Capacitive Proximity Sensor

4th Generation of *TRIPLESHIELD*™

CA18CBxxBPxIO

- LED bar graph for output, signal stability, power ON and easy adjustment
- Available in M18 in a robust PBT housing, flush or non-flush and IO-Link
- Sensing range: 2…10 mm flush or 3…15 mm non-flush
- Sensitivity adjustment either by trimmer, teach-by-wire or by IO-link parameter
- Supply voltage: 10 to 40 VDC
- Output: PNP / NPN / Push-Pull / External input
- Make and break switching function
- Protection: reverse polarity, short circuit and transients
- Cable and plug versions
- Excellent EMC performance (4th generation *TRIPLESHIELD*™)

Description

The new generation of CA18CB…IO sensors is a complete family of high performance capacitive sensors for detection of most solid or liquid targets in industrial applications such as Plastic & Rubber, Agriculture, Food & Beverage and Materials handling.

The sensor housing has the IP69K rating as well as approval by ECOLAB for cleaning and disinfection agents.

The sensor has a LED bar graph that visualizes the signal stability and makes adjustment easy.

The 4th Generation of *TRIPLESHIELD*™ technology provides increased immunity to electromagnetic interference (EMI), especially to frequency drives, and improves immunity to humidity and dust.

The on-board IO-Link communication opens up a variety of functions, such as easy communication and customization of advanced parameter settings.

Part selection key

C	**-**	Capacitive sensor
A	**-**	Cylindrical housing with threaded barrel
18	**-**	Housing diameter (mm)
C	**-**	Plastic housing - PBT
B	**-**	Bar graph LEDs
X	**F**	Flush installation
	N	Non-flush installation
X	**08**	Rated operating distance: 8 mm (Flush)
	12	Rated operating distance: 12 mm (Non-flush)
B	**-**	**Selectable:** NPN, PNP, Push-Pull, External Input (only pin 2) or External teach input (only pin 2)
P	**-**	**Selectable:** N.O. or N.C., each output
X	**A2**	Cable, 2 m
	M1	Plug, M12, 4 pins
IO	**-**	IO-Link

Part selection

Connection	Rated operating distance	Mounting	Part number
Cable	8 mm	Flush	**CA18CBF08BPA2IO**
	12 mm	Non-flush	**CA18CBN12BPA2IO**
Connector	8 mm	Flush	**CA18CBF08BPM1IO**
	12 mm	Non-flush	**CA18CBN12BPM1IO**

Features

Main operational data

Functional principle	Capacitive sensor
Functional principle details	• Flush • Non-flush • 2 outputs • Teach settings
Switching modes	Sensor switching channel 1 & 2: • Deactivated • **Single point mode *** • Windows mode • 2 point mode
Sensing	
Rated operating distance (S_n)	**8 mm** * Flush **12 mm** * Non-flush
Sensing range	Flush 2…10 mm via trimmer, teach by wire or IO-Link Setpoint 1: **1000** * and Setpoint 2: **10000** * (higher number = better signal) Non-flush 3…15 mm via trimmer, teach by wire or IO-Link Setpoint 1: **1000** * and Setpoint 2: **10000** * (higher number = better signal)
Effective operating distance (S_r)	$0.9 \times S_n \leq S_r \leq 1.1 \times S_n$
Usable operating dist. (S_u)	$0.85 \times S_r \leq S_u \leq 1.15 \times S_r$**
Reference target	24 x 24 mm ST37, 1 mm thick, grounded (Flush) 36 x 36 mm ST37, 1 mm thick, grounded (Non-flush)
Hysteresis	Adjustable via IO link (1…100%) • **4% (Flush)** * • **15% (Non-flush)** *
Operating frequency	50 Hz
Response times	t_{ON} (OFF-ON): **< 10 ms** *, t_{OFF} (ON-OFF): **< 10 ms** *
Repeat accuracy (R)	≤ 5%

* **Factory settings** - see options in “Smart functions - IO-Link selectable”

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

Electrical data

Power supply	
Operating voltage range (U_B)	10 - 40 VDC (Ripple included)
Ripple (U_{rpp})	≤ 10%
No load supply current (I_o)	≤ 20 mA
Rated insulation voltage (U_i)	50 VDC
Power-ON delay	300 ms
Outputs	
Sensor output 1 (SO1)	NPN**, PNP *,** Push-Pull**; N.O. ***, N.C.
Sensor output 2 (SO2)	NPN**, PNP *,** Push-Pull, External input, External teach**;** N.O., **N.C. ***
Rated operational current (I_e)	≤ 200 mA (continuous) pr output
OFF-state current (I_r)	≤ 100 µA
Minimum operational current (I_m)	> 0,5 mA
Voltage drop (U_d)	≤ 1,0 VDC @ 200 mA DC
Capacitive load	≤100 nF
Utilization category	DC-12: Control of resistive loads and solid state loads with optical isolation
	DC-13: Control of electromagnets

*** Factory settings** - see options in “Smart functions - IO-Link selectable”

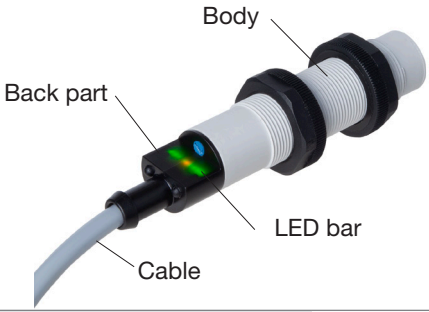
Environmental data

Ambient temperatures	
Operating	-30°C... +85°C (-22°F... +185°F)*
Storage	-40°C ... +85°C (-40°F ... +185°F)*
Max. temp. on sensing face	120°C (+248°F)
Ambient humidity range	
Operating	35% - 95%**
Storage	35% - 95%**
Mechanical influences	
Vibration	10 - 150 Hz,1.0 mm/15 g (EN IEC 60068-2-6)
Shock	30 g_n / 11 ms, 3 pos, 3 neg per axis (EN IEC 60068-2-27)
Drop test	2 x 1 m and 100 x 0.5 m (EN IEC 60068-2-31)
Categorization	
Pollution degree	3 (EN IEC 60664, 60664A; EN IEC 60947-1)
Overvoltage category	III (EN IEC 60664; EN IEC 60947-1)
Degree of protection	IP67, IP68/60 min., IP69K (EN IEC 60529; ISO 20653)
NEMA enclosure type	1, 2, 4, 4X, 5, 6, 6P, 12 (NEMA 250)
Safety (electrical)	
Protections	Short circuits, reverse polarity and transients
Rated insulation voltage (U_i)	50 VDC
Dielectric insulation voltage	≥ 1 kVAC rms, 50/60 Hz for 1 min
Rated impulse withstand voltage	> 2 kV (with 500 Ω)
EMC immunity standard	EN IEC 60947-5-2 / EN IEC 61000-6-2
EMC immunity test	
Electrostatic discharge	> 40 kV @ air discharge or > 40 kV @ contact discharge (IEC 61000-4-2)
Electromagnetic field	20 V/m (IEC 61000-4-3)
Fast transient	± 4 kV / 5 kHz (IEC 61000-4-4)
Wire conducted noise	20 Vrms (IEC 61000-4-6)
Magnetic field	Continuous: > 60 A/m, 75.9 µ tesla, Short-time > 600 A/m, 759 µ tesla (IEC 61000-4-8)

* Do not bend the cable in temperatures below -10°C
** With no icing or condensation

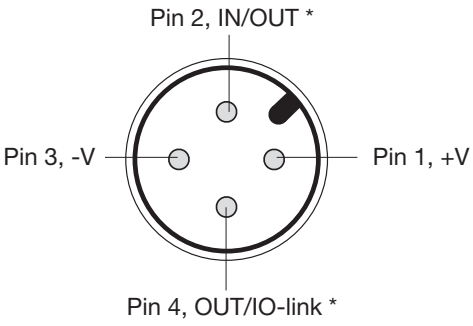
Structure

Housing



Housing	
Housing	Cylindrical with threaded barrel
Body	PBT grey, 30% glass-reinforced
Trimmer shaft	Nylon, blue
Back part	PA12, transparent, black
Finger nuts	PBTP, glass reinforced
Dimensions	M18 x 1
Thread length	47 mm (Non-flush) 55 mm (Flush)
Total length	95.5 mm
Weight	≤ 150 g, cable version ≤ 75 g, plug version
Connection	
Cable	2 m, 4 wire, 4 x 0.34 mm², Ø5.2 mm Oil proof PVC, grey
Plug	M12 x 1, 4 pin male connector
Tightening torque	≤ 2,6 Nm

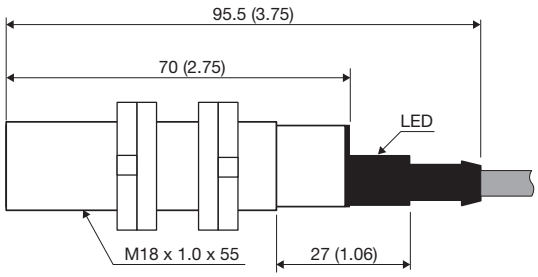
Connection and wiring



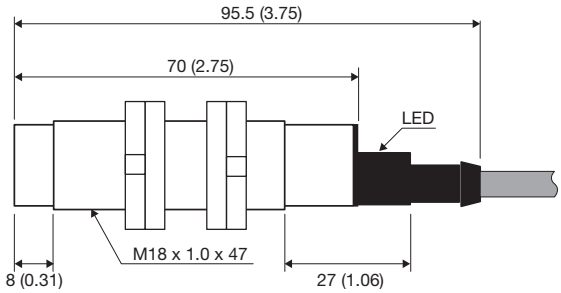
* The outputs can be configured via IO-Link

Dimensions in mm (inches)

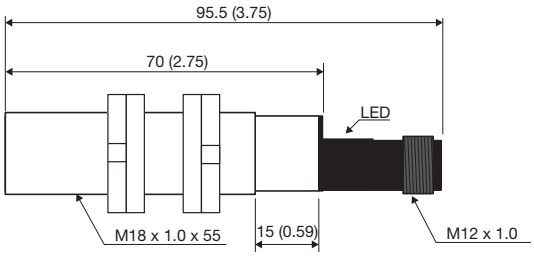
Cable version flush



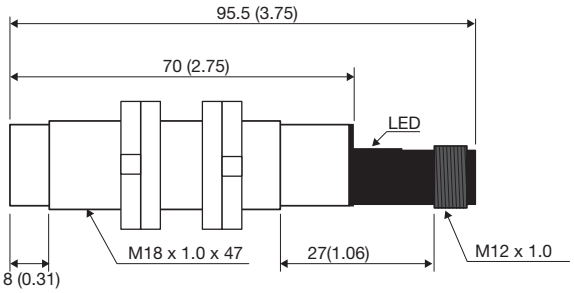
Cable version non-flush



Plug version flush



Plug version non-flush



LED indication

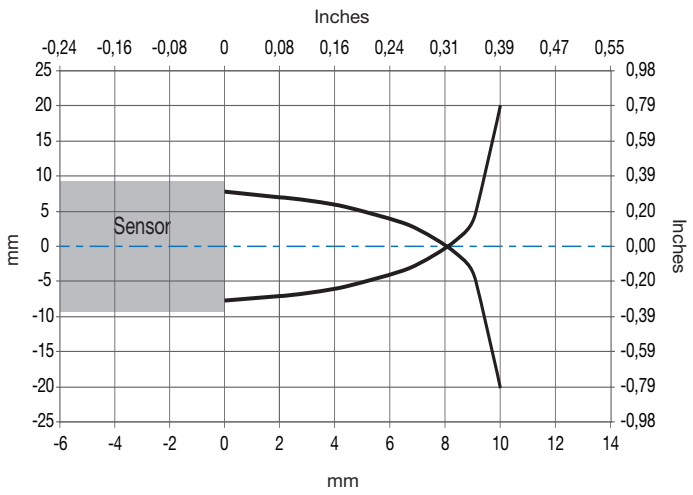
LED bar graph	Yellow LED	Switching state of the sensor ON/OFF
	Green LEDs	Signal stability
	Flashing far right green LED	IO-Link connection
	The entire LED bar flashes	Find my sensor
LED settings	• LED indication inactive, • LED indication active, single LED • **LED indication active, centered LEDs *** • LED indication active, all LEDs • Find-my-sensor	

* **Factory settings** - see options in “Smart functions - IO-Link selectable”

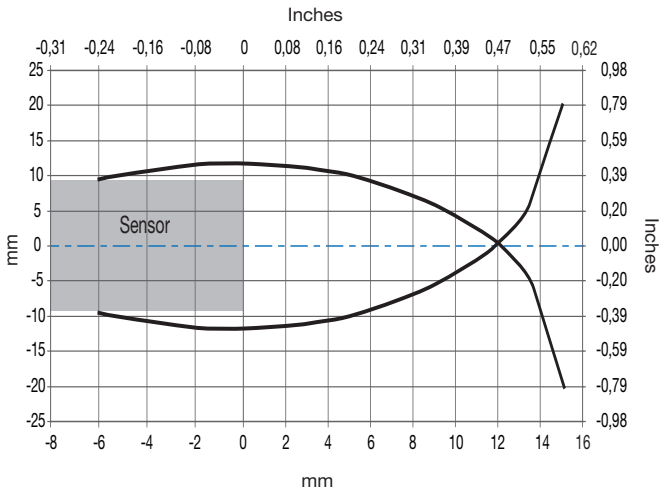
Sensing

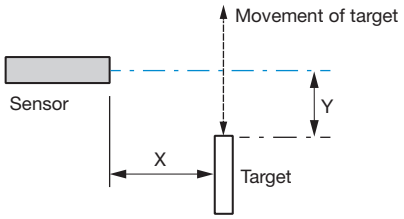
Detection diagram

Flush



Non-flush





Compatibility and conformity

Approvals and markings

General reference	Sensor designed according to EN IEC 60947-5-2 and EN IEC 60947-1
$MTTF_d$	97.1 years @ 40°C (+104°F) (EN ISO 13849-1, SN 29500)
CE-marking	CE
Approvals	cULus (UL508) Report Reference E353577
ECOLAB	ECOLAB
CFP quantification	Cable: 44,96 Kg CO_2e Plug: 44,41 Kg CO_2e

IO-Link

IO-Link information	
Revision	1.1
Transmission rate	COM2 (38.4 kbaud)
SDCI-Norm	EN IEC 61131-9
Profile	Smart sensor profile 2nd edition, common profile
Min. cycle time	5 ms
SIO mode	Yes
Min. master port class	A (4-pin)
Process data lenght	32 bit

IO-Link functions

Smart functions - IO-Link selectable

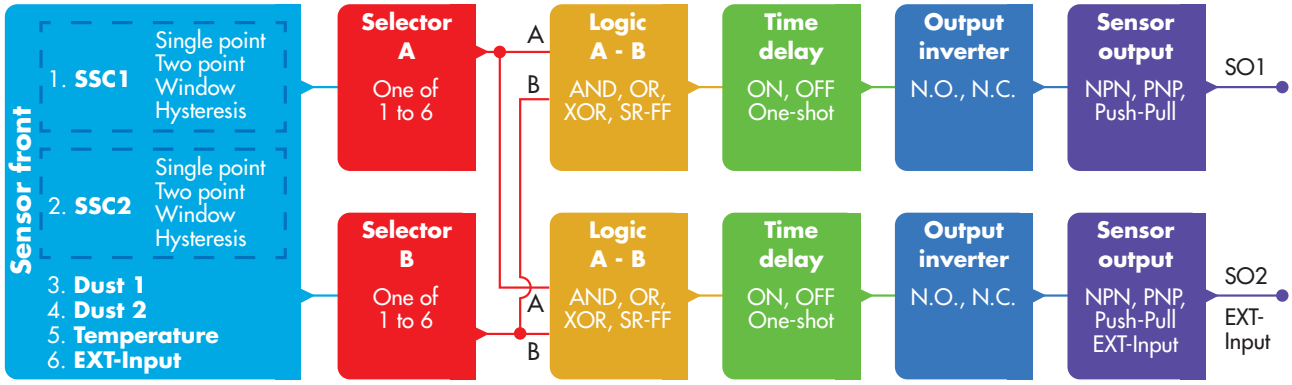
Input selector	Channel A + B: • Deactivated 1. **SSC1 *** (Channel A & B) (SSC = Switching Signal Channel) 2. SSC2 3. Dust alarm 1 4. Dust alarm 2 5. Temperature alarm 6. External input
Logic functions	Channel A + B for SO1 & SO2 (SO = Sensor Output) • **Direct *** • AND • OR • X-OR • SetReset-FlipFlop
Timer mode	For SO1 & SO2 • **Disabled *** • ON delay • OFF delay • ON delay and OFF delay • One-shot leading edge • One-shot trailing edge
Output Inverter	• **N.O. *** (SO1) • **N.C. *** (SO2)
Sensor output / Input	• Disabled output • **PNP *** • NPN • Push-pull • External Input,active high • External Input,active low • Teach-in
Alarms	
Safe limits	0 - 100% of actual SP. SSC1 and SSC2 **8% (Flush) *** **12% (Non-flush) ***
Dust alarm	Safe limits are used for dust alarm level
Temperature alarm	High threshold -50 - +125 °C **85°C *** Low threshold -50 - +125 °C **-30°C ***
Diagnostic parameters	• Sensor diagnostics • Temperature diagnostics • Operating diagnostics: Operating hours, Number of power cycles, Quality of teach, Quality of run, Excess gain • Error count • Device status
Events	Maintenance, temperature and short circuit events

*** Factory settings**

Smart functions - IO-Link selectable (cont.)

LED settings	• LED indication inactive, • LED indication active, single LED bar graph • **LED indication active, centered LED * bar graph** • LED indication active, full LED bar graph • Find-my-sensor
Observations	Readable via IO-link: • Analog values • Short circuit • Switching outputs • Switching channels • Temperature alarm • Dust alarms

*** Factory settings**



Delivery contents and accessories

Delivery contents

- Capacitive sensor: CA18CBxxBPxxIO
- 2 x M18 finger nuts
- Packaging: Carton box
- Screwdriver

Accessories

- Connector type CONx14NF-... -series.
- Mounting Brackets AMB18-S.. (straight), AMB18-A.. (angled)

Further information

User manual	http://cga.pub/?f19ed4	
Mounting brackets	http://cga.pub/?68adbc	
Connectors	http://cga.pub/?ed457b	
Carlo Gavazzi website	www.gavazziautomation.com	

Please refer to the user manual for in-depth explanations.