Special miniature ultrasonic distance and proximity sensors
UPS FB und UPS CP Series

UPS 150 FB …

- Very narrow detection beam (FOCUS Beam)
- Particularly for level measurement in narrow cavities
- No blind range
- Measuring range up to 150mm
- Teach-In
- Binary or analogue outputs

UPS 150 CP …

- Chemically resistant version (PVDF)
- Diaphragm PTFE coated
- Front resistant to most chemicals
- Measuring range up to 150mm
- Teach-In
- Binary or analogue outputs

Technical data		**UPS 150 … TVPA 24 C**	**UPS 150 ... TOR 24 CA**	**UPS 150 ... TOR 24 CI**
Detection range	mm		0 or 20...150	
Hysteresis of switching point	%	≤1	-	-
Linearity of analogue output	%FS	-	<1	<1
Reproducability	%FS	<0.5	<0.5	<0.5
Temperature error	%FS	≤1.5	≤1.5	≤1.5
Operating frequency	kHz		~400	
Status indicator	-		LED yellow/red	
Binary output, short circuit protection	-	PNP NO/NC max. 0.1A	-	-
Switching speed max.	Hz	13	-	-
t_{on} binary output	ms	~30	-	-
Analogue output in detection range		-		
R_L min. 1kΩ with V output	V		0...10	
R_L max. 300Ω with mA output	mA			4...20
Power supply (reversal polarity protection)	VDC	10...30	15...30	10...30
Power supply ripple	%		10	
Mean consumption, switched wo. load	mA		~30	
Ambient temperature during operation	°C		-25...+70	
Mass	g		25	
Protection class	-		IP65	
Housing material	-		nickel plated brass, PVDF or PP	
Electrical connection	-		connector M12, 4-pin	

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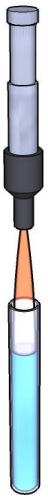
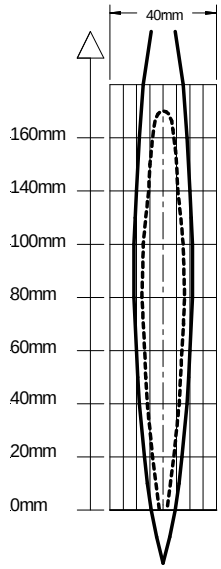
Description

UPS 150 FB ...

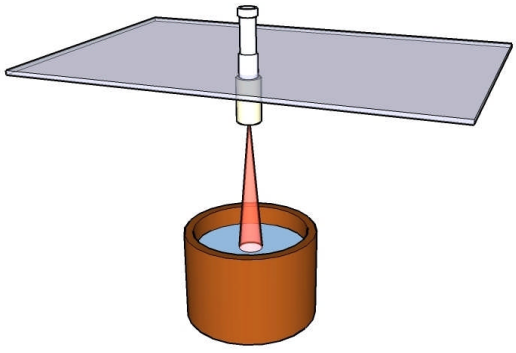




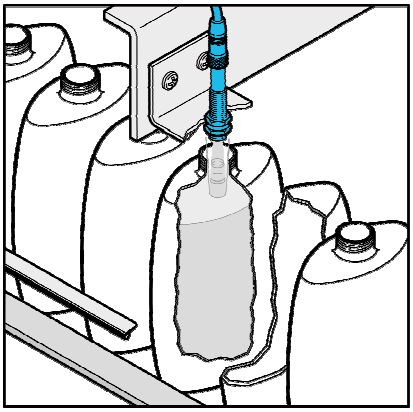
	UPS 200	UPS 150 FB
beam Ø @ 0mm	~9mm	~3mm
max. beam Ø	~23mm	~15mm

The ultrasonic sensors series UPS 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 0mm up to 150mm to watch into narrow cavities. A typical application is measuring of liquid level in small tubes or containers.
With little distance between sensor and tube and, depending on the measuring height, levels can be measured in tubes which have only few mm diameter. In very narrow setups, only a test can verify the feasibility of measurement.

UPS 150 CP ...
The diaphragm of the series UPS 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 front part. Thus the front part of the ultrasonic sensor becomes resistant to most chemicals.



All UPS sensors are available as pure proximity switches and distance sensors with analogue outputs in V or mA as well. The switching and/or measuring distances are trained by means of Teach-in. Optionally a Teach-in box is available



Model selection

The UPS versions have different outputs.

UPS 150 ... TVPA 24 C
Ultrasonic sensor with a binary output with 2 teachable switching points (NO, NC or window function).

UPS 150 ... TOR 24 CA
Ultrasonic sensor for distance measurement with an analogue output 0...10V. The lower and upper limits are teachable.

UPS 150 ... TOR 24 CI
Ultrasonic sensor for distance measurement with an analogue output 4...20mA. The lower and upper limits are teachable.

Setting of the switching points (UPS 150 ... TVPA 24 C)

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

Window operation NO
- Place the object to the near switching point
- Teach switching point with $-U_B$
- Place the object to the far switching point
- Teach switching point with $+U_B$

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Window operation NC

- Place the object to the near switching point
- Teach switching point with $+U_B$
- Place the object to the far switching point
- Teach switching point with $-U_B$

Switching point NO

- Place the object to the switching point
- Teach switching point with $+U_B$
- Cover the sensor diaphragm by hand or let the sensor look into the void
- Teach with $-U_B$

Switching point NC

- Place the object to the switching point
- Teach switching point with $-U_B$
- Cover the sensor diaphragm by hand or let the sensor look into the void
- Teach with $+U_B$

Setting the measuring limits (UPS 150 … TOR 24 CA/I)

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

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

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

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

Mounting

The sensor can be mounted with the two M12 nuts (HEX 17) which are scope of delivery.

Inclination angle of object

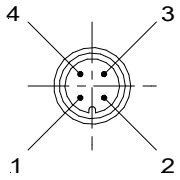
Smooth surfaces can be detected up to an inclination angle of approx. 10°. However rough and structured (granular) surfaces can be detected up to much higher angles.

Cable

The sensors have an M12 4-pin connector for screw mounting. The cable should not be mounted parallel or close to high current cables. Cables have to be ordered separately.

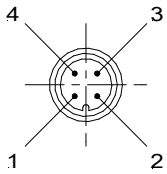
Electrical connections (view to the sensor)

UPS 150 ... TVPA 24 C



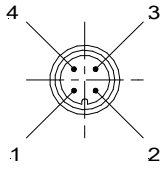
1 +24VDC (braun/brown)
2 Teach (weiss/white)
3 0V (blau/blue)
4 OUT PNP (schwarz/black)

UPS 150 ... TOR 24 CA



1 +24VDC (braun/brown)
2 Teach (weiss/white)
3 0V (blau/blue)
4 OUT 0...10V (schwarz/black)

UPS 150 ... TOR 24 CI



1 +24VDC (braun/brown)
2 Teach (weiss/white)
3 0V (blau/blue)
4 OUT 4...20mA (schwarz/black)

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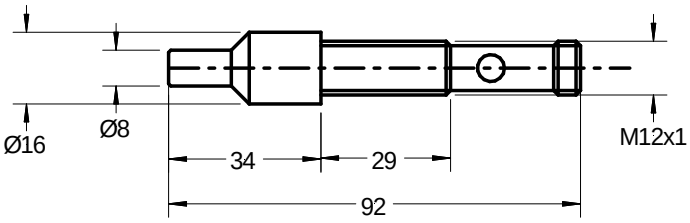
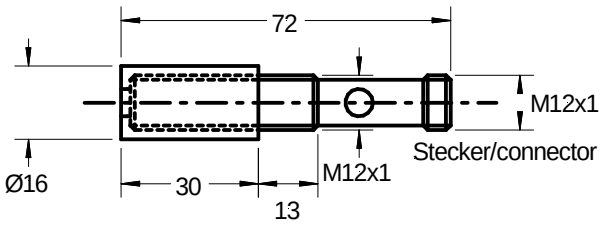
Dimensions



UPS 150 FB ...

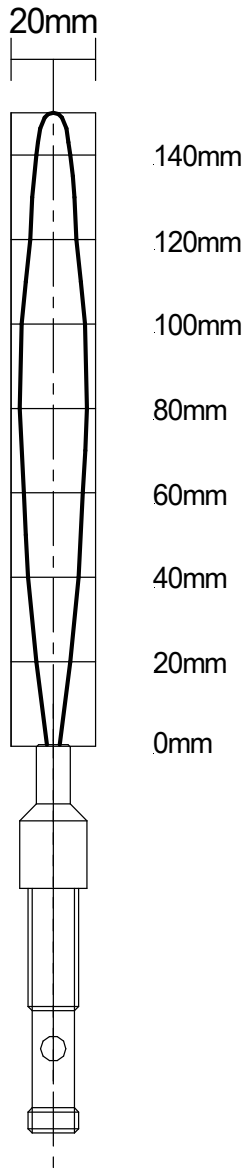


UPS 150 CP ...

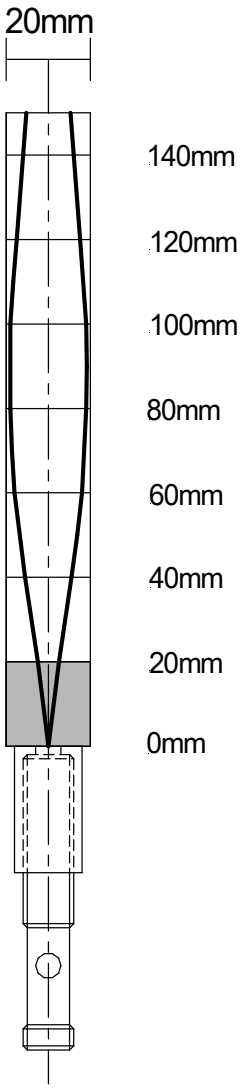
Detection beams

The detection beam of an ultrasonic sensor has the shape of a cone. The size depends on the target and its sound reflecting characteristics. Small and more badly reflecting objects result in a smaller cone (narrower and shorter). Bigger objects and those with surfaces which are not perpendicular to the central axis can expand the cone. The exact cone shape and size can be determined only at the object itself. No disturbing objects must be between the sensor and the target within the cone. Otherwise the sensor would detect the disturbing object instead of the desired target. Furthermore the size of the detection beam is influenced by air temperature and humidity. The colder and dryer the air, the larger is the beam.

The typical detection beams for the sensors UPS FB und UPS CP are shown on the right side.



UPS 150 FB ...



UPS 150 CP ...

Accessories (see also data sheet ‚ACC')

PUR cable 3-wire with M12 connector:
l=2m Type KAB 2L3VGPUR

PUR cable 4-wire with M12 connector:
l=2m Type KAB 2L4VGPUR

Teach-In box: see separate data sheet

Scope of delivery

- Sensor
- 2 M12 nuts

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