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

CARLO GAVAZZI

- **Cylindrical M18 PBT housing**
- **Sensing distance: 50-2200 mm**
- **Power supply: 15 to 30 VDC**
- **Outputs: Two multi function switching outputs. PNP or NPN, NO or NC**
- **Setup: Normal switching or adjustable hysteresis**
- **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 self-contained multi function diffuse ultrasonic sensor with a sensing range of 50 to 2200 mm in three ranges. 2 switching outputs - easely set up for two different output modes and adjusted by teach-in - makes it ideal for level control tasks in a wide variety of vessels. A sturdy one-piece polyester housing provides the perfect packaging for the sophisticated microprocessor controlled and digitally filtered sensor electronics. Excellent EMC performance and precision are typical features of this sensor on true distance measurement.

Ordering Key

UA18CAD04NPM1TI

- **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)	Digital output NPN/PNP	Ordering no.
M18	Plug M12	50-400 mm	2 x NPN	**UA 18 CAD 04 NP M1 TI**
M18	Cable	50-400 mm	2 x NPN	**UA 18 CAD 04 NP TI**
M18	Plug M12	50-400 mm	2 x PNP	**UA 18 CAD 04 PP M1 TI**
M18	Cable	50-400 mm	2 x PNP	**UA 18 CAD 04 PP TI**
M18	Plug M12	100-900 mm	2 x NPN	**UA 18 CAD 09 NP M1 TI**
M18	Cable	100-900 mm	2 x NPN	**UA 18 CAD 09 NP TI**
M18	Plug M12	100-900 mm	2 x PNP	**UA 18 CAD 09 PP M1 TI**
M18	Cable	100-900 mm	2 x PNP	**UA 18 CAD 09 PP TI**
M18	Plug M12	200-2200 mm	2 x NPN	**UA 18 CAD 22 NP M1 TI**
M18	Cable	200-2200 mm	2 x NPN	**UA 18 CAD 22 NP TI**
M18	Plug M12	200-2200 mm	2 x PNP	**UA 18 CAD 22 PP M1 TI**
M18	Cable	200-2200 mm	2 x PNP	**UA 18 CAD 22 PP TI**

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%
Beam angle	
UA18CAD04...	±8°
UA18CAD09...	±7°
UA18CAD22...	±7°
Sensitivity	
Push-button	P1 (farthest setpoint) P2 (nearest setpoint)
Temperature drift	≤ 0.1%/°C @ -20° to +60° C
Temperature compensation	Yes

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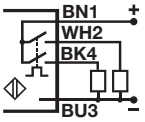
Specifications (cont.)

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 (I_e)	
Max. load capacity 100 nF	≤ 500 mA
UL508 specification	≤ 100 mA
Output current short-time (I)	
Max. load capacity 100 nF	≤ 500 mA
UL508 specification	≤ 100 mA
Minimum operational current (I_m)	≤ 0.5 mA
OFF-state current (I_r)	≤ 10 µA
Voltage drop (U_d)	≤ 2.2 VDC @ I_e max.
Protection	Short-circuit, overvoltage and reverse polarity
Carrier frequency	
UA18CAD04...	400 kHz
UA18CAD09...	300 kHz
UA18CAD22...	200 kHz
Operating frequency (f)	
UA18CAD04...	≤ 10 Hz
UA18CAD09...	≤ 4 Hz
UA18CAD22...	≤ 1 Hz
Response time OFF-ON (t_{ON})	
UA18CAD04...	≤ 50 mS
UA18CAD09...	≤ 125 mS
UA18CAD22...	≤ 500 mS
Response time ON-OFF (t_{OFF})	
UA18CAD04...	≤ 50 mS
UA18CAD09...	≤ 125 mS
UA18CAD22...	≤ 500 mS
Power ON delay	≤ 900 mS
Output function, open collector	
By sensor type	NPN or PNP
Output switching function	Two open collector transistor outputs to be configured as:.
	Normal Switching function with N.O and N.C. output. Adjustable hysteresis Filling or emptying control
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 +140°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
Weight	
Cable version	98 g
Plug version	35 g
CE-marking	Yes
Approvals	cULus (UL508)

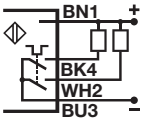
Wiring Diagram

NPN:

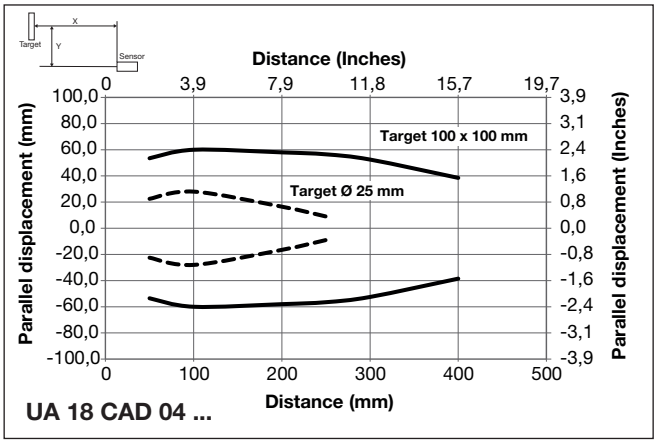


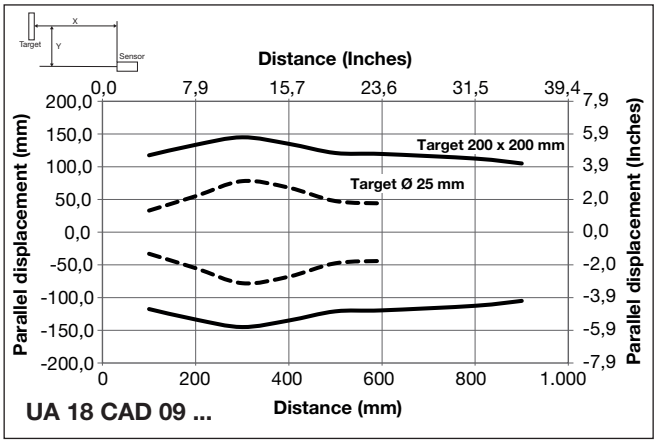
Digital

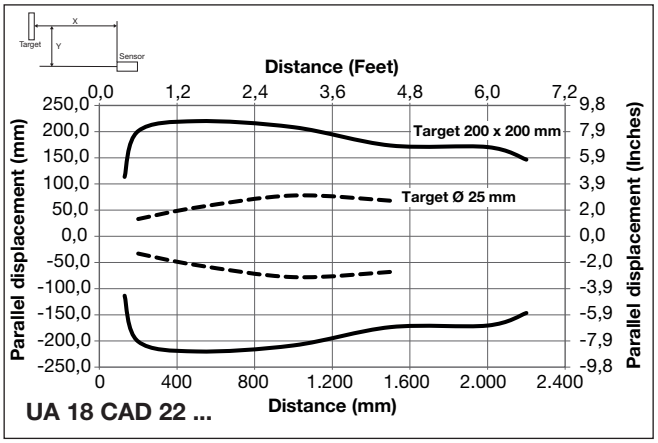
PNP:



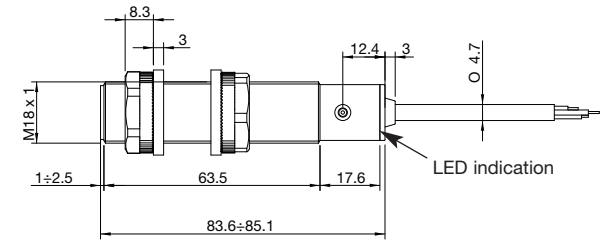
Detection Range



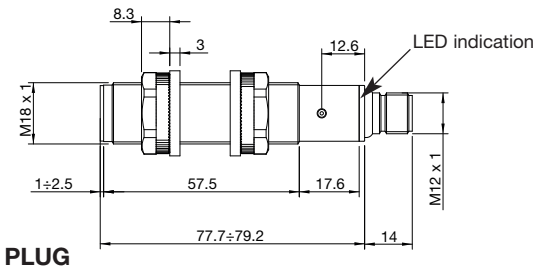




Dimensions



Cable



PLUG

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)

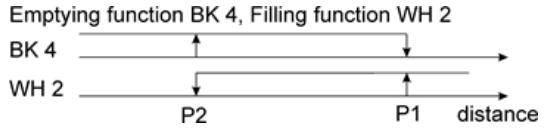
   I) P1 can be set to maximum exceeding the family specification for the sensor by removing the target in front of the sensor. Push and hold the teach-button for more than one second and the sensing distance is set at a unique distance for this sensor only.

   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 2 digital outputs: UA..CAD..PP/NP types, Normal sensing function or Adjustable Hysteresis

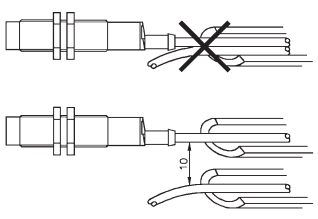
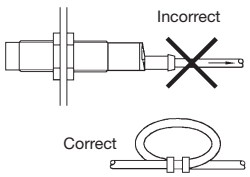
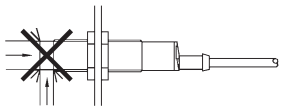
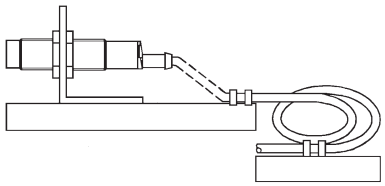
1) The factory settings are normal sensing function.

2) Push and hold the teach-button for 8 seconds (12 for UC18CAD22..) until the yellow LED flashes fast, then release the teach-button and the LED will flash 5 times to acknowledge the change in function.
   Now, the sensor is in adjustable hysteresis mode.



3) To switch back to normal function, repeat step 2.

Installation Hints

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	*Relief of cable strain*	*Protection of the sensing face*	*Switch mounted on mobile carrier*
	 The cable should not be pulled	 A proximity switch should not serve as mechanical stop	 Any repetitive flexing of the cable should be avoided

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

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

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- **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
Minimum resistive load	≥ 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
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 +140°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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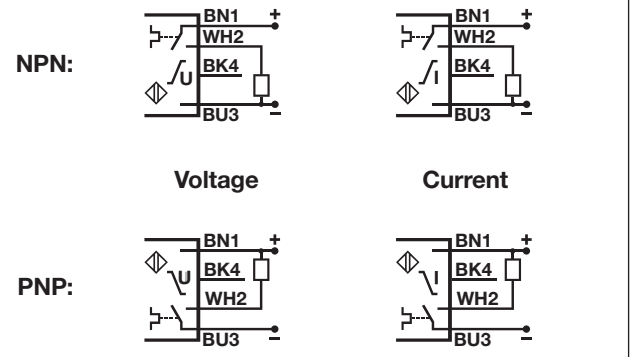
Specifications (cont.)

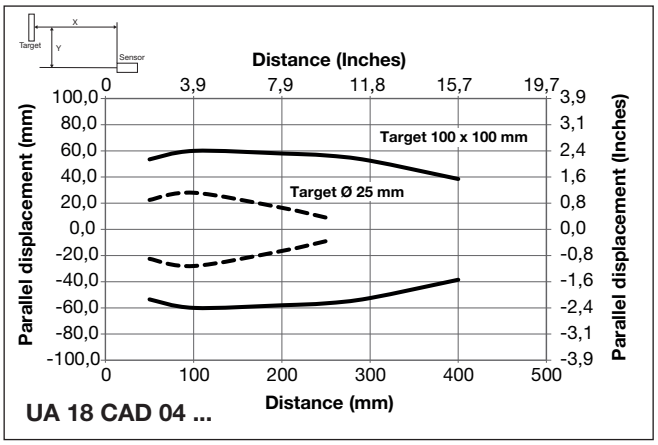
Weight	
Cable version	98 g
Plug version	35 g

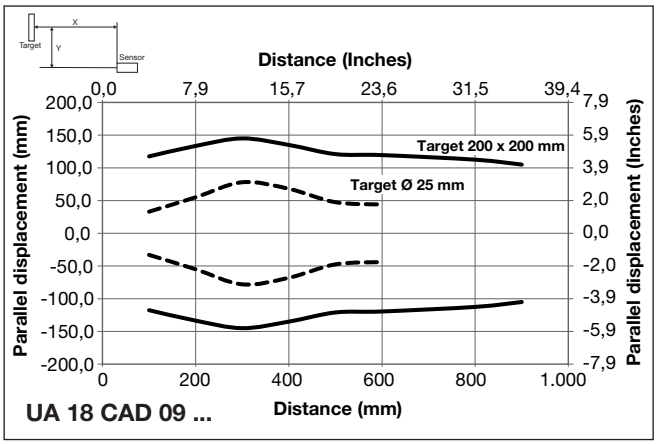
CE-marking	Yes
Approvals	cULus (UL508)

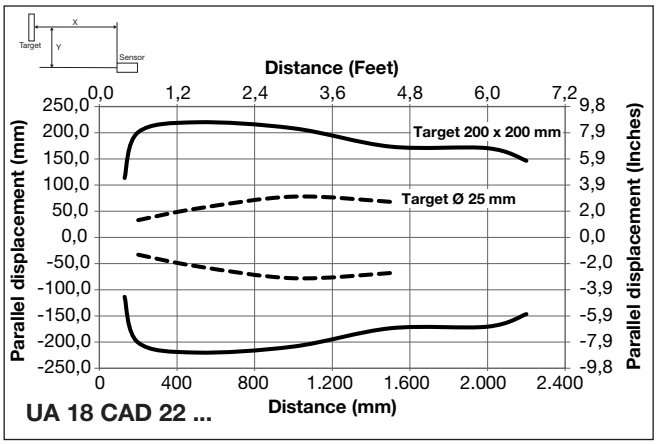
Wiring Diagram



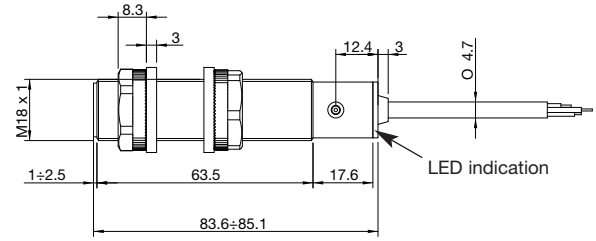
Detection Range

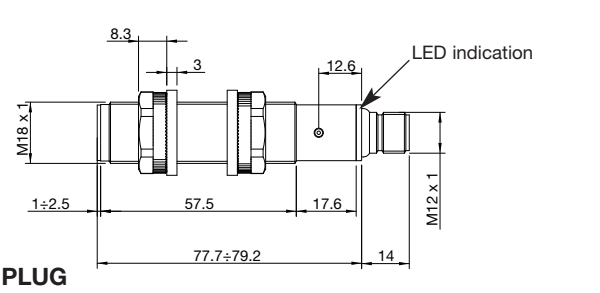






Dimensions





Programming setup

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

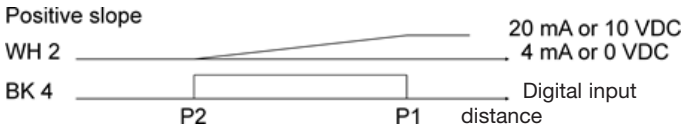
1) Mount the sensor in the selected application.
2) Place a target in front of the sensor at the maximum required distance (P1), then press shortly on the teach-button. The yellow LED switches Off and then On again after a maximum of 2 seconds. Now, the distance (P1) is saved in the sensor, and the target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

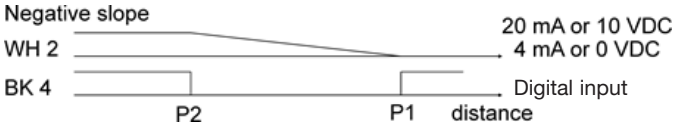
   II) The second switch point can be set to minimum by setting the target within the blind zone close to the sensor head or by covering the sensor head with your hand while teaching P2.

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.

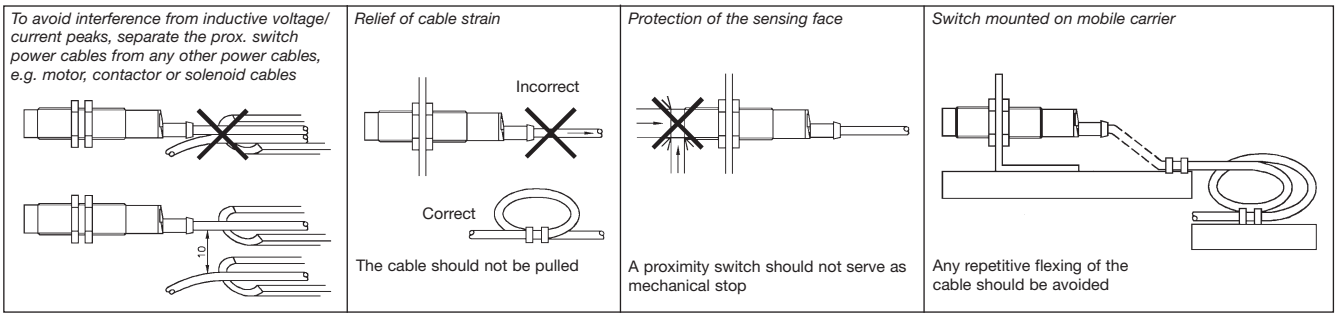


2) To reverse the slope to negative and reverse the N.O. output to N.C., push the teach-button for 8 seconds (12 for UC18CAD22..) until the yellow LED flashes fast. Release the teach-button and the LED will flash 5 times to acknowledge the change in function.



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

Installation Hints



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

Ultrasonic
Diffuse, Analogue Output
Types UA30CAD.....TI

CARLO GAVAZZI

- **Cylindrical M30 PBT housing**
- **Sensing distance: 250-3500 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 0.2%**
- **Beam angle. ±6°**
- **Protection: Short-circuit, reverse polarity and overvoltage**
- **Protection degree IP 67, Nema 4X**
- **2 m cable or M12 plug**

Product Description

A family of diffuse ultrasonic sensors with sensing range from 250-3500 mm with a resolution as low as 2.0 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 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

UA30CAD35NGM1TI

- **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	250-3500 mm	4-20 mA	NPN	**UA 30 CAD 35 NG M1 TI**
M30	Cable	250-3500 mm	4-20 mA	NPN	**UA 30 CAD 35 NG TI**
M30	Plug M12	250-3500 mm	0-10 V	NPN	**UA 30 CAD 35 NK M1 TI**
M30	Cable	250-3500 mm	0-10 V	NPN	**UA 30 CAD 35 NK TI**
M30	Plug M12	250-3500 mm	4-20 mA	PNP	**UA 30 CAD 35 PG M1 TI**
M30	Cable	250-3500 mm	4-20 mA	PNP	**UA 30 CAD 35 PG TI**
M30	Plug M12	250-3500 mm	0-10 V	PNP	**UA 30 CAD 35 PK M1 TI**
M30	Cable	250-3500 mm	0-10 V	PNP	**UA 30 CAD 35 PK TI**

Specifications

Rated operating distance (S_n)	Reference target: 1 mm metal rolled finish, size 200 x 200 mm. 250 - 3500 mm
Blind zone	≤ 250 mm
Repeatability	0.2%
Linear Accuracy	0.5%
Beam angle	±6°
Sensitivity Push-button Resolution	 P1 (longest setpoint) P2 (shortest setpoint) 2 mm
Temperature drift	0.1%/°C @ -20° to +70° C
Temperature compensation	Yes
Hysteresis (H)	Min. 0.5%

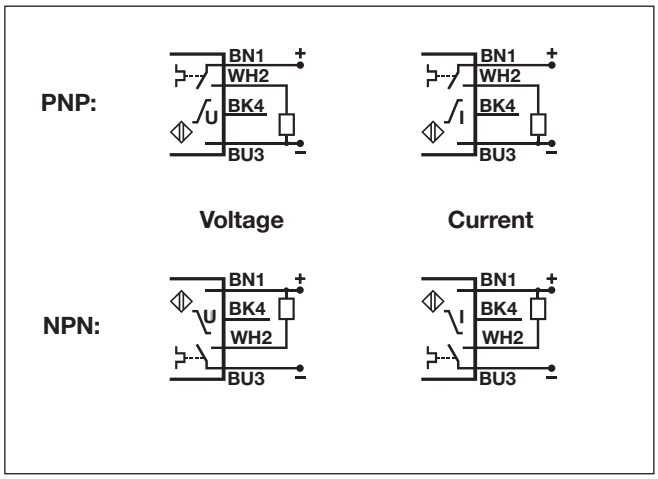
Rated operational voltage (U_B) NG or PG versions NK or PK versions	 12 to 30 VDC 15 to 30 VDC (ripple included)
Ripple (U_{rpp})	≤ 5%
No-load supply current (I_o)	50 mA @ U_B max
Output current continuous digital output (I_e) Max. load capacity 100 nF	 100 mA
Output current short-time digital output (I) Max. load capacity 100 nF	 100 mA
Minimum operational current digital output (I_m)	0.5 mA
OFF-state current digital output (I_r)	10 µA

Specifications (cont.)

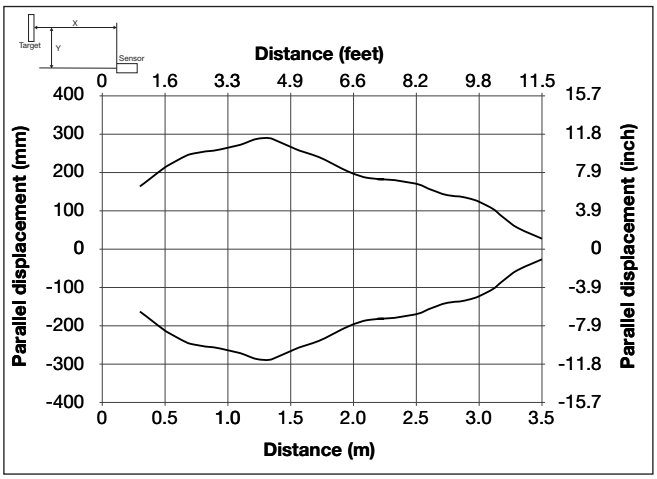
Voltage drop digital output (U_d)	≤ 2.2 VDC @ 100 mA
Protection	
Digital output	Short-circuit, overvoltage pulses and reverse polarity
Supply	Overvoltage pulses and reverse polarity
Analogue output	Overvoltage pulses
Analog output	
NG.. or PG.. types	4 to 20 mA (Load ≤ 500 Ω)
NK.. or PK.. types	0 to 10 VDC (Load ≥ 3 kΩ)
Carrier frequency	112 kHz
Operating frequency digital output (f)	≤ 2 Hz
Response time OFF-ON digital output (t_{ON})	≤ 250 mS
Response time ON-OFF digital output (t_{OFF})	≤ 250 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: - 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	160 g
Plug version	90 g
CE-marking	Yes
Approvals	cULus (UL508)

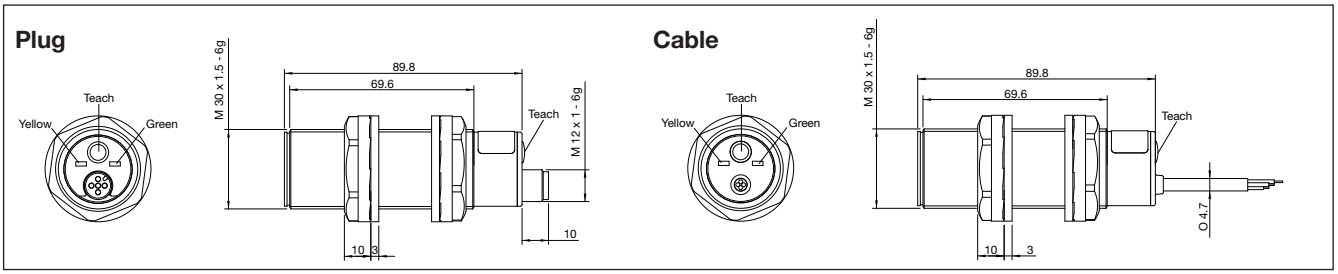
Wiring Diagram



Detection Range



Dimensions



Programming setup

General set up of sensing point P1 (longest distance) and Shortest distance (P2) independent on the sensor type or function.

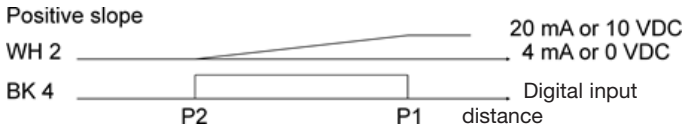
1) Mount the sensor in the selected application
2) Place a target in front of the sensor at the maximum required distance (P1), then press shortly on the teach-button, the Yellow LED switch Off and then On again after maximum 2 seconds. The distance (P1) is now saved in the sensor, and the target can be moved. I)
3) Place the target at the minimum distance requested (P2), then press shortly on the teach-button, the yellow LED turn Off then flash 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.

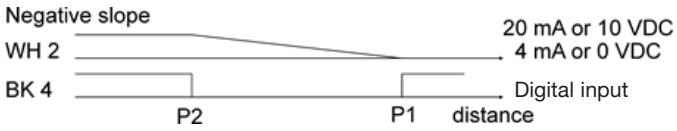
   II) The second switch point can be set to minimum by setting the target within the blind zone close to the sensor head or by covering the sensor head with your hand while teaching P2.

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

1) The factory setting is Normally Open N.O. for the digital output and positive slope for the analogue output.



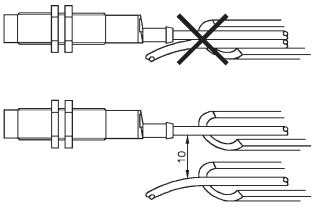
2) To reverse the slope to negative and reverse the N.O. output to Normally Closed N.C. Push the teach-button for 8 second until the yellow LED flash fast release the teach button and the LED will flash 5 times to acknowledge the change in function.



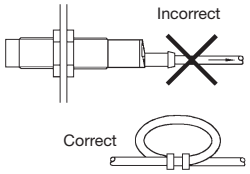
3) To switch back to positive slope or N.O. output, repeat step 2.

Installation Hints

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

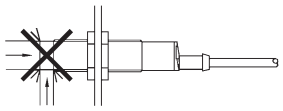


Relief of cable strain



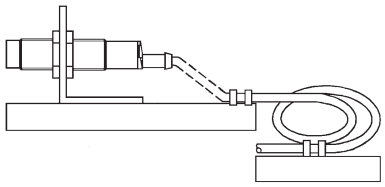
The cable should not be pulled

Protection of the sensing face



A proximity switch should not serve as mechanical stop

Switch mounted on mobile carrier



Any repetitive flexing of the cable should be avoided

Delivery Contents

- Ultrasonic sensor: UA30CAD....
- Installation instruction
- Mounting:
  2 x M30 Nuts
  2 x rubber washers
- Packaging: Carton box 35 x 107 x 173 mm

Accessories

- Connector type CONM14NF.. series

Ultrasonic
Diffuse, Digital Output
Types UA30CAD.....TI

- **Cylindrical M30 PBT housing**
- **Sensing distance: 250-3500 mm**
- **Power supply: 12 to 30 VDC**
- **Outputs: Two multi function switching outputs. PNP or NPN**
- **Setup: Normal switching or adjustable hysteresis**
- **Repeatability 0.2%**
- **Beam angle. ±6°**
- **Protection: Short-circuit, reverse polarity and overvoltage**
- **Protection degree IP 67, Nema 4X**
- **2 m cable or M12 plug**

Product Description

A self-contained multi function diffuse ultrasonic sensor with a sensing range of 250 to 3500 mm. 2 switching outputs - easely set up for two different output modes and adjusted by teach-in - makes it ideal for level control tasks in a wide variety of vessels. A sturdy one-piece polyester housing provides the perfect packaging for the sophisticated microprocessor controlled and digitally filtered sensor electronics. Excellent EMC performance and precision are typical features of this sensor on true distance measurement.

Ordering Key

UA30CAD35NPM1TI

- **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)	Digital output NPN/PNP	Ordering no.
M30	Plug M12	250-3500 mm	2 x NPN	**UA 30 CAD 35 NP M1 TI**
M30	Cable	250-3500 mm	2 x NPN	**UA 30 CAD 35 NP TI**
M30	Plug M12	250-3500 mm	2 x PNP	**UA 30 CAD 35 PP M1 TI**
M30	Cable	250-3500 mm	2 x PNP	**UA 30 CAD 35 PP TI**

Specifications

Rated operating distance (S_n)	Reference target: 1 mm metal rolled finish, size 200 x 200 mm. 250 - 3500 mm
Blind zone	≤ 250 mm
Repeatability	0.2%
Beam angle	±6°
Adjustment Push-button	P1 (farthest setpoint) P2 (nearest setpoint)
Temperature drift	≤ 0.1%/°C @ -20° to +70° C
Temperature compensation	Yes
Hysteresis (H)	Min. 0.5%
Rated operational voltage (U_B)	12 to 30 VDC (ripple included)
Ripple (U_{rpp})	≤ 5%
No-load supply current (I_o)	≤ 50 mA @ U_B max

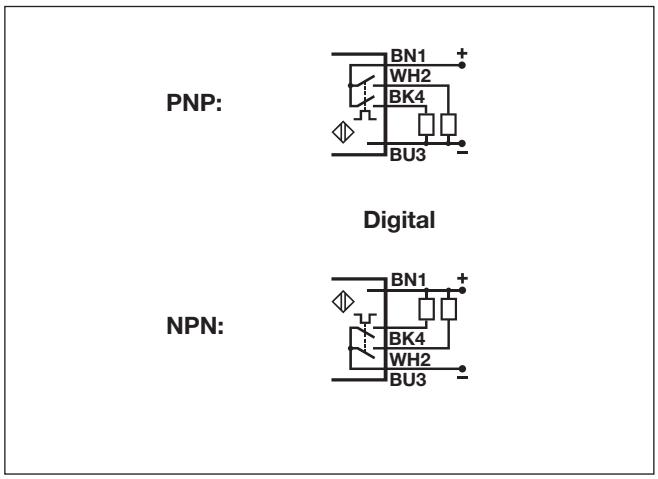
Output current continuous (I_e)	
Max. load capacity 100 nF	≤ 300 mA
UL508 specification	≤ 100 mA
Output current short-time (I)	
Max. load capacity 100 nF	≤ 300 mA
UL508 specification	≤ 100 mA
Minimum operational current (I_m)	≤ 0.5 mA
OFF-state current (I_r)	≤ 10 µA
Voltage drop (U_d)	≤ 2.2 VDC @ 100 mA
Protection	Short-circuit, overvoltage and reverse polarity
Carrier frequency	112 kHz
Operating frequency (f)	≤ 2 Hz
Response time OFF-ON (t_{ON})	≤ 250 mS
Response time ON-OFF (t_{OFF})	≤ 250 mS
Power ON delay	≤ 500 mS

Specifications (cont.)

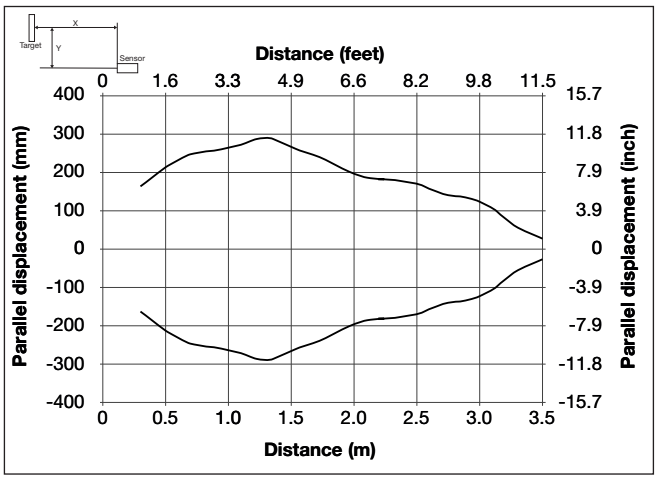
Output function, open collector	
By sensor type	NPN or PNP
Output switching function	Two open collector transistor outputs to be configured as:. - Normal Switching function with N.O and N.C. output. - Adjustable hysteresis Filling or emptying control
Indication	
Output ON	Yellow LED
Echo received	Green 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 mm^2, Ø = 4.7 mm
Plug	M12, 4-pin (CON. 14-series)
Tightening torque	≤ 1.5 Nm
Weight	
Cable version	160 g
Plug version	90 g
CE-marking	Yes
Approvals	cULus (UL508)

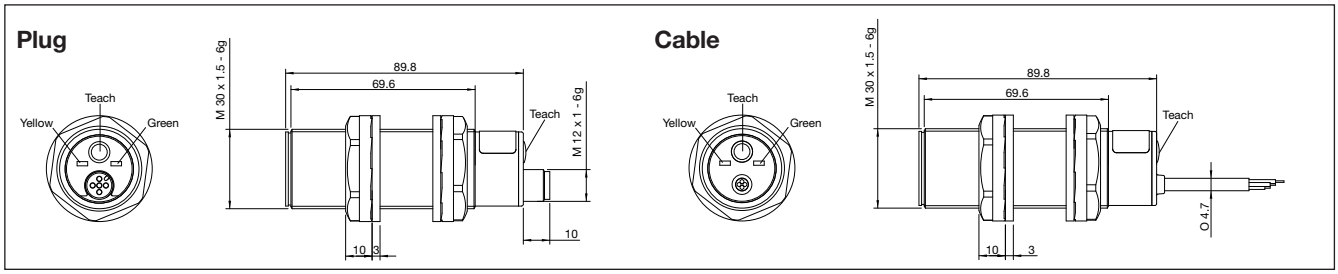
Wiring Diagram



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)

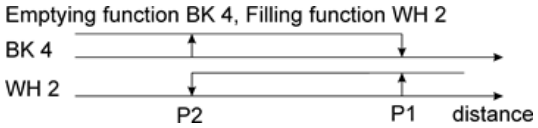
   I) P1 can be set to maximum exceeding the family specification for the sensor by removing the target in front of the sensor. Push and hold the teach-button for more than one second and the sensing distance is set at a unique distance for this sensor only.

   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 2 digital outputs: UA..CAD..PP/NP types, Normal sensing function or Adjustable Hysteresis

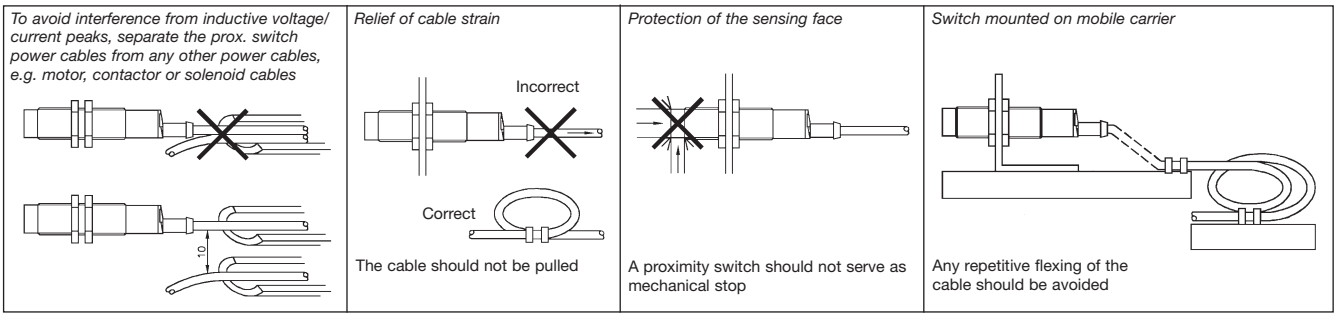
1) The factory settings are normal sensing function.

2) Push and hold the teach-button for 8 seconds (12 for UC18CAD22..) until the yellow LED flashes fast, then release the teach-button and the LED will flash 5 times to acknowledge the change in function.
   Now, the sensor is in adjustable hysteresis mode.



3) To switch back to normal function, repeat step 2.

Installation Hints



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