Sensor Partners

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**

Contact

Sensor Partners BV
James Wattlaan 15
5151 DP Drunen
The Netherlands
+31 (0)416 - 37 82 39
info@sensorpartners.com
sensorpartners.com

Sensor Partners BVBA
Z.1 Researchpark 310
B-1731, Zellik
Belgium
+32 (0)2 - 464 96 90
info@sensorpartners.com
sensorpartners.com

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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 operation and the state of the switching output.

Safety Notes

- 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.

Proper Use

nero-ultrasonic sensors are used for non-contact detection of objects.

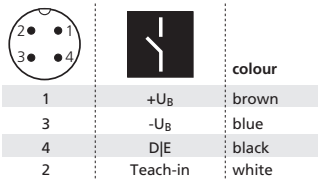
Installation

- Mount the sensor at the place of fitting.
- Connect a connection cable to the M12 device plug, see figure 1.

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

Start-up

- Connect the power supply.
- Set the parameters of the sensor by using the Teach-in procedure, see diagram »Set sensor parameters with the Teach-in procedure«.



		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 cables

Factory Setting

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

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

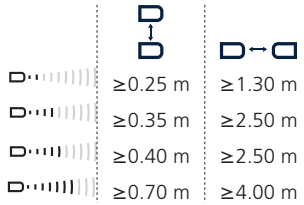


Fig. 2: Minimal assembly distances

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 within the set window limits.

- **Two-way reflective barrier**

The switching output is set when no object is between sensor and fixed reflector.

Checking Sensor Settings

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:**

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

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

1 x flashing = NOC
2 x flashing = NCC

To change the operating mode und output function, see diagram »Set sensor parameters with the Teach-in procedure«.

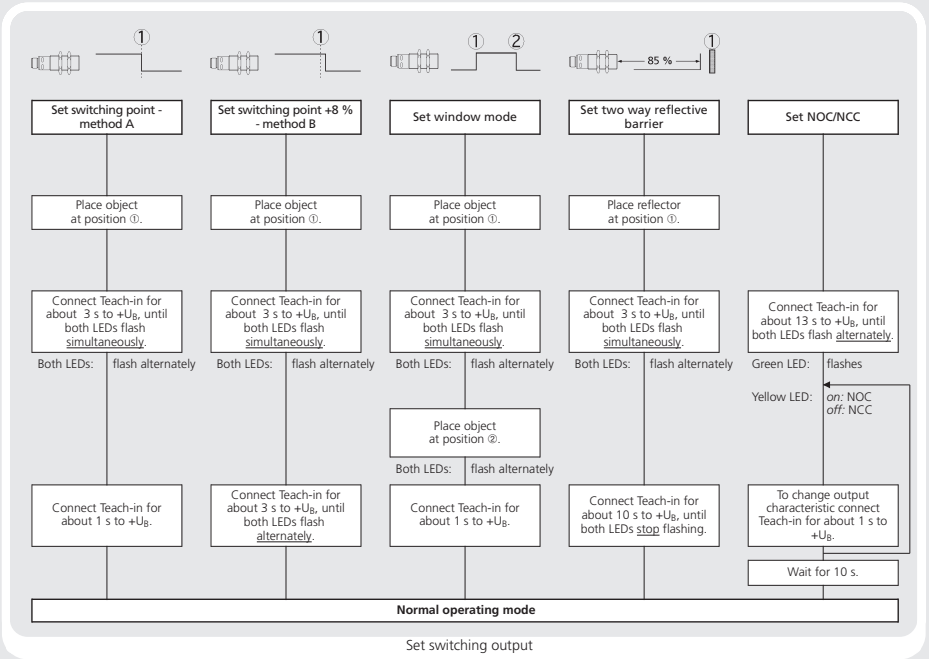
Maintenance

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

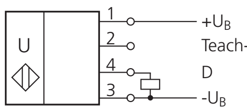
Notes

- 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 0-85 % of the set distance.
- In the »Set switching point - method A« Teach-in procedure the

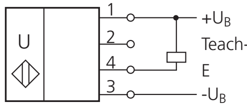
Set sensor parameters with the Teach-in procedure



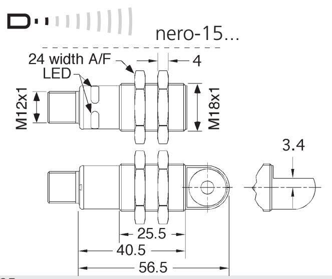
Technical data

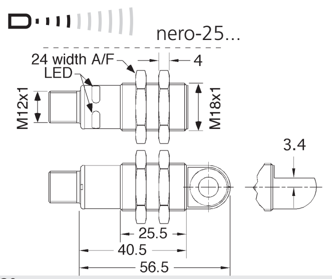


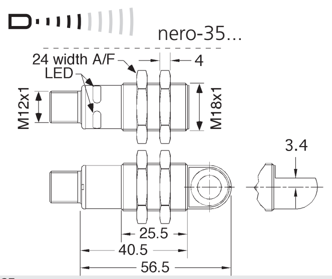
1 pnp switching output

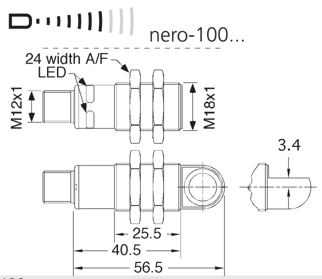


1 npn switching output



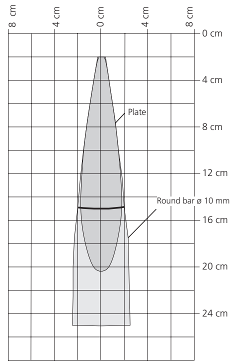


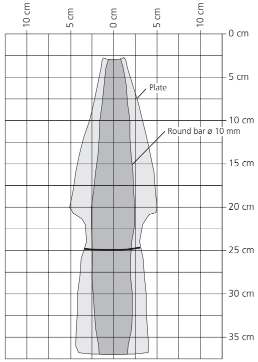


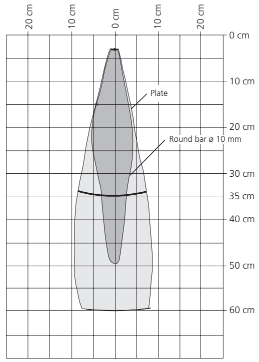


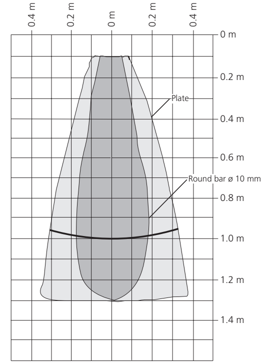
	nero-15...	nero-25...	nero-35...	nero-100...
blind zone	25 mm	30 mm	65 mm	120 mm
operating range	150 mm	250 mm	350 mm	1,000 mm
maximum range	250 mm	350 mm	600 mm	1,300 mm
angle of beam spread	see detection zone	see detection zone	see detection zone	see detection zone
transducer frequency	380 kHz	320 kHz	400 kHz	200 kHz
resolution	0.20 mm	0.20 mm	0.20 mm	0.20 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.









	nero-15...	nero-25...	nero-35...	nero-100...
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 - 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	< 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
scope of settings	Teach-in	Teach-in	Teach-in	Teach-in
indicators	LED green (operation) LED yellow (state of output)	LED green (operation) LED yellow (state of output)	LED green (operation) LED yellow (state of output)	LED green (operation) LED yellow (state of output)
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
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	70 ms	100 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	pnp, U_B-2 V, I_{max} = 200 mA	pnp, U_B-2 V, I_{max} = 200 mA	pnp, U_B-2 V, I_{max} = 200 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
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	npn, -U_B+2 V, I_{max} = 200 mA	npn, -U_B+2 V, I_{max} = 200 mA	npn, -U_B+2 V, I_{max} = 200 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
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	pnp, U_B-2 V, I_{max} = 200 mA	pnp, U_B-2 V, I_{max} = 200 mA	pnp, U_B-2 V, I_{max} = 200 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
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	npn, -U_B+2 V, I_{max} = 200 mA	npn, -U_B+2 V, I_{max} = 200 mA	npn, -U_B+2 V, I_{max} = 200 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
weight	20 g	20 g	20 g	20 g

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.

- 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.

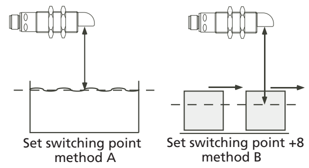


Fig. 3: Setting the switching point for different directions of movement of the object

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

2014/30/EU

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.