

INSTALLATION GUIDE

Ultrasonic Sensors Series UPT

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

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.

It is important to avoid structure-borne sound bridges between the sensor and it's holder.

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

UPT with Analog Output

Pin 1 +24 V

Pin 3 0 V

Pin 4 Analog Output

Pin 5 Hold / Sync.

UPT with Switching Output

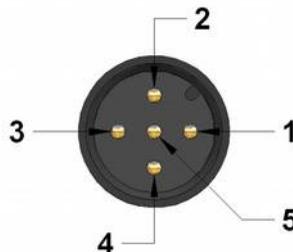
Pin 1 +24 V

Pin 2 Switching Point P2

Pin 3 0 V

Pin 4 Switching Point P1

Pin 5 Hold / Sync.



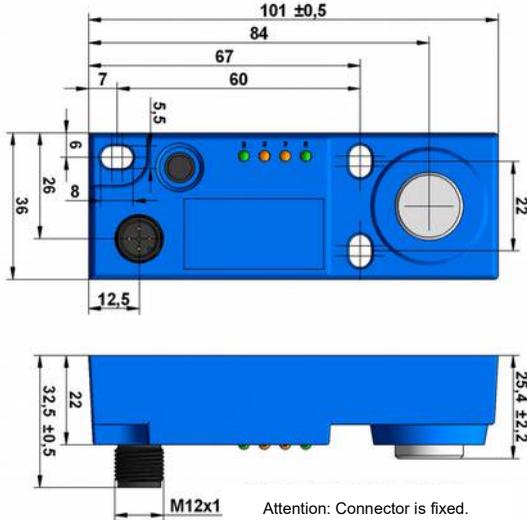
INSTALLATION GUIDE

Ultrasonic Sensors Series UPT

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

TECHNICAL DRAWING

UPT



Attention: Connector is fixed.
Do not turn.

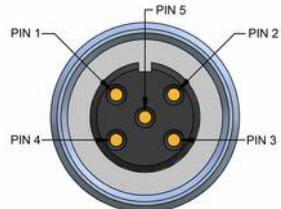
ACCESSORIES

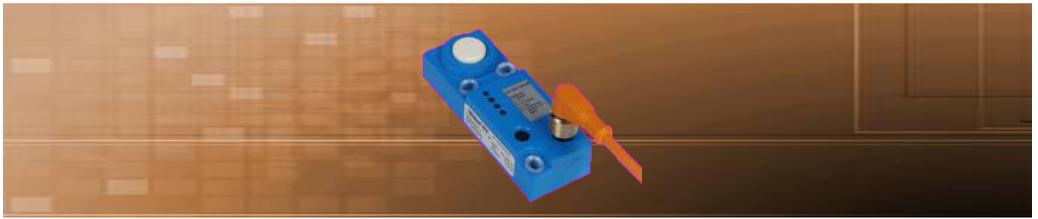
Cable with M12 connector, 5-pole, shielded, IP67

K5P2M-S-M12	2 m, straight connector
K5P5M-S-M12	5 m, straight connector
K5P10M-S-M12	10 m, straight connector
K5P2M-SW-M12	2 m, angular connector
K5P5M-SW-M12	5 m, angular connector
K5P10M-SW-M12	10 m, angular connector

PIN Cable colour

1	brown
2	white
3	blue
4	black
5	grey

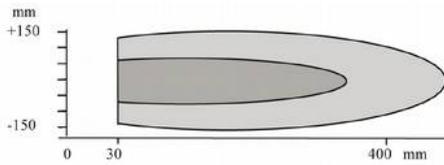




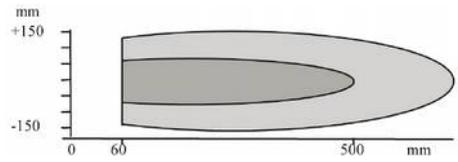
SOUND CONE GEOMETRY

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

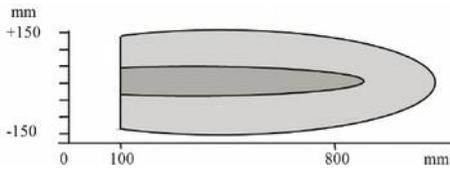
UPT-400



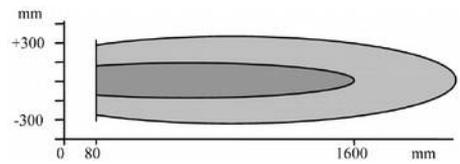
UPT-500



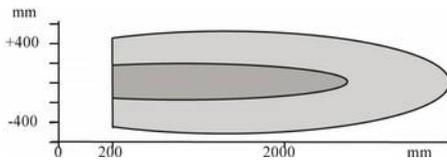
UPT-800



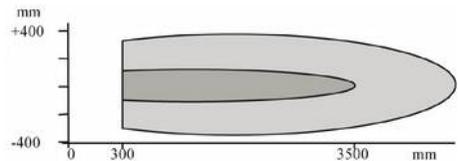
UPT-1600



UPT-2000



UPT-3500



Guaranteed detection of a target
100 x 100 mm²



Possible detection of a large
target



TEACH-IN GUIDE

Ultrasonic Sensors Series UPT

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

INTRODUCTION

Sensor with analog output:

Every sensor is delivered with the factory set-up (max. measuring range). The teach-in feature is designed to choose a smaller range within the nominal measuring range for optimizing the resolution and linearity. Output current, or output voltage adapt to the new range and get new characteristic curves. The two positions P1 and P2 must be taught.

Sensor with switching output:

The teaching procedure is used to set the operation mode of the switching output and the 2 switching points.

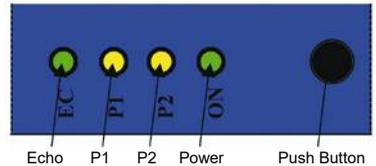
TEACH-IN ELEMENTS

UPT with analog output:

The Echo LED is ON when an echo is received (this is the alignment LED confirming that the target is properly aligned). One of the yellow LEDs is ON, if the object is not between P1 and P2.

UPT with switching output:

The Echo LED is ON when an echo is received (alignment LED). P1 and P2 LEDs are indicating the status of the switching outputs. ON LED shows that sensor is connected to power supply.

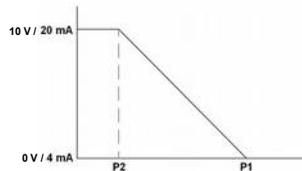
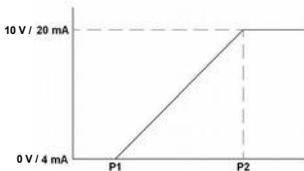


TEACHING THE ANALOG OUTPUT

Characteristics

P1 and P2 define the analog output slope.

P1 determines the 0 V / 4 mA position and P2 the 10V / 20 mA position.





TEACHING THE ANALOG OUTPUT

Teach In of P1 position (0 V / 4 mA output):

Press push-button around 6 seconds until the LEDs P1 and Echo are blinking simultaneously (blinking rate will be 2 Hz): sensor is now in Teach In mode for P1: LED P1 changes the blinking to 1 Hz and the Echo LED returns to normal function to show if the target is properly aligned.

There is a time window of 30 seconds to teach the P1 position.

Place the target at the right distance P1. Press push-button shortly: P1 is now programmed. The sensor returns to normal function with the new value for P1.

Teach In of P2 position (10V / 20 mA output)

Press push-button around 15 seconds until LEDs P2 and Echo start blinking simultaneously (blinking rate will be 2 Hz). It is important to note that before reaching the P2 teach in mode, P1 LED will be blinking for few seconds before reaching P2. After 6 seconds the LEDs P1 and Echo will be blinking, however after an additional 9 seconds P2 LED and Echo LED will be blinking with a 2 Hz rate. Release push-button. Now the sensor is in Teach In mode for P2: The P2 LED will be blinking at 1 Hz rate now and the Echo LED will return to its normal function (alignment LED).

There is a time window of 30 seconds to do the programming of P2.

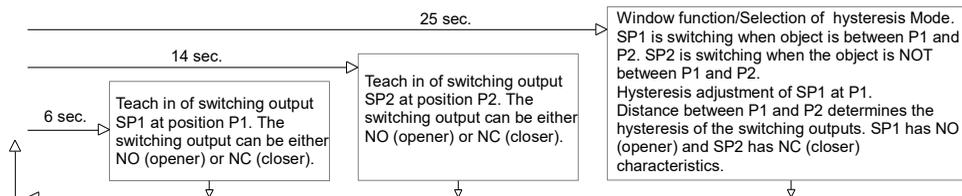
Place the target at the position P2. Press push-button shortly : P2 is programmed and the sensor returns to normal function with the new value for P2 programmed.

TEACHING THE SWITCHING OUTPUT

Three different modes of switching outputs can be selected:

normal switching function / window function / adjustable hysteresis

All these functions will be taught with the push-button (Teach-In button). Each mode has a different sequence using the Echo, P1 and P2 LEDs. The diagram displays the timing.



TEACH-IN GUIDE

Ultrasonic Sensors Series UPT

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

TEACHING THE SWITCHING OUTPUT

Normal Switching Function

Teach In of P1 (SP1 position)

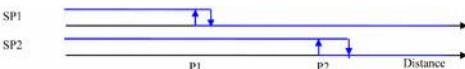
Press the push-button until P1 and Echo LEDs start blinking with a 2 Hz frequency. The sensor is now in Teach In mode for P1: P1 LED will now blink with a 1 Hz frequency and the Echo LED will go back to normal function (alignment LED). There is a time window of 30 seconds to do the programming of P1. Place the target at the new position P1. Press push-button once: P1 is now programmed. Sensor returns to normal function with new value for P1.

Teach In of P2 (SP2 position)

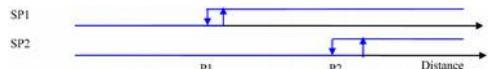
Press the push-button until P2 and Echo LEDs start blinking with a 2 Hz frequency. First P1 and Echo LEDs will be blinking but it is important to wait until P2 and Echo are blinking. The sensor is now in Teach In mode for P2: P2 LED blinks with a 1 Hz frequency now. The Echo LED returns to normal function (alignment LED). There is a time window of 30 seconds to do the programming of P2. Place the target at the new position P2. Press push-button once: P2 is now programmed. The sensor returns to normal function with new value for P2.

Switching output characteristics

Is LED P1 ON while pressing the push-button to set SP1, the switching output will have NO characteristics, is LED P1 OFF the switching output will have NC characteristics. The same applies for P2.



NO characteristics (opener)



NC characteristics (closer)

Window function / Hysteresis adjustment

Press push button until P1, P2 and Echo LEDs starts blinking with a 2 Hz frequency. Before reaching the Teach In mode, the sensor will go through the P1 and P2 teaching sequence. Keep the button pressed until reaching the point when all LEDs are blinking with a 2 Hz frequency. Release button. The sensor is now in Teach In mode for window function / hysteresis adjustment: P1+P2 LED are now blinking with a 1 Hz frequency. The Echo LED returns to its normal function (alignment LED).

There is a time window of 30 seconds to complete the programming. Press and release Teach In button:

If P1+P2 LED are OFF during pressing the key, the sensor will operate in window function: If there is an object between P1 and P2, SP1 will switch ON and SP2 will switch OFF. If there is no object between P1 and P2, SP1 will switch OFF and SP2 will switch ON.

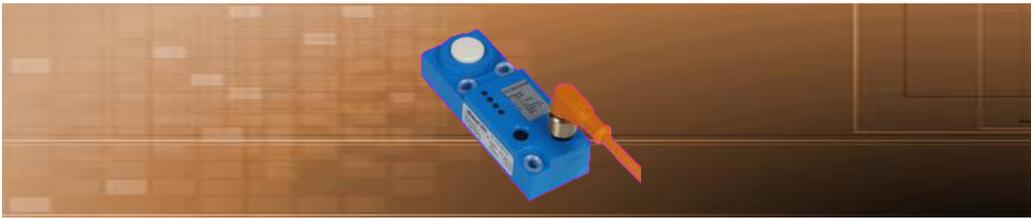
If P1+P2 LEDs are ON during contact, the sensor will operate in hysteresis mode. The switching output SP1 will be (NO) at P1 with hysteresis P1-P2 and switching output SP2 will be (NC), also at P1 with hysteresis P1-P2.



Window Function



Hysteresis adjustment



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

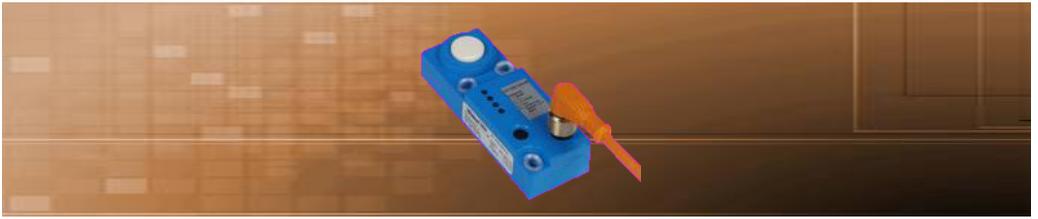
reflects almost all of the impulse energy from ultrasound applications in a way that makes them very easy to detect with ultrasound.

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.



DECLARATION OF EC-CONFORMITY

WayCon Positionsmesstechnik GmbH
Mehlbeerenstrasse 4
82024 Taufkirchen / Germany

This is to certify that the products

Classification
Series

Ultrasonic Sensors
UPT

fulfill the current request of the following EC-directives:
EMV-directive 2004/108/CE
applied harmonized standards:
EN 61000-6-2:2005, EN 61000-6-4:2007, EN 61326-1:2006

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

Taufkirchen, 13.03.2013


Andreas Träger
CEO