Operating manual

Ultrasonic sensor with one analogue output

nano-15/C nano-15/CU
nano-24/C nano-24/CU

Product Description

The nano sensor offers a non-contact measurement of the distance to an object that has to be present within the sensor’s detection zone. Depending on the set window limits, a distance-proportional analogue signal is output. The window limits of the analogue output and its characteristic can be adjusted with the Teach-in procedure.

One 2-colour LED indicates operation and the state of the analogue output.

Use for intended purpose only

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

Safety Notes

■ Read the operating instructions 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.

Installation

■ Mount the sensor at the installation site.
■ Connect a connection cable to the M12 device plug.

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

Fig. 2: Assembly distances, indicating synchronization

≥ 0.25 m
≥ 1.3 m
≥ 0.25 m
≥ 1.4 m

Start-Up

■ Connect the power supply.
■ Carry out the sensor adjustment in accordance with the diagram.

Further settings

■ Rising analogue characteristic curve between the blind zone and the operating range.

Maintenance

microsonic sensors are maintenance-free. In case of excess caked-on dirt we recommend to clean 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. This results in a slight correction of the analogue output value after 45 seconds.

■ If the sensor was switched off for at least 30 minutes and after power on an object is placed in the middle of the adjusted analogue window for 30 minutes (the analogue output value is in the range of 11 to 13 mA or 4.4 to 5.6 V) 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 the object is within the adjusted window limits.

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

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

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+Ua</td>
<td>brown</td>
</tr>
<tr>
<td>2</td>
<td>Teach-in</td>
<td>white</td>
</tr>
<tr>
<td>3</td>
<td>-Ua</td>
<td>blue</td>
</tr>
<tr>
<td>4</td>
<td>IJU</td>
<td>black</td>
</tr>
</tbody>
</table>

Fig. 3: Pin assignment with view onto sensor plug and colour coding of the microsonic connection cable

<table>
<thead>
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<td>blue</td>
</tr>
<tr>
<td>4</td>
<td>IJU</td>
<td>black</td>
</tr>
</tbody>
</table>

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.

2014/30/EU
Technical data

### Technical Data Table

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
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<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technical Data</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>blind zone</strong></td>
<td>20 mm</td>
<td><strong>operating range</strong></td>
<td>150 mm</td>
</tr>
<tr>
<td><strong>operating range</strong></td>
<td>150 mm</td>
<td></td>
<td>250 mm</td>
</tr>
<tr>
<td><strong>maximum range</strong></td>
<td>250 mm</td>
<td></td>
<td>See detection zone</td>
</tr>
<tr>
<td><strong>angle of beam spread</strong></td>
<td>250 mm</td>
<td></td>
<td>See detection zone</td>
</tr>
<tr>
<td><strong>reproducibility</strong></td>
<td>± 0.15 %</td>
<td></td>
<td>± 0.15 %</td>
</tr>
<tr>
<td><strong>transducer frequency</strong></td>
<td>380 kHz</td>
<td></td>
<td>500 kHz</td>
</tr>
<tr>
<td><strong>resolution</strong></td>
<td>69 µm</td>
<td></td>
<td>69 µm</td>
</tr>
<tr>
<td><strong>accuracy</strong></td>
<td>± 1 % (temperature drift internally compensated)</td>
<td>± 1 % (temperature drift internally compensated)</td>
<td>± 0.15 %</td>
</tr>
<tr>
<td><strong>operating voltage ripple</strong></td>
<td>± 1 %</td>
<td>± 1 % (temperature drift internally compensated)</td>
<td>± 0.15 %</td>
</tr>
<tr>
<td><strong>no-load current consumption</strong></td>
<td>30 mA</td>
<td>± 10 %</td>
<td>± 0 mA</td>
</tr>
<tr>
<td><strong>housing</strong></td>
<td>brass sleeve, nickel-plated, plastic parts: PBT, ultrasonic transducer: polyurethane foam, epoxy resin with glass content</td>
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<td></td>
</tr>
<tr>
<td><strong>max. tightening torque of nuts</strong></td>
<td>1 Nm</td>
<td>1 Nm</td>
<td>15 Nm</td>
</tr>
<tr>
<td><strong>class of protection to EN 60 529</strong></td>
<td>IP 67</td>
<td>IP 67</td>
<td>IP 67</td>
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<tr>
<td><strong>norm conformity</strong></td>
<td>EN 60947-5-2</td>
<td>EN 60947-5-2</td>
<td>EN 60947-5-2</td>
</tr>
<tr>
<td><strong>type of connection</strong></td>
<td>4-pin M12 initiator plug</td>
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<td>4-pin M12 initiator plug</td>
</tr>
<tr>
<td><strong>cable</strong></td>
<td>Teach-in</td>
<td>Teach-in</td>
<td>Teach-in</td>
</tr>
<tr>
<td><strong>operating temperature</strong></td>
<td>25°C to +70°C</td>
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</tr>
<tr>
<td><strong>storage temperature</strong></td>
<td>40°C to +85°C</td>
<td>40°C to +85°C</td>
<td>40°C to +85°C</td>
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<tr>
<td><strong>weight</strong></td>
<td>15 g</td>
<td>15 g</td>
<td>15 g</td>
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<tr>
<td><strong>response time</strong></td>
<td>24 ms</td>
<td>30 ms</td>
<td>30 ms</td>
</tr>
<tr>
<td><strong>time delay before availability</strong></td>
<td>&lt; 300 ms</td>
<td>&lt; 300 ms</td>
<td>&lt; 300 ms</td>
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<tr>
<td><strong>order no.</strong></td>
<td>nano-15/CI</td>
<td>nano-24/CI</td>
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</tr>
<tr>
<td><strong>analogue output</strong></td>
<td>0-20 mA</td>
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</tr>
<tr>
<td><strong>analogue output</strong></td>
<td>10 - 30 V DC for R&lt;sub&gt;L&lt;/sub&gt; ≤ 100 Q (Class 2)</td>
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</tr>
<tr>
<td><strong>operating voltage U&lt;sub&gt;s&lt;/sub&gt;</strong></td>
<td>15 - 30 V DC for R&lt;sub&gt;L&lt;/sub&gt; &gt; 100 Q (Class 2)</td>
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</tr>
<tr>
<td><strong>analogue output</strong></td>
<td>0-10 V</td>
<td>0-10 V</td>
<td>0-10 V</td>
</tr>
<tr>
<td><strong>analogue output</strong></td>
<td>15 - 30 V DC, reverse polarity protection (Class 2)</td>
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<tr>
<td><strong>operating voltage U&lt;sub&gt;s&lt;/sub&gt;</strong></td>
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