



**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.

**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

- 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.

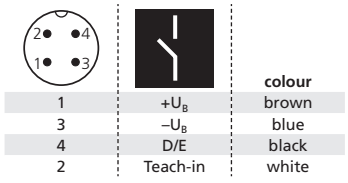


Fig. 1: Pin assignment with view onto sensor plug and colour coding of the microsonic connection cable

**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

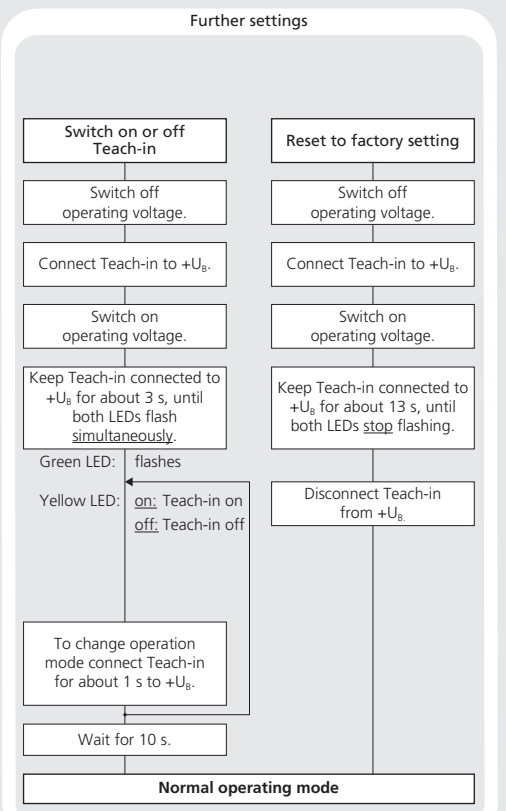
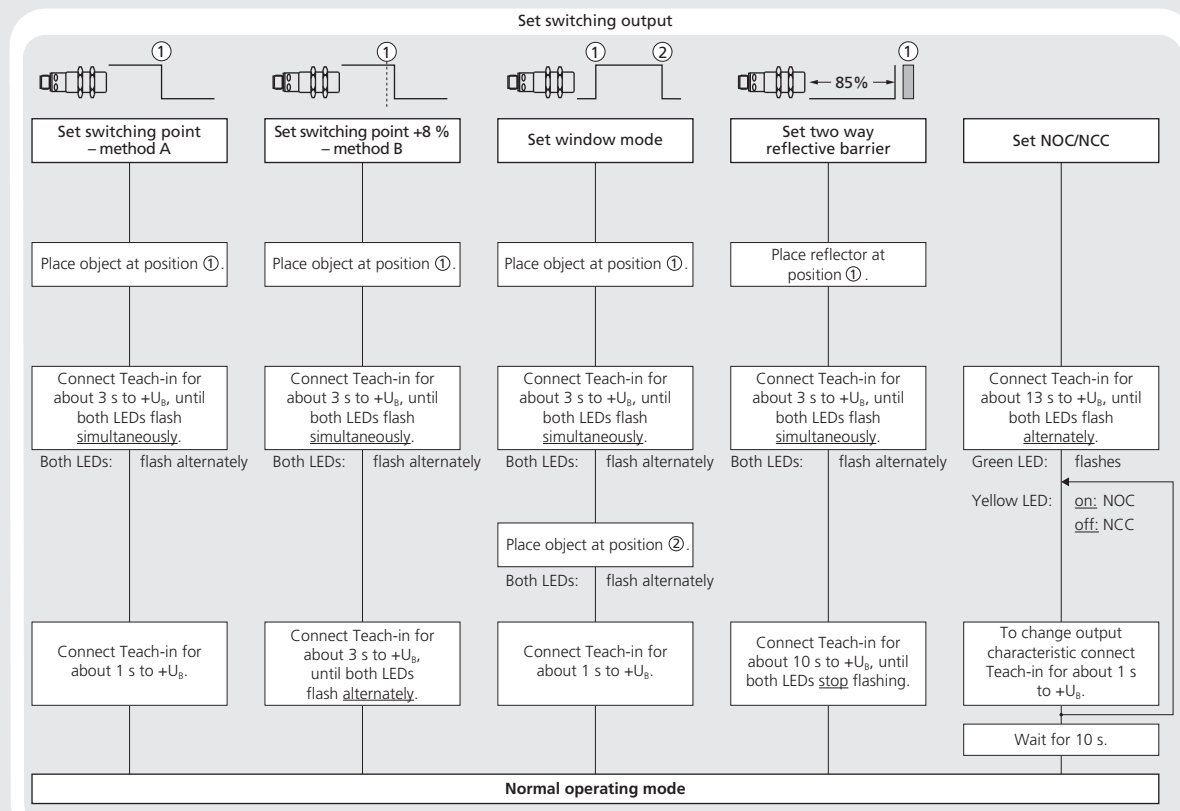
**Checking operation mode**  
 → In normal operating mode shortly connect Teach-in to +U<sub>B</sub>. Both LEDs stop shining for one second. The green LED indicates the current operating mode:

- 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.

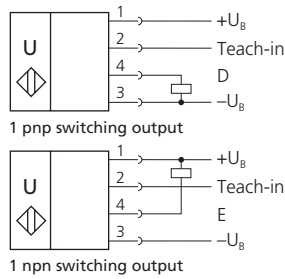
**Maintenance**  
 microsonic sensors are maintenance-free. In case of excess caked-on dirt we recommend cleaning the white sensor surface.

- 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).

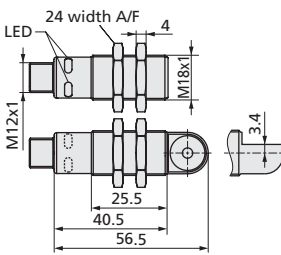
**Diagram 1: Set sensor parameters via Teach-in procedure**



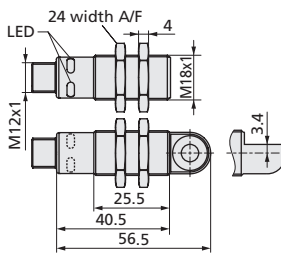
Technical data



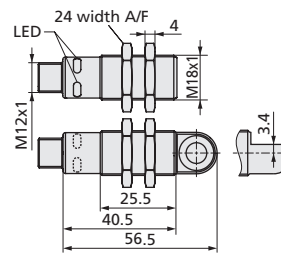
nero-15...



nero-25...



nero-35...



nero-100...

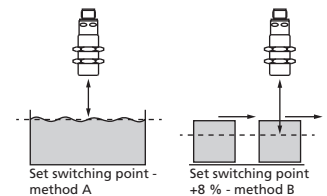
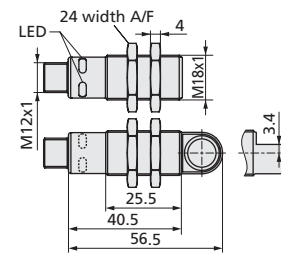


Fig. 3: Setting the switching point for different directions of movement of the object

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

	<b>blind zone</b> 25 mm	<b>blind zone</b> 30 mm	<b>blind zone</b> 65 mm	<b>blind zone</b> 120 mm
	<b>operating range</b> 150 mm	<b>operating range</b> 250 mm	<b>operating range</b> 350 mm	<b>operating range</b> 1,000 mm
	<b>maximum range</b> 250 mm	<b>maximum range</b> 350 mm	<b>maximum range</b> 600 mm	<b>maximum range</b> 1,300 mm
	<b>angle of beam spread</b> see detection zone	<b>angle of beam spread</b> see detection zone	<b>angle of beam spread</b> see detection zone	<b>angle of beam spread</b> see detection zone
	<b>transducer frequency</b> 380 kHz	<b>transducer frequency</b> 320 kHz	<b>transducer frequency</b> 400 kHz	<b>transducer frequency</b> 200 kHz
	<b>resolution</b> 0.2 mm	<b>resolution</b> 0.2 mm	<b>resolution</b> 0.2 mm	<b>resolution</b> 0.2 mm
	<b>reproducibility</b> ±0.15 %	<b>reproducibility</b> ±0.15 %	<b>reproducibility</b> ±0.15 %	<b>reproducibility</b> ±0.15 %
<b>detection zones</b> 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.				
<b>accuracy</b>	temperature drift 0.17 %/°C	temperature drift 0.17 %/°C	temperature drift 0.17 %/°C	temperature drift 0.17 %/°C
<b>operating voltage UB</b>	10 bis 30 V DC, reverse polarity protection (Class 2)	10 bis 30 V DC, reverse polarity protection (Class 2)	10 bis 30 V DC, reverse polarity protection (Class 2)	10 bis 30 V DC, reverse polarity protection (Class 2)
<b>voltage ripple</b>	±10 %	±10 %	±10 %	±10 %
<b>no-load current consumption</b>	<40 mA	<40 mA	<40 mA	<40 mA
<b>housing</b>	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
<b>max. tightening torque of nuts</b>	1 Nm	1 Nm	1 Nm	1 Nm
<b>class of protection per EN 60529</b>	IP 67	IP 67	IP 67	IP 67
<b>norm conformity</b>	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
<b>type of connection</b>	4-pin M12 circular plug	4-pin M12 circular plug	4-pin M12 circular plug	4-pin M12 circular plug
<b>controls</b>	Teach-in via pin 2	Teach-in via pin 2	Teach-in via pin 2	Teach-in via pin 2
<b>indicators</b>	LED green, LED yellow	LED green, LED yellow	LED green, LED yellow	LED green, LED yellow
<b>programmable</b>	Teach-in	Teach-in	Teach-in	Teach-in
<b>operating temperature</b>	-25 to +70 °C	-25 to +70 °C	-25 to +70 °C	-25 to +70 °C
<b>storage temperature</b>	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C
<b>switching hysteresis</b>	2 mm	3 mm	5 mm	20 mm
<b>switching frequency</b>	25 Hz	25 Hz	12 Hz	10 Hz
<b>response time</b>	32 ms	32 ms	64 ms	80 ms
<b>time delay before availability</b>	<300 ms	<300 ms	<300 ms	<300 ms
<b>order no. directly radiating pnp switching output</b>	<b>nero-15/CD</b> pnp, UB-2 V, Imax = 200 mA switchable NOC/NCC, short-circuit-proof	<b>nero-25/CD</b> pnp, UB-2 V, Imax = 200 mA switchable NOC/NCC, short-circuit-proof	<b>nero-35/CD</b> pnp, UB-2 V, Imax = 200 mA switchable NOC/NCC, short-circuit-proof	<b>nero-100/CD</b> pnp, UB-2 V, Imax = 200 mA switchable NOC/NCC, short-circuit-proof
<b>order no. directly radiating npn switching output</b>	<b>nero-15/CE</b> npn, -UB+2 V, Imax = 200 mA switchable NOC/NCC, short-circuit-proof	<b>nero-25/CE</b> npn, -UB+2 V, Imax = 200 mA switchable NOC/NCC, short-circuit-proof	<b>nero-35/CE</b> npn, -UB+2 V, Imax = 200 mA switchable NOC/NCC, short-circuit-proof	<b>nero-100/CE</b> npn, -UB+2 V, Imax = 200 mA switchable NOC/NCC, short-circuit-proof
<b>weight</b>	15 g	15 g	15 g	15 g
<b>order no. angular head pnp switching output</b>	<b>nero-15/WK/CD</b> pnp, UB-2 V, Imax = 200 mA switchable NOC/NCC, short-circuit-proof	<b>nero-25/WK/CD</b> pnp, UB-2 V, Imax = 200 mA switchable NOC/NCC, short-circuit-proof	<b>nero-35/WK/CD</b> pnp, UB-2 V, Imax = 200 mA switchable NOC/NCC, short-circuit-proof	<b>nero-100/WK/CD</b> pnp, UB-2 V, Imax = 200 mA switchable NOC/NCC, short-circuit-proof
<b>order no. angular head npn switching output</b>	<b>nero-15/WK/CE</b> npn, -UB+2 V, Imax = 200 mA switchable NOC/NCC, short-circuit-proof	<b>nero-25/WK/CE</b> npn, -UB+2 V, Imax = 200 mA switchable NOC/NCC, short-circuit-proof	<b>nero-35/WK/CE</b> npn, -UB+2 V, Imax = 200 mA switchable NOC/NCC, short-circuit-proof	<b>nero-100/WK/CE</b> npn, -UB+2 V, Imax = 200 mA switchable NOC/NCC, short-circuit-proof
<b>weight</b>	20 g	20 g	20 g	20 g



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

The proximity switches shall be used with a Listed (CYJV7) cable/connector assembly rated minimum 32 Vdc, minimum 290 mA, in the final installation.

