



## GENERAL FEATURES

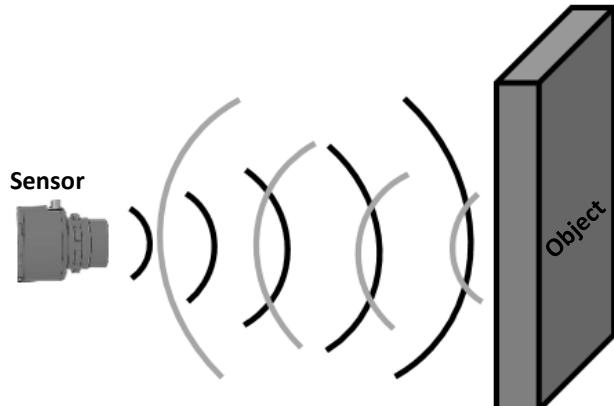
- Ultrasonic working principle
- 0.5 - 9 meters measuring range which can be calibrated from the menu
- Non-contact and high precision measurement
- $\pm 0.2$  FS accuracy
- Single line 5 digit display and 4 sealed keypads for configuration
- Display of measured value in level, distance (cm, m, inch or feet) or volume (liters, m<sup>3</sup>, imp, gallons)
- RS-232, RS-485 and CANopen serial connection options
- 4-20 mA, 0-20 mA or 0-5V, 0-10V or 0.5-4.5V analog output options
- 2 PNP Open Collector outputs
- IP65 (with transparent cover) or IP67 (with aluminum cover) protection
- Economical and maintenance-free design
- Easy installation

The ultrasonic sensor sends and detects high-frequency ultrasonic sound with a piezoelectric transducer. A part of the reflected sound wave by hitting the measuring surface is detected by the transducer, depending on the speed of the signal in the air, the distance of the objects is determined. When the specified switching point is reached, the output is switched. The measured value is given as analog (0 ... 10 V / 4 ... 20 mA) or CANopen signal.

With ultrasonic sensors, objects can be reliably detected and measured regardless of material, color, transparency and surface properties.

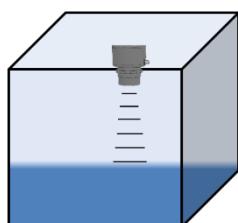
### ULS series ultrasonic sensors;

Used in non-contact, level and volume measurement of liquid and solid materials in open and closed tanks. There is also an open canal flow measurement option. It can display the measured value as level, distance (cm, m, inch or feet) or volume (liters, m<sup>3</sup>, imp, gallons) with 4 sealed membrane keypads.

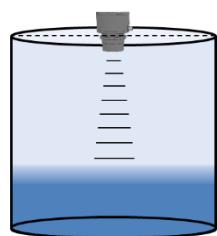


## APPLICATION AREAS

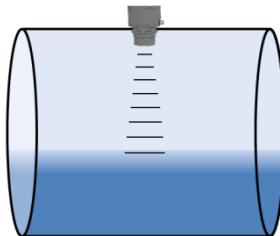
- Level measurement, pump control in tank, warehouse etc.
- Occupancy rate calculation in product warehouses
- Treatment plants
- Food industry
- Chemical industry



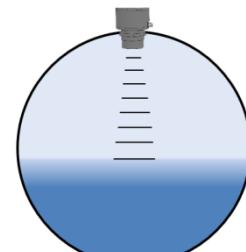
Measurement in rectangular tanks



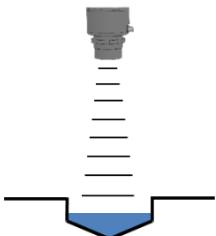
Measurement in cylinder tanks



Measurement in horizontal cylinder tanks



Measurement in cube tanks



Measurement in flumes

## TECHNICAL SPECIFICATIONS

<b>Operating range</b>	0.5 - 9 meters
<b>Blind area</b>	50 cm max.
<b>Measurement Frequency</b>	40 kHz
<b>Accuracy</b>	±0.2 FS
<b>Supply Voltage</b>	16...30 VDC
<b>Power consumption</b>	2,4 Watt max.
<b>Current consumption</b>	100 mA max. @24 VDC / 150 mA max. @16 VDC
<b>Sampling rate</b>	4 Hz
<b>Ultrasonic taper angle</b>	30°
<b>Minimum resolution</b>	1 mm
<b>Relay outputs (Optional)</b>	2 x PNP Open Collector Outputs
<b>Serial connection (Optional)</b>	RS-232, RS-485, CANopen
<b>Analog outputs (Optional)</b>	0.5-4.5V, 0-5V, 0-10 V, 4-20 mA, 0-20 mA
<b>Analog output load</b>	500 Ω
<b>Analog output resolution</b>	16 Bit
<b>Reverse connection protection</b>	Yes
<b>Overload protection</b>	Yes (600 mA)
<b>Temperature compensation</b>	Yes
<b>Watchdog</b>	Yes
<b>Electrical connection</b>	M12 / 8 pin male and M12 / 5 pin female sockets (standard) 1 piece 8 x 0,14 mm <sup>2</sup> shielded cable and 1 piece 5 x 0,14 mm <sup>2</sup> shielded cable (optional)
<b>Cable length</b>	Standard 1 m, Optional others
<b>Operating temperature</b>	-40 °C ... 75 °C
<b>Storage temperature</b>	-40 °C ... 85 °C
<b>Protection class</b>	With transparent cover: IP65 With aluminum cover: IP67
<b>Weight</b>	~700 gr
<b>Housing material</b>	Delrin® POM-C EN 10204

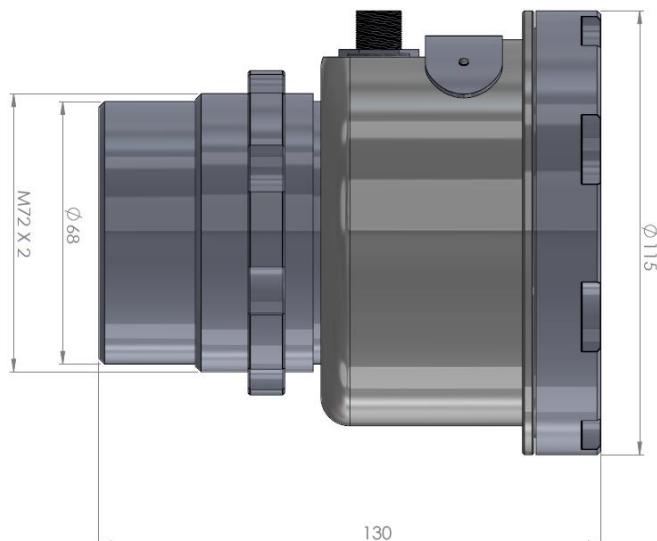
## CANopen SPECIFICATIONS

<b>Communication Profile</b>	CiA 301
<b>Cevaplama Frekansi</b>	100 Hz.
<b>Device Type</b>	CANopen, CiA 301
<b>Node ID</b>	Between 1 and 127, configurable via LSS or SDO.
<b>Baud Rate</b>	10 kBit/s, 20 kBit/s, 50 kBit/s, 100 kBit/s, 125 kBit/s, 250 kBit/s, 500 kBit/s, 800 kBit/s, 1 Mbit/s
<b>PDO Data Rate</b>	100 ms
<b>Error Check</b>	Heartbeat, Emergency Message
<b>PDO</b>	1 Tx PDO
<b>PDO Modes</b>	Event/Time triggered, Synch/Asynch
<b>SDO</b>	1 server
<b>Position data</b>	Object Dictionary 6004
<b>Terminating Resistor</b>	Optional

## RS-232 / RS-485 SPECIFICATIONS

<b>Communication Protocols</b>	ASCII, Modbus RTU, Modbus ASCII
<b>Baud Rate</b>	600, 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600, 115200
<b>Parity</b>	None, Odd, Even
<b>Address</b>	Between 1 and 247

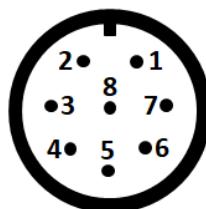
## MECHANICAL DIMENSIONS (in mm)



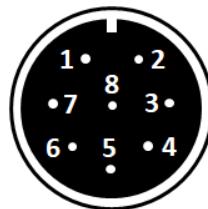
## ELECTRICAL CONNECTIONS

### CN1 (M12 / 8 Pin connector or 8x0,14 mm<sup>2</sup> cable)

Pin No	Signal	Cable Color
1	16..30VDC Supply input	Red
2	GND – 0V	Black
3	Analog Out -	Green
4	Serial Communication (RS232 - Tx) (RS485 - B) (CAN - L)	Blue
5	Serial Communication (RS232 - Rx) (RS485 - A) (CAN - H)	White
6	Analog Out +	Yellow
7	Open Collector Output 1	Grey
8	Open Collector Output 2	Pink



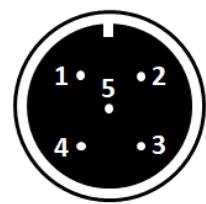
## **M12/8 Pin male socket**



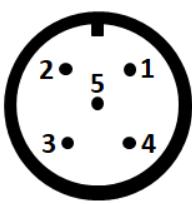
## **M12/8 Pin female socket**

**CN2 (M12 / 5 Pin connector or 5x0,14 mm<sup>2</sup> cable)**

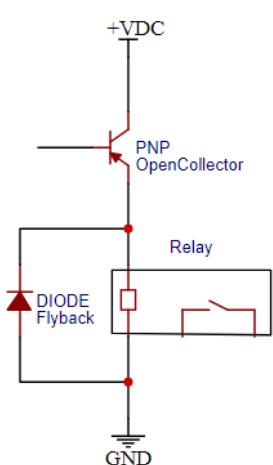
Pin No	Signal	Cable Color
1	16..30VDC Supply input	Red
2	GND – 0V	Black
3	Analog Out +	Yellow
4	Analog Out -	Green
5	N/C	Pink



### M12/5 Pin female socket



### M12/5 Pin male socket

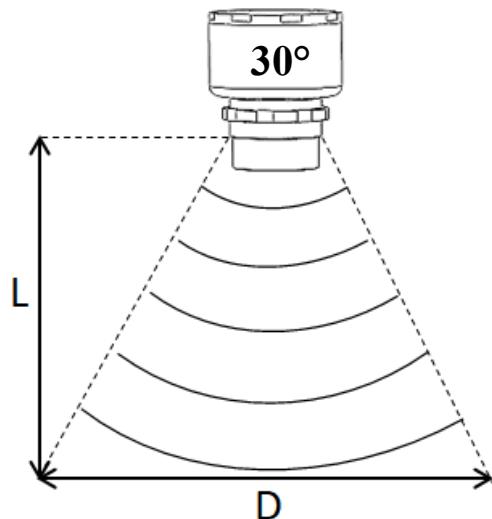


## PNP Open Collector Output Schematic

## MECHANICAL MOUNTING

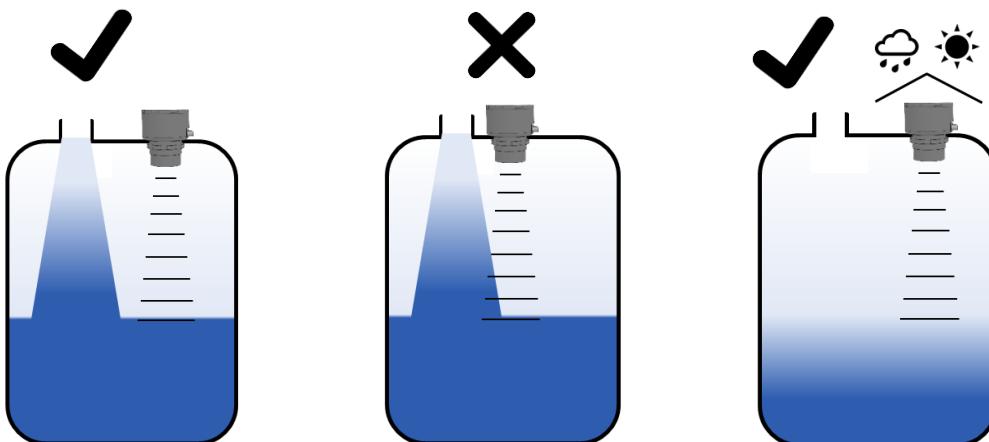
### Measurement Distance and Diameter

	OPTIMUM	MINIMUM
L	D	
1m	60 cm	60 cm
2m	120 cm	80 cm
3m	180 cm	100 cm
4m	240 cm	110 cm
5m	300 cm	120 cm
6m	360 cm	140 cm
7m	420 cm	160 cm
8m	480 cm	180 cm
9m	540 cm	200 cm

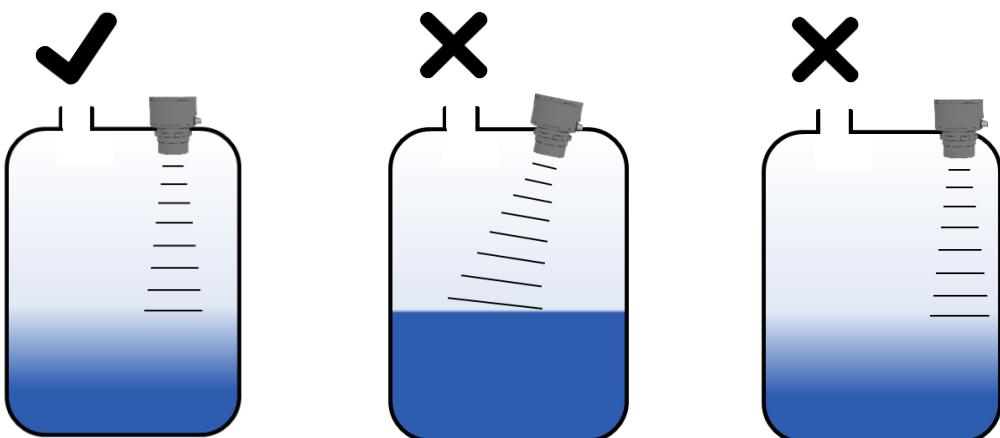


L indicates the mounting height and there should be no obstacle which blocks signals in D width. These values are optimally included in the table above. If optimum dimensions are not followed, level measurement is made, but measurement accuracy decreases. If it is not possible to install in optimum dimensions, the minimum dimensions must be followed.

### Mounting Warnings



- For level measurement, the sensor must not be installed near the tank input.
- It is recommended that the sensor be protected against sun and rain.



- The sensor must be installed perpendicular to the surface to be measured and should not be placed close to the side surface.

## ORDER CODE

<b>Model</b>	<b>Measuring Distance</b>		<b>Digital Output</b>		<b>Electrical Connection (*)</b>		
	9: 9 meters		<b>No code:</b> No digital output <b>C:</b> CANopen <b>S1:</b> RS-232 <b>S2:</b> RS-485		<b>S14M:</b> M12/8 pin male <b>S13M:</b> M12/5 pin male <b>S13F:</b> M12/5 pin female <b>1M:</b> 1 meter cable (*optional others)		
<b>ULS</b>	<b>X</b>	<b>X</b>	<b>XX</b>	<b>XX</b>	<b>XXX</b>	<b>XXX</b>	<b>XXXX</b>
<b>Housing Material</b>	<b>Analog Output</b>		<b>Switch Output</b>		<b>Protection Class</b>		
<b>D:</b> Delrin	<b>No code:</b> No analog output <b>V0:</b> 0-10 V <b>V1:</b> 0-5 V <b>V3:</b> 0.5-4.5 V <b>A0:</b> 0-20 mA <b>A4:</b> 4-20 mA		<b>No code:</b> No switch output <b>OCP:</b> 2 x PNP open collector		<b>No code:</b> IP65 (transparent cover) <b>IP67:</b> IP67 (aluminum cover)		

\* The product can be requested with cable or connector. In models with socket; S13M or S13F code socket should be selected only when product with analog output is desired. If different outputs are desired in addition to analog output, S14M code socket should be selected.

## OPTIONAL PRODUCTS

Product	Code	Description
A black cylindrical M12/8 pin female socket with a grey protective cap.	S14F	M12/8 pin female socket (IP67) (For connection with M12/8 pin male socket on the sensor)
A black cylindrical M12/5 pin male socket with a grey protective cap.	S13M	M12/5 pin male socket (IP67) (For connection with M12/5 pin female socket on the sensor)
A black cylindrical M12/8 pin female socket with a grey protective cap, attached to a black cable.	CB8 XM / S14F	X meters 8x0,14 mm <sup>2</sup> extension cable + M12/8 pin female socket (IP67) X = Max. 50 meters
A black cylindrical M12/5 pin male socket with a grey protective cap, attached to a black cable.	CB5 XM / S13M	X meters 5x0,14 mm <sup>2</sup> extension cable + M12/5 pin male socket (IP67) X = Max. 50 meters

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