Ultrasonic sensor

UMC3000-30H-I-5M-3G-3D

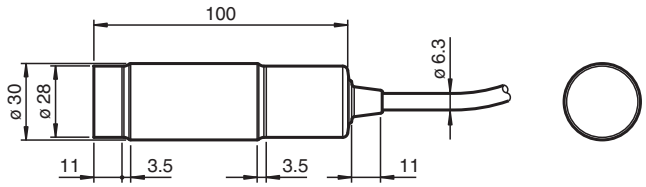
- ATEX-approval for zone 2 and zone 22
- Front of transducer and housing manufactured entirely from stainless steel
- Degree of protection IP68 / IP69K
- Programmable via DTM with PACTWARE

Single head system

Function

The enclosure and transducer of this ultrasonic sensor form a hermetically sealed unit. For reliable operation, due to the special design of this sensor, solely the enclosed mounting accessories must be used.
If the sensor is used in hazardous (classified) location, it will be necessary to follow the notes of the instruction manual.

Dimensions



Technical Data

General specifications		
Sensing range		200 ... 3000 mm
Adjustment range		240 ... 3000 mm
Dead band		0 ... 200 mm
Standard target plate		100 mm x 100 mm
Transducer frequency		approx. 100 kHz
Response delay		≤ 200 ms
Indicators/operating means		
LED green		Operating display
LED yellow		object in evaluation range
LED red		error
Electrical specifications		
Operating voltage	U_B	10 ... 30 V DC

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Technical Data

No-load supply current	I_0	≤ 50 mA
Time delay before availability	t_v	≤ 400 ms
Input/Output		
Input/output type		1 synchronization connection, bidirectional
0 Level		0 ... 1 V
1 Level		4 V ... U_B
Input impedance		> 12 kΩ
Output rated operating current		< 12 mA
Pulse length		≥ 200 µs
Pulse interval		≥ 2 ms
Synchronization frequency		
Common mode operation		≤ 20 Hz
Multiplex operation		≤ 20/n Hz, n = number of sensors n ≤ 10 (factory setting: 5)
Input		
Input type		1 program input
Level (evaluation limit 1)		0 ... 1 V
Level (evaluation limit 2)		3 V ... U_B
Input impedance		> 12 kΩ
Pulse length		2 ... 5 s
Output		
Output type		1 analog output 4 ... 20 mA
Resolution		Evaluation range [mm]/3200, however ≥ 0.4 mm
Deviation of the characteristic curve		≤ 0.2 % of full-scale value
Repeat accuracy		≤ 0.1 % of full-scale value
Load impedance		≤ 500 Ω at U_B ≥ 14V ≤ 300 Ω at U_B < 14V
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		
CCC approval		CCC approval / marking not required for products rated ≤36 V
Ambient conditions		
Ambient temperature		-25 ... 60 °C (-13 ... 140 °F)
Storage temperature		-40 ... 85 °C (-40 ... 185 °F)
Mechanical specifications		
Connection type		cable PUR , 5 m
Core cross section		5 x 0.5 mm²
Housing diameter		30 mm
Degree of protection		IP68 / IP69K
Material		
Housing		Stainless steel 1.4404 / AISI 316L LED window: VMQ Elastosil LR 3003/Shore 50 A
Transducer		Stainless steel 1.4435 / AISI 316L
Mass		425 g
Factory settings		
Output		evaluation limit A1: 240 mm evaluation limit A2: 3000 mm output function: rising ramp
Equipment protection level Gc (nC)		
Certificate		PF 17 CERT 3944 X
ATEX marking		⟨Ex⟩ II 3G Ex nC IIC T6 Gc X
Directive conformity		2014/34/EU

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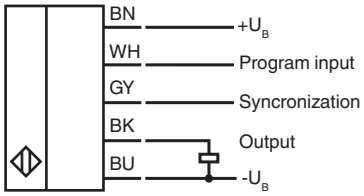
Technical Data

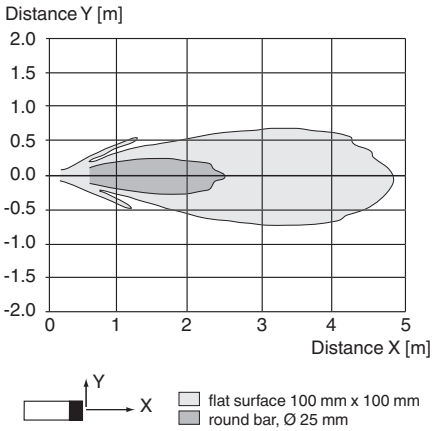
Standards		EN IEC 60079-0:2018 , EN 60079-15:2010
Equipment protection level Dc (tc)		
Certificate		PF 17 CERT 3944 X
ATEX marking		⟨Ex⟩ II 3D Ex tc IIIC T80°C Dc X
Directive conformity		2014/34/EU
Standards		EN IEC 60079-0:2018 , EN 60079-31:2014
General information		
Supplementary information		Switch settings of the external programming adapter: "output load": pull-down "output logic": noninv

Connection

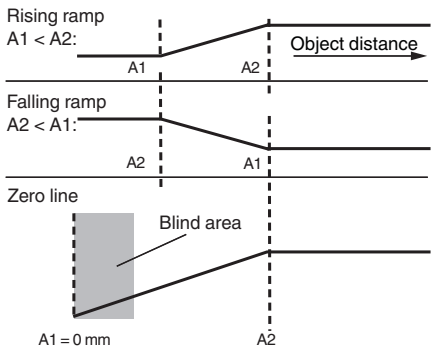


Characteristic Curve

Characteristic response curve



Programming the evaluation limits



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Accessories

	**UC-PROG1-USB**	Programming adapter
	**V15S-G-0,3M-PUR-WAGO**	Male cordset, M12, 5-pin, PUR cable with WAGO terminals

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Mounting

Mounting

Comply with the minimum permissible bending radius of 70 mm, if you install the connecting cable!

For reliable operation, you must use the included sensor mounting aid.

Programming

Programming

The sensor can be adapted to specific application requirements by programming. There are two types of programming.

1. Basic functions can be configured using the teach-in process. These include the function for setting the measuring range limits and the output function. The teach-in process is connected either with $+U_B$ (1 level) or $-U_B$ (0 level)
2. Connecting a programming adapter (see Accessories) to the serial interface on the sensor provides an extensive range of configurable functions. Refer to the programming adapter description for instructions. A male cordset with WAGO terminals is required to connect the programming adapter (see Accessories).

Note:

- The sensor can only be programmed during the first 5 minutes after switching on. This time is extended during the actual programming process. The option of programming the sensor is revoked if no programming activities take place for 5 minutes.
- You have the option of aborting the programming process at any time without adopting the modified sensor settings. Simply discontinue programming. After 10 seconds, the sensor exits programming, switches to normal operating mode and adopts the previous valid settings.

Programming the evaluation limits

Note:
A flashing red LED during the programming process indicates unreliable object detection. In this case, adjust the alignment of the object until the yellow LED flashes. Only then are the settings stored in the memory of the sensor.

Teach-in of the evaluation limit (A1)

1. Position the target object at the evaluation limit (A1)
2. Connect the teach-in for > 2 sec with $+U_B$ or $-U_B$
3. Disconnect the teach-in process. The yellow LED begins to flash after 2 secs and the sensor is ready for teach-in[*)].
4. Connect the teach-in process within 8 secs for > 2 sec with -UB.
5. Disconnect the teach-in process within 8 secs. The green LED flashes three times briefly for confirmation. The evaluation limit (A1) has now been taught in.

Teach-in of the evaluation limit (A2)

1. Position the target object at the evaluation limit (A2)
2. Connect the teach-in for > 2 sec with $+U_B$ or $-U_B$
3. Disconnect the teach-in process. The yellow LED begins to flash after 2 secs and the sensor is ready for teach-in[*)].
4. Connect the teach-in process within 8 secs for > 2 sec with +UB.
5. Disconnect the teach-in process within 8 secs. The green LED flashes three times briefly for confirmation. The evaluation limit (A2) has now been taught in.

[*)] If there are no objects within the sensor detection range while the sensor is ready for teach-in, this is indicated by fast flashing of the yellow LED. Teach-in is possible, however. In programming evaluation limit A1, this is set to 0 mm (zero line). In programming evaluation limit A2, this is set to the measurement range upper limit.

Programming the output function

You can choose between “rising ramp” and “falling ramp” for the output function of the sensor. The position of the programmed evaluation limits is critical here.
If the evaluation limit A1 is closer to the sensor than A2, the output function is“rising ramp”
If the evaluation limit A2 is closer to the sensor than A1, the output function is“falling ramp”

Indication

The sensor features 3 display LEDs to indicate various operating modes

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Operating mode	Green LED	Yellow LED	Red LED
Normal operation	Lights	Target within evaluation range	Unstable target
Programming the evaluation limits Target detected Unstable target Confirmation of successful programming	 Off Off Flashes 3x	 Flashes Off Off	 Off Flashes Off

Commissioning

Synchronisation

The sensor has a synchronisation input for suppressing mutual interefence by third-party ultrasonic signals. If this input is not connected, the sensor works with internally generated clock pulses. It can be synchronised by connecting external rectangular pulses and through corresponding parameterisation via the DTM module for PACTware™. Each falling pulse edge triggers the sending of an individual ultrasonic pulse. If the signal at the synchronisation input carries ≥ 1 s low level, the sensor returns to normal, unsynchronised operating mode. This is also the case when the synchronisation input is disconnected from external signals (see note below).
If there is a high level > 1 s at the synchronisation input, the sensor enters standby mode. This is indicated by the flashing green LED. In this operating mode, the most recent output statuses are retained. For external synchronisation, please observe the software description.

Note:

- If the synchronisation option is not being used, the synchronisation input must be earthed (0 V).
- The synchronisation option is not available during programming, which means that the sensor cannot be programmed during synchronisation.

The following synchronisation methods are possible:

1. Multiple sensors (for max. number see Technical data) can be synchronised by simply connecting their synchronisation inputs. In this case, the sensors operate in a self-synchronised sequence in multiplex mode. Only one sensor transmits at any given time (see note below).
2. Multiple sensors (for max. number see Technical data) can be synchronised by simply connecting their synchronisation inputs. As a result of parameterisation via the DTM module for PACTware™, one of the sensors operates as a master and the others as slaves (see Interface description). In this case, the sensors operate synchronously, i.e. simultaneously in master/slave mode, whereby the master sensor performs the role of an intelligent external clock pulse generator.
3. Multiple sensors can be triggered jointly by an external signal. In this case, the sensors are triggered in parallel and operate synchronously, i.e. simultaneously. All sensors must be parameterised for external control by means of parameterisation via the DTM module for PACTware™ (see Software description).
4. Multiple sensors are triggered with a delay by an external signal. In this case, only one sensor operates with external synchronisation at any given time (see note below). All sensors must be parameterised for external control by means of parameterisation via the DTM module for PACTware™ (see Software description).
5. A high level (+U_B) or a low level (-U_B) at the synchronisation input puts the sensor in standby mode in the case of external parameterisation.

Note:

The response time of the sensors increases proportionally to the number of sensors in the synchronisation chain. Multiplexing means that the measurement cycles of the individual sensors run one after the other.

Note:

The synchronisation connection of the sensors delivers an output current at low level and an input impedance at high level. Please note that the synchronising device must have the following drive capability:
Drive current with +U_B: ≥ n * high level/input impedance (n = number of sensors to be synchronised)
Drive current with 0 V: ≥ n * output current (n = number of sensors to be synchronised)

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