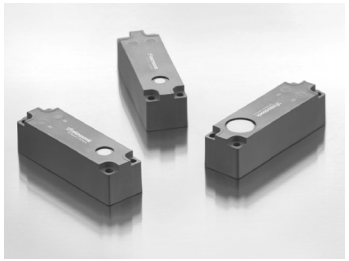
microsonic



**Operating Manual**

**Ultrasonic sensors with one analogue output**

**lcs-25/IU/QP**
**lcs-35/IU/QP**
**lcs-130/IU/QP**

## 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 sensor automatically detects the load put to the analogue output and switches to current output or voltage output respectively.
- You can choose between rising and falling output characteristics.
- Three-colour LEDs indicate the operation conditions.
- The sensor can be set via Teach-in procedure.
- Optionally all Teach-in and additional sensor parameter settings can be made using the LinkControl adapter (optional accessory) and the LinkControl software for Windows®.

## Safety Notes

- Read the operating manual prior to start-up.
- Connection, installation and adjustment works should be carried out by expert personnel only.
- No safety component in accordance with the EU Machine Directive, use in the area of personal and machine protection not permitted

## Proper Use

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

The lcs-sensors have a **blind zone** in which distance measurement is not possible. 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.

## Installation

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

| | | colour |
|---|---|---|
| 1 | $+U_B$ | brown |
| 3 | $-U_B$ | blue |
| 4 | – | black |
| 2 | I/U | white |
| 5 | Com | grey |

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

## 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.

| |  | |
|---|---|---|
| lcs-25... | >0.25 m | >1.30 m |
| lcs-35... | >0.35 m | >2.50 m |
| lcs-130... | >1.10 m | >8.00 m |

*Fig. 2: Assembly distances*

## Start-Up

➔ Connect the power supply.
➔ Set the sensor parameters using the Teach-in procedure, see Diagram 1.

## Factory Setting

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

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

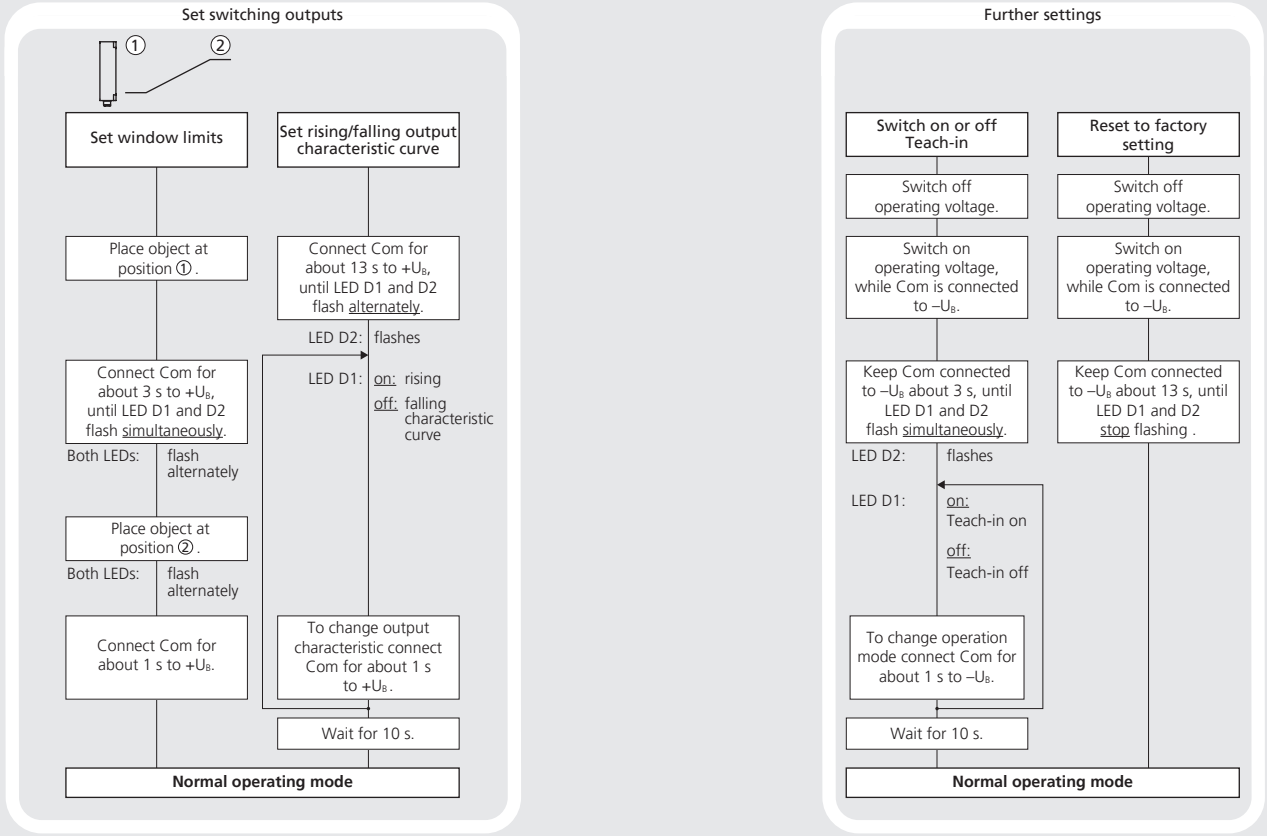
## Maintenance

microsonic sensors are maintenance-free. In case of excess caked-on dirt we recommend to clean the white sensor surface.

## 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.
- The load put to the analogue output is detected automatically when turning power supply on (the load must be connected to the analogue output before turning power supply on).
- If an object is within the set window limits of the analogue output, then LED D1 lights up green, if the object is outside the window limits, then LED D1 lights up red.
- If no signal is generated at the Com input for 20 seconds during the Teach-in procedure, the settings made up to that point are stored and the sensor returns to normal operating mode.
- The sensor can be reset to its factory setting (see Diagram 1).

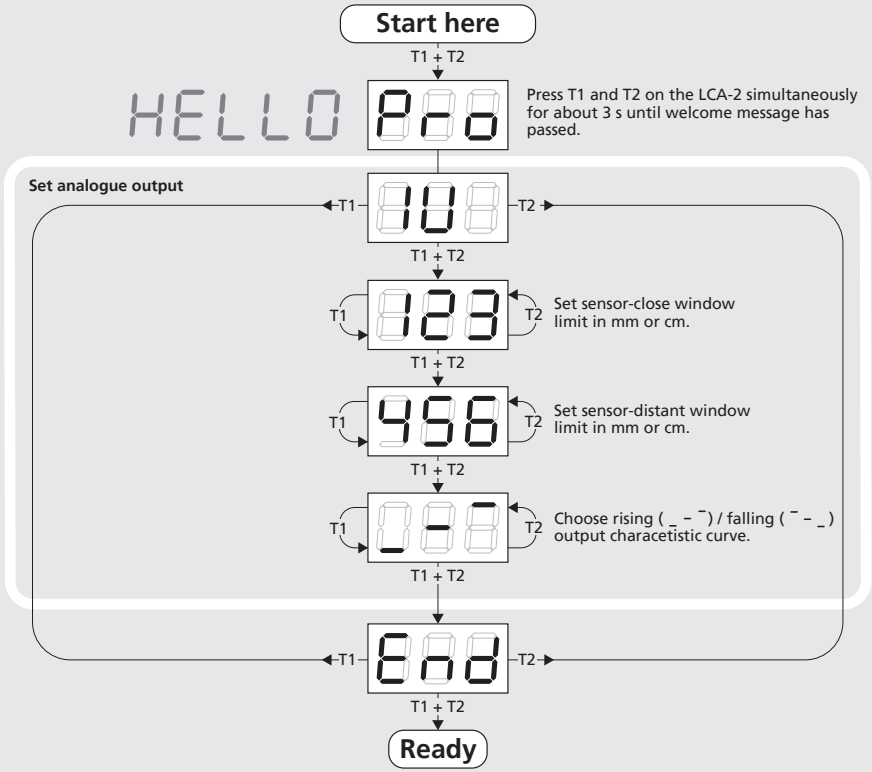
## Diagram 1: Set sensor parameters via Teach-in procedure



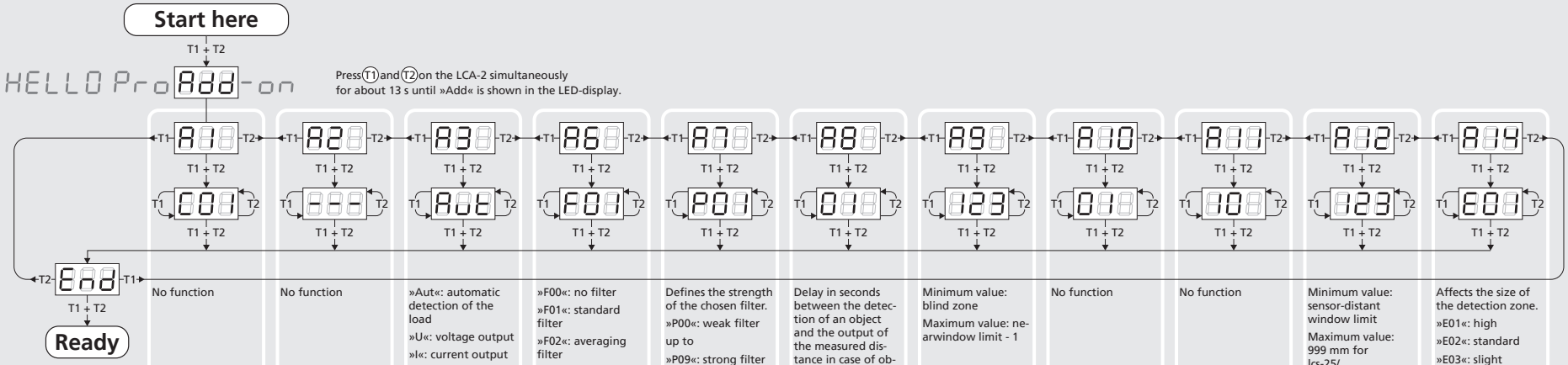
## Diagram 2: Optional setting of parameters using the LinkControl Adapter LCA-2 (Offline programming)

**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 lcs sensor.
- ➔ Refer to the quick reference guide on the LCA-2.

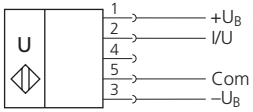


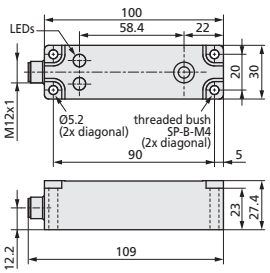
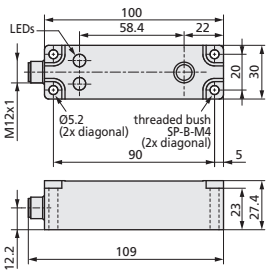
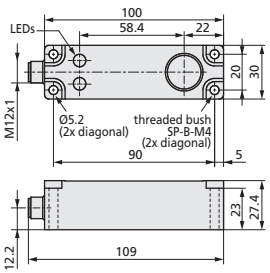
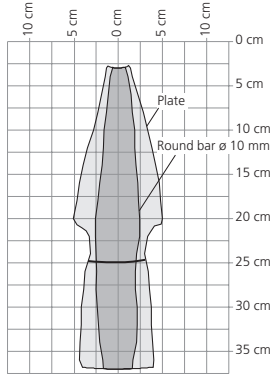
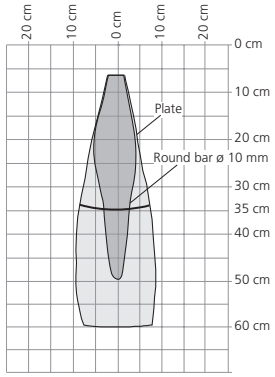
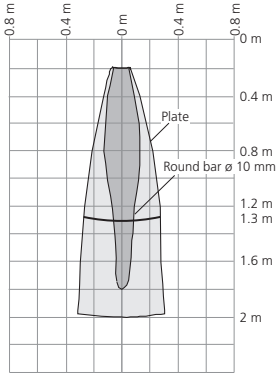

## Diagram 3: Useful additional functions in Add-on menu (for experienced users only, settings not required for standard applications)




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

## Technical data




| | lcs-25... | lcs-35... | lcs-130... |
|---|---|---|---|
| |   |   |   |
| **blind zone** | 0 to 30 mm | 0 to 65 mm | 0 to 200 mm |
| **operating range** | 250 mm | 350 mm | 1,300 mm |
| **maximum range** | 350 mm | 600 mm | 2,000 mm |
| **angle of beam spread** | see detection zone | see detection zone | see detection zone |
| **transducer frequency** | 320 kHz | 400 kHz | 200 kHz |
| **resolution** | 0.18 mm | 0.18 mm | 0.18 mm |
| **reproducibility** | ±0.15 % | ±0.15 % | ±0.15 % |
| **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. |   |   |   |
| **accuracy** | ≤2 % (temperature drift internally compensated; can be deactivated [1]), 0.17 %/K without compensation | ≤2 % (temperature drift internally compensated; can be deactivated [1]), 0.17 %/K without compensation | ≤2 % (temperature drift internally compensated; can be deactivated [1]), 0.17 %/K without compensation |
| **operating voltage $U_B$** | 9 to 30 V DC, reverse polarity protection | 9 to 30 V DC, reverse polarity protection | 9 to 30 V DC, reverse polarity protection |
| **voltage ripple** | ±10 % | ±10 % | ±10 % |
| **no-load current consumption** | <60 mA | <60 mA | <60 mA |
| **housing** | PBT ultrasonic transducer: polyurethane foam, epoxy resin with glass content | PBT ultrasonic transducer: polyurethane foam, epoxy resin with glass content | PBT ultrasonic transducer: polyurethane foam, epoxy resin with glass content |
| **class of protection per EN 60529** | IP 65 | IP 65 | IP 65 |
| **norm conformity** | EN 60947-5-2 | EN 60947-5-2 | EN 60947-5-2 |
| **type of connection** | 5-pin M12 circular plug | 5-pin M12 circular plug | 5-pin M12 circular plug |
| **controls** | Com input (pin 5) | Com input (pin 5) | Com input (pin 5) |
| **indicators** | 2 three-colour LEDs | 2 three-colour LEDs | 2 three-colour LEDs |
| **scope of settings** | Teach-in via Com (pin 5), LCA-2 and LinkControl | Teach-in via Com (pin 5), LCA-2 and LinkControl | Teach-in via Com (pin 5), LCA-2 and LinkControl |
| **operating temperature** | –25 to +70 °C | –25 to +70 °C | –25 to +70 °C |
| **storage temperature** | –40 to +85 °C | –40 to +85 °C | –40 to +85 °C |
| **weight** | 120 g | 120 g | 120 g |
| **response time** [2] | 50 ms | 70 ms | 110 ms |
| **time delay before availability** | <300 ms | <300 ms | <300 ms |
| **order no.** | **lcs-25/IU/QP** | **lcs-35/IU/QP** | **lcs-130/IU/QP** |
| **current output 4 to 20 mA** | $R_L$ ≤ 100 Ω at 9 V ≤ $U_B$ ≤ 20 V; $R_L$ ≤ 500 Ω at $U_B$ ≥ 20 V Rising/falling output characteristic | $R_L$ ≤ 100 Ω at 9 V ≤ $U_B$ ≤ 20 V; $R_L$ ≤ 500 Ω at $U_B$ ≥ 20 V Rising/falling output characteristic | $R_L$ ≤ 100 Ω at 9 V ≤ $U_B$ ≤ 20 V; $R_L$ ≤ 500 Ω at $U_B$ ≥ 20 V Rising/falling output characteristic |
| **voltage output 0 to 10 V** | $R_L$ ≥ 100 kΩ at $U_B$ ≥ 15 V, short-circuit-proof Rising/falling output characteristic | $R_L$ ≥ 100 kΩ at $U_B$ ≥ 15 V, short-circuit-proof Rising/falling output characteristic | $R_L$ ≥ 100 kΩ at $U_B$ ≥ 15 V, short-circuit-proof Rising/falling output characteristic |

[1] Can be programmed via LinkControl.
[2] With LinkControl the selected filter setting influences the response time.

**microsonic GmbH / Phoenixseestraße 7 / 44263 Dortmund / Germany / T** +49 231 975151-0 / **F** +49 231 975151-51 / **E** info@microsonic.de / **W** microsonic.de
The content of this document is subject to technical changes. Specifications in this document are presented in a descriptive way only. They do not warrant any product features.

2014/30/EU
MV-DO-074366-851870