

## Model Number

**UB2000-F42-E6-V15**

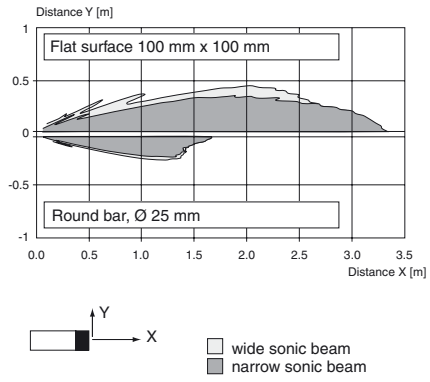
Single head system

## Features

- **2 independent switch outputs**
- **Extremly small unusable area**
- **TEACH-IN**
- **Interference suppression (adjustable divergence of sound cone in close range)**
- **Temperature compensation**
- **Synchronization options**
- **NO/NC selectable**

## Diagrams

### Characteristic response curve



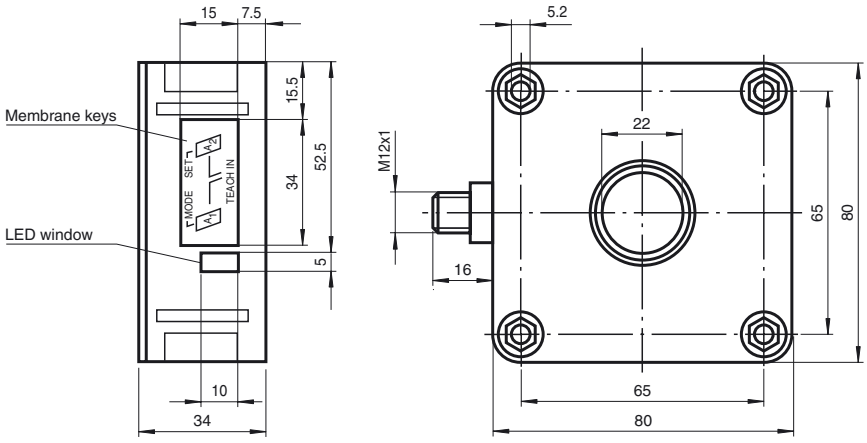

## Technical data

| | |
|---|---|
| **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 | solid green: Power on |
| LED yellow 1 | solid: switching state switch output 1<br>flashing: program function |
| LED yellow 2 | solid: switching state switch output 2<br>flashing: program function |
| LED red | normal operation: "fault"<br>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<br>0 level -$U_B$...+1 V<br>1 level: +4 V...+$U_B$<br>input impedance: > 12 KOhm<br>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 | 2 switch outputs PNP, NO/NC selectable |
| Rated operational current $I_e$ | 200 mA , short-circuit/overload protected |
| Default setting | Switch point A1: 90 mm , Switch point A2: 2000 mm , wide sound lobe |
| Voltage drop $U_d$ | ≤ 2.5 V |
| Repeat accuracy | ≤ 0.5 % of switching point |
| Switching frequency f | ≤ 2.7 Hz |
| Range hysteresis H | 1 % of the set operating distance |
| Temperature influence | ± 1 % of full-scale value |
| **Ambient conditions** | |
| Ambient temperature | -25 ... 70 °C (-13 ... 158 °F) |
| Storage temperature | -40 ... 85 °C (-40 ... 185 °F) |
| **Mechanical specifications** | |
| Connection type | Device connector M12 x 1 , 5-pin |
| Protection degree | IP54 |
| Material | |
| Housing | ABS |
| 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<br>IEC 60947-5-2:2007 |
| **Approvals and certificates** | |
| UL approval | cULus Listed, General Purpose |
| CSA approval | cCSAus Listed, General Purpose |

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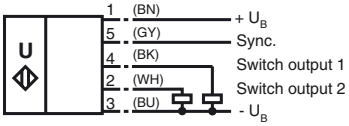
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## Dimensions



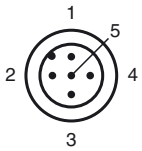

## Electrical Connection

**Standard symbol/Connections:**
(version E6, pnp)




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

## Pinout

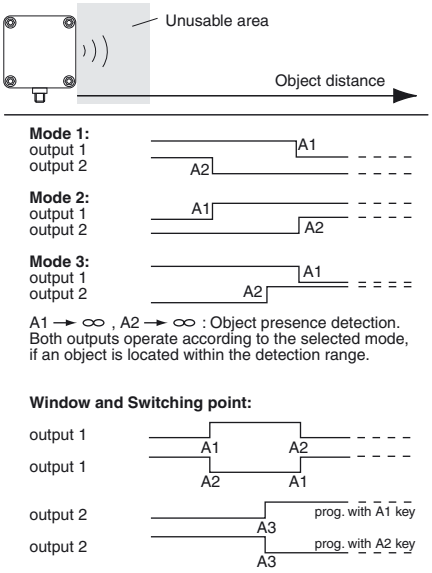



Wire colors in accordance with EN 60947-5-2

| | | |
|---|---|---|
| 1 | BN | (brown) |
| 2 | WH | (white) |
| 3 | BU | (blue) |
| 4 | BK | (black) |
| 5 | GY | (gray) |

## Additional Information

### Switching output programmation




A1 → ∞ , A2 → ∞ : Object presence detection.
Both outputs operate according to the selected mode, if an object is located within the detection range.

**Window and Switching point:**




**Note:**
→ ∞ means: cover transducer surface with your hand, while programming the output.
If A1 = A2, the output work like A1 < A2

## Accessories

**MH 04-3505**
Mounting aid for FP sensors

**MHW 11**
Mounting brackets for sensors

**V15-G-2M-PVC**
Cable socket, M12, 5-pin, PVC cable

**V15-W-2M-PUR**
Cable socket, M12, 5-pin, PUR cable

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**Functional description**

The sensor can be completely parameterised using 2 keys on the side of the housing. One special feature of this sensor is the option of adapting the ultrasonic beam width to the ambient conditions at the place where the sensor is used.

**Teach-in of switching points:**

Teach-in of switching points is used to determine the points at which the switching outputs will change their state. In addition, the order of switching points A1 < A2, or A1 > A2 also determines the effective direction (normally closed/open function) of the window in the output function (operating mode) "Window + Switching point“ (see below).

| Teach-in of switching point A1 with key A1 | |
|---|---|
| Press key A1 > 2 seconds | The sensor goes into learning mode for switching point A1 |
| Position the target object at the desired distance | The sensor indicates by rapid flashing of the yellow LED that the target object has been detected. If no object is detected, the red LED flashes. |
| Press key A1 briefly | The sensor completes the Teach-in process for switching point A1 and stores the value in permanent memory. If the object is uncertain (red LED lit irregularly) the Teach-in value is not valid. Teach-in mode closes. |

**The process for Teach-in of switching point A2 is similar to what was described above, using key A2.**

Special feature for output function "Window + switching point“

In the case of the output function (operating mode) "Window + switching point“ (see below), switching points A1 and A2 define the window limits of switch output 1.
A third switching point A3 can also be defined here at which switch output 2 switches.

| Teach-in of switching point A3 with keys A1 and A2<br>(only for operating mode window + switching point, see below) | |
|---|---|
| Press key A1 + A2 > 2 seconds | The sensor goes into learning mode for switching point A3 |
| Position the target object at the desired distance | The sensor indicates by rapid flashing of the yellow LEDs that the target object has been detected. If no object is detected, the red LED flashes. |
| Press key A1 briefly<br>(output 2: normally closed)<br><br>or<br><br>Press key A2 briefly<br>(output 2: normally open) | The sensor completes the Teach-in process for switching point A3 and stores the value in permanent memory.<br>If the object is uncertain (red LED lit irregularly) the Teach-in value is not valid. Teach-in mode closes. |

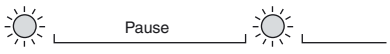
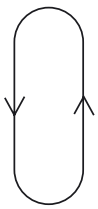
Teach-in for switching points can only be performed within the first 5 minutes after turning on the power supply. If the switching points need to be changed at a later time, this cannot be done until there is a new Power On.

**Parameter assignment of the output function and ultrasound beam width**

If you press the A1 key while the power supply is being turned on and then hold it down for 1 second, the sensor goes into the two-level parameterisation of operating modes.

**Level 1, parametrisation of the output function**

Pressing the A2 key briefly will cause the possible output functions to be selected one after the other (depending on the last output function to be parameterised). The functions are indicated by a flashing sequence of the green LED.

| Operating mode | Flashing sequence of green LED | A2 key |
|---|---|---|
| 2 x normally open function (default) |  |  |
| 2 x normally closed function |  | |
| 2 switching points<br>n.o. (output 1) +<br>n.c. (output 2) |  | |
| Window (output 1) +<br>switching point (output 2) |  | |

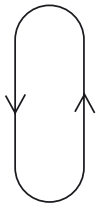
Pressing the A1 key for 2 seconds saves the selected output operating mode. The parameter assignment process is then complete and the sensor returns

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to normal mode. If you press the A1 key briefly instead, you go to Level 2 (parameter assignment of ultrasonic beam range).

**Level 2, parameter assignment of ultrasonic beam width**

The ultrasonic beam width can be adjusted to match the requirements of the application in Level 2.
Pressing the A2 key briefly will cause the possible beam widths to be selected one after the other (depending on the last beam width to be parameterised). The functions are indicated by a flashing sequence of the red LED.

| Beam width | Flashing sequence of red LED | A2 key |
|---|---|---|
| Narrow beam width |   |  |
| Average beam width |   | |
| Wide beam (default) |   | |

Pressing the A1 key for 2 seconds saves the selected type of beam width. The parameter assignment process is then complete and the sensor returns to normal mode. If you press the A1 briefly instead, you go back to Level 1 (parameter assignment of output function).

If parameterisation is not complete within 5 minutes (pressing the A1 key for 2 seconds), the sensor interrupts parameterisation mode without changing the settings.

**Synchronisation**

The sensor is equipped with a synchronisation connection to suppress mutual interaction. If it is not turned on, the sensor works at an internally generated cycle rate. Synchronisation of more than one sensor is possible in a number of different ways.

External synchronisation:
The sensor can be synchronised by the application of a square wave voltage externally. A synchronisation pulse on the synchronisation input results in the execution of a measurement cycle. The pulse width must be greater than 100 µs. The measurement cycle must be started with the falling signal edge. A Low level > 1 s or an open synchronisation input results in normal operation of the sensor. A High level on the synchronisation input deactivates the sensor.

Two different operating modes are possible

- Multiple sensors can be controlled by the same synchronisation signal. The sensors work on synonymous cycle.
- Synchronisation pulses are sent cyclically to only one sensor each time. The sensors work in Multiplex mode.

Self synchronisation:
The synchronisation connections of up to 5 sensors with option for self-synchronisation are connected with each other. These sensors work after turning on the operating voltage in Multiplex mode. The On delay increases depending on the number of sensors to be synchronised. Synchronisation is possible during Teach-in and vice-versa. Sensors must be operated unsynchronised to perform Teach-in of switching points.

**Note:**

If the option for synchronisation is not used, the synchronisation input can be connected with ground (0 V) or the sensor can be operated with a V1 connection cable (4-pin).

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