

Ultrasonic sensor

UB2000-F54-E4-V15

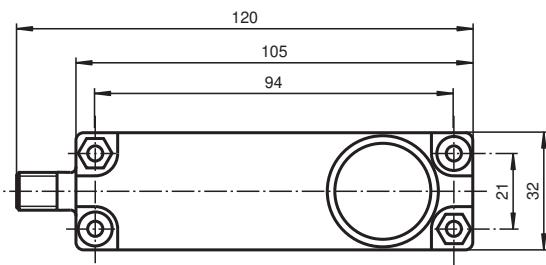


- Switching output
- 5 different output functions can be set
- Program input
- Synchronization options
- Deactivation option
- Temperature compensation

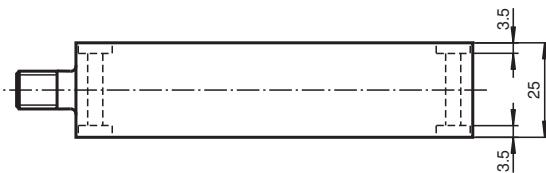
Single head system



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

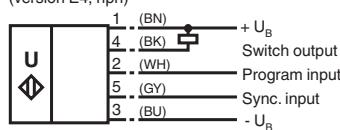
LED green	solid green: monitoring system green flashing: program function
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Technical Data

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}
No-load supply current	I_0	≤ 55 mA
Input/Output		
Synchronization	1 synchronous input 0-level: $-U_B \dots +1$ V 1-level: $+4$ V ... $+U_B$ input impedance: > 12 K Ω synchronization pulse: 0,1 ... 28 ms	
Synchronization frequency		
Common mode operation	max. 33 Hz	
Multiplex operation	$\leq 33 / n$ Hz, n = number of sensors	
Input		
Input type	1 program input, switching point A1: $-U_B \dots +1$ V, switching point A2: $+4$ V ... $+U_B$ input impedance: > 4.7 k Ω , program pulse: ≥ 1 s	
Output		
Output type	1 switch output E4, NPN, 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	

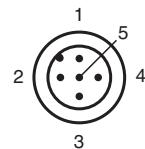
Connection

Standard symbol/Connections:
(version E4, npn)



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

Connection Assignment

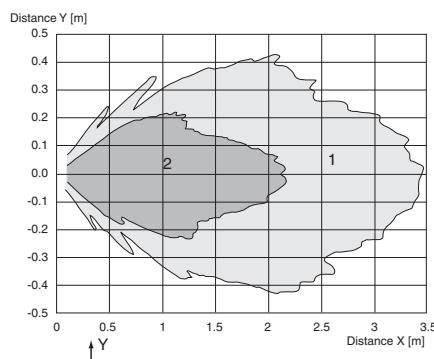


Wire colors in accordance with EN 60947-5-2

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

Characteristic Curve

Characteristic response curve

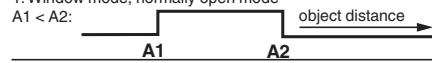


Curve 1: flat surface 100 mm x 100 mm
Curve 2: round bar, Ø 25 mm

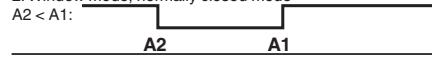
Characteristic Curve

Programmable output modes

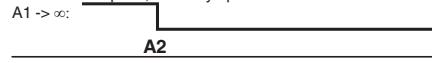
1. Window mode, normally open mode



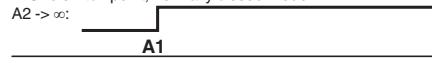
2. Window mode, normally closed mode



3. One switch point, normally open mode



4. One switch point, normally closed mode



5. A1 -> ∞, A2 -> ∞: Object presence detection mode

Object detected: Switch output closed

No object detected: Switch output open

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
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