

#### Wiring diagrams



#### Technical data

Housing material	Brass, nickel-plated	Brass, nickel-plated
Degree of protection acc. to IEC 60529	IP 67	IP 67 Mating connector inserted and screwed tight
Ambient temperature [°C]	-25 <sup>1)</sup> ... +80	-25 ... +80
Approach speed, max. [m/min]	8	8
Mechanical life (axial)	1 x 10 <sup>6</sup> operating cycles	1 x 10 <sup>6</sup> operating cycles
Operating point accuracy <sup>2)</sup> [mm]	± 0.01	± 0.01
Actuating force (end position) [N]	Approx. 20	Approx. 20
Switching element	Snap-action switching contact	Snap-action switching contact
Switching contact	1 changeover contact	1 changeover contact
Contact material	Silver alloy, gold-plated	Silver alloy, gold-plated
Rated insulation voltage U <sub>i</sub> [V]	250	50
Rated impulse withstand voltage U <sub>imp</sub>	2.5	2.5
Utilization category acc. to IEC 60947-5-1	AC-15 U <sub>e</sub> 230 V I <sub>e</sub> 0.5 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.6 A	AC-15 U <sub>e</sub> 50 V I <sub>e</sub> 0.5 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.6 A
Switching current, min., at 24 V [mA]	10	10
Switching voltage, min. [V DC]	12	12
Short circuit protection (control circuit fuse) [A gG]	2	2
Connection	PUR cable 4 x 0.5 mm <sup>2</sup>	Plug connector M12 <sup>3)</sup>

1) Cable hard wired.

2) The reproducible operating point accuracy relates to axial actuation, after run-in of approx. 2,000 operating cycles.

3) Mating connector see page A-44 to A-46.

#### Ordering table

1 changeover contact	Connecting cable 2 m	<b>092695</b> EGT1M12-2000	-
	Connecting cable 5 m	<b>093364</b> EGT1M12-5000	-
	Plug connector	-	<b>093365</b> EGT1M12SEM4



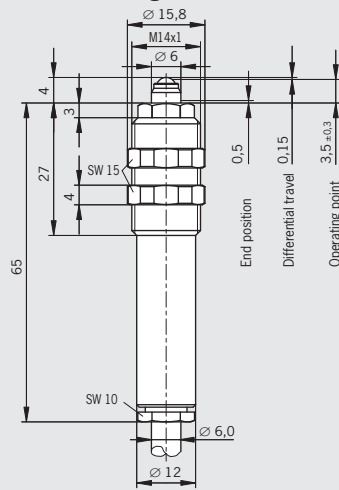
## Precision single hole fixing limit switches

- ▶ With snap-action switching element
- ▶ Plunger material stainless steel
- ▶ Any installation position

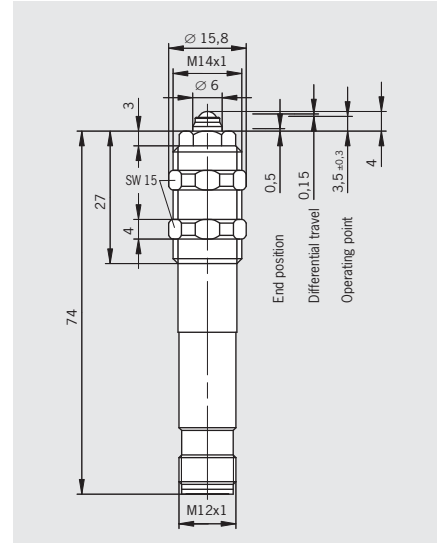


### Design EGT1, M14 x 1, ball plunger Connecting cable with PE connection

#### Dimension drawings

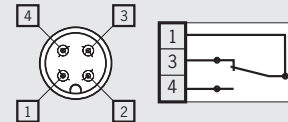
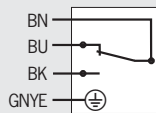


### Design EGT1, M14 x 1, ball plunger Plug connector M12



⚠ Single hole fixing limit switches must not be used as an end stop.

#### Wiring diagrams



#### Technical data

	Design EGT1, M14 x 1, ball plunger Connecting cable with PE connection	Design EGT1, M14 x 1, ball plunger Plug connector M12
Housing material	Brass, nickel-plated	Brass, nickel-plated
Degree of protection acc. to IEC 60529	IP 67	IP 67 Mating connector inserted and screwed tight
Ambient temperature [°C]	-25 <sup>1)</sup> ... +80	-25 ... +80
Approach speed, max. [m/min]	8	8
Mechanical life (axial)	1 x 10 <sup>6</sup> operating cycles	1 x 10 <sup>6</sup> operating cycles
Operating point accuracy <sup>2)</sup> [mm]	± 0.01	± 0.01
Actuating force (end position) [N]	Approx. 20	Approx. 20
Switching element	Snap-action switching contact	Snap-action switching contact
Switching contact	1 changeover contact	1 changeover contact
Contact material	Silver alloy, gold-plated	Silver alloy, gold-plated
Rated insulation voltage U <sub>i</sub> [V]	250	50
Rated impulse withstand voltage U <sub>imp</sub>	2.5	2.5
Utilization category acc. to IEC 60947-5-1	AC-15 U <sub>e</sub> 230 V I <sub>e</sub> 0.5 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.6 A	AC-15 U <sub>e</sub> 50 V I <sub>e</sub> 0.5 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.6 A
Switching current, min., at 24 V [mA]	10	10
Switching voltage, min. [V DC]	12	12
Short circuit protection (control circuit fuse) [A gG]	2	2
Connection	PUR cable 4 x 0.5 mm <sup>2</sup>	Plug connector M12 <sup>3)</sup>

1) Cable hard wired.

2) The reproducible operating point accuracy relates to axial actuation, after run-in of approx. 2,000 operating cycles.

3) Mating connector see page A-44 to A-46.

#### Ordering table

Ordering code	Description	Part number	Notes
1 changeover contact	Connecting cable 2 m	<b>001732</b> EGT1-2000	-
	Connecting cable 5 m	<b>001733</b> EGT1-5000	-
	Plug connector	-	<b>019727</b> EGT1SEM4



For plug connector with LED display



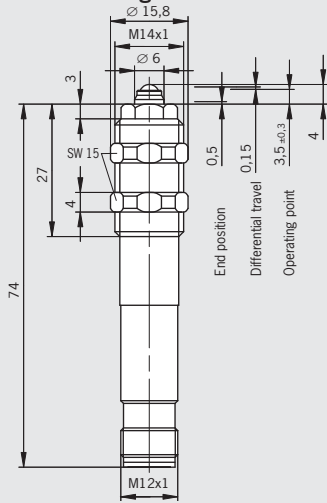
For plug connector with LED display



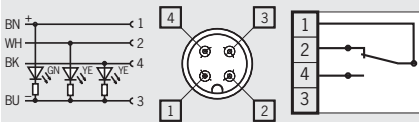
Suitable for aggressive coolant; diaphragm made of Viton

## Design EGT1, M14 x 1, ball plunger Plug connector M12

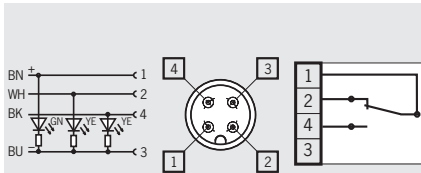
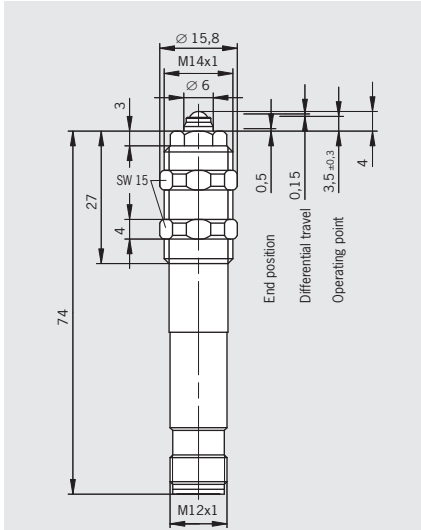
### Dimension drawings



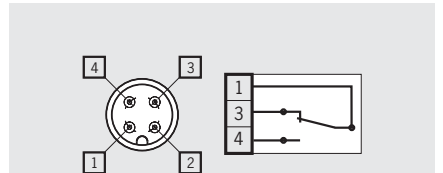
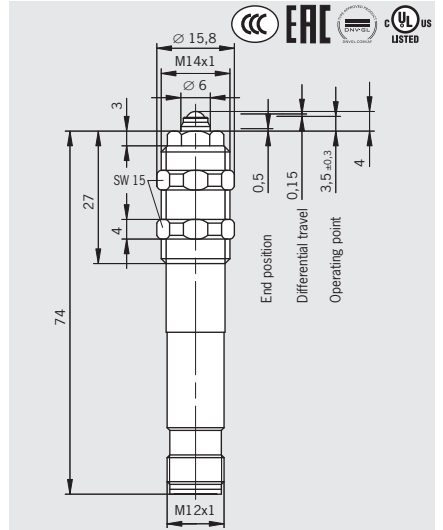
### Wiring diagrams



## Design EGT1, M14 x 1, ball plunger Plug connector M12



## Design EGT1, M14 x 1, ball plunger Plug connector M12



Brass, nickel-plated	Brass, nickel-plated	Brass, nickel-plated
IP 67	IP 67	IP 67
Mating connector inserted and screwed tight	Mating connector inserted and screwed tight	Mating connector inserted and screwed tight
-25 ... +80	-5 ... +80	-5 ... +80
8	8	8
1 x 10 <sup>6</sup> operating cycles	1 x 10 <sup>6</sup> operating cycles	1 x 10 <sup>6</sup> operating cycles
± 0.01	± 0.01	± 0.01
Approx. 20	Approx. 20	Approx. 20
Snap-action switching contact	Snap-action switching contact	Snap-action switching contact
1 changeover contact	1 changeover contact	1 changeover contact
Silver alloy, gold-plated	Silver alloy, gold-plated	Silver alloy, gold-plated
50	50	50
2.5	2.5	2.5
DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.6 A	AC-15 U <sub>e</sub> 50 V I <sub>e</sub> 0.5 ADC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.6 A	AC-15 U <sub>e</sub> 50 V I <sub>e</sub> 0.5 ADC-13 U <sub>e</sub> 24 V I <sub>e</sub> 0.6 A
10	10	10
12	12	12
2	2	2
Plug connector M12 <sup>3)</sup>	Plug connector M12 <sup>3)</sup>	Plug connector M12 <sup>3)</sup>

-	-	-
-	-	-
<b>054250</b> EGT1SEM4C1613	<b>102479</b> EGT1SEM4C2221	<b>077347</b> EGT1SEM4C1832

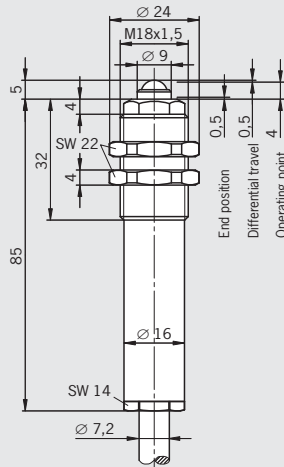
## Precision single hole fixing limit switches

- ▶ With snap-action switching element
- ▶ Plunger material stainless steel
- ▶ Any installation position

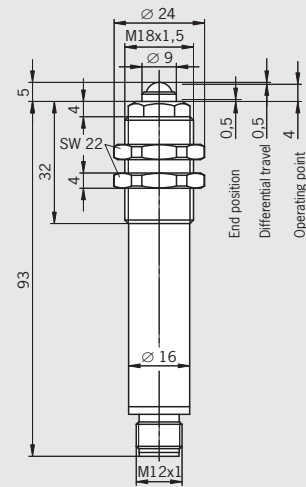


### Design EGT2, M18 x 1.5, ball plunger Connecting cable with PE connection

#### Dimension drawings

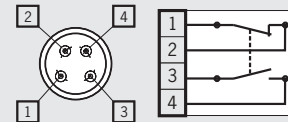
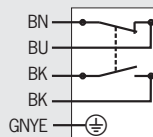


### Design EGT2, M18 x 1.5, ball plunger Plug connector M12



⚠ Single hole fixing limit switches must not be used as an end stop.

#### Wiring diagrams



#### Technical data

	Design EGT2, M18 x 1.5, ball plunger Connecting cable with PE connection	Design EGT2, M18 x 1.5, ball plunger Plug connector M12
Housing material	Brass, nickel-plated	Brass, chromium-plated
Degree of protection acc. to IEC 60529	IP 67	IP 67 Mating connector inserted and screwed tight
Ambient temperature [°C]	-5 ... +60	-5 ... +60
Approach speed, max. [m/min]	10	10
Mechanical life	1 x 10 <sup>6</sup> operating cycles	1 x 10 <sup>6</sup> operating cycles
Operating point accuracy <sup>1)</sup> [mm]	± 0.01	± 0.01
Actuating force (end position) [N]	Approx. 24	Approx. 24
Switching element	Snap-action switching contact	Snap-action switching contact
Switching contact	1 NC and 1 NO	1 NC and 1 NO
Contact material	Fine silver, gold-plated	Fine silver, gold-plated
Rated insulation voltage U <sub>i</sub> [V]	250	50
Rated impulse withstand voltage U <sub>imp</sub>	2.5	2.5
Utilization category acc. to IEC 60947-5-1	AC-15 U <sub>e</sub> 230 V I <sub>e</sub> 2 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 1 A	AC-15 U <sub>e</sub> 30 V I <sub>e</sub> 2 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 1 A
Switching current, min., at 24 V [mA]	10	10
Switching voltage, min. [V DC]	12	12
Short circuit protection (control circuit fuse) [A gG]	2	2
Connection	PUR cable 5 x 0.75 mm <sup>2</sup>	Plug connector M12 <sup>2)</sup>

1) The reproducible operating point accuracy relates to axial actuation, after run-in of approx. 2,000 operating cycles.  
2) Mating connector see page A-44 to A-46.

#### Ordering table

Ordering code	Description	Part number	Notes
1 NC + 1 NO	Connecting cable 2 m	<b>001864</b> EGT2-2000	-
	Connecting cable 5 m	<b>001865</b> EGT2-5000	-
	Plug connector	-	<b>052504</b> EGT2SEM4

## Precision single hole fixing limit switches

- ▶ With snap-action switching element
- ▶ Plunger material stainless steel
- ▶ Any installation position

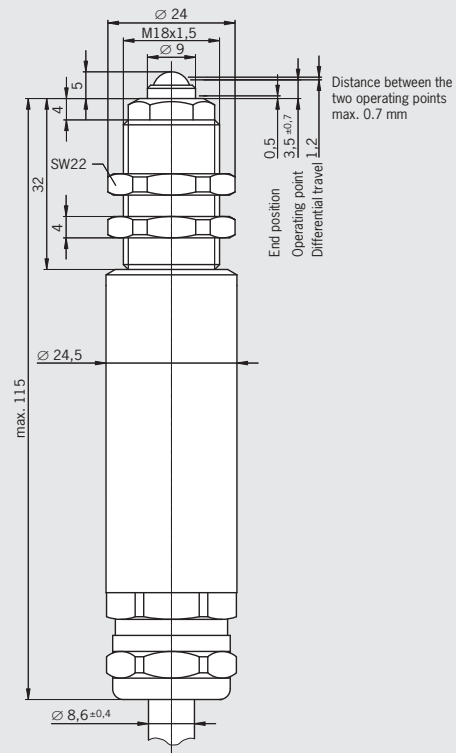


With four switching contacts



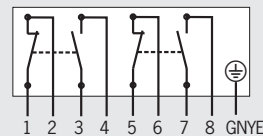
**Design EGT4, M18 x 1.5, ball plunger**  
Connecting cable with PE connection

### Dimension drawings



⚠ Single hole fixing limit switches must not be used as an end stop.

### Wiring diagrams



### Technical data

Housing material	Brass, nickel-plated
Degree of protection acc. to IEC 60529	IP 67
Ambient temperature	[°C] -25 <sup>1)</sup> ... +70
Approach speed, max.	[m/min] 10
Mechanical life	5 x 10 <sup>5</sup> operating cycles
Operating point accuracy <sup>2)</sup>	[mm] ± 0.01
Actuating force (end position)	[N] Approx. 25
Switching element	Snap-action switching contact
Switching contact	2 NC and 2 NO
Contact material	Fine silver, gold-plated
Rated insulation voltage U <sub>i</sub>	[V] 250
Rated impulse withstand voltage U <sub>imp</sub>	2.5
Utilization category acc. to IEC 60947-5-1	AC-15 U <sub>e</sub> 230 V I <sub>e</sub> 2 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 1 A
Switching current, min., at 24 V	[mA] 10
Switching voltage, min.	[V DC] 12
Short circuit protection (control circuit fuse)	[A gG] 2
Connection	PUR cable 9 x 0.5 mm <sup>2</sup>

1) Cable hard wired.

2) The reproducible operating point accuracy relates to axial actuation, after run-in of approx. 2,000 operating cycles.

### Ordering table

2 NC + 1 NO	Connecting cable 2 m	<b>094339</b> EGT4-2000
	Connecting cable 5 m	<b>092026</b> EGT4-5000
	Connecting cable 10 m	<b>093967</b> EGT4-10000

## Precision single hole fixing limit switches

- ▶ With slow-action switching element
- ▶ Plunger and housing made of high-quality stainless steel
- ▶ Any installation position
- ▶ Threaded section M12 x 1

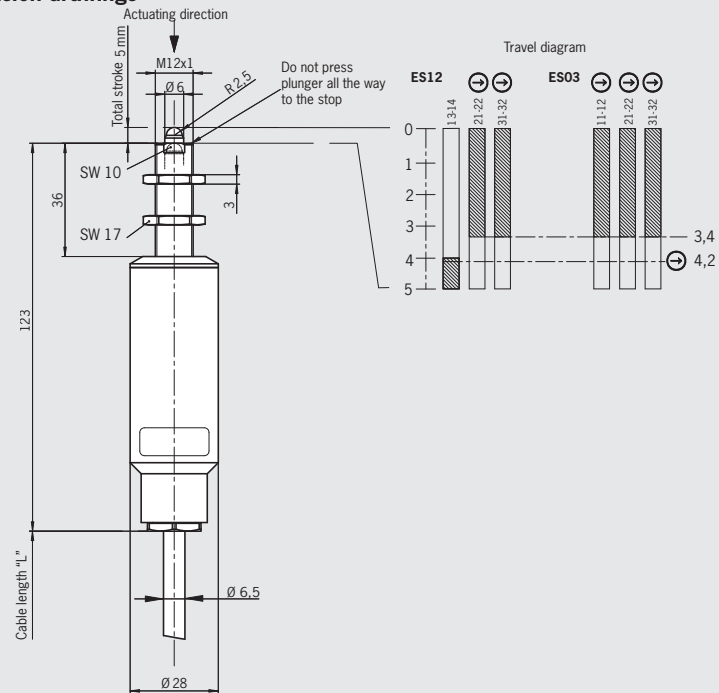


Switching element, with three switching contacts



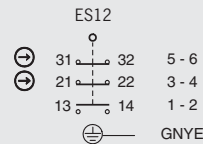
**Design EGZ12, M12 x 1, dome plunger**  
Connecting cable with PE connection

### Dimension drawings



**!** Single hole fixing limit switches must not be used as an end stop.

### Wiring diagrams



### Technical data

Housing material	Stainless steel
Plunger material	Stainless steel 60 HRC hardened and polish-ground
Degree of protection acc. to IEC 60529	IP 67
Ambient temperature [°C]	-20 <sup>1)</sup> ... +80
Approach speed, max. [m/min]	8
Mechanical life	3 x 10 <sup>6</sup> operating cycles
Actuating force at 20 °C [N]	< 16
Switching element	Slow-action switching contact
Switching contact	See travel diagram
Contact material	Silver alloy, gold flashed
Rated insulation voltage U <sub>i</sub> [V]	250
Rated impulse withstand voltage U <sub>imp</sub>	2.5
Utilization category acc. to IEC 60947-5-1	AC-15 U <sub>e</sub> 230 V I <sub>e</sub> 4 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 4 A
Switching current, min., at 24 V [mA]	1
Switching voltage, min. [V DC]	12
Short circuit protection (control circuit fuse) [A gG]	4
Connection	PUR cable 7 x 0.5 mm <sup>2</sup>

1) Cable hard wired.

### Ordering table

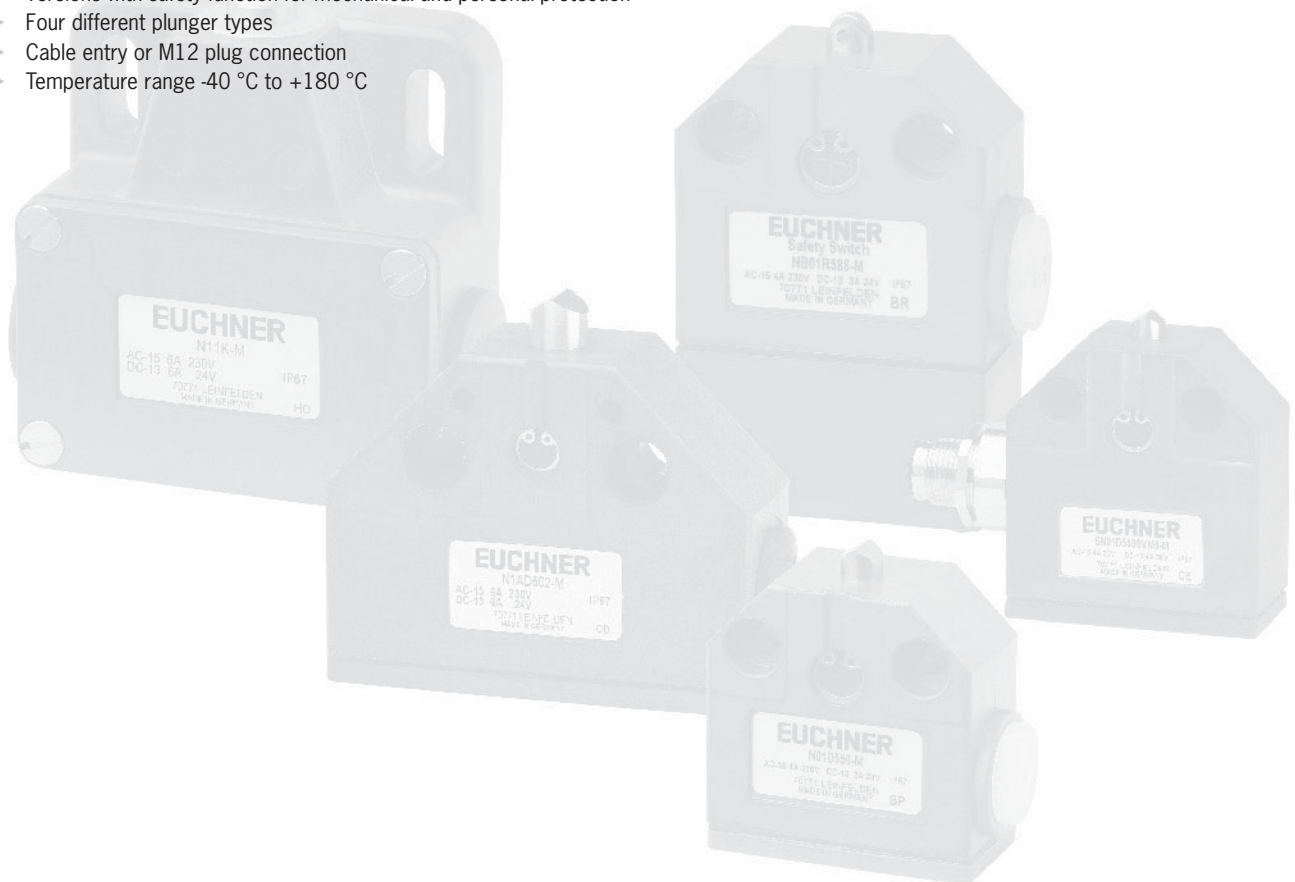
Connecting cable	ES12
Connecting cable 5 m	<b>094823</b> EGZ12-12-5000

## Precision single limit switches

These switches are used in mechanical and systems engineering for controlling and positioning tasks. The robust housings made of die-cast anodized aluminum are characterized by their high level of mechanical endurance and corrosion resistance.

### Features

- ▶ Six basic types in die-cast aluminum housings
- ▶ From the miniature version 40 x 40 mm to the standard size according to DIN 43693
- ▶ Mechanical life up to 30 million operating cycles
- ▶ Versions with safety function for mechanical and personal protection
- ▶ Four different plunger types
- ▶ Cable entry or M12 plug connection
- ▶ Temperature range -40 °C to +180 °C



## Precision single limit switches

► Plunger material stainless steel



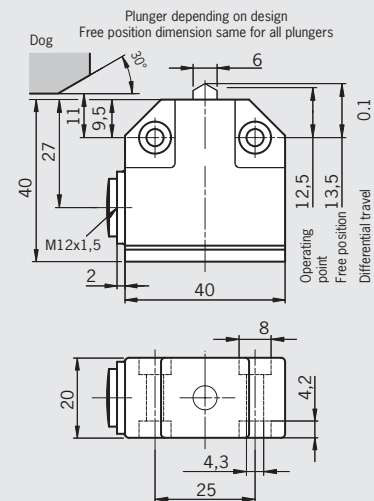
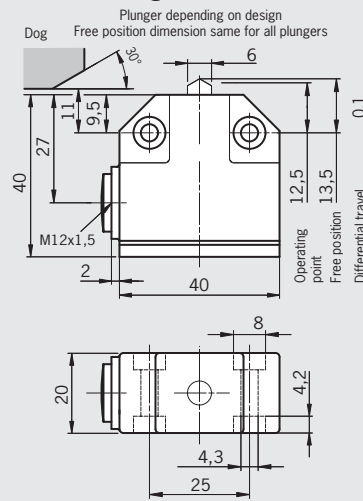
For temperatures up to 180 °C



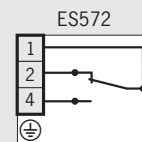
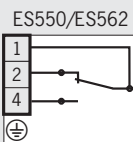
**Design N01**  
Cable entry M12 x 1.5

**Design N01**  
Cable entry M12 x 1.5

### Dimension drawings



### Wiring diagrams



### Technical data

	Die-cast aluminum, anodized			Die-cast aluminum, anodized		
Housing material	Die-cast aluminum, anodized			Die-cast aluminum, anodized		
Degree of protection acc. to IEC 60529	IP 67			IP 67		
Ambient temperature [°C]	-5 ... +80			-5 ... +180		
Plunger type	Chisel	Roller	Ball	Chisel	Roller	Ball
Operating point accuracy <sup>1)</sup> [mm]	± 0.02	± 0.05	± 0.03	± 0.02	± 0.05	± 0.03
Approach speed, max. <sup>2)</sup> [m/min]	20	50	8	20	50	8
Approach speed, min. [m/min]	0.01			0.01		
Actuating force, max. [N]	15			15		
Switching element	<b>ES550</b>		<b>ES562</b>	<b>ES572</b>		
Switching contact	1 changeover contact			1 changeover contact		
Switching principle	Snap-action switching contact			Snap-action switching contact		
Mechanical life	1 x 10 <sup>7</sup> operating cycles			5 x 10 <sup>5</sup> operating cycles at -5 ... +125 °C, 200 h at +180 °C		
Rated impulse withstand voltage U <sub>imp</sub> [kV]	2.5			2.5		
Rated insulation voltage U <sub>i</sub> [V]	250			250		
Utilization category acc. to IEC 60947-5-1	AC-15 U <sub>e</sub> 230 V I <sub>e</sub> 2 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 2 A		DC-13 U <sub>e</sub> 30 V I <sub>e</sub> 100 mA	AC-15 U <sub>e</sub> 230 V I <sub>e</sub> 4 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 1 A		
Contact material	Silver, gold-plated		Gold alloy	Fine silver		
Switching current, min., at switching voltage [mA]	10		5	10		
[V DC]	24		5	12		
Short circuit protection (control circuit fuse) [A gG]	6		0.125	5		
Connection	Soldered connection, 1.0 mm <sup>2</sup> max.			Soldered connection, 1.0 mm <sup>2</sup> max.		

1) The reproducible operating point accuracy relates to axial actuation, after run-in of approx. 2,000 operating cycles.

2) The approach speed applies to a trip dog approach angle of 30°, 100 mm long, hardened and ground.

3) Mating connector see page A-44 to A-46.

### Ordering table

Plunger type	ES550	ES562	ES572
Chisel plunger  120°	<b>084902</b> <sup>4)</sup> N01D550-M	<b>087151</b> N01D562-M	<b>087162</b> N01D572-M
Roller plunger  R = 2.5 mm	<b>084903</b> <sup>4)</sup> N01R550-M	<b>085243</b> N01R562-M	<b>087163</b> N01R572-M
Ball plunger	<b>084904</b> <sup>4)</sup> N01K550-M	<b>087152</b> N01K562-M	<b>087164</b> N01K572-M

4) CCC approval only for switching element ES550

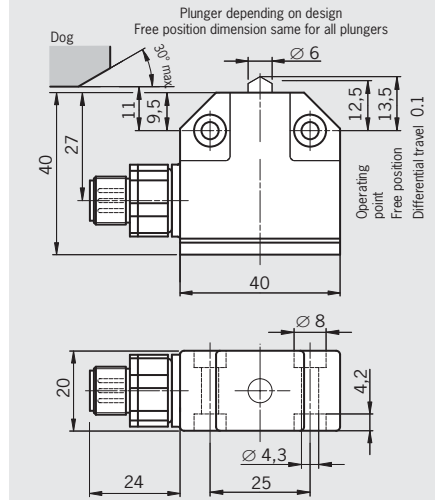
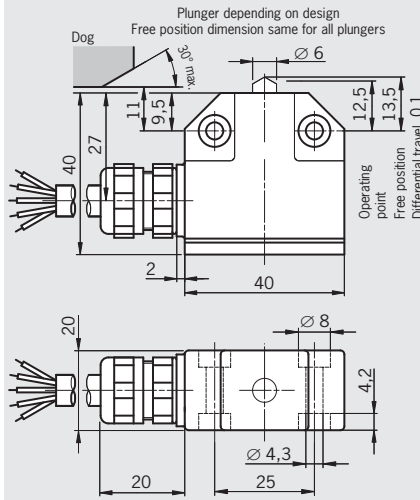
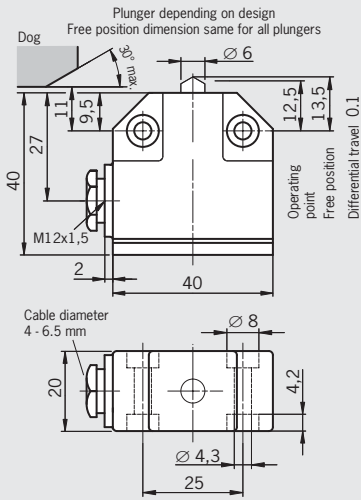


**Design N01**  
Cable gland M12 x 1.5

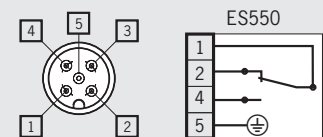
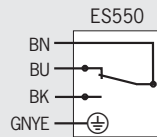
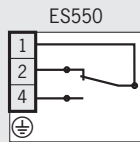
**Design N01**  
Connecting cable, length 5 m

**Design N01**  
M12 plug adjustable, 4-pin + PE

### Dimension drawings



### Wiring diagrams



Die-cast aluminum, anodized			Die-cast aluminum, anodized			Die-cast aluminum, anodized		
IP 67			IP 67			IP 67		
-5 ... +80			-5 ... +80			-5 ... +80		
Chisel	Roller	Ball	Chisel	Roller	Ball	Chisel	Roller	Ball
± 0.02	± 0.05	± 0.03	± 0.02	± 0.05	± 0.03	± 0.02	± 0.05	± 0.03
20	50	8	20	50	8	20	50	8
0.01			0.01			0.01		
15			15			15		
<b>ES550</b>			<b>ES550</b>			<b>ES550</b>		<b>ES562</b>
1 changeover contact			1 changeover contact			1 changeover contact		
Snap-action switching contact			Snap-action switching contact			Snap-action switching contact		
1 x 10 <sup>7</sup> operating cycles			1 x 10 <sup>7</sup> operating cycles			1 x 10 <sup>7</sup> operating cycles		
2.5			2.5			1.5		
250			250			50		50
AC-15 U <sub>e</sub> 230 V I <sub>e</sub> 2 A			AC-15 U <sub>e</sub> 230 V I <sub>e</sub> 2 A			AC-15 U <sub>e</sub> 30 V I <sub>e</sub> 2 A		DC-13 U <sub>e</sub> 30 V I <sub>e</sub>
DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 2 A			DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 2 A			DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 3 A		100 mA
Silver, gold-plated			Silver, gold-plated			Silver, gold-plated		Gold alloy
10			10			10		5
24			24			24		5
6			6			4		0.125
Soldered connection, 1.0 mm <sup>2</sup> max.			PUR cable 4 x 0.5 mm <sup>2</sup>			Plug connector M12 <sup>3)</sup>		

<b>ES550</b>	<b>ES550</b>	<b>ES550</b>	<b>ES562</b>
<b>085708</b> <sup>4)</sup> N01D550-MC2018	<b>088978</b> N01D550X5000-M	<b>088623</b> N01D550SVM5-M	-
<b>094856</b> <sup>4)</sup> N01R550-MC2018	<b>088982</b> N01R550X5000-M	<b>088622</b> N01R550SVM5-M	<b>093426</b> N01R562SVM5-M
<b>089619</b> <sup>4)</sup> N01K550-MC2018	<b>088986</b> N01K550X5000-M	<b>088624</b> N01K550SVM5-M	-

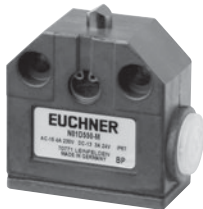
## Precision single limit switches

For temperatures up to 125 °C

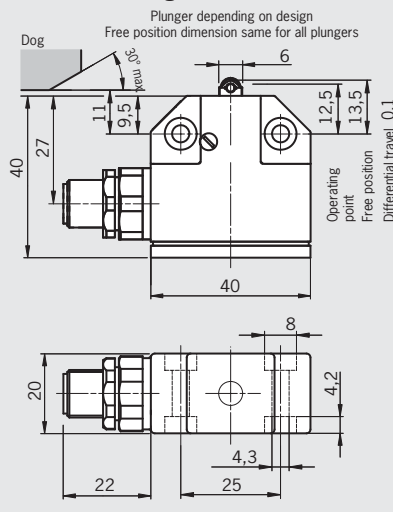


► Plunger material stainless steel

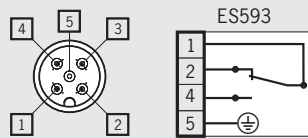
**Design N01**  
M12 plug adjustable, 4-pin + PE



### Dimension drawings



### Wiring diagrams



### Technical data

Housing material	Die-cast aluminum, anodized	
Degree of protection acc. to IEC 60529	IP 65	
Ambient temperature	[°C]	-5 ... +125
Plunger type		Roller
Operating point accuracy <sup>1)</sup>	[mm]	± 0.05
Approach speed, max. <sup>2)</sup>	[m/min]	50
Approach speed, min.	[m/min]	0.01
Actuating force, max.	[N]	15
Switching element	<b>ES593</b>	
Switching contact	1 changeover contact	
Switching principle	Snap-action switching contact	
Mechanical life	5 x 10 <sup>5</sup> operating cycles at -5 ... +125 °C, 30,000 h at +100 °C / 8,000 h at +125 °C	
Rated impulse withstand voltage U <sub>imp</sub>	[kV]	1.5
Rated insulation voltage U <sub>i</sub>	[V]	50
Utilization category acc. to IEC 60947-5-1	DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 1 A	
Contact material	Silver, gold-plated	
Switching current, min., at switching voltage	[mA]	10
	[V DC]	24
Short circuit protection (control circuit fuse)	[A gG]	2
Connection	Plug connector M12 <sup>3)</sup>	

- 1) The reproducible operating point accuracy relates to axial actuation, after run-in of approx. 2,000 operating cycles.  
 2) The approach speed applies to a trip dog approach angle of 30°, 100 mm long, hardened and ground.  
 3) The following mating connectors can be used: 136960, 136961, 136962, 136963 (see page A-45 and A-46).

### Ordering table

Plunger type		ES550
Chisel plunger		-
Roller plunger	R = 2.5 mm	<b>128070</b> N01R593-MC2445
Ball plunger		-





## Precision single limit switches

► Plunger material stainless steel

For plug connector with LED display



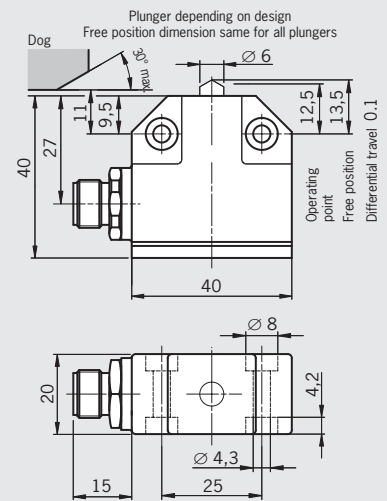
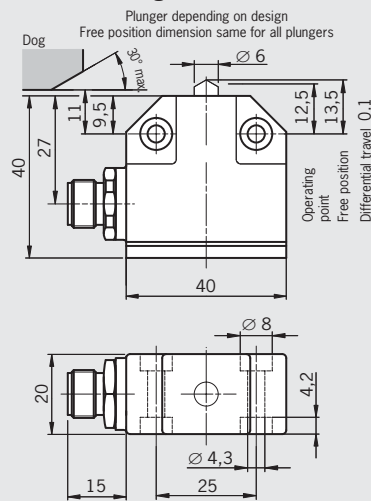
For operating voltage 230 V



**Design N01**  
M12 plug, 4-pin

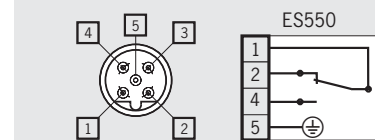
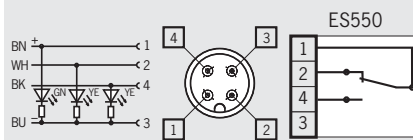
**Design N01**  
M12 plug, 4-pin + PE

### Dimension drawings



⚠ To achieve the positively driven travel, the dimension (11.0.5) must be maintained by the trip dog. Actuating elements such as cam approach guides must be positively mounted in accordance with EN ISO 14119, i.e. riveted, welded or otherwise secured against becoming loose.

### Wiring diagrams



### Technical data

	Die-cast aluminum, anodized	Die-cast aluminum, anodized
Housing material	IP 67	IP 67
Degree of protection acc. to IEC 60529	Mating connector inserted and screwed tight	Mating connector inserted and screwed tight
Ambient temperature [°C]	-5 ... +80	-5 ... +80
Plunger type	Chisel      Roller      Ball	Chisel      Roller      Ball
Operating point accuracy <sup>1)</sup> [mm]	± 0.02      ± 0.05      ± 0.03	± 0.02      ± 0.05      ± 0.03
Approach speed, max. <sup>2)</sup> [m/min]	20      50      8	20      50      8
Approach speed, min. [m/min]	0.01	0.01
Actuating force, max. [N]	15	15
Switching element	<b>ES550</b>	<b>ES550</b>
Switching contact	1 changeover contact	1 changeover contact
Switching principle	Snap-action switching contact	Snap-action switching contact
Mechanical life	1 x 10 <sup>7</sup> operating cycles	1 x 10 <sup>7</sup> operating cycles
Rated impulse withstand voltage U <sub>imp</sub> [kV]	2.0	1.5
Rated insulation voltage U <sub>i</sub> [V]	50	250
Utilization category acc. to IEC 60947-5-1	DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 2 A	AC-15 U <sub>e</sub> 230 V I <sub>e</sub> 2 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 2 A
Contact material	Silver, gold-plated	Silver, gold-plated
Switching current, min., at switching voltage [mA]	10	10
[V DC]	24	24
Short circuit protection (control circuit fuse) [A gG]	4	4
Connection	Plug connector M12 <sup>3)</sup>	Plug connector M12, B-coded <sup>3)</sup>

1) The reproducible operating point accuracy relates to axial actuation, after run-in of approx. 2,000 operating cycles.

2) The approach speed applies to a trip dog approach angle of 30°, 100 mm long, hardened and ground.

3) Mating connector see page A-44 to A-46.

4) 30 V AC Class 2 / 24 V DC Class 2

### Ordering table

Plunger type	ES550	ES550
Chisel plunger	<b>091003</b> N01D550-MC1526	-
Roller plunger  R = 2.5 mm	<b>091001</b> N01R550-MC1526	<b>091257</b> N01R550SEM5-M
Ball plunger	<b>091002</b> N01K550-MC1526	<b>091258</b> N01K550SEM5-M

With safety function



Larger connection space, robust screw terminal

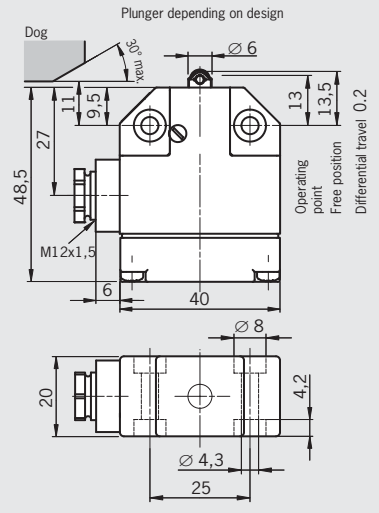
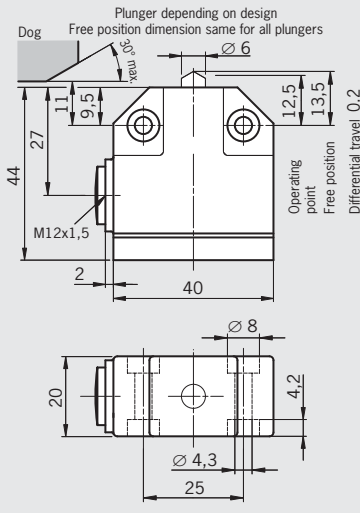
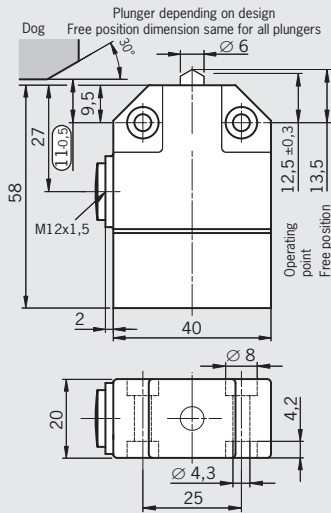


**Design NB01**  
Cable entry M12 x 1.5

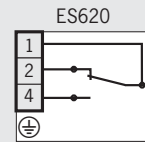
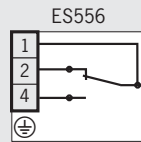
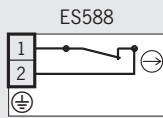
**Design NB01**  
Cable entry M12 x 1.5

**Design NB01**  
Cable gland M12 x 1.5

### Dimension drawings



### Wiring diagrams



Die-cast aluminum, anodized		Die-cast aluminum, anodized			Die-cast aluminum, anodized	
IP 67		IP 67			IP 67	
-25 ... +60		-5 ... +80			-5 ... +80	
Chisel ± 0.02	Roller ± 0.05	Chisel ± 0.02	Roller ± 0.05	Ball ± 0.03	Roller ± 0.05	
20	50	20	50	8	50	
0.01		0.01			0.01	
15		15			15	
<b>ES588</b>		<b>ES556</b>			<b>ES620</b>	
1 NC ⊕		1 changeover contact			1 changeover contact	
Slow-action switching contact		Snap-action switching contact			Snap-action switching contact	
1 x 10 <sup>7</sup> operating cycles		1 x 10 <sup>7</sup> operating cycles			1 x 10 <sup>7</sup> operating cycles	
2.5		2.5			2.5	
250		250			250	
AC-15 U <sub>e</sub> 230 V I <sub>e</sub> 4 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 3 A		AC-15 U <sub>e</sub> 230 V I <sub>e</sub> 2 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 2 A			AC-15 U <sub>e</sub> 230 V I <sub>e</sub> 2 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 2 A	
Fine silver		Silver, gold-plated			Silver, gold-plated	
1		10			10	
5		24			24	
10		6			6	
Screw terminal, 1.0 mm <sup>2</sup> max.		1.3 mm hexagon socket screw terminal/screw terminal, 1.0 mm <sup>2</sup> max.			Screw terminal, 1.0 mm <sup>2</sup> max.	

ES588	ES556	ES620
<b>088584</b> NB01D588-M	<b>085245</b> NB01D556-M	-
<b>088583</b> NB01R588-M	<b>085246</b> NB01R556-M	<b>102883</b> NB01R620-MC2276
-	<b>085247</b> NB01K556-M	-

## Precision single limit switches

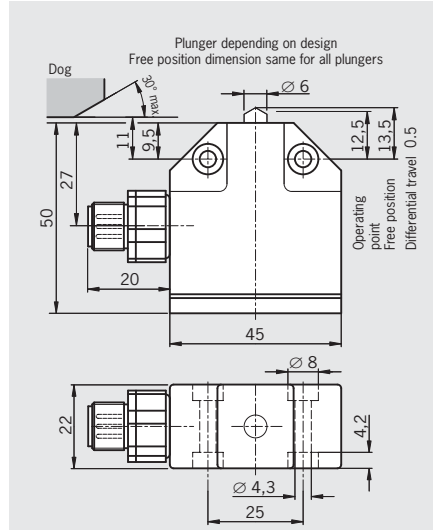
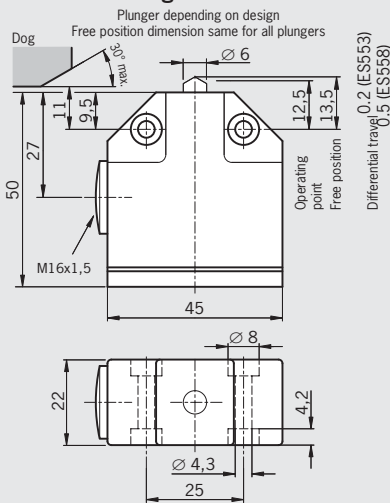
► Plunger material stainless steel



**Design SN01**  
Cable entry M16 x 1.5

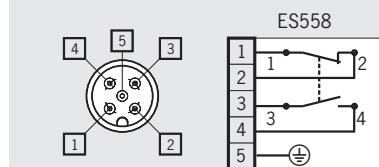
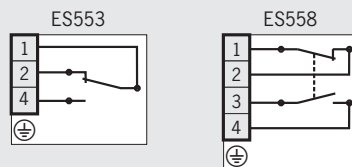
**Design SN01**  
M12 plug adjustable, 4-pin + PE

### Dimension drawings



⚠ To achieve the positively driven travel, the dimension (12.5) must be maintained by the trip dog. Actuating elements such as cam approach guides must be positively mounted in accordance with EN ISO 14119, i.e. riveted, welded or otherwise secured against becoming loose.

### Wiring diagrams



### Technical data

Housing material	Die-cast aluminum, anodized			Die-cast aluminum, anodized		
Degree of protection acc. to IEC 60529	IP 67			IP 67 Mating connector inserted and screwed tight		
Ambient temperature [°C]	-5 ... +80			-5 ... +80		
Plunger type	Chisel	Roller	Ball	Chisel	Roller	Ball
Operating point accuracy <sup>1)</sup> [mm]	± 0.02	± 0.05	± 0.03	± 0.02	± 0.05	± 0.03
Approach speed, max. <sup>2)</sup> [m/min]	20	50	8	20	50	8
Approach speed, min. [m/min]	0.01			0.01		
Actuating force, max. [N]	15			15		
Switching element	<b>ES553</b>		<b>ES558</b>	<b>ES558</b>		
Switching contact	1 changeover contact		1 NO + 1 NC	1 NO + 1 NC		
Switching principle	Snap-action switching contact			Snap-action switching contact		
Mechanical life	1 x 10 <sup>7</sup> operating cycles			1 x 10 <sup>7</sup> operating cycles		
Rated impulse withstand voltage U <sub>imp</sub> [kV]	2.5			1.5		
Rated insulation voltage U <sub>i</sub> [V]	250			30		
Utilization category acc. to IEC 60947-5-1	AC-15 U <sub>e</sub> 230 V I <sub>e</sub> 2 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 2 A	AC-15 U <sub>e</sub> 230 V I <sub>e</sub> 4 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 3 A		AC-15 U <sub>e</sub> 36 V I <sub>e</sub> 4 A DC-13 U <sub>e</sub> 24 V I <sub>e</sub> 3 A		
Contact material	Silver, gold-plated		Silver	Silver		
Switching current, min., at switching voltage [mA]	10		10	10		
[V DC]	24		5	5		
Short circuit protection (control circuit fuse) [A gG]	6		4	4		
Connection	Screw terminal, 1.0 mm <sup>2</sup> max.		Soldered connection, 1.0 mm <sup>2</sup> max.	Plug connector M12 <sup>3)</sup>		

1) The reproducible operating point accuracy relates to axial actuation, after run-in of approx. 2,000 operating cycles.  
2) The approach speed applies to a trip dog approach angle of 30°, 100 mm long, hardened and ground.  
3) Mating connector see page A-44 to A-46.

### Ordering table

Plunger type	ES553	ES558	ES558
Chisel plunger	<b>085252</b> <sup>4)</sup> SN01D553-M	<b>085260</b> SN01D558-M	<b>088625</b> SN01D558SVM5-M
Roller plunger  R = 2.5 mm	<b>085253</b> <sup>4)</sup> SN01R553-M	<b>085261</b> SN01R558-M	<b>088626</b> SN01R558SVM5-M
Ball plunger	<b>085254</b> <sup>4)</sup> SN01K553-M	<b>085262</b> SN01K558-M	<b>088627</b> SN01K558SVM5-M

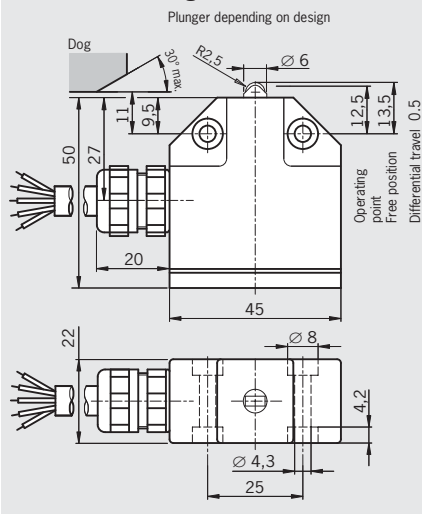
4) CCC approval only for switching element ES553



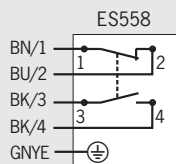
## Design SN01

Connecting cable, length 2 m

### Dimension drawings



### Wiring diagrams



Die-cast aluminum, anodized

IP 67

-5 ... +80

Roller

± 0.05

50

0.01

15

**ES558**

1 NO + 1 NC

Snap-action switching contact

1 x 10<sup>7</sup> operating cycles

2.5

250

AC-15 U<sub>0</sub> 230 V I<sub>0</sub> 4 A

DC-13 U<sub>0</sub> 24 V I<sub>0</sub> 3 A

Silver

10

5

4

PUR cable 5 x 0.5 mm<sup>2</sup>

**ES558**

-

**090515**

SN01R558X2000-M

-

## Precision single limit switches

- ▶ Plunger material stainless steel
- ▶ Housing according to DIN 43693
- ▶ Low temperature down to -40 °C

With safety switching element



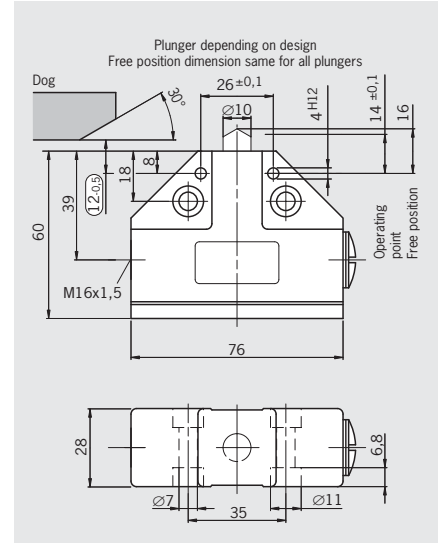
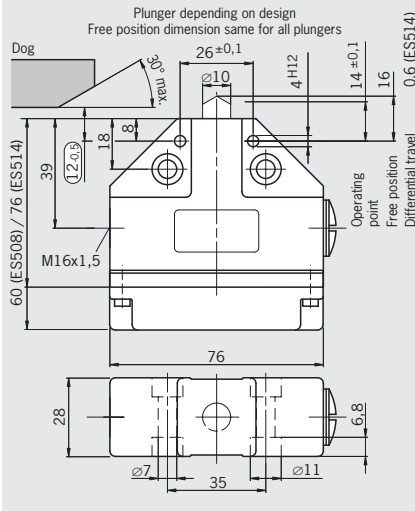
With safety switching element, silicone diaphragm (interior) and low-temperature grease



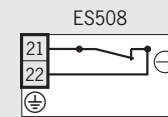
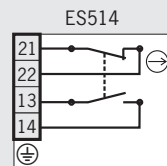
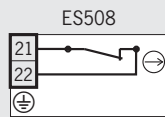
**Design N1A**  
Cable entry M16 x 1.5

**Design N1A**  
Cable entry M16 x 1.5

### Dimension drawings



### Wiring diagrams



### Technical data

Housing material	Die-cast aluminum, anodized			Die-cast aluminum, anodized		
Degree of protection acc. to IEC 60529	IP 67			IP 67		
Ambient temperature [°C]	-25 ... +80			-40 ... +80		
Plunger type	Chisel	Roller	Dome	Chisel	Roller 3)	Dome
Operating point accuracy <sup>1)</sup> [mm]	± 0.002	± 0.01	± 0.002	± 0.002	± 0.01	± 0.002
Approach speed, max. <sup>2)</sup> [m/min]	40	80	10	40	80	10
Approach speed, min. [m/min]	0.01			0.01		
Actuating force, max. [N]	≥ 15		≥ 30	≥ 15		
Switching element	<b>ES508</b> <sup>4)</sup>		<b>ES514</b>	<b>ES508</b> <sup>4)</sup>		
Switching contact	1 NC ⊖		1 NO + 1 NC ⊖	1 NC ⊖		
Switching principle	Slow-action switching contact		Snap-action switching contact	Slow-action switching contact		
Mechanical life	30 x 10 <sup>6</sup> operating cycles		1 x 10 <sup>6</sup> operating cycles	1 x 10 <sup>6</sup> operating cycles		
Rated impulse withstand voltage U <sub>imp</sub> [kV]	4			4		
Rated insulation voltage U <sub>i</sub> [V]	250			250		
Utilization category acc. to IEC 60947-5-1	AC-15 U <sub>e</sub> 230V I <sub>e</sub> 6A DC-13 U <sub>e</sub> 24V I <sub>e</sub> 6A		AC-15 U <sub>e</sub> 230V I <sub>e</sub> 2.5A DC-13 U <sub>e</sub> 24V I <sub>e</sub> 6A	AC-15 U <sub>e</sub> 230V I <sub>e</sub> 6A DC-13 U <sub>e</sub> 24V I <sub>e</sub> 6A		
Contact material	Silver, gold-plated			Silver, gold-plated		
Switching current, min., at switching voltage [mA]	10		5	10		
[V DC]	24		24	24		
Short circuit protection (control circuit fuse) [A gG]	10		6	10		
Connection	Screw terminal 0.34 ... 1.5 mm <sup>2</sup>			Screw terminal 0.34 ... 1.5 mm <sup>2</sup>		

1) The reproducible operating point accuracy relates to axial actuation, after run-in of approx. 2,000 operating cycles.

2) The approach speed applies to a trip dog approach angle of 30°, 100 mm long, hardened and ground.

3) Version with bearing for high speeds and long travel distances on request.

### Ordering table

Plunger type	ES508	ES514	ES508
Chisel plunger	<b>083886</b> N1AD508-M	<b>083849</b> N1AD514-M	<b>103237</b> N1AD508-MC2222
Roller plunger  R = 4.0 mm	<b>083887</b> N1AR508-M	<b>078487</b> N1AR514-M	<b>103221</b> N1AR508-MC2222
Ball plunger	-	-	-
Dome plunger	<b>087205</b> N1AW508-M	<b>083850</b> N1AW514-M	<b>103222</b> N1AW508-MC2222

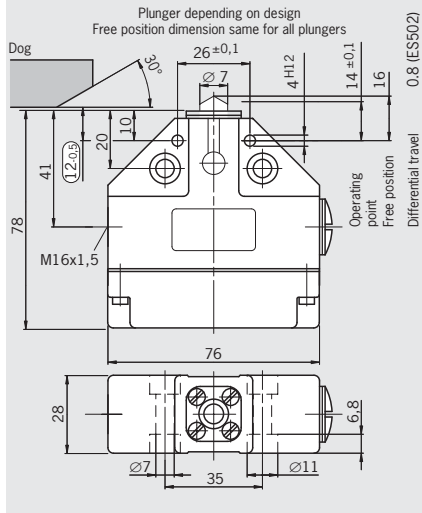
With safety switching element, silicone diaphragm (internal and external) and low-temperature grease



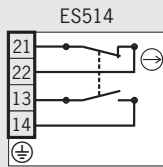
### Design N1A

Cable entry M16 x 1.5

#### Dimension drawings

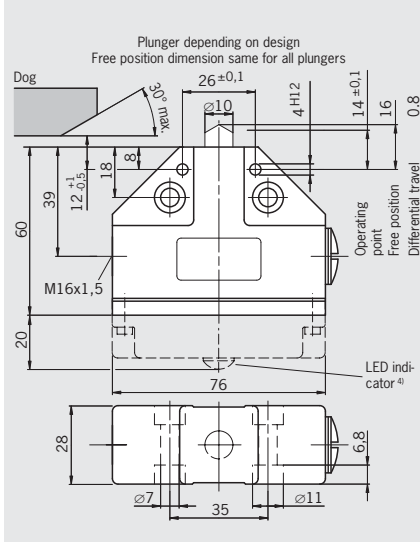


#### Wiring diagrams

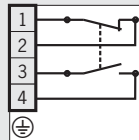


### Design N1A

Cable entry M16 x 1.5



#### ES502E

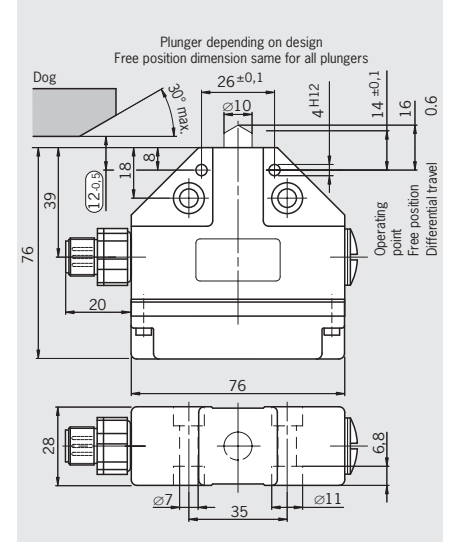


With safety switching element

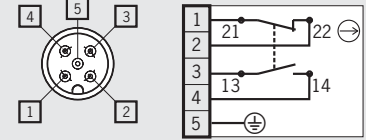


### Design N1A

M12 plug adjustable, 4-pin + PE



#### ES514



Die-cast aluminum, anodized		Die-cast aluminum, anodized			Die-cast aluminum, anodized		
IP 67		IP 67			IP 67		
-30 ... +80		-5 ... +80			Mating connector inserted and screwed tight		
Chisel	Roller	Chisel	Roller 3)	Ball	Chisel	Roller	Dome
± 0.002	± 0.01	± 0.002	± 0.01	± 0.01	± 0.002	± 0.01	± 0.002
40	80	40	80	10	40	80	10
0.01		0.01			0.01		
≥ 30		≥ 20			≥ 30		
ES514		ES502E <sup>4)</sup>			ES514		
1 NO + 1 NC ⊕		1 NO + 1 NC			1 NO + 1 NC ⊕		
Snap-action switching contact		Snap-action switching contact			Snap-action switching contact		
1 x 10 <sup>6</sup> operating cycles		30 x 10 <sup>6</sup> operating cycles			1 x 10 <sup>6</sup> operating cycles		
2.5		2.5			1.5		
250		250			30		
AC-15 U <sub>e</sub> 230V I <sub>e</sub> 2.5A DC-13 U <sub>e</sub> 24V I <sub>e</sub> 6A		AC-12 U <sub>e</sub> 250V I <sub>e</sub> 8A / AC-15 U <sub>e</sub> 230V I <sub>e</sub> 6A DC-13 U <sub>e</sub> 24V I <sub>e</sub> 6A			AC-15 U <sub>e</sub> 36V I <sub>e</sub> 2.5A DC-13 U <sub>e</sub> 24V I <sub>e</sub> 4A		
Silver, gold-plated		Silver, gold-plated			Silver, gold-plated		
5		10			5		
24		24			24		
6		8			6		
Screw terminal 0.34 ... 1.5 mm <sup>2</sup>		Screw terminal 0.34 ... 1.5 mm <sup>2</sup>			Plug connector M12 <sup>5)</sup>		

4) Version with LED function display AC/DC 10-60 V or AC 110/230 V on request.

5) Mating connector see page A-44 to A-46.

ES514	ES502E	ES514
<b>110462</b> N1AD514AM-MC2222	<b>079265</b> N1AD502-M	<b>087603</b> N1AD514SVM5-M
<b>103247</b> N1AR514AM-MC2222	<b>078485</b> N1AR502-M	<b>087604</b> N1AR514SVM5-M
-	<b>083847</b> N1AK502-M	-
-	-	<b>090743</b> N1AW514SVM5-M

## Precision single limit switches

- ▶ Plunger material stainless steel
- ▶ Housing according to DIN 43693



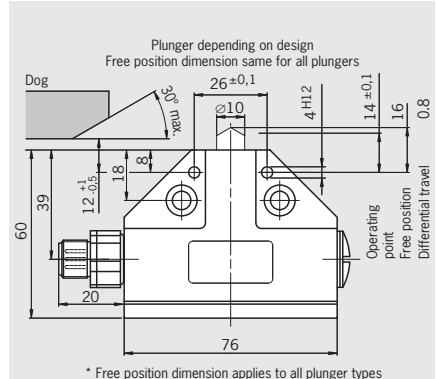
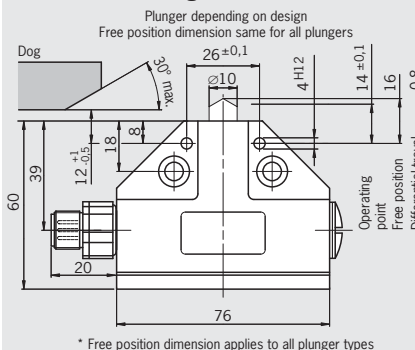
For plug connectors with LED indicator



**Design N1A**  
M12 plug adjustable, 4-pin + PE

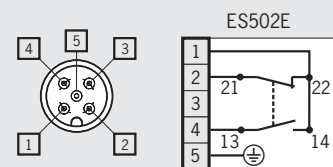
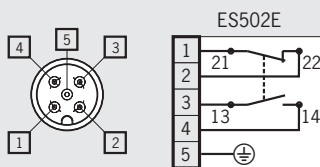
**Design N1A**  
M12 plug adjustable, 4-pin + PE

### Dimension drawings



⚠ To achieve the positively driven travel, the dimension (31-0.5) must be maintained by the trip dog. Actuating elements such as cam approach guides must be positively mounted in accordance with EN ISO 14119, i.e. riveted, welded or otherwise secured against becoming loose.

### Wiring diagrams



### Technical data

	Die-cast aluminum, anodized			Die-cast aluminum, anodized		
	IP 67 Mating connector inserted and screwed tight			IP 67 Mating connector inserted and screwed tight		
Housing material	Die-cast aluminum, anodized			Die-cast aluminum, anodized		
Degree of protection acc. to IEC 60529	IP 67 Mating connector inserted and screwed tight			IP 67 Mating connector inserted and screwed tight		
Ambient temperature [°C]	-5 ... +80			-5 ... +80		
Plunger type	Chisel	Roller	Ball	Chisel	Roller	Ball
Operating point accuracy <sup>1)</sup> [mm]	± 0.002	± 0.01	± 0.01	± 0.002	± 0.01	± 0.01
Approach speed, max. <sup>2)</sup> [m/min]	40	80	10	40	80	10
Approach speed, min. [m/min]	0.01			0.01		
Actuating force, max. [N]	≥ 20			≥ 20		
Switching element	<b>ES502E</b>			<b>ES502E</b>		
Switching contact	1 NO + 1 NC			1 NO + 1 NC		
Switching principle	Snap-action switching contact			Snap-action switching contact		
Mechanical life	30 x 10 <sup>6</sup> operating cycles			30 x 10 <sup>6</sup> operating cycles		
Rated impulse withstand voltage U <sub>imp</sub> [kV]	1.5			1.5		
Rated insulation voltage U <sub>i</sub> [V]	50			50		
Utilization category acc. to IEC 60947-5-1	AC-15 U <sub>e</sub> 30V I <sub>e</sub> 4A DC-13 U <sub>e</sub> 24V I <sub>e</sub> 4A			AC-15 U <sub>e</sub> 30V I <sub>e</sub> 4A DC-13 U <sub>e</sub> 24V I <sub>e</sub> 4A		
Contact material	Silver, gold-plated			Silver, gold-plated		
Switching current, min., at switching voltage [mA]	10			10		
[V DC]	24			24		
Short circuit protection (control circuit fuse) [A gG]	8			8		
Connection	Plug connector M12 <sup>4)</sup>			Plug connector M12 <sup>4)</sup>		

1) The reproducible operating point accuracy relates to axial actuation, after run-in of approx. 2,000 operating cycles.

2) The approach speed applies to a trip dog approach angle of 30°, 100 mm long, hardened and ground.

### Ordering table

Plunger type	ES502E	ES502E
Chisel plunger	<b>087487</b> N1AD502SVM5-M	<b>091471</b> N1AD502SVM5-MC1883
Roller plunger  R = 4.0 mm	<b>087488</b> N1AR502SVM5-M	-
Ball plunger	<b>087489</b> N1AK502SVM5-M	<b>087496</b> N1AK502SVM5-MC1883
Extended roller plunger	-	-

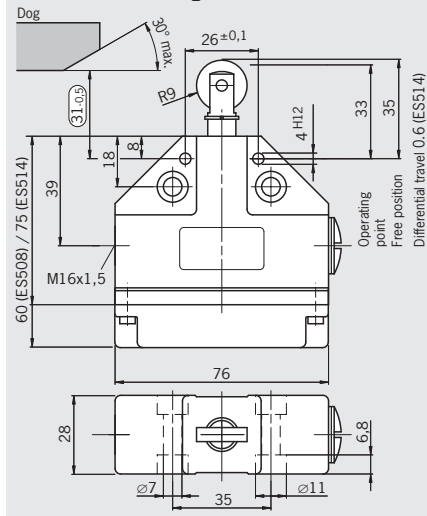


With safety switching element

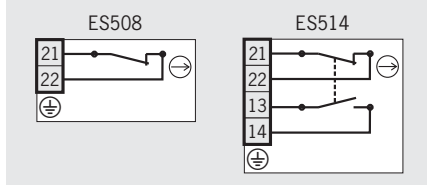


**Design N1A, extended roller plunger**  
Cable entry M16 x 1.5

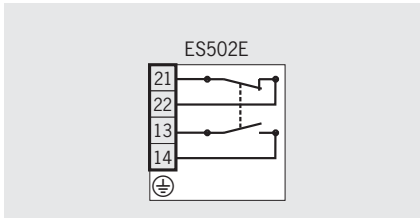
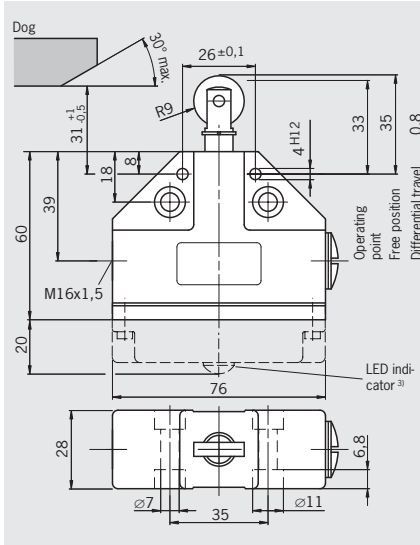
**Dimension drawings**



**Wiring diagrams**



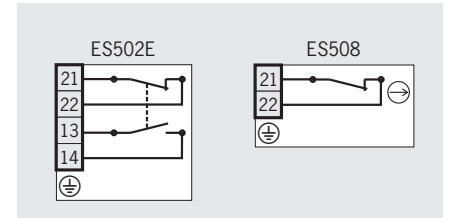
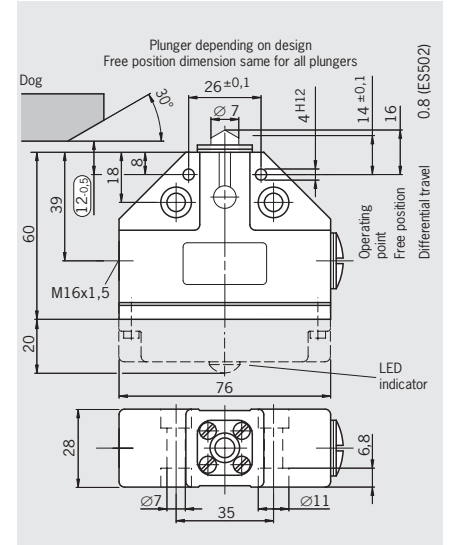
**Design N1A, extended roller plunger**  
Cable entry M16 x 1.5



With exterior diaphragm



**Design N1A**  
Cable entry M16 x 1.5



Die-cast aluminum, anodized		Die-cast aluminum, anodized		Die-cast aluminum, anodized		
IP 67		IP 67		IP 67		
-25 ... +80		-5 ... +80		-5 ... +80 (ES502E)		-25 ... +80 (ES508)
Extended roller		Extended roller		Chisel	Roller	Ball
0.1		0.1		± 0.002	± 0.01	± 0.01
20		20		40	80	10
0.01		0.01		0.01		
≥ 15	≥ 30	≥ 20		≥ 20		≥ 15
<b>ES508</b>	<b>ES514</b>	<b>ES502E<sup>3)</sup></b>		<b>ES502E</b>	<b>ES508</b>	
1 NC ⊖	1 NO + 1 NC ⊕	1 NO + 1 NC		1 NO + 1 NC		1 NC ⊕
Slow-action switching con. 30 x 10 <sup>6</sup> operating cycles	Snap-action switching con. 1 x 10 <sup>6</sup> operating cycles	Snap-action switching contact 30 x 10 <sup>6</sup> operating cycles		Snap-action switching con. 30 x 10 <sup>6</sup> operating cycles		Slow-action switching con.
4		2.5		2.5		4
250		250		250		
AC-15 U <sub>e</sub> 230V I <sub>e</sub> 6A DC-13 U <sub>e</sub> 24V I <sub>e</sub> 6A	AC-15 U <sub>e</sub> 230V I <sub>e</sub> 2.5A DC-13 U <sub>e</sub> 24V I <sub>e</sub> 6A	AC-12 U <sub>e</sub> 250V I <sub>e</sub> 8A AC-15 U <sub>e</sub> 230V I <sub>e</sub> 6A DC-13 U <sub>e</sub> 24V I <sub>e</sub> 6A		AC-12 U <sub>e</sub> 250V I <sub>e</sub> 8A AC-15 U <sub>e</sub> 230V I <sub>e</sub> 6A DC-13 U <sub>e</sub> 24V I <sub>e</sub> 6A		AC-15 U <sub>e</sub> 230V I <sub>e</sub> 6A DC-13 U <sub>e</sub> 24V I <sub>e</sub> 6A
Silver, gold-plated		Silver, gold-plated		Silver, gold-plated		
10	5	10		10		
24	24	24		24		
10	6	8		8		10
Screw terminal 0.34 ... 1.5 mm <sup>2</sup>		Screw terminal 0.34 ... 1.5 mm <sup>2</sup>		Screw terminal 0.34 ... 1.5 mm <sup>2</sup>		

4) Version with LED function display AC/DC 10-60 V or AC 110/230 V on request.  
5) Mating connector see page A-44 to A-46.

ES508	ES514	ES502E	ES502E	ES508
-	-	-	-	<b>090546</b> N1AD508AM-M
-	-	-	<b>090541</b> N1AR502AM-M	-
-	-	-	-	-
<b>087147</b> N1ARL508-M	<b>087204</b> N1ARL514-M	<b>083848</b> N1ARL502-M	-	-

## Precision single limit switches

► Plunger material stainless steel

EAC

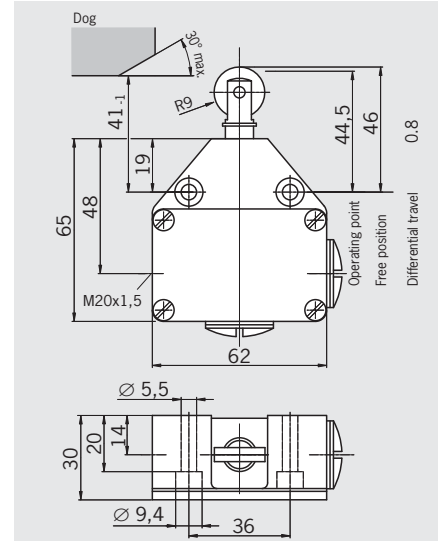
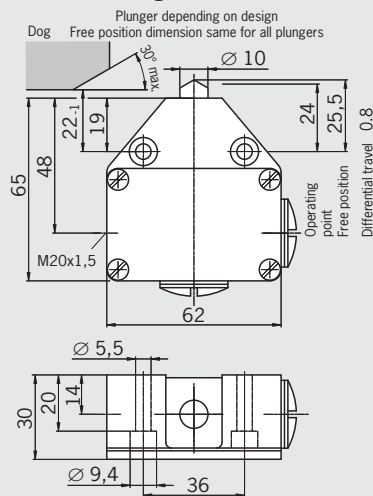
EAC



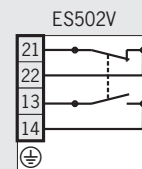
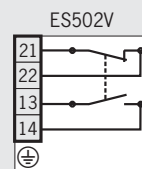
**Design N10**  
Cable entry M20 x 1.5

**Design N10, extended roller plunger**  
Cable entry M20 x 1.5

### Dimension drawings



### Wiring diagrams



### Technical data

Housing material	Die-cast aluminum, anodized			Die-cast aluminum, anodized
Degree of protection acc. to IEC 60529	IP 67			IP 67
Ambient temperature [°C]	-5 ... +80			-5 ... +80
Plunger type	Chisel	Roller	Ball	Extended roller
Operating point accuracy <sup>1)</sup> [mm]	± 0.002	± 0.01	± 0.01	± 0.1
Approach speed, max. <sup>2)</sup> [m/min]	40	80	10	20
Approach speed, min. [m/min]	0.01			0.01
Actuating force, max. [N]	≥ 20			≥ 20
Switching element	<b>ES502V</b>			<b>ES502V</b>
Switching contact	1 NO + 1 NC			1 NO + 1 NC
Switching principle	Snap-action switching contact			Snap-action switching contact
Mechanical life	30 x 10 <sup>6</sup> operating cycles			30 x 10 <sup>6</sup> operating cycles
Rated impulse withstand voltage U <sub>imp</sub> [kV]	2.5			2.5
Rated insulation voltage U <sub>i</sub> [V]	250			250
Utilization category acc. to IEC 60947-5-1	AC-12 U <sub>e</sub> 230V I <sub>e</sub> 16A/AC-15 U <sub>e</sub> 230V I <sub>e</sub> 10A DC-13 U <sub>e</sub> 24V I <sub>e</sub> 6A			AC-12 U <sub>e</sub> 230V I <sub>e</sub> 16A/AC-15 U <sub>e</sub> 230V I <sub>e</sub> 10A DC-13 U <sub>e</sub> 24V I <sub>e</sub> 6A
Contact material	Silver, gold-plated			Silver, gold-plated
Switching current, min., at switching voltage [mA]	20			20
[V DC]	24			24
Short circuit protection (control circuit fuse) [A gG]	16			16
Connection	Screw terminal, 1.5 mm <sup>2</sup> max.			Screw terminal, 1.5 mm <sup>2</sup> max.

1) The reproducible operating point accuracy relates to axial actuation, after run-in of approx. 2,000 operating cycles.  
2) The approach speed applies to a trip dog approach angle of 30°, 100 mm long, hardened and ground.

### Ordering table

Plunger type	ES502V	ES502V
Chisel plunger	<b>086293</b> N10D-M	-
Roller plunger  R = 4 mm	<b>086294</b> N10R-M	-
Ball plunger	<b>088589</b> N10K-M	-
Extended roller plunger	-	<b>088587</b> N10RL-M

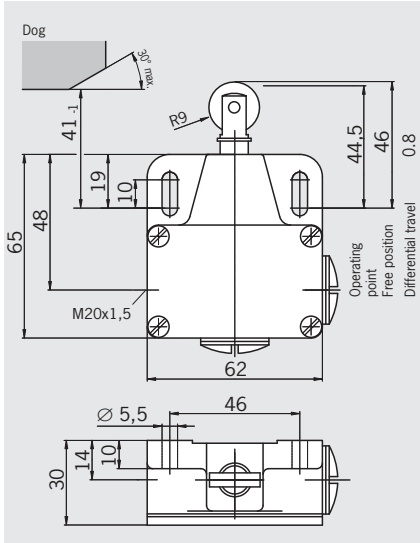
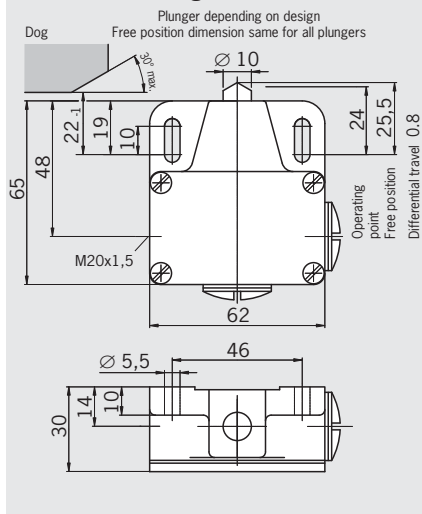
**EAC**

**EAC**

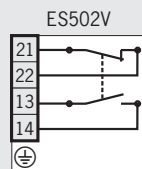
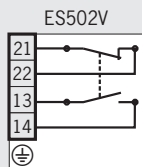
**Design N11**  
Cable entry M20 x 1.5

**Design N11, extended roller plunger**  
Cable entry M20 x 1.5

**Dimension drawings**



**Wiring diagrams**



Die-cast aluminum, anodized			Die-cast aluminum, anodized		
IP 67			IP 67		
-5 ... +80			-5 ... +80		
Chisel	Roller	Ball	Extended roller		
± 0.002	± 0.01	± 0.01	± 0.1		
40	80	10	20		
0.01			0.01		
≥ 20			≥ 20		
<b>ES502V</b>			<b>ES502V</b>		
1 NO + 1 NC			1 NO + 1 NC		
Snap-action switching contact			Snap-action switching contact		
30 x 10 <sup>6</sup> operating cycles			30 x 10 <sup>6</sup> operating cycles		
2.5			2.5		
250			250		
AC-12 U <sub>e</sub> 230V I <sub>e</sub> 16A/AC-15 U <sub>e</sub> 230V I <sub>e</sub> 10A			AC-12 U <sub>e</sub> 230V I <sub>e</sub> 16A/AC-15 U <sub>e</sub> 230V I <sub>e</sub> 10A		
DC-13 U <sub>e</sub> 24V I <sub>e</sub> 6A			DC-13 U <sub>e</sub> 24V I <sub>e</sub> 6A		
Silver, gold-plated			Silver, gold-plated		
20			20		
24			24		
16			16		
Screw terminal, 1.5 mm <sup>2</sup> max.			Screw terminal, 1.5 mm <sup>2</sup> max.		

ES502V	ES502V
<b>086298</b> N11D-M	-
<b>086313</b> N11R-M	-
<b>088585</b> N11K-M	-
-	<b>086299</b> N11RL-M

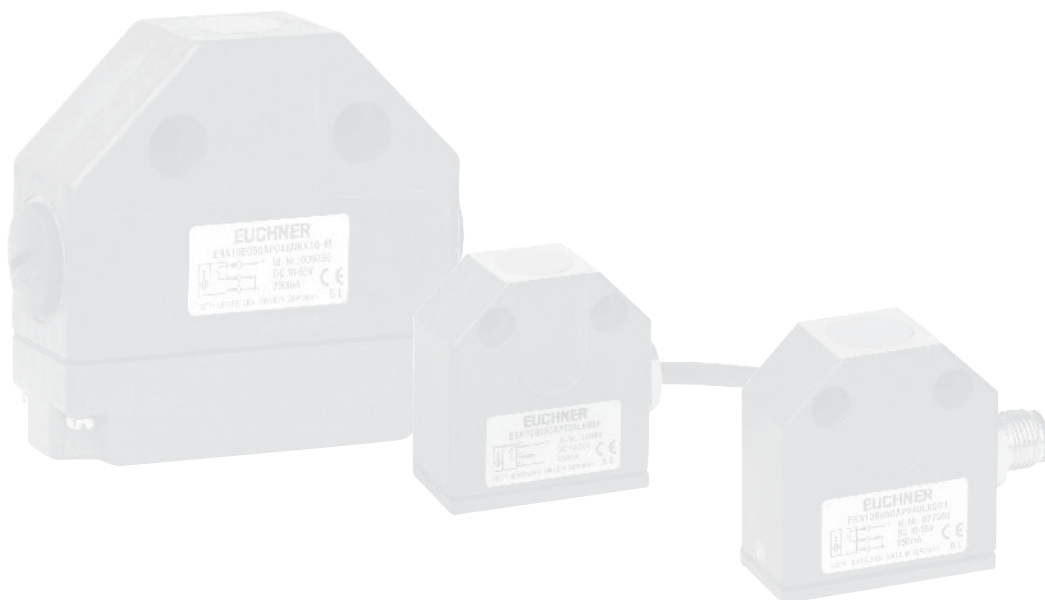


## Inductive single limit switches

Inductive single limit switches are non-contact in operation. They are used as an alternative to mechanical switches. The main advantage is their wear-free operating mode. They are noted for their insensitivity to corrosive ambient conditions and their virtually unlimited mechanical life.

### Features

- ▶ High approach speed and high switching frequency
- ▶ Resistant to strong vibrations and coarse contamination
- ▶ Resistant to most cutting oils and coolants
- ▶ Replacement for precision single limit switch of the same design



## Inductive single limit switch design ENA, DC version

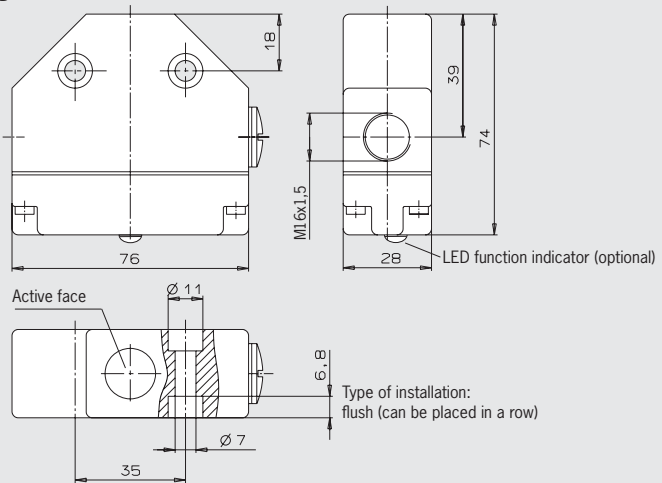


- ▶ Housing according to DIN 43693
- ▶ Rated operating distance 5 mm
- ▶ LED function display optional

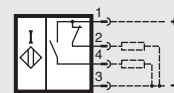


**Design ENA**  
Cable entry M16 x 1.5

### Dimension drawings



### Wiring diagrams



DC NO + NC contacts, PNP

### Technical data

Rated operating distance $S_n$	[mm]	5
Assured operating distance $S_a$	[mm]	0 ... 4
Switching function		NO + NC
Output		PNP or NPN (see ordering table)
LED function display		See ordering table
Operating voltage $U_B$	[V]	DC 10 ... 55
Voltage drop $U_d$	[V]	≤ 2.5
Rated insulation voltage $U_i$	[V]	DC 60
Rated operating current $I_e$	[mA]	≤ 250
Off-state current $I_r$	[mA]	≤ 0.001
No-load current $I_0$	[mA]	≤ 15
Short circuit and overload protection, pulsed		Yes
Reverse polarity protection		Yes
Wire break safety		Yes
EMC compliance as per		IEC 60947-5-2
Hysteresis H	[mm]	≤ 0.5
Repeat accuracy R	[%]	≤ 5
Switching frequency f	[Hz]	≤ 500
Utilization category acc. to IEC 60947-5-2		DC-13
Housing material		Die-cast aluminum, anodized
Material for the active face		PBT
Degree of protection acc. to IEC 60529		IP 67
Ambient temperature T	[°C]	- 25 ... + 70
Connection		Screw terminal
Conductor cross-section, max.	[mm <sup>2</sup> ]	2 x 1.5 (per contact)
Weight	[kg]	0.2

### Ordering table

LED function display		
with	Order no.	<b>ENA 086280</b>
	Item	ENA1.0B050UP048LKK10-M
without	Order no.	<b>ENA 086099</b>
	Item	ENA1.0B050UP048NKK10-M

## Inductive single limit switch design ESN, DC version



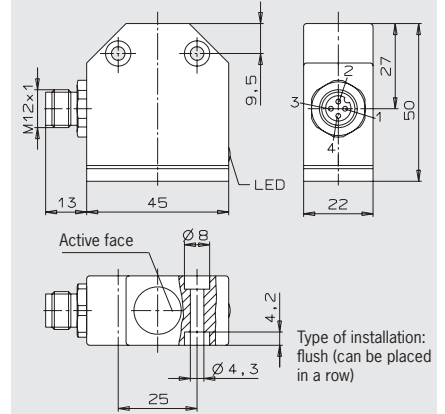
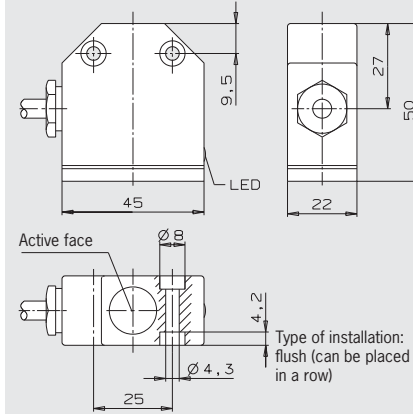
- ▶ Compact design with connecting cable or plug connector
- ▶ Rated operating distance 5 mm
- ▶ LED function display



**Design ESN**  
Connecting cable 5 m PUR

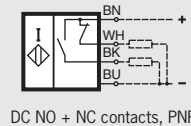
**Design ESN**  
Plug connector M12, 4-pin

### Dimension drawings

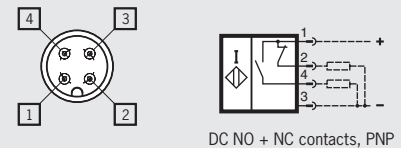


Plug connector see page A-44 to A-46

### Wiring diagrams



DC NO + NC contacts, PNP



DC NO + NC contacts, PNP

### Technical data

Rated operating distance $S_n$	[mm]	5	5
Assured operating distance $S_a$	[mm]	0 ... 4	0 ... 4
Switching function		NO + NC	NO + NC
Output		PNP	PNP
LED function display		Yes	Yes
Operating voltage $U_B$	[V]	DC 10 ... 55	DC 10 ... 55
Voltage drop $U_d$	[V]	$\leq 2.5$	$\leq 2.5$
Rated insulation voltage $U_i$	[V]	DC 60	DC 60
Rated operating current $I_e$	[mA]	$\leq 250$	$\leq 250$
Off-state current $I_f$	[mA]	$\leq 0.05$	$\leq 0.05$
No-load current $I_0$	[mA]	$\leq 15$	$\leq 15$
Short circuit and overload protection, pulsed		Yes	Yes
Reverse polarity protection		Yes	Yes
Wire break safety		Yes	Yes
EMC compliance as per		IEC 60947-5-2	IEC 60947-5-2
Hysteresis H	[mm]	$\leq 0.5$	$\leq 0.5$
Repeat accuracy R	[%]	$\leq 5$	$\leq 5$
Switching frequency f	[Hz]	$\leq 500$	$\leq 500$
Utilization category acc. to IEC 60947-5-2		DC-13	DC-13
Housing material		Die-cast aluminum, anodized	Die-cast aluminum, anodized
Material for the active face		PBT	PBT
Degree of protection acc. to IEC 60529		IP 67	IP 67
Ambient temperature T	[°C]	- 25 ... + 70	- 25 ... + 70
Connection		PUR cable 4 x 0.25	Plug connector M12 <sup>1)</sup>
Weight	[kg]	0.3	0.3

1) Degree of protection guaranteed only on the use of the plug connectors on page A-44 to A-46.

### Ordering table

Connection		Order no.	Item
PUR cable 5 m (4 x 0.25 mm <sup>2</sup> )	Order no.	<b>ESN 088771</b>	
	Item	ESN10B050UP048LK05P-M	
Plug connector S01 (M12, 4-pin)	Order no.	<b>ESN 088770</b>	
	Item	ESN10B050UP048LKS01-M	

Other cable lengths on request. Output NPN NO + NC on request.

## Round connector M12

- ▶ Straight design and elbow connector
- ▶ Screw connection
- ▶ Molded cable
- ▶ 4-pin and 5-pin

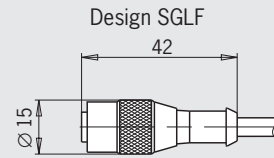
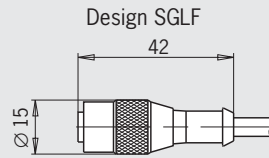
### Straight plug connector M12

4-pin / 4-pin + PE

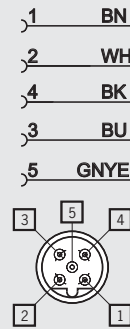
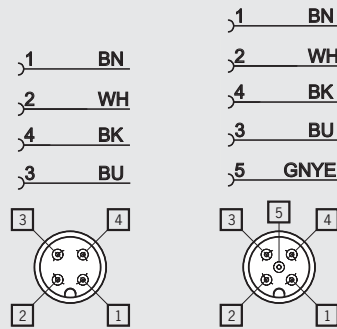
### Straight plug connector M12, coded

4-pin + PE

#### Dimension drawings



#### Wiring diagrams



#### Technical data

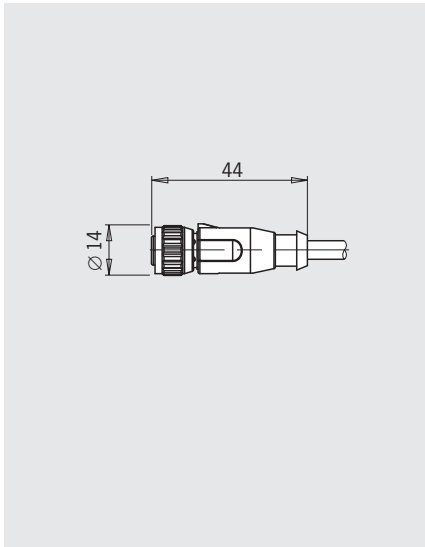
Number of pins		4	4+PE	4+PE
Housing material	Grip	TPU self extinguishing		TPU self extinguishing
	Contact carrier	TPU self extinguishing		TPU self extinguishing
Sheath material		PUR, halogen free, flame retardant		PVC, halogen free, flame retardant
Sheath color		Black		Orange
Degree of protection acc. to IEC 60529 (inserted and screwed tight)		IP 67		IP 67
Ambient temperature	[°C]	-25 ... +80		-25 ... +90
Contact material		CuSn nickel-plated, 0.3 µm gold-plated		CuSn nickel-plated, 0.8 µm gold-plated
Connection cross-section	[mm <sup>2</sup> ]	4 x 0.34	5 x 0.5	4 x 0.34 / 1 x 0.5
Cable diameter	[mm]	6		5
Contact resistance	[mΩ]	≤ 5		≤ 5
Test voltage (60 s)	[kV eff]	2	1.5	2
Rated voltage	[V]	AC 250/DC 300	AC 30/DC 36	AC 250/DC 300
Rated current	[A]	4		4

#### Ordering table

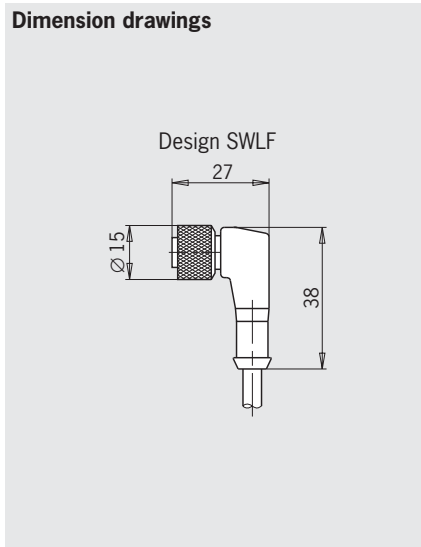
Plug connector M12, without LED, connecting cable 5 m	<b>035613</b> C-M12F04-04X034PU05,0-GA-035613	<b>073461</b> C-M12F05-05X050PU05,0-GA-073461	<b>045524</b> C-M12F05-05XDIFPV0,50-GA-045524
Plug connector M12, without LED, connecting cable 10 m	-	-	-
Plug connector M12, with three LEDs, connecting cable 5 m	-	-	-



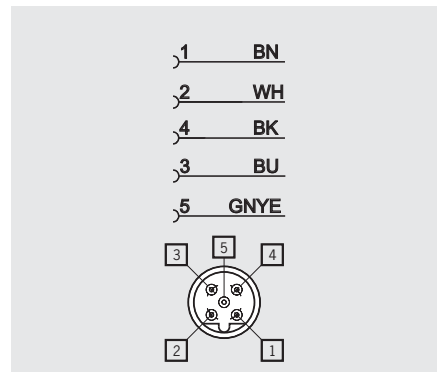
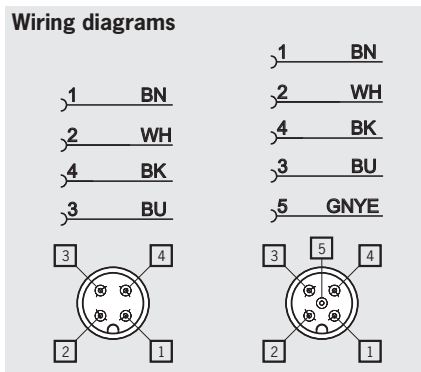
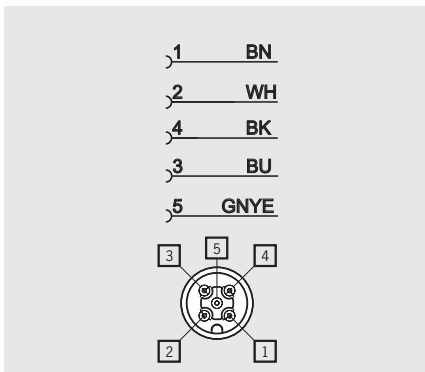
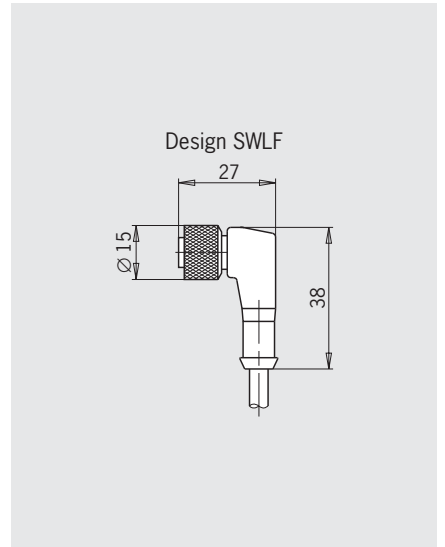
**Straight plug connector M12, A-coded**  
4-pin + PE



**Right-angle plug connector M12**  
4-pin / 4-pin + PE



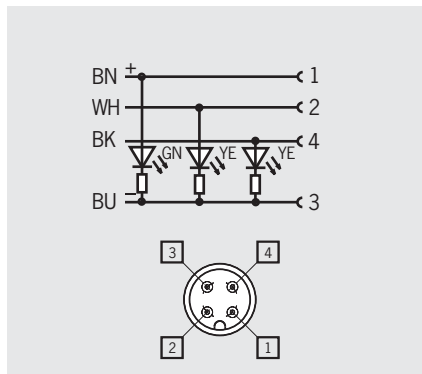
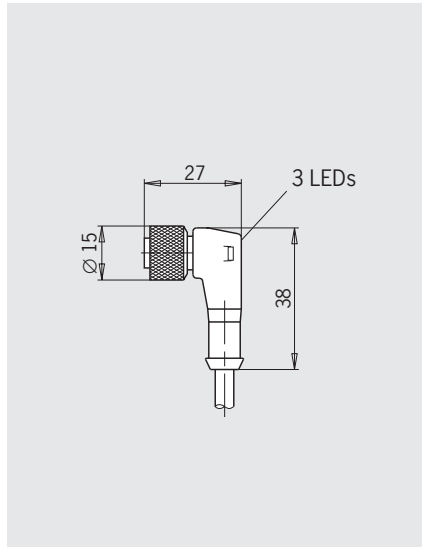
**Right-angle plug connector M12, coded**  
4-pin + PE



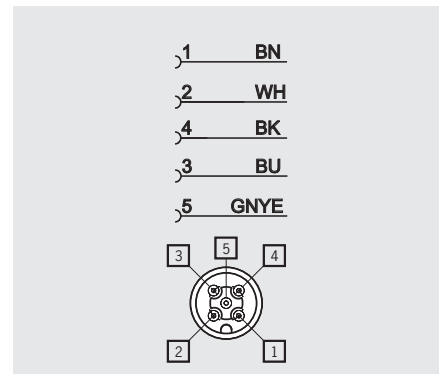
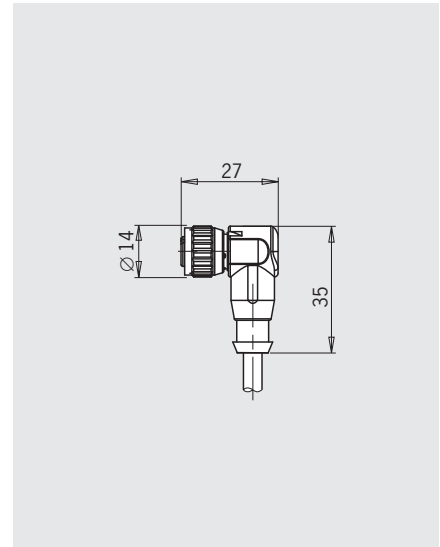
4+PE	4	4+PE	4+PE
TPE	TPU self extinguishing	TPU self extinguishing	TPU self extinguishing
PBT GF, LIL 94	TPU self extinguishing	TPU self extinguishing	TPU self extinguishing
TPE (high-temperature PUR)	PUR, halogen free, flame retardant	PUR, halogen free, flame retardant	PVC, halogen-free, flame retardant
Black	Black	Black	Orange
IP 65	IP 67	IP 67	IP 67
-30 ... +150 (for 2,000 h) (+125 for 8,000 h / +100 for 30,000 h)	-25 ... +80	-25 ... +80	-25 ... +90
CuZn, CuBe	CuSn nickel-plated, 0.3 µm gold-plated	CuSn nickel-plated, 0.3 µm gold-plated	CuSn nickel-plated, 0.8 µm gold-plated
5 x 0.34	4 x 0.34	5 x 0.5	5 x 0.5
5.5	6	5	5
-	≤ 5	≤ 5	≤ 5
-	2	1.5	2
60	AC 250/DC 300	AC 30/DC 36	AC 250/DC 300
4	4	4	4

<b>136960</b> CM12F05-05X034PU05,0-GA-136960	<b>035618</b> CM12F04-04X034PU05,0-GA-035618	<b>073462</b> CM12F05-05X050PU05,0-GA-073462	<b>045523</b> CM12F05-05XDIFPV05,0-GA-045523
<b>136961</b> CM12F05-05X034PU10,0-GA-136961	-	-	-
-	-	-	-

### Plug connector M12 with three LEDs 4-pin



### Plug connector M12, A-coded 4-pin + PE



### Technical data

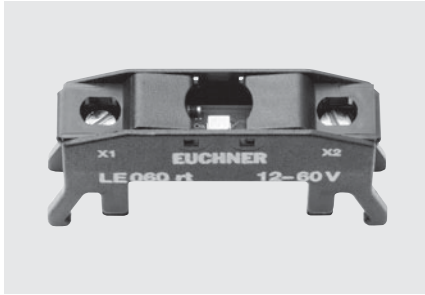
Number of pins		4	4+PE
Housing material	Grip	TPU self extinguishing	TPE
	Contact carrier	TPU self extinguishing	PBT GF, LIL 94
Sheath material		PUR, halogen-free, flame retardant	TPE (high-temperature PUR)
Sheath color		Black	Black
Degree of protection acc. to IEC 60529 (inserted and screwed tight)		IP 67	IP 65
Ambient temperature	[°C]	-25 ... +80	-30 ... +150 (for 2,000 h) (+125 for 8,000 h / +100 for 30,000 h)
Contact material		CuSn nickel-plated, 0.3 µm gold-plated	CuZn, CuBe
Connection cross-section	[mm <sup>2</sup> ]	4 x 0.34	5 x 0.34
Cable diameter	[mm]	5	5.5
Contact resistance	[mΩ]	≤ 5	-
Test voltage (60 s)	[kV eff]	-	-
Rated voltage	[V]	DC 10 ... 30	60
Rated current	[A]	4	4

### Ordering table

Plug connector M12, without LED, connecting cable 5 m	-	<b>136962</b> C-M12F05-05X034PU05,0-GA-136962
Plug connector M12, without LED, connecting cable 10 m	-	<b>136963</b> C-M12F05-05X034PU10,0-GA-136963
Plug connector M12, with three LEDs, connecting cable 5 m	<b>041091</b> C-M12F04-04X034PU05,0-GA-041091	-

## LED function display

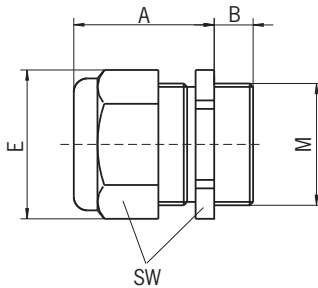
On request, versions with voltage ranges AC 110/230 V are available.



Operating voltage [V]	Color	Item	Order no.
AC/DC 12 - 60	Red	LE 060 rt	<b>035495</b>
	Green	LE 060 gr	<b>035496</b>
	Yellow	LE 060 ge	<b>035497</b>

## Cable glands

Material nickel-plated brass, degree of protection IP 67



Item	Metric thread M	Cable outer diameter [mm]	A [mm]	B [mm]	E [mm]	SW [mm]	Order no.
EKVM12/04	M12 x 1.5	4 - 6.5	20	5	15.5	14	<b>086327</b>
EKVM16/04	M16 x 1.5	4 - 6.5	20	6	20	18	<b>086328</b>
EKVM16/06	M16 x 1.5	6.5 - 9.5	20	6	20	18	<b>086330</b>
EKVM20/06	M20 x 1.5	6.5 - 9.5	20	6	24.4	22	<b>077683</b>

## Additional products

### Trip rails/trip dogs

#### U-trip rails

enable the trip dogs to be adjusted from the switch side. The trip dogs can be installed and adjusted quickly and easily in any location.

#### U-trip dogs

are designed for usage in U-trip rails. They have an expansion plate clamp and enable precise adjustment, even when the limit switch is activated.



For detailed information see catalog for multiple limit switches.

## Appendix

### Terms and explanations

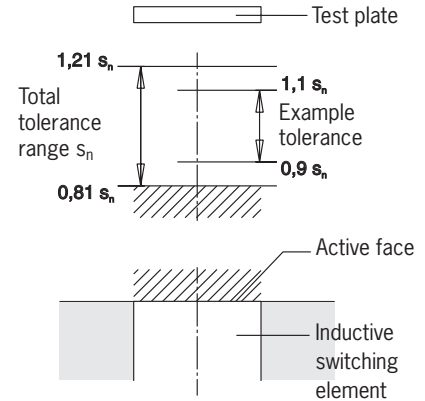
#### Rated operating distance $s_n$

The rated operating distance is a general variable used for identifying the operating distances. It does not take into account either the production tolerances or changes caused by external effects such as voltage and temperature.

#### Assured operating distance $s_a$

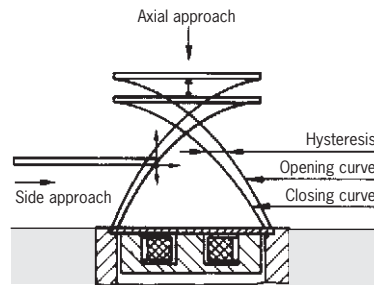
The assured operating distance is the operating distance at which correct operation of the inductive switching element is guaranteed within the permissible operating conditions (temperature and voltage).

The actuation distance is between 0 and 81% of the rated operating distance  $s_n$ .



#### Hysteresis H

The hysteresis is the difference in distance terms between the ON point as the test plate approaches and the OFF point as it moves away from the active face of the inductive switching element.



#### Repeat accuracy R

The repeat accuracy is the reproducibility of the real operating distance  $s_r$  for two switching actions in succession within 8 hours at an operating temperature of  $23 \pm 5 \text{ }^\circ\text{C}$  and an operating voltage of  $U_B \pm 5\%$ .

#### Operating voltage $U_B$

The operating voltage indicates the voltage range in which the inductive switching element functions reliably. The specified values represent limits without any tolerances. The values can be obtained by referring to the technical data for the switching element. In the case of two-wire switching elements, this is applicable only in series connection with the load.

#### Voltage drop $U_d$

The voltage drop is measured across the active output of the inductive switching element when the output is in the "active energized" condition and when the rated operating current  $I_e$  flows.

#### Rated operating current $I_e$

The rated operating current is the nominal current that can load the inductive switching element in continuous operation.

#### Off-state current $I_r$

The off-state current is the current that flows in the load circuit of an inductive switching element in the non-conducting condition. In practical terms, this current has to be taken into account only for two-wire switching elements.

#### Minimum operating current $I_m$

The minimum operating current is the minimum current required for the function of a 2-wire switching element in active energized condition.

#### Switch-on current $I_k$

The switch-on current is the maximum current that can flow in an AC 2-wire switching element for a particular period at the moment it is switched on. The details in the technical data are valid for 20 ms.

#### Switching frequency $f$

The switching frequency is the maximum possible number of switching operations per second. It is determined according to IEC 60947-5-2, and is based on a mark-space ratio of 1:2. The switching frequency is a switch-specific variable and can be obtained by referring to the technical data for the switching element.

#### Ambient temperature T

The ambient temperature is the temperature range in which the reliable operation of the inductive switching element is guaranteed. This range is between  $-25$  and  $+70 \text{ }^\circ\text{C}$ .

#### Temperature drift $\Delta s$

The temperature drift defines the offset in the switching point in  $\mu\text{m/K}$  on a change in the ambient temperature from  $-25$  to  $+70 \text{ }^\circ\text{C}$  under otherwise constant measurement conditions.

## Suppressor circuits

The inductive switching elements are largely protected against external interference by use of various circuit techniques (suppressor circuits). For utilization category DC-13 the output is to be protected with a free-wheeling diode for inductive loads.

### Short circuit and overload protection

The inductive switching elements are designed so that short circuits cannot damage the outputs. **Pulsed short circuit protection** is used. This means that the output transistor is switched off and on again in quick succession in the event of overloading or a short-circuit. In this way, it is possible to establish whether the fault is still present or has been rectified.

### Transient protection

EUCHNER proximity switches are protected against interference caused by the occurrence of inductive voltage peaks in accordance with IEC 801-4. The respective values are specified in the technical data. Testing is performed in accordance with the stipulations in DIN VDE 0660, Part 208 and IEC 947-5-2.

### Wire break safety

The EUCHNER proximity switches with wire break safety are designed such that on a wire break on any connection, the switch does not output a spurious signal.

### Reverse polarity protection

Protection against reverse polarization of the operating voltage.

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# Position Switches according to EN 50041



B

# EUCHNER

More than safety.



## Position Switches According to EN 50041

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## General information

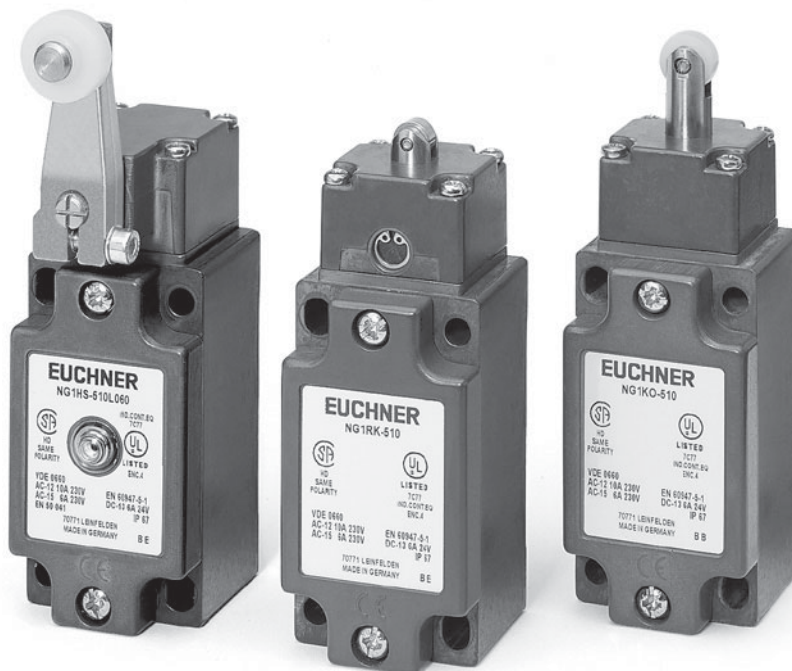
### EUCHNER position switches – precise, reliable and versatile

EUCHNER position switches are manufactured in accordance with European standard EN 50041. Robust construction and the use of high quality corrosion resistant materials, precision finishing and degree of protection IP 67 according to IEC 60529 guarantee trouble-free and reliable operation under the toughest conditions.

### Approvals for series NG... and NZ...

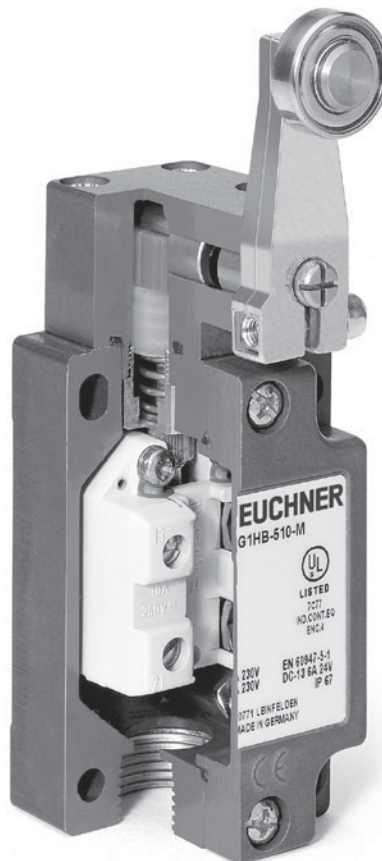


Various EUCHNER position switch variants are also equipped as safety switches with switching elements whose NC contacts are positively opened by a rigid plunger, even if the switching element is damaged due to a broken spring or contact weld. Positively driven position switches are used in cases where a guarantee of machine and/or human safety is absolutely essential, e.g. final position limitation or an EMERGENCY STOP.

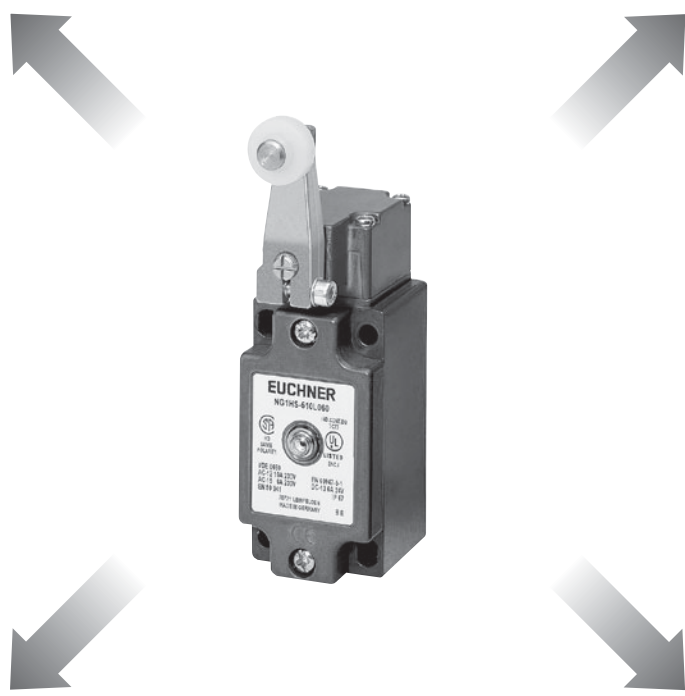


## EUCHNER position switches offer important advantages and special features

- ▶ Housing and cover made of robust die-cast aluminum to take ten different actuators
- ▶ Actuating heads can be adjusted 4 x 90°, lever arms can be adjusted and fixed either continuously or 4 x 90°
- ▶ Double or quadruple switching elements (e.g. two positively driven contacts + two NO contacts), silver alloy contacts, gold flashed
- ▶ Cable entry M20 x 1.5 or plug connection
- ▶ Mechanical life up to 30 million operating cycles
- ▶ Degree of protection IP 67 according to IEC 60529
- ▶ High operating point accuracy to  $\pm 0.002$  mm
- ▶ Use of silicone-free lubricants
- ▶ Cover made of die-cast aluminum with inserted edge seal
- ▶ Diaphragm seal and cover seal made of NBR plastic (acrylonitrile-butadiene rubber): protection of the switching space against coolants and lubricants
- ▶ Great versatility thanks to LED function display, plug connector and multiple adjustment options



## Application examples for position switches from series NG... and NZ...





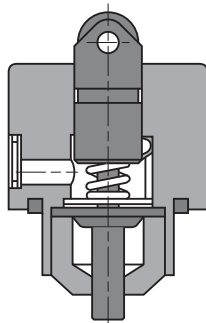
## Position switch in detail

### Plunger actuation

The plunger actuated versions allow the user a choice of six different designs.

The hardened stainless steel plungers with telescopic action (positively driven position switches have rigid plungers) are precisely guided within the anodized actuator head, and are almost maintenance free.

The approach direction of the actuator head can easily be changed by 90°.

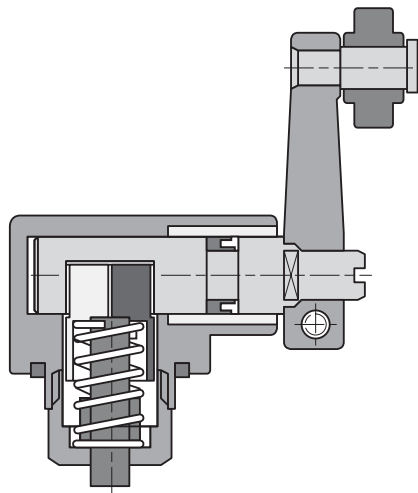


### Lever arm actuation

Different types of actuators may be used for lever arm actuation. The stainless steel shaft is guided precisely through the housing.

With the numerous adjusting options, a high degree of flexibility is given:

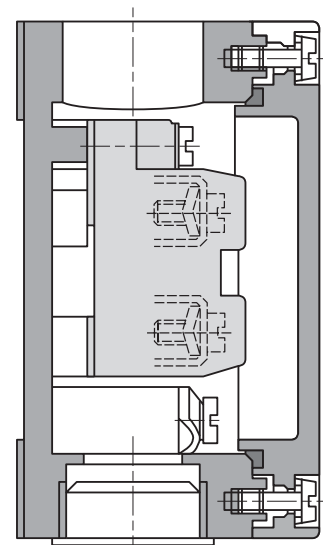
- ▶ Approach direction adjustable by 8 x 90°
- ▶ Actuator direction for lever arm actuation adjustable by 4 x 90°
- ▶ Switches to the left or to the right, or on both sides



### The housing

With their robust design, the die-cast alloy housings have proven themselves highly resistant to corrosion even under the toughest conditions.

The control cable can be connected with a cable gland M20 x 1.5 or via pre-wired plug connectors with straight or angled outlet. The right-angle plug connectors can be adjusted in seven directions around the longitudinal axis of the switch.



### The diaphragm seal

In switches with plunger actuation, the plunger compartment and the interior of the switch are separated by a diaphragm seal made of NBR (acrylonitrile-butadiene rubber). Because of their outstanding technical properties, NBR materials are used wherever possible for all mechanical and systems engineering applications.

The seal is permanently connected to the plunger, and the plunger – not the switching element – returns it to the free position by means of the plunger return spring after every switching operation. Any build-up of pressure during plunger actuation is reliably prevented by a relief valve.

The switching element is actuated by means of a metal cap pressed onto the seal.

Switching point displacement (a logical consequence due to the high elasticity of the seal) is therefore completely eliminated.

### The edge seal

In lever arm actuated switches, an edge seal protects the actuating mechanism and the switch chamber against dirt and dust. The edge seal, which is made of NBR, is resistant to all known coolants and lubricants.

### Cable connections

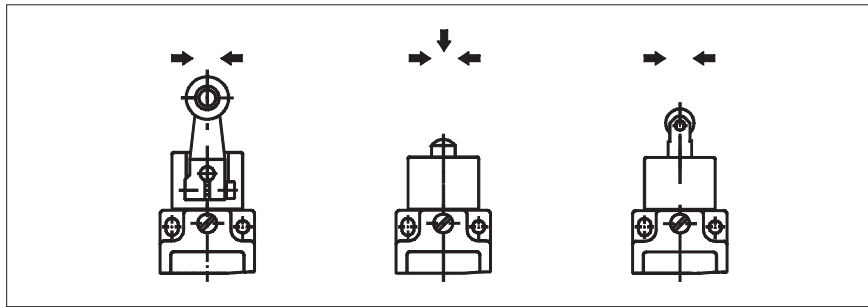
EUCHNER position switches according to EN 50041 undergo routine check tests for compliance with degree of protection IP 67 before delivery to the customer. To achieve this degree of protection, only high-quality metal cable glands with a captive sealing ring or the pre-wired straight or angled plug connectors must be used.

### Function display

The position switches can be fitted with a function display (LED) on request. Voltage ranges of 10 to 60 V AC/DC, 110 V AC and 230 V AC are available.

## Adjustment options

### Actuator and approach directions



Lever arm  
 HS = steel roller  
 HB = plastic roller

WO = domed plunger  
 KO = ball plunger

RG = plastic roller  
 RS, RK, RL = steel roller

The large selection of actuator heads guarantees maximum flexibility and is suitable for a variety of applications.

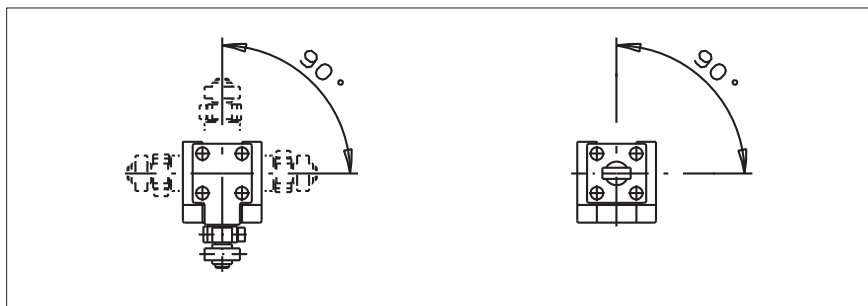
For example, the aluminum lever arm is used for high approach speeds and generous actuating mechanism tolerances.

The chisel plunger with polish-ground surface is designed for a high operating point accuracy of  $\pm 0.002$  mm.

The ball plungers can be actuated from a number of different directions.

### Adjustment option for the actuator

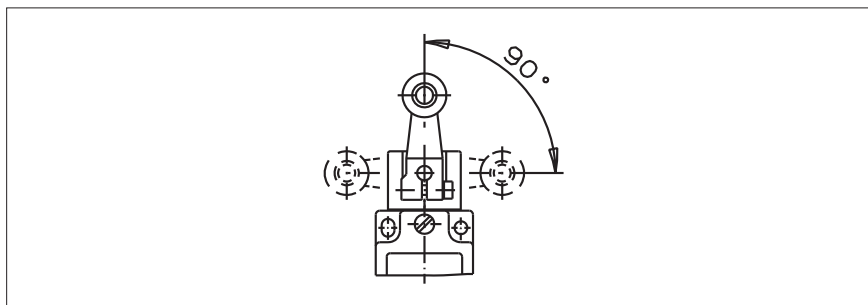
Horizontal adjustment 4 x 90°



Lever arm                      Straight actuator

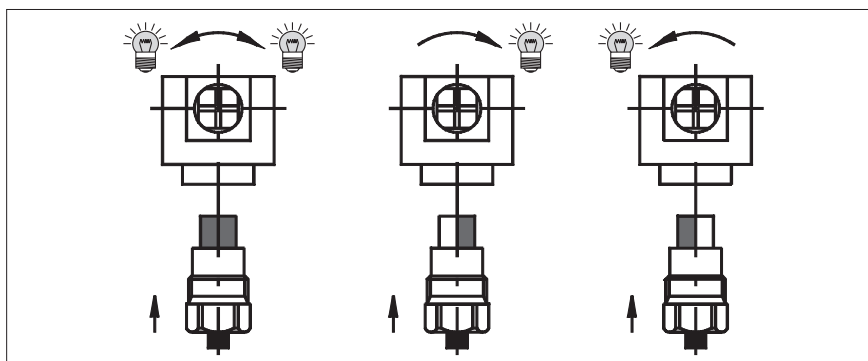
After removal of the stainless steel fixing screws, the actuator heads can each be adjusted horizontally by 90°.

### Vertical adjustment 4 x 90° or 8 x 45°



The lever arm can be adjusted continuously for position switches without a safety function and by 45° for position switches with a safety function.

### Adjustment option for switching direction



left/right switching (default setting)      right switching      left switching

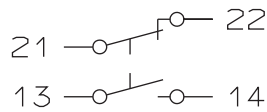
On delivery, the lever arm actuation is set to left and right switching.

If necessary, it can be set to right switching or left switching only.

## Switching elements

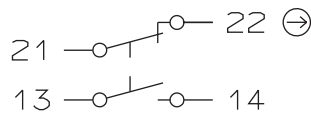
### Switching element 510 <sup>2)</sup>

(without positively driven contact)  
 Snap-action switching contact with one NC contact and one NO contact. Double gap, electrically isolated switching bridge, silver alloy gold flashed contact material, screw terminal with self-lifting clamp washers. Used for NG...



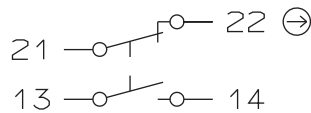
### Switching element 511 <sup>2)</sup>

Snap-action switching contact with one positively driven contact and one NO contact. Double gap, electrically isolated contacts, silver alloy gold flashed contact material, screw terminal with self-lifting clamp washers. Used for NZ...



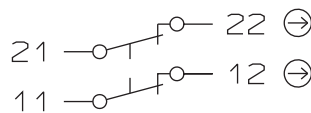
### Switching element 528H <sup>1) 3)</sup>

Slow-action switching contact with one positively driven contact and one NO contact. Double gap, electrically isolated H contact bridges for currents from 1 mA to 4 A, silver alloy gold flashed contact material, screw terminal with self-lifting clamp washers. Used for NZ...



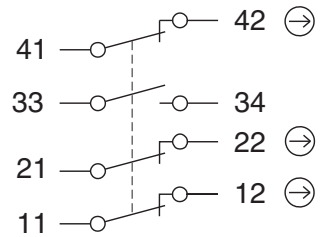
### Switching element 538H <sup>1) 3)</sup>

Slow-action switching contact with two positively driven contacts. Double gap, electrically isolated H contact bridges for currents from 1 mA to 4 A, silver alloy gold flashed contact material, screw terminal with self-lifting clamp washers. Used for NZ...



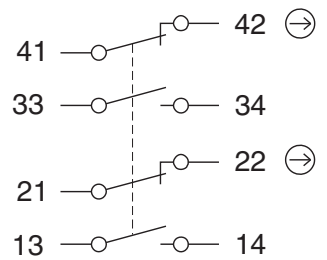
### Switching element 2131 H <sup>3)</sup>

Slow-action switching contact with three positively driven contacts and one NO contact. Double gap, electrically isolated H contact bridges for currents from 1 mA to 4 A, silver alloy gold flashed contact material, screw terminal with self-lifting clamp washers. Used for NZ...



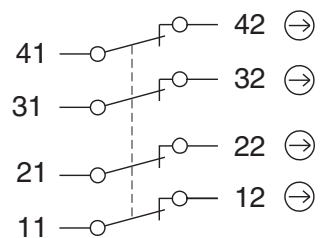
### Switching element 3131 H <sup>3)</sup>

Slow-action switching contact with two positively driven contacts and two NO contacts. Double gap, electrically isolated H contact bridges for currents from 1 mA to 4 A, silver alloy gold flashed contact material, screw terminal with self-lifting clamp washers. Used for NZ...



### Switching element 2121 H <sup>3)</sup>

Slow-action switching contact with four positively driven contacts. Double gap, electrically isolated H contact bridges for currents from 1 mA to 4 A, silver alloy gold flashed contact material, screw terminal with self-lifting clamp washers. Used for NZ...



EUCHNER position switches marked with this symbol meet the IEC 60947-5-1 requirements for positively driven position switches. **Safety switching elements marked with this symbol are not available as replacement switching elements.**

#### 1) Slow-action switching element

The slow-action switching element has a switching contact that opens and closes depending on its actuation speed.

#### 2) Snap-action switching element

The snap-action switching element has a switching contact that opens and closes independently of its actuation speed.

#### 3) H-contact bridge

The design properties of the H-contact bridge (H-shaped) ensure that these switching elements reliably switch currents from 1 mA to 4 A.



## Wiring diagrams

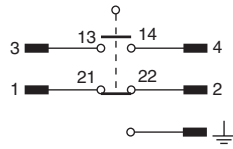
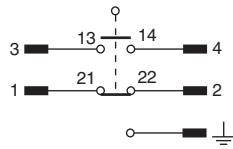
### Plug connector SR6

Pin assignment for male socket  
(top view of  
switch mounted connector)



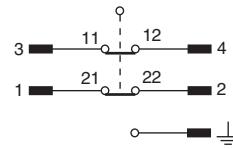
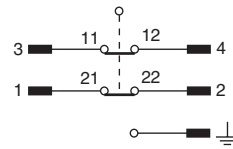
### Terminal assignment for switching elements

#### 510 / 511 / 528H



with LED indicator

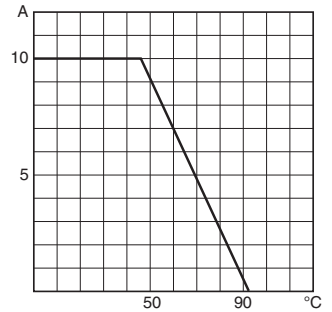
#### 538H



with LED indicator

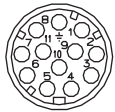
### Current rating curve

for connection cross section  
1.5 mm<sup>2</sup>



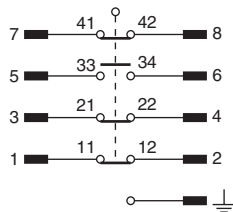
### Plug connector SR11

Pin assignment for male socket  
(top view of  
switch mounted connector)

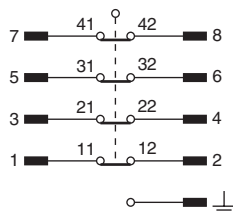


### Terminal assignment for switching elements

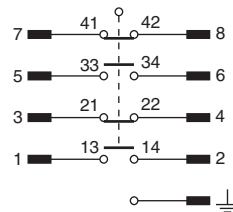
#### 2131H



#### 2121H

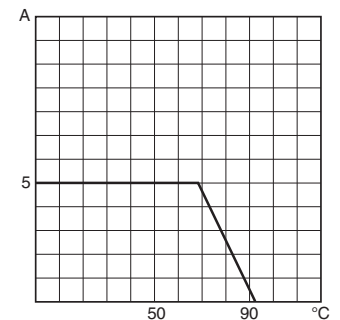


#### 3131H



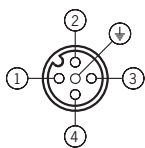
### Current rating curve

for connection cross section  
0.5 mm<sup>2</sup>



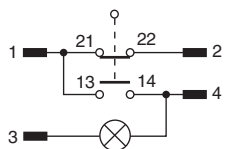
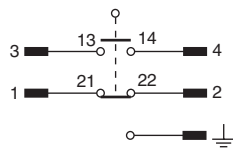
### Plug connector SVM5 (M12, 5-pin)

Pin assignment for male socket  
(top view of  
switch mounted connector)



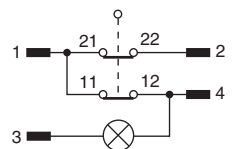
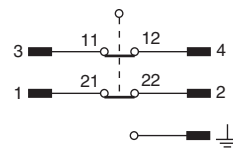
### Terminal assignment for switching elements

#### 510 / 511 / 528H



with LED indicator

#### 538H



with LED indicator

## Plunger types

Plungers for position switches are made of stainless steel and are extremely accurate.

In conjunction with a plunger guide with a special surface finish, operation is extremely reliable and maintenance-free even beyond the guaranteed mechanical life.

There are two different types of actuating systems, depending on the application. For standard applications, the plunger is fitted with a telescopic device. With this system, the plunger can be depressed to the reference surface without damaging the switching element.

Instead of this telescopic plunger, position switches with safety function (with safety switching element) have a *rigid* plunger to ensure positive driving according to IEC 60947-5-1. This means that the contact point will be reliably opened in the event of mechanical failure of the switching element – e.g. owing to the failure of a contact spring or contact weld resulting from an overload.

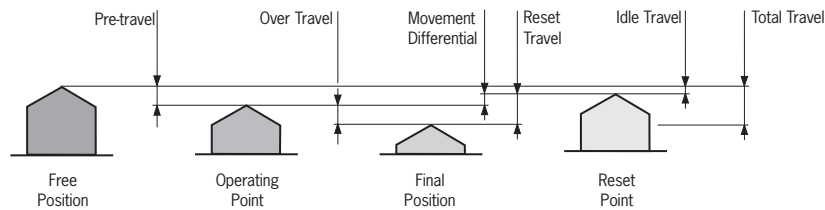
## Plunger travel

The pictures show the various positions of the plunger actuated by a trip dog.

The precise values for the relevant design are shown in the technical data.

## Travel ratio for plunger/trip dog

All the plunger travel data shown in the technical data refers to axial actuation. The travel for radial actuation with angled trip dogs is increase, and this must be calculated.



## Plunger types

Depending on the technical requirements, four different plunger types (chisel, roller, ball and domed plungers) are used.

### Chisel plunger



Hardened and polish ground.  
Operating point accuracy to  $\pm 0.002 \text{ mm}^{1)}$ .  
Max. approach speed of 10 m/min.  
With its high operating point accuracy, the chisel plunger is ideal for setting reference points for moderate approach speeds.

### Domed plunger



Hardened and polished ground.  
Operating point accuracy to  $\pm 0.002 \text{ mm}^{1)}$ .  
Max. approach speed of 10 m/min.  
This plunger can be actuated from a number of different directions.  
For use in conjunction with safety switching elements!

### Roller plunger



Hardened roller.  
Operating point accuracy to  $\pm 0.01 \text{ mm}^{1)}$ .  
Max. approach speed of 50 m/min.  
The roller plunger is suitable for higher approach speeds. For very high approach speeds and long travel distances, roller plungers with a protected bearing can be offered on request.

### Extended roller plunger



Robust roller plunger for medium approach speeds.

### Ball plunger



Ball hardened.  
Operating point accuracy to  $\pm 0.01 \text{ mm}^{1)}$ .  
Max. approach speed of 10 m/min.  
This plunger can be actuated from a number of different directions.  
It must not be used in conjunction with safety switching elements!

1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 502 E has been run in with approx. 2,000 operating cycles.

## Position switch series NG1.../NZ1...

- ▶ **Roller lever arm** **HB** (plastic roller)  
**HS** (steel roller)
- ▶ **Cable entry** M20 x 1.5

**NG...**

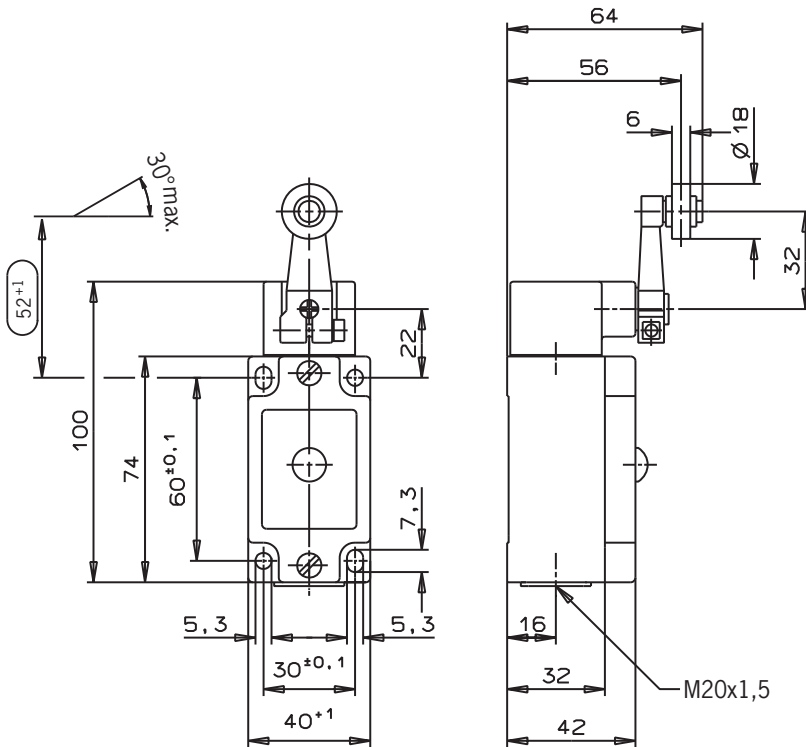


**NZ...**



1) Not applicable to NZ with switching element 511.

### Dimension drawing



### Switching elements

- ▶ **510** Snap-action switching contact  
1 NC + 1 NO
- ▶ **511** Snap-action switching contact  
1 NC ⊖ + 1 NO
- ▶ **528H** Slow-action switching contact  
1 NC ⊖ + 1 NO
- ▶ **538H** Slow-action switching contact  
2 NC ⊖
- ▶ **2131H** Slow-action switching contact  
3 NC ⊖ + 1 NO
- ▶ **3131H** Slow-action switching contact  
2 NC ⊖ + 2 NO

(further information: see page B-9)

### LED function display

A red function display LED is available for the following voltage ranges:

- ▶ 12-60 V AC/DC L060
- ▶ 110 V AC ±15% L110
- ▶ 230 V AC ±15% (on request) L220

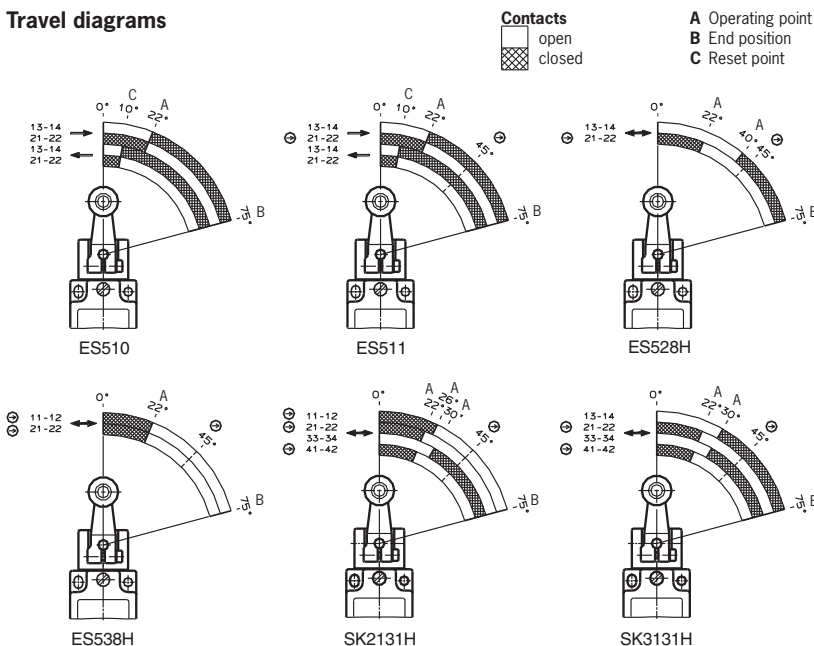
### Adjustment options (see page B-8)

- ▶ Horizontal 4 x 90°
- ▶ Vertical 8 x 45°

### Switching direction

Switches to the right, left or both sides (see page B-8).

### Travel diagrams



⚠ If damaged or worn, safety switches must be replaced as a unit.

### Notes on installation for position switches with safety switching elements

To achieve the positively driven travel, the dimension  $52^{+1}$  must be maintained by the trip dog. Actuating elements such as cam approach guides must be positively mounted in accordance with EN 1088, i.e. riveted, welded or otherwise secured against becoming loose.

## Technical data

Parameter	Value				Unit	
Housing material	Anodized die-cast alloy					
Degree of protection acc. to IEC 60529	IP 67					
Installation position	Any					
Mechanical life	30 x 10 <sup>6</sup> operating cycles					
Ambient temperature	- 25 ... + 80 (-40 °C on request)				°C	
Weight	Approx. 0.3				kg	
Actuator	Roller lever arm					
Roller material	Plastic (HB)		Steel (HS)			
Approach speed, max. <sup>1)</sup>	300		60		m/min	
Approach speed, min.	0.1				m/min	
Operating point accuracy	± 0.25					
Positively driven acc. to IEC 60947-5-1, appendix K	See symbol ⊖ in travel diagram					
Actuating force, min.	15				N	
Switching elements	<b>510</b> 1 NC + 1 NO	<b>528H</b> 1 NC ⊖ + 1 NO	<b>538H</b> 2 NC ⊖			
	<b>511</b> 1 ⊖ + 1 NO	<b>2131H</b> 3 NC ⊖ + 1 NO	<b>3131H</b> 2 NC ⊖ + 2 NO			
Switching principle	Snap-action switching contact		Slow-action switching contact with H-contact bridge			
Contact material	Silver alloy, gold flashed					
Contact closing time	< 4				ms	
Contact bounce time	< 3				ms	
Rated impulse withstand voltage U <sub>imp</sub>	2.5				kV	
Rated insulation voltage U <sub>i</sub>	250				V	
Utilization category acc. to IEC 60947-5-1	AC12	I <sub>e</sub> 10 A U <sub>e</sub> 230 V	-			
	AC15	I <sub>e</sub> 6 A U <sub>e</sub> 230 V	I <sub>e</sub> 4 A U <sub>e</sub> 230 V			
	DC13	I <sub>e</sub> 6 A U <sub>e</sub> 24 V	I <sub>e</sub> 4 A U <sub>e</sub> 24 V			
Switching current, min., at switching voltage	10	1	10	1	10	mA
	24	24	12	24	12	V DC
Conventional thermal current I <sub>th</sub>	6	4				A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)	10/6	4				A gG
Connection	Screw terminal <sup>2)</sup>					
Conductor cross-section, max.	2 x 1.5				mm <sup>2</sup>	

1) The specified approach speed applies to an approach angle of 30°.

2) Wiring diagram: see page B-9.

## Ordering table

Series	Roller	Switching element	Order no.		
			without	Function display L060	L110
<b>NG1...-M</b>  <b>NZ1...-M</b>	<b>HB</b> Plastic roller	510	<b>079926</b>	<b>090360</b>	On request
		511	<b>079952</b>	<b>090039</b>	
		528	<b>088199</b>	<b>090965</b>	
		538	<b>090966</b>	<b>090967</b>	-
		2131	<b>090968</b>	-	
		3131	<b>090969</b>	-	
<b>NG1...-M</b>  <b>NZ1...-M</b>	<b>HS</b> Steel roller	510	<b>079927</b>	<b>079937</b>	On request
		511	<b>079953</b>	<b>090035</b>	
		528	<b>090970</b>	<b>090971</b>	
		538	<b>090972</b>	<b>090760</b>	-
		2131	<b>090973</b>	-	
		3131	<b>090747</b>	-	

**Ordering example:** Position switch without safety function **NG**, cable entry **1**, lever arm with steel roller **HS**, snap-action switching element **510**, function display **L060** 10 - 60 V, metric thread M20 x 1.5 **M**  
**NG1HS-510L060-M**

Order no. 079937

## Position switch series NG2.../NZ2...

- ▶ Roller lever arm **HB** (plastic roller)  
**HS** (steel roller)
- ▶ Plug connectors **SR6** and **SR11**

NG...

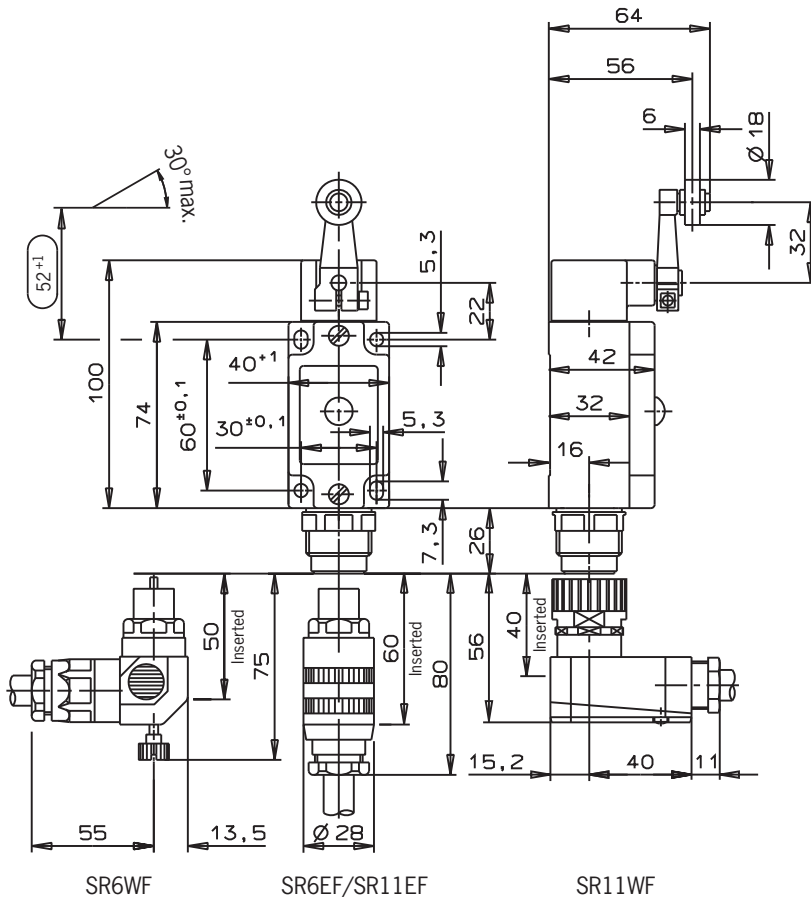


NZ...



1) Not applicable to NZ with switching element 511.

### Dimension drawing



### Switching elements

- ▶ **510** Snap-action switching contact  
1 NC + 1 NO
- ▶ **511** Snap-action switching contact  
1 NC ⊖ + 1 NO
- ▶ **528H** Slow-action switching contact  
1 NC ⊖ + 1 NO
- ▶ **538H** Slow-action switching contact  
2 NC ⊖
- ▶ **2131H** Slow-action switching contact  
3 NC ⊖ + 1 NO
- ▶ **3131H** Slow-action switching contact  
2 NC ⊖ + 2 NO

(further information: see page B-9)

### LED function display

A red function display LED is available for the following voltage ranges:

- ▶ 12-60 V AC/DC (standard) L060
- ▶ 110 V AC ±15% (on request) L110
- ▶ 230 V AC ±15% (on request) L220

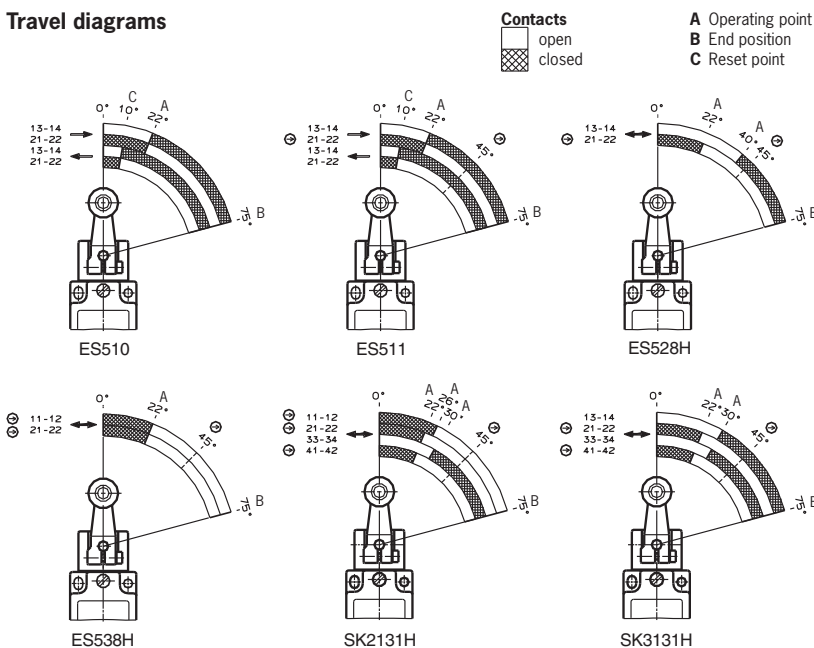
### Adjustment options (see page B-8)

- ▶ Horizontal 4 x 90°
- ▶ Vertical 8 x 45°

### Switching direction

Switches to the right, left or both sides (see page B-8).

### Travel diagrams



⚠ If damaged or worn, safety switches must be replaced as a unit.

### Notes on installation for position switches with safety switching elements

To achieve the positively driven travel, the dimension  $52^{+1}$  must be maintained by the trip dog. Actuating elements such as cam approach guides must be positively mounted in accordance with EN 1088, i.e. riveted, welded or otherwise secured against becoming loose.



## Technical data

Parameter	Value				Unit	
Housing material	Anodized die-cast alloy					
Degree of protection acc. to IEC 60529	IP 65					
Installation position	Any					
Mechanical life	30 x 10 <sup>6</sup> operating cycles					
Ambient temperature	- 25 ... + 80 (-40 °C on request)				°C	
Weight	Approx. 0.3				kg	
Actuator	Roller lever arm					
Roller material	Plastic (HB)		Steel (HS)			
Approach speed, max. <sup>1)</sup>	300		60		m/min	
Approach speed, min.	0.1				m/min	
Operating point accuracy	± 0.25					
Positively driven acc. to IEC 60947-5-1, appendix K	See symbol ⊖ in travel diagram					
Actuating force, min.	15				N	
Switching elements	<b>510</b> 1 NC + 1 NO	<b>528H</b> 1 NC ⊖ + 1 NO	<b>538H</b> 2 NC ⊖			
	<b>511</b> 1 ⊖ + 1 NO	<b>2131H</b> 3 NC ⊖ + 1 NO	<b>3131H</b> 2 NC ⊖ + 2 NO			
Switching principle	Snap-action switching cont.	Slow-action switching contact with H-contact bridge				
Contact material	Silver alloy, gold flashed					
Contact closing time	< 4				ms	
Contact bounce time	< 3				ms	
Switching current, min., at switching voltage	10	1	10	1	10	mA
	24	24	12	24	12	
Conventional thermal current I <sub>th</sub>	6	4				A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)	6	4				A gG
Connection	Plug connector according to DIN 43651 <sup>2)</sup>					
Rated impulse withstand voltage U <sub>imp</sub>	With plug connector SR6				kV	
	2.5					
	With plug connector SR11					
1.5						
Rated insulation voltage U <sub>i</sub>	With plug connector SR6				V	
	250					
	With plug connector SR11					
50						
Utilization category acc. to IEC 60947-5-1	With plug connector SR6	AC15	I <sub>e</sub> 6 A U <sub>e</sub> 230 V	I <sub>e</sub> 4 A U <sub>e</sub> 230 V		
		DC13	I <sub>e</sub> 6 A U <sub>e</sub> 24 V	I <sub>e</sub> 4 A U <sub>e</sub> 24 V		
	With plug connector SR11	AC15		I <sub>e</sub> 4 A U <sub>e</sub> 50 V		
		DC13		I <sub>e</sub> 4 A U <sub>e</sub> 24 V		

1) The specified approach speed applies to an approach angle of 30°.

2) Wiring diagram: see page B-10.

## Ordering table

Series	Roller	Switching element	Order no.			
			Plug connector/function display			
			SR6 without	SR6 L060	SR11 without	SR11 L110
NG2...	HB Plastic roller	510	089088	089089	-	-
		511	089091	089092	-	-
		528	090845	090846	-	-
		538	090847	090848	-	-
		2131	-	-	-	090136
3131	-	-	-	090137		
NG2...	HS Steel roller	510	090851	089090	-	-
		511	089093	089094	-	-
		528	090852	088196	-	-
		538	090853	090854	-	-
		2131	-	-	-	090146
3131	-	-	090856	-		

**Ordering example:** Position switch without safety function **NG**, plug connector **2**, lever arm with steel roller **HS**, snap-action switching element **510**, function display **L060** 10 - 60 V  
**NG2HS-510L060**

Order no.  
**089090**

## Position switch series NG2.../NZ2...

- ▶ **Roller lever arm** **HB** (plastic roller)  
**HS** (steel roller)
- ▶ **Plug connector** **M12/SVM5**

**NG...**

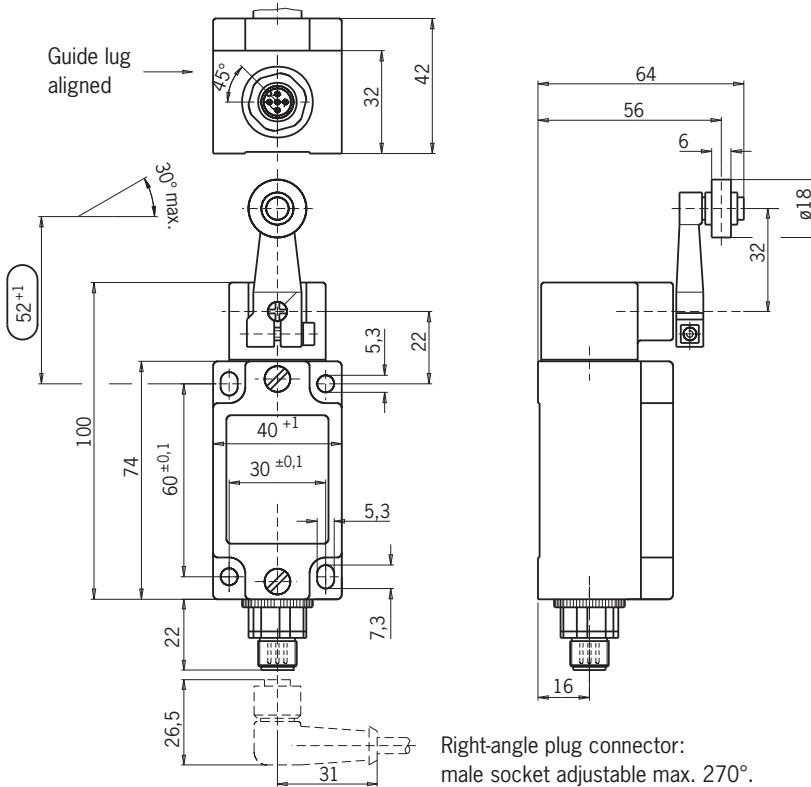


**NZ...**



1) Not applicable to NZ with switching element 511.

### Dimension drawing



### Switching elements

- ▶ **510** Snap-action switching contact  
1 NC + 1 NO
- ▶ **511** Snap-action switching contact  
1 NC ⊖ + 1 NO
- ▶ **528H** Slow-action switching contact  
1 NC ⊖ + 1 NO
- ▶ **538H** Slow-action switching contact  
2 NC ⊖

(further information: see page B-9)

### LED function display

Available on request

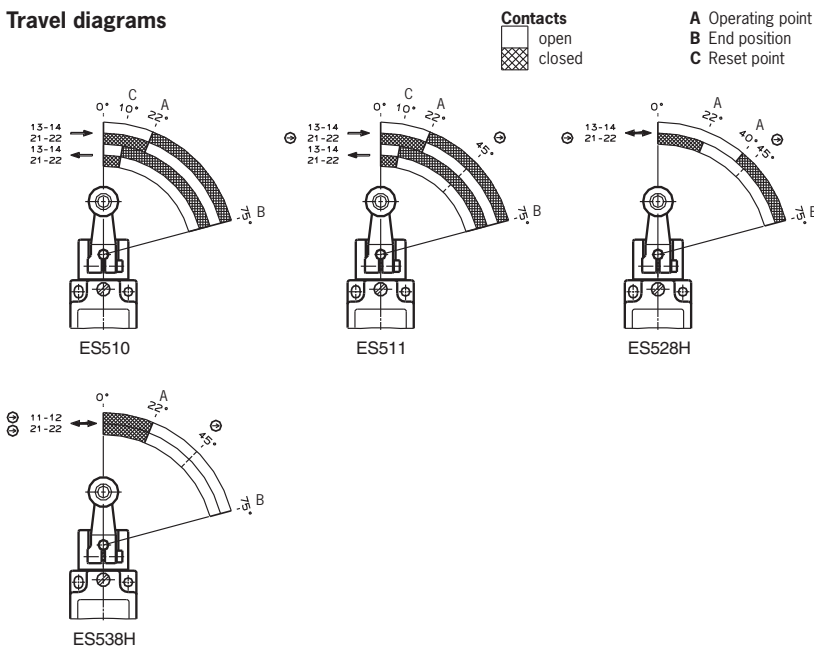
### Adjustment options (see page B-8)

- ▶ Horizontal 4 x 90°
- ▶ Vertical 8 x 45°

### Switching direction

Switches to the right, left or both sides (see page B-8).

### Travel diagrams



⚠ If damaged or worn, safety switches must be replaced as a unit.

### Notes on installation for position switches with safety switching elements

To achieve the positively driven travel, the dimension  $52+1$  must be maintained by the trip dog. Actuating elements such as cam approach guides must be positively mounted in accordance with EN 1088, i.e. riveted, welded or otherwise secured against becoming loose.

## Technical data

Parameter	Value				Unit
Housing material	Anodized die-cast alloy				
Degree of protection acc. to IEC 60529	IP 67				
Installation position	Any				
Mechanical life	30 x 10 <sup>6</sup> operating cycles				
Ambient temperature	- 25 ... + 80 (-40 °C on request)				°C
Weight	Approx. 0.3				kg
Actuator	Roller lever arm				
Roller material	Plastic (HB)		Steel (HS)		
Approach speed, max. <sup>1)</sup>	300		60		m/min
Approach speed, min.	0.1				m/min
Operating point accuracy	± 0.25				
Positively driven acc. to IEC 60947-5-1, appendix K	See symbol ⊖ in travel diagram				
Actuating force, min.	15				N
Switching elements	<b>510</b> 1 NC + 1 NO	<b>528H</b> 1 NC ⊖ + 1 NO	<b>538H</b> 2 NC ⊖		
	<b>511</b> 1 ⊖ + 1 NO				
Switching principle	Snap-action switching contact		Slow-action switching contact with H-contact bridge		
Contact material	Silver alloy, gold flashed				
Contact closing time	< 4				ms
Contact bounce time	< 3				ms
Rated impulse withstand voltage U <sub>imp</sub>	1.5				kV
Rated insulation voltage U <sub>i</sub>	50				V
Utilization category acc. to IEC 60947-5-1					
with plug connector SVM5	AC15	I <sub>e</sub> 4 A U <sub>e</sub> 30 V	I <sub>e</sub> 4 A U <sub>e</sub> 30 V		
	DC13	I <sub>e</sub> 4 A U <sub>e</sub> 24 V	I <sub>e</sub> 4 A U <sub>e</sub> 24 V		
Switching current, min., at switching voltage	10 24	1 24	10 12	1 24	10 12
Conventional thermal current I <sub>th</sub>	4				A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)	4				A gG
Connection	Plug connector M12 <sup>2)</sup>				

1) The specified approach speed applies to an approach angle of 30°.

2) Wiring diagram: see page B-10.

## Ordering table

Series	Roller	Switching element	Order no.			
			Plug connector SVM5			
NG2...	HB Plastic roller	510	088631			
NZ2...		511	090861			
		528	090864			
		538	090862			
NG2...	HS Steel roller	510	090866			
NZ2...		511	090867			
		528	090868			
		538	090869			

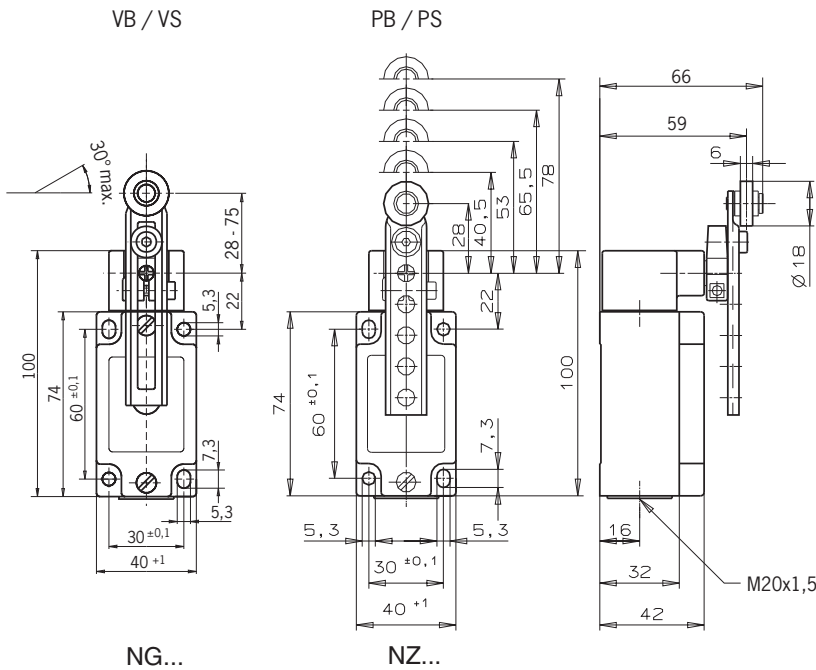
**Ordering example:** Position switch without safety function **NG**, plug connector **2**, lever arm with steel roller **HS**, snap-action switching element **510**, M12 male socket with PE connection **SVM5**  
**NG2HS-510SVM5**

Order no. 090866

## Position switch series NG1.../NZ1...

- ▶ **Adjustable roller lever arm**  
**VB** (plastic) / **PB** (plastic roller)  
**VS** (steel roller) / **PS** (steel roller)
- ▶ **Cable entry M20 x 1.5** (plug connector on request)

### Dimension drawing



NG...

NZ...



1) Not applicable to NZ with switching element 511.

### Switching elements

- ▶ **510** Snap-action switching contact  
1 NC + 1 NO
- ▶ **511** Snap-action switching contact  
1 NC ⊖ + 1 NO
- ▶ **528H** Slow-action switching contact  
1 NC ⊖ + 1 NO
- ▶ **538H** Slow-action switching contact  
2 NC ⊖
- ▶ **2131H** Slow-action switching contact  
3 NC ⊖ + 1 NO
- ▶ **3131H** Slow-action switching contact  
2 NC ⊖ + 2 NO

(further information: see page B-9)

### LED function display

A red function display LED is available for the following voltage ranges:

- ▶ 12-60 V AC/DC (standard) L060
- ▶ 110 V AC ±15% (on request) L110
- ▶ 230 V AC ±15% (on request) L220

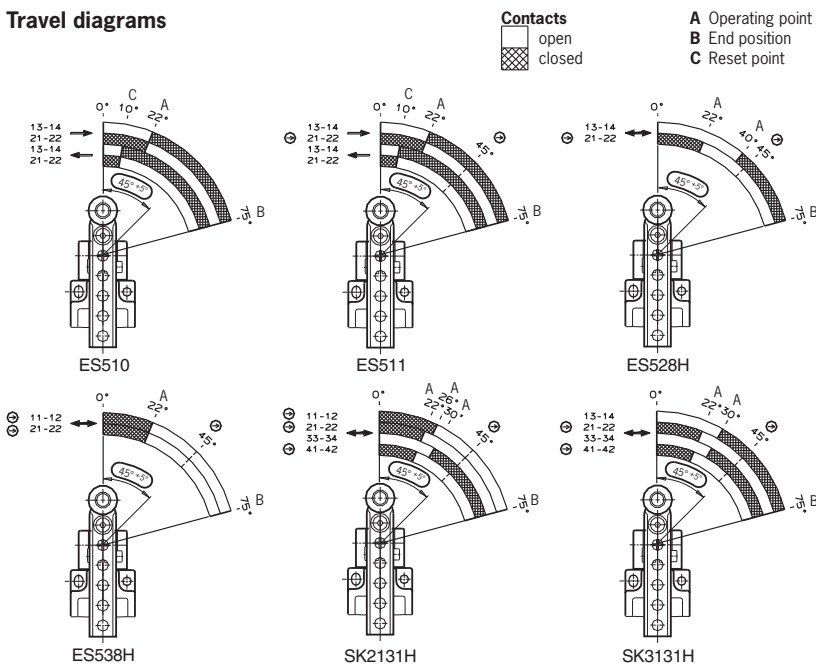
### Adjustment options (see page B-8)

- ▶ Horizontal 4 x 90°
- ▶ Vertical 8 x 45°

### Switching direction

Switches to the right, left or both sides (see page B-8).

### Travel diagrams



⚠ If damaged or worn, safety switches must be replaced as a unit.

### Notes on installation for position switches with safety switching elements

To achieve the positively driven travel, the trip dog must be mounted so that it actuates the lever arm to the angle  $45^{+5}$ . Actuating elements such as cam approach guides must be positively mounted in accordance with EN 1088, i.e. riveted, welded or otherwise secured against becoming loose.

## Technical data

Parameter	Value				Unit	
Housing material	Anodized die-cast alloy					
Degree of protection acc. to IEC 60529	IP 67					
Installation position	Any					
Mechanical life	30 x 10 <sup>6</sup> operating cycles					
Ambient temperature	- 25 ... + 80 (-40 °C on request)				°C	
Weight	Approx. 0.3				kg	
Actuator	Adjustable roller lever arm					
Roller material	Plastic (VB)	Plastic (PB)	Steel (VS)	Steel (PS)		
Approach speed, max. <sup>1)</sup>	120	120	30	30	m/min	
Approach speed, min.	0.5				m/min	
Positively driven acc. to IEC 60947-5-1, appendix K	See symbol ⊖ in travel diagram					
Actuating force, min.	15				N	
Switching elements	<b>510</b> 1 NC + 1 NO	<b>528H</b> 1 NC ⊖ + 1 NO	<b>538H</b> 2 NC ⊖			
	<b>511</b> 1 ⊖ + 1 NO	<b>2131H</b> 3 NC ⊖ + 1 NO	<b>3131H</b> 2 NC ⊖ + 2 NO			
Switching principle	Snap-action switching contact	Slow-action switching contact with H-contact bridge				
Contact material	Silver alloy, gold flashed					
Contact closing time	< 4				ms	
Contact bounce time	< 3				ms	
Rated impulse withstand voltage U <sub>imp</sub>	2.5				kV	
Rated insulation voltage U <sub>i</sub>	250				V	
Utilization category acc. to IEC 60947-5-1	AC12	I <sub>e</sub> 10 A U <sub>e</sub> 230 V	-			
	AC15	I <sub>e</sub> 6 A U <sub>e</sub> 230 V	I <sub>e</sub> 4 A U <sub>e</sub> 230 V			
	DC13	I <sub>e</sub> 6 A U <sub>e</sub> 24 V	I <sub>e</sub> 4 A U <sub>e</sub> 24 V			
Switching current, min., at switching voltage	10	1	10	1	10	mA
	24	24	12	24	12	
Conventional thermal current I <sub>th</sub>	6	4			A	
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)	10/6	4			A gG	
Connection	Screw terminal <sup>2)</sup>					
Conductor cross-section, max.	2 x 1.5				mm <sup>2</sup>	

1) The specified approach speed applies to an approach angle of 30°.

2) Wiring diagram: see page B-9.

## Ordering table

Series	Roller	Switching element	Order no.	
			without	Function display L060
NG1...-M	VB Plastic roller	510	086322	091288
	VS Steel roller	510	079934	090599
NZ1...-M	PB Plastic roller	511	088618	094753
		528	090870	On request
		538	090871	
		2131	090872	
		3131	090873	
	PS Steel roller	511	088613	-
		528	090874	090430
		538	090875	-
		2131	090876	-
		3131	090877	-

**Ordering example:** Position switch with safety function **NZ**, cable entry **1**, adjustable lever arm with plastic roller **PB**, snap-action switching element **511**, metric thread M20 x 1.5 **M**  
**NZ1PB-511-M**

Order no. 088613

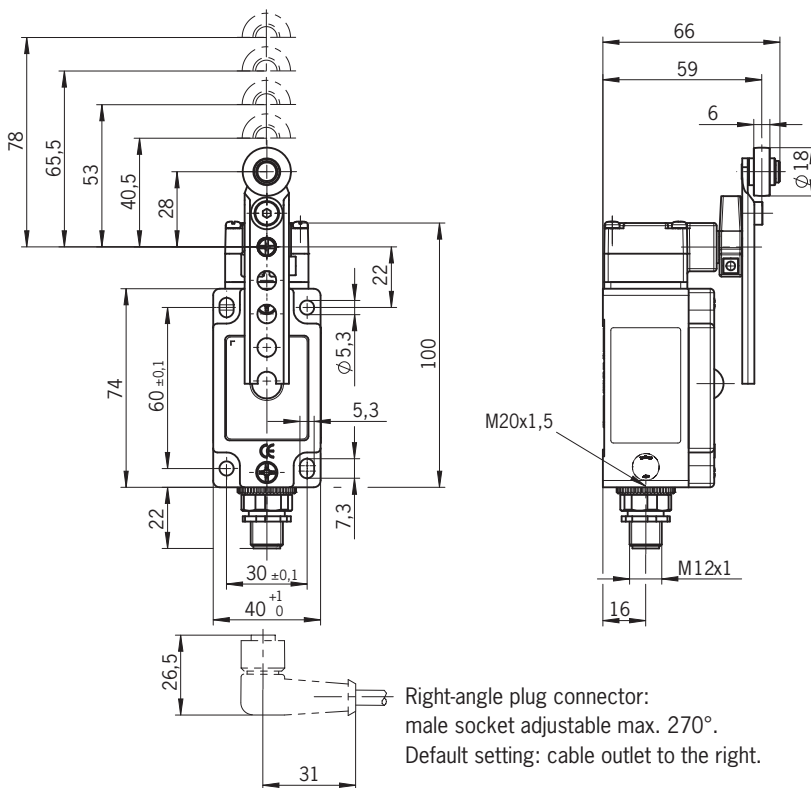
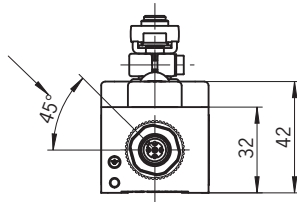
## Position switch series NZ2...



- ▶ **Adjustable roller lever arm**
  - PB** (plastic roller)
  - PS** (steel roller)
- ▶ **Plug connector M12/SVM5**

### Dimension drawing

Guide lug aligned



### Switching elements

- ▶ **511** Snap-action switching contact  
1 NC ⊖ + 1 NO  
(further information: see page B-9)

### LED function display

A yellow function display is available for the following voltage ranges:

- ▶ 12-60 V AC/DC (standard) L060

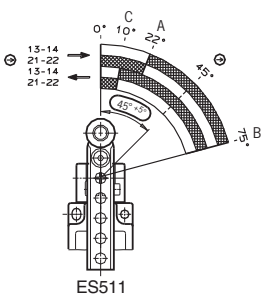
### Adjustment options (see page B-8)

- ▶ Horizontal 4 x 90°
- ▶ Vertical 8 x 45°

### Switching direction

Switches to the right, left or both sides (see page B-8).

### Travel diagrams



**Contacts**  
□ open  
▨ closed

**A** Operating point  
**B** End position  
**C** Reset point

⚠ If damaged or worn, safety switches must be replaced as a unit.

### Notes on installation for position switches with safety switching elements

To achieve the positively driven travel, the trip dog must be mounted so that it actuates the lever arm to the angle  $(45^{\circ} \pm 5^{\circ})$ . Actuating elements such as cam approach guides must be positively mounted in accordance with EN 1088, i.e. riveted, welded or otherwise secured against becoming loose.

## Technical data

Parameter	Value		Unit
Housing material	Anodized die-cast alloy		
Degree of protection acc. to IEC 60529	IP 67		
Installation position	Any		
Mechanical life	30 x 10 <sup>6</sup> operating cycles		
Ambient temperature	- 25 ... + 80 (-40 °C on request)		°C
Weight	Approx. 0.3		kg
Actuator	Adjustable roller lever arm		
Roller material	Plastic (PB)	Steel (PS)	
Approach speed, max. <sup>1)</sup>	120	30	m/min
Approach speed, min.	0.5		m/min
Positively driven acc. to IEC 60947-5-1, appendix K	See symbol $\ominus$ in travel diagram		
Actuating force, min.	15		N
Switching elements	<b>511</b> 1 $\ominus$ + 1 NO		
Switching principle	Snap-action switching contact		
Contact material	Silver alloy, gold flashed		
Contact closing time	< 4		ms
Contact bounce time	< 3		ms
Rated impulse withstand voltage U <sub>imp</sub>	1.5		kV
Rated insulation voltage U <sub>i</sub>	50		V
Utilization category acc. to IEC 60947-5-1			
with plug connector SVM5	AC15	I <sub>e</sub> 4 A U <sub>e</sub> 30 V	
	DC13	I <sub>e</sub> 4 A U <sub>e</sub> 24 V	
Switching current, min., at switching voltage	10		mA
	24		V DC
Conventional thermal current I <sub>th</sub>	4		A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)	4		A gG
Connection	Plug connector M12 <sup>2)</sup>		

1) The specified approach speed applies to an approach angle of 30°.

2) Wiring diagram: see page B-10.

## Ordering table

Series	Roller	Switching element	Order no.	
			without	Function display L060
NZ2...	PB Plastic roller	511	-	098646
	PS Steel roller	511	106697	098645

**Ordering example:** Position switch with safety function **NZ**, plug connector **2**, adjustable lever arm with steel roller **PS**, snap-action switching element **511**, M12 male socket with PE connection **SVM5**  
**NZ2PS-511SVM5**

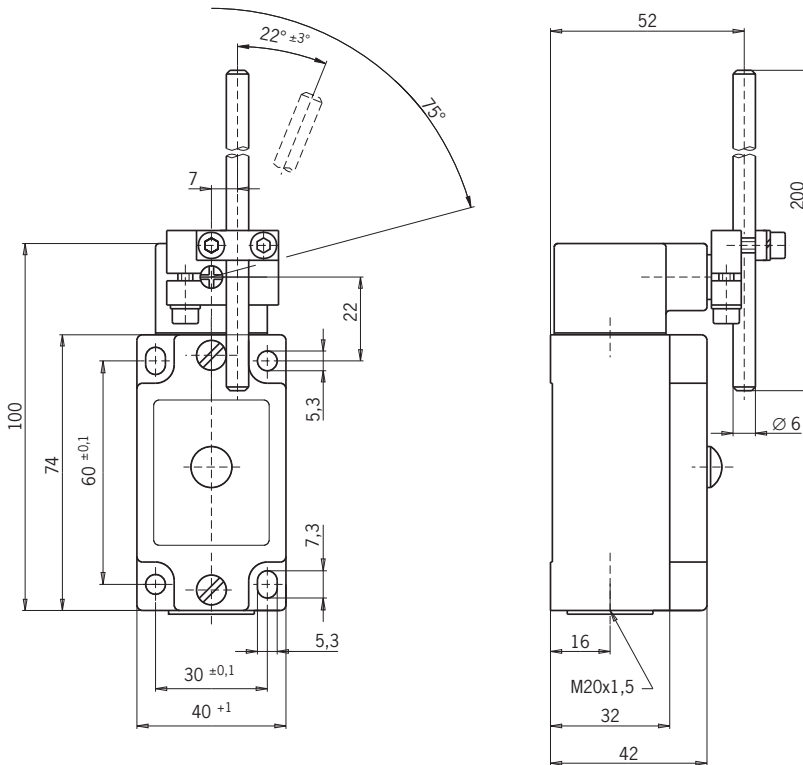
Order no. 106697

## Position switch series NG1...



- ▶ Pivoted lever arm **SB** (plastic rod)  
**SM** (aluminum rod)
- ▶ Cable entry **M20 x 1.5** (plug connector on request)

### Dimension drawing



### Switching elements

- ▶ **510** Snap-action switching contact  
1 NC + 1 NO  
(further information: see page B-9)

### LED function display

A red function display LED is available for the following voltage ranges:

- ▶ 12-60 V AC/DC (standard) L060
- ▶ 110 V AC ±15% (on request) L110
- ▶ 230 V AC ±15% (on request) L220

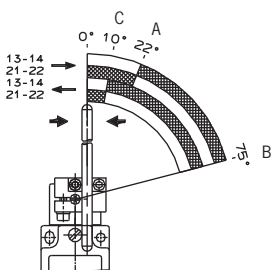
### Adjustment options

Horizontal and vertical 4 x 90° (see page B-8).

### Switching direction

Switches to the right, left or both sides (see page B-8).

### Travel diagrams



**Contacts**

**A** Operating point  
**B** End position  
**C** Reset point



## Technical data

Parameter	Value		Unit
Housing material	Anodized die-cast alloy		
Degree of protection acc. to IEC 60529	IP 67		
Installation position	Any		
Mechanical life	30 x 10 <sup>6</sup> operating cycles		
Ambient temperature	- 25 ... + 80 (-40 °C on request)		°C
Weight	Approx. 0.3		kg
Actuator	Pivoted lever arm		
Roller material	Plastic (SB)	Aluminum (SM)	
Approach speed, max.	60		m/min
Approach speed, min.	0.5		m/min
Operating point accuracy	± 1		°
Actuating force, min.	15		N
Switching elements	<b>510</b> 1 NC + 1 NO		
Switching principle	Snap-action switching contact		
Contact material	Silver alloy, gold flashed		
Contact closing time	< 4		ms
Contact bounce time	< 3		ms
Rated impulse withstand voltage U <sub>imp</sub>	2.5		kV
Rated insulation voltage U <sub>i</sub>	250		V
Utilization category acc. to IEC 60947-5-1			
	AC12	I <sub>e</sub> 10 A U <sub>e</sub> 230 V	
	AC15	I <sub>e</sub> 6 A U <sub>e</sub> 230 V	
	DC13	I <sub>e</sub> 6 A U <sub>e</sub> 24 V	
Switching current, min., at switching voltage	10 24		mA V DC
Conventional thermal current I <sub>th</sub>	6		A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)	10/6		A gG
Connection	Screw terminal <sup>1)</sup>		
Conductor cross-section, max.	2 x 1.5		mm <sup>2</sup>

1) Wiring diagram: see page B-9.

## Ordering table

Series	Actuator	Switching element	Order no.	
			without	Function display
NG1...-M	SB Plastic rod	510	088609	L060 090577
	SM Aluminum rod	510	079932	090575

**Ordering example:** Position switch without safety function **NG**, cable entry **1**, pivoted lever arm with plastic rod **SB**, snap-action switching element **510**, function display **L060** 10 - 60 V, metric thread M20 x 1.5 **M**  
**NG1SB-510L060-M**

Order no. 090577

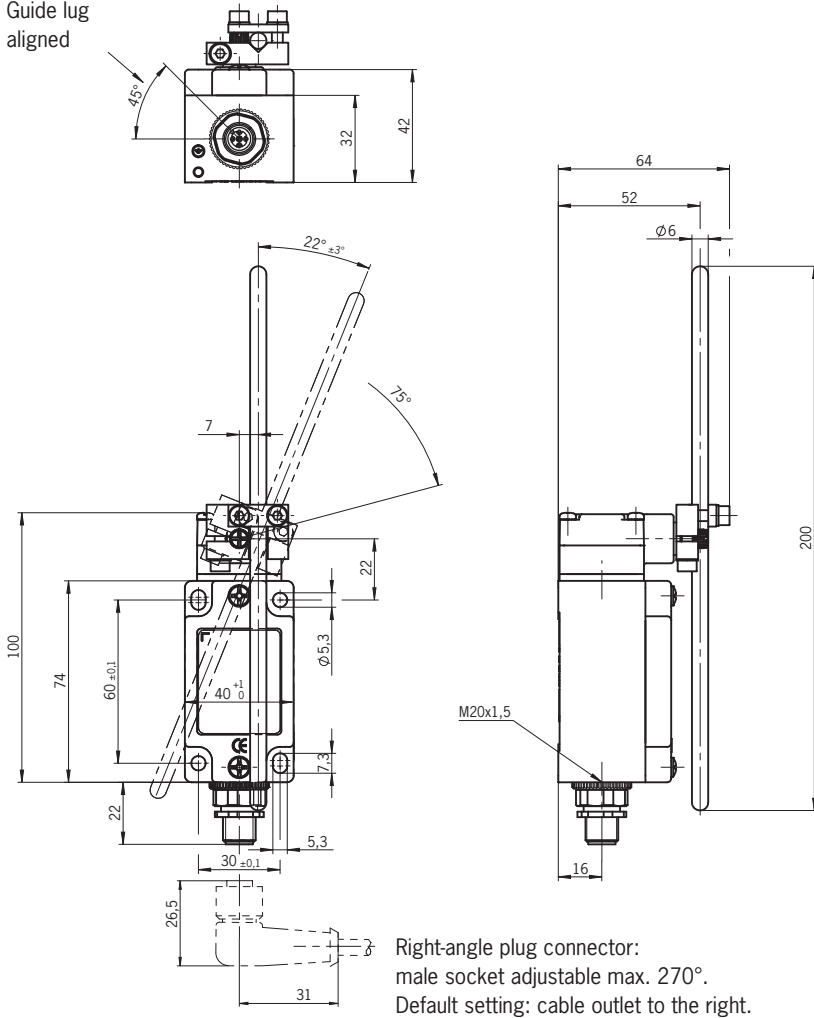
## Position switch series NG2...



- ▶ Pivoted lever arm **SB** (plastic rod)  
**SM** (aluminum rod)
- ▶ Plug connector M12/SVM5

### Dimension drawing

Guide lug aligned



### Switching elements

- ▶ **510** Snap-action switching contact  
1 NC + 1 NO  
(further information: see page B-9)

### LED function display

Available on request

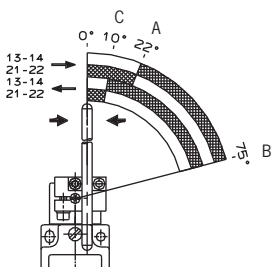
### Adjustment options

Horizontal and vertical 4 x 90° (see page B-8).

### Switching direction

Switches to the right, left or both sides (see page B-8).

### Travel diagrams



### Contacts



### A Operating point

**B** End position

**C** Reset point

## Technical data

Parameter	Value		Unit
Housing material	Anodized die-cast alloy		
Degree of protection acc. to IEC 60529	IP 67		
Installation position	Any		
Mechanical life	30 x 10 <sup>6</sup> operating cycles		
Ambient temperature	- 25 ... + 80 (-40 °C on request)		°C
Weight	Approx. 0.3		kg
Actuator	Pivoted lever arm		
Roller material	Plastic (SB)	Aluminum (SM)	
Approach speed, max.	60		m/min
Approach speed, min.	0.5		m/min
Operating point accuracy	± 1		°
Actuating force, min.	15		N
Switching elements	<b>510</b> 1 NC + 1 NO		
Switching principle	Snap-action switching contact		
Contact material	Silver alloy, gold flashed		
Contact closing time	< 4		ms
Contact bounce time	< 3		ms
Rated impulse withstand voltage U <sub>imp</sub>	1.5		kV
Rated insulation voltage U <sub>i</sub>	50		V
Utilization category acc. to IEC 60947-5-1			
Plug connector SVM5	AC15	I <sub>e</sub> 4 A U <sub>e</sub> 30 V	
	DC13	I <sub>e</sub> 4 A U <sub>e</sub> 24 V	
Switching current, min., at switching voltage	10		mA
	24		V DC
Conventional thermal current I <sub>th</sub>	4		A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)	4		A gG
Connection	Plug connector M12 <sup>1)</sup>		

1) Wiring diagram: see page B-10.

## Ordering table

Series	Actuator	Switching element	Order no.
			Plug connector SVM5
NG2...	<b>SB</b> Plastic rod	510	<b>091303</b>
	<b>SM</b> Aluminum rod	510	<b>094059</b>

**Ordering example:** Position switch without safety function **NG**, plug connector **2**, pivoted lever arm with plastic rod **SB**, snap-action switching element **510**, M12 male socket with PE connection **SVM5**  
**NG2SB-510SVM5**

Order no. **091303**

## Position switch series NG1.../NZ1...

- ▶ **Plunger actuator**  
**WO** (domed plunger) / **KO** (ball plunger)  
**DO** (chisel plunger) / **RK** (roller plunger with small steel roller)
- ▶ **Cable entry M20 x 1.5**

NG...

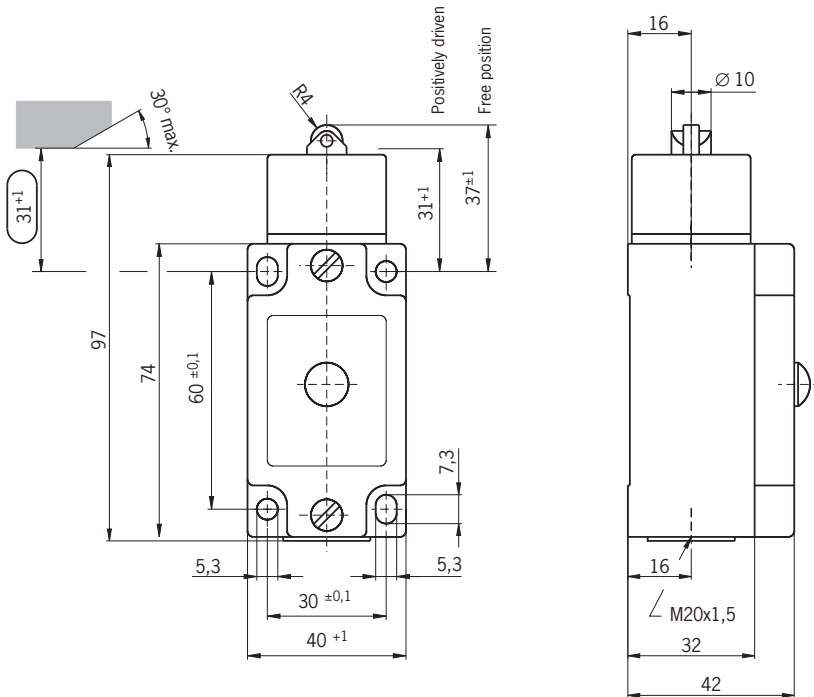


NZ...



- 1) - Not applicable to NZ with switching element 511.
- Not applicable to NZ versions DO and KO.
- 2) - Not applicable to NG/NZ versions DO and KO with switching element 528H, 538H, 2131H, 3131H.

### Dimension drawing



### Switching elements

- ▶ **510** Snap-action switching contact  
1 NC + 1 NO
- ▶ **511** Snap-action switching contact  
1 NC ⊖ + 1 NO
- ▶ **528H** Slow-action switching contact  
1 NC ⊖ + 1 NO
- ▶ **538H** Slow-action switching contact  
2 NC ⊖
- ▶ **2131H** Slow-action switching contact  
3 NC ⊖ + 1 NO
- ▶ **3131H** Slow-action switching contact  
2 NC ⊖ + 2 NO

(further information: see page B-9)

### LED function display

A red function display LED is available for the following voltage ranges:

- ▶ 12-60 V AC/DC (standard) L060
- ▶ 110 V AC ±15% (on request) L110
- ▶ 230 V AC ±15% (on request) L220

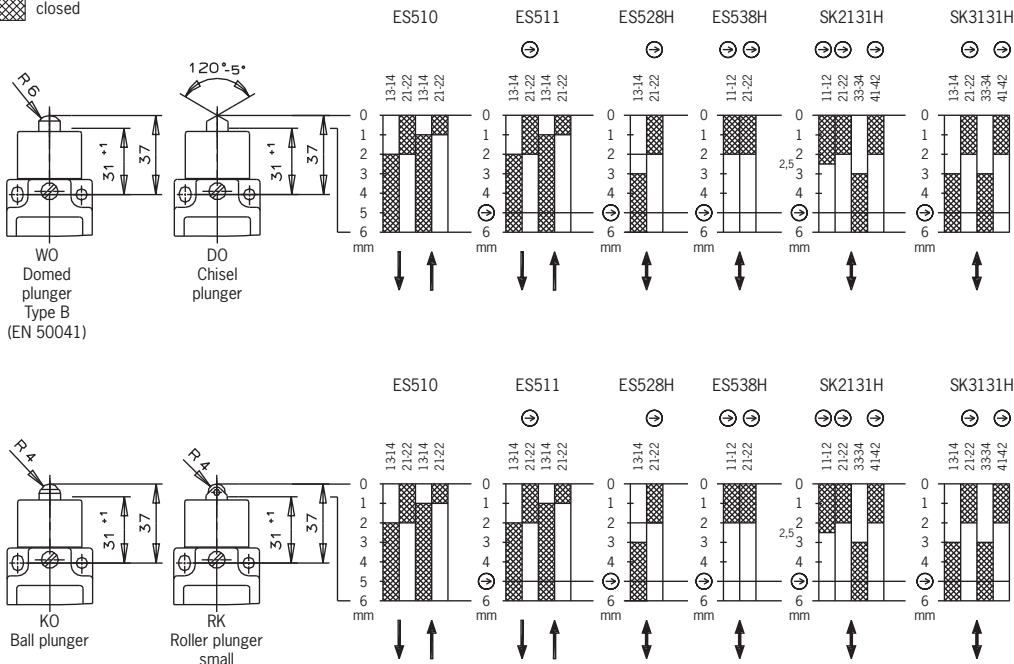
### Adjustment options

Horizontal 4 x 90° (see page B-8).

⚠ To achieve the positively driven travel, the dimension (31 ±1) must be maintained by the trip dog. Actuating elements such as cam approach guides must be positively mounted in accordance with EN 1088, i.e. riveted, welded or otherwise secured against becoming loose.

### Travel diagrams

**Contacts**



## Technical data

Parameter	Value				Unit	
Housing material	Anodized die-cast alloy					
Degree of protection acc. to IEC 60529	IP 67					
Installation position	Any					
Mechanical life	30 x 10 <sup>6</sup> operating cycles					
Ambient temperature	- 25 ... + 80 (-40 °C on request)				°C	
Weight	Approx. 0.3				kg	
Actuator	Domed plunger (WO)	Chisel plunger (DO)	Ball plunger (KO)	Roller plunger, small (RK)		
Approach speed, max. <sup>1)</sup>	10			50	m/min	
Approach speed, min.	0.1				m/min	
Operating point accuracy <sup>2)</sup>	± 0.002		0.01		mm	
Positively driven acc. to IEC 60947-5-1, appendix K	See symbol ⊖ in travel diagram					
Actuating force, min.	15				N	
Switching elements	<b>510</b> 1 NC + 1 NO	<b>528H</b> 1 NC ⊖ + 1 NO	<b>538H</b> 2 NC ⊖			
	<b>511</b> 1 ⊖ + 1 NO	<b>2131H</b> 3 NC ⊖ + 1 NO	<b>3131H</b> 2 NC ⊖ + 2 NO			
Switching principle	Snap-action switching cont.	Slow-action switching contact with H-contact bridge				
Contact material	Silver alloy, gold flashed					
Contact closing time	< 4				ms	
Contact bounce time	< 3				ms	
Rated impulse withstand voltage U <sub>imp</sub>	2.5				kV	
Rated insulation voltage U <sub>i</sub>	250				V	
Utilization category acc. to IEC 60947-5-1	AC12	I <sub>e</sub> 10 A U <sub>e</sub> 230 V	-			
	AC15	I <sub>e</sub> 6 A U <sub>e</sub> 230 V	I <sub>e</sub> 4 A U <sub>e</sub> 230 V			
	DC13	I <sub>e</sub> 6 A U <sub>e</sub> 24 V	I <sub>e</sub> 4 A U <sub>e</sub> 24 V			
Switching current, min., at switching voltage	10 24	1 24	10 12	1 24	10 12	mA V DC
Conventional thermal current I <sub>th</sub>	6	4			A	
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)	10/6	4			A gG	
Connection	Screw terminal <sup>3)</sup>					
Conductor cross-section, max.	2 x 1.5				mm <sup>2</sup>	

1) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639.

2) The reproducible operating point accuracy refers to the plunger's axial travel, after a run-in of approx. 2,000 operating cycles.

3) Wiring diagram: see page B-9.

## Ordering table

Series	Actuator	Switching element	Order no.	
			without	Function display L060
NG1...-M  NZ1...-M	WO Domed plunger	510	<b>079945</b>	On request
		511	<b>088611</b>	<b>089057</b>
		528	<b>089624</b>	<b>089078</b>
		538	<b>090878</b>	<b>089046</b>
		2131	<b>089629</b>	-
		3131	<b>089626</b>	-
NG1...-M  NZ1...-M	DO Chisel plunger	510	<b>088616</b>	On request
		511	<b>088620</b>	
		528	<b>090901</b>	
		538	<b>090902</b>	
		2131	<b>090903</b>	
		3131	<b>090904</b>	
NG1...-M  NZ1...-M	RK Roller plunger, small	510	<b>088619</b>	On request
		511	<b>088608</b>	<b>090354</b>
		528	<b>090905</b>	<b>090358</b>
		538	<b>090906</b>	On request
		2131	<b>090907</b>	-
		3131	<b>090908</b>	-
NG1...-M	KO Ball plunger	510	<b>088604</b>	On request

**Ordering example:** Position switch with safety function **NZ**, cable entry **1**, domed plunger **WO**, snap-action switching element **511**, function display **L060** 10 - 60 V, metric thread M20 x 1.5 **M**  
**NZ1WO-511L060-M**

Order no. **089057**

## Position switch series NG2.../NZ2...

- ▶ **Plunger actuator**  
**WO** (domed plunger) / **KO** (ball plunger)  
**DO** (chisel plunger) / **RK** (roller plunger with small steel roller)
- ▶ **Plug connectors SR6 and SR11**

NG...

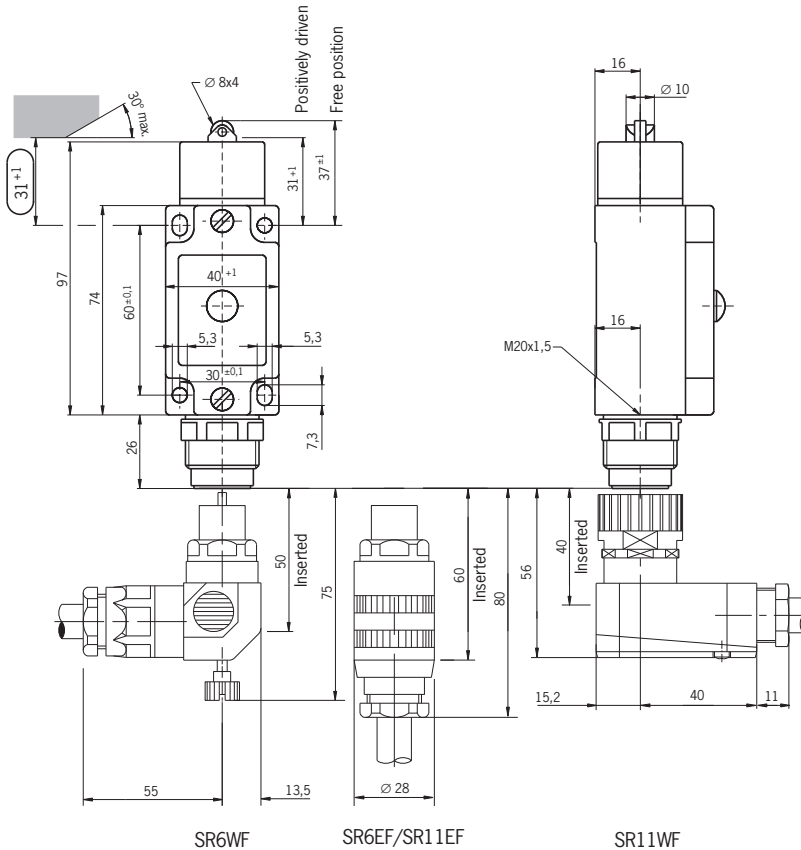


NZ...



- 1) - Not applicable to NZ with switching element 511.
- Not applicable to NZ versions DO and KO.
- 2) - Not applicable to NG/NZ versions DO and KO with switching element 528H, 538H, 2131H, 3131H.

### Dimension drawing



### Switching elements

- ▶ **510** Snap-action switching contact  
1 NC + 1 NO
- ▶ **511** Snap-action switching contact  
1 NC ⊖ + 1 NO
- ▶ **528H** Slow-action switching contact  
1 NC ⊖ + 1 NO
- ▶ **538H** Slow-action switching contact  
2 NC ⊖
- ▶ **2131H** Slow-action switching contact  
3 NC ⊖ + 1 NO
- ▶ **3131H** Slow-action switching contact  
2 NC ⊖ + 2 NO

(further information: see page B-9)

### LED function display

A red function display LED is available for the following voltage ranges:

- ▶ 12-60 V AC/DC (standard) L060
- ▶ 110 V AC ±15% (on request) L110
- ▶ 230 V AC ±15% (on request) L220

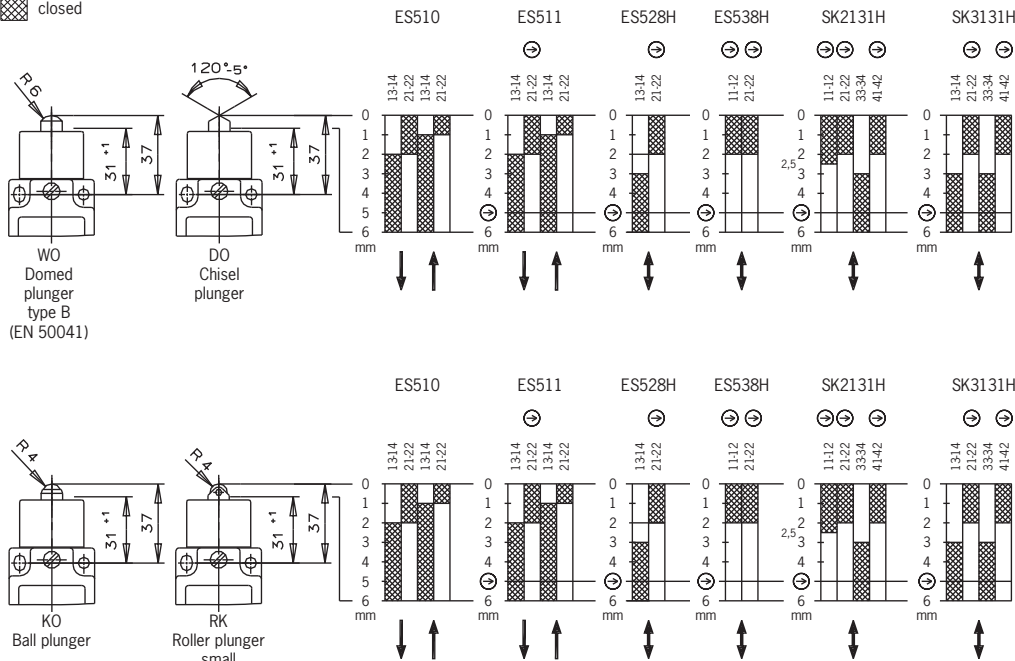
### Adjustment options

Horizontal 4 x 90° (see page B-8).

⚠ To achieve the positively driven travel, the dimension  $31^{+1}$  must be maintained by the trip dog. Actuating elements such as cam approach guides must be positively mounted in accordance with EN 1088, i.e. riveted, welded or otherwise secured against becoming loose.

### Travel diagrams

**Contacts**



## Technical data

Parameter	Value					Unit
Housing material	Anodized die-cast alloy					
Degree of protection acc. to IEC 60529	IP 65					
Installation position	Any					
Mechanical life	30 x 10 <sup>6</sup> operating cycles					
Ambient temperature	- 25 ... + 80 (-40 °C on request)					°C
Weight	Approx. 0.3					kg
Actuator	Domed plunger (WO)	Chisel plunger (DO)	Ball plunger (KO)	Roller plunger, small (RK)		
Approach speed, max. <sup>1)</sup>	10			50		m/min
Approach speed, min.	0.1					m/min
Operating point accuracy <sup>2)</sup>	± 0.002		0.01			°
Positively driven acc. to IEC 60947-5-1, appendix K	See symbol ⊖ in travel diagram					
Actuating force, min.	15					N
Switching elements	<b>510</b> 1 NC + 1 NO	<b>528H</b> 1 NC ⊖ + 1 NO	<b>538H</b> 2 NC ⊖			
	<b>511</b> 1 ⊖ + 1 NO	<b>2131H</b> 3 NC ⊖ + 1 NO	<b>3131H</b> 2 NC ⊖ + 2 NO			
Switching principle	Snap-action switching cont.	Slow-action switching contact with H-contact bridge				
Contact material	Silver alloy, gold flashed					
Contact closing time	< 4					ms
Contact bounce time	< 3					ms
Switching current, min., at switching voltage	10	1	10	1	10	mA
	24	24	12	24	12	V DC
Conventional thermal current I <sub>th</sub>	6	4				A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)	6	4				A gG
Connection	Plug connector according to DIN 43651 <sup>3)</sup>					
Rated impulse withstand voltage U <sub>imp</sub>	With plug connector SR6					kV
	2.5					
	With plug connector SR11					1.5
Rated insulation voltage U <sub>i</sub>	With plug connector SR6					V
	250					
	With plug connector SR11					
Utilization category acc. to IEC 60947-5-1	With plug connector SR6	AC15	I <sub>e</sub> 6 A U <sub>e</sub> 230 V	I <sub>e</sub> 4 A U <sub>e</sub> 230 V		
		DC13	I <sub>e</sub> 6 A U <sub>e</sub> 24 V	I <sub>e</sub> 4 A U <sub>e</sub> 24 V		
	With plug connector SR11	AC15		I <sub>e</sub> 4 A U <sub>e</sub> 50 V		
		DC13		I <sub>e</sub> 4 A U <sub>e</sub> 24 V		

1) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639.

2) The reproducible operating point accuracy refers to the plunger's axial travel, after a run-in of approx. 2,000 operating cycles.

3) Wiring diagram: see page B-10.

## Ordering table

Series	Actuator	Switching element	Order no.	
			without	Function display L060
NG2...	WO Domed plunger	510	090012	On request
		511	090909	091280
		528	090910	091279
		538	090911	087558
		2131	090912	-
NG2...	DO Chisel plunger	510	090011	On request
		511	090015	
		528	090914	
		538	090915	
		2131	090916	
NG2...	RK Roller plunger, small	510	090918	091300
		511	090016	099273
		528	090919	091292
		538	090920	On request
		2131	090921	-
NG2...	KO Ball plunger	510	090922	-
		510	090020	On request

## Position switch series NG2.../NZ2...

- ▶ **Plunger actuator**  
**WO** (domed plunger) / **KO** (ball plunger)  
**DO** (chisel plunger) / **RK** (roller plunger with small steel roller)
- ▶ **Plug connector M12/SVM5**

NG...

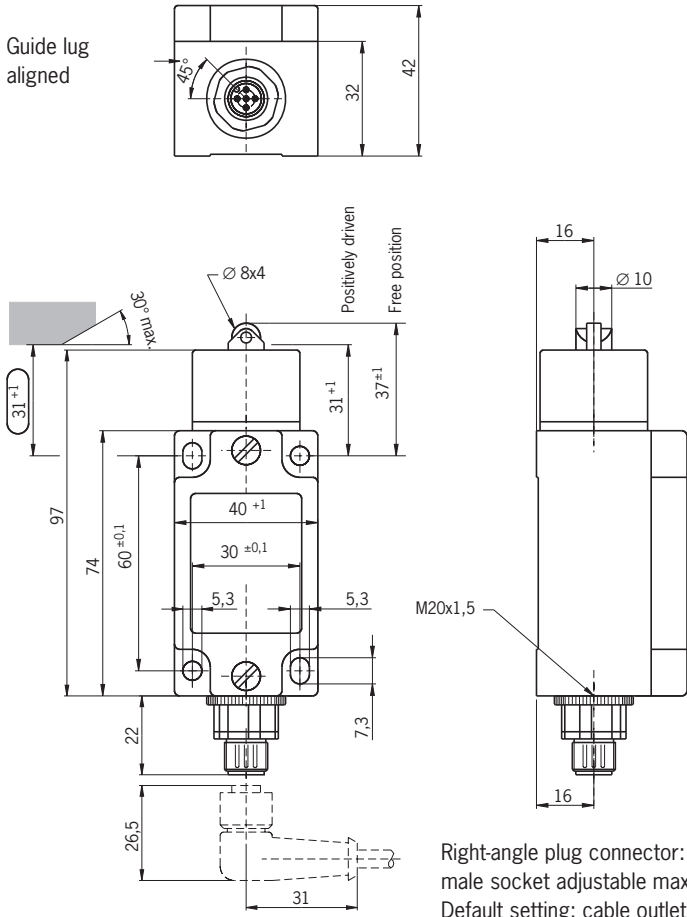


NZ...



- 1) - Not applicable to NZ with switching element 511.  
 - Not applicable to NZ versions DO and KO.
- 2) - Not applicable to NG/NZ versions DO and KO with switching element 528H, 538H, 2131H, 3131H.

### Dimension drawing



### Switching elements

- ▶ **510** Snap-action switching contact  
1 NC + 1 NO
- ▶ **511** Snap-action switching contact  
1 NC ⊖ + 1 NO
- ▶ **528H** Slow-action switching contact  
1 NC ⊖ + 1 NO
- ▶ **538H** Slow-action switching contact  
2 NC ⊖

(further information: see page B-9)

### LED function display

A red function display LED is available for the following voltage ranges:

- ▶ 12-60 V AC/DC (standard) L060
- ▶ 110 V AC ±15% (on request) L110
- ▶ 230 V AC ±15% (on request) L220

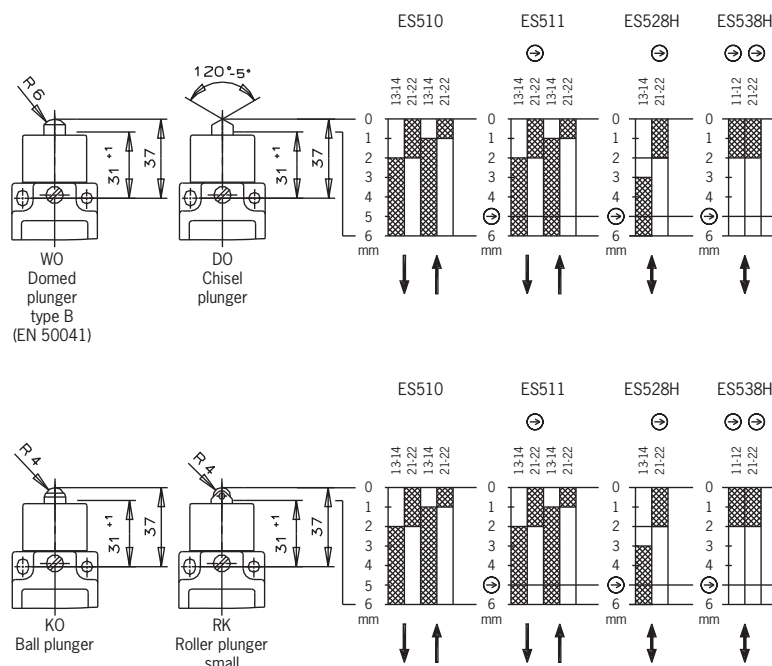
### Adjustment options

Horizontal 4 x 90° (see page B-8).

⚠ To achieve the positively driven travel, the dimension 31<sup>+1</sup> must be maintained by the trip dog. Actuating elements such as cam approach guides must be positively mounted in accordance with EN 1088, i.e. riveted, welded or otherwise secured against becoming loose.

### Travel diagrams

**Contacts**  
 □ open  
 ▨ closed





## Technical data

Parameter	Value				Unit	
Housing material	Anodized die-cast alloy					
Degree of protection acc. to IEC 60529	IP 67					
Installation position	Any					
Mechanical life	30 x 10 <sup>6</sup> operating cycles					
Ambient temperature	- 25 ... + 80 (-40 °C on request)				°C	
Weight	Approx. 0.3				kg	
Actuator	Domed plunger (WO)	Chisel plunger (DO)	Ball plunger (KO)	Roller plunger, small (RK)		
Approach speed, max. <sup>1)</sup>	10			50	m/min	
Approach speed, min.	0.1				m/min	
Operating point accuracy <sup>2)</sup>	± 0.002		0.01		mm	
Positively driven acc. to IEC 60947-5-1, appendix K	See symbol ⊖ in travel diagram					
Actuating force, min.	15				N	
Switching elements	<b>510</b> 1 NC + 1 NO	<b>528H</b> 1 NC ⊖ + 1 NO	<b>538H</b> 2 NC ⊖			
	<b>511</b> 1 ⊖ + 1 NO					
Switching principle	Snap-action switching contact	Slow-action switching contact with H-contact bridge				
Contact material	Silver alloy, gold flashed					
Contact closing time	< 4				ms	
Contact bounce time	< 3				ms	
Rated impulse withstand voltage U <sub>imp</sub>	1.5				kV	
Rated insulation voltage U <sub>i</sub>	50				V	
Utilization category acc. to IEC 60947-5-1	Plug connector SVM5		AC15		I <sub>e</sub> 4 A U <sub>e</sub> 30 V	
			DC13		I <sub>e</sub> 4 A U <sub>e</sub> 24 V	
					I <sub>e</sub> 4 A U <sub>e</sub> 24 V	
Switching current, min., at switching voltage	10	24	10	1	10	mA
Conventional thermal current I <sub>th</sub>	4			4		A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)	4			4		A gG
Connection	Plug connector M12 <sup>3)</sup>					

1) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639.

2) The reproducible operating point accuracy refers to the plunger's axial travel, after a run-in of approx. 2,000 operating cycles.

3) Wiring diagram: see page B-10.

## Ordering table

Series	Actuator	Switching element	Order no.	
			Plug connector SVM5	
NG2...	WO Domed plunger	510	090018	
		511	089014	
		528	090923	
NG2...	DO Chisel plunger	538	090924	
		510	090014	
		511	090927	
NG2...	RK Roller plunger, small	528	090928	
		538	090929	
		510	089020	
NG2...	KO Ball plunger	511	089007	
		528	090930	
		538	089018	
NG2...		510	090931	

**Ordering example:** Position switch without safety function **NG**, plug connector **2**, small roller plunger **RK**, snap-action switching element **510**, M12 male socket with PE connection **SVM5**  
**NG2RK-510SVM5**

Order no. 089020

## Position switch series NG1.../NZ1...

- ▶ **Plunger actuator**
  - RG** (roller plunger, plastic roller)
  - RS** (roller plunger, steel roller)
  - RL** (extended roller plunger)
- ▶ **Cable entry** M20 x 1.5

NG...

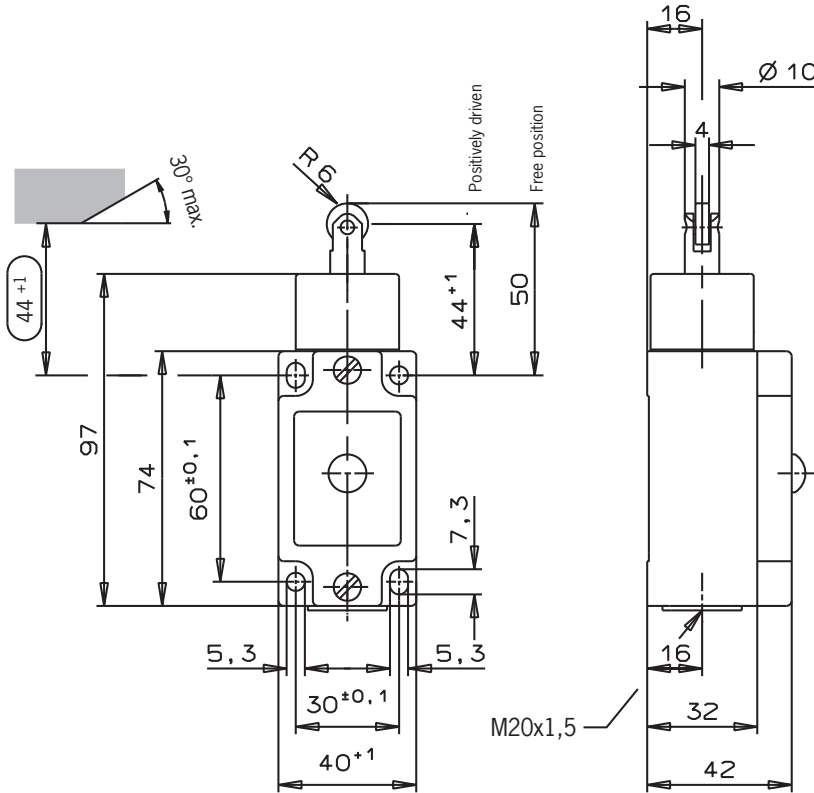


NZ...



1) Not applicable to NZ with switching element 511.

### Dimension drawing



### Switching elements

- ▶ **510** Snap-action switching contact  
1 NC + 1 NO
  - ▶ **511** Snap-action switching contact  
1 NC ⊖ + 1 NO
  - ▶ **528H** Slow-action switching contact  
1 NC ⊖ + 1 NO
  - ▶ **538H** Slow-action switching contact  
2 NC ⊖
  - ▶ **2131H** Slow-action switching contact  
3 NC ⊖ + 1 NO
  - ▶ **3131H** Slow-action switching contact  
2 NC ⊖ + 2 NO
- (further information: see page B-9)

### LED function display

A red function display LED is available for the following voltage ranges:

- ▶ 12-60 V AC/DC (standard) L060
- ▶ 110 V AC ±15% (on request) L110
- ▶ 230 V AC ±15% (on request) L220

### Adjustment options

Horizontal 4 x 90° (see page B-8).

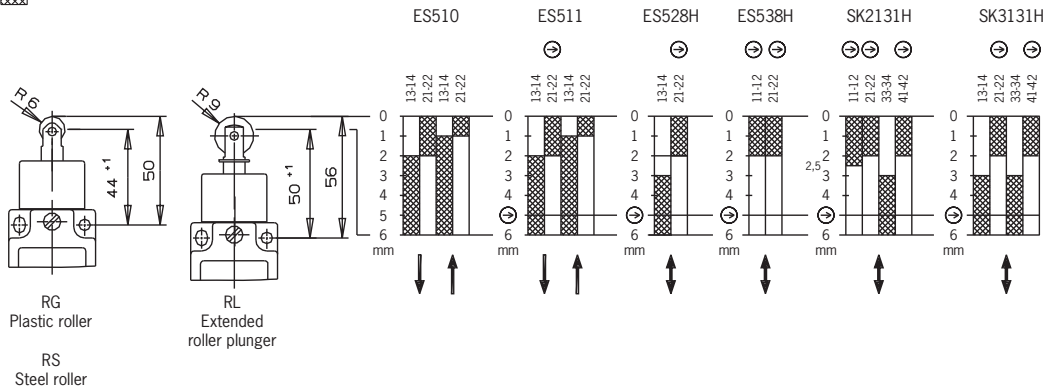
⚠ If damaged or worn, safety switches must be replaced as a unit.

### Notes on installation for position switches with safety switching elements

To achieve the positively driven travel, the dimension  $44 \pm 1$  must be maintained by the trip dog. Actuating elements such as cam approach guides must be positively mounted in accordance with EN 1088, i.e. riveted, welded or otherwise secured against becoming loose.

### Travel diagrams

**Contacts**



## Technical data

Parameter	Value				Unit	
Housing material	Anodized die-cast alloy					
Degree of protection acc. to IEC 60529	IP 67					
Installation position	Any					
Mechanical life	30 x 10 <sup>6</sup> operating cycles					
Ambient temperature	- 25 ... + 80 (-40 °C on request)				°C	
Weight	Approx. 0.3				kg	
Actuator	Roller plunger, plastic roller (RG)	Roller plunger, steel roller (RS)	Extended roller plunger (RL)			
Approach speed, max. <sup>1)</sup>	20				m/min	
Approach speed, min.	0.1				m/min	
Operating point accuracy <sup>2)</sup>	± 0.1				mm	
Positively driven acc. to IEC 60947-5-1, appendix K	See symbol ⊖ in travel diagram					
Actuating force, min.	15				N	
Switching elements	<b>510</b> 1 NC + 1 NO	<b>528H</b> 1 NC ⊖ + 1 NO	<b>538H</b> 2 NC ⊖			
	<b>511</b> 1 ⊖ + 1 NO	<b>2131H</b> 3 NC ⊖ + 1 NO	<b>3131H</b> 2 NC ⊖ + 2 NO			
Switching principle	Snap-action switching contact	Slow-action switching contact with H-contact bridge				
Contact material	Silver alloy, gold flashed					
Contact closing time	< 4				ms	
Contact bounce time	< 3				ms	
Rated impulse withstand voltage U <sub>imp</sub>	2.5				kV	
Rated insulation voltage U <sub>i</sub>	250				V	
Utilization category acc. to IEC 60947-5-1	AC12	I <sub>e</sub> 10 A U <sub>e</sub> 230 V	-			
	AC15	I <sub>e</sub> 6 A U <sub>e</sub> 230 V	I <sub>e</sub> 4 A U <sub>e</sub> 230 V			
	DC13	I <sub>e</sub> 6 A U <sub>e</sub> 24 V	I <sub>e</sub> 4 A U <sub>e</sub> 24 V			
Switching current, min., at switching voltage	10	1	10	1	10	mA
	24	24	12	24	12	V DC
Conventional thermal current I <sub>th</sub>	6	4			A	
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)	10/6	4			A gG	
Connection	Screw terminal <sup>3)</sup>					
Conductor cross-section, max.	2 x 1.5				mm <sup>2</sup>	

1) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639.

2) The reproducible operating point accuracy refers to the plunger's axial travel, after a run-in of approx. 2,000 operating cycles.

3) Wiring diagram: see page B-9.

## Ordering table

Series	Actuator	Switching element	Order no.	
			without	Function display L060
NG1...-M	RG Roller plunger Plastic roller	510	079941	090398
		511	088605	089052
		528	090932	090008
		538	090933	090009
		2131	090934	-
		3131	090935	-
NG1...-M	RS Roller plunger Steel roller	510	079942	079943
		511	079960	089053
		528	089627	086413
		538	090936	090555
		2131	089633	-
		3131	089631	-
NG1...-M	RL Extended roller plunger	510	086324	090602
		511	088614	088996
		528	090937	090938
		538	090939	090940
		2131	090941	-
		3131	090942	-

**Ordering example:** Position switch with safety function **NZ**, cable entry **1**, roller plunger with plastic roller **RG**, snap-action switching element **511**, function display **L060** 10 - 60 V, metric thread M20 x 1.5 **M**  
**NZ1RG-511L060-M**

Order no. 089052

## Position switch series NG2.../NZ2...

- ▶ **Plunger actuator** **RG** (roller plunger, plastic roller)
- RS** (roller plunger, steel roller)
- RL** (extended roller plunger)
- ▶ **Plug connectors** **SR6** and **SR11**

**NG...**

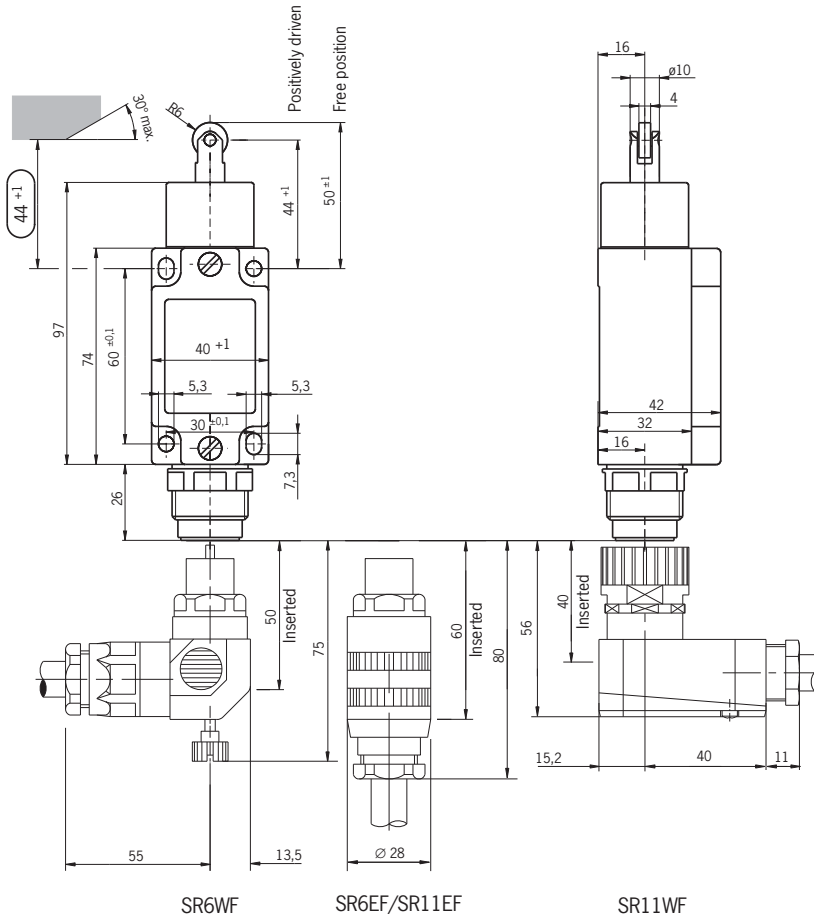


**NZ...**



1) Not applicable to NZ with switching element 511.

### Dimension drawing



### Switching elements

- ▶ **510** Snap-action switching contact  
1 NC + 1 NO
  - ▶ **511** Snap-action switching contact  
1 NC ⊖ + 1 NO
  - ▶ **528H** Slow-action switching contact  
1 NC ⊖ + 1 NO
  - ▶ **538H** Slow-action switching contact  
2 NC ⊖
  - ▶ **2131H** Slow-action switching contact  
3 NC ⊖ + 1 NO
  - ▶ **3131H** Slow-action switching contact  
2 NC ⊖ + 2 NO
- (further information: see page B-9)

### LED function display

A red function display LED is available for the following voltage ranges:

- ▶ 12-60 V AC/DC (standard) L060
- ▶ 110 V AC ±15% (on request) L110
- ▶ 230 V AC ±15% (on request) L220

### Adjustment options

Horizontal 4 x 90° (see page B-8).

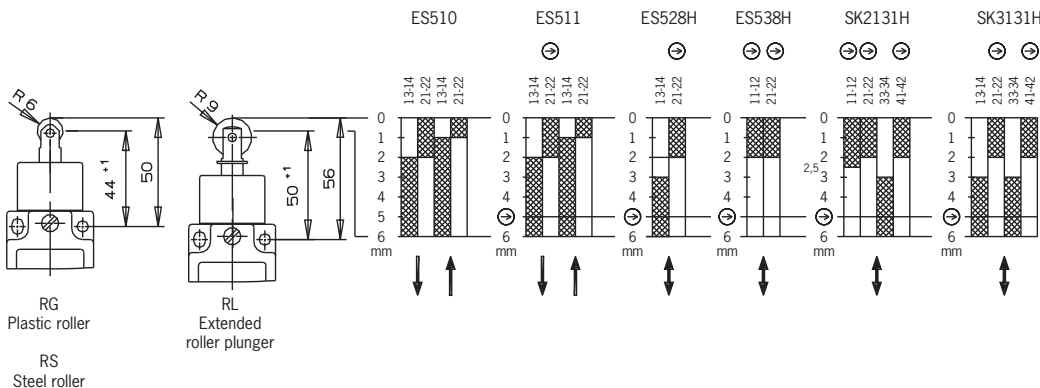
⚠ If damaged or worn, safety switches must be replaced as a unit.

### Notes on installation for position switches with safety switching elements

To achieve the positively driven travel, the dimension  $44^{+1}$  must be maintained by the trip dog. Actuating elements such as cam approach guides must be positively mounted in accordance with EN 1088, i.e. riveted, welded or otherwise secured against becoming loose.

### Travel diagrams

**Contacts**



## Technical data

Parameter	Value					Unit
Housing material	Anodized die-cast alloy					
Degree of protection acc. to IEC 60529	IP 65					
Installation position	Any					
Mechanical life	30 x 10 <sup>6</sup> operating cycles					
Ambient temperature	- 25 ... + 80 (-40 °C on request)					°C
Weight	Approx. 0.3					kg
Actuator	Roller plunger, plastic roller (RG)	Roller plunger, steel roller (RS)	Extended roller plunger (RL)			
Approach speed, max. <sup>1)</sup>	20					m/min
Approach speed, min.	0.1					m/min
Operating point accuracy <sup>2)</sup>	± 0.1					mm
Positively driven acc. to IEC 60947-5-1, appendix K	See symbol ⊖ in travel diagram					
Actuating force, min.	15					N
Switching elements	<b>510</b> 1 NC + 1 NO	<b>528H</b> 1 NC ⊖ + 1 NO	<b>538H</b> 2 NC ⊖			
	<b>511</b> 1 ⊖ + 1 NO	<b>2131H</b> 3 NC ⊖ + 1 NO	<b>3131H</b> 2 NC ⊖ + 2 NO			
Switching principle	Snap-action switching cont.	Slow-action switching contact with H-contact bridge				
Contact material	Silver alloy, gold flashed					
Contact closing time	< 4					ms
Contact bounce time	< 3					ms
Switching current, min., at switching voltage	10	1	10	1	10	mA
	24	24	12	24	12	V DC
Conventional thermal current I <sub>th</sub>	6	4				A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)	6	4				A gG
Connection	Plug connector according to DIN 43651 <sup>3)</sup>					
Rated impulse withstand voltage U <sub>imp</sub>	With plug connector SR6					kV
	With plug connector SR11					
	With plug connector SR11					
Rated insulation voltage U <sub>i</sub>	With plug connector SR6					V
	With plug connector SR11					
	With plug connector SR11					
Utilization category acc. to IEC 60947-5-1	With plug connector SR6	AC15	I <sub>e</sub> 6 A U <sub>e</sub> 230 V	I <sub>e</sub> 4 A U <sub>e</sub> 230 V		
		DC13	I <sub>e</sub> 6 A U <sub>e</sub> 24 V	I <sub>e</sub> 4 A U <sub>e</sub> 24 V		
	With plug connector SR11	AC15	I <sub>e</sub> 4 A U <sub>e</sub> 50 V	I <sub>e</sub> 4 A U <sub>e</sub> 50 V		
		DC13	I <sub>e</sub> 4 A U <sub>e</sub> 24 V	I <sub>e</sub> 4 A U <sub>e</sub> 24 V		

1) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639.

2) The reproducible operating point accuracy refers to the plunger's axial travel, after a run-in of approx. 2,000 operating cycles.

3) Wiring diagram: see page B-10.

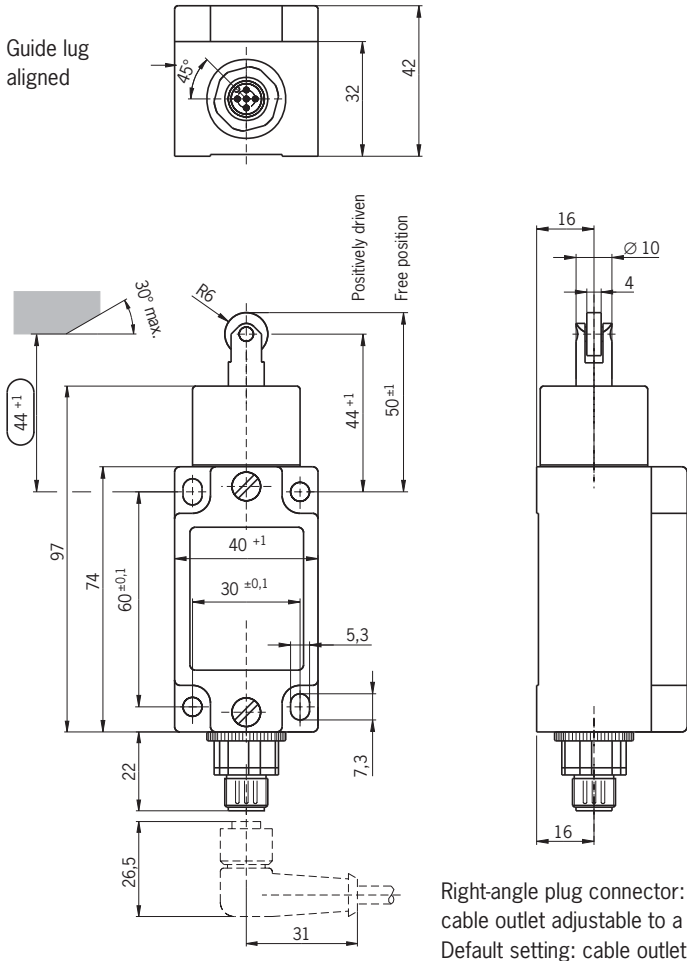
## Ordering table

Series	Actuator	Switching element	Order no.	
			without	Function display L060
NG2... N22...	RG Roller plunger Plastic roller	510	090021	090949
		511	090032	091284
		528	090943	090944
		538	090945	090946
		2131	090947	-
		3131	090948	-
NG2... N22...	RS Roller plunger Steel roller	510	090953	On request
		511	090024	090147
		528	090950	088197
		538	090951	090952
		2131	090149	-
		3131	090954	-
NG2... N22...	RL Extended roller plunger	510	090022	091285
		511	090025	090955
		528	090956	091282
		538	090957	091278
		2131	090958	-
		3131	090959	-

## Position switch series NG2.../NZ2...

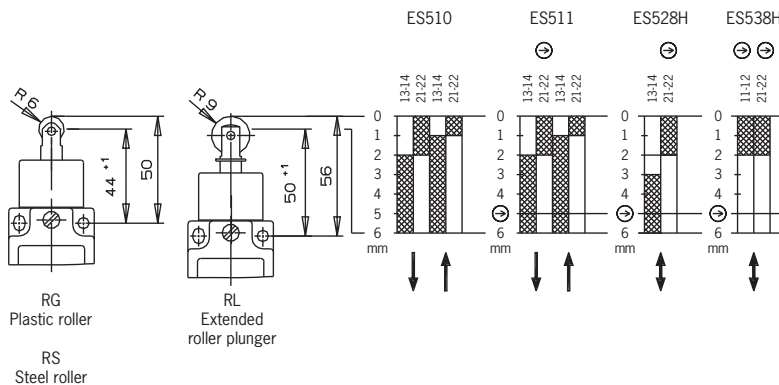
- ▶ **Plunger actuator** **RG** (roller plunger, plastic roller)
- RS** (roller plunger, steel roller)
- RL** (extended roller plunger)
- ▶ **Plug connector** **M12/SVM5**

### Dimension drawing



### Travel diagrams

**Contacts**



NG...



NZ...



1) Not applicable to NZ with switching element 511.

### Switching elements

- ▶ **510** Snap-action switching contact  
1 NC + 1 NO
- ▶ **511** Snap-action switching contact  
1 NC ⊖ + 1 NO
- ▶ **528H** Slow-action switching contact  
1 NC ⊖ + 1 NO
- ▶ **538H** Slow-action switching contact  
2 NC ⊖

(further information: see page B-9)

### LED function display

Available on request

### Adjustment options

Horizontal 4 x 90° (see page B-8).

⚠ If damaged or worn, safety switches must be replaced as a unit.

### ⚠ Notes on installation for position switches with safety switching elements

To achieve the positively driven travel, the dimension (44 +1) must be maintained by the trip dog. Actuating elements such as cam approach guides must be positively mounted in accordance with EN 1088, i.e. riveted, welded or otherwise secured against becoming loose.

## Technical data

Parameter	Value				Unit	
Housing material	Anodized die-cast alloy					
Degree of protection acc. to IEC 60529	IP 67					
Installation position	Any					
Mechanical life	30 x 10 <sup>6</sup> operating cycles					
Ambient temperature	- 25 ... + 80 (-40 °C on request)				°C	
Weight	Approx. 0.3				kg	
Actuator	Roller plunger, plastic roller (RG)	Roller plunger, steel roller (RS)	Extended roller plunger (RL)			
Approach speed, max. <sup>1)</sup>	20				m/min	
Approach speed, min.	0.1				m/min	
Operating point accuracy <sup>2)</sup>	± 0.1				mm	
Positively driven acc. to IEC 60947-5-1, appendix K	See symbol ⊖ in travel diagram					
Actuating force, min.	15				N	
Switching elements	<b>510</b> 1 NC + 1 NO	<b>528H</b> 1 NC ⊖ + 1 NO	<b>538H</b> 2 NC ⊖			
	<b>511</b> 1 ⊖ + 1 NO					
Switching principle	Snap-action switching contact	Slow-action switching contact with H-contact bridge				
Contact material	Silver alloy, gold flashed					
Contact closing time	< 4				ms	
Contact bounce time	< 3				ms	
Rated impulse withstand voltage U <sub>imp</sub>	1.5				kV	
Rated insulation voltage U <sub>i</sub>	50				V	
Utilization category acc. to IEC 60947-5-1	Plug connector SVM5		AC15		I <sub>e</sub> 4 A U <sub>e</sub> 30 V	
			DC13		I <sub>e</sub> 4 A U <sub>e</sub> 24 V	
					I <sub>e</sub> 4 A U <sub>e</sub> 24 V	
Switching current, min., at switching voltage	10	24	10	1	10	mA
Conventional thermal current I <sub>th</sub>	4			4		A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)	4			4		A gG
Connection	Plug connector M12 <sup>3)</sup>					

1) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639.

2) The reproducible operating point accuracy refers to the plunger's axial travel, after a run-in of approx. 2,000 operating cycles.

3) Wiring diagram: see page B-10.

## Ordering table

Series	Actuator	Switching element	Order no.			
			Plug connector SVM5			
NG2...	RG Roller plunger Plastic roller	510	090960			
NZ2...		511	090026			
		528	090961			
		538	090962			
NG2...	RS Roller plunger Steel roller	510	088632			
NZ2...		511	090027			
		528	090963			
		538	090964			
NG2...	RL Extended roller plunger	510	On request			
NZ2...		511	090028			
		528	On request			
		538				

**Ordering example:** Position switch with safety function **NZ**, plug connector **2**, roller plunger with plastic roller **RG**, snap-action switching element **511**, M12 male socket with PE connection **SVM5**  
**NZ2RG-511SVM5**

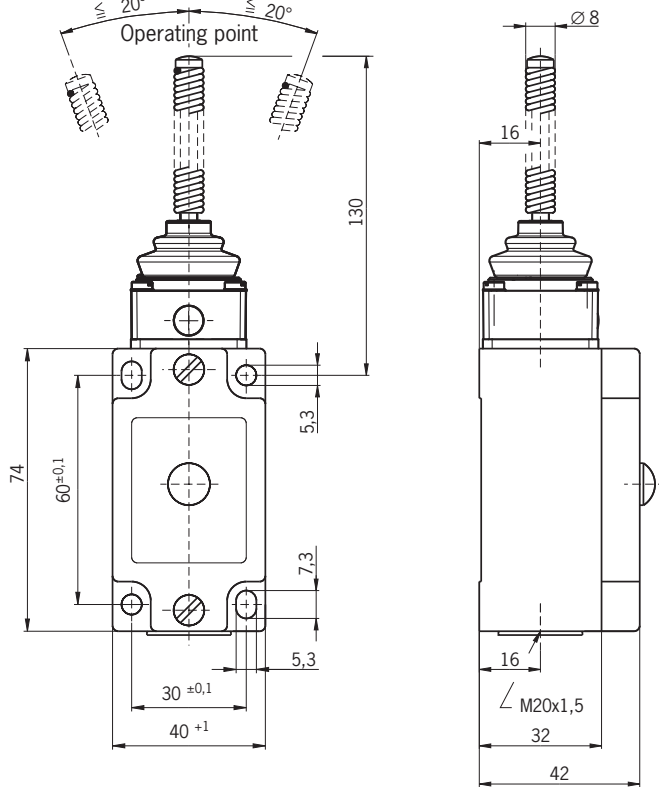
Order no. 090026

## Position switch series NG1...



- ▶ Spring actuator FO
- ▶ Cable entry M20 x 1.5
- ▶ Actuating direction: all sides

### Dimension drawing



### Switching elements

- ▶ **510** Snap-action switching contact  
1 NC + 1 NO  
(further information: see page B-9)

### LED function display

A red function display LED is available for the following voltage ranges:

- |                 |              |      |
|-----------------|--------------|------|
| ▶ 12-60 V AC/DC | (standard)   | L060 |
| ▶ 110 V AC ±15% | (on request) | L110 |
| ▶ 230 V AC ±15% | (on request) | L220 |



## Technical data

Parameter	Value	Unit
Housing material	Anodized die-cast alloy	
Degree of protection acc. to IEC 60529	IP 67	
Installation position	Any	
Mechanical life	30 x 10 <sup>6</sup> operating cycles	
Ambient temperature	- 25 ... + 80 (-40 °C on request)	°C
Weight	Approx. 0.35	kg
Actuator	Spring actuator made of spring steel wire (FO)	
Approach speed, max.	20	m/min
Approach speed, min.	0.5	m/min
Actuating force, min.	5	N
Switching elements	<b>510</b> 1 NC + 1 NO	
Switching principle	Snap-action switching contact	
Contact material	Silver alloy, gold flashed	
Contact closing time	< 4	ms
Contact bounce time	< 3	ms
Rated impulse withstand voltage U <sub>imp</sub>	2.5	kV
Rated insulation voltage U <sub>i</sub>	250	V
Utilization category acc. to IEC 60947-5-1		
	AC12	I <sub>e</sub> 10 A U <sub>e</sub> 230 V
	AC15	I <sub>e</sub> 6 A U <sub>e</sub> 230 V
	DC13	I <sub>e</sub> 6 A U <sub>e</sub> 24 V
Switching current, min., at switching voltage	10	mA
	24	V DC
Conventional thermal current I <sub>th</sub>	6	A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)	10/6	A gG
Connection	Screw terminal <sup>1)</sup>	
Conductor cross-section, max.	2 x 1.5	mm <sup>2</sup>

1) Wiring diagram: see page B-9.

## Ordering table

Series	Actuator	Switching element	Order no.	
			without	Function display L060
NG1...-M	FO Spring actuator	510	079911	090029

### Ordering example:

Position switch without safety function **NG**, cable entry **1**, spring steel wire spring actuator **FO**, snap-action switching element **510**, function display **L060** 10 - 60 V, metric thread M20 x 1.5 **M**  
**NG1FO-510L060-M**

Order no. 090 029

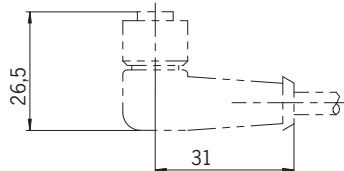
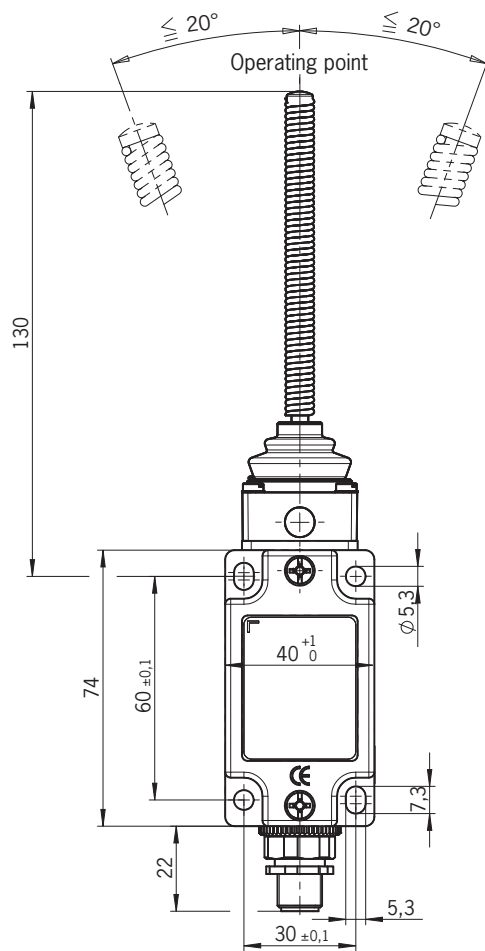
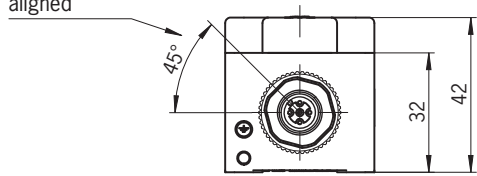
## Position switch series NG2...



- ▶ Spring actuator FO
- ▶ Plug connector M12/SVM5
- ▶ Actuating direction: all sides

### Dimension drawing

Guide lug aligned



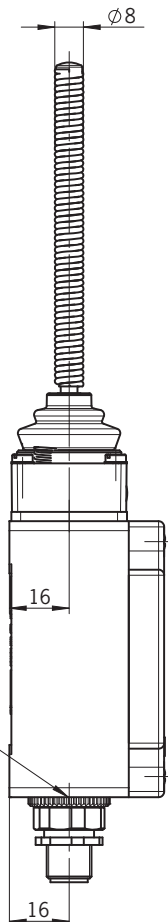
Right-angle plug connector:  
cable outlet adjustable to max.  
270°.  
Default setting: cable outlet to the right.

### Switching elements

- ▶ **510** Snap-action switching contact  
1 NC + 1 NO  
(further information: see page B-9)

### LED function display

Available on request



## Technical data

Parameter	Value	Unit
Housing material	Anodized die-cast alloy	
Degree of protection acc. to IEC 60529	IP 67	
Installation position	Any	
Mechanical life	30 x 10 <sup>6</sup> operating cycles	
Ambient temperature	- 25 ... + 80 (-40 °C on request)	°C
Weight	Approx. 0.35	kg
Actuator	Spring actuator made of spring steel wire (FO)	
Approach speed, max.	20	m/min
Approach speed, min.	0.5	m/min
Actuating force, min.	5	N
Switching elements	<b>510</b> 1 NC + 1 NO	
Switching principle	Snap-action switching contact	
Contact material	Silver alloy, gold flashed	
Contact closing time	< 4	ms
Contact bounce time	< 3	ms
Rated impulse withstand voltage U <sub>imp</sub>	1.5	kV
Rated insulation voltage U <sub>i</sub>	50	V
Utilization category acc. to IEC 60947-5-1		
Plug connector SVM5	AC15 DC13	I <sub>e</sub> 4 A U <sub>e</sub> 30 V I <sub>e</sub> 4 A U <sub>e</sub> 24 V
Switching current, min., at switching voltage	10 24	mA V DC
Conventional thermal current I <sub>th</sub>	4	A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)	4	A gG
Connection	Plug connector M12 <sup>1)</sup>	

1) Wiring diagram: see page B-10.

## Ordering table

Series	Actuator	Switching element	Order no.
			Plug connector SVM5
NG2...	FO Spring actuator	510	092058

### Ordering example:

Position switch without safety function **NG**, plug connector **2**, spring steel wire spring actuator **FO**, snap-action switching element **510**, M12 male socket with PE connection **SVM5**  
**NG2FO-510SVM5**

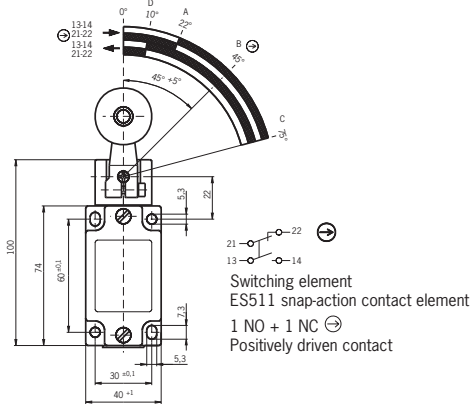
Order no. 092 058

## Special versions (other special versions available on request)

### Position switch with large plastic roller

Diameter 30 mm

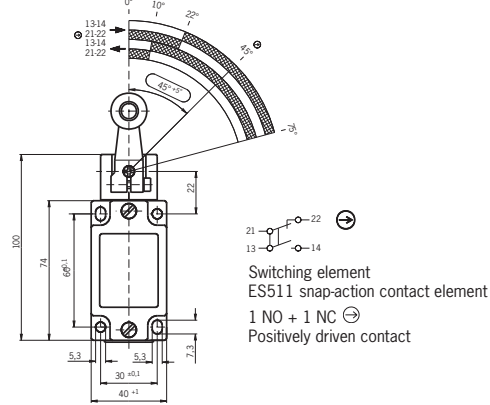
Item	Order no.
NZ1HB-511-MC569	079965



### Position switch with sealed bearings

Diameter 19 mm

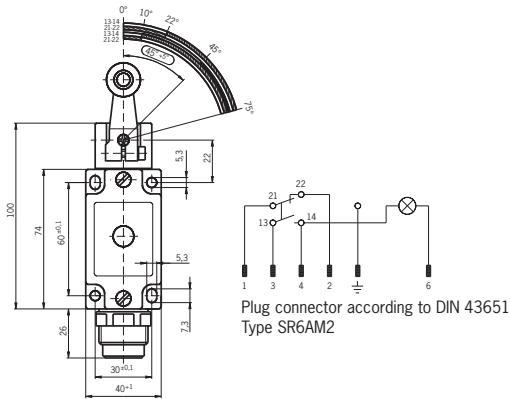
Item	Order no.
NZ1HS-511-MC1833	091312



### Position switch with plug connector according to DIN 43651

VW/Audi, VW mat. no. 2348

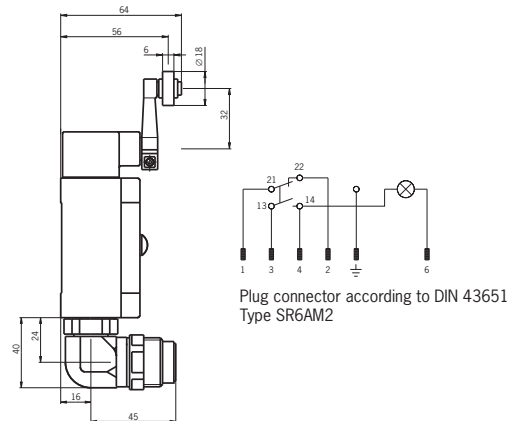
Item	Order no.
NZ2HB-511L060C1630	054121



### Position switch with plug connector and elbow adapter according to DIN 43651

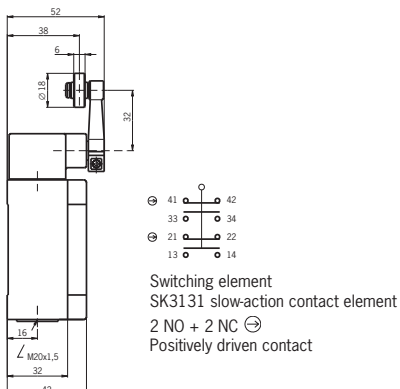
VW/Audi, VW mat. no. 2349

Item	Order no.
NZ2HB-511L060C1631	054122



### Position switch with steel roller on the inside of the lever

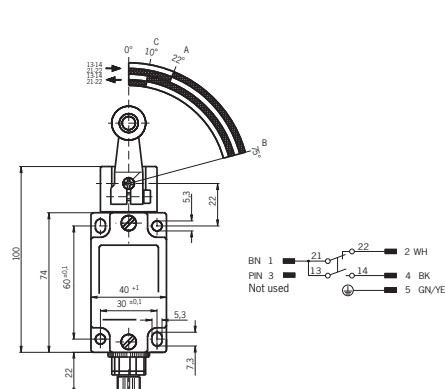
Item	Order no.
NZ1HS-3131-MC1779	079996



### Position switch with M12 plug connector and pin assignment for LED indicator

(pin 3 not used)

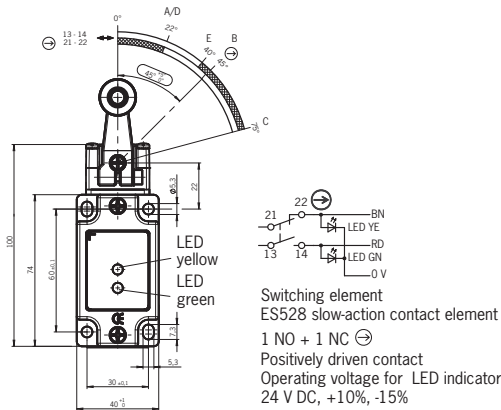
Item	Order no.
NG2HB-510SVM5C1883	086561



## Position switch with two LED indicators

Diameter 18 mm

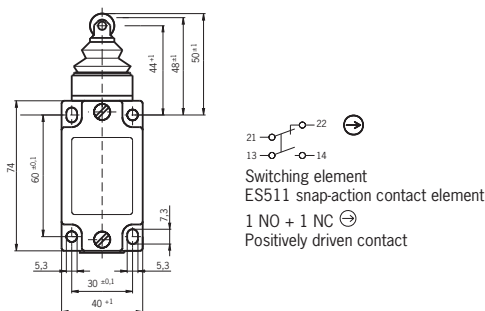
Item		Order no.
NZ1HB-528L024GEGR-M	Plastic roller	099929
NZ1HS-528L024GEGR-M	Steel roller	099930



## Position switch with protective NBR bellows on the plunger guide

Protection against serious contamination and aggressive coolants

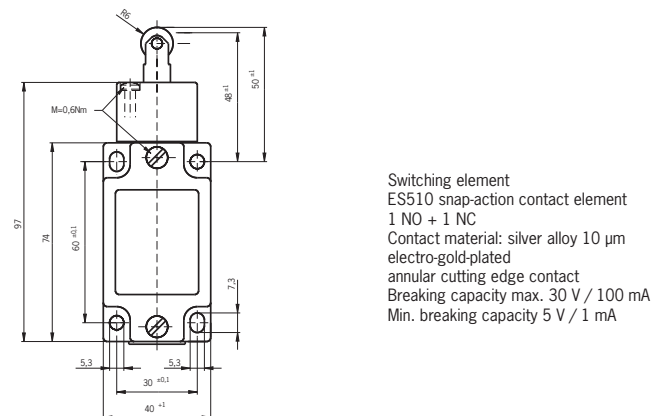
Item	Order no.
NZ1RS-511-MC1588	091352



## Position switch with gold plated contacts

For switching low currents of at least 1 mA

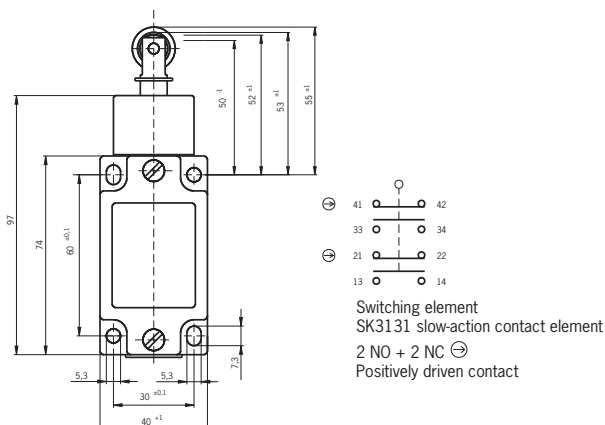
Item	Order no.
NZ1RS-510AU-M	090416



## Position switch with sealed bearings

Diameter 16 mm

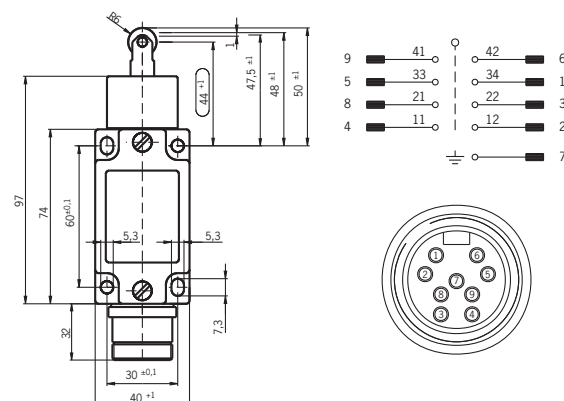
Item	Order no.
NZ1RL-3131-MC1831	089082



## Position switch with MENCOM plug connector

MIN-9MR-1-18

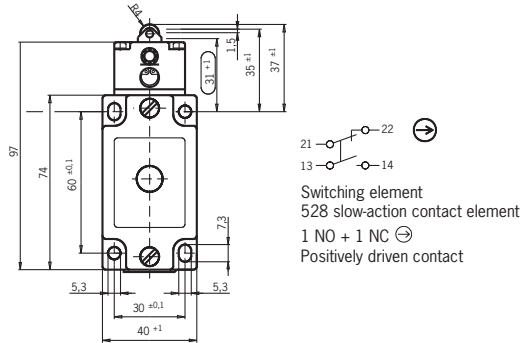
Item	Order no.
NZ1RS-2131-9C-GMMF	077362



## Position switch with small bearing

For high approach speeds and long travel distances

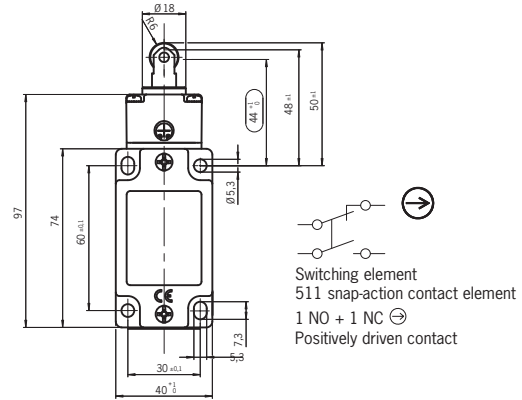
Item	Order no.
NZ1RK-528-MC1912	090572



## Position switch with steel sleeve

For high approach speeds and protected guidance

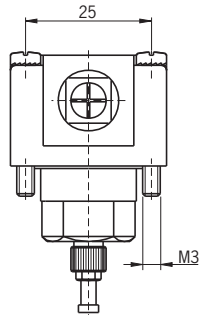
Item	Order no.
NZ1RS-511-MC782	093141



## Accessories

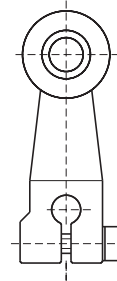
### Lever arm actuation

Item	Order no.
NSA	012051



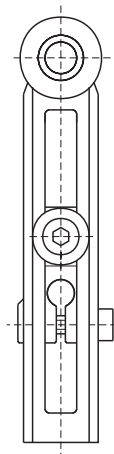
### Roller arm

Item	Order no.
NHB (plastic roller)	012042
NHS (steel roller)	012043
NHSC1834 (ball bearing $\varnothing$ 19 mm)	077349



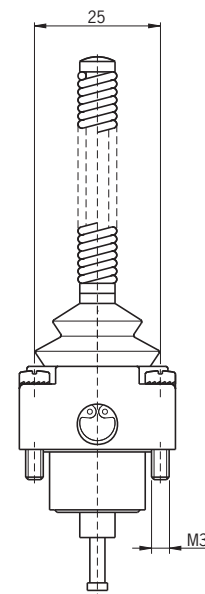
### Adjustable roller arm

Item	Order no.
NVB (plastic roller)	012064
NVS (steel roller)	012065



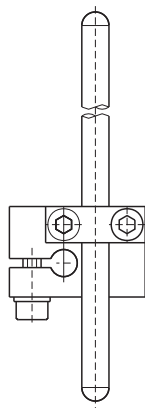
### Spring actuator

Item	Order no.
NFO (spring steel wire)	011909



### Rod lever

Item	Order no.
NSB (plastic rod)	012052
NSM (aluminum rod)	012053



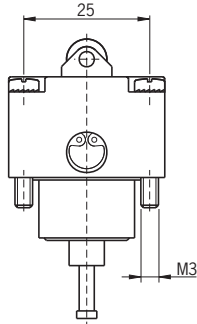
### Notice:

The actuator heads and actuators (except for roller lever NHB, NHS, NHSC...) are replacement parts for position switches without safety function. They do not fit position switches with safety function and must not be operated with these switches.



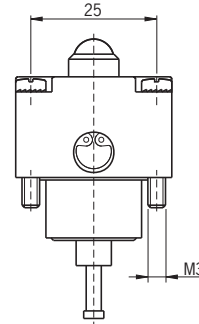
## Actuator with small roller plunger

Item	Order no.
NRK (small steel roller)	012049



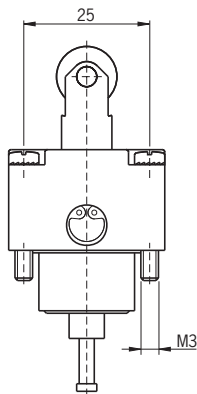
## Actuator with ball plunger

Item	Order no.
NKO (steel ball)	012045



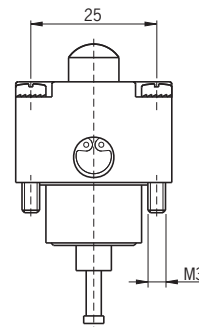
## Actuator with roller plunger $\varnothing$ 12 mm

Item	Order no.
NRG (plastic roller)	012046
NRS (steel roller)	012047



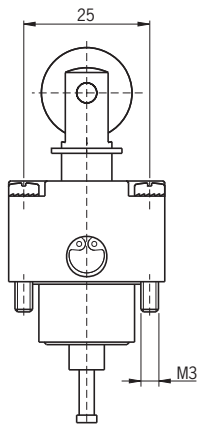
## Actuator with domed plunger

Item	Order no.
NWO (polish-ground dome)	012066



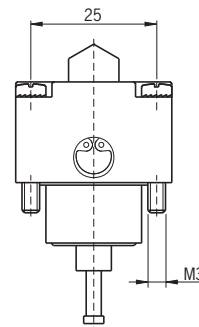
## Actuator with extended roller plunger $\varnothing$ 18 mm

Item	Order no.
NRL (large steel roller)	012050



## Actuator with chisel plunger

Item	Order no.
NDO (polish-ground chisel plunger)	011908



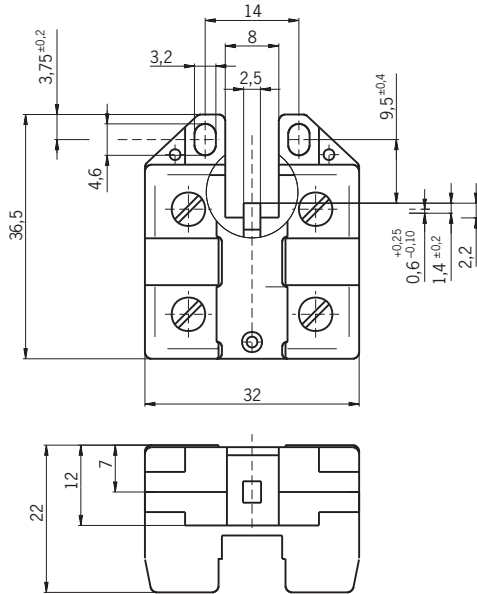
### Notice:

The actuator heads shown are spare parts for position switches without safety function. They do not fit position switches with safety function and must not be operated with these switches.



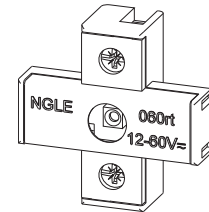
## Switching element ES 510 for series NG...

Item	Order no.
ES 510	010422



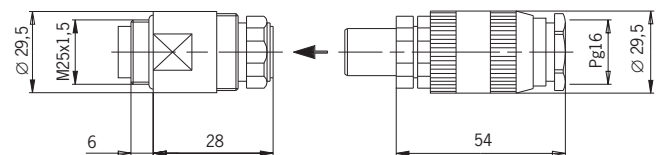
## LED function display for series NG.../NZ...

Item	Voltage [V]	Current [mA]	Order no.
NGLE 060 rt	12-60 AC/DC	≤ 6.5	029220
NGLE 110 rt	110 ±15% AC	≤ 3.5	045822
NGLE 220 rt	230 ±15% AC	≤ 3.5	045825



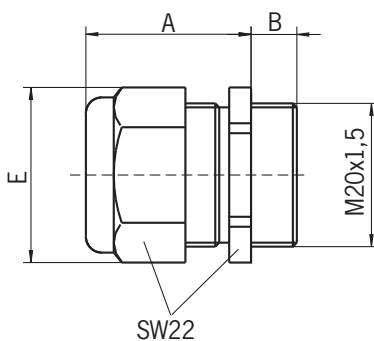
## Male socket/female plug, 12-pin

Item	Order no.
Male socket SD 12-M	085648
Female plug BS 12	002763



## Cable gland M20 x 1.5

Item	Cable outer diameter [mm]	A [mm]	B [mm]	E [mm]	Order no.
EKVM20/06	6.5 - 9.5	20	6	24.5	077683
EKVM20/09	9 - 13	21	6	24.5	077684



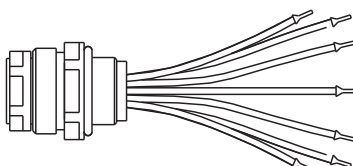
## Technical data

Parameter	Value
Housing material	Metal
Number of pins	11 + PE
Rated voltage	250 V <sub>~</sub>
Level of contamination VDE 0110	2
Connection	Soldered connections
Max. conductor cross-section	1 mm <sup>2</sup>
Contact material / surface	CuZn 1 μ hard gold-plated
Clamping range for cable	12 - 14 mm
Degree of protection acc. to IEC 60529	IP 67/inserted
Ambient temperature range	-20 °C ... +80 °C

## Appliance socket, 7-pin

for series NG.../NZ... with plug connector SR6

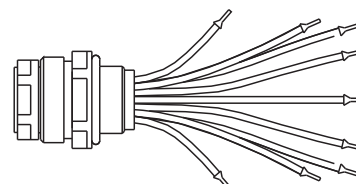
Item	Order no.
Appliance socket, 7-pin, NG/NZ-SR6	093342



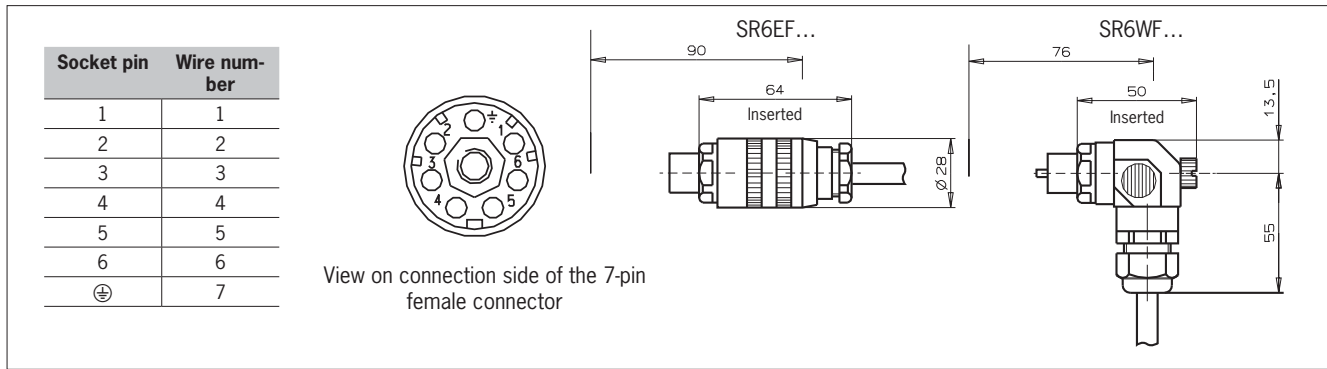
## Appliance socket, 12-pin

for series NG.../NZ... with plug connector SR11

Item	Order no.
Appliance socket, 12-pin, NZ-SR11	093343



## Plug connector SR6 (socket 6+PE) with/without connecting cable



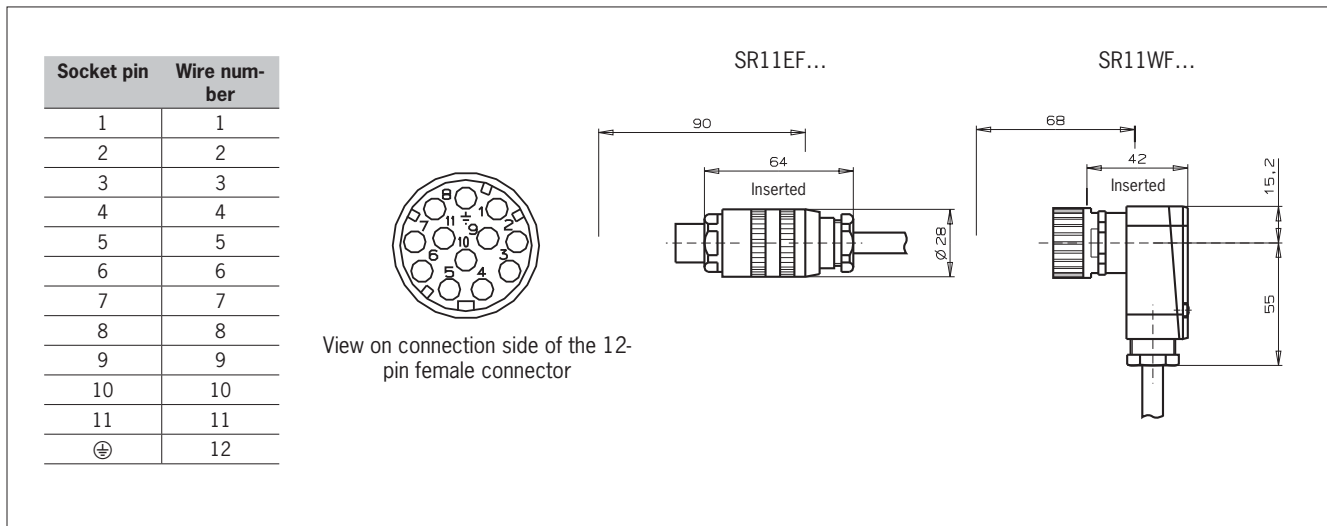
### Technical data

Parameter	Value
Housing material	Plastic
Number of pins	6 + PE
Rated voltage	250 V <sub>≅</sub>
Degree of protection acc. to IEC 60529	IP 65/inserted
Connecting cable	PUR gray
Outer diameter	∅ 8 mm
Conductor cross-section	1.0 mm <sup>2</sup>

### Ordering table

Plug version	Connecting cable	Item	Order no.
Socket Straight	without	SR6EF	<b>013176</b>
	5 m	SR6EF-5000	<b>077632</b>
	10 m	SR6EF-10000	<b>077633</b>
	15 m	SR6EF-15000	<b>077634</b>
Socket Angled	without	SR6WF	<b>024999</b>
	5 m	SR6WF-5000	<b>077638</b>
	10 m	SR6WF-10000	<b>077639</b>
	15 m	SR6WF-15000	<b>077640</b>

## Plug connector SR11 (socket 11+PE) with/without connecting cable



### Technical data

Parameter	Value
Housing material	Plastic
Number of pins	11 + PE
Rated voltage	50 V <sub>≅</sub>
Degree of protection acc. to IEC 60529	IP 65/inserted
Connecting cable	PUR gray
Outer diameter	∅ 10.5 mm
Conductor cross-section	1.0 mm <sup>2</sup>

### Ordering table

Plug version	Connecting cable	Item	Order no.
Straight socket	without	SR11EF	<b>070859</b>
	5 m	SR11EF-5000	<b>077629</b>
	10 m	SR11EF-10000	<b>077630</b>
	15 m	SR11EF-15000	<b>077631</b>
Angled socket	without	SR11WF	<b>054773</b>
	5 m	SR11WF-5000	<b>077635</b>
	10 m	SR11WF-10000	<b>077636</b>
	15 m	SR11WF-15000	<b>077637</b>





# Multiple Limit Switches, Trip Rails and Trip Dogs



**EUCHNER**

More than safety.



## Multiple limit switches, trip rails and trip dogs

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<b>General</b>	<b>C-4</b>
<b>Multiple limit switches</b>	<b>C-8</b>
Accessories	C-23
Technical data	C-26
<b>Trip rails/trip dogs</b>	<b>C-29</b>
<b>Appendix</b>	
Glossary	C-33

## General information on mechanical multiple limit switches

### Use

EUCHNER precision multiple limit switches are used for controlling and positioning in all areas of mechanical and systems engineering and for solving automation tasks.

The main advantages of these highly accurate and reliable positioning devices are:

- ▶ Minimum space requirements due to compact design
- ▶ Low-cost connection through the use of a common control cable
- ▶ Easy access to all switch stations for test and service purposes
- ▶ Easy installation

A range of housing versions, including DIN versions, are available to suit the full spectrum of application fields. A high standard of quality is always guaranteed in every installation position by the degree of protection IP 67.

### Function

Precision multiple limit switches possess several switching elements arranged in a row. The spacing between the individual switching positions of 12 mm and 16 mm is standardized in accordance with DIN 43697. The range is completed with a particularly compact, space-saving version with a spacing of 8 mm.

The switching elements are actuated by means of plungers. This action is achieved with trip dogs in accordance with DIN 69 639, which are mounted with an interference fit in trip rails according to DIN 69 638 (see page C-29).

### Layout

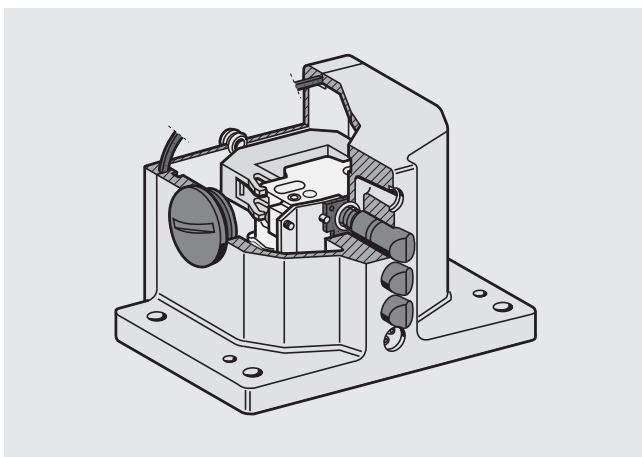
Depending on the technical requirements in terms of operating point accuracy and approach speed, four functionally different plunger types (chisel, roller, ball and domed plungers) are used.

Depending on the plunger type, the reproducible operating point accuracy is  $\pm 0.002$  mm and the maximum approach speed is 120 m/min.

The precision multiple limit switches can be assembled with snap and safety switching elements, or also in combination with inductive switching elements. The mechanical life of the switching elements amounts to  $30 \times 10^6$  mechanical operating cycles.

EUCHNER uses high-quality and proven acrylonitrile-butadiene rubber (NBR) for all seals and sealed areas. This material is resistant to oils, greases, fuels, hydraulic fluids and most known cooling lubricants. Moreover, NBR possesses high mechanical rigidity over a wide temperature range and so it is perfectly suitable for the highly stressed diaphragm seal, which separates the plunger compartment and the interior of the switch.

The material used for the diaphragm seal is a key criterion for the quality, mechanical life and precision of the EUCHNER multiple limit switches. The same material is used for the cover seal and the cable entry.

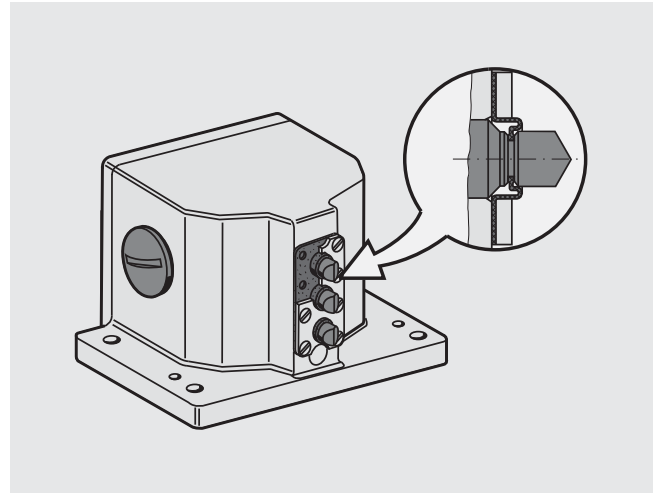


## Exterior diaphragm

A series with an exterior diaphragm that is designed to resist the effect of resinous cooling lubricants is also available.

The exterior diaphragm provides additional sealing of the plunger outside the housing.

The plunger guides in the housing are thus reliably protected from the penetration of the cooling lubricant. Plunger sticking is prevented, and the replacement of the switch or plunger is unnecessary. Technical data for this series: see page C-21 and C-22.



## Plunger systems

### General

Plungers for multiple limit switches are made of stainless steel and are extremely accurate.

In conjunction with a plunger guide with a special surface finish, operation is extremely reliable and maintenance-free even beyond the guaranteed mechanical life.

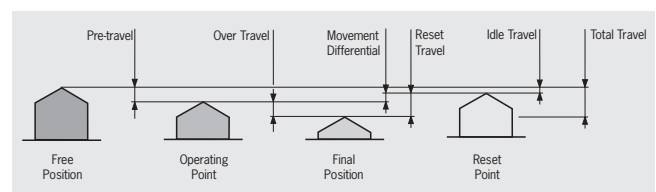
There are two different types of actuating systems, depending on the application. For standard applications, the plunger is fitted with a telescopic device.

With this system, the plunger can be depressed to the reference surface without damaging the switching element.

Multiple limit switches with safety switching elements possess a "rigid" plunger instead of this plunger with telescopic action, which ensures positive action in accordance with EN 60947. This means that the contact point will be reliably opened in the event of mechanical failure of the switching element – e.g. owing to the failure of a contact spring or contact weld resulting from an overload.

### Plunger travel

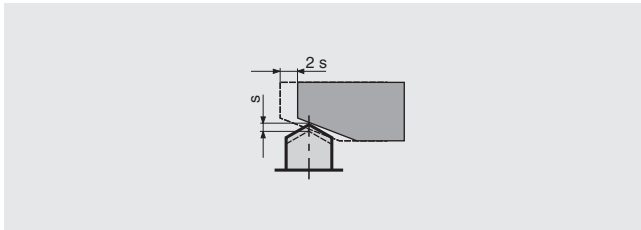
The pictures show the various positions of a plunger actuated by a trip dog. The precise values for the relevant design are shown in the technical data.





## Travel ratio for plunger/trip dog

All the plunger travel data shown in the technical data refers to axial actuation. When using our trip dogs in accordance with DIN 69639, this travel is doubled at the trip rail.



## Plunger types

Depending on the technical requirements, four functionally different plunger types (chisel, roller, ball and domed plungers) are used for 8, 12 or 16 mm plunger spacing, respectively.

### Chisel plunger D

Hardened and polish-ground.  
Operating point accuracy to  $\pm 0.002 \text{ mm}^{1)}$   
Max. approach speed of 40 m/min.



### Roller plunger R with plain bearing

(standard version for roller plunger)  
Hardened roller.  
Operating point accuracy to  $\pm 0.01 \text{ mm}^{1)}$   
Max. approach speed of 80 m/min.



### Roller plunger B with ball bearing

Hardened roller.  
Operating point accuracy to  $\pm 0.01 \text{ mm}^{1)}$   
Max. approach speed of 120 m/min.



### Ball plunger K

(not in conjunction with safety switching elements)  
Hardened ball.  
Can be actuated from various directions.  
Operating point accuracy to  $\pm 0.01 \text{ mm}^{1)}$   
Max. approach speed of 10 m/min.



### Dome plunger W

(instead of ball plungers in safety switching elements)  
Hardened and polish-ground.  
Can be actuated from various directions.  
Operating point accuracy to  $\pm 0.002 \text{ mm}^{1)}$   
Max. approach speed of 10 m/min.



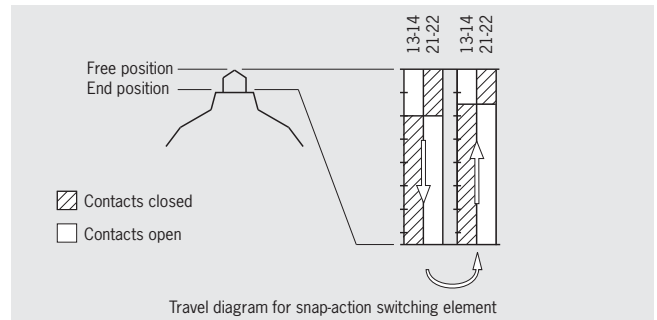
## Switching elements

### Snap-action switching element

Snap-action switching elements are predominantly used in mechanical multiple limit switches.

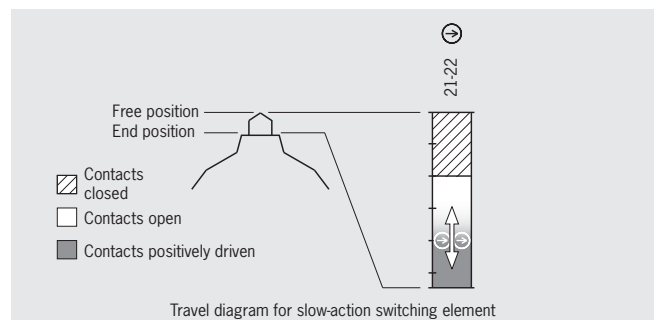
On snap-action switching elements, the change from the completely closed state to the completely open state is made at a defined point (operating point).

As a result the operating point is at a defined position, unlike on slow-action switching elements. Snap-action switching elements typically have a switching hysteresis.



### Slow-action switching element

On slow-action switching elements the opening of the switching element is directly dependent on the position of the plunger. The further the plunger is moved, the further the switching element is opened. The plunger travel is therefore directly proportional to the travel covered by the switching contact in the switching element. From the travel diagrams it can be seen at which point the switching element changes from the closed state to the open state.



### Positively driven contacts $\ominus$

Positively driven contacts are used in the switching elements. These are special switching contacts that are designed to ensure the switching contacts are always reliably separated. Even if contacts are welded together, the connection is opened by the actuating force.

It is a common feature of all safety switching elements that at least one switching contact is designed as a positively driven contact. In safety-relevant circuits, only switching elements with positively driven contacts are allowed.

1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 502 E has been run-in with approx. 2,000 operating cycles.

## General information on inductive multiple limit switches

Inductive multiple limit switches are used for positioning and control in all areas of mechanical and systems engineering. Inductive multiple limit switches are used for automation tasks in machines for the wood, textile and plastics industry, as well as for area monitoring for robotics.

Due to their non-contact and thus wear-free principle of operation, inductive multiple limit switches are insensitive to heavy vibration, heavy soiling and have an above average mechanical life even in aggressive ambient conditions.

Four different designs of inductive multiple limit switches are available for a very wide range of applications with 8 mm, 12 mm or 16 mm proximity switch spacing; these can be equipped with numerous inductive switching elements. In addition to these multiple limit switches, single limit switches according to DIN 43693 and the particularly compact ESN design are also available. With these versions a solution can be provided for almost every requirement.

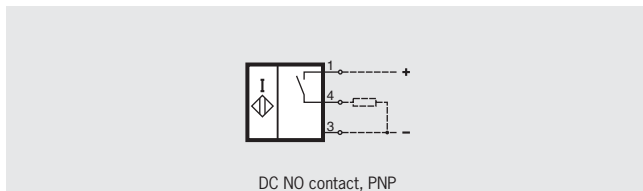
Interchangeability with mechanical multiple limit switches and single limit switches means that it is possible to straightforwardly convert machines. The switches can therefore be retrofitted on existing machine installations to take full advantage of the benefits of non-contact switches.

For safety-relevant final position limitation, EMERGENCY STOP functions or other safety critical applications, it is possible to equip the multiple limit switches with a mixture of the necessary mechanical safety switching elements and inductive switching elements. You can combine the advantages of non-contact switching with positively driven contacts.

## Switching functions

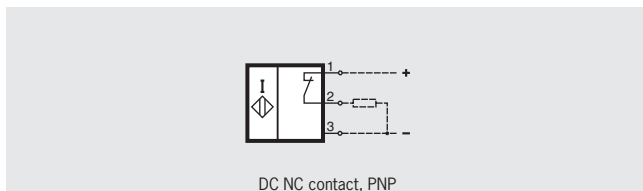
### NO function

The NO function means that the load current flows when the active face of the inductive switching element is activated and that no current flows when the active face is not activated.



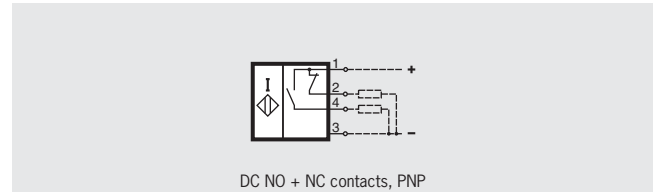
### NC function

The NC function means that the load current does not flow when the active face of the inductive switching element is activated and that current flows when the active face is not activated.



### NO + NC function

The NO + NC function incorporates both an NO function and an NC function. Associated circuit diagrams and wiring diagrams are given in the technical data.



## Suppressor circuits

The inductive switching elements are largely protected against external interference by use of various circuit techniques (suppressor circuits). For utilization category DC-13 the output is to be protected with a free-wheeling diode for inductive loads.

## Approvals

All multiple limit switches with plug connector or permanently connected cable are approved by Underwriters Laboratories (UL, Canada and USA).

## Special versions

### Mixed contact assembly

(Only in multiple limit switches with 12 mm and 16 mm plunger spacing) For specific functions on machines and systems, e.g. final position limitation, EMERGENCY STOP or similar, one or more stations on multiple limit switches can be equipped with safety switching elements. Multiple limit switches with 12 mm plunger spacing can be assembled **on request with a mixture of mechanical and inductive** switching elements.

### Plug connector

Many of our multiple limit switches are also available in a version with a plug connector. These versions all have UL approval.

### Approach speed and usage with roller plungers

Using high-quality bearings and technology matched to the application, approach speeds up to 120 m/min and very high usage can be realized at the same time.

### High/low temperature

For use in extreme temperature conditions, multiple limit switches can be supplied in special versions on request.

## General information on trip rails/trip dogs

EUCHNER trip rails and trip dogs are successfully used in conjunction with EUCHNER multiple limit switches in all areas of mechanical and systems engineering and for solving automation tasks. They are needed wherever travel-dependent positioning of various work steps is required.

The particular advantages of the EUCHNER combination include:

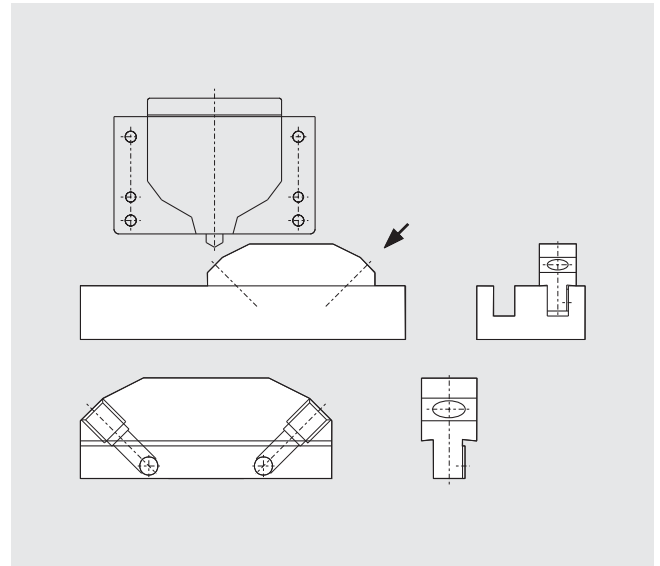
- ▶ Very high accuracy (to 0.002 mm).
- ▶ Long mechanical life (low mechanical wear and resistant to corrosion due to selected materials).
- ▶ Easy to use (user-friendly fastening and adjustment using refined precision mechanics).

EUCHNER trip rails and trip dogs are available in two variants. The function is exactly the same, in principle they differ only in the adjustment of the dog.

## System U

U-trip rails enable the trip dogs to be adjusted from the switch side. The trip dogs can be installed and adjusted quickly and easily in any location. Materials are cast iron or aluminum.

U-trip dogs are designed for usage in U-trip rails. They have a split plate clamp mechanism and enable sensitive, accurate adjustment, even when the limit switch is activated.



## Selection table for mechanical precision multiple limit switches

Series (here only preferable series: for other series see catalog)																			
<b>RGBF</b>	Standard switch according to DIN 43697, upright housing, large product range																		
<b>SN</b>	Compact upright housing; high market acceptance due to versatile applications, low cost																		
<b>GSBF</b>	Upright housing																		
<b>GLBF</b>	Horizontal housing																		
Plunger spacing (mm)																			
<b>8</b>	Small housing for installations where there is little space																		
<b>12</b>	Industry standard, large product range																		
<b>16</b>	Necessary only in special applications																		
Plunger types																			
<b>D</b>	Chisel plunger for high operating point accuracy																		
<b>R</b>	Roller plunger for approach speeds up to max. 80 m/min																		
<b>B</b>	Roller plunger for approach speeds up to max. 120 m/min																		
<b>K</b>	Ball plunger; necessary only in special applications																		
<b>W</b>	Dome plunger; necessary only in special applications																		
Switching element																			
<b>502</b>	1 NC + 1 NO, precision snap-action switching element																		
<b>508</b>	1 NC $\ominus$ , safety switching element, slow-action switching contact																		
<b>514</b>	1 NC $\ominus$ + 1 NO, safety switching element, snap-action switching contact																		
<b>552</b>	1 C/O, snap-action switching contact (standard)																		
<b>614</b>	1 C/O, snap-action switching contact for low currents																		
Options																			
<b>AM</b>	Exterior diaphragm																		
<b>ST</b>	Plug connector																		
<b>LED</b>	LED indicator																		

Series				Plunger spacing			Plunger types					Switching element					Options			Page	
RGBF	SN	GSBF	GLBF	8	12	16	D	R	B	K	W	502	508	514	552	614	AM	St	LED		
•					•		•	•	•	○	○	•	•	•				○	•	C-10	
•					•		•	•				•		○			•	○	○	C-21	
•						•	•	•	○	○	○	•	•	•				○	•	C-10	
	•			•			•	•		•					•	•		○		C-14	
	•				•		•	•	•	○	○	•	•	•				○	•	C-12	
	•				•		•	•				•					•	○	○	C-22	
	•					•	•	•	○	○	○	•	•	•				○	•	C-12	
		•		•			•	•		○					•	•		○		C-17	
		•			•		•	•		○	○	•	•	•				○	•	C-15	
		•				•	•	•		○	○	•	•	•				○	•	C-15	
			•	•			•	•		•					•	•				C-20	
			•		•		•	•		○	○	•	•	•						•	C-18
			•			•	•	•		○	○	•	•	•						•	C-18

• Available

○ Available on request

## Selection table for inductive multiple limit switches

Series (here only preferable series: for other series see catalog)										
<b>RGBF</b>		Standard switch according to DIN 43697, upright housing, large product range								
<b>SN</b>		Compact upright housing; high market acceptance due to versatile applications, low cost								
Proximity switch spacing (mm)										
<b>12</b>		Rated operating distance 2 mm, industry standard, large product range								
<b>16</b>		Rated operating distance 5 mm; necessary only in special applications								
Switching element										
<b>772</b>		DC NO + NC contacts, PNP								
<b>777</b>		DC NO contact, PNP								
<b>779</b>		DC NO contact, PNP								
<b>780</b>		DC NO + NC contacts, NPN								
<b>781</b>		DC NO + NC contacts, PNP								
<hr/>										
<b>St</b>		Plug connector								
<b>LED</b>		LED indicator								

Series		Proximity switch spacing		Switching element					Options		Page
RGBF	SN	12	16	772	777	779	780	781	St	LED	
●		●			●		●	●	○	●	C-11
●			●	●		●			○	●	C-11
	●	●			●		●	●	○	●	C-13
	●		●	●		●			○	●	C-13

● Available      ○ Available on request

## Series RGBF... 12/16 mm, mechanical

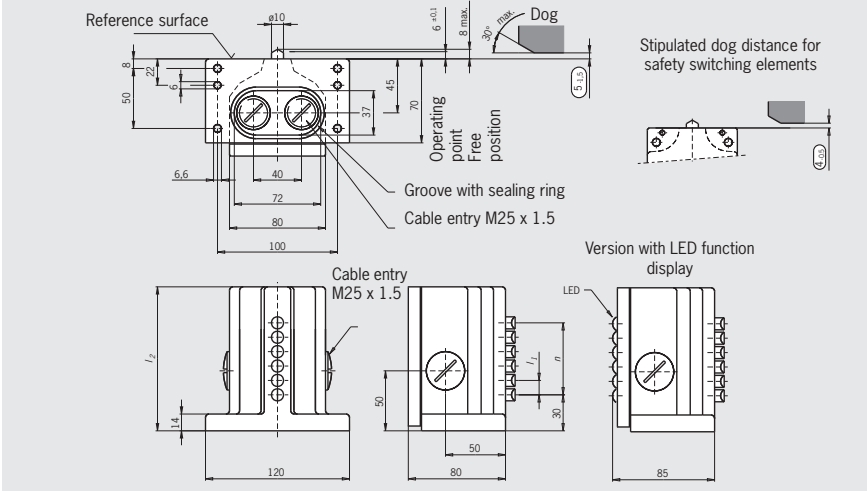


- ▶ Plunger spacing 12 or 16 mm
- ▶ Upright housing according to DIN 43697
- ▶ Degree of protection IP 67 according to IEC 60529
- ▶ LED function display optional



### Series RGBF... mechanical Plunger spacing 12 or 16 mm

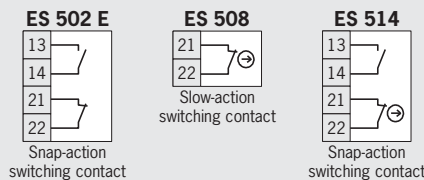
#### Dimension drawing Illustration with chisel plunger; plunger type depending on version



#### Switching elements

- ▶ **ES 502 E** Snap-action switching contact  
1 NC + 1 NO
- ▶ **ES 508** Slow-action switching contact  
1 NC ⊖
- ▶ **ES 514** Snap-action switching contact  
1 NC ⊕ + 1 NO

#### Switching elements



On the usage of safety switching elements, the dog distance (4.05) must be maintained to achieve the positively driven travel. The dogs must be positively mounted according to EN ISO 14119, i.e. riveted, welded or secured in some other way against becoming loose.

#### LED function display (optional)

Function displays are available for the following voltage ranges (see accessories page C-23):

- ▶ **LE060** 12 ... 60 V AC/DC
- ▶ **LE110** 110 V AC ±15%
- ▶ **LE220** 220 V AC ±15%

Plunger types	D	R	B	K <sup>4)</sup>	W <sup>4)</sup>	
Operating point accuracy <sup>1)</sup>	± 0.002	± 0.01	± 0.01	± 0.01	± 0.002	mm
Approach speed, max. <sup>2)</sup>	40	80	120	10	10	m/min

1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 502 E has been run-in with approx. 2,000 operating cycles  
 2) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639. Special versions of roller plungers for high usage on request  
 3) For safety reasons, multiple limit switches with switching elements ES 508 and ES 514 are not available with ball plungers  
 4) Plunger type on request

n Number of plungers/proximity switches	Plunger/proximity switch spacing			
	I <sub>1</sub> = 12		I <sub>1</sub> = 16	
	I <sub>2</sub>	Housing material	I <sub>2</sub>	Housing material
2	70	Die-cast aluminum, anodized	70	Die-cast aluminum, anodized
3	80		90	
4	90		105	
5	105		120	
6	120		140	
8	140		170	

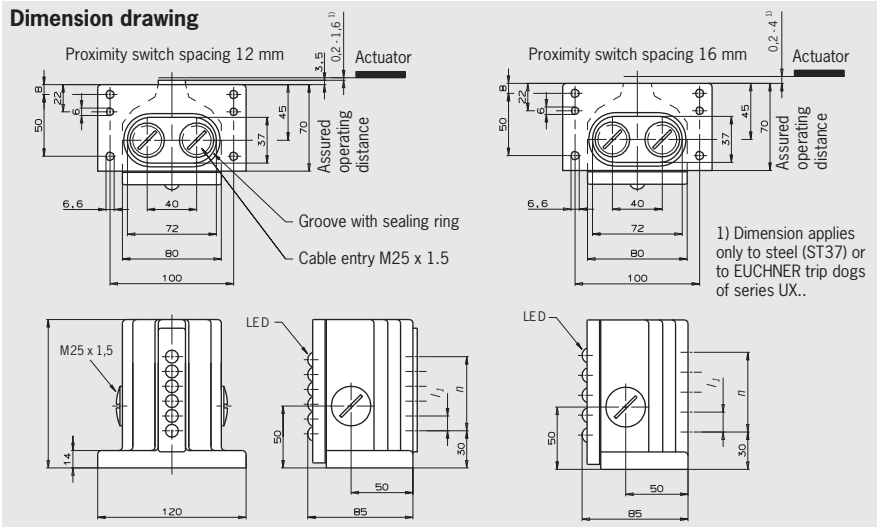
## Series RGBF... 12/16 mm, inductive

- ▶ Proximity switch spacing 12 or 16 mm
- ▶ Upright housing according to DIN 43697
- ▶ Degree of protection IP 67 according to IEC 60529
- ▶ LED function display



### Series RGBF... inductive Proximity switch spacing 12 or 16 mm

#### Dimension drawing



#### Rated operating distance

With 12 mm proximity switch spacing, the rated operating distance is 2 mm; with 16 mm proximity switch distance it is 5 mm.

#### Mixed contact assembly

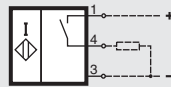
On request mixed assembly with electro-mechanical safety switching elements according to IEC 60947-5-1 is possible for 12 mm proximity switch spacing.

#### LED function display

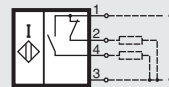
DC and AC switching elements are equipped as standard with a function display on the switching element (yellow). The function display can be seen from the exterior.

#### Switching elements

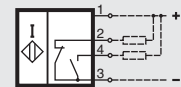
DC NO contact, PNP  
777,  $I_1 = 12$  mm  
779,  $I_1 = 16$  mm



DC NO + NC contacts, PNP  
781,  $I_1 = 12$  mm  
772,  $I_1 = 16$  mm



DC NO + NC contacts,  
NPN  
780,  $I_1 = 12$  mm



Switching elements with 5 mm operating distance (16 mm proximity switch spacing) are supplied with two different oscillator frequencies to avoid mutual interference. Multiple limit switches must therefore be assembled alternately with these switching elements.

Further switching elements on request (see page C-28)

#### Ordering code

#### Mechanical

R	G	B	F					-				L	E					-	M
R	G	B	F			X						L							M

Series

Number of plungers/proximity switches

Plunger type (only mechanical switches, e.g. **D** = chisel)

Plunger/proximity switch spacing (**12** or **16** mm)

Switching elements (e.g. ES **508** or **777**)

Visible LED (yellow) (on inductive switches)

LED function display (optional on mechanical switches, e.g. 12 ... 60 V AC/DC = **060**)

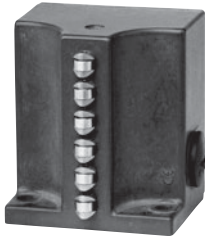
LED color (red standard; others on request)

Cable entry M25 x 1.5 (plug connector on request)

## Series SN... 12/16 mm, mechanical



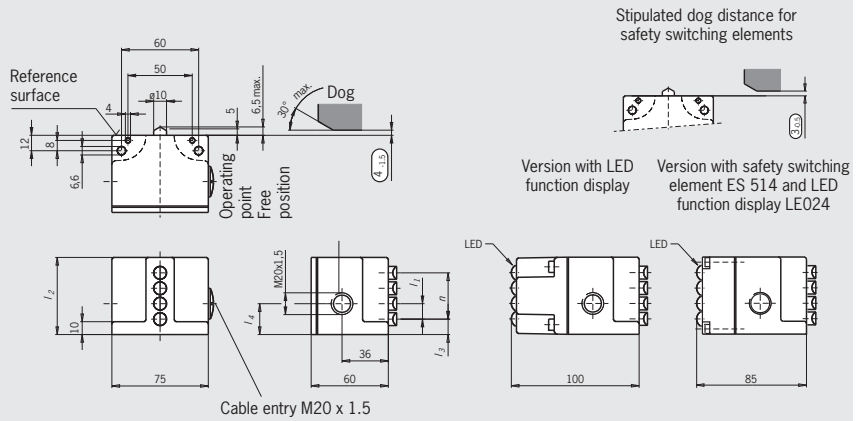
- ▶ Plunger spacing 12 or 16 mm
- ▶ Upright housing, small flange
- ▶ Degree of protection IP 67 according to IEC 60529
- ▶ LED function display optional



### Series SN... mechanical

Plunger spacing 12 or 16 mm

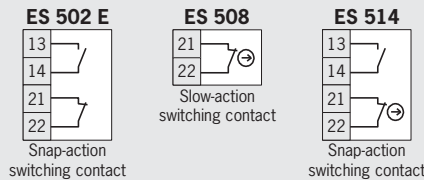
#### Dimension drawing Illustration with chisel plunger; plunger type depending on version



#### Switching elements

- ▶ **ES 502 E** Snap-action switching contact  
1 NC + 1 NO
- ▶ **ES 508** Slow-action switching contact  
1 NC ⊖
- ▶ **ES 514** Snap-action switching contact  
1 NC ⊕ + 1 NO

#### Switching elements



On the usage of safety switching elements, the dog distance (3.0) must be maintained to achieve the positively driven travel. The dogs must be positively mounted according to EN ISO 14119, i.e. riveted, welded or secured in some other way against becoming loose.

#### LED function display (optional)

Function displays are available for the following voltage ranges (see accessories page C-23):

- ▶ **LE024ge** 24 V DC (for ES 514)
- ▶ **LE060** 12 ... 60 V AC/DC
- ▶ **LE110** 110 V AC ±15%
- ▶ **LE220** 220 V AC ±15%

Plunger types	D Chisel	R Roller (plain bearing)	B Roller (ball bearing)	K <sup>4)</sup> Ball <sup>3)</sup>	W <sup>4)</sup> Dome	
Operating point accuracy <sup>1)</sup>	± 0.002	± 0.01	± 0.01	± 0.01	± 0.002	mm
Approach speed, max. <sup>2)</sup>	40	80	120	10	10	m/min

- 1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 502 E has been run-in with approx. 2,000 operating cycles
- 2) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639. Special versions of roller plungers for high usage on request
- 3) For safety reasons, multiple limit switches with switching elements ES 508 and ES 514 are not available with ball plungers
- 4) Plunger type on request

n Number of plungers/proximity switches	Plunger/proximity switch spacing						Housing material
	I <sub>1</sub> = 12		I <sub>1</sub> = 16				
	I <sub>2</sub>	I <sub>3</sub>	I <sub>4</sub>	I <sub>2</sub>	I <sub>3</sub>	I <sub>4</sub>	
2	36	12	24	19	48	16	Die-cast aluminum, anodized
3	48			72			
4	60			84			
5	72			-	-	-	
6	84			-	-	-	



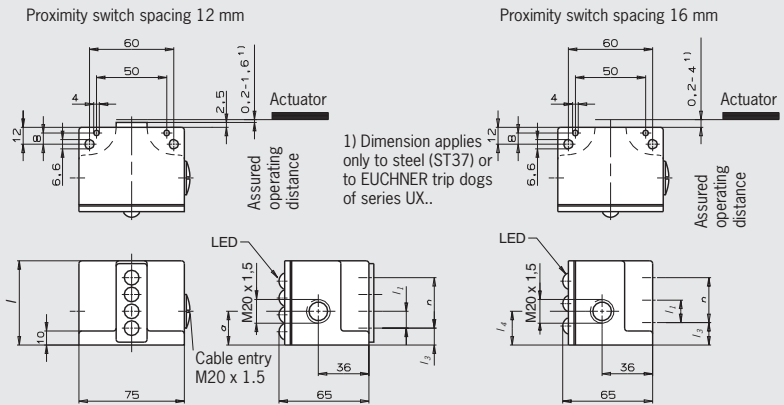
## Series SN... 12/16 mm, inductive

- ▶ Proximity switch spacing 12 or 16 mm
- ▶ Upright housing, small flange
- ▶ Degree of protection IP 67 according to IEC 60529
- ▶ LED function display



### Series SN... inductive Proximity switch spacing 12 or 16 mm

#### Dimension drawing



#### Rated operating distance

With 12 mm proximity switch spacing, the rated operating distance is 2 mm; with 16 mm proximity switch distance it is 5 mm.

#### Mixed contact assembly

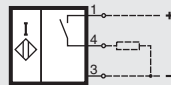
On request mixed assembly with electro-mechanical safety switching elements according to IEC 60947-5-1 is possible for 12 mm proximity switch spacing.

#### LED function display

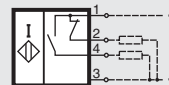
DC and AC switching elements are equipped as standard with a function display on the switching element (yellow). The function display can be seen from the exterior.

#### Switching elements

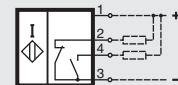
DC NO contact, PNP  
777,  $I_1 = 12$  mm  
779,  $I_1 = 16$  mm



DC NO + NC contacts, PNP  
781,  $I_1 = 12$  mm  
772,  $I_1 = 16$  mm



DC NO + NC contacts,  
NPN  
780,  $I_1 = 12$  mm



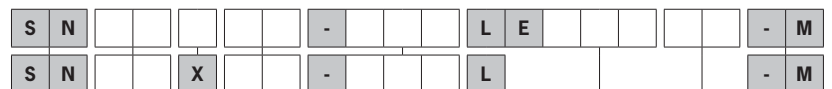
Switching elements with 5 mm operating distance (16 mm proximity switch spacing) are supplied with two different oscillator frequencies to avoid mutual interference. Multiple limit switches must therefore be assembled alternately with these switching elements.

Further switching elements on request (see page C-28)

#### Ordering code

#### Mechanical

#### Inductive



Series

Number of plungers/proximity switches

Plunger type (only mechanical switches, e.g. **D** = chisel)

Plunger/proximity switch spacing (**12** or **16** mm)

Switching elements (e.g. ES **508** or **777**)

Visible LED (yellow) (on inductive switches)

LED function display (optional on mechanical switches, e.g. 12 ... 60 V AC/DC = **060**)

LED color (**red** standard; others on request)

Cable entry M20 x 1.5 (plug connector on request)

## Series SN... 8 mm, mechanical

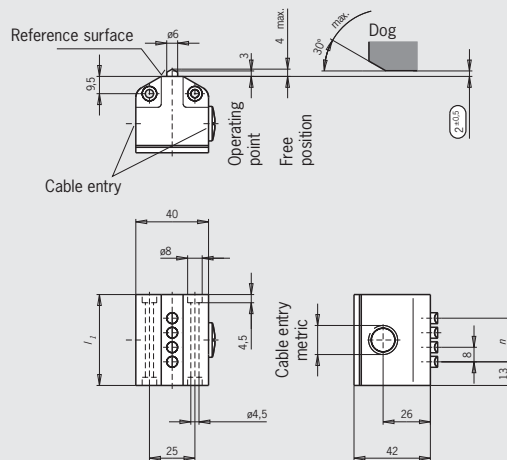


- ▶ Plunger spacing 8 mm
- ▶ Upright housing, without flange
- ▶ Degree of protection IP 67 according to IEC 60529



### Series SN... mechanical Plunger spacing 8 mm

#### Dimension drawing Illustration with chisel plunger; plunger type depending on version

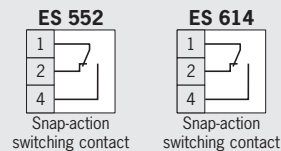


#### Switching elements

- ▶ **ES 552** Snap-action switching contact  
1 changeover contact  
Standard switching element
- ▶ **ES 614** Snap-action switching contact  
1 changeover contact  
Suitable for switching low currents

(See technical data on the switching elements)

#### Switching elements



Plunger types	D	R	CI	
	 Chisel	 Roller (plain bearing)	 Ball	
Operating point accuracy <sup>1)</sup>	± 0.02	± 0.05	± 0.03	mm
Approach speed, max. <sup>2)</sup>	20	50	8	m/min

1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 552 E has been run-in with approx. 2,000 operating cycles

2) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639

n Number of plungers	I <sub>1</sub>	Plunger spacing 8 mm		Housing material
		Cable entry		
2	34	M16 x 1.5	Die-cast aluminum, anodized	
3	42			
4	50			
5	58	M20 x 1.5		
6	66			

Ordering code **Mechanical** S N     0 8 -     - M

Series

Number of plungers

Plunger type (e.g. D = chisel)

Plunger spacing  
(8 mm)

Switching element  
(ES 552 or ES 614)

Cable entry with metric thread  
(plug connector on request)

## Series GSBF... 12/16 mm, mechanical

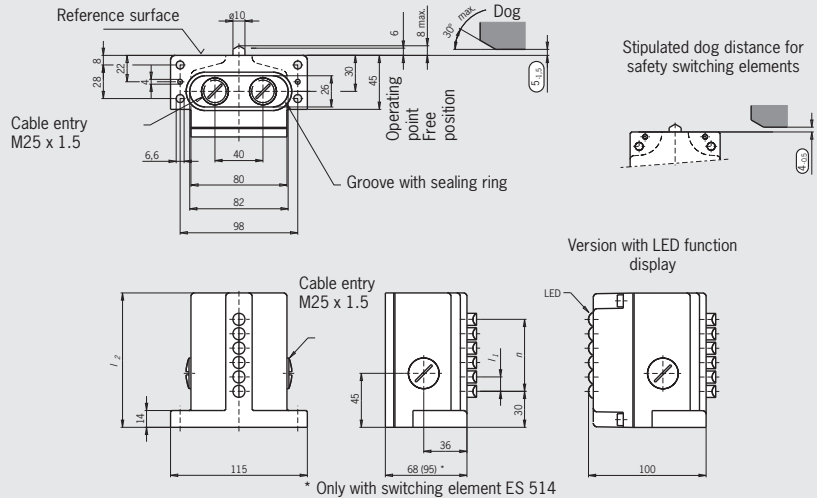


- ▶ Plunger spacing 12 or 16 mm
- ▶ Upright housing
- ▶ Degree of protection IP 67 according to IEC 60529
- ▶ LED function display optional



### Series GSBF... mechanical Plunger spacing 12 or 16 mm

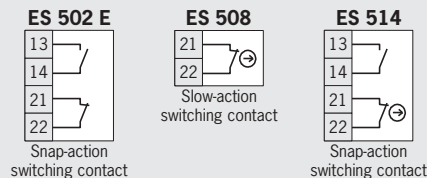
#### Dimension drawing Illustration with chisel plunger; plunger type depending on version



#### Switching elements

- ▶ **ES 502 E** Snap-action switching contact  
1 NC + 1 NO
- ▶ **ES 508** Slow-action switching contact  
1 NC ⊕
- ▶ **ES 514** Snap-action switching contact  
1 NC ⊕ + 1 NO

#### Switching elements



On the usage of safety switching elements, the dog distance (4.0.5) must be maintained to achieve the positively driven travel. The dogs must be positively mounted according to EN ISO 14119, i.e. riveted, welded or secured in some other way against becoming loose.

#### LED function display (optional)

Function displays are available for the following voltage ranges (see accessories page C-23):

- ▶ **LE060** 12 ... 60 V AC/DC
- ▶ **LE110** 110 V AC ±15%
- ▶ **LE220** 220 V AC ±15%

Plunger types	D Chisel	R Roller (plain bearing)	K <sup>4)</sup> Ball <sup>3)</sup>	W <sup>4)</sup> Dome	
Operating point accuracy <sup>1)</sup>	± 0.002	± 0.01	± 0.01	± 0.002	mm
Approach speed max. <sup>2)</sup>	40	80	10	10	m/min

1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 502 E has been run-in with approx. 2,000 operating cycles  
 2) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639  
 3) For safety reasons, multiple limit switches with switching elements ES 508 and ES 514 are not available with ball plungers  
 4) Plunger type on request

n Number of plungers	Plunger spacing		Housing material
	I <sub>1</sub> = 12 I <sub>2</sub>	I <sub>1</sub> = 16 I <sub>2</sub>	
2	70	70	Die-cast aluminum, anodized
3	70	82	
4	82	96	
5	96	112	
6	112	130	
8	130	-	

Ordering code	Mechanical	G	S	B	F					-			L	E					-	M
Series	_____																			
Number of plungers	_____																			
Plunger type (e.g. <b>D</b> = chisel)	_____																			
Plunger spacing ( <b>12</b> or <b>16</b> mm)	_____																			
Switching elements (e.g. ES <b>508</b> )	_____																			
LED function display (optional, e.g. 12 ... 60 V AC/DC = <b>060</b> )	_____																			
LED color ( <b>red</b> standard; others on request)	_____																			
Cable entry M25 x 1.5	_____																			

## Series GSBF... 8 mm, mechanical

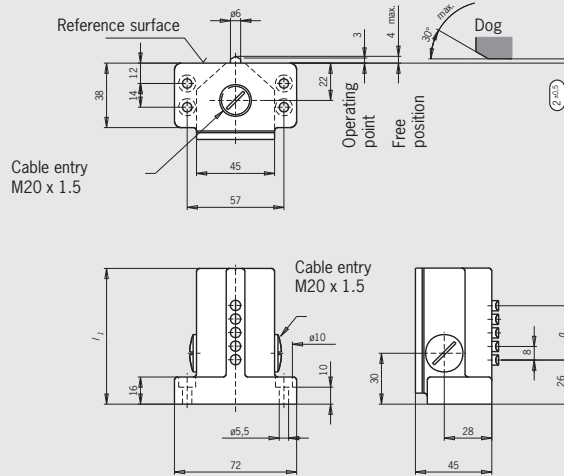


- ▶ Plunger spacing 8 mm
- ▶ Upright housing
- ▶ Degree of protection IP 67 according to IEC 60529



### Series GSBF... mechanical Plunger spacing 8 mm

Dimension drawing Illustration with chisel plunger; plunger type depending on version

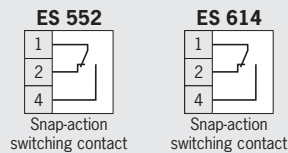


### Switching elements

- ▶ **ES 552** Snap-action switching contact  
1 changeover contact  
Standard switching element
- ▶ **ES 614** Snap-action switching contact  
1 changeover contact  
Suitable for switching low currents

(See technical data on the switching elements)

### Switching elements



Plunger types	D	R	K <sup>4)</sup>	
	Chisel	Roller (plain bearing)	Ball	
Operating point accuracy <sup>1)</sup>	± 0.02	± 0.05	± 0.03	mm
Approach speed, max. <sup>2)</sup>	20	50	8	m/min

1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 552 E has been run-in with approx. 2,000 operating cycles  
2) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639  
3) Plunger type on request

n Number of plungers/proximity switches	Plunger/proximity switch spacing 8 mm	
	I <sub>1</sub>	Housing material
2	48	Sand-cast aluminum, anodized
3	64	
4	64	
5	80	
6	80	

**Ordering code**      **Mechanical**      **G S B F**      **O 8 - - M**

Series \_\_\_\_\_

Number of plungers/proximity switches \_\_\_\_\_

Plunger type (only mechanical switches, e.g. **D** = chisel) \_\_\_\_\_

Plunger/proximity switch spacing (**8** mm) \_\_\_\_\_

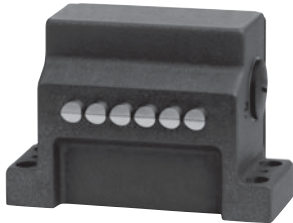
Switching element (ES **552** or ES **614**) \_\_\_\_\_

Cable entry M20 x 1.5 \_\_\_\_\_

## Series GLBF... 12/16 mm, mechanical (on request)

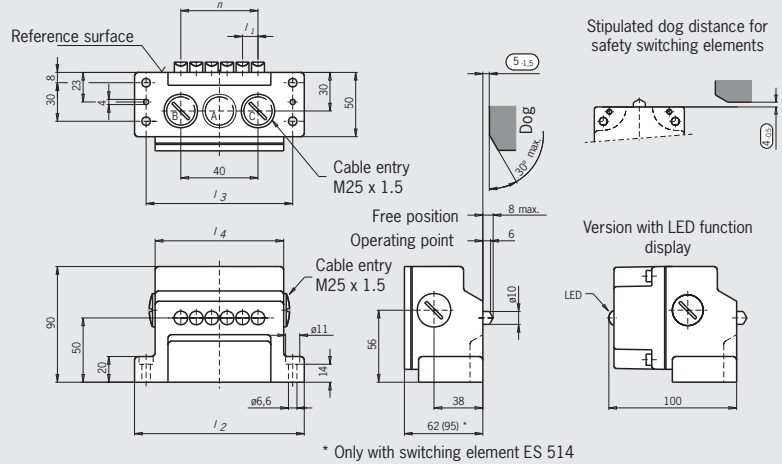


- ▶ Plunger spacing 12 or 16 mm
- ▶ Horizontal housing
- ▶ Degree of protection IP 67 according to IEC 60529
- ▶ LED function display optional



### Series GLBF... mechanical Plunger spacing 12 or 16 mm

#### Dimension drawing Illustration with chisel plunger; plunger type depending on version



#### Switching elements

- ▶ **ES 502 E** Snap-action switching contact  
1 NC + 1 NO
- ▶ **ES 508** Slow-action switching contact  
1 NC ⊖
- ▶ **ES 514** Snap-action switching contact  
1 NC ⊕ + 1 NO

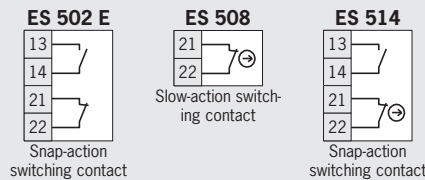
On the usage of safety switching elements, the dog distance (4.05) must be maintained to achieve the positively driven travel. The dogs must be positively mounted according to EN ISO 14119, i.e. riveted, welded or secured in some other way against becoming loose.

#### LED function display (optional)

Function displays are available for the following voltage ranges (see accessories page C-23):

- ▶ **LE060** 12 ... 60 V AC/DC
- ▶ **LE110** 110 V AC ±15%
- ▶ **LE220** 220 V AC ±15%

#### Switching elements



Plunger types	D	R	K <sup>4)</sup>	W <sup>4)</sup>	
	Chisel	Roller (plain bearing)	Ball <sup>3)</sup>	Dome	
Operating point accuracy <sup>1)</sup>	± 0.002	± 0.01	± 0.01	± 0.002	mm
Approach speed max. <sup>2)</sup>	40	80	10	10	m/min

- 1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 502 E has been run-in with approx. 2,000 operating cycles
- 2) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639
- 3) For safety reasons, multiple limit switches with switching elements ES 508 and ES 514 are not available with ball plungers
- 4) Plunger type on request

n Number of plungers/ proximity switches	Plunger/proximity switch spacing							Housing material	
	l <sub>1</sub> = 12			l <sub>1</sub> = 16					
	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	Cable entry	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	Cable entry	
2	84	66	52	A M25 x 1.5	84	66	52	A M25 x 1.5	Sand-cast aluminum, anodized
3	84	66	52		100	82	68		
4	100	82	68	B + C M25 x 1.5	114	98	84	B + C M25 x 1.5	
5	114	98	84		132	114	100		
6	132	114	100	148	130	116			

Ordering code	Mechanical	G	L	B	F					-				L	E					-	M
Series	_____																				
Number of plungers/proximity switches	_____																				
Plunger type (only mechanical switches, e.g. <b>D</b> = chisel)	_____																				
Plunger/proximity switch spacing ( <b>12</b> or <b>16</b> mm)	_____																				
Switching elements (e.g. ES <b>508</b> )	_____																				
Visible LED yellow (on inductive switches)	_____																				
LED function display (optional on mechanical switches, e.g. 12 ... 60 V AC/DC = <b>060</b> )	_____																				
LED color ( <b>red</b> standard; others on request)	_____																				
Cable entry M25 x 1.5	_____																				

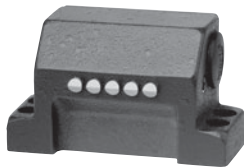


For technical data see page C-26

## Series GLBF... 8 mm, mechanical

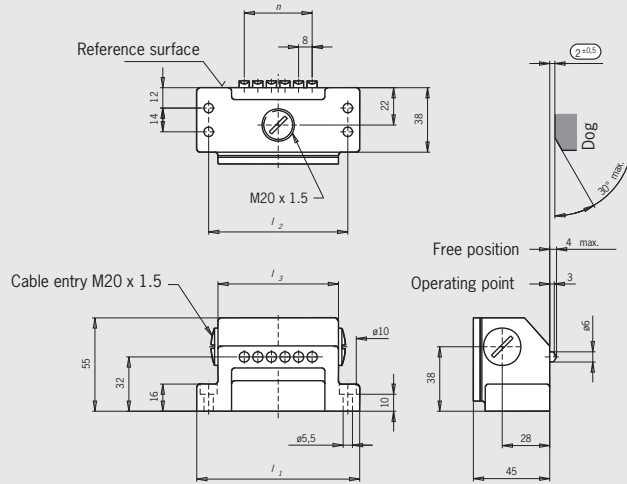


- ▶ Plunger spacing 8 mm
- ▶ Horizontal housing
- ▶ Degree of protection IP 67 according to IEC 60529



### Series GLBF... mechanical Plunger spacing 8 mm

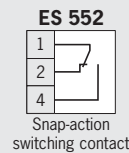
#### Dimension drawing Illustration with chisel plunger; plunger type depending on version



#### Switching elements

- ▶ **ES 552** Snap-action switching contact  
1 changeover contact  
Standard switching element
- (See technical data on the switching elements)

#### Switching elements



Plunger types	D  Chisel	R  Roller (plain bearing)	K <sup>3)</sup>  Ball	
Operating point accuracy <sup>1)</sup>	± 0.02	± 0.05	± 0.03	mm
Approach speed, max. <sup>2)</sup>	20	50	8	m/min

1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 552 E has been run-in with approx. 2,000 operating cycles  
2) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639  
3) Plunger type on request

n Number of plungers/proximity switches	Plunger/proximity switch spacing 8 mm			Housing material
	I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	
2	64	50	39	Sand-cast aluminum, anodized
3	80	66	55	
4	80	66	55	

**Ordering code**      **Mechanical**      **G L B F**      **0 8 - 5 5 2 - M**

Series \_\_\_\_\_

Number of plungers/proximity switches \_\_\_\_\_

Plunger type (only mechanical switches, e.g. **D** = chisel) \_\_\_\_\_

Plunger/proximity switch spacing (**8** mm) \_\_\_\_\_

Switching element **ES 552** \_\_\_\_\_

Cable entry M20 x 1.5 \_\_\_\_\_



## Series RGBF...AM 12 mm, mechanical

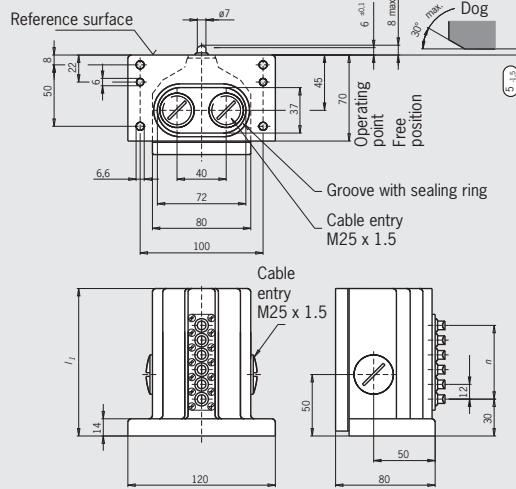


- ▶ With exterior diaphragm
- ▶ Plunger spacing 12 mm
- ▶ Upright housing according to DIN 43697
- ▶ Degree of protection IP 67 according to IEC 60529



### Series RGBF... AM mechanical Plunger spacing 12 mm

#### Dimension drawing Illustration with chisel plunger; plunger type depending on version



#### Exterior diaphragm

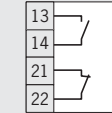
The exterior diaphragm protects the plunger guide against the entry of very fine dust (dust from grinding, casting, glass, etc.) and prevents the plunger from seizing. At the same time, plunger sticking, caused by resinous lubricating coolants, can be prevented with this exterior diaphragm version.

#### Switching elements

- ▶ **ES 502 E** Snap-action switching contact  
1 NC + 1 NO
- ▶ **ES 514** Snap-action switching contact  
1 NC ⊖ + 1 NO

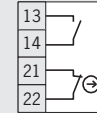
#### Switching elements

##### ES 502 E



Snap-action switching contact

##### ES 514



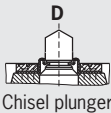
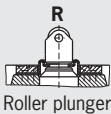
Snap-action switching contact (on request)

Plunger types	D Chisel	R Roller (plain bearing)	
Operating point accuracy <sup>1)</sup>	± 0.002	± 0.01	mm
Approach speed, max. <sup>2)</sup>	20	50	m/min

1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 502 E has been run-in with approx. 2,000 operating cycles  
2) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639

LED function display possible on request.

n Number of plungers	Plunger spacing 12 mm	
	I <sub>1</sub>	Housing material
2	70	Die-cast aluminum, anodized
3	80	
4	90	
5	105	
6	120	
8	140	

Plunger type	Number of plungers	Order no./item
 Chisel plunger	2	<b>082325</b> RGBF 02 D 12 -502 AM -M
	3	<b>088365</b> RGBF 03 D 12 -502 AM -M
	4	<b>082326</b> RGBF 04 D 12 -502 AM -M
	5	<b>088366</b> RGBF 05 D 12 -502 AM -M
	6	<b>087097</b> RGBF 06 D 12 -502 AM -M
	 Roller plunger	2
3		<b>088364</b> RGBF 03 R 12 -502 AM -M
4		<b>082327</b> RGBF 04 R 12 -502 AM -M
5		<b>087099</b> RGBF 05 R 12 -502 AM -M
6		<b>087100</b> RGBF 06 R 12 -502 AM -M

## Series SN...AM 12 mm, mechanical

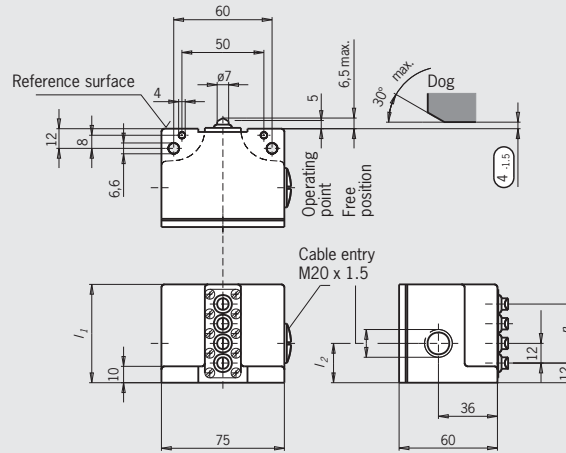


- ▶ With exterior diaphragm
- ▶ Plunger spacing 12 mm
- ▶ Upright housing, small flange
- ▶ Degree of protection IP 67 according to IEC 60529



### Series SN...AM mechanical Plunger spacing 12 mm

#### Dimension drawing Illustration with chisel plunger; plunger type depending on version

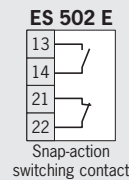


#### Exterior diaphragm

The exterior diaphragm protects the plunger guide against the entry of very fine dust (dust from grinding, casting, glass, etc.) and prevents the plunger from seizing. At the same time, plunger sticking, caused by resinous lubricating coolants, can be prevented with this exterior diaphragm version.

#### Switching elements

- ▶ **ES 502 E** Snap-action switching contact  
1 NC + 1 NO



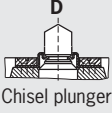

LED function display possible on request.

#### Switching elements

Plunger types	D	R	
	Chisel	Roller (plain bearing)	
Operating point accuracy <sup>1)</sup>	± 0.002	± 0.01	mm
Approach speed, max. <sup>2)</sup>	20	50	m/min

1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 502 E has been run-in with approx. 2,000 operating cycles  
2) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639

n Number of plungers	Plunger spacing 12 mm		Housing material
	l <sub>1</sub>	l <sub>2</sub>	
2	36	19	Die-cast aluminum, anodized
3	48	24	
4	60		
5	72		
6	84		

Plunger type	Number of plungers	Order no./item
 Chisel plunger	2	<b>086584</b> SN 02 D 12 -502 AM -M
	3	<b>086585</b> SN 03 D 12 -502 AM -M
	4	<b>086586</b> SN 04 D 12 -502 AM -M
	5	<b>088752</b> SN 05 D 12 -502 AM -M
	6	<b>088753</b> SN 06 D 12 -502 AM -M
	 Roller plunger	2
3		<b>086587</b> SN 03 R 12 -502 AM -M
4		<b>086588</b> SN 04 R 12 -502 AM -M
5		<b>088765</b> SN 05 R 12 -502 AM -M
6		<b>088766</b> SN 06 R 12 -502 AM -M

## Accessories for mechanical multiple limit switches

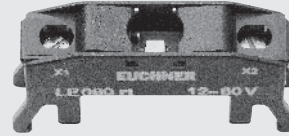
### ► LED function display

#### LED function display

#### LED function display

Three versions in various voltage ranges are available in the standard colors red, green and yellow. The built-in electronic regulation (LE060 only) ensures that the luminosity remains constant, independent of the voltage applied.

#### Figure



#### Ordering table

Designation	Operating voltage [V]	Color	Order no./item
LED function display <sup>1)</sup>	AC/DC 12 - 60	Red	<b>035495</b> LE 060 rt
		Green	<b>035496</b> LE 060 gr
		Yellow	<b>035497</b> LE 060 ge
	AC 110 ±15%	Red	<b>045579</b> LE 110 rt
	AC 220 ±15%	Red	<b>045582</b> LE 220 rt
		Yellow	<b>045584</b> LE 220 ge

1) If color not stated, red will be supplied as standard

### ► Replacement mechanical switching elements

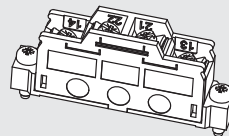
#### Replacement switching elements

#### Replacement switching elements

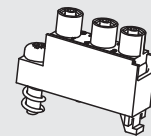
Replacement switching elements for multiple limit switches with 8, 12 and 16 mm plunger spacing.

**The safety switching elements ES 508 and ES 514 are not allowed to be replaced for safety reasons and are therefore not available as spare parts. In safety circuits, the entire multiple limit switch must be replaced in case of damage or wear. Repairs are to be made only by the manufacturer.**

#### Figure



ES 502 E



ES 552/ES 614

#### Ordering table

Designation	Order no./item
Replacement switching elements	<b>010387</b> ES 502 E
	<b>099513</b> ES 552
	<b>099507</b> ES 614

## Accessories for inductive multiple limit switches

### ► Replacement inductive switching elements

The switching elements used for all inductive multiple limit switches supplied are available as spare parts

### Ordering table

Designation	Bridge	Function	Order no.
<b>ES777</b>	12 mm	NO contact/PNP	<b>008401</b>
<b>ES781</b>	12 mm	NO + NC contacts/PNP	<b>031535</b>
<b>ES780</b>	12 mm	NO + NC contacts/NPN	<b>031534</b>
<b>ES779</b> <sup>1)</sup>	16 mm	NO contact/PNP	<b>008470</b>
<b>ES779/2</b> <sup>1)</sup>	16 mm	NO contact/PNP	<b>036731</b>
<b>ES772</b> <sup>1)</sup>	16 mm	NO + NC contacts/PNP	<b>053674</b>
<b>ES772/2</b> <sup>1)</sup>	16 mm	NO + NC contacts/PNP	<b>053677</b>

1) Switching elements with 5 mm operating distance (proximity switch spacing 16 mm) are supplied with two different oscillator frequencies to avoid mutual interference. Multiple limit switches must therefore be assembled alternately with these switching elements.

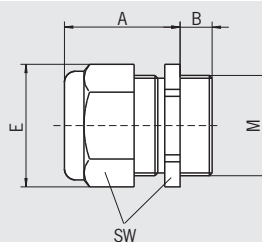
## Cable glands

- ▶ M16 x 1.5
- ▶ M20 x 1.5
- ▶ M25 x 1.5

### Cable glands

Suitable for various cable diameters. Versions in metal.

### Cable glands



Item	Thread	Cable Ø [mm]	A [mm]	B [mm]	E [mm]	SW [mm]
EKVM16/04	M16x1.5	4 - 6.5	20	6	20	18
EKVM16/05	M16x1.5	5 - 8	20	6	20	18
EKVM16/06	M16x1.5	6.5 - 9.5	20	6	20	18
EKVM20/06	M20x1.5	6.5 - 9.5	20	6	24.4	22
EKVM20/09	M20x1.5	9 - 13	21	6	24.4	22
EKVM25/09	M25x1.5	9 - 13	21	6.5	31.2	28
EKVM25/11	M25x1.5	11.5 - 15.5	21	6.5	31.2	28

### Ordering table

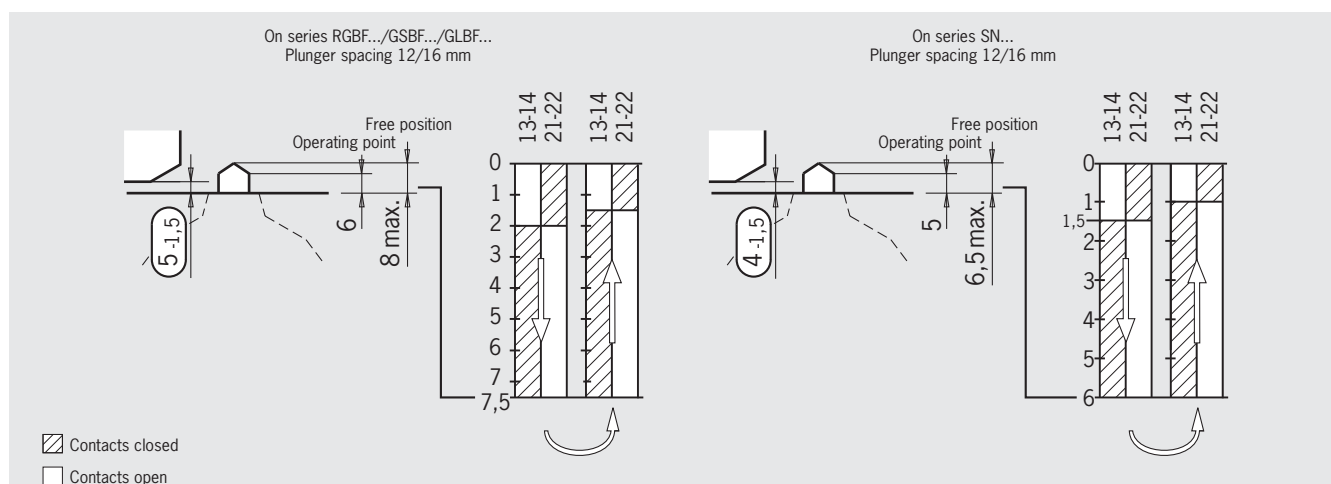
Thread	Version	Order no./item
M16 x 1.5	Cable diameter 4 - 6.5 mm	<b>086328</b> EKVM16/04
	Cable diameter 5 - 8 mm	<b>086329</b> EKVM16/05
	Cable diameter 6.5 - 9.5 mm	<b>086330</b> EKVM16/06
M20 x 1.5	Cable diameter 6.5 - 9.5 mm	<b>077683</b> EKVM20/06
	Cable diameter 9 - 13 mm	<b>077684</b> EKVM20/09
	Cable diameter 9 - 13 mm	<b>086334</b> EKVM25/09
M25 x 1.5	Cable diameter 11.5 - 15.5 mm	<b>086335</b> EKVM25/11

## Multiple limit switches, mechanical

Parameter	Value					Unit
Switching elements ES	502 E	508	514	552	614	
Degree of protection acc. to EN IEC 60529	IP 67					
Installation position	Any					
Plunger material	Stainless steel					
Plunger guide	Maintenance-free					
Ambient temperature	-5 ... +80					°C
Switching contacts	1 NO + 1 NC	1 NC ⊕	1 NO + 1 NC ⊕	1 changeover contact		
Switching principle	Snap-action switching cont.	Slow-action switching cont.	Snap-action switching contact			
Actuating force	≥ 20	≥ 15	≥ 30	≥ 15		N
Approach speed, min.	0.01	-	0.01		m/min	
Differential travel	0.8	-	0.6	0.1		mm
Switching frequency	≤ 300	≤ 50		≤ 200		min <sup>-1</sup>
Mechanical life (operating cycles)	≥ 30 x 10 <sup>6</sup>		≥ 1 x 10 <sup>6</sup>	≥ 10 x 10 <sup>6</sup>		
Rated impulse withstand voltage U <sub>imp</sub>	2.5	4		2.5		kV
Rated insulation voltage U <sub>i</sub>	250					V
Utilization category acc. to EN IEC 60947-5-1	AC-12	I <sub>e</sub> 8 A U <sub>e</sub> 250 V	-	-	-	
	AC-15	I <sub>e</sub> 6 A U <sub>e</sub> 230 V		I <sub>e</sub> 2.5 A U <sub>e</sub> 230 V	I <sub>e</sub> 2 A U <sub>e</sub> 230 V	-
	DC-13	I <sub>e</sub> 6 A U <sub>e</sub> 24 V		I <sub>e</sub> 2 A U <sub>e</sub> 24 V	I <sub>e</sub> 1 A U <sub>e</sub> 30 V	
Switching current, min., at switching voltage	10 12	10 24	5 24	10 24	1 5	mA V DC
Conventional thermal current I <sub>th</sub>	8	10		6	2	A
Contact closing time	< 4	-	≤ 5	-		ms
Contact bounce time	< 3	-	≤ 3	≤ 2		ms
Short circuit prot. acc. to EN IEC 60269-1 (control circuit fuse)	8	10	6		2	A gG
Connection	Screw terminal					
Conductor cross-section, max.	0.34 ... 1.5			0.14 ... 1.0		mm <sup>2</sup>
Approvals for switching elements		-			-	
LED function display (optional)	Red standard; others on request		LE024ge	-		

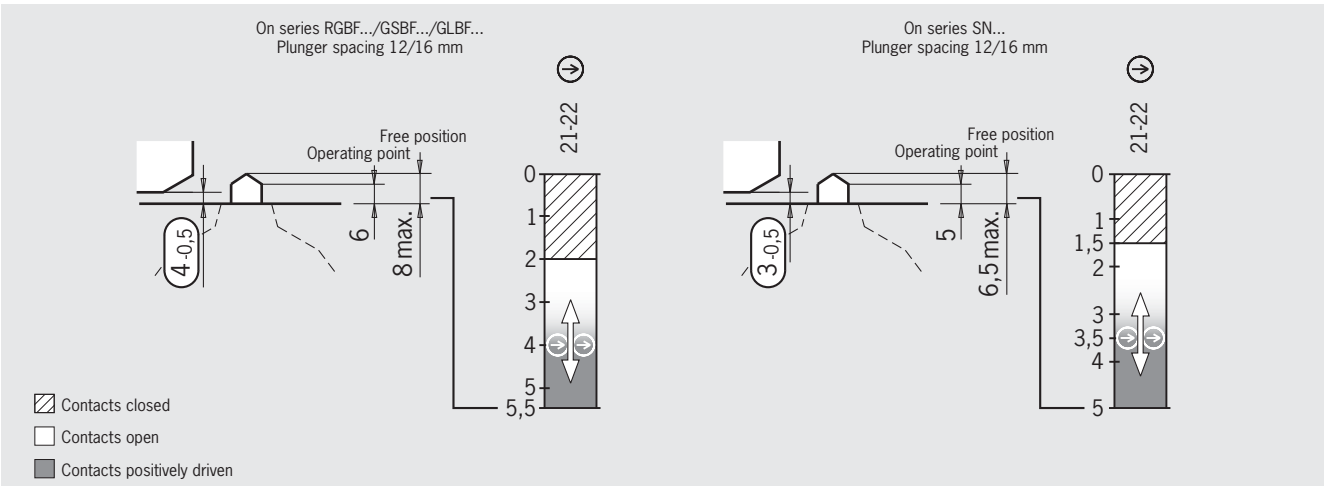
### Travel diagram ES 502 E

Snap-action switching contact according to DIN 43695 with one NO and one NC contact. Double gap, electrically isolated switching contacts, silver contact material, electro-gold plated. Screw terminal with self-raising clamp washers.



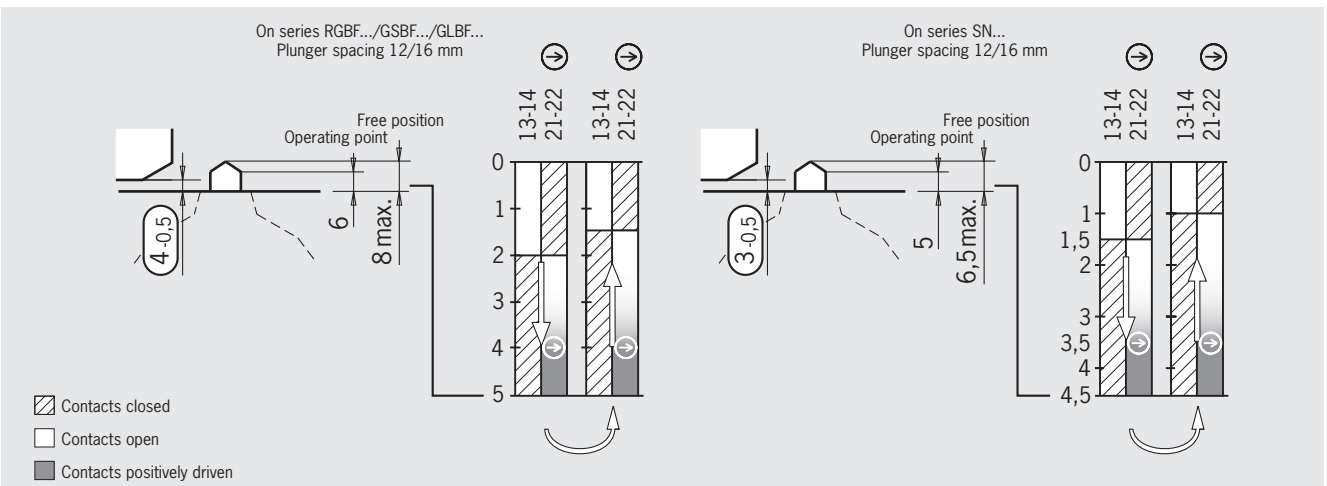
### Travel diagram ES 508

Slow-action switching contact with one positively driven contact. Double gap, silver contact material, electro-gold plated. Screw terminal with self-raising clamp washers.



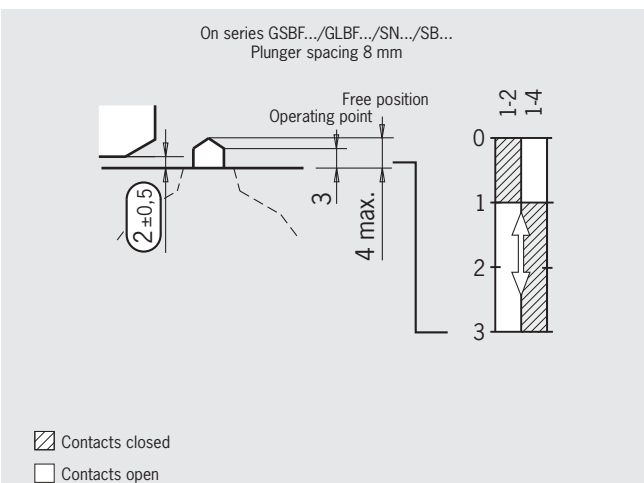
### Travel diagram ES 514

Magnetic snap-action switching contact with one positively driven contact and one NO contact. Double gap, electrically isolated switching contacts, silver contact material, electro-gold plated. Screw terminal with self-raising clamp washers.



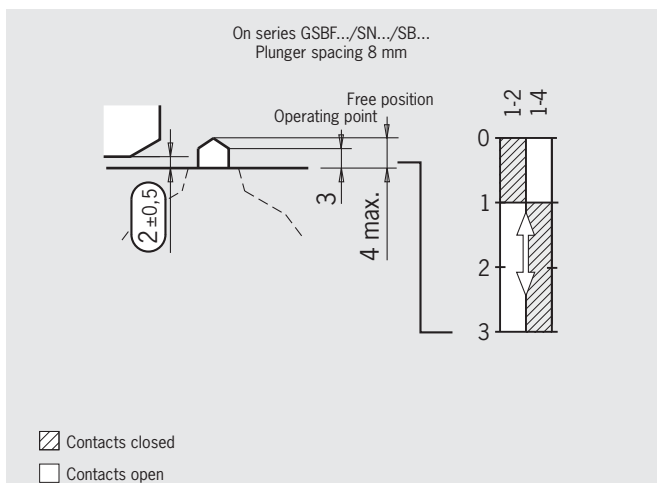
### Travel diagram ES 552

Snap-action switching contact with one changeover contact. Silver contact material, electro-gold plated. Screw terminal.



### Travel diagram ES 614

Snap-action switching contact with one changeover contact. Silver contact material, electro-gold plated (gold cross cut contact). Screw terminal.



## Multiple limit switches, inductive

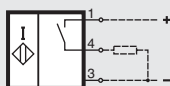
Parameter	Value					Unit
	777	781	780	779 <sup>1)</sup> 779/2	772 <sup>1)</sup> 772/2	
Switching element ES						
Proximity switch spacing	12			16		mm
Rated operating distance $S_n$	2			5		mm
Assured operating distance $S_a$	0 ... 1.6			0 ... 4		mm
Switching function	NO contact	NO + NC		NO contact	NO + NC	
Output	PNP		NPN	PNP		
LED function display	Yes					
Operating voltage $U_b$	DC 10 ... 55					V
Permissible residual ripple s	≤ 10					%
Voltage drop $U_d$	≤ 2.5					V
Rated insulation voltage $U_i$	DC 60					V
Rated operating current $I_e$	250					mA
Off-state current $I_r$	≤ 0.001					mA
No-load current $I_0$	≤ 15					mA
Short circuit and overload protection, pulsed	Yes					
Reverse polarity protection	Yes					
EMC compliance as per	EN IEC 60947-5-2					
Hysteresis H (in installed state)	≤ 0.2			≤ 0.5		mm
Repeat accuracy R	≤ 5					%
Switching frequency f	≤ 500					Hz
Utilization category acc. to EN IEC 60947-5-2	DC-13					
Housing material	PBT fiber glass reinforced					
Material, active face	PBT					
Ambient temperature T	-25 ... +70					°C
Connection	Connection terminals					
Conductor cross-section, max.	1.5					mm <sup>2</sup>

1) Switching elements with 5 mm operating distance (proximity switch spacing 16 mm) are supplied with two different oscillator frequencies to avoid mutual interference. Multiple limit switches must therefore be assembled alternately with these switching elements.

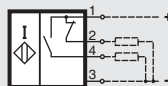
When ordering single elements, please prefix the part number with ES. E.g. switching element ES 781

### Wiring diagrams

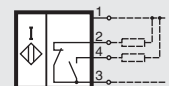
**DC NO contact, PNP**  
777,  $I_i = 12$  mm  
779,  $I_i = 16$  mm



**DC NO + NC contacts, PNP**  
781,  $I_i = 12$  mm  
772,  $I_i = 16$  mm



**DC NO + NC contacts, PNP**  
780,  $I_i = 12$  mm





## Selection table for trip rails

**Trip rail series** (here only preferable series; for other series see catalog)

**UFA** Aluminum

**ULA** Aluminum, according to DIN 69638

**UL** Aluminum, can be expanded

**UF** Cast iron, according to DIN 69638

**Slot spacing [mm]**

8

12

16

**Number of slots (max.)**

3

4

6

8

Series				Slot spacing [mm]			Number of slots (max.)				Page
UFA	ULA	UL	UF	8	12	16	3	4	6	8	
•				•					•		C-30
	•				•				•		C-30
	•					•			•		C-30
		•			•		Can be expanded				C-30
			•	•						•	C-30
			•		•					•	C-30
			•			•				•	C-30

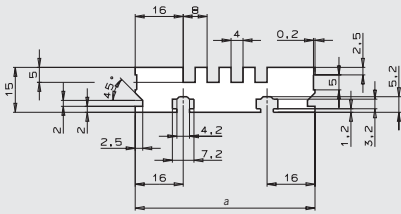
• Available

## Trip rails with 8 mm, 12 mm or 16 mm spacing



**Series UFA...**  
Slot spacing 8 mm, aluminum

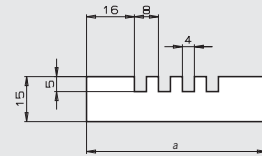
### Dimension drawing



Dimension a [mm]	44	52	60	68	76
Number of slots	2	3	4	5	6

Minimum order 2,010 mm, 1 bar

**Series UF...**  
Slot spacing 8 mm, cast iron



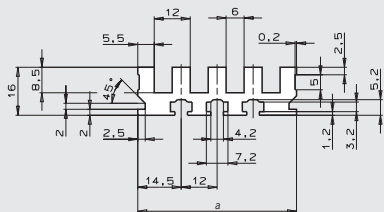
Dimension a [mm]	44	52	60	68	76	92
Number of slots	2	3	4	5	6	8
Dimension a [mm]	108	124	140	156	172	188
Number of slots	10	12	14	16	18	20

Length max. 1,000 mm  
Gray figures on request



**Series ULA...** according to DIN 69638 type A  
Slot spacing 12 mm, aluminum

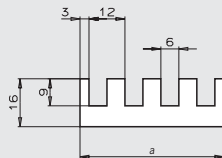
### Dimension drawing



Dimension a [mm]	29	41	53	65	77
Number of slots	2	3	4	5	6

Minimum order 2,010 mm, 1 bar

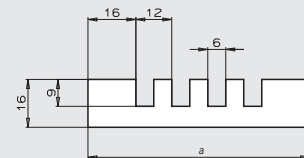
**Series UL...** can be placed in a row  
Slot spacing 12 mm, aluminum



Dimension a [mm]	24	36	48
Number of slots	2	3	4

Preferable lengths 1,000, 2,000, 3,000 and 4,000 mm (preferable length corresponds to minimum order)

**Series UF...** according to DIN 69638 type A  
Slot spacing 12 mm, cast iron



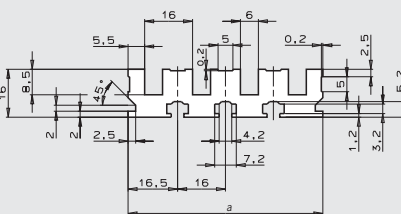
Dimension a [mm]	50	62	74	86	98	122
Number of slots	2	3	4	5	6	8
Dimension a [mm]	146	170	194	218		
Number of slots	10	12	14	16		

Length max. 1,000 mm  
Gray figures on request



**Series ULA...** according to DIN 69638 type A  
Slot spacing 16 mm, aluminum

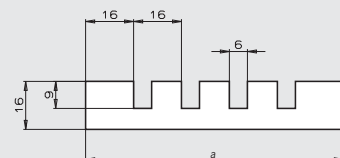
### Dimension drawing



Dimension a [mm]	33	49	65	97
Number of slots	2	3	4	6

Minimum order 2,010 mm, 1 bar

**Series UF...** according to DIN 69638 type A  
Slot spacing 16 mm, cast iron



Dimension a [mm]	54	70	86	102	118	150
Number of slots	2	3	4	5	6	8
Dimension a [mm]	182	214				
Number of slots	10	12				

Length max. 1,000 mm  
Gray figures on request

### Ordering code

U				-					
---	--	--	--	---	--	--	--	--	--

Series

Number of slots (see tables)

Slot spacing (8, 12 or 16 mm)

Length [mm] (note minimum order/preferable length)

## Trip dogs for trip rails with 8 mm, 12 mm or 16 mm spacing

### Type of actuation mechanical

#### Series U8...

For 8 mm slot spacing, hardened, ground steel

#### Dimension drawing

Figure 1

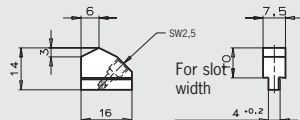


Figure 2

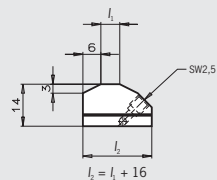
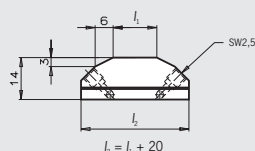


Figure 3



$l_2$	Figure
0	1
4	2
6.3	2
10	3
16	3
20	3
25	3
40	3
63	3
100	3

### Type of actuation inductive

#### Series UX8...

For 8 mm slot spacing, black painted steel



Figure 1

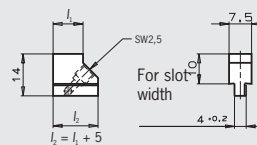
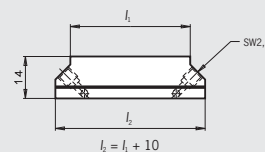


Figure 2



$l_2$	Figure
6	1
10	1
16	1
25	2
40	2
63	2
100	2

#### Series U1216... according to DIN 69639 type UA/UB

For 12 or 16 mm slot spacing, hardened, ground steel

#### Dimension drawing

Figure 1

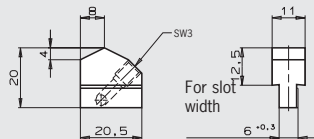


Figure 2

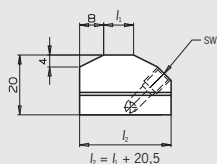
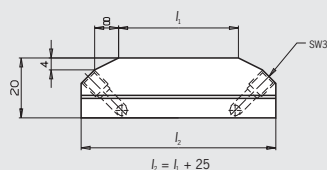


Figure 3



$l_2$	Figure	DIN/type
0	1	UA
4	2	UA
6.3	2	-
10	2	UA
16	3	UB
25	3	UB
40	3	UB
63	3	UB
100	3	UB
125	3	-

#### Series UX1216...

For 12 or 16 mm slot spacing, black painted steel

Figure 1

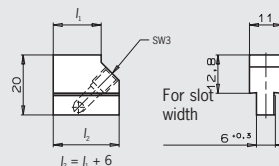
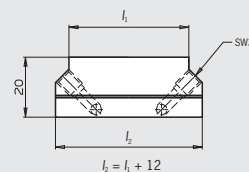


Figure 2



$l_2$	Figure
10	1
16	1
25	2
40	2
63	2
100	2
125	2



### Ordering code

**U**       -

Series

Length  $l_1$

## Special trip dogs for trip rails with 12 mm or 16 mm spacing

### Type of actuation mechanical

- ▶ **Safety dog**
- ▶ **Fine adjustment dogs**

#### Safety dog UZ

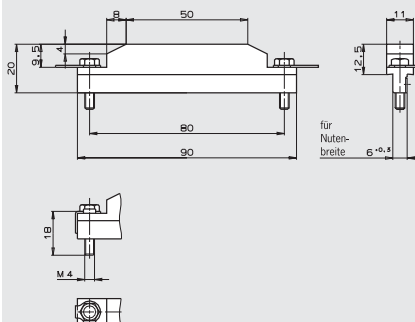
For limit switches with safety function the safety dog must be positively mounted

#### Fine adjustment dog UE

The fine adjustment dog UE1216-4 can be mounted in all U-trip rails with 12 or 16 mm slot spacing. The fine adjustment is made using a self-locking hexagon socket head screw

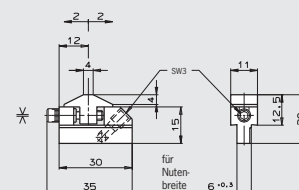
**Safety dog UZ** for 12/16 mm slot spacing, hardened, ground steel

#### Dimension drawing UZ1216-50



**Fine adjustment dog UE** for 12/16 mm slot spacing, hardened, ground steel

#### Dimension drawing UE1216-4



Adjustment range [mm]	4
Graduation > < [mm]	0.02

### Ordering table

Designation	Use	Order no./item
Safety dog UZ	For trip rails ULA/UL/UF 12 or 16 mm	<b>022734</b> UZ1216-50
Fine adjustment dog UE	For trip rails ULA/UL/UF 12 or 16 mm	<b>013340</b> UE1216-4

## Glossary

### Rated operating current $I_e$

The rated operating current is the nominal current that can load the inductive switching element in continuous operation.

### Rated operating distance $S_n$

The rated operating distance is a general variable used for measurement of operating distances. It does not take into account either the production tolerances or changes caused by external effects such as voltage and temperature.

### Operating voltage $U_B$

The operating voltage defines the voltage range in which the inductive switching element functions reliably. The specified values represent limits without any tolerances. The values can be obtained by referring to the technical data for the switching element. In the case of two-wire switching elements, this is applicable only in series connection with the load.

### Wire break safety

The EUCHNER proximity switches with wire break safety are designed such that on a wire break on any connection, the switch does not output a spurious signal.

### Switch-on current $I_k$

The switch-on current is the maximum current that can flow in an AC 2-wire switching element for a particular period at the moment it is switched on. The details in the technical data are valid for 20 ms.

### Assured operating distance $S_a$

The assured operating distance is the operating distance at which correct operation of the inductive switching element is guaranteed within the permissible operating conditions (temperature and voltage). The actuation distance lies between 0 and 81% of the rated operating distance  $s_n$ .

### Hysteresis H

The hysteresis is the difference in distance terms between the ON point as the test plate approaches and the OFF point as it moves away from the active face of the inductive switching element.

### Minimum operating current $I_m$

The minimum operating current is the minimum current required for the function of a 2-wire switching element in active energized condition.

### Short circuit and overload protection

The inductive switching elements are designed so that short circuits cannot damage the outputs. Pulsed short circuit protection is used. This means that the output transistor is switched off and on again in quick succession in the event of overloading or a short circuit. In this way, it is possible to establish whether the fault is still present or has been rectified.

### Off-state current $I_r$

The off-state current is the current that flows in the load circuit of an inductive DC 2-wire switching element in the non-conducting condition. In practical terms, this current has to be taken into account only for 2-wire switching elements.

### Switching elements

Switching elements are used in mechanical multiple limit switches. Switching elements are available with a normally closed function, a normally open function and as positively driven contacts.

### Switching frequency $f$

The switching frequency is the maximum possible number of switching operations per second. This is determined according to IEC 60947-5-2, and is based on a mark-space ratio of 1:2. The switching frequency is a switch-specific variable and can be obtained by referring to the technical data for the switching element.

### Slow-action contact elements

A slow-action contact element is characterized by the opening of the switching contact as a function of the speed at which the plunger is moved.

### Degree of protection

The degree of protection is defined according to EN 60529-1 and is given as an IP. "IP" is followed by two digits; the first digit gives the degree of protection against the penetration of solid foreign bodies and the second digit gives the degree of protection against the penetration of liquids.

### Voltage drop $U_d$

The voltage drop is measured across the active output of the inductive switching element when the output is in the "active energized" condition and when the rated operating current  $I_e$  flows.

### Snap-action contact elements

On snap-action contact elements the switching element jumps to the other switch state from a defined plunger position. The movement of the switching contact is independent of the speed at which the actuator is moved. Snap-action contact elements typically have hysteresis.

### Transient protection

EUCHNER proximity switches are protected against interference caused by the occurrence of inductive voltage peaks in accordance with IEC 801-4. Testing is performed in accordance with the stipulations in DIN VDE 0660, Part 208 and IEC 947-5-2.

### Ambient temperature T

The ambient temperature is the temperature range in which the reliable operation of the inductive switching element is guaranteed. This range is between - 25 and + 70 °C.

### Reverse polarity protection

Protection against reverse polarization of the operating voltage.

### Repeat accuracy R

The repeat accuracy is the reproducibility of the real operating distance  $s_r$  for two switching actions in succession within 8 hours at an operating temperature of  $23 \pm 5$  °C and an operating voltage of  $U_B \pm 5\%$ .

# Representatives

## International

### Austria

EUCHNER GmbH  
Aumühlweg 17-19/Halle 1C  
2544 Leobersdorf  
Tel. +43 720 010 200  
Fax +43 720 010 200-20  
info@euchner.at

### Benelux

EUCHNER (BENELUX) BV  
Visschersbuurt 23  
3356 AE Papendrecht  
Tel. +31 78 615-4766  
Fax +31 78 615-4311  
info@euchner.nl

### Brazil

EUCHNER Com.Comp.  
Eletronicos Ltda.  
Av. Prof. Luiz Ignácio Anhaia Mello,  
no. 4387  
Vila Graciosa  
São Paulo - SP - Brasil  
CEP 03295-000  
Tel. +55 11 29182200  
Fax +55 11 23010613  
euchner@euchner.com.br

### Canada

EUCHNER Canada Inc.  
2105 Fasan Drive  
Oldcastle, ON NOR 1L0  
Tel. +1 519 800-8397  
Fax +1 519 737-0314  
sales@euchner.ca

### China

EUCHNER (Shanghai)  
Trading Co., Ltd.  
No. 15 building,  
No. 68 Zhongchuang Road,  
Songjiang  
Shanghai, 201613, P.R.C  
Tel. +86 21 5774-7090  
Fax +86 21 5774-7599  
info@euchner.com.cn

### Czech Republic

EUCHNER electric s.r.o.  
Trnkova 3069/117h  
628 00 Brno  
Tel. +420 533 443-150  
Fax +420 533 443-153  
info@euchner.cz

### Denmark

Duelco A/S  
Systemvej 8 - 10  
9200 Aalborg SV  
Tel. +45 7010 1007  
Fax +45 7010 1008  
info@duelco.dk

### Finland

Sähkölehto Oy  
Holkkitie 14  
00880 Helsinki  
Tel. +358 9 7746420  
office@sahkolehto.fi

### France

EUCHNER France S.A.R.L.  
Parc d'Affaires des Bellevues  
Allée Rosa Luxembourg  
Bâtiment le Colorado  
95610 ERAGNY sur OISE  
Tel. +33 1 3909-9090  
Fax +33 1 3909-9099  
info@euchner.fr

### Hungary

EUCHNER Magyarország Kft.  
FSD Park 2,  
2045 Törökbálint  
Tel. +36 1 919 0855  
Fax +36 1 919 0857  
info@euchner.hu

### India

EUCHNER (India) Pvt. Ltd.  
401, Bremen Business Center,  
City Survey No. 2562,  
University Road  
Aundh, Pune - 411007  
Tel. +91 20 64016384  
Fax +91 20 25885148  
info@euchner.in

### Israel

Ilan & Gavish Automation Service Ltd.  
26 Shenkar St. Qiryat Arie 49513  
P.O. Box 10118  
Petach Tikva 49001  
Tel. +972 3 9221824  
Fax +972 3 9240761  
mail@ilan-gavish.com

### Italy

TRITECNICA SpA  
Viale Lazio 26  
20135 Milano  
Tel. +39 02 541941  
Fax +39 02 55010474  
info@tritecnica.it

### Japan

EUCHNER Co., Ltd.  
1662-3 Komakiharashinden  
Komaki-shi, Aichi-ken  
485-0012, Japan  
Tel. +81 568 42 0157  
Fax +81 568 42 0159  
info@euchner.jp

### Korea

EUCHNER Korea Co., Ltd.  
115 Gasan Digital 2 - Ro  
(Gasan-dong, Daeryung  
Technotown 3rd Rm 810)  
153 - 803 Kumchon-Gu, Seoul  
Tel. +82 2 2107-3500  
Fax +82 2 2107-3999  
info@euchner.co.kr

### Mexico

EUCHNER México S de RL de CV  
95610 ERAGNY sur OISE  
Conjunto Industrial PK Co.  
Carretera Estatal 431 km. 1+300  
Ejido El Colorado, El Marqués  
76246 Querétaro, México  
Tel. +52 442 402 1485  
Fax +52 442 402 1486  
info@euchner.mx

### Poland

EUCHNER Sp. z o.o.  
Kraśnińskiego 29  
40-019 Katowice  
Tel. +48 32 252 20 09  
Fax +48 32 252 20 13  
info@euchner.pl

### Portugal

PAM Servicos Tecnicos Industriais Lda.  
Rua de Timor - Pavilhao 2A  
Zona Industrial da Abelheira  
4785-123 Trofa  
Tel. +351 252 418431  
Fax +351 252 494739  
pam@mail.telepac.pt

### Republic of South Africa

RUBICON  
ELECTRICAL DISTRIBUTORS  
4 Reith Street, Sidwell  
6061 Port Elizabeth  
Tel. +27 41 451-4359  
Fax +27 41 451-1296  
sales@rubiconelectrical.com

### Romania

First Electric SRL  
Str. Ritmului Nr. 1 Bis  
Ap. 2, Sector 2  
021675 Bucuresti  
Tel. +40 21 2526218  
Fax +40 21 3113193  
office@firstelectric.ro

### Singapore

BM Safety Singapore Pte Ltd.  
Blk 3, Ang Mo Kio Industrial Park 2A  
#05-06  
Singapore 568050  
Tel. +65 6744 8018  
Fax +65 6744 1929  
sales@bmsafety.com.sg

### Slovakia

EUCHNER electric s.r.o.  
Trnkova 3069/117h  
628 00 Brno  
Tel. +420 533 443-150  
Fax +420 533 443-153  
info@euchner.cz

### Slovenia

SMM proizvodni sistemi d.o.o.  
Jaskova 18  
2000 Maribor  
Tel. +386 2 4502326  
Fax +386 2 4625160  
franc.kit@smm.si

### Spain

EUCHNER, S.L.  
Gurutzezi 12 - Local 1  
Poligono Belartza  
20018 San Sebastian  
Tel. +34 943 316-760  
Fax +34 943 316-405  
info@euchner.es

### Sweden

Censit AB  
Box 331  
33123 Värnamo  
Tel. +46 370 691010  
Fax +46 370 18888  
info@censit.se

### Switzerland

EUCHNER AG  
Falknisstrasse 9a  
7320 Sargans  
Tel. +41 81 720-4590  
Fax +41 81 720-4599  
info@euchner.ch

### Taiwan

Daybreak Int'l (Taiwan) Corp.  
3F, No. 124, Chung-Cheng Road  
Shihlin 11145, Taipei  
Tel. +886 2 8866-1234  
Fax +886 2 8866-1239  
day111@ms23.hinet.net

### Turkey

EUCHNER Endüstriyel Emniyet  
Teknolojileri Ltd. Şti.  
Hattat Bahattin Sok.  
Ceylan Apt. No. 13/A  
Göztepe Mah.  
34730 Kadıköy / Istanbul  
Tel. +90 216 359-5656  
Fax +90 216 359-5660  
info@euchner.com.tr

### United Kingdom

EUCHNER (UK) Ltd.  
Unit 2 Petre Drive,  
Sheffield  
South Yorkshire  
S4 7PZ  
Tel. +44 114 2560123  
Fax +44 114 2425333  
sales@euchner.co.uk

### USA

EUCHNER USA Inc.  
6723 Lyons Street  
East Syracuse, NY 13057  
Tel. +1 315 701-0315  
Fax +1 315 701-0319  
info@euchner-usa.com

EUCHNER USA Inc.  
Detroit Office  
130 Hampton Circle  
Rochester Hills, MI 48307  
Tel. +1 248 537-1092  
Fax +1 248 537-1095  
info@euchner-usa.com

## Germany

### Augsburg

EUCHNER GmbH + Co. KG  
Ingenieur- und Vertriebsbüro  
Julius-Spokojny-Weg 8  
86153 Augsburg  
Tel. +49 821 56786540  
Fax +49 821 56786541  
peter.klopfer@euchner.de

### Berlin

EUCHNER GmbH + Co. KG  
Ingenieur- und Vertriebsbüro  
Ulmenstraße 115a  
12621 Berlin  
Tel. +49 30 50508214  
Fax +49 30 56582139  
alexander.walz@euchner.de

### Chemnitz

EUCHNER GmbH + Co. KG  
Ingenieur- und Vertriebsbüro  
Am Vogelherd 2  
09627 Bobritzsch-Hilbersdorf  
Tel. +49 37325 906000  
Fax +49 37325 906004  
jens.zehrtner@euchner.de

### Düsseldorf

EUCHNER GmbH + Co. KG  
Ingenieur- und Vertriebsbüro  
Tippgarten 3  
59427 Unna  
Tel. +49 2308 9337284  
Fax +49 2308 9337285  
christian.schimke@euchner.de

### Essen

Thomas Kreißl  
fördern - steuern - regeln  
Hackenbergweg 8a  
45133 Essen  
Tel. +49 201 84266-0  
Fax +49 201 84266-66  
info@kreisslessen.de

### Freiburg

EUCHNER GmbH + Co. KG  
Ingenieur- und Vertriebsbüro  
Steige 5  
79206 Breisach  
Tel. +49 7664 403833  
Fax +49 7664 403834  
peter.seifert@euchner.de

### Lübeck

EUCHNER GmbH + Co. KG  
Ingenieur- und Vertriebsbüro  
Am Stadtrand 13  
23556 Lübeck  
Tel. +49 451 88048371  
Fax +49 451 88184364  
martin.pape@euchner.de

### Nürnberg

EUCHNER GmbH + Co. KG  
Ingenieur- und Vertriebsbüro  
Steiner Straße 22a  
90522 Oberasbach  
Tel. +49 911 6693829  
Fax +49 911 6696722  
ralf.paulus@euchner.de

### Stuttgart

EUCHNER GmbH + Co. KG  
Ingenieur- und Vertriebsbüro  
Kohlhammerstraße 16  
70771 Leinfelden-Echterdingen  
Tel. +49 711 7597-0  
Fax +49 711 7597-303  
oliver.laier@euchner.de  
uwe.kupka@euchner.de

### Wiesbaden

EUCHNER GmbH + Co. KG  
Ingenieur- und Vertriebsbüro  
Adolfsallee 3  
65185 Wiesbaden  
Tel. +49 611 98817644  
Fax +49 611 98895071  
giancarlo.pasquesi@euchner.de



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**EUCHNER GmbH + Co. KG**

Kohlhammerstraße 16  
70771 Leinfelden-Echterdingen  
Germany  
Tel. +49 711 7597-0  
Fax +49 711 753316  
info@euchner.de  
www.euchner.com

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