



ZWS

The zws sensors are among the smallest ultrasonic sensors available on the market in miniature housings with a Teach-in button.

HIGHLIGHTS

- › Small ultrasonic sensor in cuboidal housing
- › Installation-compatible with many optical sensors › a true alternative for critical applications
- › Up to 250 Hz switching frequency › for fast sampling
- › Optionally with SoundPipe wave guide attachment
- › Synchronisation input
- › Improved temperature compensation › adjustment to working conditions within 45 seconds

BASICS

- › 1 switching output in pnp or npn variant
- › Analogue output 4–20 mA or 0–10 V
- › 5 detection ranges with a measurement range of 20 mm to 1 m
- › microsonic Teach-in using a button
- › 20–30 V operating voltage





The miniature sensor housing

of the zws-15 has dimensions of 20 mm x 32 mm x 12 mm. The housing's design and mounting is compatible with many optical sensors. This facilitates the conversion to ultrasonic sensors for critical applications.

For the zws sensor range

two output versions and five detection ranges are available:

-  1 switching output, optionally in pnp or npn circuitry
-  1 analogue output 4–20 mA or 0–10 V

The Teach-in button

on the top facilitates the convenient setting of the sensor.

Two LEDs

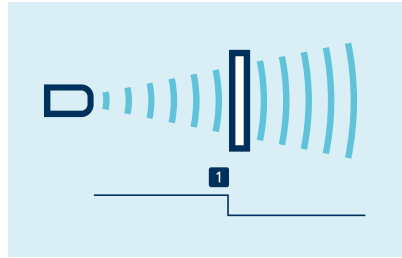
in the sensor housing's upper half indicate the switched output and, respectively the analogue output states.

The zws sensors with switched output have three operating modes:

- › Single switching point
- › Two-way reflective barrier
- › Window mode

Teach-in of a single switching point

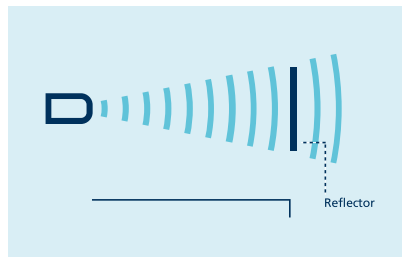
by positioning the object to be detected within the desired distance **1** to the sensor, pressing the button for approx. 3 seconds and then pressing it once more for approx. 1 second. Ready.



Teach-in of a switching point

Teach-in of a two-way reflective barrier

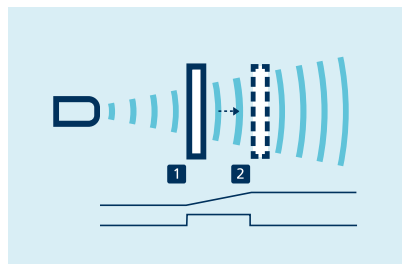
with a fixed reflector can be set up with the help of a permanently mounted reflector by mounting the zws sensor and the reflector, then pressing the button for approx. 3 seconds and then pressing it once more for approx. 10 seconds. Now, the two-way reflective barrier has been set.



Teach-in of a two-way reflective barrier

Set the analogue output

by initially positioning the object to be detected on the sensor-close window limit **1**, pressing the button for approx. 3 seconds, shifting the object



Teach-in of an analogue characteristic or a window with two switching points

to the sensor-distant window limit **2** and pressing the button once more for approx. 1 second. Ready.

To set a window

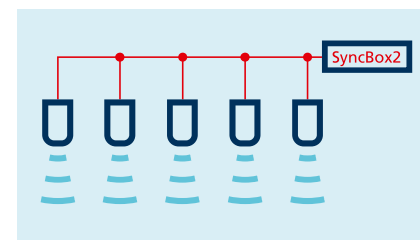
with two detection points on a single switched output, the procedure is the same as setting the analogue.

NCC/NOC

and rising/falling analogue characteristic curve can also be set using the push-button.

The control input on pin 2

can be used to synchronise multiple zws sensors with each other. The SyncBox2, which is available as an accessory, generates a synchronisation signal output on pin 2. This permits up to 50 zws sensors to be autonomously synchronised (see the chapter "Accessories").



Synchronisation of up to 50 zws sensors

The temperature compensation of the analogue sensors

profits from a significant improvement. The sensors reach their operating point only 45 seconds after activation of the operating voltage.

zws-7: 250 Hz switching frequency for fast measurement

At a maximum detection range of 100 mm, the zws-7 can achieve a switching frequency of 250 Hz.

This allows both detection of objects with a high counting frequency and extremely narrow gaps between two objects at fast machinery speeds. The zws-7 responds in under 3 ms.

Additionally fitting the new SoundPipe to the zws-7 markedly raises the power to detect narrow gaps between two objects at high machine speeds.



The zws-7, with a 250 Hz switching frequency, is particularly suitable for counting tasks at high machine speeds.

Technical data:

Operating range: 70 mm
Maximum range: 100 mm
Switching frequency: 250 Hz
Response time: < 3 ms



Fast zws-7



zws-7/15 with SoundPipe

Brings an intensively bundled sound field directly to the measuring point

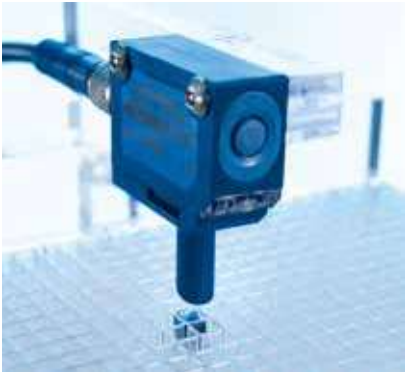
The SoundPipe can be used with any zws-7 or zws-15 sensor. It directs sound to the measuring point thus allowing measurements to be taken in drill holes and openings with diameters under 5 mm.

Measurement can be carried out directly before the sound exit opening, since the blind zone is inside the SoundPipe.

The SoundPipe is clipped onto the front of the zws-7 or zws-15 sensors (see the chapter "Accessories").

A typical field of application is measuring levels in micro-plate wells which are used in medical analysis technology. The SoundPipe can be directly placed over the opening; this makes exact positioning that much easier. The attachment can also be used in scanning gaps of only a few millimetres in width between two objects.

The zws sensors are ideal for probing of circuit boards and wafers in the electronic industry or for use in packaging machines in which high-transparency films must be detected.



With the SoundPipe, the zws-7/-15 sensor can measure fill levels in the smallest of openings.



The SoundPipe is positioned directly over the measuring point.

zws-7

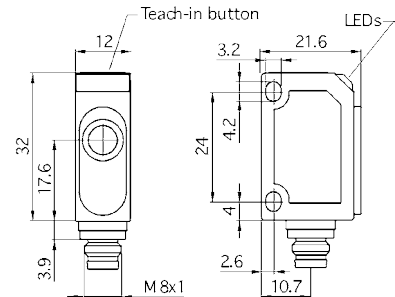
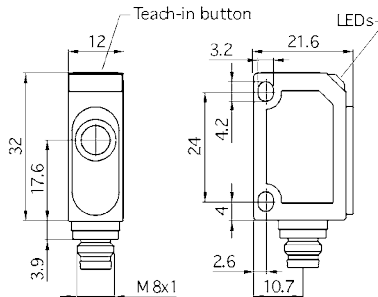
zws-15



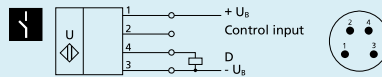
measuring range

20–100 mm

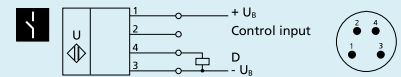
20–250 mm



blind zone	20 mm	20 mm
operating range	70 mm	150 mm
maximum range	100 mm	250 mm
angle of beam spread	please see i	please see i
transducer frequency	380 kHz	380 kHz
resolution/sampling rate	0.056 mm	0.056 mm
reproducibility	± 0.15 %	± 0.15 %
accuracy	temperature drift 0.17 %/K	temperature drift 0.17 %/K
operating voltage U_B	20 V to 30 V DC, reverse polarity protection	20 V to 30 V DC, reverse polarity protection
no-load current consumption	< 25 mA	< 25 mA
housing	ABS; ultrasonic transducer: polyurethane foam, epoxy resin with glass content	ABS; ultrasonic transducer: polyurethane foam, epoxy resin with glass content
class of protection according to EN 60529	IP 67	IP 67
type of connection	4-pin M8 initiator plug	4-pin M8 initiator plug
controls	push-button	push-button
scope for settings	Teach-in via push-button	Teach-in via push-button
indicators	LED green: working, LED yellow: switch status	LED green: working, LED yellow: switch status
operating temperature	-25°C to +70°C	-25°C to +70°C
storage temperature	-40°C to +85°C	-40°C to +85°C
weight	10 g	10 g
switching hysteresis	2 mm	2 mm
switching frequency	250 Hz	25 Hz
response time	3 ms	24 ms
delay prior to availability	< 300 ms	< 300 ms
order number	zws-7/CD/QS	zws-15/CD/QS
switching output	pnp, $U_B=2\text{ V}$, $I_{\max}=200\text{ mA}$, NOC/NCC adjustable, short-circuit-proof	pnp, $U_B=2\text{ V}$, $I_{\max}=200\text{ mA}$, NOC/NCC adjustable, short-circuit-proof

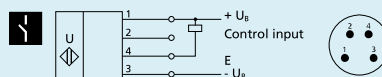


1 pnp switching output

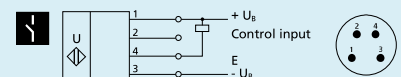


1 pnp switching output

order number	zws-7/CE/QS	zws-15/CE/QS
switching output	npn, $-U_B+2\text{ V}$, $I_{\max}=200\text{ mA}$, NOC/NCC adjustable, short-circuit-proof	npn, $-U_B+2\text{ V}$, $I_{\max}=200\text{ mA}$, NOC/NCC adjustable, short-circuit-proof



1 npn switching output

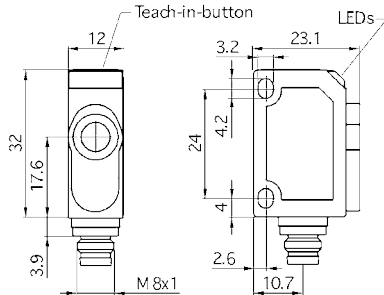


1 npn switching output

zws-24



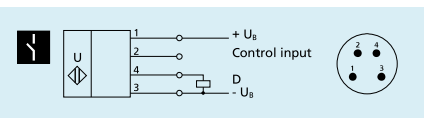
50–350 mm



- 50 mm
- 240 mm
- 350 mm
- please see ⓘ
- 500 kHz
- 0.037 mm
- ± 0.15 %
- temperature drift 0.17 %/K
- 20 V to 30 V DC, reverse polarity protection
- < 25 mA
- ABS; ultrasonic transducer: polyurethane foam, epoxy resin with glass content
- IP 67
- 4-pin M8 initiator plug
- push-button
- Teach-in via push-button
- LED green: working, LED yellow: switch status
- 25°C to +70°C
- 40°C to +85°C
- 10 g
- 2 mm
- 25 Hz
- 24 ms
- < 300 ms

zws-24/CD/QS

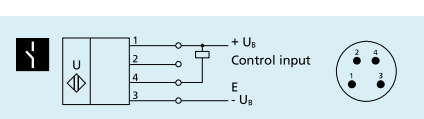
pnp, $U_B=2\text{ V}$, $I_{\max}=200\text{ mA}$,
NOC/NCC adjustable, short-circuit-proof



1 pnp switching output

zws-24/CE/QS

nnp, $-U_B+2\text{ V}$, $I_{\max}=200\text{ mA}$,
NOC/NCC adjustable, short-circuit-proof

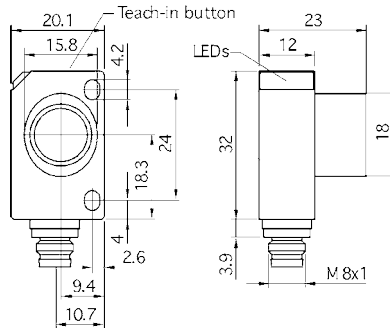


1 nnp switching output

zws-25



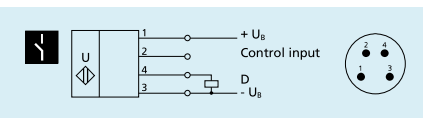
30–350 mm



- 30 mm
- 250 mm
- 350 mm
- please see ⓘ
- 320 kHz
- 0.069 mm
- ± 0.15 %
- temperature drift 0.17 %/K
- 20 V to 30 V DC, reverse polarity protection
- < 25 mA
- ABS; ultrasonic transducer: polyurethane foam, epoxy resin with glass content
- IP 67
- 4-pin M8 initiator plug
- push-button
- Teach-in via push-button
- LED green: working, LED yellow: switch status
- 25°C to +70°C
- 40°C to +85°C
- 11 g
- 2 mm
- 31 Hz
- 20 ms
- < 300 ms

zws-25/CD/QS

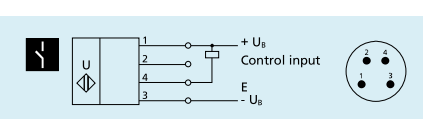
pnp, $U_B=2\text{ V}$, $I_{\max}=200\text{ mA}$,
NOC/NCC adjustable, short-circuit-proof



1 pnp switching output

zws-25/CE/QS

nnp, $-U_B+2\text{ V}$, $I_{\max}=200\text{ mA}$,
NOC/NCC adjustable, short-circuit-proof

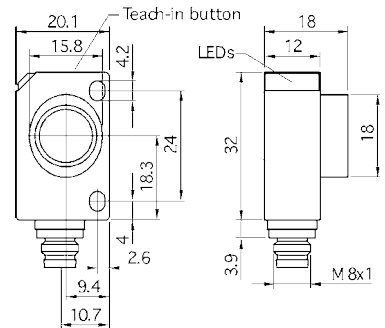


1 nnp switching output

zws-70



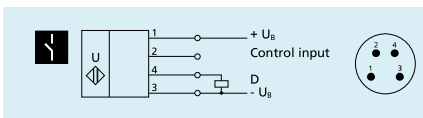
120–1,000 mm



- 120 mm
- 700 mm
- 1,000 mm
- please see ⓘ
- 300 kHz
- 0.037 mm
- ± 0.15 %
- temperature drift 0.17 %/K
- 20 V to 30 V DC, reverse polarity protection
- < 25 mA
- ABS; ultrasonic transducer: polyurethane foam, epoxy resin with glass content
- IP 67
- 4-pin M8 initiator plug
- push-button
- Teach-in via push-button
- LED green: working, LED yellow: switch status
- 25°C to +70°C
- 40°C to +85°C
- 11 g
- 2 mm
- 11 Hz
- 36 ms
- < 300 ms

zws-70/CD/QS

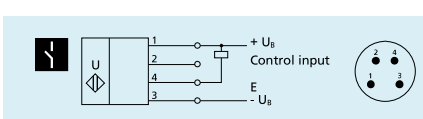
pnp, $U_B=2\text{ V}$, $I_{\max}=200\text{ mA}$,
NOC/NCC adjustable, short-circuit-proof



1 pnp switching output

zws-70/CE/QS

nnp, $-U_B+2\text{ V}$, $I_{\max}=200\text{ mA}$,
NOC/NCC adjustable, short-circuit-proof



1 nnp switching output

zws-15

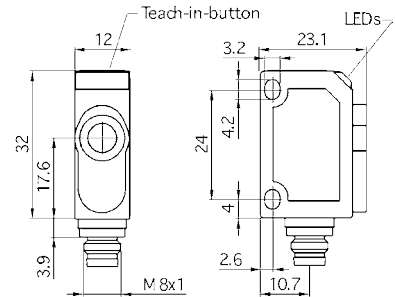
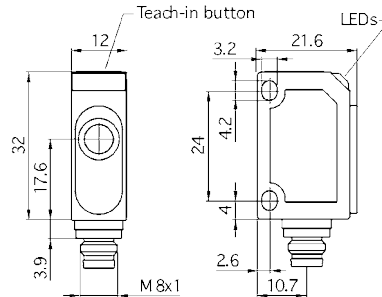
zws-24



measuring range

20–250 mm

55–350 mm



blind zone	20 mm	55 mm
operating range	150 mm	240 mm
maximum range	250 mm	350 mm
angle of beam spread	please see i	please see i
transducer frequency	380 kHz	500 kHz
resolution/sampling rate	0.056 mm	0.037 mm to 0.072 mm, depending on the analogue window
reproducibility	± 0.15 %	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)	± 1 % (temperature drift internally compensated)
operating voltage U_B	20 V to 30 V DC, reverse polarity protection	20 V to 30 V DC, reverse polarity protection
no-load current consumption	< 25 mA	< 25 mA
housing	ABS; ultrasonic transducer: polyurethane foam, epoxy resin with glass content	ABS; ultrasonic transducer: polyurethane foam, epoxy resin with glass content
class of protection according to EN 60529	IP 67	IP 67
type of connection	4-pin M8 initiator plug	4-pin M8 initiator plug
controls	push-button	push-button
scope for settings	Teach-in via push-button	Teach-in via push-button
indicators	LED green: working, LED yellow: object in the window	LED green: working, LED yellow: object in the window
operating temperature	-25°C to +70°C	-25°C to +70°C
storage temperature	-40°C to +85°C	-40°C to +85°C
weight	10 g	10 g
response time	50 ms	50 ms
delay prior to availability	< 300 ms	< 300 ms

order number

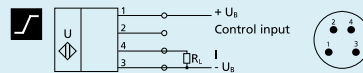
zws-15/CI/QS

zws-24/CI/QS

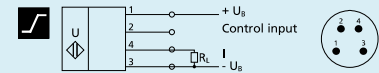
analogue output

current output 4–20 mA
switchable rising/falling

current output 4–20 mA
switchable rising/falling



analogue output 4–20 mA



analogue output 4–20 mA

order number

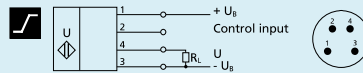
zws-15/CU/QS

zws-24/CU/QS

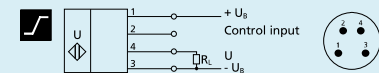
analogue output

voltage output 0–10 V
short-circuit-proof, switchable rising/falling

voltage output 0–10 V
short-circuit-proof, switchable rising/falling



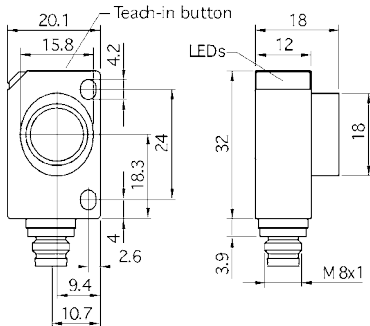
analogue output 0–10 V



analogue output 0–10 V



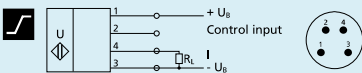
120–1,000 mm



- 120 mm
- 700 mm
- 1,000 mm
- please see
- 300 kHz
- 0.037 mm to 0.215 mm, depending on the analogue window
- ± 0.15 %
- ± 1 % (temperature drift internally compensated)
- 20 V to 30 V DC, reverse polarity protection
- < 25 mA
- ABS; ultrasonic transducer: polyurethane foam, epoxy resin with glass content
- IP 67
- 4-pin M8 initiator plug
- push-button
- Teach-in via push-button
- LED green: working, LED yellow: object in the window
- 25°C to +70°C
- 40°C to +85°C
- 11 g
- 70 ms
- < 300 ms

zws-70/CI/QS

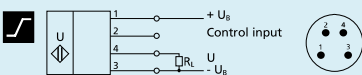
- current output 4–20 mA
- switchable rising/falling



analogue output 4–20 mA

zws-70/CU/QS

- voltage output 0–10 V
- short-circuit-proof, switchable rising/falling



analogue output 0–10 V