

# ULTRASONIC

## Distance and Proximity Sensors



### Series UFA-150, UFA-200

#### Key-Features:

- Very small blind range, narrow detection beam
- Measuring range 0 to 150 mm and 20 to 200 mm
- Distance sensor or 1 point proximity switch
- Teachable measurement range
- Linearity <1% of full scale
- Resolution approx. 0.5 mm
- Working temperature -25 to +70 °C
- Measurement is independent of the targets material, surface, colour or transparency
- Protection class IP67
- Special sensors with very small sound cone and chemically resistant

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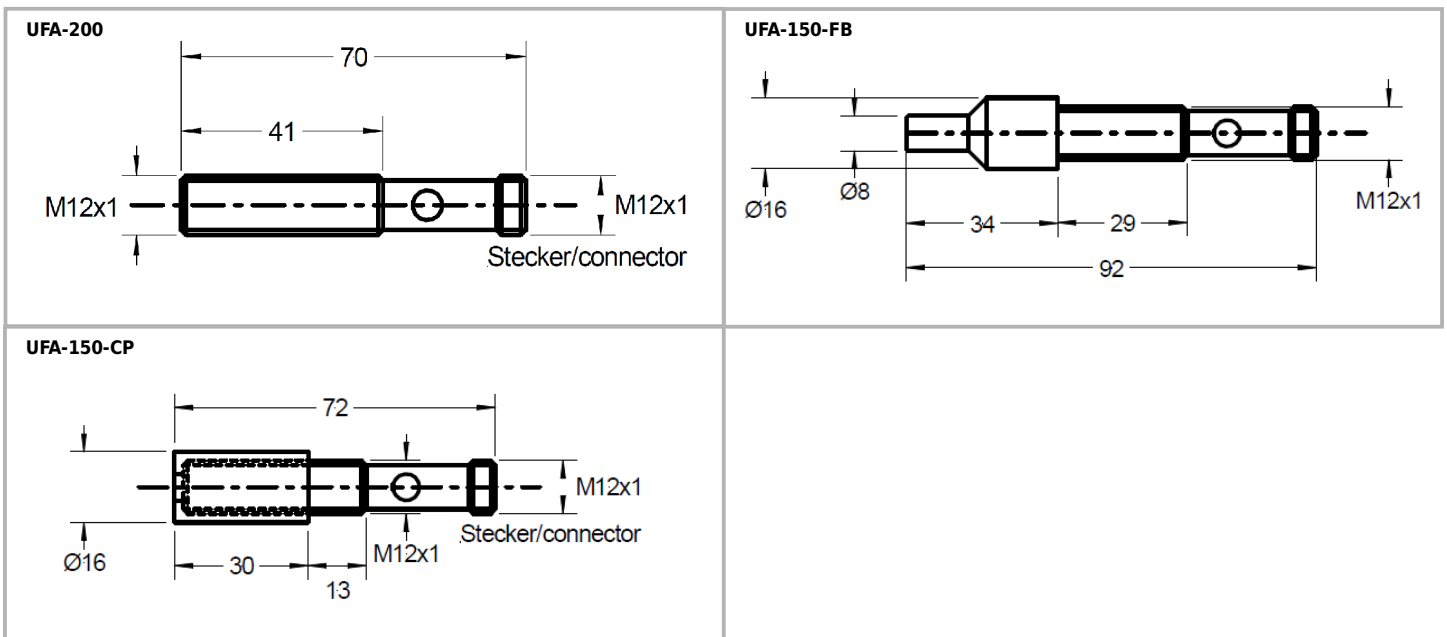
## MODEL NAMES

	Analog Output		Proximity switch
	Current output 4...20 mA	Voltage output 0...10 V	
<b>Standard</b>	UFA-200-TOR-24-CI	UFA-200-TOR-24-CU	UFA-200-TVPA-24C
<b>With focusing device for narrow sound cone</b>	UFA-150-FB-TOR-24-CI	UFA-150-FB-TOR-24-CU	UFA-150-FB-TVPA-24C
<b>Chemically resistant version (PVDF)</b>	UFA-150-CP-TOR-24-CI	UFA-150-CP-TOR-24-CU	UFA-150-CP-TVPA-24C

## TECHNICAL DATA

		Analog Output	Proximity switch
Measurement range UFA-200	[mm]	20 to 200	20 to 200
Measurement range UFA-150-FB	[mm]	0 to 150	0 to 150
Measurement range UFA-150-CP	[mm]	20 to 150	20 to 150
Hysteresis switching point, axial	[%]	-	≤1
Linearity	[% FS]	<1	-
Repeatability	[% FS]	approx. 0.5	
Temperature error	[% FS]	≤1.5	
Operating frequency	[Hz]	approx. 400	
Status indicator		LED yellow / red	
Switching output, reversal polarity protection, load max. 0.1 A		-	PNP NO / NC
Switching speed, max.	[Hz]	-	13
t switching output	[ms]	-	ca. 30
Analog output UFA...CU	[V]	0...10 (R <sub>min</sub> 1 kOhm)	-
Analog output UFA...CI	[mA]	4...20 (R <sub>max</sub> 300 Ohm)	-
Voltage supply (reverse polarity protection)	[VDC]	10...30, except UFA-150/200...CU: 15...30	
Ripple of supply voltage	[%]	10	
Mean current consumption	[mA]	approx. 30	
Temperature range	[°C]	-25...+75	
Protection class		IP67	
Weight	[g]	approx. 25	
Housing material		Nickel-plated brass	
Electrical connection		M12 connector, 4-pole	

## TECHNICAL DRAWING



## !! WARNING - SAFETY INFORMATION !!

These products are neither allowed to be used as safety- or emergency shut-off devices, nor in other applications, where a malfunction of this product may result in personal injury. Failure to follow this notice may result in serious or fatal injury.

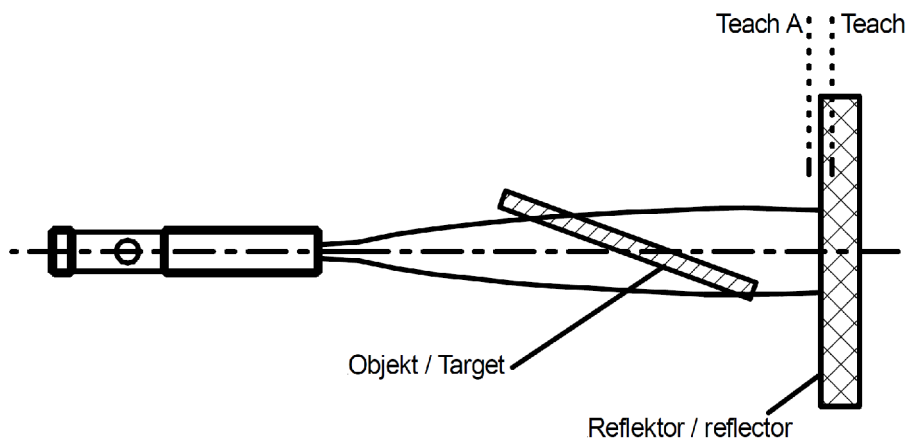
## SETTING OF THE SWITCHING POINTS (UFA...-TVPA-24C)

The switching points are set by connecting the teach wire with either the power supply  $-U_B$  (0 V) or  $+U_B$  (+24 VDC). The voltage must be active for at least 1 s on the teach wire. During teaching the LED shows if the sensor has detected the object.

<p><b>Window operation (closer):</b></p> <ul style="list-style-type: none"> <li>• Place the object to the near switching point</li> <li>• Teach switching point with <math>-U_B</math></li> <li>• Place the object to the far switching point</li> <li>• Teach switching point with <math>+U_B</math></li> </ul>	<p><b>Window operation (opener):</b></p> <ul style="list-style-type: none"> <li>• Place the object to the near switching point</li> <li>• Teach switching point with <math>+U_B</math></li> <li>• Place the object to the far switching point</li> <li>• Teach switching point with <math>-U_B</math></li> </ul>
<p><b>Switching point (closer):</b></p> <ul style="list-style-type: none"> <li>• Place the object to the switching point</li> <li>• Teach switching point with <math>+U_B</math></li> <li>• Cover the sensor diaphragm by hand or let the sensor look into the void</li> <li>• Teach with <math>-U_B</math></li> </ul>	<p><b>Switching point (opener):</b></p> <ul style="list-style-type: none"> <li>• Place the object to the switching point</li> <li>• Teach switching point with <math>-U_B</math></li> <li>• Cover the sensor diaphragm by hand or let the sensor look into the void</li> <li>• Teach with <math>+U_B</math></li> </ul>

## APPLICATION HINT WINDOW OPERATION (UFA...TVPA-24C)

In window operation the sensor detects only targets which are within the window limits. The same function can also be used to simulate a kind of retro-reflective sensor. The reflector is mounted in the small window between Teach A and Teach B (see drawing below). In such setup the sensor detects also targets which pass the sensor beam in a very flat angle. The sensor would not detect such targets in normal scan operation mode.



## SETTING THE MEASURING LIMITS (ANALOGUE OUTPUT)

The two measuring limits are set by connecting the teach wire with either the power supply  $-U_B$  (0 V) or  $+U_B$  (+24 VDC). The voltage must be active for at least 1 s on the teach wire. During teaching the LED shows if the sensor has detected the object. With  $-U_B$  the lower measuring limit (0 V or 4 mA) and with  $+U_B$  the upper measuring limit (10 V or 20 mA) is taught. Thus it is possible to teach a rising or a falling ramp.

- Place the object to the lower measuring limit (where 0 V or 4 mA is expected)
- Teach lower measuring limit with  $-U_B$
- Place the object to the upper measuring limit (where 10 v or 20 mA is expected)
- Teach upper measuring limit with  $+U_B$

Lower and upper measuring limits can also be programmed individually later.

**Attention:** The teach wire must not be connected during normal operation. The sensor can e. g. be operated after teaching with a 3 wire cable.

	LED red	LED yellow
During teach-in:		
- Object detected	off	blinking
- No object detected	blinking	off
- Object not reliably detected	on	off
Normal operation PNP	off	switching status
Normal operation analogue	off	on
Error	on	last status

## VERSION WITH FOCUSING DEVICE UFA-150-FB

### Key Features

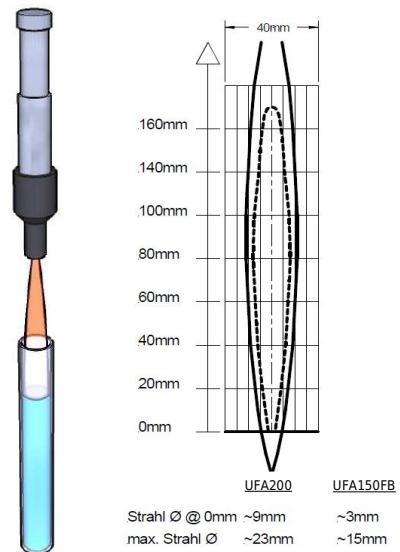
- very narrow detection beam
- particularly for level measurement in narrow cavities
- no blind range
- measuring range up to 150 mm
- Teach-In
- Binary or analogue outputs

### Description:

The ultrasonic sensors series UFA-150-FB (FOCUS Beam) are equipped with a focusing device made of glass-fibre reinforced polypropylene, which makes the sound beam particularly narrow. Therefore they are suitable in the near range from 0 mm up to 150 mm to watch into narrow cavities. A typical application is measuring of liquid level in small tubes or containers.

With a little distance between sensor and tube, and depending on the measuring height, levels can be measured in tubes which only have a few mm diameter. In very narrow set ups, only a test can verify the feasibility of measurement.

Technical data see page 2.



## CHEMICAL-RESISTANT VERSION UFA-150-CP

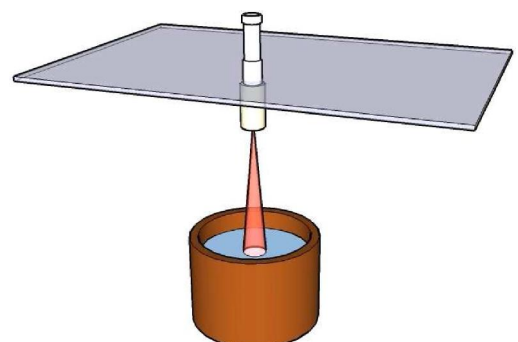
### Key Features

- chemically resistant version (PVDF)
- diaphragm PTFE coated
- front resistant against most chemicals
- measuring range up to 150 mm
- Teach-In
- binary or analogue outputs

### Description:

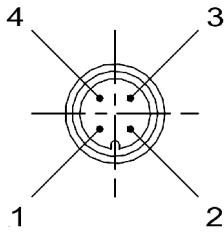
The diaphragm of the series UFA-150-CP (Chemical Protection) is coated with a thin PTFE foil. The head made of chemically resistant PVDF serves as mechanical fixation for the foil and protection of the sensor's front part. Thus the front part of the ultrasonic sensor becomes resistant to most chemicals.

Technical data see page 2.



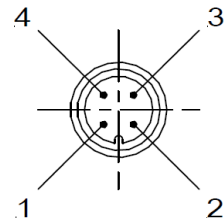
## ELECTRICAL CONNECTION

### PIN-assignment UFA-...-TOR-24-CU



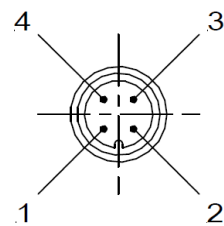
- 1 +24 VDC
- 2 Teach-In
- 3 0 V
- 4 OUT 0...10 V

### PIN-assignment UFA-...-TVPA-24-C



- 1 +24 VDC
- 2 Teach-In
- 3 0 V
- 4 OUT PNP

### PIN-assignment UFA-...-TOR-24-CI



- 1 +24 VDC
- 2 Teach-In
- 3 0 V
- 4 OUT 4...20 mA

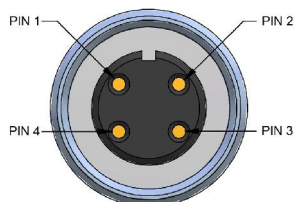
The sensors feature a 4-pole M12 connector. The cables should never be mounted parallel or close to high current cables. Please order the necessary cables separately (see accessories).

## ACCESSORIES

### Cable with connector M12, 4 poles, shielded

K4P2M-S-M12	2 m, connector straight
K4P5M-S-M12	5 m, connector straight
K4P10M-S-M12	10 m, connector straight
K4P2M-SW-M12	2 m, connector angular
K4P5M-SW-M12	5 m, connector angular
K4P10M-SW-M12	10 m, connector angular

PIN No.	cable colour	PIN No.	cable colour
Pin 1	brown	Pin 3	blue
Pin 2	white	Pin 4	black



### Mating connector M12, 4-pole (for self assembly), shielded

Connector M12 straight	D4-G-M12-S
Connector M12 angular	D4-W-M12-S
Protection class	IP67
Cable passage	ø 4...8 mm
Temperature range	-25...+90 °C
Wire cross section	0.14...0.34 mm <sup>2</sup>
Mode of connection	Spring cage
Special feature	excellent resistance against chemicals and oil



