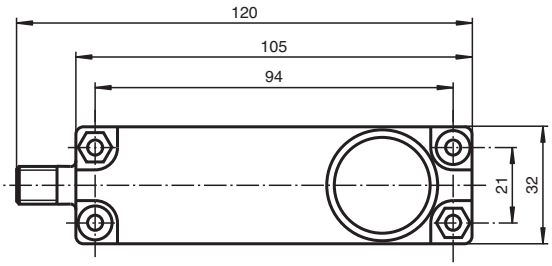
Ultrasonic sensor

UB2000-F54-E5-V15

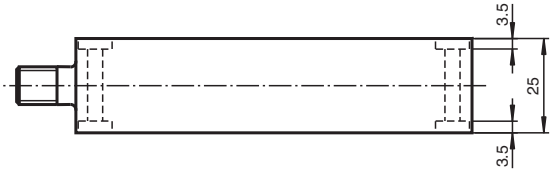
- Switching output
- 5 different output functions can be set
- Program input
- Synchronization options
- Deactivation option
- Temperature compensation

Single head system

Dimensions



Bore hole and countersinking
for screws/hexagon M4



Technical Data

General specifications		
Sensing range		80 ... 2000 mm
Adjustment range		100 ... 2000 mm
Dead band		0 ... 80 mm
Standard target plate		100 mm x 100 mm
Transducer frequency		approx. 175 kHz
Response delay		≤ 150 ms
Indicators/operating means		
LED green		solid green: monitoring system green flashing: program function
LED yellow		indication of the switching state 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 $\%_{SS}$

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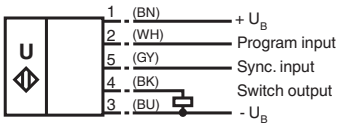
Technical Data

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 ... 28 ms
Synchronization frequency		
Common mode operation		max. 33 Hz
Multiplex operation		≤ 33 / n Hz, n = number of sensors
Input		
Input type		1 program input, switching point A1: -U_B ... +1 V, switching point A2: +4 V ... +U_B input impedance: > 4.7 kΩ, program pulse: ≥ 1 s
Output		
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. 3 Hz
Range hysteresis	H	≤ 1 % of the set operating distance
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
Approvals and certificates		
UL approval		cULus Listed, Class 2 Power Source
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
Dimensions		
Height		31 mm
Width		105 mm
Length		25 mm

Connection Assignment

Standard symbol/Connections:
(version E5, pnp)



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

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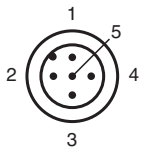
Connection Assignment

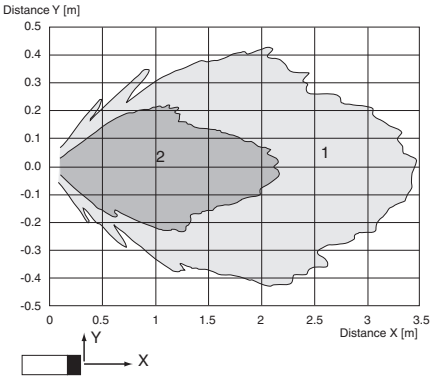


Wire colors in accordance with EN 60947-5-2

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

Characteristic Curve

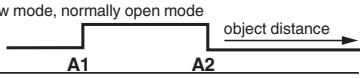
Characteristic response curve



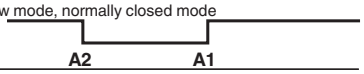
Curve 1: flat surface 100 mm x 100 mm
Curve 2: round bar, Ø 25 mm

Programmable output modes

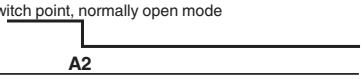
1. Window mode, normally open mode
A1 < A2:



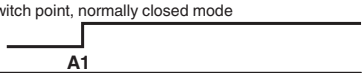
2. Window mode, normally closed mode
A2 < A1:



3. One switch point, normally open mode
A1 -> ∞:



4. One switch point, normally closed mode
A2 -> ∞:



5. A1 -> ∞, A2 -> ∞: Object presence detection mode
Object detected: Switch output closed
No object detected: Switch output open

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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 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

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LED Displays

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

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