



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.

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Installation

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

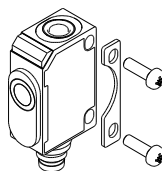


Fig. 1: Attachment with mounting plate

- Connect a connection cable to the M8 device plug.
- Avoid mechanical load on the connector.

Start-Up

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

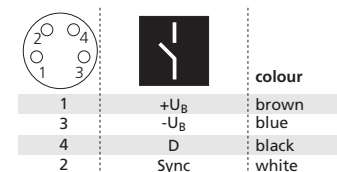


Fig. 2: Pin assignment with view onto sensor plug and colour coding of the microsonic connection cable

Factory Setting

- Operation with one detect point
- Switched output on NOC
- Detect points at operating range

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.

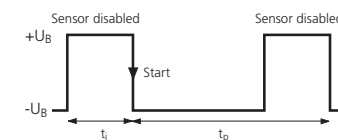


Fig.3: External synchronization signal

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 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.

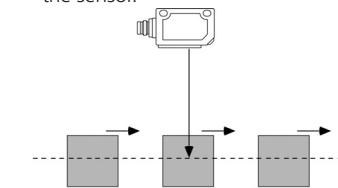
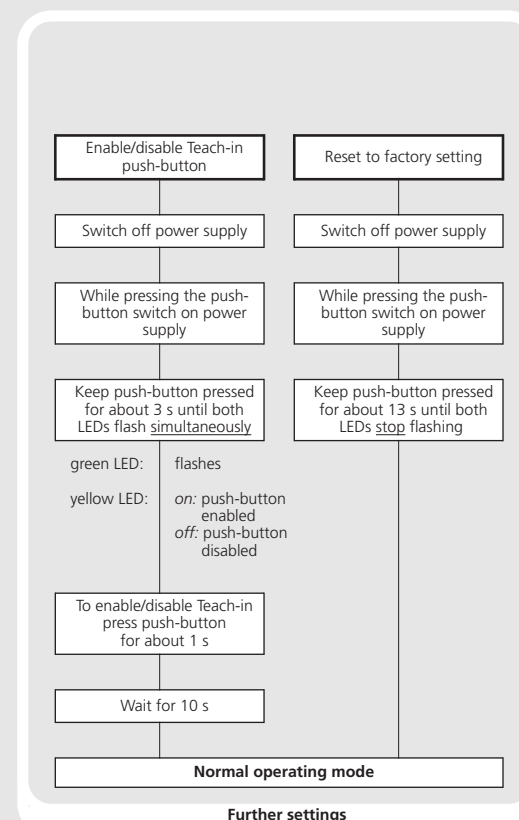
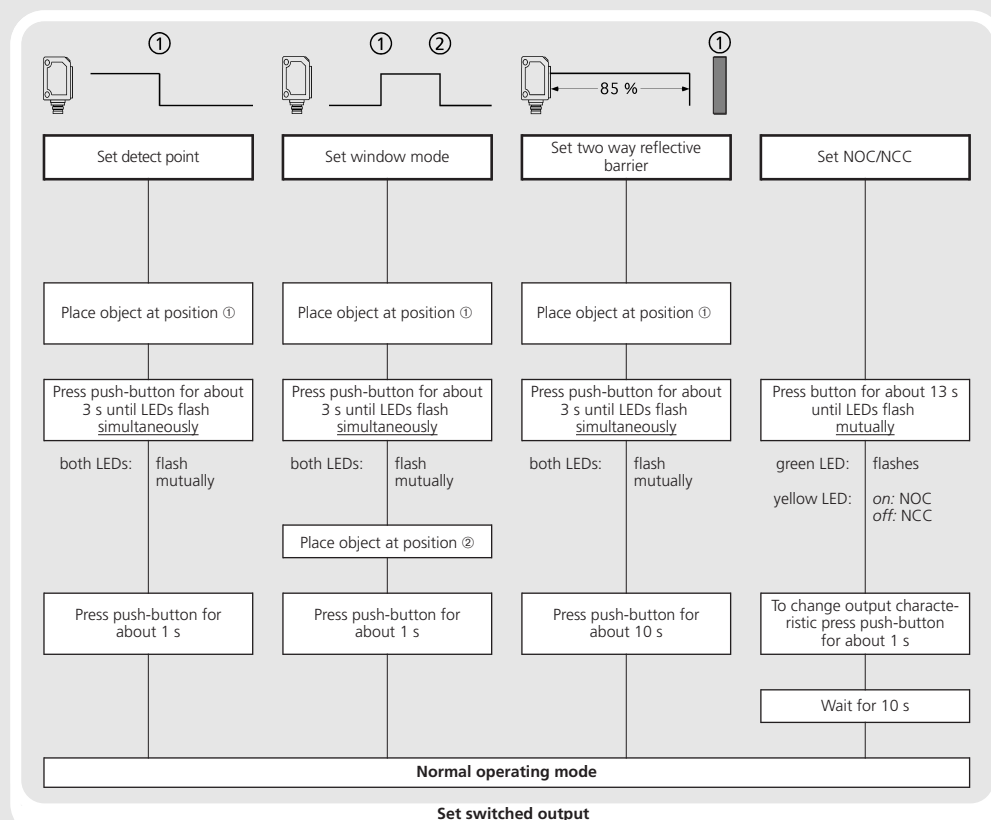
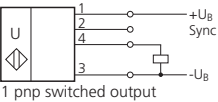
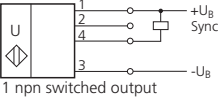
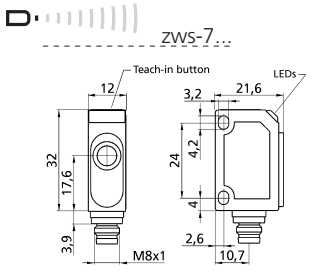
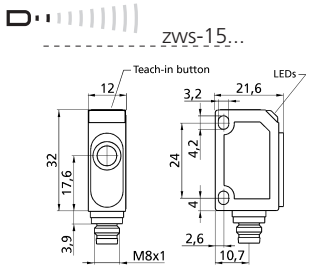
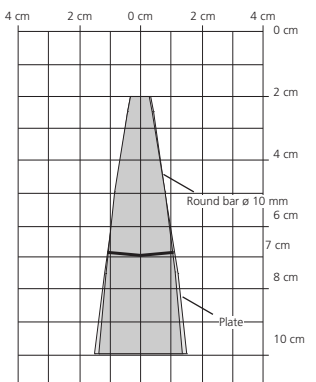
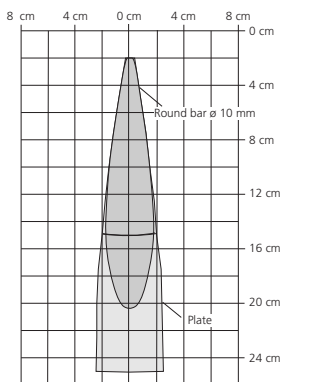


Fig. 4: Setting the switching point

- 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-

Sensor adjustment with Teach-in procedure



Technical data		
 <p>1 pnp switched output</p>  <p>1 npn switched output</p>	 <p>zws-7...</p>	 <p>zws-15...</p>
	<p>blind zone 20 mm</p> <p>operating range 70 mm</p> <p>maximum range 100 mm</p> <p>angle of beam spread See detection zone</p> <p>transducer frequency 380 kHz</p> <p>resolution, sampling rate 0,20 mm</p> <p>reproducibility ± 0,15 %</p> <p>rejection zones for different objects: The dark grey areas are determined with a thin round bar (10 mm dia.) and indicate the typical operating range of a sensor. 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.</p> 	<p>blind zone 20 mm</p> <p>operating range 150 mm</p> <p>maximum range 250 mm</p> <p>angle of beam spread See detection zone</p> <p>transducer frequency 380 kHz</p> <p>resolution, sampling rate 0,20 mm</p> <p>reproducibility ± 0,15 %</p> 
<p>accuracy Temperature drift 0,17 % / °C</p> <p>operating voltage U_B 20 - 30 V DC, reverse polarity protection</p> <p>voltage ripple ±10 %</p> <p>no-load current consumption < 30 mA</p> <p>housing ABS</p> <p>class of protection to EN 60 529 IP 67</p> <p>type of connection 4-pin M8 initiator plug</p> <p>controls Yes, Teach-in push-button</p> <p>indicators LED green (operation) LED yellow (state of output)</p> <p>programmable No</p> <p>synchronisation Yes, external</p> <p>pulse width synchronization signal t_p > 150 µs</p> <p>repetition rate synchronization signal t_r 2 ms < t_r < 1 s</p> <p>operating temperature -25°C to +70°C</p> <p>storage temperature -40°C to +85°C</p> <p>weight 10 g</p> <p>switching hysteresis 2 mm</p> <p>switching frequency 250 Hz</p> <p>response time < 3 ms</p> <p>switch-off delay time < 3 ms</p> <p>time delay before availability < 300 ms</p> <p>norm conformity EN 60947-5-2</p>	<p>accuracy Temperature drift 0,17 % / °C</p> <p>operating voltage U_B 20 - 30 V DC, reverse polarity protection</p> <p>voltage ripple ±10 %</p> <p>no-load current consumption < 30 mA</p> <p>housing ABS</p> <p>class of protection to EN 60 529 IP 67</p> <p>type of connection 4-pin M8 initiator plug</p> <p>controls Yes, Teach-in push-button</p> <p>indicators LED green (operation) LED yellow (state of output)</p> <p>programmable No</p> <p>synchronisation Yes, external</p> <p>pulse width synchronization signal t_p > 150 µs</p> <p>repetition rate synchronization signal t_r 5 ms < t_r < 1 s</p> <p>operating temperature -25°C to +70°C</p> <p>storage temperature -40°C to +85°C</p> <p>weight 10 g</p> <p>switching hysteresis 2 mm</p> <p>switching frequency 100 Hz</p> <p>response time < 7 ms</p> <p>switch-off delay time < 7 ms</p> <p>time delay before availability < 300 ms</p> <p>norm conformity EN 60947-5-2</p>	<p>order no. zws-7/CD/QS</p> <p>switched output pnp, U_B-2 V, I_{max} = 200 mA switchable NOC/NCC, short-circuit-proof</p> <p>order no. zws-7/CE/QS</p> <p>switched output npn, -U_B+2 V, I_{max} = 200 mA switchable NOC/NCC, short-circuit-proof</p> <p>order no. zws-15/CD/5ms.a</p> <p>switched output pnp, U_B-2 V, I_{max} = 200 mA switchable NOC/NCC, short-circuit-proof</p> <p>order no. zws-15/CE/5ms.a</p> <p>switched output npn, -U_B+2 V, I_{max} = 200 mA switchable NOC/NCC, short-circuit-proof</p>

ting measurements. To avoid this, there has to be an unobstructed space extending to a depth of 500 mm in front of the sensor. Only the objects to be detected are to be within the sensor's 20-100 mm operating area.

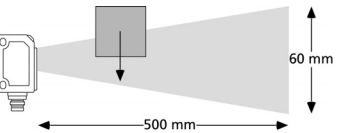


Fig. 5: Unobstructed space in front of the sensor

- With the zws-7, it is vital that the objects to be detected enter the sound fields from the sides.
- If the unobstructed 500 mm space cannot be provided or should the sensor be used in the «Two-way reflective barrier» mode, then a plane reflector at a specific distance to the sensor must be fitted. The size of the reflector and its working clearance from the sensor can be taken from the table in Fig.7.

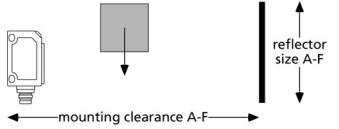


Fig. 6: Sensor/reflector working clearance

A	366 mm	60 mm x 60 mm
B	194 mm	60 mm x 60 mm
C	137 mm	50 mm x 50 mm
D	108 mm	40 mm x 40 mm
E	91 mm	40 mm x 40 mm
F	79 mm	30 mm x 30 mm

Fig. 7: Working clearance and reflector sizes

- In the »Two-way reflective barrier« operating mode, the object has to be within the range of 0-85 % of the set distance.
- The zws-7 sensor has no temperature compensation.
- If the push-button is not pressed for 2 minutes during the teach-in setting, the settings made hitherto are deleted.
- The sensor can be reset to its factory setting.