

ULTRASONIC

Proximity Sensors



Series UX micro

Key-Features:

- Very small dimensions
- Repeatability < 1% of full scale
- Versions with synchronisation input for multi-sensor use
- Measurement ranges 0 to 170 and 0 to 500 mm
- Level detection, counting, scanning of dimensions
- PNP or NPN switch
- Protection class IP67, water, dust and oil resistant
- Viton sealed transducer
- Measurement independent of material, surface and colour of the target material
- Adjustable binary output
- Adjustable switch off delay (UX 500)
- Easy installation

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TECHNICAL DATA

		UX micro 150	UX micro 500
Measurement range	[mm]	0...170	0...500
Adjustment range of binary output	[mm]	60...170	120...500
Axial hysteresis of binary output	[%]	with potentiometer approx. 10...40 approx. 10	
Repeatability	[% FS]	<1	
Operating frequency	[kHz]	approx. 350	approx. 175
Status indicator	-	LED red	
Binary output, short circuit proof, 0.1 A max.	-	selectable PNP, NPN, closer, opener	
Max. switching frequency	[Hz]	approx. 15	approx. 2
t _{on} binary out	[ms]	<5	<10
t _{off} binary out	[ms]	<40	Adjustable with potentiometer 400...8000
Power supply voltage (reverse polarity protected)	[VDC]	12...28	
Ripple of supply voltage	[%]	<10	
Mean consumption, switched without load	[mA]	approx. 45	approx. 55
Peak current, switched without load	[mA/ms]	100/0.05	250/0.1
Temperature coefficient	[%/°K]	typical -0,1	
Temperature coefficient of air path	[%/°K]	-0.17	
Ambient temperature during operation	[°C]	-20...+50	
Working temperature	[°C]	-20...+70	
Pressure range	[mbar _{abs}]	approx. 900...1100	
Weight without cable	[g]	approx. 50	
Protection class		IP67	
Material of the housing		Polyamide, stainless steel	
Electrical connection		M8 connector or integrated cable	



Model selection

The main difference between the two UX micro models is their different detection range (reach and shape). Also switching speed is different.

UX micro 150 ...

Very narrow detection zone. Useful for looking into small vents. Fast reaction time t_{on}. For fast counting/detecting up to 170 mm distance and for level control as well. Axial hysteresis can be adjusted with potentiometer from approx. 10...40 %, depending on switching distance. This enables e.g. also a min./max. Level control.

UX micro 500 ...

General purpose proximity switch with fast reaction time t_{on} and slower t_{off} delay. The delay can be adjusted with potentiometer between 0.4...8 s. Detection zone with Ø 90 mm.

DESCRIPTION

Binary output

The binary output becomes active, i.e. it switches on or off, when a scanned object falls below the set distance or if it exceeds it. Each switch point has a hysteresis (see technical specifications). 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 (NO). Thus the switching distance for the binary output is set.

Blind range

The lower detection range is called blind range. It is typical for ultrasonic sensors. In the blind range no distance measurement is possible! However the pure function as proximity switch (binary output), as used on the UX series, is possible in the blind range with certain restrictions (only bigger objects).

Synchronisation-Input (Y-versions)

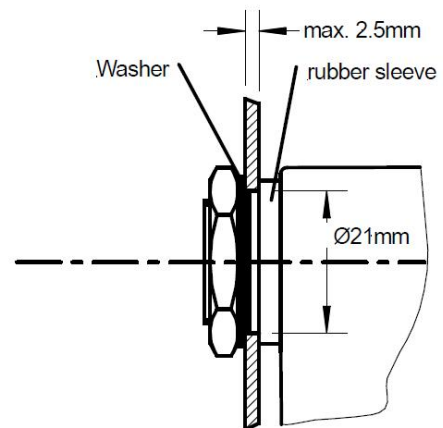
The ultrasonic signals can disturb each other when several sensors are focused on the same target or when sensors are mounted close together. This can be avoided by synchronizing the sending pulses. The synchronisation leads of all sensors are connected to each other by shielded cables as short as possible. Since all sensors send then simultaneously, the current consumption increases heavily. Not used synchronisation leads shall be isolated.

Inclination angle of objects

Smooth surfaces can be detected up to an inclination angle of 7° (UPX 150) and 10° (UPX 500). However rough and structured (granular) surfaces can be detected up to much higher angles.

Mounting

Ultrasonic sensors should be mounted softly in order to keep external acoustic noise away from the sensor. The UX sensors can be mounted in two ways, with two M4 screws through the two holes in the housing or on the M18 thread of the transducer as well. Anyway a rubber gasket should be used between the sensor and the mounting spot. Thus scope of delivery are a M18 nut, a washer and a rubber sleeve for mounting on the M18 transducer. The rubber sleeve fits for a mounting hole of Ø21 mm.



Cable

The sensors have a 3 or 4 pole 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. 100m, if cross section area is appropriate (peak current of 100 or 250 mA!, use 470 mF/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

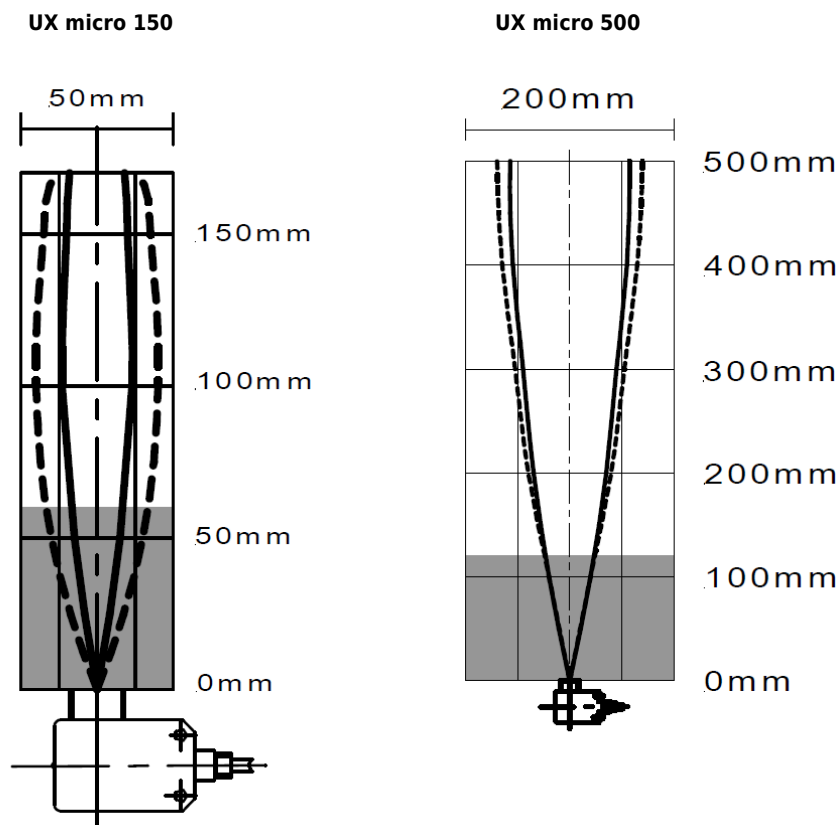
Ideally a power supply is used exclusively for the sensor. The power supply must be able supply the short peak current of approx. 100 mA (UX 150) or 250 mA (UX 500). In order to avoid disturbances the part where the sensor is mounted must be correctly earthed.

DETECTION BEAM

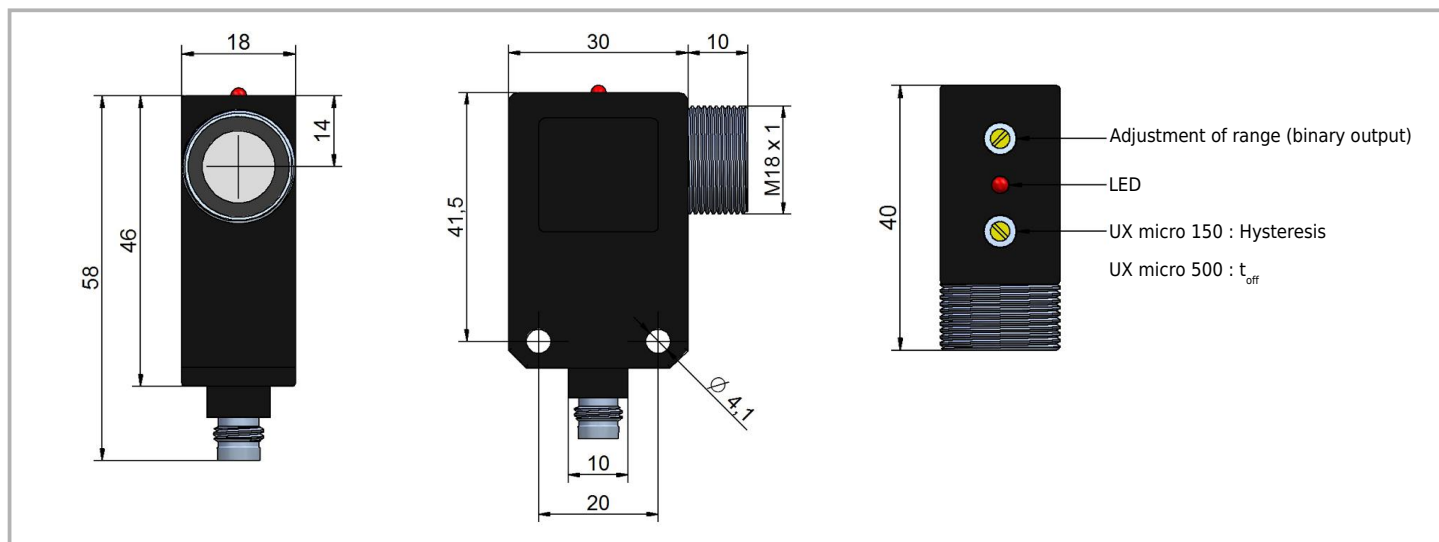
The detection beam of an ultrasonic sensor has the shape of a cone. The size depends on the target and its sound reflecting characteristics. Small and more badly reflecting objects result in a smaller cone (narrower and shorter). Bigger objects and those with surfaces which are not perpendicular to the 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. Below the typical cone shapes for the UX sensors are shown.

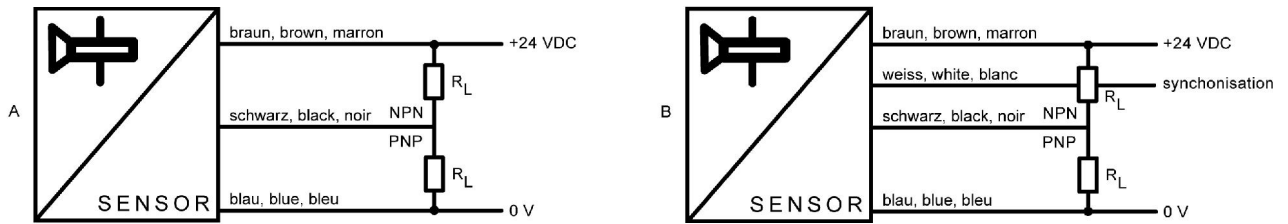
The difference between bold and dotted line represents the variation due to different targets. Furthermore the size of the detection beam is influenced by air temperature and humidity. The colder and dryer the air, the larger is the beam. No other ultrasonic sensor working at the same frequency shall be within the cone or close to it or opposite to it. This is only allowed when using the synchronisation option (Y-Version).



TECHNICAL DRAWING



ELECTRICAL CONNECTION



APPLICATIONS

Level detection

- detection of liquid level of filling systems
- tailback control of conveyor belts
- level detecting in small reservoirs
- level measurement of liquid waste
- Monitoring contents of granulate hoppers

Process control

- Controlling belt tension or sag
- Sensing and signalling 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 on lookers at free standing sales displays
- Access supervision at rotating doors, counters etc.
- Door automation
- Detecting transparent objects, foils, flat glass, bottles
- 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

