



Model Number

UB2000-F42S-E2-V15

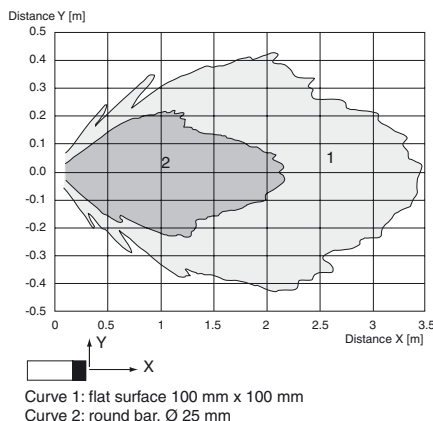
Single head system

Features

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

Curves

Characteristic response curve



Technical data

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: program function
LED red	normal operation: "fault" program function: no object detected

Electrical specifications

Operating voltage U_B	10 ... 30 V DC , ripple 10 % _{SS}
No-load supply current I_0	≤ 50 mA

Input/output

Synchronization	bi-directional 0 level: $-U_B \dots +1$ V 1 level: $+4$ V $\dots +U_B$ input impedance: > 12 KOhm synchronization pulse: ≥ 100 μs, synchronization interpulse period: ≥ 2 ms
Synchronization frequency	
Common mode operation	≤ 30 Hz
Multiplex operation	≤ 30/n Hz, n = number of sensors

Output

Output type	1 switch output E2, pnp NO
Rated operational current I_e	200 mA , short-circuit/overload protected
Voltage drop U_d	≤ 2.5 V
Repeat accuracy	≤ 0.5 % of switching point
Switching frequency f	≤ 3 Hz
Range hysteresis H	1 % of the set operating distance
Temperature influence	± 1 % of full-scale value

Ambient conditions

Ambient temperature	-25 ... 70 °C (248 ... 343 K)
Storage temperature	-40 ... 85 °C (233 ... 358 K)

Mechanical specifications

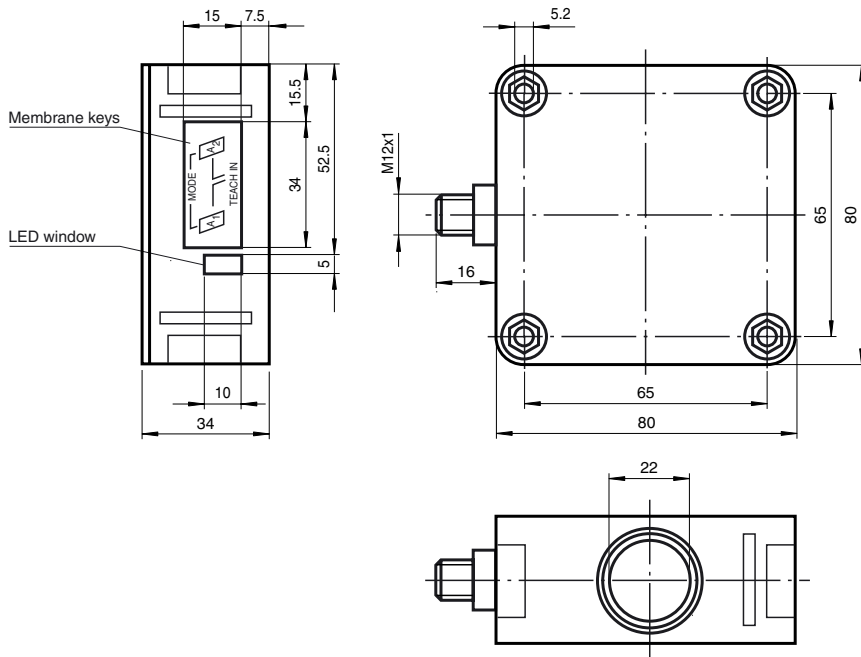
Protection degree	IP54
Connection	connector V15 (M12 x 1), 5 pin
Material	
Housing	PBT
Transducer	epoxy resin/hollow glass sphere mixture; foam polyurethane, cover PBT
Mass	140 g

Compliance with standards and directives

Standard conformity	
Standards	EN 60947-5-2:2007 IEC 60947-5-2:2007

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Dimensions



Accessories

MH 04-3505
Mounting aid

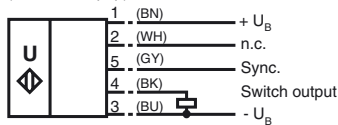
MHW 11
Mounting aid

V15-G-2M-PVC
Cable connector

V15-W-2M-PUR
Cable connector

Electrical Connection

Standard symbol/Connections:
(version E2, pnp)



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

Pinout

Connector V15



Nominal ratings

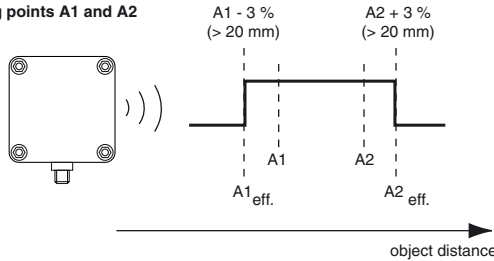
The effective switching point $A1_{eff}$ is less than the programmed switching point $A1$ by 3 %, but in any case at least 20 mm.

The effective switching point $A2_{eff}$ is greater than the programmed switching point $A2$ by 3 %, but in any case at least 20 mm.

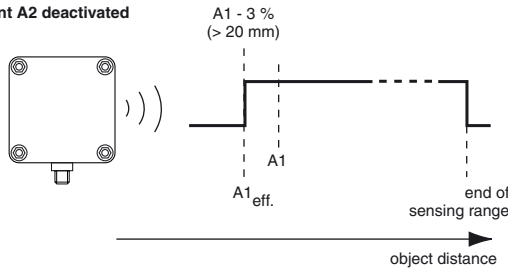
Range hysteresis = 1 % of the effective switching point.

Possible operating modes

1. Two switching points A1 and A2
 $A1 \leq A2!$



2. Switching point A2 deactivated
 $A2 \rightarrow \infty$
 (A2 deactivated)



Note: $A1 = \infty$ is not permitted since A1 must be $\leq A2$. If the switching points are mixed up during programming (teach-in) ($A2 < A1$), programming will be invalid and the old switching points will be retained.

Parameter assignment:

The sensor can be programmed with 2 keys. The learning mode for switching point 1 is started with the A1 key, while the learning mode for switching point 2 is started with the A2 key.

If both keys are pressed while you are turning the power supply on, the sensor goes into the sensitivity adjustment mode.

If parameter assignment is not completed within 5 minutes, the sensor aborts the process and keeps the settings unmodified.

TEACH-IN of switching points:

Teach-in of switching point A1 with the A1 key

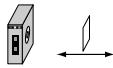
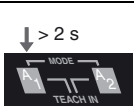


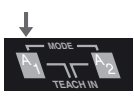

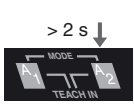


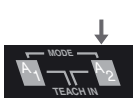

- Press the A1 key > 2 s The sensor goes into learning mode for switching point 1
- Position the target object at the desired distance. The sensor indicates with the LEDs, whether the target objects is detected. If the object is detected, the yellow LED flashes. If the object is not detected, the red LED flashes.
- Press the A1 key briefly The sensor terminates the teach-in procedure for switching point 1 and saves this value in non-volatile memory. If the object is uncertain (flashing red LED), the value from teach-in is invalid. The system exits teach-in mode.

The teach-in procedure for switching point A2 is similar to what was described above but with the A2 key.

Deactivation of switching point A2:

Remove the target object from the detection range while performing teach-in for switching point A2 or cover the active surface of the sensor with your hand. The red LED then flashes at an even rate.

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Teach-in for switching points		LED layout	
		<ul style="list-style-type: none"> <input type="radio"/> green (gn) <input type="radio"/> red (rd) <input type="radio"/> yellow (ye) 	
Switching point 1			
Position the target object at the desired position/distance. Press the A1 key for > 2 s (time lock)		Target detected 	Target not detected  (rd) Correct the object position or sensor alignment until the object is detected.
	Acknowledge when target is detected.		 (ye)
Switching point 2			
Position the target object at the desired position/distance. Press the A2 key for > 2 s (time lock)		 (ye)	Target not detected  (rd) Correct the object position or sensor alignment until the object is detected.
	Acknowledge when target is detected.		 (ye)
If teach-in mode is not acknowledged within 5 min., the sensor goes back into normal mode and retains the last values to be stored.			

Sensitivity adjustment for interference target masking

Remove the actual target object from the detection range

Press and hold down the A1 and A2 keys while turning on the power supply

The sensor goes into the Sensitivity adjustment operating mode. The sensitivity of the sensor can be adjusted at a resolution of 24 levels.

Press the A1 key briefly

The sensitivity is increased. The LEDs indicate the sensor status.

- Red flashing: No interference target detected
- Yellow flashing: Interference target detected
- Continuous red light: Upper adjustment limit reached.

Press the A2 key briefly

The sensitivity is decreased. The LEDs indicate the sensor status.

- Red flashing: No interference target detected
- Yellow flashing: Interference target detected
- Continuous red light: Lower adjustment limit reached.

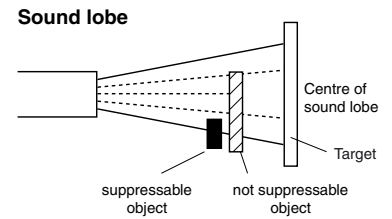
Press both the A1 and A2 keys briefly

Exit sensitivity adjustment. The sensor sensitivity you have set will be stored in non-volatile memory.

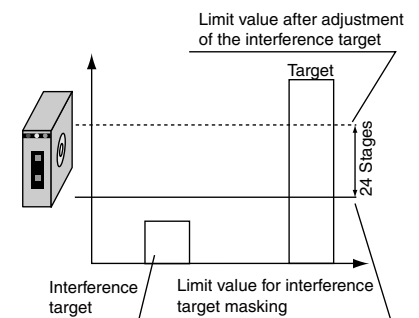
If you do not exit Sensitivity adjustment mode in this manner, the sensor will exit this operating mode automatically after 5 minutes and the last valid sensitivity value will remain in effect.

What is an interference target

- lesser distance to the sensor than the actual target
- must not completely cover the actual goal
- The amplitude of the interference signal must be less than the amplitude of the usable signal.
- The interference target must be positioned only at the edge of the sound lobe and not in the center.



Interference target masking		LED layout	
Remove the target object from the detection range.			<ul style="list-style-type: none"> ○ green (gn) ○ red (rd) ○ yellow (ye)
Turn off the operating voltage Hold down both keys while turning on the operating voltage		Interference target detected	<ul style="list-style-type: none"> ○ (ye)
The interference target masking mode is now active			
Adjust the limit value	<p>oder</p> <p>A1: more sensitive A2: less sensitive</p>	Interference target detected	<p>Limit value OK</p> <ul style="list-style-type: none"> ○ (ye) Æ ○ (rd) ○ (rd)
Please note: Press the keys only briefly. When the end of the adjustable range is reached, the red LED is lit continuously			
Press both keys briefly		Exit interference mode, store the target value.	
Check target detection			
If interference target mode is not acknowledged within 5 min., the sensor goes back into normal mode and retains the last values to be stored.			



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Synchronisation

The sensor features a synchronisation input for the suppression of mutual interference. If this input is not used, the sensor will operate using an internally generated clock rate. The synchronisation of multiple sensors can be realised as follows:

External synchronisation:

The sensor can be synchronised by the external application of a square wave voltage. A synchronisation pulse at the synchronisation input starts a measuring cycle. The pulse must have a duration greater than 100 µs. The measuring cycle starts with the falling edge of a synchronisation pulse. A low level > 1 s or an open synchronisation input will result in the normal operation of the sensor. A high level at the synchronisation input disables the sensor.

Two operating modes are available

- Multiple sensors can be controlled by the same synchronisation signal. The sensors are synchronised.
- The synchronisation pulses are sent cyclically to individual sensors. The sensors operate in multiplex mode.

Internal synchronisation:

The synchronisation connections of up to 5 sensors capable of internal synchronisation are connected to one another. When power is applied, these sensors will operate in multiplex mode. The response delay increases according to the number of sensors to be synchronised. Synchronisation cannot be performed during TEACH-IN and vice versa. The sensors must be operated in an unsynchronised manner to teach the switching point.

Note:

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