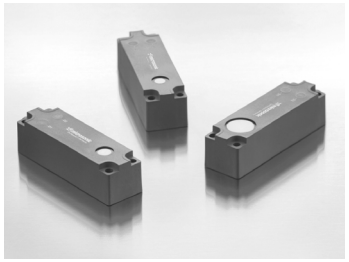
microsonic



Operating Manual

Ultrasonic sensor with two switching outputs

lcs-25/DD/QP
lcs-35/DD/QP
lcs-130/DD/QP

Product Description

- The lcs+ sensor offers a non-contact measurement of the distance to an object which must be positioned within the sensor's detection zone. The switching outputs are set conditional upon the adjusted detect distances.
- The output functions are adjustable from NOC to NCC.
- Three-colour LEDs indicate the switching status.
- 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.

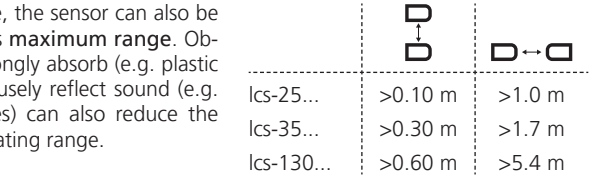
Installation

➔ 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	D2	black
2	D1	white
5	Com	grey

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



	D↕D	D↔D
lcs-25...	>0.10 m	>1.0 m
lcs-35...	>0.30 m	>1.7 m
lcs-130...	>0.60 m	>5.4 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:

- Switching outputs on NOC
- Detect distance at operating range and at half operating range
- Measurement range set to maximum range

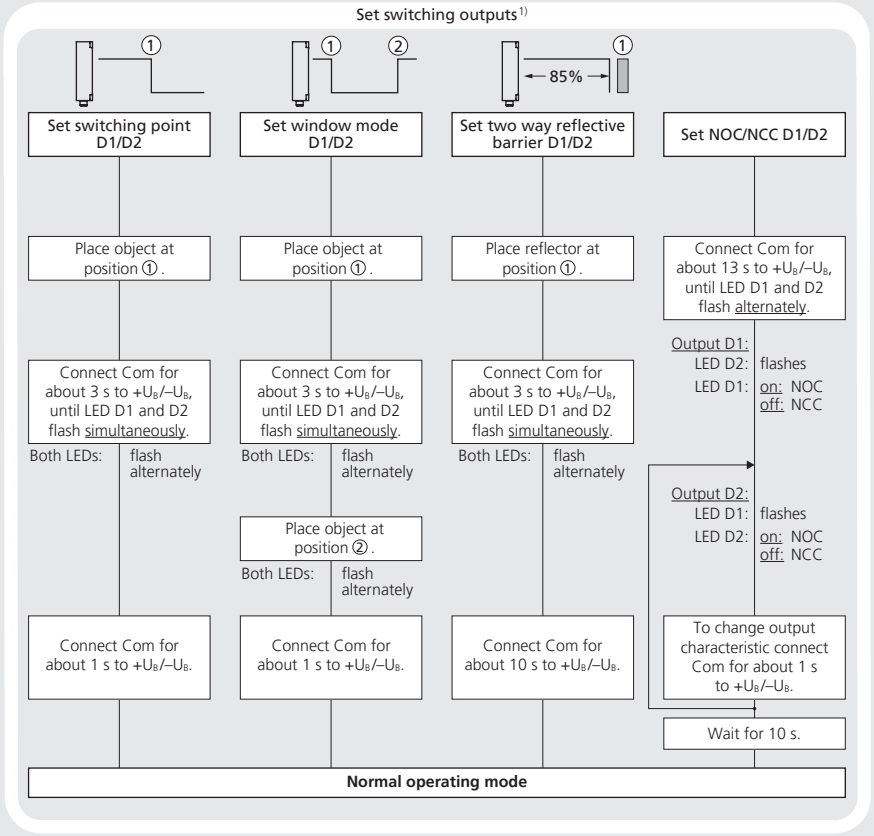
Maintenance

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.
- In the normal operating mode, an illuminated yellow LED signals that the corresponding switching output is set.
- During Teach-in procedure, the hysteresis loops are set back to factory settings.
- 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



1) Teach-in Switching output D1 (Pin 2): connect Com with $+U_B$.
Teach-in Switching output D2 (Pin 4): connect Com with $-U_B$.

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.

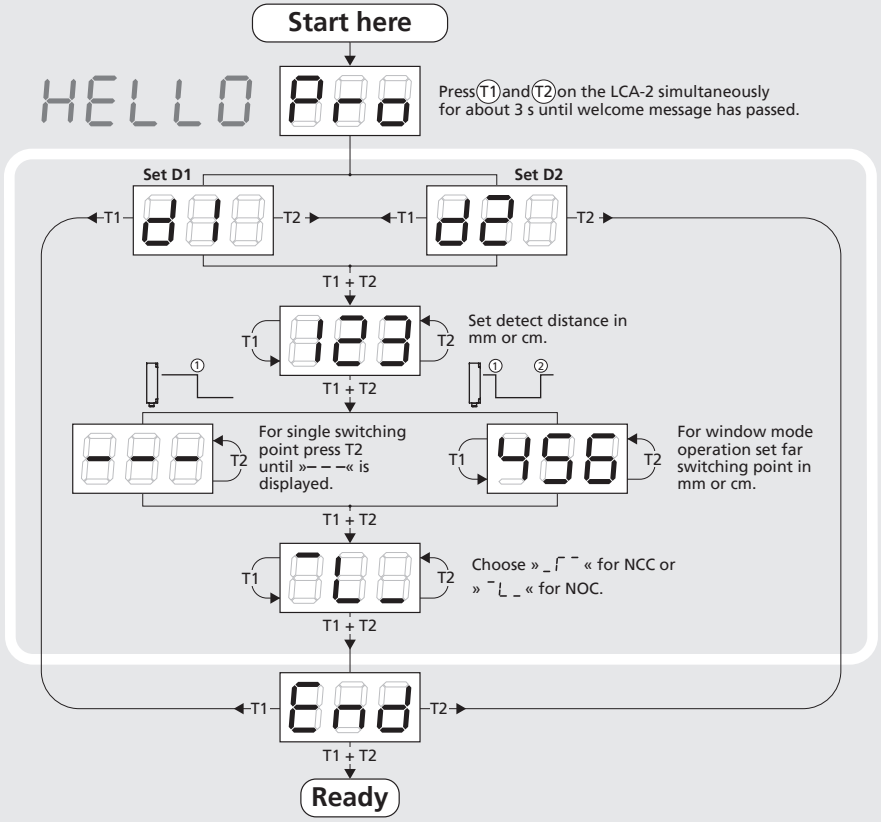
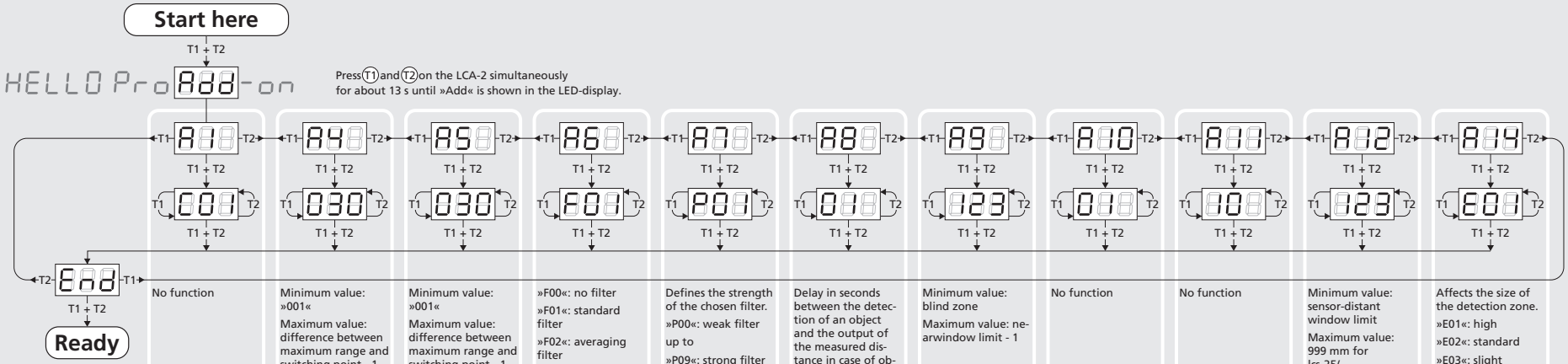


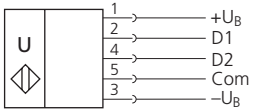
Diagram 3: Useful additional functions in Add-on menu (for experienced users only, settings not required for standard applications)

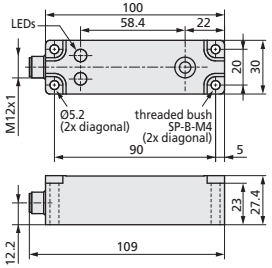
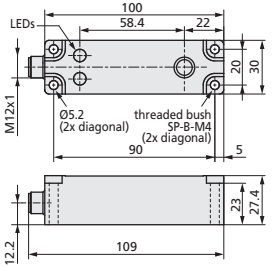
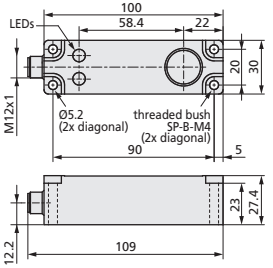
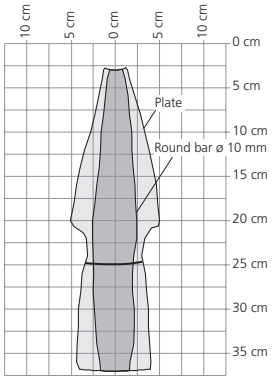
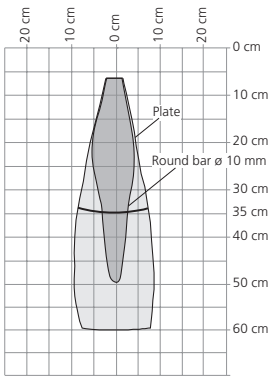
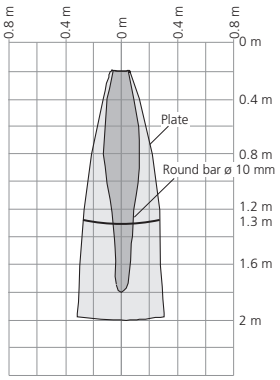


Note
Changes in the Add-on menu may impair the sensor function.
A6, A7, A8, A12 have influence on the response time of the sensor.

Low power mode	Hysteresis switching output D1	Hysteresis switching output D2	Measurement filter	Filter strength	Response time	Foreground suppression	Multiplex mode device addressing	Multiplex mode highest address	Measurement range	Detection zone sensitivity
No function	Minimum value: »001« Maximum value: difference between maximum range and switching point - 1 During window mode operation hysteresis influences both switching points.	Minimum value: »001« Maximum value: difference between maximum range and switching point - 1 During window mode operation hysteresis influences both switching points.	»F00«: no filter »F01«: standard filter »F02«: averaging filter »F03«: foreground filter »F04«: background filter	Defines the strength of the chosen filter. »P00«: weak filter up to »P09«: strong filter	Delay in seconds between the detection of an object and the output of the measured distance in case of object approach. "00": 0 s (no delay) up to "20": 20 s response time	Minimum value: blind zone Maximum value: nearwindow limit - 1	No function	No function	Minimum value: sensor-distant window limit Maximum value: 999 mm for lcs-25/..., lcs-35/..., 999 cm for lcs-130/...	Affects the size of the detection zone. »E01«: high »E02«: standard »E03«: slight

Technical data



	lcs-25...	lcs-35...	lcs-130...
			
blind zone	0 to 30 mm	0 to 65 mm	0 bis 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
switching hysteresis [1]	3 mm	5 mm	20 mm
switching frequency [2]	25 Hz	12 Hz	8 Hz
response time [2]	32 ms	64 ms	92 ms
time delay before availability	<300 ms	<300 ms	<300 ms
order no.	**lcs-25/DD/QP**	**lcs-35/DD/QP**	**lcs-130/DD/QP**
switching outputs	2x pnp, U_B – 2 V, I_{max} = 200 mA NOC/NCC adjustable, short-circuit-proof	2x pnp, U_B – 2 V, I_{max} = 200 mA NOC/NCC adjustable, short-circuit-proof	2x pnp, U_B – 2 V, I_{max} = 200 mA NOC/NCC adjustable, short-circuit-proof

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

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