CARLO GAVAZZI
Automation Components

CARLO GAVAZZI

IO-Link capacitive proximity sensors

Sensors

CA18/30 series
IO-Link capacitive proximity sensors

Carlo Gavazzi is proud to introduce this series of high-quality capacitive sensors to meet the demands of a new industrial era; an era that requires devices with enhanced capabilities and new ways of accessing, communicating and processing data. The Carlo Gavazzi IO-Link sensors combine their excellent features with the benefits of the IO-Link standard, which opens up the access to detailed information, advanced functionality and flexibility.

The IO-Link system provides significant advantages including enhanced data availability and workability, remote configuration and automatic parameter settings, advanced diagnostics, simplified installation and easy sensor replacement.

Get ready for the era of Industry 4.0 and the Industrial Internet of Things!

8 PREDICTIVE MAINTENANCE

1 CONFIGURABLE SENSORS

7 MULTI-FUNCTION DEVICE

6

Universal, smart and easy

8 PREDICTIVE MAINTENANCE
1 CONFIGURABLE SENSORS
7 MULTI-FUNCTION DEVICE
2 ADVANCED DETECTION
6 PLUG & PLAY
3 REDUCED INVENTORY
5 ADVANCED DIAGNOSTICS
4 AUTOMATIC PARAMETER SETTING

IO-Link

Data availability down to the field level
Using IO-Link, the sensors can deliver their data directly into the control system very efficiently.

Device identification
Each IO-Link sensor has an IODD (IO Device Description), which describes the sensor, its capabilities and parameters, process data, diagnosis data and user interface configuration. Furthermore, each sensor is equipped with an internal ID.

Automatic parameter settings
Initial setup of a new sensor is smooth and easy using previously stored parameters. Once a sensor has been replaced, the IO-Link master simply transmits parameters stored from the old sensor.

Sensors

Universal, smart and easy

Centralised configuration and data management
IO-Link enables fast configuration and dynamic change of the sensor parameters on the fly, which considerably reduces downtime in case of product changeover and increases flexibility and diversity of the installation.

Simplified installation
An IO-Link system requires just standard, unshielded 3-wire cables, and a standardised uniform interface for sensors and actuators drastically reduce the complexity of the installation process. In addition, the automated parameter reassignment simplifies sensor replacement in case of defects and prevents incorrect settings. The IO-Link-enabled sensor acts as a standard sensor when installed in a non-IO-Link system, so the same sensor can be stocked for both standard I/O (SIO) applications and IO-Link applications.

Predictive maintenance
Advanced and detailed diagnostics mechanisms are one of the main features of the IO-Link sensors. Moreover, the sensors continuously deliver data on their condition and are able to detect defects at an early stage or predict when a machine needs repair or replacement of spare parts. Instead of unnecessary, frequent preventive maintenance, service is need-based, and the risk of machine stoppages is significantly reduced.

IO-Link
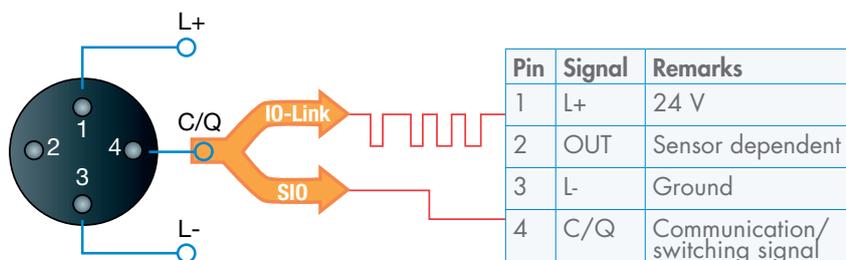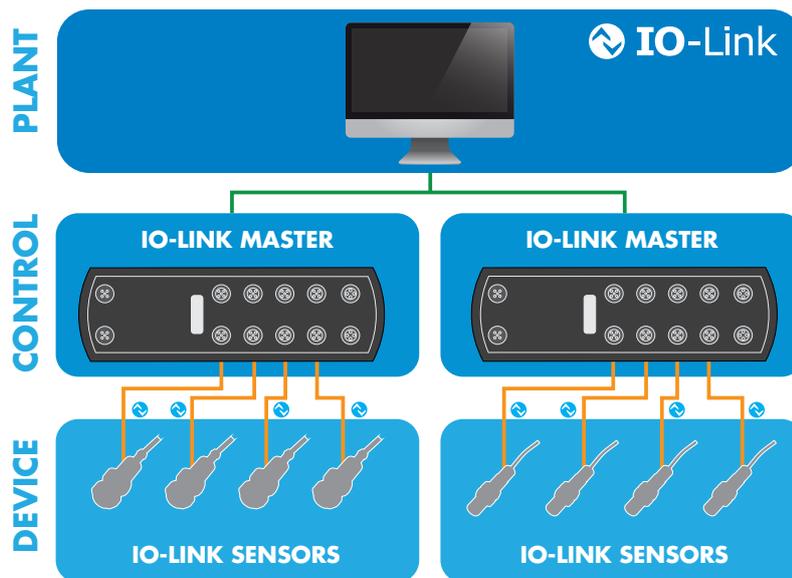
What is IO-Link?
IO-Link is a universal, open communication standard protocol that allows IO-Link-enabled devices to exchange, collect and analyse data and convert it into actionable information.
IO-Link is recognised worldwide as an international standard (IEC 61131-9), and it is today considered as the "USB interface" for sensors and actuators in the industrial automation environment.

Plug and play
When the IO-Link sensor is connected to an IO-Link port, the IO-Link master sends a wake-up request to the sensor, which automatically switches to IO-Link mode, and a point-to-point bidirectional communication automatically starts between the master and the sensor.

Operating modes
The IO-Link-capable sensor can operate in two different modes; SIO mode (standard I/O) or IO-Link mode.

- SIO mode: the sensor works as a traditional sensor, and pin 4 acts as an ordinary digital output. SIO mode ensures backwards compatibility with standard sensor systems.

- IO-Link mode: exchange of data between sensor and IO-Link master takes place, and pin 4 is used for the transmission of IO-Link-related data.


Pin	Signal	Remarks
1	L+	24 V
2	OUT	Sensor dependent
3	L-	Ground
4	C/Q	Communication/switching signal

IO-Link capacitive proximity sensors

IO-Link functions

Fully configurable

IO-Link provides the first globally standardised interface for communication with the sensor. Once you have connected the sensor to the IO-Link port, you can access a multitude of configuration parameters and advanced functionalities. This way, the sensor can be tailored to meet your individual needs and requirements at a given time. The settings can also stored in the master and can always be changed if the need occurs, or they can be smoothly transferred to a new sensor in case of sensor replacement.
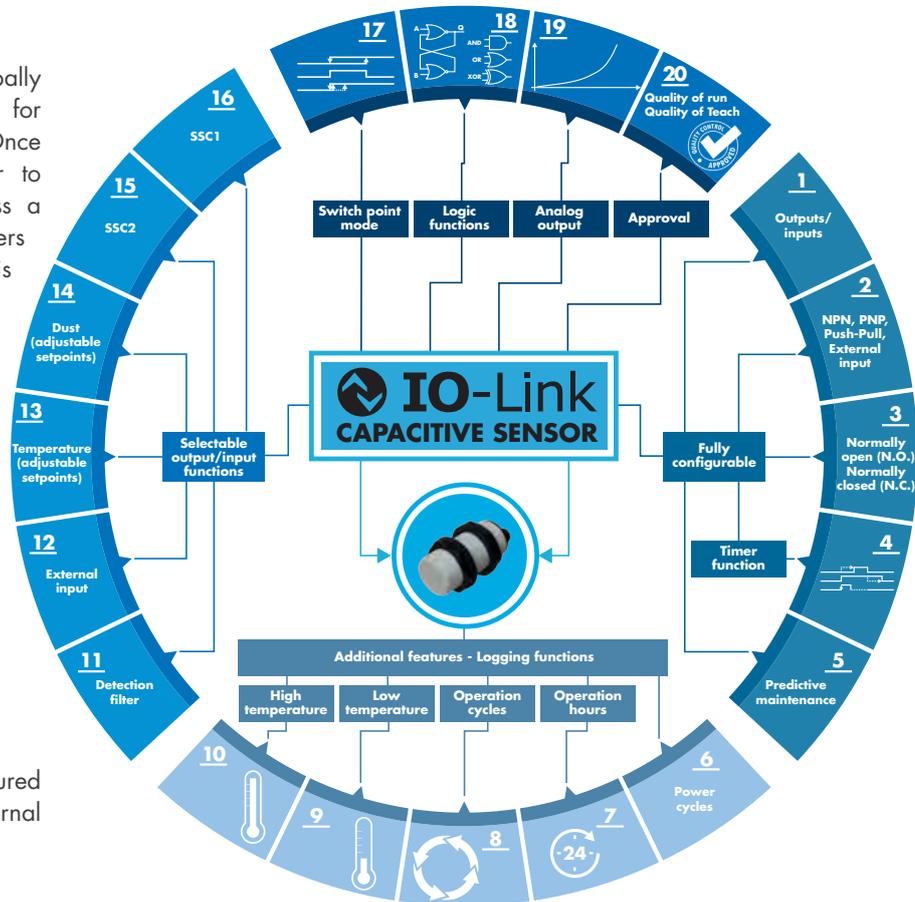
1. Outputs/inputs
The sensor has two I/O terminals.

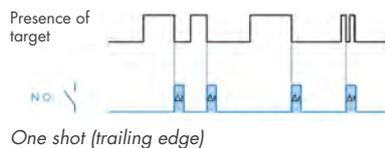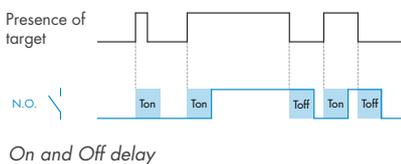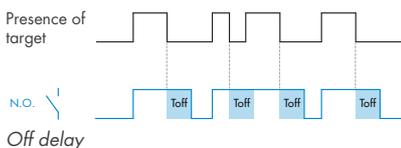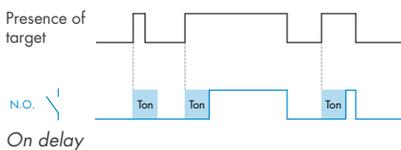### 2. NPN, PNP, Push-pull, External input
The I/O terminals can be configured as: NPN, PNP, push-pull or external input (only output 2).

3. Normally open (N.O.) Normally closed (N.C.)
The output can be configured to normally open or normally closed.

4. Timer function
It is possible to activate different timer functions: ON delay, OFF delay, ON and OFF delay or one shot (leading edge or trailing edge).

Presence of target

N.O.   Ton   Ton   Ton

On delay

Presence of target

N.O.   Toff   Toff   Toff   Toff

Off delay

Presence of target

N.O.   Ton   Ton   Toff   Ton   Toff

On and Off delay

Presence of target

N.O.

One shot (trailing edge)

5. Predictive maintenance
The sensors can provide information about their basic status during normal operation, for instance increasing contamination (dust build up). Maintenance can be required before a system fails and costly machine downtime is avoided.

Additional logging functions

The Carlo Gavazzi capacitive IO-Link sensors offer additional logging functions for advanced diagnostics mechanisms making both real-time and historic data available.

Circular diagram labels:
17, 18, 19, 20 Quality of run Quality of Teach, 16 SSC1, 15 SSC2, 14 Dust (adjustable setpoints), 13 Temperature (adjustable setpoints), 12 External input, 11 Detection filter, 10, 9, 8, 7, 6 Power cycles, 5 Predictive maintenance, 4, 3 Normally open (N.O.) Normally closed (N.C.), 2 NPN, PNP, Push-Pull, External input, 1 Outputs/inputs

Switch point mode, Logic functions, Analog output, Approval, Selectable output/input functions, IO-Link CAPACITIVE SENSOR, Fully configurable, Timer function, Additional features - Logging functions, High temperature, Low temperature, Operation cycles, Operation hours

6. Power cycles
Counts and store how many times the sensor has been powered up since its creation.

7. Operation hours
Counts and store number of hours of power connected since its creation.

8. Operation cycle
Number of sensor detections (SSC1) since its creation.

9. Low temperature
Two different specifics are measured: The lowest temperature the sensor has been exposed to since
1. its creation (stored in sensor)
2. since last power-up.

10. High temperature
Two different specifics are logged: The highest temperature the sensor has been exposed to since
1. its creation (stored in sensor)
2. since last power-up.

Selectable output/input functions

11. Detection filter

It is a stabilising filter there encrease the immunity of the variation of the sensor's measurements and media. The detection filter can be set to measure the average value of additional 1 to 255 mesurements.

12. External input

The external input can be controlled by outputs from sensors or PLC's.

13. Temperature alarm

The sensor can be configured to give an alarm if the temperature exceeds or drops below a preset value (Tmax or Tmin).

14. Dust alarm

The sensor can be configured to give an alarm if the contamination level exceeds a preset value of choice.

15. SSC1

The Switching Signal Channel 1 (SSC1) output can be configured to the following four detection modes: Single-point mode, two-point mode, windows mode and adjustable hysteresis.
Two individual setpoints and hysteresis can be set.

Single point mode
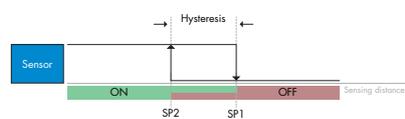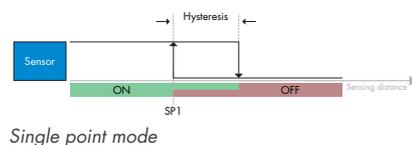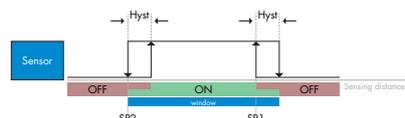
Two point mode

Windows mode

16. SSC2

The Switching Signal Channel 2 (SSC2) output can be configured to the same modes as SSC1.
Two individual setpoints and hysteresis can be set.

## Switch point mode

17. Switch point mode

SSC1 and SSC2 can be configured to single-point mode, two-point mode, windows mode, adjustable hysteresis.

Logic functions

18. Logic functions

In the logic function block the selected signals from the input selector can be added a logic function directly without using a PLC – making decentral decisions possible.
The logic functions available are: AND, OR, XOR and Gated SR-FF.

AND

OR

XOR

Gated SR-FF
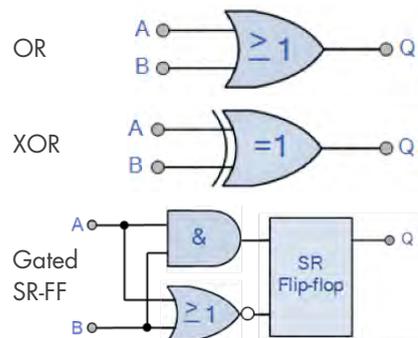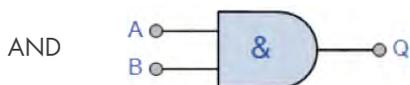
Analogue output

19. Analogue output

16 bit Analogue Output by IO-Link representing the Dielectric value measured by the sensor.

Approval

20. Quality of run

The quality of run value informs about the actual sensing performance compared to the set-points of the sensor, the higher the value the better quality of detection.

20. Quality of teach

The quality if teach value informs about how well the actually teach procedure was done, meaning the margin between the actual setpoints and the environmental influence of the sensor.

Protection

4th Generation *TRIPLESHIELD*[TM] technology

IP69K
Surge ±2 kV
Shock 30 G
Vibration 15 G
Rough handling shocks 1 m
Electrostatic discharge 40 kV
Electrical fast transients/burst ±4 kV
Wire conducted disturbances 20 Vrms
Power-frequency magnetic fields 600 A/m
Radiated RF electromagnetic fields 20 V/m

IP69K

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Sensors

5

IO-Link capacitive proximity sensors

Features and functions

CA18CAN..IO Flush

M12 plug

30% glass reinforced PBT housing

120°C on sensing face

All versions are avaliable as cable or M12 plug versions.

CA18CAF..IO Non-Flush

Cable

Back part of the sensor

Multiturn sensitivity adjustment for SCC1 only

Yellow LED
• Output
• Short circuit
• Timer

Green LED
• Power
• Stability
• IO-Link communication

CA30CAN..IO Flush

M12 plug

30% glass reinforced PBT housing

120°C on sensing face

All versions are avaliable as cable or M12 plug versions.

CA30CAF..IO Non-Flush

Cable

Back part of the sensor

Multiturn sensitivity adjustment for SCC1 only
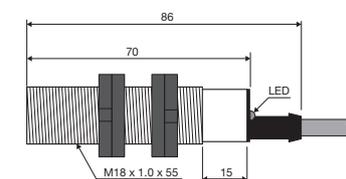
DIST.

SCC1

STABLE

Yellow LED
• Output
• Short circuit
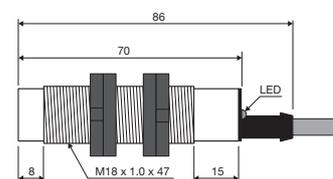• Timer

Green LED
• Power
• Stability
• IO-Link communication

Interchangeable housing length

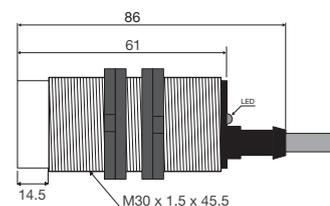For flexibility and compatibility, the new sensors, whether flush or non-flush, share the same length.

86

70

LED

M18 x 1.0 x 55   15

Flush

86

70

LED

8   M18 x 1.0 x 47   15

Non-flush

86

61

LED

M30 x 1.5 x 59.5

Flush

86

61

LED

14.5   M30 x 1.5 x 45.5

Non-flush

Sensors
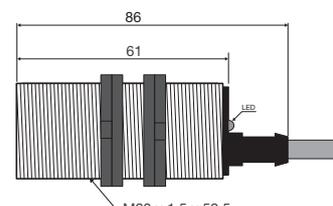
The Capacitive IO-Link Family

	M18 / M30 DC IO-Link 4TH Generation TRIPLESHIELD™			
	M18		**M30**	
Connection	**Flush**	**Non-Flush**	**Flush**	**Non-Flush**
Cable	**CA18CAF08BPA2IO**	**CA18CAN12BPA2IO**	**CA30CAF16BPA2IO**	**CA30CAN25BPA2IO**
Plug	**CA18CAF08BPM1IO**	**CA18CAN12BPM1IO**	**CA30CAF16BPM1IO**	**CA30CAN25BPM1IO**
Sensing distance	0 - 8 mm	0 - 12 mm	0 - 16 mm	0 - 25 mm
Adjustable distance	2 - 10 mm	3 - 15 mm	2 - 20 mm	4 - 30 mm
IO-Link	Transmission type: COM2 (38.4 k Baud), Revision: 1.1, SDCI standard: IEC 61131-9, Profiles: Smart sensor (Process Data Variable; Device Identification), SIO mode: Yes, Required master port type: A, Min. process cycle time [ms]: 5			
Selectable function output 1	NPN, PNP or Push-Pull			
Selectable function output 2	NPN, PNP, Push-Pull, External input or External teach			
Diagnostic	Operation hours, Power cycles, Detection cyclesmax. and min. Temperatures, Short-circuit, maintenaince, No of Parameter change.			
Logic functions	AND, OR, X-OR, Gated SR-FF			
Timer functions	ON Delay. OFF delay, ON+OFF delay and One shot			
Sensitivity control	Trimmer input, Teach by wire or by IO-Link			
Rated operational voltage (U_e)	10 to 40 V DC (ripple included)			
No load supply current (I_o)	≤ 20 mA			
Minimum operational current (I_m)	≤ 0.5 mA			
Off-State current (I_r)	≤ 100 µA			
Voltage drop, digital (U_d)	≤ 1.0 V DC @ 200 mA DC			
Capacitive load	100 nF @ 200 mA			
Frequency of operating cycles (f)	50 Hz			
Response time t_{ON} or t_{OFF}	10 ms			
Power on delay (t_v)	300 ms			
Hysteresis (adjustable)	6%	15%	7%	10%
Led indications	Yellow LED steady: Output ON and signal stability. Yellow LED flashing: Output short-circuit, timer indication and teach. Green LED steady: Power ON and signal stability. Green LED flashing: IO-Link mode.			
Sensor protection	Shortcircuit (A), reverse polarity (B) and transients (C)			
Electrostatic discharge	Contact discharge: > 40 kV. Air discharge: > 40 kV (IEC 61000-4-2)			
Electrical fast transients/burst	±4kV/5kHz (IEC 61000-4-4; EN 60947-1)			
Surge	Power-supply: > 2kV (with 500 Ω). Sensor output: > 2kV (with 500 Ω) (IEC 61000-4-5)			
Wire conducted disturbances	> 20 Vrms (IEC 61000-4-6)			
Power - frequency magnetic fields	Continous: > 60 A/m, 75.9 µ tesla. Short-time: > 600 A/m, 759 µ tesla (IEC 61000-4-8)			
Radiated RF electromagnetic fields	> 20 V/m (IEC 61000-4-3)			
Vibration	10 to 150 Hz, 1 mm/15G in X,Y and Z direction (EN 60068-2-6)			
Shock	30G /11 mS. 3 positive and 3 negative in X,Y and Z direction (EN 60068-2-27)			
Drop test	2 times from 1m, 100 times from 0,5m (EN 60068-2-31)			
Degree of protection	IP 67, IP 68, IP 69K (EN 60529; EN 60947-1; DIN 40050-9)			
NEMA type	1, 2, 4, 4X, 5, 6, 6P, 12 (NEMA 250)			
Ambient temperature	Operating: -30 to +85°C (-22 to +185°F). Storage: -40 to +85°C (-40 to +185°F)			
Max. temperature on sensing face	120°C (248°F)			
CE marking	According to EN 60947-5-2			
Approvals	cULus (UL508), ECOLAB			
Overvoltage category	III (IEC60664; EN 60947-1)			
Pollution degree	3(IEC60664/60664A; EN 60947-1)			
MTTF$_d$	114.6 years @ 40°C (104°F)		98.3 years @ 40°C (104°F)	
Material	Body: PBT grey, 30% glass reinforced. Trimmer shaft: Nylon, blue. Backpart: PA12 black			
Tightening torque	≤ 2.6 Nm		≤ 7.5 Nm	
Cable	PCV, grey, 2 m, 4 x 0.34 mm², Ø=5.2 mm, Oil proof			
Connector	M12, 4-pin			
Dimensions	Cable and Plug: M18 x 70 mm		Cable and Plug: M30 x 61 mm	
Weight incl. packaging	Cable version ≤ 150 g, Plug version ≤ 75 g		Cable version ≤ 190 g, Plug version ≤ 106 g	
Accessories, additional	Connectors: CONM14NF-... -series. Mounting brackets: AMB18-A... and AMB18-S...		Connectors: CONM14NF-... -series. Mounting brackets: AMB30-A... and AMB30-S...	

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