ULTRASONIC
Distance and Proximity Sensors

Series UFA-150, UFA-200

Key-Features:
- Very small blind range, narrow detection beam
- Measuring range 0 to 150 mm and 20 to 200 mm
- Distance sensor or 1 point proximity switch
- Teachable measurement range
- Linearity <1% of full scale
- Resolution approx. 0.5 mm
- Working temperature 0 to +75 °C
- Measurement is independent of the targets material, surface, colour or transparency
- Protection class IP67
- Special sensors with very small sound cone, radial beam and chemically resistant
**TECHNICAL DATA**

<table>
<thead>
<tr>
<th>Analog Output</th>
<th>Proximity switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog Output UFA...CU</td>
<td>Proximity switch UFA-200-TVPA-24C</td>
</tr>
<tr>
<td>Analog Output UFA...CI</td>
<td>Proximity switch UFA-200-TOR-24-CU</td>
</tr>
</tbody>
</table>

**TECHNICAL DRAWING**

**Model Names**

<table>
<thead>
<tr>
<th>Analog Output</th>
<th>Proximity switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current output 4...20 mA</td>
<td>Voltage output 0...10 V</td>
</tr>
<tr>
<td>Standard UFA-200</td>
<td>UFA-200-TOR-24-CU</td>
</tr>
<tr>
<td>With focusing device for narrow sound cone UFA-150-FB</td>
<td>UFA-150-FB-TOR-24-CU</td>
</tr>
<tr>
<td>Chemically resistant version (PVDF) UFA-150-CP</td>
<td>UFA-150-CP-TOR-24-CU</td>
</tr>
<tr>
<td>Radial sensing direction UFA-180-RB</td>
<td>UFA-180-RB-TOR-24-CU</td>
</tr>
</tbody>
</table>

**TECHNICAL DRAWING**

<table>
<thead>
<tr>
<th>Model</th>
<th>Drawing</th>
</tr>
</thead>
<tbody>
<tr>
<td>UFA-200</td>
<td><img src="image1" alt="UFA-200" /></td>
</tr>
<tr>
<td>UFA-150-FB</td>
<td><img src="image2" alt="UFA-150-FB" /></td>
</tr>
<tr>
<td>UFA-150-CP</td>
<td><img src="image3" alt="UFA-150-CP" /></td>
</tr>
<tr>
<td>UFA-180-RB</td>
<td><img src="image4" alt="UFA-180-RB" /></td>
</tr>
</tbody>
</table>
## Setting of the Switching Points (UFA...-TVPA-24C)

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

### Window operation (closer):
- 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 (opener):
- 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 (closer):
- 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 (opener):
- 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 (Analogue Output)

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

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

Lower and upper measuring limits can also be programmed individually later.

**Attention:** The teach wire must not be connected during normal operation. The sensor can e. g. be operated after teaching with a 3 wire cable.

<table>
<thead>
<tr>
<th></th>
<th>LED red</th>
<th>LED yellow</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>During teach-in:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Object detected</td>
<td>off</td>
<td>blinking</td>
</tr>
<tr>
<td>- No object detected</td>
<td>blinking</td>
<td>on</td>
</tr>
<tr>
<td>- Object not reliably detected</td>
<td>on</td>
<td>off</td>
</tr>
<tr>
<td><strong>Normal operation PNP</strong></td>
<td>off</td>
<td>switching status</td>
</tr>
<tr>
<td><strong>Normal operation analogue</strong></td>
<td>off</td>
<td>on</td>
</tr>
<tr>
<td><strong>Error</strong></td>
<td>on</td>
<td>last status</td>
</tr>
</tbody>
</table>
DESCRIPTION:

The ultrasonic sensors series UFA-150-FB (FOCUS Beam) are equipped with a focusing device made of glass-fibre reinforced polypropylene, which makes the sound beam particularly narrow. Therefore they are suitable in the near range from 0 mm up to 150 mm to watch into narrow cavities. A typical application is measuring of liquid level in small tubes or containers.

Technical data see page 2.

VERSION WITH FOCUSING DEVICE UFA-150-FB

Key Features

- very narrow detection beam
- particularly for level measurement in narrow cavities
- no blind range
- measuring range up to 150 mm
- Teach-In
- Binary or analogue outputs

Description:
The ultrasonic sensors series UFA-150-FB (FOCUS Beam) are equipped with a focusing device made of glass-fibre reinforced polypropylene, which makes the sound beam particularly narrow. Therefore they are suitable in the near range from 0 mm up to 150 mm to watch into narrow cavities. A typical application is measuring of liquid level in small tubes or containers.

With a little distance between sensor and tube, and depending on the measuring height, levels can be measured in tubes which only have a few mm diameter. In very narrow set ups, only a test can verify the feasibility of measurement.

Technical data see page 2.

APPLICATION HINT WINDOW OPERATION (UFA...TVPA-24C)

In window operation the sensor detects only targets which are within the window limits. The same function can also be used to simulate a kind of retro-reflective sensor. The reflector is mounted in the small window between Teach A and Teach B (see drawing below). In such setup the sensor detects also targets which pass the sensor beam in a very flat angle. The sensor would not detect such targets in normal scan operation mode.

VERSION WITH RADIAL BEAM UFA-180-RB

VERSION WITH FOCUSING DEVICE UFA-150-FB

Key Features

- chemically resistant version (PVDF)
- diaphragm PTFE coated
- front resistant against most chemicals
- measuring range up to 150 mm
- Teach-In
- binary or analogue outputs

Description:
The diaphragm of the series UFA-150-CP (Chemical Protection) is coated with a thin PTFE foil. The head made of chemically resistant PVDF serves as mechanical fixation for the foil and protection of the sensor’s front part. Thus the front part of the ultrasonic sensor becomes resistant to most chemicals.

Technical data see page 2.
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).

### ELECTRICAL CONNECTION

**PIN-assignment UFA-...-TOR-24-CU**

1. +24 VDC
2. Teach-In
3. 0 V
4. OUT 0...10 V

**PIN-assignment UFA-...-TVPA-24-C**

1. +24 VDC
2. Teach-In
3. 0 V
4. OUT PNP

**PIN-assignment UFA-...-TOR-24-CI**

1. +24 VDC
2. Teach-In
3. 0 V
4. OUT 4...20 mA

### ACCESSORIES

<table>
<thead>
<tr>
<th>Cable with connector M12, 4 poles, shielded</th>
<th>Mating connector M12, 4-pole (for self assembly), shielded</th>
</tr>
</thead>
<tbody>
<tr>
<td>K4P2M-S-M12, 2 m, connector straight</td>
<td>Connector M12 straight, D4-G-M12-S</td>
</tr>
<tr>
<td>K4P5M-S-M12, 5 m, connector straight</td>
<td>Connector M12 angular, D4-W-M12-S</td>
</tr>
<tr>
<td>K4P10M-S-M12, 10 m, connector straight</td>
<td>Protection class, IP67</td>
</tr>
<tr>
<td>K4P2M-SW-M12, 2 m, connector angular</td>
<td>Cable passage, ø 4...8 mm</td>
</tr>
<tr>
<td>K4P5M-SW-M12, 5 m, connector angular</td>
<td>Temperature range, -25...+90 °C</td>
</tr>
<tr>
<td>K4P10M-SW-M12, 10 m, connector angular</td>
<td>Wire cross section, 0.14...0.34 mm²</td>
</tr>
<tr>
<td><strong>PIN No.</strong></td>
<td><strong>Mode of connection</strong>, Spring cage</td>
</tr>
<tr>
<td><strong>cable colour</strong></td>
<td><strong>Special feature</strong>, excellent resistance against...</td>
</tr>
<tr>
<td>Pin 1, brown</td>
<td></td>
</tr>
<tr>
<td>Pin 2, white</td>
<td></td>
</tr>
<tr>
<td>Pin 3, blue</td>
<td></td>
</tr>
<tr>
<td>Pin 4, black</td>
<td></td>
</tr>
</tbody>
</table>
**ORDER CODE UFA-150**

<table>
<thead>
<tr>
<th>Version</th>
<th>Type of output</th>
<th>Output signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>FB/CP &quot;with focusing device chemical resistant&quot;</td>
<td>Switching output PNP</td>
<td>Switching output (only available with TVPA)</td>
</tr>
<tr>
<td></td>
<td>Analog output</td>
<td>0...10 V (only available with TOR)</td>
</tr>
</tbody>
</table>

**Cable with mating connector M12, 4-pole, 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

**ORDER CODE UFA-180**

<table>
<thead>
<tr>
<th>Type of output</th>
<th>Output signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>TVPA/FB/CP &quot;chemical resistant&quot;</td>
<td>Switching output PNP</td>
</tr>
</tbody>
</table>

**Accessories**

- **D4-G-M12-S** Mating connector M12 straight
- **D4-W-M12-S** Mating connector M12 angular

**ORDER CODE UFA-200**

<table>
<thead>
<tr>
<th>Type of output</th>
<th>Output signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>TVPA/FB/CP &quot;chemical resistant&quot;</td>
<td>Switching output PNP</td>
</tr>
</tbody>
</table>

**OVERVIEW**

- **UFA150-FB-TOR-24-CI**
- **UFA150-FB-TOR-24-CU**
- **UFA150-FB-TVPA-24C**
- **UFA150-CP-TOR-24-CI**
- **UFA150-CP-TOR-24-CU**
- **UFA150-CP-TVPA-24C**
- **UFA180-RB-TOR-24-CI**
- **UFA180-RB-TOR-24-CU**
- **UFA180-TVPA-24-C**

**ACCESSORIES**

- **Cable with mating connector M12, 4-pole, shielded**
- **Mating connector M12, 4-pole, shielded (for self assembly)**

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