ULTRASONIC

Ultrasonic Distance and Proximity Sensors

Series UPR-A ATEX

Key features:

- *Measurement range 120 to 1500 mm*
- *for use in hazardous areas with dust (ATEX zone 22) and Gas (ATEX zone 2)*
- *complies with the directive 94/9/EC*
- *in compliance with EN 60079:2012.*
- *Distance sensor or 1-point proximity switch*
- *Teachable measurement range*
- *Linearity <1% of full scale*
- *with mechanical reinforcements on the front and connector side*
- *Working temperature 0 to +60 °C*
- *Protection class IP67, waterproof, oil-resistant*
- *Configurable size of sound cone*

Content:

11.08.16

WayCon Positionsmesstechnik

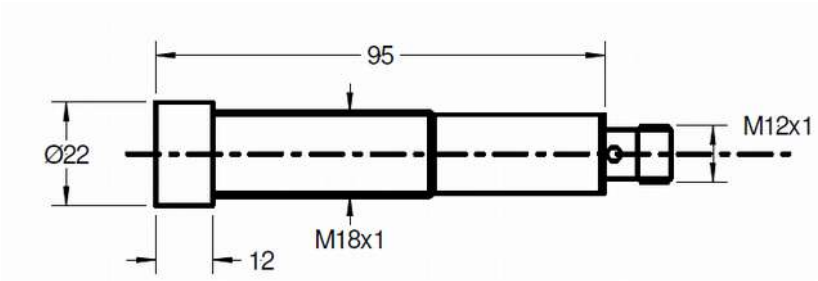
TECHNICAL DATA

		UPR-A-1500-TOR-24-CAI-Ex Distance sensor	UPR-A-1500-TVPA-24-C-Ex Proximity sensor
Measurement range MR	[mm]	120…1500	120…1500
Switching point hysteresis, axial	[mm]	-	2
Linearity	[% MR]	<1	-
Resolution	[mm]	approx. 0.5	
Linearity over full temperature range *	[% MR]	<2	
Operating frequency	[kHz]	approx. 180	
Status indicator		LED yellow / red	
Switching output, short circuit proof, max. load 0.1 A		-	PNP closer / opener
Switching speed, max.	[Hz]	-	approx. 5
Analog output frequency	[Hz]	approx. 30	-
Analog output **	[V]	0…10 (R_{min} 10 kOhm)	-
	[mA]	4…20 (R_{max} 400 Ohm)	-
Voltage supply (reverse polarity protection)	[VDC]	11…30	
Ripple of supply voltage	[%]	10	
Mean current consumption	[mA]	approx. 45…65	approx. 45
Temperature range	[°C]	0…+60	
Pressure area	[mbar]	800…1100 absolute	
Protection class		IP67	
Weight	[g]	approx. 65	
Housing material		Nickel-plated brass	
Marking		Dust: Ex tc IIIC T60°C Dc 0°C ≤ T_a ≤ +60°C, Gas: Ex nA IIC T6 Gc 0°C ≤ T_a ≤ +60°C	
Electrical connection		M12 connector, 4-pole (Use only special cable sockets with self-locking!)	

* linearity can be further improved by only teaching the sensor in a heat-resisting state (e.g. 30 minutes after switching on).

** The analog sensor automatically recognises the load connected and emits the corresponding signal 4…20 mA or 0…10 V.

TECHNICAL DRAWING

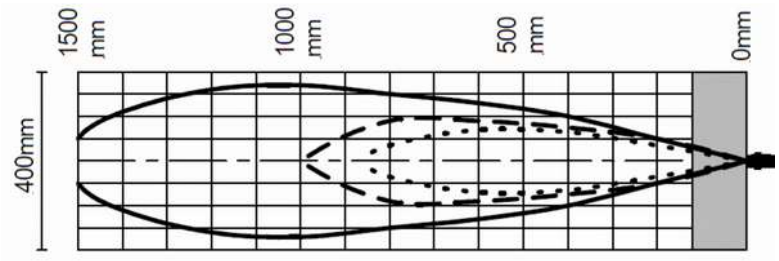


SOUND CONE

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 poorly 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. The diagram shows the three typical cone shapes of the UPR-A-1500 sensors (small, medium and large cone). 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. On UPR-A-1500 sensors three different cones can be programmed by the user. This is e.g. helpful when sensing into small containers or between narrow gaps.

The cone size is set by connecting the teach input for >5 s with the power supply $-U_B$ (0V). See also the teach table at page 5:

- Small cone: Teach 5...10s with $-U_B$ (yellow LED blinks fast)
- Medium cone: Teach 10...15s with $-U_B$ (yellow/red LED blinks fast)
- Large cone: Teach 15...20s with $-U_B$ (red LED blinks fast)



SETTING THE SWITCHING POINTS IN SCANNING MODE

In scanning mode the target reflects a portion of the ultrasound, which in turn is detected by the sensor. The switching points are set by attaching the voltage supply $-U_B$ (0 V) or $+U_B$ (+24 VDC) during 1...5 s to the Teach input.
During the learn-in process a flashing LED indicates whether the sensor detects the target.

- Yellow flashing LED: detected
- Red flashing LED: not detected

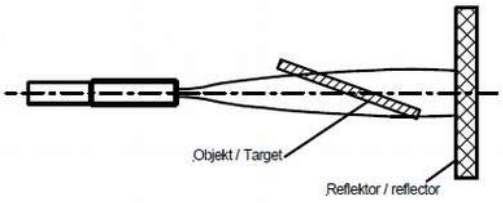
Window operation closer NO: • Set target to near switching point • Teach switching point 1...5 s with $-U_B$ • Set target to far switching point • Teach switching point 1...5 s with $+U_B$	**Window operation opener NC:** • Set target to near switching point • Teach switching target at 1...5 s with $+U_B$ • Set target to far switching point • Teach switching point 1...5 s with $-U_B$
Switching point closer NO: • Set target to switching point • Teach switching point 1...5 s wit $+U_B$ • Point sensor at space (>1.5 m) • Teach 1...5 s with $-U_B$	**Switching point opener NC:** • Set target to switching point • Teach switching point 1...5 s with $-U_B$ • Point sensor at space (>1.5 m) • Teach 1...5 s with $+U_B$

SETTING SWITCHING POINT IN RETROFLECTIVE MODE

Retroflective mode uses a reflector in the background (max. 1.5 m from the sensor). Unlike optical sensors the reflector can be any material which is somewhat sound-reflecting. Retroflective mode is used in place of scanning mode if the target is at a very sharp angle to the sensor beam (see drawing), or is extremely sound-absorbing (no evaluable signal would be reflected from the target to the sensor). In this mode the sensor permanently checks whether it sees the reflector or if it is covered by the target. Likewise, the sensor has no blind range in this operating mode.

In reflection barrier mode the reflector is taught as follows:

Closer NO: Teach 5...10 s with $+U_B$ (Rapid flashing yellow LED)
Opener NC: Teach 10...15 s with $+U_B$ (Rapid flashing red LED)



SETTING THE ANALOG OUTPUT MEASURING LIMITS

The two measuring limits are set by attaching the voltage supply $-U_B$ (0 V), or $+U_B$ (+24 VDC) to the Teach input for 1...5 s. During the teaching process the flashing LED indicates if the sensor detected the target.

- Yellow flashing LED: detected
- Red flashing LED: not detected

$-U_B$ teaches the lower evaluation limit (0 V or 4 mA) and the upper evaluation limit with $+U_B$ (10 V or 20 mA). It can be used to program a rising or falling ramp

- Position the target at the lower measuring limit (i.e. where 0 V or 4 mA is desired)
- Teach lower limit 1...5 s with $-U_B$
- Position the target at the upper measuring limit (i.e. where 10 V or 20 mA is desired)
- Teach upper limit 1...5 s with $+U_B$

Upper and lower measuring limits can also later be programmed individually.

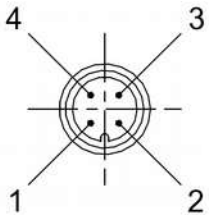
Attention:

The Teach wire/input must be disconnected after the Teaching process is completed. The sensor can therefore also be operated with a 3-wire cable after teaching.

ELECTRICAL CONNECTION

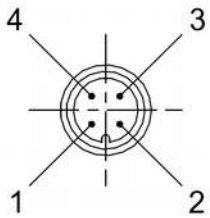
The sensors feature a 4-pole M12 connector. The cables should never be mounted parallel or close to high current cables. Please order the necessary cables separately (see accessories).

PIN assignment: UPR-A-1500-TOR-24-CAI-Ex



1 +24 VDC (brown)
2 Teach (white)
3 0V (blue)
4 OUT 0...10 V (black)

PIN assignment: UPR-A-1500-TVPA-24-C-Ex

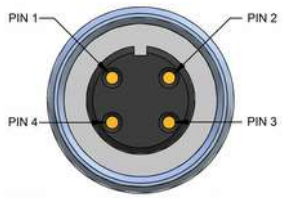


1 +24 VDC (brown)
2 Teach (white)
3 0V (blue)
4 OUT PNP (black)

Connection cable (accessory)

Cable with connector M12, 4 poles, shielded	
K4P2M-S-M12	2 m, connector straight
K4P5M-S-M12	5 m, connector straight
K4P10M-S-M12	10 m, connector straight
K4P2M-SW-M12	2 m, connector angular
K4P5M-SW-M12	5 m, connector angular
K4P10M-SW-M12	10 m, connector angular

PIN No.	cable colour	PIN No.	cable colour
Pin 1	brown	Pin 3	blue
Pin 2	white	Pin 4	black

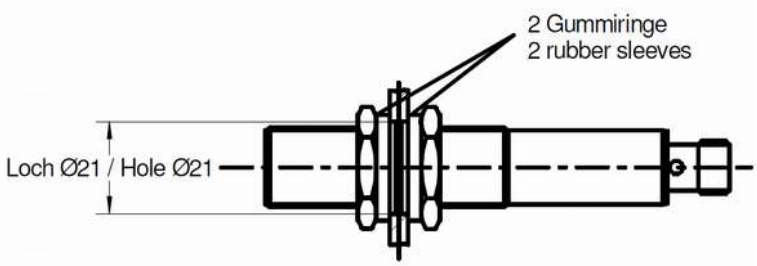


Mating connector (accessory)

Mating Connector M12, 4 poles, shielded	
D4-G-M12-S	straight, M12 for self assembly
D4-W-M12-S	angular, M12 for self assembly
	protection class: IP67
	temperature: -25...+90 °C
	cable passage: ø 4...8 mm
	wire cross-section: 0.14...0.34 mm²
	mode of connection: spring cage

MOUNTING THE SENSOR

Ultrasonic sensors shall be mounted as soft as possible in order keep acoustic disturbances away from the mounting spot. Thus two M18 nuts, washers and rubber sleeves for mounting are included. The rubber sleeves for a hole of Ø21 mm shall be used.



TEACH TABLE

TIME	Connect Teach input to	LED flashes	Switching output version	Analog output version
1 to 5 s	$+U_B$ (typ. +24 VDC)	slow yellow	Closer NO: far window point, or switching point Opener NC: close window point	10 V or 20 mA
1 to 5 s	$-U_B$ (0 VDC)	slow yellow	Closer NO: near window point Opener NC: far window point, or switching point	0 V, or 4 mA
5 to 10 s	$+U_B$ (typ. +24 VDC)	fast yellow	Retroreflective barrier closer NO	-
10 to 15 s	$+U_B$ (typ. +24 VDC)	fast red	Retroreflective barrier opener NC	-
5 to 10 s	$-U_B$ (0 VDC)	yellow	small detection cone	small detection cone
10 to 15 s	$-U_B$ (0 VDC)	yellow / red	medium detection cone	medium detection cone
15 to 20 s	$-U_B$ (0 VDC)	red	large detection cone	large detection cone
>20 s	$-U_B$ (0 VDC)	No LED	Factory reset	Factory reset

ORDER CODE

UPR-A-1500-TOR-24-CAI-Ex	Analog output
UPR-A-1500-TVPA-24-C-Ex	Switching output

ACCESSORIES

Cable with mating connector M12, 4 poles, shielded	
K4P2M-S-M12	2 m, straight connector
K4P5M-S-M12	5 m, straight connector
K4P10M-S-M12	10 m, straight connector
K4P2M-SW-M12	2 m, angular connector
K4P5M-SW-M12	5 m, angular connector
K4P10M-SW-M12	10 m, angular connector

Mating Connector M12, 4 poles, shielded	
D4-G-M12-S	straight, M12 for self assembly
D4-W-M12-S	angular, M12 for self assembly

Digital display 1 channel, 0...10V/4...20 mA	
PAXP000B	1 channel, supply: 85 to 250 VAC
PAXP001B	1 channel, supply: 11...36 VDC/24 VAC

Digital display 2 channels, 0...10V/4...20 mA	
PAXDP00B	2 channels, supply: 85 to 250 VAC
PAXDP01B	2 channels, supply: 11...36 VDC/24 VAC

For further information please see the data sheet of the PAXD display series

!! WARNING – PERSONAL INJURY !!

Never use these products 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.

Safety

- The above mentioned devices may be used only in zones compliant with the marking.
- Temperature range 0...+60 °C.
- Pressure range 0.8...1.1 bar absolute.
- Use only special cable sockets with self-locking!
- Tightening torque for M12 cable socket max. 25 Nm.
- Do not disconnect cable under tension!
- The sensor housing as well as the DC power ground must be earthed by an appropriate cable. A soldering eyelet is scope of delivery.

The following statement has to be placed close to the device: „Do not disconnect cable under voltage!"

WayCon Positionsmesstechnik GmbH
E-Mail: info@waycon.de
Internet: www.waycon.de

Head Office
Mehlbeerenstr. 4
82024 Taufkirchen
Tel. +49 (0)89 67 97 13-0
Fax +49 (0)89 67 97 13-250

Cologne Office
Auf der Pehle 1
50321 Brühl
Tel. +49 (0)2232 56 79 44
Fax +49 (0)2232 56 79 45