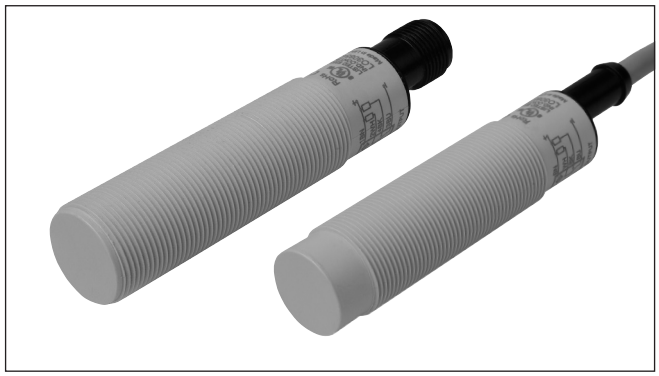
Proximity Sensors Capacitive Thermoplastic Polyester Housing Types CA18CAN/CAF.....

CARLO GAVAZZI



- **4TH Generation *TRIPLESHIELD*™**
- **Adjustable sensing distance: 2 - 10 mm Flush or 3-15 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, Target and Stability**
- **IP67, IP68, IP69K, Nema 1, 2, 4, 4X, 5, 6, 6P, 12**
- **Cable and M12 connector versions available**

Product Description

The CA18CA.. 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 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 Celcius.
The sensor housing is featuring IP69K as well as approval by ECOLAB for cleaning- and disinfection agents.

Ordering Key

CA18CAN12NAM1

- **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 18	Flush	NPN	NO+NC	Cable	0 - 8 mm	**CA18CAF08NA**		
M 18	Flush	NPN	NO+NC	M12 Plug	0 - 8 mm	**CA18CAF08NAM1**		
M 18	Flush	PNP	NO+NC	Cable	0 - 8 mm	**CA18CAF08PA**		
M 18	Flush	PNP	NO+NC	M12 Plug	0 - 8 mm	**CA18CAF08PAM1**		
M 18	Flush	PNP	NO	Cable	0 - 8 mm		CA18CAF08PODU[1]	CA18CAF08POTA[1]
M 18	Flush	PNP	NC	Cable	0 - 8 mm		CA18CAF08PCDU[1]	CA18CAF08PCTA[1]
M 18	Non-Flush	NPN	NO+NC	Cable	0 - 12 mm	**CA18CAN12NA**		
M 18	Non-Flush	NPN	NO+NC	M12 Plug	0 - 12 mm	**CA18CAN12NAM1**		
M 18	Non-Flush	PNP	NO+NC	Cable	0 - 12 mm	**CA18CAN12PA**		
M 18	Non-Flush	PNP	NO+NC	M12 Plug	0 - 12 mm	**CA18CAN12PAM1**		
M 18	Non-Flush	PNP	NO	Cable	0 - 12 mm		CA18CAN12PODU[2]	CA18CAN12POTA[2]
M 18	Non-Flush	PNP	NC	Cable	0 - 12 mm		CA18CAN12PCDU[2]	CA18CAN12PCTA[2]

[1] Replaced by CA18CAF08BPA2IO
[2] Replaced by CA18CAN12BPA2IO

Specifications EN 60947-5-2

Rated operating distance (S_n) Non-flush mounted sensor	0 - 12 mm (factory setting 12 mm), (ref. target 36x36 mm ST37, 1 mm thick, grounded)	Flush mounted sensor	0 - 8 mm (factory setting 8 mm - non-flush mounted) (ref. target 24x24 mm ST37, 1 mm thick, grounded)

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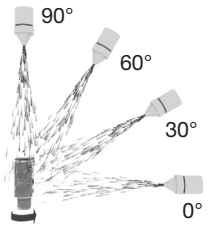
Specifications (cont.) EN 60947-5-2

Sensitivity control	Adjustable by potentiometer
Electrical adjustment	11 turns
Mechanical adjustment	16 turns
Adjustable distance	
Flush types	2 to 10 mm
Non-flush types	3 to 15 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)*	$0.85 \times S_r \leq S_u \leq 1.15 \times S_r$
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	≤ 2.6 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	60ºC ± 5ºC
Response time examples T_A = 25°C	14 sec @ T_{EXC} = 800°C 315 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)	
Continous	> 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 60068-2-27)	30 G / 11ms, 3 pos, 3 neg per axis
Rough handling shocks (IEC 60068-2-31)	2 times from 1m 100 times from 0,5m
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	150 g
Plug version	75 g
Approvals	cULus (UL508), ECOLAB
CE-marking	Yes
MTTF$_d$	825 years @ 40°C (+104°F)

* For Flush type sensor flush mounted in conductive material, the usable operating distance (Su) is $0.80 \times S_r \leq S_u \leq 1.2 \times S_r$ for temperatures exceeding 0 - 60 °C (32 - 140°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.



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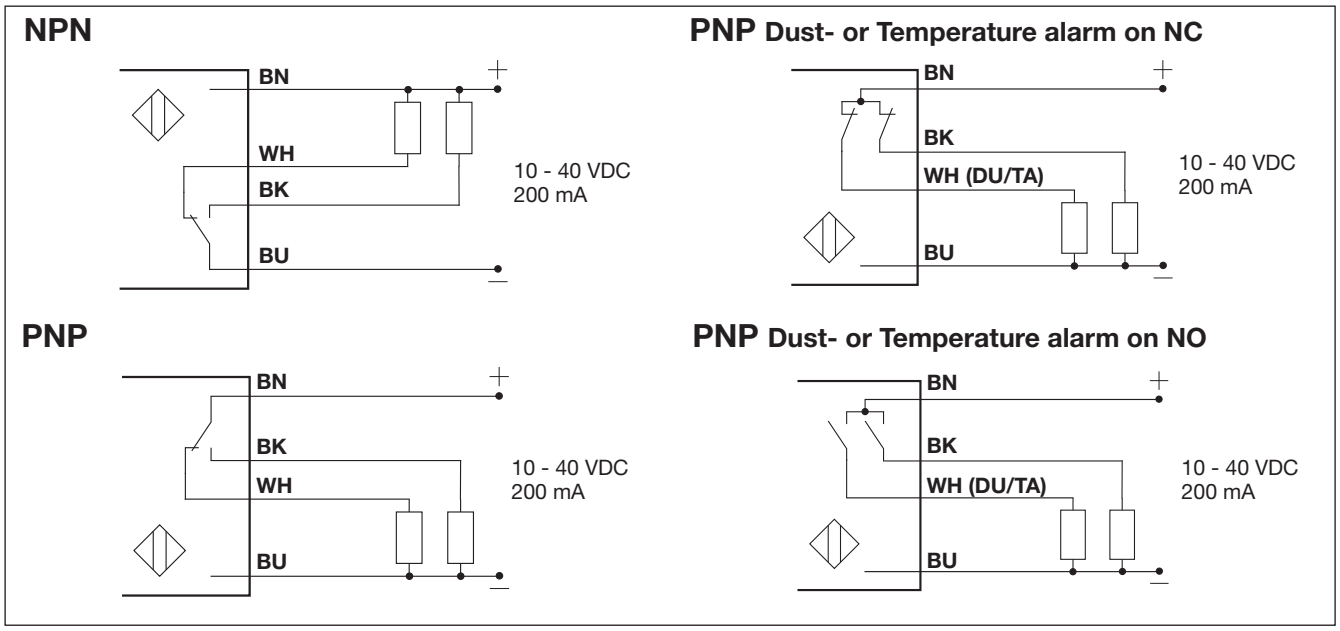
Adjustment Guide

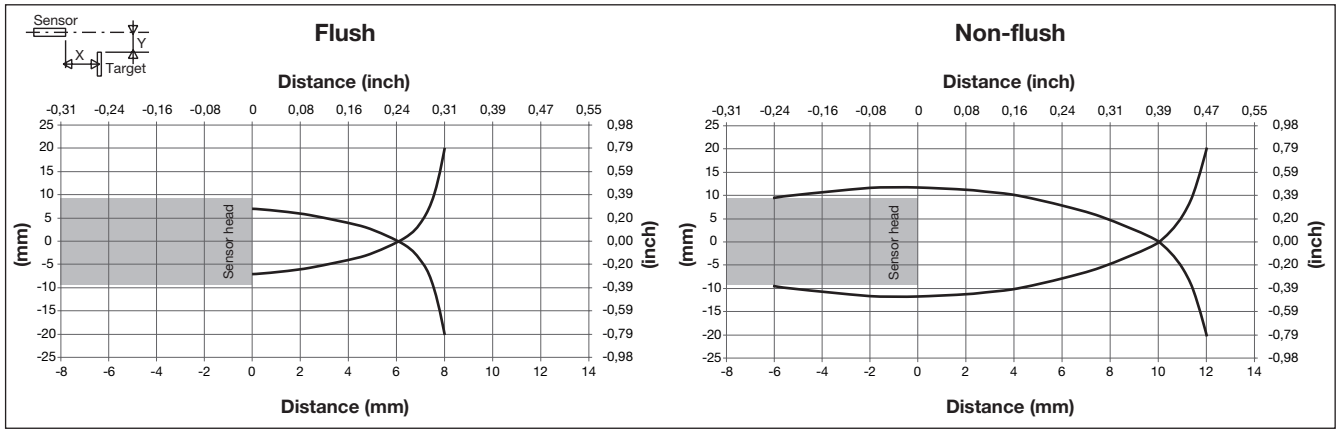
The environments in which capacitive sensors are installed can often be unstable as regards temperature, humidity, object distance and industrial (noise) interference. That is why Carlo Gavazzi offers as standard features in all TRIPLESHIELD™ capacitive sensors a user-friendly sensitivity adjustment instead of a fixed sensing range. Likewise, these sensors provide an extended 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 $Sn.S_n$.

Wiring Diagram



Detection Diagram



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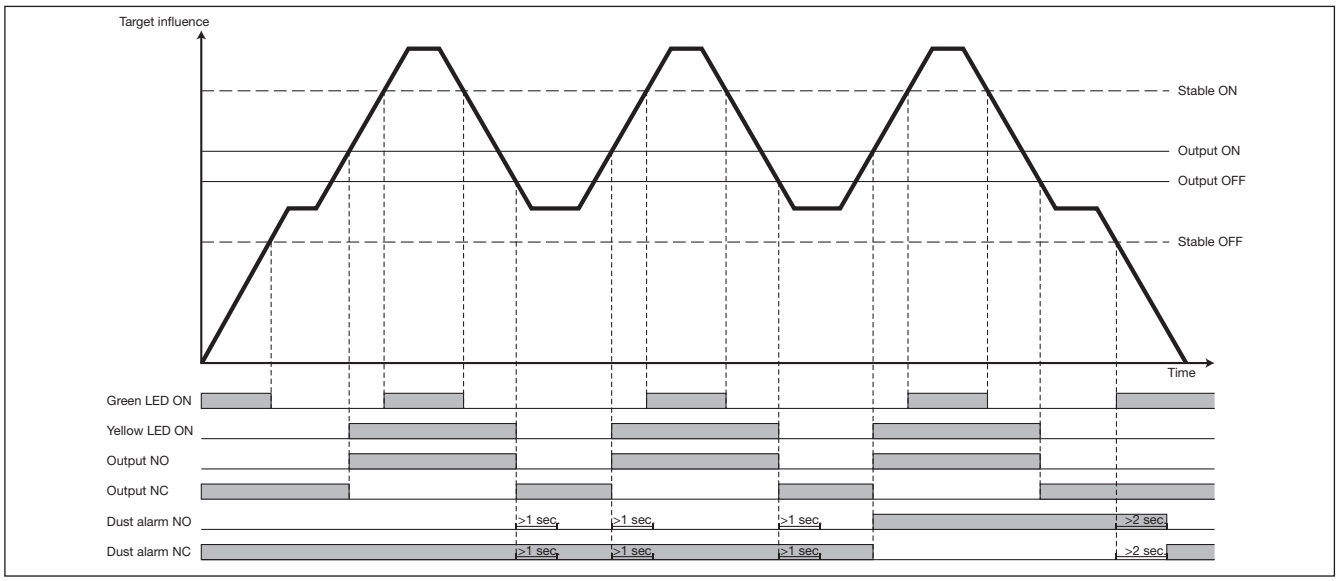
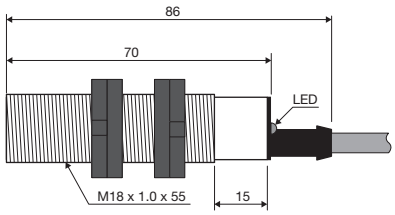
Detection Stability Indication

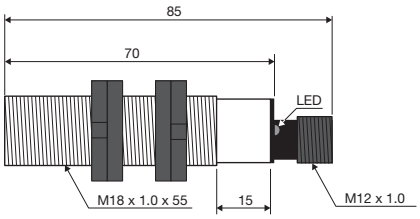


Dimensions

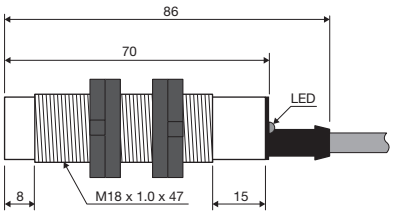
CA18CAF....



CA18CAF....M1

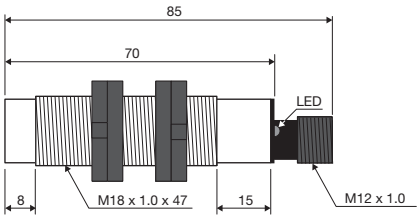


CA18CAN....



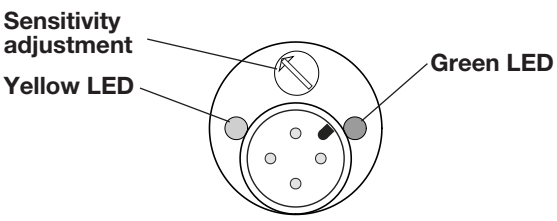
Cable

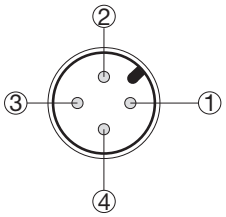
CA18CAN....M1



Plug

The back of the sensor





Colour code

1 Brown
2 White
3 Blue
4 Black

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Installation Hints

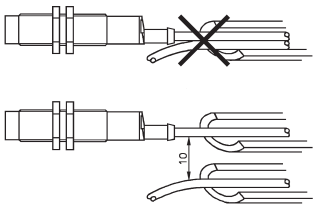
Capacitive sensors have a unique ability to detect almost any material in liquid or solid form. Capacitive sensors are able to detect metallic as well as non-metallic objects. However, their traditional use is for non-metallic materials such as:

- **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.

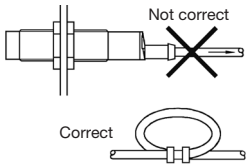
Materials are detected due to their dielectric constant. The bigger the size of an object, the higher the density of material, the better or easier it is to detect the object.

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

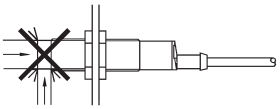


Relief of cable strain



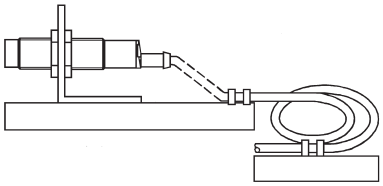
The cable should not be pulled

Protection of the sensing face



A proximity switch should not serve as a mechanical stop

Switch mounted on mobile carrier



Any repetitive flexing of the cable should be avoided

Delivery Contents

- Capacitive switch: CA18CAN/CAF.....
- User manual
- 2 x M18 fingernuts
- Screwdriver
- **Packaging:** Cardboard box

Accessories

- Connector type CONB14NF-... -series.
- Mounting Brackets AMB18-S.. (straight), AMB18-A.. (angled)