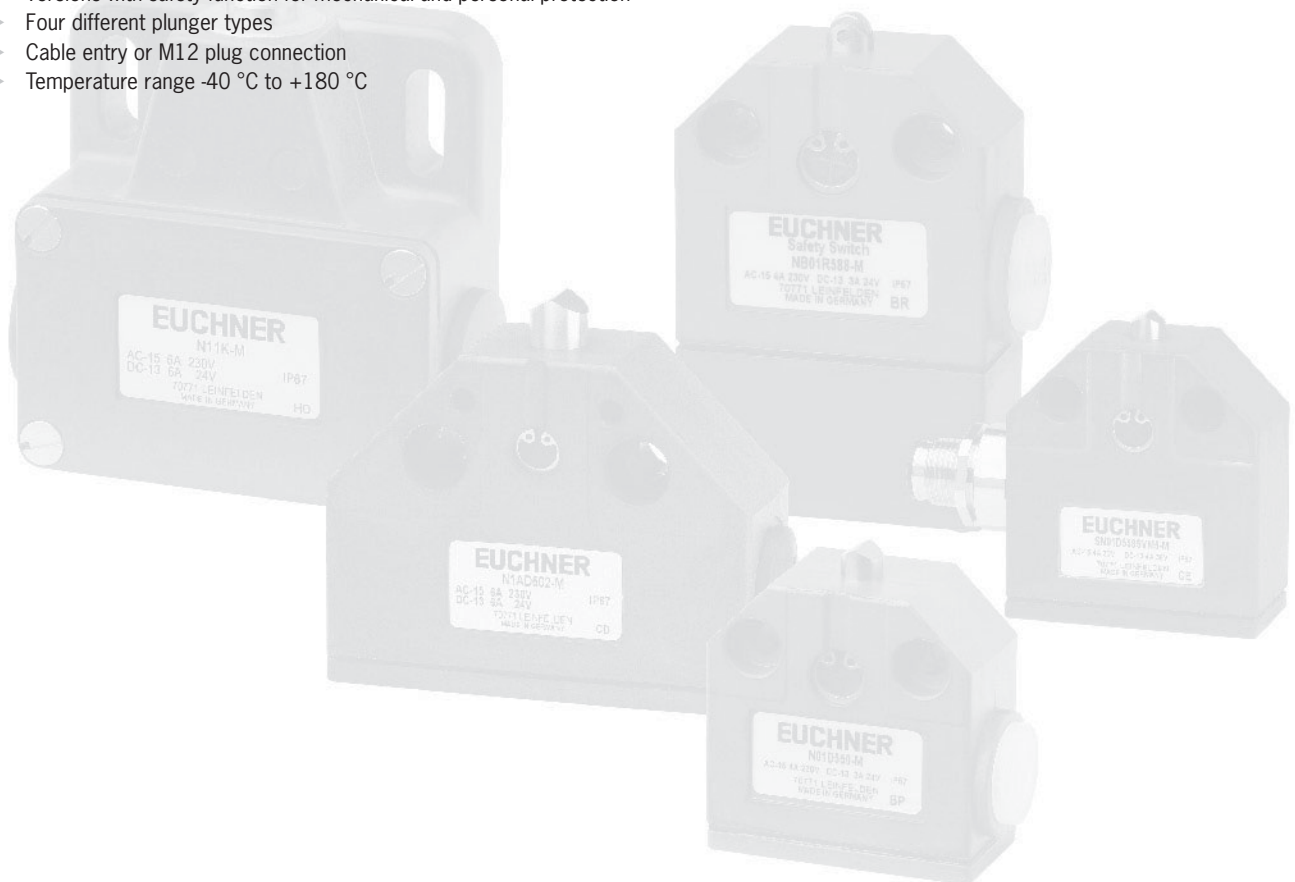


Precision single limit switches

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

Features

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



Precision single limit switches

► Plunger material stainless steel



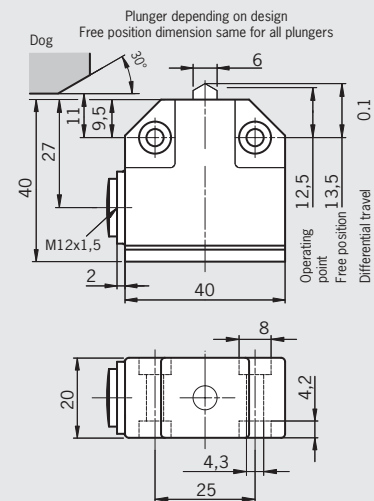
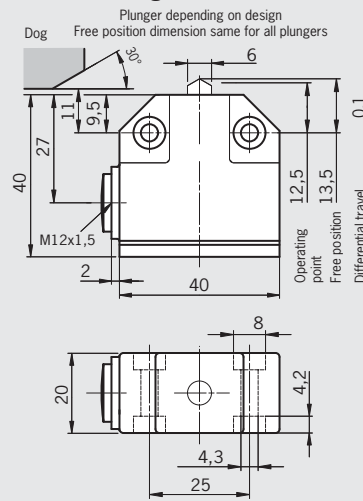
For temperatures up to 180 °C



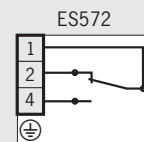
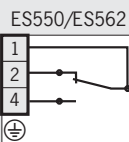
Design N01
Cable entry M12 x 1.5

Design N01
Cable entry M12 x 1.5

Dimension drawings



Wiring diagrams



Technical data

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

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

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

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

Ordering table

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

4) CCC approval only for switching element ES550

Precision single limit switches

For temperatures up to 125 °C

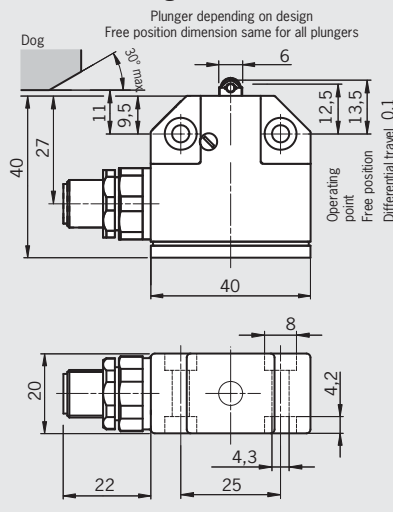


► Plunger material stainless steel

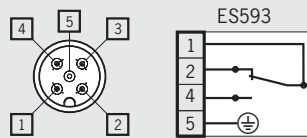
Design N01
M12 plug adjustable, 4-pin + PE



Dimension drawings



Wiring diagrams



Technical data

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

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

Ordering table

Plunger type		ES550
Chisel plunger		-
Roller plunger		128070 N01R593-MC2445
Ball plunger		-



Precision single limit switches

► Plunger material stainless steel

For plug connector with LED display



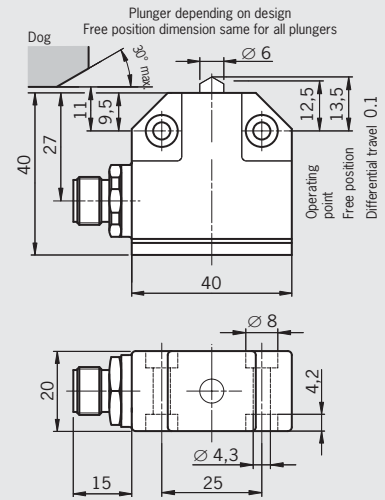
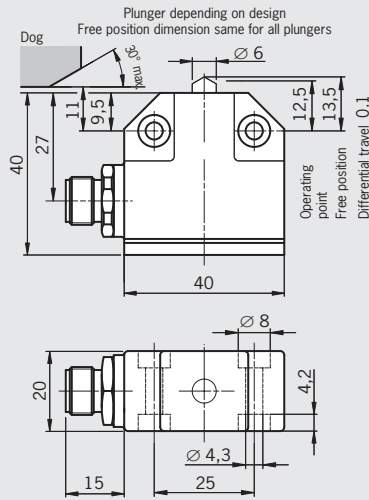
For operating voltage 230 V



Design N01
M12 plug, 4-pin

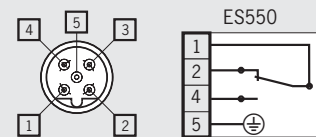
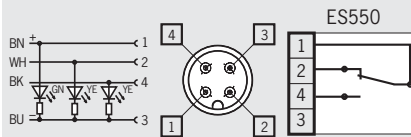
Design N01
M12 plug, 4-pin + PE

Dimension drawings



⚠ To achieve the positively driven travel, the dimension (11.0.3) must be maintained by the trip dog. Actuating elements such as cam approach guides must be positively mounted in accordance with EN ISO 14119, i.e. riveted, welded or otherwise secured against becoming loose.

Wiring diagrams



Technical data

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

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

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

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

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

Ordering table

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

With safety function



Larger connection space, robust screw terminal

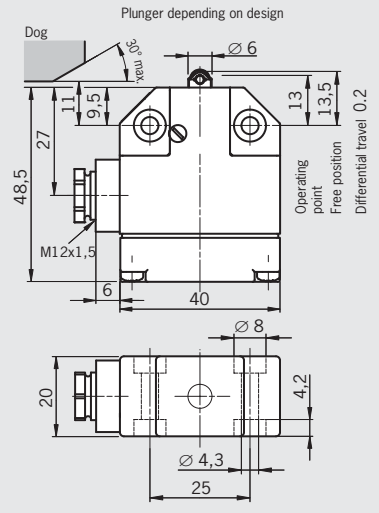
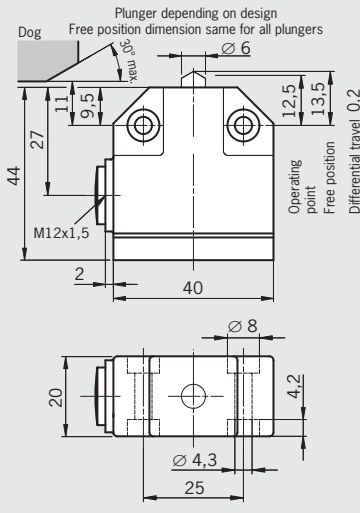
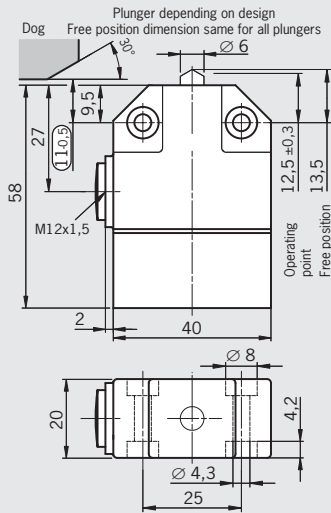


Design NB01
Cable entry M12 x 1.5

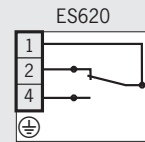
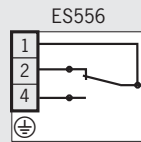
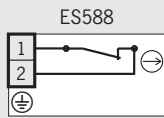
Design NB01
Cable entry M12 x 1.5

Design NB01
Cable gland M12 x 1.5

Dimension drawings



Wiring diagrams



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

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

Precision single limit switches

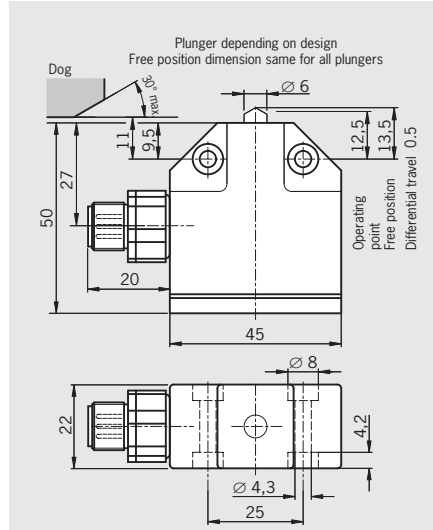
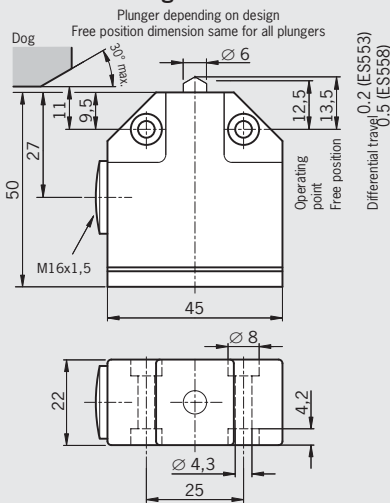
► Plunger material stainless steel



Design SN01
Cable entry M16 x 1.5

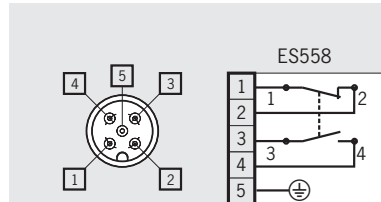
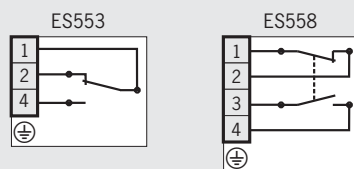
Design SN01
M12 plug adjustable, 4-pin + PE

Dimension drawings



⚠ To achieve the positively driven travel, the dimension (12.0.5) must be maintained by the trip dog. Actuating elements such as cam approach guides must be positively mounted in accordance with EN ISO 14119, i.e. riveted, welded or otherwise secured against becoming loose.

Wiring diagrams



Technical data

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

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

Ordering table

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

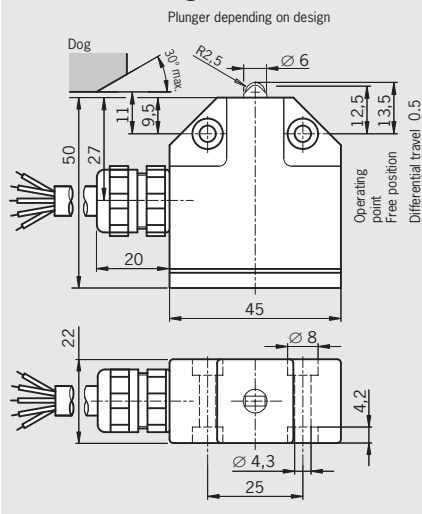
4) CCC approval only for switching element ES553



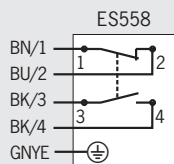
Design SN01

Connecting cable, length 2 m

Dimension drawings



Wiring diagrams



Die-cast aluminum, anodized

IP 67

-5 ... +80

Roller

± 0.05

50

0.01

15

ES558

1 NO + 1 NC

Snap-action switching contact

1 x 10⁷ operating cycles

2.5

250

AC-15 U₀ 230 V I₀ 4 A

DC-13 U₀ 24 V I₀ 3 A

Silver

10

5

4

PUR cable 5 x 0.5 mm²

ES558

-

090515

SN01R558X2000-M

-



Precision single limit switches

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

With safety switching element



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



Design N1A

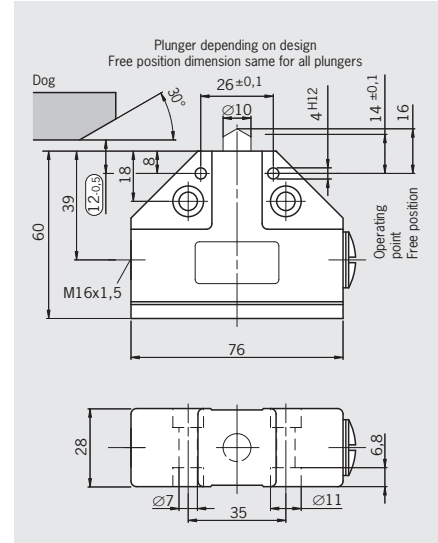
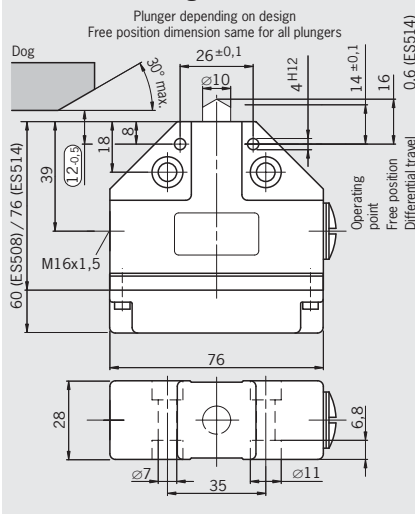
Cable entry M16 x 1.5

Design N1A

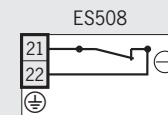
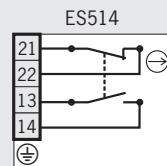
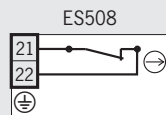
Cable entry M16 x 1.5



Dimension drawings



Wiring diagrams



Technical data

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

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

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

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

Ordering table

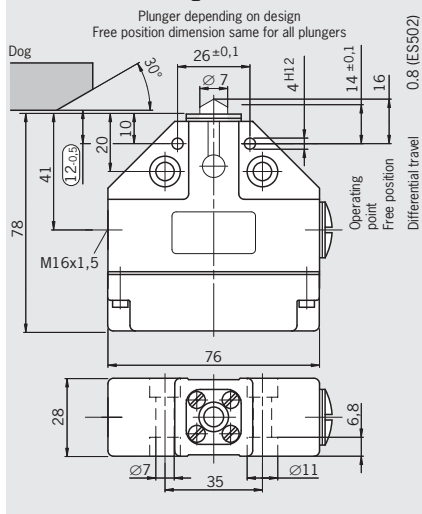
Plunger type	ES508	ES514	ES508
Chisel plunger	083886 N1AD508-M	083849 N1AD514-M	103237 N1AD508-MC2222
Roller plunger R = 4.0 mm	083887 N1AR508-M	078487 N1AR514-M	103221 N1AR508-MC2222
Ball plunger	-	-	-
Dome plunger	087205 N1AW508-M	083850 N1AW514-M	103222 N1AW508-MC2222

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

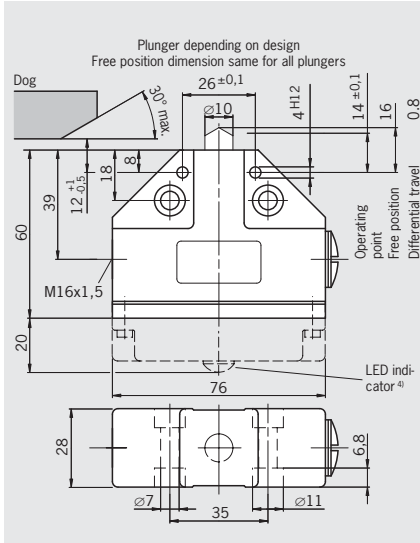


Design N1A
Cable entry M16 x 1.5

Dimension drawings



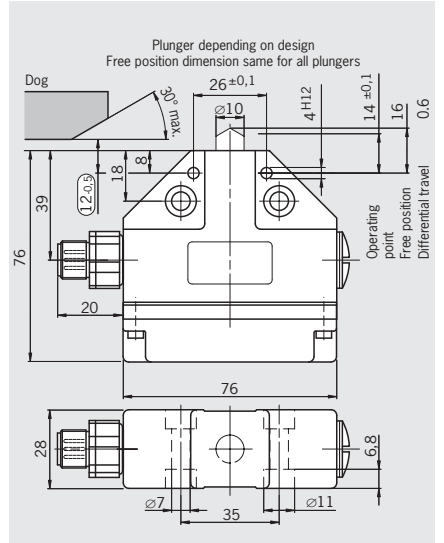
Design N1A
Cable entry M16 x 1.5



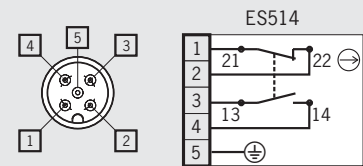
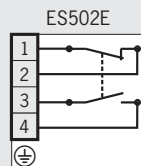
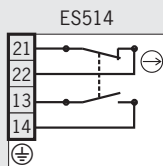
With safety switching element



Design N1A
M12 plug adjustable, 4-pin + PE



Wiring diagrams



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

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

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

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

Precision single limit switches

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



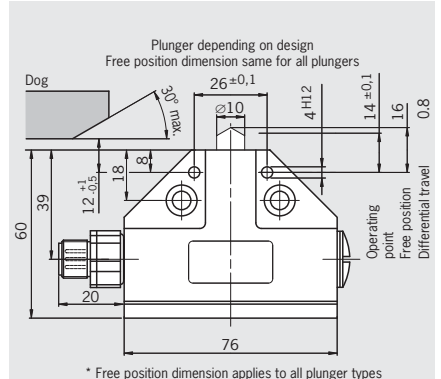
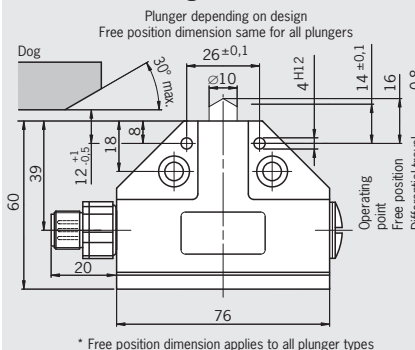
For plug connectors with LED indicator



Design N1A
M12 plug adjustable, 4-pin + PE

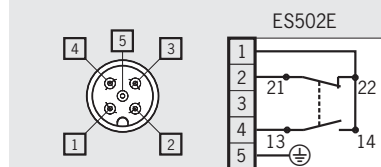
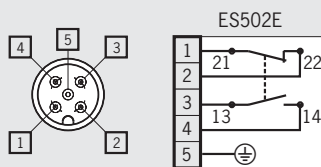
Design N1A
M12 plug adjustable, 4-pin + PE

Dimension drawings



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

Wiring diagrams



Technical data

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

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

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

Ordering table

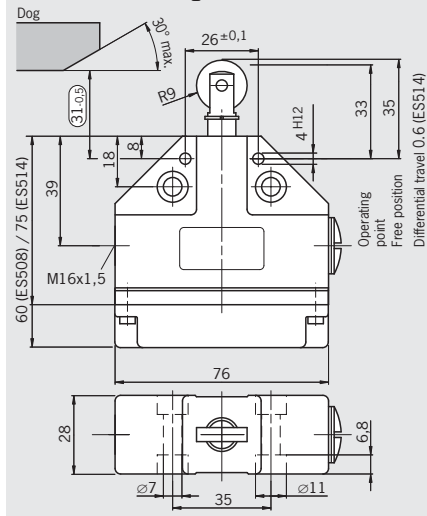
Plunger type	ES502E	ES502E
Chisel plunger	087487 N1AD502SVM5-M	091471 N1AD502SVM5-MC1883
Roller plunger R = 4.0 mm	087488 N1AR502SVM5-M	-
Ball plunger	087489 N1AK502SVM5-M	087496 N1AK502SVM5-MC1883
Extended roller plunger	-	-

With safety switching element

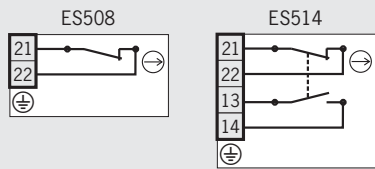


Design N1A, extended roller plunger
Cable entry M16 x 1.5

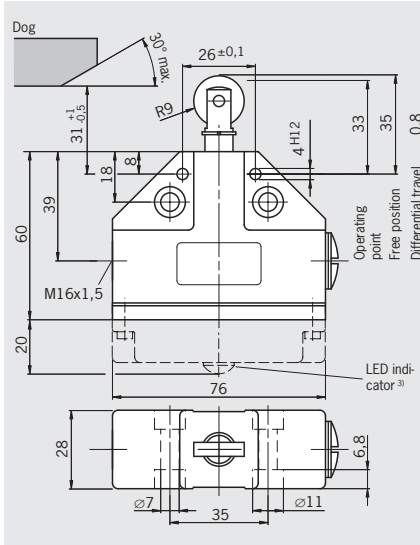
Dimension drawings



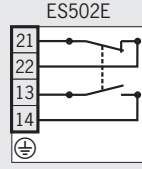
Wiring diagrams



Design N1A, extended roller plunger
Cable entry M16 x 1.5



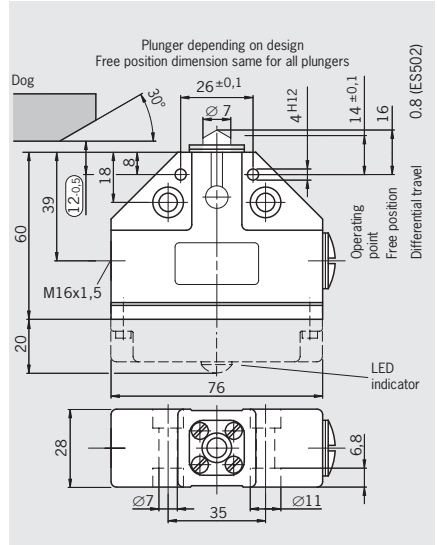
Wiring diagrams



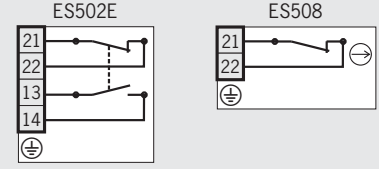
With exterior diaphragm



Design N1A
Cable entry M16 x 1.5



Wiring diagrams



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

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

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

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

Precision single limit switches

► Plunger material stainless steel

EAC

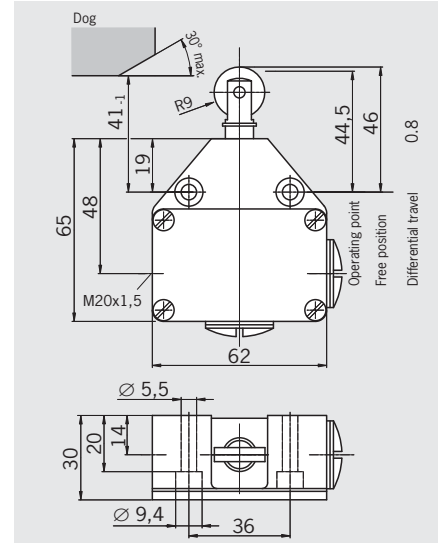
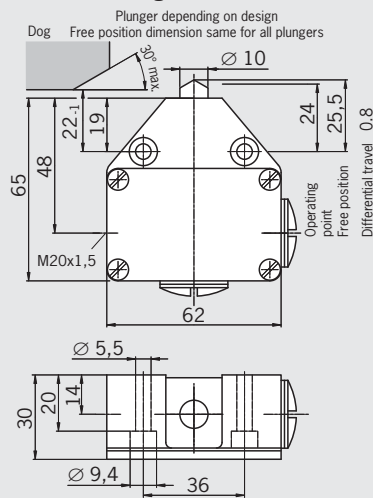
EAC



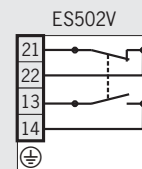
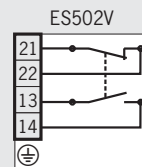
Design N10
Cable entry M20 x 1.5

Design N10, extended roller plunger
Cable entry M20 x 1.5

Dimension drawings



Wiring diagrams



Technical data

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

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

Ordering table

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

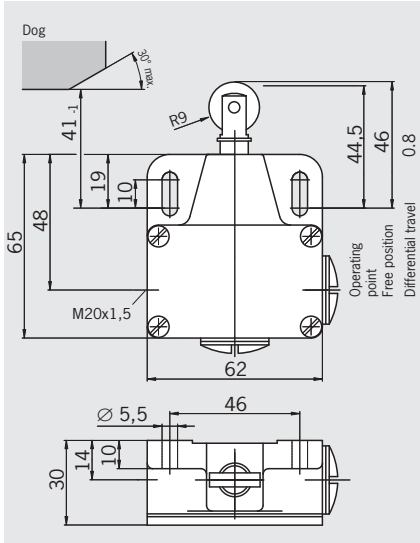
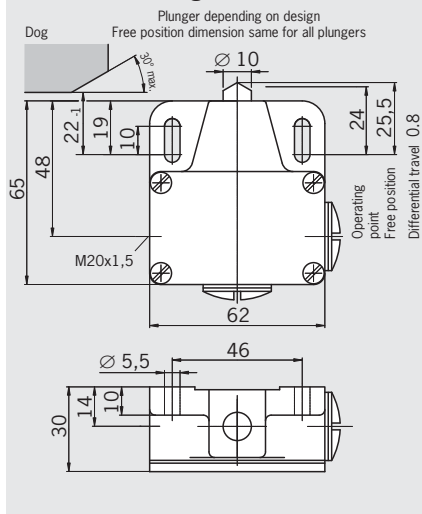
EAC

EAC

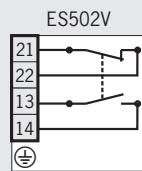
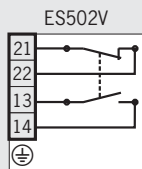
Design N11
Cable entry M20 x 1.5

Design N11, extended roller plunger
Cable entry M20 x 1.5

Dimension drawings



Wiring diagrams



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

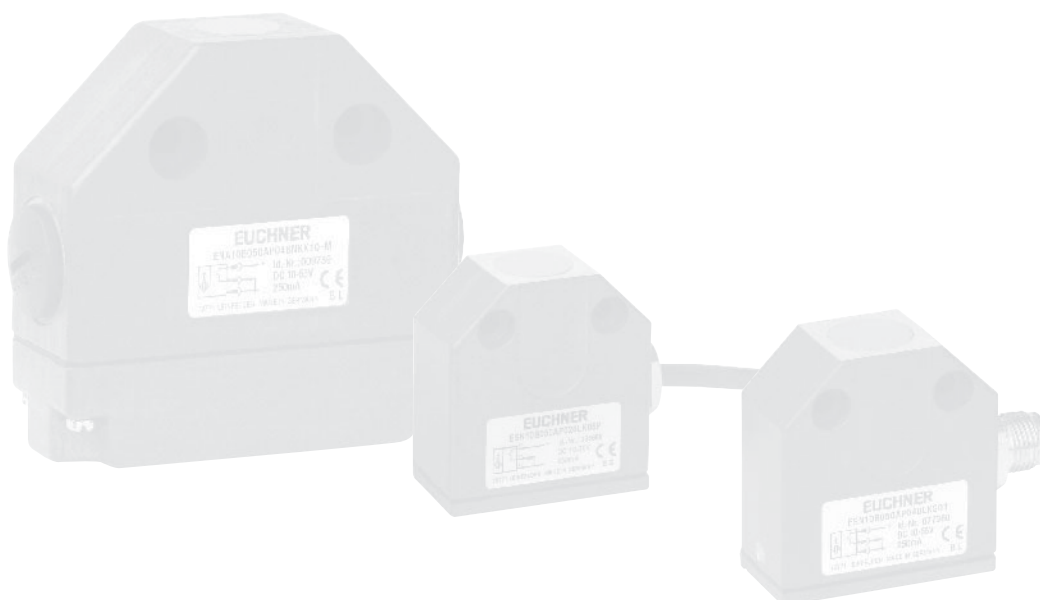
ES502V	ES502V
086298 N11D-M	-
086313 N11R-M	-
088585 N11K-M	-
-	086299 N11RL-M

Inductive single limit switches

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

Features

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



Inductive single limit switch design ENA, DC version

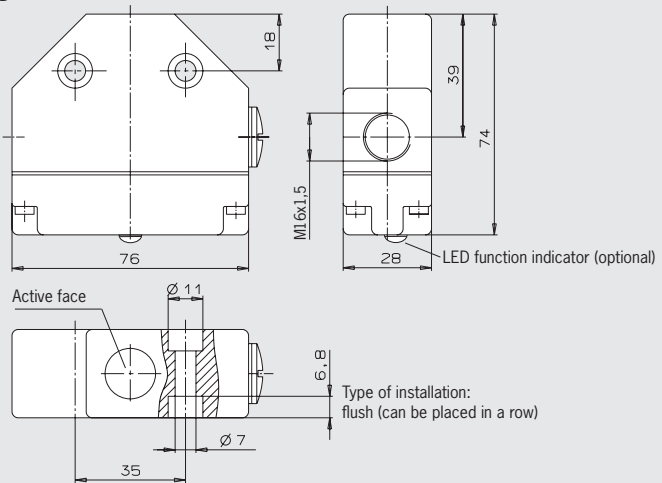


- ▶ Housing according to DIN 43693
- ▶ Rated operating distance 5 mm
- ▶ LED function display optional

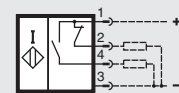


Design ENA
Cable entry M16 x 1.5

Dimension drawings



Wiring diagrams



DC NO + NC contacts, PNP

Technical data

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

Ordering table

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

Inductive single limit switch design ESN, DC version



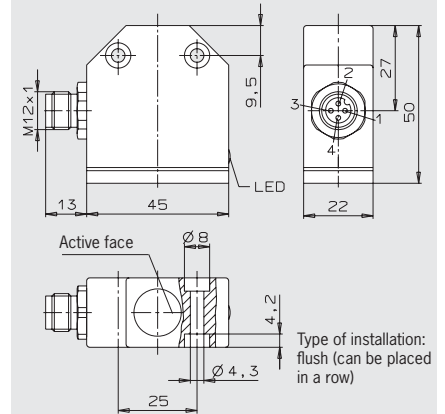
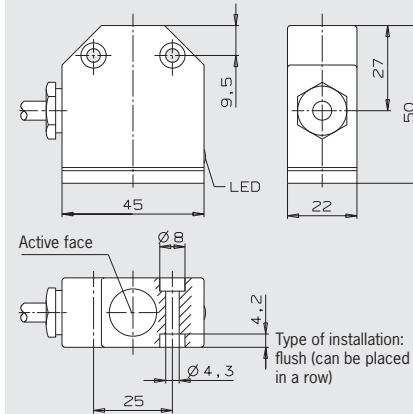
- ▶ Compact design with connecting cable or plug connector
- ▶ Rated operating distance 5 mm
- ▶ LED function display



Design ESN
Connecting cable 5 m PUR

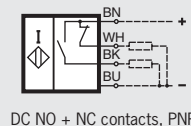
Design ESN
Plug connector M12, 4-pin

Dimension drawings

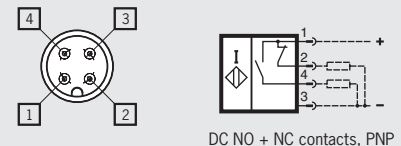


Plug connector see page A-44 to A-46

Wiring diagrams



DC NO + NC contacts, PNP



DC NO + NC contacts, PNP

Technical data

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

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

Ordering table

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

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

Round connector M12

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

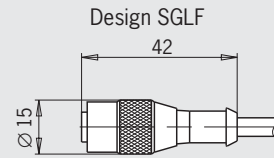
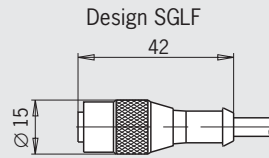
Straight plug connector M12

4-pin / 4-pin + PE

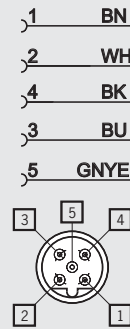
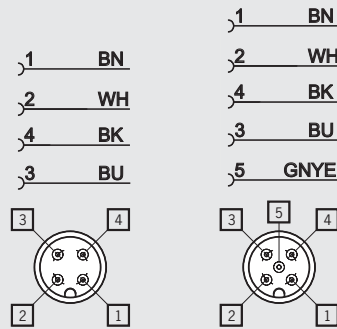
Straight plug connector M12, coded

4-pin + PE

Dimension drawings



Wiring diagrams



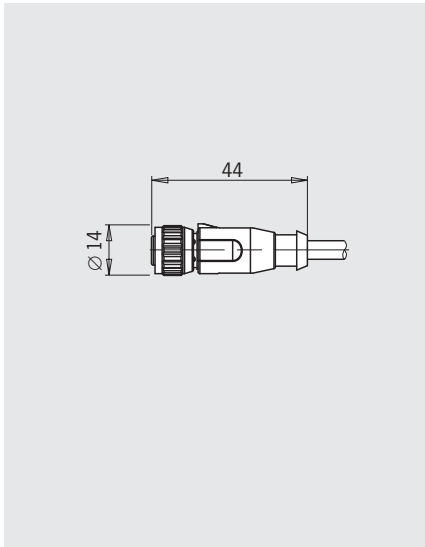
Technical data

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

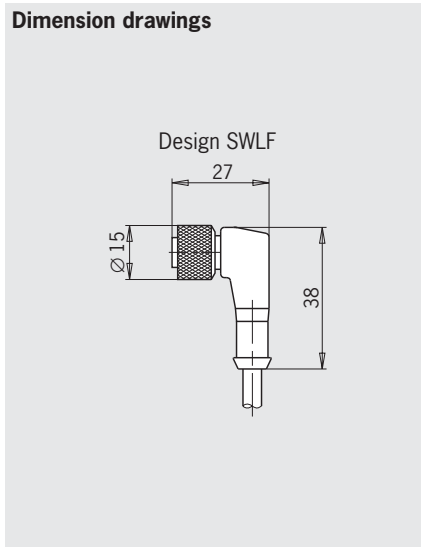
Ordering table

	035613 CM12F04-04X034PU05,0-GA-035613	073461 CM12F05-05X050PU05,0-GA-073461	045524 C-M12F05-05XDIFPV0,50-GA-045524
Plug connector M12, without LED, connecting cable 5 m			
Plug connector M12, without LED, connecting cable 10 m	-	-	-
Plug connector M12, with three LEDs, connecting cable 5 m	-	-	-

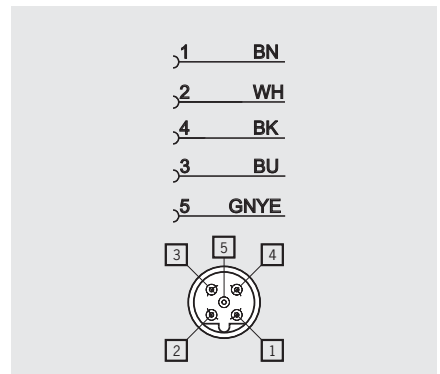
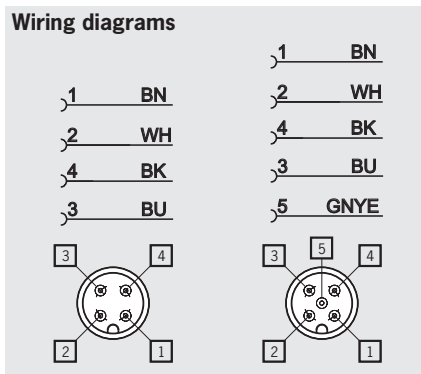
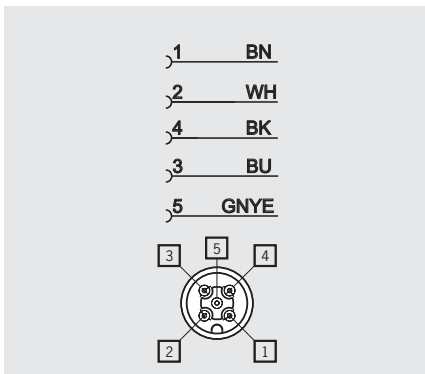
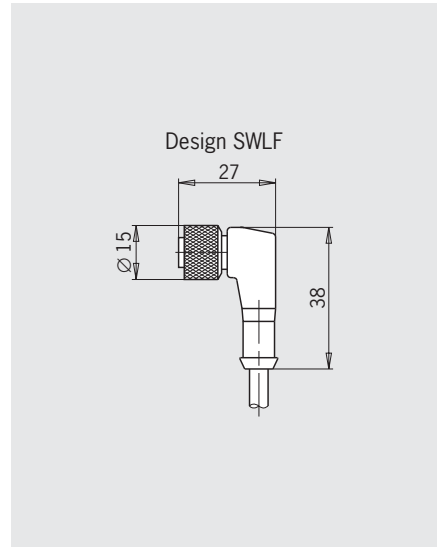
Straight plug connector M12, A-coded
4-pin + PE



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



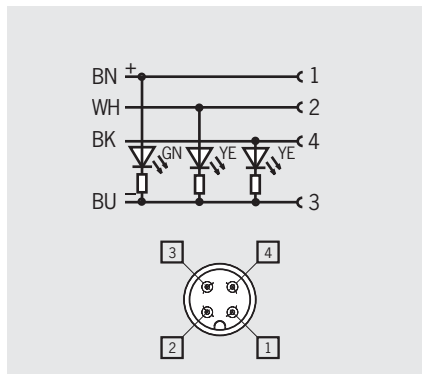
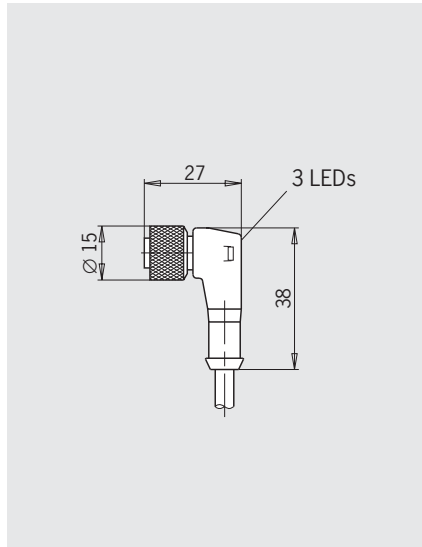
Right-angle plug connector M12, coded
4-pin + PE



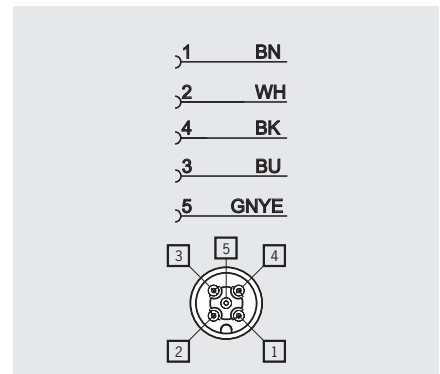
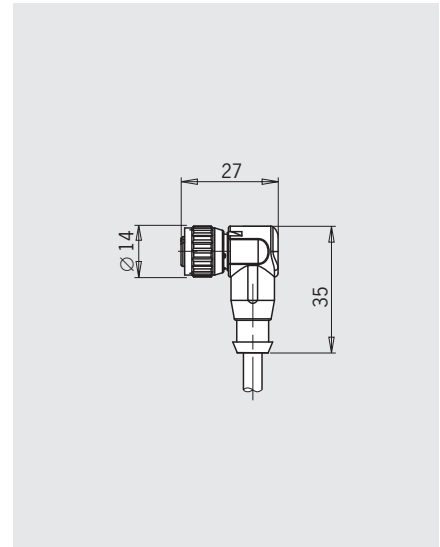
4+PE	4	4+PE	4+PE
TPE	TPU self extinguishing	TPU self extinguishing	TPU self extinguishing
PBT GF, LIL 94	TPU self extinguishing	TPU self extinguishing	TPU self extinguishing
TPE (high-temperature PUR)	PUR, halogen free, flame retardant	PUR, halogen free, flame retardant	PVC, halogen-free, flame retardant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

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

Plug connector M12 with three LEDs 4-pin



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



Technical data

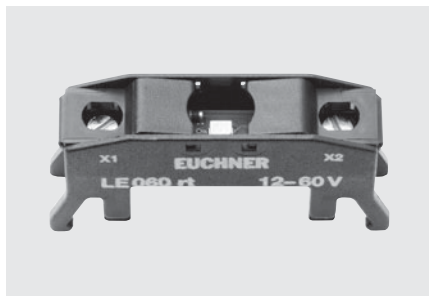
Number of pins		4	4+PE
Housing material	Grip	TPU self extinguishing	TPE
	Contact carrier	TPU self extinguishing	PBT GF, LIL 94
Sheath material		PUR, halogen-free, flame retardant	TPE (high-temperature PUR)
Sheath color		Black	Black
Degree of protection acc. to IEC 60529 (inserted and screwed tight)	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

Ordering table

Plug connector M12, without LED, connecting cable 5 m	-	136962 C-M12F05-05X034PU05,0-GA-136962
Plug connector M12, without LED, connecting cable 10 m	-	136963 C-M12F05-05X034PU10,0-GA-136963
Plug connector M12, with three LEDs, connecting cable 5 m	041091 CM12F04-04X034PU05,0-GA-041091	-

LED function display

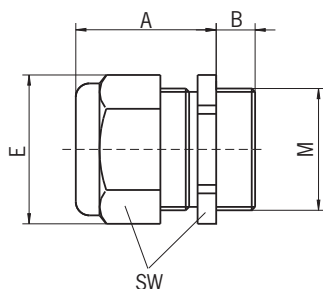
On request, versions with voltage ranges AC 110/230 V are available.



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

Cable glands

Material nickel-plated brass, degree of protection IP 67



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

Additional products

Trip rails/trip dogs

U-trip rails

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

U-trip dogs

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



For detailed information see catalog for multiple limit switches.

Appendix

Terms and explanations

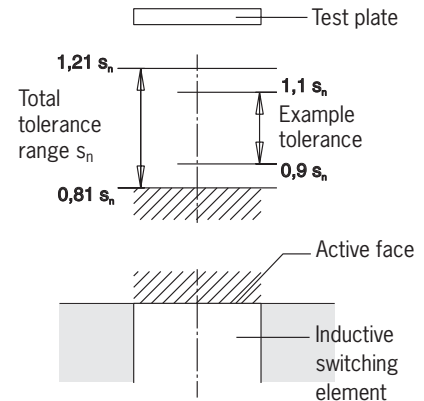
Rated operating distance s_n

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

Assured operating distance s_a

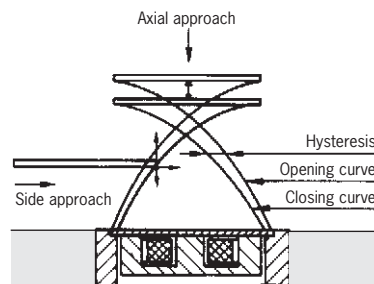
The assured operating distance is the operating distance at which correct operation of the inductive switching element is guaranteed within the permissible operating conditions (temperature and voltage).

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



Hysteresis H

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



Repeat accuracy R

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

Operating voltage U_B

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

Voltage drop U_d

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

Rated operating current I_e

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

Off-state current I_r

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

Minimum operating current I_m

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

Switch-on current I_k

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

Switching frequency f

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

Ambient temperature T

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

Temperature drift Δs

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

Suppressor circuits

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

Short circuit and overload protection

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

Transient protection

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

Wire break safety

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

Reverse polarity protection

Protection against reverse polarization of the operating voltage.



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