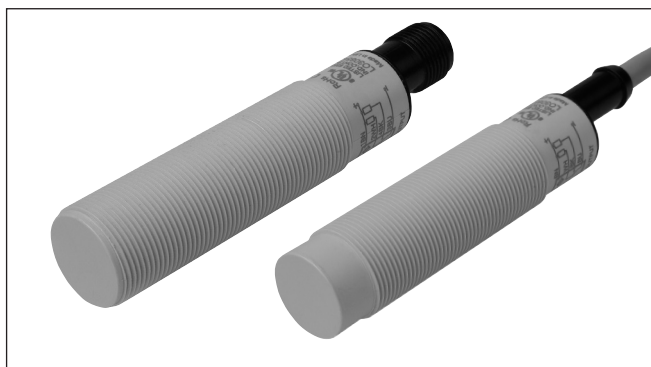# Proximity Sensors Capacitive Thermoplastic Polyester Housing Types CA18CAN/CAF.....

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

CE ᶜ(UL)us **ECOLAB**®

Product Description

The CA18CA.. capacitive proximity switches feature an improved 4TH Generation *TRIPLESHIELD*™ technology. Furthermore, these sensors feature increased immunity to electromagnetic inteference (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	CA18CAF08POTA
M 18	Flush	PNP	NC	Cable	0 - 8 mm		CA18CAF08PCDU	CA18CAF08PCTA
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	CA18CAN12POTA
M 18	Non-Flush	PNP	NC	Cable	0 - 12 mm		CA18CAN12PCDU	CA18CAN12PCTA

Specifications EN 60947-5-2

|			
Rated operating distance (S_n)		**Sensitivity control**	Adjustable by potentiometer
Non-flush mounted sensor	0 - 12 mm (factory setting 12 mm), (ref. target 36x36 mm ST37, 1 mm thick, grounded)	Electrical adjustment	11 turns
		Mechanical adjustment	16 turns
		Adjustable distance	
		Flush types	2 to 10 mm
Flush mounted sensor	0 - 8 mm (factory setting 8 mm - non-flush mounted) (ref. target 24x24 mm ST37, 1 mm thick, grounded)	Non-flush types	3 to 15 mm
		Effective operating dist. (S_r)	$0.9 \times S_n \leq S_r \leq 1.1 \times S_n$

Specifications (cont.) EN 60947-5-2

Usable operating dist. (S_u)*	$0.85 \times S_r \leq S_u \leq 1.15 \times S_r$	**Temperature alarm output** Response time examples $T_A = 25°C$	60°C ± 5°C 14 sec @ T_{EXC} = 800°C 315 sec @ T_{EXC} = 80°C
Repeat accuracy (R)	≤ 5%		
Hysteresis (H)	3 - 20%		
Rated operational volt. (U_B)	10 to 40 VDC (ripple incl.)	***TRIPLESHIELD*™** **Exceeding the norms for** **capacitive sensors** Electrostatic discharge (EN61000-4-2) Contact discharge Air discharge	 > 40 kV > 40 kV
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	Electrical fast transients/burst (EN 61000-4-4)	 ±4kV
No-load supply current (I_o)	≤ 12 mA		
Voltage drop (U_d)	≤ 2.0 VDC @ 200 mA DC	Surge (EN 61000-4-5) Power-supply Sensor output	 > 2kV (with 500 Ω) > 2kV (with 500 Ω)
Minimum operational **current** (I_m)	≥ 0.5 mA		
OFF state current (I_r)	≤ 100 µA	Wire conducted disturbances (EN 61000-4-6)	 > 20 Vrms
Protection	Short-circuit, reverse polarity, transients	Power-frequency magnetic fields (EN 61000-4-8) Continous Short-time	 > 60 A/m, 75.9 µ tesla > 600 A/m, 759 µ tesla
Frequency of operating **cycles** (f)	50 Hz		
Response time OFF-ON (t_{on})	≤ 10 ms	Radiated RF electromagnetic fields (EN 61000-4-3)	 > 20 V/m
Response time ON-OFF (t_{off})	≤ 10 ms	Shock (IEC 60068-2-27)	30 G / 11ms, 3 pos, 3 neg per axis
Power ON delay (t_v)	≤ 200 ms		
Indication Target detected Power and detection stability	 LED, yellow LED, green	Rough handling shocks (IEC 60068-2-31)	 2 times from 1m 100 times from 0,5m
Environment Installation category	 III (IEC 60664, 60664A; 60947-1)	Vibration (IEC 60068-2-6)	10 to 150 Hz, 1 mm / 15 G
		Housing material Body	 PBT, grey, 30% glass reinforced
Degree of pollution	3 (IEC 60664, 60664A; 60947-1)	Cable gland Fingernuts Trimmershaft	PA12, black PA12, black Nylon
Degree of protection	IP 67, IP 68/60 min., IP69K** (IEC 60529; 60943-1)		
NEMA type	1, 2, 4, 4X, 5, 6, 6P, 12	**Weight** Cable version Plug version	 150 g 75 g
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)	**Approvals**	cULus (UL508), ECOLAB
Rated insulation voltage	1 kVAC (rms) IEC protection class III ⬙	**CE-marking**	Yes
Tightening torque	≤ 2.6 Nm	**MTTF$_d$**	825 years @ 40°C (+104°F)
Connection Cable	 PVC, Ø5.2 x 2 m, 4 x 0.34 mm² Oil proof, grey		
Plug (M1)	M12 x 1 - 4 pin		

* For Flush type sensor flushmounted 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.

90°
60°
30°
0°

Specifications are subject to change without notice (02.02.2015)
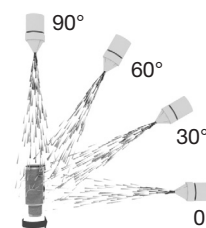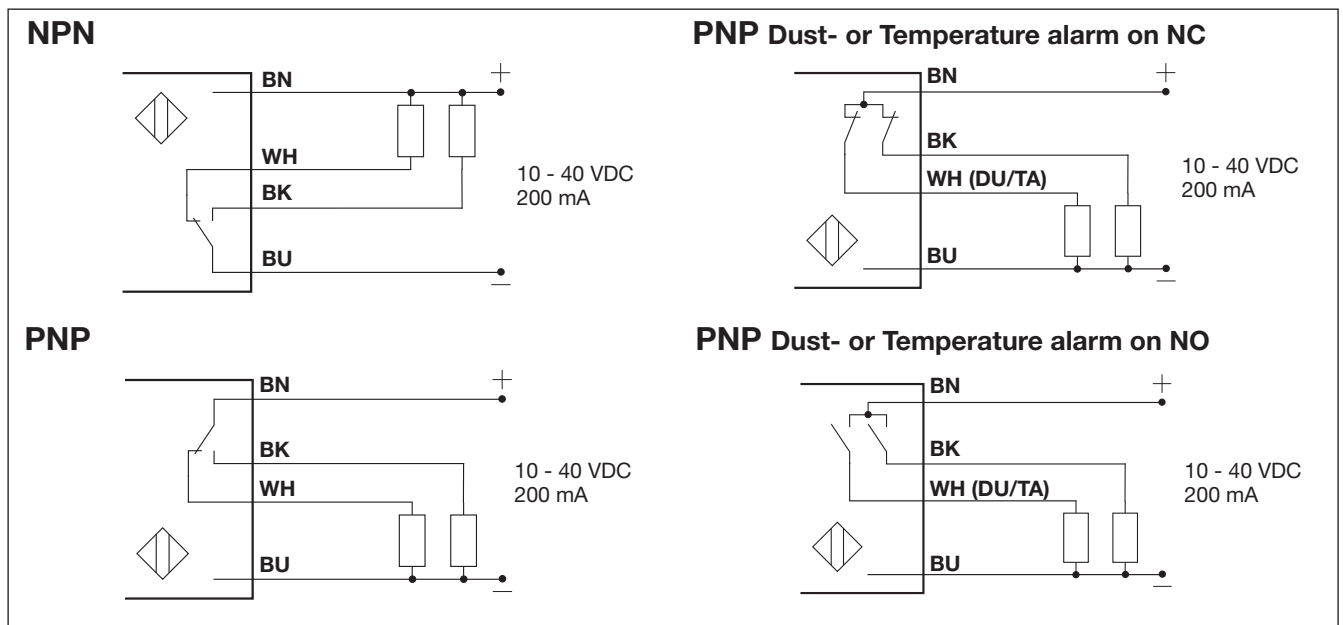
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Adjustment Guide

The environments in which capacitive sensors are installed can often be unstable as regards to temperature, humidity, object distance and industrial (noise) interference. Because of this, 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 provi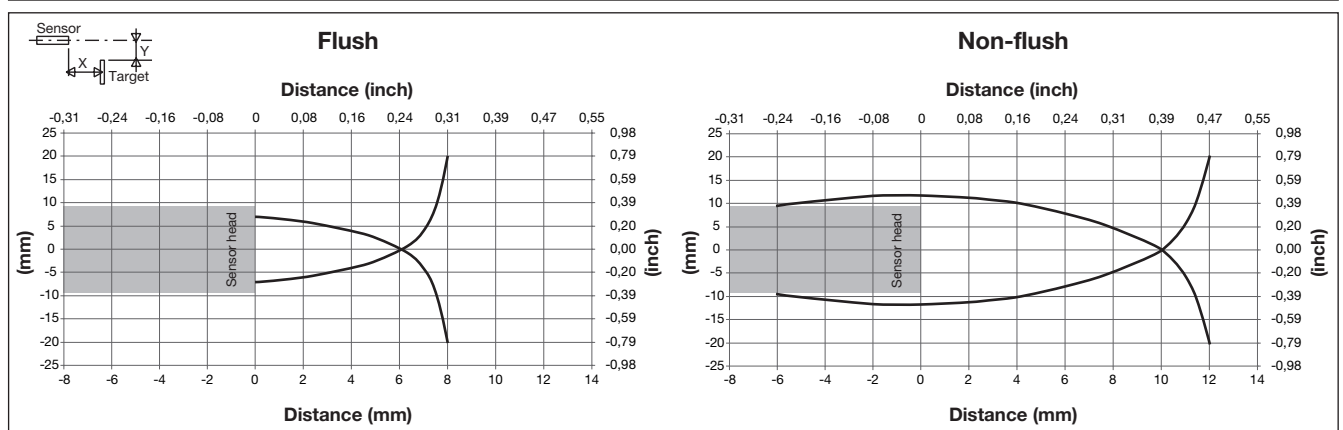de an extended sensing range to accommodate mechanically demanding areas and temperature stability to ensure high immunity to electromagnetic interference (EMI) and a minimum need for adjusting sensitivity if the temperature varies.

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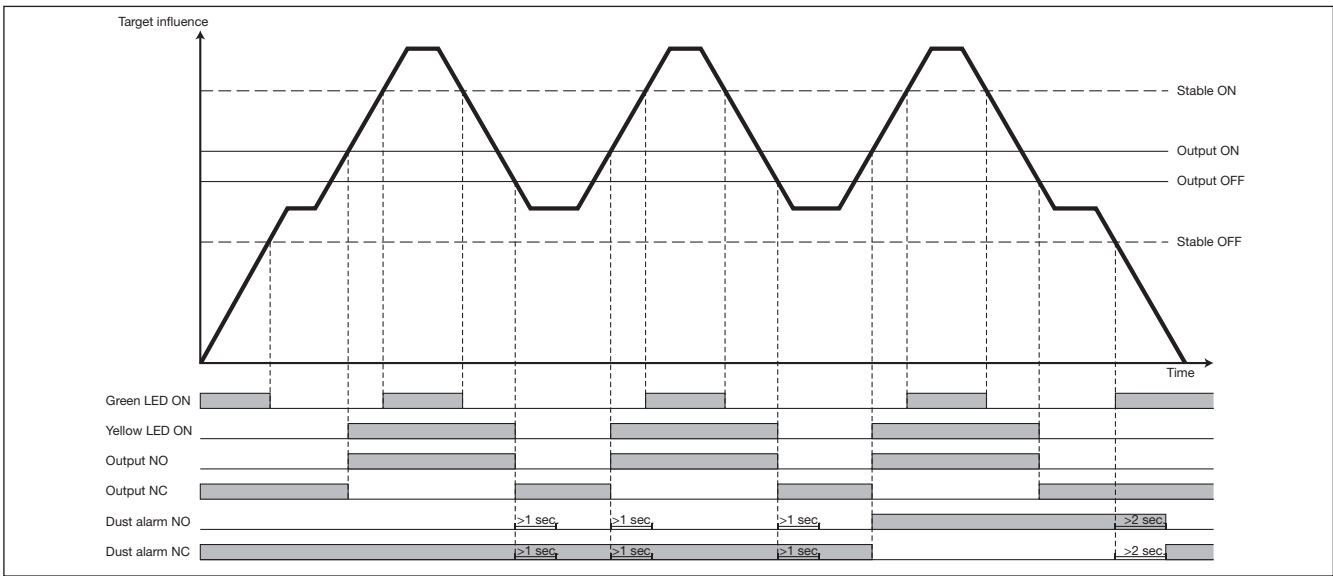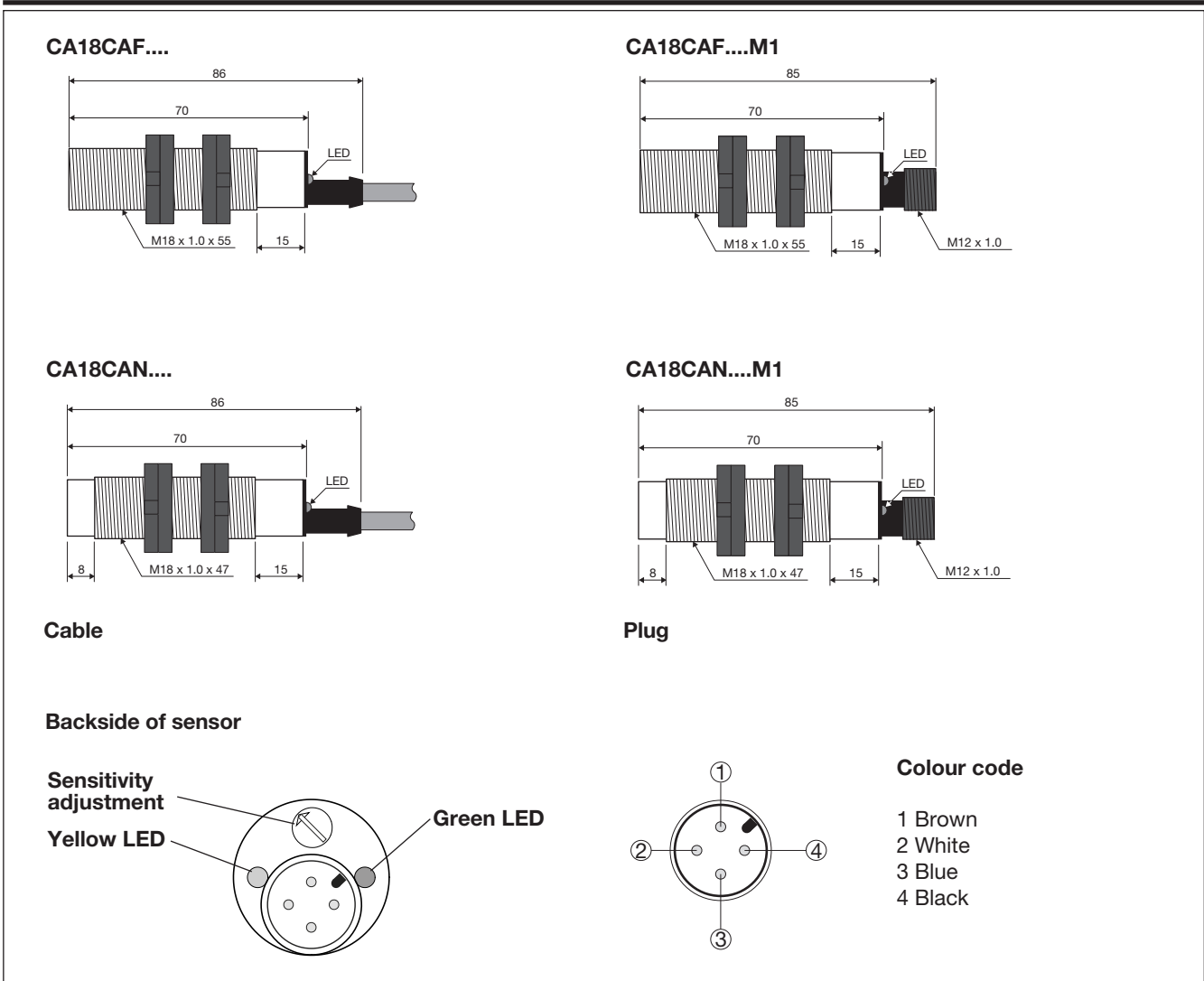Sensors are factory set (default) to nominal sensing range S_n.

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

Sensor

X   Y
Target

Distance (inch)

-0,31 -0,24 -0,16 -0,08   0   0,08 0,16 0,24 0,31 0,39 0,47 0,55

(mm)   25   20   15   10   5   0   -5   -10   -15   -20   -25

Sensor head

0,98 0,79 0,59 0,39 0,20 0,00 -0,20 -0,39 -0,59 -0,79 -0,98 (inch)

-8   -6   -4   -2   0   2   4   6   8   10   12   14

Distance (mm)

Non-flush

Distance (inch)

-0,31 -0,24 -0,16 -0,08   0   0,08 0,16 0,24 0,31 0,39 0,47 0,55

(mm)   25   20   15   10   5   0   -5   -10   -15   -20   -25

Sensor head

0,98 0,79 0,59 0,39 0,20 0,00 -0,20 -0,39 -0,59 -0,79 -0,98 (inch)

-8   -6   -4   -2   0   2   4   6   8   10   12   14

Distance (mm)

Detection Stability Indication

Dimensions

CA18CAF....

86
70
LED
M18 x 1.0 x 55   15

CA18CAF....M1

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

CA18CAN....

86
70
LED
8   M18 x 1.0 x 47   15

CA18CAN....M1

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

Cable

Plug

Backside of sensor

Sensitivity adjustment
Yellow LED
Green LED

Colour code

1 Brown
2 White
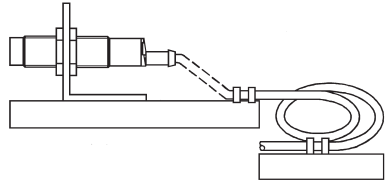3 Blue
4 Black

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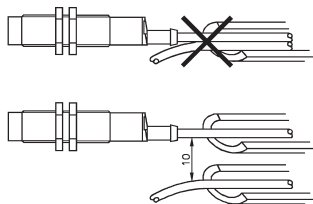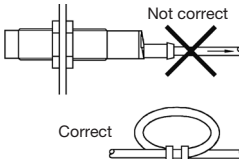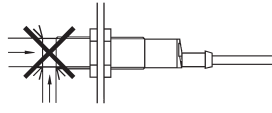
Capacitive sensors have a unique ability to detect almost any material in liquid or solid form. Capacitive sensors are able to detect metallic as well as non-metallic objects. However, their traditional use is for non-metallic materials such as:

• **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*	*Protection of the sensing face*	*Switch mounted on mobile carrier*
	Not correct		
	Correct		
	The cable should not be pulled	A proximity switch should not serve as mechanical stop	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 CONM14NF.. -series.
• Mounting Brackets AMB18-S.. (straight), AMB18-A.. (angled)