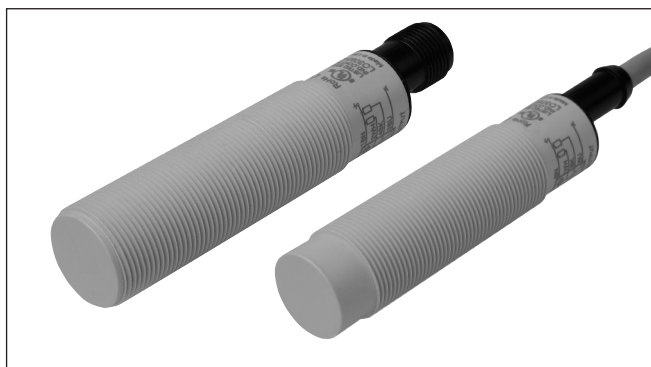


# Proximity Sensors Capacitive Thermoplastic Polyester Housing Types CA18CAN/CAF.....

CARLO GAVAZZI



- **4<sup>TH</sup> Generation TRIPLESIELD™**
- 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 4<sup>TH</sup> Generation TRIPLESIELD™ technology. Furthermore, these sensors feature increased immunity to electromagnetic interference (EMI), especially to frequency drives. Not only does 4<sup>TH</sup> Generation TRIPLESIELD™ 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 <sub>n</sub> ) | 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 <sup>1)</sup> | CA18CAF08POTA <sup>1)</sup>    |
| M 18             | Flush       | PNP         | NC              | Cable      | 0 - 8 mm                                   |                       | CA18CAF08PCDU <sup>1)</sup> | CA18CAF08PCTA <sup>1)</sup>    |
| 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 <sup>2)</sup> | CA18CAN12POTA <sup>2)</sup>    |
| M 18             | Non-Flush   | PNP         | NC              | Cable      | 0 - 12 mm                                  |                       | CA18CAN12PCDU <sup>2)</sup> | CA18CAN12PCTA <sup>2)</sup>    |

<sup>1)</sup> Replaced by CA18CAF08BPA2IO

<sup>2)</sup> Replaced by CA18CAN12BPA2IO

## Specifications EN 60947-5-2

**Rated operating distance (S<sub>n</sub>)**  
Non-flush mounted sensor

0 - 12 mm (factory setting 12 mm),  
(ref. target 36x36 mm ST37,  
1 mm thick, grounded)

Flush mounted sensor

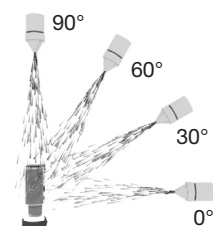
0 - 8 mm (factory setting  
8 mm - non-flush mounted)  
(ref. target 24x24 mm ST37,  
1 mm thick, grounded)

**Specifications (cont.)** EN 60947-5-2

|                                                    |                                                                                                                              |                                                      |                                                                        |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|------------------------------------------------------------------------|
| <b>Sensitivity control</b>                         | Adjustable by potentiometer                                                                                                  | <b>Connection</b>                                    |                                                                        |
| Electrical adjustment                              | 11 turns                                                                                                                     | Cable                                                | PVC,<br>Ø5.2 x 2 m, 4 x 0.34 mm <sup>2</sup>                           |
| Mechanical adjustment                              | 16 turns                                                                                                                     |                                                      | Oil proof, grey                                                        |
| Adjustable distance                                |                                                                                                                              | Plug (M1)                                            | M12 x 1 - 4 pin                                                        |
| Flush types                                        | 2 to 10 mm                                                                                                                   | <b>Temperature alarm output</b>                      | 60°C ± 5°C                                                             |
| Non-flush types                                    | 3 to 15 mm                                                                                                                   | Response time examples<br>T <sub>A</sub> = 25°C      | 14 sec @ T <sub>EXC</sub> = 800°C<br>315 sec @ T <sub>EXC</sub> = 80°C |
| <b>Effective operating dist. (S<sub>r</sub>)</b>   | 0.9 x S <sub>n</sub> ≤ S <sub>r</sub> ≤ 1.1 x S <sub>n</sub>                                                                 | <b>TRIPLESIELD™</b>                                  |                                                                        |
| <b>Usable operating dist. (S<sub>u</sub>)*</b>     | 0.85 x S <sub>r</sub> ≤ S <sub>u</sub> ≤ 1.15 x S <sub>r</sub>                                                               | <b>Exceeding the norms for capacitive sensors</b>    |                                                                        |
| <b>Repeat accuracy (R)</b>                         | ≤ 5%                                                                                                                         | Electrostatic discharge<br>(EN61000-4-2)             |                                                                        |
| <b>Hysteresis (H)</b>                              | 3 - 20%                                                                                                                      | Contact discharge                                    | > 40 kV                                                                |
| <b>Rated operational volt. (U<sub>B</sub>)</b>     | 10 to 40 VDC (ripple incl.)                                                                                                  | Air discharge                                        | > 40 kV                                                                |
| <b>Ripple</b>                                      | ≤ 10%                                                                                                                        | Electrical fast transients/burst<br>(EN 61000-4-4)   | ±4kV                                                                   |
| <b>Output function</b>                             | NPN or PNP                                                                                                                   | Surge<br>(EN 61000-4-5)                              |                                                                        |
| <b>Output switching function</b>                   | N.O. and N.C.                                                                                                                | Power-supply                                         | > 2kV (with 500 Ω)                                                     |
| <b>Rated operational current (I<sub>a</sub>)</b>   | ≤ 200 mA (continuous)                                                                                                        | Sensor output                                        | > 2kV (with 500 Ω)                                                     |
| <b>Capacitive load</b>                             | 100 nF                                                                                                                       | Wire conducted disturbances<br>(EN 61000-4-6)        | > 20 Vrms                                                              |
| <b>No-load supply current (I<sub>o</sub>)</b>      | ≤ 12 mA                                                                                                                      | Power-frequency magnetic<br>fields (EN 61000-4-8)    |                                                                        |
| <b>Voltage drop (U<sub>d</sub>)</b>                | ≤ 2.0 VDC @ 200 mA DC                                                                                                        | Continuous                                           | > 60 A/m, 75.9 μ tesla                                                 |
| <b>Minimum operational current (I<sub>m</sub>)</b> | ≥ 0.5 mA                                                                                                                     | Short-time                                           | > 600 A/m, 759 μ tesla                                                 |
| <b>OFF state current (I<sub>r</sub>)</b>           | ≤ 100 μA                                                                                                                     | Radiated RF electromagnetic<br>fields (EN 61000-4-3) | > 20 V/m                                                               |
| <b>Protection</b>                                  | Short-circuit, reverse<br>polarity, transients                                                                               | Shock (IEC 60068-2-27)                               | 30 G / 11ms, 3 pos, 3 neg<br>per axis                                  |
| <b>Frequency of operating cycles (f)</b>           | 50 Hz                                                                                                                        | Rough handling shocks<br>(IEC 60068-2-31)            | 2 times from 1m<br>100 times from 0,5m                                 |
| <b>Response time OFF-ON (t<sub>on</sub>)</b>       | ≤ 10 ms                                                                                                                      | Vibration (IEC 60068-2-6)                            | 10 to 150 Hz, 1 mm / 15 G                                              |
| <b>Response time ON-OFF (t<sub>off</sub>)</b>      | ≤ 10 ms                                                                                                                      | <b>Housing material</b>                              |                                                                        |
| <b>Power ON delay (t<sub>v</sub>)</b>              | ≤ 200 ms                                                                                                                     | Body                                                 | PBT, grey,<br>30% glass reinforced                                     |
| <b>Indication</b>                                  |                                                                                                                              | Cable gland                                          | PA12, black                                                            |
| Target detected                                    | LED, yellow                                                                                                                  | Fingernuts                                           | PA12, black                                                            |
| Power and detection stability                      | LED, green                                                                                                                   | Trimmershaft                                         | Nylon                                                                  |
| <b>Environment</b>                                 |                                                                                                                              | <b>Weight</b>                                        |                                                                        |
| Installation category                              | III (IEC 60664, 60664A;<br>60947-1)                                                                                          | Cable version                                        | 150 g                                                                  |
| Degree of pollution                                | 3 (IEC 60664, 60664A;<br>60947-1)                                                                                            | Plug version                                         | 75 g                                                                   |
| Degree of protection                               | IP 67, IP 68/60 min., IP69K**<br>(IEC 60529; 60943-1)                                                                        | <b>Approvals</b>                                     | cULus (UL508), ECOLAB                                                  |
| NEMA type                                          | 1, 2, 4, 4X, 5, 6, 6P, 12                                                                                                    | <b>CE-marking</b>                                    | Yes                                                                    |
| Operating temperature                              | -30 to +85°C (-22 to +185°F)                                                                                                 | <b>MTTF<sub>d</sub></b>                              | 825 years @ 40°C (+104°F)                                              |
| Max. temperature on sensing face                   | 120°C (248°F)                                                                                                                |                                                      |                                                                        |
| Storage temperature                                | -40 to +85°C (-40 to +185°F)                                                                                                 |                                                      |                                                                        |
| <b>Rated insulation voltage</b>                    | 1 kVAC (rms)<br>IEC protection class III  |                                                      |                                                                        |
| <b>Tightening torque</b>                           | ≤ 2.6 Nm                                                                                                                     |                                                      |                                                                        |

\* For Flush type sensor flush mounted in conductive material, the usable operating distance (S<sub>u</sub>) is 0.80 x S<sub>r</sub> ≤ S<sub>u</sub> ≤ 1.2 x S<sub>r</sub> 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.



## 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 TRIPLESIELD™ 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 tem-

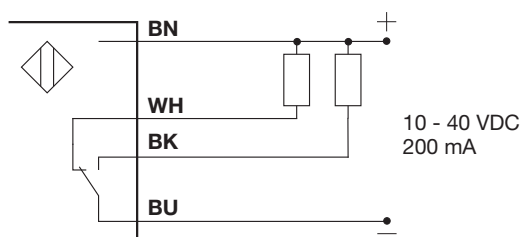
perature stability to ensure high immunity to electromagnetic interference (EMI) and a minimum need for adjusting sensitivity, if the temperature varies.

### Note:

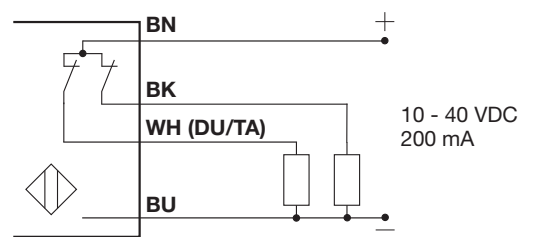
The sensors are factory set (default) to nominal sensing range  $S_n.S_n$ .

## Wiring Diagram

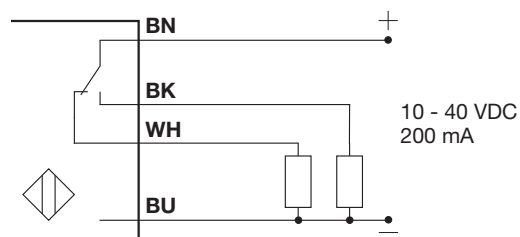
### NPN



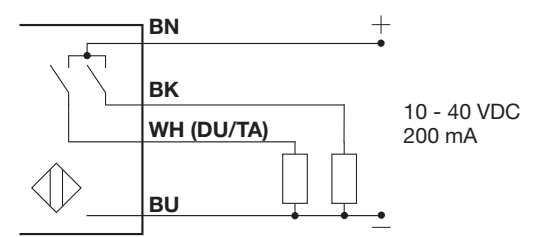
### PNP Dust- or Temperature alarm on NC



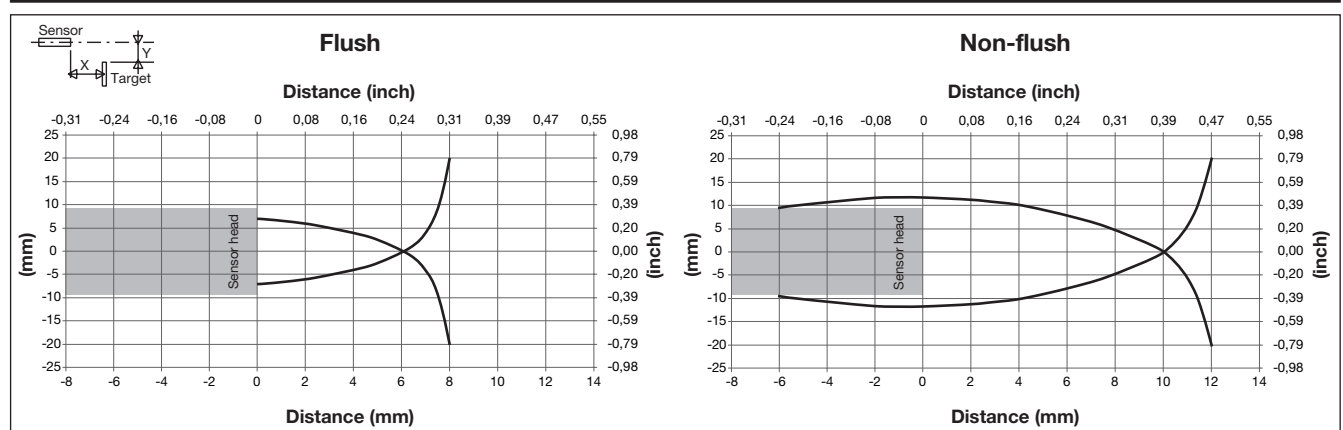
### PNP



### PNP Dust- or Temperature alarm on NO

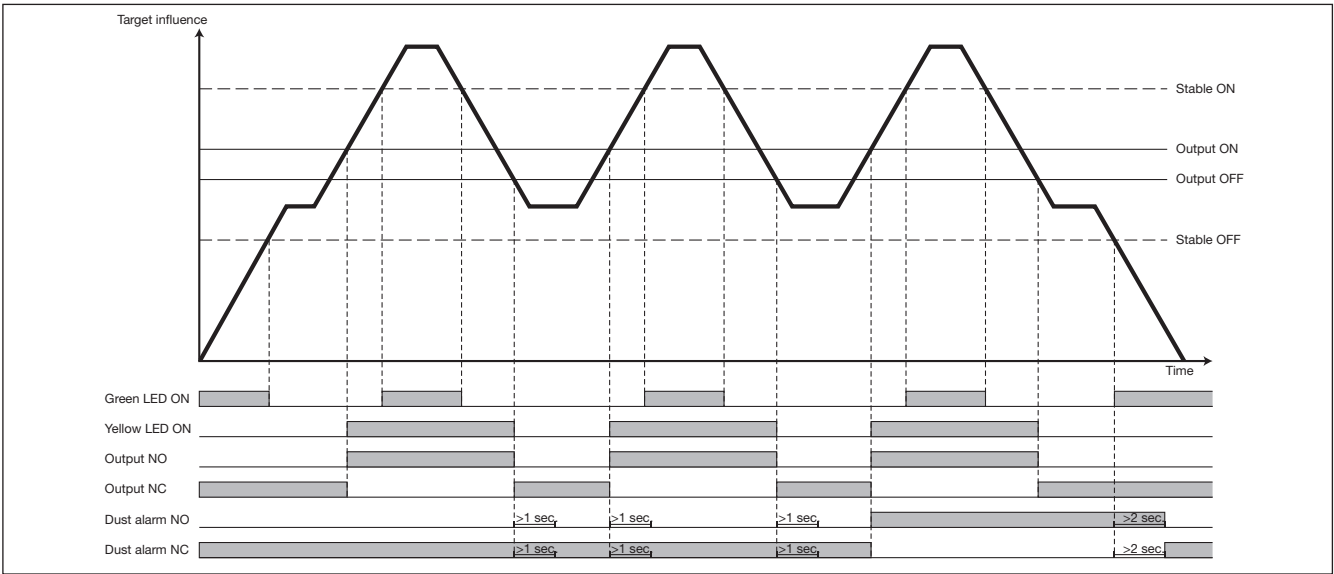


## Detection Diagram





Detection Stability Indication



Dimensions

**CA18CAF....**

86  
70  
M18 x 1.0 x 55  
15  
LED

**CA18CAF....M1**

85  
70  
M18 x 1.0 x 55  
15  
LED  
M12 x 1.0

**CA18CAN....**

86  
70  
M18 x 1.0 x 47  
15  
LED  
8

**CA18CAN....M1**

85  
70  
M18 x 1.0 x 47  
15  
LED  
8  
M12 x 1.0

**Cable**

**Plug**

**The back of the sensor**

Sensitivity adjustment  
Yellow LED  
Green LED

**Colour code**

1 Brown  
2 White  
3 Blue  
4 Black

## Installation Hints

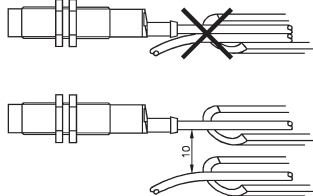
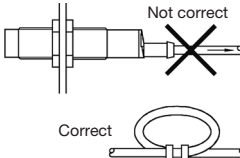
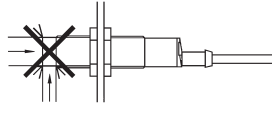
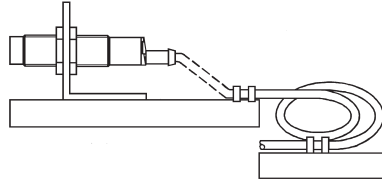
Capacitive sensors have a unique ability to detect almost any material in liquid or solid form. Capacitive sensors are able to detect metallic as well as non-metallic objects. However, their traditional use is for non-metallic materials such as:

- **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.

|                                                                                                                                                                                                                                                                    |                                                                                                                                                       |                                                                                                                                                                                          |                                                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>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</p>  | <p>Relief of cable strain</p>  <p>The cable should not be pulled</p> | <p>Protection of the sensing face</p>  <p>A proximity switch should not serve as a mechanical stop</p> | <p>Switch mounted on mobile carrier</p>  <p>Any repetitive flexing of the cable should be avoided</p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Delivery Contents

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

## Accessories

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