

Miniature ultrasonic distance and proximity sensors UPS Series

- Measuring range up to 200mm
- Very small blind range
- Narrow detection beam
- Small size M12x1
- Teach-In
- Binary or analogue outputs
- Measurement independent of material, surface, colour and size of target
- Work under dust, dirt, fog, light
- Detect transparent and bright objects



| Technical specifications | | UPS 200 TVPA 24 C | UPS 200 TOR 24 CA | UPS 200 TOR 24 CI |
|--|-----|------------------------|----------------------|-------------------|
| Detection range | mm | | 20...200 | |
| Blind range (no reasonable analogue output signal) | mm | | 20 | |
| Adjustment range | mm | | 20...200 | |
| Hysteresis | % | ≤1 | - | - |
| Linearity of analogue output | %FS | - | <1 | <1 |
| Reproducibility | %FS | <0.5 | <0.5 | <0.5 |
| Temperature error | %FS | ≤1.5 | ≤1.5 | ≤1.5 |
| Operating frequency | kHz | | ~400 | |
| Status indicator | - | | LED yellow/red | |
| Binary output, reversal polarity protection, | - | PNP NO/NC max. 0.1A | - | - |
| Switching speed max. | Hz | 13 | - | - |
| t _{on} binary output | ms | ~30 | - | - |
| Analogue output in detection range | | | | |
| R _L min. 1kΩ with V output | V | | 0...10 | |
| R _L max. 300Ω with mA output | mA | | | 4...20 |
| Power supply (reversal polarity protection) | VDC | 10...30 | 15...30 | 10...30 |
| Power supply ripple | % | | 10 | |
| Mean consumption, switched wo. load | mA | | ~30 | |
| Ambient temperature during operation | °C | | -25...+70 | |
| Mass | g | | 25 | |
| Protection class | - | | IP65 | |
| Housing material | - | | nickel plated brass | |
| Electrical connection | - | | connector M12, 4-pin | |

Description

The ultrasonic sensors of the UPS series are specially small, and they have a narrow detection beam. Thus they are well suited to detect objects in the near range up to 200mm and under confined conditions. The sensors are available as well as pure proximity switches as also as distance sensors with analogue mA or V output. The switch or measuring distances can be learned by a teach-in procedure. Typical applications are detection of objects and distance and level measurement.

Model selection

The UPS versions have different outputs.

UPS 200 TVPA 24 C

Ultrasonic sensor with a binary output with 2 teachable switching points (NO, NC or window function).

UPS 200 TOR 24 CA

Ultrasonic sensor for distance measurement with an analogue output 0...10V. The lower and upper limits are teachable.

UPS 200 TOR 24 CI

Ultrasonic sensor for distance measurement with an analogue output 4...20mA. The lower and upper limits are teachable.

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) is possible in the blind range with certain restrictions (only bigger objects).

Setting of the switching points (UPS 200 TVPA 24 C)

The switching points are set by connecting the teach wire with either the power supply $-U_B$ (0V) or $+U_B$ (+24VDC). The voltage must be active for min. 1s on the teach wire. The LED shows during teaching if the sensor has detected the object.

Window operation NO

- Place the object to the near switching point
- Teach switching point with $-U_B$
- Place the object to the far switching point
- Teach switching point with $+U_B$

Window operation NC

- Place the object to the near switching point
- Teach switching point with $+U_B$
- Place the object to the far switching point
- Teach switching point with $-U_B$

Switching point NO

- Place the object to the switching point
- Teach switching point with $+U_B$
- Cover the sensor diaphragm by hand or let the sensor look into the void
- Teach with $-U_B$

Switching point NC

- Place the object to the switching point
- Teach switching point with $-U_B$
- Cover the sensor diaphragm by hand or let the sensor look into the void
- Teach with $+U_B$

Setting the measuring limits (UPS 200 TOR 24 CA/I)

The two measuring limits are set by connecting the teach wire with either the power supply $-U_B$ (0V) or $+U_B$ (+24VDC). The voltage must be active for min. 1s on the teach wire. The LED shows during teaching if the sensor has detected the object. With $-U_B$ the lower measuring limit (0V or 4mA) and with $+U_B$ the upper measuring limit (10V or 20mA) is taught. Thus it is possible to teach a rising or a falling ramp.

- Place the object to the lower measuring limit (i.e. where 0V or 4mA is expected)
- Teach lower measuring limit with $-U_B$
- Place the object to the upper measuring limit (i.e. where 10V or 20mA is expected)
- Teach upper measuring limit with $+U_B$

Lower and upper measuring limits can also later be programmed individually. The teach wire must not be connected during normal operation. The sensor can e.g. be operated after teaching with a 3 wire cable.

LED indicator

| | LED red | LED yellow |
|--------------------------------|----------|------------------|
| During teach-in: | | |
| - object detected | off | blinking |
| - no object detected | blinking | off |
| - object not reliably detected | on | off |
| Normal operation PNP | off | switching status |
| Normal operation analogue | off | on |
| Error | on | last status |

Mounting

The sensor can be mounted with the two M12 nuts (HEX 17) which are scope of delivery.

Inclination angle of object

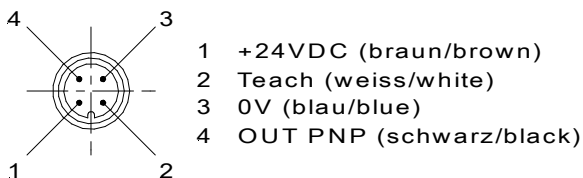
Smooth surfaces can be detected up to an inclination angle of approx. 10°. However rough and structured (granular) surfaces can be detected up to much higher angles.

Cable

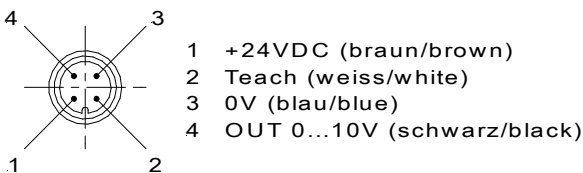
The sensors have an M12 4-pin connector for screw mounting. The cable should not be mounted parallel or close to high current cables. Cables have to be ordered separately.

Electrical connections (view to the sensor)

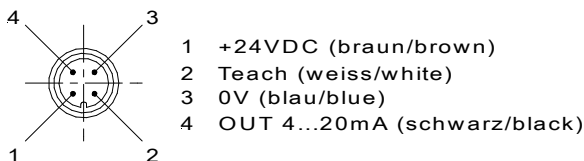
UPS 200 TVPA 24 C



UPS 200 TOR 24 CA



UPS 200 TOR 24 CI

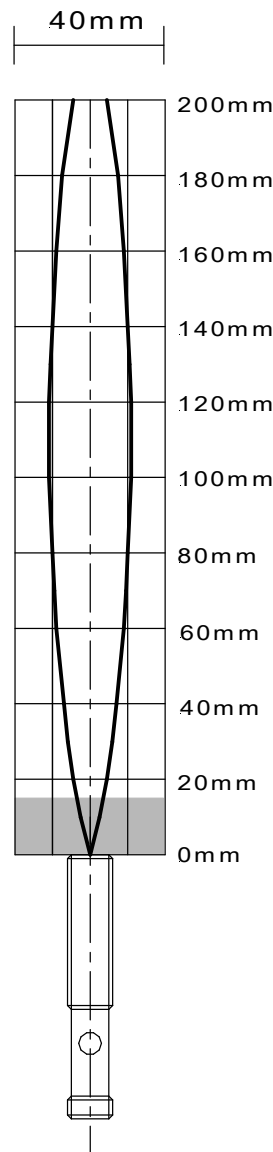


Accessories (see also data sheet ,ACC')

PUR cable 3-wire with M12 connector:
l=2m Type KAB 2L3VGPUR

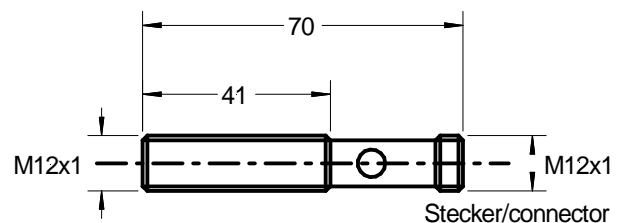
PUR cable 4-wire with M12 connector:
l=2m Type KAB 2L4VGPUR

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. On the left the typical cone shape for the UPS sensors is shown. 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.

Dimensions



Scope of delivery

- Sensor
- 2 M12 nuts