SONARANGE

SNT SENSORTECHNIK AG

Ultrasonic distance sensor
UPR 1503 R 24

- Measuring range up to 1500mm
- Adjustable full scale (500...1500mm)
- Version with 90° (radial) transducer
- Small size M18 x 1
- Measurement independent of material, surface, colour and size of target
- Work under dust, dirt, fog, light
- Detect transparent and bright objects
- Protection class IP 67, fully watertight, robust
- Swiss made

Technical specifications		**UPR 1503 R 24 C(W)A**	**UPR 1503 R 24 C(W)I**
Detection range	mm	180...1500	
Blind range (no reasonable analogue signal)	mm	0...180	
Adjustable full scale (mit Potentiometer)	mm	500...1500	
Linearity	%FS	<0.5	
Over all accuracy	%FS	~±1	
Operating frequency	kHz	~180	
Status indicator (when object detected)	-	LED red	
Switching speed max.	Hz	~7	
Analogue output in detection range		(0)...10 V R_L min. 10kΩ	(4)...20mA R_L max. 500Ω
Ripple of analogue output	mV	~±100	
Tracking speed of analogue output	s/95%FS	<0.4	
Power supply voltage (reversal polarity protection)	VDC	18...33	
Ripple of supply voltage	%	<10	
Mean consumption	mA	~35	~55
Peak current	mA	300mA/0.1ms	
Temperature coefficient of sensor	mV/°K	typ. +4	
Temperature coefficient of air path	%/°K	-0.17	
Ambient temperature during operation	°C	-20...+50	
Sensor temperature during operation	°C	-20...+70	
Pressure range	$mbar_{abs}$	~900...1100	
Mass wo. cable	g	~45	
Protection class	-	IP67	
Housing material	-	Polyamide	
Electrical connection	-	M8 connector 3-pin	

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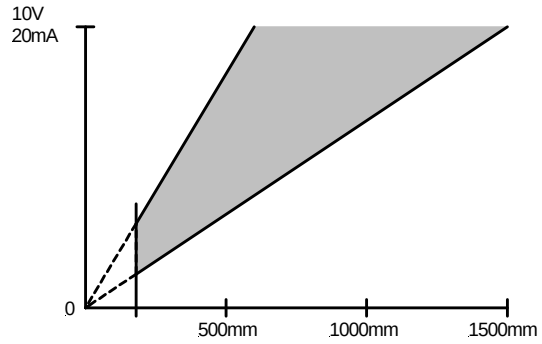
Description

The UPR 1503 sensors are based on the well established UPR series. Outstanding features are the compact M18 size and the 'W' version with 90° (radial) ***SONARANGE*** transducer for confine mounting conditions. The sensors have an extended measuring range of 1500mm with analogue output in V or mA. Ideal applications are distance and level measurement. The full scale (10V or 20mA) can be set with a multi turn potentiometer.

Setting of full scale

The full scale (FS), i.e. the distance where analogue output shall be 10V or 20mA, can be adjusted between 500…1500m. In order to set the FS, an object with reasonable size is placed at the desired distance. First the potentiometer is turned min. 4x counterclockwise to zero (no stop). Then the potentiometer is slowly turned clockwise until the desired reading is measured with a multimeter in V or mA. The analogue output always goes through (theoretical) zero, although it can never reach zero due to the blind range.



Blind range

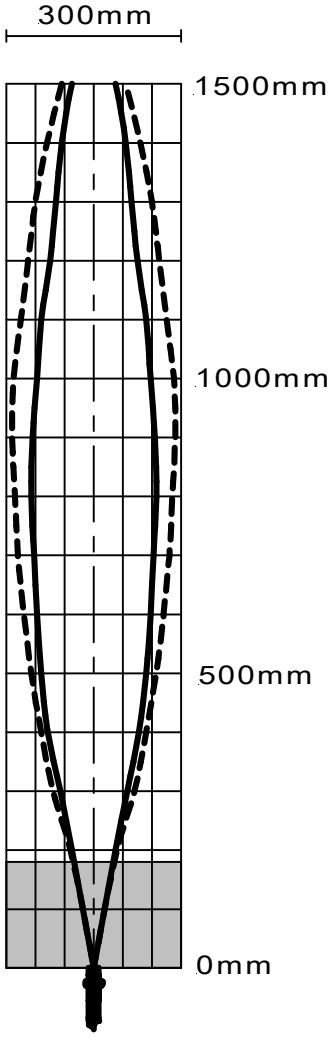
The lower detection range is called blind range. It is typical for ultrasonic sensors. In the blind range the analogue output signal can have any reading. Thus no distance measurement is possible there!

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 shape of UPR 1503 is shown.

The bold line shows the range, where the sensor detects objects which are perpendicular to the sensor axis. In the dotted range the sensor detects round objects (Ø10mm). 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.



Inclination angle of object

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

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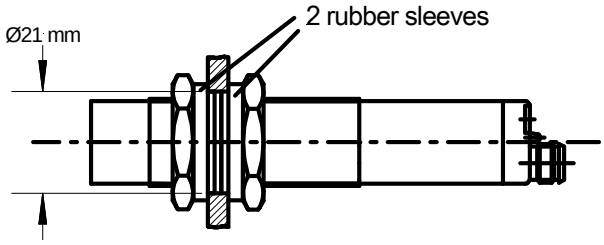
Mounting

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 scope of delivery. The rubber sleeves for a hole of Ø21mm shall be used!



Cable

The sensors have a 3-pin M8 connector for screw or snap-on connection. The cable should be kept as short as possible. Maximum cable length is approx. 100m, if cross section area is appropriate (peak current of 300mA!, use 470µF/35V 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.

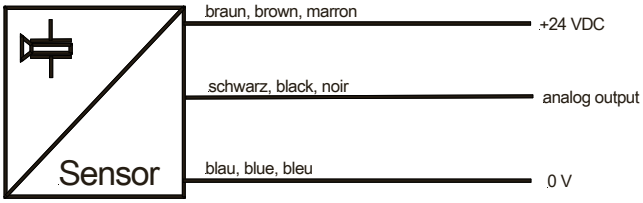
Power supply

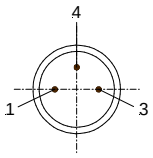
Ideally a power supply is used exclusively for the sensor. The power supply must be able supply the short peak current of approx. 300mA for each sensor. In order to avoid disturbances the part where the sensor is mounted must be correctly earthed.

Versions

Type	Description
UPR 1503 R 24 CA	axial transducer, analogue output 0...10V, 3-pin connector
UPR 1503 R 24 CI	axial transducer, analogue output 4…20mA, 3-pin connector
UPR 1503 R 24 CWA	radial transducer, analogue output 0...10V, 3-pin connector
UPR 1503 R 24 CWI	radial transducer, analogue output 4…20mA, 3-pin connector

Diagram of connections



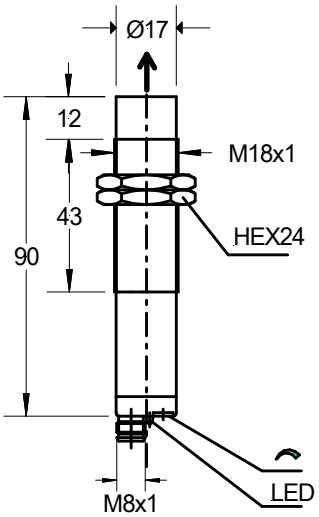


3-pin connector (view on the sensor):
1 brown
3 blue
4 black

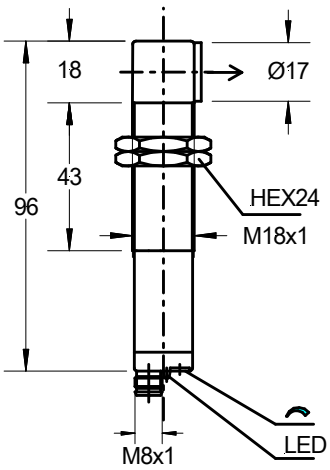
Use an appropriate miniature screw driver max. size 2.5mm for adjustment of the potentiometer!

Dimensions

axial transducer



radial transducer



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Scope of delivery

- Sensor
- 2 of each M18 nuts, washers and rubber sleeves for mounting

Accessories (see also data sheet ‚ACC')

Cables 3-pin with M8 screw connector, PUR:

With straight connector:	l=2m	Type KAB 2K3VGPUR
	l=5m	Type KAB 5K3VGPUR
With 90° connector:	l=2m	Type KAB 2K3VWPUR
	l=5m	Type KAB 5K3VWPUR

Some typical ultrasound 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 on injection molding machines
- Distance monitoring on combine harvesters, beet lifters etc.
- Monitoring ground clearance and distance on agriculture and construction vehicles

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, assembling machines)
- Detecting material feed
- Detecting the feed of strip stock to blanking machines and presses
- Detecting on plastic blow-molding machines

Counting / Detection

- Counting onlookers at freestanding sales displays or show cases
- 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
- Measuring the volume of tree-trunks

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