

Capacitive proximity switches



CONTRINEX



Capacitive proximity switches

Introduction

Capacitive proximity switches are used in machines, installations and vehicles for monitoring the levels of liquids, pastes and bulk material. These materials can even be detected through non-metallic dividing walls. In addition, capacitive proximity switches are suitable as limit switches, contact-free position switches, for monitoring and positioning, as pulse generators for counting purposes, distance and speed measurement, and much more.

Operating principle

The electrodes at the device's sensing face permit the sensor to detect the dielectric conditions in its close surroundings. Depending on the distance between the target (or material) to be detected and the capacitive proximity switch, the capacitance in the measuring zone changes. The capacitance is dependent not only on the above-mentioned distance, but also on the dielectric constant (ϵ_r) of the target, as well as its shape. As the proximity switch approaches the target, the capacitance increases. When the set threshold value is reached, the transistor-oscillator is activated. By means of the built-in electronics, a changeable, electrical current is generated which, depending on the execution of the device, is available as a linear current signal or as a binary voltage at the output.

Using capacitive proximity switches, electronic circuits and PLCs, as well as relays or contactors can be controlled directly.

Capacitive proximity switches are enclosed in synthetic or metal housings and potted in epoxy resin. They are, moreover, insensitive to dirt and shock.

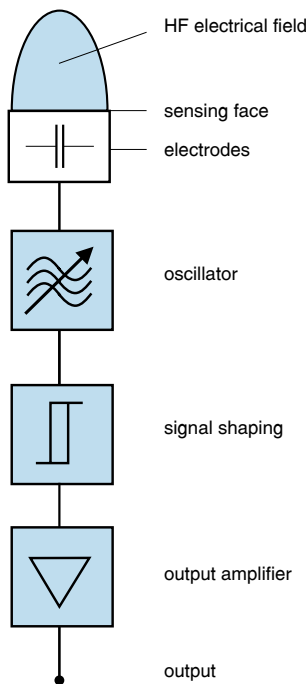


Fig. 1: operating principle

Delivery program

The Contrinex delivery program consists of 4-wire devices in sizes M12, M18 and M30 (PNP or NPN, with changeover outputs) as well as 2-wire switches (UC, NO) in sizes M18 and M30.

Series and parallel connection

Capacitive 2-wire proximity switches with binary output can be used in series or parallel connection, similar to mechanical contacts. Attention has to be paid to the device-specific voltage drop, i.e. the residual voltage U_d , which multiplies in the case of series connection according to the number of devices. In the case of parallel connection of sensors with thyristor output, the first switching output takes the whole load current.

Adjustment of the operating distance

Equipped with a 20-turn potentiometer, these Contrinex switches allow for adjustment of the operating distance, which can be either longer than or shorter than the rated operating distance. Under favorable conditions, an operating distance of up to the maximum given value can be set.

Mounting

As with inductive sensors, two kinds of mounting are distinguished for capacitive switches: embeddable or non-embeddable.

Sensors for embeddable installation in metal or other materials can be arranged side by side, and are particularly suitable for the contact-free detection of solid bodies or liquid levels through non-metallic dividing walls (max. wall thickness 4 mm).

When mounting two or more sensors for non-embeddable installation side by side in metal or other materials, some free space must be provided. Non-embeddable sensors are particularly suitable for applications where the medium to be detected comes into contact with the sensing head (e.g. level monitoring of bulk material, pastes or liquids).

M12

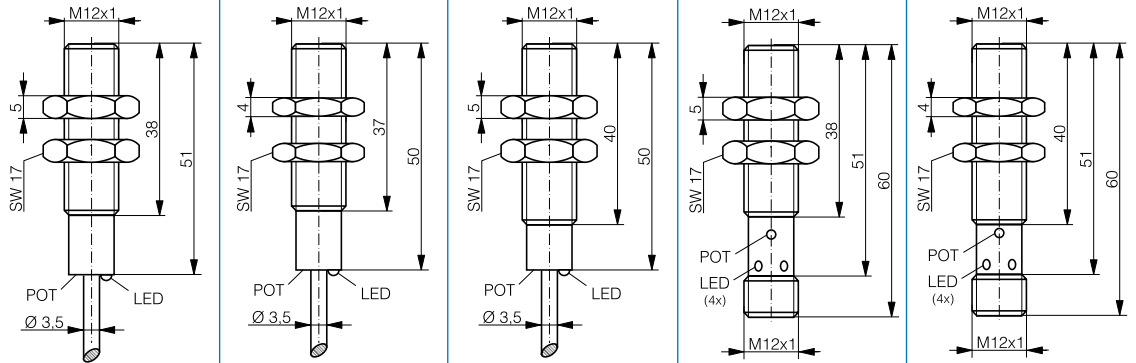
Housing size

Operating distance mm	2	2	2	2	2
Setting range	0.5 ... 5	0 ... 6	0 ... 6	0.5 ... 5	0 ... 6
Housing material	PPO	Stainless steel V2A	PTFE	PPO	Stainless steel V2A
Sensing face	PPO	PTFE	PTFE	PPO	PTFE
Connection ¹⁾	PUR 4 x 0.14 mm ²	PUR 4 x 0.14 mm ²	PUR 4 x 0.14 mm ²	Connector S12	Connector S12
Degree of protection	IP 67	IP 67	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable	Embeddable	Embeddable
Max. switching frequency	500 Hz	500 Hz	500 Hz	500 Hz	500 Hz
Technical data ²⁾	Table 1	Table 1	Table 1	Table 1	Table 1
Wiring ²⁾	Diagram 1	Diagram 1	Diagram 1	Diagram 1	Diagram 1
LED	Green / yellow	Green / yellow	Green / yellow	Yellow	Yellow
Supply voltage range	10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 250 mA

¹⁾Standard cable length 2 m.
Non-standard cable lengths and types on request.
²⁾see page 13
³⁾see page 14



Dimensions:



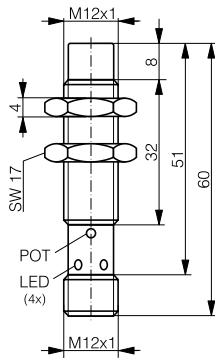
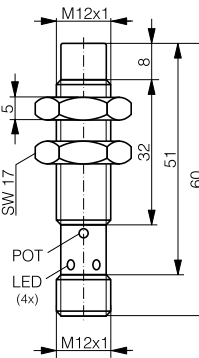
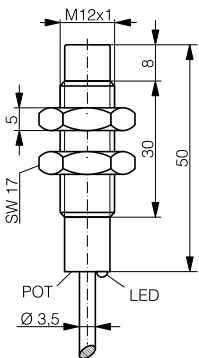
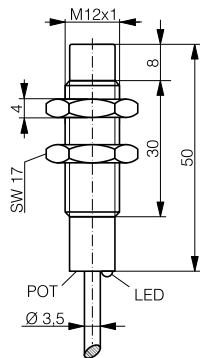
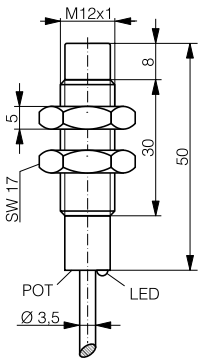
Part references:
(**bold**: preferred types)

NPN changeover outputs	CSK-1120-201	CSK-1120-101	CSK-1120-301	CSS-1120-201	CSS-1120-101
PNP changeover outputs	CSK-1120-203	CSK-1120-103	CSK-1120-303	CSS-1120-203	CSS-1120-103
AC/DC 2-wire N.O.					
Compatible connectors ³⁾				M, N	M, N

SERIES 1120

M12

4	4	4	4	4
1 ... 6	0.5 ... 10	0.5 ... 10	1 ... 6	0.5 ... 10
PPO	Stainless steel V2A	PTFE	PPO	Stainless steel V2A
PPO	PTFE	PTFE	PPO	PTFE
PUR 4 x 0.14 mm ²	PUR 4 x 0.14 mm ²	PUR 4 x 0.14 mm ²	Connector S12	Connector S12
IP 67	IP 67	IP 67	IP 67	IP 67
Non-embeddable	Non-embeddable	Non-embeddable	Non-embeddable	Non-embeddable
50 Hz	50 Hz	50 Hz	50 Hz	50 Hz
Table 1	Table 1	Table 1	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 1	Diagram 1	Diagram 1
Green / yellow	Green / yellow	Green / yellow	Yellow	Yellow
10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 250 mA



CSK-1120-211

CSK-1120-111

CSK-1120-311

CSS-1120-211

CSS-1120-111

CSK-1120-213

CSK-1120-113

CSK-1120-313

CSS-1120-213

CSS-1120-113

M, N

M, N

M18

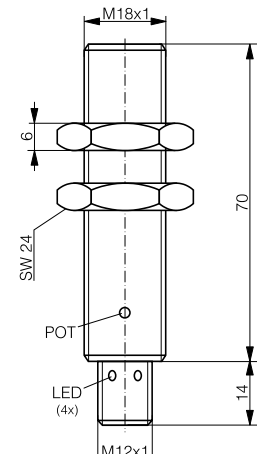
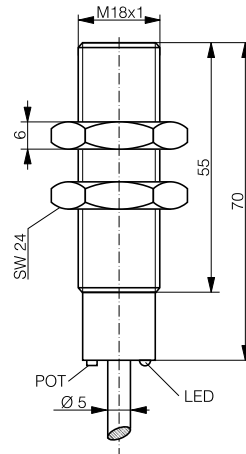
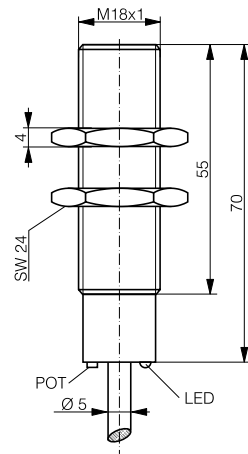
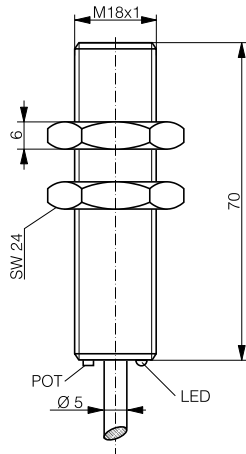
Housing size

Operating distance mm	5	5	5	5
Setting range	0.5 ... 10	0.5 ... 10	0.5 ... 10	0.5 ... 10
Housing material	PPO	Nickel-plated brass	PTFE	PPO
Sensing face	PPO	PTFE	PTFE	PPO
Connection ¹⁾	PVC 4 x 0.34 mm ²	PVC 4 x 0.34 mm ²	PVC 4 x 0.34 mm ²	Connector S12
Degree of protection	IP 67	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable	Embeddable
Max. switching frequency	300 Hz	300 Hz	300 Hz	300 Hz
Technical data ²⁾	Table 1	Table 1	Table 1	Table 1
Wiring ²⁾	Diagram 1	Diagram 1	Diagram 1	Diagram 1
LED	Green / yellow	Green / yellow	Green / yellow	Yellow
Supply voltage range	10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 250 mA

¹⁾Standard cable length 2 m.
Non-standard cable lengths and types on request.
²⁾see page 13
³⁾see page 14



Dimensions:



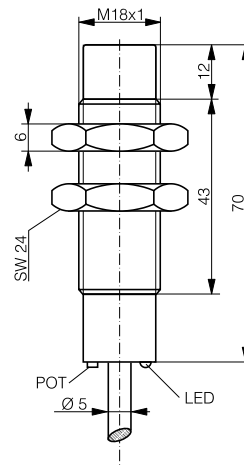
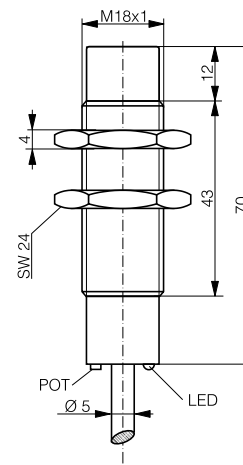
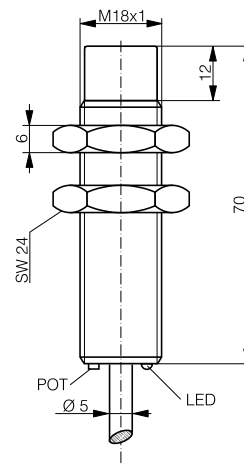
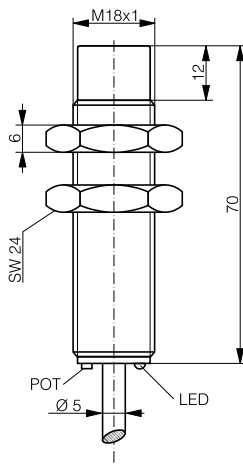
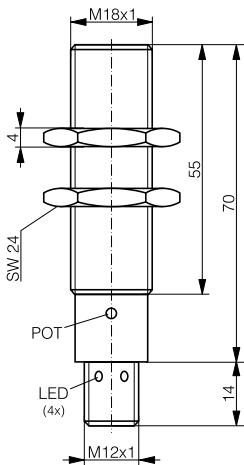
Part references:
(**bold**: preferred types)

NPN changeover outputs	CSK-1180-201	CSK-1180-101	CSK-1180-301	CSS-1180-201
PNP changeover outputs	CSK-1180-203	CSK-1180-103	CSK-1180-303	CSS-1180-203
AC/DC 2-wire N.O.				
Compatible connectors ³⁾				M, N

SERIES 1180

M18

5	8	8	8	8
0.5 ... 10	1 ... 10	0.5 ... 15	0.5 ... 15	0.5 ... 15
Nickel-plated brass	PPO	PPO	Nickel-plated brass	PTFE
PTFE	PPO	PPO	PTFE	PTFE
Connector S12	PVC 4 x 0.34 mm ²	PVC 4 x 0.34 mm ²	PVC 4 x 0.34 mm ²	PVC 4 x 0.34 mm ²
IP 67	IP 67	IP 67	IP 67	IP 67
Embeddable	Non-embeddable	Non-embeddable	Non-embeddable	Non-embeddable
300 Hz	50 Hz	50 Hz	50 Hz	50 Hz
Table 1	Table 3	Table 1	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 1	Diagram 1	Diagram 1
Yellow	Yellow	Green / yellow	Green / yellow	Green / yellow
10 ... 35 VDC	10 ... 30 VDC	10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 2 x 250 mA	≤ 2 x 200 mA	≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 250 mA



CSS-1180-101

CSK-1180-211

CSK-1180-111

CSK-1180-311

CSS-1180-103

CSK-1181-213



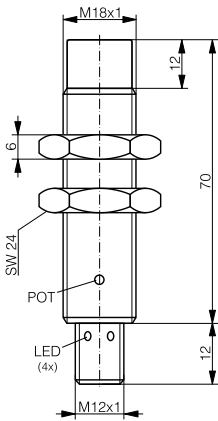
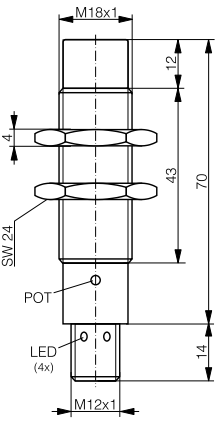
CSK-1180-213

CSK-1180-113

CSK-1180-313






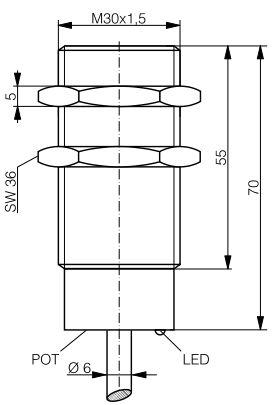
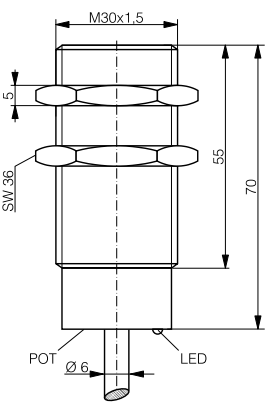
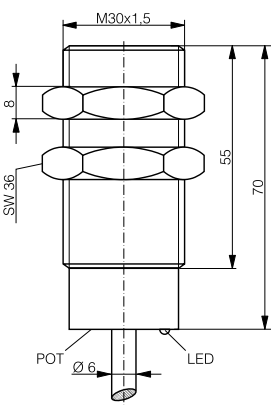
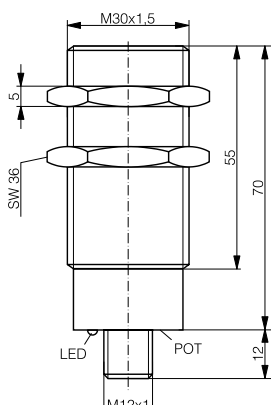
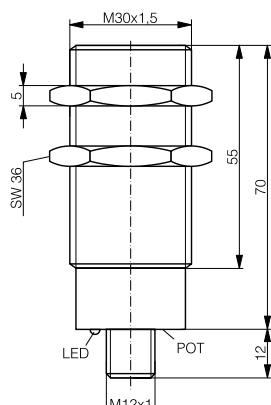
M, N

M18

Housing size			
Operating distance mm	8	8	
Setting range	0.5 ... 15	0.5 ... 15	
Housing material	PPO	Nickel-plated brass	
Sensing face	PPO	PTFE	
Connection ¹⁾	Connector S12	Connector S12	
Degree of protection	IP 67	IP 67	
Mounting	Non-embeddable	Non-embeddable	
Max. switching frequency	50 Hz	50 Hz	
Technical data ²⁾	Table 1	Table 1	
Wiring ²⁾	Diagram 1	Diagram 1	
LED	Yellow	Yellow	
Supply voltage range	10 ... 35 VDC	10 ... 35 VDC	
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	
Output current	≤ 2 x 250 mA	≤ 2 x 250 mA	
¹⁾ Standard cable length 2 m. Non-standard cable lengths and types on request. ²⁾ see page 13 ³⁾ see page 14			
Dimensions:			
Part references: (bold: preferred types)			
NPN changeover outputs	CSS-1180-211	CSS-1180-111	
PNP changeover outputs	CSS-1180-213	CSS-1180-113	
AC/DC 2-wire N.O.			
Compatible connectors ³⁾	M, N	M, N	

SERIES 1300

M30

10	10	10	10	10
0.5 ... 25	0.5 ... 25	0.5 ... 25	0.5 ... 25	0.5...25
PPO	Nickel-plated brass	PTFE	PPO	Nickel-plated brass
PPO	PTFE	PTFE	PPO	PTFE
PVC 4 x 0.5 mm ²	PVC 4 x 0.5 mm ²	PVC 4 x 0.5 mm ²	Connector S12	Connector S12
IP 67	IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable	Embeddable
200 Hz	200 Hz	200 Hz	200 Hz	200 Hz
Table 1	Table 1	Table 1	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 1	Diagram 1	Diagram 1
Green / yellow	Green / yellow	Green / yellow	Green / yellow	Green / yellow
10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 250 mA
				
				
CSK-1300-201	CSK-1300-101	CSK-1300-301	CSS-1300-201	CSS-1300-101
CSK-1300-203	CSK-1300-103	CSK-1300-303	CSS-1300-203	CSS-1300-103
			M, N	M, N

M30

Housing size

Operating distance mm	15	15	15	15
Setting range	2 ... 25	2 ... 25	1 ... 30	1 ... 30
Housing material	PPO	Nickel-plated brass	PPO	Nickel-plated brass
Sensing face	PPO	PPO	PPO	PTFE
Connection ¹⁾	PVC 4 x 0.5 mm ²	PVC 4 x 0.5 mm ²	PVC 4 x 0.5 mm ²	PVC 4 x 0.5 mm ²
Degree of protection	IP 67	IP 67	IP 67	IP 67
Mounting	Non-embeddable	Non-embeddable	Non-embeddable	Non-embeddable
Max. switching frequency	50 Hz	50 Hz	50 Hz	50 Hz
Technical data ²⁾	Table 3	Table 3	Table 1	Table 1
Wiring ²⁾	Diagram 1	Diagram 1	Diagram 1	Diagram 1
LED	Yellow	Yellow	Green / yellow	Green / yellow
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 35 VDC	10 ... 35 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 2 x 200 mA	≤ 2 x 200 mA	≤ 2 x 250 mA	≤ 2 x 250 mA

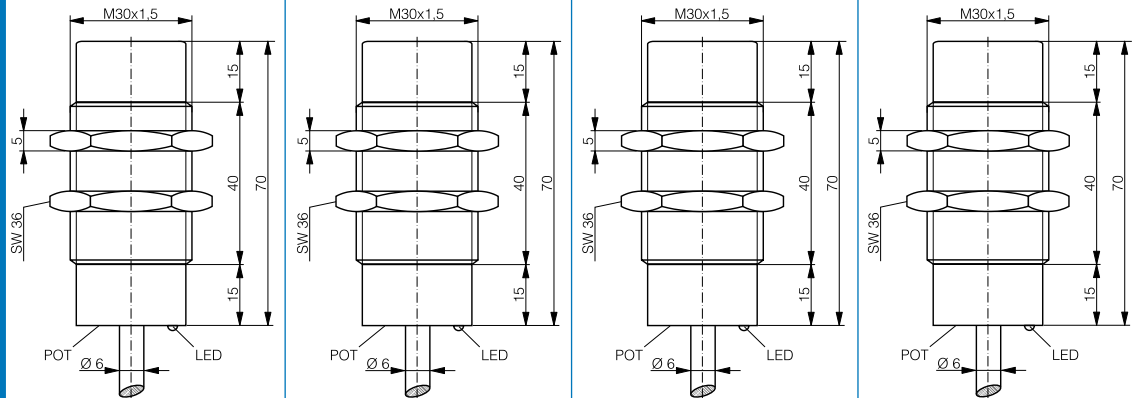
¹⁾Standard cable length 2 m.
Non-standard cable lengths and types on request.

²⁾see page 13

³⁾see page 14



Dimensions:



Part references:

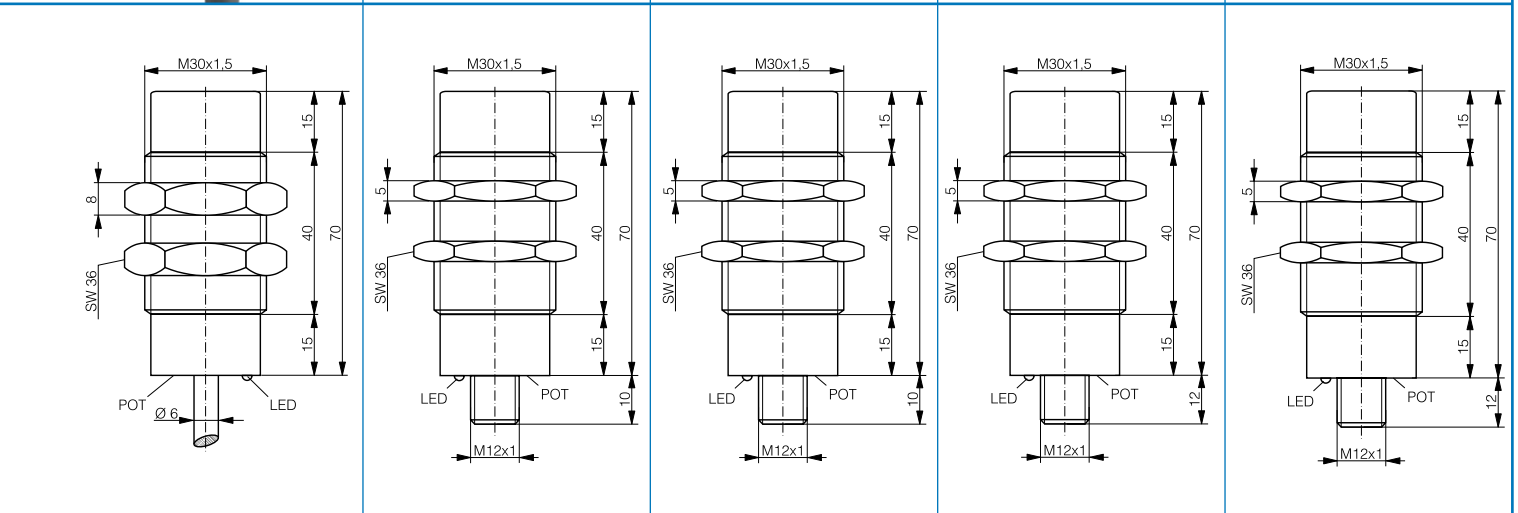
(**bold**: preferred types)

NPN changeover outputs			CSK-1300-211	CSK-1300-111
PNP changeover outputs	CSK-1301-213	CSK-1301-113	CSK-1300-213	CSK-1300-113
AC/DC 2-wire N.O.				
Compatible connectors ³⁾				





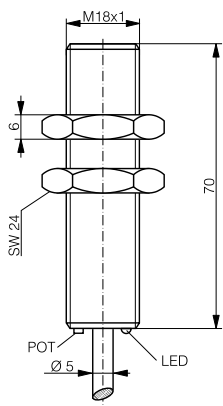
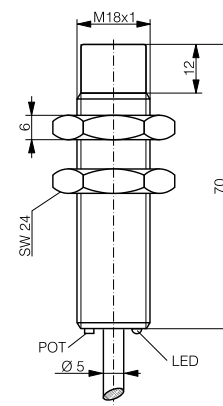
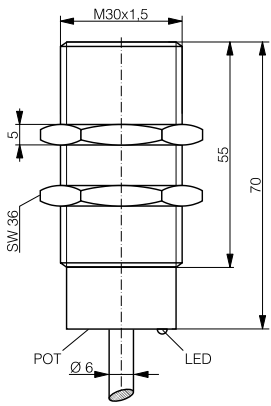
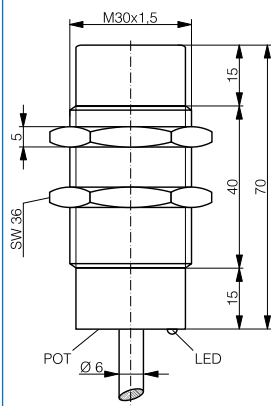
SERIES 1300

M30

15	15	15	15	15
1 ... 30	2 ... 25	2 ... 25	1 ... 30	1 ... 30
PTFE	PPO	Nickel-plated brass	PPO	Nickel-plated brass
PTFE	PPO	PPO	PPO	PTFE
PVC 4 x 0.5 mm ²	Connector S12	Connector S12	Connector S12	Connector S12
IP 67	IP 67	IP 67	IP 67	IP 67
Non-embeddable	Non-embeddable	Non-embeddable	Non-embeddable	Non-embeddable
50 Hz	50 Hz	50 Hz	50 Hz	50 Hz
Table 1	Table 3	Table 3	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 1	Diagram 1	Diagram 1
Green / yellow	Yellow	Yellow	Green / yellow	Green / yellow
10 ... 35 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 35 VDC	10 ... 35 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 2 x 250 mA	≤ 2 x 200 mA	≤ 2 x 200 mA	≤ 2 x 250 mA	≤ 2 x 250 mA



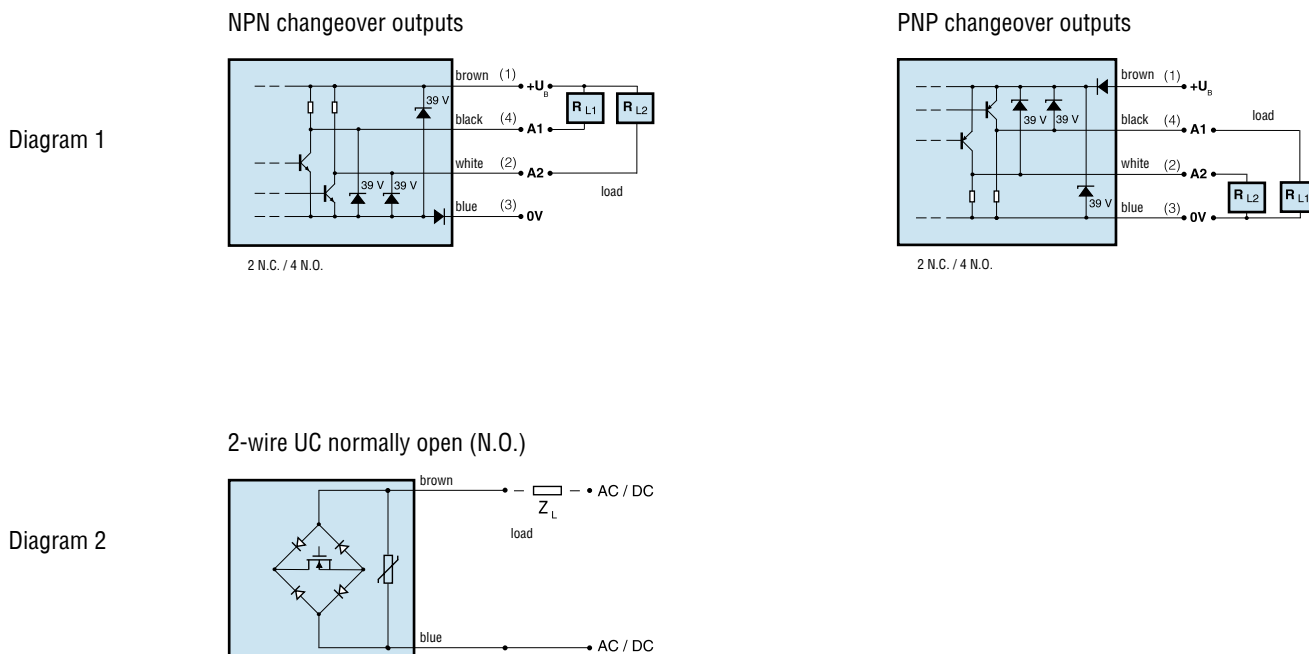
CSK-1300-311			CSS-1300-211	CSS-1300-111
CSK-1300-313	CSS-1301-213	CSS-1301-113	CSS-1300-213	CSS-1300-113
	M, N	M, N	M, N	M, N

Housing size	M18		M30	
	5	8	10	15
Operating distance mm	5	8	10	15
Setting range	1 ... 5	2 ... 8	2 ... 15	2 ... 20
Housing material	PPO	PPO	PPO	PPO
Sensing face	PPO	PPO	PPO	PPO
Connection ¹⁾	PUR 2 x 0.34 mm ²	PUR 2 x 0.34 mm ²	PVC 2 x 0.75 mm ²	PVC 2 x 0.75 mm ²
Degree of protection	IP 67	IP 67	IP 67	IP 67
Mounting	Embeddable	Non-embeddable	Embeddable	Non-embeddable
Max. switching frequency	25 Hz	25 Hz	25 Hz	25 Hz
Technical data ²⁾	Table 2	Table 2	Table 2	Table 2
Wiring ²⁾	Diagram 2	Diagram 2	Diagram 2	Diagram 2
LED	Yellow	Yellow	Yellow	Yellow
Supply voltage range	20 ... 250 VAC/DC	20 ... 250 VAC/DC	20 ... 250 VAC/DC	20 ... 250 VAC/DC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 330 mA	≤ 330 mA	≤ 330 mA	≤ 330 mA
¹⁾ Standard cable length 2 m. Non-standard cable lengths and types on request. ²⁾ see page 13 ³⁾ see page 14				
	Dimensions:    			
Part references: (bold: preferred types)				
NPN changeover outputs				
PNP changeover outputs				
AC/DC 2-wire N.O.	CSK-1180-207	CSK-1180-217	CSK-1300-207	CSK-1300-217
Compatible connectors ³⁾				

Technical data

	Table 1	Table 2	Table 3
Permissible ripple content	≤ 10 %	---	≤ 5 %
No-load supply current	15 mA typ.	2.5 mA typ.	≤ 8 mA
Min. load current	---	5 mA	---
Voltage drop, switched state	≤ 2 V	≤ 6 V	≤ 2 V
Hysteresis % s_r	≤ 20 %	≤ 20 %	≤ 20 %
Repeat accuracy	≤ 0.02 mm	≤ 0.02 mm	≤ 0.02 mm
(T _A constant)			
Short-circuit protection	built-in	---	built-in
Polarity reversal protection	built-in	---	built-in

Wiring diagrams



Further data can be obtained from individual data sheets, which may be retrieved from the CONTRINEX website (www.contrinex.com) or ordered from our sales offices.

Tightening torque

	PPO	PTFE	Nickel-plated brass	Stainless steel
M12 x 1	1 Nm	0.2 Nm	16 Nm	25 Nm
M18 x 1	1.7 Nm	0.5 Nm	28 Nm	60 Nm
M30 x 1.5	8 Nm	2.5 Nm	82 Nm	200 Nm

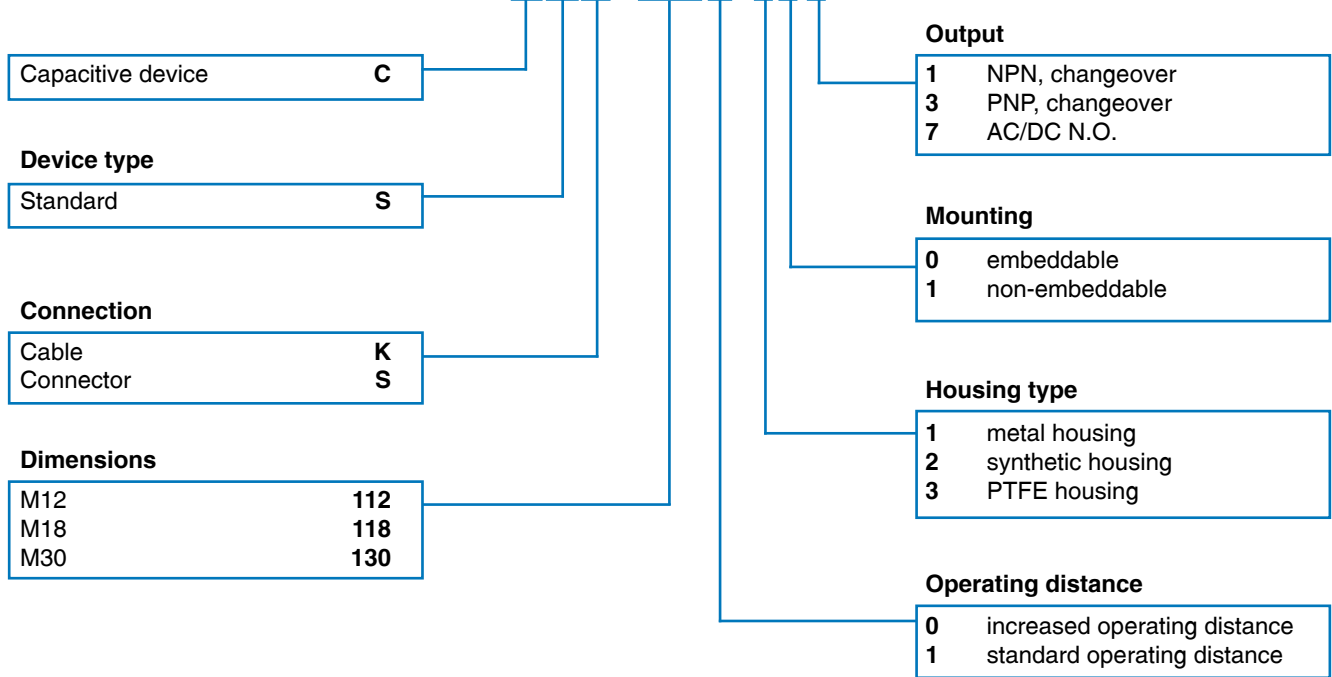
Connecting cables

Part reference	Size	Number of poles	For N.O. / N.C.	Cable	Execution
S12-4FVG-020	S12	4	N.O. / N.C.	PVC 2 m	M
S12-4FUG-020	S12	4	N.O. / N.C.	PUR 2 m	M
S12-4FVW-020	S12	4	N.O. / N.C.	PVC 2 m	N
S12-4FUW-020	S12	4	N.O. / N.C.	PUR 2 m	N



Part references

CSK-1120-103





CONTRINEX

all over the world

Europe

Austria
Belgium
Croatia
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