# CARLO GAVAZZI
### Automation Components

**CARLO GAVAZZI**

## UA12/UA18/UA30 Ultrasonic IO-Link sensors

# Sensors

# UA12/18/30
## Ultrasonic IO-Link sensors

This ultrasonic IO-Link sensor series of UA12, UA18 and UA30 provides superior sensing solutions with a good price-performance-ratio for a variety of industry applications. The ultrasonic sensors are excellent at contactless position and distance measurement and they are able to detect any target regardless of its colour, transparency or surface.

Because of their resistance to high and low temperatures and immunity against dust, steam and fumes, these Ultrasonic sensors are especially well suited to harsh environments.

The UA12, UA18 and UA30 come in a purely digital version and a combined version with one digital and one analog output.

Sensing distances go from 20 to 6000 mm and only plug versions are available.

Due to improved technology, an extended sensing distance and a reduced housing length, these sensors make for a state of the art sensor family with high accuracy, versatility and resilience!

## Advantages of the Ultrasonic IO-Link sensors

**Increased machine runtime**

Scheduled maintenance is vastly preferable to unexpected machine break downs. The sensors' built-in diagnostic features like temperatures, operating hours and error count give the option of scheduled maintenance, preventing costly downtime. Should a sensor malfunction, sensor replacement is simplified by using the automated parameter reassignment and it also prevents incorrect settings.

**Simplified sensor/machine set-up**

IO-Link features offer a wide range of customizable options that are easy to set up. When in an IO-link environment the digital channel of the analogue sensor is available for output instead of being reserved for manual teach, which makes the analogue sensor version a 2-in-1 option.

An IO-Link system requires just standard, unshielded 3-wire cables, that are widely available at relatively low cost. In addition, the standardized interface for sensors and actuators drastically reduces the complexity of the installation process.

**Reduced stock**

The Ultrasonic sensor is a all-in-one sensor thanks to its IO-Link features. It is highly customizable via an IO-Link master or the SCTL55, allowing for the same sensor being used in multiple applications, ultimately reducing the stock costs.

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.

**IO-Link**

## Sensors

## Blow moulding machine

A blow moulding machine uses air to blow liquid plastic to a certain size or shape. Ultrasonic sensors on all sides of the shape ensure the correct dimensions are reached. The UA-series features synchronized sensing to avoid crosstalk when sensors are mounted facing each other across the blown shape.
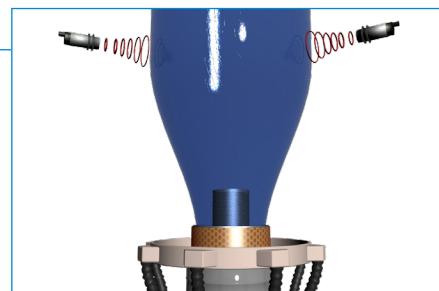


## Parts counting & presence detection

Because of their superior ability to detect transparent objects and to measure distance, the UA12, UA18 and UA30 sensors are a perfect choice for a wide range of applications. Parts are precisely detected and positioned and objects or persons are counted by the UA18 and UA30 sensors in areas dealing with people, robots, glass, fluids, food & beverage, solid objects, car wash and materials handling.



## Detection of trees in mobile spraying systems

Thanks to its 6 m sensing distance, our ultrasonic sensor UA30ASD60 is ideal for tree detection in agricultural spraying equipment used in for instance fruit orchards. A sensor is mounted in front of each sprayer, and its information is used to ensure that only trees are sprayed. As a result, the quantities of pesticides used are reduced for the benefit of costs as well as the environment.



## Distance measurement in street sweepers

Because it is highly resistant to salt water and mechanical stress, our ultrasonic sensor with a stainless steel housing is an excellent choice for distance measurement in street sweepers. This sensor detects the distance to the pavement while ignoring its colour or shape. By knowing the exact distance, the performance of the brushes is optimized.

CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.

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## Applications

### Level detection in large storage silos

In the animal feed industry, feed manufacturers and animal producers share a common interest in solutions that optimize handling of animal feed at the lowest possible cost. Our ultrasonic sensor UA30ASD60 with a 6 m sensing distance is superb at measuring levels in large feed silos. Knowing the feed level in the silo and the required output of animal feed for a certain period is a powerful instrument. Thus, the feed supplier will know the exact quantity necessary for each refill, overstocking is avoided, and each feed portion will be fresher.

### Height and size measurement

The UA12, UA18 and UA30 sensors are successfully used in applications which measure the height or size of objects moving past the sensor or for stacking operations in industries such as the automotive industry, printing machines, metal working, package & distribution, food & beverage, bottle sorting, agriculture, robots, the electronics industry, glass and materials handling.
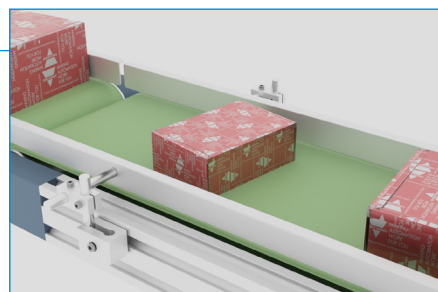
### Tension control

Monitoring and control of speed, position and tension of materials being processed are efficiently and accurately performed by the UA12, UA18 and UA30 sensors. The sensors monitor the slope of loops and synchronise the speed between machines, securing a stable working flow. These features are useful in metal working, paper, aluminium, textile and plastics manufacturing as well as packaging and chemical industries.

### Diameter measurement

The UA12, UA18 and UA30 sensors are ideal for accurate measurement of changing diameters, such as reels and drums in paper, aluminium and other metal manufacturing, textile, plastics and packaging industries. The sensors provide a precise output of the diameter in rolls or drums as it changes when materials wind or unwind.

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## Applications

### Detecting people in front of ATMs

Our short-body UA18CSD/ESD sensors can detect up to 800 mm, and they are not affected by the colour of for instance clothes or vehicles. Therefore, these sensors are highly appropriate for detection of customers in front of an ATM (automatic teller machine) or a drive-through ATM. Moreover, the sensors are very resistant to adverse conditions, and they offer a reliable detection that facilitates communication between customer and machine.

### Ink level measurement in offset printing

In modern offset printers the ink level is automatically monitored and adjusted for the specific print job. The ink fountain controls the amount of ink that enters the inking system. Our short-body UA18CSD/ESD sensors can detect from 40 to 300 mm, and they offer a precise detection of the ink level in the ink fountain. The ink distribution rollers will receive only the requisite quantity of ink, and unnecessary waste is thereby avoided.

## Universal, smart and easy

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

**Data availability down to a detailed 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.

**Centralized 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.

# UA12/18/30
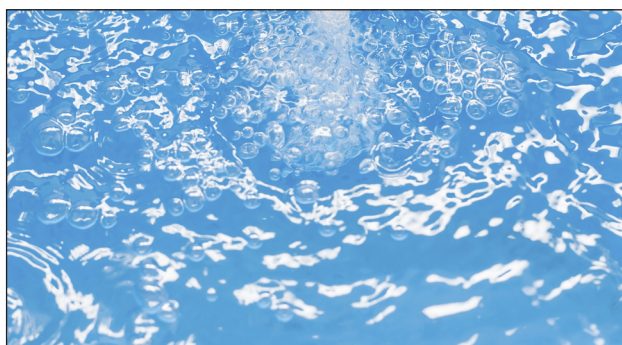## Ultrasonic IO-Link sensors

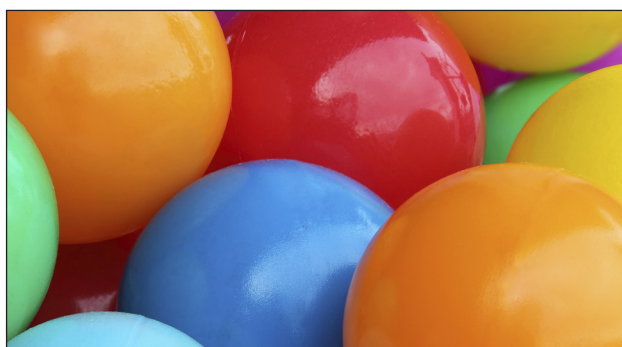**Materials to be detected**

### Hard foam



### Wood



### Glass



### Liquid / water



### Metal



### Plastic



### Paint / lacquer



### Bulk material / rock

**Sensors**

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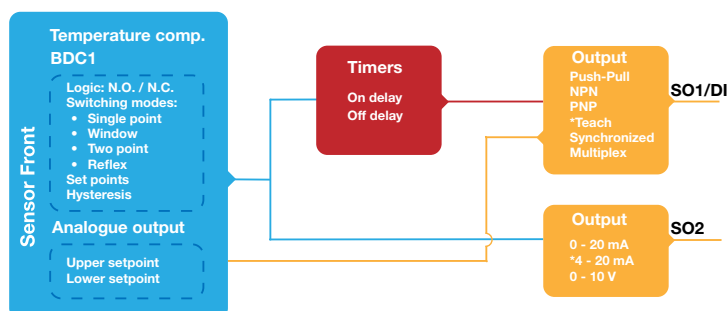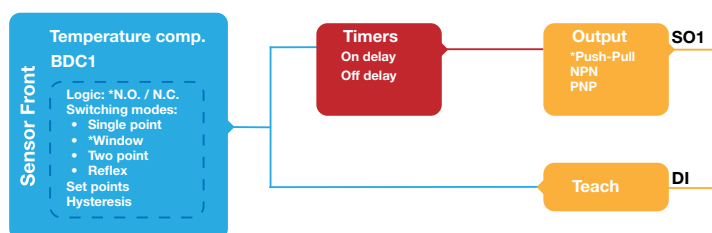
## IO-Link functions

### Highly flexible sensors

IO-Link provides the first globally standardized interface for sensor communication. 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 be stored in a 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.

**Analog sensor version**

**Temperature comp.**
**BDC1**

Logic: N.O. / N.C.
Switching modes:
- Single point
- Window
- Two point
- Reflex
Set points
Hysteresis

Sensor Front

**Analogue output**

Upper setpoint
Lower setpoint

**Timers**
On delay
Off delay

**Output**
Push-Pull
NPN
PNP
*Teach
Synchronized
Multiplex

SO1/DI

**Output**
0 - 20 mA
*4 - 20 mA
0 - 10 V

SO2

**Digital sensor version**

**Temperature comp.**
**BDC1**

Logic: *N.O. / N.C.
Switching modes:
- Single point
- *Window
- Two point
- Reflex
Set points
Hysteresis

Sensor Front

**Timers**
On delay
Off delay

**Output**
*Push-Pull
NPN
PNP

SO1

**Teach**

DI

## Sensor front

**BDC1 (Binary data channel) Detection modes**
Each channel can be set to operate in 1 of 4 switching modes. The switching mode setting is used to create more advanced output behavior. The following switching modes can be selected for the switching behavior of BDC1: Single-point mode, *Window mode, Two-point mode or Reflex mode.

**Hysteresis Settings**
The hysteresis can be changed via IO-Link.

## Output

The sensor outputs (SO) can be configured as:
**Analog sensor version**
SO1/DI: NPN, PNP, push-pull, Teach, Synchronized or Multiplex.
SO2: 0-20 mA, 4-20 mA or 0-10 V.
**Digital sensor version**
SO1: NPN, PNP, push-pull.
DI: Teach.

## Timers

Via IO-Link it is possible to activate different timer functions: ON delay, OFF delay or disabled. These delays may be adjusted in ms.
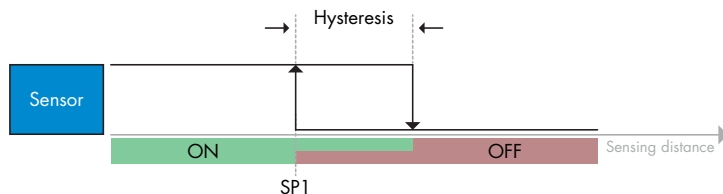
## Predictive maintenance

IO-Link connection offers information on operating hours, number of power ONs, temperature alarm, error count and device status, which can be used to schedule maintenance of the installation.

* Default settings
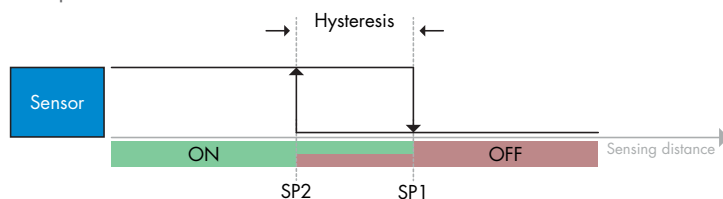
CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.

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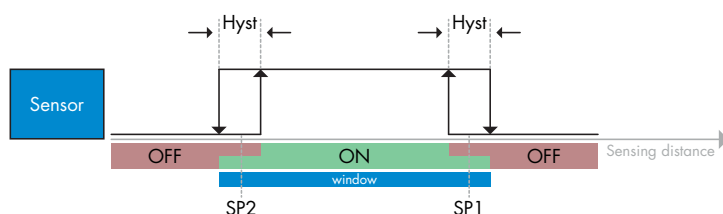
## Digital output

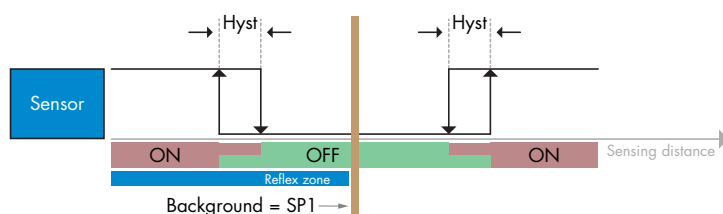### Single point mode



### Two point mode



### Window mode



### Reflex mode



The digital output of the sensor offers 4 different switching modes. These switching modes make the sensor very flexible in its setup, helping it fit most needs in distance, level or diameter measurement, as well as loop control.

If an object needs to be detected at a certain point, the single point mode or two point mode are eminently useful as the sensor switches between ON and OFF at a certain distance. Two Point mode is more flexible.

If the object must be detected within a specific distance range, the window mode lets you define an interval within which the sensor is ON. Outside this range, it switches OFF. Among others, this mode is used in tension control.

In reflex mode, the sensor detects anything between itself and a reference background, which makes it useful for presence and absence detection of any objects, that would absorb or redirect the sound.

These modes all require setup via IO-link.

## Analogue output

### Negative slope
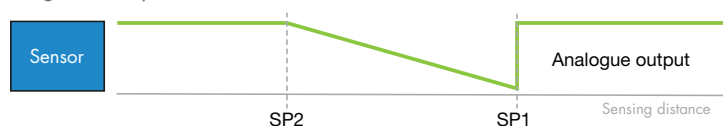


### Positive slope
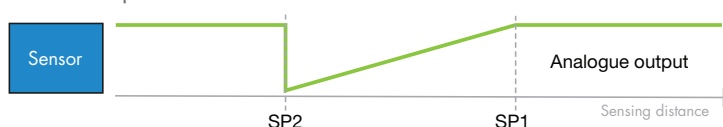


The analogue ultrasonic sensors offer an anaologue output channel in addition to the digital one. This analogue output can be configured with either "positive slope" or "negative slope" depending on your application needs. The slope is defined by two teachable set points.

This means that between the two setpoints, the distance from sensor to object is translated into a current or voltage output, where any change in distance results in a corresponding change in the analog output.

0-10V and 4-20mA do not require an IO-link connection, whereas 0-20mA does require IO-link.

## UA12....

LED (4x)     Ø10.5 (0.41)

M12x1

8 (0.31)
11.5 (0.45)
23 (0.91)    42 (1.65)
65 (2.56)

M12x1

M12, 4-pin male connector

M12 housing

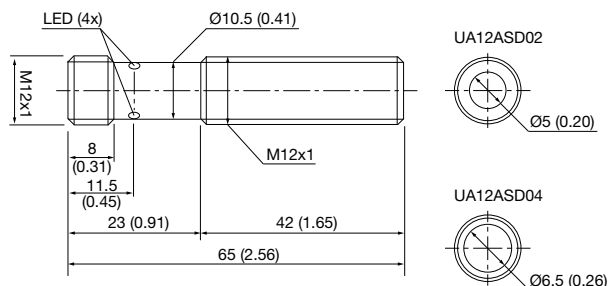Sensing window, Ø5.5 mm (02), Ø6.5 mm (04)

UA12ASD02
Ø5 (0.20)

UA12ASD04
Ø6.5 (0.26)

## UA18....

Ø 16.9 (0.67)     M18x1

LED (2x2)

M12x1

13.5 (0.53)
13.5 (0.53)
30.5 (1.20)
55.5 (2.19)

Ø 10.9 (0.43)

M12, 4-pin male connector

M18 housing

Sensing window, Ø10.9 mm

## UA 30ASD30..

Ø 28 (1.10)     M30x1.5

M12x1

7 (0.28)
11.5 (0.45)
14 (0.55)
11.5 (0.45)
34.5 (1.36)
1 (0.04)
60 (2.36)

Ø 19.9 (0,78)

M12, 4-pin male connector

M30 housing

Sensing window, Ø19.9 mm

## UA 30ASD60..

M12, 4-pin male connector

Ø 28 (1.10)     M30x1.5

M12x1

7 (0.28)
11.5 (0.45)
14 (0.55)
11.5 (0.45)
33.5 (1.32)
19 (0.75)
59 (2.32)
78 (3.07)

45.5 (1.79)

Ø 29.5 (1.16)

M30 housing

Sensing window, Ø29.5 mm

CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.

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# UA12/18/30
## Ultrasonic IO-Link sensors

### UA12, UA18 and UA30 Analog output

| | UA12 | UA18 | UA30 | |
|---|---|---|---|---|
| | | | | |
| Sensing range 20…200 mm | **UA12ASD02APM1IO** | | | |
| Sensing range 40…400 mm | **UA12ASD04APM1IO** | | | |
| Sensing range 80…800 mm | | **UA18ASD08APM1IO** | | |
| Sensing range 150…1500 mm | | **UA18ASD15APM1IO** | | |
| Sensing range 300…3000 mm | | | **UA30ASD30APM1IO** | |
| Sensing range 600…6000 mm | | | | **UA30ASD60APM1IO** |
| Rated operating distance (S$_n$) | UA12ASD02: 200 mm, UA12ASD04: 400 mm | UA18ASD08: 800 mm, UA18ASD15: 1500 mm | UA30ASD30: 3000 mm | UA30ASD60: 6000 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 | Push-Pull, NPN, PNP, Teach, Synchronized, Multiplex | | | |
| Selectable function output 2 | 0-20 mA, 4-20 mA, 0-10 V | | | |
| Diagnostic | Sensor, Temperature, Operation hours, Power cycles, Error count, Device status | | | |
| Timer functions | ON delay, OFF delay | | | |
| Sensitivity adjustment | Teach by wire | | | |
| Rated operational voltage (U$_B$) | 18-30 VDC | | | |
| No load supply current (I$_o$) | ≤ 40 mA (24 VDC) | | | |
| Voltage drop, digital (U$_d$) | ≤ 2 VDC | | | |
| Frequency of operating cycles (f) | UA12ASD02: 20 Hz, UA12ASD04: 10 Hz | <5 Hz | 3 Hz | 2 Hz |
| Response time | ≤ 300 ms | | | |
| Power on delay (t$_v$) | ≤ 300 ms | | | |
| Hysteresis (H) (adjustable by IO-Link) | 2…20 mm | 6…20 mm | 5…50 mm | 5…50 mm |
| Led indications | Green LED: Status, Yellow LED: Switching output | | | |
| Protections | Short circuits and reverse polarity (except for the analog output PIN2) | | | |
| Electrostatic discharge | ± 8 kV @ air discharge or ± 4 kV @ contact discharge (IEC 61000-4-2, EN60947-1) | | | |
| Fast transient | ± 2 kV / 5 kHz (IEC 61000-4-4) | | | |
| Wire-conducted immunity | 10 Vrms (IEC 61000-4-6, EN60947-1) | | | |
| Power - frequency magnetic fields | Continuous: > 30 A/m, 28 µ tesla, Short-time: > 300 A/m, 280 µ tesla (IEC61000-4-8, EN60947-1) | | | |
| Electromagnetic field immunity | 10V/m (IEC 61000-4-3, EN60947-1) | | | |
| Vibration | 10 - 55 Hz,1.0 mm/15 g (EN IEC 60068-2-6) | | | |
| Shock | 30 gn / 11 ms, 3 pos, 3 neg per axis (EN IEC 60068-2-27) | | | |
| Degree of protection | IP67 (EN IEC 60539; EN IEC 60947-1) | | | |
| Ambient temperature | Operating: -25° - +70°C (-13° - +158°F), Storage: -25° - +70°C (-13° - +158°F) | | | |
| CE marking | According to EN60947-5-2 | | | |
| Approvals | cULus listed (IND. CONT. EQ. 29W7), UKCA | | | |
| Overvoltage category | III (EN IEC 60664; EN IEC 60947-1) | | | |
| MTTF$_d$ | 110.1 years (EN ISO 13849-1, SN 29500) | 128.7 years (EN ISO 13849-1, SN 29500) | 116 years (EN ISO 13849-1, SN 29500) | 114.8 years (EN ISO 13849-1, SN 29500) |
| Material | Body: Nickel plated brass, Front: PBT and Filling epoxy resin, Sealing front: PUR | | | |
| Connector | M12, 4-pin male | | | |
| Dimensions | M12 x 65 mm | M18 x 55 mm | M30 x 60 mm | M30 (49,5) x 78 mm |
| Weight incl. packaging | 18 g | 30 g | 70 g | 140 g |
| Accessories, additional | Connector type: CO..14NF.. series to be purchased separately | | | |
| Further informaion | www.gavazziautomation.com | | | |

**Sensors**

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# UA12, UA18 and UA30 Digital output

| | UA12 | UA18 | UA30 | |
|---|---|---|---|---|
| | | | | |
| Sensing range 20…200 mm | **UA12ASD02BPM1IO** | | | |
| Sensing range 40…400 mm | **UA12ASD04BPM1IO** | | | |
| Sensing range 80…800 mm | | **UA18ASD08BPM1IO** | | |
| Sensing range 150…1500 mm | | **UA18ASD15BPM1IO** | | |
| Sensing range 300…3000 mm | | | **UA30ASD30BPM1IO** | |
| Sensing range 600…6000 mm | | | | **UA30ASD60BPM1IO** |
| Rated operating distance ($S_n$) | UA12ASD02: 200 mm, UA12ASD04: 400 mm | UA18ASD08: 800 mm, UA18ASD15: 1500 mm | UA30ASD30: 3000 mm | UA30ASD60: 6000 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 | Push-Pull, NPN, PNP | | | |
| Selectable function output 2 | Teach | | | |
| Diagnostic | Sensor, Temperature, Operation hours, Power cycles, Error count, Device status | | | |
| Timer functions | ON delay, OFF delay | | | |
| Sensitivity adjustment | Teach by wire | | | |
| Rated operational voltage ($U_B$) | 18-30 VDC | | | |
| No load supply current ($I_o$) | ≤ 40 mA (24 VDC) | | | |
| Voltage drop ($U_d$) | ≤ 2 VDC | | | |
| Frequency of operating cycles (f) | UA12ASD02: 20 Hz UA12ASD04: 10 Hz | <5 Hz | 3 Hz | 2 Hz |
| Response time | ≤ 300 ms | | | |
| Power on delay ($t_v$) | ≤ 300 ms | | | |
| Hysteresis (H) (adjustable by IO-Link) | 2…20 mm | 6…20 mm | 5…50 mm | 5…50 mm |
| Led indications | Green LED: Status Yellow LED: Switching output | | | |
| Protections | Short circuits and reverse polarity (except for the analog output PIN2) | | | |
| Electrostatic discharge | ± 8 kV @ air discharge or ± 4 kV @ contact discharge (IEC 61000-4-2, EN60947-1) | | | |
| Fast transient | ± 2 kV / 5 kHz (IEC 61000-4-4) | | | |
| Wire-conducted immunity | 10 Vrms (IEC 61000-4-6, EN60947-1) | | | |
| Power - frequency magnetic fields | Continuous: > 30 A/m, 28 µ tesla, Short-time: > 300 A/m, 280 µ tesla (IEC61000-4-8, EN60947-1) | | | |
| Electromagnetic field immunity | 10V/m (IEC 61000-4-3, EN60947-1) | | | |
| Vibration | 10 - 55 Hz,1.0 mm/15 g (EN IEC 60068-2-6) | | | |
| Shock | 30 gn / 11 ms, 3 pos, 3 neg per axis (EN IEC 60068-2-27) | | | |
| Degree of protection | IP67 (EN IEC 60539; EN IEC 60947-1) | | | |
| Ambient temperature | Operating: -25° - +70°C (-13° - +158°F), Storage: -25° - +70°C (-13° - +158°F) | | | |
| CE marking | According to EN60947-5-2 | | | |
| Approvals | cULus listed (IND. CONT. EQ. 29W7), UKCA | | | |
| Overvoltage category | III (EN IEC 60664; EN IEC 60947-1) | | | |
| MTTF$_d$ | 115.1 years (EN ISO 13849-1, SN 29500) | 135.6 years (EN ISO 13849-1, SN 29500) | 128.2 years (EN ISO 13849-1, SN 29500) | 126.8 years (EN ISO 13849-1, SN 29500) |
| Material | Body: Nickel plated brass, Front: PBT and Filling epoxy resin, Sealing front: PUR | | | |
| Connector | M12, 4-pin male | | | |
| Dimensions | M12 x 65 mm | M18 x 55 mm | M30 x 60 mm | M30 (49,5) x 78 mm |
| Weight incl. packaging | 18 g | 30 g | 70 g | 140 g |
| Accessories, additional | Connector type: CO..14NF.. series to be purchased separately | | | |
| Further informaion | www.gavazziautomation.com | | | |

CE   cULus   UKCA   IO-Link

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# CARLO GAVAZZI
### Automation Components

**CARLO GAVAZZI**

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