

# Ultrasonic sensor

## UMC3000-30H-E5-5M-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

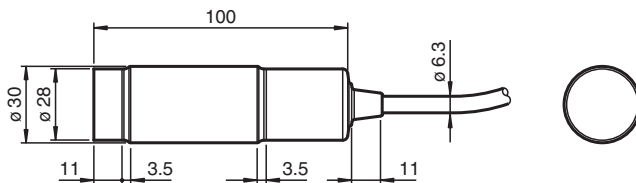
Single head system



### 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	switching state
LED red	error

#### Electrical specifications

Operating voltage	U <sub>B</sub>	10 ... 30 V DC
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Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

Pepperl+Fuchs Group  
www.pepperl-fuchs.com

USA: +1 330 486 0001  
fa-info@us.pepperl-fuchs.com

Germany: +49 621 776 1111  
fa-info@de.pepperl-fuchs.com

Singapore: +65 6779 9091  
fa-info@sg.pepperl-fuchs.com

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## Technical Data

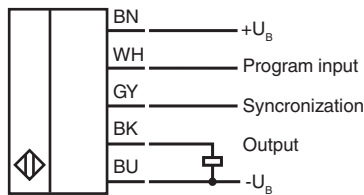
No-load supply current	$I_0$	$\leq 50 \text{ mA}$
<b>Input/Output</b>		
Input/output type		1 synchronization connection, bidirectional
0 Level		0 ... 1 V
1 Level		4 V ... $U_B$
Input impedance		$> 12 \text{ k}\Omega$
Output rated operating current		$< 12 \text{ mA}$
Pulse length		$\geq 200 \mu\text{s}$
Pulse interval		$\geq 2 \text{ ms}$
Synchronization frequency		
Common mode operation		$\leq 20 \text{ Hz}$
Multiplex operation		$\leq 20/n \text{ Hz}$ , n = number of sensors $n \leq 10$ (factory setting: 5 )
<b>Input</b>		
Input type		1 program input
Level (switch point 1)		0 ... 1 V
Level (switch point 2)		4 V ... $U_B$
Input impedance		$> 10 \text{ k}\Omega$
Pulse length		2 ... 5 s
<b>Output</b>		
Output type		1 switching output E5, PNP NO/NC, programmable
Rated operating current	$I_e$	200 mA , short-circuit/overload protected
Voltage drop	$U_d$	$\leq 2 \text{ V}$
Repeat accuracy		$\leq 0.1 \%$ of full-scale value
Switching frequency	f	$\leq 2.8 \text{ Hz}$
Range hysteresis	H	programmable , preset to 1 mm
Temperature influence		$< 1.5 \%$ of full-scale value
<b>Compliance with standards and directives</b>		
Standard conformity		
Standards		EN 60947-5-2:2007+A1:2012 IEC 60947-5-2:2007 + A1:2012
<b>Approvals and certificates</b>		
CCC approval		CCC approval / marking not required for products rated $\leq 36 \text{ V}$
<b>Ambient conditions</b>		
Ambient temperature		$-25 \dots 60 \text{ }^\circ\text{C}$ ( $-13 \dots 140 \text{ }^\circ\text{F}$ )
Storage temperature		$-40 \dots 85 \text{ }^\circ\text{C}$ ( $-40 \dots 185 \text{ }^\circ\text{F}$ )
<b>Mechanical specifications</b>		
Connection type		cable PUR , 5 m
Core cross-section		$5 \times 0.5 \text{ mm}^2$
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
<b>Factory settings</b>		
Output		near switch point: 240 mm far switch point: 3000 mm output function: Window mode output behavior: NO contact
<b>Equipment protection level Gc (nC)</b>		
Certificate		PF 17 CERT 3944 X
ATEX marking		Ⓜ II 3G Ex nC IIC T6 Gc X
Directive conformity		2014/34/EU
Standards		EN IEC 60079-0:2018 , EN 60079-15:2010
<b>Equipment protection level Dc (tc)</b>		

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## Technical Data

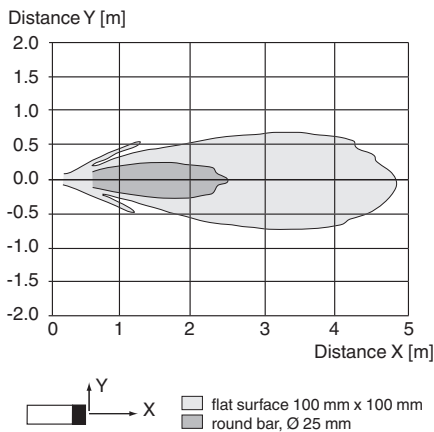
Certificate	PF 17 CERT 3944 X
ATEX marking	Ⓔ II 3D Ex tc IIIC T80°C Dc X
Directive conformity	2014/34/EU
Standards	EN IEC 60079-0:2018 , EN 60079-31:2014
<b>General information</b>	
Supplementary information	Switch settings of the external programming adapter: "output load": pull-down "output logic": inv

## Connection



## Characteristic Curve

### Characteristic response curve





## Programming

### Programmable output modes

1. Window mode, normally open mode  
 $A1 < A2$ : object distance →
2. Window mode, normally closed mode  
 $A2 < A1$ :
3. One switch point, normally open mode  
 $A1 \rightarrow \infty$ :
4. One switch point, normally closed mode  
 $A2 \rightarrow \infty$ :
5.  $A1 \rightarrow \infty, A2 \rightarrow \infty$ : Object presence detection mode  
 Object detected: Switch output closed  
 No object detected: Switch output open

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**Accessories**

	<p><b>UC-PROG1-USB</b></p>	<p>Programming adapter</p>
	<p><b>V15S-G-0,3M-PUR-WAGO</b></p>	<p>Male cordset, M12, 5-pin, PUR cable with WAGO terminals</p>

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fa-info@us.pepperl-fuchs.com

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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 the specific requirements of the application by means of programming. There are two methods of programming.

1. Basic functions can be set using the teach-in process. These are the position of the switch points and the output function. The teach-in process is connected either with  $+U_B$  (1 level) or  $-U_B$  (0 level).
2. With a programming adapter (see Accessories) and the DTM module for PACTware, a comprehensive range of parameterisable functions is available. A male cordset with WAGO terminals is needed for the connection to the programming adapter (see Accessories).

Note:

- The programming options are available in the first 5 minutes after switching on and are extended during programming. After 5 minutes without any programming activity, the sensor is locked to prevent programming.
- It is possible to exit programming without changing the sensor settings at any time. Simply stop any programming activity. After 10 seconds, the sensor exits programming mode and switches to normal operating mode with the last valid settings.

### Programming the switch points

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 A1 switch point

1. Position the target object at the desired switch point 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<sup>\*)</sup>.
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 switch point A1 has now been taught in.

#### Teach-in of switch point A2

1. Position the target object at the desired switch point 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<sup>\*)</sup>.
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 switch point A2 has now been taught in.

<sup>\*)</sup> 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 switch point A1, this is set to the end of the blind zone. In programming switch point A2, this is set to the detection range upper limit.

### Programming the output function

You can choose between NC and NO function for the output function of the sensor. The position of the programmed switch points is critical here. If switch point A1 is closer to the sensor than A2, the switching output operates as NO.”

If switch point A2 is closer to the sensor than A1, the switching output operates as NC.

## Indication

The sensor has 3 display LEDs to indicate various operating modes

Operating state	Green LED	Yellow LED	Red LED
Normal operation	lights up	Object in evaluation range	Unreliable object
Programming the trip points Object reliably detected Unreliable object Confirmation for successful programming	Off Off Flashes 3x	Flashes Off Off	Off Flashes Off

## Commissioning

### Synchronisation

The sensor has a synchronisation input for suppressing mutual interference 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  $\geq 1$  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<sub>B</sub>) or a low level (-U<sub>B</sub>) 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<sub>B</sub>:  $\geq n \cdot \text{high level/input impedance}$  ( $n$  = number of sensors to be synchronised)

Drive current with 0 V:  $\geq n \cdot \text{output current}$  ( $n$  = number of sensors to be synchronised)