EN

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

made in Germany

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Position Switches

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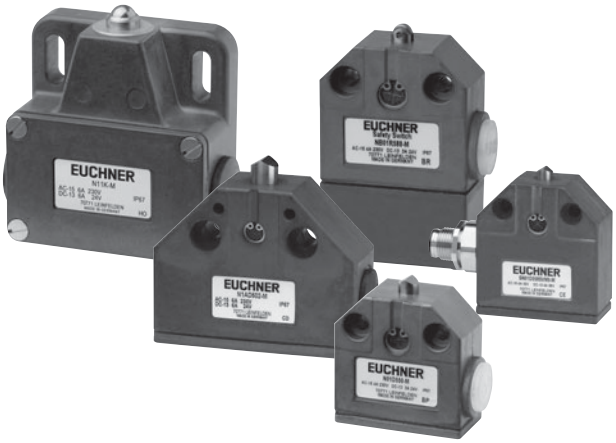
General information

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

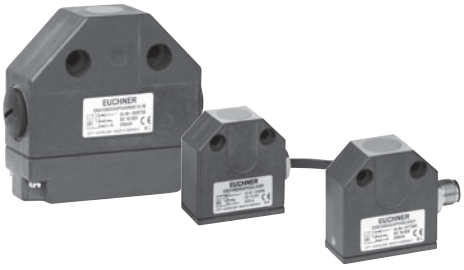
EUCHNER precision single hole fixing limit switches are technically sophisticated command switches, which have been proving their reliability, day in and day out, for decades in harsh industrial applications.
These mechanically actuated precision single hole fixing limit switches are IP 67 rated and 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

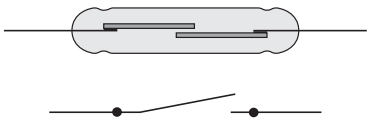


Inductive single limit switches are used for positioning and control in all areas of mechanical and systems engineering. Inductive single limit switches are used for automation tasks in machinery in the wood, textile and plastics industries.
Due to their non-contact and thus wear-free principle of operation, 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

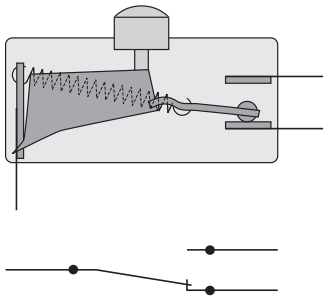
The reed contact comprises two ferromagnetic contacts in a glass bulb. When the reed contact is placed in a magnetic field, the contacts adopt opposite polarities and are closed.
For series EGT with reed contact.



Mechanical switching elements

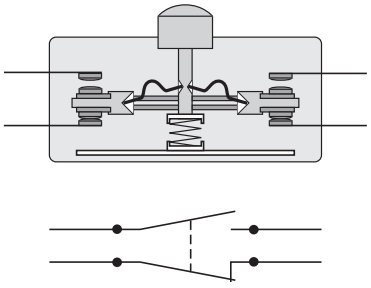
Changeover contact with snap-action function

Snap-action switching element [1] with single gap and three connections.
For series EGT with snap-action switch and series N01, NB01, SN01 with soldered connection.



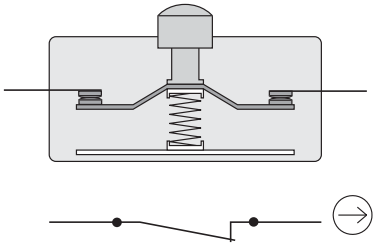
Snap-action switching element [1] with one normally open contact (NO) and one normally closed contact (NC)

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.



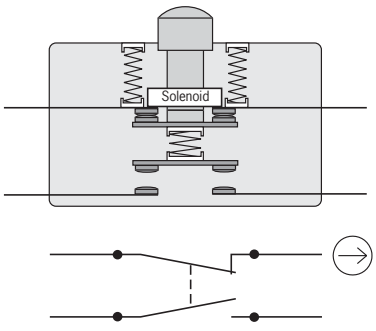
Safety switching element with slow-action switching contact [2]

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 [1]

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

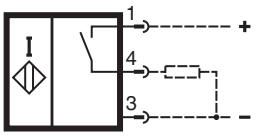
Positively driven contacts are used in some switching elements. These are special switching contacts that are designed to ensure the switching contacts are always reliably separated. Even if contacts are welded together, the connection is opened by the actuating force.
It is a common feature of all safety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

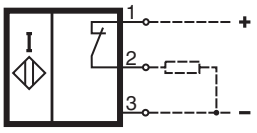
The NO function means that the load current flows when the active face of the inductive switching element is activated and that no current flows when the active face is not activated.



DC NO contact, PNP

NC function

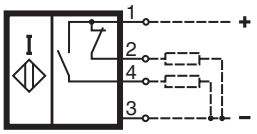
The NC function means that the load current does not flow when the active face of the inductive switching element is activated and that current flows when the active face is not activated.



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.

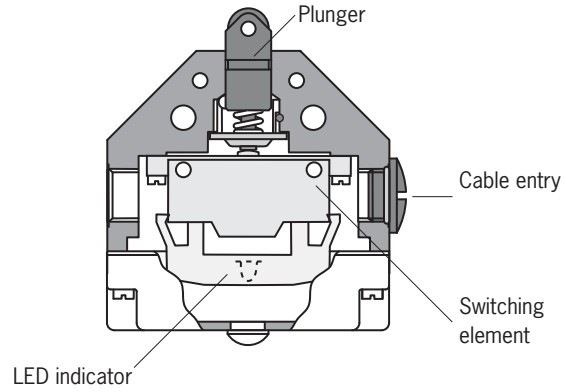


DC NO + NC contacts, PNP

Precision single limit switches

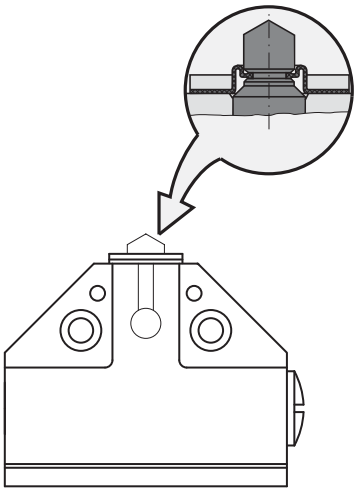
Layout

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.



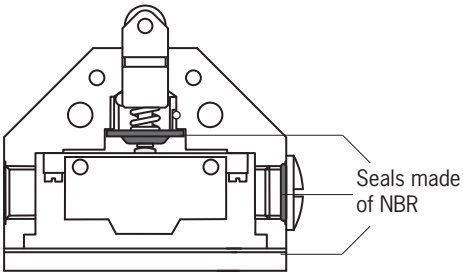
Exterior diaphragm

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.



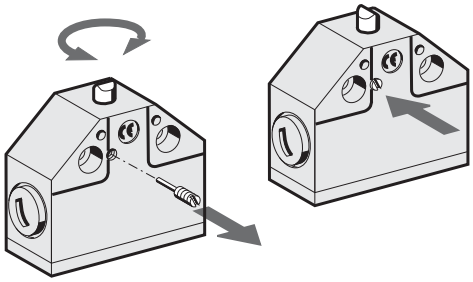
Seals

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.



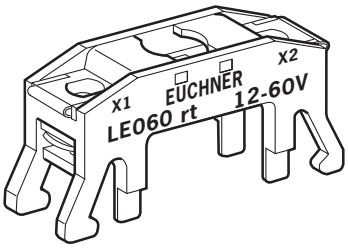
Adjustability

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°.



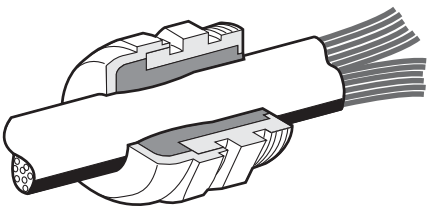
LED function display

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 ± 0.01 mm max.
- With hard-wired cable or with M12 plug connection
- Temperature range -30 °C to +120 °C

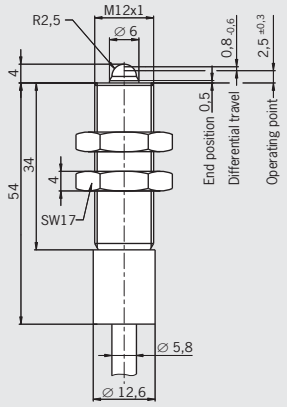
Precision single hole fixing limit switches

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

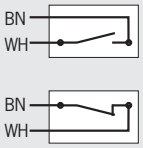
Ambient temperature up to 120 °C

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

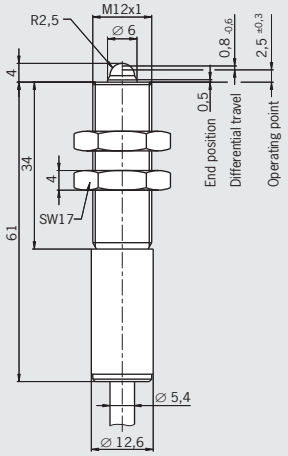
Dimension drawings

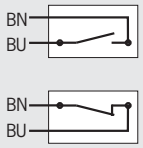


Wiring diagrams



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.

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 [1] ... +120	-25 [1] ... +80
Approach speed, max.		[m/min]	8	8
Mechanical life	axial actuation		30 x 10^6 operating cycles (1 x 10^6 at 120 °C)	30 x 10^6 operating cycles
	radial actuation		-	1 x 10^6 operating cycles (dog 30°)
Operating point accuracy [2]		[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_i		[V]	50 ⊡	50 ⊡
Utilization category acc. to IEC 60947-5-1			AC-12 U_e 30 V I_e 0.3 A DC-13 U_e 24 V I_e 0.3 A	AC-12 U_e 30 V I_e 0.3 A DC-13 U_e 24 V I_e 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 mm²	PUR cable 2 x 0.5 mm²

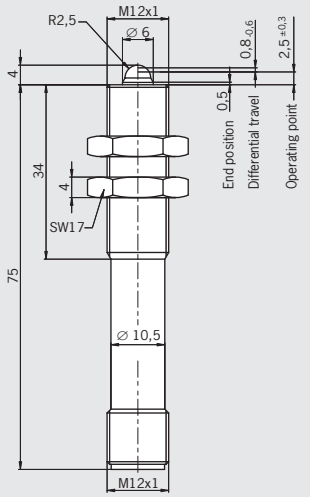
1) Cable hard wired.
2) The reproducible operating point accuracy relates to axial actuation, after run-in of approx. 2,000 operating cycles.
3) Mating connector see page A-44 to A-46.

Ordering table

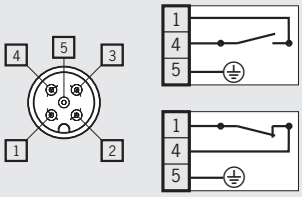
1 NO	Connecting cable 3 m	**104223** EGT12A3000C2250	-
	Connecting cable 5 m	-	**082201** EGT12A5000
	Plug connector	-	-
1 NC	Connecting cable 3 m	-	-
	Connecting cable 5 m	On request	**078848** EGT12R5000
	Plug connector	-	-

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

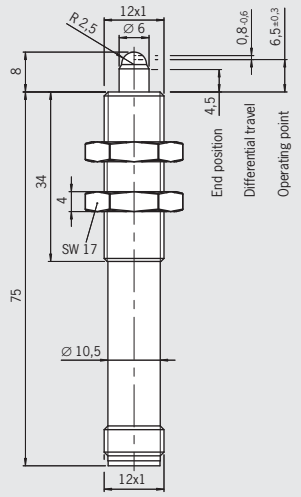
Dimension drawings

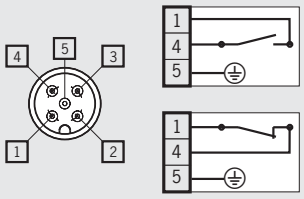


Wiring diagrams



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





Brass, nickel-plated	Brass, nickel-plated
Stainless steel	Stainless steel
IP 67 Mating connector inserted and screwed tight	IP 67 Mating connector inserted and screwed tight
-25 … +80	-25 … +80
8	5
30 x 10^6 operating cycles	5 x 10^6 operating cycles
1 x 10^6 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_e 30 V I_e 0.3 A DC-13 U_e 24 V I_e 0.3 A	AC-12 U_e 30 V I_e 0.3 ADC-13 U_e 24 V I_e 0.3 A
1	1
1	1
0.4	0.4
Plug connector M12 [3]	Plug connector M12 [3]

-	-
-	-
075426 EGT12ASFM5	**095112** EGT12ASFM5C2083
-	-
-	-
075427 EGT12RSFM5	-

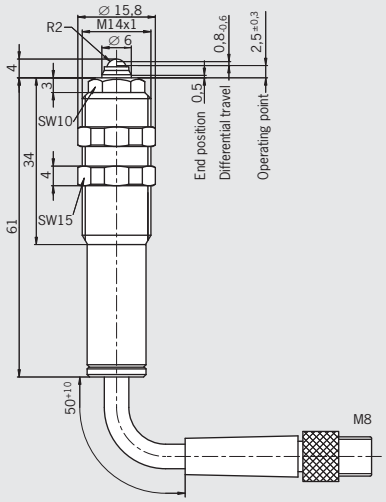
Precision single hole fixing limit switches

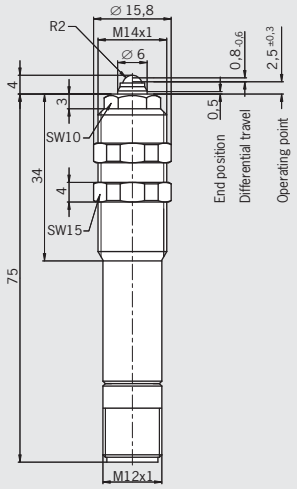
- **With reed contact and protective diode**
- **Plunger material stainless steel**
- **Any installation position**

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

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

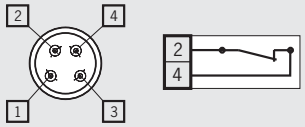
Dimension drawings

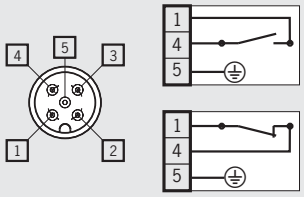




⚠ Never switch incandescent lamps. Not even for test purposes.
Single hole fixing limit switches must not be used as an end stop.

Wiring diagrams





Technical data

Housing material	Sleeve		Brass, nickel-plated	Brass, nickel-plated
	Threaded section		Stainless steel	Stainless steel
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 10^6 operating cycles	30 x 10^6 operating cycles
	radial actuation		-	5 x 10^6 operating cycles (dog 15°)
Operating point accuracy [2]		[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_i		[V]	50	50
Utilization category acc. to IEC 60947-5-1			AC-12 U_e 30 V I_e 0.3 A DC-13 U_e 24 V I_e 0.3 A	AC-12 U_e 30 V I_e 0.3 A DC-13 U_e 24 V I_e 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 [3]	Plug connector M12 [3]

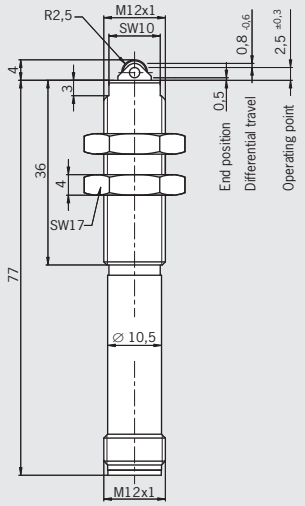
1) Cable hard wired.
2) The reproducible operating point accuracy relates to axial actuation, after run-in of approx. 2,000 operating cycles.
3) Mating connector see page A-44 to A-46.

Ordering table

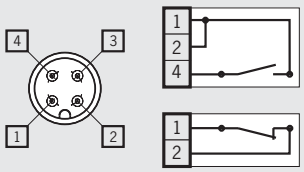
1 NO	Connecting cable 0.5 m with plug connector M8	-	-
	Connecting cable 5 m	-	-
	Plug connector	-	**093352** EGT11A2NSFM5
1 NC	Connecting cable 0.5 m with plug connector M8	**084000** EGT11R2N50SAM4	-
	Connecting cable 5 m	-	-
	Plug connector	-	**091848** EGT11R2NSFM5

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 10^6 operating cycles
± 0.01
Approx. 16
Reed contact
1 NO or 1 NC
Rhodium
50 ⧈
AC-12 U_e 30 V I_e 0.3 A DC-13 U_e 24 V I_e 0.3 A
1
1
0.4
Plug connector M12 [3]

-
-
078483 EGT12ARSEM4C1888
-
-
079139 EGT12RRSEM4C1888

Precision single hole fixing limit switches

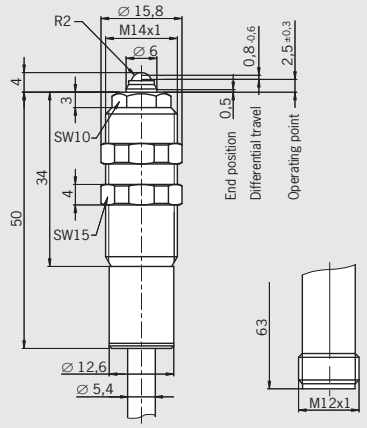
- **With reed contact**
- **Plunger material stainless steel**
- **Any installation position**

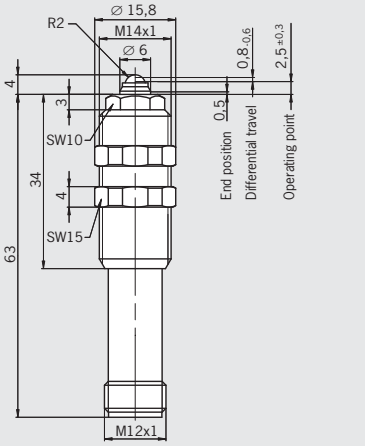
For mating connector with LED display

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

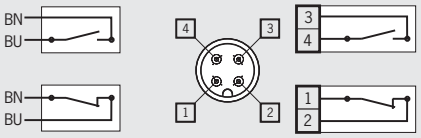
Dimension drawings

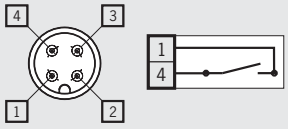




⚠ Never switch incandescent lamps. Not even for test purposes.
Single hole fixing limit switches must not be used as an end stop.

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 [4]	IP 67 Mating connector inserted and screwed tight
Ambient temperature	[°C]	-25 [1] … +80	-25 … +80	-25 … +80
Approach speed, max.	[m/min]	8		8
Mechanical life (axial)		30 x 10^6 operating cycles		30 x 10^6 operating cycles
Operating point accuracy [2]	[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_i	[V]	250 ⧈	50	50
Utilization category acc. to IEC 60947-5-1	AC-12	U_e 230 V I_e 0.03 A	U_e 30 V I_e 0.3 A	AC-12 U_e 30 V I_e 0.3 A
	DC-13	U_e 24 V I_e 0.3 A	U_e 24 V I_e 0.3 A	DC-13 U_e 24 V I_e 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 mm², encapsulated	Plug connector M12 [3]	Plug connector M12 [3]

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

1 NO	Connecting cable 2 m	**001366** EGT1/4A2000	-
	Connecting cable 5 m	**001368** EGT1/4A5000	-
	Plug connector	**033976** EGT1/4ASEM4	**075644** EGT1/4ASEM4C1802
1 NC	Connecting cable 2 m	**001371** EGT1/4R2000	-
	Connecting cable 5 m	**001372** EGT1/4R5000	-
	Plug connector	**033982** EGT1/4RSEM4	-

Made of high-quality stainless steel

With scraper made of PU

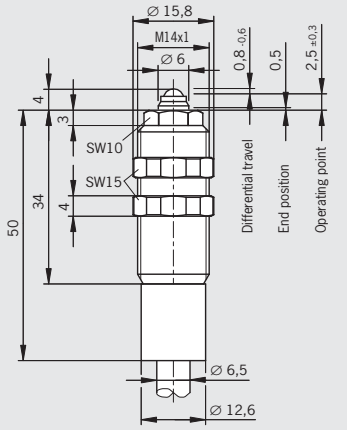
With scraper made of PU

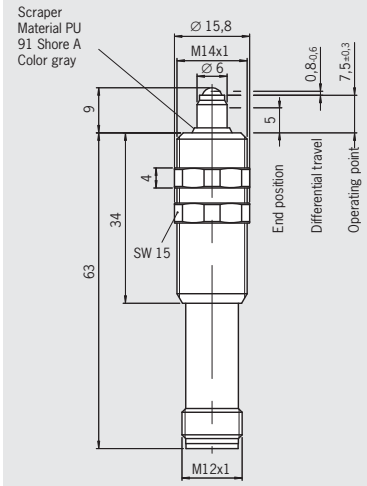
Design EGT1/4, M14 x 1, ball plunger
Connecting cable, max. pressure 300 kPa

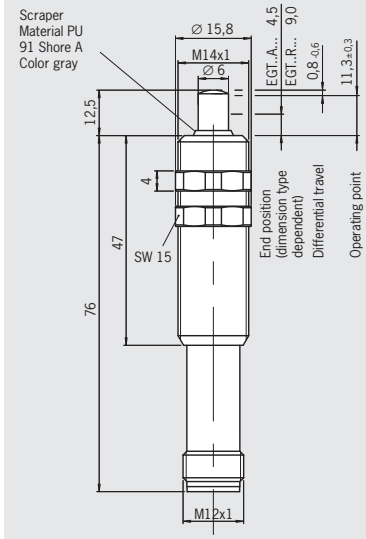
Design EGT1/4, M14 x 1, ball plunger
Plug connector M12

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

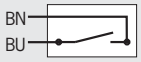
Dimension drawings

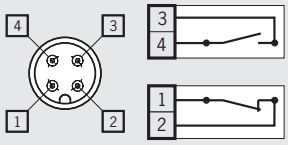


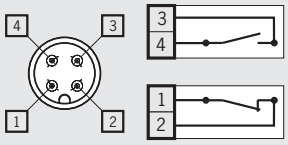




Wiring diagrams







High-quality stainless steel	Brass, nickel-plated	Brass, nickel-plated
	Stainless steel	Stainless steel
IP 68	IP 67 Mating connector inserted and screwed tight	IP 67 Mating connector inserted and screwed tight
-25 ... +80	-25 ... +80	-25 ... +80
8	Approx. 16	8
30 x 10^6 operating cycles	5 x 10^6 operating cycles	30 x 10^6 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_e 30 V I_e 0.3 A DC-13 U_e 24 V I_e 0.3 A	AC-12 U_e 30 V I_e 0.3 A DC-13 U_e 24 V I_e 0.3 A	AC-12 U_e 30 V I_e 0.3 A DC-13 U_e 24 V I_e 0.3 A
1	1	1
1	1	1
0.4	0.4	0.4
Hydrofirm cable 2 x 0.5 mm², encapsulated	Plug connector M12 [3)]	Plug connector M12 [3)]

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

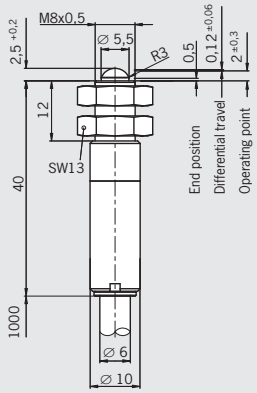
Precision single hole fixing limit switches

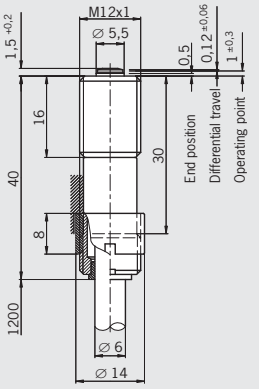
- **With snap-action switching element**
- **Plunger material stainless steel**
- **Any installation position**

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

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

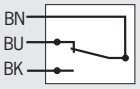
Dimension drawings





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

Wiring diagrams



Technical data

Housing material		Stainless steel	Stainless steel	
Degree of protection acc. to IEC 60529		IP 65	IP 65	
Ambient temperature	[°C]	-20 [1] ... +80	-20 [1] ... +80	-30 ... +80
Approach speed, max.	[m/min]	8	8	
Mechanical life (axial)		1 x 10^6 operating cycles	1 x 10^6 operating cycles	
Operating point accuracy [2]	[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_i	[V]	250 ⧈	250 ⧈	
Rated impulse withstand voltage U_{imp}		2.5	2.5	
Utilization category acc. to IEC 60947-5-1		AC-15 U_e 230 V I_e 0.5 A DC-13 U_e 24 V I_e 0.6 A	AC-15 U_e 230 V I_e 0.5 A DC-13 U_e 24 V I_e 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 mm²	PUR cable 3 x 0.5 mm²	Silicone cable 3 x 0.5 mm²

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

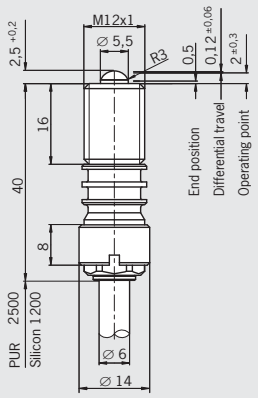
1 changeover contact	Connecting cable 1 m	**119345** EGM8-1000C2396	-	-
	Connecting cable1.2 m	-	**075556** EGM12-1200C1791	**076464** EGM12-1200C1820
	Connecting cable 2 m	-	-	-
	Connecting cable2.5 m	-	-	-
	Connecting cable 4 m	-	**076154** EGM12-4000C1791	-
	Connecting cable 5 m	-	-	-
	Plug connector	-	-	-

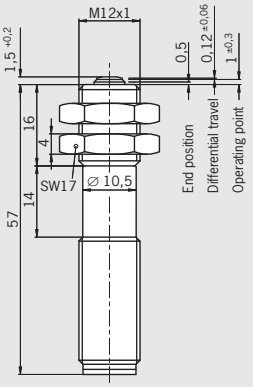
Design EGM12, M12 x 1, dome plunger
For sealing with O-rings

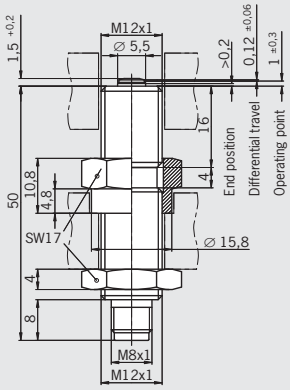
Design EGM12, M12 x 1, flat plunger
Plug connector M12

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

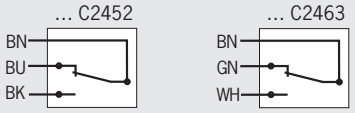
Dimension drawings

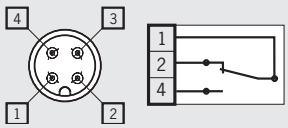


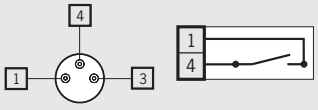




Wiring diagrams







Stainless steel		Stainless steel		Stainless steel
IP 65		IP 65 Mating connector inserted and screwed tight		IP 65 Mating connector inserted and screwed tight
-20 [1] ... +80	-30 ... +80	-20 ... +80	-30 ... +85	-20 ... +85
8		8		8
1 x 10^6 operating cycles		1 x 10^6 operating cycles		1 x 10^6 operating cycles
± 0.01		± 0.01		± 0.01
Approx. 16		Approx. 16		Approx. 16
Snap-action switching contact		Snap-action switching contact		Snap-action switching contact
1 changeover contact		1 changeover contact		1 NO
Fine silver, gold-plated		Silver alloy, gold-plated		Silver alloy, gold-plated
250 ⧈		50		50
2.5		1.5		1.5
AC-15 U_e 230 V I_e 0.5 A DC-13 U_e 24 V I_e 0.6 A		AC-15 U_e 50 V I_e 0.5 A DC-13 U_e 24 V I_e 0.6 A		AC-15 U_e 24 V I_e 0.5 A DC-13 U_e 24 V I_e 0.6 A
10		10		10
12		12		12
2		2		2
PUR cable 3 x 0.5 mm²	Silicone cable 3 x 0.5 mm²	Plug connector M12 [3]		Plug connector M8 [3]

-	-	-	-	-
-	**128196** EGM12-1200C2463	-	-	-
-	-	-	-	-
126384 EGM12-2500C2452	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	**082205** EGM12SEM4	**093733** EGM12SEM4C1820	**077228** EGM12SAM3C1868

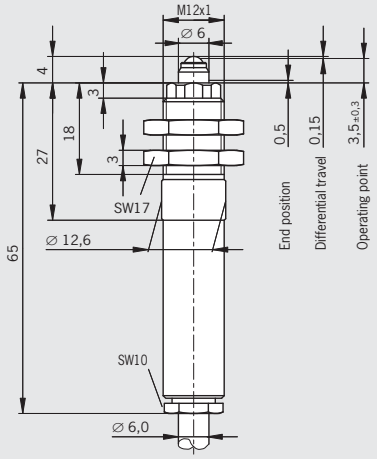
Precision single hole fixing limit switches

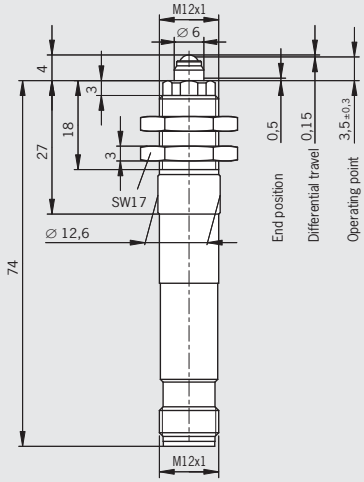
- **With snap-action switching element**
- **Plunger material stainless steel**
- **Any installation position**

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

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

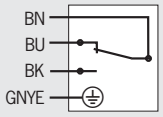
Dimension drawings

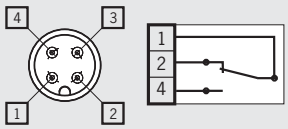




⚠ Single hole fixing limit switches must not be used as an end stop.

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 [1] ... +80	-25 ... +80
Approach speed, max.	[m/min]	8	8
Mechanical life (axial)		1 x 10^6 operating cycles	1 x 10^6 operating cycles
Operating point accuracy [2]	[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_i	[V]	250	50
Rated impulse withstand voltage U_{imp}		2.5	2.5
Utilization category acc. to IEC 60947-5-1		AC-15 U_e 230 V I_e 0.5A DC-13 U_e 24 V I_e 0.6 A	AC-15 U_e 50 V I_e 0.5 A DC-13 U_e 24 V I_e 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 mm²	Plug connector M12 [3]

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	**092695** EGT1M12-2000	-
	Connecting cable 5 m	**093364** EGT1M12-5000	-
	Plug connector	-	**093365** EGT1M12SEM4

Precision single hole fixing limit switches

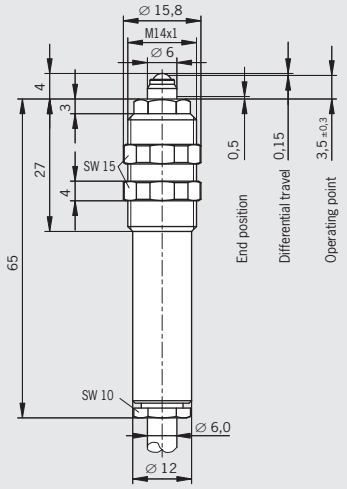
- **With snap-action switching element**
- **Plunger material stainless steel**
- **Any installation position**

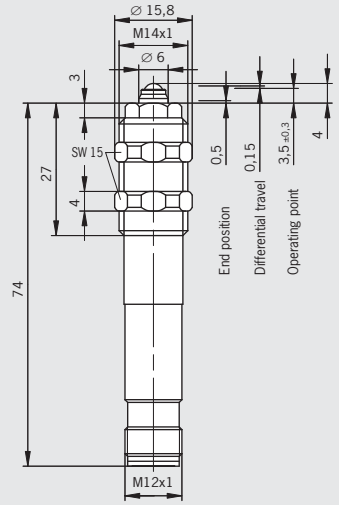
⚠ Single hole fixing limit switches must not be used as an end stop.

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

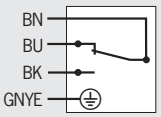
Design EGT1, M14 x 1, ball plunger
Plug connector M12

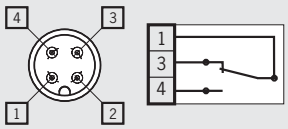
Dimension drawings





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 [1] ... +80	-25 ... +80
Approach speed, max.	[m/min]	8	8
Mechanical life (axial)		1 x 10^6 operating cycles	1 x 10^6 operating cycles
Operating point accuracy [2]	[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_i	[V]	250	50
Rated impulse withstand voltage U_{imp}		2.5	2.5
Utilization category acc. to IEC 60947-5-1		AC-15 U_e 230 V I_e 0.5 A DC-13 U_e 24 V I_e 0.6 A	AC-15 U_e 50 V I_e 0.5 A DC-13 U_e 24 V I_e 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 mm²	Plug connector M12 [3]

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.

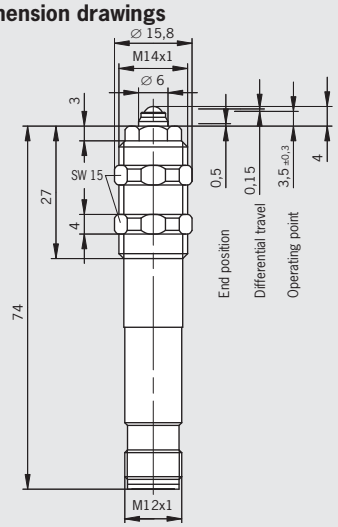
Ordering table

1 changeover contact	Connecting cable 2 m	**001732** EGT1-2000	-
	Connecting cable 5 m	**001733** EGT1-5000	-
	Plug connector	-	**019727** EGT1SEM4

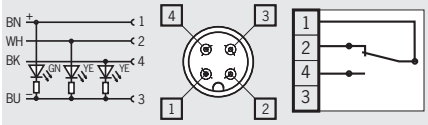
For plug connector with LED display

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

Dimension drawings



Wiring diagrams

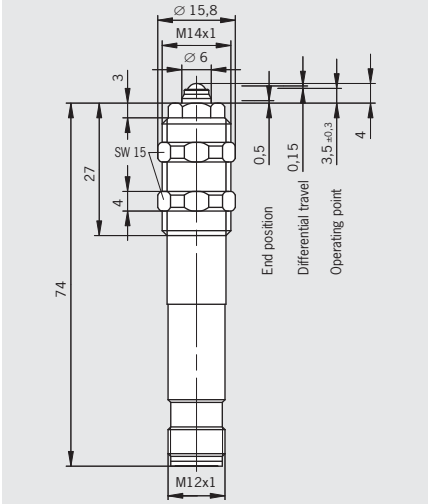


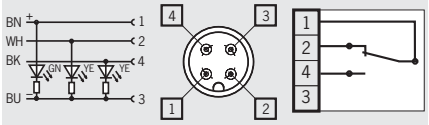
Brass, nickel-plated
IP 67 Mating connector inserted and screwed tight
-25 … +80
8
1 x 10^6 operating cycles
± 0.01
Approx. 20
Snap-action switching contact
1 changeover contact
Silver alloy, gold-plated
50
2.5
DC-13 U_e 24 V I_e 0.6 A
10
12
2
Plug connector M12 [3]

-
-
054250 EGT1SEM4C1613

For plug connector with LED display

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



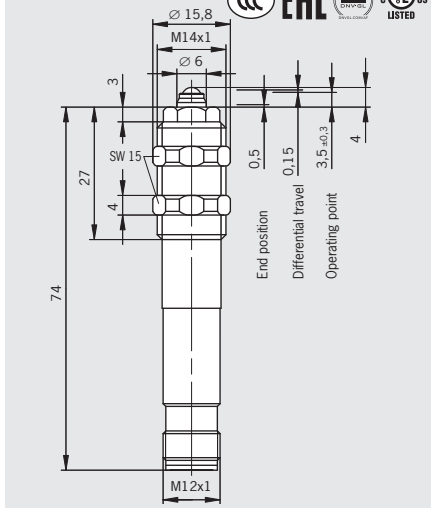


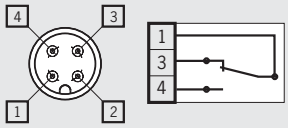
Brass, nickel-plated
IP 67 Mating connector inserted and screwed tight
-5 … +80
8
1 x 10^6 operating cycles
± 0.01
Approx. 20
Snap-action switching contact
1 changeover contact
Silver alloy, gold-plated
50
2.5
AC-15 U_e 50 V I_e 0.5 ADC-13 U_e 24 V I_e 0.6 A
10
12
2
Plug connector M12 [3]

-
-
102479 EGT1SEM4C2221

Suitable for aggressive coolant; diaphragm made of Viton

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





Brass, nickel-plated
IP 67 Mating connector inserted and screwed tight
-5 … +80
8
1 x 10^6 operating cycles
± 0.01
Approx. 20
Snap-action switching contact
1 changeover contact
Silver alloy, gold-plated
50
2.5
AC-15 U_e 50 V I_e 0.5 ADC-13 U_e 24 V I_e 0.6 A
10
12
2
Plug connector M12 [3]

-
-
077347 EGT1SEM4C1832

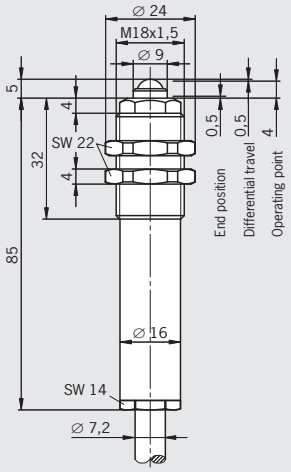
Precision single hole fixing limit switches

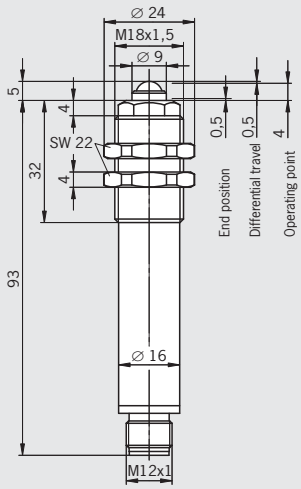
- **With snap-action switching element**
- **Plunger material stainless steel**
- **Any installation position**

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

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

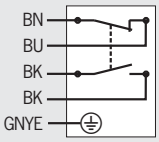
Dimension drawings

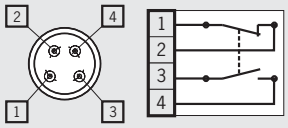




⚠ Single hole fixing limit switches must not be used as an end stop.

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 10^6 operating cycles	1 x 10^6 operating cycles
Operating point accuracy [1]	[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_i	[V]	250	50
Rated impulse withstand voltage U_{imp}		2.5	2.5
Utilization category acc. to IEC 60947-5-1		AC-15 U_e 230 V I_e 2 A DC-13 U_e 24 V I_e 1 A	AC-15 U_e 30 V I_e 2 A DC-13 U_e 24 V I_e 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 mm²	Plug connector M12 [2]

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

1 NC + 1 NO	Connecting cable 2 m	**001864** EGT2-2000	-
	Connecting cable 5 m	**001865** EGT2-5000	-
	Plug connector	-	**052504** EGT2SEM4

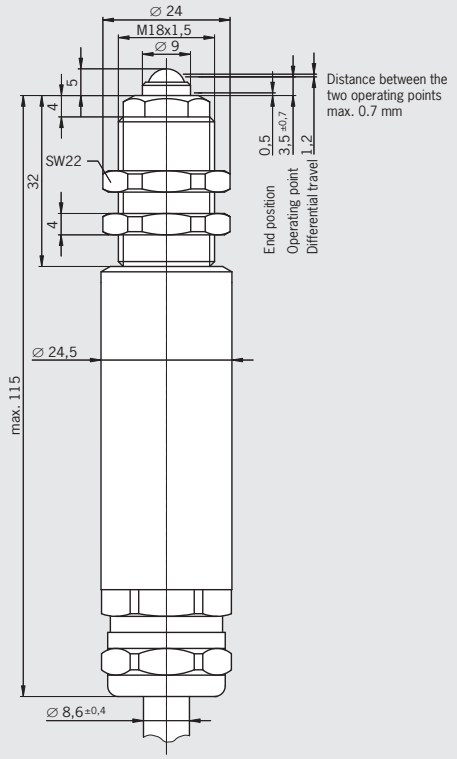
Precision single hole fixing limit switches

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

With four switching contacts

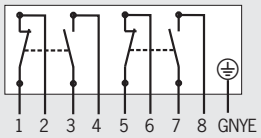
Design EGT4, M18 x 1.5, ball plunger
Connecting cable with PE connection

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 [1] ... +70
Approach speed, max.	[m/min]	10
Mechanical life		5 x 10^5 operating cycles
Operating point accuracy [2]	[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_i	[V]	250
Rated impulse withstand voltage U_{imp}		2.5
Utilization category acc. to IEC 60947-5-1		AC-15 U_e 230 V I_e 2 A DC-13 U_e 24 V I_e 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 mm²

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	**094339** EGT4-2000
	Connecting cable 5 m	**092026** EGT4-5000
	Connecting cable 10 m	**093967** EGT4-10000

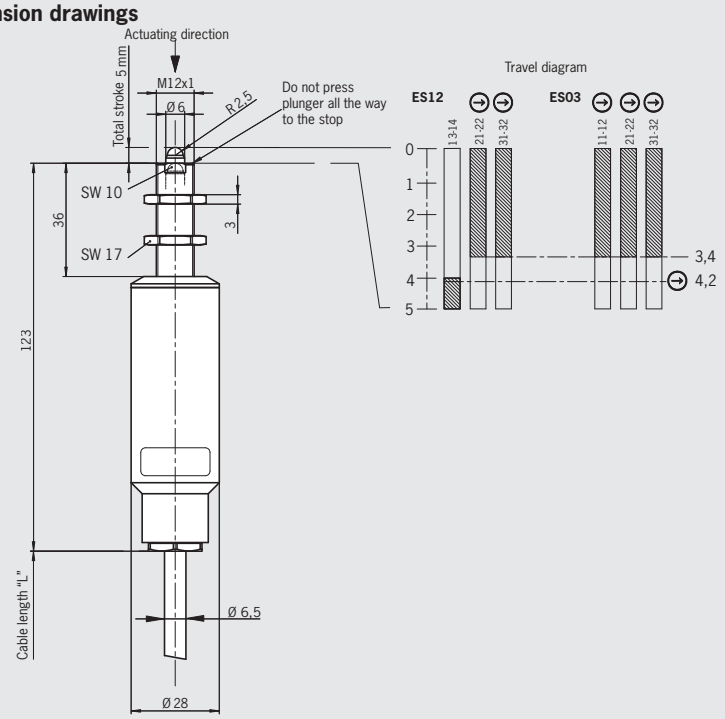
Precision single hole fixing limit switches

- **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

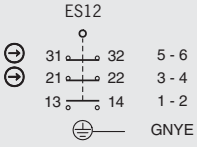
Design EGZ12, M12 x 1, dome plunger
Connecting cable with PE connection

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 [1] ... +80
Approach speed, max.	[m/min]	8
Mechanical life		3 x 10^6 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_i	[V]	250
Rated impulse withstand voltage U_{imp}		2.5
Utilization category acc. to IEC 60947-5-1		AC-15 U_e 230 V I_e 4 A DC-13 U_e 24 V I_e 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 mm²

1) Cable hard wired.

Ordering table

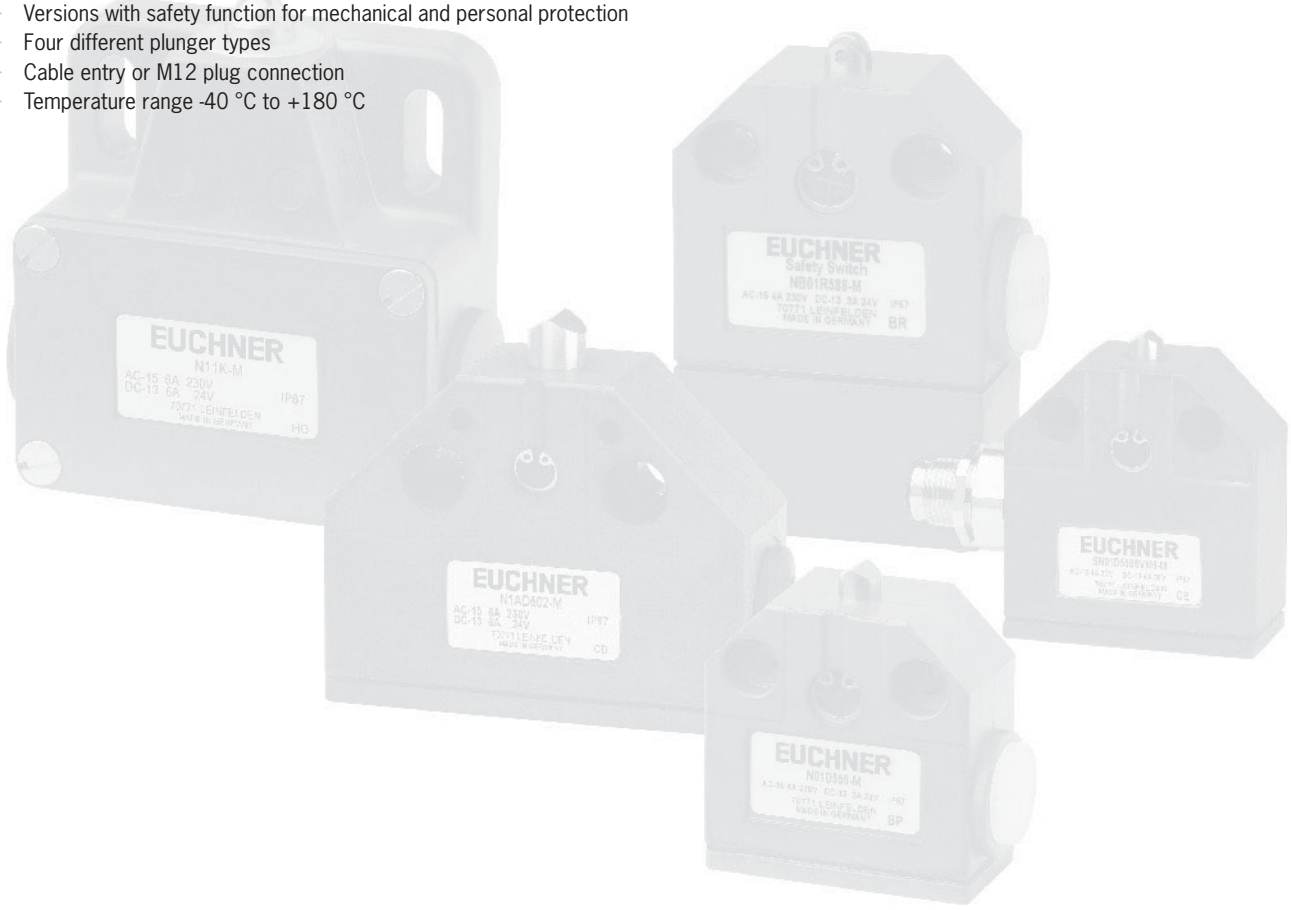
Connecting cable	ES12
Connecting cable 5 m	**094823** EGZ12-12-5000

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

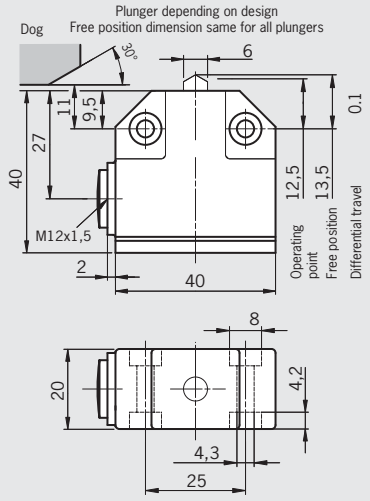
For temperatures up to 180 °C

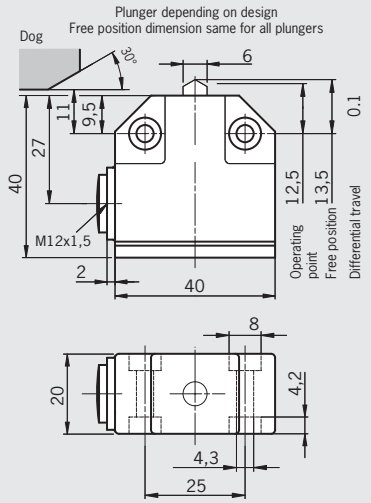
► **Plunger material stainless steel**

Design N01
Cable entry M12 x 1.5

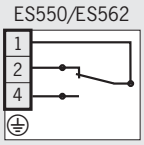
Design N01
Cable entry M12 x 1.5

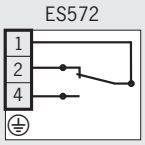
Dimension drawings





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 … +180		
Plunger type		Chisel	Roller	Ball	Chisel	Roller	Ball
Operating point accuracy [1]	[mm]	± 0.02	± 0.05	± 0.03	± 0.02	± 0.05	± 0.03
Approach speed, max. [2]	[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		**ES550**		**ES562**	**ES572**		
Switching contact		1 changeover contact			1 changeover contact		
Switching principle		Snap-action switching contact			Snap-action switching contact		
Mechanical life		1 x 10^7 operating cycles			5 x 10^5 operating cycles at -5 … +125 °C, 200 h at +180 °C		
Rated impulse withstand voltage U_{imp}	[kV]	2.5			2.5		
Rated insulation voltage U_i	[V]	250			250		
Utilization category acc. to IEC 60947-5-1		AC-15 U_e 230 V I_e 2 A DC-13 U_e 24 V I_e 2 A		DC-13 U_e 30 V I_e 100 mA	AC-15 U_e 230 V I_e 4 A DC-13 U_e 24 V I_e 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 mm² max.			Soldered connection, 1.0 mm² 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.

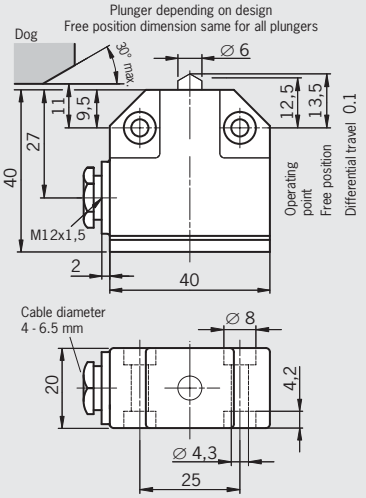
Ordering table

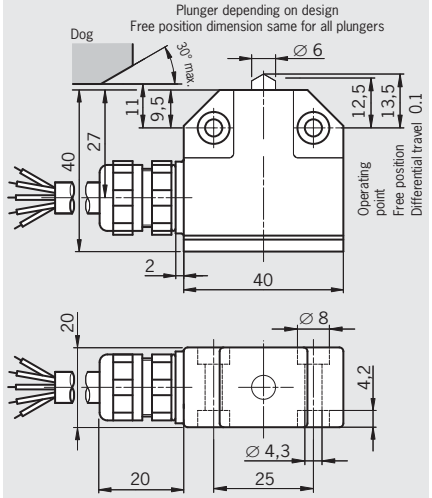
Plunger type		**ES550**	**ES562**	**ES572**
Chisel plunger	120°	**084902** [4] N01D550-M	**087151** N01D562-M	**087162** N01D572-M
Roller plunger	R = 2.5 mm	**084903** [4] N01R550-M	**085243** N01R562-M	**087163** N01R572-M
Ball plunger		**084904** [4] N01K550-M	**087152** N01K562-M	**087164** N01K572-M

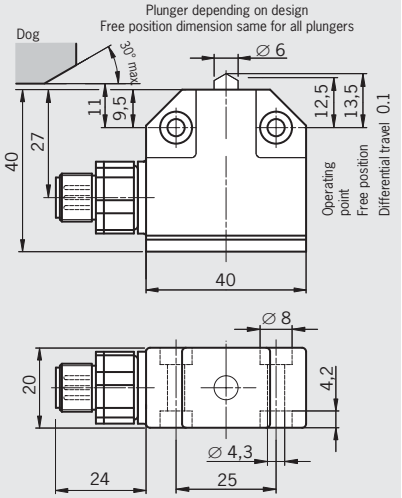
4) CCC approval only for switching element ES550

Design N01 Cable gland M12 x 1.5	Design N01 Connecting cable, length 5 m	Design N01 M12 plug adjustable, 4-pin + PE

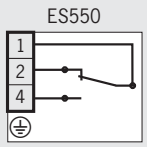
Dimension drawings

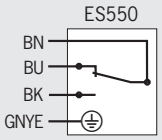


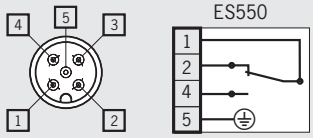




Wiring diagrams







Die-cast aluminum, anodized			Die-cast aluminum, anodized			Die-cast aluminum, anodized		
IP 67			IP 67			IP 67 Mating connector inserted and screwed tight		
-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		
ES550			**ES550**			**ES550**	**ES562**	
1 changeover contact			1 changeover contact			1 changeover contact		
Snap-action switching contact			Snap-action switching contact			Snap-action switching contact		
1 x 10^7 operating cycles			1 x 10^7 operating cycles			1 x 10^7 operating cycles		
2.5			2.5			1.5		
250			250			50	50	
AC-15 U_e 230 V I_e 2 A DC-13 U_e 24 V I_e 2 A			AC-15 U_e 230 V I_e 2 A DC-13 $_e$ 24 V I_e 2 A			AC-15 U_e 30 V I_e 2 A DC-13 U_e 24 V I_e 3 A	DC-13 U_e 30 V I_e 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 mm² max.			PUR cable 4 x 0.5 mm²			Plug connector M12 [3]		

ES550	ES550	ES550	ES562
085708 [4] N01D550-MC2018	**088978** N01D550X5000-M	**088623** N01D550SVM5-M	-
094856 [4] N01R550-MC2018	**088982** N01R550X5000-M	**088622** N01R550SVM5-M	**093426** N01R562SVM5-M
089619 [4] N01K550-MC2018	**088986** N01K550X5000-M	**088624** N01K550SVM5-M	-

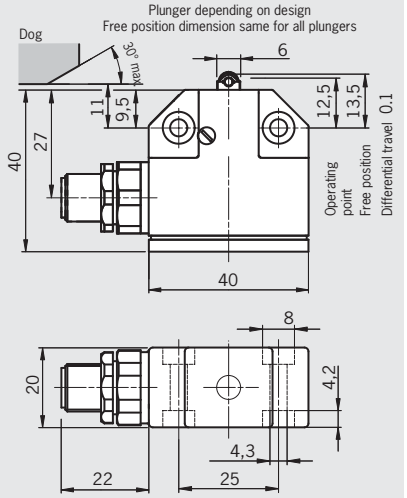
Precision single limit switches

For temperatures up to 125 °C

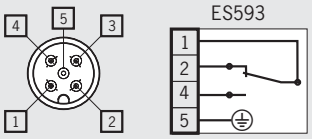
► **Plunger material stainless steel**

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 [1]	[mm]		± 0.05	
Approach speed, max. [2]	[m/min]		50	
Approach speed, min.	[m/min]	0.01		
Actuating force, max.	[N]	15		
Switching element		**ES593**		
Switching contact		1 changeover contact		
Switching principle		Snap-action switching contact		
Mechanical life		5 x 10^5 operating cycles at -5 ... +125 °C, 30,000 h at +100 °C / 8,000 h at +125 °C		
Rated impulse withstand voltage U_{imp}	[kV]	1.5		
Rated insulation voltage U_i	[V]	50		
Utilization category acc. to IEC 60947-5-1		DC-13 U_e 24 V I_e 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 [3]		

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	**128070** N01R593-MC2445
Ball plunger		-

Precision single limit switches

▶ **Plunger material stainless steel**

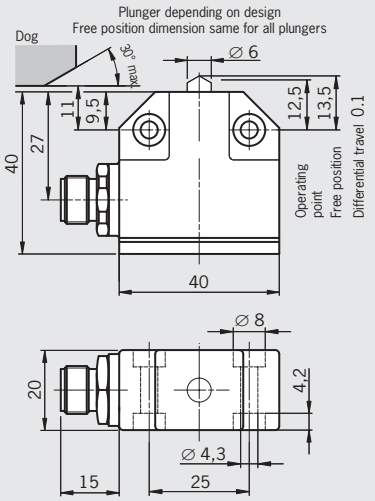
For plug connector with LED display

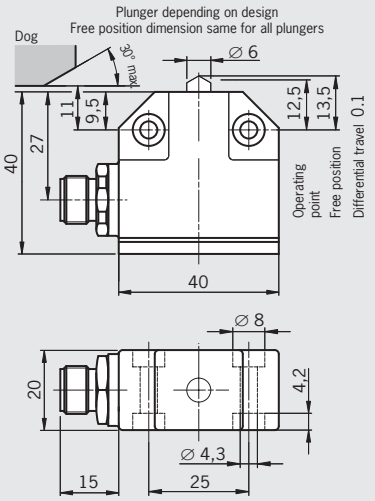
For operating voltage 230 V 4)

Design N01
M12 plug, 4-pin

Design N01
M12 plug, 4-pin + PE

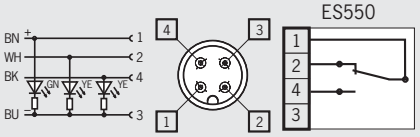
Dimension drawings

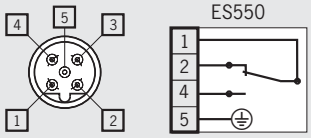




⚠ To achieve the positively driven travel, the dimension (11-0,5) must be maintained by the trip dog. Actuating elements such as cam approach guides must be positively mounted in accordance with EN ISO 14119, i.e. riveted, welded or otherwise secured against becoming loose.

Wiring diagrams





Technical data

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 1)	[mm]	± 0.02	± 0.05	± 0.03	± 0.02	± 0.05	± 0.03
Approach speed, max. 2)	[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		**ES550**			**ES550**		
Switching contact		1 changeover contact			1 changeover contact		
Switching principle		Snap-action switching contact			Snap-action switching contact		
Mechanical life		1 x 10^7 operating cycles			1 x 10^7 operating cycles		
Rated impulse withstand voltage U_{imp}	[kV]	2.0			1.5		
Rated insulation voltage U_i	[V]	50			250		
Utilization category acc. to IEC 60947-5-1		DC-13 U_e 24 V I_e 2 A			AC-15 U_e 230 V I_e 2 A DC-13 U_e 24 V I_e 2 A		
Contact material		Silver, gold-plated			Silver, gold-plated		
Switching current, min.,	[mA]	10			10		
at switching voltage	[V DC]	24			24		
Short circuit protection (control circuit fuse)	[A gG]	4			4		
Connection		Plug connector M12 3)			Plug connector M12, B-coded 3)		

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		**091003** N01D550-MC1526	-
Roller plunger	 R = 2.5 mm	**091001** N01R550-MC1526	**091257** N01R550SEM5-M
Ball plunger		**091002** N01K550-MC1526	**091258** N01K550SEM5-M

With safety function

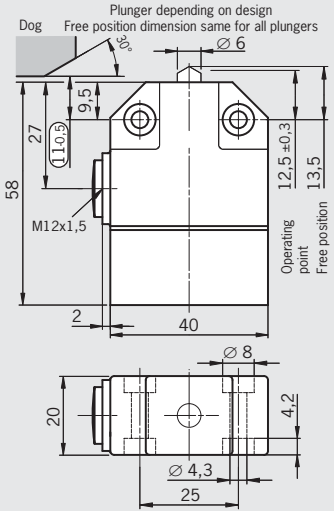
Design NB01
Cable entry M12 x 1.5

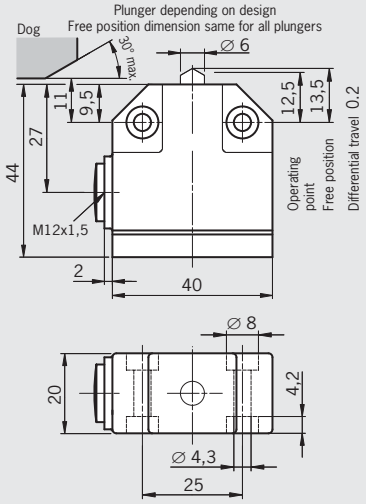
Design NB01
Cable entry M12 x 1.5

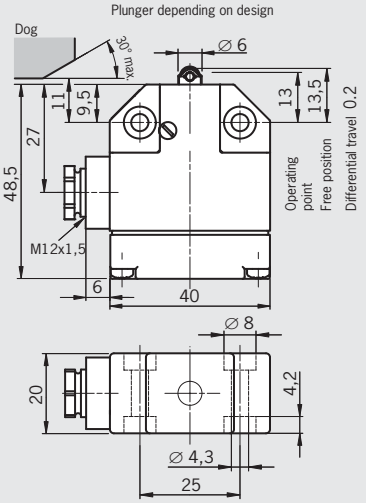
Larger connection space, robust screw terminal

Design NB01
Cable gland M12 x 1.5

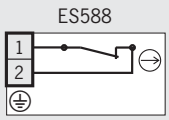
Dimension drawings

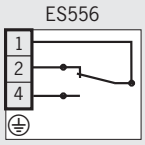


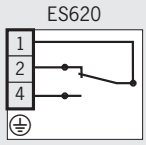




Wiring diagrams







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	Roller	Chisel	Roller	Ball	Roller
± 0.02	± 0.05	± 0.02	± 0.05	± 0.03	± 0.05
20	50	20	50	8	50
0.01		0.01			0.01
15		15			15
ES588		**ES556**			**ES620**
1 NC ⊖		1 changeover contact			1 changeover contact
Slow-action switching contact		Snap-action switching contact			Snap-action switching contact
1 x 10^7 operating cycles		1 x 10^7 operating cycles			1 x 10^7 operating cycles
2.5		2.5			2.5
250		250			250
AC-15 U_e 230 V I_e 4 A DC-13 U_e 24 V I_e 3 A		AC-15 U_e 230 V I_e 2 A DC-13 U_e 24 V I_e 2 A			AC-15 U_e 230 V I_e 2 A DC-13 U_e 24 V I_e 2 A
Fine silver		Silver, gold-plated			Silver, gold-plated
1		10			10
5		24			24
10		6			6
Screw terminal, 1.0 mm² max.		1.3 mm hexagon socket screw terminal/screw terminal, 1.0 mm² max.			Screw terminal, 1.0 mm² max.

ES588	ES556	ES620
088584 NB01D588-M	**085245** NB01D556-M	-
088583 NB01R588-M	**085246** NB01R556-M	**102883** NB01R620-MC2276
-	**085247** NB01K556-M	-

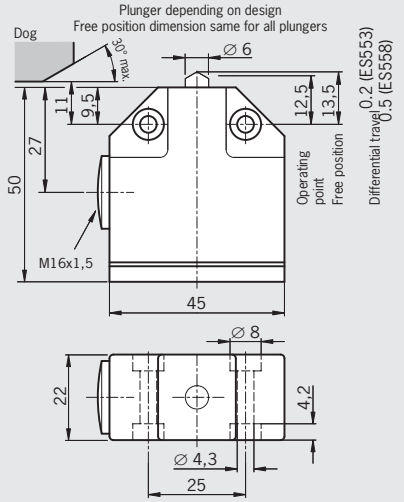
Precision single limit switches

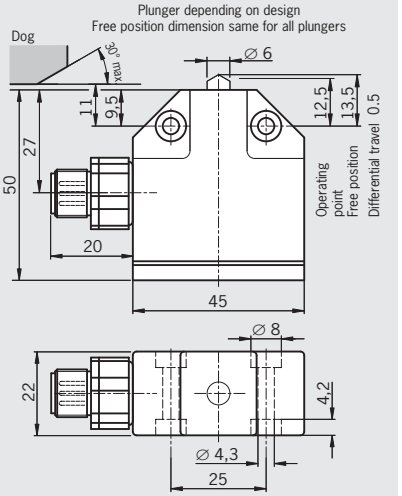
► **Plunger material stainless steel**

Design SN01
Cable entry M16 x 1.5

Design SN01
M12 plug adjustable, 4-pin + PE

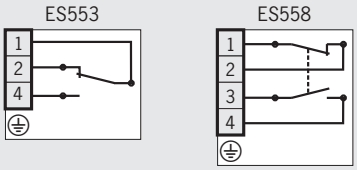
Dimension drawings

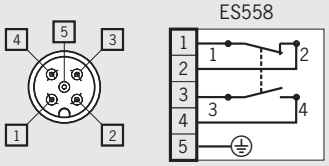




⚠ To achieve the positively driven travel, the dimension (12-0,5) must be maintained by the trip dog. Actuating elements such as cam approach guides must be positively mounted in accordance with EN ISO 14119, i.e. riveted, welded or otherwise secured against becoming loose.

Wiring diagrams





Technical data

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 [1]	[mm]	± 0.02	± 0.05	± 0.03	± 0.02	± 0.05	± 0.03
Approach speed, max. [2]	[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		**ES553**	**ES558**		**ES558**		
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 10^7 operating cycles			1 x 10^7 operating cycles		
Rated impulse withstand voltage U_{imp}	[kV]	2.5			1.5		
Rated insulation voltage U_i	[V]	250			30		
Utilization category acc. to IEC 60947-5-1		AC-15 U_e 230 V I_e 2 A DC-13 U_e 24 V I_e 2 A	AC-15 U_e 230 V I_e 4 A DC-13 U_e 24 V I_e 3 A		AC-15 U_e 36 V I_e 4 A DC-13 U_e 24 V I_e 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 mm² max.	Soldered connection, 1.0 mm² max.		Plug connector M12 [3]		

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.

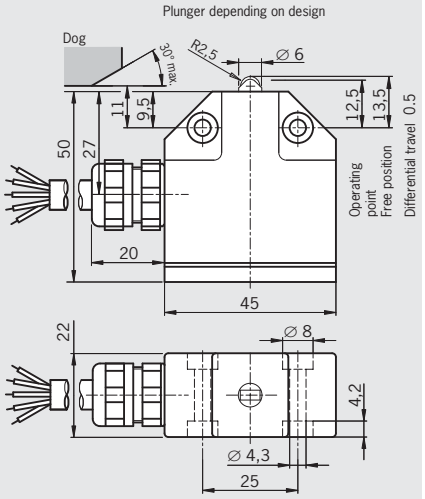
Ordering table

Plunger type		**ES553**	**ES558**	**ES558**
Chisel plunger	120°	**085252** [4] SN01D553-M	**085260** SN01D558-M	**088625** SN01D558SVM5-M
Roller plunger	R = 2.5 mm	**085253** [4] SN01R553-M	**085261** SN01R558-M	**088626** SN01R558SVM5-M
Ball plunger		**085254** [4] SN01K553-M	**085262** SN01K558-M	**088627** SN01K558SVM5-M

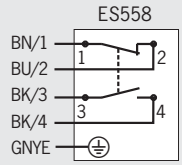
4) CCC approval only for switching element ES553

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 10^7 operating cycles
2.5
250
AC-15 U_e 230 V I_e 4 A DC-13 U_e 24 V I_e 3 A
Silver
10
5
4
PUR cable 5 x 0.5 mm²

ES558
-
090515 SN01R558X2000-M
-

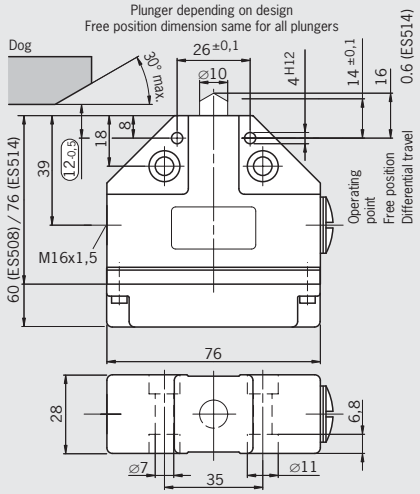
Precision single limit switches

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

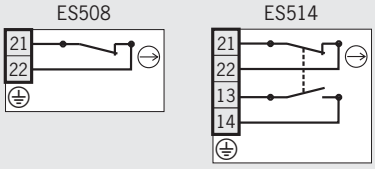
With safety switching element

Design N1A
Cable entry M16 x 1.5

Dimension drawings



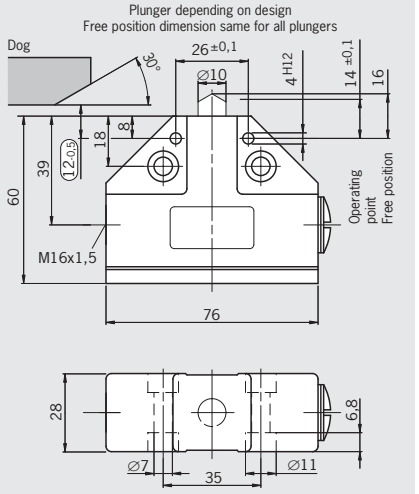
Wiring diagrams



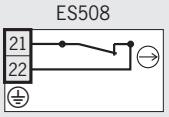
With safety switching element, silicone diaphragm (interior) and low-temperature grease

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 [1]	[mm]	± 0.002	± 0.01	± 0.002	± 0.002	± 0.01	± 0.002
Approach speed, max. [2]	[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		**ES508** [4]		**ES514**	**ES508** [4]		
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 10^6 operating cycles		1 x 10^6 operating cycles	1 x 10^6 operating cycles		
Rated impulse withstand voltage U_{imp}	[kV]	4			4		
Rated insulation voltage U_i	[V]	250			250		
Utilization category acc. to IEC 60947-5-1		AC-15 U_e 230V I_e 6A DC-13 U_e 24V I_e 6A		AC-15 U_e 230V I_e 2.5A DC-13 U_e 24V I_e 6A	AC-15 U_e 230V I_e 6A DC-13 U_e 24V I_e 6A		
Contact material		Silver, gold-plated			Silver, gold-plated		
Switching current, min.,	[mA]	10		5	10		
at switching voltage	[V DC]	24		24	24		
Short circuit protection (control circuit fuse)	[A gG]	10		6	10		
Connection		Screw terminal 0.34 ... 1.5 mm²			Screw terminal 0.34 ... 1.5 mm²		

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	120°	**083886** N1AD508-M	**083849** N1AD514-M	**103237** N1AD508-MC2222
Roller plunger	R = 4.0 mm	**083887** N1AR508-M	**078487** N1AR514-M	**103221** N1AR508-MC2222
Ball plunger		-	-	-
Dome plunger		**087205** N1AW508-M	**083850** N1AW514-M	**103222** N1AW508-MC2222

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

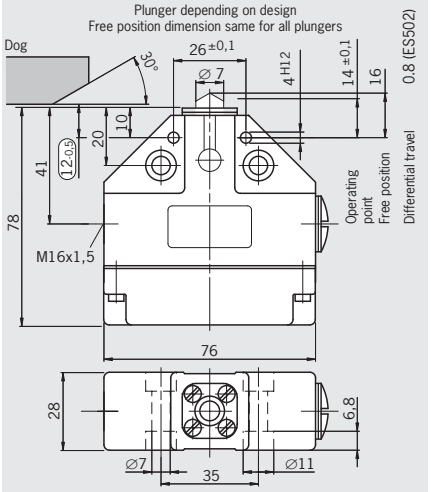
With safety switching element

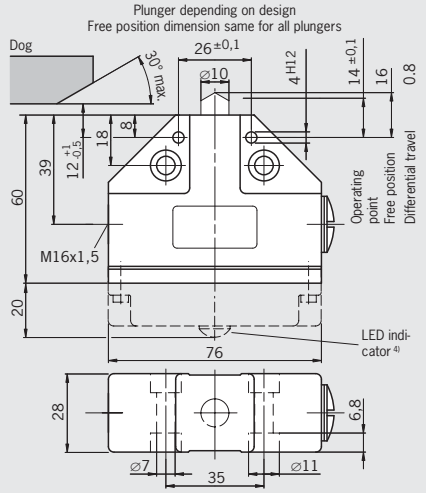
Design N1A
Cable entry M16 x 1.5

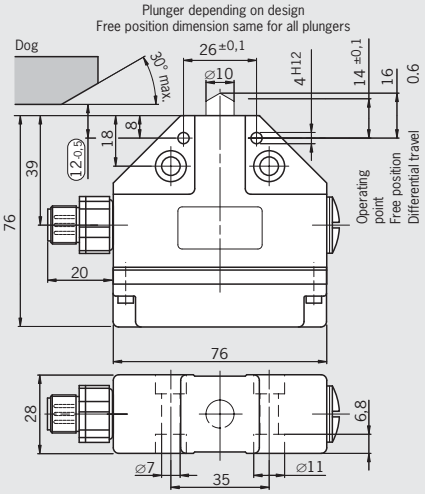
Design N1A
Cable entry M16 x 1.5

Design N1A
M12 plug adjustable, 4-pin + PE

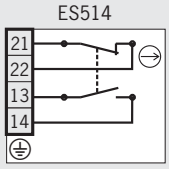
Dimension drawings

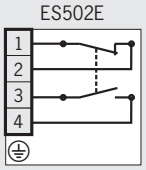


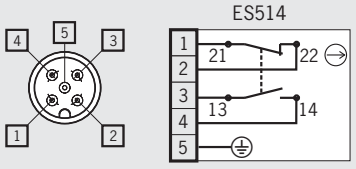




Wiring diagrams







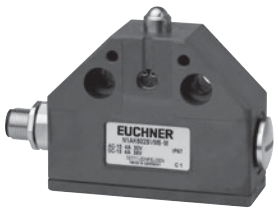
Die-cast aluminum, anodized		Die-cast aluminum, anodized			Die-cast aluminum, anodized		
IP 67		IP 67			IP 67 Mating connector inserted and screwed tight		
-30 … +80		-5 … +80			-25 … +80		
Chisel	Roller	Chisel	Roller 3)	Ball	Chisel	Roller	Dome
± 0.002	± 0.01	± 0.002	± 0.01	± 0.01	± 0.002	± 0.01	± 0.002
40	80	40	80	10	40	80	10
0.01		0.01			0.01		
≥ 30		≥ 20			≥ 30		
ES514		**ES502E** 4)			**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 10^6 operating cycles		30 x 10^6 operating cycles			1 x 10^6 operating cycles		
2.5		2.5			1.5		
250		250			30		
AC-15 U_e 230V I_e 2.5A DC-13 U_e 24V I_e 6A		AC-12 U_e 250V I_e 8A / AC-15 U_e 230V I_e 6A DC-13 U_e 24V I_e 6A			AC-15 U_e 36V I_e 2.5A DC-13 U U_e 24V I_e 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 mm²		Screw terminal 0.34 … 1.5 mm²			Plug connector M12 5)		

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
110462 N1AD514AM-MC2222	**079265** N1AD502-M	**087603** N1AD514SVM5-M
103247 N1AR514AM-MC2222	**078485** N1AR502-M	**087604** N1AR514SVM5-M
-	**083847** N1AK502-M	-
-	-	**090743** N1AW514SVM5-M

Precision single limit switches

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

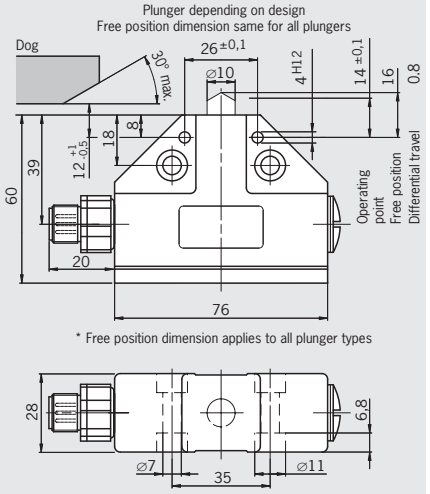


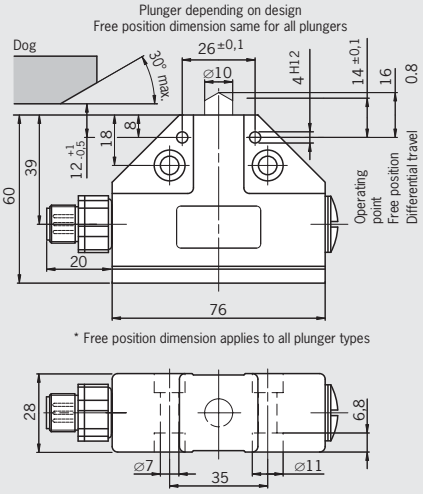
Design N1A
M12 plug adjustable, 4-pin + PE

For plug connectors with LED indicator

Design N1A
M12 plug adjustable, 4-pin + PE

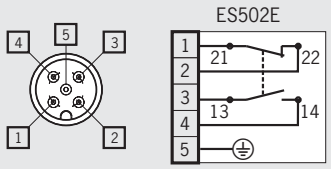
Dimension drawings

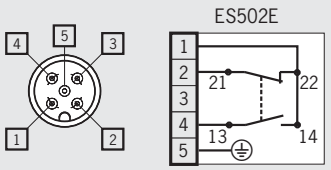




⚠ To achieve the positively driven travel, the dimension (31-0,5) must be maintained by the trip dog. Actuating elements such as cam approach guides must be positively mounted in accordance with EN ISO 14119, i.e. riveted, welded or otherwise secured against becoming loose.

Wiring diagrams





Technical data

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 [1]	[mm]	± 0.002	± 0.01	± 0.01	± 0.002	± 0.01	± 0.01
Approach speed, max. [2]	[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		**ES502E**			**ES502E**		
Switching contact		1 NO + 1 NC			1 NO + 1 NC		
Switching principle		Snap-action switching contact			Snap-action switching contact		
Mechanical life		30 x 10^6 operating cycles			30 x 10^6 operating cycles		
Rated impulse withstand voltage U_{imp}	[kV]	1.5			1.5		
Rated insulation voltage U_i	[V]	50			50		
Utilization category acc. to IEC 60947-5-1		AC-15 U_e 30V I_e 4A DC-13 U_e 24V I_e 4A			AC-15 U_e 30V I_e 4A DC-13 U_e 24V Ie 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 [4]			Plug connector M12 [4]		

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.

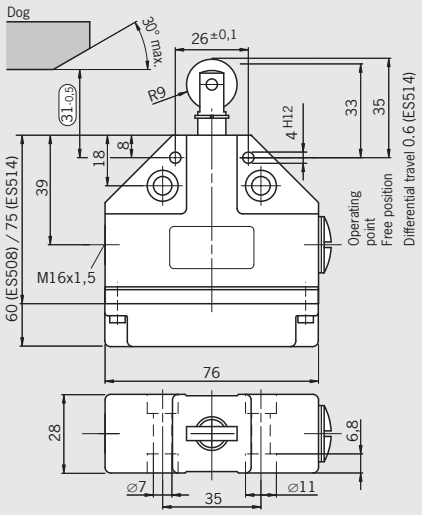
Ordering table

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

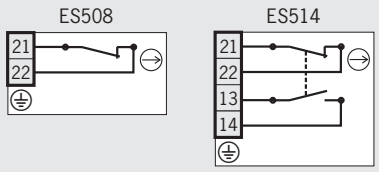
With safety switching element

Design N1A, extended roller plunger
Cable entry M16 x 1.5

Dimension drawings

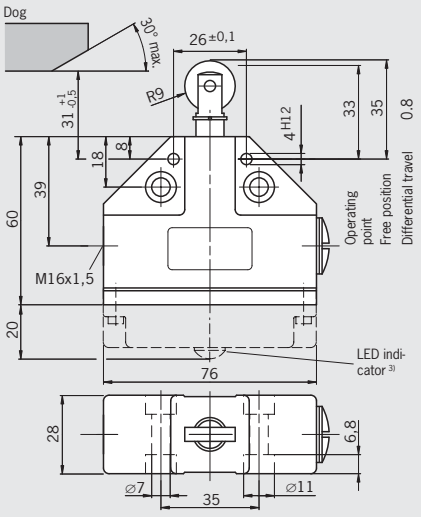


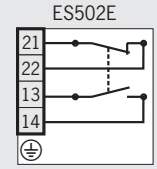
Wiring diagrams



Die-cast aluminum, anodized	
IP 67	
-25 … +80	
Extended roller	
0.1	
20	
0.01	
≥ 15	≥ 30
ES508	**ES514**
1 NC ⊖	1 NO + 1 NC ⊖
Slow-action switching con.	Snap-action switching con.
30 x 10^6 operating cycles	1 x 10^6 operating cycles
4	
250	
AC-15 U_e 230V I_e 6A DC-13 U_e 24V I_e 6A	AC-15 U_e 230V I_e 2.5A DC-13 U_e 24V I_e 6A
Silver, gold-plated	
10	5
24	24
10	6
Screw terminal 0.34 … 1.5 mm²	

Design N1A, extended roller plunger
Cable entry M16 x 1.5

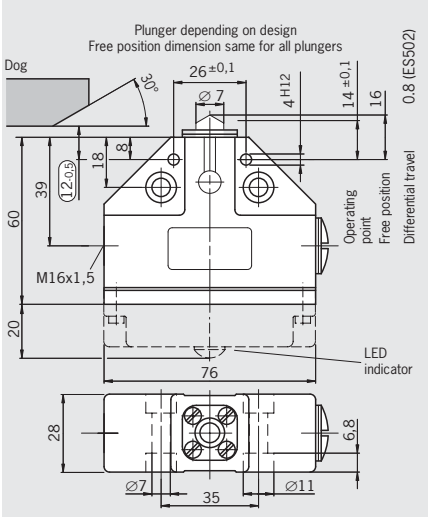


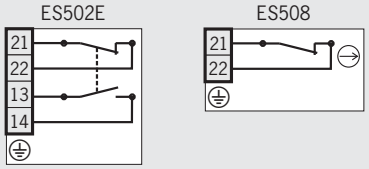


Die-cast aluminum, anodized	
IP 67	
-5 … +80	
Extended roller	
0.1	
20	
0.01	
≥ 20	
ES502E 3)	
1 NO + 1 NC	
Snap-action switching contact	
30 x 10^6 operating cycles	
2.5	
250	
AC-12 U_e 250V I_e 8A AC-15 U_e 230V I_e 6A DC-13 U_e 24V I_e 6A	
Silver, gold-plated	
10	
24	
8	
Screw terminal 0.34 … 1.5 mm²	

With exterior diaphragm

Design N1A
Cable entry M16 x 1.5





Die-cast aluminum, anodized		
IP 67		
-5 … +80 (ES502E)		-25 … +80 (ES508)
Chisel	Roller	Ball
± 0.002	± 0.01	± 0.01
40	80	10
0.01		
≥ 20		≥ 15
ES502E		**ES508**
1 NO + 1 NC		1 NC ⊖
Snap-action switching con.		Slow-action switching con.
30 x 10^6 operating cycles		
2.5		4
250		
AC-12 U_e 250V I_e 8A AC-15 U_e 230V I_e 6A DC-13 U_e 24V I_e 6A		AC-15 U_e 230V I_e 6A DC-13 U_e 24V I_e 6A
Silver, gold-plated		
10		
24		
8		10
Screw terminal 0.34 … 1.5 mm²		

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.

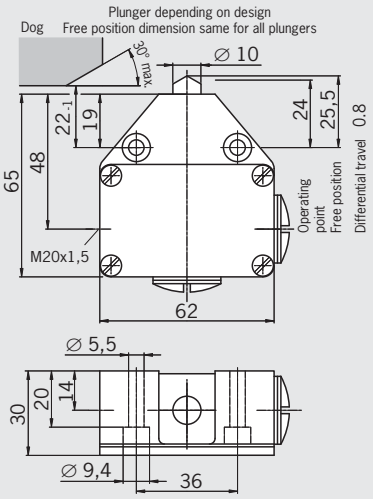
ES508	ES514	ES502E	ES502E	ES508
-	-	-	-	**090546** N1AD508AM-M
-	-	-	**090541** N1AR502AM-M	-
-	-	-	-	-
087147 N1ARL508-M	**087204** N1ARL514-M	**083848** N1ARL502-M	-	-

Precision single limit switches

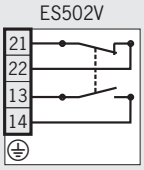
► **Plunger material stainless steel**

Design N10
Cable entry M20 x 1.5

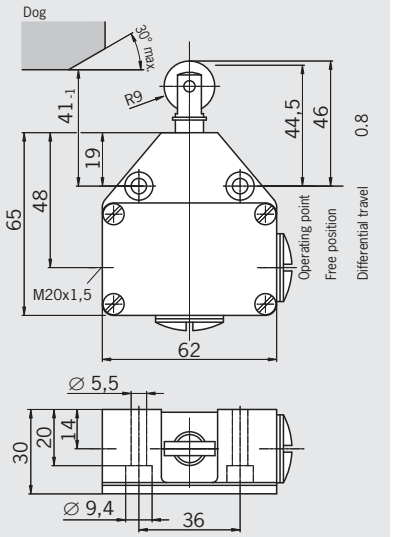
Dimension drawings

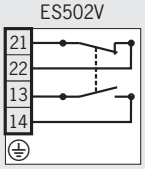


Wiring diagrams



Design N10, extended roller plunger
Cable entry M20 x 1.5





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 [1]	[mm]	± 0.002	± 0.01	± 0.01	± 0.1
Approach speed, max. [2]	[m/min]	40	80	10	20
Approach speed, min.	[m/min]	0.01			0.01
Actuating force, max.	[N]	≥ 20			≥ 20
Switching element		**ES502V**			**ES502V**
Switching contact		1 NO + 1 NC			1 NO + 1 NC
Switching principle		Snap-action switching contact			Snap-action switching contact
Mechanical life		30 x 10^6 operating cycles			30 x 10^6 operating cycles
Rated impulse withstand voltage U_{imp}	[kV]	2.5			2.5
Rated insulation voltage U_i	[V]	250			250
Utilization category acc. to IEC 60947-5-1		AC-12 U_e 230V I_e 16A/AC-15 U_e 230V I_e 10A DC-13 U_e 24V I_e 6A			AC-12 U_e 230V I_e 16A/AC-15 U_e 230V I_e 10A DC-13 U_e 24V I_e 6A
Contact material		Silver, gold-plated			Silver, gold-plated
Switching current, min.,	[mA]	20			20
at switching voltage	[V DC]	24			24
Short circuit protection (control circuit fuse)	[A gG]	16			16
Connection		Screw terminal, 1.5 mm² max.			Screw terminal, 1.5 mm² 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.

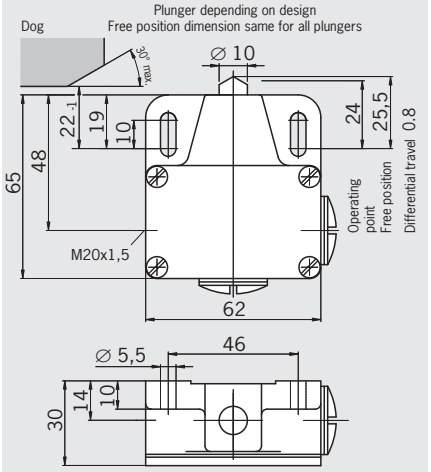
Ordering table

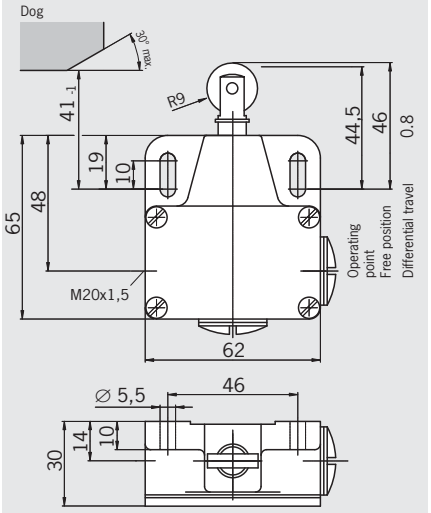
Plunger type		ES502V	ES502V
Chisel plunger	120°	**086293** N10D-M	-
Roller plunger	R = 4 mm	**086294** N10R-M	-
Ball plunger		**088589** N10K-M	-
Extended roller plunger		-	**088587** N10RL-M

Design N11
Cable entry M20 x 1.5

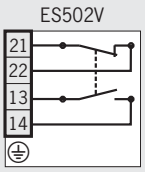
Design N11, extended roller plunger
Cable entry M20 x 1.5

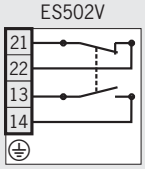
Dimension drawings





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
ES502V			**ES502V**
1 NO + 1 NC			1 NO + 1 NC
Snap-action switching contact			Snap-action switching contact
30 x 10^6 operating cycles			30 x 10^6 operating cycles
2.5			2.5
250			250
AC-12 U_e 230V I_e 16A/AC-15 U_e 230V I_e 10A DC-13 U_e 24V I_e 6A			AC-12 U_e 230V I_e 16A/AC-15 U_e 230V I_e 10A DC-13 U_e 24V I_e 6A
Silver, gold-plated			Silver, gold-plated
20			20
24			24
16			16
Screw terminal, 1.5 mm² max.			Screw terminal, 1.5 mm² max.

ES502V	ES502V
086298 N11D-M	-
086313 N11R-M	-
088585 N11K-M	-
-	**086299** 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

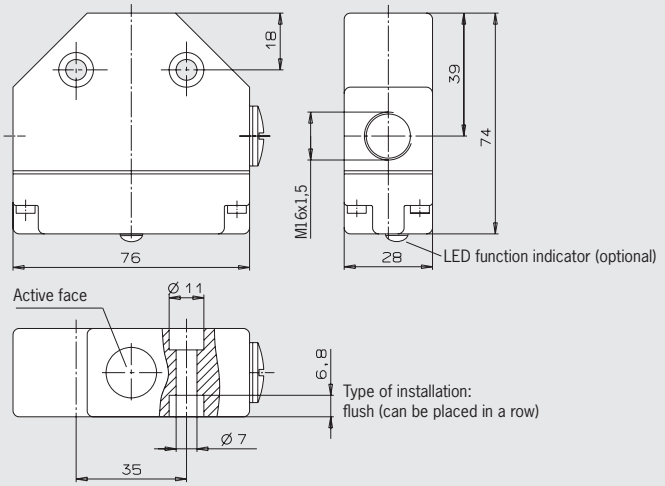
- High approach speed and high switching frequency
- Resistant to strong vibrations and coarse contamination
- Resistant to most cutting oils and coolants
- Replacement for precision single limit switch of the same design

Inductive single limit switch design ENA, DC version

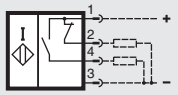
- **Housing according to DIN 43693**
- **Rated operating distance 5 mm**
- **LED function display optional**

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.	[mm²]	2 x 1.5 (per contact)
Weight	[kg]	0.2

Ordering table

LED function display		
with	Order no.	**ENA 086280**
	Item	ENA10B050UP048LKK10-M
without	Order no.	**ENA 086099**
	Item	ENA10B050UP048NKK10-M

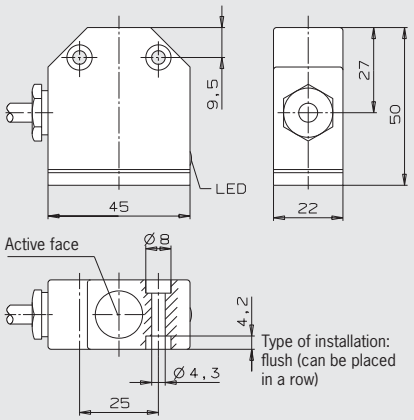
Inductive single limit switch design ESN, DC version

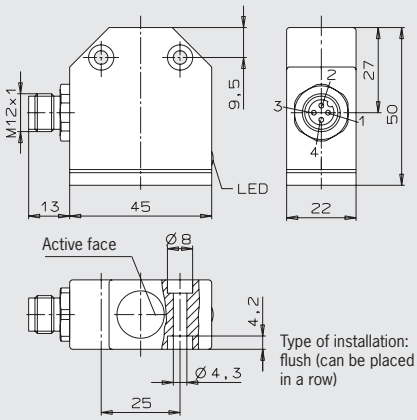
- **Compact design with connecting cable or plug connector**
- **Rated operating distance 5 mm**
- **LED function display**

Design ESN
Connecting cable 5 m PUR

Design ESN
Plug connector M12, 4-pin

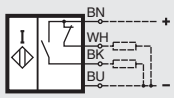
Dimension drawings



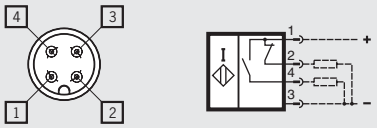


Plug connector see page A-44 to A-46

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]	≤ 2.5	≤ 2.5
Rated insulation voltage U_i	[V]	DC 60	DC 60
Rated operating current I_e	[mA]	≤ 250	≤ 250
Off-state current I_r	[mA]	≤ 0.05	≤ 0.05
No-load current I_0	[mA]	≤ 15	≤ 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]	≤ 0.5	≤ 0.5
Repeat accuracy R	[%]	≤ 5	≤ 5
Switching frequency f	[Hz]	≤ 500	≤ 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 [1]
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			
PUR cable 5 m (4 x 0.25 mm²)	Order no.	**ESN 088771**	-
	Item	ESN10B050UP048LK05P-M	
Plug connector S01 (M12, 4-pin)	Order no.	-	**ESN 088770**
	Item		ESN10B050UP048LKS01-M

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

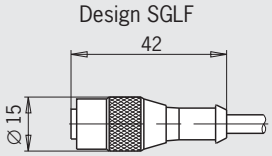
Round connector M12

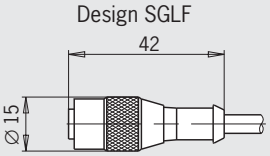
- **Straight design and elbow connector**
- **Screw connection**
- **Molded cable**
- **4-pin and 5-pin**

Straight plug connector M12
4-pin / 4-pin + PE

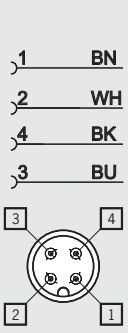
Straight plug connector M12, coded
4-pin + PE

Dimension drawings





Wiring diagrams



Technical data

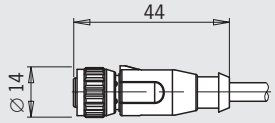
Number of pins			4	4+PE	4+PE
Housing material	Grip		TPU self extinguishing		TPU self extinguishing
	Contact carrier		TPU self extinguishing		TPU self extinguishing
Sheath material			PUR, halogen free, flame retardant		PVC, halogen free, flame retardant
Sheath color			Black		Orange
Degree of protection 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		[mm²]	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

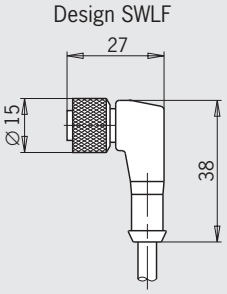
Ordering table

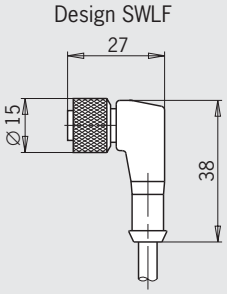
Plug connector M12, without LED, connecting cable 5 m	**035613** C-M12F04-04X034PU05,0-GA-035613	**073461** C-M12F05-05X050PU05,0-GA-073461	**045524** C-M12F05-05XDIFPV0,50-GA-045524
Plug connector M12, without LED, connecting cable 10 m	-	-	-
Plug connector M12, with three LEDs, connecting cable 5 m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

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

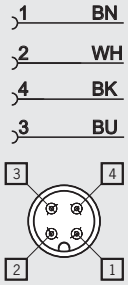
Dimension drawings

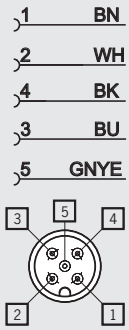






Wiring diagrams

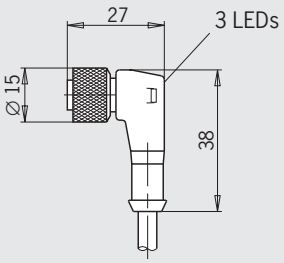


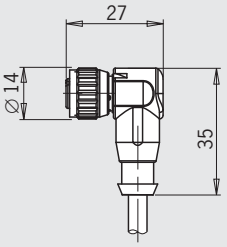


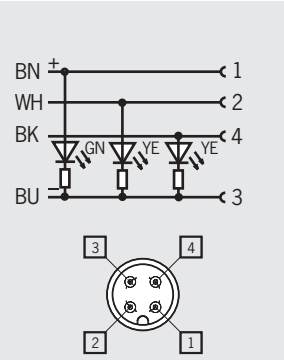
4+PE	4	4+PE	4+PE
TPE	TPU self extinguishing		TPU self extinguishing
PBT GF, LIL 94	TPU self extinguishing		TPU self extinguishing
TPE (high-temperature PUR)	PUR, halogen free, flame retardant		PVC, halogen-free, flame retardant
Black	Black		Orange
IP 65	IP 67		IP 67
-30 ... +150 (for 2,000 h) (+125 for 8,000 h / +100 for 30,000 h)	-25 ... +80		-25 ... +90
CuZn, CuBe	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
-	2	1.5	2
60	AC 250/DC 300	AC 30/DC 36	AC 250/DC 300
4	4		4

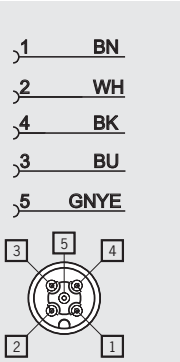
136960 C-M12F05-05X034PU05,0-GA-136960	**035618** C-M12F04-04X034PU05,0-GA-035618	**073462** C-M12F05-05X050PU05,0-GA-073462	**045523** C-M12F05-05XDIFPV05,0-GA-045523
136961 C-M12F05-05X034PU10,0-GA-136961	-	-	-
	-	-	-

Plug connector M12 with three LEDs 4-pin	**Plug connector M12, A-coded** 4-pin + PE









Technical data

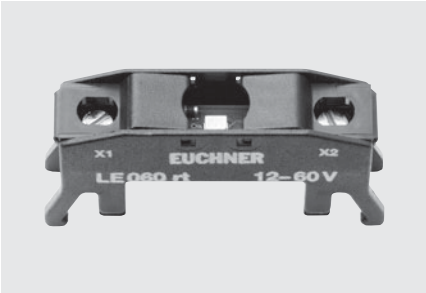
Number of pins			4	4+PE
Housing material	Grip		TPU self extinguishing	TPE
	Contact carrier		TPU self extinguishing	PBT GF, LIL 94
Sheath material			PUR, halogen-free, flame retardant	TPE (high-temperature PUR)
Sheath color			Black	Black
Degree of protection acc. to IEC 60529 (inserted and screwed tight)			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		[mm²]	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	-	**136962** C-M12F05-05X034PU05,0-GA-136962
Plug connector M12, without LED, connecting cable 10 m	-	**136963** C-M12F05-05X034PU10,0-GA-136963
Plug connector M12, with three LEDs, connecting cable 5 m	**041091** C-M12F04-04X034PU05,0-GA-041091	-

LED function display

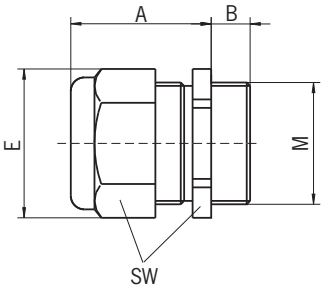
On request, versions with voltage ranges AC 110/230 V are available.



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

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	**086327**
EKVM16/04	M16 x 1.5	4 - 6.5	20	6	20	18	**086328**
EKVM16/06	M16 x 1.5	6.5 - 9.5	20	6	20	18	**086330**
EKVM20/06	M20 x 1.5	6.5 - 9.5	20	6	24.4	22	**077683**

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.

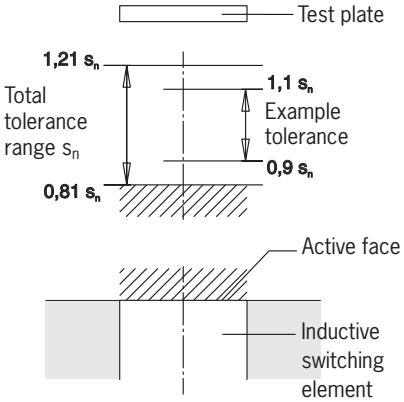
For detailed information see catalog for multiple limit switches.

Appendix

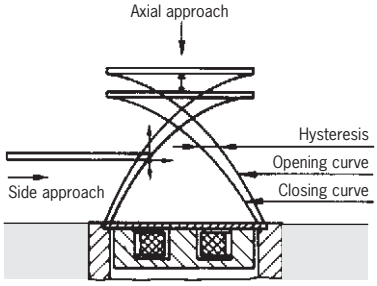
Terms and explanations

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 ± 5 °C and an operating voltage of UB ± 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 °C.

Temperature drift Δs
The temperature drift defines the offset in the switching point in µm/K on a change in the ambient temperature from -25 to +70 °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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091001	N01R550-MC1526	A-30
091002	N01K550-MC1526	A-30
091003	N01D550-MC1526	A-30
091257	N01R550SEM5-M	A-30
091258	N01K550SEM5-M	A-30
091471	N1AD502SVM5-MC1883	A-36
091848	EGT11R2NSFM5	A-12
092026	EGT4-5000	A-23
092695	EGT1M12-2000	A-18
093352	EGT11A2NSFM5	A-12
093364	EGT1M12-5000	A-18
093365	EGT1M12SEM4	A-18
093426	N01R562SVM5-M	A-27
093733	EGM12SEM4C1820	A-17
093967	EGT4-10000	A-23
094339	EGT4-2000	A-23
094823	EGZ12-12-5000	A-24
094856	N01R550-MC2018	A-27
094982	EGT1/4A2000C2079	A-15
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098071	EGT1/4ASEM4C2137	A-15
102476	EGT1/4A2000C2137	A-15
102479	EGT1SEM4C2221	A-21

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103222	N1AW508-MC2222	A-34
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104223	EGT12A3000C2250	A-10
104316	EGT1/4RSEM4C2088	A-15
104372	EGT1/4RSEM4C2137	A-15
110462	N1AD514AM-MC2222	A-35
119345	EGM8-1000C2396	A-16
126384	EGM12-2500C2452	A-17
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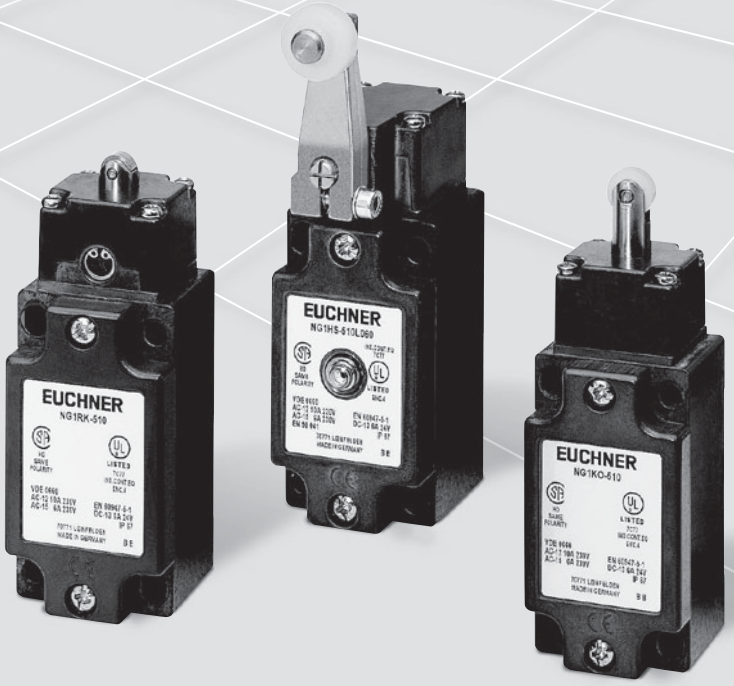
136960	C-M12F05-05X034PU05,0-GA-136960	A-45
136961	C-M12F05-05X034PU10,0-GA-136961	A-45
136962	C-M12F05-05X034PU05,0-GA-136962	A-46
136963	C-M12F05-05X034PU10,0-GA-136963	A-46
ENA 086099	ENA10B050UP048NKK10-M	A-42
ENA 086280	ENA10B050UP048LKK10-M	A-42
ESN 088770	ESN10B050UP048LKS01-M	A-43
ESN 088771	ESN10B050UP048LK05P-M	A-43

Order no.	Item	Page

Position Switches according to EN 50041

B



EUCHNER
More than safety.

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with plug connectors SR6 and SR11
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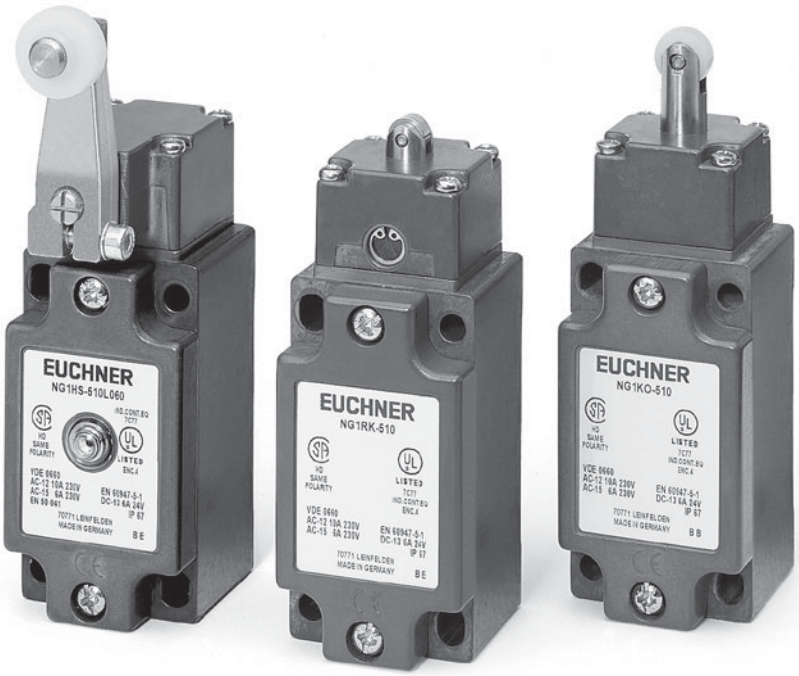
General information

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.

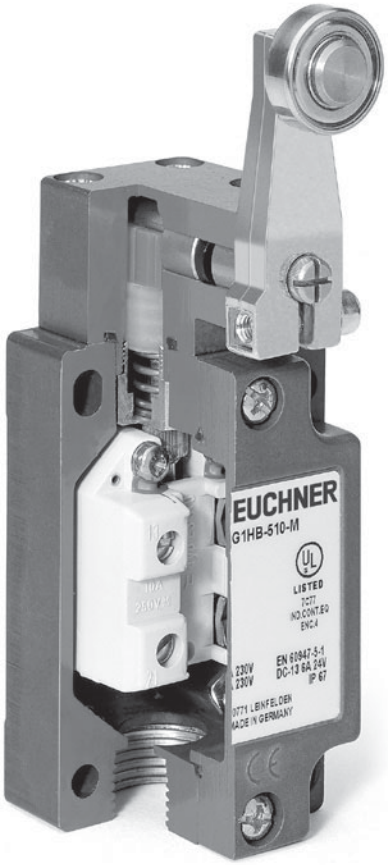
Various EUCHNER position switch variants are also equipped as safety switches with switching elements whose NC contacts are positively opened by a rigid plunger, even if the switching element is damaged due to a broken spring or contact weld. Positively driven position switches are used in cases where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

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

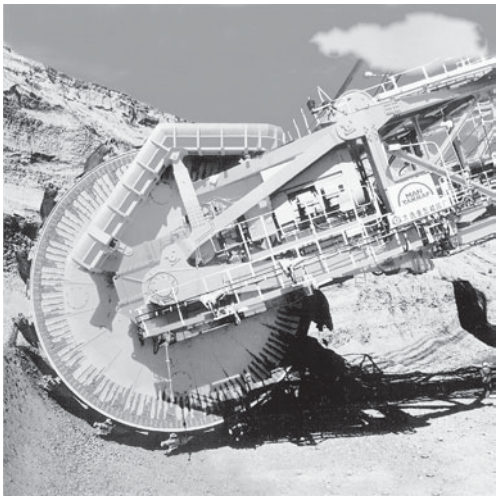


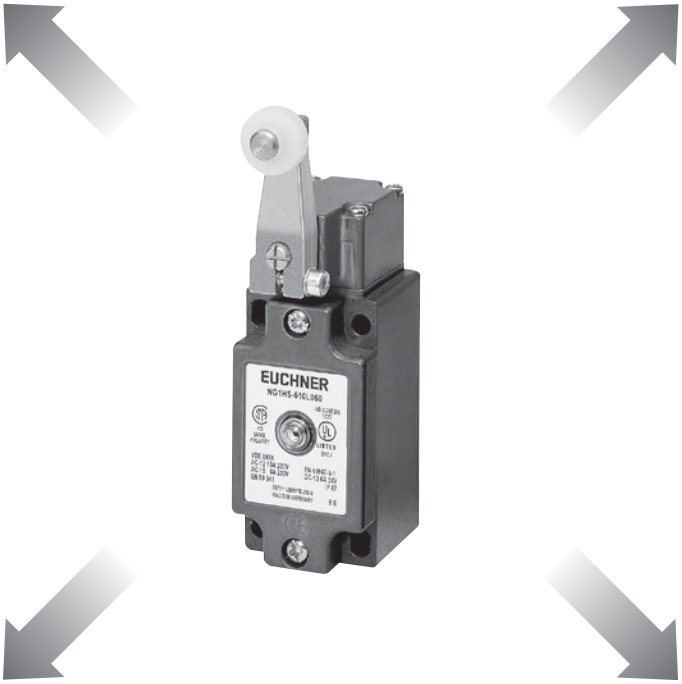
EUCHNER position switches offer important advantages and special features

- 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 ± 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...





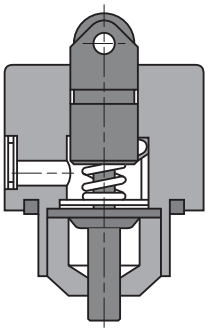
Position switch in detail

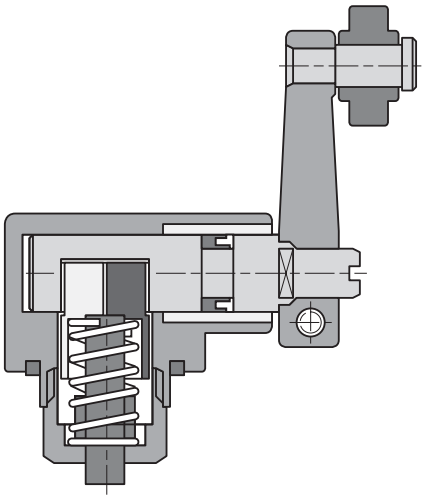
Plunger actuation
The plunger actuated versions allow the user a choice of six different designs.
The hardened stainless steel plungers with telescopic action (positively driven position switches have rigid plungers) are precisely guided within the anodized actuator head, and are almost maintenance free.
The approach direction of the actuator head can easily be changed by 90°.

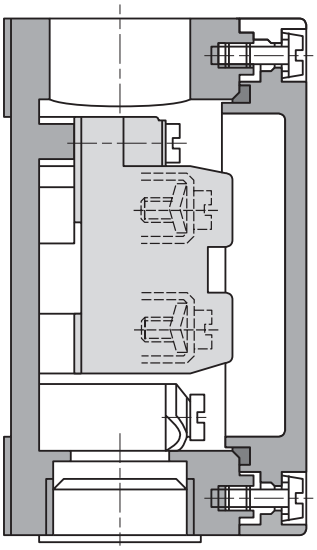
Lever arm actuation
Different types of actuators may be used for lever arm actuation. The stainless steel shaft is guided precisely through the housing.
With the numerous adjusting options, a high degree of flexibility is given:

- 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.

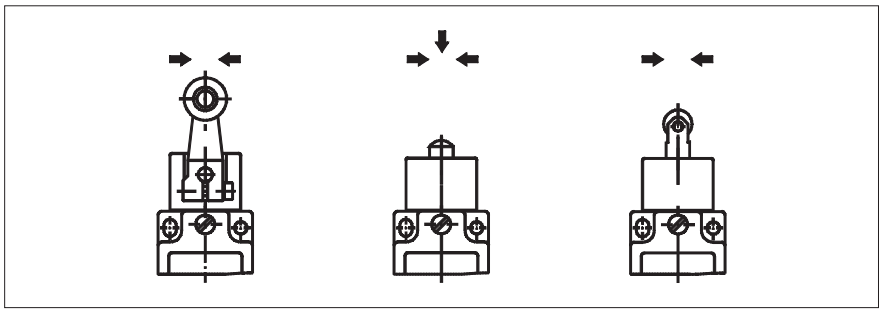
The edge seal
In lever arm actuated switches, an edge seal protects the actuating mechanism and the switch chamber against dirt and dust. The edge seal, which is made of NBR, is resistant to all known coolants and lubricants.

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



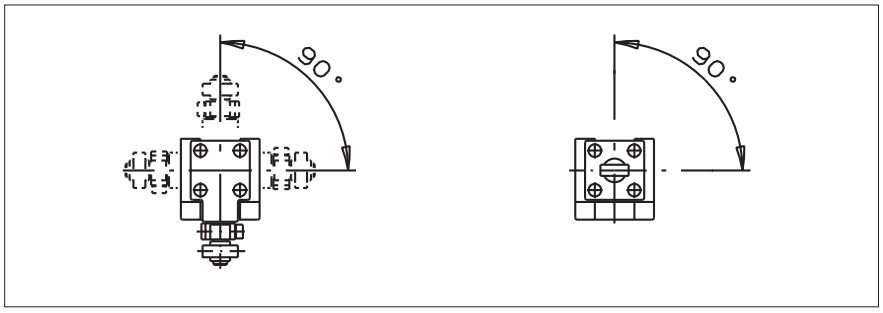
Lever arm
HS = steel roller
HB = plastic roller

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 ± 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°

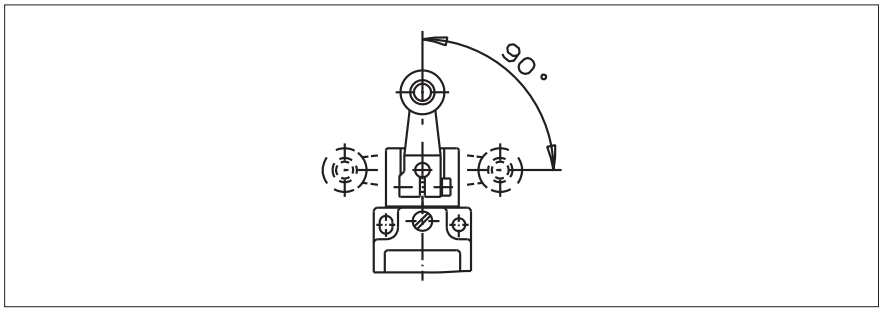


Lever arm

Straight actuator

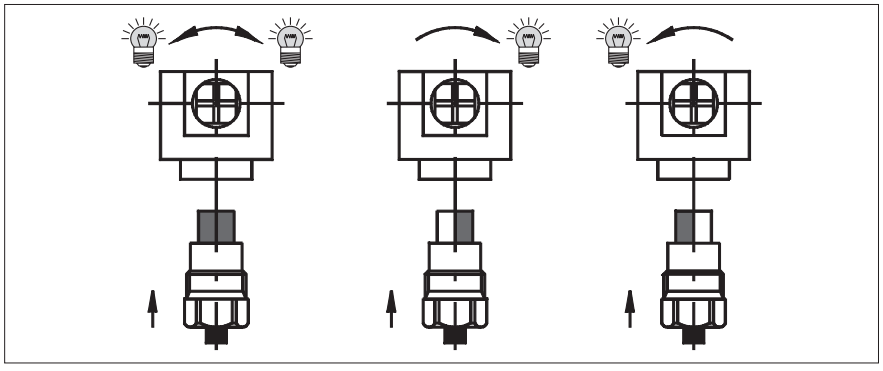
After removal of the stainless steel fixing screws, the actuator heads can each be adjusted horizontally by 90°.

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)

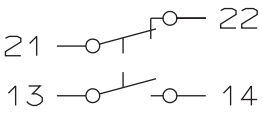
right switching

left switching

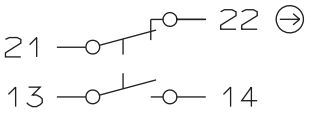
On delivery, the lever arm actuation is set to left and right switching.
If necessary, it can be set to right switching or left switching only.

Switching elements

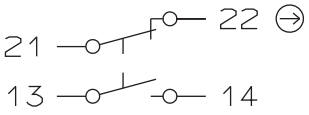
Switching element 510 [2]
(without positively driven contact)
Snap-action switching contact with one NC contact and one NO contact.
Double gap, electrically isolated switching bridge, silver alloy gold flashed contact material, screw terminal with self-lifting clamp washers.
Used for NG…



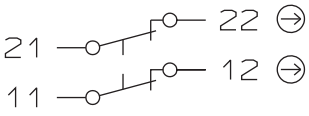
Switching element 511 [2]
Snap-action switching contact with one positively driven contact and one NO contact.
Double gap, electrically isolated contacts, silver alloy gold flashed contact material, screw terminal with self-lifting clamp washers.
Used for NZ…



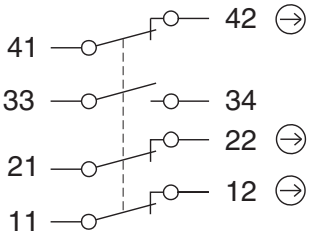
Switching element 528H [1] [3]
Slow-action switching contact with one positively driven contact and one NO contact.
Double gap, electrically isolated H contact bridges for currents from 1 mA to 4 A, silver alloy gold flashed contact material, screw terminal with self-lifting clamp washers.
Used for NZ…



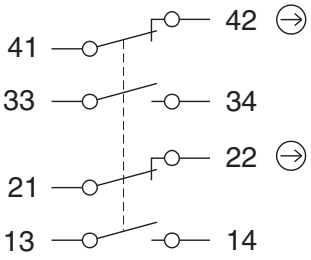
Switching element 538H [1] [3]
Slow-action switching contact with two positively driven contacts.
Double gap, electrically isolated H contact bridges for currents from 1 mA to 4 A, silver alloy gold flashed contact material, screw terminal with self-lifting clamp washers.
Used for NZ…



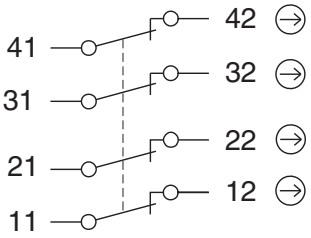
Switching element 2131 H [3]
Slow-action switching contact with three positively driven contacts and one NO contact.
Double gap, electrically isolated H contact bridges for currents from 1 mA to 4 A, silver alloy gold flashed contact material, screw terminal with self-lifting clamp washers.
Used for NZ…



Switching element 3131 H [3]
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 [3]
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.

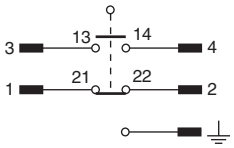
Wiring diagrams

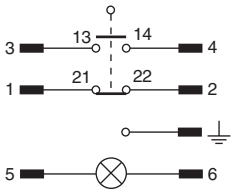
Plug connector SR6

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

Terminal assignment for switching elements

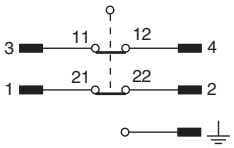
510 / 511 / 528H

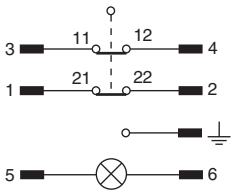




with LED indicator

538H

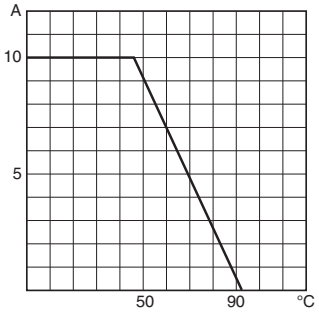




with LED indicator

Current rating curve

for connection cross section 1.5 mm²

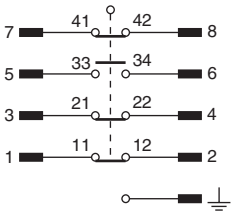


Plug connector SR11

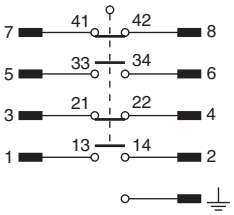
Pin assignment for male socket (top view of switch mounted connector)

Terminal assignment for switching elements

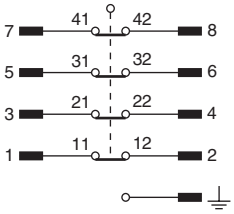
2131H



3131H

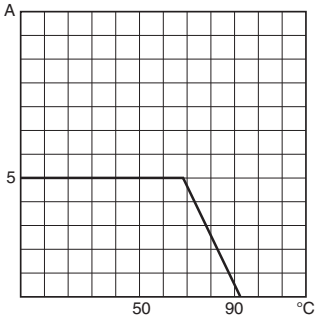


2121H



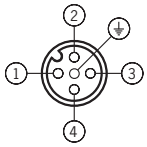
Current rating curve

for connection cross section 0.5 mm²



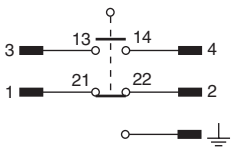
Plug connector SVM5 (M12, 5-pin)

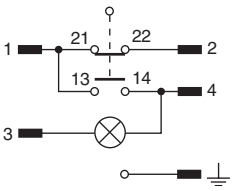
Pin assignment for male socket (top view of switch mounted connector)



Terminal assignment for switching elements

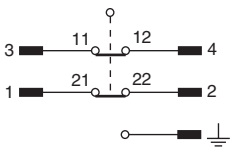
510 / 511 / 528H

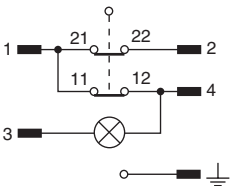




with LED indicator

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.

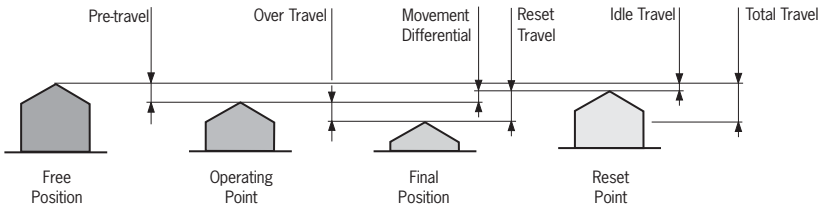
Instead of this telescopic plunger, position switches with safety function (with safety switching element) have a *rigid* plunger to ensure positive driving according to IEC 60947-5-1. This means that the contact point will be reliably opened in the event of mechanical failure of the switching element – 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 ± 0.002 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.

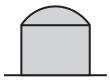
Roller plunger

Hardened roller.
Operating point accuracy to ± 0.01 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.

Ball plunger

Ball hardened.
Operating point accuracy to ± 0.01 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!

Domed plunger



Hardened and polished ground.
Operating point accuracy to ± 0.002 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!

Extended roller plunger

Robust roller plunger for medium approach speeds.

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...

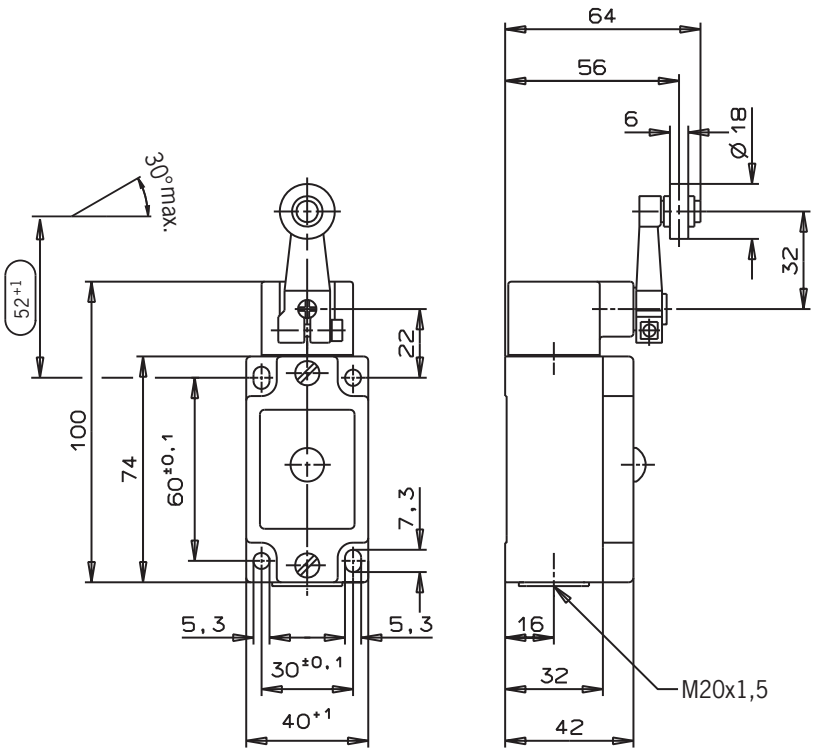
- **Roller lever arm** **HB** (plastic roller)
  HS (steel roller)
- **Cable entry M20 x 1.5**

NG...

NZ... 1)

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°

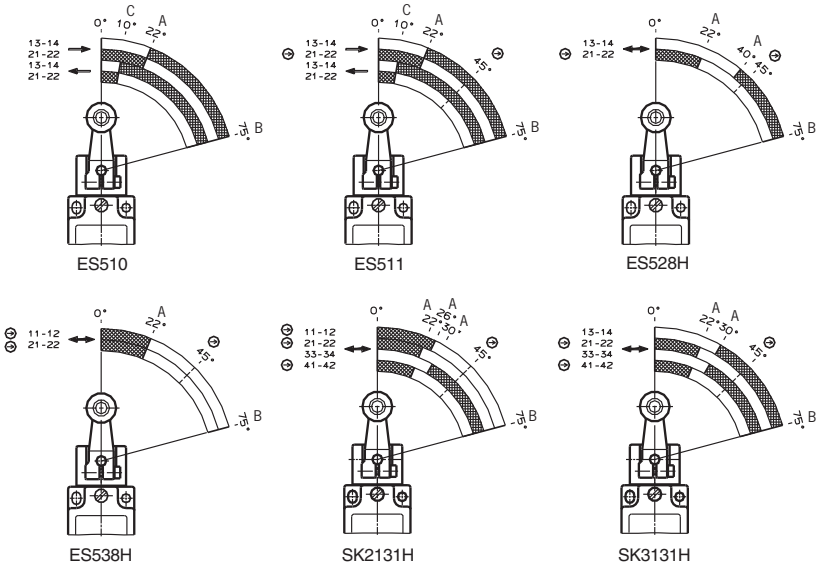
Switching direction

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

Travel diagrams

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 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 10^6 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. [1]		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		**510** 1 NC + 1 NO		**528H** 1 NC ⊖ + 1 NO		**538H** 2 NC ⊖	
		511 1 ⊖ + 1 NO		**2131H** 3 NC ⊖ + 1 NO		**3131H** 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_{imp}		2.5					kV
Rated insulation voltage U_i		250					V
Utilization category acc. to IEC 60947-5-1							
	AC12	I_e 10 A U_e 230 V		-			
	AC15	I_e 6 A U_e 230 V		I_e 4 A U_e 230 V			
	DC13	I_e 6 A U_e 24 V		I_e 4 A U_e 24 V			
Switching current, min., at		10		1	10	1	10 mA
switching voltage		24		24	12	24	12 V DC
Conventional thermal current I_{th}		6		4			A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)		10/6		4			A gG
Connection		Screw terminal [2]					
Conductor cross-section, max.		2 x 1.5					mm^2

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
NG1...-M	**HB** Plastic roller	510	**079926**	**090360**	On request
NZ1...-M		511	**079952**	**090039**	
		528	**088199**	**090965**	
		538	**090966**	**090967**	
		2131	**090968**	-	-
		3131	**090969**	-	-
NG1...-M	**HS** Steel roller	510	**079927**	**079937**	On request
NZ1...-M		511	**079953**	**090035**	
		528	**090970**	**090971**	
		538	**090972**	**090760**	
		2131	**090973**	-	-
		3131	**090747**	-	-

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...

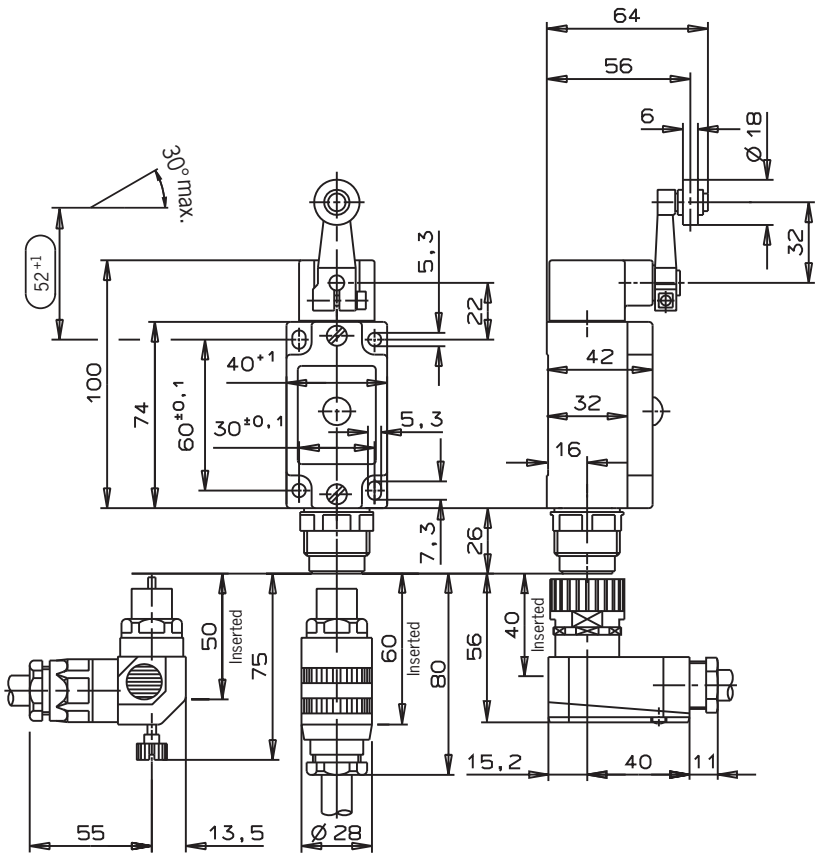
- **Roller lever arm** **HB** (plastic roller)
  HS (steel roller)
- **Plug connectors SR6 and SR11**

NG...

NZ... 1)

1) Not applicable to NZ with switching element 511.

Dimension drawing



SR6WF SR6EF/SR11EF SR11WF

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

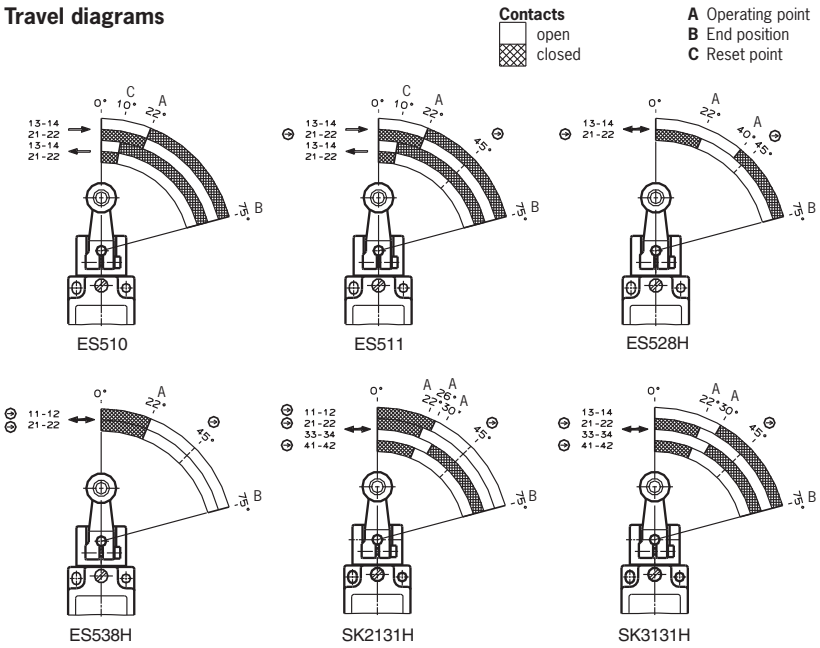
Adjustment options (see page B-8)

- 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 10^6 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. [1]			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			**510** 1 NC + 1 NO		**528H** 1 NC ⊖ + 1 NO		**538H** 2 NC ⊖	
			511 1 ⊖ + 1 NO		**2131H** 3 NC ⊖ + 1 NO		**3131H** 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			10	1	10	1	10	mA
switching voltage			24	24	12	24	12	V DC
Conventional thermal current I_{th}			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 [2]					
Rated impulse withstand voltage U_{imp}								
With plug connector SR6			2.5					kV
With plug connector SR11			1.5					
Rated insulation voltage U_i								
With plug connector SR6			250					V
With plug connector SR11			50					
Utilization category acc. to IEC 60947-5-1								
With plug connector SR6		AC15	I_e 6 A U_e 230 V	I_e 4 A U_e 230 V				
		DC13	I_e 6 A U_e 24 V	I_e 4 A U_e 24 V				
With plug connector SR11		AC15		I_e 4 A U_e 50 V				
		DC13		I_e 4 A U_e 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**	-	-
NZ2...		511	**089091**	**089092**	-	-
		528	**090845**	**090846**	-	-
		538	**090847**	**090848**	-	-
		2131	-	-	-	**090136**
		3131	-	-	-	**090137**
NG2...	**HS** Steel roller	510	**090851**	**089090**	-	-
NZ2...		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...

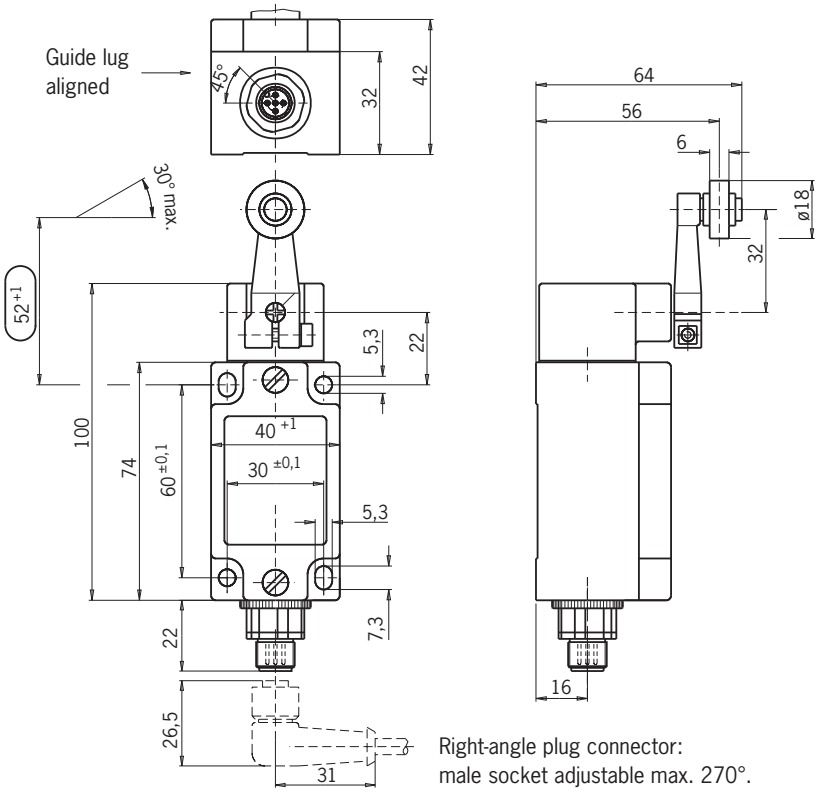
- **Roller lever arm** **HB** (plastic roller)
  HS (steel roller)
- **Plug connector M12/SVM5**

NG...

NZ... 1)

1) Not applicable to NZ with switching element 511.

Dimension drawing



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

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)

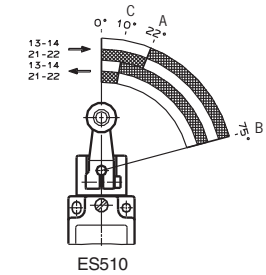
- Horizontal 4 x 90°
- Vertical 8 x 45°

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

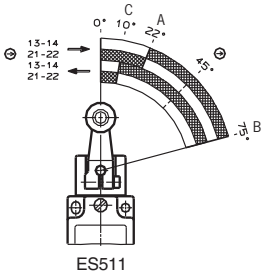
Travel diagrams

Contacts
open
closed

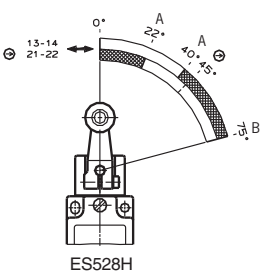
A Operating point
B End position
C Reset point



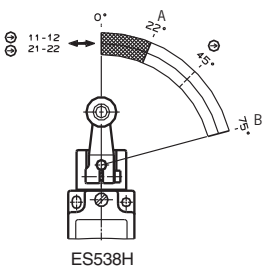
ES510



ES511



ES528H



ES538H

⚠ 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 10^6 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. [1]		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		**510** 1 NC + 1 NO		**528H** 1 NC ⊖ + 1 NO		**538H** 2 NC ⊖	
		511 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_{imp}		1.5					kV
Rated insulation voltage U_i		50					V
Utilization category acc. to IEC 60947-5-1							
with plug connector SVM5	AC15	I_e 4 A U_e 30 V		I_e 4 A U_e 30 V			
	DC13	I_e 4 A U_e 24 V		I_e 4 A U_e 24 V			
Switching current, min., at		10		1	10	1	10	mA
switching voltage		24		24	12	24	12	V DC
Conventional thermal current I_{th}		4		4				A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)		4		4				A gG
Connection		Plug connector M12 [2]						

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...

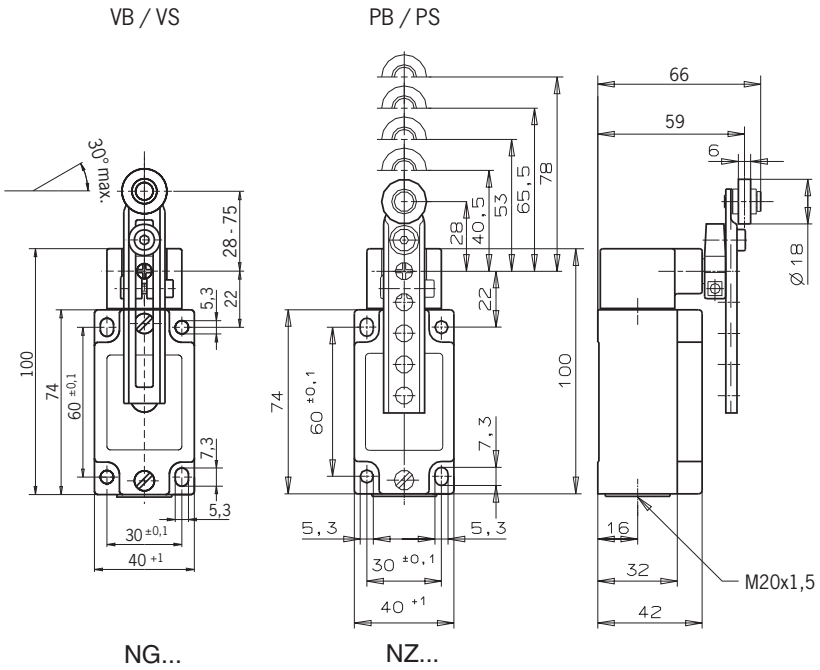
- **Adjustable roller lever arm**
  VB (plastic) / **PB** (plastic roller)
  VS (steel roller) / **PS** (steel roller)
- **Cable entry M20 x 1.5** (plug connector on request)

NG...

NZ... 1)

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

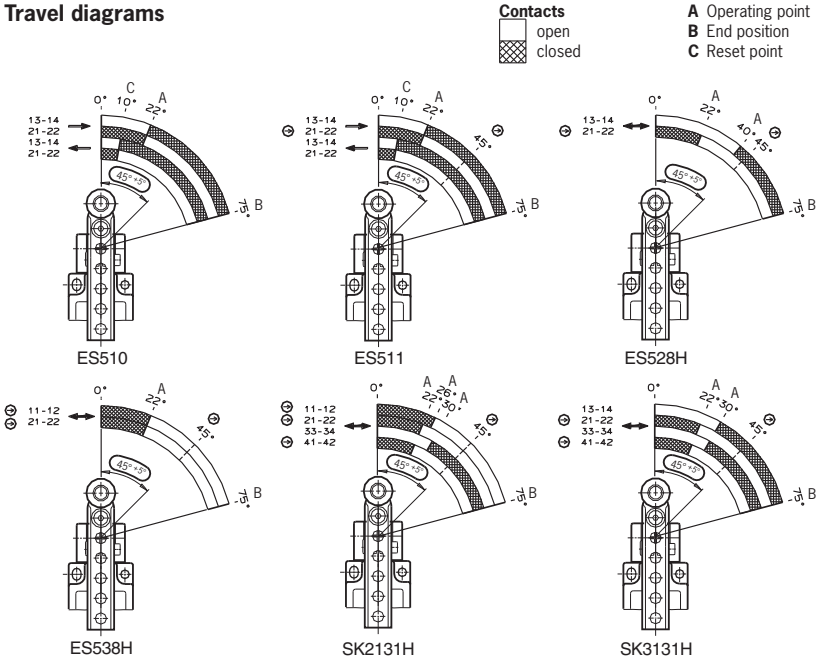
Adjustment options (see page B-8)

- 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 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 10^6 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. [1]		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		**510** 1 NC + 1 NO	**528H** 1 NC ⊖ + 1 NO		**538H** 2 NC ⊖	
		511 1 ⊖ + 1 NO	**2131H** 3 NC ⊖ + 1 NO		**3131H** 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_{imp}		2.5				kV
Rated insulation voltage U_i		250				V
Utilization category acc. to IEC 60947-5-1						
	AC12	I_e 10 A U_e 230 V	-			
	AC15	I_e 6 A U_e 230 V	I_e 4 A U_e 230 V			
	DC13	I_e 6 A U_e 24 V	I_e 4 A U_e 24 V			
Switching current, min., at		10	1	10	1	10	mA
switching voltage		24	24	12	24	12	V DC
Conventional thermal current I_{th}		6	4				A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)		10/6	4				A gG
Connection		Screw terminal [2]					
Conductor cross-section, max.		2 x 1.5					mm^2

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.	
			Function display	
			without	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**	-

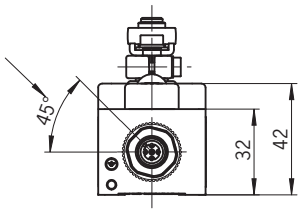
Ordering example: Position switch with safety function **NZ**, cable entry **1**, adjustable lever arm with plastic roller **PB**, snap-action switching element **511**, metric thread M20 x 1.5 **M**
NZ1PB-511-M **Order no. 088613**

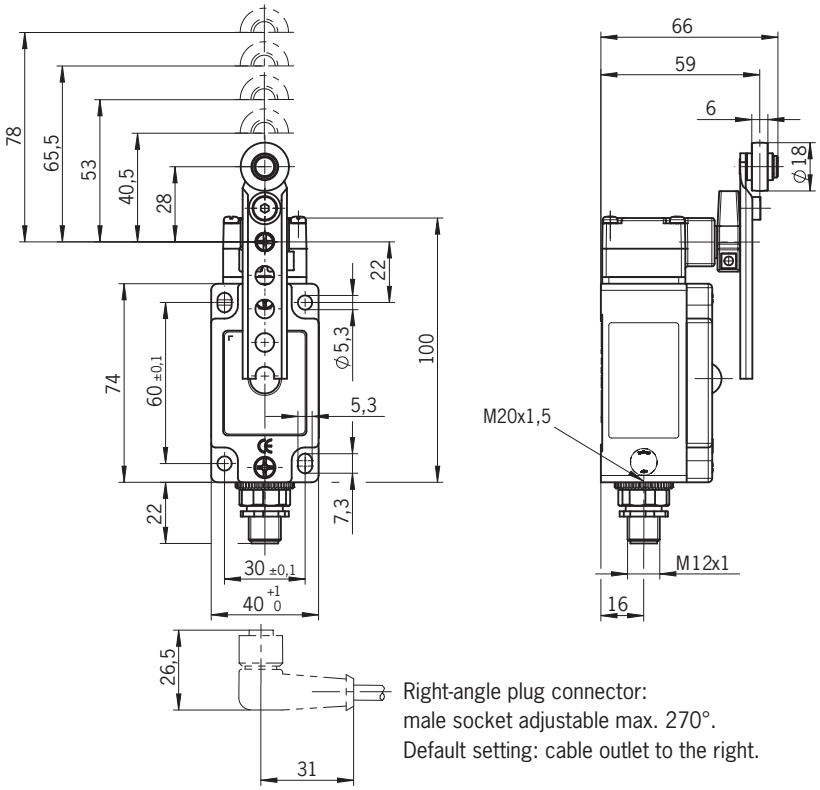
Position switch series NZ2...

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

Dimension drawing

Guide lug aligned





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

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

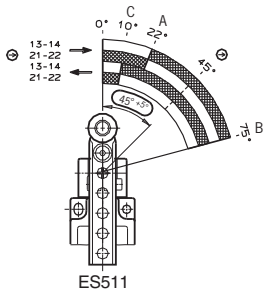
Adjustment options (see page B-8)

- 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°+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 10^6 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. [1]		120	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		**511** 1 ⊖ + 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_{imp}		1.5		kV
Rated insulation voltage U_i		50		V
Utilization category acc. to IEC 60947-5-1				
with plug connector SVM5	AC15	I_e 4 A U_e 30 V		
	DC13	I_e 4 A U_e 24 V		
Switching current, min., at switching voltage		10 24		mA V DC
Conventional thermal current I_{th}		4		A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)		4		A gG
Connection		Plug connector M12 [2]		

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

2) Wiring diagram: see page B-10.

Ordering table

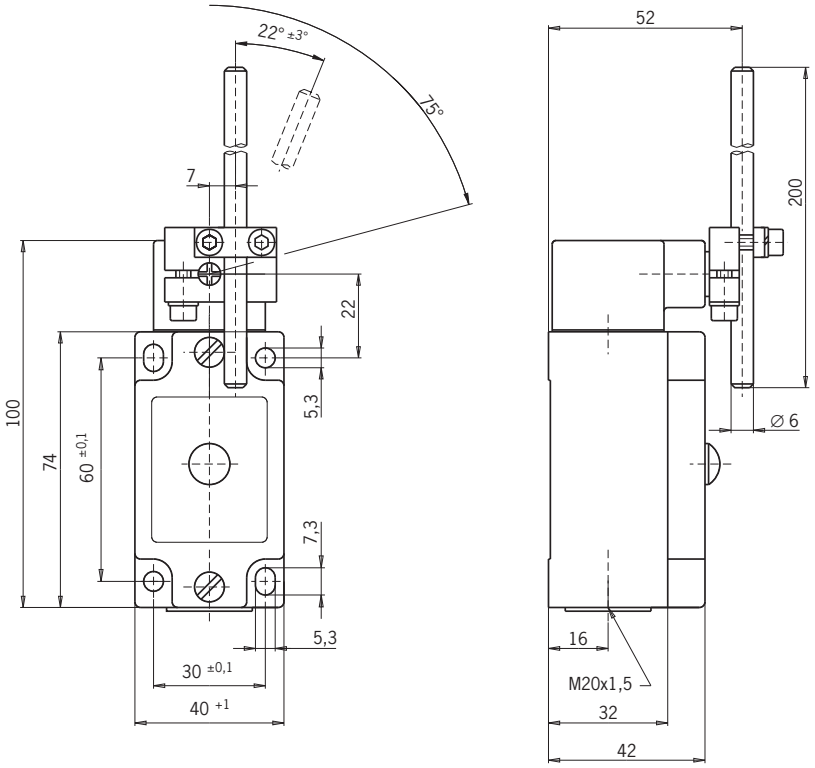
Series	Roller	Switching element	Order no.	
			Function display	
			without	L060
NZ2...	**PB** Plastic roller	511	-	**098646**
	PS Steel roller	511	**106697**	**098645**

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

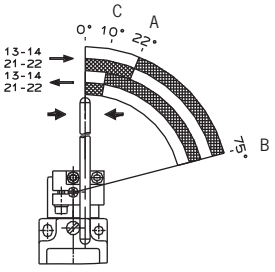
Adjustment options

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
open
closed

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 10^6 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		**510** 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_{imp}		2.5		kV
Rated insulation voltage U_i		250		V
Utilization category acc. to IEC 60947-5-1				
	AC12	I_e 10 A U_e 230 V		
	AC15	I_e 6 A U_e 230 V		
	DC13	I_e 6 A U_e 24 V		
Switching current, min., at switching voltage		10 24		mA V DC
Conventional thermal current I_{th}		6		A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)		10/6		A gG
Connection		Screw terminal [1]		
Conductor cross-section, max.		2 x 1.5		mm^2

1) Wiring diagram: see page B-9.

Ordering table

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

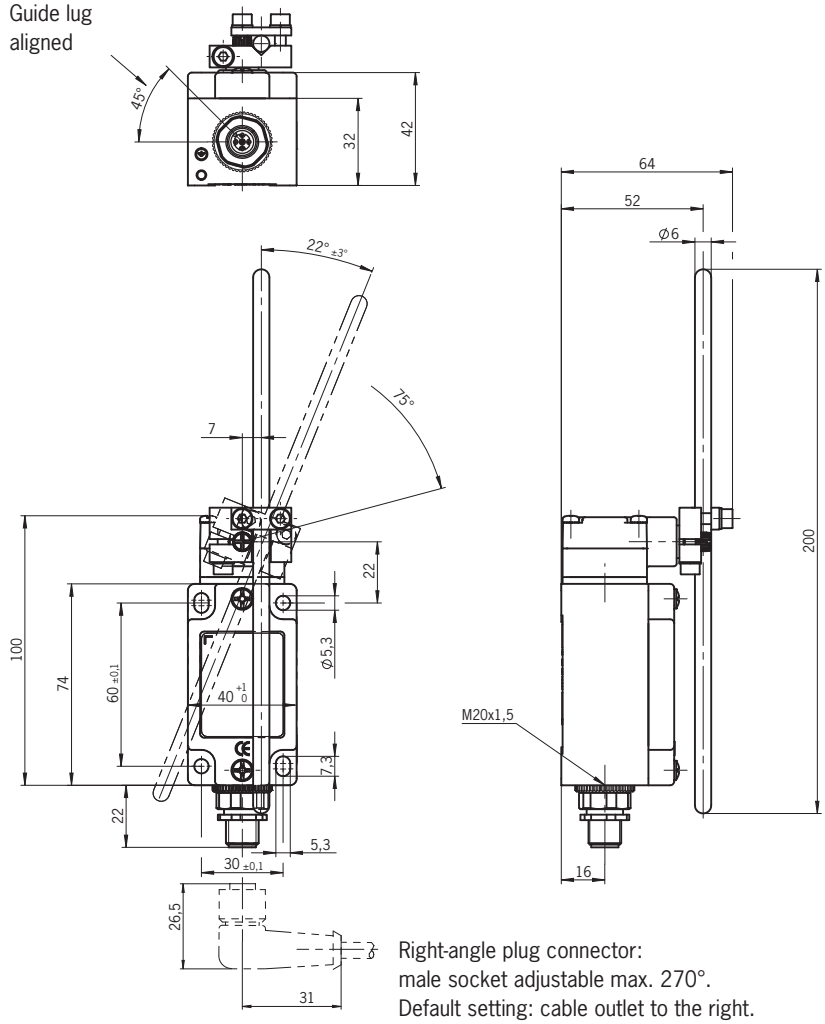
Ordering example: Position switch without safety function **NG**, cable entry **1**,
pivoted lever arm with plastic rod **SB**, snap-action switching element **510**,
function display **L060** 10 - 60 V, metric thread M20 x 1.5 **M**
NG1SB-510L060-M **Order no. 090577**

Position switch series NG2...

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

Dimension drawing

Guide lug aligned



Right-angle plug connector:
male socket adjustable 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

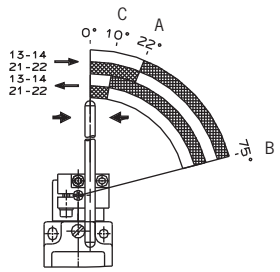
Adjustment options

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
open
closed

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 10^6 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		**510** 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_{imp}		1.5		kV
Rated insulation voltage U_i		50		V
Utilization category acc. to IEC 60947-5-1				
Plug connector SVM5	AC15	I_e 4 A U_e 30 V		
	DC13	I_e 4 A U_e 24 V		
Switching current, min., at		10		mA
switching voltage		24		V DC
Conventional thermal current I_{th}		4		A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)		4		A gG
Connection		Plug connector M12 [1]		

1) Wiring diagram: see page B-10.

B

Ordering table

Series	Actuator	Switching element	Order no. Plug connector SVM5
NG2...	**SB** Plastic rod	510	**091303**
	SM Aluminum rod	510	**094059**

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...

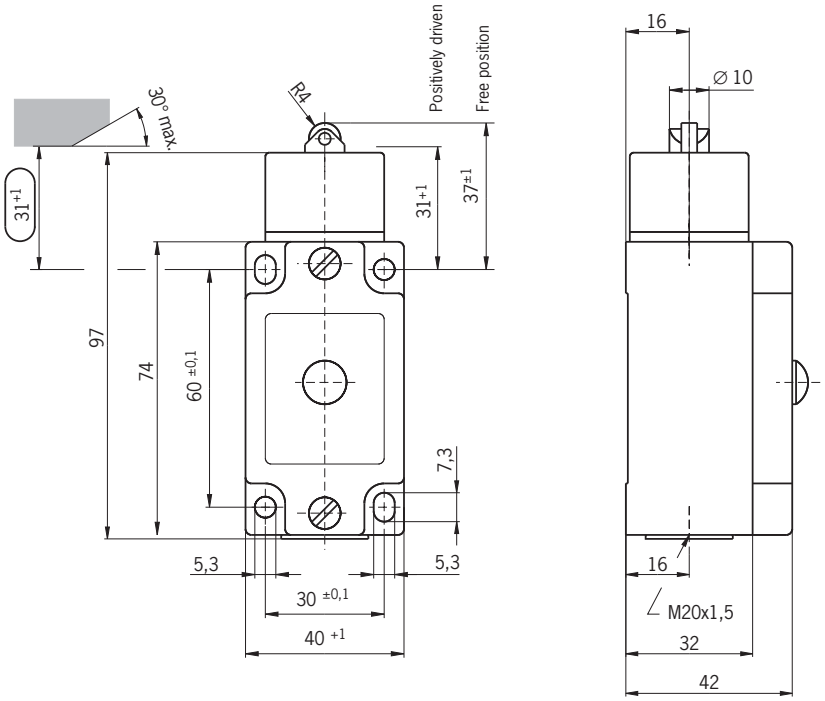
- **Plunger actuator**
  WO (domed plunger) / **KO** (ball plunger)
  DO (chisel plunger) / **RK** (roller plunger with small steel roller)
- **Cable entry M20 x 1.5**

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:

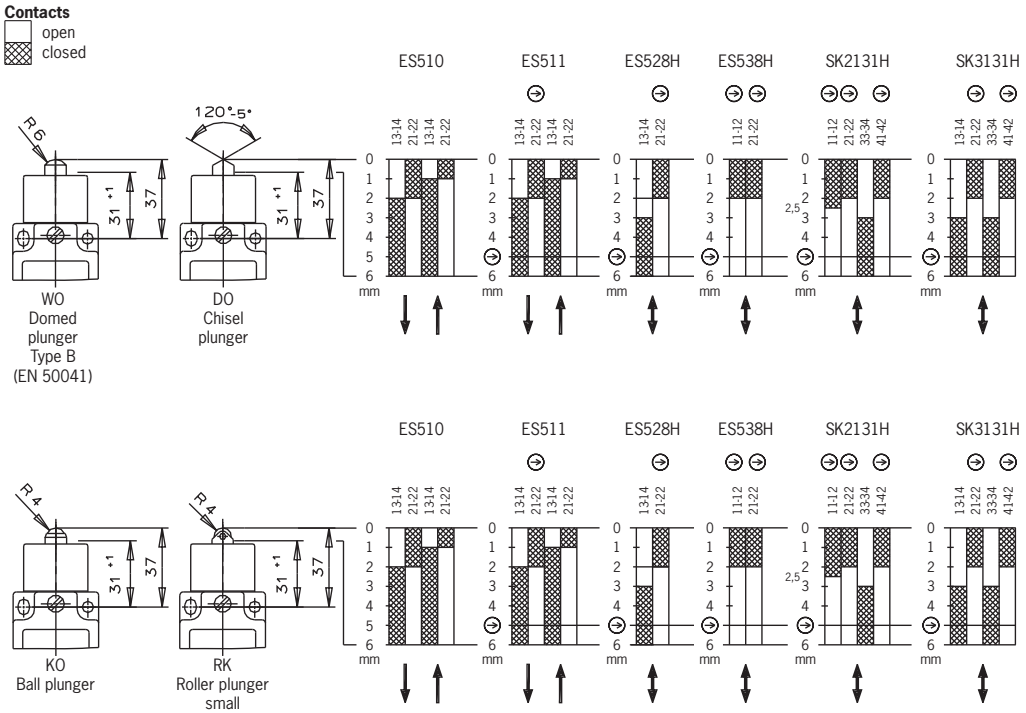
12-60 V	AC/DC	(standard)	L060
110 V	AC ±15%	(on request)	L110
230 V	AC ±15%	(on request)	L220

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



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 10^6 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. [1]		10			50		m/min
Approach speed, min.		0.1					m/min
Operating point accuracy [2]		± 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		**510** 1 NC + 1 NO	**528H** 1 NC ⊖ + 1 NO		**538H** 2 NC ⊖		
		511 1 ⊖ + 1 NO	**2131H** 3 NC ⊖ + 1 NO		**3131H** 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_{imp}		2.5					kV
Rated insulation voltage U_i		250					V
Utilization category acc. to IEC 60947-5-1							
	AC12	I_e 10 A U_e 230 V	-				
	AC15	I_e 6 A U_e 230 V	I_e 4 A U_e 230 V				
	DC13	I_e 6 A U_e 24 V	I_e 4 A U_e 24 V				
Switching current, min., at		10	1	10	1	10	mA
switching voltage		24	24	12	24	12	V DC
Conventional thermal current I_{th}		6	4				A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)		10/6	4				A gG
Connection		Screw terminal [3]					
Conductor cross-section, max.		2 x 1.5					mm^2

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

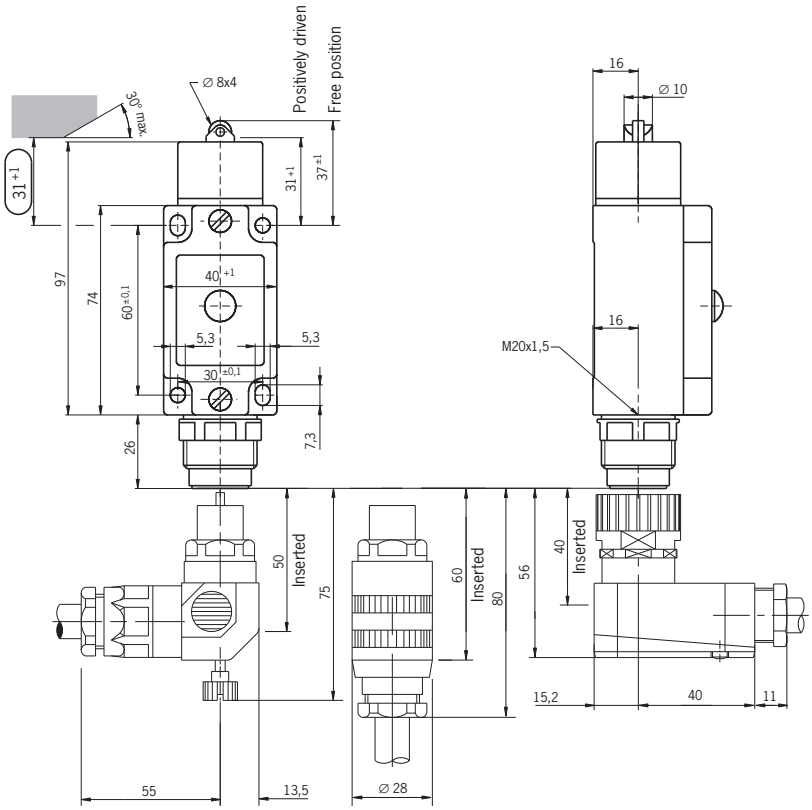
Position switch series NG2.../NZ2...

- **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



SR6WF SR6EF/SR11EF SR11WF

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:

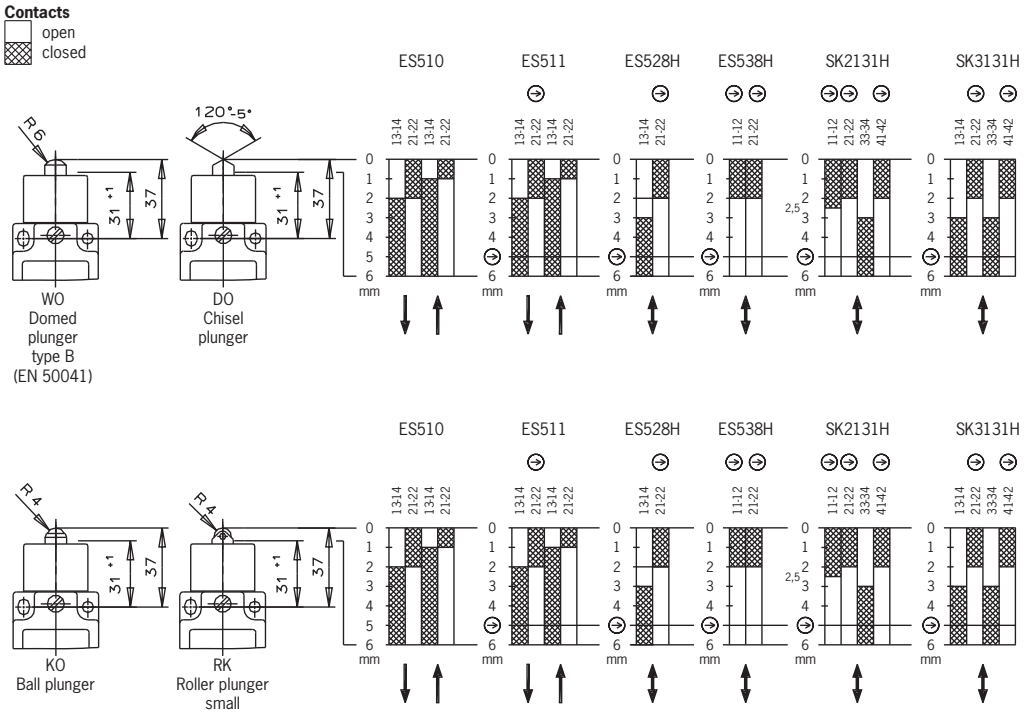
12-60 V	AC/DC	(standard)	L060
110 V	AC ±15%	(on request)	L110
230 V	AC ±15%	(on request)	L220

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



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 10^6 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. [1]			10			50		m/min
Approach speed, min.			0.1					m/min
Operating point accuracy [2]			± 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			**510** 1 NC + 1 NO	**528H** 1 NC ⊖ + 1 NO		**538H** 2 NC ⊖		
			511 1 ⊖ + 1 NO	**2131H** 3 NC ⊖ + 1 NO		**3131H** 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			10	1	10	1	10	mA
switching voltage			24	24	12	24	12	V DC
Conventional thermal current I_{th}			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 [3]					
Rated impulse withstand voltage U_{imp}								
	With plug connector SR6		2.5					kV
	With plug connector SR11		1.5					
Rated insulation voltage U_i								
	With plug connector SR6		250					V
	With plug connector SR11		50					
Utilization category acc. to IEC 60947-5-1								
	With plug connector SR6	AC15	I_e 6 A U_e 230 V	I_e 4 A U_e 230 V				
		DC13	I_e 6 A U_e 24 V	I_e 4 A U_e 24 V				
	With plug connector SR11	AC15		I_e 4 A U_e 50 V				
		DC13		I_e 4 A U_e 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. Function display without	Order no. Function display L060
NG2...	**WO** Domed plunger	510	**090012**	On request
NZ2...		511	**090909**	**091280**
		528	**090910**	**091279**
		538	**090911**	**087558**
		2131	**090912**	-
		3131	**090913**	-
NG2...	**DO** Chisel plunger	510	**090011**	On request
NZ2...		511	**090015**	
		528	**090914**	
		538	**090915**	
		2131	**090916**	**-**
		3131	**090917**	**-**
NG2...	**RK** Roller plunger, small	510	**090918**	**091300**
NZ2...		511	**090016**	**099273**
		528	**090919**	**091292**
		538	**090920**	On request
		2131	**090921**	-
		3131	**090922**	-
NG2...	**KO** Ball plunger	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...

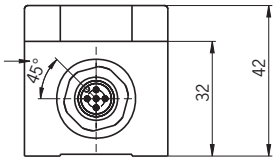
NZ... 1)

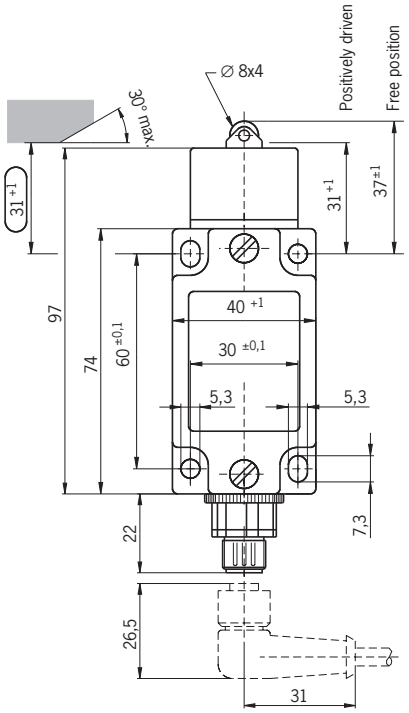
1) - Not applicable to NZ with switching element 511.
- Not applicable to NZ versions DO and KO.

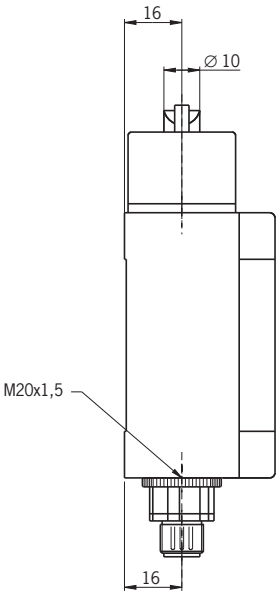
2) - Not applicable to NG/NZ versions DO and KO with switching element 528H, 538H, 2131H, 3131H.

Dimension drawing

Guide lug aligned







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

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

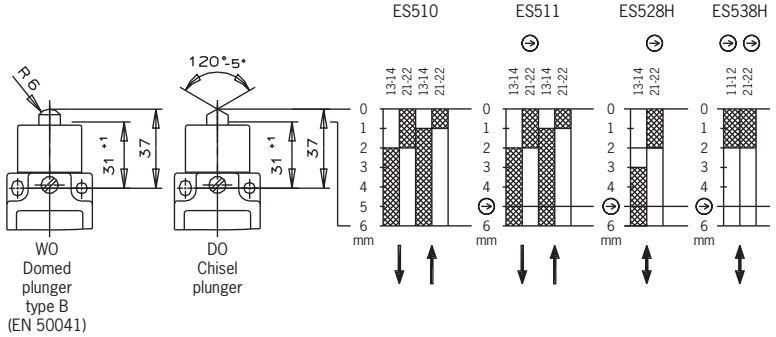
Adjustment options

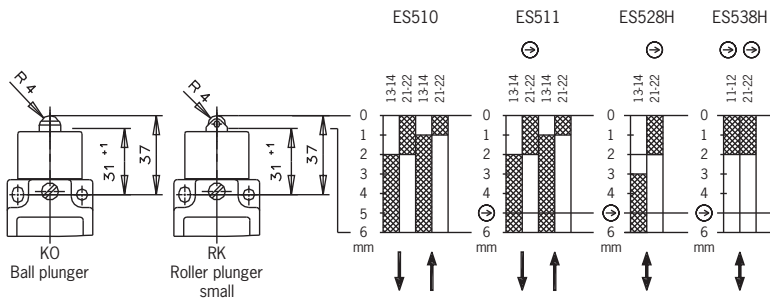
Horizontal 4 x 90° (see page B-8).

⚠ To achieve the positively driven travel, the dimension (31 +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
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 10^6 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. [1]		10			50		m/min
Approach speed, min.		0.1					m/min
Operating point accuracy [2]		± 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		**510** 1 NC + 1 NO	**528H** 1 NC ⊖ + 1 NO		**538H** 2 NC ⊖		
		511 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_{imp}		1.5					kV
Rated insulation voltage U_i		50					V
Utilization category acc. to IEC 60947-5-1							
Plug connector SVM5	AC15	I_e 4 A U_e 30 V	I_e 4 A U_e 30 V				
	DC13	I_e 4 A U_e 24 V	I_e 4 A U_e 24 V				
Switching current, min., at		10	1	10	1	10	mA
switching voltage		24	24	12	24	12	V DC
Conventional thermal current I_{th}		4	4				A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)		4	4				A gG
Connection		Plug connector M12 [3]					

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**
NZ2...		511	**089014**
		528	**090923**
		538	**090924**
NG2...	**DO** Chisel plunger	510	**090014**
NZ2...		511	**090927**
		528	**090928**
		538	**090929**
NG2...	**RK** Roller plunger, small	510	**089020**
NZ2...		511	**089007**
		528	**090930**
		538	**089018**
NG2...	**KO** Ball plunger	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...

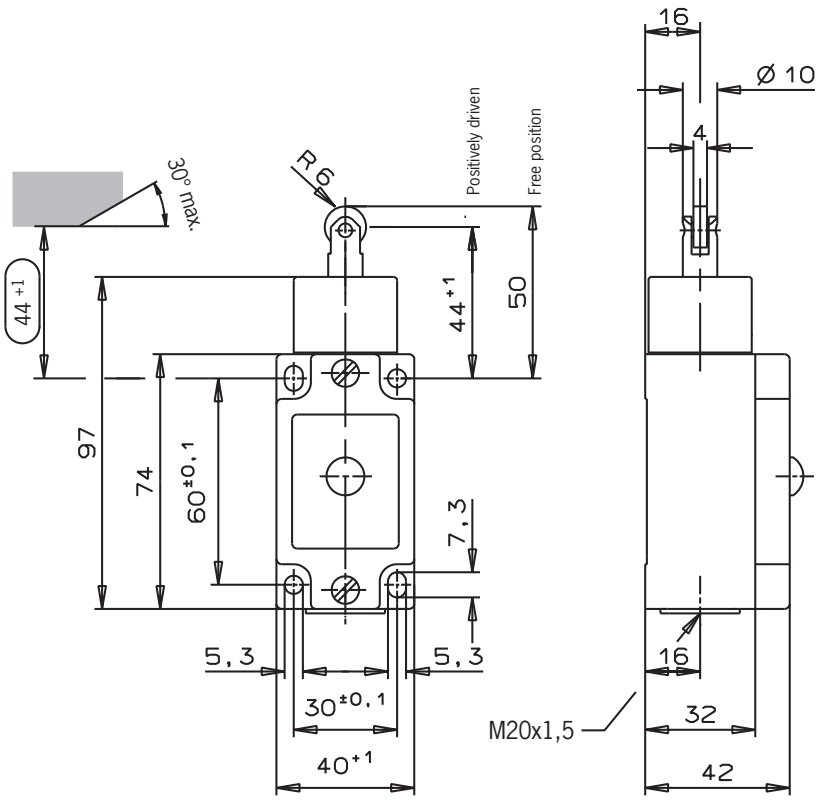
- **Plunger actuator** **RG** (roller plunger, plastic roller)
  RS (roller plunger, steel roller)
  RL (extended roller plunger)
- **Cable entry M20 x 1.5**

NG...

NZ... 1)

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).

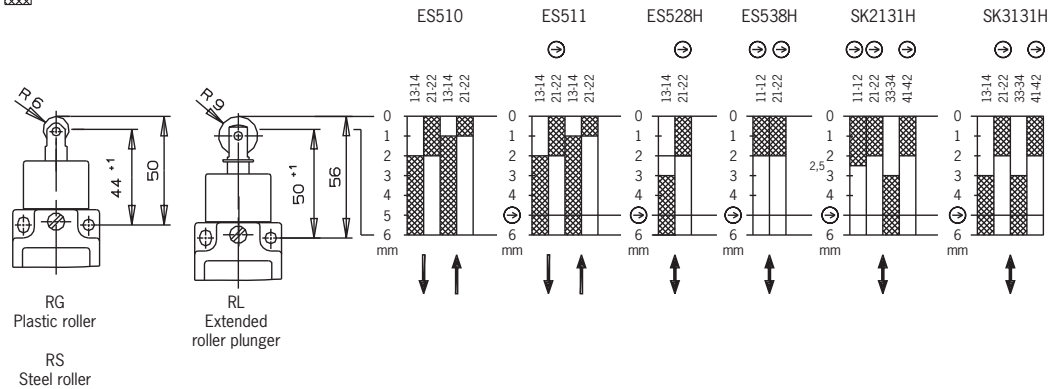
⚠ If damaged or worn, safety switches must be replaced as a unit.

⚠ **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
open
closed



RG
Plastic roller

RS
Steel roller

RL
Extended
roller plunger

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 10^6 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. [1]		20					m/min
Approach speed, min.		0.1					m/min
Operating point accuracy [2]		± 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		**510** 1 NC + 1 NO		**528H** 1 NC ⊖ + 1 NO		**538H** 2 NC ⊖	
		511 1 ⊖ + 1 NO		**2131H** 3 NC ⊖ + 1 NO		**3131H** 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_{imp}		2.5					kV
Rated insulation voltage U_i		250					V
Utilization category acc. to IEC 60947-5-1							
	AC12	I_e 10 A U_e 230 V		-			
	AC15	I_e 6 A U_e 230 V		I_e 4 A U_e 230 V			
	DC13	I_e 6 A U_e 24 V		I_e 4 A U_e 24 V			
Switching current, min., at		10	1	10	1	10	mA
switching voltage		24	24	12	24	12	V DC
Conventional thermal current I_{th}		6	4				A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)		10/6	4				A gG
Connection		Screw terminal [3]					
Conductor cross-section, max.		2 x 1.5					mm^2

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. Function display without	Order no. Function display L060
NG1...-M	**RG** Roller plunger Plastic roller	510	**079941**	**090398**
NZ1...-M		511	**088605**	**089052**
		528	**090932**	**090008**
		538	**090933**	**090009**
		2131	**090934**	-
		3131	**090935**	-
NG1...-M	**RS** Roller plunger Steel roller	510	**079942**	**079943**
NZ1...-M		511	**079960**	**089053**
		528	**089627**	**086413**
		538	**090936**	**090555**
		2131	**089633**	**-**
		3131	**089631**	**-**
NG1...-M	**RL** Extended roller plunger	510	**086324**	**090602**
NZ1...-M		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...

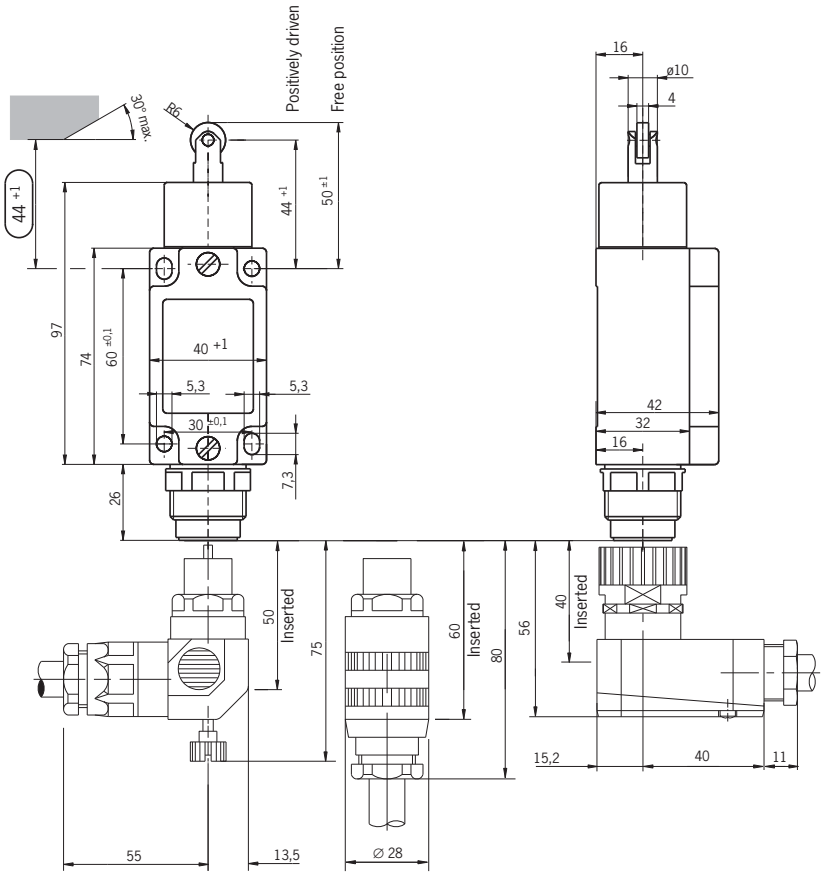
- **Plunger actuator** **RG** (roller plunger, plastic roller)
  RS (roller plunger, steel roller)
  RL (extended roller plunger)
- **Plug connectors SR6 and SR11**

NG...

NZ... 1)

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).

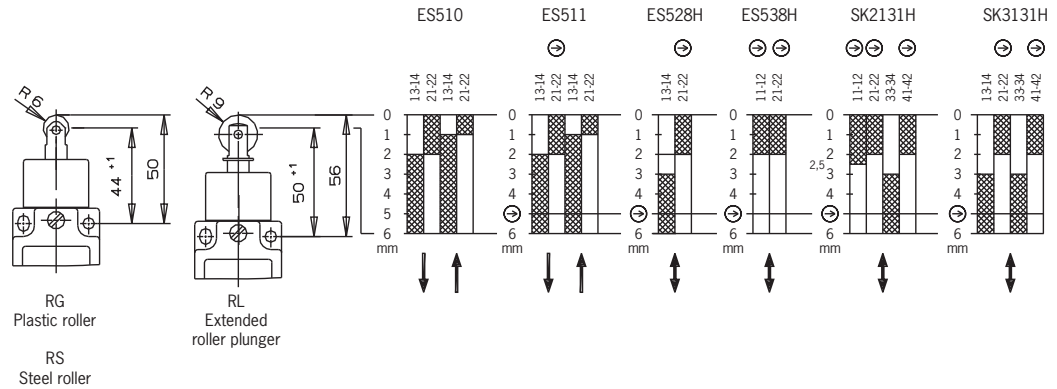
⚠ If damaged or worn, safety switches must be replaced as a unit.

⚠ **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
open
closed



RG
Plastic roller

RS
Steel roller

RL
Extended
roller plunger

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 10^6 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. [1]			20					m/min
Approach speed, min.			0.1					m/min
Operating point accuracy [2]			± 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			**510** 1 NC + 1 NO		**528H** 1 NC ⊖ + 1 NO		**538H** 2 NC ⊖	
			511 1 ⊖ + 1 NO		**2131H** 3 NC ⊖ + 1 NO		**3131H** 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			10		1	10	1 10	mA
switching voltage			24		24	12	24 12	V DC
Conventional thermal current I_{th}			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 [3]					
Rated impulse withstand voltage U_{imp}								
	With plug connector SR6		2.5					kV
	With plug connector SR11		1.5					
Rated insulation voltage U_i								
	With plug connector SR6		250					V
	With plug connector SR11		50					
Utilization category acc. to IEC 60947-5-1								
	With plug connector SR6	AC15	I_e 6 A U_e 230 V		I_e 4 A U_e 230 V			
		DC13	I_e 6 A U_e 24 V		I_e 4 A U_e 24 V			
	With plug connector SR11	AC15	I_e 4 A U_e 50 V		I_e 4 A U_e 50 V			
		DC13	I_e 4 A U_e 24 V		I_e 4 A U_e 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.	
			Function display	
			without	L060
NG2...	**RG** Roller plunger Plastic roller	510	**090021**	**090949**
NZ2...		511	**090032**	**091284**
		528	**090943**	**090944**
		538	**090945**	**090946**
		2131	**090947**	-
		3131	**090948**	-
NG2...	**RS** Roller plunger Steel roller	510	**090953**	On request
NZ2...		511	**090024**	**090147**
		528	**090950**	**088197**
		538	**090951**	**090952**
		2131	**090149**	**-**
		3131	**090954**	**-**
NG2...	**RL** Extended roller plunger	510	**090022**	**091285**
NZ2...		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**

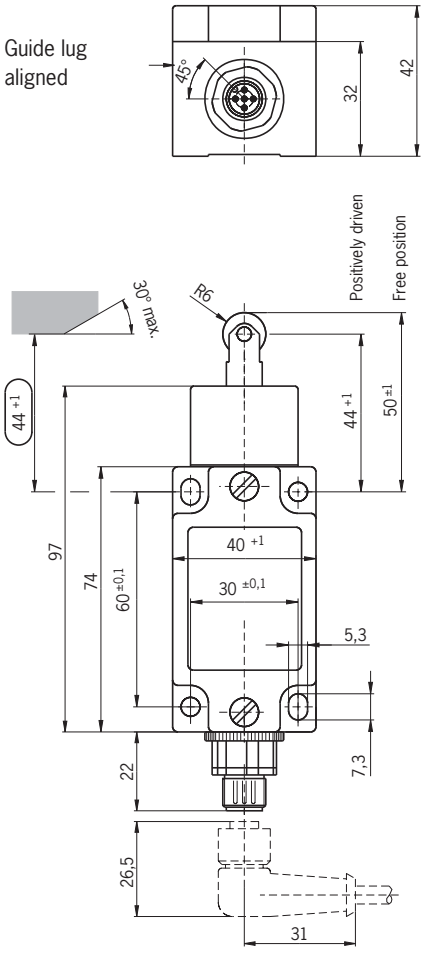
NG...

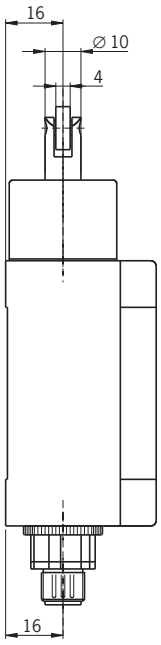
NZ... 1)

1) Not applicable to NZ with switching element 511.

Dimension drawing

Guide lug aligned





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

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).

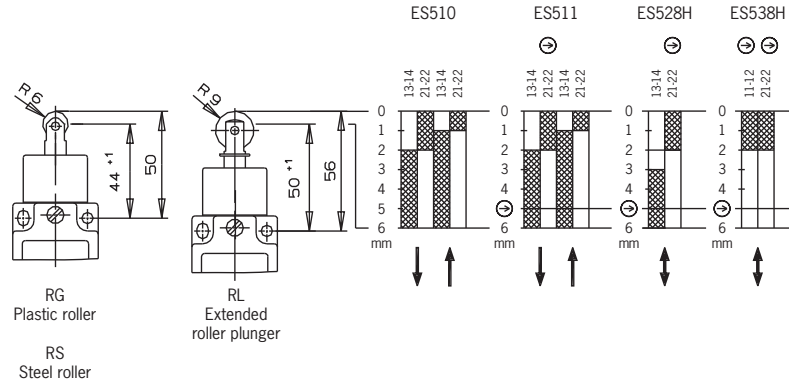
⚠ If damaged or worn, safety switches must be replaced as a unit.

⚠ **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.

Travel diagrams

Contacts
open
closed



RG
Plastic roller

RS
Steel roller

RL
Extended roller plunger

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 10^6 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. [1]			20					m/min
Approach speed, min.			0.1					m/min
Operating point accuracy [2]			± 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			**510** 1 NC + 1 NO	**528H** 1 NC ⊖ + 1 NO		**538H** 2 NC ⊖		
			511 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_{imp}			1.5					kV
Rated insulation voltage U_i			50					V
Utilization category acc. to IEC 60947-5-1								
Plug connector SVM5	AC15		I_e 4 A U_e 30 V	I_e 4 A U_e 30 V				
	DC13		I_e 4 A U_e 24 V	I_e 4 A U_e 24 V				
Switching current, min., at			10	1	10	1	10	mA
switching voltage			24	24	12	24	12	V DC
Conventional thermal current I_{th}			4	4				A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)			4	4				A gG
Connection			Plug connector M12 [3]					

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

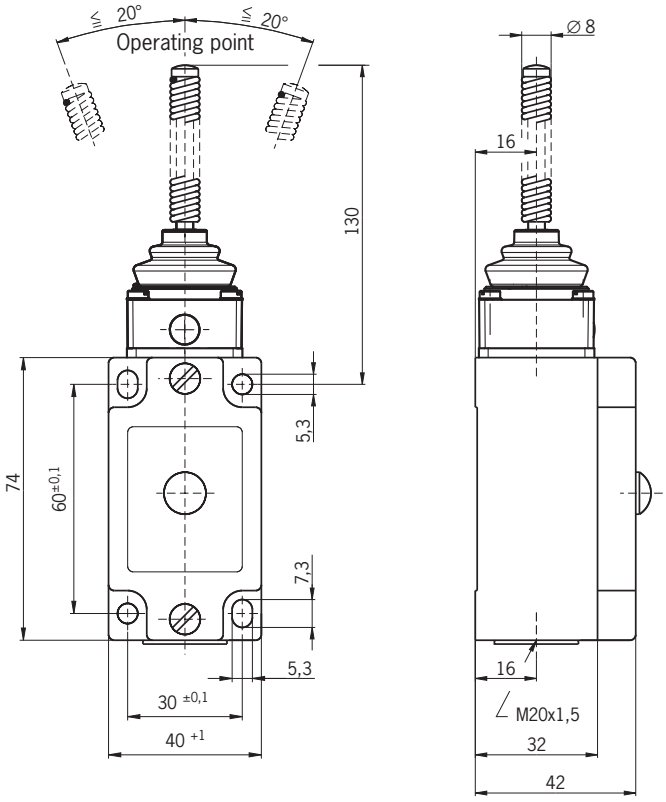
Series	Actuator	Switching element	Order no. Plug connector SVM5
NG2...	**RG** Roller plunger Plastic roller	510	**090960**
NZ2...		511	**090026**
		528	**090961**
		538	**090962**
NG2...	**RS** Roller plunger Steel roller	510	**088632**
NZ2...		511	**090027**
		528	**090963**
		538	**090964**
NG2...	**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 10^6 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		**510** 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_{imp}		2.5	kV
Rated insulation voltage U_i		250	V
Utilization category acc. to IEC 60947-5-1			
	AC12	I_e 10 A U_e 230 V	
	AC15	I_e 6 A U_e 230 V	
	DC13	I_e 6 A U_e 24 V	
Switching current, min., at		10	mA
switching voltage		24	V DC
Conventional thermal current I_{th}		6	A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)		10/6	A gG
Connection		Screw terminal [1]	
Conductor cross-section, max.		2 x 1.5	mm^2

1) Wiring diagram: see page B-9.

Ordering table

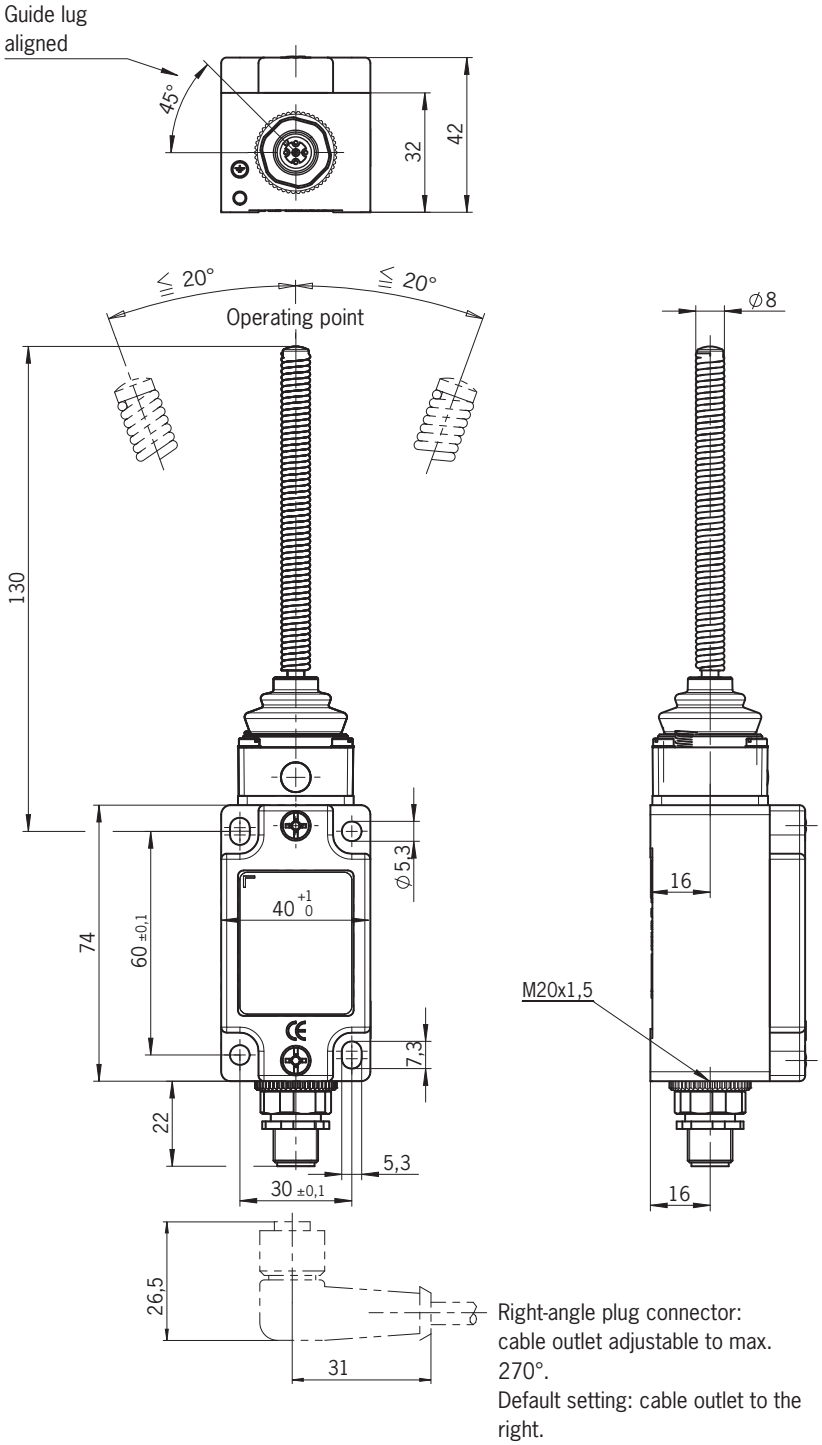
Series	Actuator	Switching element	Order no.	
			Function display	
			without	L060
NG1...-M	**FO** Spring actuator	510	**079911**	**090029**

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



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 10^6 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		**510** 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_{imp}		1.5	kV
Rated insulation voltage U_i		50	V
Utilization category acc. to IEC 60947-5-1			
Plug connector SVM5	AC15	I_e 4 A U_e 30 V	
	DC13	I_e 4 A U_e 24 V	
Switching current, min., at		10	mA
switching voltage		24	V DC
Conventional thermal current I_{th}		4	A
Short circuit prot. acc. to IEC 60269-1 (control circuit fuse)		4	A gG
Connection		Plug connector M12 [1)]	

1) Wiring diagram: see page B-10.

B

Ordering table

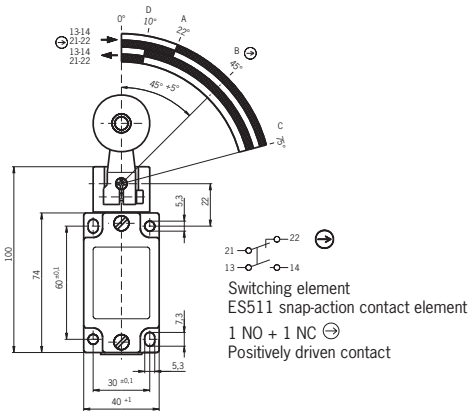
Series	Actuator	Switching element	Order no. Plug connector SVM5
NG2...	**FO** Spring actuator	510	**092058**

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)

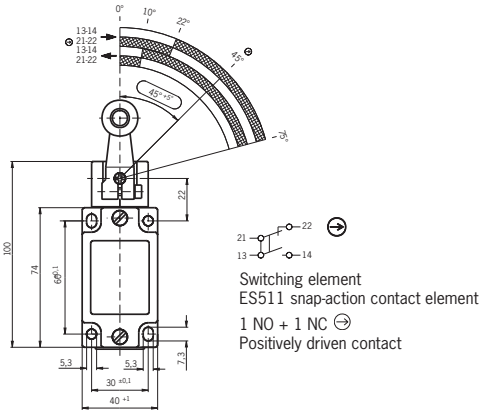
Position switch with large plastic roller
Diameter 30 mm

Item	Order no.
NZ1HB-511-MC569	**079965**



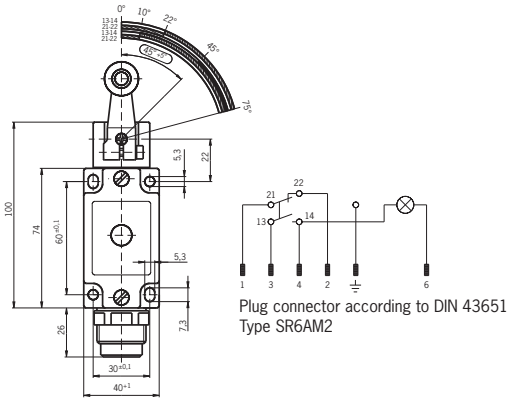
Position switch with sealed bearings
Diameter 19 mm

Item	Order no.
NZ1HS-511-MC1833	**091312**



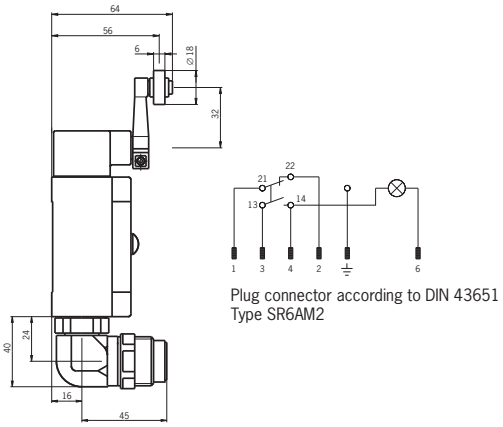
Position switch with plug connector according to DIN 43651
VW/Audi, VW mat. no. 2348

Item	Order no.
NZ2HB-511L060C1630	**054121**



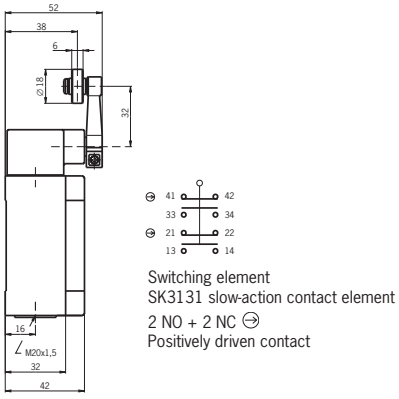
Position switch with plug connector and elbow adapter according to DIN 43651
VW/Audi, VW mat. no. 2349

Item	Order no.
NZ2HB-511L060C1631	**054122**



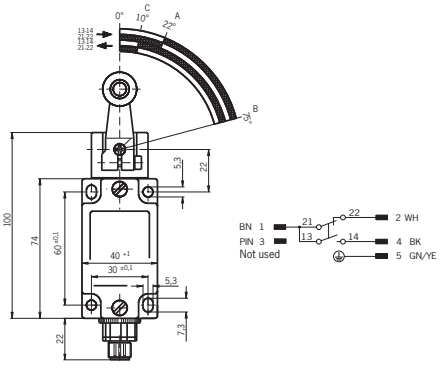
Position switch with steel roller on the inside of the lever

Item	Order no.
NZ1HS-3131-MC1779	**079996**



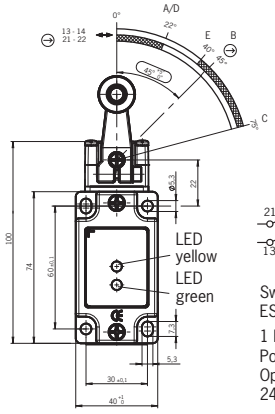
Position switch with M12 plug connector and pin assignment for LED indicator
(pin 3 not used)

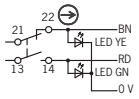
Item	Order no.
NG2HB-510SVM5C1883	**086561**



Position switch with two LED indicators
Diameter 18 mm

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

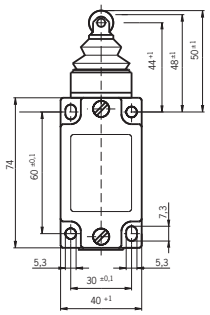


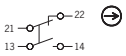


Switching element
ES528 slow-action contact element
1 NO + 1 NC ⊖
Positively driven contact
Operating voltage for LED indicator
24 V DC, +10%, -15%

Position switch with protective NBR bellows on the plunger guide
Protection against serious contamination and aggressive coolants

Item	Order no.
NZ1RS-511-MC1588	**091352**

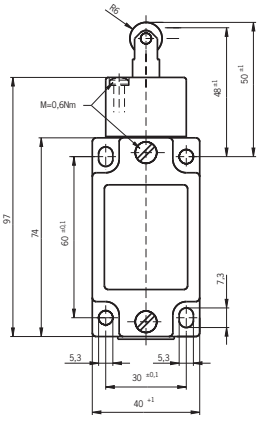




Switching element
ES511 snap-action contact element
1 NO + 1 NC ⊖
Positively driven contact

Position switch with gold plated contacts
For switching low currents of at least 1 mA

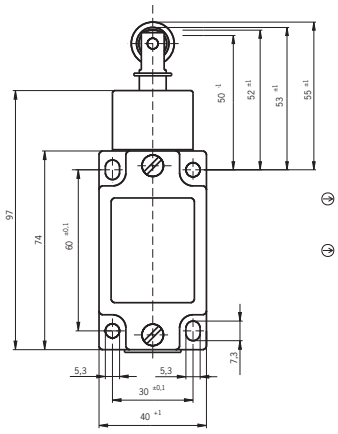
Item	Order no.
NZ1RS-510AU-M	**090416**

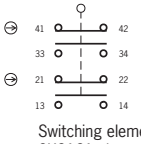


Switching element
ES510 snap-action contact element
1 NO + 1 NC
Contact material: silver alloy 10 µm electro-gold-plated
annular cutting edge contact
Breaking capacity max. 30 V / 100 mA
Min. breaking capacity 5 V / 1 mA

Position switch with sealed bearings
Diameter 16 mm

Item	Order no.
NZ1RL-3131-MC1831	**089082**

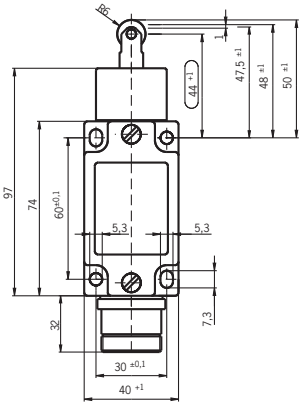


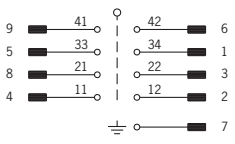


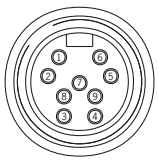
Switching element
SK3131 slow-action contact element
2 NO + 2 NC ⊖
Positively driven contact

Position switch with MENCOM plug connector MIN-9MR-1-18

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

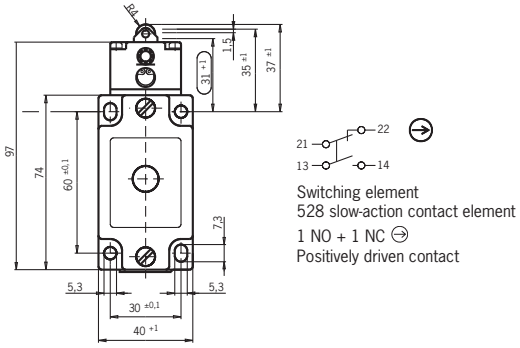






Position switch with small bearing
For high approach speeds and long travel distances

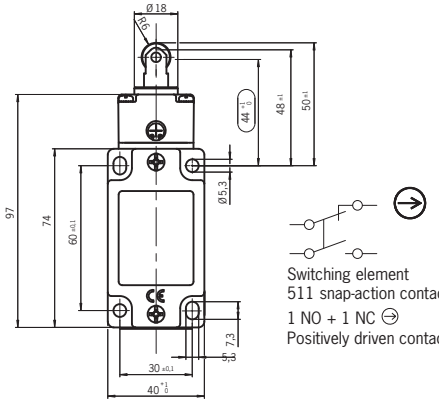
Item	Order no.
NZ1RK-528-MC1912	**090572**



Switching element
528 slow-action contact element
1 NO + 1 NC ⊖
Positively driven contact

Position switch with steel sleeve
For high approach speeds and protected guidance

Item	Order no.
NZ1RS-511-MC782	**093141**

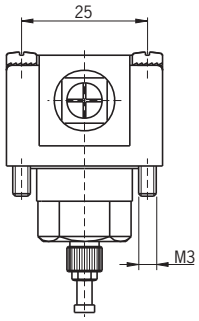


Switching element
511 snap-action contact element
1 NO + 1 NC ⊖
Positively driven contact

Accessories

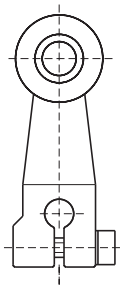
Lever arm actuation

Item	Order no.
NSA	**012051**



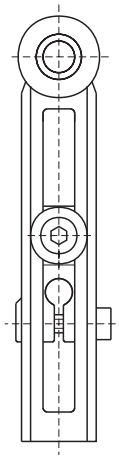
Roller arm

Item	Order no.
NHB (plastic roller)	**012042**
NHS (steel roller)	**012043**
NHSC1834 (ball bearing ∅ 19 mm)	**077349**



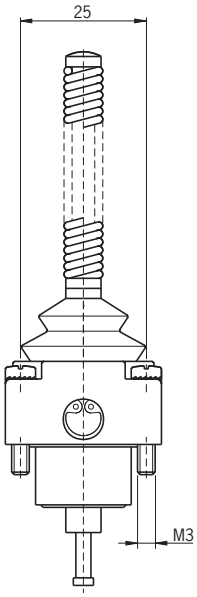
Adjustable roller arm

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



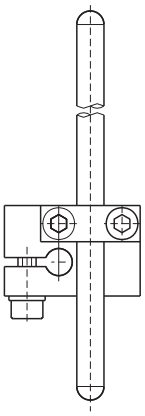
Spring actuator

Item	Order no.
NFO (spring steel wire)	**011909**



Rod lever

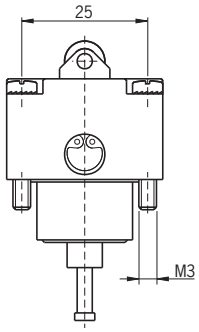
Item	Order no.
NSB (plastic rod)	**012052**
NSM (aluminum rod)	**012053**



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.

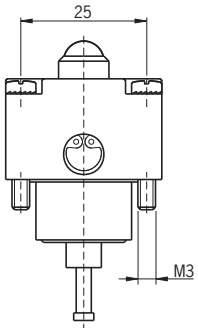
Actuator with small roller plunger

Item	Order no.
NRK (small steel roller)	**012049**



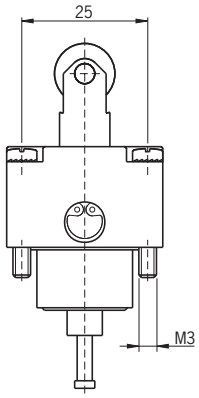
Actuator with ball plunger

Item	Order no.
NKO (steel ball)	**012045**



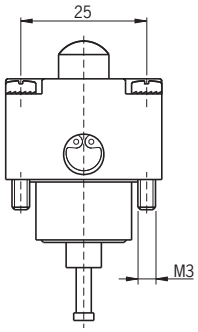
Actuator with roller plunger ∅ 12 mm

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



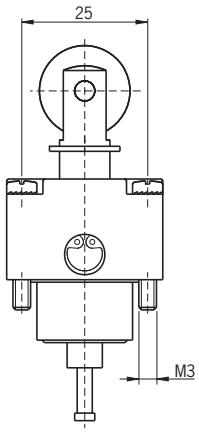
Actuator with domed plunger

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



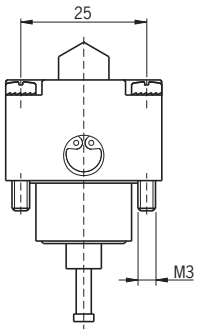
Actuator with extended roller plunger ∅ 18 mm

Item	Order no.
NRL (large steel roller)	**012050**



Actuator with chisel plunger

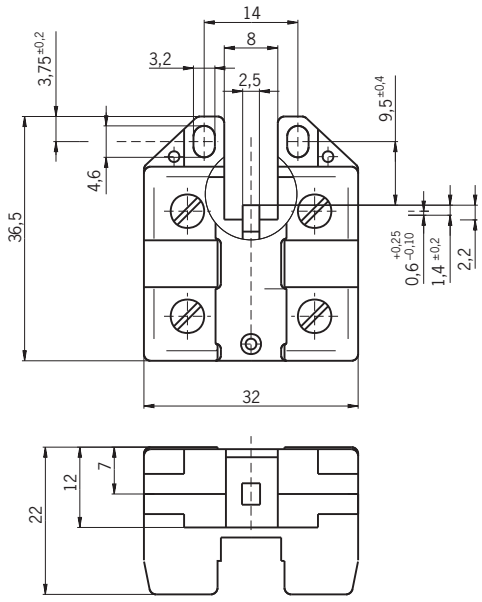
Item	Order no.
NDO (polish-ground chisel plunger)	**011908**



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.

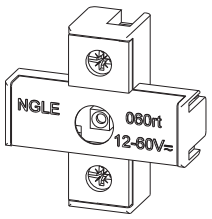
Switching element ES 510 for series NG...

Item	Order no.
ES 510	**010422**



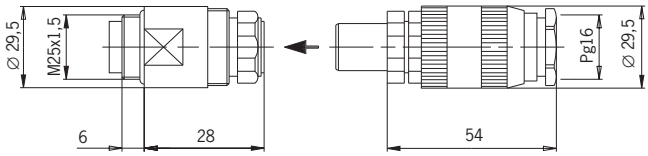
LED function display for series NG.../NZ...

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**



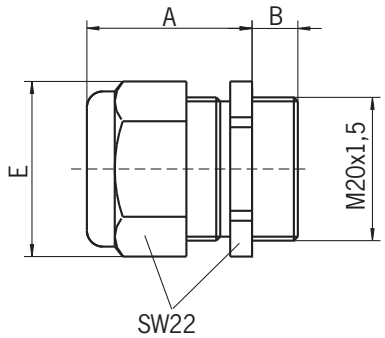
Male socket/female plug, 12-pin

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**

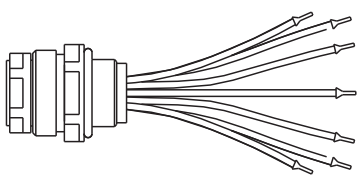


Technical data

Parameter	Value
Housing material	Metal
Number of pins	11 + PE
Rated voltage	250 V≂
Level of contamination VDE 0110	2
Connection	Soldered connections
Max. conductor cross-section	1 mm²
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

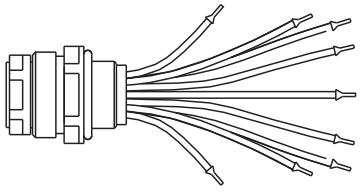
Appliance socket, 7-pin
for series NG.../NZ... with plug connector SR6

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



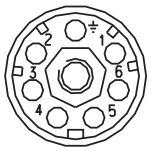
Appliance socket, 12-pin
for series NG.../NZ... with plug connector SR11

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

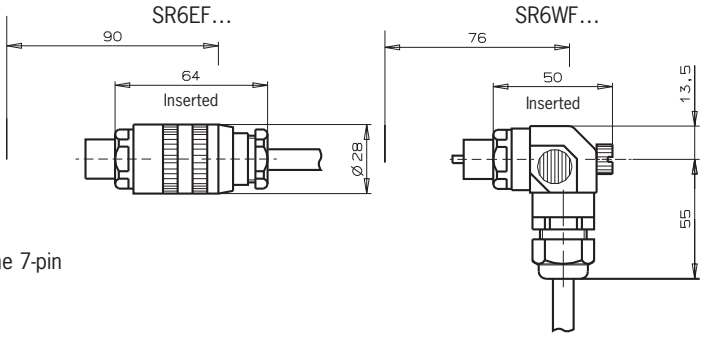


Plug connector SR6 (socket 6+PE) with/without connecting cable

Socket pin	Wire number
1	1
2	2
3	3
4	4
5	5
6	6
⏚	7



View on connection side of the 7-pin female connector



Technical data

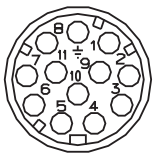
Parameter	Value
Housing material	Plastic
Number of pins	6 + PE
Rated voltage	250 V≅
Degree of protection acc. to IEC 60529	IP 65/inserted
Connecting cable	PUR gray
Outer diameter	∅ 8 mm
Conductor cross-section	1.0 mm²

Ordering table

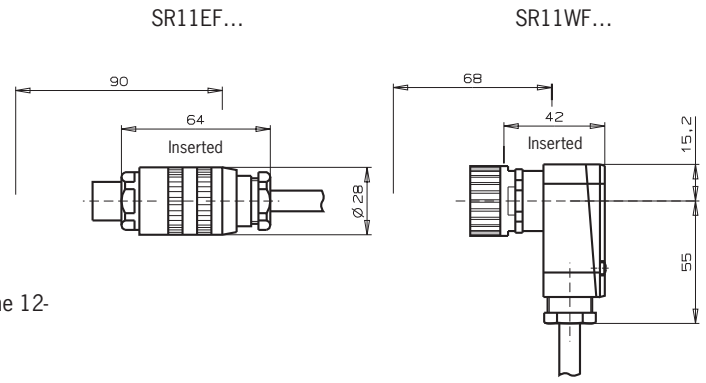
Plug version	Connecting cable	Item	Order no.
Socket Straight	without	SR6EF	**013176**
	5 m	SR6EF-5000	**077632**
	10 m	SR6EF-10000	**077633**
	15 m	SR6EF-15000	**077634**
Socket Angled	without	SR6WF	**024999**
	5 m	SR6WF-5000	**077638**
	10 m	SR6WF-10000	**077639**
	15 m	SR6WF-15000	**077640**

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

Socket pin	Wire number
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
⏚	12



View on connection side of the 12-pin female connector



Technical data

Parameter	Value
Housing material	Plastic
Number of pins	11 + PE
Rated voltage	50 V≅
Degree of protection acc. to IEC 60 529	IP 65/inserted
Connecting cable	PUR gray
Outer diameter	∅ 10.5 mm
Conductor cross-section	1.0 mm²

Ordering table

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

Multiple Limit Switches, Trip Rails and Trip Dogs

C

EUCHNER
More than safety.

Multiple limit switches, trip rails and trip dogs

General **C-4**

Multiple limit switches **C-8**
Accessories C-23
Technical data C-26

Trip rails/trip dogs **C-29**

Appendix
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

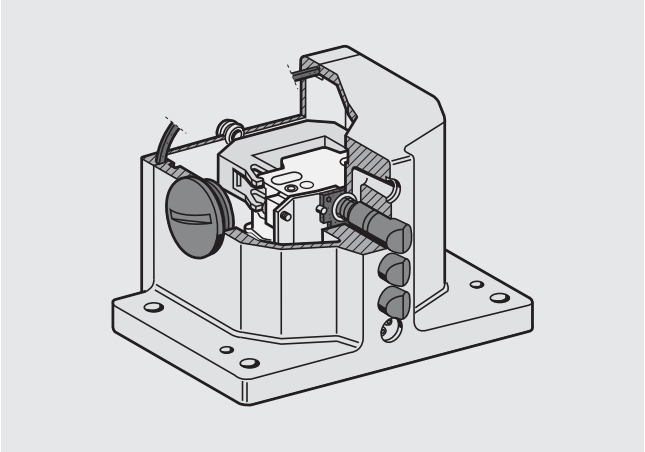
A range of housing versions, including DIN versions, are available to suit the full spectrum of application fields. A high standard of quality is always guaranteed in every installation position by the degree of protection IP 67.

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).

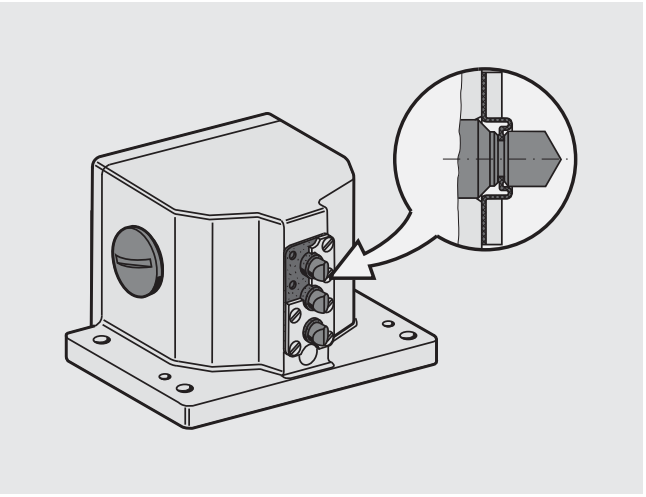
Layout

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 ± 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 x 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

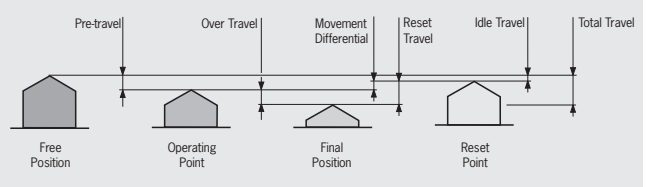
General

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.

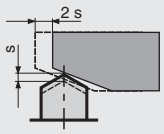
Plunger travel

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 ± 0.002 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 ± 0.01 mm [1)]
Max. approach speed of 80 m/min.

Roller plunger B with ball bearing
Hardened roller.
Operating point accuracy to ± 0.01 mm [1)]
Max. approach speed of 120 m/min.

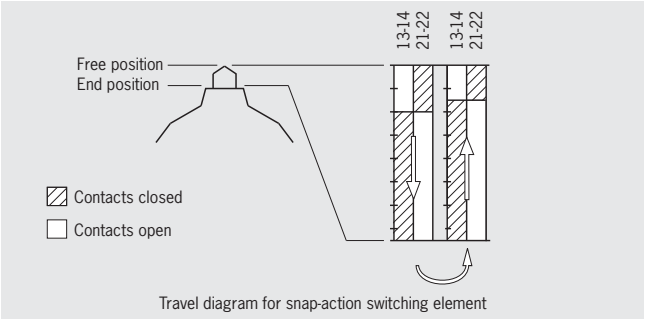
Ball plunger K
(not in conjunction with safety switching elements)
Hardened ball.
Can be actuated from various directions.
Operating point accuracy to ± 0.01 mm [1)]
Max. approach speed of 10 m/min.

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 ± 0.002 mm [1)]
Max. approach speed of 10 m/min.

Switching elements

Snap-action switching element

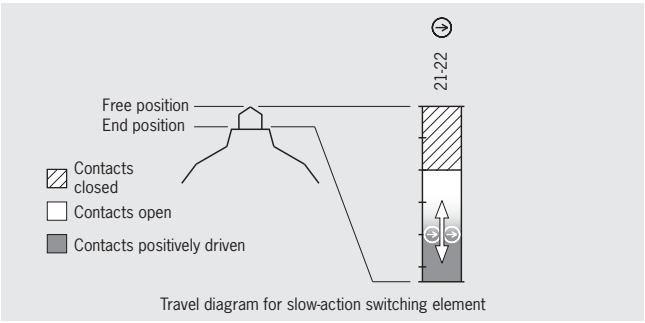
Snap-action switching elements are predominantly used in mechanical multiple limit switches.
On snap-action switching elements, the change from the completely closed state to the completely open state is made at a defined point (operating point).
As a result the operating point is at a defined position, unlike on slow-action contact elements. Snap-action switching elements typically have a switching hysteresis.



Travel diagram for snap-action switching element

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.



Travel diagram for slow-action switching element

Positively driven contacts ⊖

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.

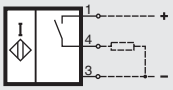
Interchangeability with mechanical multiple limit switches and single limit switches means that it is possible to straightforwardly convert machines. The switches can therefore be retrofitted on existing machine installations to take full advantage of the benefits of non-contact switches.

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

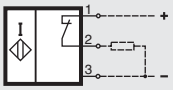
The NO function means that the load current flows when the active face of the inductive switching element is activated and that no current flows when the active face is not activated.



DC NO contact, PNP

NC function

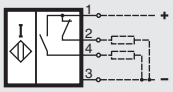
The NC function means that the load current does not flow when the active face of the inductive switching element is activated and that current flows when the active face is not activated.



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

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 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.

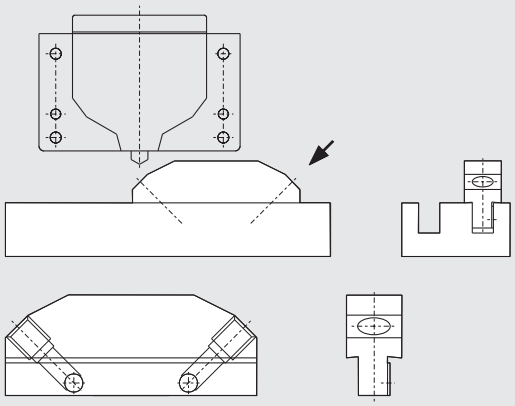
The particular advantages of the EUCHNER combination include:

- 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)

- **RGBF** Standard switch according to DIN 43697, upright housing, large product range
- **SN** Compact upright housing; high market acceptance due to versatile applications, low cost
- **GSBF** Upright housing
- **GLBF** Horizontal housing

Plunger spacing (mm)

- **8** Small housing for installations where there is little space
- **12** Industry standard, large product range
- **16** Necessary only in special applications

Plunger types

- **D** Chisel plunger for high operating point accuracy
- **R** Roller plunger for approach speeds up to max. 80 m/min
- **B** Roller plunger for approach speeds up to max. 120 m/min
- **K** Ball plunger; necessary only in special applications
- **W** Dome plunger; necessary only in special applications

Switching element

- **502** 1 NC + 1 NO, precision snap-action switching element
- **508** 1 NC ⊖, safety switching element, slow-action switching contact
- **514** 1 NC ⊖ + 1 NO, safety switching element, snap-action switching contact
- **552** 1 C/O, snap-action switching contact (standard)
- **614** 1 C/O, snap-action switching contact for low currents

Options

- **AM** Exterior diaphragm
- **ST** Plug connector
- **LED** 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)

- **RGBF** Standard switch according to DIN 43697, upright housing, large product range
- **SN** Compact upright housing; high market acceptance due to versatile applications, low cost

Proximity switch spacing (mm)

- **12** Rated operating distance 2 mm, industry standard, large product range
- **16** Rated operating distance 5 mm; necessary only in special applications

Switching element

- **772** DC NO + NC contacts, PNP
- **777** DC NO contact, PNP
- **779** DC NO contact, PNP
- **780** DC NO + NC contacts, NPN
- **781** DC NO + NC contacts, PNP

Options

- **St** Plug connector
- **LED** 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

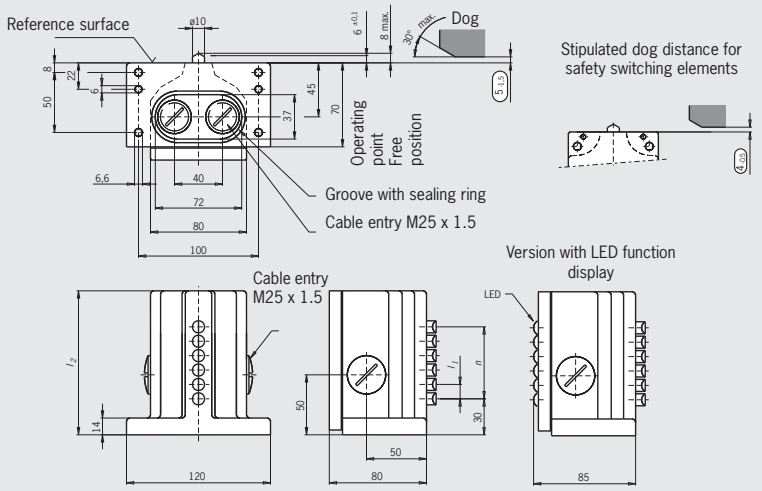
● Available ○ Available on request

Series RGBF... 12/16 mm, mechanical

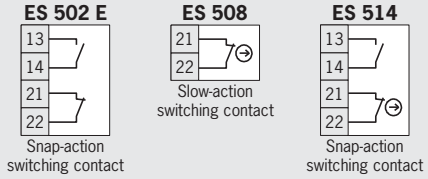
- **Plunger spacing 12 or 16 mm**
- **Upright housing according to DIN 43697**
- **Degree of protection IP 67 according to IEC 60529**
- **LED function display optional**

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

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



Switching elements



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 -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)	B Roller (ball bearing)	K 4) Ball 3)	W 4 Dome	
Operating point accuracy 1)	± 0.002	± 0.01	± 0.01	± 0.01	± 0.002	mm
Approach speed, max. 2)	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

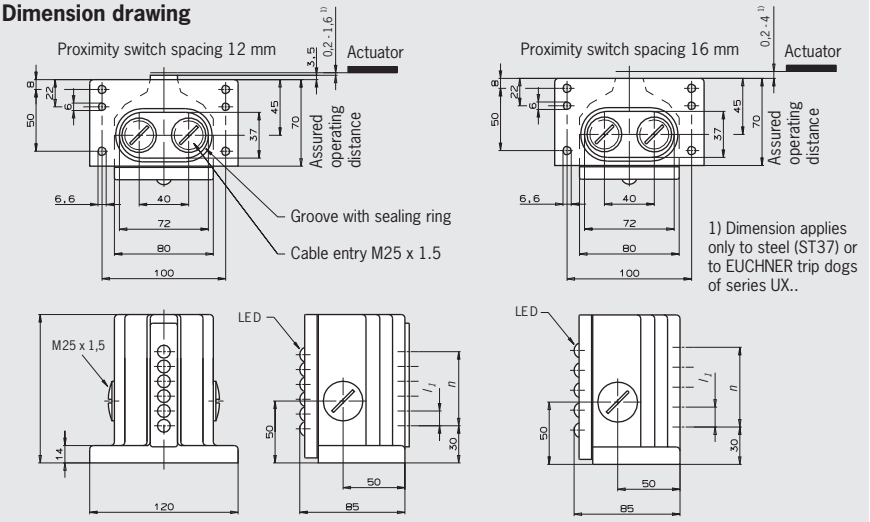
n Number of plungers/proximity switches	Plunger/proximity switch spacing l_1 = 12		l_1 = 16	
	l_2	Housing material	l_2	Housing material
2	70	Die-cast aluminum, anodized	70	Die-cast aluminum, anodized
3	80		90	
4	90		105	
5	105		120	
6	120		140	
8	140		170	

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



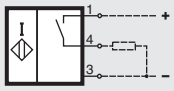
Rated operating distance
With 12 mm proximity switch spacing, the rated operating distance is 2 mm; with 16 mm proximity switch distance it is 5 mm.

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.

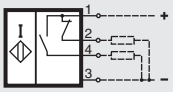
LED function display
DC and AC switching elements are equipped as standard with a function display on the switching element (yellow). The function display can be seen from the exterior.

Switching elements

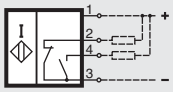
DC NO contact, PNP
777, l_1 = 12 mm
779, l_1 = 16 mm



DC NO + NC contacts, PNP
781, l_1 = 12 mm
772, l_1 = 16 mm



DC NO + NC contacts, NPN
780, l_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

	R	G	B	F						-				L	E					-	M
Mechanical																					
Inductive	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)

C

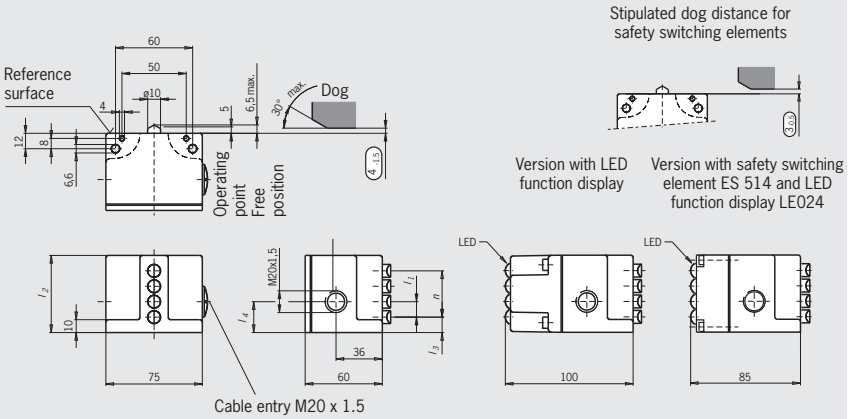
For technical data see page C-26

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

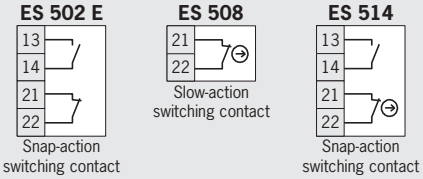
- **ES 502 E** Snap-action switching contact 1 NC + 1 NO
- **ES 508** Slow-action switching contact 1 NC ⊖
- **ES 514** Snap-action switching contact 1 NC ⊖ + 1 NO

On the usage of safety switching elements, the dog distance (3-0.5) 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):

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

Switching elements



Plunger types	D Chisel	R Roller (plain bearing)	B Roller (ball bearing)	K 4) Ball 3)	W 4 Dome	
Operating point accuracy 1)	± 0.002	± 0.01	± 0.01	± 0.01	± 0.002	mm
Approach speed, max. 2)	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

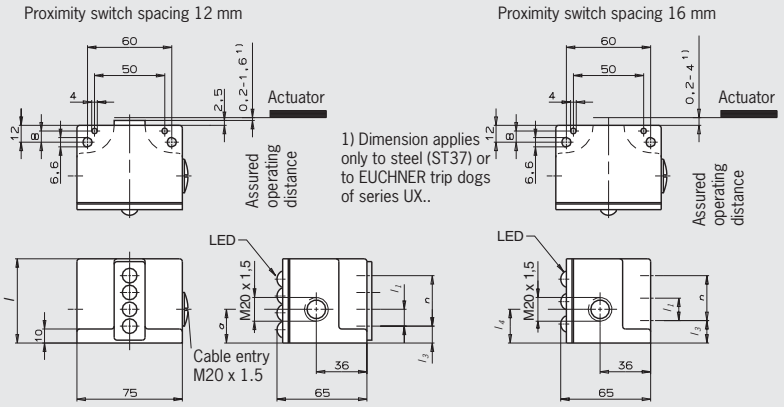
n Number of plungers/proximity switches	Plunger/proximity switch spacing l_1 = 12 l_2	l_3	l_4	l_1 = 16 l_2	l_3	l_4	Housing material
2	36	12	19	48	16	24	Die-cast aluminum, anodized
3	48		24	72			
4	60			84			
5	72			-	-	-	
6	84			-	-	-	

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

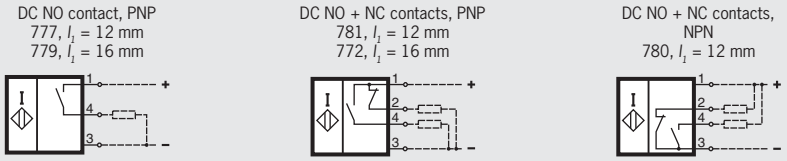


Rated operating distance
With 12 mm proximity switch spacing, the rated operating distance is 2 mm; with 16 mm proximity switch distance it is 5 mm.

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



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

	S	N			X			-				L	E						-	M
Mechanical																				
Inductive	S	N			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 M20 x 1.5 (plug connector on request)

C

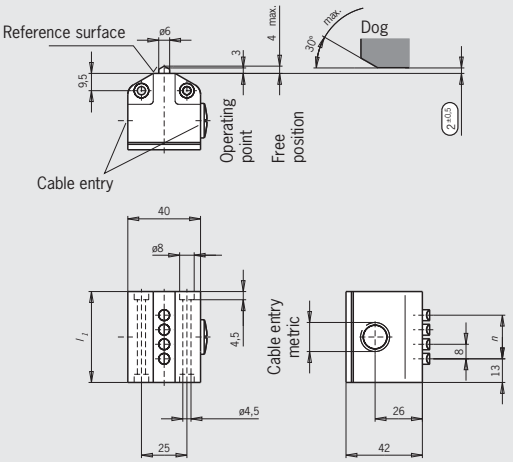
For technical data see page C-26

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

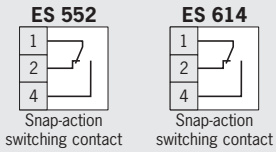


Switching elements

- **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 Chisel	R Roller (plain bearing)	CI Ball	
Operating point accuracy [1]	± 0.02	± 0.05	± 0.03	mm
Approach speed, max. [2]	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	Plunger spacing 8 mm l_i	Cable entry	Housing material
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**)

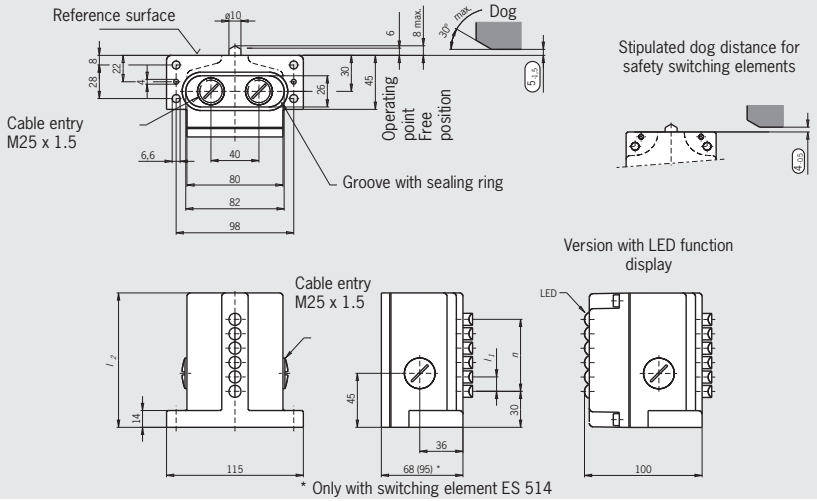
Cable entry with metric thread
(plug connector on request)

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

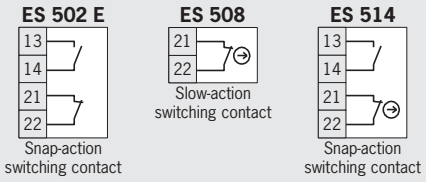
- **ES 502 E** Snap-action switching contact 1 NC + 1 NO
- **ES 508** Slow-action switching contact 1 NC ⊖
- **ES 514** Snap-action switching contact 1 NC ⊖ + 1 NO

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%

Switching elements



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

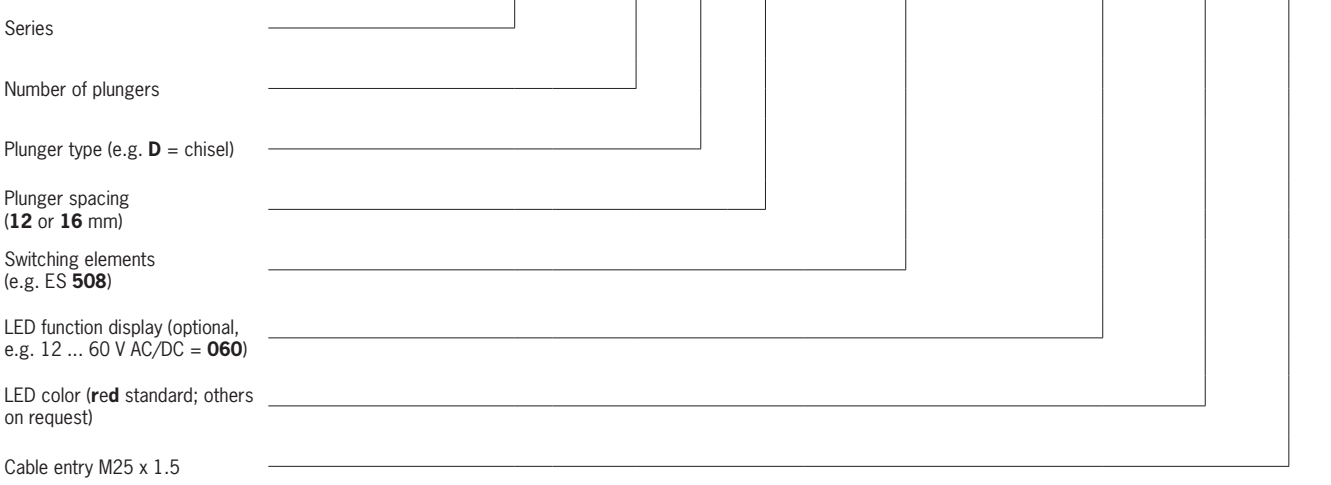
1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 502 E has been run-in with approx. 2,000 operating cycles
2) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639
3) For safety reasons, multiple 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 l_1 = 12 l_2	Plunger spacing l_1 = 16 l_2	Housing material
2	70	70	Die-cast aluminum, anodized
3	70	82	
4	82	96	
5	96	112	
6	112	130	
8	130	-	

C

For technical data see page C-26

Ordering code **Mechanical** | G | S | B | F | | | | | | | - | | | | L | E | | | | | | - | M |

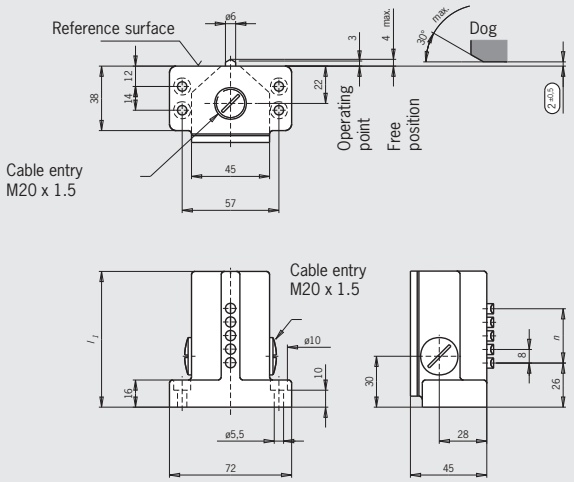


Series GSBF... 8 mm, mechanical

- **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

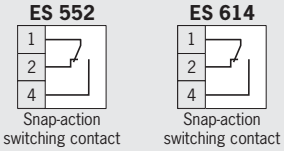


Switching elements

- **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 Chisel	R Roller (plain bearing)	K [4] Ball	
Operating point accuracy [1]	± 0.02	± 0.05	± 0.03	mm
Approach speed, max. [2]	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**	
	l_1	**Housing material**
2	48	Sand-cast aluminum, anodized
3	64	
4	64	
5	80	
6	80	

Ordering code **Mechanical**

G	S	B	F					0	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**)

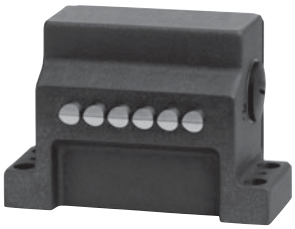
Cable entry M20 x 1.5

C

For technical data see page C-26

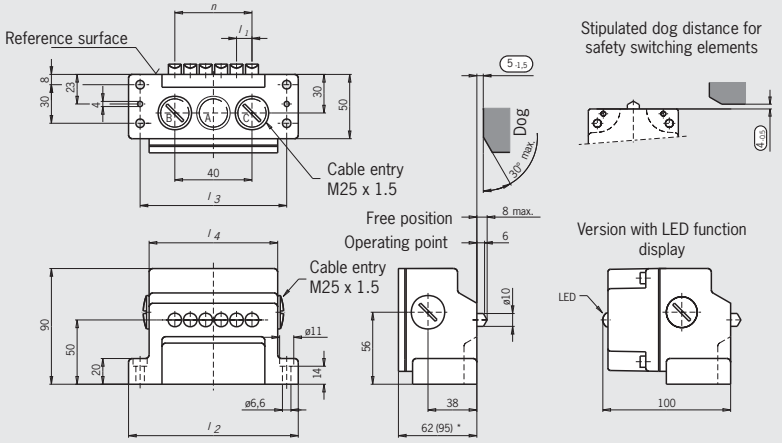
Series GLBF... 12/16 mm, mechanical (on request)

- **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

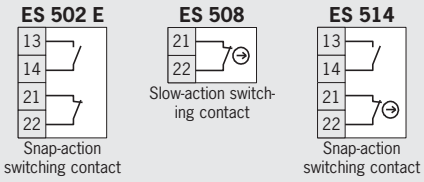
- **ES 502 E** Snap-action switching contact 1 NC + 1 NO
- **ES 508** Slow-action switching contact 1 NC ⊖
- **ES 514** Snap-action switching contact 1 NC ⊖ + 1 NO

On the usage of safety switching elements, the dog distance (4 -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%

Switching elements



Plunger types	D Chisel	R Roller (plain bearing)	K 4) Ball 3)	W 4) Dome	
Operating point accuracy 1)	± 0.002	± 0.01	± 0.01	± 0.002	mm
Approach speed max. 2)	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 l_1 = 12				l_1 = 16				Housing material
	l_2	l_3	l_4	Cable entry	l_2	l_3	l_4	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		114	98	84	B + C M25 x 1.5	
5	114	98	84	B + C M25 x 1.5	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. **D** = chisel)

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

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

Visible LED yellow (on inductive switches)

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

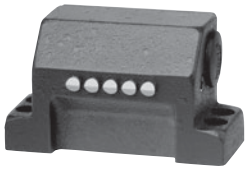
LED color (**red** standard; others on request)

Cable entry M25 x 1.5

For technical data see page C-26

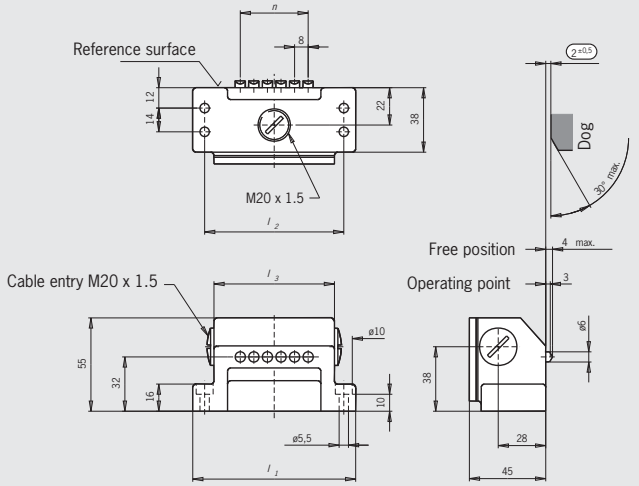
Series GLBF... 8 mm, mechanical

- **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

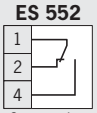


Switching elements
- **ES 552** Snap-action switching contact
  1 changeover contact
  Standard switching element

(See technical data on the switching elements)

Switching elements

ES 552



Snap-action switching contact

Plunger types	D Chisel	R Roller (plain bearing)	K 3) Ball	
Operating point accuracy 1)	± 0.02	± 0.05	± 0.03	mm
Approach speed, max. 2)	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
	l_1	l_2	l_3	
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**

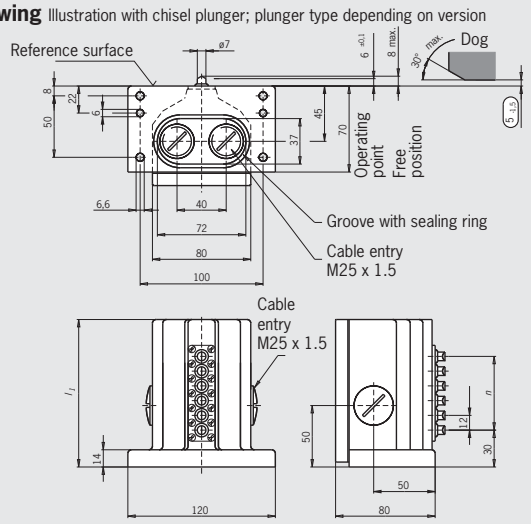
Cable entry M20 x 1.5

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



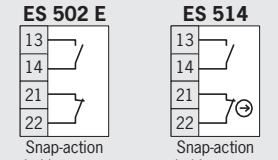
Exterior diaphragm
The exterior diaphragm protects the plunger guide against the entry of very fine dust (dust from grinding, casting, glass, etc.) and prevents the plunger from seizing. At the same time, plunger sticking, caused by resinous lubricating coolants, can be prevented with this exterior diaphragm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

Switching elements

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

LED function display possible on request.

Switching elements



Plunger types	D Chisel	R Roller (plain bearing)	
Operating point accuracy [1]	± 0.002	± 0.01	mm
Approach speed, max. [2]	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 l_1	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
D Chisel plunger	2	**082325** RGBF 02 D 12 -502 AM -M
	3	**088365** RGBF 03 D 12 -502 AM -M
	4	**082326** RGBF 04 D 12 -502 AM -M
	5	**088366** RGBF 05 D 12 -502 AM -M
	6	**087097** RGBF 06 D 12 -502 AM -M
R Roller plunger	2	**087098** RGBF 02 R 12 -502 AM -M
	3	**088364** RGBF 03 R 12 -502 AM -M
	4	**082327** RGBF 04 R 12 -502 AM -M
	5	**087099** RGBF 05 R 12 -502 AM -M
	6	**087100** RGBF 06 R 12 -502 AM -M

C

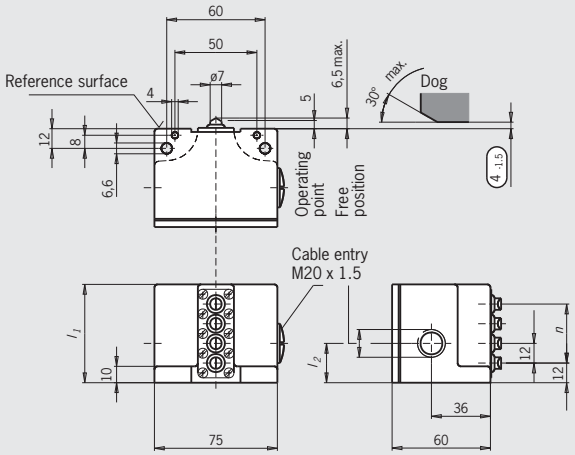
For technical data see page C-26

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



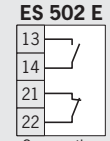
Exterior diaphragm
The exterior diaphragm protects the plunger guide against the entry of very fine dust (dust from grinding, casting, glass, etc.) and prevents the plunger from seizing. At the same time, plunger sticking, caused by resinous lubricating coolants, can be prevented with this exterior diaphragm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

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

LED function display possible on request.

Switching elements

ES 502 E



Snap-action switching contact

Plunger types	D Chisel	R Roller (plain bearing)	
Operating point accuracy [1]	± 0.002	± 0.01	mm
Approach speed, max. [2]	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		
	l_1	l_2	Housing material
2	36	19	Die-cast aluminum, anodized
3	48	24	
4	60		
5	72		
6	84		

Plunger type	Number of plungers	Order no./item
D Chisel plunger	2	**086584** SN 02 D 12 -502 AM -M
	3	**086585** SN 03 D 12 -502 AM -M
	4	**086586** SN 04 D 12 -502 AM -M
	5	**088752** SN 05 D 12 -502 AM -M
	6	**088753** SN 06 D 12 -502 AM -M
R Roller plunger	2	**079289** SN 02 R 12 -502 AM -M
	3	**086587** SN 03 R 12 -502 AM -M
	4	**086588** SN 04 R 12 -502 AM -M
	5	**088765** SN 05 R 12 -502 AM -M
	6	**088766** 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 [1]	AC/DC 12 - 60	Red	**035495** LE 060 rt
		Green	**035496** LE 060 gr
		Yellow	**035497** LE 060 ge
	AC 110 ±15%	Red	**045579** LE 110 rt
	AC 220 ±15%	Red	**045582** LE 220 rt
		Yellow	**045584** LE 220 ge

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

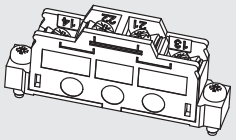
▶ **Replacement mechanical switching elements**

Replacement switching elements

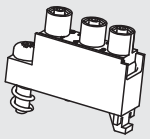
Replacement switching elements
Replacement switching elements for multiple limit switches with 8, 12 and 16 mm plunger spacing.

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	**010387** ES 502 E
	099513 ES 552
	099507 ES 614

C

For technical data see page C-26

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.
ES777	12 mm	NO contact/PNP	**008401**
ES781	12 mm	NO + NC contacts/PNP	**031535**
ES780	12 mm	NO + NC contacts/NPN	**031534**
ES779 [1]	16 mm	NO contact/PNP	**008470**
ES779/2 [1]	16 mm	NO contact/PNP	**036731**
ES772 [1]	16 mm	NO + NC contacts/PNP	**053674**
ES772/2 [1]	16 mm	NO + NC contacts/PNP	**053677**

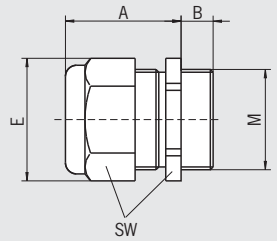
1) Switching elements with 5 mm operating distance (proximity switch spacing 16 mm) are supplied with two different oscillator frequencies to avoid mutual interference. Multiple limit switches must therefore be assembled alternately with these switching elements.

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 ∅ [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	**086328** EKVM16/04
	Cable diameter 5 - 8 mm	**086329** EKVM16/05
	Cable diameter 6.5 - 9.5 mm	**086330** EKVM16/06
M20 x 1.5	Cable diameter 6.5 - 9.5 mm	**077683** EKVM20/06
	Cable diameter 9 - 13 mm	**077684** EKVM20/09
M25 x 1.5	Cable diameter 9 - 13 mm	**086334** EKVM25/09
	Cable diameter 11.5 - 15.5 mm	**086335** EKVM25/11

C

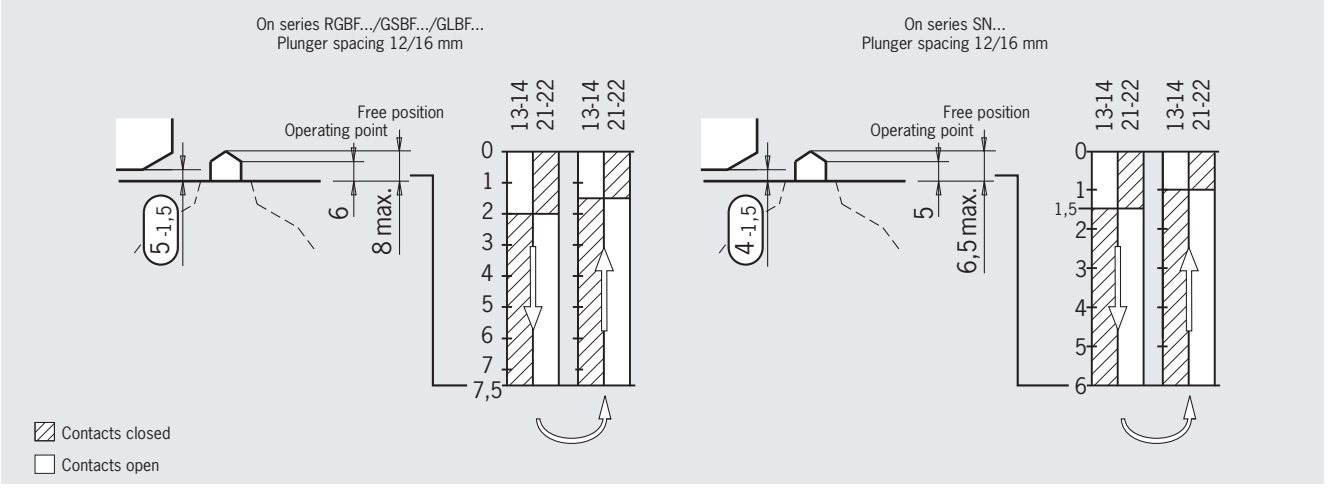
For technical data see page C-26

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^{-1}
Mechanical life (operating cycles)		≥ 30 x 10^6		≥ 1 x 10^6	≥ 10 x 10^6		
Rated impulse withstand voltage U_{imp}		2.5	4		2.5		kV
Rated insulation voltage U_i		250					V
Utilization category acc. to EN IEC 60947-5-1	AC-12	I_e 8 A U_e 250 V	-	-	-	-	
	AC-15	I_e 6 A U_e 230 V		I_e 2.5 A U_e 230 V	I_e 2 A U_e 230 V	-	
	DC-13	I_e 6 A U_e 24 V			I_e 2 A U_e 24 V	I_e 1 A U_e 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_{th}		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^2
Approvals for switching elements		cULus	-	cULus		-	
LED function display (optional)		Red standard; others on request		LE024ge	-		

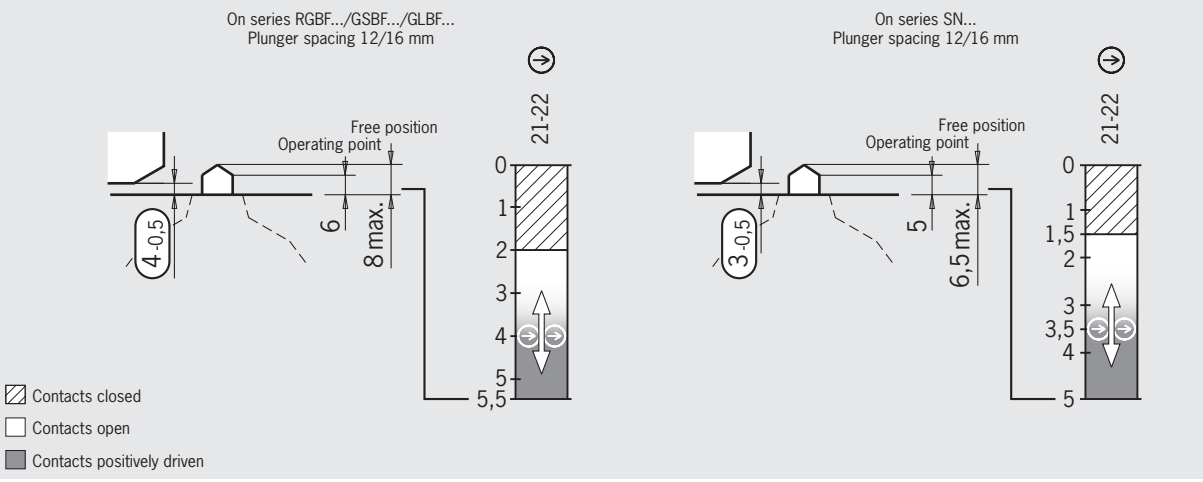
Travel diagram ES 502 E

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.



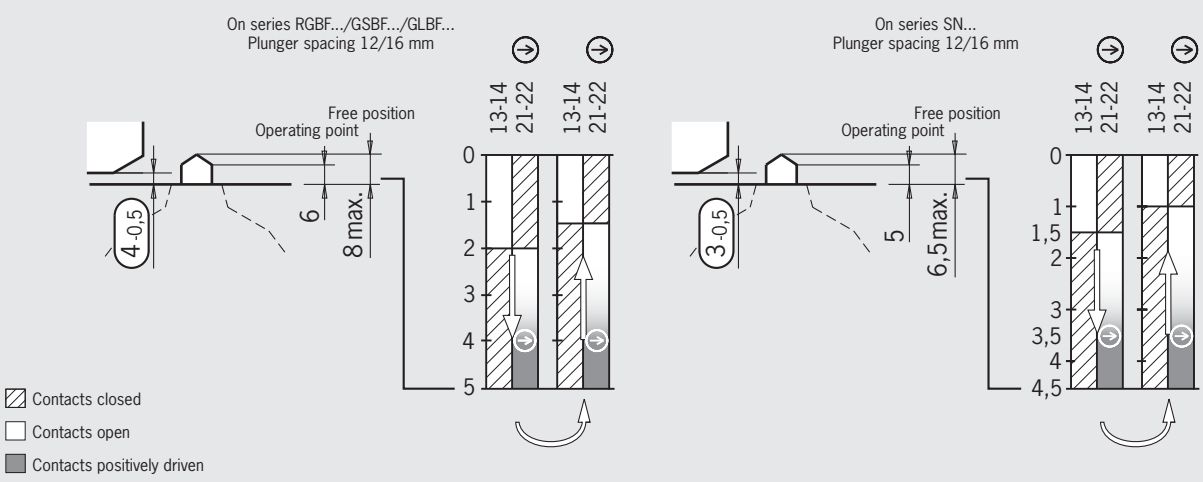
Travel diagram ES 508

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



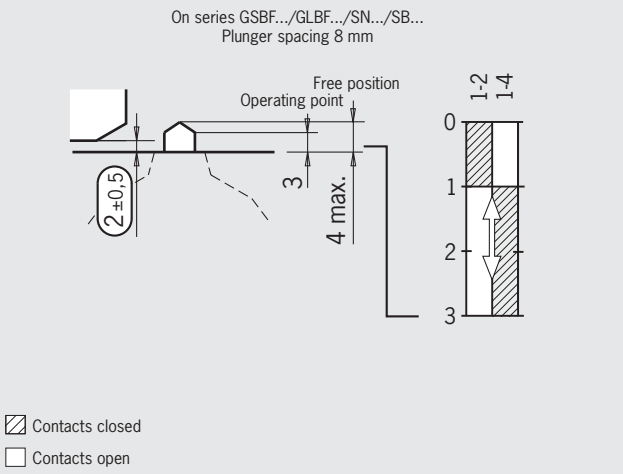
Travel diagram ES 514

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.



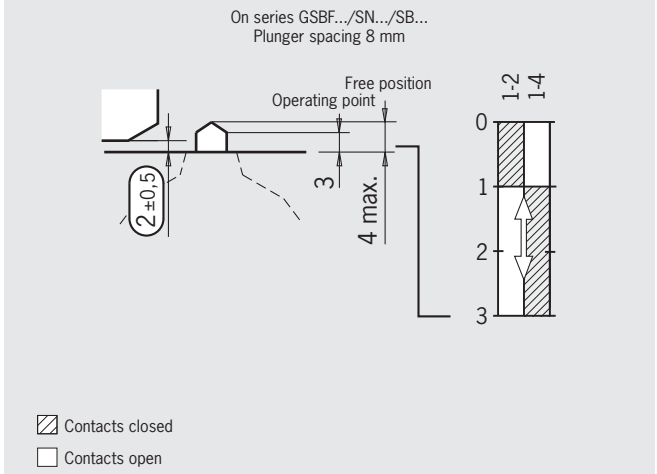
Travel diagram ES 552

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 contract material, electro-gold plated (gold cross cut contact). Screw terminal.



C

Multiple limit switches, inductive

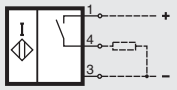
Parameter	Value					Unit
Switching element ES	**777**	**781**	**780**	**779** [1] **779/2**	**772** [1] **772/2**	
Proximity switch spacing	12			16		mm
Rated operating distance S_n	2			5		mm
Assured operating distance S_a	0 ... 1.6			0 ... 4		mm
Switching function	NO contact	NO + NC		NO contact	NO + 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^2

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.

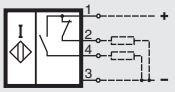
When ordering single elements, please prefix the part number with ES. E.g. switching element ES 781

Wiring diagrams

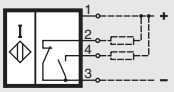
DC NO contact, PNP
777, l_i = 12 mm
779, l_i = 16 mm



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



DC NO + NC contacts, NPN
780, l_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

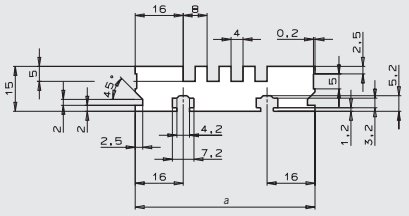
● Available

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

8 mm

Series UFA...
Slot spacing 8 mm, aluminum

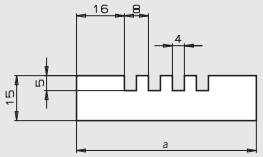
Dimension drawing



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



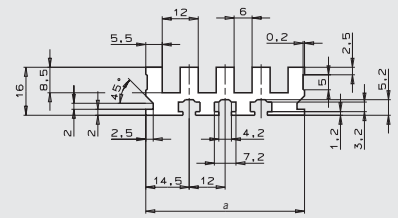
Dimension *a* [mm]	44	52	60	68	76	92
Number of slots	2	3	4	5	6	8
Dimension *a* [mm]	108	124	140	156	172	188
Number of slots	10	12	14	16	18	20

Length max. 1,000 mm
Gray figures on request

12 mm

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

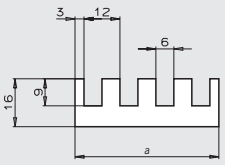
Dimension drawing



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

Minimum order 2,010 mm, 1 bar

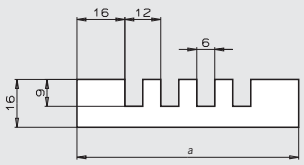
Series UL... can be placed in a row
Slot spacing 12 mm, aluminum



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



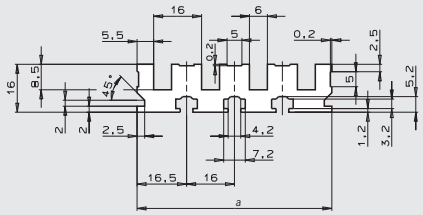
Dimension *a* [mm]	50	62	74	86	98	122
Number of slots	2	3	4	5	6	8
Dimension *a* [mm]	146	170	194	218		
Number of slots	10	12	14	16		

Length max. 1,000 mm
Gray figures on request

16 mm

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

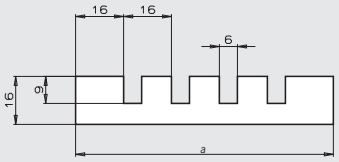
Dimension drawing



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

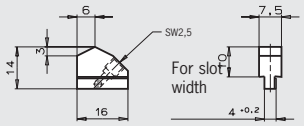


Figure 2

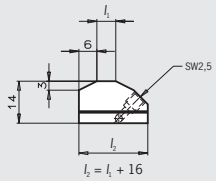
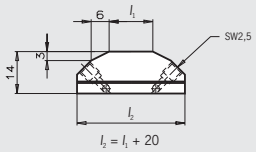


Figure 3



l_1	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

8 mm

Figure 1

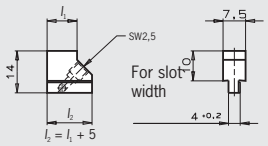
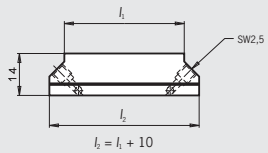


Figure 2



l_1	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

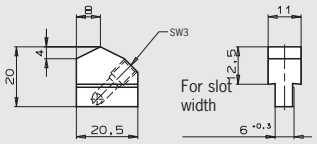


Figure 2

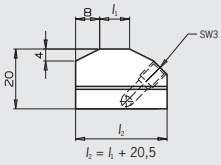
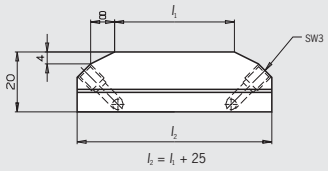


Figure 3



l_1	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

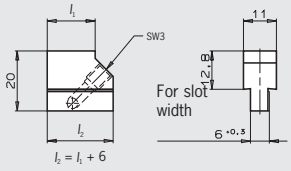
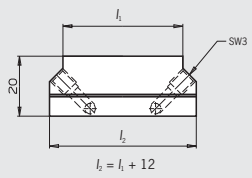


Figure 2



l_1	Figure
10	1
16	1
25	2
40	2
63	2
100	2
125	2

12 mm

16 mm

C

Ordering code

U							-			

Series

Length l_1

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

Type of actuation mechanical

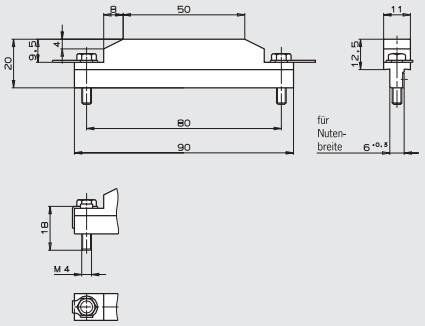
- **Safety dog**
- **Fine adjustment dogs**

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

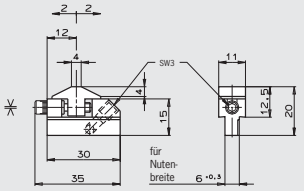
Safety dog UZ for 12/16 mm slot spacing, hardened, ground steel

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 >I I< [mm]	0.02

Ordering table

Designation	Use	Order no./item
Safety dog UZ	For trip rails ULA/UL/UF 12 or 16 mm	**022734** UZ1216-50
Fine adjustment dog UE	For trip rails ULA/UL/UF 12 or 16 mm	**013340** 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 ±5 °C and an operating voltage of U_B ±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 N0R 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
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.
Krasińskiego 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.
Gurutzegi 12 - Local 1
Polígono 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
Hackenberghang 8a
45133 Essen
Tel. +49 201 84266-0
Fax +49 201 84266-66
info@kreissl-essen.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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