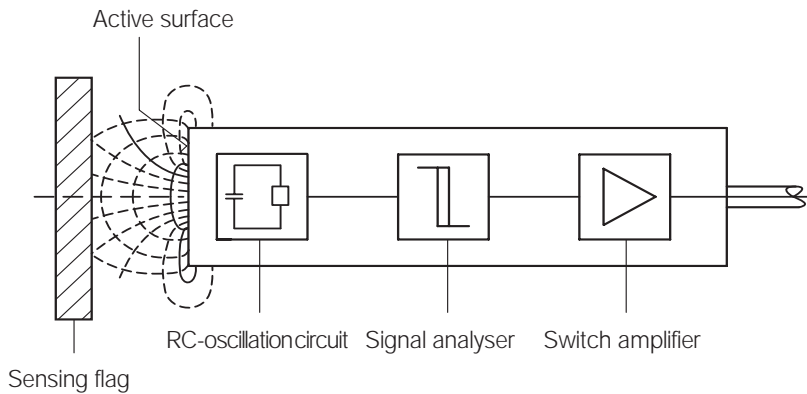


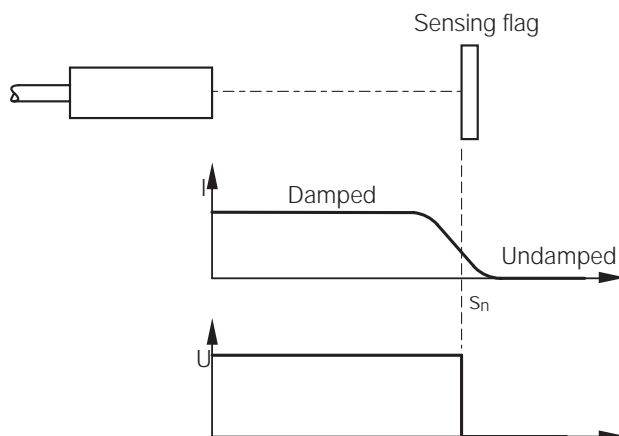
Operating Principle

Capacitive proximity sensors



The active element in a capacitive proximity sensor consists of a sensor electrode and shielding. Together, these two electrodes form the capacitor. On the approach of a sensing flag (metallic or non-metallic object), a

change in capacity takes place in the electrical field of this capacitor, i.e. the capacitor of the RC oscillation circuit is arranged in such a way that its capacity increases when an object approaches.



The oscillator is set in such a way that it only becomes capable of oscillation through this increase in capacity. The start in oscillation when an object approaches is detected by the signal analyser and output via the signal amplifier.

Reduction factor R

As with the inductive proximity sensors, the reduction factor depends on the material. It describes the factor by which the sensing range s is reduced by a certain material, with reference to the nominal sensing range s_n , which results from the use of an earthed ST37 metal plate as sensing flag.

The most important reduction factors for capacitive proximity sensors are:

iron, earthed	1.0
water	1.0
wheat	0.
(moisture content 12%)	
wood	0.7
glass	0.6
oil	0.4
PVC	0.4
PE	0.37
ceramic material	0.3

EMC-overview

Test	Standard	Product Standard EN 60947-5-2	Generic Standard EN 50082-2	SICK Capacitive Sensors
Electrostatic Discharge ESD	EN 61000-4-2 (IEC 1000-4-2)	4 kV cd / 8 kV ad*	4 kV cd/8 kV ad*	17 kV cd/ad*
HF radiated	EN 61000-4-3 (IEC 1000-4-3)	3 V/m 80 ... 1000 MHz	10 V/m 80 ... 1000 MHz	< 15 V/m 80 ... 1000 MHz
HF wire conducted	EN 61000-4-6 (IEC 1000-4-6)	–	10 V 0,15 ... 80 MHz	> 10 V
Burst	EN 61000-4-4 (IEC 1000-4-4)	1 kV	2 kV	4 kV
Surge	IEC 255-5	1 kV, 500 Ohm	–	2.5 kV, 500 Ohm

*cd = contact discharge ad = air discharge

Selection table/Type code

Capacitive proximity sensors

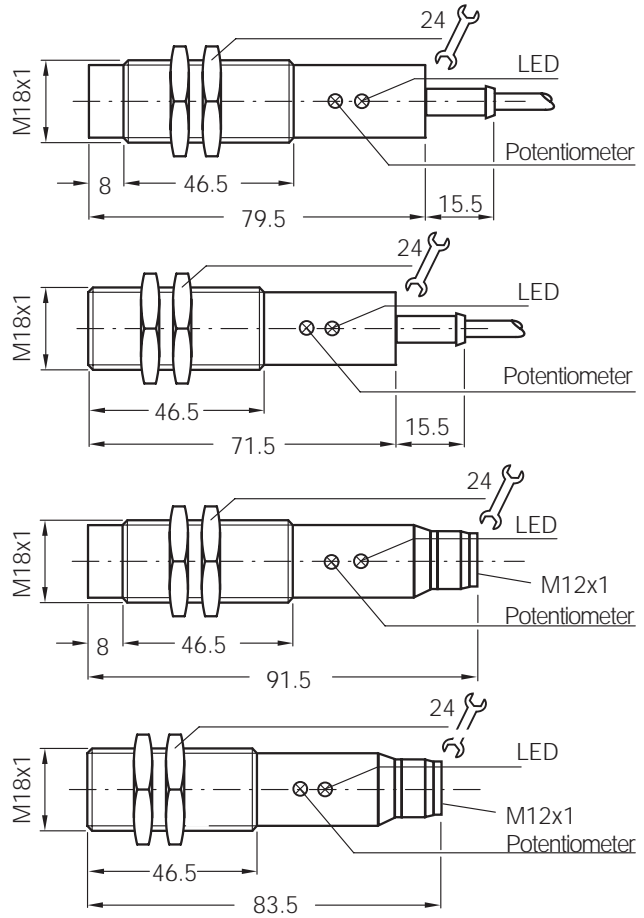
Series	Housing			Sensing range s _n in mm		Switching output	Outout function	Connection type		Electr. config.	Page
	Design	Size in mm	Material	Flush	N. flush	PNP	complementary	Cable	Connector		
CM18	with thread	M18	Plastic	8	12	•	•	•	•	DC	108
CM30		M30	Plastic	16	25	•	•	•	•	DC	110
CQ35	Cuboid	35x55x15	Plastic	16	25	•	•	•	•	DC	112

Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Stelle
	C	M	3	O	-	2	5	N	P	P	-	K	W	O	
1 Sensor technologie C Capacitive														other codes	14
2 Design M Cylinder with thread Q Cuboid														Connection W Cable, PVC C Connector, M12x1	13
3/4 Housing shape 18 Diameter 30 or 35 Edge length of sensing face														Housing material K Plastic	12
6/7/8 Sensing range/ installation B flush N non flush 08B 8 mm; flush 25N 25 mm; non flush														Output P complementary	10
														Interface P DC (3/4-wire) PNP N DC (3/4-wire) NPN	9

Capacitive proximity sensors

CM18 series, sensing range 8 / 12 mm

DC 4-wire, plastic housing



Features

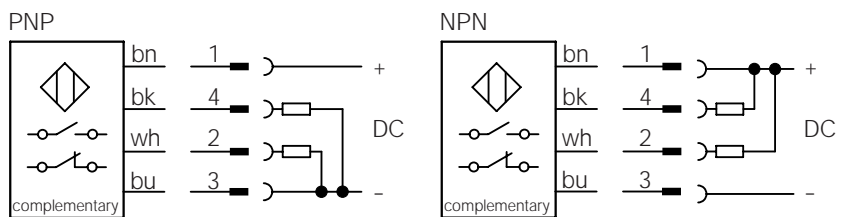


- ▶ High EMC-immunity
- ▶ Can be installed flush or non-flush
- ▶ PNP output
- ▶ Adjustable sensing range: 3 to 8 mm (flush), 3 to 12 mm (non flush)
- ▶ Complementary output function
- ▶ Short-circuit protection (pulsed)
- ▶ Plastic housing with fine thread M18 x 1 mm
- ▶ Cable or connector
- ▶ Enclosure rating IP 67
- ▶ LED-status indicator
- ▶

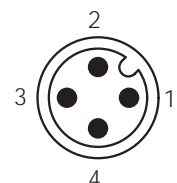
Accessories

- Round connector
- Mounting bracket

Connection diagram



















Wire colour	Contact	Assignment
bn brown	1	+ V DC
bk black	4	Schließer
wh white	2	Öffner
bu blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 40 V DC	Short circuit protection (pulsed)	yes
Ripple U_{pp}	$\leq 10\%$ of U_b	Reverse polarity protection	yes
Voltage drop U_d	$\leq 2,5$ V	Power-up pulse suppression	yes
Power consumption (without load)	≤ 10 mA	Enclosure rating to EN 60529	IP 67
Continuous current I_a	≤ 200 mA	Shock und vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Time delay before availability t_v	≤ 100 ms	Ambient temperature T_a	- 25 ... + 80 °C
Hysteresis H	4% ... 20% of s_r	Housing material	Plastic
Repeatability R (U_b and T_a constant)	$\leq 5\%$ of s_r	Tightening torque	2,6 Nm
Temperature drift	$\pm 10\%$ of s_r	Connection cable	PVC, 4 x 0.34 mm ²
EMV	to EN 60 947-5-2		

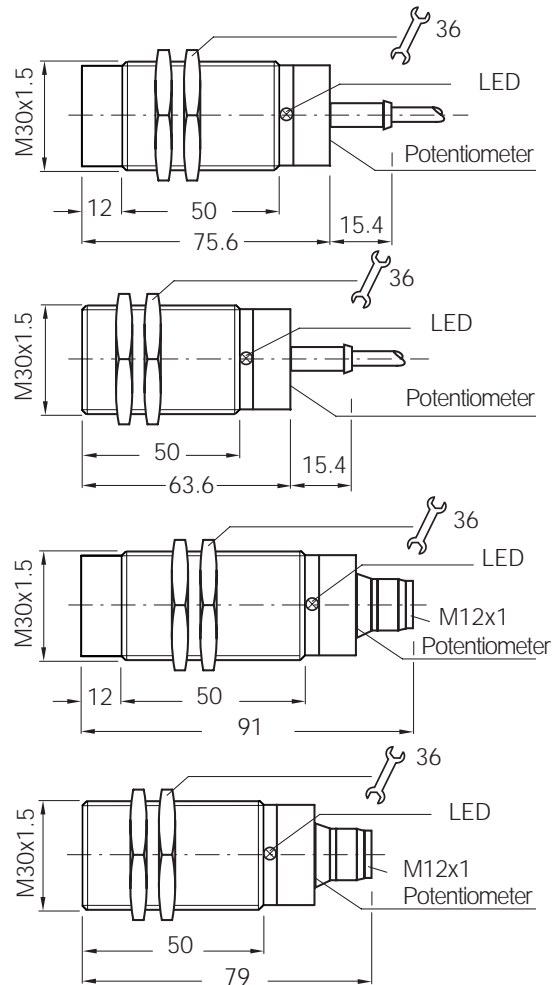
Selection table

Sensing range s_n mm	Installation	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
8		PNP	 complementary	30	cable 2 m	CM18-08BPP-KW1	6020136
8		NPN	 complementary	30	cable 2 m	CM18-08BNP-KW1	6021455
8		PNP	 complementary	30	connector M12 x 1 mm	CM18-08BPP-KC1	6020388
8		NPN	 complementary	30	connector M12 x 1 mm	CM18-08BNP-KC1	6021456
12		PNP	 complementary	30	cable 2 m	CM18-12NPP-KW1	6020389
12		NPN	 complementary	30	cable 2 m	CM18-12NNP-KW1	6021457
12		PNP	 complementary	30	connector M12 x 1 mm	CM18-12NPP-KC1	6020410
12		NPN	 complementary	30	connector M12 x 1 mm	CM18-12NNP-KC1	6021458

Capacitive proximity sensors

CM30 series, sensing range 16 / 25 mm

DC 4-wire, plastic housing



Features

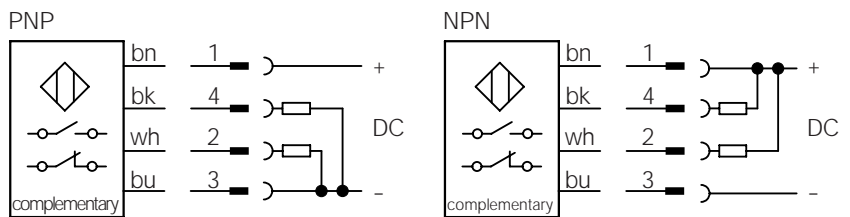


- ▶ High EMC-immunity
- ▶ Can be installed flush or non-flush
- ▶ PNP output
- ▶ Adjustable sensing range: 2 to 16 mm (flush), 4 to 25 mm (non flush)
- ▶ Complementary output function
- ▶ Short-circuit protection (pulsed)
- ▶ Plastic housing with fine thread M30 x 1.5 mm
- ▶ Cable or connector
- ▶ Enclosure rating IP 67
- ▶ LED-status indicator
- ▶

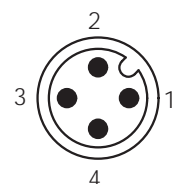
Accessories

- Round connector
- Mounting bracket

Connection diagram



















Wire colour	Contact	Assignment
bn brown	1	+ V DC
bk black	4	NO
wh white	2	NC
bu blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 40 V DC	Short circuit protection (pulsed)	yes
Ripple U_{pp}	$\leq 10\%$ of U_b	Reverse polarity protection	yes
Voltage drop U_d	$\leq 2,5$ V	Power-up pulse suppression	yes
Power consumption (without load)	≤ 10 mA	Enclosure rating to EN 60529	IP 67
Continuous current I_a	≤ 200 mA	Shock und vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Time delay before availability t_v	≤ 100 ms	Ambient temperature T_a	- 25 ... + 80 °C
Hysteresis H	4% ... 20% of s_r	Housing material	Plastic
Repeatability R (U_b and T_a constant)	$\leq 5\%$ of s_r	Tightening torque	7,5 Nm
Temperature drift EMV	$\pm 10\%$ of s_r to EN 60 947-5-2	Connection cable	PVC, 4 x 0.34 mm ²

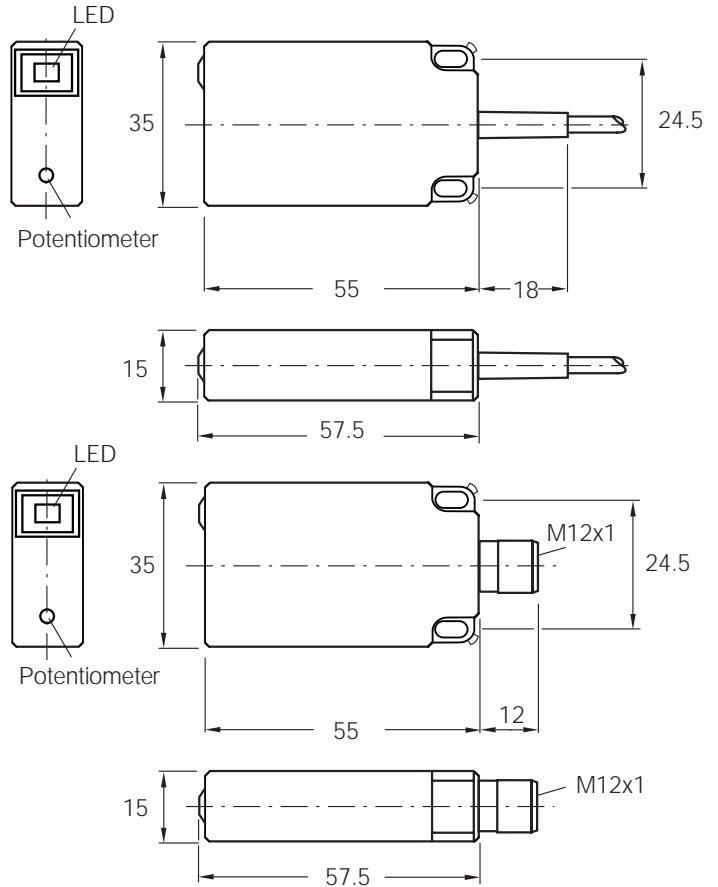
Selection table

Sensing range s_n mm	Installation	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
16		PNP	 complementary	50	cable 2 m	CM30-16BPP-KW1	6020473
16		NPN	 complementary	50	cable 2 m	CM30-16BNP-KW1	6021459
16		PNP	 complementary	50	connector M12 x 1 mm	CM30-16BPP-KC1	6020475
16		NPN	 complementary	50	connector M12 x 1 mm	CM30-16BNP-KC1	6021460
25		PNP	 complementary	50	cable 2 m	CM30-25NPP-KW1	6020476
25		NPN	 complementary	50	cable 2 m	CM30-25NNP-KW1	6021461
25		PNP	 complementary	50	connector M12 x 1 mm	CM30-25NPP-KC1	6020477
25		NPN	 complementary	50	connector M12 x 1 mm	CM30-25NNP-KC1	6021462

Capacitive proximity sensors

CQ35 series, sensing range 25 mm

DC 4-wire, plastic housing



Features

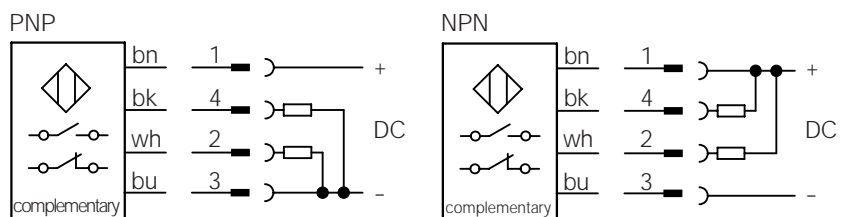


- ▶ High EMC-immunity
- ▶ Can be installed flush or non-flush
- ▶ PNP output
- ▶ Adjustable sensing range: 4 to 25 mm (non flush)
- ▶ Device can be flush mounted, sensing range: 16 mm
- ▶ Complementary output function
- ▶ Short-circuit protection (pulsed)
- ▶ Plastic housing
- ▶ Cable or connector
- ▶ Enclosure rating IP 67
- ▶ LED-status indicator
- ▶

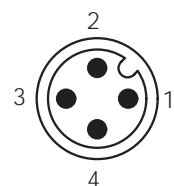
Accessories

Round connector

Connection diagram











Wire colour	Contact	Assignment
bn brown	1	+ V DC
bk black	4	NO
wh white	2	NC
bu blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 40 V DC	Short circuit protection (pulsed)	yes
Ripple U_{pp}	$\leq 10\%$ of U_b	Reverse polarity protection	yes
Voltage drop U_d	$\leq 2,5$ V	Power-up pulse suppression	yes
Power consumption (without load)	≤ 10 mA	Enclosure rating to EN 60529	IP 67
Continuous current I_a	≤ 200 mA	Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Time delay before availability t_v	≤ 100 ms	Ambient temperature T_a	- 25 ... + 75 °C
Hysteresis H	4% ... 20% of s_r	Housing material	Plastic
Repeatability R (U_b und T_a constant)	$\leq 5\%$ of s_r	Connection cable	PVC, 4 x 0.34 mm ²
Temperature drift EMV	$\pm 10\%$ of s_r to EN 60 947-5-2		

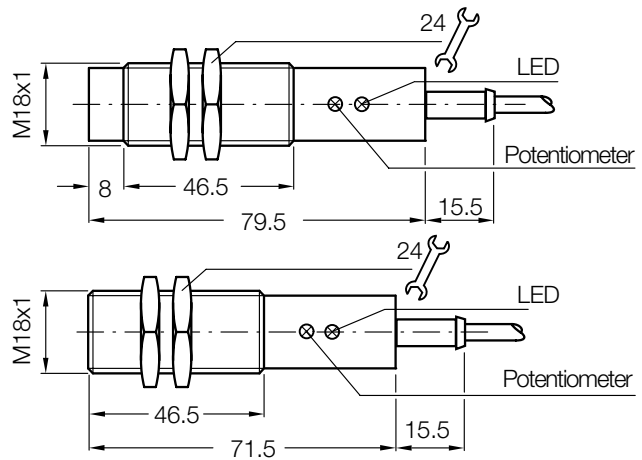
Selection table

Sensing range s_n mm	Installation	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
25		PNP	 complementary	50	cable 2 m	CQ35-25NPP-KW1	6020478
25		NPN	 complementary	50	cable 2 m	CQ35-25NNP-KW1	6021463
25		PNP	 complementary	50	connector M12 x 1 mm	CQ35-25NPP-KC1	6020479
25		NPN	 complementary	50	connector M12 x 1 mm	CQ35-25NNP-KC1	6021464

Capacitive proximity sensors

CM18 (PTFE) series, sensing range 8 mm

DC 4-wire, PTFE housing



Features

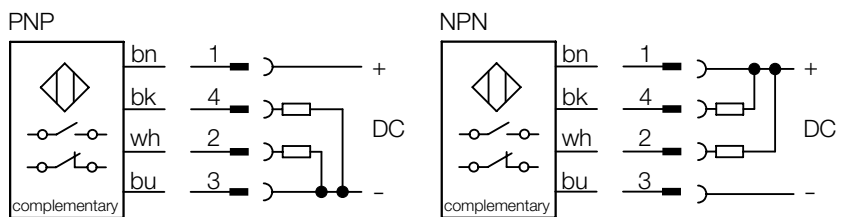


- ▶ High EMC-immunity
- ▶ Can be installed flush
- ▶ PNP output/NPN output
- ▶ Adjustable sensing range: 3 to 8 mm (flush)
- ▶ Complementary output function
- ▶ Short-circuit protection (pulsed)
- ▶ PTFE housing with M18 x 1 mm
- ▶ Cable PVC;
- ▶ Enclosure rating IP 67
- ▶ LED-status indicator

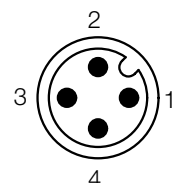
Accessories

Round connector
Mounting bracket

Connection diagram







Wire colour	Contact	Assignment
bn brown	1	+ V DC
bk black	4	NO
wh white	2	NC
bu blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 40 V DC	Short circuit protection (pulsed)	yes
Ripple U_{pp}	$\leq 10\%$ of U_b	Reverse polarity protection	yes
Voltage drop U_d	$\leq 2,5$ V	Power-up pulse suppression	yes
Power consumption (without load)	≤ 10 mA	Enclosure rating to EN 60529	IP 67
Continuous current I_a	≤ 200 mA	Shock und vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Time delay before availability t_v	≤ 100 ms	Ambient temperature T_a	- 25 ... + 60 °C
Hysteresis H	4% ... 20% of s_r	Housing material	PTFE
Repeatability R (U_b and T_a constant)	$\leq 5\%$ of s_r	Tightening torque	2,6 Nm
Temperature drift	$\pm 10\%$ of s_r	Connection cable	PVC, 4 x 0.34 mm ²
EMV	to EN 60 947-5-2		

Selection table

Sensing range s_n mm	Installation	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
8		PNP	 complementary	30	cable 2 m	CM18-08BPP-TWO	6026195
8		NPN	 complementary	30	cable 2 m	CM18-08BNP-TWO	6026194