

Correct use

Precision multiple limit switches according to DIN 43697 are used for positioning and controlling machines and in industrial installations.

For general applications, snap-action switching elements ES 502E are used. In safety circuits, only the switching elements ES 508E and ES 514 with positively driven NC contacts are allowed.

Correct use includes compliance with the relevant requirements for installation and operation, in particular

- ▶ EN 60204-1, electrical equipment of machines
- ▶ EN 954-1, Safety of machinery. Safety related parts of control systems. General principles for design, Annex B
- ▶ EN ISO 14121, Safety of machinery. Principles for risk assessment.

Incorrect use

Precision multiple limit switches with switching element ES 502E (snap-action switching element not positively driven) must not be used in safety circuits.

⚠ Safety precautions ⚠

In safety circuits, only the switching elements ES 508E or ES 514 with positively driven NC contacts are allowed.

Precision multiple limit switches in safety circuits provide a personal protection function. Incorrect installation or tampering can lead to severe injuries to personnel.

⚠ Precision multiple limit switches in safety circuits must **not** be bypassed (bridging of contacts), removed or otherwise rendered ineffective.

⚠ Where precision multiple limit switches are used in safety circuits, switches and trip dogs must be fitted in such a way that they are adequately secured against movement.

To meet these requirements:

- ▶ The fixings must be reliable and must also require the use of a tool to undo them.
- ▶ The use of the slot must be limited to the initial adjustment.
- ▶ Precautions must be taken to ensure that there is no movement after adjustment (e.g. using bolts or dowel pins).

The letters on the rating plate represent the product's year of manufacture.

Function

Precision multiple limit switches possess several switching elements arranged in a row.

The switching elements are actuated by means of plungers. The plunger spacing is standardized according to DIN 43697.

Different plunger types and trip dogs are used depending on the application (operating point accuracy and approach speed).

In general applications the plunger is actuated by trip dogs in accordance with DIN 69639 which are mounted with an interference fit in trip rails in accordance with DIN 69638.

Switching elements / pin assignment

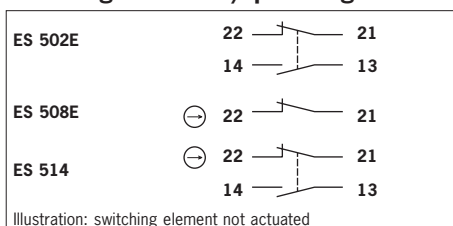


Fig. 1: Switching elements and pin assignment

Mounting

⚠ This unit is to be assembled by authorized personnel only.

⚠ Precision multiple limit switches must not be used as an end stop.

⚠ When used in safety circuits, positively mount trip dogs on the machine/safety guard so that they cannot be detached.

⚠ It is imperative that dimension $\phi_{4-0.5}$ (distance from switch reference surface to trip dog, see Figure 5) is maintained in safety circuits to ensure safe contact opening.

Fit precision multiple limit switches so that

- ▶ connection cables and plug connectors are not damaged by moving parts of the machine.
- ▶ sealing is ensured on cable entry through the base.

Protection against environmental influences

Safety venting valves are used to equalize the pressure to protect against the pumping action of the plunger. They must not be sealed with paint.

- ▶ Mask plunger, plunger guide, safety valves and rating plate during painting work!

Electrical connection

⚠ Electrical connection must be performed by authorized personnel only.

The following applies for switches with UL approval:

For use and applications as per the requirements of ϕ_{UL} , a class 2 power supply or a class 2 transformer according to UL1310 or UL1585 must be used.

Connection cables for precision multiple limit switches installed at the place of use must be separated from all moving and permanently installed cables and un-insulated active elements of other parts of the system which operate at a voltage of over 150 V. A constant clearance of 50.8 mm must be maintained. This does not apply if the moving cables are equipped with suitable insulation materials which possess an identical or higher dielectric strength compared to the other relevant parts of the system.

When switches are used with indicators, the voltage range printed on the indicator housing must be observed (connection see Figure 7).

- ▶ Open switch cover
- ▶ Conductor cross-section 0.34 ... 1.5 mm²
- ▶ For switch type RG in LED version with switching element ES514 and plunger spacing 12 mm the following applies: Make LED connections to the switching element (connection see Figure 7)
- ▶ For pin assignment see Figure 1
- ▶ Fit EUCHNER cable gland M25x1.5 or similar quality cable gland with captive O-ring
- ▶ Seal cable carefully. Sealing ring must be matched to the diameter of the cable
- ▶ Tighten screws for connections to the switching element to 0.6 Nm
- ▶ Close switch cover and tighten cover screws to 1.5 Nm.

Setup

- ▶ Mechanical function test
- ▶ Actuate plunger and check the switching function.

- ▶ Electrical function test

▶ Start the machine

▶ Check correct function

▶ In safety circuits, check the safety function:

Machine must **stop** when the safety switching element is actuated.

Machine must **not start** when the safety switching element is actuated.

Service and inspection

No servicing is required, but **regular inspection** of the following is necessary to ensure trouble-free long-term operation:

- ▶ correct switching function
- ▶ secure mounting of components
- ▶ precise adjustment of trip dog in relation to multiple limit switch
- ▶ dirt and wear
- ▶ sealing of cable entry
- ▶ loose cable connections.

⚠ 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.

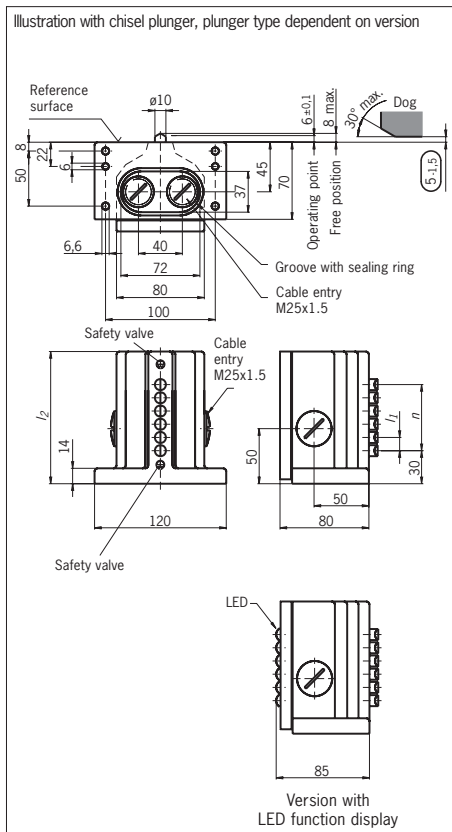
The multiple limit switches in safety circuits must be replaced when the max. number of operating cycles is reached.

Exclusion of liability under the following circumstances

- ▶ if the unit is not used for its intended purpose
- ▶ non-compliance with safety regulations
- ▶ installation and electrical connection not performed by authorized personnel
- ▶ failure to perform functional checks.

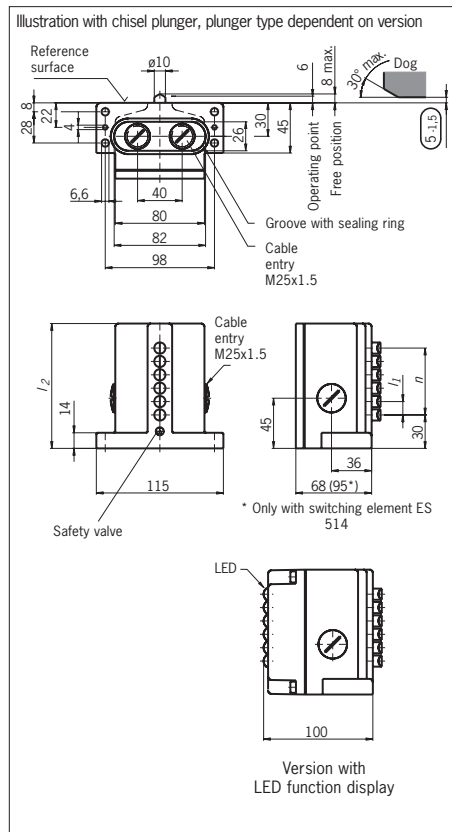
Technical data

Parameters	Value
Housing material	Anodized die-cast aluminum/ anodized sand-cast aluminum (see dimension drawings)
Plunger material	Stainless steel
Degree of protection to IEC 60529	IP 67
Mech. operating cycles	ES502E / ES508E 30x10 ⁶ ES514 1x10 ⁶
Switching frequency	ES502E 300 min ⁻¹ ES508E / ES514 50 min ⁻¹
Ambient temperature	-5 ... +80°C
Installation position	Any
Approach speed, max.	
Plunger	Chisel D 40 m/min Roller R (slide bearing) 80 m/min Roller B (ball bearing) 120 m/min Dome W/ball K 10 m/min
Approach speed, min.	0.01 m/min
Actuating force	ES502E ≥ 20 N
with switching element	ES508E ≥ 15 N ES514 ≥ 30 N
Switching element	
ES502E	1 NO + 1 NC
ES508E	1 positively driven contact
ES514	1 NO + 1 positively driven contact
Switching principle	
ES502E / ES514	Snap-action switching element
ES508E	Slow-action switching element
Switching hysteresis	ES502E 0.8 mm ES514 0.6 mm
Contact material	Silver alloy, gold flashed
ES502E / ES508E / ES 514	
Connection type	Screw terminals
Conductor cross-section	0.34 ... 1.5 mm ²
Rated insulation voltage	U _i = 250 V
Rated impulse withstand voltage	U _{imp} = 4 kV
Utilization category switching element according to IEC 60947-5-1	
ES502E	AC-12 250 V 10 A
ES502E / ES508E	AC-15 230 V 6 A DC-13 24 V 6 A
ES514	AC-15 230 V 2.5 A DC-13 24 V 6 A
Switching current, min.	
at DC 24 V	ES514 5 mA ES508E 10 mA ES502E 10 mA
at DC 12 V	
Conv. thermal current I _{th}	10 A
Short circuit protection according to IEC 60269-1 (control circuit fuse)	ES502E / ES508E 10 A gG ES514 6 A gG
Indicator LED with reverse polarity protection with ES502E / ES508E	LE060 AC/DC 12 - 60 V LE110 AC 110 V ±15% LE220 AC 220 V ±15%
For design RG in LED version with switching element ES514 and plunger spacing 12 mm	LE024GE DC24 V ± 10%



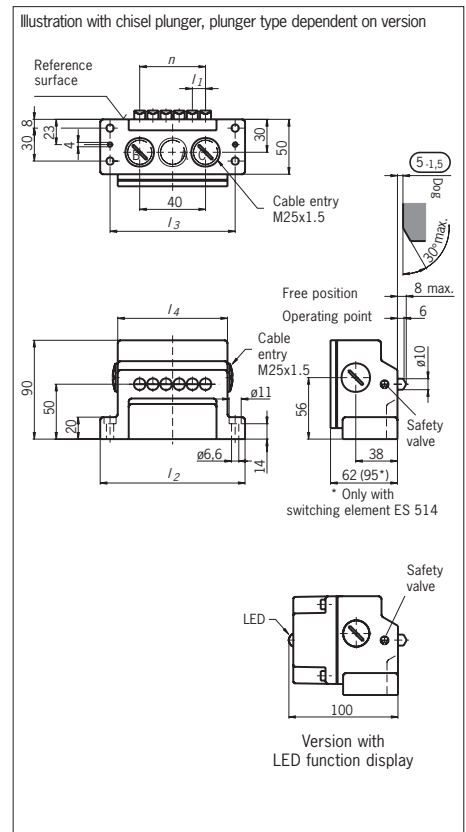
n Number of plungers	Plunger spacing				
	l ₁ = 12		l ₁ = 16		
	l ₂	Housing material	l ₂	Housing material	
2	70	Aluminum die-cast anodized	70	Aluminum die-cast anodized	
3	80		90		
4	90		105		
5	105		120		
6	120		140		
8	140		170		
10	170		200		Aluminum
12	200		240		sand-cast
14	240	-	-	-	
16	240	anodized	-	-	

Figure 2: Dimension drawing RG...



n Number of plungers	Plunger spacing				
	l ₁ = 12		l ₁ = 16		
	l ₂	Housing material	l ₂	Housing material	
2	70	Aluminum die-cast anodized	70	Aluminum die-cast anodized	
3	70		82		
4	82		96		
5	96		112		
6	112		130		
8	130		160		
10	160		192		Aluminum
12	179		226		sand-cast
14	208	256	anodized		
16	226	anodized	288	-	
18	256	-	-	-	
20	288	-	-	-	

Figure 3: Dimension drawing GS...



n Number of plungers	Plunger spacing								Housing material
	l ₁ = 12				l ₁ = 16				
	l ₂	l ₃	l ₄	Cable entry	l ₂	l ₃	l ₄	Cable entry	
2	84	66	52		84	66	52	A	Aluminum sand-cast anodized
3	84	66	52	A	100	82	68		
4	100	82	68		114	98	84		
5	114	98	84		132	114	100		
6	132	114	100		148	130	116		
8	148	130	116		180	162	148		
10	180	162	148	B	212	194	180	B	
12	199	178	167	+	244	226	212	+	
14	228	210	196	C	276	258	244	C	
16	244	226	212		308	290	276		
18	276	258	244		340	322	308		
20	308	290	276		-	-	-	-	

Figure 4: Dimension drawing GL...

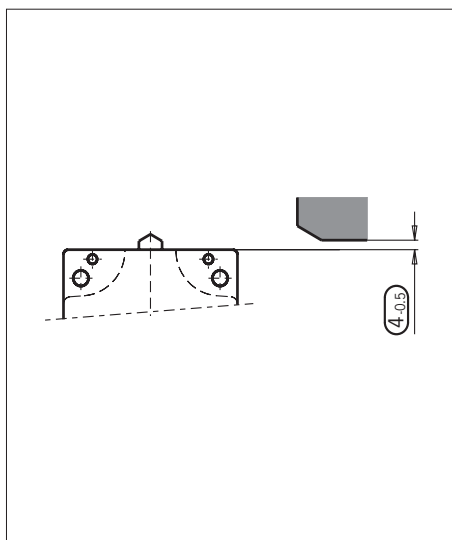


Figure 5: Mounting RG/GS/GL...-508 and RG/GS/GL...-514 for safety circuits

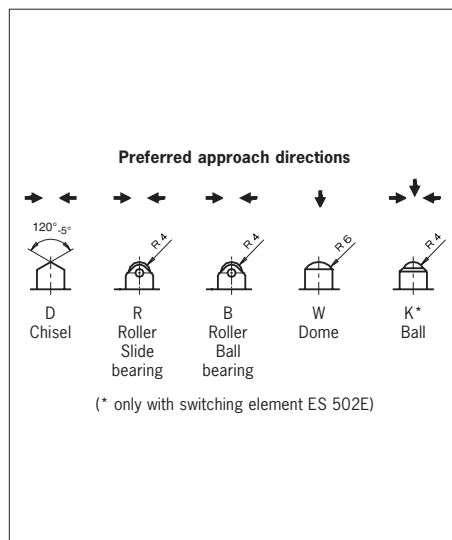


Figure 6: Plungers and approach directions

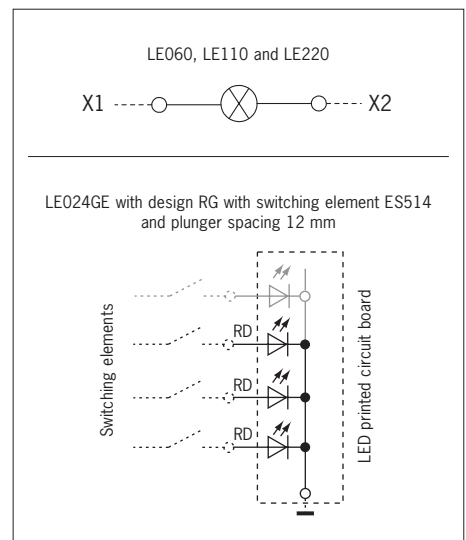


Figure 7: LED connection