

**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

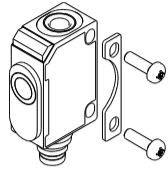


Fig. 1: Attachment with mounting plate

- 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.

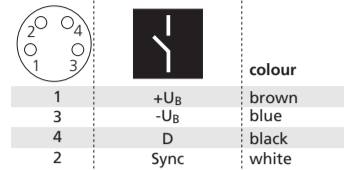


Fig. 2: Pin assignment with view onto sensor plug and colour coding of the microsonic connection cable

**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).

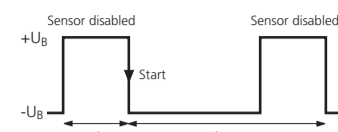


Fig.3: External synchronization signal

A high level on the sync-input will deactivate the sensor.

**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

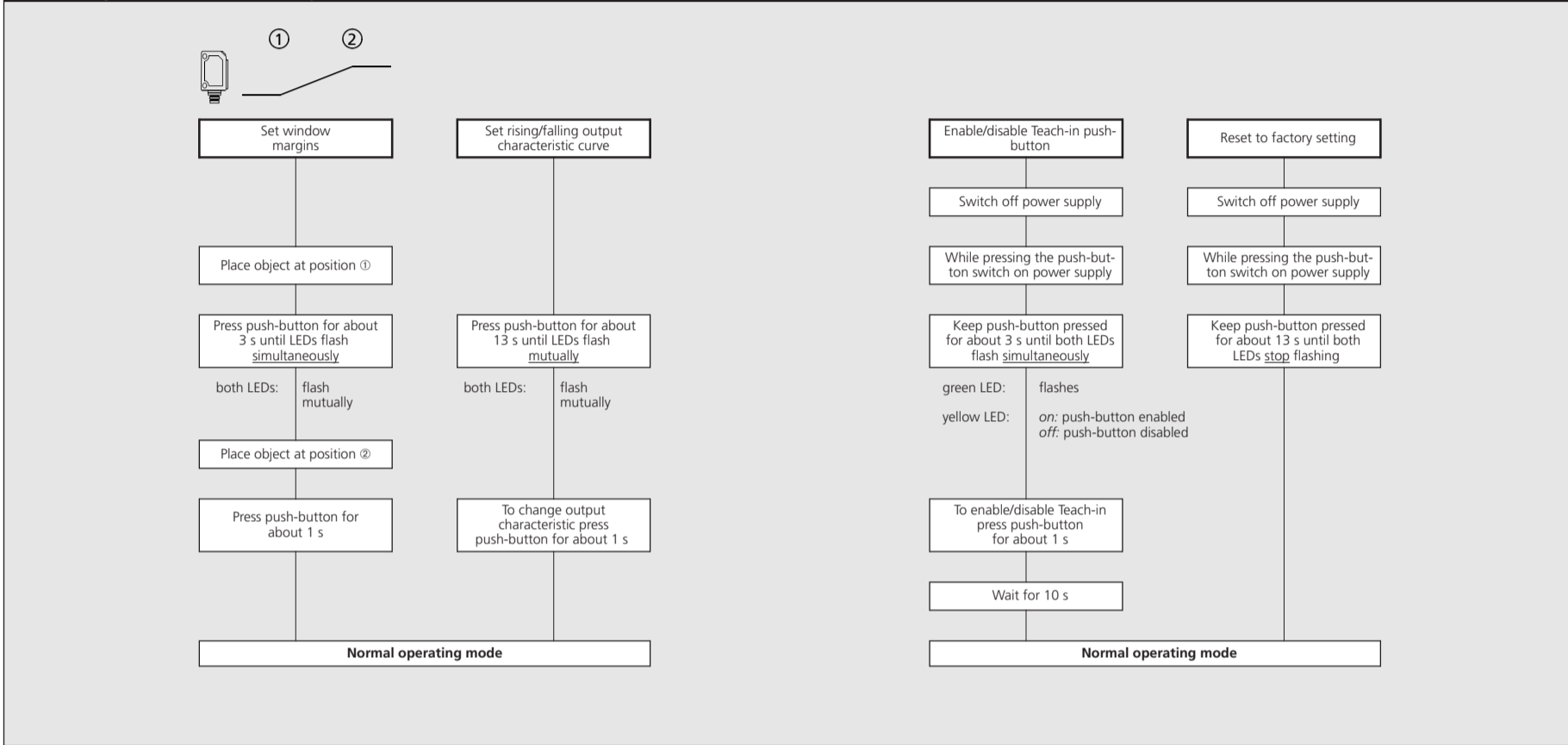
**Maintenance**

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

**Notes**

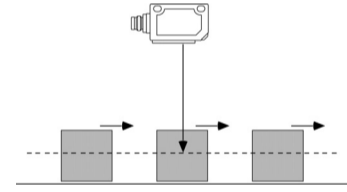
- The zws sensor has a blind zone, within which distance measurements are not possible.
- In the normal operating mode, an illuminated yellow LED signals the switched output is switched through.
- The sensor got to know the distance to the object at the teach-in stage. For objects that move into the sound field from the side, an 8-10 % greater distance should be set for reliable object detection by the sensor.

**Sensor adjustment with Teach-in procedure**



**Technical data**

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



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

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 existing 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.

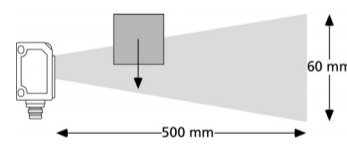


Fig. 5: Unobstructed space in front of the sensor

- 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.

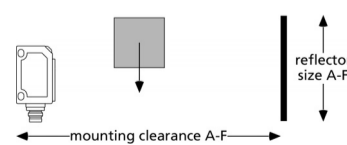


Fig. 6: Sensor/reflecter working clearance