# Ultrasonic sensor
UB500-F54-I-V15

- Analog output 4 mA ... 20 mA
- Measuring window adjustable
- Program input
- Synchronization options
- Deactivation option
- Temperature compensation

Single head system

CE c(UL)us UKCA

Dimensions
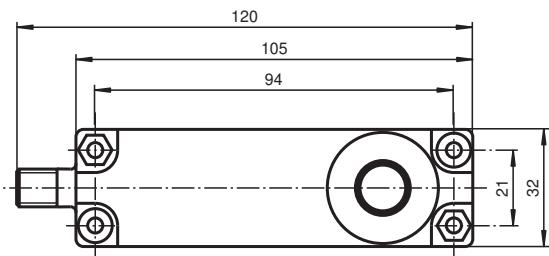
Bore hole and countersinking
for screws/hexagon M4

120
105
94
21
32
3.5
25
3.5
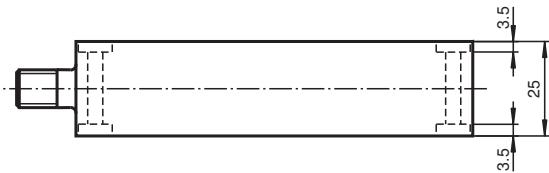
Technical Data

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 green flashing: program function

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

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Technical Data

LED yellow		solid yellow: object in the evaluation range yellow, flashing: program function, object detected
LED red		flashing: normal mode: error Program function: no object detected permanently: Program mode, object uncertain
Electrical specifications		
Operating voltage	U_B	10 ... 30 V DC , ripple 10 %$_{SS}$
No-load supply current	I_0	≤ 55 mA
Input/Output		
Synchronization		1 synchronous input 0 level: U_B...+1 V 1 level: +4 V...+U_B input impedance: > 12 KOhm 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 lower evaluation limit A1: -U_B ... +1 V, upper evaluation limit A2: +4 V ... +U_B input impedance: > 4.7 kΩ, pulse duration: ≥ 1 s
Output		
Output type		1 analog output 4 ... 20 mA
Default setting		evaluation limit A1: 50 mm evaluation limit A2: 500 mm
Resolution		0.13 mm
Deviation of the characteristic curve		± 1 % of full-scale value
Repeat accuracy		± 0.1 % of full-scale value
Load impedance		0 ... 300 Ohm
Temperature influence		± 1.5 % of full-scale value
Compliance with standards and directives		
Standard conformity		
Standards		EN IEC 60947-5-2:2020 IEC 60947-5-2:2019 EN 60947-5-7:2003 IEC 60947-5-7:2003
Approvals and certificates		
UL approval		cULus 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 I)

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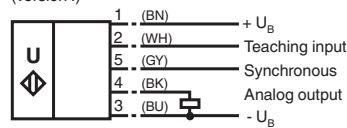
Core colours in accordance with EN 60947-5-2.

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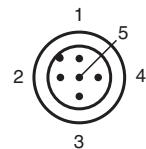
Wire colors in accordance with EN 60947-5-2

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

Characteristic Curve

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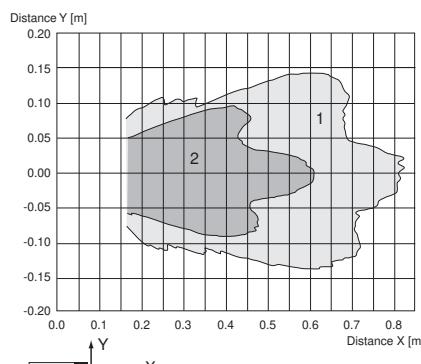
Curve 1: flat surface 100 mm x 100 mm
Curve 2: round bar, Ø 25 mm

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Characteristic Curve

Programming the analog output mode

Rising ramp
A1 < A2:

object range

A1   A2

Falling ramp
A2 < A1:

A2   A1
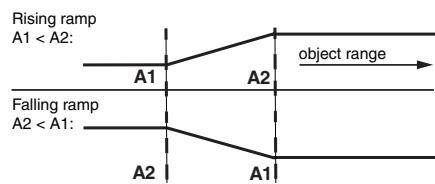
Accessories

	UB-PROG2	Programming unit
	V15-G-2M-PVC	Female cordset 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

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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			
Object detected	off	flashes	flashes
No object detected	flashes	off	flashes
Object uncertain (TEACH-IN invalid)	on	off	flashes
Normal mode (evaluation range)	off	on	on
Fault	flashes	previous state	off

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