

# INSTALLATION GUIDE

## Ultrasonic Sensors Series UX micro

For further information please see the data sheet at [www.waycon.biz/products/ultrasonic-sensors/](http://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:

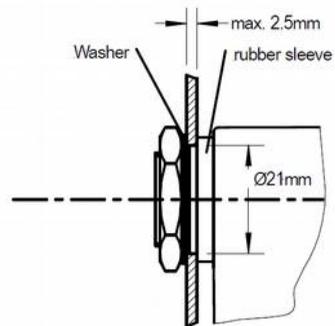
Carefully lift the device out of the box by grabbing the housing. After unpacking the device, check it for any visible damage as a result of rough handling during the shipment. Check the delivery for completeness. If necessary consult the transportation company, or contact WayCon directly.

### 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.

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.

Ultrasonic sensors should be mounted softly in order to keep external acoustic noise away from the sensor. The UX micro sensors can be mounted in two ways, either with the two M4 screws through the holes in the housing or by the M18 thread of the transducer. A rubber gasket should be used between the sensor and the mounting spot. Included with the sensor are an M18 nut, a washer and a rubber sleeve for the mounting on the M18 thread. The rubber sleeve is sized for a mounting hole of  $\varnothing 21$  mm.



# INSTALLATION GUIDE

## Ultrasonic Sensors Series UX micro

For further information please see the data sheet at [www.waycon.biz/products/ultrasonic-sensors/](http://www.waycon.biz/products/ultrasonic-sensors/)

### ELECTRICAL CONNECTION

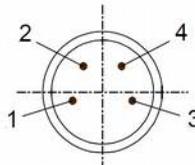
The sensors have a 3 or 4 PIN M8 connector for screw or snap-on connection, or an integrated cable. The cable should be kept as short as possible. Maximum cable length is approx. 100 m, if cross section area is appropriate (peak current of 100 or 250 mA, use 470  $\mu$ F/35 V backup capacitor close to sensor). The cable should not be mounted parallel or close to high current cables. Cables for connection to the M8 connector have to be ordered separately.

#### Power supply

Ideally a power supply is used exclusively for the sensor. The power supply must be able supply the short peak current of approx. 100 mA (UX micro 150) or 250 mA (UX micro 500). In order to avoid disturbances the component, the sensor is mounted to should be correctly earthed.

#### Connector M8

PIN 1	brown
PIN 2	white
PIN 3	blue
PIN 4	black



**UX micro 150-PS-24** PNP NO, 2 m integrated cable

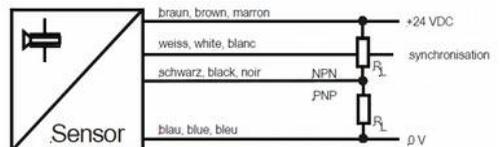
**UX micro 150-PS-24-C** PNP NO, 3 pole connector

**UX micro 500-PS-24** PNP NO, 2 m integrated cable

**UX micro 500-PS-24-C** PNP NO, 3 pole connector



**UX micro 500-PS-24-C-SY** PNP NO, 4 pole connector, synchronisation input





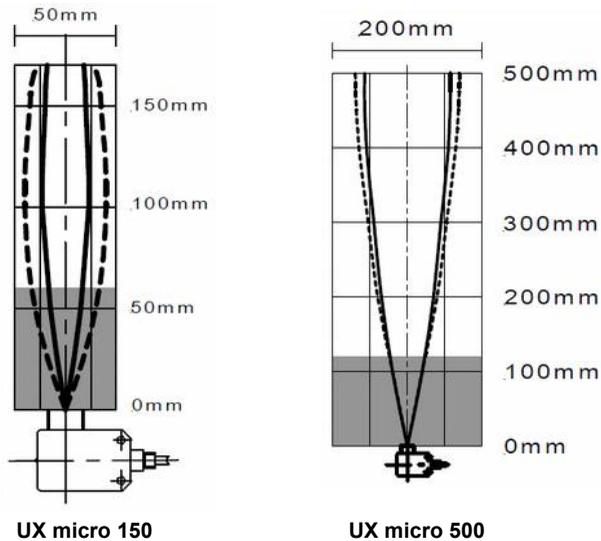
## SOUND CONE GEOMETRY

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  $7^\circ$  (UX micro 150) and  $10^\circ$  (UX micro 500). However rough and structured (granular) surfaces can be detected up to higher angles.

Below the typical cone shapes for the UX micro sensors are shown. The difference between bold and dotted line represents the variation due to different targets. Furthermore the size of the detection cone is influenced by air temperature and humidity. The colder and dryer the air, the larger is the beam.

No other ultrasonic sensor working at the same frequency should be within the sensing cone, close to it or opposite to it. This is only allowed when using the synchronisation option (Y version).



■ : blind range

# TEACH-IN GUIDE

## Ultrasonic Sensors Series UX micro

For further information please see the data sheet at [www.waycon.biz/products/ultrasonic-sensors/](http://www.waycon.biz/products/ultrasonic-sensors/)

### SWITCHING OUTPUT

The switching output becomes active, which means it switches on or off, as soon as the distance to a scanned object falls below the set value or if it exceeds it. Each switch point has a hysteresis (see technical data). This is the difference between switch on and switch off point during approach or departure. Hysteresis is necessary for an appropriate switching behaviour. The switching distance is set with the potentiometer. An object with reasonable size and perpendicularly to the sensor axis is placed at the desired distance from the sensor. The potentiometer is now turned from left slowly clockwise until the LED illuminates (NO) or expires (NC). Thus the switching distance for the binary output is set.

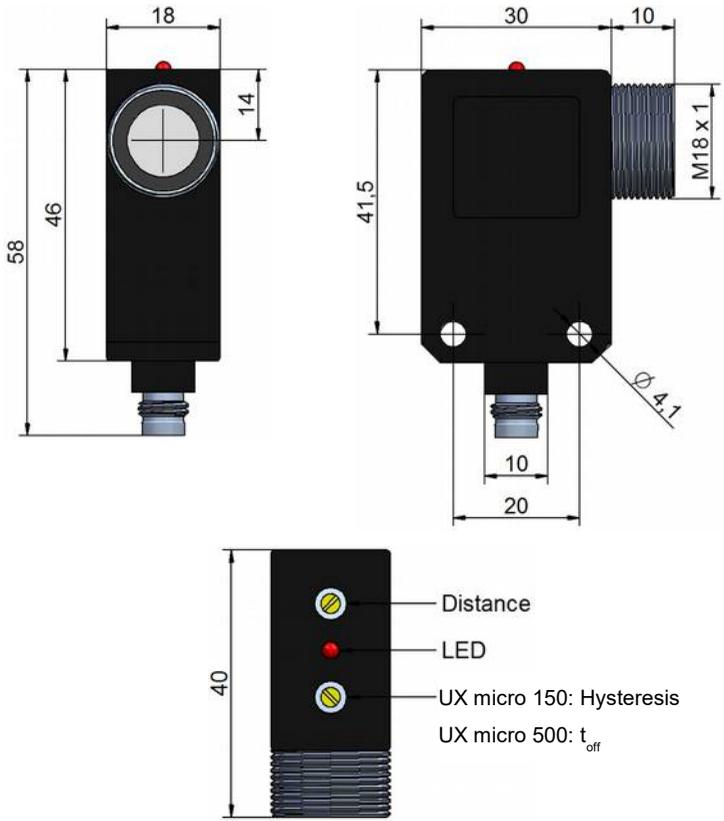
Type	UX micro 150	UX micro 500
Adjustment range of switching output	60 – 170 mm	120 – 500 mm
Hysteresis switching point, axial	approx. 10 – 40 (Poti)	approx. 10
Switching output, load max. 0.1 A	PNP, NPN, NO, NC	
Switching frequency	approx. 15 Hz	approx. 2 Hz
$t_{on}$ switching output	< 5 ms	< 10 ms
$t_{off}$ switching output	< 40 ms	400 – 8000 ms (Poti)

### SYNCHRONISATION Y VERSIONS

The ultrasonic signals can disturb each other when several sensors are focused on the same target or when sensors are mounted too close together. This can be avoided by synchronizing the sending pulses. The synchronisation lines of all sensors are connected to each other with shielded cables, that should be as short as possible. Since all sensors now send simultaneously, the current consumption increases heavily. Unused synchronisation lines shall be isolated.



# TECHNICAL DRAWING



Use the miniature screw driver which is included for the adjustments of the two potentiometers.

# TEACH-IN GUIDE

## Ultrasonic Sensors Series UX micro

For further information please see the data sheet at [www.waycon.biz/products/ultrasonic-sensors/](http://www.waycon.biz/products/ultrasonic-sensors/)

### TYPICAL APPLICATIONS

#### **Level measurement**

- Measuring level in small containers
- Water gauge measurement
- Monitoring liquid levels in bottling plants
- Checking for tailbacks on conveyor belts
- Monitoring contents of granulate hoppers

#### **Process control**

- Controlling belt tension or sag
- Sensing and signaling valve positions
- Measuring roll diameter on reeling machines
- Monitoring the height of stacks (charges, storehouse)
- Detecting material feed
- Detecting the feed of strip stock to blanking machines

#### **Counting / Detection**

- Counting onlookers at free standing sales displays
- Access supervision at rotating doors, counters etc.
- Door automation
- Detecting transparent objects, foils, flat glass, bottles etc.
- Sensing objects in robot grippers
- Recognizing full or empty pallets
- Count and detect objects with 'difficult' surface
- Detect wrong parts on conveyors
- Collision protection on vehicles

#### **Scanning of dimensions**

- Determining the dimensions of packages
- Sensing the height of plants in automated green houses



## 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  $3^\circ$  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.



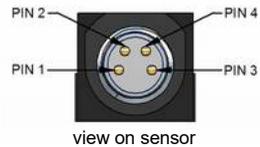
## ACCESSORIES

### Cable with mating M8 connector 4 poles, shielded, IP67

K4P2M-S-M8	2 m, straight connector
K4P5M-S-M8	5 m, straight connector
K4P10M-S-M8	10 m, straight connector
K4P2M-SW-M8	2 m, angular connector
K4P5M-SW-M8	5 m, angular connector
K4P10M-SW-M8	10 m, angular connector

### 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 UX micro

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 Täger  
CEO