**Product description**

The lpc+ 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 conditionally upon the adjusted detect distance, as an alternative to the set window margins, a distance proportional analogue signal is output.

Via the Teach-in procedure, the detect distance and operating mode can be adjusted. Two LEDs indicate operation and status of the switching and analogue outputs.

Use for intended purpose only

lpc+ ultrasonic sensors are used for non-contact detection of objects.

**Installation**

- Mount the sensor at the place of fitting.
- Connect a connection cable to the M12 device plug, see fig. 1.

**Start-up**

- Connect the power supply.
- Carry out sensor adjustment in accordance with the diagram »Sensor adjustment with the Teach-in procedure«.

Set operation specific parameters can be locked against changes with the teach-in procedure »Switch on or off Teach-in + Synchronization«.

**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:

- Operation with one detect point
- The switched output is set when the object falls below the detect point.
- Window mode
- The switched output is set when the object is within the set window.
- Two-way reflective barrier
- The switched output is set when the object is between sensor and fixed reflector.

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**Operating Instructions**

**Ultrasonic proximity switch**

with one analogue output, one switched output and IO-Link

**Sensor adjustment with Teach-in procedure**

<table>
<thead>
<tr>
<th>Set window margins</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detect point (+8%) - method A</td>
<td>Place object at position 1</td>
<td>Connect Com for about (3 \text{ s to } +U), until both LEDs flash simultaneously</td>
</tr>
<tr>
<td>Detect point (+15%) - method B</td>
<td>Place object at position 1</td>
<td>Connect Com for about (3 \text{ s to } +U), until both LEDs flash simultaneously</td>
</tr>
<tr>
<td>Window margins</td>
<td>Place object at position 2</td>
<td>Install reflector at position 3</td>
</tr>
<tr>
<td>Switched output on NOC</td>
<td>Set toggled output</td>
<td></td>
</tr>
<tr>
<td>Operation specific parameters</td>
<td>Set NOC/NCC</td>
<td></td>
</tr>
</tbody>
</table>

**Further Settings**

- Reset to factory setting
- Switch off operating voltage
- Disconnect Com from \(-U\) before switching off supply voltage
- Keep Com connected to \(-U\) for about \(3 \text{ s} \), until both LEDs stop flashing
- Keep Com connected to \(-U\) for about \(13 \text{ s} \), until both LEDs flash simultaneously
- To change operation characteristic connect Com for about \(1 \text{ s to } -U\)
Synchronisation

If under multiple sensor operation the assembly distance falls below the values shown in fig. 2, the internal synchronisation should be used. For this purpose set the switched outputs of all sensors in accordance with the diagram »Sensor adjustment with the Teach-in procedure«.

Then switch-on the multi-function output »Com« (pin 5) to »Teach-in« and »synchronisation« (see »Further settings«).

Finally interconnect each pin 5 of the sensors to be synchronised.

In the »Two-way reflective barrier« operating mode, the object has to be within the range of 0-85 % of the set distance.

In the »Set detect point – method A« Teach-in procedure the actual distance to the object is taught to the sensor as the detect point. If the object moves towards the sensor (e.g. with level control) then the taught distance is the level at which the sensor has to switch the output, see fig. 3.

If the object to be scanned moves into the detection area from the side, the »Set detect point +8 % – method B« Teach-in procedure should be used. In this way the switching distance is set 8 % further than the actual measured distance to the object.

This ensures a reliable switching distance even if the height of the objects varies slightly, see fig. 3.

Maintenance

Microsonic sensors are maintenance-free. In case of excess caked-on dirt we recommend cleaning the white sensor surface.

Notes

- The sensors of the lpc+ family have a blind zone, within which a distance measurement is not possible.
- The lpc+ 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 lpc+ sensors have a push-pull switching output.
- Using the LinkControl adapter LCA-2 (optional accessory) and the LinkControl software for Windows, all Teach-in and additional sensor parameter settings can be optionally undertaken.
- The latest IODD file and informations about start-up and configuration of lpc+ sensors with IO-Link, you will find online at: https://www.microsonic.de/lpc+

Fig. 2: Assembly distances

Fig. 3: Setting the detect point for different directions of movement of the object
### Technical data

#### Operating range and maximum range

<table>
<thead>
<tr>
<th>Type</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blind zone</td>
<td>20 mm</td>
</tr>
<tr>
<td>Operating range</td>
<td>150 mm</td>
</tr>
<tr>
<td>Maximum range</td>
<td>250 mm</td>
</tr>
</tbody>
</table>

#### Angle of beam spread

- Transducer frequency: 250 kHz
- Max. probing distance: 1,000 mm
- Max. working area: 1,4 m x 1,3 m x 1,2 m

#### Transducer frequency

- Ultrasonic transducer: polyurethane foam
- Frequency: 200 kHz

#### Response time

- Max. response time: 10 Hz
- Min. response time: 100 Hz

#### Housing

- Material: brass sleeve, nickel-plated, plastic parts: PBT
- Connection: 5-pin M12 circular plug

#### Operative voltage

- No load current consumption: < 60 mA
- Voltage ripple: ±1 % (temperature drift internally compensated)

#### Max. tightening torque of nuts

- Class protection per EN 60 529: IP 67
- Torque: 15 Nm

#### Operating temperature

- Storage temperature: -40°C to +85°C
- Operating temperature: -25°C to +70°C

#### Switched output

- Switchable NOC/NCC, short-circuit-proof
- Push-Pull, U
- Pull-Pull, U

#### Synchronisation

- Internal synchronisation: up to 10 sensors
- External synchronisation: up to 10 sensors

#### No-load current consumption

- Voltage drop: ±10 %
- Operating voltage: 10 - 30 V DC, reverse polarity protection (Class 2)

#### Reproducibility

- ±1 % (temperature drift internally compensated)
- ± 0.15 %

#### Response time

- Max. max. response time: 100 Hz
- Min. min. response time: 1000 Hz

#### Time delay before availability

- Analogue output 4-20mA
- Operating voltage: 10 - 30 V DC, reverse polarity protection (Class 2)

#### Order number

- Order no. directly radiating: lpc+100/CFI
- Weight: 40 g

#### Type of connection indicators

- Programmable by Teach-in:
- LinkControl

#### Type of connection

- 5-pin M12 circular plug

#### Maximum range

- Detection zones:
  - see detection zone
  - see detection zone
  - see detection zone

#### Accuracy

- ±1 % (temperature drift internally compensated)
- ±0.15 %

#### Type of protection per EN 60 529

- EN 60947-5-2
- lpc+15/WK/CFI
- Weight: 35 g

### Diagram

- Push-Pull output in npn circuit
- Push-Pull output in npn circuit

### Notes

1) Can be programmed with LinkControl

The dark grey areas represent the zone where it is easy to recognise the normal reflector (round bar). This indicates the typical alignment to the sensor. It is not possible to evaluate ultrasonic reflections outside this area.