Operating manual

Ultrasonic proximity switch with analogue output
zws-15/CI/QS  zws-15/CU/QS
zws-24/CI/QS  zws-24/CU/QS
zws-25/CI/QS  zws-25/CU/QS
zws-35/CI/QS  zws-35/CU/QS
zws-70/CI/QS  zws-70/CU/QS

Product Description
The zws sensor offers a non-contact measurement of the distance to an object which must be positioned within the sensor’s detection zone. In dependence of the set window limits, a distance-proportional analogue signal is output. Via the push-button, the window limits of the analogue output and its characteristic can be adjusted (teach-in). Two LEDs indicate operation and the state of the analogue output.

Safety Notes
- Read the operating instructions prior to start-up.
- Connection, installation and adjustment works may only be carried out by expert personnel.
- No safety component in accordance with the EU Machine Directive.

Set analogue output
Reset to factory setting

Proper use
zws ultrasonic sensors are used for non-contact detection of objects.

Installation
- Mount the sensor at the installation site with the aid of the enclosed mounting plate. Maximum torque: 0,5 Nm

Start-Up
- Connect the power supply.
- Carry out the adjustment in accordance with the diagram.

Factory Setting
- Rising analogue characteristic curve between the blind zone and the operating range

Synchronization
You can synchronize as many sensors as you like.
- Apply a square-wave signal to the sync-input with pulse width $t_p$ and repetition rate $f_p$ (Fig. 3 and technical data).
- A high level on the sync-input will deactivate the sensor.

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 zws sensor has a blind zone, within which distance measurements are not possible.
- In the normal operating mode, an illuminated yellow LED signals the object is within the adjusted window limits.
- If the push-button is not pressed for 30 seconds during the teach-in setting, the settings made hitherto are deleted.
- The sensor can be reset to its factory setting.

Checking operation mode
- In normal mode shortly press the push-button. The green LED stops shining for one second, then it will show the current characteristic of the analogue output:

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>LED indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rising</td>
<td>yellow LED: on</td>
</tr>
<tr>
<td>Falling</td>
<td>green LED: on</td>
</tr>
</tbody>
</table>

Further settings

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

Proper use
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- Mount the sensor at the installation site with the aid of the enclosed mounting plate. Maximum torque: 0,5 Nm

Teach-in procedure

1. Set window limits
2. Place object at position 1
   - Press push-button for about 3 s until LEDs flash simultaneously
   - Both LEDs: flash mutually

3. Place object at position 2
   - Press push-button for about 3 s until LEDs flash simultaneously
   - green LED: flashes
   - yellow LED: on: rising, off: falling characterstic curve

4. To change output characteristic press push-button for about 1 s

5. Wait for 10 s

Fig. 1: Attachment with mounting plate

Fig. 2: Pin assignment with view onto sensor plug and colour coding of the microsonic connection cable

Fig. 3: External synchronization signal

Table: Colour coding of microsonic connection cable
<table>
<thead>
<tr>
<th>Colour</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>brown</td>
<td>4</td>
</tr>
<tr>
<td>blue</td>
<td>4</td>
</tr>
<tr>
<td>white</td>
<td>4</td>
</tr>
</tbody>
</table>

Fig. 4: Microsonic connection cable
Technical data

The dark grey areas are determined with a thin round bar (10 mm dia.) for different objects. In order to obtain the light grey areas, a plate (100 x 100 mm) is introduced into the beam spread from the side. In doing so, the optimum angle between plate and sensor is always employed. This therefore indicates the maximum detection zone of the sensor. It is not possible to evaluate ultrasonic reflections outside this area.

<table>
<thead>
<tr>
<th>Blind Zone</th>
<th>Operating Range</th>
<th>Angle of Beam Spread</th>
<th>Transducer Frequency</th>
<th>Resolution, Sampling Rate</th>
<th>Reproducibility</th>
<th>Detection Zones</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 mm</td>
<td>55 mm</td>
<td>80 mm</td>
<td>380 kHz</td>
<td>0.20 mm</td>
<td>± 0.15 %</td>
<td>1 analogue output</td>
</tr>
<tr>
<td>250 mm</td>
<td>350 mm</td>
<td>400 mm</td>
<td>500 kHz</td>
<td>0.20 mm</td>
<td>± 1 %</td>
<td>U-plate and sensor is always employed.</td>
</tr>
<tr>
<td>100 mm</td>
<td>200 mm</td>
<td>250 mm</td>
<td>600 kHz</td>
<td>0.20 mm</td>
<td>± 1 %</td>
<td>U-plate and sensor is always employed.</td>
</tr>
<tr>
<td>150 mm</td>
<td>200 mm</td>
<td>250 mm</td>
<td>700 kHz</td>
<td>0.20 mm</td>
<td>± 1 %</td>
<td>U-plate and sensor is always employed.</td>
</tr>
<tr>
<td>200 mm</td>
<td>250 mm</td>
<td>300 mm</td>
<td>800 kHz</td>
<td>0.20 mm</td>
<td>± 1 %</td>
<td>U-plate and sensor is always employed.</td>
</tr>
<tr>
<td>250 mm</td>
<td>300 mm</td>
<td>350 mm</td>
<td>900 kHz</td>
<td>0.20 mm</td>
<td>± 1 %</td>
<td>U-plate and sensor is always employed.</td>
</tr>
<tr>
<td>300 mm</td>
<td>350 mm</td>
<td>400 mm</td>
<td>1000 kHz</td>
<td>0.20 mm</td>
<td>± 1 %</td>
<td>U-plate and sensor is always employed.</td>
</tr>
</tbody>
</table>

The content of this document is subject to technical changes. Specifications in this document are presented in a descriptive way only. They do not warrant any product features.