Operating Instructions

Fast ultrasonic proximity switch with one switched output

zws-7/CD/QS  zws-7/CE/QS
zws-15/CD/5ms.a  zws-15/CE/5ms.a

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.

The switched output is set in dependence of the adjusted detect distance.

Due to the short response time and the high switching frequency these zws sensors are applicable to the detection of quick processes. For the zws-7, the faster variant, please see the notes for installation and operation. Via the push-button, the detect distance and operating mode can be adjusted (teach-in). Two LEDs indicate operation and the state of the switched 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.

Installation

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

Start-Up

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

Operating modes

Three operating modes are available for the switched output:

- Operation with one detect point
- The switched output is set if the object falls below the set detect point.
- Window mode
- The switched output is set if the object is within the set window margins.
- Two-way reflective barrier
- The switched output is set if the object is between sensor and reflector.

Synchronization

You can synchronize as many sensors as you like.

- Apply a square-wave signal to the sync-input with pulse width t_i and repetition rate t_p (Fig.3 and technical data).
- A high level on the sync-input will deactivate the sensor.

Further settings

Enable/disable Teach-in push-button

Reset to factory setting

Switch off power supply

While pressing the push-button switch on power supply

Keep push-button pressed for about 1 s until both LEDs flash simultaneously

Check operation mode

In normal mode shortly press the push-button.

- The green LED stops shining for one second, then it will show the current operating mode:
  - 1 x flashing = operation with one switching point
  - 2 x flashing = window mode
  - 3 x flashing = reflective barrier

After a break of 3 s the green LED shows the output function:
- 1 x flashing = NOC
- 2 x flashing = NCC

Maintenance

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

Notes

- 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 switched output is switched through.
- The sensor got to know the distance to the object at the teach-in stage. For objects that move into the sound field from the side, an 8-10 % greater distance should be set for reliable object detection by the sensor.

Sensor adjustment with Teach-in procedure

![Diagram of sensor adjustment steps](Image)

Sensor disabled

Enable/Disable Teach-in push-button

Reset to factory setting

Switch off power supply

While pressing the push-button switch on power supply

Keep push-button pressed for about 1 s until both LEDs start flashing

Checking operation mode

In normal mode shortly press the push-button.

- Press push-button for about 13 s until both LEDs flash simultaneously
- Press push-button for about 1 s
- To change output characteristic press push-button for about 1 s
- Wait for 10 s

Notes

- The zws-7 has a very short measurement cycle time of only 2 ms. Under unfavourable conditions this can lead to the sensor wrongly responding to echoes from exis-
### Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blind zone</td>
<td>20 mm</td>
</tr>
<tr>
<td>Operating range</td>
<td>70 mm</td>
</tr>
<tr>
<td>Maximum range</td>
<td>180 mm</td>
</tr>
<tr>
<td>Angle of beam spread</td>
<td>380 kHz</td>
</tr>
<tr>
<td>Resolution, sampling rate</td>
<td>200 mm</td>
</tr>
<tr>
<td>Reproducibility</td>
<td>± 0.15 %</td>
</tr>
<tr>
<td>Operating area</td>
<td>See detection zone</td>
</tr>
<tr>
<td>Detection zone</td>
<td>See detection zone</td>
</tr>
</tbody>
</table>

**Accuracy**
- Temperature drift: 0.17 % / °C
- Voltage ripple: ± 30 mA
- No-load current consumption: < 30 mA

**Housing**
- ABS
- Ultrasonic transducer: polyurethane foam, epoxy resin with glass content

**Protection class**
- Type of protection: IP 67

**Connection options**
- 4-pin M8 initiator plug

**Indicators**
- LED green (operation)
- LED yellow (state of output)

**Programmability**
- Yes, external
- Yes, external

**Synchronization**
- Yes, Teach-in push-button
- Yes, Teach-in push-button

**No-switching times**
- 2 ms < t_s < 1 s
- 3 ms < t_s < 1 s

**Switching conditions**
- Operating voltage: U_{DC} = 20 - 30 V DC, reverse polarity protection
- Operating area: ± 10 %

**Storage temperature**
- Weight: 10 g
- -25°C to +70°C
- -40°C to +85°C

**Performance specifications**
- Switching time: < 3 ms
- Switching frequency: 250 Hz
- Temperature drift: 0.17 % / °C
- Temperature ripple: ± 0.1 %

**Compatible transducers**
- Ultrasonic transducer: polyurethane foam, epoxy resin with glass content

**Operating area**
- Weight: < 30 mA
- Temperature drift: 0.17 % / °C
- Temperature ripple: ± 0.1 %

**Symbol for conformity**
- 2014/30/EU

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**Fig. 5:** Unobstructed space in front of the sensor

- With the zws-7 sensor, it is vital that the objects to be detected enter the range of 0-85 % of the set distance.

**Fig. 6:** Sensor/reflector working clearance

**Fig. 7:** Working clearance and reflector sizes