### Product description
The pico+ sensor offers a non-contact measurement of the distance to an object which must be positioned within the sensor’s detection zone. The switched output is set conditional upon the adjusted detect distance. The ultrasonic transducer surface of the pico+ sensors is laminated with a PTFE film (Teflon film). The transducer is sealed against the housing by a joint ring. This composition permits measurement in up to 0.5 bar over pressure. Via the Teach-in procedure, the detect distance and operating mode can be adjusted. Two LEDs indicate operation and the state of the switched output.

### IO-Link
The pico+ sensors are IO-Link-capable in accordance with IO-Link specification V1.0.

### Safety instructions
- Read the operating instructions prior to start-up.
- Connection, installation and adjustments may only be carried out by qualified staff.
- No safety component in accordance with the EU Machine Directive.

### Use for intended purpose only
pico+ ultrasonic sensors are used for non-contact detection of objects.

### Installation
Mount the sensor at the place of fitting.

### Start-up
- Connect the power supply.
- Carry out sensor adjustment in accordance with the diagram.

### Factory setting
- Detect point operation
- Switched output on NOC
- Detect distance at operating range
- Multi-function input »Com« set to »Teach-in«
- Filter at F01
- Filter strength at P00

### Operating modes
Three operating modes are available for the switched output:
- Operation with one detect point
  - The switched output is set when the object falls below the set detect point.

### Disconnect Com from -U
- Switch off operating voltage
- Disconnect Com from -U
- Keep Com connected to -U for about 3 s, until both LEDs flash simultaneously
- Disconnect Com from -U before switching off supply voltage

### Further Settings
- Switch off operating voltage
- Disconnect Com from -U
- Keep Com connected to -U for about 13 s, until both LEDs flash simultaneously
- Disconnect Com from -U before switching off supply voltage

### Notes
- The sensors of the pico+ family have a blind zone, within which a distance measurement is not possible.
- The Pico+ sensors are equipped with an internal temperature compensation. Due to the sensors self-heating, the temperature compensation reaches its optimum working point after approx. 120 seconds of operation.
- In the normal operating mode, an illuminated yellow LED signals that the switched output is switched through.
- The pico+ sensors have a push-pull switched output.
- In the »Two-way reflective barrier« operating mode, the object has to...
### Technical Data

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Push-Pull output</td>
<td>PNP circuit</td>
</tr>
<tr>
<td>Push-Pull output</td>
<td>NPN circuit</td>
</tr>
<tr>
<td>max. load current consumption</td>
<td>10 - 30 V DC, reverse polarity protection</td>
</tr>
<tr>
<td>voltage ripple</td>
<td>-3 V, -U</td>
</tr>
<tr>
<td>ambient pressure</td>
<td>up to 0.5 bar over pressure</td>
</tr>
<tr>
<td>max. tightening torque of nuts</td>
<td>1 Nm</td>
</tr>
<tr>
<td>type of connection</td>
<td>M12 circular plug</td>
</tr>
<tr>
<td>class of protection</td>
<td>EN 60 929</td>
</tr>
<tr>
<td>programmable</td>
<td>Teach-in, LinkControl</td>
</tr>
<tr>
<td>synchronisation</td>
<td>Internal synchronisation up to 10 sensors</td>
</tr>
<tr>
<td>storage temperature</td>
<td>-25°C to +70°C, -40°C to +85°C</td>
</tr>
<tr>
<td>switched output</td>
<td>Internal synchronisation up to 10 sensors</td>
</tr>
<tr>
<td>switching hysteresis</td>
<td>2 mm</td>
</tr>
<tr>
<td>switching frequency</td>
<td>25 Hz</td>
</tr>
<tr>
<td>response time</td>
<td>12 Hz</td>
</tr>
<tr>
<td>time delay before availability</td>
<td>20 ms</td>
</tr>
<tr>
<td>norm conformity</td>
<td>EN 60947-5-2</td>
</tr>
<tr>
<td>order no.</td>
<td>pico+15/TF/F</td>
</tr>
<tr>
<td></td>
<td>pico+25/TF/F</td>
</tr>
<tr>
<td></td>
<td>pico+35/TF/F</td>
</tr>
<tr>
<td></td>
<td>pico+100/TF/F</td>
</tr>
</tbody>
</table>

#### Blind Zone

- **Operating Range:**
  - 150 mm
  - 250 mm
  - 350 mm
  - 450 mm

- **Resolution:**
  - 0.069 mm
  - 0.12 mm

- **Angle of Beam Spread:**
  - 10°
  - 20°
  - 30°
  - 40°

- **Weight:**
  - 30 g

- **Supply Voltage:**
  - 10 - 30 V DC, reverse polarity protection
  - 10 V DC, reverse polarity protection

- **Accuracy:**
  - ±1 % (temperature drift internally compensated)

- **Synchronization:**
  - Internal synchronization up to 10 sensors

- **Response Time:**
  - 30 ms
  - 50 ms
  - 100 ms

- **Order No.:**
  - pico+15/TF/F
  - pico+25/TF/F
  - pico+35/TF/F
  - pico+100/TF/F

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### Fig. 4: Setting the Detect Point for Different Directions of Movement of the Object

- The sensor can be reset to its factory setting (see "Further settings").
- The LinkControl adapter (optional accessory) and the LinkControl software for Windows, all Teach-in and additional sensor parameter settings can be optionally undertaken.

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2014/30/EU
IO-Link mode
The pico+ sensors are IO-Link-capable in accordance with IO-Link specification V1.0.

**Pointers**
- In IO-Link mode Teach-in, Link-Control and synchronization via pin 5 are not available.
- In IO-Link mode pin 5 must not be connected to any potential.
- For current information about IO-Link please contact the microsonic sales department.

Synchronisation in IO-Link mode
In IO-Link mode each sensor is synchronized on the protocol of the IO-Link master. In multiple sensor operation the sensors are synchronous if the master protocol is synchronous.

Process data
The pico+ cyclically transmits the measured distance value with a resolution of 0.1 mm and the state of the switched output.

**Service data**
The following sensor parameters may be set via IO-Link interface using the IO-Link device description (IODD).

**Detect point 1**
The switched output is activated when the distance to an object is under that of the present detect point.

**Return detect point 1**
The switched output is reactivated when the distance to an object is greater than the present return detect point (detect point + hysteresis).

**Detect point 2, return detect point 2**
By programming these two detect points the window mode is activated.

**Measurement filter**
- pico+ ultrasonic sensors provide for a choice of 3 filter settings:
  - **F00**
    - No filter, each ultrasonic measurement acts in an unfiltered manner on the output.
  - **F01**
    - Standard filter, on the object configuration acts in a filter effect – can be selected for each measurement filter.
  - **F02**
    - Window filter effect – can be selected for each measurement filter.

**Filter strength**
- A filter strength between 0 – weak filter effect – and 9 – pronounced filter effect – can be selected for each measurement filter.

**Foreground suppression**
Spurious reflections, caused by objects in the foreground of the sensor may be blocked out by the foreground suppression.

**Pointer**
- Check that the object in the foreground does not cause multiple reflections.

**System commands**
- The object in the foreground must not cover the sensor in a way that the detection zone is influenced.

**System commands**
With 4 system commands the following settings may be carried out:
- Teach-in detect point – method A
- Teach-in detect point – method B
- Teach-in two way reflective barrier
- Reset sensor to factory settings

**IO-Link data**

<table>
<thead>
<tr>
<th>Physical layer</th>
<th>pico+15...</th>
<th>pico+25...</th>
<th>pico+35...</th>
<th>pico+100...</th>
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</thead>
<tbody>
<tr>
<td>SIO mode support</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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<tr>
<td>min cycle time</td>
<td>8.4 ms</td>
<td>8.4 ms</td>
<td>8.4 ms</td>
<td>8.4 ms</td>
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<td>baud rate</td>
<td>COM 2 (38.400 Bd)</td>
<td>COM 2 (38.400 Bd)</td>
<td>COM 2 (38.400 Bd)</td>
<td>COM 2 (38.400 Bd)</td>
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<tr>
<td>Format of process data</td>
<td>16 Bit, R, UNI16</td>
<td>16 Bit, R, UNI16</td>
<td>16 Bit, R, UNI16</td>
<td>16 Bit, R, UNI16</td>
</tr>
<tr>
<td>Content of process data</td>
<td>Bit 0: state of switched output; Bit 1-15: distance value with 0.1 mm resolution</td>
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<td>Bit 0: state of switched output; Bit 1-15: distance value with 0.1 mm resolution</td>
</tr>
</tbody>
</table>

**Service data IO-Link specific**

| Vendor name | microsonic GmbH | microsonic GmbH | microsonic GmbH | microsonic GmbH |
| Product name | pico+ | pico+ | pico+ | pico+ |
| Product ID | 15/F;15/WK/F | 15/F;15/WK/F | 15/F;15/WK/F | 15/F;15/WK/F |
| Product text | Ultrasonic Sensor | Ultrasonic Sensor | Ultrasonic Sensor | Ultrasonic Sensor |

**Detect point 1**
The switched output is activated when the distance to an object is (21,248 mm) 1 |

- **Return detect point 1**
The switched output is reactivated when the distance to an object is greater than the present return detect point (detect point + hysteresis).

- **Detect point 2**

<table>
<thead>
<tr>
<th>Service data IO-Link specific</th>
<th>index</th>
<th>access</th>
<th>value</th>
</tr>
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<tr>
<td><strong>Index</strong></td>
<td>index</td>
<td>access</td>
<td>value</td>
</tr>
<tr>
<td><strong>Access</strong></td>
<td>range (dez)</td>
<td>format</td>
<td>access value</td>
</tr>
<tr>
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<td>index</td>
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</tr>
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<td>format</td>
<td>access value</td>
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<tr>
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<td>access</td>
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<td>format</td>
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<td><strong>Value</strong></td>
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<td>access</td>
<td>value</td>
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**Service data IO-Link specific**

<table>
<thead>
<tr>
<th><strong>Index</strong></th>
<th><strong>Access</strong></th>
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<tbody>
<tr>
<td><strong>Detect point 1</strong></td>
<td><strong>Return detect point 1</strong></td>
<td><strong>Switching mode</strong></td>
</tr>
<tr>
<td><strong>Index</strong></td>
<td><strong>Range (dez)</strong></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td><strong>Access</strong></td>
<td><strong>Range (dez)</strong></td>
<td><strong>Format</strong></td>
</tr>
<tr>
<td><strong>Value</strong></td>
<td><strong>Format</strong></td>
<td><strong>Access</strong></td>
</tr>
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<td><strong>Format</strong></td>
<td><strong>Access</strong></td>
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<thead>
<tr>
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<th><strong>Format</strong></th>
<th><strong>Access</strong></th>
<th><strong>Value</strong></th>
</tr>
</thead>
</table>

**Detect point 2**
By programming these two detect points the window mode is activated.

**Filter strength**
- The measurement filter provides for a choice of 3 filter settings:
  - **F00**
    - No filter, each ultrasonic measurement acts in an unfiltered manner on the output.
  - **F01**
    - Standard filter, on the object configuration acts in a filter effect – can be selected for each measurement filter.
  - **F02**
    - Window filter effect – can be selected for each measurement filter.

**Filter strength**
- A filter strength between 0 – weak filter effect – and 9 – pronounced filter effect – can be selected for each measurement filter.

**Foreground suppression**
Spurious reflections, caused by objects in the foreground of the sensor may be blocked out by the foreground suppression.

**Pointer**
- Check that the object in the foreground does not cause multiple reflections.

**Teach-in detect point**
- Teach-in one way reflective barrier
- Reset to factory settings

**IO-Link file**
The latest IODD file you will find on the internet under www.microsonic.de/en/IODD

For further informations on IO-Link see www.io-link.com