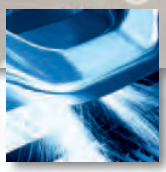
Precision Multiple Limit Switches

More than safety.

EUCHNER

More than safety.

Emil Euchner, the company's founder and inventor of the multiple limit switch, circa 1928.



Around the world – the Swabian specialists in motion sequence control for mechanical and systems engineering.

EUCHNER's history began in 1940 with the establishment of an engineering office by Emil Euchner. Since that time, EUCHNER has been involved in the design and development of switchgear for controlling a wide variety of motion sequences in mechanical and systems engineering. In 1953, Emil Euchner founded EUCHNER + Co., a milestone in the company's history. In 1952, he developed the first multiple limit switch – to this day a symbol of the enterprising spirit of this family-owned company.

Automation – Safety – ManMachine

Today, our products range from electromechanical and electronic components to complex system solutions. With this wide range of products we can provide the necessary technologies to offer the right solution for special requirements – regardless of whether these relate to reliable and precise positioning or to components and systems for safety engineering in the automation sector.
EUCHNER products are sold through a world-wide sales network of competent partners. With our closeness to the customer and the guarantee of reliable solutions throughout the globe, we enjoy the confidence of customers all over the world.

Quality, reliability, precision

Quality, reliability and precision are the hallmarks of our corporate philosophy. They represent concepts and values to which we feel totally committed.
At EUCHNER, quality means that all our employees take personal responsibility for the company as a whole and, in particular, for their own field of work. This individual commitment to perfection results in products which are ideally tailored to the customers' needs and the requirements of the market. After all: our customers and their needs are the focus of all our efforts. Through efficient and effective use of resources, the promotion of personal initiative and courage in finding unusual solutions to the benefit of our customers, we ensure a high level of customer satisfaction. We familiarize ourselves with their needs, requirements and products and we learn from the experiences of our customers' own customers.

EUCHNER – More than safety.

Quality – made by EUCHNER

Table of Contents

Precision Multiple Limit Switches

Accessories

Appendix

General Information

Application

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

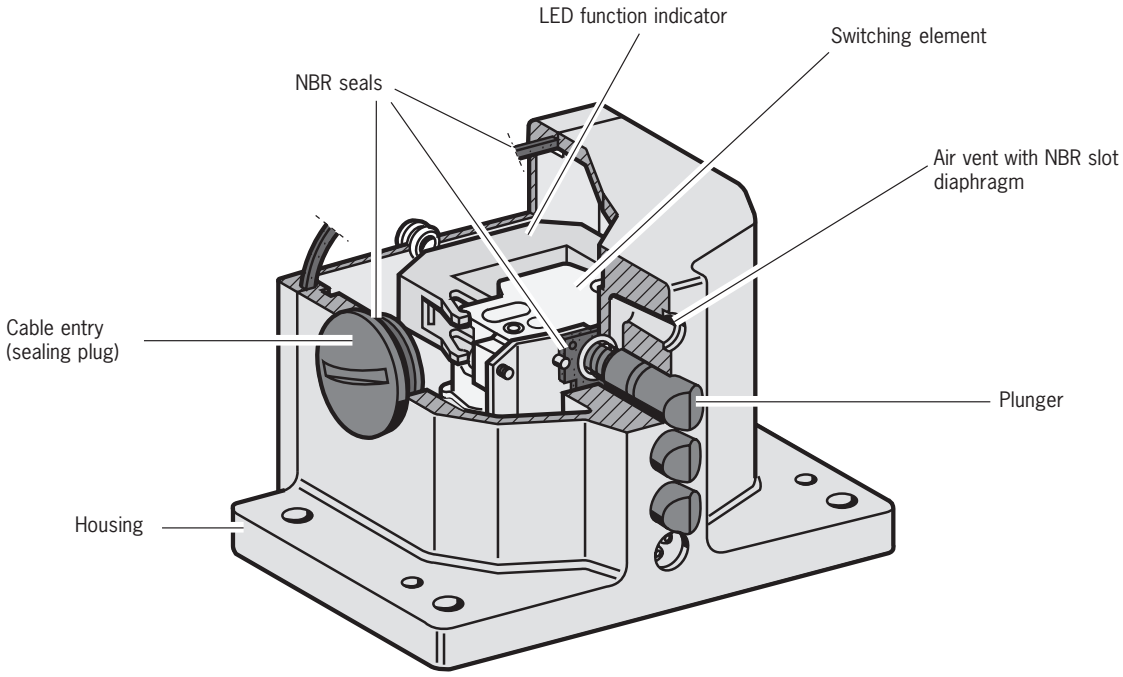
A range of housing versions, including DIN versions, is available to suit the full spectrum of application fields. A high standard of quality is guaranteed in every installation position by the degree of protection IP 67.

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 product 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 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 catalogue *Trip Dogs and Trip Rails*).

Design

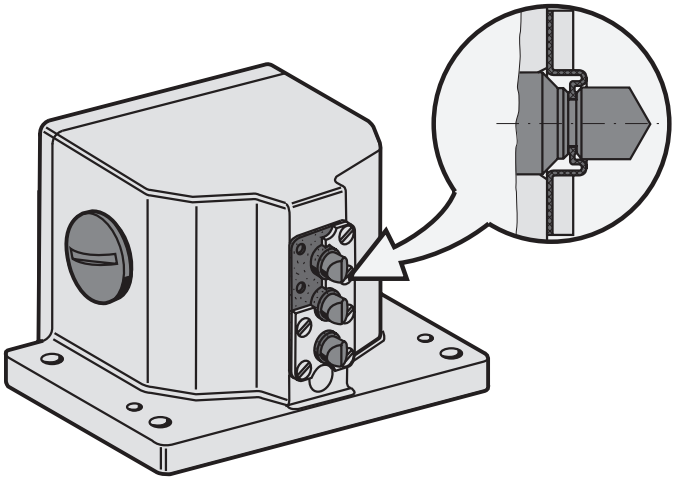
Depending on the technical requirements in terms of operating point accuracy and approach speed, four functionally different types of plunger (chisel, roller, ball and dome plungers) are used. Depending on the plunger type, the reproducible operating point accuracy is ± 0.002 mm and the maximum approach speed is 120 m/min.
The precision multiple limit switches can be assembled with snap-action 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 switching 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 is therefore ideal 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 decisive criterion for the quality, mechanical life and precision of EUCHNER precision multiple limit switches. The same material is used for the cover seal and the cable entry.
A series with an exterior diaphragm which is designed to resist the effect of resinous cooling lubricants is also available. This version prevents the plungers sticking.
A further variant with an interchangeable plunger guide allows a quick and easy plunger replacement without any re-adjustment of the multiple limit switch. This keeps production downtimes as short as possible.



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.

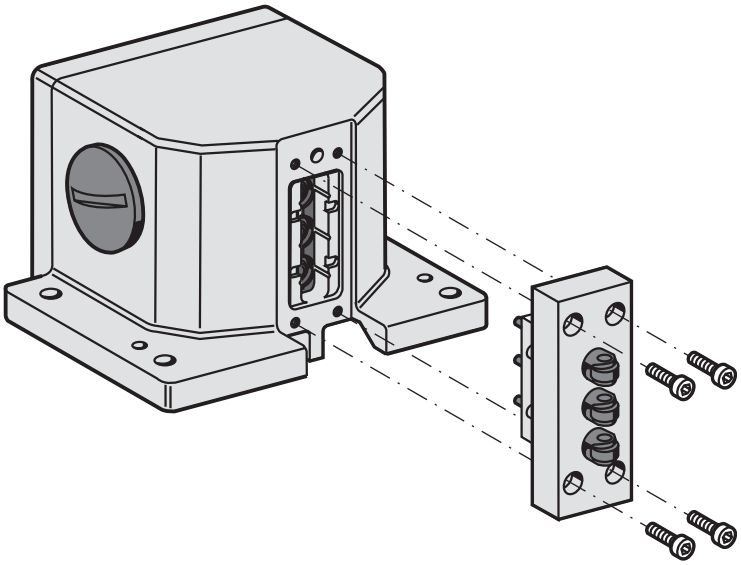
The plunger guides in the housing are thus reliably protected from the penetration of the cooling lubricant. Plunger sticking is prevented and it is not necessary to replace the switch or plunger.
For technical data on this series see pages 20 and 21.



Interchangeable plunger guide

The series RGCS with its interchangeable plunger guide allows quick and easy plunger replacement without any new adjustment of the multiple limit switch. This keeps production downtimes as short as possible.
In case of damage or wear to the plunger, e.g. when processing abrasive materials, and also when the plunger has become completely stuck due to resinous cooling lubricants, it is only necessary to replace the plunger guide and plungers on these multiple limit switches.

The complete plunger guide is dismantled from the plunger side. The plungers can be replaced easily and quickly by the operator without special tools. Specialist knowledge is not required. It is not necessary to make changes to the machine installation or perform time-consuming re-adjustment of the system.
In this way, repair costs are reduced and the machine downtimes are minimized. For technical data on this series see pages 22 and 23.

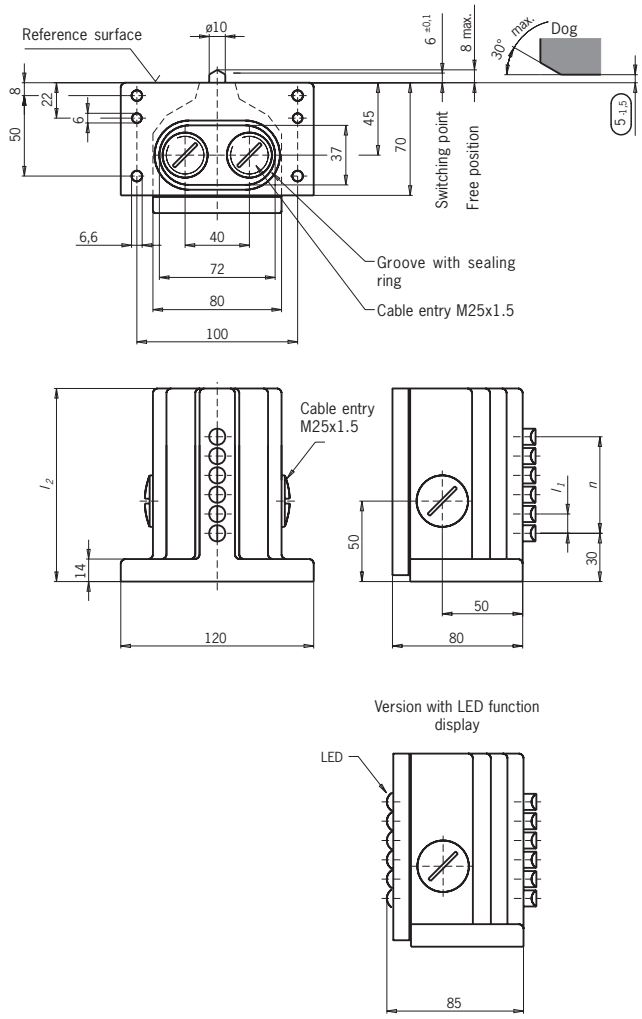


Series RGBF...

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

Dimension drawing

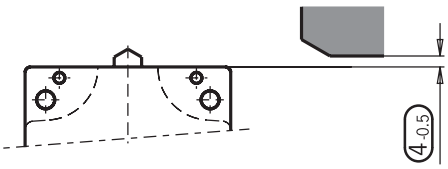
Illustration with chisel plunger, plunger type depending on version



Note

The series RGBF multiple limit switches can be fully or partially equipped with **safety switching elements**. Here it is important that the **trip dog setting distance** is observed to ensure the safe opening of the circuit. The trip dogs must be positively mounted according to EN 1088, i.e. riveted, welded or secured in some other way against becoming loose.

Trip dog setting distance for safety switching elements



n Number of plungers	Plunger 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	
10	170		200	Sand-cast aluminum anodized
12	200	Sand-cast aluminum anodized	240	
14	240		–	–
16	240		–	–

Technical data

Parameter		Value					Unit
Housing material		Die-cast aluminum, anodized / Sand cast aluminum, anodized (see table, left)					
Degree of protection according to IEC 60529		IP 67					
Installation position		any					
Ambient temperature		- 5 to + 80 [1]					°C
Plunger types		**D**  Chisel	**R**  Roller (slide bearing)	**B**  Roller (ball bearing)	**K**  Ball [2]	**W**  Dome	
Operating point accuracy [3]		± 0,002	± 0,01	± 0,01	± 0,01	± 0,002	mm
Approach speed, max. [4]		40	80	120 [5]	10	10	m/min
Number of plungers		See table, left					
Plunger material		Stainless steel					
Plunger guide		Maintenance-free					
Switching element		**ES 502 E**		**ES 508**		**ES 514**	
Contact elements		1 NO + 1 NC		1 NC ⊖		1 NO + 1 NC ⊖	
Switching principle		Snap-action contact element		Slow-action contact element		Snap-action contact element	
Actuating force		≥ 20		≥ 15		≥ 30	N
Approach speed, min.		0.01		-		0.01	m/min
Differential travel		0.8		-		0.6	mm
Pre-travel to the switching point		See travel diagram p. 26 and p. 27					
Switching frequency		≤ 300		≤ 50		≤ 50	min^{-1}
Mech. life (switching cycles)		≥ 30 x 10^6				≥ 1 x 10^6	
Rated impulse withstand voltage U_{imp}		4		-		4	kV
Rated insulation voltage U_i		250					V
Utilization category according to IEC 60947-5-1	AC-12	I_e 10 A U_e 250 V		-		-	
	AC-15	I_e 6 A U_e 230 V		I_e 6 A U_e 230 V		I_e 2.5 A U_e 230 V	
	DC-13	I_e 6 A U_e 24 V		I_e 6 A U_e 24 V		I_e 6 A U_e 24 V	
Switching current, min. at Switching voltage		10 12		10 24		5 24	mA DC V
Conventional thermal current I_{th}		10					A
Contact closing time		< 4		-		≤ 5	ms
Contact bounce time		< 3		-		≤ 3	ms
Short-circuit protection according to IEC 60269-1 (control circuit fuse)		10					A gG
Connection type		Screw terminal					
Conductor cross-section, max.		2 x 1.5 (per contact)					mm^2
Approvals for switching elements		c UL us		-			
LED function indicator (optional)		Standard red, for other colours see accessories				on request	

1) Special versions for low temperature range down to -30 °C on request.
2) For safety reasons, multiple limit switches with switching elements ES 508 and ES 514 are not available with ball plungers.
3) 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 switching cycles.
4) The approach speed specified applies in conjunction with EUCHNER trip dogs in accordance with DIN 69639.
Special versions for high usage with roller plungers on request.
5) Only in conjunction with switching element ES 502 E or ES 508.

Ordering code

R	G	B	F						-				L	E				-	M

Series

Number of plungers (see table, left)

Plunger types
(**D** = Chisel, **R** = Roller (slide bearing), **B** = Rolle (ball bearing), **K** = Ball, **W** = Dome)

Plunger spacing (**12** or **16** mm)

Switching elements (ES **502** E, ES **508**, ES **514**)

LED function indicator (AC/DC 12-60 V = **060**, AC 110 V = **110**, AC 220 V = **220**)

Cable entry with metric thread M25 x 1.5 (**M**)

Ordering example: Multiple limit switch according to DIN 43697, 8 roller plungers, plunger spacing 12 mm, switching element ES 502 E, LED 24 V **RGBF 08 R 12 -502 LE060-M**

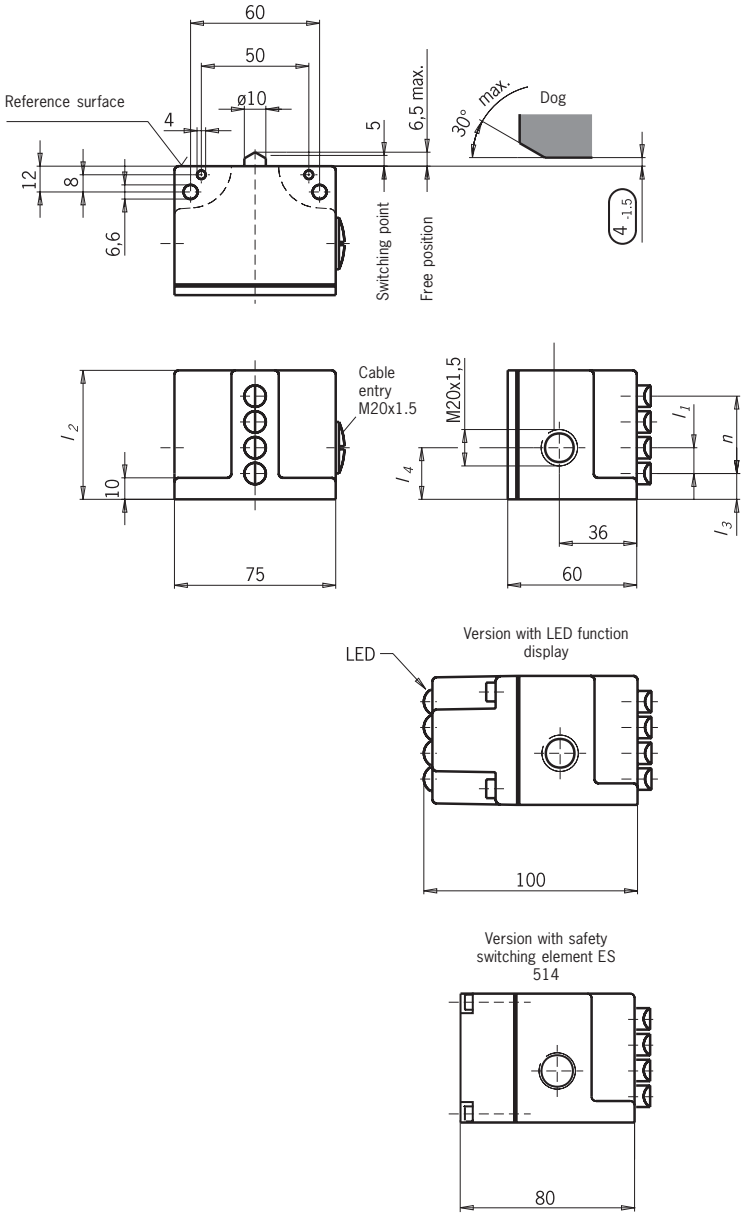
Mixed contact assembly: If the multiple limit switch is equipped with safety switching elements and the standard switching element ES 502 E, please note page 28.

Series SN...

- **Plunger spacing 12 or 16 mm**
- **Upright housing, small flange**
- **Degree of protection IP 67 according to IEC 60529**

Dimension drawing

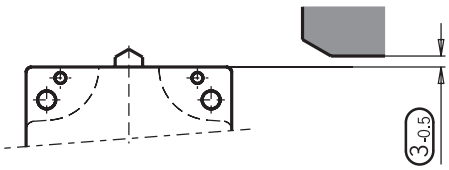
Illustration with chisel plunger, plunger type depending on version



Note

The series SN multiple limit switches can be fully or partially equipped with **safety switching elements**. Here it is important that the **trip dog setting distance** is observed to ensure the safe opening of the circuit. The trip dogs must be positively mounted according to EN 1088, i.e. riveted, welded or secured in some other way against becoming loose.

Trip dog setting distance for safety switching elements



n Number of plungers	Plunger 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			–	–	–	

Technical data

Parameter		Value					Unit
Housing material		Die-cast aluminum, anodized					
Degree of protection according to IEC 60529		IP 67					
Installation position		any					
Ambient temperature		- 5 to + 80 [1]					°C
Plunger types		**D**  Chisel	**R**  Roller (slide bearing)	**B**  Roller (ball bearing)	**K**  Ball [2]	**W**  Dome	
Operating point accuracy [3]		± 0,002	± 0,01	± 0,01	± 0,01	± 0,002	mm
Approach speed, max. [4]		40	80	120 [5]	10	10	m/min
Number of plungers		See table, left					
Plunger material		Stainless steel					
Plunger guide		Maintenance-free					
Switching element		**ES 502 E**		**ES 508**	**ES 514** (on request)		
Contact elements		1 NO + 1 NC		1 NC ⊖	1 NO + 1 NC ⊖		
Switching principle		Snap-action contact element		Slow-action contact element	Snap-action contact element		
Actuating force		≥ 20		≥ 15	≥ 30		N
Approach speed, min.		0.01		-	0.01		m/min
Differential travel		0.8		-	0.6		mm
Pre-travel to the switching point		See travel diagram p. 26 and p. 27					
Switching frequency		≤ 300		≤ 50	≤ 50		min^{-1}
Mech. life (switching cycles)		≥ 30 x 10^6			≥ 1 x 10^6		
Rated impulse withstand voltage U_{imp}		4		-	4		kV
Rated insulation voltage U_i		250					V
Utilization category according to IEC 60947-5-1	AC-12	I_e 10 A U_e 250 V		-	-		
	AC-15	I_e 6 A U_e 230 V		I_e 6 A U_e 230 V	I_e 2.5 A U_e 230 V		
	DC-13	I_e 6 A U_e 24 V		I_e 6 A U_e 24 V	I_e 6 A U_e 24 V		
Switching current, min. at		10		10	5		mA
Switching voltage		12		24	24		DC V
Conventional thermal current I_{th}		10					A
Contact closing time		< 4		-	≤ 5		ms
Contact bounce time		< 3		-	≤ 3		ms
Short-circuit protection according to IEC 60269-1 (control circuit fuse)		10					A gG
Connection type		Screw terminal					
Conductor cross-section, max.		2 x 1.5 (per contact)					mm^2
Approvals for switching elements		cULus		-			
LED function indicator (optional)		Standard red, for other colours see accessories			on request		

1) Special versions for low temperature range down to -30 °C on request.
2) For safety reasons, multiple limit switches with switching elements ES 508 and ES 514 are not available with ball plungers.
3) 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 switching cycles.
4) The approach speed specified applies in conjunction with EUCHNER trip dogs in accordance with DIN 69639.
Special versions for high usage with roller plungers on request.
5) Only in conjunction with switching element ES 502 E or ES 508.

Ordering code

S	N							-				L	E				-	M

Series
Number of plungers (see table, left)
Plunger types
(**D** = Chisel, **R** = Roller (slide bearing), **B** = Rolle (ball bearing), **K** = Ball, **W** = Dome)
Plunger spacing (**12** or **16** mm)
Switching elements (ES **502** E, ES **508**, ES **514**)
LED function indicator (AC/DC 12-60 V = **060**, AC 110 V = **110**, AC 220 V = **220**)
Cable entry with metric thread M20 x 1.5 (**M**)

Ordering example: Multiple limit switch, 3 chisel plungers, plunger spacing 12 mm, switching element ES 508, no LED

SN 03 D 12 -508 -M

Mixed contact assembly: If the multiple limit switch is equipped with safety switching elements and the standard switching element ES 502 E, please note page 28.

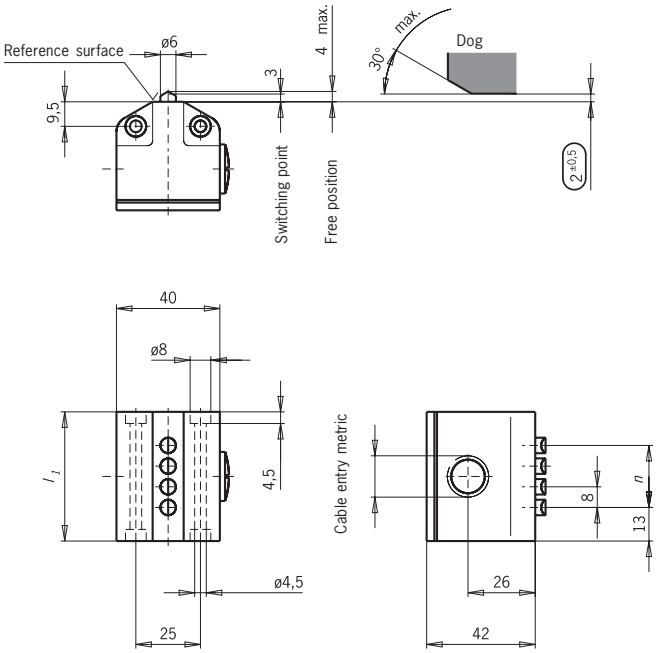
Series SN... / SB...

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

Dimension drawing

Series SN...

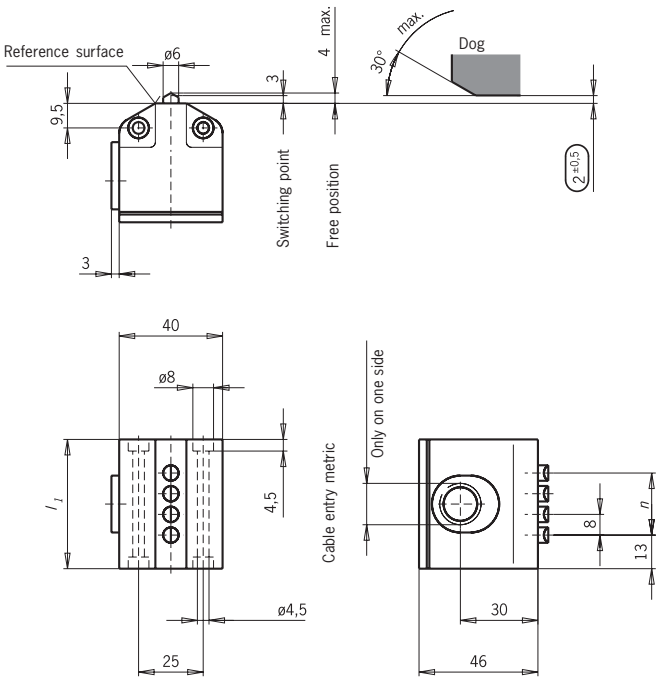
Illustration with chisel plunger, plunger type depending on version



n Number of plungers	Plunger spacing 8 mm l_1	Cable entry	Housing material
2	34	M16x1.5	Die-cast aluminum anodized
3	42		
4	50		
5	58	M20x1.5	
6	66		

Series SB... (with enlarged space for wiring)

Illustration with chisel plunger, plunger type depending on version



n Number of plungers	Plunger spacing 8 mm l_1	Cable entry	Housing material
2	34	M16x1.5	Die-cast aluminum anodized
3	42		
4	50		
5	58	M20x1.5	

Technical data

Parameter	Value			Unit
Housing material	Die-cast aluminum, anodized			
Degree of protection according to IEC 60529	IP 67			
Installation position	any			
Ambient temperature	- 5 to + 80			°C
Plunger types	**D**  Chisel	**R**  Roller	**K**  Ball	
Operating point accuracy [1]	± 0.02	± 0.05	± 0.03	mm
Approach speed, max. [2]	20	50	8	m/min
Number of plungers	See table, left			
Plunger material	Stainless steel			
Plunger guide	Maintenance-free			
Switching element	**ES 552**			
Contact elements	1 changeover contact			
Switching principle	Snap-action contact element			
Actuating force	≥ 15			N
Approach speed, min.	0.01			m/min
Differential travel	0.2			mm
Pre-travel to the switching point	See travel diagram p. 26 and p. 27			
Switching frequency	≤ 200			min^{-1}
Mech. life (switching cycles)	≥ 10 x 10^6			
Rated impulse withstand voltage U_{imp}	4			kV
Rated insulation voltage U_i	250			V
Utilization category AC-15	Ie 2.5 A U_e 230 V			
according to IEC 60947-5-1 DC-13	Ie 2 A U_e 24 V			
Switching current, min. at	10			mA
Switching voltage	24			DC V
Conventional thermal current I_{th}	4			A
Contact closing time	≤ 10			ms
Contact bounce time	≤ 1.5			ms
Short-circuit protection according to IEC 60269-1 (control circuit fuse)	4			A gG
Connection type	Screw terminal			
Conductor cross-section, max.	1.5			mm^2

1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 552 has been run-in with approx. 2000 switching cycles.
2) The approach speed specified applies in conjunction with EUCHNER trip dogs in accordance with DIN 69639.

Ordering code

					0	8	-	5	5	2	-	M

Series (**SN**, **SB** see dimension drawing left)
Number of plungers (see table, left)
Plunger types
(**D** = Chisel, **R** = Roller, **K** = Ball)
Plunger spacing (**8** mm)
Switching elements (ES **552**)
Cable entry with metric thread (**M**, see table, left)

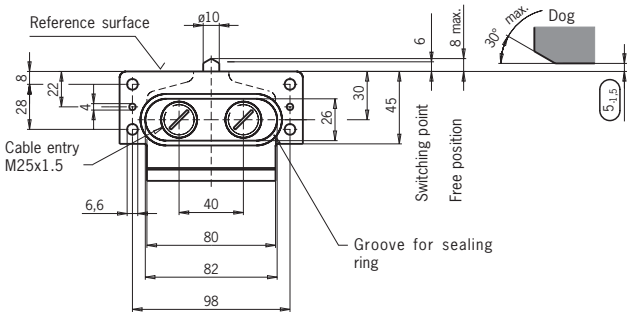
Ordering example: Multiple limit switch series SB, 3 roller plungers, plunger spacing 8 mm, switching element ES 552 **SB 03 R 08 -552 -M**

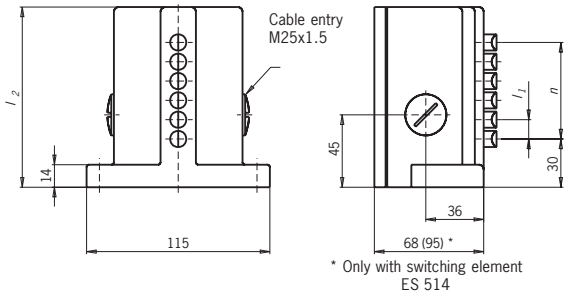
Series GSBF...

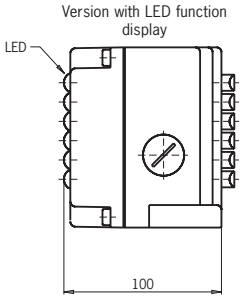
- **Plunger spacing 12 or 16 mm**
- **Upright housing**
- **Degree of protection IP 67 according to IEC 60529**

Dimension drawing

Illustration with chisel plunger, plunger type depending on version







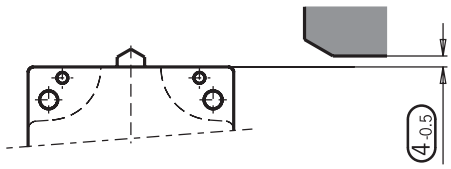
n Number of plungers	Plunger spacing l_1 = 12 l_2	Housing material	l_1 = 16 l_2	Housing material
2	70	Die-cast aluminum anodized	70	Die-cast aluminum anodized
3	70		82	
4	82		96	
5	96		112	
6	112		130	
8	130		160	Sand-cast aluminum anodized
10	160	Sand-cast aluminum anodized	192	
12	179		226	
14	208		256	
16	226		288	
18	256		–	–
20	288		–	–

Grey values on request

Note

The series GSBF multiple limit switches can be fully or partially equipped with **safety switching elements**. Here it is important that the **trip dog setting distance** is observed to ensure the safe opening of the circuit. The trip dogs must be positively mounted according to EN 1088, i.e. riveted, welded or secured in some other way against becoming loose.

Trip dog setting distance for safety switching elements



Technical data

Parameter		Value				Unit
Housing material		Die-cast aluminum, anodized / Sand cast aluminum, anodized (see table, left)				
Degree of protection according to IEC 60529		IP 67				
Installation position		any				
Ambient temperature		- 5 to + 80				°C
Plunger types		**D** Chisel	**R** Roller	**K** Ball [1]	**W** Dome	
Operating point accuracy [2]		± 0.002	± 0.01	± 0.01	± 0.002	mm
Approach speed, max. [3]		40	80	10	10	m/min
Number of plungers		See table, left				
Plunger material		Stainless steel				
Plunger guide		Maintenance-free				
Switching element		**ES 502 E**	**ES 508**		**ES 514**	
Contact elements		1 NO + 1 NC	1 NC ⊖		1 NO + 1 NC ⊖	
Switching principle		Snap-action contact element	Slow-action contact element		Snap-action contact element	
Actuating force		≥ 20	≥ 15		≥ 30	N
Approach speed, min.		0.01	-		0.01	m/min
Differential travel		0.8	-		0.6	mm
Pre-travel to the switching point		See travel diagram p. 26 and p. 27				
Switching frequency		≤ 300	≤ 50		≤ 50	min^{-1}
Mech. life (switching cycles)		≥ 30 x 10^6			≥ 1 x 10^6	
Rated impulse withstand voltage U_{imp}		4	-		4	kV
Rated insulation voltage U_i		250				V
Utilization category according to IEC 60947-5-1	AC-12	I_e 10 A U_e 250 V	-		-	
	AC-15	I_e 6 A U_e 230 V	I_e 6 A U_e 230 V		I_e 2.5 A U_e 230 V	
	DC-13	I_e 6 A U_e 24 V	I_e 6 A U_e 24 V		I_e 6 A U_e 24 V	
Switching current, min. at Switching voltage		10 12	10 24		5 24	mA DC V
Conventional thermal current I_{th}		10				A
Contact closing time		< 4	-		≤ 5	ms
Contact bounce time		< 3	-		≤ 3	ms
Short-circuit protection according to IEC 60269-1 (control circuit fuse)		10				A gG
Connection type		Screw terminal				
Conductor cross-section, max.		2 x 1.5 (per contact)				mm^2
Approvals for switching elements		cULus	-			
LED function indicator (optional)		Standard red, for other colours see accessories			-	

1) For safety reasons, multiple limit switches with switching elements ES 508 and ES 514 are not available with ball plungers.
2) 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 switching cycles.
3) The approach speed specified applies in conjunction with EUCHNER trip dogs in accordance with DIN 69639.

Ordering code

G	S	B	F							-				L	E					-	M

Series
Number of plungers (see table, left)
Plunger types
(**D** = Chisel, **R** = Roller, **K** = Ball, **W** = Dome)
Plunger spacing (**12** or **16** mm)
Switching elements (ES **502** E, ES **508**, ES **514**)
LED function indicator (AC/DC 12-60 V = **060**, AC 110 V = **110**, AC 220 V = **220**)
Cable entry with metric thread M25 x 1.5 (**M**)

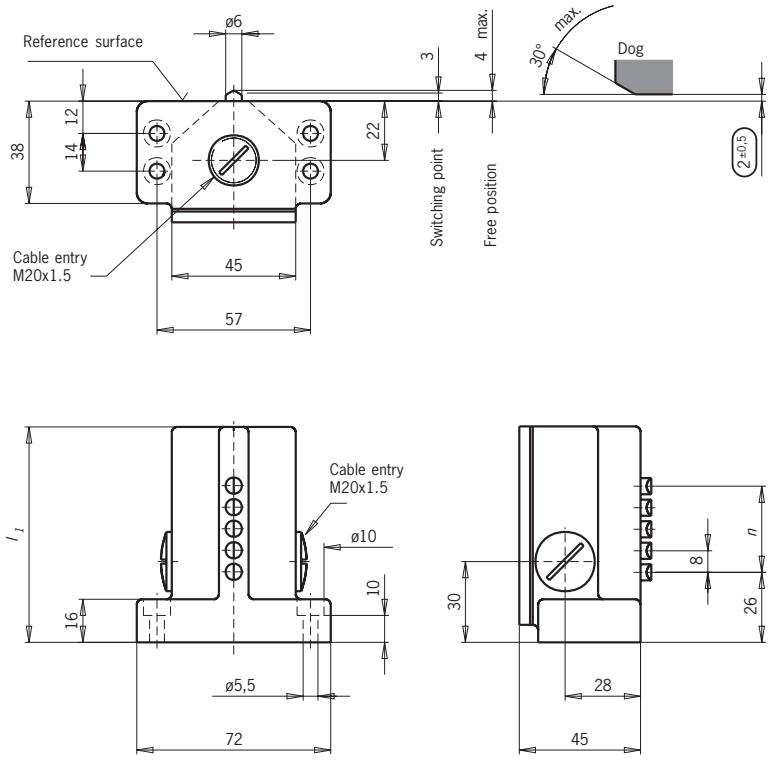
Ordering example: Multiple limit switch, 10 chisel plungers, plunger spacing 12 mm, switching element ES 508, LED 24 V **GSBF 10 D 12 -508 LE060-M**

Series GSBF...

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

Dimension drawing

Illustration with chisel plunger, plunger type depending on version



n Number of plungers	Plunger spacing 8 mm l_1	Housing material
2	48	Sand-cast aluminum anodized
3	64	
4	64	
5	80	
6	80	
8	96	
10	112	
12	128	
14	144	
16	160	
18	176	
20	192	

Grey values on request

Technical data

Parameter	Value			Unit
Housing material	Sand-cast aluminum, anodized			
Degree of protection according to IEC 60529	IP 67			
Installation position	any			
Ambient temperature	- 5 to + 80			°C
Plunger types	**D**  Chisel	**R**  Roller	**K**  Ball	
Operating point accuracy [1]	± 0.02	± 0.05	± 0.03	mm
Approach speed, max. [2]	20	50	8	m/min
Number of plungers	See table, left			
Plunger material	Stainless steel			
Plunger guide	Maintenance-free			
Switching element	**ES 552**			
Contact elements	1 changeover contact			
Switching principle	Snap-action contact element			
Actuating force	≥ 15			N
Approach speed, min.	0.01			m/min
Differential travel	0.2			mm
Pre-travel to the switching point	See travel diagram p. 26 and p. 27			
Switching frequency	≤ 200			min^{-1}
Mech. life (switching cycles)	≥ 10 x 10^6			
Rated impulse withstand voltage U_{imp}	4			kV
Rated insulation voltage U_i	250			V
Utilization category AC-15	Ie 2.5 A U_e 230 V			
according to IEC 60947-5-1 DC-13	Ie 2 A U_e 24 V			
Switching current, min. at	10			mA
Switching voltage	24			DC V
Conventional thermal current I_{th}	4			A
Contact closing time	≤ 10			ms
Contact bounce time	≤ 1.5			ms
Short-circuit protection according to IEC 60269-1 (control circuit fuse)	4			A gG
Connection type	Screw terminal			
Conductor cross-section, max.	1.5			mm^2

1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 552 has been run-in with approx. 2000 switching cycles.
2) The approach speed specified applies in conjunction with EUCHNER trip dogs in accordance with DIN 69639.

Ordering code

G	S	B	F				0	8	-	5	5	2	-	M

Series
Number of plungers (see table, left)
Plunger types
(**D** = Chisel, **R** = Roller, **K** = Ball)
Plunger spacing (**8** mm)
Switching elements (ES **552**)
Cable entry with metric thread M20 x 1.5 (**M**)

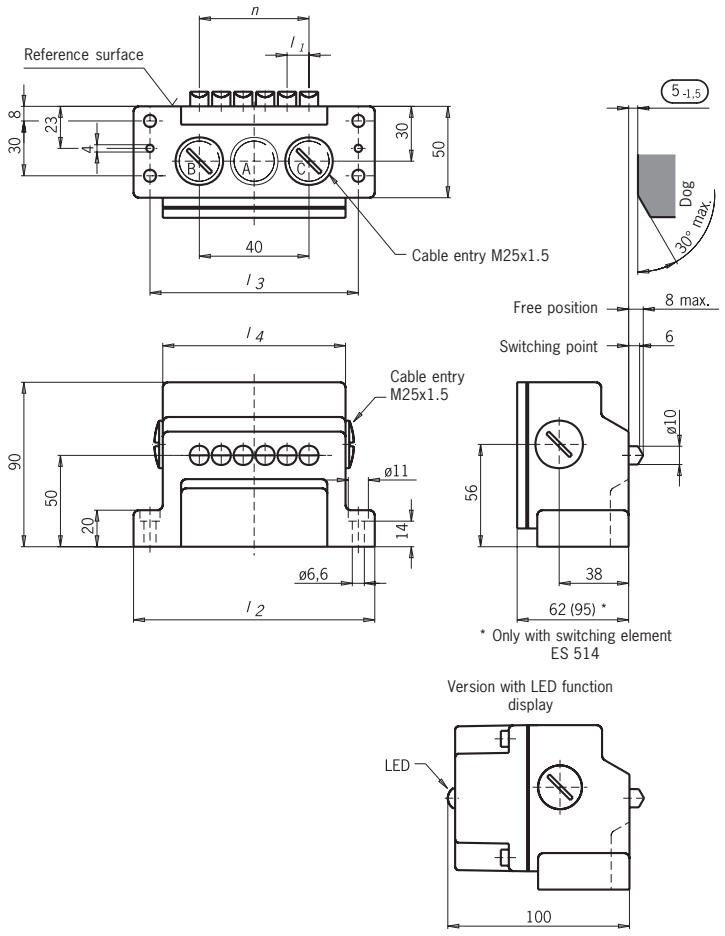
Ordering example: Multiple limit switch, 8 roller plungers, plunger spacing 8 mm, switching element ES 552 **GSBF 08 R 08 -552 -M**

Series GLBF...

- **Plunger spacing 12 or 16 mm**
- **Horizontal housing**
- **Degree of protection IP 67 according to IEC 60529**

Dimension drawing

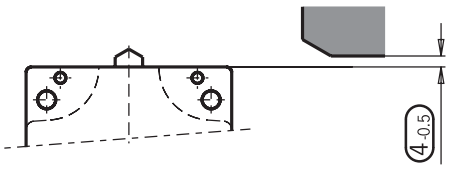
Illustration with chisel plunger, plunger type depending on version



Note

The series GLBF multiple limit switches can be fully or partially equipped with **safety switching elements.** Here it is important that the **trip dog setting distance** is observed to ensure the safe opening of the circuit. The trip dogs must be positively mounted according to EN 1088, i.e. riveted, welded or secured in some other way against becoming loose.

Trip dog setting distance for safety switching elements



n Number of plungers	Plunger spacing l_1 = 12 l_2	l_3	l_4	Cable entry	l_1 = 16 l_2	l_3	l_4	Cable entry	Housing material
2	84	66	52	A M25x1.5	84	66	52	A M25x1.5	Sand-cast aluminum anodized
3	84	66	52		100	82	68		
4	100	82	68		114	98	84	B + C M25x1.5	
5	114	98	84	B + C M25x1.5	132	114	100		
6	132	114	100		148	130	116		
8	148	130	116		180	162	148		
10	180	162	148		212	194	180		
12	199	178	167		244	226	212		
14	228	210	196		276	258	244		
16	244	226	212		308	290	276		
18	276	258	244		340	322	308		
20	308	290	276		–	–	–	–	–

Grey values on request

Technical data

Parameter		Value				Unit
Housing material		Sand cast aluminum, anodized (see table, left)				
Degree of protection according to IEC 60529		IP 67				
Installation position		any				
Ambient temperature		- 5 to + 80				°C
Plunger types		**D** Chisel	**R** Roller	**K** Ball [1]	**W** Dome	
Operating point accuracy [2]		± 0.002	± 0.01	± 0.01	± 0.002	mm
Approach speed, max. [3]		40	80	10	10	m/min
Number of plungers		See table, left				
Plunger material		Stainless steel				
Plunger guide		Maintenance-free				
Switching element		**ES 502 E**	**ES 508**		**ES 514**	
Contact elements		1 NO + 1 NC	1 NC ⊖		1 NO + 1 NC ⊖	
Switching principle		Snap-action contact element	Slow-action contact element		Snap-action contact element	
Actuating force		≥ 20	≥ 15		≥ 30	N
Approach speed, min.		0.01	-		0.01	m/min
Differential travel		0.8	-		0.6	mm
Pre-travel to the switching point		See travel diagram p. 26 and p. 27				
Switching frequency		≤ 300	≤ 50		≤ 50	min^{-1}
Mech. life (switching cycles)		≥ 30 x 10^6			≥ 1 x 10^6	
Rated impulse withstand voltage U_{imp}		4	-		4	kV
Rated insulation voltage U_i		250				V
Utilization category according to IEC 60947-5-1	AC-12	I_e 10 A U_e 250 V	-		-	
	AC-15	I_e 6 A U_e 230 V	I_e 6 A U_e 230 V		I_e 2.5 A U_e 230 V	
	DC-13	I_e 6 A U_e 24 V	I_e 6 A U_e 24 V		I_e 6 A U_e 24 V	
Switching current, min. at Switching voltage		10 12	10 24		5 24	mA DC V
Conventional thermal current I_{th}		10				A
Contact closing time		< 4	-		≤ 5	ms
Contact bounce time		< 3	-		≤ 3	ms
Short-circuit protection according to IEC 60269-1 (control circuit fuse)		10				A gG
Connection type		Screw terminal				
Conductor cross-section, max.		2 x 1.5 (per contact)				mm^2
Approvals for switching elements		c UL us	-			
LED function indicator (optional)		Standard red, for other colours see accessories			-	

1) For safety reasons, multiple limit switches with switching elements ES 508 and ES 514 are not available with ball plungers.
2) 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 switching cycles.
3) The approach speed specified applies in conjunction with EUCHNER trip dogs in accordance with DIN 69639.

Ordering code

G	L	B	F							-				L	E				-	M

Series
Number of plungers (see table, left)
Plunger types
(**D** = Chisel, **R** = Roller, **K** = Ball, **W** = Dome)
Plunger spacing (**12** or **16** mm)
Switching elements (ES **502** E, ES **508**, ES **514**)
LED function indicator (AC/DC 12-60 V = **060**, AC 110 V = **110**, AC 220 V = **220**)
Cable entry with metric thread M25 x 1.5 (**M**)

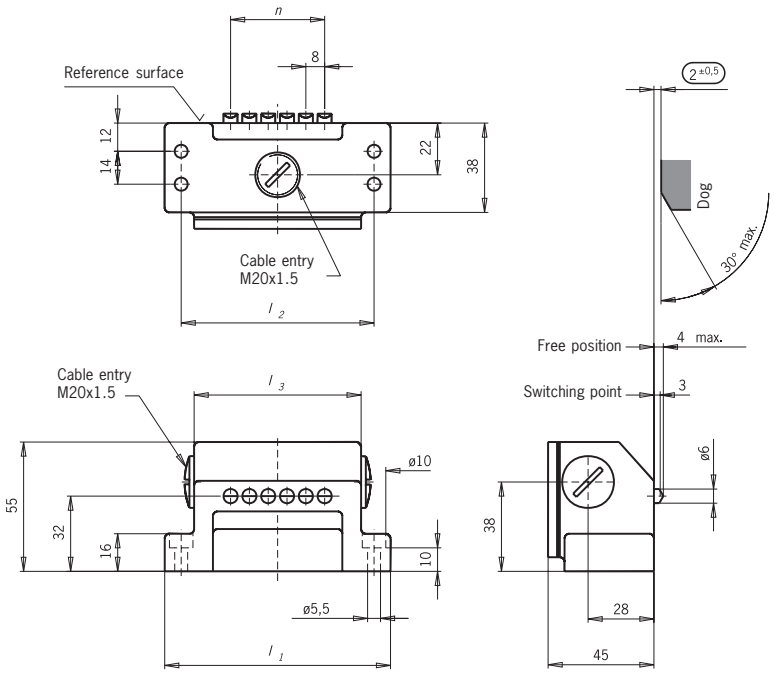
Ordering example: Multiple limit switch, 6 roller plungers, plunger spacing 16 mm, switching element ES 508, LED 220 V — **GLBF 06 R 16 -508 LE220-M**

Series GLBF...

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

Dimension drawing

Illustration with chisel plunger, plunger type depending on version



n Number of plungers	Plunger spacing 8 mm			
	l_1	l_2	l_3	Housing material
2	64	50	39	Sand-cast aluminum anodized
3	80	66	55	
4	80	66	55	
5	96	82	71	
6	96	82	71	
8	112	98	87	
10	128	114	103	
12	144	130	119	

Grey values on request

Technical data

Parameter	Value			Unit
Housing material	Sand-cast aluminum, anodized			
Degree of protection according to IEC 60529	IP 67			
Installation position	any			
Ambient temperature	- 5 to + 80			°C
Plunger types	**D**  Chisel	**R**  Roller	**K**  Ball	
Operating point accuracy [1]	± 0.02	± 0.05	± 0.03	mm
Approach speed, max. [2]	20	50	8	m/min
Number of plungers	See table, left			
Plunger material	Stainless steel			
Plunger guide	Maintenance-free			
Switching element	**ES 552**			
Contact elements	1 changeover contact			
Switching principle	Snap-action contact element			
Actuating force	≥ 15			N
Approach speed, min.	0.01			m/min
Differential travel	0.2			mm
Pre-travel to the switching point	See travel diagram p. 26 and p. 27			
Switching frequency	≤ 200			min^{-1}
Mech. life (switching cycles)	≥ 10 x 10^6			
Rated impulse withstand voltage U_{imp}	4			kV
Rated insulation voltage U_i	250			V
Utilization category AC-15	Ie 2.5 A U_e 230 V			
according to IEC 60947-5-1 DC-13	Ie 2 A U_e 24 V			
Switching current, min. at	10			mA
Switching voltage	24			DC V
Conventional thermal current I_{th}	4			A
Contact closing time	≤ 10			ms
Contact bounce time	≤ 1.5			ms
Short-circuit protection according to IEC 60269-1 (control circuit fuse)	4			A gG
Connection type	Screw terminal			
Conductor cross-section, max.	1.5			mm^2

1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 552 has been run-in with approx. 2000 switching cycles.
2) The approach speed specified applies in conjunction with EUCHNER trip dogs in accordance with DIN 69639.

Ordering code

G	L	B	F				0	8	-	5	5	2	-	M

Series
Number of plungers (see table, left)
Plunger types
(**D** = Chisel, **R** = Roller, **K** = Ball)
Plunger spacing (**8** mm)
Switching elements (ES **552**)
Cable entry with metric thread M20 x 1.5 (**M**)

Ordering example: Multiple limit switch, 12 ball plungers, plunger spacing 8 mm, switching element ES 552 — **GLBF 12 K 08 -552 -M**

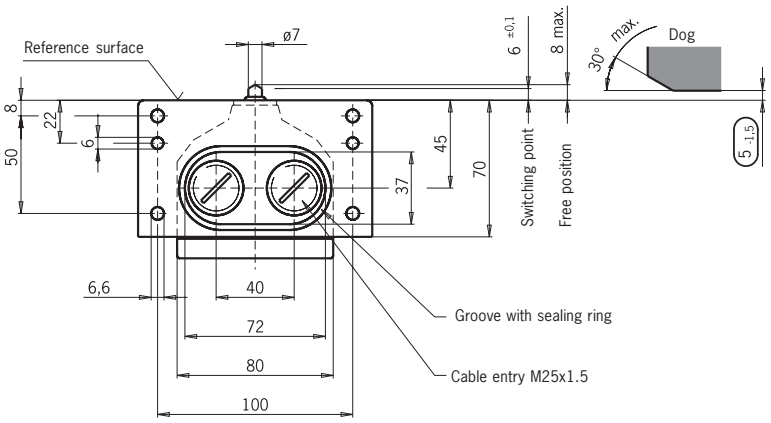
Series RGBF...AM / SN...AM with exterior diaphragm

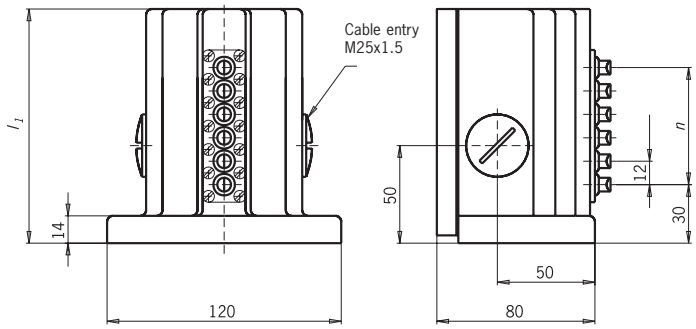
- **Plunger spacing 12 mm**
- **Upright housing**
- **Degree of protection IP 67 according to IEC 60529**

Dimension drawing

Series RGBF... (according to DIN 43697)

Illustration with chisel plunger, plunger type depending on version





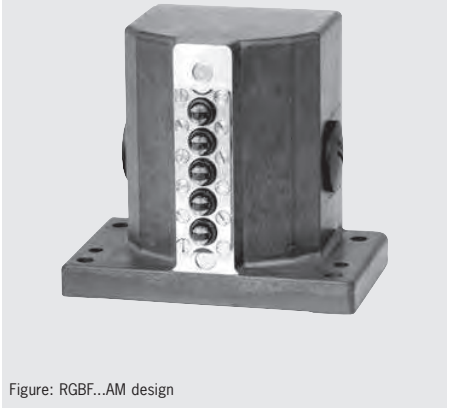
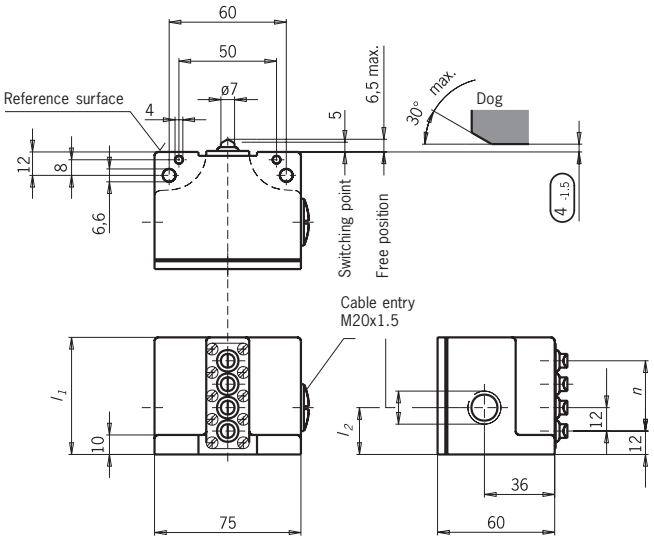


Figure: RGBF...AM design

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	

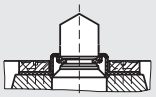
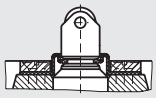
Series SN...

Illustration with chisel plunger, plunger type depending on version



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		

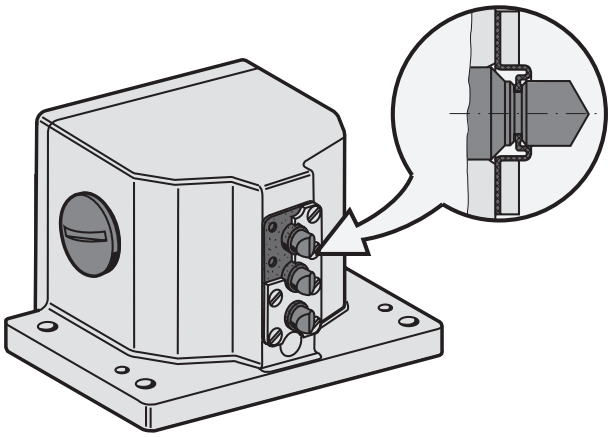
Technical data

Parameter	Value		Unit
Housing material	Die-cast aluminum, anodized		
Degree of protection according to IEC 60529	IP 67		
Installation position	any		
Ambient temperature	- 5 to + 80		°C
Plunger types	**D**  Chisel	**R**  Roller	
Operating point accuracy [1]	± 0.002	± 0.01	mm
Approach speed, max. [2]	20	50	m/min
Number of plungers	See table, left		
Plunger material	Stainless steel		
Plunger guide	Maintenance-free		
Switching element	**ES 502 E**		
Contact elements	1 NO + 1 NC		
Switching principle	Snap-action contact element		
Actuating force	≥ 15		N
Approach speed, min.	0.01		m/min
LED function indicator	on request		

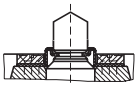
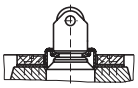
1) The reproducible operating point accuracy refers to the axial travel of the plunger after the switching element ES 502 E has been run-in with approx. 2000 switching cycles.
2) The approach speed specified applies in conjunction with EUCHNER trip dogs in accordance with DIN 69639.

Exterior diaphragm

The exterior diaphragm provides additional protection to the plunger guide.
Plunger sticking, primarily caused by resinous lubricating coolants, can be prevented by this exterior diaphragm version.



Ordering table (Other versions on request)

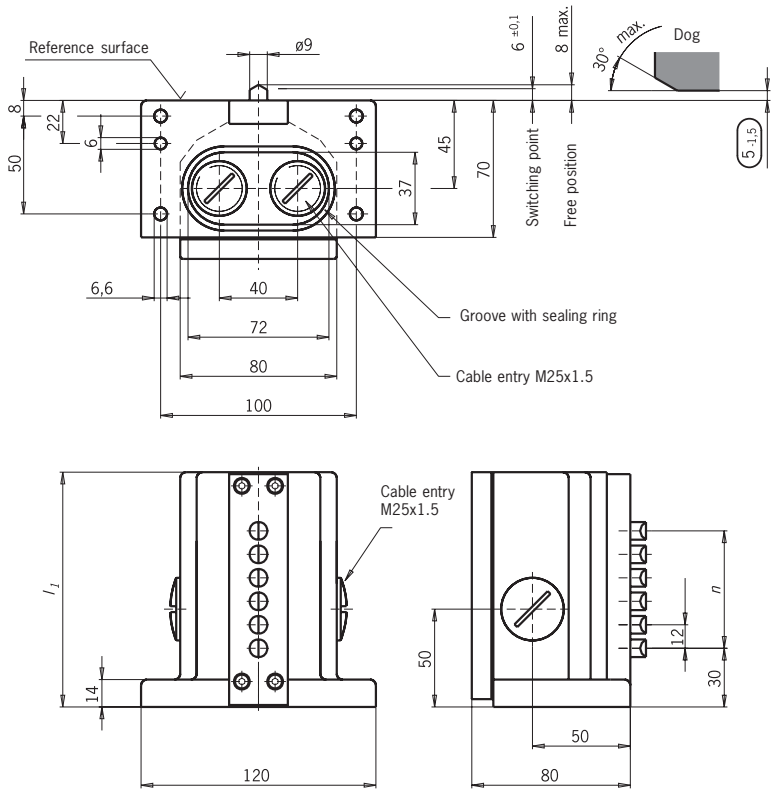
Number of plungers	Plunger type	Multiple limit switch exterior diaphragm version			
		Series RGBF...	Order No.	Series SN...	Order No.
2	D  Chisel plunger	RGBF 02 D 12 -502 AM -M	082 325	SN 02 D 12 -502 AM -M	086 584
3		RGBF 03 D 12 -502 AM -M	088 365	SN 03 D 12 -502 AM -M	086 585
4		RGBF 04 D 12 -502 AM -M	082 326	SN 04 D 12 -502 AM -M	086 586
5		RGBF 05 D 12 -502 AM -M	088 366	SN 05 D 12 -502 AM -M	088 752
6		RGBF 06 D 12 -502 AM -M	087 097	SN 06 D 12 -502 AM -M	088 753
8		RGBF 08 D 12 -502 AM -M	087 135	–	–
2	R  Roller plunger	RGBF 02 R 12 -502 AM -M	087 098	SN 02 R 12 -502 AM -M	079 289
3		RGBF 03 R 12 -502 AM -M	088 364	SN 03 R 12 -502 AM -M	086 587
4		RGBF 04 R 12 -502 AM -M	082 327	SN 04 R 12 -502 AM -M	086 588
5		RGBF 05 R 12 -502 AM -M	087 099	SN 05 R 12 -502 AM -M	088 765
6		RGBF 06 R 12 -502 AM -M	087 100	SN 06 R 12 -502 AM -M	088 766
8		RGBF 08 R 12 -502 AM -M	085 730	–	–

Series RGCS... with interchangeable plunger guide

- **Plunger spacing 12 mm**
- **Upright housing according to DIN 43697**
- **Degree of protection IP 67 according to IEC 60529**

Dimension drawing

Illustration with chisel plunger, plunger type depending on version



Features

- Plunger guide made of special material
- Can be dismantled from the plunger side
- Complete plunger guide can be replaced

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	

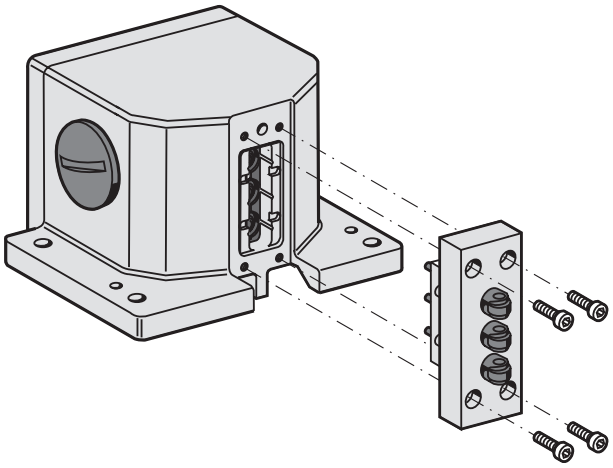
Technical data

Parameter	Value		Unit
Housing material	Die-cast aluminum, anodized		
Degree of protection according to IEC 60529	IP 67		
Installation position	any		
Ambient temperature	- 5 to + 80		°C
Plunger types	**D**  Chisel	**R**  Roller	
Operating point accuracy [1]	± 0.002	± 0.01	mm
Approach speed, max. [2]	20	50	m/min
Number of plungers	See table, left		
Plunger material	Stainless steel		
Plunger guide	Maintenance-free		
Switching element	**ES 502 E**		
Contact elements	1 NO + 1 NC		
Switching principle	Snap-action contact element		
Actuating force	≥ 15		N
Approach speed, min.	0.01		m/min
LED function indicator	on request		

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 switching cycles.
2) The approach speed specified applies in conjunction with EUCHNER trip dogs in accordance with DIN 69639.

Interchangeable plunger guide

The interchangeable plunger guide makes it possible to rapidly and easily replace the plunger without re-adjusting the multiple limit switch.
This keeps production downtimes as short as possible.



Ordering table (Other versions on request)

Number of plungers	Plunger type	Multiple limit switch RGCS...		Interchangeable plunger guide	
		Item	Order No.	Item	Order No.
2	**D**  Chisel plunger	RGCS 02 D 12 -502 -M	087 452	RGCS 02 D 12	074 591
3		RGCS 03 D 12 -502 -M	087 453	RGCS 03 D 12	079 203
4		RGCS 04 D 12 -502 -M	087 454	RGCS 04 D 12	074 592
5		RGCS 05 D 12 -502 -M	087 455	RGCS 05 D 12	077 449
6		RGCS 06 D 12 -502 -M	087 456	RGCS 06 D 12	074 593
8		RGCS 08 D 12 -502 -M	087 457	RGCS 08 D 12	077 450
2	**R**  Roller plunger	RGCS 02 R 12 -502 -M	087 459	RGCS 02 R 12	075 412
3		RGCS 03 R 12 -502 -M	087 460	RGCS 03 R 12	079 205
4		RGCS 04 R 12 -502 -M	087 461	RGCS 04 R 12	075 413
5		RGCS 05 R 12 -502 -M	087 462	RGCS 05 R 12	078 382
6		RGCS 06 R 12 -502 -M	087 463	RGCS 06 R 12	075 414
8		RGCS 08 R 12 -502 -M	087 464	RGCS 08 R 12	078 383

Accessories

LED function indicator

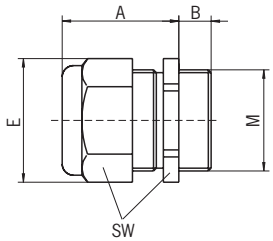
Three versions with the voltage ranges AC/DC 12 - 60 V, AC 110 V ± 15 %, AC 220 V ± 15 % are available in the standard colour red. On request they can be supplied in the colours green and yellow.
The built-in electronic closed-loop control ensures that the luminosity remains constant independently of the voltage applied.

Operating voltage [V]	Color	Item	Order No.
AC/DC 12 - 60	Red	LE 060 rt	035 495
	Green	LE 060 gr	035 496
	Yellow	LE 060 ge	035 497
AC 110 ± 15 %	Red	LE 110 rt	045 579
	Green	LE 110 gr	on request
	Yellow	LE 110 ge	
AC 220 ± 15 %	Red	LE 220 rt	045 582
	Green	LE 220 gr	on request
	Yellow	LE 220 ge	

Cable glands

EUCHNER multiple limit switches are manufactured and supplied with the degree of protection IP 67 according to IEC 60529. High-quality cable glands must be used to maintain this degree of protection.
The following table contains the items suitable for the corresponding internal thread in the multiple limit switch and for the outer diameter of the cable used.

Material: brass, nickel-plated



Item	Metric thread M	Cable outer diameter [mm]	A [mm]	B [mm]	E [mm]	AF [mm]	Order No.
EKVM12/04	M12 x 1.5	4 - 6.5	20	5	15.5	14	086 327
EKVM16/04	M16 x 1.5	4 - 6.5	20	6	20	18	086 328
EKVM16/05	M16 x 1.5	5 - 8	20	6	20	18	086 329
EKVM16/06	M16 x 1.5	6.5 - 9.5	20	6	20	18	086 330
EKVM20/06	M20 x 1.5	6.5 - 9.5	20	6	24.4	22	077 683
EKVM20/09	M20 x 1.5	9 - 13	21	6	24.4	22	077 684
EKVM25/09	M25 x 1.5	9 - 13	21	6.5	31.2	28	086 334
EKVM25/11	M25 x 1.5	11.5 - 15.5	21	6.5	31.2	28	086 335

Switching elements

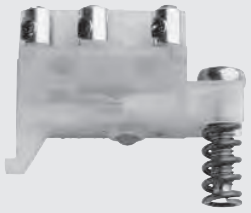
The switching elements ES 502 E can be supplied for multiple limit switches with 12 or 16 mm plunger spacing and ES 552 for multiple limit switches with 8 mm plunger spacing.

The switching elements ES 508 and ES 514 must not be replaced for safety reasons.

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

ES 502 E **Order No. 010 387**

ES 552 **Order No. 010 429**



Appendix

Plunger systems

General

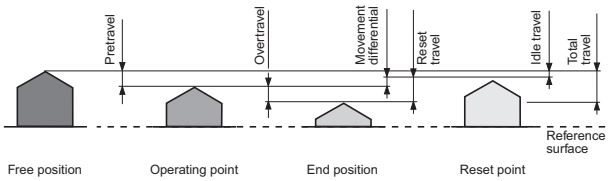
Plungers for precision multiple limit switches are made of stainless steel and are extremely accurate.
In conjunction with a specially surface-treated plunger guide, the extremely reliable and maintenance-free operation extends even beyond the guaranteed mechanical life.

There are two different types of actuating system, depending on 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.
Precision multiple limit switches with safety switching elements have a „rigid“ plunger instead of a plunger with telescopic action; the rigid plunger provides a positively driven NC contact 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.

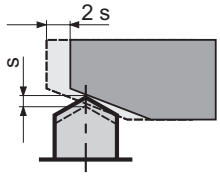
Plunger travel

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



Travel ratio for plunger/trip dog

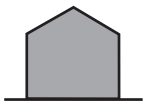
All the plunger travel data shown in the technical data refers to axial actuation. When using our trip dogs in accordance with DIN 69639, this travel is doubled at the trip rail.



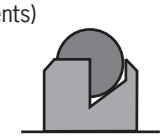
Plunger types

Depending on the technical requirements, four functionally different types of plunger (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 ± 0.002 mm.
Max. approach speed of 40 m/min.



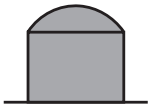
Ball plunger K
(not in conjunction with safety switching elements)
Hardened ball.
Can be actuated from various directions.
Operating point accuracy up to ± 0.01 mm.
Max. approach speed of 10 m/min.



Roller plunger R with slide bearing
(standard version for roller plunger)
Hardened roller.
Operating point accuracy up to ± 0.01 mm.
Max. approach speed of 80 m/min.

Roller plunger R with ball bearing
Hardened roller.
Operating point accuracy up to ± 0.01 mm.
Max. approach speed of 120 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 up to ± 0.002 mm.
Max. approach speed of 10 m/min.



Switching elements

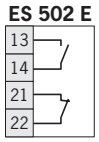
General Information

Different switching elements are available for various applications. Along with the standard switching elements with snap-action function, switching elements with positively driven NC contacts can be used for safety functions.

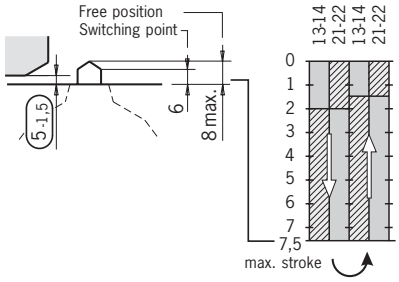
Switching element ES 502 E
Approval c UL us

Snap-action contact element [1] according to DIN 43695 with one NO and one NC contact.
Double gap, electrically isolated contact elements, silver contact, electro-gold plated.
Screw terminal with self-lifting clamp washers.
Used in multiple limit switches with 12 and 16 mm plunger spacing.

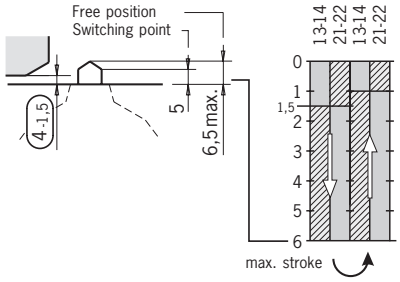
Pin assignment and switching function



Travel diagram for
series RGBF.../GSBF.../GLBF...
with plunger spacing 12 and 16 mm



Travel diagram for
series SN...
with plunger spacing 12 and 16 mm

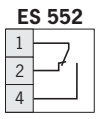


Contacts closed Contacts open

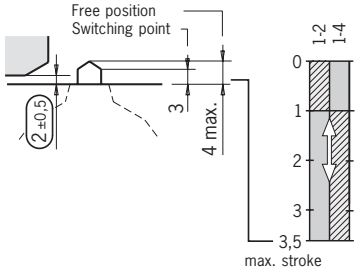
Switching element ES 552

Snap-action contact element [1] with one changeover contact.
Silver contact, electro-gold plated. Screw terminal.
Used in multiple limit switches with 8 mm plunger spacing.

Pin assignment and switching function



Travel diagram for
series GSBF.../GLBF.../SN.../SB...
with plunger spacing 8 mm



Contacts closed Contacts open

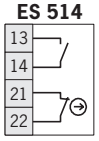
1) A snap-action contact element has a contact element which opens or closes regardless of its actuation speed.

Switching element ES 514
(safety switching element)

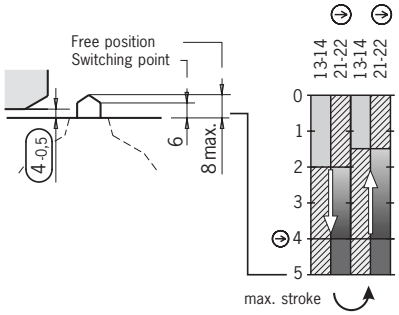
Magnetic snap-action contact element [1] with one positively driven NC contact and one NO contact.
Double gap, electrically isolated contact elements, silver contact, electro-gold plated.
Screw terminal with self-lifting clamp washers.
Used in multiple limit switches with 12 and 16 mm plunger spacing.

Pin assignment and switching function

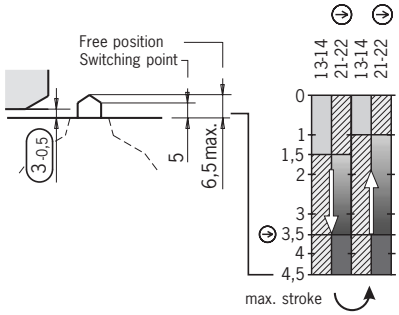
ES 514



Travel diagram for
series RGBF.../GSBF.../GLBF...
with plunger spacing 12 and 16 mm



Travel diagram for
series SN...
with plunger spacing 12 and 16 mm



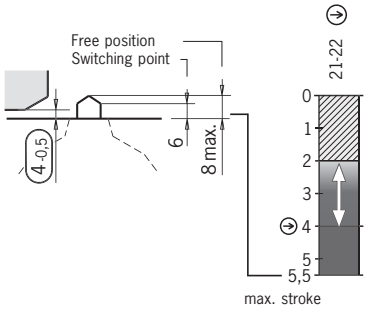
Switching element ES 508
(safety switching element)

Slow-action contact element [2] with one positively driven NC contact.
Double gap, silver contact, electro-gold plated.
Screw terminal with self-lifting clamp washers.
Used in multiple limit switches with 12 and 16 mm plunger spacing.

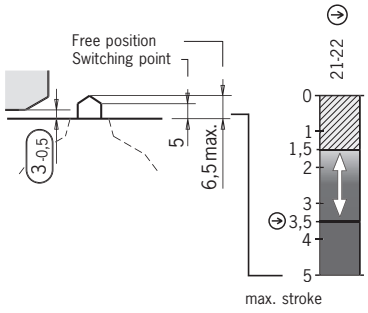
Pin assignment and switching function

ES 508

Travel diagram for
series RGBF.../GSBF.../GLBF...
with plunger spacing 12 and 16 mm



Travel diagram for
series SN...
with plunger spacing 12 and 16 mm



Electrical life
The electrical life of the switching elements is dependent on the electrical load, the switching frequency and the approach speed.

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

1) A snap-action contact element has a contact element which opens or closes regardless of its actuation speed.
2) A slow-action contact element has a contact element which opens and closes depending on its actuation speed.

Customized versions

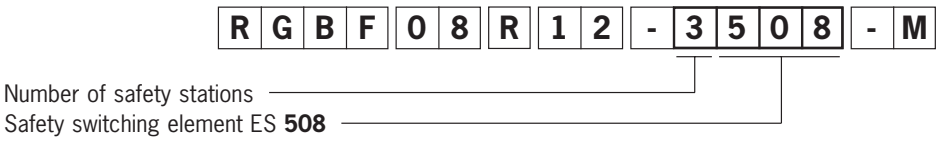
Mixed contact assembly (only in multiple limit switches with 12 and 16 mm plunger spacing)

For specific functions on machines and systems, e.g. end of travel limit switching, EMERGENCY STOP or similar, it is necessary that one or more stations on multiple limit switches are equipped with safety switching elements. See the ordering example below for information on the specification of such multiple limit switches.

The following requirements are to be observed:

- On **upright** multiple limit switches (e.g. RGBF...) it is necessary to start with the safety station/s on the flange side.
- On **horizontal** multiple limit switches (e.g. RGBF...) it is necessary to start with the safety station/s on the left side (view on the plunger side).
- If several safety stations are to be fitted, these must be fitted directly one after the other.
- The remaining stations are equipped with standard switching elements ES 502 E.

Ordering example: Multiple limit switch series RGBF, 8 roller plunger, plunger spacing 12 mm,
stations 1 to 3 with safety switching elements ES 508,
remaining stations with standard switching elements ES 502 E



If a multiple limit switch of mixed assembly cannot be specified with this ordering code, we would ask you to state your order in plain English.

Multiple limit switches with 12 mm plunger spacing can **be assembled on request** with a mixture of **mechanical** and **inductive** switching elements.

Approach speed and performance with roller plungers

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

Low temperature

The selection of specially tested materials permits operation at ambient temperatures down to -30 °C.

Interchangeable plunger guide
Exterior diaphragm

Resinous lubricating coolants and the processing of abrasive materials can result in failure of the plunger function in particularly difficult conditions. Proven series, shown on pages 20 to 23, minimizes downtimes and reduces repair costs.

Additional Products

Inductive multiple limit switches with long mechanical life

EUCHNER offers inductive multiple limit switches as an alternative to precision multiple limit switches. There are five different designs available for various areas of application with 8, 12 or 16 mm proximity switch spacing respectively. The dimensions of these versions are such that they can be interchanged with precision multiple limit switches.

The crucial advantages

- Very long mechanical life
- High switching frequency
- Contact-less, non-reactive switching
- Safe switching under extreme conditions
- Resistant to strong vibrations, heavy dirt and aggressive fluids

Trip rails / trip dogs

U-trip rails
enable the adjustment of the trip dogs from the switch side. The trip dogs can be installed and adjusted quickly and easily in any location.

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

G-trip rails
enable the adjustment of trip dogs from the side opposite the switch. They are made of steel and are protected from corrosion by a special surface treatment. Trip rails can be ordered pre-assembled or as a component for self-assembly.

G-trip dogs
are designed for use in G-trip rails. The trip dogs are clamped in the trip rail by a hexagon socket screw with spring washer. This washer locks the trip dog in place even when the trip rail is in a vertical position and allows precise adjustment.