microsonic

Operating Manual

Ultrasonic proximity switch with one switching output

nero-15/CD	**nero-15/CE**
nero-25/CD	**nero-25/CE**
nero-35/CD	**nero-35/CE**
nero-100/CD	**nero-100/CE**
nero-15/WK/CD	**nero-15/WK/CE**
nero-25/WK/CD	**nero-25/WK/CE**
nero-35/WK/CD	**nero-35/WK/CE**
nero-100/WK/CD	**nero-100/WK/CE**

Product description

The nero sensor offers a non-contact measurement of the distance to an object which must be positioned within the sensor's detection zone. The switching output is set conditional upon the adjusted detect distance.
Via the Teach-in procedure, the detect distance and operating mode can be adjusted. Two LEDs indicate the state of the switching output.

Safety instructions

- Read the operating manual 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 in the area of personal and machine protection not permitted.

Use for intended purpose only

nero 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.

The assembly distances shown in Fig. 2 for two or more sensors should not be fallen below in order to avoid mutual interference.

		colour
1	$+U_B$	brown
3	$-U_B$	blue
4	D/E	black
2	Teach-in	white

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

Start-up

➔ Connect the power supply.
➔ Carry out sensor adjustment in accordance with Diagram 1.

Factory setting

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

- Switching point operation
- Switching output on NOC
- Detect distance at operating range

Operating modes

Three operating modes are available for the switching output:

- Operation with one switching point
  The switching output is set when the object falls below the set switching point.
- Window mode
  The switching output is set when the object is inside the set window.
- Two-way reflective barrier
  The switching output is set when the object is between sensor and fixed reflector.

	D↕D	D↔D
nero-15...	≥0.25 m	≥1.30 m
nero-25...	≥0.35 m	≥2.50 m
nero-35...	≥0.40 m	≥2.50 m
nero-100...	≥0.70 m	≥4.00 m

Fig. 2: Minimal assembly distances

Checking operation mode

➔ In normal operating mode shortly connect Teach-in to $+U_B$. Both LEDs stop shining for one second. The green LED indicates the current **operating mode**:

- 1x flashing = operation with one switching point
- 2x flashing = window mode
- 3x flashing = reflective barrier

After a break of 3 s the green LED shows the **output function**:

- 1x flashing = NOC
- 2x flashing = NCC

To change the operating mode und output function, see Diagram 1.

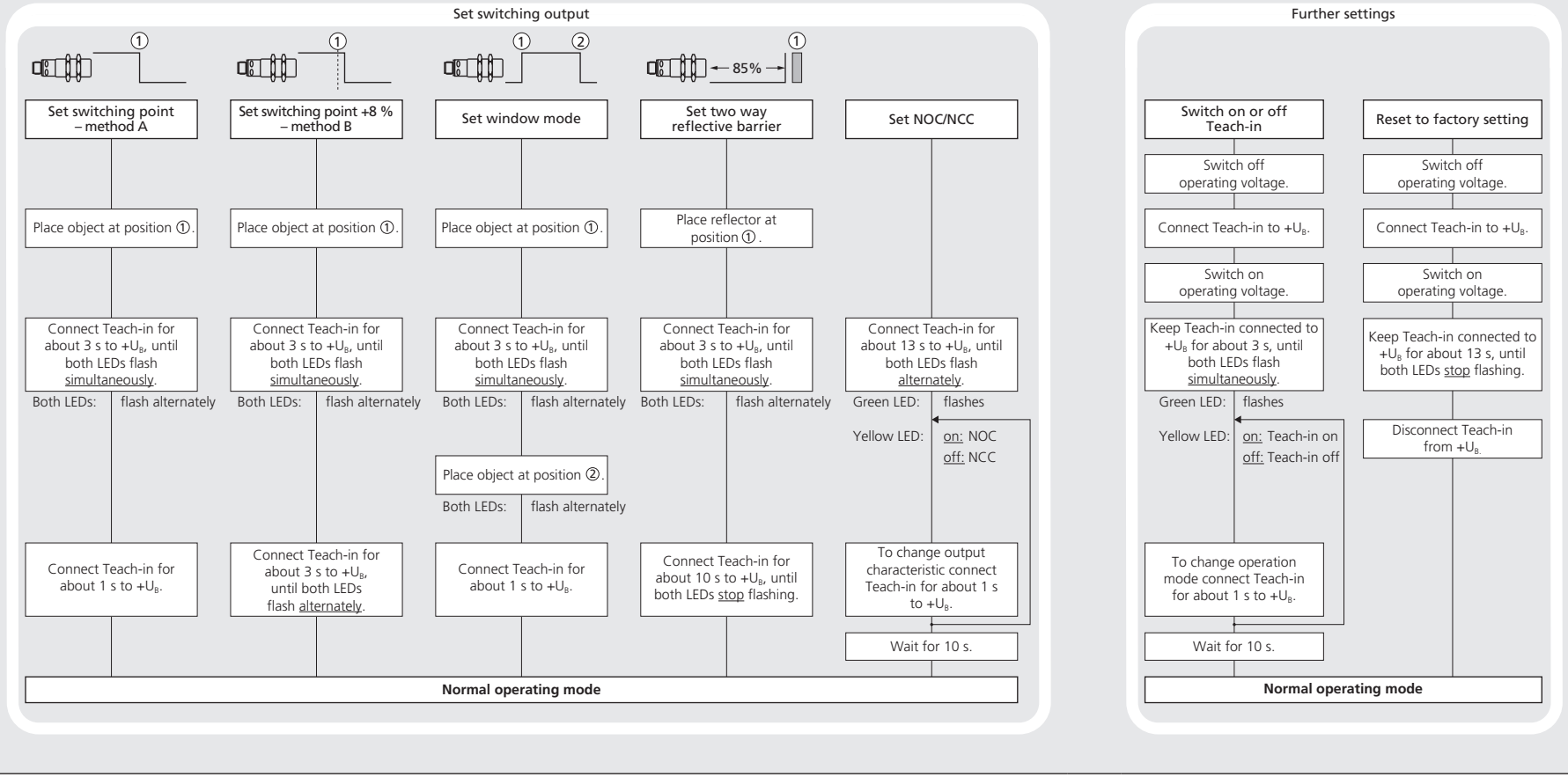
Maintenance

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

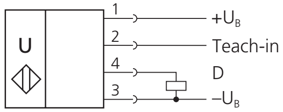
Notes

- The sensors of the nero family have a blind zone, within which a distance measurement is not possible.
- In the normal operating mode, an illuminated yellow LED signals that the switching output is switched through.
- In the »Two-way reflective barrier« operating mode, the object has to be within the range of 0 to 85 % of the set distance.
- In the »Set switching point - method A« Teach-in procedure the actual distance to the object is taught to the sensor as the switching 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 switching 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).

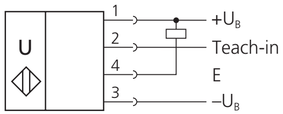
Diagram 1: Set sensor parameters via Teach-in procedure



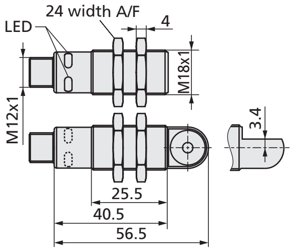
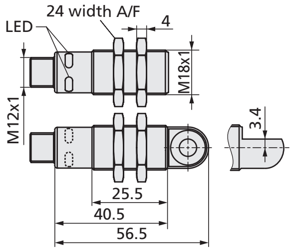
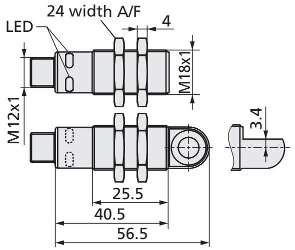
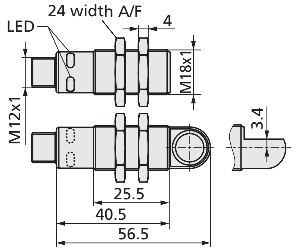
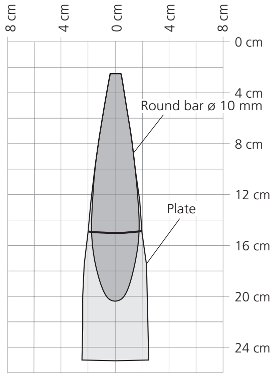
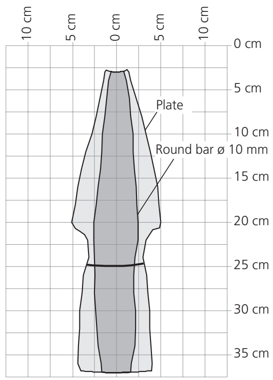
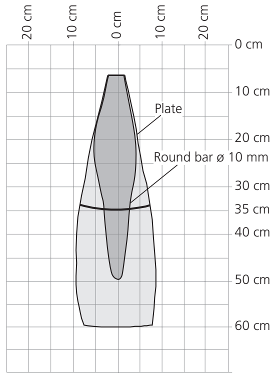
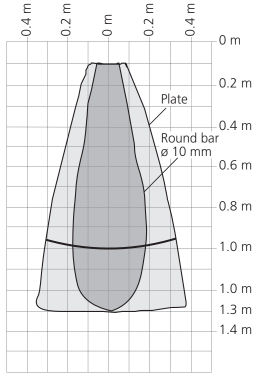
Technichal data



1 pnp switching output



1 npn switching output

	nero-15...	nero-25...	nero-35...	nero-100...
				
blind zone	25 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	0.2 mm	0.2 mm	0.2 mm	0.2 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 recognised. The requirement here is for an optimum alignment to the sensor. It is not possible to evaluate ultrasonic reflections outside this area.				
accuracy	temperature drift 0.17 %/°C	temperature drift 0.17 %/°C	temperature drift 0.17 %/°C	temperature drift 0.17 %/°C
operating voltage U_B	10 to 30 V DC, reverse polarity protection (Class 2)	10 to 30 V DC, reverse polarity protection (Class 2)	10 to 30 V DC, reverse polarity protection (Class 2)	10 to 30 V DC, reverse polarity protection (Class 2)
voltage ripple	±10 %	±10 %	±10 %	±10 %
no-load current consumption	<40 mA	<40 mA	<40 mA	<40 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	PBT; ultrasonic transducer: polyurethane foam, epoxy resin with glass content
max. tightening torque of nuts	1 Nm	1 Nm	1 Nm	1 Nm
class of protection per EN 60529	IP 67	IP 67	IP 67	IP 67
norm conformity	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
type of connection	4-pin M12 circular plug	4-pin M12 circular plug	4-pin M12 circular plug	4-pin M12 circular plug
controls	Teach-in via pin 2	Teach-in via pin 2	Teach-in via pin 2	Teach-in via pin 2
indicators	LED green, LED yellow	LED green, LED yellow	LED green, LED yellow	LED green, LED yellow
programmable	Teach-in	Teach-in	Teach-in	Teach-in
operating temperature	–25 to +70 °C	–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	–40 to +85 °C
switching hysteresis	2 mm	3 mm	5 mm	20 mm
switching frequency	25 Hz	25 Hz	12 Hz	10 Hz
response time	32 ms	32 ms	64 ms	80 ms
time delay before availability	<300 ms	<300 ms	<300 ms	<300 ms
order no. directly radiating pnp	**nero-15/CD**	**nero-25/CD**	**nero-35/CD**	**nero-100/CD**
switching output	pnp, U_B–2 V, I_{max} = 200 mA switchable NOC/NCC, short-circuit-proof	pnp, U_B–2 V, I_{max} = 200 mA switchable NOC/NCC, short-circuit-proof	pnp, U_B–2 V, I_{max} = 200 mA switchable NOC/NCC, short-circuit-proof	pnp, U_B–2 V, I_{max} = 200 mA switchable NOC/NCC, short-circuit-proof
order no. directly radiating npn	**nero-15/CE**	**nero-25/CE**	**nero-35/CE**	**nero-100/CE**
switching output	npn, –U_B+2 V, I_{max} = 200 mA switchable NOC/NCC, short-circuit-proof	npn, –U_B+2 V, I_{max} = 200 mA switchable NOC/NCC, short-circuit-proof	npn, –U_B+2 V, I_{max} = 200 mA switchable NOC/NCC, short-circuit-proof	npn, –U_B+2 V, I_{max} = 200 mA switchable NOC/NCC, short-circuit-proof
weight	15 g	15 g	15 g	15 g
order no. angular head pnp	**nero-15/WK/CD**	**nero-25/WK/CD**	**nero-35/WK/CD**	**nero-100/WK/CD**
switching output	pnp, U_B–2 V, I_{max} = 200 mA switchable NOC/NCC, short-circuit-proof	pnp, U_B–2 V, I_{max} = 200 mA switchable NOC/NCC, short-circuit-proof	pnp, U_B–2 V, I_{max} = 200 mA switchable NOC/NCC, short-circuit-proof	pnp, U_B–2 V, I_{max} = 200 mA switchable NOC/NCC, short-circuit-proof
order no. angular head npn	**nero-15/WK/CE**	**nero-25/WK/CE**	**nero-35/WK/CE**	**nero-100/WK/CE**
switching output	npn, –U_B+2 V, I_{max} = 200 mA switchable NOC/NCC, short-circuit-proof	npn, –U_B+2 V, I_{max} = 200 mA switchable NOC/NCC, short-circuit-proof	npn, –U_B+2 V, I_{max} = 200 mA switchable NOC/NCC, short-circuit-proof	npn, –U_B+2 V, I_{max} = 200 mA switchable NOC/NCC, short-circuit-proof
weight	20 g	20 g	20 g	20 g

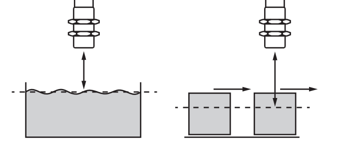


Fig. 3: Setting the switching point for different directions of movement of the object

- The sensor can be reset to its factory setting (see »Further settings«, Diagram 1).

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Enclosure Type 1
For use only in industrial machinery NFPA 79 applications.

The proximity switches shall be used with a Listed (CYJV/7) cable/connector assembly rated minimum 32 Vdc, minimum 290 mA, in the final installation.

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