microsonic

**Operating Manual**

**Ultrasonic proximity switch with one 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

## Use for intended purpose only

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 (see Fig. 1). Maximum torque of attachment screw: 0,5 Nm

➔ Connect a connection cable to the M8 device plug (see Fig. 2).

➔ Avoid mechanical load on the connector.

## Start-Up

➔ Connect the power supply.

➔ Carry out the adjustment in accordance with Diagram 1.

## Factory Setting

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

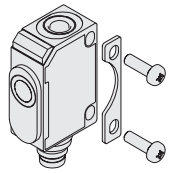
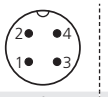


*Fig. 1: Attachment with mounting plate*




| | | colour |
|---|---|---|
| 1 | $+U_B$ | brown |
| 3 | $-U_B$ | blue |
| 4 | U/I | black |
| 2 | sync | white |

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

## Synchronisation

You can synchronise 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 disable the sensor.

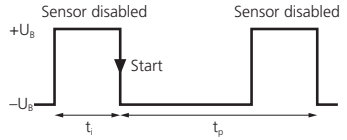



*Fig. 3: External synchronisation signal*

## Checking operation mode

➔ In normal operating 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**:

- 1x flashing = rising
- 2x flashing = falling

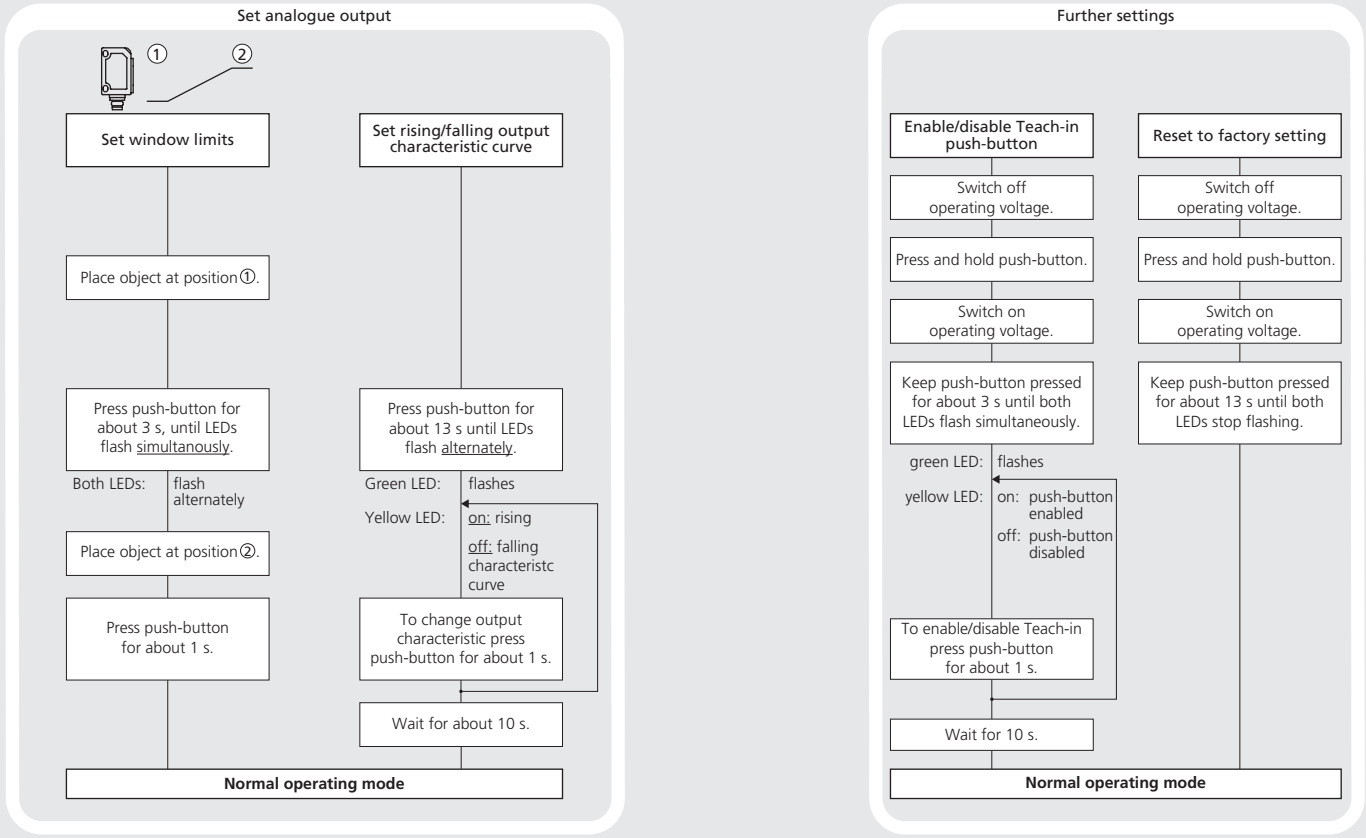
## Maintenance

microsonic sensors are maintenance-free. In case of excess caked-on dirt we recommend cleaning 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 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 (see »Further settings«, Diagram 1).

## Diagram 1: Set sensor parameters via Teach-in procedure





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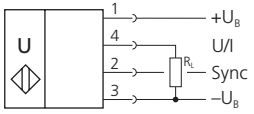
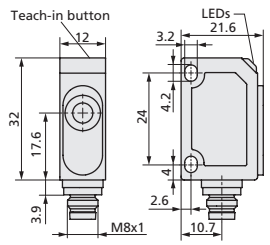
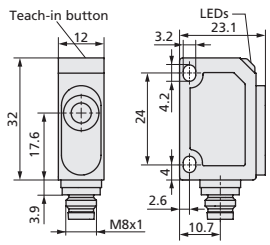
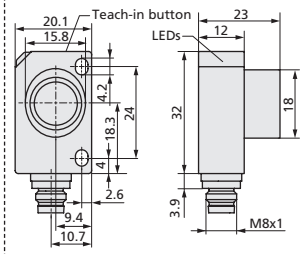
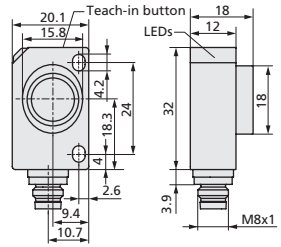
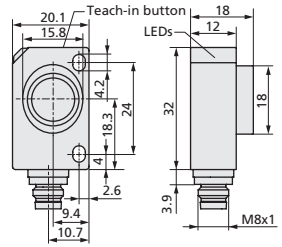
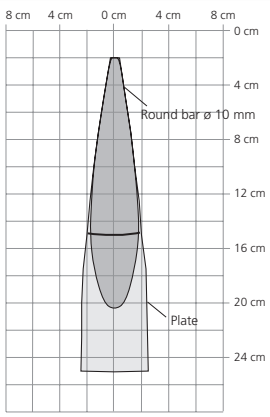
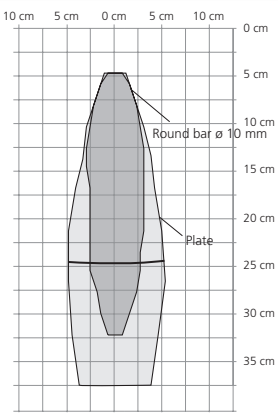
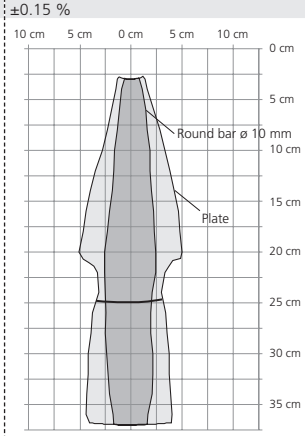
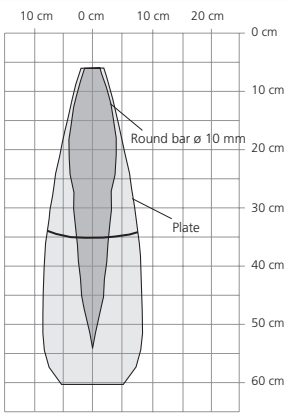
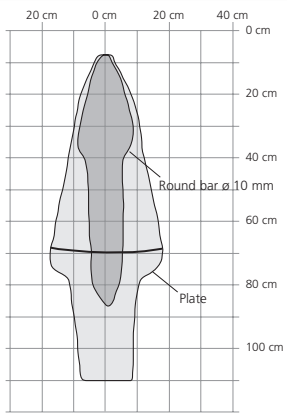
## Technical Data



1 analogue output

| | zws-15... | zws-24... | zws-25... | zws-35... | zws-70... |
|---|---|---|---|---|---|
| |  |  |  |  |  |
| **blind zone** | 20 mm | 50 mm | 30 mm | 64 mm | 120 mm |
| **operating range** | 150 mm | 240 mm | 250 mm | 350 mm | 700 mm |
| **maximum range** | 250 mm | 350 mm | 350 mm | 600 mm | 1000 mm |
| **angle of beam spread** | see detection zone | see detection zone | see detection zone | see detection zone | see detection zone |
| **transducer frequency** | 380 kHz | 500 kHz | 320 kHz | 400 kHz | 300 kHz |
| **resolution** | 0.20 mm | 0.20 mm | 0.20 mm | 0.20 mm | 0.20 mm |
| **reproducibility** | ±0.15 % | ±0.15 % | ±0.15 % | ±0.15 % | ±0.15 % |
| **detection zones**<br>for different objects:<br>The dark grey areas represent the zone where it is easy to recognise the normal reflector (round bar). This indicates the typical operating range of the sensors. The light grey areas represent the zone where a very large reflector – for instance a plate – can still be recognised. The requirement here is for an optimum alignment to the sensor. It is not possible to evaluate ultrasonic reflections outside this area. |  |  |  |  |  |
| **accuracy** | ±1 %;<br>temperature drift internal compensated | ±1 %;<br>temperature drift internal compensated | ±1 %;<br>temperature drift internal compensated | ±1 %;<br>temperature drift internal compensated | ±1 %;<br>temperature drift internal compensated |
| **operating voltage $U_B$** | 20 to 30 V DC, reverse polarity protection | 20 to 30 V DC, reverse polarity protection | 20 to 30 V DC, reverse polarity protection | 20 to 30 V DC, reverse polarity protection | 20 to 30 V DC, reverse polarity protection |
| **voltage ripple** | ±10 % | ±10 % | ±10 % | ±10 % | ±10 % |
| **no-load current consumption** | <25 mA | <35 mA | <25 mA | <35 mA | <35 mA |
| **housing** | ABS<br>ultrasonic transducer: polyurethane foam, epoxy resin with glass content | ABS<br>ultrasonic transducer: polyurethane foam, epoxy resin with glass content | ABS<br>ultrasonic transducer: polyurethane foam, epoxy resin with glass content | ABS<br>ultrasonic transducer: polyurethane foam, epoxy resin with glass content | ABS<br>ultrasonic transducer: polyurethane foam, epoxy resin with glass content |
| **class of protection to EN 60529** | IP 67 | IP 67 | IP 67 | IP 67 | IP 67 |
| **norm conformity** | EN 60947-5-2 | EN 60947-5-2 | EN 60947-5-2 | EN 60947-5-2 | EN 60947-5-2 |
| **type of connection** | 4-pin M8 initiator plug | 4-pin M8 initiator plug | 4-pin M8 initiator plug | 4-pin M8 initiator plug | 4-pin M8 initiator plug |
| **controls** | Teach-in push-button | Teach-in push-button | Teach-in push-button | Teach-in push-button | Teach-in push-button |
| **indicators** | LED green (operation)<br>LED yellow (state of output) | LED green (operation)<br>LED yellow (state of output) | LED green (operation)<br>LED yellow (state of output) | LED green (operation)<br>LED yellow (state of output) | LED green (operation)<br>LED yellow (state of output) |
| **synchronisation** | external | external | external | external | external |
| **pulse width synchronisation signal $t_i$** | >150 µs | >150 µs | >150 µs | >150 µs | >150 µs |
| **cycle time synchronisation signal $t_p$** | 8 ms < $t_p$ < 1 s | 10 ms < $t_p$ < 1 s | 10 ms < $t_p$ < 1 s | 16 ms < $t_p$ < 1 s | 14 ms < $t_p$ < 1 s |
| **operating temperature** | –25 to +70 °C | –25 to +70 °C | –25 to +70 °C | –25 to +70 °C | –25 to +70 °C |
| **storage temperature** | –40 to +85 °C | –40 to +85 °C | –40 to +85 °C | –40 to +85 °C | –40 to +85 °C |
| **weight** | 10 g | 10 g | 11 g | 11 g | 11 g |
| **response time** | 50 ms | 50 ms | 50 ms | 80 ms | 70 ms |
| **switch-off delay time** | <300 ms | <300 ms | <300 ms | <300 ms | <300 ms |
| **order no.** | **zws-15/CI/QS** | **zws-24/CI/QS** | **zws-25/CI/QS** | **zws-35/CI/QS** | **zws-70/CI/QS** |
| **analogue output 4 to 20 mA** | $R_L$ ≤ 500 Ω<br>rising/falling characteristic | $R_L$ ≤ 500 Ω<br>rising/falling characteristic | $R_L$ ≤ 500 Ω<br>rising/falling characteristic | $R_L$ ≤ 500 Ω<br>rising/falling characteristic | $R_L$ ≤ 500 Ω<br>rising/falling characteristic |
| **order no.** | **zws-15/CU/QS** | **zws-24/CU/QS** | **zws-25/CU/QS** | **zws-35/CU/QS** | **zws-70/CU/QS** |
| **analogue output 0 to 10 V** | $R_L$ ≥ 100 kΩ, short-circuit-proof,<br>rising/falling characteristic | $R_L$ ≥ 100 kΩ, short-circuit-proof,<br>rising/falling characteristic | $R_L$ ≥ 100 kΩ, short-circuit-proof,<br>rising/falling characteristic | $R_L$ ≥ 100 kΩ, short-circuit-proof,<br>rising/falling characteristic | $R_L$ ≥ 100 kΩ, short-circuit-proof,<br>rising/falling characteristic |



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