**Instrucr manual**

Lcs-Ultrasonic Sensors with one analogue output

**Product description**

- The lcs-sensor with one analogue output measures the distance to an object within the detection zone contactless. A signal proportional to distance is created according to the adjusted window margins of the analogue characteristic curve.
- The sensor automatically detects the load put to the analogue output and switches to current output or voltage output respectively.
- Choosing between rising and falling output characteristic is possible.
- Light emitting diodes (three-colour LEDs) indicate the operation conditions.
- The sensors can be trained using Teach-in procedures.
- Using the LinkControl adapter (optional accessory) all sensor parameter settings may be made by a Windows-Software.

**Important instructions for assembly and application**

All employee and plant safety-relevant measures must be taken prior to assembly, start-up, or maintenance work (see operation manual for the entire plant and the operator instruction of the plant).

The sensors are not considered as safety equipment and may not be used to ensure human or machine safety!

The lcs-sensors indicate a blind zone, in which the distance cannot be measured. The operating range indicates the distance of the sensor that can be applied with normal reflectors with sufficient function reserve.

When using good reflectors, such as a calm water surface, the sensor can also be used up to its maximum range. Objects that strongly absorb (e.g., plastic foam) or diffusely reflect sound (e.g., pebble stones) can also reduce the defined operating range.

**Assembly instructions**

- Assemble the sensor at the installation location.
- Plug in the connector cable to the M12 connector.

**Assembly distances**

The assembly distances shown in Fig. 2 for two or more sensors should not be fallen below in order to avoid mutual interference.

**Important notes**

- Lcs-sensors have internal temperature compensation. Because the sensors heat up on their own, the temperature compensation reaches its optimum working point after approx. 30 minutes of operation.
- If an object is within the set window margins of the analogue output, then LED D1 lights up green, if the object is outside the window margins, then LED D1 lights up red.
- The load put to the analogue output is detected automatically when turning supply voltage on.
- If the signal at the Com line does not change for 20 seconds during parameter setting mode the made changes are stored and the sensor returns to normal mode operation.
- You can reset the factory settings at any time, see »Lock Teach-in & factory setting«
- Lcs-sensors optional can be programmed using the LinkControl adapter LCA-2, see »Optional setting of parameters using the LinkControl adapter LCA-2«.

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

**Figure 2: Assembly distances**

**Start-up**

Lcs-sensors are delivered factory made with the following settings:

- Rising characteristic
- Window margins for the analogue output set to blind zone and operating range
- Measurement range set to maximum range

Set the parameters of the sensor using the Teach-in procedure.

**Assembly distances**

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**Lock Teach-in & factory setting**

Activate/deactivate Teach-in

Reset to factory setting

Turn supply voltage OFF

Keep Com connected to -UB until both LEDs flash simultaneously (ca. 13 s)

Keep Com connected to -UB until both LEDs flash simultaneously (ca. 3 s)

LED D1: Red, sensor return to Teach-in setting

LED D2: Green, Teach-in activated

LED D2: Red, Teach-in deactivated

To activate or deactivate Teach-in, connect Com to +U0 for about 1 s

Wait for 10 s

Normal mode operation

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**Normal mode operation**

Set analogue output

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### Technical data

<table>
<thead>
<tr>
<th></th>
<th><strong>lcs-25</strong></th>
<th></th>
<th><strong>lcs-35</strong></th>
<th></th>
<th><strong>lcs-130</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Blind zone</strong></td>
<td>0 to 30 mm</td>
<td></td>
<td>0 to 65 mm</td>
<td></td>
<td>0 to 100 mm</td>
</tr>
<tr>
<td><strong>Operating range</strong></td>
<td>350 mm</td>
<td></td>
<td>500 mm</td>
<td></td>
<td>1,300 mm</td>
</tr>
<tr>
<td><strong>Maximum range</strong></td>
<td>1,300 mm</td>
<td></td>
<td>3,000 mm</td>
<td></td>
<td>6,000 mm</td>
</tr>
<tr>
<td><strong>Angle of beam spread</strong></td>
<td>0 to 65 mm</td>
<td></td>
<td>0 to 250 mm</td>
<td></td>
<td>0 to 350 mm</td>
</tr>
<tr>
<td><strong>Transducer frequency</strong></td>
<td>320 kHz</td>
<td></td>
<td>400 kHz</td>
<td></td>
<td>500 kHz</td>
</tr>
<tr>
<td><strong>Resolution, sampling rate</strong></td>
<td>0,18 mm</td>
<td></td>
<td>0,18 mm</td>
<td></td>
<td>0,18 mm</td>
</tr>
<tr>
<td><strong>Reproducibility</strong></td>
<td>± 0,15 %</td>
<td></td>
<td>± 0,15 %</td>
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<td>± 0,15 %</td>
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</tbody>
</table>

**Detection zones** for different objects:
The dark grey areas are determined with a thin round bar (10 mm dia.) and indicate the typical operating range of a sensor. In order to obtain the light grey areas, a plate (100 x 100 mm) is introduced into the beam spread from the side. In doing so, the optimum angle between plate and sensor is always employed. This therefore indicates the maximum detection zone of the sensor. It is not possible to evaluate ultrasonic reflections outside this area.

**Accuracy**
- Temperature drift internal compensated, ± 2 %, may be deactivated (0,17 %/K without compensation)

**Operating voltage**
- 9 V to 30 V DC, reverse polarity protection

**No-load current consumption**
- ≤ 60 mA

**Housing**
- PBT

**Class of protection to EN 60 529**
- IP 65

**Type of connection**
- 5-pin M12 initiator plug

**Indicators**
- 2 three-colour LEDs

**Programmable**
- Yes, with LCA-2 & LinkControl

**Temperature drift internal compensated, ± 2 %, may be deactivated (0,17 %/K without compensation**

**Order No.**
- **lcs-25/IU/QP**
- **lcs-35/IU/QP**
- **lcs-130/IU/QP**

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<tbody>
<tr>
<td><strong>Current output 4 – 20 mA</strong></td>
<td>R_L ≤ 100 kΩ at U_L ≤ 15 V, short-circuit-proof</td>
<td></td>
<td>R_L ≤ 100 kΩ at U_L ≤ 15 V, short-circuit-proof</td>
<td></td>
<td>R_L ≥ 100 kΩ at U_L ≥ 15 V, short-circuit-proof</td>
</tr>
<tr>
<td><strong>Voltage output 0 – 10 V</strong></td>
<td>Rising/falling output characteristic</td>
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1) Can be programmed with LinkControl
Optional setting of parameters using the LinkControl Adapter LCA-2 (Offline programming)

Offline programming
- Load Sensor parameters in the LinkControl Adapter LCA-2
- Change parameters and additional functions as described here
- Write changed parameters back into the LCA-sensor

Please refer to the quick reference guide on the LCA-2.

Setting of additional functions in the LCA-2

Start here

Press T1 + T2 on the LCA-2 simultaneously for about 3 s until «Add» is shown in the LED-display.

Add

Low power mode
Display mode
Choose current/voltage output
Measurement filter
Filter strength
Response time
Foreground suppression
Multiplex mode
Multiplex device addressing
Measurement range
Detection zone sensitivity

Front

Choose rising / falling output characteristic curve

End

Note: Changes in the Add-on menu may impair the sensor function.
A6, A7, A8, A10, A11, A12 have influence on the response time of the sensor.

Start here

Press T1 + T2 simultaneously for about 13 s until «Add» is shown in the LED-display.

Add

Low power mode
Display mode
Choose current/voltage output
Measurement filter
Filter strength
Response time
Foreground suppression
Multiplex mode
Multiplex highest device address
Measurement range
Detection zone sensitivity

End

No function!
No function!
«Aut»: automatic detection of the load 
«Vo»: voltage output 
«Ic»: current output
«POf»: no filter 
«POh»: standard filter 
«POv»: averaging filter 
«POg»: foreground filter 
«POb»: background filter

Defines the strength of the chosen filter 
«POf»: weak filter up to 
«POb»: strong filter

Delay in seconds between the detection of an object and the output of the measured distance in case of object approach (behaves as on-delay). 
"00": 0 s (no delay) 
"20": 20 s response time

Minimum value: blind zone 
Maximum value: near-window limit - 1

No function!
No function!
Minimum value: sensor-distant window margin 
Maximum value: 999 mm for mic+25/..., mic+35/..., 999 cm for mic+130/..., mic+340/..., mic+600/...

Affects the size of the detection zone. 
«EOI»: high 
«EOV»: standard 
«EOG»: light

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