microsonic

Operating Manual

**Ultrasonic sensor
with three switching outputs**

lcs-25/DDD/QP
lcs-35/DDD/QP
lcs-130/DDD/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.

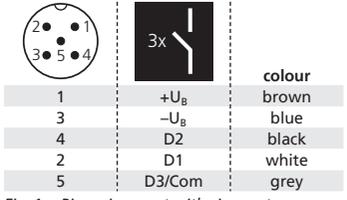|		colour
1	+U$_B$	brown
3	−U$_B$	blue
4	D2	black
2	D1	white
5	D3/Com	grey

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...	>0.10 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 4.

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 3).
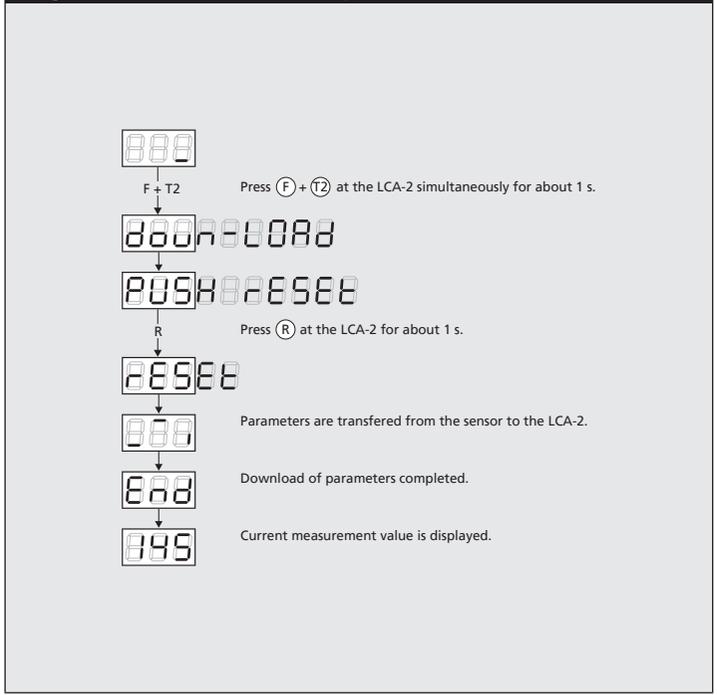

Diagram 1: Download of sensor parameters in the LCA-1

F + T2 — Press (F) + (T2) at the LCA-2 simultaneously for about 1 s.

door-LOAd

PUSH-rESEt — Press (R) at the LCA-2 for about 1 s.

rESEt — Parameters are transfered from the sensor to the LCA-2.

Download of parameters completed.

End

145 — Current measurement value is displayed.

Diagram 2: Upload of sensor parameters back to the sensor

F + T1 — Press (F) + (T1) at the LCA-2 simultaneously for about 1 s.

UP-LOAd

PUSH-rESEt — Press (R) at the LCA-2 for about 1 s.

rESEt — Parameters are transfered from the LCA-2 to the sensor.

Upload of parameters completed.

End

145 — Current measurement value is displayed.

Diagram 3: Factory setting

Further settings

Reset to factory setting

Switch off operating voltage.

Switch on operating voltage, while D3/Com is connected to −U$_B$.

Keep D3/Com connected to −U$_B$ about 13 s, until LED D1 and D2 stop flashing .

Normal operating mode

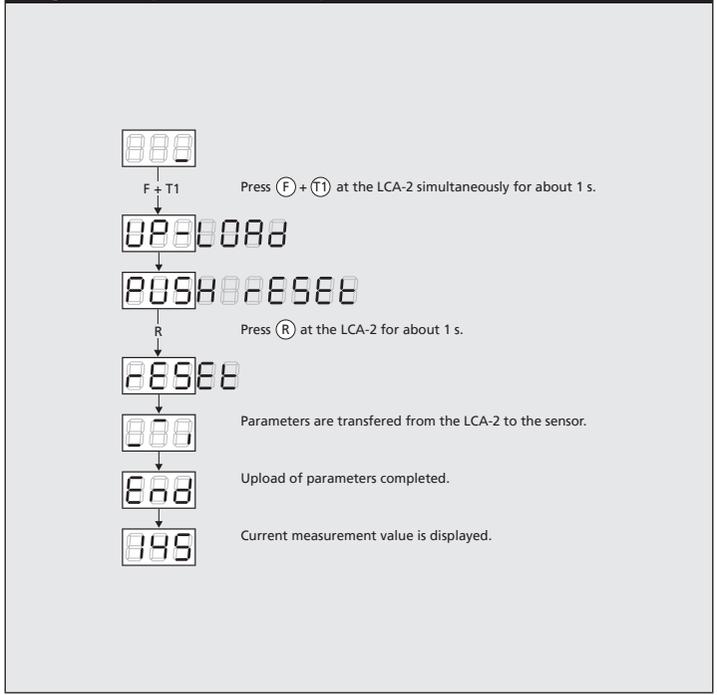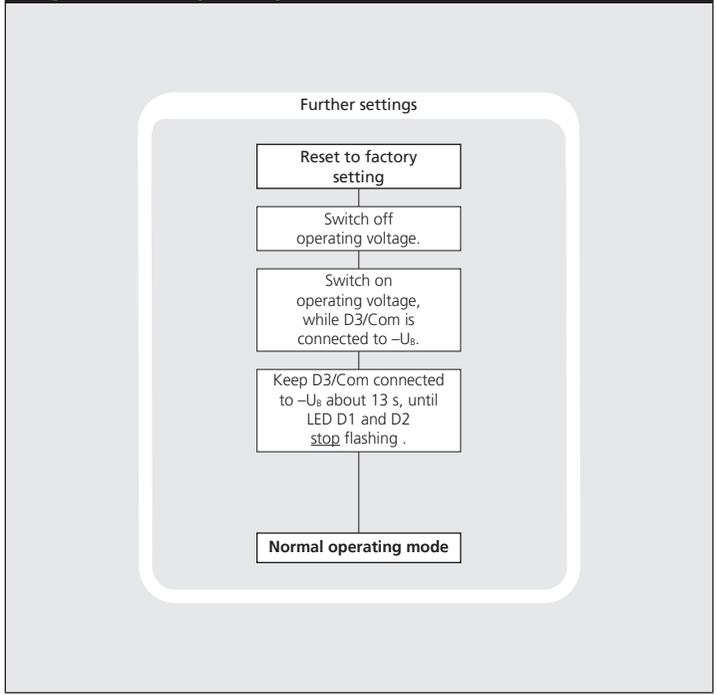## Diagram 4: Setting of parameters using the LinkControl Adapter LCA-2 (Offline programming)

Start here

HELLO **Pro**

Press T1 and T2 simultaneously for about 3 s until welcome message has passed.

Set switching output D1 — **Set switching output D2** — **Set switching output D3**

d1 — T1 / T2 — d2 — T2 / T1 — d3

T1 + T2

123 — Set detect distance in mm or cm.

T1 + T2

For single switching point press T2 until »– – –« is displayed.

456 — For window mode operation set far switching point in mm or cm.

T1 + T2

Choose » _⌐ ¯ « for NCC or » ¯ ⌐ _ « for NOC.

T1 + T2

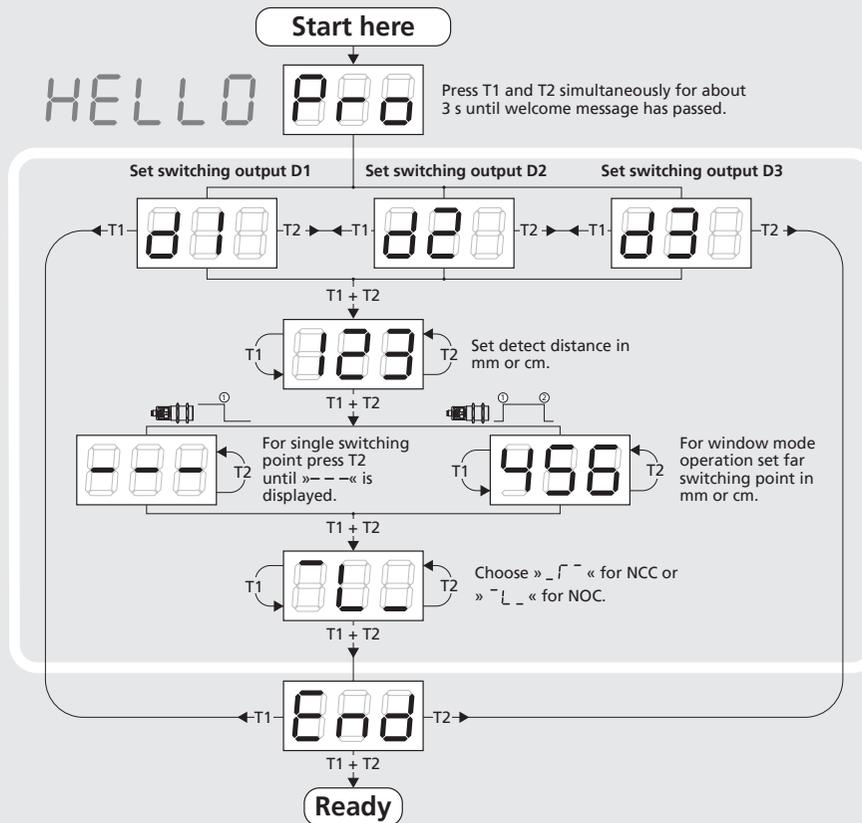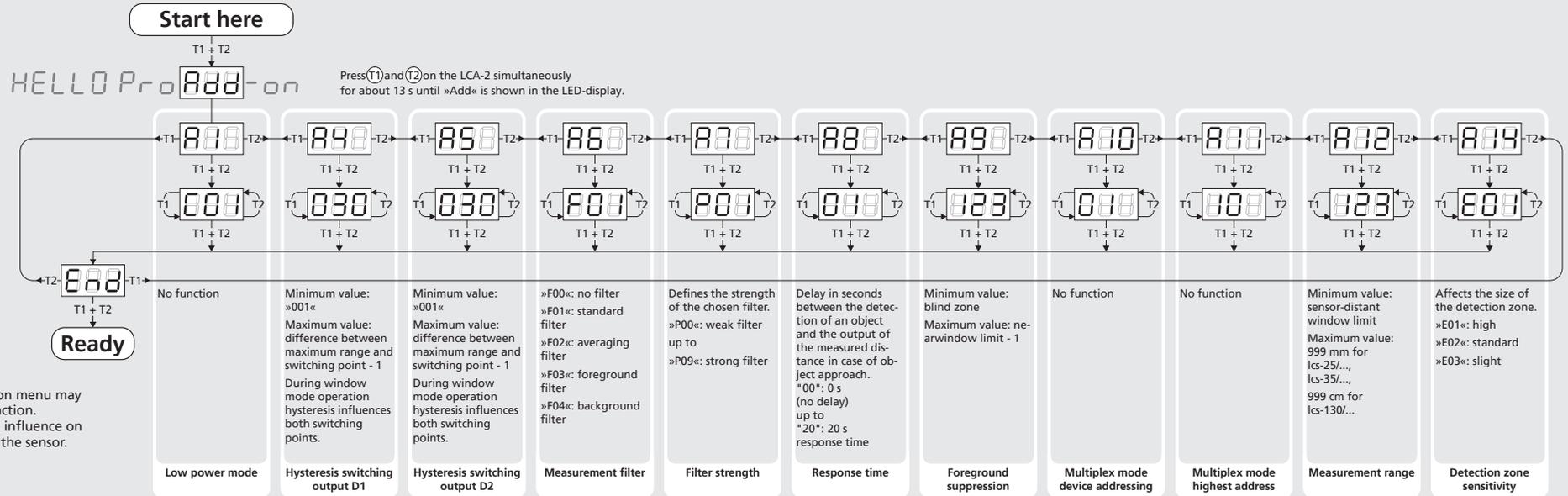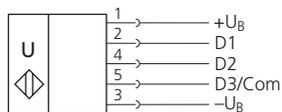**End**

T1 + T2

Ready

Diagram 5: Useful additional functions in Add-on menu (for experienced users only, settings not required for standard applications)

Start here

T1 + T2
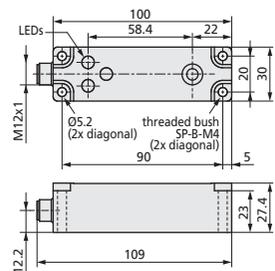
HELLO Pro **Add-on**

Press T1 and T2 on the LCA-2 simultaneously for about 13 s until »Add« is shown in the LED-display.

A3 — A4 — A5 — A6 — A7 — A8 — A9 — A10 — A11 — A12 — A14

A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A14
C01	030	030	F01	P01	018	123	018	108	123	E01

End

T1 + T2

Ready

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.

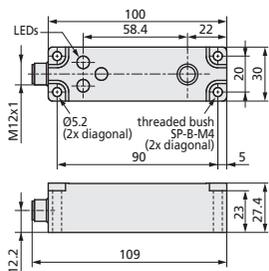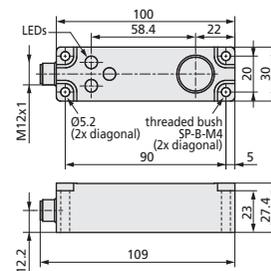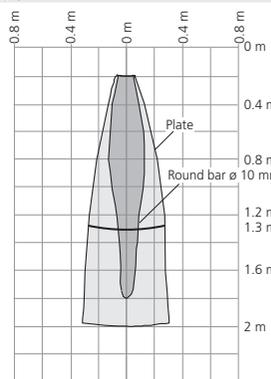|										
No function	Minimum value: »001« Maximum value: difference between maximum range and switching point - 1 During window mode operation hysteresis influences both switching points.	Minimum value: »001« Maximum value: difference between maximum range and switching point - 1 During window mode 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
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**

Technical data

	lcs-25... D·∙∙IIIⅡⅡⅡ	lcs-35... D·∙∙IIIⅡⅡⅡ	lcs-130... D·∙∙IIIⅡⅡ
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	<70 mA	<70 mA	<70 mA
housing	PBT	PBT	PBT
	ultrasonic transducer: polyurethane foam, epoxy resin with glass content	ultrasonic transducer: polyurethane foam, epoxy resin with glass content	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
indicators	3 three-colour LEDs	3 three-colour LEDs	3 three-colour LEDs
scope of settings	LCA-2 and LinkControl	LCA-2 and LinkControl	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]	11 Hz	8 Hz	6 Hz
response time [2]	50 ms	70 ms	110 ms
time delay before availability	<300 ms	<300 ms	<300 ms
order no.	**lcs-25/DDD/QP**	**lcs-35/DDD/QP**	**lcs-130/DDD/QP**
switching outputs	3x pnp, U_B – 2 V, I_{max} = 200 mA NOC/NCC adjustable, short-circuit-proof	3x pnp, U_B – 2 V, I_{max} = 200 mA NOC/NCC adjustable, short-circuit-proof	3x 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.

Connection diagram:
1 — +U_B
2 — D1
4 — D2
5 — D3/Com
3 — –U_B

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