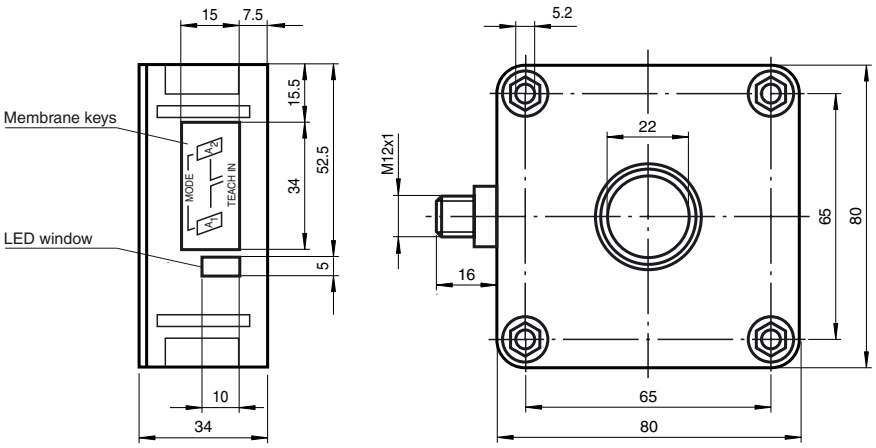
Ultrasonic sensor
UB2000-F42-E4-V15

Dimensions



Features

- Switch output
- Extremely small unusable area
- TEACH-IN
- Interference suppression (adjustable width of sound cone in close range)
- Temperature compensation
- Synchronisation options
- NO/NC selectable

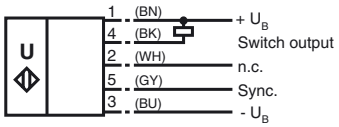
Technical data

CE

General specifications	
Sensing range	60 ... 2000 mm
Adjustment range	90 ... 2000 mm
Unusable area	0 ... 60 mm
Standard target plate	100 mm x 100 mm
Transducer frequency	approx. 175 kHz
Response delay	approx. 150 ms
Indicators/operating means	
LED green	permanently green: Power on
LED yellow	permanent: switching state switch output flashing: TEACH-IN function
LED red	normal operation: "fault" TEACH-IN function: no object detected
Electrical specifications	
Operating voltage	10 ... 30 V DC , ripple 10 $\%_{SS}$
No-load supply current I_0	≤ 50 mA
Input/Output	
Synchronisation	bi-directional 0 level -U_B...+1 V 1 level: +4 V...+U_B input impedance: > 12 KOhm synchronisation pulse: ≥ 100 µs, synchronisation interpulse period: ≥ 2 ms
Synchronisation frequency	
Common mode operation	≤ 30 Hz
Multiplex operation	≤ 30/n Hz, n = number of sensors
Output	
Output type	1 switch output E4, npn NO/NC, parameterisable
Repeat accuracy	≤ 0.5 % of switching point
Rated operational current I_e	200 mA , short-circuit/overload protected
Voltage drop U_d	≤ 2.5 V
Switching frequency f	≤ 3 Hz
Range hysteresis H	1 % of the set operating distance
Temperature influence	± 1 % of full-scale value
Standard conformity	
Standards	EN 60947-5-2
Ambient conditions	
Ambient temperature	-25 ... 70 °C (248 ... 343 K)
Storage temperature	-40 ... 85 °C (233 ... 358 K)
Mechanical specifications	
Protection degree	IP54
Connection	connector V15 (M12 x 1), 5 pin
Material	
Housing	PBT
Transducer	epoxy resin/hollow glass sphere mixture; foam polyurethane, cover PBT
Mass	140 g

Electrical connection

Standard symbol/Connections:
(version E4, npn)



Core colours in accordance with EN 60947-5-2.

Connector V15

111703_ENG.xml

2005-07-27

Notes

Parameterisation:

You can use 2 keys to parameterise the sensor. In order to start the switch point 1 learning mode, press the A1 key; in order to start the switch point 2 learning mode, press the A1 key.

If you keep both keys pressed as you switch on the power supply, the sensor will switch over to the sensitivity adjustment mode of operation.

In case the parameterisation procedure is not completed within 5 minutes, the sensor will discontinue the process and retain all previous settings.

Teaching in switch points:

Teaching in A1 switch point by pressing A1 key.

Keep A1 key pressed for > 2 s	The sensor enters the switch point 1 learning mode
Position target object in the desired distance	The sensor indicates via LED lights whether the target object has been detected. In case the object has been detected, the yellow LED will flash; if the object has not been detected, the red LED flashes.
Briefly press the A1 key	The sensor completes the switch point 1 TEACH-IN process and saves this value in non-volatile memory. In the event of an uncertain object (flashing red LED), the value learned is invalid. The system exits the TEACH-IN mode.

Analogously, the A2 switch point is learned in the same fashion as described above using the A2 key.

Switching hysteresis operation mode <--> switch point/window operation mode:

Keep both A1 and A2 keys pressed	The sensor indicates the current operation mode through the green LED. permanent green: Switch point/window operation mode flashing green: Hysteresis operation mode
after 2 seconds:	The sensor changes the operation mode which can be identified through the green LED. permanent green: Switch point/window operation mode flashing green: Hysteresis operation mode
Release keys	The green LED of the sensor keeps indicating the operation mode selected for additional 5 seconds

Suppression of disturbing targets

Some types of installation or particular conditions during operation of an ultrasonic sensor may admit that undesired objects (such as shelf brow posts, edges of machines) are closer than the actual target as they enter the recording range. In this case, the sensor would normally detect these objects rather than the desired target. So in order to ensure an error-free operation, in may be necessary to suppress those objects.

Objects can be suppressed if they meet the following conditions:

Model number

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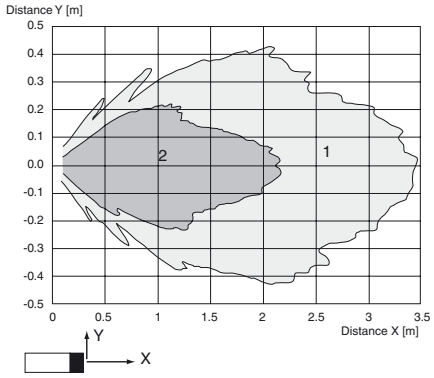
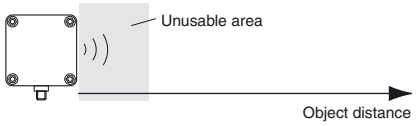
Characteristic curves/additional information

Characteristic response curve

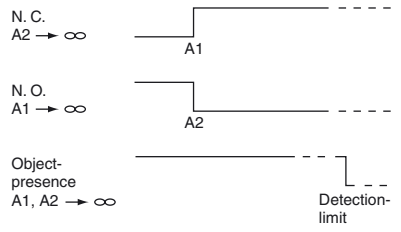


Curve 1: flat surface 100 mm x 100 mm
Curve 2: round bar, Ø 25 mm

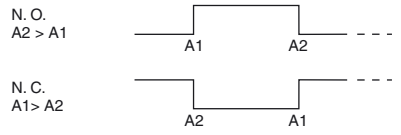
Programmable operation modes



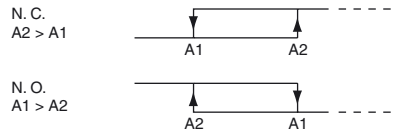
1. Switching point mode



2. Window mode



3. Hysteresis mode

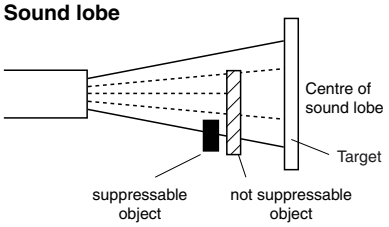


Note:
→ ∞ means: cover transducer surface with your hand, while teaching the switching point.

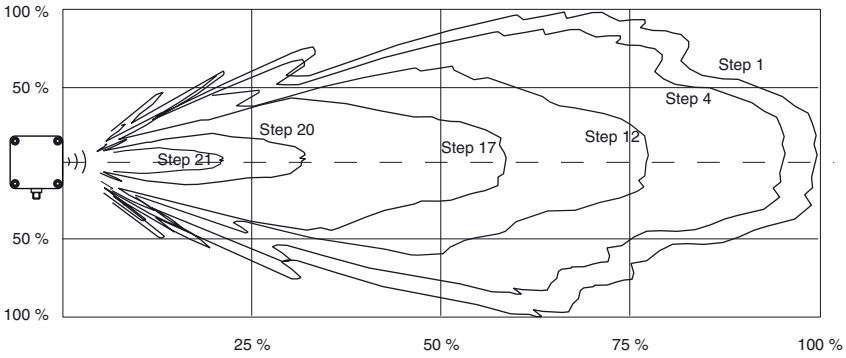
If A1 = A2, the output works like A2 > A1

- The disturbing target must not hide the actual target completely.
- The amplitude of the disturbing signal must be smaller than the amplitude of the desired signal.
- The disturbing target must remain in the edge region of the sound lobe and must not enter its center.

Sound lobe



The suppression of the disturbing target is effected through reduction of the response sensitivity. This figure shows its effect on the response characteristics of the sensor. The sensor is preset on step 1 by the manufacturer.



Sensitivity adjustment for suppression of disturbing targets

Remove the actual target object from the detection range.

Keep A1 and A2 keys pressed as you switch on power supply	The sensor enters the sensitivity adjustment mode of operation. The sensor sensitivity can be adjusted in 24 steps. Step 1 = high response Step 24 = low response
Briefly press the A1 key	Response is increased. The LED lights indicate the actual state of the sensor. - flashing red: no disturbing target detected - flashing yellow: disturbing target detected - permanent red: upper setting limit is reached.
Briefly press the A2 key	Response is decreased. The LED lights indicate the actual state of the sensor. - flashing red: no disturbing target detected - flashing yellow: disturbing target detected - permanent red: lower setting limit is reached.
Press both A1 and A2 keys at once	Exiting sensitivity adjustment. The sensor response is saved in non-volatile memory. In the event the sensitivity adjustment is not exited through this procedure, the sensor will exit this operation mode automatically after 5 minutes, and the previous sensitivity value remains valid.

Synchronisation

In order to prevent conflicts, the sensor is equipped with a synchronisation connection. In case this is unwired, the sensor function is based on an intern clock rate. Several sensors can be synchronised through the following methods:

External synchronisation:
The sensor can be synchronised by application of external square wave voltage. A synchronising pulse at the synchronisation input triggers a measuring cycle. The pulse width needs to be bigger than 100 µs. The measuring cycle is started with the falling edge. A low level > 1 s or an open synchronisation input causes the sensor to operate at normal operating mode. A high level at the synchronisation input deactivates the sensor.

There are two possible operation modes:

- Several sensors are controlled by the same synchronisation signal. The sensors function in common mode.
- The respective synchronising pulses are directed to just one sensor each cyclically. The sensors function in multiplex mode.

Self synchronisation:
The synchronisation connections of up to 5 sensors offering a self synchronisation option are interconnected. After switching on power supply, these sensors function in the multiplex mode. The response delay increases according to the number of sensors to be synchronised. During the TEACH-IN process no synchronisation can be performed and vice versa. For teaching in switch points, the sensors need to be operated in an unsynchronised state.

Note:

If the option for synchronisation is not used, the synchronisation input has to be connected to ground (0 V) or the sensor has to be operated via a V1 cable connector (4-pin).

Accessories

Mounting aids

MH 04-3505
MHW 11

Cable sockets *)

V15-G-2M-PVC
V15-W-2M-PUR

*) For additional cable sockets see section „Accessories“.