



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.

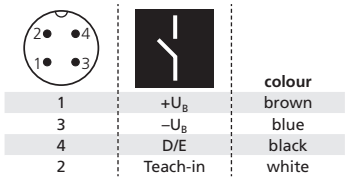


Fig. 1: Pin assignment with view onto sensor plug and colour coding of the microsonic connection cable

- 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.

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

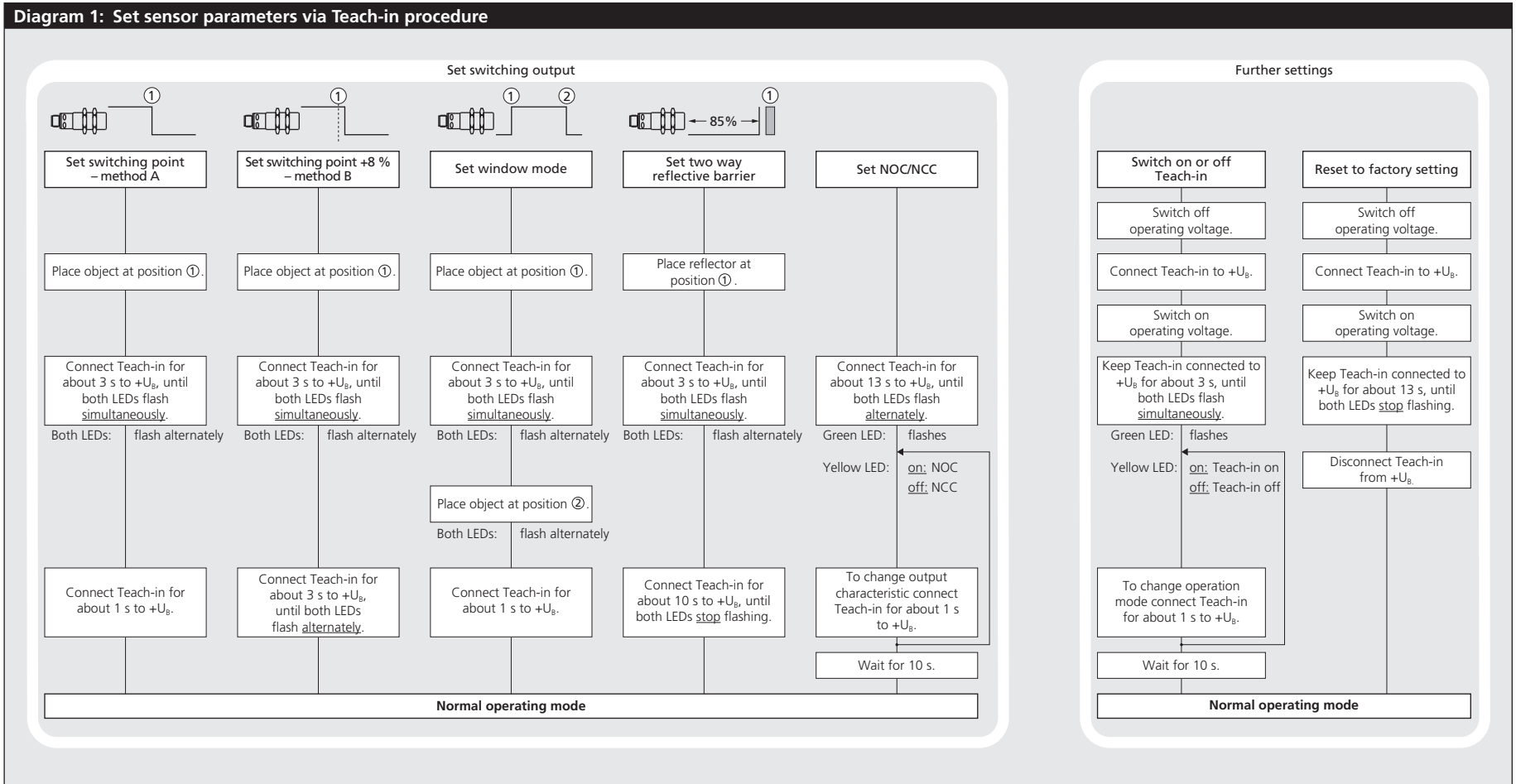
Fig. 2: Minimal assembly distances

- 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:

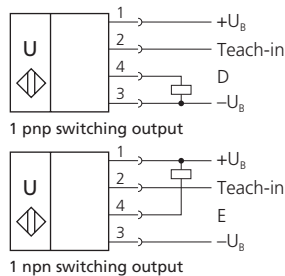
- 1x flashing = operation with one switching point
 - 2x flashing = window mode
 - 3x flashing = reflective barrier
- After a break of 3 s the green LED shows the **output function**:
- 1x flashing = NOC
 - 2x flashing = NCC
- To change the operating mode und output function, see Diagram 1.

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

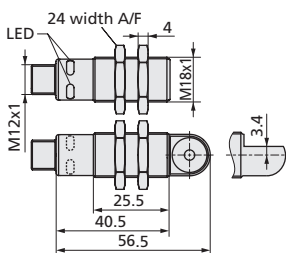
- Notes**
- The sensors of the nero family have a blind zone, within which a distance measurement is not possible.
 - In the normal operating mode, an illuminated yellow LED signals that the switching output is switched through.
 - In the »Two-way reflective barrier« operating mode, the object has to 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).



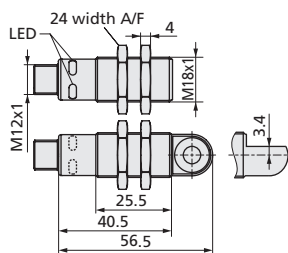
Technical data



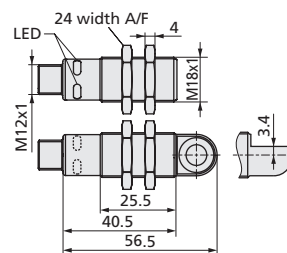
nero-15...



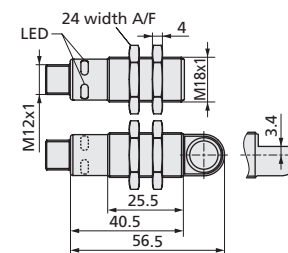
nero-25...



nero-35...



nero-100...



blind zone
operating range
maximum range
angle of beam spread
transducer frequency
resolution
reproducibility

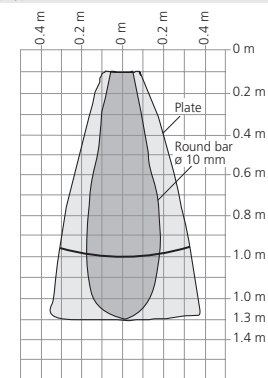
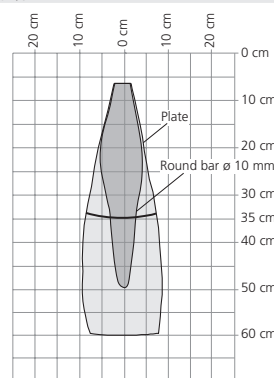
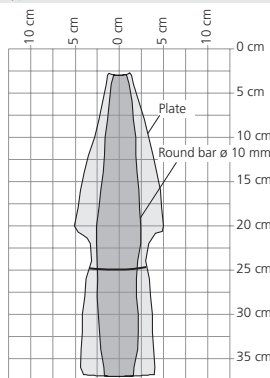
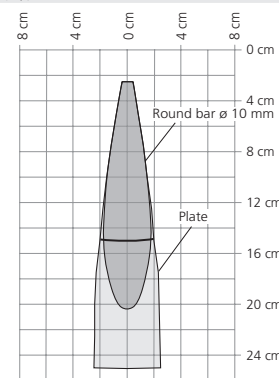
25 mm
150 mm
250 mm
see detection zone
380 kHz
0.2 mm
±0.15 %

30 mm
250 mm
350 mm
see detection zone
320 kHz
0.2 mm
±0.15 %

65 mm
350 mm
600 mm
see detection zone
400 kHz
0.2 mm
±0.15 %

120 mm
1,000 mm
1,300 mm
see detection zone
200 kHz
0.2 mm
±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
operating voltage U_B
voltage ripple
no-load current consumption
housing
max. tightening torque of nuts
class of protection per EN 60529
norm conformity
type of connection
controls
indicators
programmable
operating temperature
storage temperature
switching hysteresis
switching frequency
response time
time delay before availability

temperature drift 0.17 %/°C
10 bis 30 V DC, reverse polarity protection (Class 2)
±10 %
<40 mA
PBT; ultrasonic transducer: polyurethane foam, epoxy resin with glass content
1 Nm
IP 67
EN 60947-5-2
4-pin M12 circular plug
Teach-in via pin 2
LED green, LED yellow
Teach-in
-25 to +70 °C
-40 to +85 °C
2 mm
25 Hz
32 ms
<300 ms

temperature drift 0.17 %/°C
10 bis 30 V DC, reverse polarity protection (Class 2)
±10 %
<40 mA
PBT; ultrasonic transducer: polyurethane foam, epoxy resin with glass content
1 Nm
IP 67
EN 60947-5-2
4-pin M12 circular plug
Teach-in via pin 2
LED green, LED yellow
Teach-in
-25 to +70 °C
-40 to +85 °C
3 mm
25 Hz
32 ms
<300 ms

temperature drift 0.17 %/°C
10 bis 30 V DC, reverse polarity protection (Class 2)
±10 %
<40 mA
PBT; ultrasonic transducer: polyurethane foam, epoxy resin with glass content
1 Nm
IP 67
EN 60947-5-2
4-pin M12 circular plug
Teach-in via pin 2
LED green, LED yellow
Teach-in
-25 to +70 °C
-40 to +85 °C
5 mm
12 Hz
64 ms
<300 ms

temperature drift 0.17 %/°C
10 bis 30 V DC, reverse polarity protection (Class 2)
±10 %
<40 mA
PBT; ultrasonic transducer: polyurethane foam, epoxy resin with glass content
1 Nm
IP 67
EN 60947-5-2
4-pin M12 circular plug
Teach-in via pin 2
LED green, LED yellow
Teach-in
-25 to +70 °C
-40 to +85 °C
20 mm
10 Hz
80 ms
<300 ms

order no. directly radiating pnp switching output
order no. directly radiating npn switching output
weight
order no. angular head pnp switching output
order no. angular head npn switching output
weight

nero-15/CD
pnp, $U_B=2$ V, $I_{max}=200$ mA
switchable NOC/NCC, short-circuit-proof
nero-15/CE
npn, $-U_B+2$ V, $I_{max}=200$ mA
switchable NOC/NCC, short-circuit-proof
15 g
nero-15/WK/CD
pnp, $U_B=2$ V, $I_{max}=200$ mA
switchable NOC/NCC, short-circuit-proof
nero-15/WK/CE
npn, $-U_B+2$ V, $I_{max}=200$ mA
switchable NOC/NCC, short-circuit-proof
20 g

nero-25/CD
pnp, $U_B=2$ V, $I_{max}=200$ mA
switchable NOC/NCC, short-circuit-proof
nero-25/CE
npn, $-U_B+2$ V, $I_{max}=200$ mA
switchable NOC/NCC, short-circuit-proof
15 g
nero-25/WK/CD
pnp, $U_B=2$ V, $I_{max}=200$ mA
switchable NOC/NCC, short-circuit-proof
nero-25/WK/CE
npn, $-U_B+2$ V, $I_{max}=200$ mA
switchable NOC/NCC, short-circuit-proof
20 g

nero-35/CD
pnp, $U_B=2$ V, $I_{max}=200$ mA
switchable NOC/NCC, short-circuit-proof
nero-35/CE
npn, $-U_B+2$ V, $I_{max}=200$ mA
switchable NOC/NCC, short-circuit-proof
15 g
nero-35/WK/CD
pnp, $U_B=2$ V, $I_{max}=200$ mA
switchable NOC/NCC, short-circuit-proof
nero-35/WK/CE
npn, $-U_B+2$ V, $I_{max}=200$ mA
switchable NOC/NCC, short-circuit-proof
20 g

nero-100/CD
pnp, $U_B=2$ V, $I_{max}=200$ mA
switchable NOC/NCC, short-circuit-proof
nero-100/CE
npn, $-U_B+2$ V, $I_{max}=200$ mA
switchable NOC/NCC, short-circuit-proof
15 g
nero-100/WK/CD
pnp, $U_B=2$ V, $I_{max}=200$ mA
switchable NOC/NCC, short-circuit-proof
nero-100/WK/CE
npn, $-U_B+2$ V, $I_{max}=200$ mA
switchable NOC/NCC, short-circuit-proof
20 g

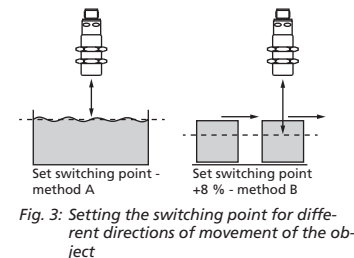


Fig. 3: Setting the switching point for different directions of movement of the object

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



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

The proximity switches shall be used with a Listed (CYJ/V7) cable/connector assembly rated minimum 32 Vdc, minimum 290 mA, in the final installation.

