

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



- 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.  $\pm 7^\circ$  or  $\pm 8^\circ$
- Protection: Short-circuit, reverse polarity and overvoltage
- Protection degree IP 67
- 2 m cable or M12 plug

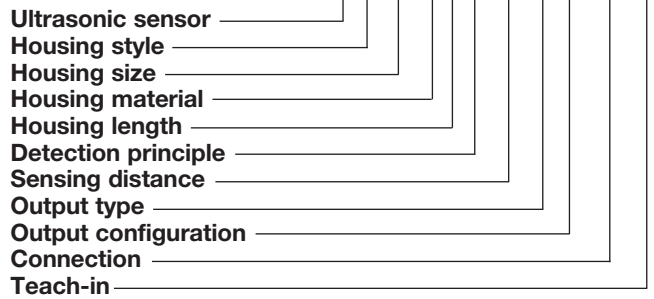
## Product Description

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 win-

dow 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**



## Type Selection

Housing diameter	Conne- ction	Rated operating dist. (S <sub>n</sub> )	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

## Specifications

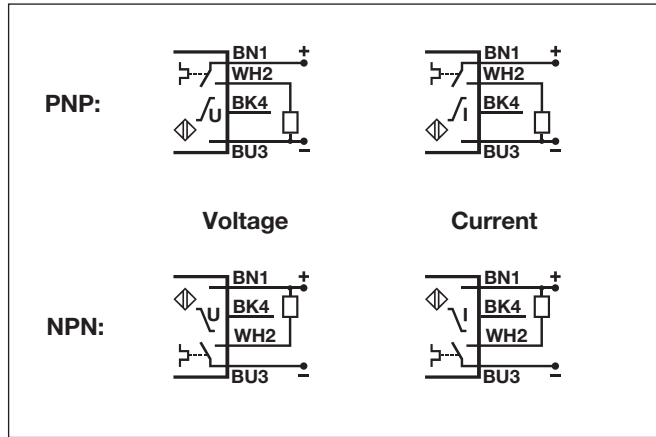
<b>Rated operating distance (<math>S_n</math>)</b>	Reference target: 1 mm metal rolled finish. CAD04: 100 x 100 mm CAD09 and CAD22: 200 x 200 mm	<b>Operating frequency digital output (f)</b>	
UA18CAD04	50 - 400 mm	UA18CAD04...	≤ 10 Hz
UA18CAD09	100 - 900 mm	UA18CAD09...	≤ 4 Hz
UA18CAD22	200 - 2200 mm	UA18CAD22...	≤ 1 Hz
<b>Blind zone</b>		<b>Response time OFF-ON digital output (<math>t_{ON}</math>)</b>	
UA18CAD04...	≤ 50 mm	UA18CAD04...	≤ 50 mS
UA18CAD09...	≤ 100 mm	UA18CAD09...	≤ 125 mS
UA18CAD22...	≤ 200 mm	UA18CAD22...	≤ 500 mS
<b>Repeatability</b>	0.5%	<b>Response time ON-OFF digital output (<math>t_{OFF}</math>)</b>	
<b>Linear Accuracy</b>	1%	UA18CAD04...	≤ 50 mS
<b>Beam angle</b>		UA18CAD09...	≤ 125 mS
UA18CAD04...	±8°	UA18CAD22...	≤ 500 mS
UA18CAD09...	±7°	<b>Response time analog output</b>	≤ 500 mS
UA18CAD22...	±7°	<b>Power ON delay</b>	≤ 500 mS
<b>Sensitivity</b>		<b>Output function, open collector</b>	
Push-button	P1 (farthest setpoint) P2 (nearest setpoint)	By sensor type	NPN or PNP
Resolution	1 mm	<b>Output switching function</b>	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.
<b>Temperature drift</b>	0.1%/°C @ -20° to +60° C	<b>Indication Output ON</b>	Yellow LED
<b>Temperature compensation</b>	Yes	<b>Environment</b>	
<b>Hysteresis (H)</b>	Min. 1%	Installation category	III (IEC 60664/60664A; 60947-1)
<b>Rated operational voltage (<math>U_B</math>)</b>	15 to 30 VDC (ripple included)	Pollution degree	3 (IEC 60664/60664A; 60947-1)
<b>Ripple (<math>U_{pp}</math>)</b>	≤ 5%	Degree of protection	IP67 (IEC 60529; 60947-1)
<b>No-load supply current (<math>I_o</math>)</b>		<b>Ambient temperature</b>	
UA18CAD04...	45 mA @ $U_B$ max	Operating	-20° to +60°C (-4° to +140°F)
UA18CAD09...	45 mA @ $U_B$ max	Storage	-35° to +70°C (-31° to +158°F)
UA18CAD22...	50 mA @ $U_B$ max	<b>Vibration</b>	10 to 55 Hz, 1.0 mm/6g (IEC/EN 60068-2-6)
<b>Output current continuous digital output (<math>I_o</math>)</b>		<b>Shock</b>	30 g / 11 mS, 3 directions (IEC/EN 60068-2-27)
Max. load capacity 100 nF	500 mA	<b>Rated insulation voltage</b>	< 500 VAC (rms)
UL508 specification	100 mA	<b>Housing</b>	
<b>Output current short-time digital output (I)</b>		Material body	PBT
Max. load capacity 100 nF	500 mA	Material front	Epoxy-glass resin
UL508 specification	100 mA	Material back, plug	Grilamid
<b>Minimum operational current digital output (<math>I_m</math>)</b>	0.5 mA	Material back, cable	Grilamid
<b>OFF-state current digital output (<math>I_o</math>)</b>	10 μA	Material trimmer	POM
<b>Voltage drop digital output (<math>U_d</math>)</b>	≤ 2.2 VDC @ $I_g$ max.	Sealing around trimmer	TPE
<b>Protection digital output</b>	Short-circuit, overvoltage and reverse polarity	Material sealing front	
<b>Output analog output</b>		UA18CAD04...	TPE
NG.. or PG.. types	4 to 20 mA	UA18CAD09...	TPE
NK.. or PK.. types	0 to 10 VDC	UA18CAD22...	PBT
<b>Load</b>		<b>Connection</b>	
4 to 20 mA	max. 500 Ω	Cable	PVC, grey, 2 m, 4 x 0.32 mm <sup>2</sup> , Ø = 4.7 mm
0 to 10 VDC	min. 3 kΩ	Plug	M12, 4-pin (CON. 14-series)
<b>Carrier frequency</b>		<b>Tightening torque</b>	≤ 1 Nm
UA18CAD04...	400 kHz		
UA18CAD09...	300 kHz		
UA18CAD22...	200 kHz		

## Specifications (cont.)

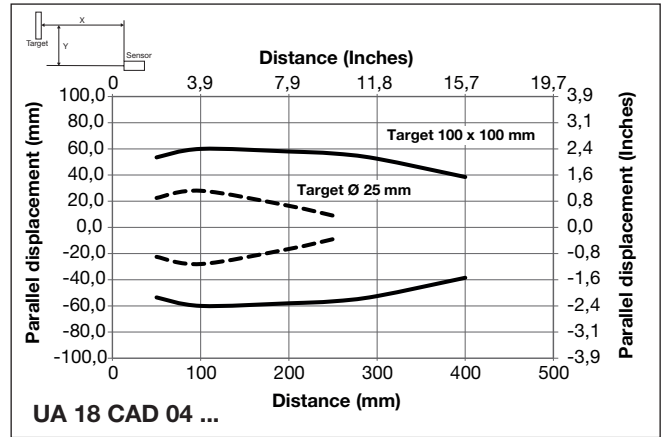
<b>Weight</b>	
Cable version	98 g
Plug version	35 g

<b>CE-marking</b>	Yes
<b>Approvals</b>	cULus (UL508)

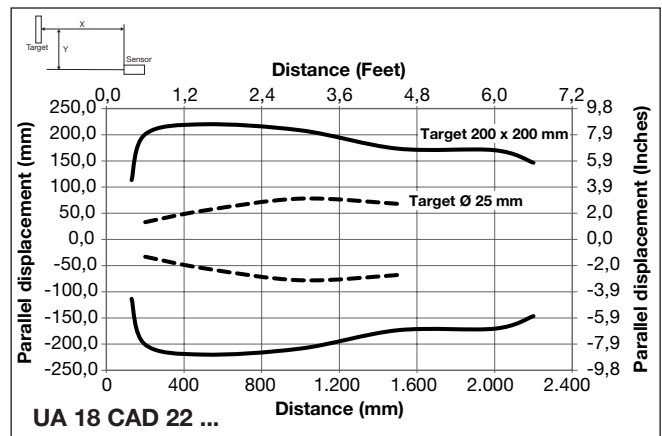
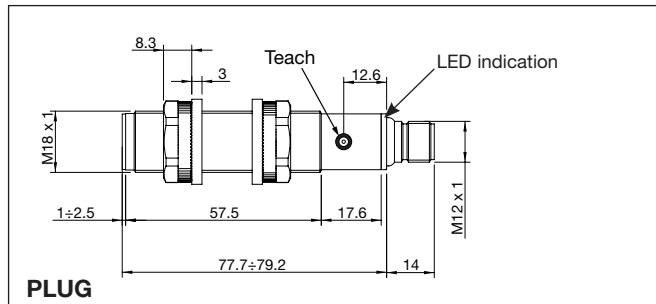
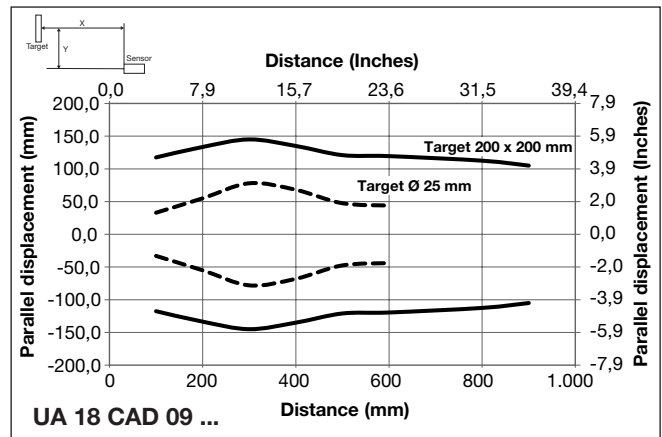
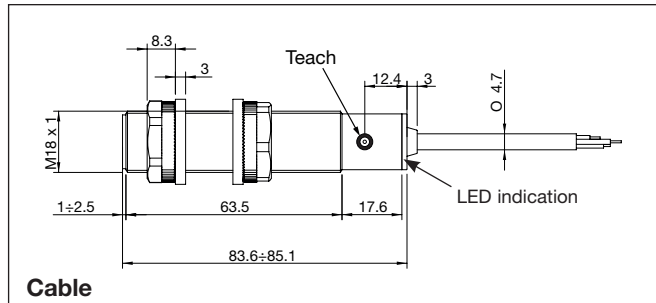
## Wiring Diagram



## Detection Range



## Dimensions



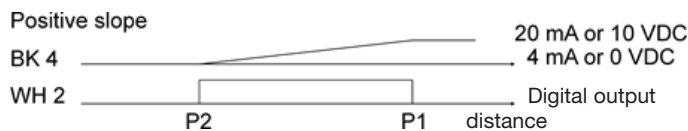
## Programming setup

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

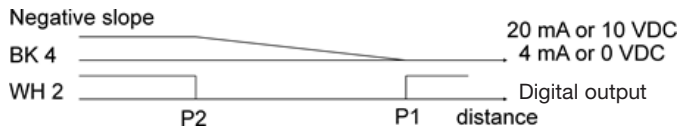
- 1) Mount the sensor in the selected application.
  - 2) Place a target in front of the sensor at the maximum required distance (P1), then press shortly on the teach-button. The yellow LED switches Off and then On again after a maximum of 2 seconds. Now, the distance (P1) is saved in the sensor, and 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.

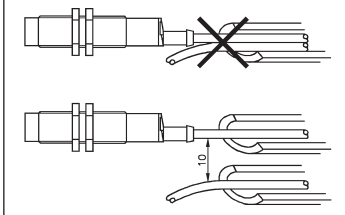
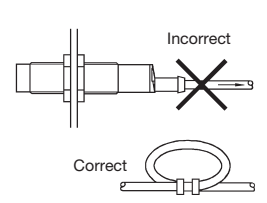
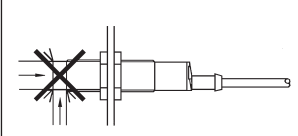
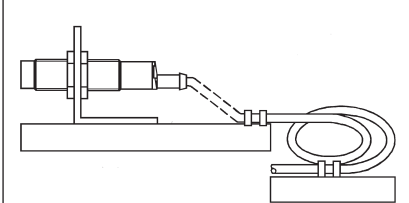


- 2) To reverse the slope to negative and reverse the N.O. output to N.C., push the teach-button for 8 seconds (12 for UC18CAD22..) until the yellow LED flashes fast. Release the teach-button and the LED will flash 5 times to acknowledge the change in function.



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

## Installation Hints

<p>To avoid interference from inductive voltage/current peaks, separate the prox. switch power cables from any other power cables, e.g. motor, contactor or solenoid cables</p> 	<p>Relief of cable strain</p>  <p>Incorrect</p> <p>Correct</p> <p>The cable should not be pulled</p>	<p>Protection of the sensing face</p>  <p>A proximity switch should not serve as mechanical stop</p>	<p>Switch mounted on mobile carrier</p>  <p>Any repetitive flexing of the cable should be avoided</p>
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## 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