

# Multiple Limit Switches, Trip Rails and Trip Dogs



**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 700 people around the world.

16 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



## Multiple limit switches, trip dogs and trip rails

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## 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 separate page 29).

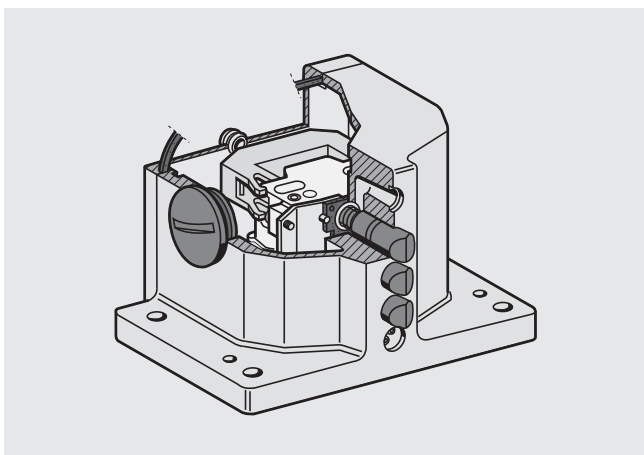
### Structure

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

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

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

EUCHNER uses the 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.

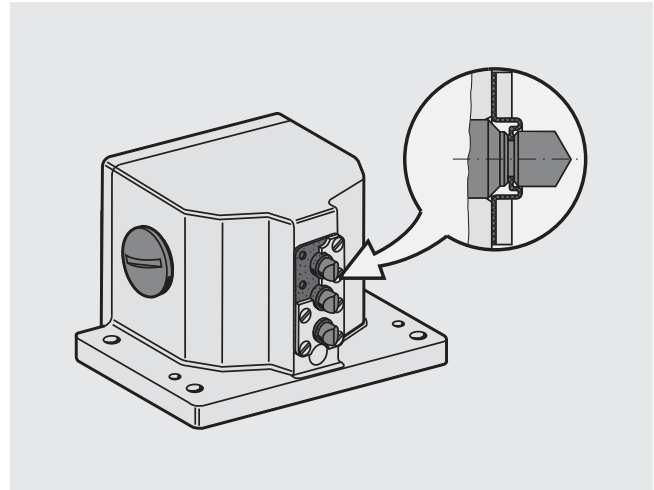


## Exterior diaphragm

A series with an exterior diaphragm which 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. For technical data on this series see page 21 and 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.

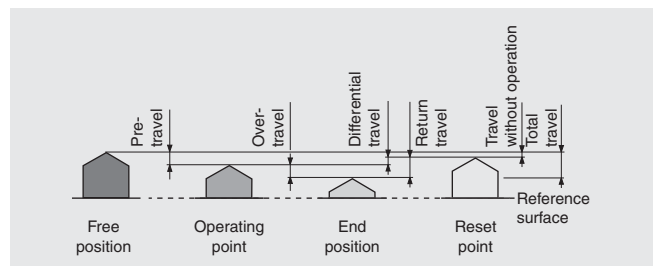
There are two different types of actuating systems, depending on the application. For standard applications, the plunger is fitted with a telescopic device.

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.

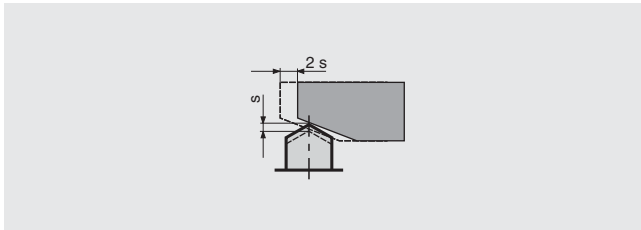
### Plunger travel

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 up to  $\pm 0.002$  mm.  
Max. approach speed of 40 m/min.



### Roller plunger R with plain bearing

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



### Roller plunger B with ball bearing

Hardened roller.  
Operating point accuracy up to  $\pm 0.01$  mm.  
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 up to  $\pm 0.01$  mm.  
Max. approach speed of 10 m/min.



### Dome plunger W

(instead of ball plunger with safety switching elements)  
Hardened and polish-ground.  
Can be actuated from various directions.  
Operating point accuracy up to  $\pm 0.002$  mm.  
Max. approach speed of 10 m/min.



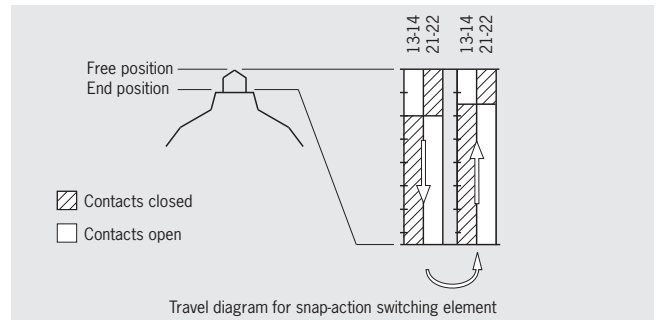
## Switching elements

### Snap-action switching element

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

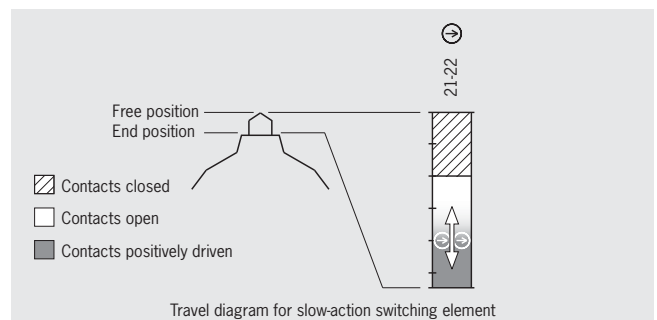
On snap-action switching elements, the change from the completely closed state to the completely open state is made at a defined point (operating point).

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



### Slow-action switching element

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



### Positively driven NC contacts $\rightarrow$

Positively driven NC 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 NC contact. In safety-relevant circuits, only switching elements with positively driven NC contacts are allowed.

## 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.

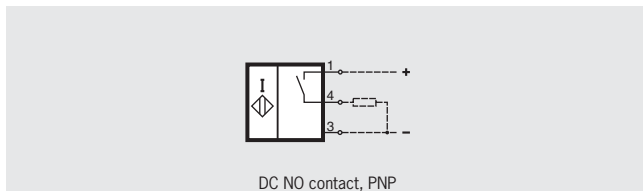
Interchangeability with mechanical multiple limit switches and single limit switches means that it is possible to straightforwardly convert machines. The switches can therefore be retrofitted on existing machine installations to take full advantage of the benefits of non-contact switches.

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 NC contacts.

## Switching functions

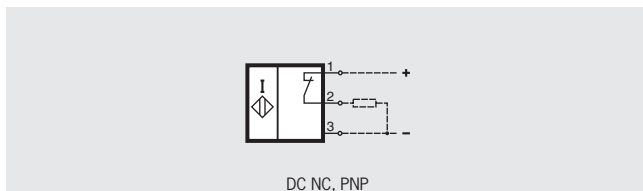
### NO function

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



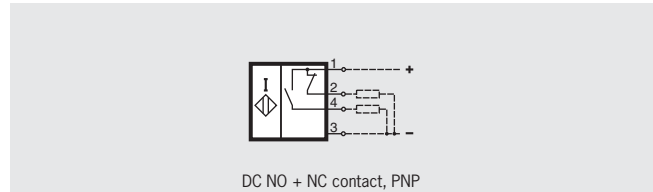
### NC function

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



### NO + NC function

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



## Suppressor circuits

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

## Approvals

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

## Special versions

### Mixed contact assembly

(Only in multiple limit switches with 12 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:

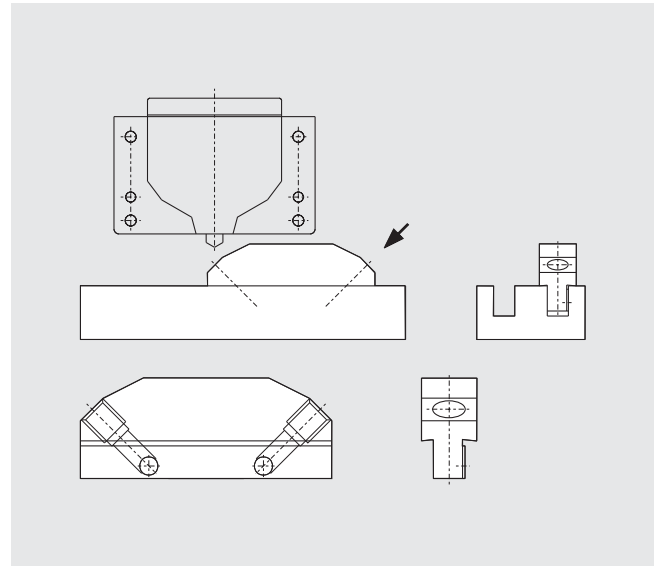
- ▶ Very high accuracy (to 0.002 mm).
- ▶ Long mechanical life (low mechanical wear and resistant to corrosion due to selected materials).
- ▶ Easy to use (user-friendly fastening and adjustment using refined precision mechanics).

EUCHNER trip rails and trip dogs are available in two variants. The function is exactly the same, in principle they only differ 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** Only necessary 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, only necessary in special applications

**W** Dome plunger; only necessary in special applications

### Switching element

**502** 1 NC + 1 NO, precision snap-action switching element

**508** 1 NC  $\ominus$ , safety switching element, slow-action switching contact

**514** 1 NC  $\ominus$  + 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	
•					•		•	•	•	○	○	•	•	•				○	•	10
•					•		•	•				•		○			•	○	○	21
•						•	•	•	○	○	○	•	•	•				○	•	10
	•			•			•	•		•					•	•		○		14
	•				•		•	•	•	○	○	•	•	•				○	•	12
	•				•		•	•				•					•	○	○	22
	•					•	•	•	○	○	○	•	•	•				○	•	12
		•		•			•	•		○					•	•		○		17
		•			•		•	•		○	○	•	•	•				○	•	15
		•				•	•	•		○	○	•	•	•				○	•	15
			•	•			•	•		•					•	•				20
			•		•		•	•		○	○	•	•	•					•	18
			•			•	•	•		○	○	•	•	•					•	18

• Available

○ Available on request



## Selection table for inductive multiple limit switches

Series (here only preferable series: for other series see catalog)												
Series		Description										
RGBF	SN	Standard switch according to DIN 43697, upright housing, large product range										
RGBF	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, only necessary in special applications									
Switching element												
		771	DC NO + NC contact, NPN									
		772	DC NO + NC contact, PNP									
		777	DC NO contact, PNP									
		779	DC NO contact, PNP									
		780	DC NO + NC contact, NPN									
		781	DC NO + NC contact, PNP									
Options												
		St	Plug connector									
		LED	LED indicator									
Series	Proximity switch spacing		Switching element							Options		Page
RGBF	SN	12	16	771	772	777	779	780	781	St	LED	
•		•				•		•	•	○	•	11
•			•	•	•		•			○	•	11
	•	•				•		•	•	○	•	13
	•		•	•	•		•			○	•	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 IP67 according to IEC 60529
- ▶ LED function display optional



### Switching elements

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

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

### LED function display (optional)

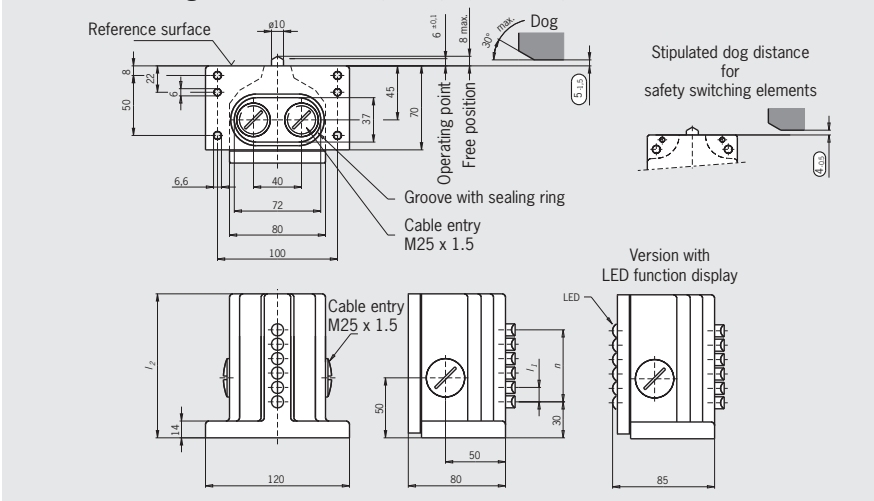
Function displays are available for the following voltage ranges (see accessories page 23):

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

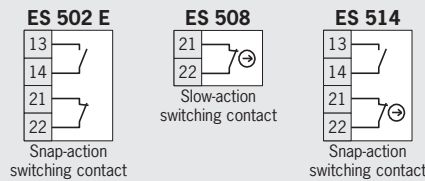
## Series RGBF... mechanical

Plunger spacing 12 or 16 mm

### Dimension drawing illustration with chisel plunger, plunger type depending on version



### Switching elements



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

- 1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 502 E has been run-in with approx. 2000 operating cycles
- 2) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639. Special versions of roller plungers for high usage on request
- 3) For safety reasons, multiple limit switches with switching elements ES 508 and ES 514 are not available with ball plungers
- 4) Plunger type on request

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

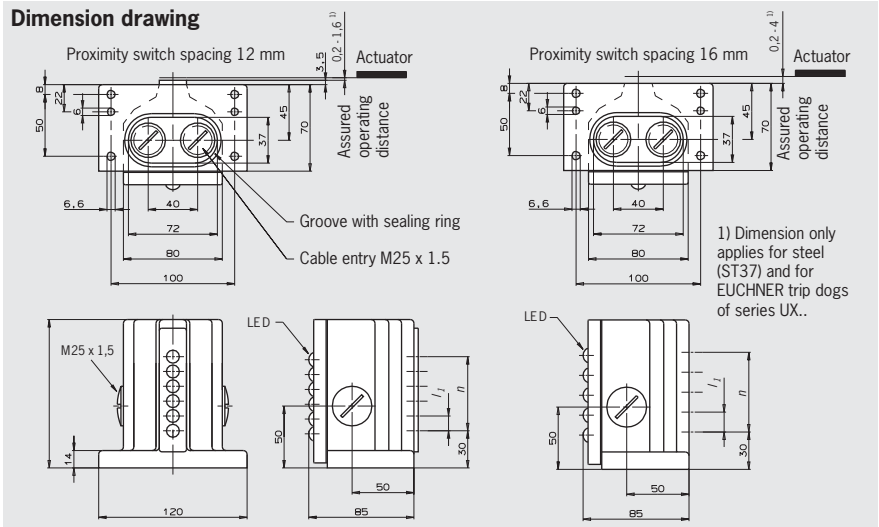
## Series RGF... 12/16 mm inductive

- ▶ Proximity switch spacing 12 or 16 mm
- ▶ Upright housing according to DIN 43697
- ▶ Degree of protection IP67 according to IEC 60529
- ▶ LED function display



### Series RGF... 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.

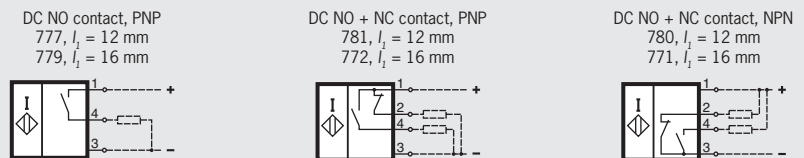
#### Mixed contact assembly

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 28)

#### Ordering code

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

Series \_\_\_\_\_

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

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

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

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

Visible LED (yellow) (on inductive switches) \_\_\_\_\_

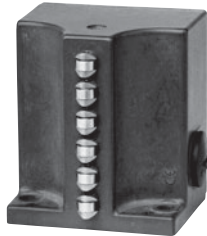
LED function display (optional on mechanical switches, e. g. 12 ... 60 V AC/DC = **060**) \_\_\_\_\_

LED color (**red** standard, others on request) \_\_\_\_\_

Cable entry M25 x 1.5 (plug connector on request) \_\_\_\_\_

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

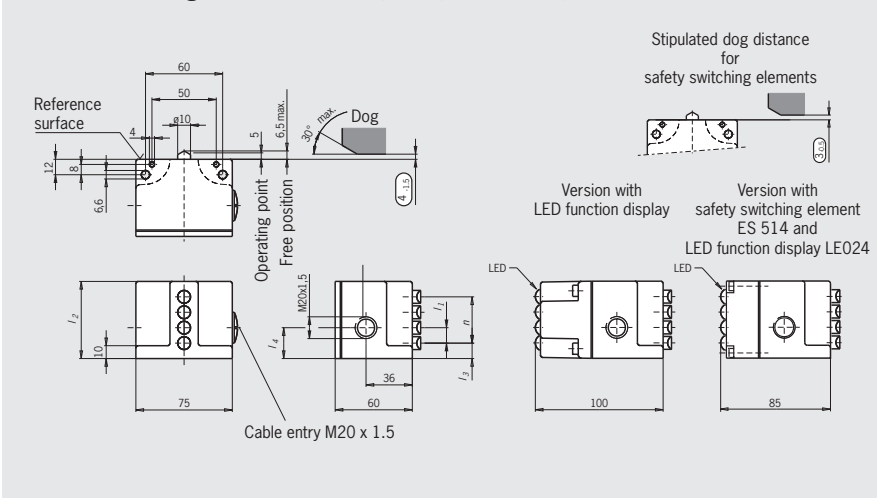
- ▶ Plunger spacing 12 or 16 mm
- ▶ Upright housing, small flange
- ▶ Degree of protection IP67 according to IEC 60529
- ▶ LED function display optional



### Series SN... mechanical

Plunger spacing 12 or 16 mm

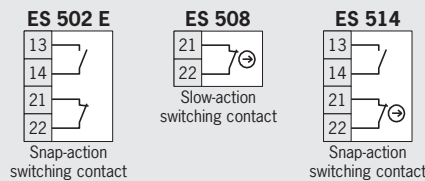
### Dimension drawing illustration with chisel plunger, plunger type depending on version



### Switching elements

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

### Switching elements



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

### LED function display (optional)

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

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

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

- 1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 502 E has been run-in with approx. 2000 operating cycles
- 2) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639. Special versions of roller plungers for high usage on request
- 3) For safety reasons, multiple limit switches with switching elements ES 508 and ES 514 are not available with ball plungers
- 4) Plunger type on request

n Number of plungers/ proximity switches	Plunger/proximity switch spacing						Housing material
	l <sub>1</sub> = 12			l <sub>1</sub> = 16			
	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	
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

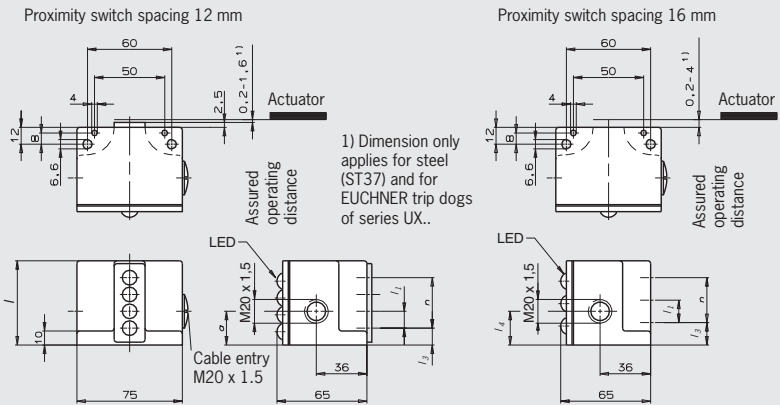
- ▶ Proximity switch spacing 12 or 16 mm
- ▶ Upright housing, small flange
- ▶ Degree of protection IP67 according to IEC 60529
- ▶ LED function display



### Series SN... inductive

Proximity switch spacing 12 or 16 mm

#### Dimension drawing



#### Rated operating distance

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

#### Mixed contact assembly

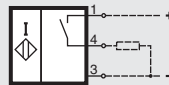
On request mixed assembly with electro-mechanical safety switching elements according to IEC 60947-5-1 is possible for 12 mm proximity switch spacing.

#### LED function display

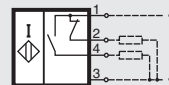
DC and AC switching elements are equipped as standard with a function display on the switching element (yellow). The function display can be seen from the exterior.

#### Switching elements

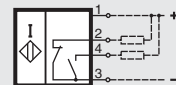
DC NO contact, PNP  
777,  $l_1 = 12$  mm  
779,  $l_1 = 16$  mm



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



DC NO + NC contact, NPN  
780,  $l_1 = 12$  mm  
771,  $l_1 = 16$  mm



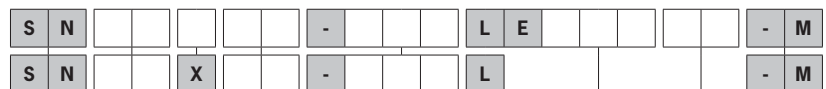
Switching elements with 5 mm operating distance (16 mm proximity switch spacing) are supplied with two different oscillator frequencies to avoid mutual interference. Multiple limit switches must therefore be assembled alternately with these switching elements.

Further switching elements on request (see page 28)

#### Ordering code

#### Mechanical

#### Inductive



Series

Number of plungers/proximity switches

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

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

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

Visible LED (yellow) (on inductive switches)

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

LED color (red standard, others on request)

Cable entry M20 x 1.5 (plug connector on request)



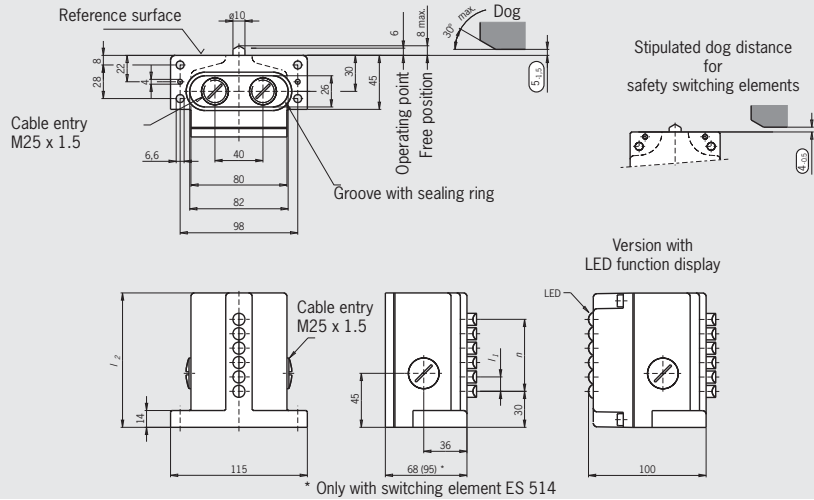
## Series GSBF... 12/16 mm mechanical

- ▶ Plunger spacing 12 or 16 mm
- ▶ Upright housing
- ▶ Degree of protection IP67 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

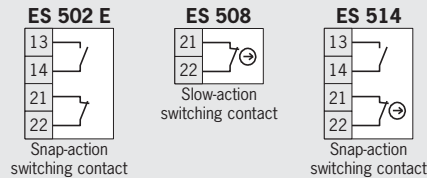
On the usage of safety switching elements, the dog distance (4.0.5) must be maintained to achieve the positively driven travel. The dogs must be positively mounted according to EN ISO 14119, i.e. riveted, welded or secured in some other way against becoming loose.

#### LED function display (optional)

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

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

#### Switching elements



Plunger types	D	R	K 4)	W 4)	
	Chisel	Roller (plain bearing)	Ball 3)	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. 2000 operating cycles  
 2) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639  
 3) For safety reasons, multiple limit switches with switching elements ES 508 and ES 514 are not available with ball plungers  
 4) Plunger type on request

n Number of plungers	Plunger spacing		Housing material
	$l_1 = 12$ $l_2$	$l_1 = 16$ $l_2$	
2	70	70	Die-cast aluminum, anodized
3	70	82	
4	82	96	
5	96	112	
6	112	130	
8	130	-	

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



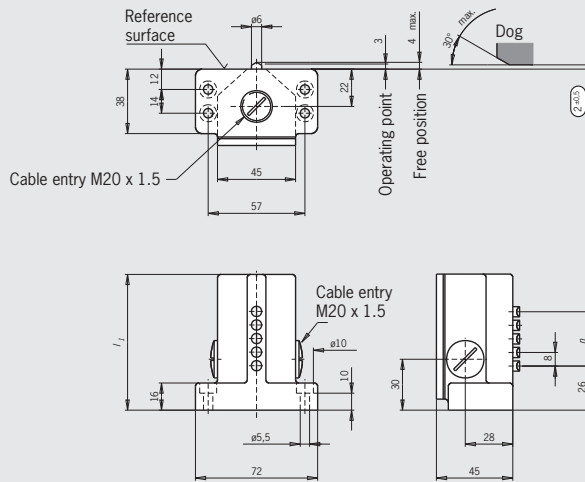
## Series GSBF... 8 mm mechanical

- ▶ Plunger spacing 8 mm
- ▶ Upright housing
- ▶ Degree of protection IP67 according to IEC 60529



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

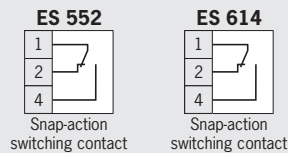
Dimension drawing illustration with chisel plunger, plunger type depending on version



### Switching elements

- ▶ **ES 552** Snap-action switching contact  
1 changeover contact  
standard switching element
  - ▶ **ES 614** Snap-action switching contact  
1 changeover contact  
suitable for switching low currents
- (See technical data on the switching elements)

### Switching elements



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

1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 502 E has been run-in with approx. 2000 operating cycles  
2) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639  
3) Plunger type on request

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

**Ordering code**

**Mechanical** G S B F     0 8 -     - M

Series \_\_\_\_\_

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

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

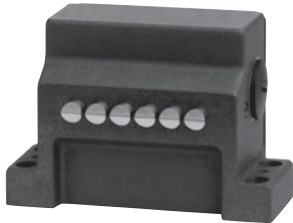
Plunger/proximity switch spacing (**8** mm) \_\_\_\_\_

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

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

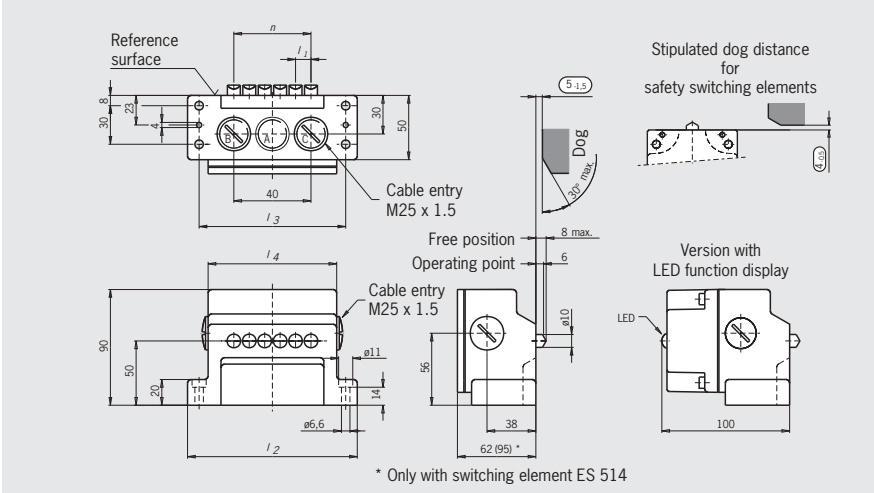
## Series GLBF... 12/16 mm mechanical (on request)

- ▶ Plunger spacing 12 or 16 mm
- ▶ Horizontal housing
- ▶ Degree of protection IP67 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

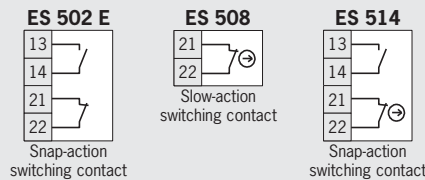
On the usage of safety switching elements, the dog distance (4.0.5) must be maintained to achieve the positively driven travel. The dogs must be positively mounted according to EN ISO 14119, i.e. riveted, welded or secured in some other way against becoming loose.

#### LED function display (optional)

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

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

#### Switching elements



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

- 1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 502 E has been run-in with approx. 2000 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

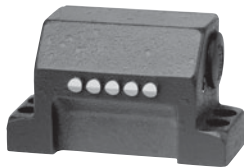
n Number of plungers/ proximity switches	Plunger/proximity switch spacing							Cable entry	Housing material
	l <sub>1</sub> = 12			l <sub>1</sub> = 16					
	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>			
2	84	66	52	A M25 x 1.5	84	66	52	A M25 x 1.5	Sand-cast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

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

For technical data see page 26

## Series GLBF... 8 mm mechanical

- ▶ Plunger spacing 8 mm
- ▶ Horizontal housing
- ▶ Degree of protection IP67 according to IEC 60529



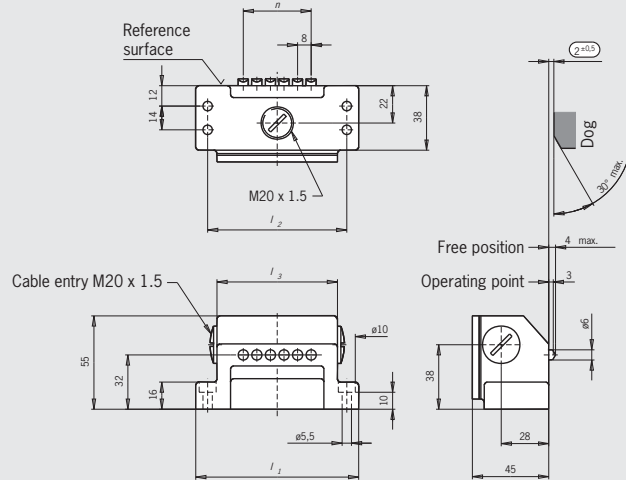
### Switching elements

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

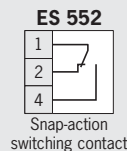
## Series GLBF... mechanical

Plunger spacing 8 mm

### Dimension drawing illustration with chisel plunger, plunger type depending on version



### Switching elements



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

1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 502 E has been run-in with approx. 2000 operating cycles  
2) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639  
3) Plunger type on request

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

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

Series \_\_\_\_\_

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

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

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

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

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

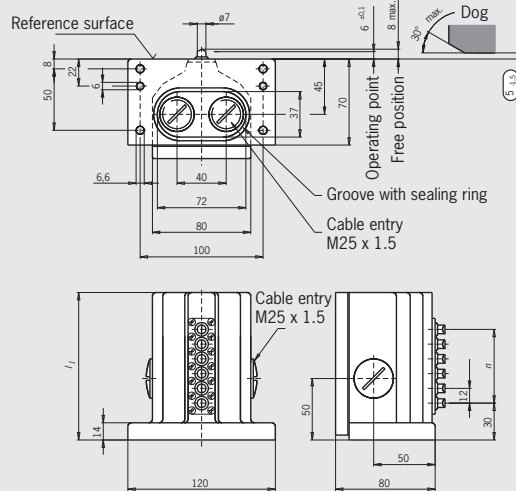
## Series RGBF...AM 12 mm mechanical

- ▶ With exterior diaphragm
- ▶ Plunger spacing 12 mm
- ▶ Upright housing according to DIN 43697
- ▶ Degree of protection IP67 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

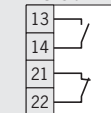
The exterior diaphragm protects the plunger guide against the entry of very fine dust (dust from grinding, casting, glass, etc.) and prevents the plunger seizing. At the same time, plunger sticking, caused by resinous lubricating coolants, can be prevented with this exterior diaphragm version.

### Switching elements

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

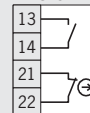
### Switching elements

#### ES 502 E



Snap-action switching contact

#### ES 514



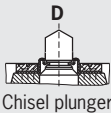
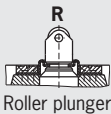
Snap-action switching contact (on request)

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

1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 502 E has been run-in with approx. 2000 operating cycles  
2) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639

LED function display possible on request.

n Number of plungers	Plunger spacing 12 mm	
	$I_1$	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
 Chisel plunger	2	<b>082325</b> RGBF 02 D 12 -502 AM -M
	3	<b>088365</b> RGBF 03 D 12 -502 AM -M
	4	<b>082326</b> RGBF 04 D 12 -502 AM -M
	5	<b>088366</b> RGBF 05 D 12 -502 AM -M
	6	<b>087097</b> RGBF 06 D 12 -502 AM -M
	 Roller plunger	2
3		<b>088364</b> RGBF 03 R 12 -502 AM -M
4		<b>082327</b> RGBF 04 R 12 -502 AM -M
5		<b>087099</b> RGBF 05 R 12 -502 AM -M
6		<b>087100</b> RGBF 06 R 12 -502 AM -M

## Series SN...AM 12 mm mechanical

- ▶ With exterior diaphragm
- ▶ Plunger spacing 12 mm
- ▶ Upright housing, small flange
- ▶ Degree of protection IP67 according to IEC 60529



### 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 seizing. At the same time, plunger sticking, caused by resinous lubricating coolants, can be prevented with this exterior diaphragm version.

### Switching elements

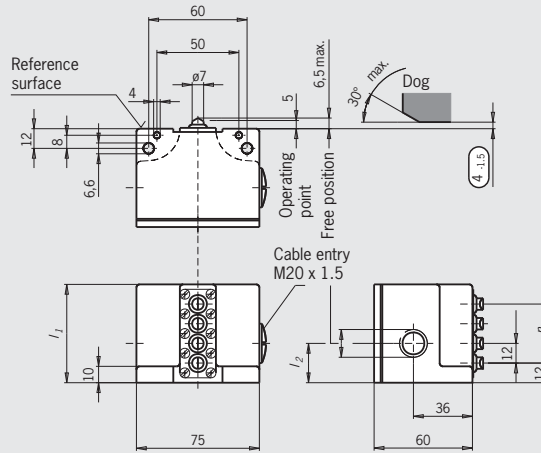
- ▶ **ES 502 E** Snap-action switching contact
- 1 NC + 1 NO

LED function display possible on request.

### Series SN...AM mechanical

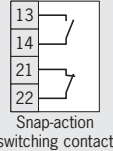
Plunger spacing 12 mm

#### Dimension drawing illustration with chisel plunger, plunger type depending on version



### Switching elements

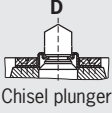

#### ES 502 E



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

1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 502 E has been run-in with approx. 2000 operating cycles  
 2) The approach speed specified applies in conjunction with EUCHNER trip dogs according to DIN 69639

n Number of plungers	Plunger spacing 12 mm		Housing material
	$l_1$	$l_2$	
2	36	19	Die-cast aluminum, anodized
3	48	24	
4	60		
5	72		
6	84		

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

## Accessories for mechanical multiple limit switches

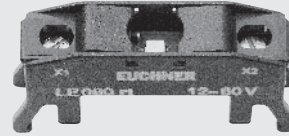
### ► LED function display

#### LED function display

#### LED function display

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

#### Figure



#### Ordering table

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

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

### ► Replacement mechanical switching elements

#### Replacement switching elements

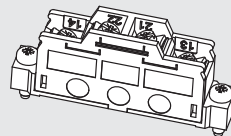
#### Replacement switching elements

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

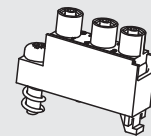
**The safety switching elements ES 508 and ES 514 are not allowed to be replaced for safety reasons and are therefore not available as spare parts.**

**In safety circuits, the entire multiple limit switch must be replaced in case of damage or wear. Repairs are to be made only by the manufacturer.**

#### Figure



ES 502 E



ES 552/ES 614

#### Ordering table

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

## Accessories for inductive multiple limit switches

### ► Replacement inductive switching elements

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

#### Ordering table

Designation	Function	Order no.
<b>ES777</b>	NO contact/PNP	<b>008401</b>
<b>ES781</b>	NO + NC/PNP	<b>031535</b>
<b>ES780</b>	NO + NC/NPN	<b>031534</b>
<b>ES779</b> <sup>1)</sup>	NO contact/PNP	<b>008470</b>
<b>ES779/2</b> <sup>1)</sup>	NO contact/PNP	<b>036731</b>
<b>ES772</b> <sup>1)</sup>	NO + NC/PNP	<b>053674</b>
<b>ES772/2</b> <sup>1)</sup>	NO + NC/PNP	<b>053677</b>
<b>ES771</b> <sup>1)</sup>	NO + NC/NPN	<b>053685</b>
<b>ES771/2</b> <sup>1)</sup>	NO + NC/NPN	<b>053688</b>

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



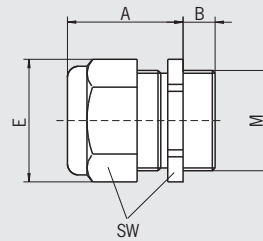
## Cable glands

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

### Cable glands

Suitable for various cable diameters. Versions in metal.

### Cable glands






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

### Ordering table

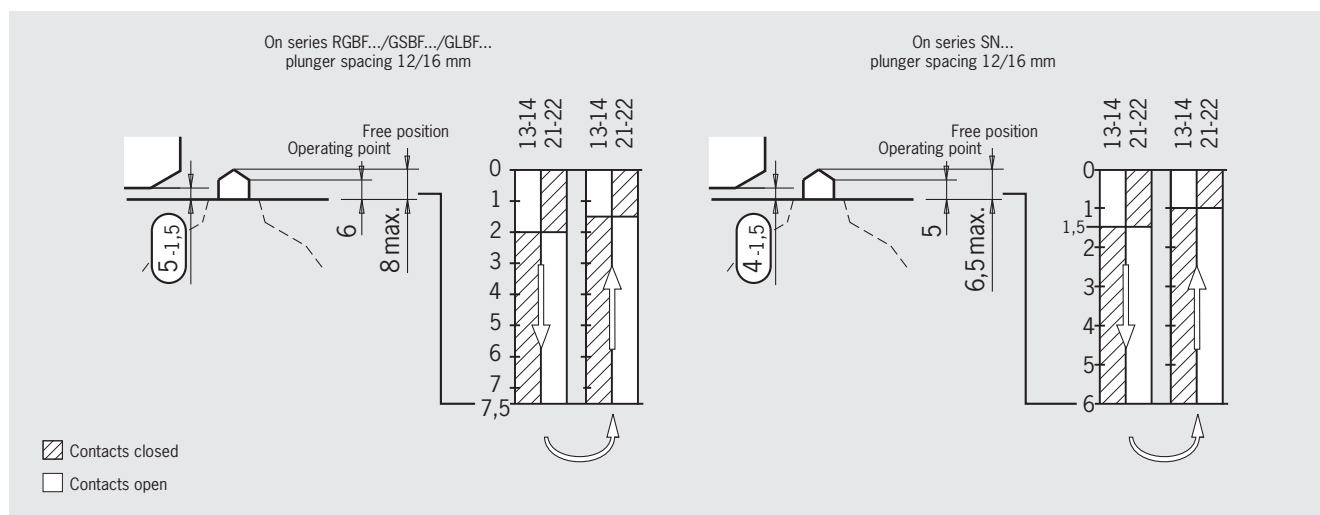
Thread	Version	Order No./item
M16 x 1.5	Cable diameter 4 - 6.5 mm	<b>086328</b> EKVM16/04
	Cable diameter 5 - 8 mm	<b>086329</b> EKVM16/05
	Cable diameter 6.5 - 9.5 mm	<b>086330</b> EKVM16/06
M20 x 1.5	Cable diameter 6.5 - 9.5 mm	<b>077683</b> EKVM20/06
	Cable diameter 9 - 13 mm	<b>077684</b> EKVM20/09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

## Multiple limit switches mechanical

Parameter	Value					Unit
Switching elements ES	502 E	508	514	552	614	
Degree of protection acc. to EN IEC 60529	IP67					
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 contact	Slow-action switching contact	Snap-action switching contact			
Actuating force	≥ 20	≥ 15	≥ 30	≥ 15		N
Min. approach speed	0.01	-	0.01		m/min	
Differential travel	0.8	-	0.6	0.1		mm
Switching frequency	≤ 300	≤ 50		≤ 200		min <sup>-1</sup>
Mechanical life (operating cycles)	≥ 30 x 10 <sup>6</sup>		≥ 1 x 10 <sup>6</sup>	≥ 10 x 10 <sup>6</sup>		
Rated impulse withstand voltage U <sub>imp</sub>	2.5	4		2.5		kV
Rated insulation voltage U <sub>i</sub>	250					V
Utilization category according to EN IEC 60947-5-1	AC-12	I <sub>e</sub> 8 A U <sub>e</sub> 250 V	-	-	-	
	AC-15	I <sub>e</sub> 6 A U <sub>e</sub> 230 V		I <sub>e</sub> 2.5 A U <sub>e</sub> 230 V	I <sub>e</sub> 2 A U <sub>e</sub> 230 V	-
	DC-13	I <sub>e</sub> 6 A U <sub>e</sub> 24 V		I <sub>e</sub> 2 A U <sub>e</sub> 24 V	I <sub>e</sub> 1 A U <sub>e</sub> 30 V	
Min. switching current at switching voltage	10 12	10 24	5 24	10 24	1 5	mA V DC
Conventional thermal current I <sub>th</sub>	8	10		6	2	A
Contact closing time	< 4	-	≤ 5	-		ms
Contact bounce time	< 3	-	≤ 3	≤ 2		ms
Short circuit protection according to EN IEC 60269-1 (control circuit fuse)	8	10	6		2	A gG
Connection	Screw terminal					
Conductor cross-section, max.	0.34 ... 1.5			0.14 ... 1.0		mm <sup>2</sup>
Approvals for switching elements		-			-	
LED function display (optional)	Red standard, others on request		LE024ge	-		

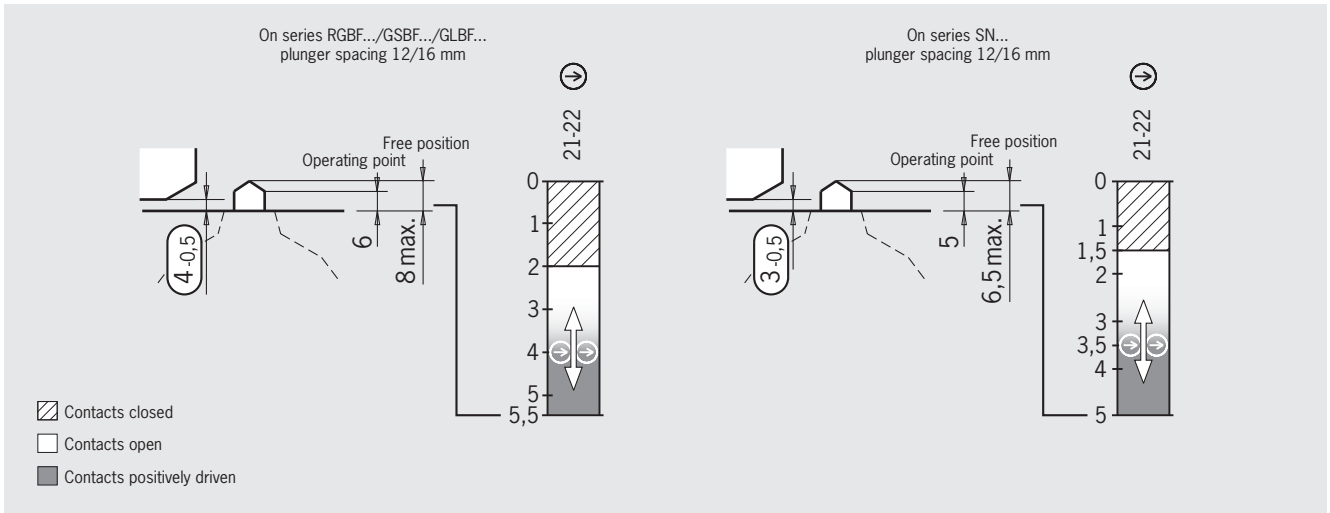
### Travel diagram ES 502 E

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



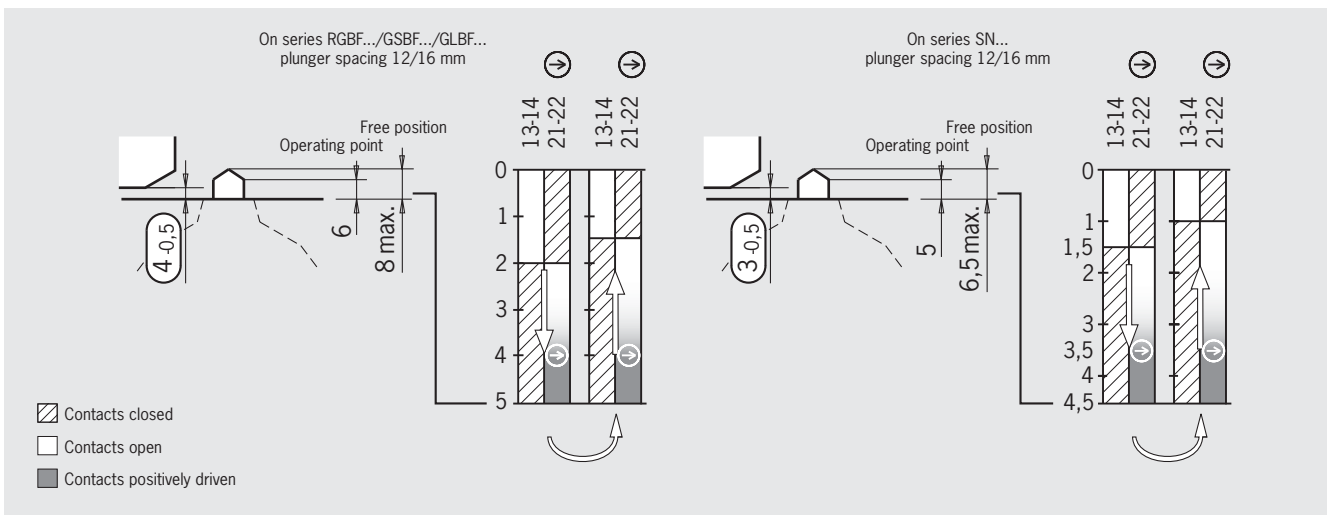
## Travel diagram ES 508

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



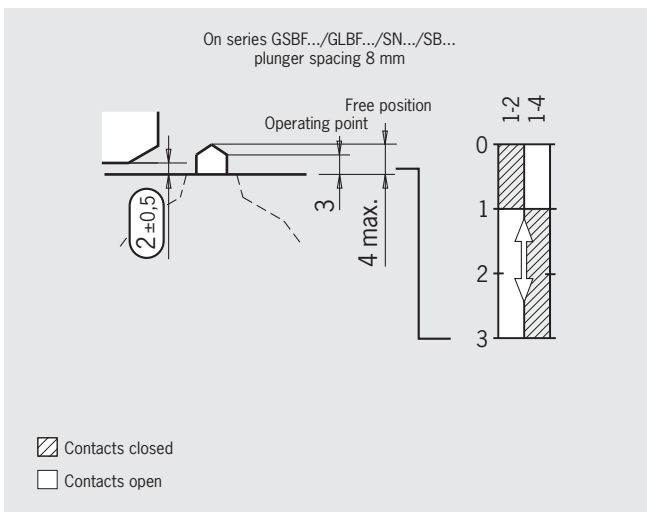
## Travel diagram ES 514

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



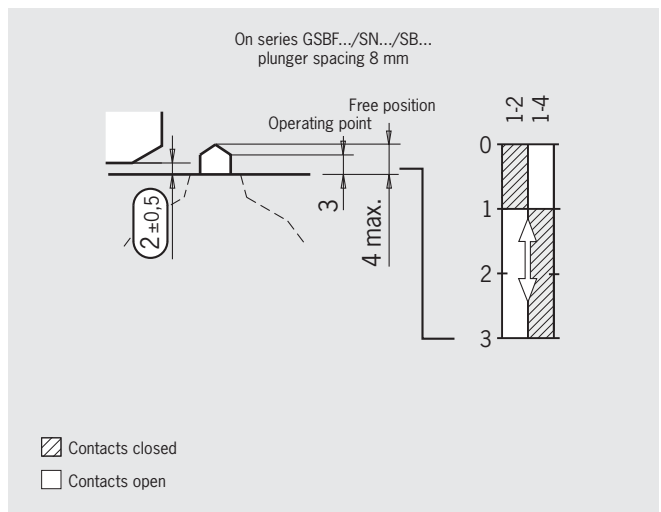
## Travel diagram ES 552

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



## Travel diagram ES 614

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



## Multiple limit switches inductive

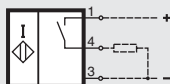
Parameter	Value						Unit
	777	781	780	779 <sup>1)</sup> 779/2	772 <sup>1)</sup> 772/2	771 <sup>1)</sup> 771/2	
Switching elements ES							
Proximity switch spacing	12			16			mm
Rated operating distance $S_n$	2			5			mm
Assured operating distance $S_a$	0 ... 1.6			0 ... 4			mm
Switching function	NO contacts	NO + NC		NO contacts	NO + NC		
Output	PNP		NPN	PNP		NPN	
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 according to EN IEC 60947-5-2	DC-13						
Housing material	PBT fiber glass reinforced						
Material active face	PBT						
Ambient temperature T	-25 ... +70						°C
Connection	Connection terminals						
Conductor cross-section, max.	1.5						mm <sup>2</sup>

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

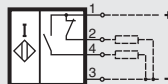
When ordering single elements, please prefix the part number with ES. E.g. Switching element ES 781

### Wiring diagrams

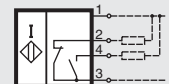
**DC NO contact, PNP**  
777,  $I_i = 12$  mm  
779,  $I_i = 16$  mm



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



**DC NO + NC contact, NPN**  
780,  $I_i = 12$  mm  
771,  $I_i = 16$  mm



## Selection table for trip rails

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

<b>UFA</b>	Aluminum
<b>ULA</b>	Aluminum, according to DIN 69638
<b>UL</b>	Aluminum, can be expanded
<b>UF</b>	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	
•				•					•		30
	•				•				•		30
	•					•			•		30
		•			•		Can be expanded				30
			•	•						•	30
			•		•					•	30
			•			•				•	30

• Available

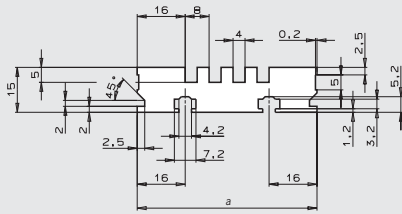
## Trip rails with 8 mm, 12 mm or 16 mm spacing



### Series UFA...

Slot spacing 8 mm, aluminum

#### Dimension drawing

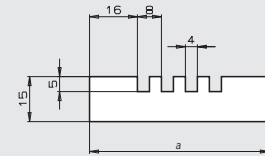


Dimension a [mm]	44	52	60	68	76
Number of slots	2	3	4	5	6

Minimum order 2010 mm, 1 bar

### Series UF...

Slot spacing 8 mm, cast iron



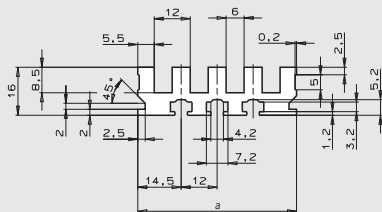
Dimension a [mm]	44	52	60	68	76	92
Number of slots	2	3	4	5	6	8
Dimension a [mm]	108	124	140	156	172	188
Number of slots	10	12	14	16	18	20

Length max. 1000 mm  
Gray figures on request



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

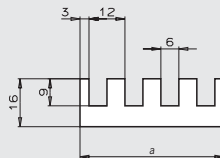
#### Dimension drawing



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

Minimum order 2010 mm, 1 bar

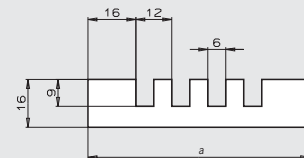
Series UL... can be placed in a row  
Slot spacing 12 mm, aluminum



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

Preferable lengths 1000, 2000, 3000 and 4000 mm (preferable lengths correspond to minimum order)

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



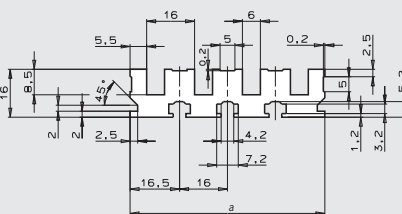
Dimension a [mm]	50	62	74	86	98	122
Number of slots	2	3	4	5	6	8
Dimension a [mm]	146	170	194	218		
Number of slots	10	12	14	16		

Length max. 1000 mm  
Gray figures on request



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

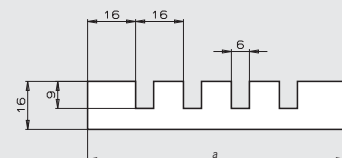
#### Dimension drawing



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

Minimum order 2010 mm, 1 bar

Series UF... according to DIN 69638 form 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. 1000 mm  
Gray figures on request

#### Ordering code

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

Series

Number of slots (see tables)

Slot spacing (8, 12 or 16 mm)

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

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

### Type of actuation mechanical

#### Series U8...

For 8 mm slot spacing, hardened, ground steel

#### Dimension drawing

Figure 1

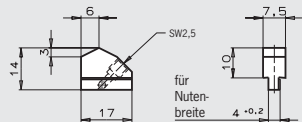


Figure 2

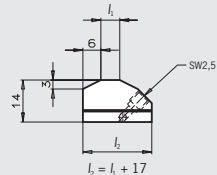
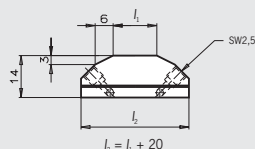


Figure 3



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

### Type of actuation inductive

#### Series UX8...

For 8 mm slot spacing, black painted steel

Figure 1

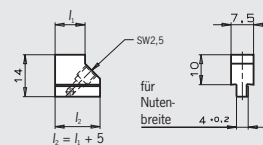
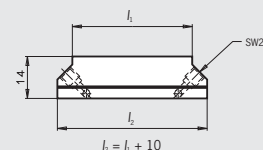


Figure 2



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



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

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

#### Dimension drawing

Figure 1

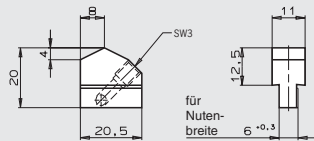


Figure 2

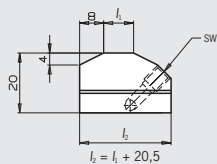
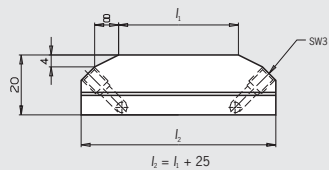


Figure 3



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

#### Series UX1216...

For 12 or 16 mm slot spacing, black painted steel

Figure 1

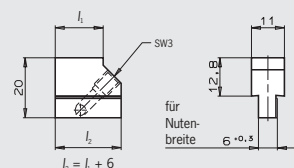
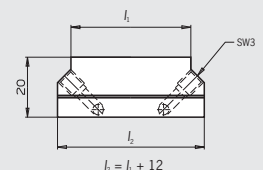


Figure 2



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



#### Ordering code

**U** |    |    |    |    |    |    |    |    |    | **-** |    |    |    |    |    |    |    |    |    |

Series

Length  $l_1$

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

### Type of actuation mechanical

- ▶ Safety dog
- ▶ Fine adjustment dogs

#### Safety dog UZ

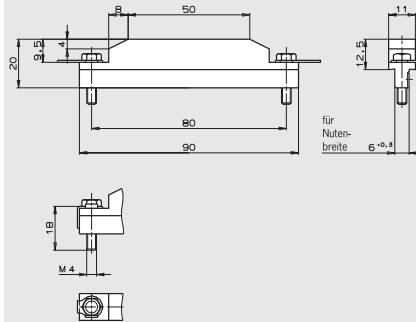
For limit switches with safety function the safety dog must be positively mounted

#### Fine adjustment dog UE

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

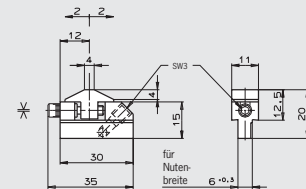
**Safety dog UZ** for 12/16 mm slot spacing, hardened, ground steel

#### Dimension drawing UZ1216-50



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

#### Dimension drawing UE1216-4



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

### Ordering table

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



## Glossary

### Rated operating current $I_e$

The rated operating current is the nominal current which 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 which 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 which 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 NC 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 element

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 605291 and is given as an IP. After the IP there are 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 element

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 accuracy 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 %.

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