ULTRASONIC
Distance and Proximity Sensors

UFP / UPA Series

Key-Features:

- Available measurement ranges from 250 to 6000 mm
- Ultrasonic distance sensor or proximity switch
- Teachable measurement range
- M12/ M18/ M30 thread housings
- Linearity up to 0.3 %
- Working temperature -20 to +70 °C
- Measurement is independent of the targets material, surface, colour or transparency
- Protection class up to IP67
## TECHNICAL DATA

<table>
<thead>
<tr>
<th>Distance sensor</th>
<th>UFP-200</th>
<th>UFP-400</th>
<th>UFP-500</th>
<th>UFP-800</th>
<th>UFP-1600</th>
<th>UFP-2000</th>
<th>UFP-3500</th>
<th>UPA-6000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection range</td>
<td>[mm]</td>
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<tr>
<td></td>
<td>25...250</td>
<td>30...400</td>
<td>60...500</td>
<td>100...800</td>
<td>80...1600</td>
<td>200...2000</td>
<td>300...3500</td>
<td>600...6000</td>
</tr>
<tr>
<td>Repeatability *</td>
<td>±0.3 % / ±0.2 mm</td>
<td>±0.2 % / ±1 mm</td>
<td>±0.2 % / ±2 mm</td>
<td>±0.2 % / ±1 mm</td>
<td>±0.2 % / ±2 mm</td>
<td>±0.2 % / ±1 mm</td>
<td>±0.2 % / ±2 mm</td>
<td>±0.2 % / ±1 mm</td>
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<td>Resolution</td>
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<td>0.250</td>
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<td>Response time</td>
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<td>100</td>
<td>100</td>
<td>140</td>
<td>200</td>
<td>400</td>
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<td>Signal output</td>
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<td>0...10 V / 4...20 mA</td>
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<td>Operating voltage</td>
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<td>15...30</td>
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<tr>
<td>Safety features</td>
<td>Protection against reverse polarity and short circuit</td>
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<td>Temperature range</td>
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<td>-20...+70</td>
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<tr>
<td>Connection</td>
<td>M12 connector</td>
<td>M12 connector, cable output</td>
<td>M12 connector</td>
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<td></td>
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<tr>
<td>Design</td>
<td>M12x1, 79 mm</td>
<td>M18x1, 100 mm</td>
<td>M30x1.5, 125 mm</td>
<td>Disk, 80x80x50 mm</td>
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<tr>
<td>Case material</td>
<td>steel</td>
<td>Plastics</td>
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<td>IP65</td>
<td>IP67</td>
<td>IP67</td>
<td>IP65</td>
<td>IP67</td>
<td>IP67</td>
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<td>Angle of the sound cone</td>
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### Proximity switch

<table>
<thead>
<tr>
<th>Switching points</th>
<th>UFP-200</th>
<th>UFP-400</th>
<th>UFP-500</th>
<th>UFP-800</th>
<th>UFP-1600</th>
<th>UFP-2000</th>
<th>UFP-3500</th>
<th>UPA-6000</th>
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<tbody>
<tr>
<td>Detecting range</td>
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<td>25...250</td>
<td>30...400</td>
<td>60...500</td>
<td>100...800</td>
<td>80...1600</td>
<td>200...2000</td>
<td>300...3500</td>
<td>600...6000</td>
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<tr>
<td>Repeatability *</td>
<td>±0.3 % / ±0.2 mm</td>
<td>±0.5 %</td>
<td>±0.2 % / ±1 mm</td>
<td>±0.2 % / ±2 mm</td>
<td>±0.2 % / ±1 mm</td>
<td>±0.2 % / ±2 mm</td>
<td>±0.2 % / ±1 mm</td>
<td>±0.2 % / ±2 mm</td>
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<tr>
<td>Resolution</td>
<td>[mm]</td>
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<td>0.125</td>
<td>0.250</td>
<td>1.0</td>
<td>1.5</td>
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<td>Hysteresis</td>
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<td>Sampling frequency</td>
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<td>PNP / NPN</td>
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<td>by Teach-in mode</td>
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<td>Max. output current</td>
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<td>Current consumption (no load)</td>
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<tr>
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<td>NO / NC</td>
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<td>Yes</td>
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<td>[°C]</td>
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<td>IP67</td>
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<td>IP67</td>
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<tr>
<td>Angle of the sound cone</td>
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<td></td>
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</tr>
</tbody>
</table>

* In case two values are indicated, please choose the worse value
** Attention !!! Do not expose sensor head to hot water >50 °C or water steam!

!! WARNING – SAFETY INFORMATION !!

These devices are not designed for critical safety or emergency shut-down purposes. Therefore they should never be used in an application, where a malfunction of the device could cause personal injury.
**TECHNICAL DRAWINGS UFP SERIES**

**UFP-200**
Measuring range: 250 mm
Output: 1 x Switching Output or 0...10 V

**UFP-400/ 500/ 800/ 1600/ 2000:**
Measuring range: up to 2000 mm
Output: 2 x Switching output or 0...10 V or 4...20 mA

**UFP-3500:**
Measuring range: 3500 mm
Output: 2 x Switching output or 0...10 V or 4...20 mA

<table>
<thead>
<tr>
<th>Model</th>
<th>X</th>
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<tbody>
<tr>
<td>UFP-400</td>
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<tr>
<td>UFP-500/800/1600/2000</td>
<td>96</td>
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</table>

**TECHNICAL DRAWINGS UPA SERIES**

**UPA-6000:**
Measuring range: 6000 mm
Output: 2 x Switching output or 0...10 V or 4...20 mA
**ELECTRICAL CONNECTIONS**

**UFP-200: PIN configuration**

<table>
<thead>
<tr>
<th>PIN</th>
<th>Description</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+ 24 V</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Teach-In</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Switch / Analog output</td>
<td></td>
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<tr>
<td>3</td>
<td>0 V</td>
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</tbody>
</table>

**UFP-200: connection cable, 4 pole**

**Cable with M12 connector, 4-pole, IP67**
- K4P2M-S-M12 2 m, M12-connector straight
- K4P5M-S-M12 5 m, M12-connector straight
- K4P10M-S-M12 10 m, M12-connector straight
- K4P2M-SW-M12 2 m, M12-connector angular
- K4P5M-SW-M12 5 m, M12-connector angular
- K4P10M-SW-M12 10 m, M12-connector angular

**PIN No.** | **cable colour**<br>Pin 1 brown<br>Pin 2 white<br>Pin 3 blue<br>Pin 4 black

**UFP-400/ 500/ 800/ 1600/ 2000/ 3500 with analog output: output configuration**

**UFP-400/ 500/ 800/ 1600/ 2000/ 3500 as proximity switch: output configuration**

**UPA-6000 with analog output: PIN configuration**

**UPA-6000 as proximity switch: PIN configuration**

**UFP-400/ 500/ 800/ 1600/ 2000/ 3500 and UPA-6000: connection cable, 5 pole**

**Cable with M12 connector, 5-pole, shielded, IP67**
- KSP2M-S-M12 2 m, M12-connector straight
- KSP5M-S-M12 5 m, M12-connector straight
- KSP10M-S-M12 10 m, M12-connector straight
- KSP2M-SW-M12 2 m, M12-connector angular
- KSP5M-SW-M12 5 m, M12-connector angular
- KSP10M-SW-M12 10 m, M12-connector angular

**PIN No.** | **Cable colour**<br>Pin 1 brown<br>Pin 2 white<br>Pin 3 blue<br>Pin 4 black<br>Pin 5 grey

**Cable with M12 connector, 5-pole, shielded, IP67**
- KSP2M-S-M12 2 m, M12-connector straight
- KSP5M-S-M12 5 m, M12-connector straight
- KSP10M-S-M12 10 m, M12-connector straight
- KSP2M-SW-M12 2 m, M12-connector angular
- KSP5M-SW-M12 5 m, M12-connector angular
- KSP10M-SW-M12 10 m, M12-connector angular

**PIN No.** | **Cable colour**<br>Pin 1 brown<br>Pin 2 white<br>Pin 3 blue<br>Pin 4 black<br>Pin 5 grey
Analog Output 0...10 V / 4...20 mA (Teach-In)

**Normal operation:**
EC (Echo LED) GREEN: Activates whenever echo is received (support for orientation).
P1 LED, P2 LED YELLOW: One of the lamps is lit whenever the target quits the zone between P1 and P2
Teach-In (Line): Connect activating line to GND (time required for teach-in: ca. 30 sec).

**Characteristic curve (P1 < P2):** P1 = 0 V / 4 mA und P2 = 10 V / 20 mA
1. Teach-In must remain coupled to GND (ca. 6 - 8 sec.), until EC (Echo LED) and P1 start to flash (2 Hz) (UFP-200 only YELLOW).
2. Now P1 starts to flash (1 Hz), and EC (Echo) is ready to operate, serving as an aid for orientation. For UFP-200 model however, only YELLOW flashes (frequency ½ Hz). The reference object has to be positioned in position 0 V / 4 mA. Acknowledge by interconnecting Teach-In and GND, just for a moment. From now on, the sensor works in normal operation with this selected P1 value.
3. Connect Teach-In to GND one more time (for ca. 15 - 16 sec.), until EC (Echo LED) and P2 start to flash (2 Hz). For model UFP-200, only YELLOW flashes (frequency 1 Hz).
4. Procedure of step 2 is repeated for P2: As soon as the reference object has been installed in position 10 V / 20 mA (do not forget to confirm, as described above), the sensor accepts the new value for P2 and uses it for further operation.

**Inverted characteristic curve (P2 < P1):** P2 = 0 V / 4 mA und P1 = 10 V / 20 mA

2 point proximity switch (Teach-In)

**Normal operation:**
EC (Echo LED) GREEN: Is lit whenever echo is received (simplifies orientation).
P1 and P2 LED YELLOW: State of break-over point SP1 resp. SP2
Teach-In: Activating line (time required for teach-in: ca. 30 sec)

**Set-up procedure for switching point SP1**
1. Teach-In line must be coupled to GND (ca. 6 - 8 sec.), until EC (Echo LED) and P1 start to flash (2 Hz). For UFP-200: Only YELLOW.
2. P1 starts to flash at a frequency of 1 Hz, and EC LED is active (for orientation purpose). For UFP-200 however, YELLOW flashes (only ½ Hz). The reference object has to be positioned. Acknowledge by shorting Teach-In and GND.
3. During teach-in, LED P1 visualizes the behavior of switching point SP1. If the lamp is lit: NO for SP1. Lamp off: NC characteristics.

**Set-up procedure for switching point SP2**
1. Teach-In line must be coupled to GND (ca. 14 - 18 sec.), until EC (Echo LED) and P2 start to flash (2 Hz). For UFP-200 only yellow (1 Hz).
2. P2 starts to flash at a frequency of 1 Hz, and EC LED is active (support for orientation). For UFP-200 however, only YELLOW flashes (½ Hz). The reference object has to be positioned. Acknowledge by shorting Teach-In and GND.
3. During teach-in, LED P1 visualizes the behavior of switching point SP2. If the lamp is lit: NO for SP1. Lamp off: NC characteristics.

**Window function / hysteresis function**
1. If for UFP-200, teach-in procedure is carried out only for SP1, SP2 automatically is accepted for this distance + 1%.
2. If both P1 and P2 LED’s are OFF, the sensor reads the window function. If an object is between P1 and P2, then: SP1 ON, SP2 OFF
3. If during Teach-In, both P1 and P2 LED’s are lit, the sensor uses the hysteresis function. SP1 (normally open contact) and SP2 (normally closed contact) are at P1 and have the hysteresis of P1-P2.
SOUND CONE GEOMETRY

The exact geometry of the sound cone depends on the air-pressure, temperature, humidity and the size of the target.
**ORDER CODE UFP SERIES**

**Output**
- Switching output, 1 X PNP
- Voltage output 0...10 V

**Connection**
- M12 connector output axial

**measurement range**
- 30...400 mm
- 400
- 60...500 mm
- 500
- 100...800 mm
- 800
- 80...1600 mm
- 1600
- 200...2000 mm
- 2000

**ORDER CODE UPA SERIES**

**Output**
- Switching output, 2 X PNP
- Voltage output 0...10 V
- Current output 4...20 mA

**Connection**
- M12 connector output axial

**ACCESSORIES**

- **Cable with M12 connector, 5-pole, shielded**
  - KSP2M-S-M12
  - KSP5M-S-M12
  - KSP10M-S-M12
  - KSP2M-SW-M12
  - KSP5M-SW-M12
  - KSP10M-SW-M12

- **Cable with M12 connector, 4-pole (for UFP-200)**
  - K4P2M-S-M12
  - K4P5M-S-M12
  - K4P10M-S-M12

- **Connector M12, 5-pole, shielded**
  - D5-G-M12-S
  - D5-W-M12-S

- **Connector M12, 4-pole (for UFP-200)**
  - D4-G-M12-S
  - D4-W-M12-S

Subject to change without prior notice.