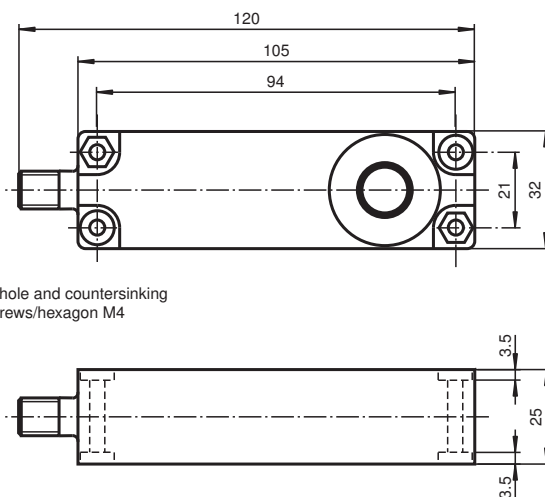# Ultrasonic sensor

# UB500-F54-U-V15

- Analog output 0 ... 10 V
- Measuring window adjustable
- Program input
- Synchronization options
- Deactivation option
- Temperature compensation

Single head system

## Dimensions



Bore hole and countersinking
for screws/hexagon M4

## 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**

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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## Technical Data

| | | |
|---|---|---|
| LED green | | solid green: monitoring system<br>green flashing: program function |
| LED yellow | | solid yellow: object in the evaluation range<br>yellow, 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 |
| **Electrical specifications** | | |
| Operating voltage | $U_B$ | 15 ... 30 V DC , ripple 10 %$_{SS}$ |
| No-load supply current | $I_0$ | ≤ 55 mA |
| **Input/Output** | | |
| Synchronization | | 1 synchronous input<br>0 level: $U_B$...+1 V<br>1 level: +4 V...+$U_B$<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 |
| **Input** | | |
| Input type | | 1 program input<br>lower evaluation limit A1: -$U_B$ ... +1 V, upper evaluation limit A2: +4 V ... +$U_B$<br>input impedance: > 4.7 kΩ, pulse duration: ≥ 1 s |
| **Output** | | |
| Output type | | 1 analog output 0 ... 10 V |
| Default setting | | evaluation limit A1: 50 mm evaluation limit A2: 500 mm |
| Resolution | | 0.11 mm |
| Deviation of the characteristic curve | | ± 1 % of full-scale value |
| Repeat accuracy | | ± 0.1 % of full-scale value |
| Load impedance | | ≥ 1 kOhm |
| Temperature influence | | ± 1.5 % of full-scale value |
| **Compliance with standards and directives** | | |
| Standard conformity | | |
|   Standards | | EN 60947-5-2:2007+A1:2012<br>IEC 60947-5-2:2007 + A1:2012<br>EN 60947-5-7:2003<br>IEC 60947-5-7:2003 |
| **Approvals and certificates** | | |
| EAC conformity | | TR CU 020/2011<br>TR CU 037/2016 |
| UL approval | | cULus Listed, General Purpose |
| CSA approval | | cCSAus Listed, General Purpose |
| CCC approval | | CCC approval / marking not required for products rated ≤36 V |
| **Ambient conditions** | | |
| Ambient temperature | | -25 ... 70 °C (-13 ... 158 °F) |
| Storage temperature | | -40 ... 85 °C (-40 ... 185 °F) |
| **Mechanical specifications** | | |
| 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 |

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## Connection

**Standard symbol/Connections:**
(version U)

```
    1 ┄ (BN) ─── + U_B
    2 ┄ (WH) ─── Teaching input
U   5 ┄ (GY) ─── Synchronous
◇   4 ┄ (BK) ─── Analog output
    3 ┄ (BU) ─── - U_B
```
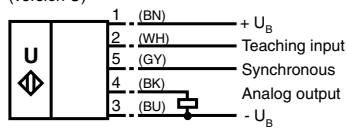
Core colours in accordance with EN 60947-5-2.

## Connection Assignment
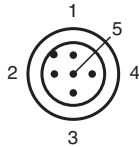
Wire colors in accordance with EN 60947-5-2

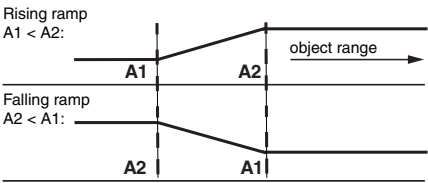| 1 | BN | (brown) |
| 2 | WH | (white) |
| 3 | BU | (blue) |
| 4 | BK | (black) |
| 5 | GY | (gray) |

## Characteristic Curve

### Characteristic response curve
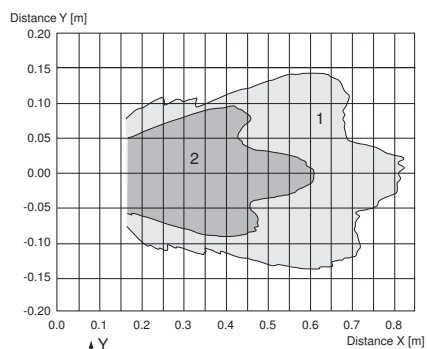
Curve 1: flat surface 100 mm x 100 mm
Curve 2: round bar, Ø 25 mm

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## Programming the analog output mode

Rising ramp
A1 < A2:

object range

A1    A2

Falling ramp
A2 < A1:

A2    A1

## Accessories

| | **UB-PROG2** | Programming unit |
|---|---|---|
| | **V15-G-2M-PVC** | Female cordset, M12, 5-pin, PVC cable |

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## 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 evaluation limits.

**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 the evaluation range (analogue output)**

The ultrasonic sensor has an analogue output with programmable evaluation limits. 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. The lower evaluation limit A1 is taught with $-U_B$, A2 with $+U_B$.

Two different output functions can be set:

1. Analogue value increases with rising distance to object (rising ramp)
2. Analogue value falls with rising distance to object (falling rampe)

**TEACH-IN rising ramp (A1 > A2)**
- Position object at lower evaluation limit
- TEACH-IN lower limit A1 with $-U_B$
- Position object at upper evaluation limit
- TEACH-IN upper limit A2 with $+U_B$

**TEACH-IN falling ramp (A1 > A):**
- Position object at lower evaluation limit
- TEACH-IN lower limit A2 with $+U_B$
- Position object at upper evaluation limit
- TEACH-IN upper limit A1 with $-U_B$

**LED Displays**

| Displays in dependence on operating mode | Red LED | Yellow LED | Green LED |
|---|---|---|---|
| **TEACH-IN evaluation limit**<br>Object detected<br>No object detected<br>Object uncertain (TEACH-IN invalid) | <br>off<br>flashes<br>on | <br>flashes<br>off<br>off | <br>flashes<br>flashes<br>flashes |
| Normal mode (evaluation range) | off | on | on |
| Fault | flashes | previous state | off |

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