Proximity Sensors Capacitive Thermoplastic Polyester Housing Types CA30CAN/CAF.....

CARLO GAVAZZI

- 4TH Generation TRIPLESHIELD™
- Adjustable sensing distance: 2 - 20 mm flush or 4-30 mm non-flush
- Protection: short-circuit, transients and reverse polarity
- Dust and humidity compensation
- Dust or temperature alarm output
- Rated operational voltage: 10-40 VDC
- Output: DC 200 mA, NPN or PNP
- Standard Output: NO and NC
- LED indications for power-supply, output and stability
- IP67, IP68, IP69K, Nema 1, 2, 4, 4X, 5, 6, 6P, 12
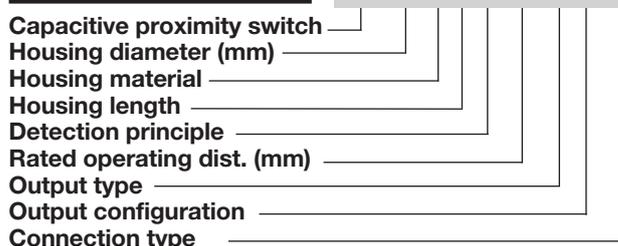- Cable and M12 connector versions available

CE   cULus   ECOLAB®

Product Description

The CA30CA.. capacitive proximity switches feature an improved 4TH generation *TRIPLESHIELD*™ technology. Furthermore, these sensors feature increased immunity to electromagnetic interference (EMI), especially to frequency drives. Not only does 4TH generation *TRIPLESHIELD*™ feature an increased EMI, but it also increases the immunity to humidity and dust. The implementation of stability indication eases the setup procedure, as both Stable ON and Stable OFF positions are indicated by the green and yellow LEDs.

The sensing distance is increased by 20 – 25 % allowing room for additional stable detection.

The dust alarm function gives an early warning that the sensing surroundings have to be cleaned.

The temperature alarm function raises an alarm if the sensing surface goes beyond 60 degree Celsius.

The sensor housing is featuring IP69K as well as approval by ECOLAB for cleaning and disinfection agents.

Ordering Key   CA30CAN25NAM1

Capacitive proximity switch
Housing diameter (mm)
Housing material
Housing length
Detection principle
Rated operating dist. (mm)
Output type
Output configuration
Connection type

Type Selection

Housing diameter	Sensor type	Output type	Output function	Connection	Rated operating distance (S_n)	Ordering no. Standard	Ordering no. Dust alarm	Ordering no. Temperature alarm
M 30	Flush	NPN	NO+NC	Cable	0 - 16 mm	CA30CAF16NA		
M 30	Flush	NPN	NO+NC	M12 Plug	0 - 16 mm	CA30CAF16NAM1		
M 30	Flush	PNP	NO+NC	Cable	0 - 16 mm	CA30CAF16PA		
M 30	Flush	PNP	NO+NC	M12 Plug	0 - 16 mm	CA30CAF16PAM1		
M 30	Flush	PNP	NO	Cable	0 - 16 mm		CA30CAF16PODU	CA30CAF16POTA
M 30	Flush	PNP	NC	Cable	0 - 16 mm		CA30CAF16PCDU	CA30CAF16PCTA
M 30	Flush	PNP	NC	M12 Plug	0 - 16 mm		CA30CAF16PCM1DU	
M 30	Non-Flush	NPN	NO+NC	Cable	0 - 25 mm	CA30CAN25NA		
M 30	Non-Flush	NPN	NO+NC	M12 Plug	0 - 25 mm	CA30CAN25NAM1		
M 30	Non-Flush	PNP	NO+NC	Cable	0 - 25 mm	CA30CAN25PA		
M 30	Non-Flush	PNP	NO+NC	M12 Plug	0 - 25 mm	CA30CAN25PAM1		
M 30	Non-Flush	PNP	NO	Cable	0 - 25 mm		CA30CAN25PODU	CA30CAN25POTA
M 30	Non-Flush	PNP	NC	Cable	0 - 25 mm		CA30CAN25PCDU	CA30CAN25PCTA

Specifications EN 60947-5-2

Rated operating distance (S_n)		**Sensitivity control**	Adjustable by potentiometer
Non-flush mounted sensor	0 - 25 mm (factory setting 25 mm), (ref. target 75x75 mm ST37, 1 mm thick, grounded)	Electrical adjustment	11 turns
		Mechanical adjustment	16 turns
		Adjustable distance	
Flush mounted sensor	0 - 16 mm (factory setting 16 mm - non-flush mounted) (ref. target 48x48 mm ST37, 1 mm thick, grounded)	Flush types	2 to 20 mm
		Non-flush types	4 to 30 mm
		Effective operating dist. (S_r)	$0.9 \times S_n \leq S_r \leq 1.1 \times S_n$
		Usable operating dist. (S_u)	$0.85 \times S_r \leq S_u \leq 1.15 \times S_r$

Specifications (cont.) EN 60947-5-2

Repeat accuracy (R)	≤ 5%
Hysteresis (H)	3 - 20%
Rated operational volt. (U_B)	10 to 40 VDC (ripple incl.)
Ripple	≤ 10%
Output function	NPN or PNP
Output switching function	N.O. and N.C.
Rated operational current (I_e)	≤ 200 mA (continuous)
Capacitive load	100 nF
No-load supply current (I_o)	≤ 12 mA
Voltage drop (U_d)	≤ 2.0 VDC @ 200 mA DC
Minimum operational current (I_m)	≥ 0.5 mA
OFF state current (I_r)	≤ 100 µA
Protection	Short-circuit, reverse polarity, transients
Frequency of operating cycles (f)	50 Hz
Response time OFF-ON (t_{on})	≤ 10 ms
Response time ON-OFF (t_{off})	≤ 10 ms
Power ON delay (t_v)	≤ 200 ms
Indication	
Target detected	LED, yellow
Power and detection stability	LED, green
Environment	
Installation category	III (IEC 60664, 60664A; 60947-1)
Degree of pollution	3 (IEC 60664, 60664A; 60947-1)
Degree of protection	IP 67, IP 68/60 min., IP69K* (IEC 60529; 60943-1)
NEMA type	1, 2, 4, 4X, 5, 6, 6P, 12
Operating temperature	-30 to +85°C (-22 to +185°F)
Max. temperature on sensing face	120°C (248°F)
Storage temperature	-40 to +85°C (-40 to +185°F)
Rated insulation voltage	1 kVAC (rms) IEC protection class III
Tightening torque	≤ 7.5 Nm
Connection	
Cable	PVC, Ø5.2 x 2 m, 4 x 0.34 mm² Oil proof, grey
Plug (M1)	M12 x 1 - 4 pin

Temperature alarm output	60°C ± 5°C
Response time examples $T_A = 25$°C	16 sec @ T_{EXC} = 800°C 390 sec @ T_{EXC} = 80°C
TRIPLESHIELD™ **Exceeding the norms for capacitive sensors**	
Electrostatic discharge (EN61000-4-2)	
Contact discharge	> 40 kV
Air discharge	> 40 kV
Electrical fast transients/burst (EN 61000-4-4)	±4kV
Surge (EN 61000-4-5)	
Power-supply	> 2kV (with 500 Ω)
Sensor output	> 2kV (with 500 Ω)
Wire conducted disturbances (EN 61000-4-6)	> 20 Vrms
Power-frequency magnetic fields (EN 61000-4-8)	
Continuous	> 60 A/m, 75.9 µ tesla
Short-time	> 600 A/m, 759 µ tesla
Radiated RF electromagnetic fields (EN 61000-4-3)	> 20 V/m
Shock (IEC 60068-2-32)	30 G / 11ms, 3 pos, 3 neg per axis
Rough handling shocks (IEC 60068-2-31)	twice from 1 m 100 times from 0.5 m
Vibration (IEC 60068-2-6)	10 to 150 Hz, 1 mm / 15 G
Housing material	
Body	PBT, grey, 30% glass reinforced
Cable gland	PA12, black
Fingernuts	PA12, black
Trimmershaft	Nylon
Weight	
Cable version	190 g
Plug version	106 g
Approvals	cULus (UL508), ECOLAB
CE-marking	Yes
MTTF$_d$	829 years @ 40°C (+104°F)

* The IP69K test according to DIN 40050-9 for high-pressure, high-temperature wash-down applications. The sensor must not only be dust tight (IP6X), but also able to withstand high-pressure and steam cleaning. The sensor is exposed to high-pressure water from a spray nozzle that is fed with 80°C water at 8'000–10'000 KPa (80–100bar) and a flow rate of 14–6L/min. The nozzle is held 100 –150 mm from the sensor at angles of 0°, 30°, 60° and 90° for 30s each. The test device sits on a turntable that rotates with a speed of 5 times per minute. The sensor must not suffer any damaging effects from the high pressure water in appearance and function.
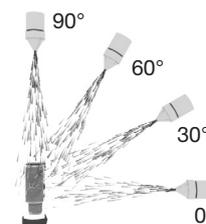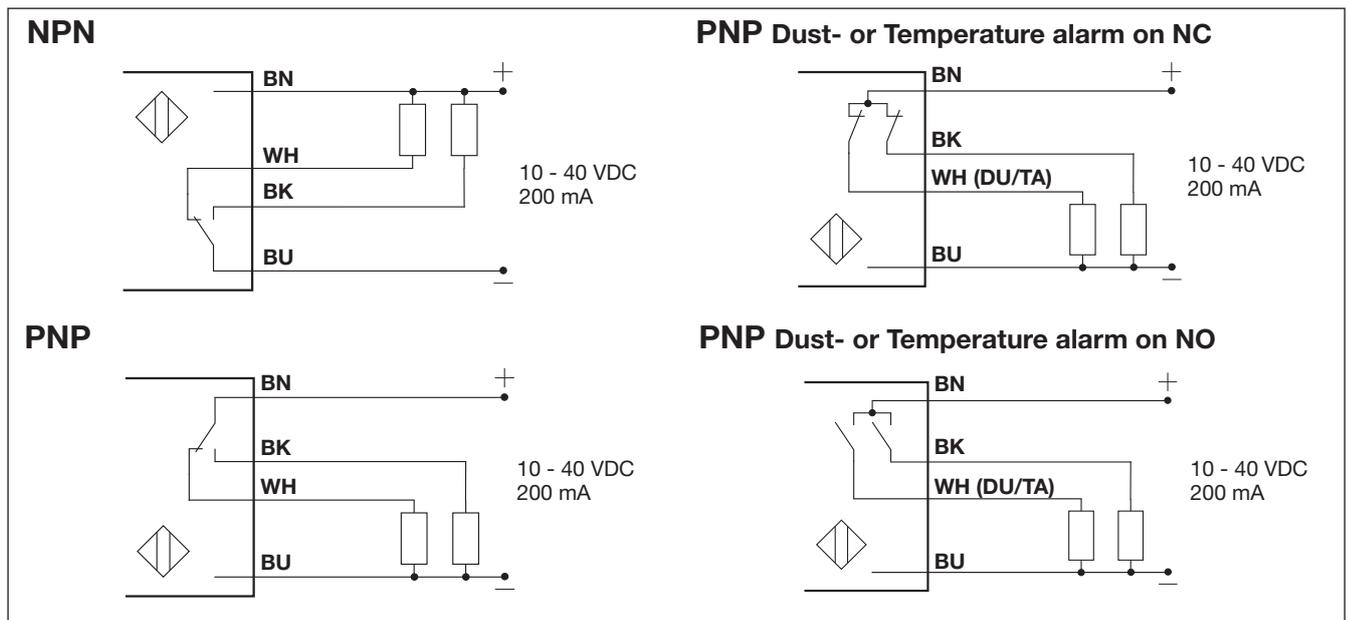
Adjustment Guide

The environments in which capacitive sensors are installed can often be unstable as regards temperature, humidity, object distance and industrial (noise) interference. This is why Carlo Gavazzi offers, as a standard feature in all TRIPLESHIELD™ capacitive sensors, a user-friendly sensitivity adjustment instead of a fixed sensing range. Likewise, these sensors provide an ex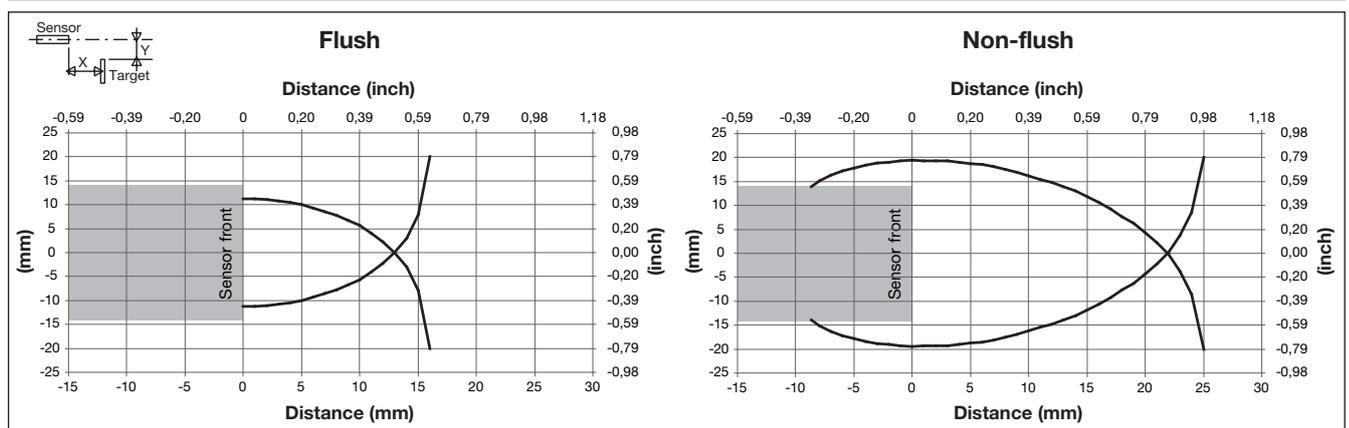tended sensing range to accommodate mechanically demanding areas and temperature stability to ensure high immunity to electromagnetic interference (EMI) and a minimum need for adjusting sensitivity if the temperature varies.

Note:
The sensors are factory set (default) to nominal sensing range S_n.

Wiring Diagram

NPN

BN
WH
BK
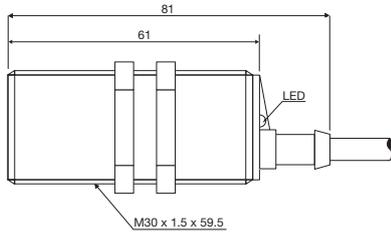BU

10 - 40 VDC
200 mA

PNP Dust- or Temperature alarm on NC

BN
BK
WH (DU/TA)
BU

10 - 40 VDC
200 mA

PNP

BN
BK
WH
BU

10 - 40 VDC
200 mA

PNP Dust- or Temperature alarm on NO

BN
BK
WH (DU/TA)
BU

10 - 40 VDC
200 mA

Detection Diagram

Flush

Non-flush

Detection Stability Indication
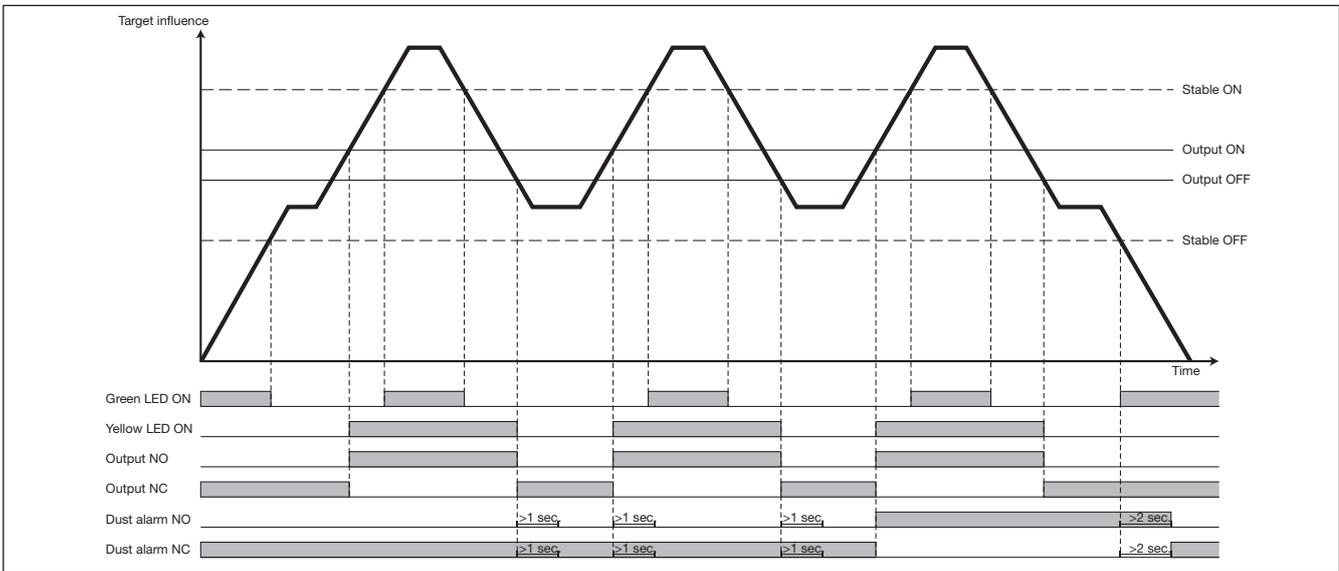
Target influence

Stable ON

Output ON
Output OFF

Stable OFF

Time

Green LED ON	
Yellow LED ON	
Output NO	
Output NC	
Dust alarm NO	>1 sec. >1 sec. >1 sec. >2 sec.
Dust alarm NC	>1 sec. >1 sec. >1 sec. >2 sec.

Dimensions

CA30CAF....

81
61

LED

M30 x 1.5 x 59.5

CA30CAF....M1

74
61

LED

M12 x 1.0

M30 x 1.5 x 59.5

CA30CAN....

81
61

LED

14,5

M30 x 1.5 x 45.5

Cable

CA30CAN....M1

74
61

LED

14,5

M12 x 1.0

M30 x 1.5 x 45.5

Plug

Back of sensor

Sensitivity
adjustment

Yellow LED

DIST.

Green LED

OUTPUT   STABLE

②
③   ①
④
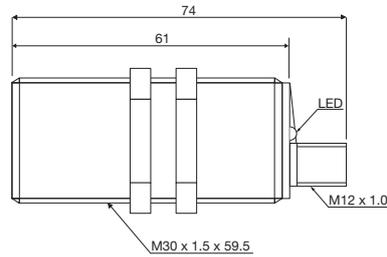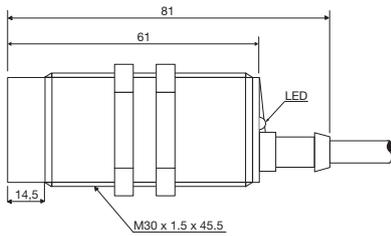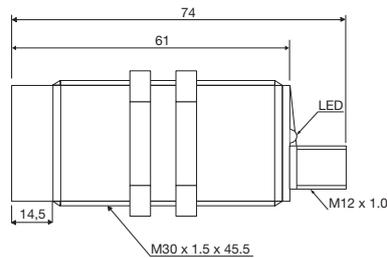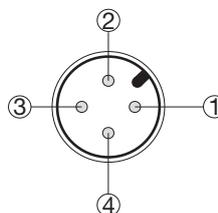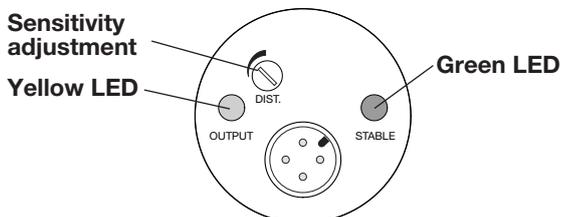
Colour code

1 Brown
2 White
3 Blue
4 Black

Specifications are subject to change without notice (22.11.2017)
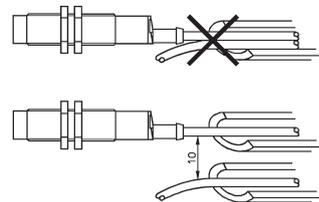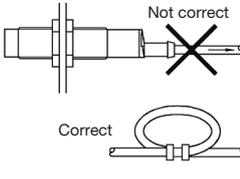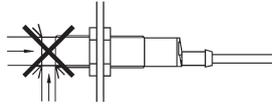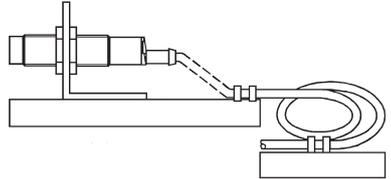
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Installation Hints

Capacitive sensors have a unique ability to detect almost any material in liquid or solid form. Capacitive sensors are able to detect metallic as well as non-metallic objects. However, their traditional use is for non-metallic materials such as:

- **Plastics Industry**
  Resins, regrinds or moulded products.

- **Chemical Industry**
  Cleansers, fertilizers, liquid soaps, corrosives and petrochemicals.

- **Wood Industry**
  Saw dust, paper products, door and window frames.

- **Ceramics & Glass Industry**
  Raw materials, clay or finished products, bottles.

- **Packaging Industry**
  Package inspection for level or contents, dry goods, fruits and vegetables, dairy products.

Materials are detected due to their dielectric constant. The bigger the size of an object, the higher the density of material, the better or easier it is to detect the object.

The nominal sensing distance for a capacitive sensor is referred to a grounded metal plate (ST37). For additional information regarding dielectric ratings of materials please refer to Technical Information.

| To avoid interference from inductive voltage/current peaks, separate the prox. switch power cables from any other power cables, e.g. motor, contactor or solenoid cables | Relief of cable strain — Not correct / Correct — The cable should not be pulled | Protection of the sensing face — A proximity switch should not serve as mechanical stop | Switch mounted on mobile carrier — Any repetitive flexing of the cable should be avoided |

Delivery Contents

- Capacitive switch: CA30CAN/CAF.......
- User manual
- 2 x M30 fingernuts
- Screwdriver
- **Packaging:** Cardboard box

Accessories

- Connector type CONB14NF-... -series.
- Mounting Brackets AMB30-S.. (straight), AMB30-A.. (angled)