Operating manual

Ultrasonic sensor with one analogue output

**Product description**

The lcs+ sensor offers a non-contact measurement of the distance to an object that has to be present within the sensor’s detection zone. Depending on the set window limits, a distance-proportional analogue signal is output. The window limits of the analogue output and its characteristic can be adjusted with the Teach-in procedure.

The sensor automatically detects the load put to the analogue output and switches to current output or voltage output respectively. Optionally all Teach-in and additional sensor parameter settings can be made using the LinkControl Adapter LCA-2 (optional accessory) and the LinkControl software for windows.

**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**

lcs+ 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.
- Optionally all Teach-in and additional sensor parameter settings can be made using the LinkControl Adapter LCA-2 (optional accessory) and the LinkControl software for windows.

**Start-up**

- Connect the power supply.
- Carry out sensor adjustment in accordance with the diagram.
- The sensor can be reset to its factory setting (see »Sensor adjustment with Teach-in procedure«).

**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 interconnect each pin 5 of maximum 10 sensors to be synchronised.

**Notes**

- The sensors of the lcs+ family have a blind zone, within which a distance measurement is not possible.
- The lcs+ sensors are equipped with an internal temperature compensation. Due to the sensors self-heating, the temperature compensation reaches its optimum working-point after approx. 30 minutes of operation.

**Maintenance**

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

**Sensor adjustment with Teach-in procedure**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Set window margins. Place object at position 1. Press T1 until both LEDs flash simultaneously (ca. 3 s). Both LEDs flash mutually (ca. 13 s). Turn OFF power supply. While pressing T1 turn ON power supply. Keep T1 pressed until both LEDs flash simultaneously (ca. 3 s). LED D1 flashes on: rising / off: falling output characteristic curve. LED D2 flashes off: Teach-in deactivated. To activate or deactivate Teach-in press T1 for about 1 s. Wait for 10 s. Normal mode operation.</td>
</tr>
<tr>
<td>2.</td>
<td>Set rising/falling output characteristic curve.</td>
</tr>
<tr>
<td>3.</td>
<td>Press T1 for about 1 s.</td>
</tr>
<tr>
<td>4.</td>
<td>To change output characteristic press T1 for about 1 s.</td>
</tr>
<tr>
<td>5.</td>
<td>Wait for 10 s.</td>
</tr>
</tbody>
</table>

**Set analogue output**

**Further Settings**

<table>
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<tr>
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<th>Description</th>
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<tbody>
<tr>
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</tr>
<tr>
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</tr>
</tbody>
</table>

**Factory Setting**

- Rising analogue characteristic curve.
- Window limits between blind zone and operating range.

**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 interconnect each pin 5 of maximum 10 sensors to be synchronised.

**Fig. 1:** Pin assignment with view onto sensor plug and colour coding of the microsonic connection cable

**Fig. 2:** Assembly distances

- d1 ≥ 1.10 m
- d2 ≥ 2.00 m
- d3 ≥ 30.00 m
- d4 ≥ 1.10 m
- d5 ≥ 2.00 m
- d6 ≥ 30.00 m
- d7 ≥ 1.10 m
- d8 ≥ 2.00 m
- d9 ≥ 30.00 m
- d10 ≥ 1.10 m

**Specifications**

- Operating mode: normal mode operation.
- Rising analogue characteristic curve.
- Window limits between blind zone and operating range.

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### Technical data

#### Analogue output

<table>
<thead>
<tr>
<th>Model</th>
<th>Blind zone</th>
<th>Operating range</th>
<th>Maximum range</th>
<th>Angle of beam spread</th>
<th>Transducer frequency</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>lcs+130/IU</td>
<td>0 to 200 mm</td>
<td>1,300 mm</td>
<td>2,000 mm</td>
<td>see detection zone</td>
<td>200 kHz</td>
<td>≤ 0.18 mm to 0.57 mm, depending on the analogue window</td>
</tr>
<tr>
<td>lcs+340/IU</td>
<td>0 to 350 mm</td>
<td>3,400 mm</td>
<td>5,000 mm</td>
<td>see detection zone</td>
<td>120 kHz</td>
<td>≤ 0.18 mm to 1.5 mm, depending on the analogue window</td>
</tr>
<tr>
<td>lcs+600/IU</td>
<td>0 to 600 mm</td>
<td>6,000 mm</td>
<td>8,000 mm</td>
<td>see detection zone</td>
<td>380 kHz</td>
<td>≤ 0.18 mm to 2.4 mm, depending on the analogue window</td>
</tr>
</tbody>
</table>

**Detection zones for different objects:**

The dark grey areas represent the zone where it is easy to recognise the normal reflector (round bar). This indicates the typical operating range of the sensors. The light grey areas represent the zone where a very large reflector – for instance a plate – can still be recognised. The requirement here is for an optimum alignment to the sensor. It is not possible to evaluate ultrasonic reflections outside this area.

- **U**
  - 9 V to 30 V DC, reverse polarity protection
  - ±10 % (temperature drift internally compensated; may be deactivated, 0.17 %/K without compensation)
- **IU**
  - 9 V to 30 V DC, reverse polarity protection
  - ±1 % (temperature drift internally compensated; may be deactivated, 0.17 %/K without compensation)
- **RL**
  - 15 V, short-circuit-proof
  - ± 0.15 %

**Reproducibility**

α ≤ 0.15 %

**Accuracy**

±1 % (temperature drift internally compensated; may be deactivated, 0.17 %/K without compensation)

**Operating voltage UB**

- **9 V to 30 V DC**
  - ±10 % (temperature drift internally compensated; may be deactivated, 0.17 %/K without compensation)
- **60 mA**

**No-load current consumption Uo**

- **≤ 50 mA**

**Housing**

- PBT, Polyester, ultrasonic transducer:
  - Polystyrene foam, epoxy resin with glass content
- SF 67

**Type of connection**

- 5-pin M12 circular plug, PBT
- 2 push-buttons
- Teach-in via push-buttons
- LCA-2 with LinkControl
- LED D1 green/red (object within/outside margins)

**Indicators**

- Internal synchronisation up to 10 sensors
- Internal synchronisation up to 10 sensors

**Synchronisation**

- Internal synchronisation up to 10 sensors
- Internal synchronisation up to 10 sensors

**Storage temperature**

- -40°C to +85°C
- -40°C to +85°C
- -40°C to +85°C

**Weight**

- 150 g
- 180 g
- 140 g

**Response time**

- 92 ms
- 172 ms
- 240 ms

**Synchronisation**

- Internal synchronisation up to 10 sensors
- Internal synchronisation up to 10 sensors
- Internal synchronisation up to 10 sensors

**Time delay before availability**

- ≤ 300 ms
- ≤ 400 ms
- ≤ 450 ms

**Order number**

- lcs+130/IU
- lcs+340/IU
- lcs+600/IU

**Current output 4 - 20 mA**

- R ≤ 100 Ω at 9 V ≤ Uo ≤ 15 V
- R ≤ 500 Ω at Uo ≥ 15 V

**Voltage output 0 - 10 V**

- RL ≤ 100 kΩ at Uo ≥ 15 V, short-circuit-proof
- rising/falling output characteristic

**Specifications**

- The content of this document is subject to technical changes. Specifications in this document are presented in a descriptive way only. They do not confirm any product features.