# Ultrasonic
# Diffuse, Analogue and Digital Output
# Types UA30CAD60....TI

**CARLO GAVAZZI**

- Cylindrical M30 with Ø40 front and PBT housing
- Sensing distance: 350-6000 mm
- Power supply: 12 (15) to 30 VDC
- Outputs: 0-10 VDC or 4-20 mA and one switching output NPN or PNP.
- Linearity error 1%
- Repeatability 1%
- Beam angle. ±7°
- Protection: Short-circuit, reverse polarity and overvoltage
- Protection degree IP 67, Nema 4X
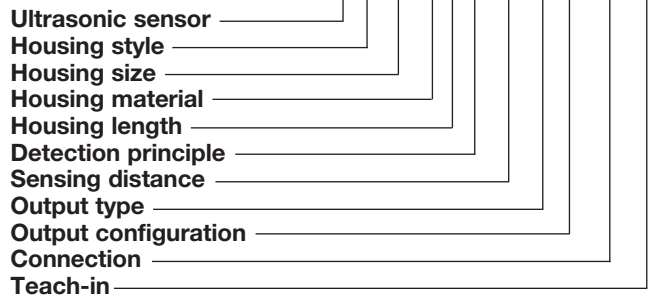- 2 m cable or M12 plug

CE  c(UL)us

## Product Description

A family of diffuse ultrasonic sensors with sensing ranges from 350-6000 mm with a resolution as low as 15 mm. The sensor contains both an analogue and a digital output. The output is either 0-10V or 4-20 mA and the digital output NPN or PNP, NO or NC which forms a windows detection.

The sensor is the ideal choice for distance measurement, level measurement, diameter measurement or loop control. Due to use of microprocessor control the digital filtering makes the sensor immune to most electromagnetic interferences.

## Ordering Key

**UA30CAD60NGM1TI**

Ultrasonic sensor
Housing style
Housing size
Housing material
Housing length
Detection principle
Sensing distance
Output type
Output configuration
Connection
Teach-in

## Type Selection

| Housing diameter | Connection | Rated operating dist. ($S_n$) | Analog Output | Digital output NPN/PNP | Ordering no. |
|---|---|---|---|---|---|
| M30 | Plug M12 | 350-6000 mm | 4-20 mA | NPN | **UA 30 CAD 60 NG M1 TI** |
| M30 | Cable | 350-6000 mm | 4-20 mA | NPN | **UA 30 CAD 60 NG TI** |
| M30 | Plug M12 | 350-6000 mm | 0-10 V | NPN | **UA 30 CAD 60 NK M1 TI** |
| M30 | Cable | 350-6000 mm | 0-10 V | NPN | **UA 30 CAD 60 NK TI** |
| M30 | Plug M12 | 350-6000 mm | 4-20 mA | PNP | **UA 30 CAD 60 PG M1 TI** |
| M30 | Cable | 350-6000 mm | 4-20 mA | PNP | **UA 30 CAD 60 PG TI** |
| M30 | Plug M12 | 350-6000 mm | 0-10 V | PNP | **UA 30 CAD 60 PK M1 TI** |
| M30 | Cable | 350-6000 mm | 0-10 V | PNP | **UA 30 CAD 60 PK TI** |

## Specifications

| | | | |
|---|---|---|---|
| **Rated operating distance** ($S_n$) | Reference target: 1 mm metal rolled finish, size 200 x 200 mm 350 - 6000 mm | **Rated operational voltage** ($U_B$) NG or PG versions NK or PK versions | 12 to 30 VDC 15 to 30 VDC (ripple included) |
| **Blind zone** | ≤ 350 mm | **Ripple** ($U_{rpp}$) | ≤ 5% |
| **Repeatability** | 1% | **No-load supply current** ($I_o$) | 50 mA @ $U_B$ max |
| **Linear Accuracy** | 1% | **Output current continuous digital output** ($I_e$) Max. load capacity 100 nF | 300 mA |
| **Beam angle** | ±7° | | |
| **Sensitivity** Push-button   Resolution | P1 (longest setpoint) P2 (shortest setpoint) 2 mm | **Output current short-time digital output** ($I$) Max. load capacity 100 nF | 300 mA |
| **Temperature drift** | ±5% | **Minimum operational current digital output** ($I_m$) | 0.5 mA |
| **Temperature compensation** | Yes | **OFF-state current digital output** ($I_r$) | 10 µA |
| **Hysteresis** (H) | Min. 2.0% | | |

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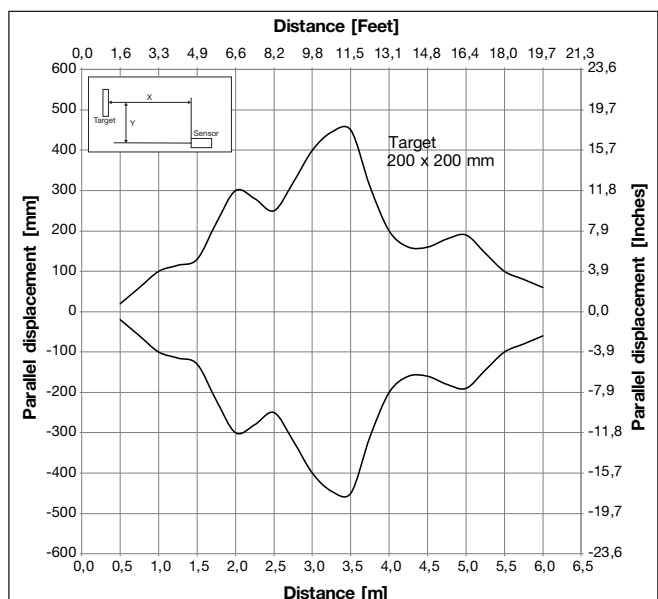# Specifications (cont.)

| | |
|---|---|
| **Voltage drop digital output** ($U_d$) | ≤ 2.2 VDC @ 100 mA |
| **Protection** | |
| Digital output | Short-circuit, overvoltage pulses and reverse polarity |
| Supply | Overvoltage pulses and reverse polarity |
| Analogue output | Overvoltage pulses |
| **Analog output** | |
| NG.. or PG.. types | 4 to 20 mA |
| NK.. or PK.. types | 0 to 10 VDC |
| **Load** | |
| 4 to 20 mA | max. 500 Ω |
| 0 to 10 VDC | min. 3 kΩ |
| **Carrier frequency** | 75 kHz |
| **Operating frequency digital output** (f) | ≤ 1 Hz |
| **Response time OFF-ON digital output** ($t_{ON}$) | ≤ 500 mS |
| **Response time ON-OFF digital output** ($t_{OFF}$) | ≤ 500 mS |
| **Response time analog output** | ≤ 500 mS |
| **Power ON delay** | ≤ 300 mS |
| **Output function, open collector** | |
| By sensor type | NPN or PNP |
| **Output switching function** | One open collector transistor and one analogue output to be configured as: - Windows function with N.O or N.C. output. - Analogue output with positive or negative slope. |
| **Indication** | |
| Output ON | Yellow LED |
| Echo received | Green LED |

| | |
|---|---|
| **Environment** | |
| Installation category | III (IEC 60664/60664A; 60947-1) |
| Pollution degree | 3 (IEC 60664/60664A; 60947-1) |
| Degree of protection | IP67 (IEC 60529; 60947-1) Nema 4X |
| **Ambient temperature** | |
| Operating | -20° to +70°C (-4° to +158°F) |
| Storage | -35° to +70°C (-31° to +158°F) |
| **Vibration** | 10 to 55 Hz, 1.0 mm/6G. (IEC/EN 60068-2-6) |
| **Shock** | 30 g / 11 mS, 3 directions (IEC/EN 60068-2-27) |
| **Rated insulation voltage** | < 500 VAC (rms) |
| **Housing** | |
| Material body | PBT |
| Material front | Epoxy-glass resin |
| Material back, plug | Grilamid |
| Material back, cable | Grilamid |
| Material push-button | TPE |
| Sealing around push-button | TPE |
| Material sealing front | TPE |
| **Connection** | |
| Cable | PVC, grey, 2 m, 4 x 0.34 mm², Ø = 4.7 mm |
| Plug | M12, 4-pin (CON. 14-series) |
| **Tightening torque** | ≤ 1.5 Nm |
| **Weight** | |
| Cable version | 200 g |
| Plug version | 130 g |
| **CE-marking** | Yes |
| **Approvals** | cULus (UL508) |

# Wiring Diagram



# Detection Range

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## Dimensions

**Plug**

Teach
Yellow          Green

Ø 40

20
89.8
59.6

Teach

M 12 x 1 - 6g

10  3

M 30 x 1.5 - 6g

10

**Cable**

Teach
Yellow          Green

Ø 40

20
89.8
59.6

Teach

Ø 4.7

10  3

M 30 x 1.5 - 6g
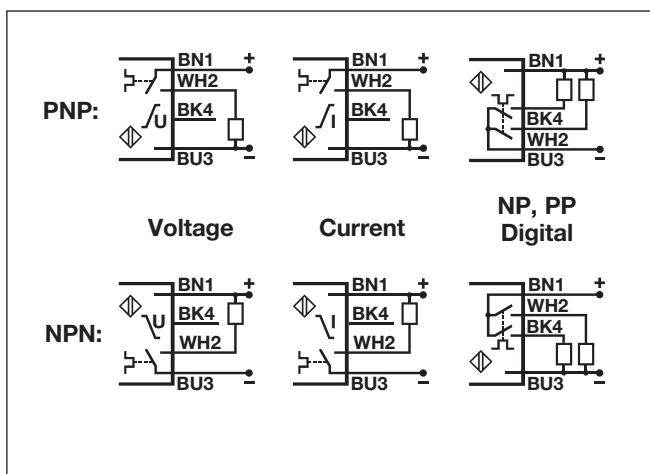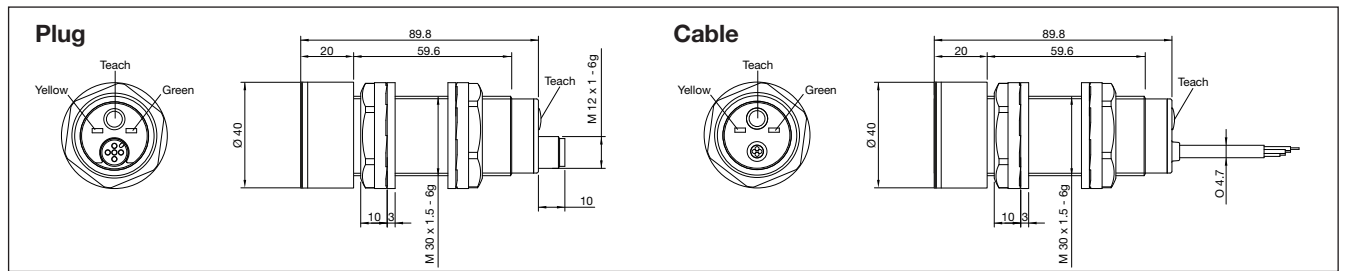
## Programming setup

**General set up of sensing point P1 (longest distance) and Shortest distance (P2) independent of the sensor type or function.**
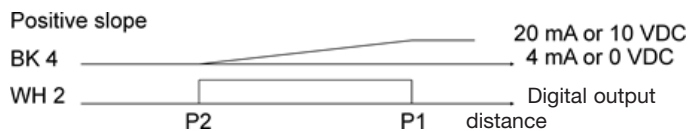
1) Mount the sensor in the selected application
2) Place a target in front of the sensor at the maximum required distance (P1), then press shortly on the teach-button, the yellow LED switches Off and then On again after a maximum of 2 seconds. The distance (P1) is now saved in the sensor and the target can be moved. I)
3) Place the target at the minimum distance requested (P2), then press shortly on the teach-button. The yellow LED turns Off and then it flashes 5 times. The distance (P2) is now saved in the sensor and the target can be moved. II)

I) P1 can be set to a maximum exceeding the family specification for the sensor by removing the target in front of the sensor. Push and hold the teach-button more than one second and the sensing distance is set at a unique distance for this sensor only. Do not use this function for an analogue output.
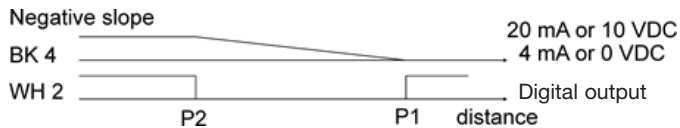
II) The second switch point can be set to a minimum by placing the target within the blind zone close to the sensor head or by covering the sensor head with your hand while teaching P2.

**Sensors with one digital output and one analogue output UA..CAD..PG/PK/NG or NK types**
1) The factory setting is Normally Open (N.O.) for the digital output and positive slope for the analogue output.

Positive slope

BK 4                    20 mA or 10 VDC
                        4 mA or 0 VDC
WH 2                    Digital output
     P2          P1     distance

2) To reverse the slope to negative and reverse the N.O. output to Normally Closed (N.C.), push the teach-button for 8 seconds until the yellow LED flashes fast. Release the teach button and the LED will flash 5 times to acknowledge the change in function.

Negative slope

BK 4                    20 mA or 10 VDC
                        4 mA or 0 VDC
WH 2                    Digital output
     P2          P1     distance

3) To switch back to positive slope or N.O. output, repeat step 2.