



Product description
 The lpc+ sensor offers a non-contact measurement of the distance to an object which must be positioned within the sensor's detection zone. The switched output is set conditional upon the adjusted detect distance, as an alternative to the set window margins, a distance proportional analogue signal is output. Via the Teach-in procedure, the detect distance and operating mode can be adjusted. Two LEDs indicate operation and status of the switching and analogue outputs. The lpc+

- Operating Instructions**
- Ultrasonic proximity switch with one analogue output, one switched output and IO-Link**
- lpc+15/CFU lpc+15/WK/CFU
 - lpc+25/CFU lpc+25/WK/CFU
 - lpc+35/CFU lpc+35/WK/CFU
 - lpc+100/CFU lpc+100/WK/CFU

sensors are IO-Link-capable in accordance with IO-Link specification V1.1 and support Smart Sensor Profile like Digital Measuring Sensor.

- 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
 lpc+ 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.

- Start-up**
- Connect the power supply.
 - Carry out sensor adjustment in accordance with the dia-

gram »Sensor adjustment with the Teach-in procedure«. Set operation-specific parameters can be locked against changes with the teach-in procedure »Switch on or off Teach-in + Synchronization«.

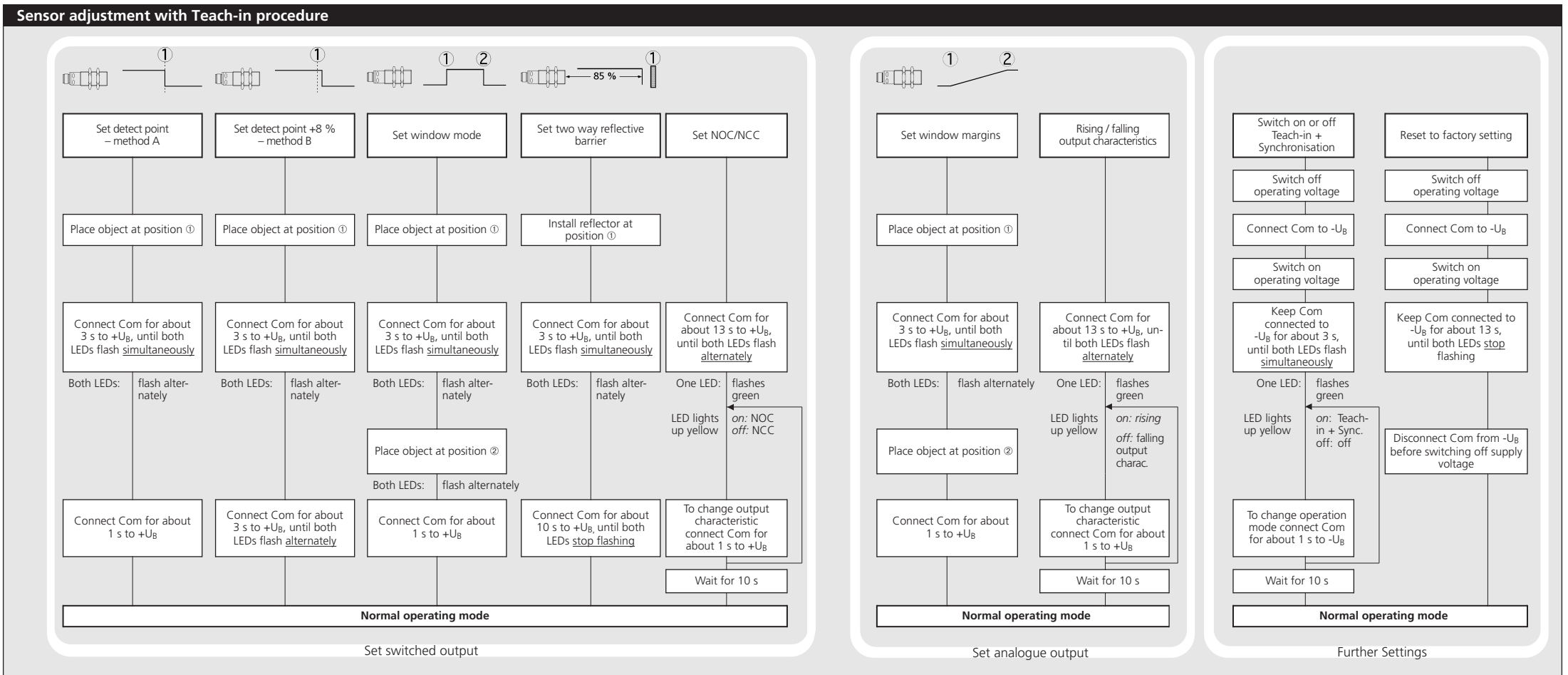
- Factory setting**
- Detect point operation
 - Switched output on NOC
 - Detect distance at operating range
 - Multifunction input »Com« set to »Teach-in«
 - Filter at F01
 - Filter strength at P00

		colour
1	+U _B	brown
3	-U _B	blue
4	F	black
2	U	white
5	Com	grey

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

Operating modes
 Three operating modes are available:

- Operation with one detect point



The switched output is set when the object falls below the set detect point.

- Window mode
The switched output is set when the object is within the set window.
- Two-way reflective barrier
The switched output is set when the object is between sensor and fixed reflector.

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 set the switched outputs of all sensors in accordance with the diagram »Sensor adjustment with the Teach-in procedure«. Then switch-on the multi-function output »Com« (pin 5) to »Teach-in« and »synchronisation« (see »Further settings«). Finally interconnect each pin 5 of the sensors to be synchronised.

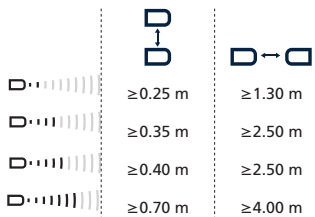


Fig. 2: Assembly distances

Maintenance

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

Notes

- The sensors of the lpc+ family have a blind zone, within which a distance measurement is not possible.
- The lpc+ sensors are equipped with an internal temperature compensation. Due to the sensors self heating, the temperature compensation reaches its optimum working-point after approx. 120 seconds of operation.
- In the normal operating mode, an illuminated yellow LED signals that the switched output is switched through.
- The lpc+ sensors have a push-pull switching output.
- In the »Two-way reflective barrier« operating mode, the object has to be within the range of 0-85 % of the set distance.
- In the »Set detect point – method A« Teach-in procedure the actual distance to the object is taught to the sensor as the detect point. If the object moves towards the sensor (e.g. with level control) then the taught distance is the level at which the sensor has to switch the output, see fig. 3.
- If the object to be scanned moves into the detection area from the side, the »Set detect point +8 % – method B« Teach-in procedure should be used. In this way the switching distance is set 8 % further than the actual measured distance to the object. This ensures a reliable switching distance even if the height of the objects varies slightly, see fig. 3.

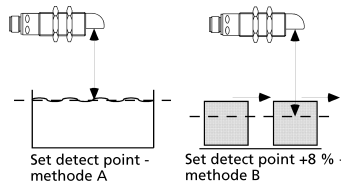
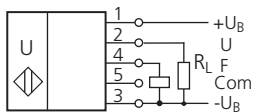


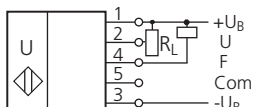
Fig. 3: Setting the detect point for different directions of movement of the object

- The sensor can be reset to its factory setting (see »Further settings«).
- Using the LinkControl adapter LCA-2 (optional accessory) and the LinkControl software for Windows, all Teach-in and additional sensor parameter settings can be optionally undertaken.
- The latest IODD file and information about start-up and configuration of lpc+ sensors with IO-Link, you will find online at: www.microsonic.de/lpc+

Technical data



Push-Pull output in pnp circuit



Push-Pull output in npn circuit

blind zone

operating range

maximum range

angle of beam spread

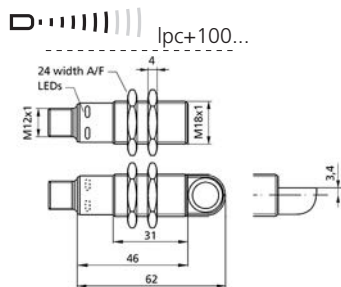
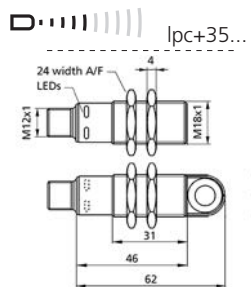
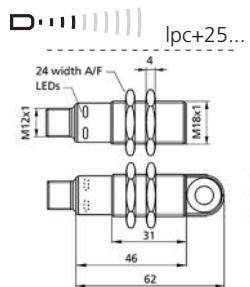
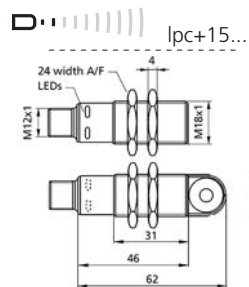
transducer frequency

resolution

reproducibility

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 recognized. The requirement here is for an optimum alignment to the sensor. It is not possible to evaluate ultrasonic reflections outside this area.



20 mm

150 mm

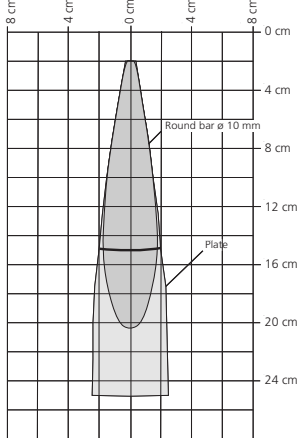
250 mm

see detection zone

380 kHz

0,1 mm

± 0.15 %



30 mm

250 mm

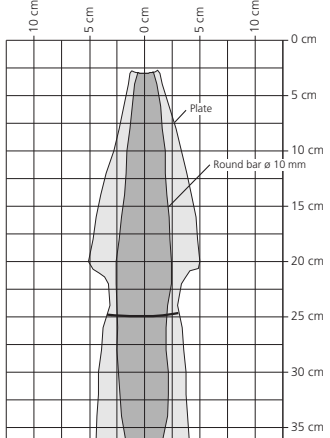
350 mm

see detection zone

320 kHz

0,1 mm

± 0.15 %



65 mm

350 mm

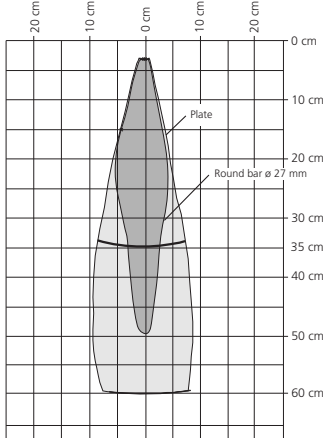
600 mm

see detection zone

400 kHz

0,1 mm

± 0.15 %



120 mm

1,000 mm

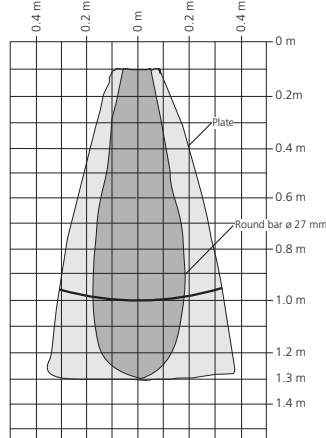
1,300 mm

see detection zone

200 kHz

0,1 mm

± 0.15 %



accuracy ±1 % (temperature drift internally compensated)

operating voltage U_B 10 - 30 V DC, reverse polarity protection (Class 2)

voltage ripple ±10 %

no-load current consumption < 60 mA

housing brass sleeve, nickel-plated, plastic parts: PBT; ultrasonic transducer: polyurethane foam, epoxy resin with glass content

max. tightening torque of nuts 15 Nm

class of protection per EN 60 529 IP 67

type of connection 5-pin M12 circular plug

controls Teach-in via pin 5 (Com)

indicators LED green (operation)

LED yellow (state of output)

programmable Teach-in, LinkControl

synchronisation internal synchronisation up to 10 sensors

operating temperature -25°C to +70°C

storage temperature -40°C to +85°C

switched output Push-Pull, U_B -3 V, $-U_B$ +3 V, I_{max} = 100 mA

switchable NOC/NCC, short-circuit-proof

switching hysteresis ¹⁾ 2 mm

switching frequency ¹⁾ 25 Hz

response time ¹⁾ 32 ms

time delay before availability ¹⁾ < 300 ms

analogue output 0-10 V R_L ≥ 100 kΩ, rising/falling characteristic, short-circuit-proof

operating voltage U_B R_L ≥ 100 kΩ at U_B ≥ 15 V, short-circuit-proof

terminal reverse polarity protected, Class 2

norm conformity EN 60947-5-2

order no. directly radiating **lpc+15/CFU**

weight 35 g

order no. angular head **lpc+15/WK/CFU**

weight 40 g

accuracy ±1 % (temperature drift internally compensated)

operating voltage U_B 10 - 30 V DC, reverse polarity protection (Class 2)

voltage ripple ±10 %

no-load current consumption < 60 mA

housing brass sleeve, nickel-plated, plastic parts: PBT; ultrasonic transducer: polyurethane foam, epoxy resin with glass content

max. tightening torque of nuts 15 Nm

class of protection per EN 60 529 IP 67

type of connection 5-pin M12 circular plug

controls Teach-in via pin 5 (Com)

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programmable Teach-in, LinkControl

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operating temperature -25°C to +70°C

storage temperature -40°C to +85°C

switched output Push-Pull, U_B -3 V, $-U_B$ +3 V, I_{max} = 100 mA

switchable NOC/NCC, short-circuit-proof

switching hysteresis ¹⁾ 3 mm

switching frequency ¹⁾ 25 Hz

response time ¹⁾ 32 ms

time delay before availability ¹⁾ < 300 ms

analogue output 0-10 V R_L ≥ 100 kΩ, short rising/falling characteristic, short-circuit-proof

operating voltage U_B R_L ≥ 100 kΩ at U_B ≥ 15 V, short-circuit-proof

terminal reverse polarity protected, Class 2

norm conformity EN 60947-5-2

order no. directly radiating **lpc+25/CFU**

weight 35 g

order no. angular head **lpc+25/WK/CFU**

weight 40 g

accuracy ±1 % (temperature drift internally compensated)

operating voltage U_B 10 - 30 V DC, reverse polarity protection (Class 2)

voltage ripple ±10 %

no-load current consumption < 60 mA

housing brass sleeve, nickel-plated, plastic parts: PBT; ultrasonic transducer: polyurethane foam, epoxy resin with glass content

max. tightening torque of nuts 15 Nm

class of protection per EN 60 529 IP 67

type of connection 5-pin M12 circular plug

controls Teach-in via pin 5 (Com)

indicators LED green (operation)

LED yellow (state of output)

programmable Teach-in, LinkControl

synchronisation internal synchronisation up to 10 sensors

operating temperature -25°C to +70°C

storage temperature -40°C to +85°C

switched output Push-Pull, U_B -3 V, $-U_B$ +3 V, I_{max} = 100 mA

switchable NOC/NCC, short-circuit-proof

switching hysteresis ¹⁾ 5 mm

switching frequency ¹⁾ 12 Hz

response time ¹⁾ 64 ms

time delay before availability ¹⁾ < 300 ms

analogue output 0-10 V R_L ≥ 100 kΩ, rising/falling characteristic, short-circuit-proof

operating voltage U_B R_L ≥ 100 kΩ at U_B ≥ 15 V, short-circuit-proof

terminal reverse polarity protected, Class 2

norm conformity EN 60947-5-2

order no. directly radiating **lpc+35/CFU**

weight 35 g

order no. angular head **lpc+35/WK/CFU**

weight 40 g

accuracy ±1 % (temperature drift internally compensated)

operating voltage U_B 10 - 30 V DC, reverse polarity protection (Class 2)

voltage ripple ±10 %

no-load current consumption < 60 mA

housing brass sleeve, nickel-plated, plastic parts: PBT; ultrasonic transducer: polyurethane foam, epoxy resin with glass content

max. tightening torque of nuts 15 Nm

class of protection per EN 60 529 IP 67

type of connection 5-pin M12 circular plug

controls Teach-in via pin 5 (Com)

indicators LED green (operation)

LED yellow (state of output)

programmable Teach-in, LinkControl

synchronisation internal synchronisation up to 10 sensors

operating temperature -25°C to +70°C

storage temperature -40°C to +85°C

switched output Push-Pull, U_B -3 V, $-U_B$ +3 V, I_{max} = 100 mA

switchable NOC/NCC, short-circuit-proof

switching hysteresis ¹⁾ 20 mm

switching frequency ¹⁾ 10 Hz

response time ¹⁾ 80 ms

time delay before availability ¹⁾ < 300 ms

analogue output 0-10 V R_L ≥ 100 kΩ, rising/falling characteristic, short-circuit-proof

operating voltage U_B R_L ≥ 100 kΩ at U_B ≥ 15 V, short-circuit-proof

terminal reverse polarity protected, Class 2

norm conformity EN 60947-5-2

order no. directly radiating **lpc+100/CFU**

weight 35 g

order no. angular head **lpc+100/WK/CFU**

weight 40 g

¹⁾ Can be programmed with LinkControl