

INSTALLATION GUIDE

Ultrasonic Sensors Series UFA-150, UFA-200

For further information please see the data sheet at www.waycon.biz/products/ultrasonic-sensors/

FIRST STEPS

WayCon Positionsmesstechnik GmbH would like to thank you for the trust you have placed in us and our products. This manual will make you familiar with the installation and operation of our ultrasonic sensors. Please read this manual carefully before initial operation!

Unpacking and checking:

Carefully lift the device out of the box by grabbing the housing. After unpacking the device, check it for any visible damage as a result of rough handling during the shipment. Check the delivery for completeness. If necessary consult the transportation company, or contact WayCon directly.

MOUNTING THE SENSOR

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

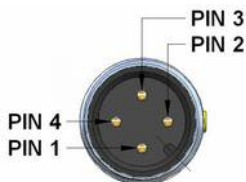
Ultrasonic sensors may be installed in any position, as long as depositions like dust, spray mist, or condensing humidity are avoided on the sound active membrane.

In case several ultrasonic sensors are used in one application, it is important to leave sufficient distance between them. Otherwise the sensors may interact which leads to false measurement values.

By using a sound deflection angle the sound beam can be redirected, at the expense of the sensor's maximum measurement range. A plain and hard surface should be used for the deflection of the sound beam. Redirecting the sound beam with multiple sound deflection angles should be avoided.

ELECTRICAL CONNECTION

Function	Connector M12
+24 V	Pin 1
Teach-In	Pin 2
0 V	Pin 3
Analog / OUT PNP	Pin 4



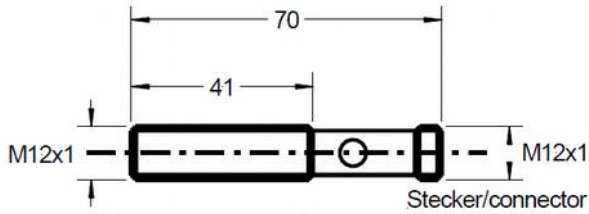
INSTALLATION GUIDE

Ultrasonic Sensors Series UFA-150, UFA-200

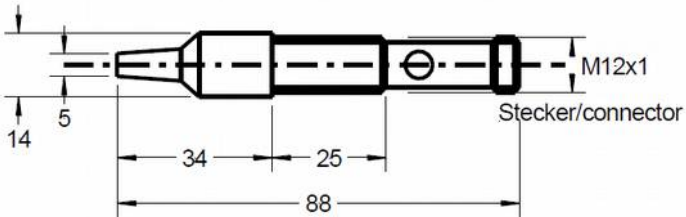
For further information please see the data sheet at www.waycon.biz/products/ultrasonic-sensors/

TECHNICAL DRAWING

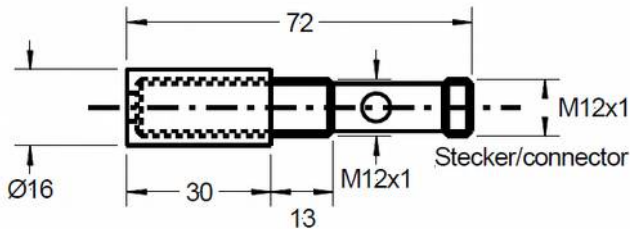
UFA-200



UFA-150-FB



UFA-150-CP



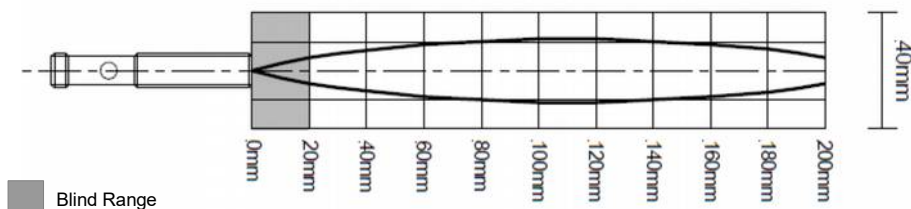


SOUND CONE GEOMETRY

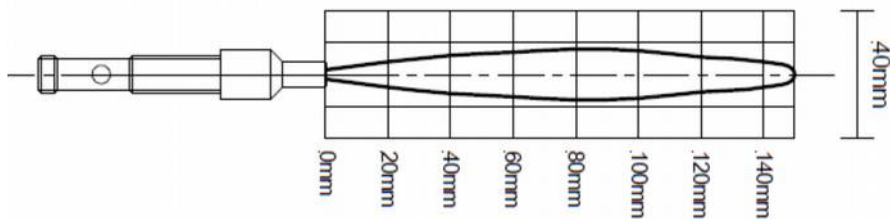
The exact geometry of the sound cone depends on the air-pressure, temperature, humidity and the size of the target.

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

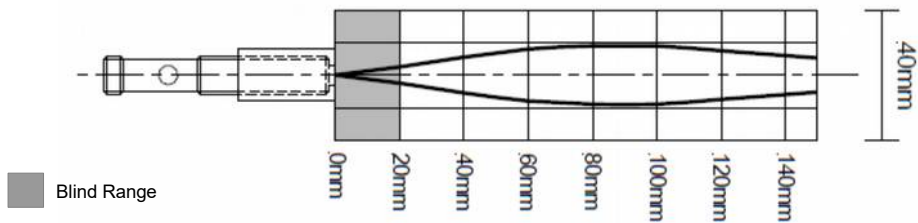
UFA-200



UFA-150-FB



UFA-150-CP



TEACH-IN GUIDE

Ultrasonic Sensors Series UFA-150, UFA-200

For further information please see the data sheet at www.waycon.biz/products/ultrasonic-sensors/

ANALOG OUTPUT

UFA...CU / CI

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 $+U_B$

Upper and lower measuring limits can be reprogrammed at any time.

Attention: The teach wire must not be connected during normal operation. The sensor can therefore 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



SWITCHING OUTPUT

UFA...C

The switching points are set by connecting the teach wire (PIN 2) 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.

Window operation closer NO:

- Set target to near switching point
- Teach switching point with $-U_B$
- Set target to far switching point
- Teach switching point with $+U_B$

Window operation opener NC:

- Set target to near switching point
- Teach switching target at with $+U_B$
- Set target to far switching point
- Teach switching point with $-U_B$

Switching point closer NO:

- Set target to switching point
- Teach switching point with $+U_B$
- Point sensor at space (>1.5 m)
- Teach with $-U_B$

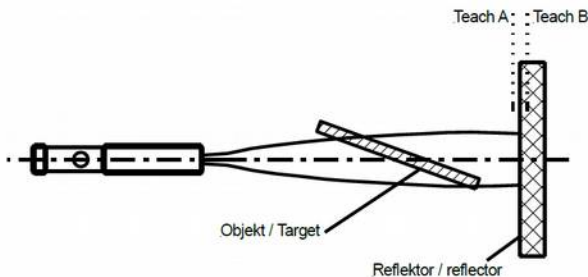
Switching point opener NC:

- Set target to switching point
- Teach switching point with $-U_B$
- Point sensor at space (>1.5 m)
- Teach with $+U_B$

RETROFLECTIVE MODE

UFA...C

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.



TEACH-IN GUIDE

Ultrasonic Sensors Series UFA-150, UFA-200

For further information please see the data sheet at www.waycon.biz/products/ultrasonic-sensors/

VERSION WITH FOCUSING DEVICE

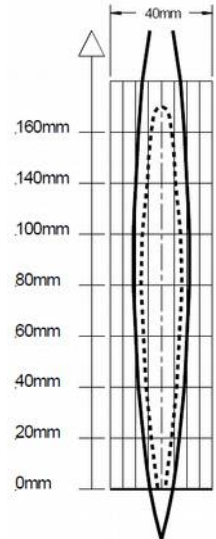
UFA-150-FB

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.



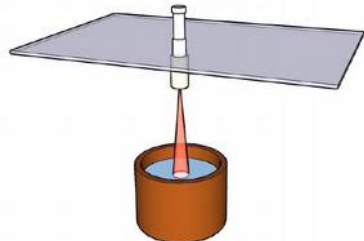
	UFA-150-FB	UFA-200
Sound beam	dashed line	solid line
Beam Ø at 0 mm	ca. 3 mm	ca. 9 mm
Maximum beam Ø	ca. 15 mm	ca. 23 mm



CHEMICAL RESISTANT VERSION

UFA-150-CP

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.





NOTES

Warning

These devices are not designed for critical safety or emergency shut-down purposes. Therefore they should never be used in an application, where a malfunction of the device could cause personal injury.

Environmental Influences

Ultrasonic sensors are made for the use in atmospheric air. Environmental Influences like rain, snow, dust or smoke have no influence on the accuracy of the measurement. However, measurements under pressure (higher than the atmospheric pressure) are not possible with ultrasonic sensors.

Strong wind or air turbulences may lead to instability in measurement values. A flow speed up to a few m/s is unproblematic and will have no influence on the sensor's accuracy.

Target Influences

Liquids

are excellently detectable with ultra sound. A classic application for ultrasonic sensors is level measurement. The sound beam axis however must have a maximum deviation of 3° vertically to the liquid level (no strong waves), otherwise the reflected sound will miss the sensor.

Hot Targets

with high temperatures cause a thermal convection in the surrounding air. For this reason the sound beam may be strongly diverted vertically to it's axis, so that the echo is weakened, or can no longer be received at all.

For convex (cylindrical and spherical) surfaces,

every area element has a different angle to the sound cone's axis. The reflected cone thus diverges and the portion of the sound energy reflected to the receiver is reduced correspondingly. The maximum range decreases with the decreasing size of the cylinder (ball).

The roughness and surface structures of the object

to be detected also determine the scanning capacities of the ultrasonic sensors. Surface structures that are larger than the ultrasound wavelength, as well as coarse-grained bulk materials, reflect ultrasound in a scattered manner, and are not detected optimally by the sensor under these conditions.

Hard material

reflects almost all of the impulse energy from ultrasound applications in a way that makes them very easy to detect with ultrasound.

Soft material,

on the other hand, absorbs almost all of the impulse energy. It is thus harder to detect with ultrasound. These materials include felt, cotton, coarse meshes, foam, etc.

Thin-walled foils

behave like soft materials. To be able to use ultrasound, the foil thickness should be at least 0.01 mm.



ACCESSORIES

Cable with mating connector M12, 4 pole, shielded

K4P2M-S-M12	2 m, straight connector, IP67
K4P5M-S-M12	5 m, straight connector, IP67
K4P10M-S-M12	10 m, straight connector, IP67
K4P2M-SW-M12	2 m, angular connector, IP67
K4P5M-SW-M12	5 m, angular connector, IP67
K4P10M-SW-M12	10 m, angular connector, IP67



PIN Cable colour

1	brown
2	white
3	blue
4	black

DECLARATION OF EC-CONFORMITY

Based on: EN 60947-5-2 + amendments (proximity switches)
EN 60947-5-7 + amendments (proximity sensors with analogue output)

This is to certify that the following products correspond to the mentioned specifications.

Classification: Ultrasonic Sensors
Series: UFA-150, UFA-200

Test on immunity: IEC 61000-6-2 (Industry)

Type of test: applied harmonized standards:
EN 61000-4-2, EN 61000-4-3, EN 61000-4-4

The declaration of conformity loses its validity if the product is misused or modified without proper authorisation.

Taufkirchen, 13.03.2013

Andreas Träger
CEO