CARLO GAVAZZI
Automation Components

CARLO GAVAZZI

UA18/UA30 - Ultrasonic sensors

Sensors

UA18/30 Series

Ultrasonic sensors

This ultrasonic sensor series of UA18 and UA30 sensors provides superior sensing solutions with a good price-performance-ratio for a variety of industry applications. The UA 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 UA sensors are especially well suited to harsh environments.

The UA18 and UA30 come in a two digital output version and a combined version with one digital and one analogue output. Also, the sensor range is supplemented with a short-body version of the UA18 with either an analog or a digital output.

Sensing distances go from 40 to 6000 mm and both cable and 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!

Sensing solutions for industry applications

Short blind zone
The new UA sensors offer a reduced blind zone which improves the mounting flexibility and minimizes the space required for reliable detection.

Easy teach-in
Sensing modes are easily set by two simple clicks on the teach-in button or by use of the teach-by-wire function.

Long sensing distance
The UA sensor family includes a wide range of models covering operational ranges of up to 6000 mm.

Housing
The sensors come in a standard housing length or a short-body version in both thermoplastic and high-grade stainless steel.

Harsh environments
The robust, solid-cast housing is specifically designed and well suited to industries where environmental conditions such as lighting, dust, fumes and steam challenge the sensing performance.

Approvals
CE (EN60947-5-2)
cULus (UL508)

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

Applications

Detection of trees in mobile spraying systems

Thanks to its 6 m sensing distance, our ultrasonic sensor UA30CAD60 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 are reduced for the benefit of costs as well as the environment.

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 UA30CAD60 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.
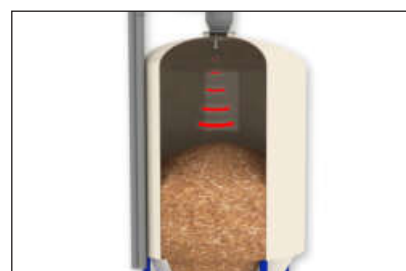
Distance measurement in street sweepers

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.
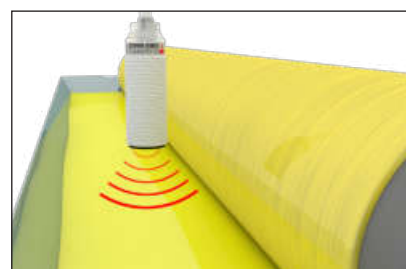
Detecting people in front of ATMs

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.

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Ultrasonic sensors

Types of detection

Diameter measurement

The 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.

Parts counting & presence detection

Because of their superior ability to detect clear, transparent objects and to measure distance, the 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.

Level detection

The UA18 and UA30 sensors are superb at detecting the level of fluids, semi fluids and solids, such as water in a tank or grain in a container. Typical applications include printing machines, hoppers, agricultural manufacturing, food & beverage, water treatment, chemical industry, analysis work and power plants.

Tension control

Monitoring and control of speed, position and tension of materials being processed are efficiently and accurately performed by the 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.

Height and size measurement

The UA18 and UA30 sensors are succesfully 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.

Sensors

Hard foam

Wood

Glass

Liquid / water
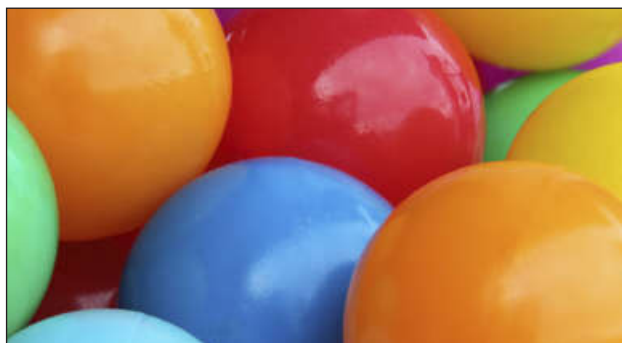
Metal

Plastic

Paint / lacquer

Bulk material / rock

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Sensors

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Ultrasonic sensors

Features and functions UA18/30 CAD/EAD - long housing

PBT housing

UA18CAD....

Teach-in

UA18: M18 x 83.6 mm (Cable)
UA18: M18 x 77.7 mm (Plug)

UA 30CAD35..

LED indication

UA30: M30 x 89.5 mm (Cable)
UA30: M30 x 89.5 mm (Plug)

UA 30CAD60..

LED indication

UA30: M30/Ø40 x 89.5 mm (Cable)
UA30: M30/Ø40 x 89.5 mm (Plug)

Locknut

All UAxxCAD models include two lock-nuts with retention grips for tight mounting.

Stainless steel housing

UA18EAD....

Teach-in

UA18: M18 x 83.6 mm (Cable)
UA18: M18 x 91.7 mm (Plug)

UA 30EAD....

LED indication

UA30: M30 x 93 mm (Cable)
UA30: M30 x 100 mm (Plug)

Nut

All UAxxEAD models include two nuts for tight mounting.
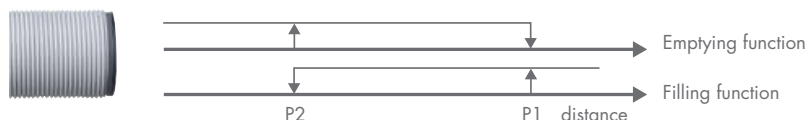
PBT and stainless steel housing

LED indication

Teach-in

Sensors

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Digital outputs NPN or PNP

Normal switching operation

Emptying function

Filling function

P2   P1   distance
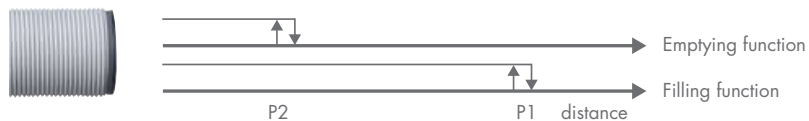
Adjustable hysteresis operation

Emptying function

Filling function

P2   P1   distance

Featuring two digital outputs, the digital UA sensors can operate in two different modes: normal switching or adjustable hysteresis. The outputs are independently teachable via the teach-in button. Modes are easily set and adjusted for on/off or filling/emptying functionality.

Analogue and digital outputs NPN or PNP

Negative slope

20 mA/10 VDC

4 mA/0 VDC

P2   P1   distance

Positive slope

20 mA/10 VDC

4 mA/0 VDC

P2   P1   distance
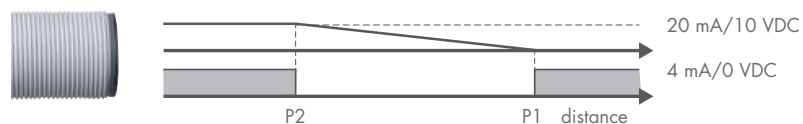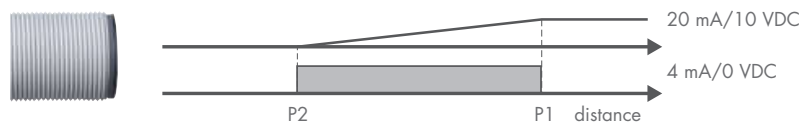
The analogue UA sensors offer a combined output configuration: one digital and one analogue output.
The analogue output of 4-20 mA or 0-10 VDC can be configured as either "positive slope" or "negative slope". The slope is defined by two teachable setpoints.
The digital output forms a sensing window in which the output is either active or inactive between the setpoints (P2 and P1). These are useful features for distance measurement, level measurement, diameter measurement or loop control.

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Ultrasonic sensors

The UA18CAD and UA30CAD PBT housing

Connec-tion	Out-put	Distance	2 x Digital outputs M18 UA18CAD...	2 x Digital outputs M30 UA30CAD...	Analogue + Digital output M18 UA18CAD... 4-20 mA	Analogue + Digital output M18 UA18CAD... 0-10 V	Analogue + Digital output M30 UA30CAD... 4-20 mA	Analogue + Digital output M30 UA30CAD... 0-10 V
Cable	NPN	50 - 400 mm	04NPTI		04NGTI	04NKTI		
		100 - 900 mm	09NPTI		09NGTI	09NKTI		
		200 - 2200 mm	22NPTI		22NGTI	22NKTI		
		250 - 3500 mm		35NPTI			35NGTI	35NKTI
		350 - 6000 mm		60NPTI			60NGTI	60NKTI
	PNP	50 - 400 mm	04PPTI		04PGTI	04PKTI		
		100 - 900 mm	09PPTI		09PGTI	09PKTI		
		200 - 2200 mm	22PPTI		22PGTI	22PKTI		
		250 - 3500 mm		35PPTI			35PGTI	35PKTI
		350 - 6000 mm		60PPTI			60PGTI	60PKTI
Plug	NPN	50 - 400 mm	04NPM1TI		04NGM1TI	04NKM1TI		
		100 - 900 mm	09NPM1TI		09NGM1TI	09NKM1TI		
		200 - 2200 mm	22NPM1TI		22NGM1TI	22NKM1TI		
		250 - 3500 mm		35NPM1TI			35NGM1TI	35NKM1TI
		350 - 6000 mm		60NPM1TI			60NGM1TI	60NKM1TI
	PNP	50 - 400 mm	04PPM1TI		04PGM1TI	04PKM1TI		
		100 - 900 mm	09PPM1TI		09PGM1TI	09PKM1TI		
		200 - 2200 mm	22PPM1TI		22PGM1TI	22PKM1TI		
		250 - 3500 mm		35PPM1TI			35PGM1TI	35PKM1TI
		350 - 6000 mm		60PPM1TI			60PGM1TI	60PKM1TI

Rated operational voltage (U_B) (5 % ripple included)	15 to 30 V DC	12 to 30 V DC	15 to 30 V DC 12 to 30 V DC 15 to 30 V DC
Blind Zone	CAD04: ≤ 50 mm, CAD09: ≤ 100 mm, CAD22: ≤ 200 mm, CAD35: ≤ 250 mm, CAD60: ≤ 350 mm		
No load supply current (I_o)	CAD04: ≤ 45 mA, CAD09: ≤ 45 mA, CAD22: ≤ 50 mA, CAD35: ≤ 50 mA and CAD60: ≤ 50 mA		
Digital output	Open collector, NPN or PNP by sensor type		
Digital output function	Standard 2 switchpoint or adjustable hysteresis for Level control	Digital output with windows function and analogue output with positive or negative slope	
Digital output current (I_e)	≤ 500 mA (max. Load capacity 100 nF), (UL508 ≤ 100 mA), CAD60 ≤ 300 mA	≤ 100 mA, CAD60 ≤ 300 mA (max. Load capacity 100 nF)	
Minimum operational current, digital (I_m)	≤ 0,5 mA		
Off-State current, digital (I_r)	≤ 10 µA		
Voltage drop, digital (U_d)	≤ 2.2 V DC @ I_e max		
Minimum resistive load, analogue	≥ 3 kΩ		
Sensor protection, digital output	Shortcircuit (A), reverse polarity (B) and transients (C)		
Response time	CAD04: ≤ 45 mS, CAD09: ≤ 125 mS, CAD22: ≤ 500 mS, CAD35: 250mS and CAD60: 500mS		
Power on delay (t_v)	≤ 900 mS, CAD60 ≤ 500 mS	≤ 500 mS	≤ 300 mS
Repeatability	0.50%, CAD60: 1%		0.20%, CAD60: 1%
Linear accuracy	1% 0.5%		1% 0.5%
Resolution	-	1 mm	
Beam angle	CAD04: ±8°, CAD09: ±7°, CAD22: ±7° and CAD35: ±6°, CAD60: ±7°		
Temperature drift, compensation	≤ 0.1%/°C, Yes		
Hysteresis	≥ 1%, CAD60:≥ 2%		≥ 0.5%
Led indications	Target detected (Yellow LED), Echo received (Green LED M30 sensor only)		
Sensitivity control	Teach-in button for setpoint P1 and P2		
Degree of protection	IP67 (IEC 60529; 60947-1)		
Ambient temperature	-20 to +60 (CAD60: 70) °C (-4 to +140 (158) °F) no condensation, Storage -35 to +70 °C (-31 to +158 °F)		
CE marking	According to EN 60947-5-2		
Approvals	CAD04, 07, 22 and 35: cULus (UL508)		
Installation category	III (IEC60664/60664A; 60947-1)		
Pollution degree	3(IEC60664/60664A; 60947-1)		
Vibration	10 to 150 Hz, (1,0 mm/15G; IEC 60068-2-6) in X,Y and Z direction		
Shock	30G /11 mS. 3 positive and 3 negative in X,Y and Z direction		
Material	Body, PBT light grey; Front Epoxy-glass resin, Backpart Grilamide, Teach-in shaft POM		
Cable / Connector	PCV, grey, 2 m, 4 x 0.34 mm2, Ø=4.7 mm / M12, 4-pin		
Dimensions	UA18 cable: M18 x 83.6 mm, UA18 plug: M18 x 77.7 mm, UA30 cable/plug: M30 x 89.5 mm,		
Weight incl. packaging	M18 cable version ≤ 100 g, plug version ≤ 35 g, M30 cable version ≤ 160 g, plug version ≤ 90 g		
Accessories, additional	Connectors: CONM14NF-... Types		

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

Connec-tion	Out-put	Distance	2 x Digital outputs		Analogue + Digital output			
			M18	M30	M18		M30	
			UA18EAD...	UA30EAD...	UA18EAD...		UA30EAD...	
					4-20 mA	0-10 V	4-20 mA	0-10 V
Cable	NPN	50 - 400 mm	04NPTI		04NGTI	04NKTI		
		100 - 900 mm	09NPTI		09NGTI	09NKTI		
		200 - 1500 mm	15NPTI		15NGTI	15NKTI		
		350 - 3500 mm		35NPTI			35NGTI	35NKTI
	PNP	50 - 400 mm	04PPTI		04PGTI	04PKTI		
		100 - 900 mm	09PPTI		09PGTI	09PKTI		
		200 - 1500 mm	15PPTI		15PGTI	15PKTI		
		350 - 3500 mm		35PPTI			35PGTI	35PKTI
Plug	NPN	50 - 400 mm	04NPM1TI		04NGM1TI	04NKM1TI		
		100 - 900 mm	09NPM1TI		09NGM1TI	09NKM1TI		
		200 - 1500 mm	15NPM1TI		15NGM1TI	15NKM1TI		
		350 - 3500 mm		35NPM1TI			35NGM1TI	35NKM1TI
	PNP	50 - 400 mm	04PPM1TI		04PGM1TI	04PKM1TI		
		100 - 900 mm	09PPM1TI		09PGM1TI	09PKM1TI		
		200 - 1500 mm	15PPM1TI		15PGM1TI	15PKM1TI		
		350 - 3500 mm		35PPM1TI			35PGM1TI	35PKM1TI
Rated operational voltage (U_b) (5 % ripple included)			15 to 30 V DC	12 to 30 V DC	15 to 30 V DC		12 to 30 V DC	15 to 30 V DC
Blind zone			EAD04: ≤ 50 mm, EAD09: ≤ 100 mm, EAD15: ≤ 200 mm, EAD35: ≤ 350 mm					
No load supply current (I_o)			≤ 50 mA					
Digital output			Open collector, NPN or PNP by sensor type					
Digital output function			Standard 2 switchpoint or adjustable hysteresis for Level control		Digital output with windows function and analogue output with positive or negative slope			
Digital output current (I_e)			UA18: ≤ 500 mA, UA35: ≤ 300 mA (max. Load capacity 100 nF), (UL508 ≤ 100 mA)		≤ 100 mA (max. Load capacity 100 nF)			
Minimum operational current, digital (I_m)			≤ 0,5 mA					
Off-State current, digital (I_l)			≤ 10 µA					
Voltage drop, digital (U_d)			≤ 2.2 V DC @ I_e max					
Minimum resistive load, analogue					≤ 500 Ω	≥ 3 kΩ	≤ 500 Ω	≥ 3 kΩ
Sensor protection, digital output			Shortcircuit (A), reverse polarity (B) and transients (C)					
Response time			EAD04: ≤ 50 mS, EAD09: ≤ 125 mS, EAD15: ≤ 500 mS and EAD35: 250mS					
Power on delay (t_v)			≤ 900 mS	≤ 1500 mS	≤ 500 mS			
Repeatability			0.5%	1%	0.5%		1%	
Linear error					0.5%		1%	
Resolution					1 mm		2 mm	
Beam angle			EAD04: ±10°, EAD09: ±7°, EAD15: ±7° and EAD35: ±7°					
Temperature drift			≤ 0.1% / °C					
Temperature compensation			Yes					
Hysteresis			≥ 1%					
Led indications			Target detected (Yellow LED), Echo received (Green LED M30 sensor only)					
Sensitivity control			Teach-in button for setpoint P1 and P2					
Degree of protection			IP67 (IEC 60529; 60947-1)					
Ambient temperature			-20 to +60 °C (-4 to +140 °F) no condensation, Storage -35 to +70 °C (-31 to +158 °C)					
CE marking			According to EN 60947-5-2					
Approvals			cULus (UL508)					
Installation category			III (IEC60664/60664A; 60947-1)					
Pollution degree			3(IEC60664/60664A; 60947-1)					
Vibration			10 to 150 Hz, (1,0 mm/15G; IEC 60068-2-6) in X,Y and Z direction					
Shock			30G /11 mS. 3 positive and 3 negative in X,Y and Z direction					
Material			Body: AISI 316L; Front: Epoxy-glass resin, Backpart: Grilamide, Teach-in shaft: POM					
Cable			PCV, grey, 2 m, 4 x 0.34 mm², Ø=4.7 mm					
Connector			M12, 4-pin (CONM14NF-... Types)					
Dimensions			UA18 cable/plug: M18 x 83.6/91.7 mm, UA30 cable/plug: M30 x 93/100 mm,					
Weight incl. packaging			M18 cable version ≤ 125 g, plug version ≤ 55 g M30 cable version ≤ 220 g, plug version ≤ 150 g					
Accessories, additional			Connectors: CON.14-series					

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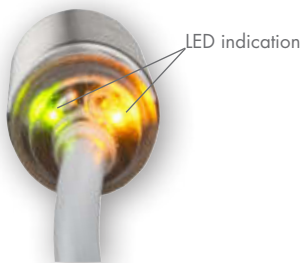
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Ultrasonic sensors

Features and functions UA18 CSD/ESD - short housing

PBT housing

UA18CSD....

LED indication

UA18: M18 x 52.9 mm (Cable)
UA18: M18 x 60.4 mm (Plug)

LED indication

Locknut

All UA18CSD models include two lock-nuts with retention grips for tight mounting.

Stainless steel housing

UA18ESD....

LED indication

UA18: M18 x 52.9 mm (Cable)
UA18: M18 x 60.4 mm (Plug)

Nut

All UA18ESD models include two nuts for tight mounting.

Digital outputs NPN or PNP

Normal switching operation
BK4 Output N.O.

ON
OFF
P2   P1   distance
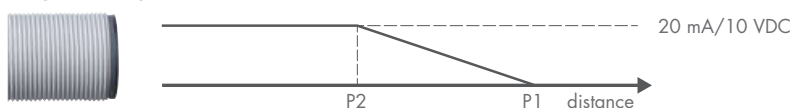
BK4 Output N.C.

ON
OFF
P2   P1   distance

Featuring one digital output, the digital UA sensors can be configured as N.O. or N.C.
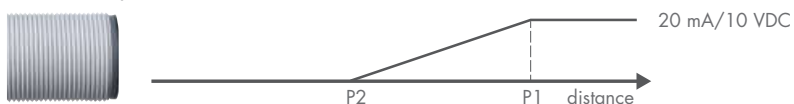A windows detection is achieved by teaching two setpoints - P1 and P2.
An object detection is achieved by teaching only one setpoint - P1.

Analogue output

Negative slope

20 mA/10 VDC

P2   P1   distance

Positive slope

20 mA/10 VDC

P2   P1   distance

The analogue UA sensors offer one analogue output.
The analogue output of 4-20 mA or 0-10 VDC can be configured as either "positive slope" or "negative slope". The slope is defined by two teachable setpoints.

Sensors

The UA18CSD PBT housing / UA18ESD stainless steel housing

Connec-tion	Output	Distance	1 x Digital Output		Analogue Output	
			PET Housing	**Stainless Steel Housing**	**PET Housing**	**Stainless Steel Housing**
Cable	NPN	40 - 300 mm	**UA18CSD03NPTI**	**UA18ESD03NPTI**		
		80 - 800 mm	**UA18CSD08NPTI**	**UA18ESD08NPTI**		
	PNP	40 - 300 mm	**UA18CSD03PPTI**	**UA18ESD03PPTI**		
		80 - 800 mm	**UA18CSD08PPTI**	**UA18ESD08PPTI**		
	4-20 mA	40 - 300 mm			**UA18CSD03AGTI**	**UA18ESD03AGTI**
		80 - 800 mm			**UA18CSD08AGTI**	**UA18ESD08AGTI**
	0-10 V	40 - 300 mm			**UA18CSD03AKTI**	**UA18ESD03AKTI**
		80 - 800 mm			**UA18CSD08AKTI**	**UA18ESD08AKTI**
Plug	NPN	40 - 300 mm	**UA18CSD03NPM1TI**	**UA18ESD03NPM1TI**		
		80 - 800 mm	**UA18CSD08NPM1TI**	**UA18ESD08NPM1TI**		
	PNP	40 - 300 mm	**UA18CSD03PPM1TI**	**UA18ESD03PPM1TI**		
		80 - 800 mm	**UA18CSD08PPM1TI**	**UA18ESD08PPM1TI**		
	4-20 mA	40 - 300 mm			**UA18CSD03AGM1TI**	**UA18ESD03AGM1TI**
		80 - 800 mm			**UA18CSD08AGM1TI**	**UA18ESD08AGM1TI**
	0-10 V	40 - 300 mm			**UA18CSD03AKM1TI**	**UA18ESD03AKM1TI**
		80 - 800 mm			**UA18CSD08AKM1TI**	**UA18ESD08AKM1TI**

Rated operational voltage (U_B)	10 to 30 V DC ($\leq$ 5% ripple included)	
Blind zone	UA18..D03: $\leq$ 40 mm, UA18..D08: $\leq$ 80 mm	
No load supply current (I_o)	35 mA @ U_B max	
Digital output	Open collector, NPN or PNP by sensor type	
Output switching function	One open cellector transistor output to be configured as N.O. or N.C.	Analogue output with positive or negative slope
Digital output current (I_e)	$\leq$ 100 mA (max. Load capacity 100 nF)	-
Minimum operational current(I_m)	$\leq$ 0,5 mA	-
Off-State current (I_r)	35 mA @ U_B max	-
Voltage drop (U_d)	$\leq$ 2.2 V DC @ I_e max	-
Output function, analogue	-	AG.. types: 4 to 20 mA, AK.. types: 0 to 10 V DC
Resistive load, analogue	-	AG.. types: $\leq$ 500 Ω, AK.. types: $\geq$ 3 kΩ
Sensor protection	Shortcircuit, overvoltage and reverse polarity	Shortcircuit and overvoltage
Response time	UA18..D03: $\leq$ 60 mS, UA18..D08: $\leq$ 100 mS	$\leq$ 400 mS
Power on delay (t_v)	$\leq$ 100 mS	$\leq$ 900 mS
Repeatability	0.5%	1.0%
Linear accuracy	-	1.0%
Resolution	-	3 mm
Beam angle	UA18..D03: 7°±2°, UA18..D08: 8°±2°	
Temperature drift	$\leq$ 0.1%/°C @ -20°C to +60°C	
Temperature compensation	Yes	
Hysteresis	$\geq$ 1%	
Led indications	Output ON (Yellow LED), Echo ON (Green LED)	
Sensitivity control	Teach by wire for setpoint P1 and P2	
Degree of protection	IP67 (IEC 60529; 60947-1)	
Ambient temperature	Operating: -20 to +60 °C (-4 to +140 °F) no condensation, Storage: -35 to +70 °C (-31 to +158 °C)	
CE marking	According to EN 60947-5-2	
Approvals	cULus (UL508)	
Installation category	III (IEC60664/60664A; 60947-1)	
Pollution degree	3(IEC60664/60664A; 60947-1)	
Vibration	10 to 55 Hz, 1.0 mm/6G (IEC/EN 60068-2-6)	
Shock	30G /11 mS, 3 directions (IEC/EN 60068-2-27)	
Material	Body: ESD: AISI 316L, CSD: PBT; Front: Epoxy-glass resin, Backpart: Grilamide, Push-button: POM	
Cable	PCV, grey, 2 m, 4 x 0.32 mm², Ø=4.7 mm	
Connector	M12, 4-pin (CON. 14-series)	
Dimensions	UA18 cable: M18 x 52.9 mm, UA18 plug: M18 x 60.4 mm	
Weight incl. packaging	M18CSD cable version $\leq$ 135 g, plug version $\leq$ 65 g M18ESD cable version $\leq$ 160 g, plug version $\leq$ 55 g	
Accessories, additional	Connectors: CON.14NF-series	

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CARLO GAVAZZI
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CARLO GAVAZZI

OUR SALES NETWORK IN EUROPE

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