



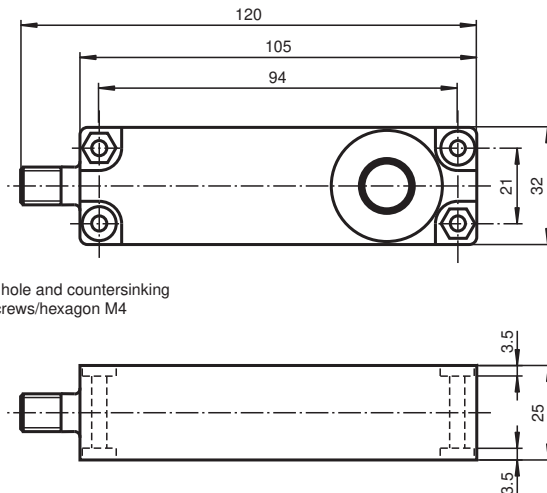
## Ultrasonic sensor UB500-F54-E5-V15

- Switching output
- 5 different output functions can be set
- Program input
- Synchronization options
- Deactivation option
- Temperature compensation

Single head system



### Dimensions



### Technical Data

#### General specifications

|                       |                 |
|-----------------------|-----------------|
| Sensing range         | 30 ... 500 mm   |
| Adjustment range      | 50 ... 500 mm   |
| Dead band             | 0 ... 30 mm     |
| Standard target plate | 100 mm x 100 mm |
| Transducer frequency  | approx. 380 kHz |
| Response delay        | ≤ 50 ms         |

#### Indicators/operating means

|           |                                                                    |
|-----------|--------------------------------------------------------------------|
| LED green | solid green: monitoring system<br>green flashing: program function |
|-----------|--------------------------------------------------------------------|

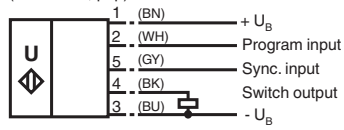
## Technical Data

|                                                 |       |                                                                                                                                                                      |
|-------------------------------------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LED yellow                                      |       | indication of the switching state<br>flashing: program function object detected                                                                                      |
| LED red                                         |       | flashing:<br>normal mode: error<br>Program function: no object detected<br>permanently:<br>Program mode, object uncertain                                            |
| <b>Electrical specifications</b>                |       |                                                                                                                                                                      |
| Operating voltage                               | $U_B$ | 10 ... 30 V DC , ripple 10 % <sub>SS</sub>                                                                                                                           |
| No-load supply current                          | $I_0$ | ≤ 55 mA                                                                                                                                                              |
| <b>Input/Output</b>                             |       |                                                                                                                                                                      |
| Synchronization                                 |       | 1 synchronous input<br>0 level: $U_B \dots +1 \text{ V}$<br>1 level: $+4 \text{ V} \dots +U_B$<br>input impedance: > 12 KOhm<br>synchronization pulse: 0.1 ... 8 ms  |
| Synchronization frequency                       |       |                                                                                                                                                                      |
| Common mode operation                           |       | max. 100 Hz                                                                                                                                                          |
| Multiplex operation                             |       | ≤ 100 / n Hz, n = number of sensors                                                                                                                                  |
| <b>Input</b>                                    |       |                                                                                                                                                                      |
| Input type                                      |       | 1 program input,<br>switching point A1: $-U_B \dots +1 \text{ V}$ , switching point A2: $+4 \text{ V} \dots +U_B$<br>input impedance: > 4.7 kΩ, program pulse: ≥ 1 s |
| <b>Output</b>                                   |       |                                                                                                                                                                      |
| Output type                                     |       | 1 switch output E5, PNP, NO/NC                                                                                                                                       |
| Rated operating current                         | $I_e$ | 200 mA , short-circuit/overload protected                                                                                                                            |
| Voltage drop                                    | $U_d$ | ≤ 3 V                                                                                                                                                                |
| Repeat accuracy                                 |       | ≤ 1 % of full-scale value                                                                                                                                            |
| Switching frequency                             | f     | max. 10 Hz                                                                                                                                                           |
| Range hysteresis                                | H     | ≤ 1 % of the set operating distance                                                                                                                                  |
| Temperature influence                           |       | ± 1.5 % of full-scale value                                                                                                                                          |
| <b>Compliance with standards and directives</b> |       |                                                                                                                                                                      |
| Standard conformity                             |       |                                                                                                                                                                      |
| Standards                                       |       | EN IEC 60947-5-2:2020<br>IEC 60947-5-2:2019                                                                                                                          |
| <b>Approvals and certificates</b>               |       |                                                                                                                                                                      |
| UL approval                                     |       | cULus Listed, Class 2 Power Source                                                                                                                                   |
| CCC approval                                    |       | CCC approval / marking not required for products rated ≤36 V                                                                                                         |
| <b>Ambient conditions</b>                       |       |                                                                                                                                                                      |
| Ambient temperature                             |       | -25 ... 70 °C (-13 ... 158 °F)                                                                                                                                       |
| Storage temperature                             |       | -40 ... 85 °C (-40 ... 185 °F)                                                                                                                                       |
| <b>Mechanical specifications</b>                |       |                                                                                                                                                                      |
| Connection type                                 |       | Connector plug M12 x 1 , 5-pin                                                                                                                                       |
| Degree of protection                            |       | IP65                                                                                                                                                                 |
| Material                                        |       |                                                                                                                                                                      |
| Housing                                         |       | ABS                                                                                                                                                                  |
| Transducer                                      |       | epoxy resin/hollow glass sphere mixture; polyurethane foam                                                                                                           |
| Mass                                            |       | 100 g                                                                                                                                                                |

## Connection

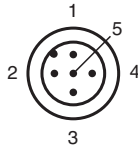
### Standard symbol/Connections:

(version E5, pnp)



Wire colors in accordance with EN 60947-5-2.

## Connection Assignment

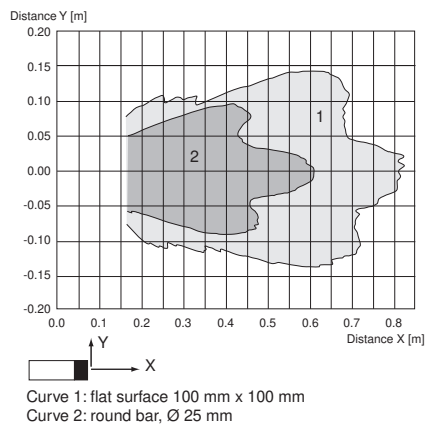


Wire colors in accordance with EN 60947-5-2

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

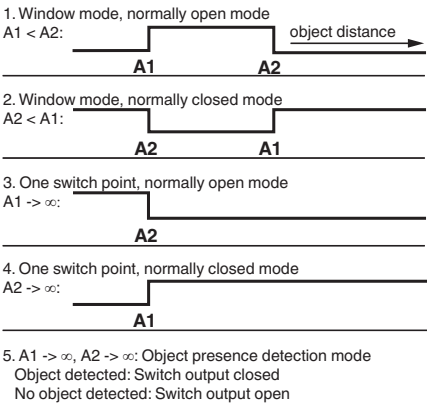
## Characteristic Curve

### Characteristic response curve



Characteristic Curve

Programmable output modes



Accessories

|  |              |                                                                         |
|--|--------------|-------------------------------------------------------------------------|
|  | UB-PROG2     | Programming unit                                                        |
|  | V15-G-2M-PVC | Female cordset single-ended M12 straight A-coded, 5-pin, PVC cable grey |
|  | V15-W-2M-PUR | Female cordset single-ended M12 angled A-coded, 5-pin, PUR cable grey   |

## Additional Information

### 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

1. Multiple sensors can be controlled by the same synchronisation signal. The sensors are synchronised.
2. 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 synchronisation is not used, the synchronisation input has to be connected to ground (0V) or the sensor has to be operated via a V1 cable connector (4-pin).

### Adjusting of switching points

The ultrasonic sensor features a switch output with two teachable switching points. These are set by applying the supply voltage  $-U_B$  or  $+U_B$  to the TEACH-IN input. The supply voltage must be applied to the TEACH-IN input for at least 1 s. LEDs indicate whether the sensor has recognised the target during the TEACH-IN procedure. Switching point A1 is taught with  $-U_B$ , A2 with  $+U_B$ .

Five different output functions can be set

1. Window mode, normally-open function
2. Window mode, normally-closed function
3. One switching point, normally-open function
4. One switching point, normally-closed function
5. Detection of object presence

#### TEACH-IN window mode, normally-open function

- Set target to near switching point
- TEACH-IN switching point A1 with  $-U_B$
- Set target to far switching point
- TEACH-IN switching point A2 with  $+U_B$

#### TEACH-IN window mode, normally-closed function

- Set target to near switching point
- TEACH-IN switching point A2 with  $+U_B$
- Set target to far switching point
- TEACH-IN switching point A1 with  $-U_B$

#### TEACH-IN one switching point, normally-open function

- Set target to near switching point
- TEACH-IN switching point A2 with  $+U_B$
- Cover sensor with hand or remove all objects from sensing range
- TEACH-IN switching point A1 with  $-U_B$

#### TEACH-IN one switching point, normally-closed function

- Set target to near switching point
- TEACH-IN switching point A1 with  $-U_B$
- Cover sensor with hand or remove all objects from sensing range
- TEACH-IN switching point A2 with  $+U_B$

#### TEACH-IN detection of object presence

- Cover sensor with hand or remove all objects from sensing range
- TEACH-IN switching point A1 with  $-U_B$
- TEACH-IN switching point A2 with  $+U_B$

### Default setting of switching points

A1 = unusable area

A2 = nominal sensing range

**LED Displays**

| Displays in dependence on operating mode | Red LED | Yellow LED      | Green LED |
|------------------------------------------|---------|-----------------|-----------|
| <b>TEACH-IN switching point:</b>         |         |                 |           |
| Object detected                          | off     | flashes         | flashes   |
| No object detected                       | flashes | off             | flashes   |
| Object uncertain (TEACH-IN invalid)      | on      | off             | flashes   |
| Normal operation                         | off     | switching state | on        |
| Fault                                    | flashes | previous state  | off       |