INSTALLATION GUIDE

Ultrasonic Sensor Series UFA2

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

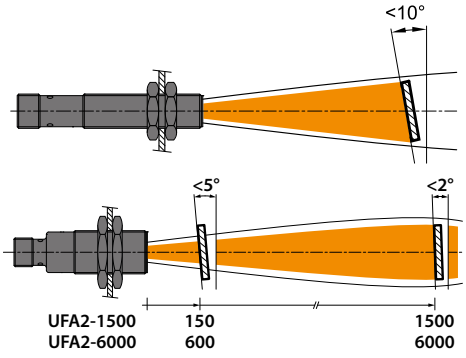
FIRST STEPS

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.

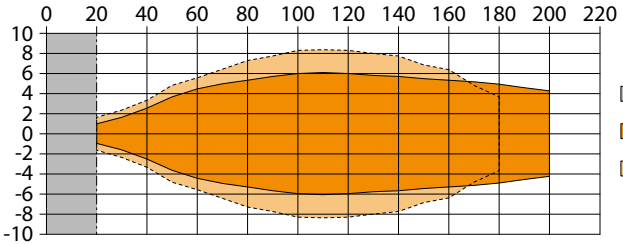
MOUNTING NOTICES

- The sensor can be mounted with the two M12 nuts (UFA2-200), M18 nuts (UFA2-1500) or M30 nuts (UFA2-6000) which are included in the delivery.
- The sensor has to be protected against mechanical loads for example shocks and impacts.
- The sensor can be mounted in any position, however a vibration-free or vibration-dampening assembly must be observed.
- The transducer surface as well as the field of the detection beam must be kept free mandatorily. You need to pay attention on having no disturbing objects between the sensor and the target object within the detection beam. Otherwise the sensor will detect the disturbing object instead of the target object required.
- The object reflects a part of the ultrasonic in the diffuse mode - this reflected sound will be evaluated by the sensor. Objects with a smooth surface are reliably detected up to a tilting angle of approx. 10°. With the UFA2-1500 (respectively UFA2-6000) the permissible angle of inclination is approx. 5° with a scanning range of 150 mm (respectively 600 mm) and approx. 2° with a scanning range of 1500 mm (respectively 6000 mm). The max. allowed tilting angle increases on objects with a rough or heavy structured (granular) surface.



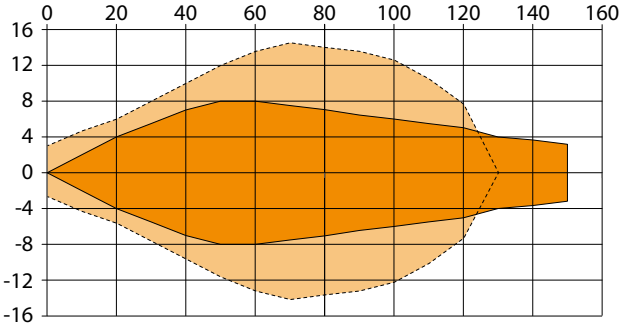
DETECTION BEAMS

UFA2-200



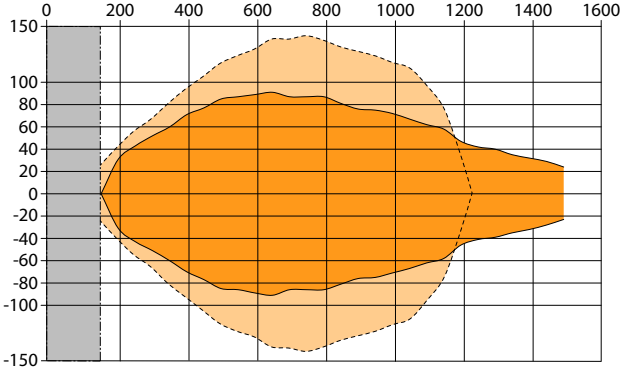
blind range
target: plate 100 x 100 mm
target: round bar Ø 10 mm

UFA2-FB-150: Focus beam Version



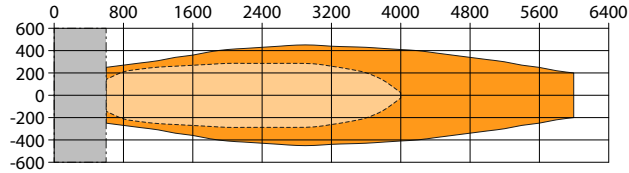
target: plate 20 x 20 mm
target: round bar Ø 10 mm

UFA2-1500



blind range
target: plate 200 x 200 mm
target: round bar Ø 25 mm

UFA2-6000

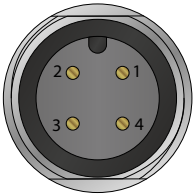


blind range
target: plate 200 x 200 mm
target: round bar Ø 20 mm

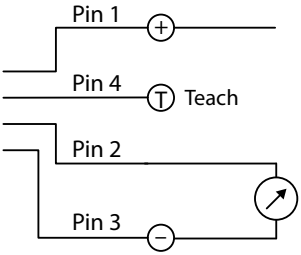
ELECTRICAL CONNECTION

Pin	Analog output	Switching output	Connection cable K4P
1	+V	+V	BR
2	Analog output	Teach	WS
3	GND	GND	BL
4	Teach	Switching output	SW

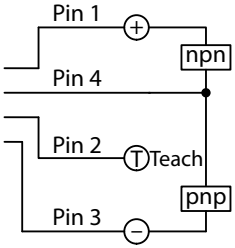
connector M12 (male)



circuit diagram analog output



circuit diagram switching output



TEACHING FUNCTION ANALOG OUTPUT

Teaching the measurement range:
The measuring range is defined by two teach points. The output signal is scaled to the taught measuring range.

Procedure:
1. Place the target on the position of the 1st teach point (i.e. where 0 V or 4 mA should be output).
2. Connect the teaching line (Pin 4) with +V (Pin 1) for 0.1...2 s. LED flashes slowly (1 Hz).
3. Within <20 s, place the target on the position for the 2nd teach point (i.e. where 10 V or 20 mA should be output) and connect the teaching line with +V for 0.1...2 s.
4. LED flashes 2 times: teach procedure successful
   LED flashes 4 times: teach procedure not successful

Changing the analog output signal:
The physical quantity (current/voltage) of the analog output is changed.

Procedure:
1. Connect the teaching line (Pin 4) with +V (Pin 1) for >6 s.
2. LED flashes 2 times: change successful
   LED flashes 4 times: change not successful

TEACHING FUNCTION SWITCHING OUTPUT

Teaching the window size:
The window size is defined by two switching limits.

Procedure:
1. Place the target on the position of near switching point.
2. Connect the teaching line (Pin 2) with +V (Pin 1) for 0.1...2 s. LED flashes slowly (1 Hz).
3. Within <20 s, place the target on the position of the far switching point and connect the teaching line with +V for 0.1...2 s.
4. LED flashes 2 times: teach procedure successful
   LED flashes 4 times: teach procedure not successful

2-step teaching:
Both conditions (background and object) can be taught successively. The switching point is placed between the object and the background.

Procedure:
1. Place the target on the position of near switching point.
2. Connect the teaching line (Pin 2) with +V (Pin 1) for 2...4 s. LED flashes slowly (1 Hz).
3. Within <20 s, remove the target and connect the teaching line with +V for 2...4 s.
4. LED flashes 2 times: teach procedure successful
   LED flashes 4 times: teach procedure not successful

Autoteach procedure:
Opens a teach window for 4...8 s and automatically teaches passing objects. The switching point is placed between the object and the background.

Procedure:
1. Connect the teaching line (Pin 2) with +V (Pin 1) for 4...6 s. LED flashes fast (2 Hz).
2. Within the next 4...8 s, the autoteach procedure detects passing objects.
3. LED flashes 2 times: teach procedure successful
   LED flashes 4 times: teach procedure not successful

Changing the switching function:
Changes between NO <=> NC. Causes a inversion of the switching output function (signal inversion on objects within / outside the window).

Procedure:
1. Connect the teaching line (Pin 2) with +V (Pin 1) for >6 s.
2. LED flashes 2 times: change successful
   LED flashes 4 times: change not successful

INFLUENCES ON THE MEASUREMENT

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 that the atmospheric pressure) are not possible with ultrasound 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 ultrasound. 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 its 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.

SAFETY NOTICES

- 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.

DECLARATION OF 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	UFA2
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, 21.12.2021

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