# microsonic nano Series Ultrasonic Proximity Switch with One Switching Output Instruction Manual



**microsonic nano Series Ultrasonic Proximity Switch with One Switching Output**

**Operation Manual**

**Ultrasonic proximity switch with one switching output**

**nano-15/CD nano-15/CE**
**nano-24/CD nano-24/CE**

Contents



## Product Description

nano sensors offer 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 switching distance. Via the Teach-in procedure, the switching distance and operating mode can be adjusted.

#### Safety Notes

- Read the operation manual prior to start-up.
- Connection, installation and adjustment works should be carried out by expert personnel only.
- No safety component in accordance with the EU Machine Directive, use in the area of personal and machine protection not permitted

#### Proper Use

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

#### Installation

- Mount the sensor at the installation site.
- Connect a connection cable to the M12 device plug, see Fig. 1.

#### Start-up

- Connect the power supply.
- Set the parameters of the sensor by using the Teach-in procedure, see Diagram 1.
- When operating several sensors, ensure that the mounting distances specified in **Fig. 2** are not undercut

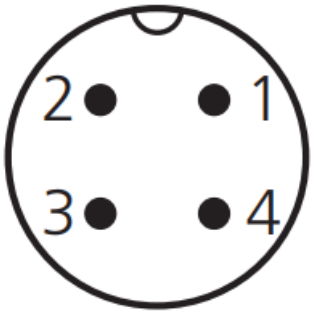
|  |  | colour |
|---|---|---|
| colour | $+U_B$ | brown |
| 3 | $– U_B$ | blue |
| 4 | D/E | black |
| 2 | Teach-in | white |

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

#### Factory Settings

nano sensors are delivered factory made with the following settings:

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

#### Operating Modes

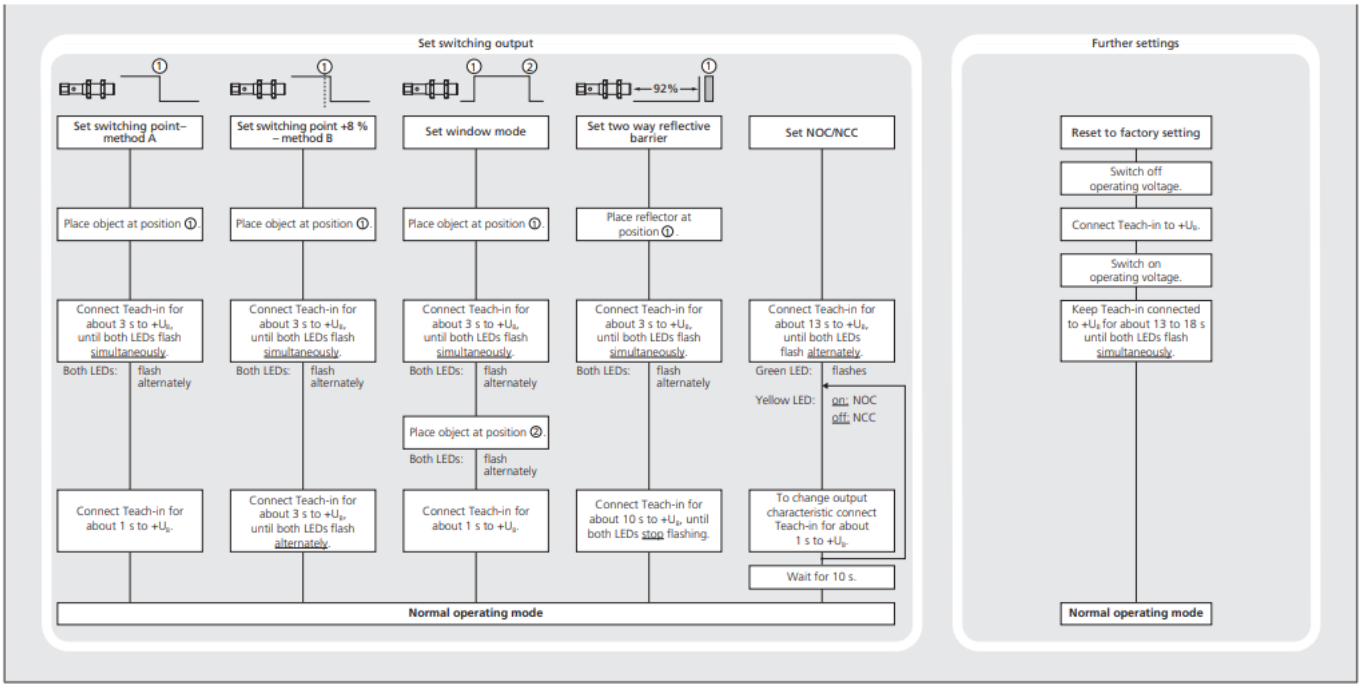
Three operating modes are available for the switching output:

- **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 within the set window limits.
- **Two-way reflective barrier**
  The switching output is set when no object is between sensor and fixed reflector.

| |  |  |
|---|---|---|
| nano-15… | ≥0.25 m | ≥1.30 m |
| nano-24… | ≥0.25 m | ≥1.40 m |

Fig. 2: Minimal assembly distances

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




**Checking Sensor Settings**

- In normal operating mode shortly connect Teach-in to +UB. 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 = two-way reflective barrier

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

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

**Maintenance**

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

**Notes**

- Every time the power supply is switched on, the sensor detects its actual operating temperature and transmits it to the internal temperature compensation. The adjusted value is taken over after 45 seconds.
- If the sensor was switched off for at least 30 minutes and after power on the switching output is not set for 30 minutes a new adjustment of the internal temperature compensation to the actual mounting conditions takes place.
- The sensors of the nano family have a blind zone. Within this zone 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 0-92 % of the set distance.
- In the »Set switching point – me – thod 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.

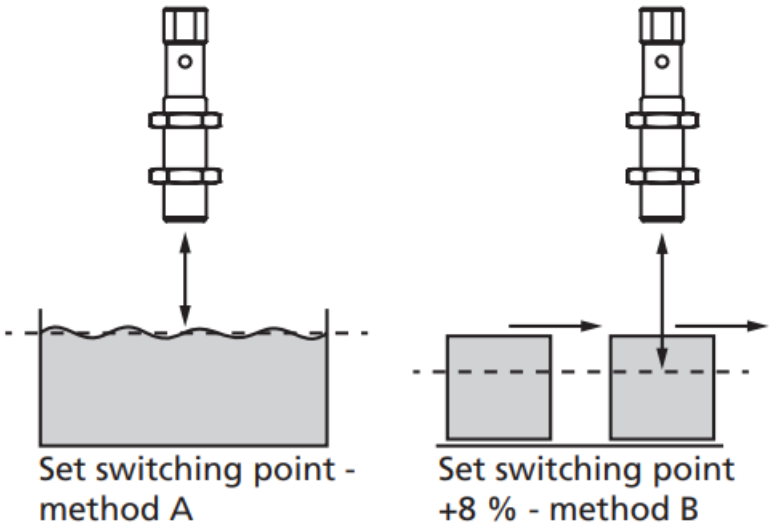
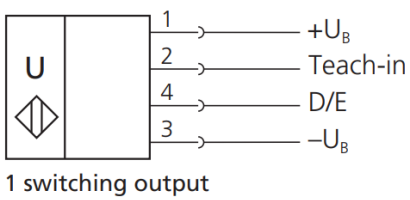
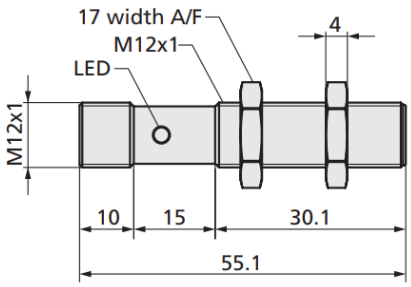
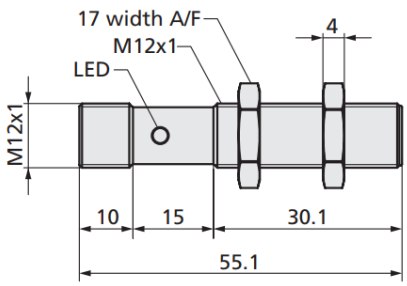


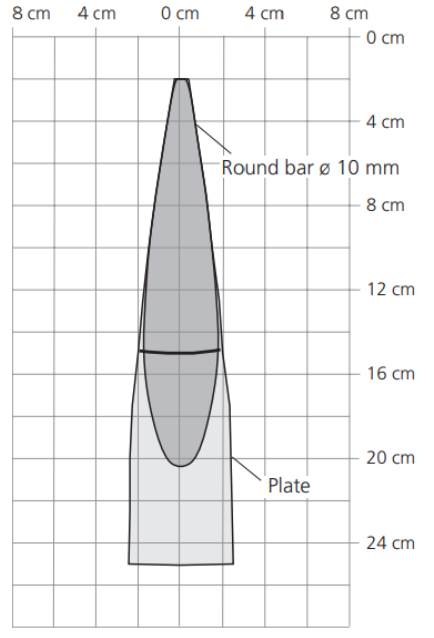
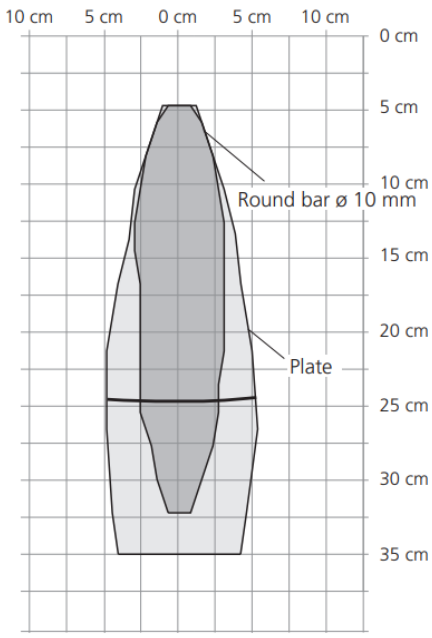

Fig. 3: Setting the switching point for different directions of movement of the object

- If the object to be scanned moves into the detection zone 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 behavior even if the height of the objects varies slightly, see Fig. 3.
- The sensor can be reset to its factory setting (see Diagram 1).

## Technical data

| | nano-15… | nano-24… |
|---|---|---|
| | | |

| | | |
|---|---|---|
|  <br>1 switching output |  |  |
| **blind zone** | 20 mm | 40 mm |
| **operating range** | 150 mm | 240 mm |
| **maximum range** | 250 mm | 350 mm |
| **angle of beam spread** | see detection zone | see detection zone |
| **transducer frequency** | 380 kHz | 500 kHz |
| **resolution** | 69 µm | 69 µm |
| **reproducibility** | ±0.15 % | ±0.15 % |

| | | |
|---|---|---|
| **detection zone** for different objects:<br><br>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.<br>The requirement is an optimal alignment to the sensor.<br>It is not possible to evaluate ultrasonic reflections outside this area. |  |  |
| **accuracy** | ±1 % (temperature drift internally compensated) | ±1 % (temperature drift internally compensated) |
| **operating voltage $U_B$** | 10 to 30 V DC, reverse polarity protection (Class 2) | 10 to 30 V DC, reverse polarity protection (Class 2) |
| **voltage ripple** | ±10 % | ±10 % |
| **no-load current consumption** | <25 mA | <35 mA |
| **housing** | brass sleeve, nickel-plated, plastic parts: PBT; | brass sleeve, nickel-plated, plastic parts: PBT; |
| | ultrasonic transducer: polyurethane foam, | ultrasonic transducer: polyurethane foam, |

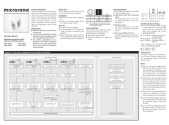
| | | |
|---|---|---|
| | epoxy resin with glass content | epoxy resin with glass content |
| **max. tightening torque of nuts** | 1 Nm | 1 Nm |
| **class of protection per EN 60529** | IP 67 | IP 67 |
| **norm conformity** | EN 60947-5-2 | EN 60947-5-2 |
| **type of connection** | 4-pin M12 circular plug | 4-pin M12 circular plug |
| **controls** | Teach-in via pin 2 | Teach-in via pin 2 |
| **scope of settings** | Teach-in | Teach-in |
| **indicators** | 2 LEDs | 2 LEDs |
| **operating temperature** | –25 to +70 °C | –25 to +70 °C |
| **storage temperature** | –40 to +85 °C | –40 to +85 °C |
| **weight** | 15 g | 15 g |
| **switching hysteresis** | 2 mm | 3 mm |

| | | |
|---|---|---|
| **switching frequency** | 31 Hz | 25 Hz |
| **response time** | 24 ms | 30 ms |
| **time delay before availability** | <300 ms | <300 ms |
| | | |
| **order no.** | **nano-15/CD** | **nano-24/CD** |
| **switching output** | 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 |
| | | |
| **order no.** | **nano-15/CE** | **nano-24/CE** |
| **switching output** | 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 |

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.

## Documents / Resources

| | |
|---|---|
|  | microsonic nano Series Ultrasonic Proximity Switch with One Switching Output [pdf] Instruction Manual<br>nano-15-CD, nano-24-CD, nano-15-CE, nano-24-CE, nano Series Ultrasonic Proximity Switch with One Switching Output, nano Series, nano Series Ultrasonic Proximity Switch, Ultrasonic Proximity Switch, Proximity Switch, Ultrasonic Switch, Switch, Ultrasonic Proximity Switch with One Switching Output |