AbN
automation

microsonic

Operating Instructions
Ultrasonic proximity switch with one analogue output, one switched output and IO-Link

lpc+15/CFI **lpc+15/WK/CFI**
lpc+25/CFI **lpc+25/WK/CFI**
lpc+35/CFI **lpc+35/WK/CFI**
lpc+100/CFI **lpc+100/WK/CFI**

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+ 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 ac cordance with the diagram »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«.

		colour
1	$+U_B$	brown
3	$-U_B$	blue
4	F	black
2	I	white
5	Com	grey

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

Factory setting

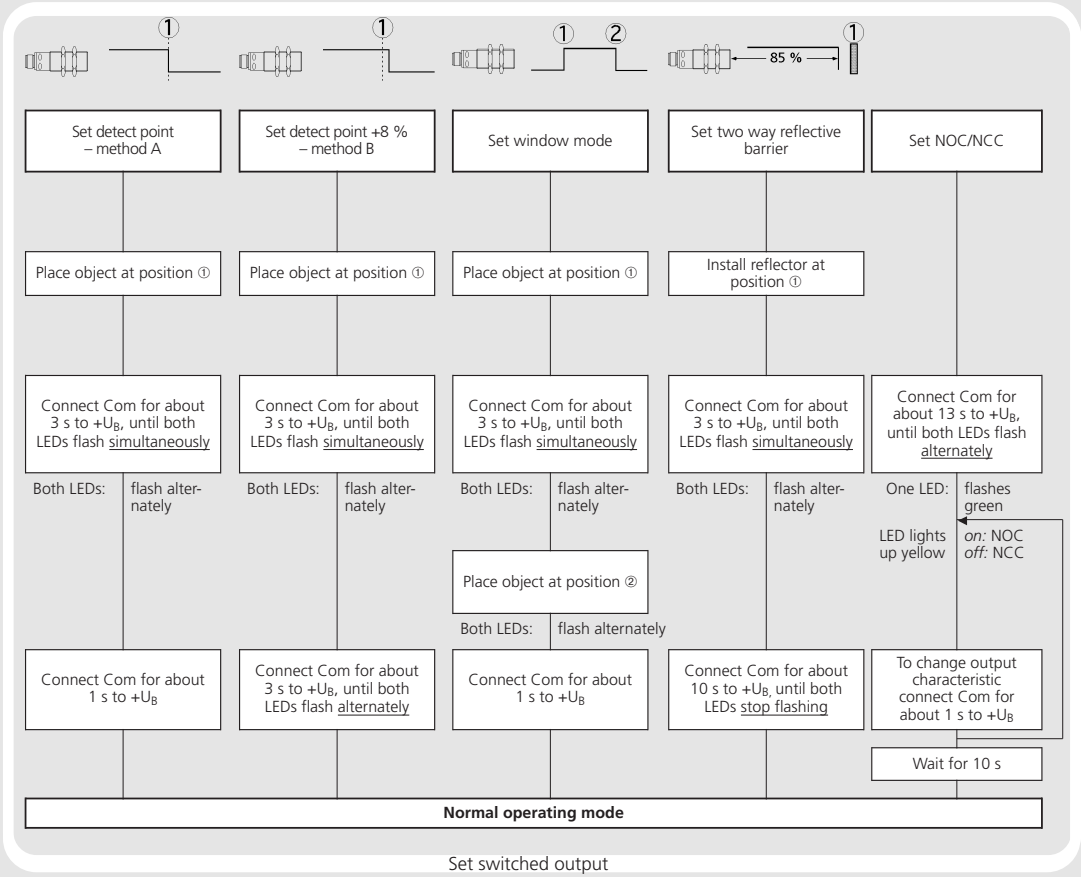
- Detect point operation
- Switched output on NOC
- Detect distance at operating range
- Multi-function input »Com« set to »Teach-in«
- Filter at F01
- Filter strength at P00

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.

Sensor adjustment with Teach-in procedure



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.

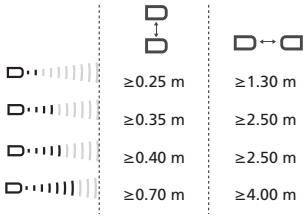


Fig. 2: *Assembly distances*

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 equip-ped with an internal temperature compensation. Due to the sensors self heating, the temperature compensation reaches its optimum work ing-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.

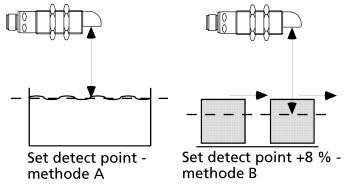


Fig. 3: *Setting the detect point for different directions of movement of the object*

- The sensor can be reset to its factory setting (see »Further settings«).
- Using the LinkControl adap-ter 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 informtations about start-up and configuration of lpc+ sensors with IO-Link, you will find online at:
  https://www.microsonic.de/lpc+

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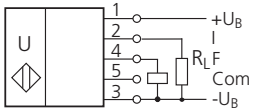
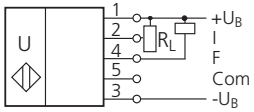
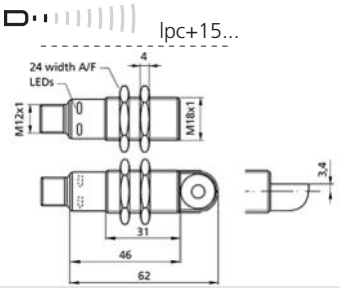
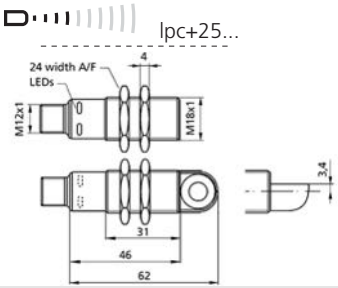
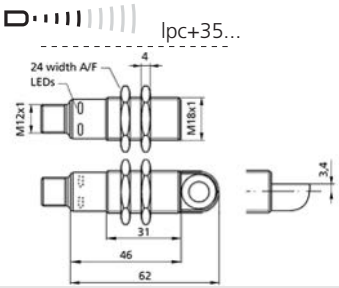
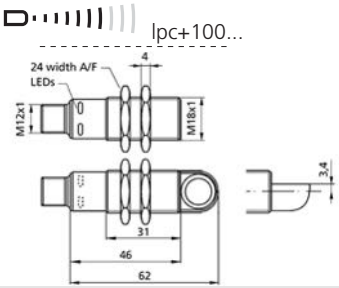
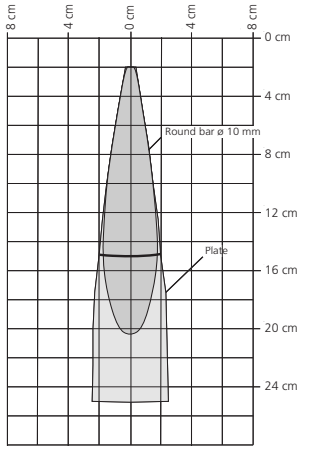
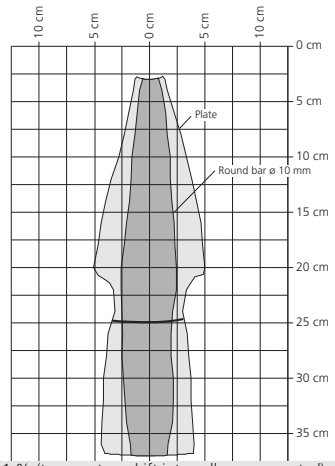
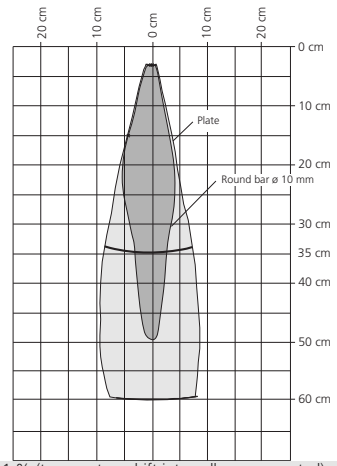
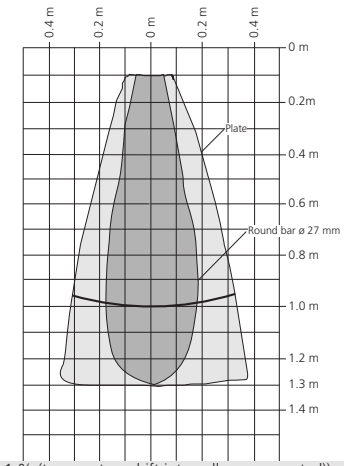
Technical data



Push-Pull output in pnp circuit



Push-Pull output in npn circuit

	lpc+15...	lpc+25...	lpc+35...	lpc+100...
				
blind zone	20 mm	30 mm	65 mm	120 mm
operating range	150 mm	250 mm	350 mm	1,000 mm
maximum range	250 mm	350 mm	600 mm	1,300 mm
angle of beam spread	see detection zone	see detection zone	see detection zone	see detection zone
transducer frequency	380 kHz	320 kHz	400 kHz	200 kHz
resolution	0,1 mm	0,1 mm	0,1 mm	0,1 mm
reproducibility	± 0.15 %	± 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 regognized. The requirement here is for an optimum alignment to the sensor. It is not possible to evaluate ultrasonic reflections outside this area.				
accuracy	±1 % (temperature drift internally compensated)	±1 % (temperature drift internally compensated)	±1 % (temperature drift internally compensated)	±1 % (temperature drift internally compensated))
operating voltage U_B	10 - 30 V DC, reverse polarity protection (Class 2)	10 - 30 V DC, reverse polarity protection (Class 2)	10 - 30 V DC, reverse polarity protection (Class 2)	10 - 30 V DC, reverse polarity protection (Class 2)
voltage ripple	±10 %	±10 %	±10 %	±10 %
no-load current consumption	< 60 mA	< 60 mA	< 60 mA	< 60 mA
housing	brass sleeve, nickel-plated, plastic parts: PBT; ultrasonic transducer: polyurethane foam, epoxy resin with glass content	brass sleeve, nickel-plated, plastic parts: PBT; ultrasonic transducer: polyurethane foam, epoxy resin with glass content	brass sleeve, nickel-plated, plastic parts: PBT; ultrasonic transducer: polyurethane foam, epoxy resin with glass content	brass sleeve, nickel-plated, plastic parts: PBT; ultrasonic transducer: polyurethane foam, epoxy resin with glass content
max. tightening torque of nuts	15 Nm	15 Nm	15 Nm	15 Nm
class of protection per EN 60 529	IP 67	IP 67	IP 67	IP 67
type of connection	5-pin M12 circular plug	5-pin M12 circular plug	5-pin M12 circular plug	5-pin M12 circular plug
controls	Teach-in via pin 5 (Com)	Teach-in via pin 5 (Com)	Teach-in via pin 5 (Com)	Teach-in via pin 5 (Com)
indicators	LED green (operation)	LED green (operation)	LED green (operation)	LED green (operation)
	LED yellow (state of output)	LED yellow (state of output)	LED yellow (state of output)	LED yellow (state of output)
programmable	Teach-in, LinkControl	Teach-in, LinkControl	Teach-in, LinkControl	Teach-in, LinkControl
synchronisation	internal synchronisation up to 10 sensors	internal synchronisation up to 10 sensors	internal synchronisation up to 10 sensors	internal synchronisation up to 10 sensors
operating temperature	-25°C to +70°C	-25°C to +70°C	-25°C to +70°C	-25°C to +70°C
storage temperature	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
switched output	Push-Pull, U_B-3 V, -U_B+3 V, I_{max} = 100 mA	Push-Pull, U_B-3 V, -U_B+3 V, I_{max} = 100 mA	Push-Pull, U_B-3 V, -U_B+3 V, I_{max} = 100 mA	Push-Pull, U_B-3 V, -U_B+3 V, I_{max} = 100 mA
	switchable NOC/NCC, short-circuit-proof	switchable NOC/NCC, short-circuit-proof	switchable NOC/NCC, short-circuit-proof	switchable NOC/NCC, short-circuit-proof
switching hysteresis [1]	2 mm	3 mm	5 mm	20 mm
switching frequency [1]	25 Hz	25 Hz	12 Hz	10 Hz
response time [1]	32 ms	32 ms	64 ms	80 ms
time delay before availability [1]	< 300 ms	< 300 ms	< 300 ms	< 300 ms
analogue output 4-20mA	R_L ≥ 100 kΩ, rising/falling characteristic	R_L ≥ 100 kΩ, short rising/falling characteristic	R_L ≥ 100 kΩ, rising/falling characteristic	R_L ≥ 100 kΩ, rising/falling characteristic
operating voltage U	R_L ≥ 100 kΩ, at U_B ≥ 15 V, short-circuit-proof terminal reverse polarity protected, Class 2	R_L ≥ 100 kΩ, at U_B ≥ 15 V, short-circuit-proof terminal reverse polarity protected, Class 2	R_L ≥ 100 kΩ, at U_B ≥ 15 V, short-circuit-proof terminal reverse polarity protected, Class 2	R_L ≥ 100 kΩ, at U_B ≥ 15 V, short-circuit-proof terminal reverse polarity protected, Class 2
norm conformity	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
order no. directly radiating	**lpc+15/CFI**	**lpc+25/CFI**	**lpc+35/CFI**	**lpc+100/CFI**
weight	35 g	35 g	35 g	35 g
order no. angular head	**lpc+15/WK/CFI**	**lpc+25/WK/CFI**	**lpc+35/WK/CFI**	**lpc+100/WK/CFI**
weight	40 g	40 g	40 g	40 g

1) Can be programmed with LinkControl