Ultrasonic
Diffuse, Analogue and Digital Output
Types UA18CAD.....TI

CARLO GAVAZZI



- Cylindrical M18 PBT housing
- Sensing distance: 50-2200 mm
- Power supply: 15 to 30 VDC
- Outputs: 0-10 VDC or 4-20 mA and one switching output NPN or PNP, NO or NC.
- Linearity error 1%
- Repeatability 0.5%
- Beam angle. ±7° or ±8°
- Protection: Short-circuit, reverse polarity and overvoltage
- Protection degree IP 67
- 2 m cable or M12 plug

Product Description

A family of diffuse ultrasonic sensors with sensing range from 50-400 mm, 100-900 mm and 200-2200 with a resolution as low as 1.0 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 window 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

UA18CAD04NGM1TI

- **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.
M18	Plug M12	50-400 mm	4-20 mA	NPN	**UA 18 CAD 04 NG M1 TI**
M18	Cable	50-400 mm	4-20 mA	NPN	**UA 18 CAD 04 NG TI**
M18	Plug M12	50-400 mm	0-10 V	NPN	**UA 18 CAD 04 NK M1 TI**
M18	Cable	50-400 mm	0-10 V	NPN	**UA 18 CAD 04 NK TI**
M18	Plug M12	50-400 mm	4-20 mA	PNP	**UA 18 CAD 04 PG M1 TI**
M18	Cable	50-400 mm	4-20 mA	PNP	**UA 18 CAD 04 PG TI**
M18	Plug M12	50-400 mm	0-10 V	PNP	**UA 18 CAD 04 PK M1 TI**
M18	Cable	50-400 mm	0-10 V	PNP	**UA 18 CAD 04 PK TI**
M18	Plug M12	100-900 mm	4-20 mA	NPN	**UA 18 CAD 09 NG M1 TI**
M18	Cable	100-900 mm	4-20 mA	NPN	**UA 18 CAD 09 NG TI**
M18	Plug M12	100-900 mm	0-10 V	NPN	**UA 18 CAD 09 NK M1 TI**
M18	Cable	100-900 mm	0-10 V	NPN	**UA 18 CAD 09 NK TI**
M18	Plug M12	100-900 mm	4-20 mA	PNP	**UA 18 CAD 09 PG M1 TI**
M18	Cable	100-900 mm	4-20 mA	PNP	**UA 18 CAD 09 PG TI**
M18	Plug M12	100-900 mm	0-10 V	PNP	**UA 18 CAD 09 PK M1 TI**
M18	Cable	100-900 mm	0-10 V	PNP	**UA 18 CAD 09 PK TI**
M18	Plug M12	200-2200 mm	4-20 mA	NPN	**UA 18 CAD 22 NG M1 TI**
M18	Cable	200-2200 mm	4-20 mA	NPN	**UA 18 CAD 22 NG TI**
M18	Plug M12	200-2200 mm	0-10 V	NPN	**UA 18 CAD 22 NK M1 TI**
M18	Cable	200-2200 mm	0-10 V	NPN	**UA 18 CAD 22 NK TI**
M18	Plug M12	200-2200 mm	4-20 mA	PNP	**UA 18 CAD 22 PG M1 TI**
M18	Cable	200-2200 mm	4-20 mA	PNP	**UA 18 CAD 22 PG TI**
M18	Plug M12	200-2200 mm	0-10 V	PNP	**UA 18 CAD 22 PK M1 TI**
M18	Cable	200-2200 mm	0-10 V	PNP	**UA 18 CAD 22 PK TI**

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Specifications

Rated operating distance (S_n)	Reference target: 1 mm metal rolled finish. CAD04: 100 x 100 mm CAD09 and CAD22: 200 x 200 mm
UA18CAD04	50 - 400 mm
UA18CAD09	100 - 900 mm
UA18CAD22	200 - 2200 mm
Blind zone	
UA18CAD04...	≤ 50 mm
UA18CAD09...	≤ 100 mm
UA18CAD22...	≤ 200 mm
Repeatability	0.5%
Linear Accuracy	1%
Beam angle	
UA18CAD04...	±8°
UA18CAD09...	±7°
UA18CAD22...	±7°
Sensitivity	
Push-button	P1 (farthest setpoint) P2 (nearest setpoint)
Resolution	1 mm
Temperature drift	0.1%/°C @ -20° to +60° C
Temperature compensation	Yes
Hysteresis (H)	Min. 1%
Rated operational voltage (U_B)	15 to 30 VDC (ripple included)
Ripple (U_{rpp})	≤ 5%
No-load supply current (I_o)	
UA18CAD04...	45 mA @ U_B max
UA18CAD09...	45 mA @ U_B max
UA18CAD22...	50 mA @ U_B max
Output current continuous digital output (I_e)	
Max. load capacity 100 nF	500 mA
UL508 specification	100 mA
Output current short-time digital output (I)	
Max. load capacity 100 nF	500 mA
UL508 specification	100 mA
Minimum operational current digital output (I_m)	0.5 mA
OFF-state current digital output (I_r)	10 µA
Voltage drop digital output (U_d)	≤ 2.2 VDC @ I_e max.
Protection digital output	Short-circuit, overvoltage and reverse polarity
Output 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	
UA18CAD04...	400 kHz
UA18CAD09...	300 kHz
UA18CAD22...	200 kHz

Operating frequency digital output (f)	
UA18CAD04...	≤ 10 Hz
UA18CAD09...	≤ 4 Hz
UA18CAD22...	≤ 1 Hz
Response time OFF-ON digital output (t_{ON})	
UA18CAD04...	≤ 50 mS
UA18CAD09...	≤ 125 mS
UA18CAD22...	≤ 500 mS
Response time ON-OFF digital output (t_{OFF})	
UA18CAD04...	≤ 50 mS
UA18CAD09...	≤ 125 mS
UA18CAD22...	≤ 500 mS
Response time analog output	≤ 500 mS
Power ON delay	≤ 500 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: Window function with N.O or N.C. output. Analogue output with positive or negative slope.
Indication Output ON	Yellow 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)
Ambient temperature	
Operating	-20° to +60°C (-4° to +140°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 trimmer	POM
Sealing around trimmer	TPE
Material sealing front	
UA18CAD04...	TPE
UA18CAD09...	TPE
UA18CAD22...	PBT
Connection	
Cable	PVC, grey, 2 m, 4 x 0.32 mm², Ø = 4.7 mm
Plug	M12, 4-pin (CON. 14-series)
Tightening torque	≤ 1 Nm

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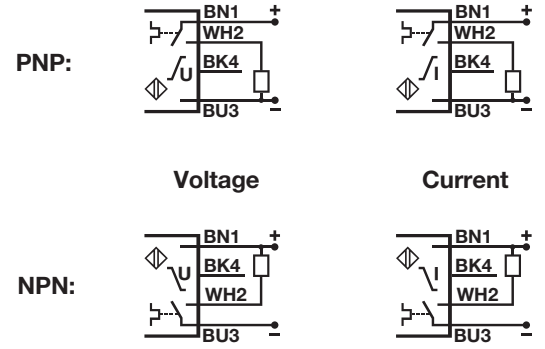
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Specifications (cont.)

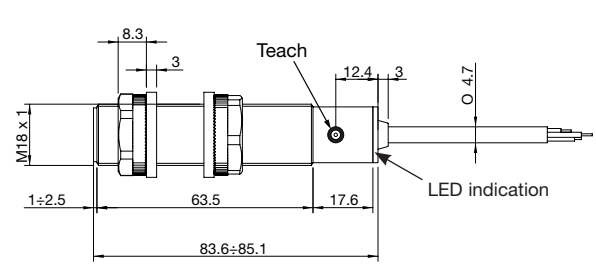
Weight	
Cable version	98 g
Plug version	35 g

CE-marking	Yes
Approvals	cULus (UL508)

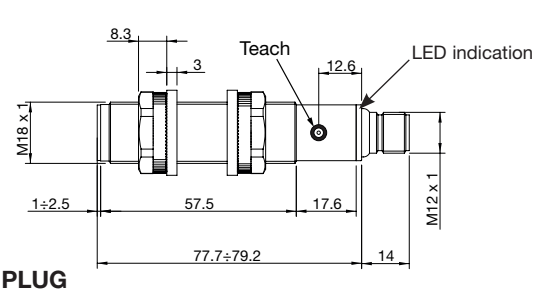
Wiring Diagram



Dimensions

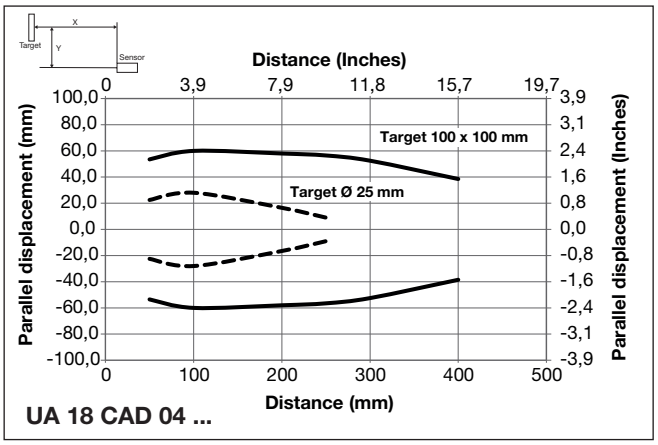


Cable

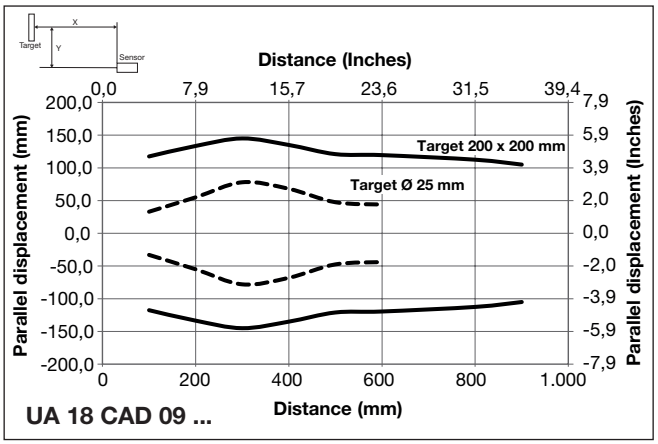


PLUG

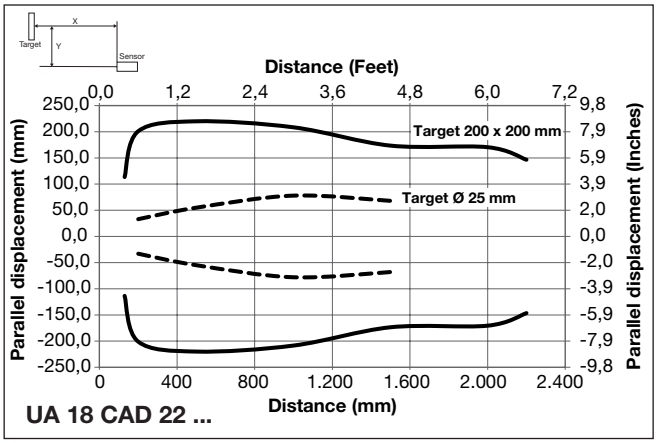
Detection Range



UA 18 CAD 04 ...



UA 18 CAD 09 ...



UA 18 CAD 22 ...

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Programming setup

General set up of sensing point P1 (longest distance) and P2 (shortest distance) independently of the sensor type or function.

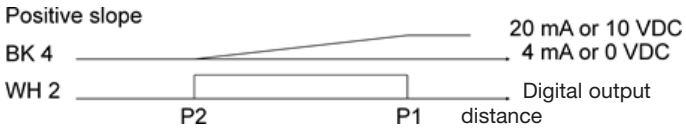
1) Mount the sensor in the selected application.
2) Place a target in front of the sensor at the maximum required distance (P1), then press shortly on the teach-button, the Yellow LED switch Off and then On and start flashing. The distance (P1) is now saved in the sensor, and the target can be moved. 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 flashes 5 times. Now, the distance (P2) is saved in the sensor and the target can be moved. II)

   I) P1 can be set to 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.

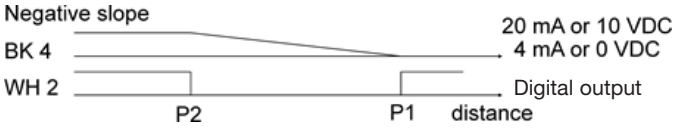
   II) The second switch point can be set to minimum by setting the target within the blind zone close to the sensor head or by covering the sensor head with your hand while teaching P2.

Sensors with 1 digital output and one analogue output UA..CAD..PG/PK/NG or NK types

1) The factory settings are Normally Open (N.O.) for the digital output and positive slope for the analogue output.

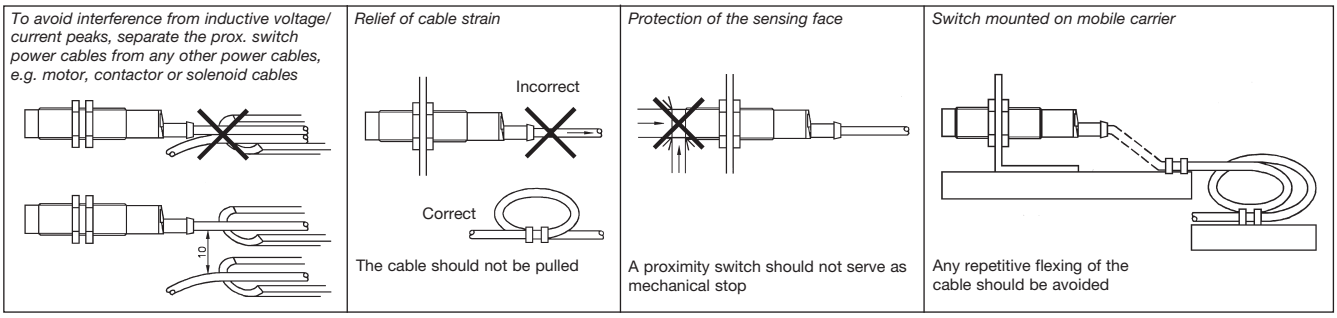


2) To reverse the slope to negative and reverse the N.O. output to N.C., push the teach-button for 8 seconds (12 seconds for UA18CAD22..) until the yellow LED flashes fast. Release the teach-button and the LED will flash 5 times to acknowledge the change in function.



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

Installation Hints



Delivery Contents

- Ultrasonic sensor: UA18CAD....
- Installation instruction
- Mounting:
  2 x M18 Nuts
  2 x rubber washers
- **Packaging:** Carton box 35 x 107 x 173 mm

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