

HTU330

Ultrasonic sensors with 2 switching outputs

en 2022/02/11 50135825



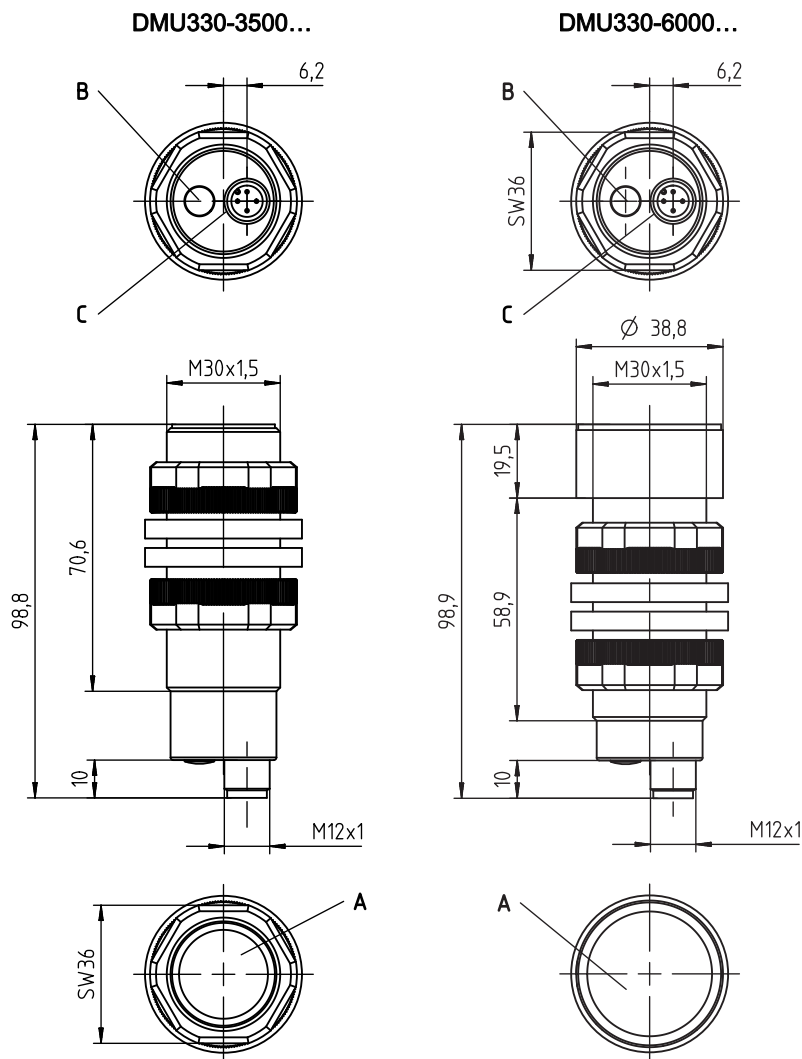
250 ... 3500mm
350 ... 6000mm

- Function largely independent of surface properties, ideal for detection of liquids, bulk materials, transparent media, ...
- Small dead zone at long range
- Adjustment of the switching point can be taught
- NO/NC function reversible
- 2 independent switching outputs (PNP or NPN)
- **NEW** – Both outputs can easily be taught using a button
- **NEW** – Stable plastic design
- **NEW** – Temperature-compensated range

Accessories: (available separately)

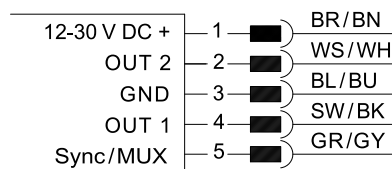
- Mounting systems
- Cables with M12 connector (KD ...)

Dimensioned drawing



- A** Active sensor surface
- B** Teach-in button
- C** Indicator diodes

Electrical connection



We reserve the right to make changes ? PAL_HTU330_3500_6000_2SWO_en_50135825.fm

Technical data

Ultrasonic specifications

Operating range ¹⁾
 Adjustment range
 Ultrasonic frequency
 Typ. opening angle
 Resolution
 Direction of beam
 Reproducibility
 Switching hysteresis
 Temperature drift

HTU330-3500.3/...-M12

250 ... 3500mm ²⁾
 250 ... 3500mm
 112kHz
 $\pm 7^\circ$
 5mm
 Axial
 $\pm 0.5\%$ ^{1) 4)}
 1% ⁴⁾
 $\leq 8\%$ ⁵⁾

HTU330-6000.3/...-M12

350 ... 6000mm ³⁾
 350 ... 6000mm
 75kHz
 $\pm 9^\circ$
 6mm
 Axial
 $\pm 0.5\%$ ^{1) 4)}
 1% ⁴⁾
 $\leq 8\%$ ⁵⁾

Time behavior

Switching frequency
 Response time
 Readiness delay

2Hz
 250ms
 ≤ 500 ms

1Hz
 500ms
 ≤ 500 ms

Electrical data

Operating voltage U_B ⁶⁾
 Residual ripple
 Open-circuit current
 Switching output / Function

12 ... 30V DC (incl. $\pm 5\%$ residual ripple)
 $\pm 5\%$ of U_B
 ≤ 50 mA

.../4P...

2 independent PNP transistor switching outputs
 OUT 1 (pin 4): NO contact preset
 OUT 2 (pin 5): NC contact preset

.../2N...

2 independent NPN transistor switching outputs
 OUT 1 (pin 4): NO contact preset
 OUT 2 (pin 5): NC contact preset

Output current
 Switching range adjustment

Max. 100mA
 1-point teach: teach-in button 2 ... 7s,
 2-point teach: teach-in button 7 ... 12s
 Teach-in button > 12s

Changeover of normally open contact (NO)/normally closed contact (NC)

Indicators

Yellow LED
 Blue LED
 Flashing yellow or blue LED
 Flashing green and yellow/blue LEDs
 Green LED

OUT1: object detected
 OUT2: object detected
 Teach-in
 Teach error
 Object within the operating range

Mechanical data

Housing
 Active surface
 Weight
 Ultrasonic transducer
 Connection type
 Installation position

Plastic (PBT)
 Epoxy resin, glass fiber reinforced
 140g / 170g
 Piezoceramic ⁷⁾
 M12 connector, 5-pin
 Any

Environmental data

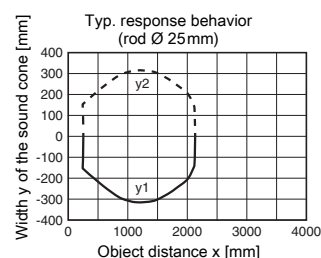
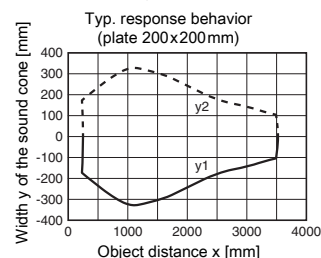
Ambient temp. (operation/storage)
 Protective circuit ⁸⁾
 VDE protection class
 Degree of protection
 Standards applied
 Certifications

$-20^\circ \dots +70^\circ\text{C} / -20^\circ \dots +70^\circ\text{C}$
 1, 2, 3
 III
 IP 67
 EN 60947-5-2
 UL 508, CSA C22.2 No.14-13 ^{6) 9)}

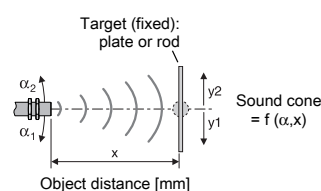
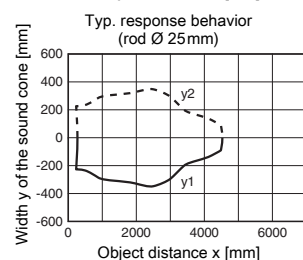
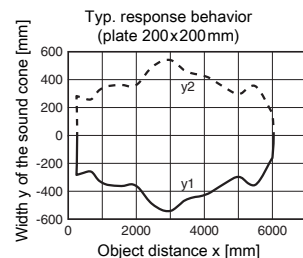
- 1) At 20°C
- 2) Target: 200mm x 200mm plate
- 3) Target: 400mm x 400mm plate
- 4) From end value
- 5) Over the temperature range $-20^\circ\text{C} \dots +70^\circ\text{C}$
- 6) For UL applications: use is permitted exclusively in Class 2 circuits according to NEC
- 7) The ceramic material of the ultrasonic transducer contains lead zirconium titanate (PZT)
- 8) 1=short-circuit and overload protection, 2=polarity reversal protection, 3=wire break and inductive protection
- 9) These proximity switches shall be used with UL Listed Cable assemblies rated 30V, 0.5A min, in the field installation, or equivalent (categories: CYJV/CYJV7 or PVVA/PVVA7)

Diagrams

HTU330-3500.3/...-M12



HTU330-6000.3/...-M12



Notes

Observe intended use!

- ⚠ This product is not a safety sensor and is not intended as personnel protection.
- ⚠ The product may only be put into operation by competent persons.
- ⚠ Only use the product in accordance with its intended use.

HTU330

Ultrasonic sensors with 2 switching outputs

Part number code

H T U 3 3 0 - 3 5 0 0 . 3 / 4 P K - M 1 2

Operating principle

- HTU** Ultrasonic sensor, scanning principle, with background suppression
- DMU** Ultrasonic sensor, distance measurement
- RKU** Ultrasonic sensor, retro-reflective ultrasonic sensor

Series

- 330** 330 series, cylindrical short M30 design

Operating range in mm

- 3500** 250 ... 3500
- 6000** 350 ... 6000

Equipment

- .3** Teach button on the sensor

Pin assignment of connector pin 4 / black cable wire (OUT1)

- 4** PNP output, NO contact preset
- P** PNP output, NC contact preset
- 2** NPN output, NO contact preset
- N** NPN output, NC contact preset

Pin assignment of connector pin 2 / white cable wire (Analog OUT/ OUT2)

- 4** PNP output, NO contact preset
- P** PNP output, NC contact preset
- 2** NPN output, NO contact preset
- N** NPN output, NC contact preset
- C** Analog output 4 ... 20 mA
- V** Analog output 0 ... 10 V

Pin assignment of connector pin 5 / gray cable wire (Sync / MUX)

- K** Synchronization/multiplex input

Connection technology

- M12** M12 connector, 5-pin

Order guide

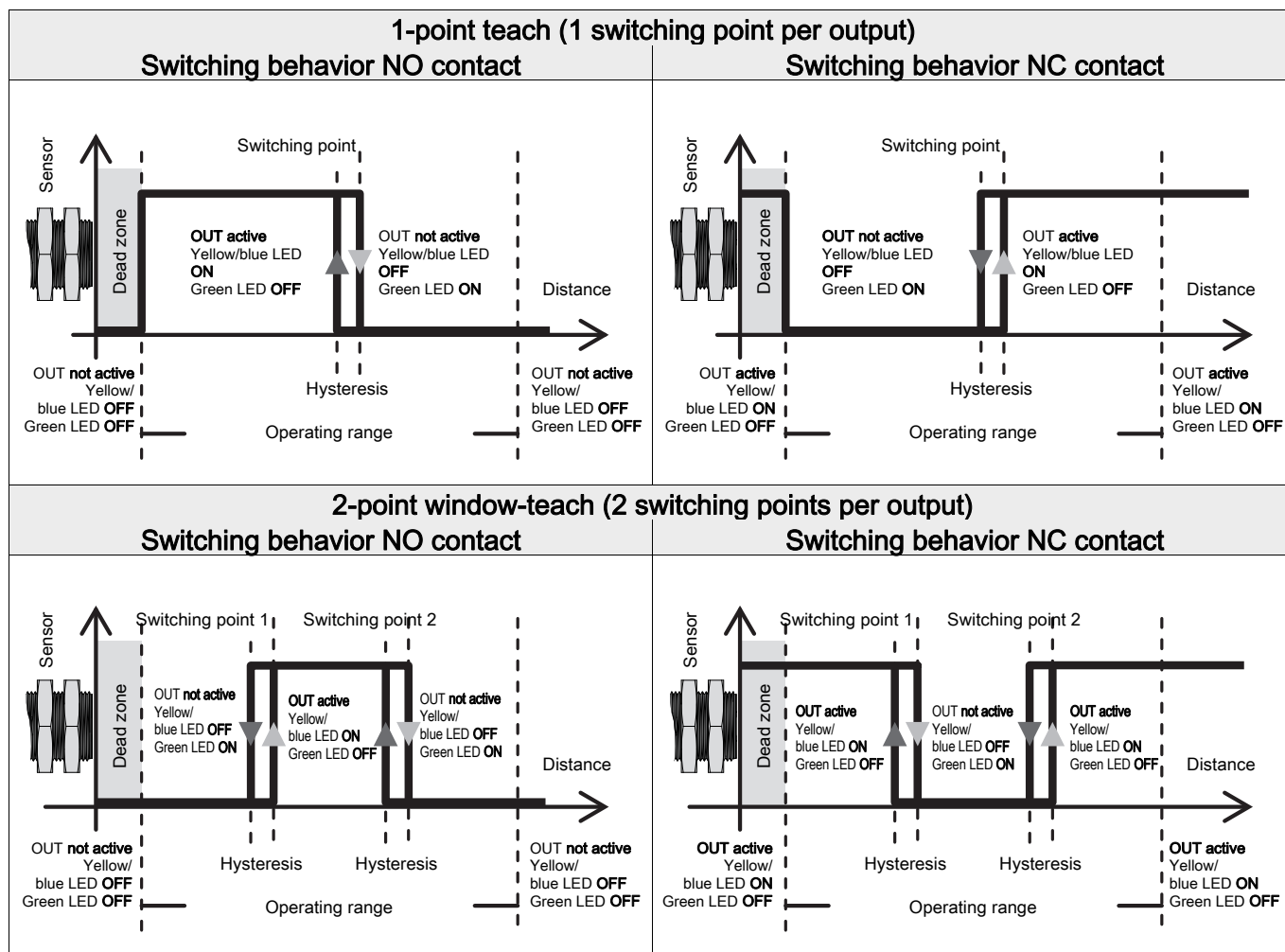
The sensors listed here are preferred types; current information at www.leuze.com.

	Designation	Part no.
Operating range / switching output / teach-in		
250 ... 3500 mm / 2 x PNP / teach button	HTU330-3500.3/4PK-M12	50136110
250 ... 3500 mm / 2 x NPN / teach button	HTU330-3500.3/2NK-M12	50136111
350 ... 6000 mm / 2 x PNP / teach button	HTU330-6000.3/4PK-M12	50136116

Device functions and indicators

All settings on the sensor are taught-in via the **teach button**. Device status and switching states are indicated as follows by means of 3 LEDs:

Switching behavior



NOTE



The switching behavior is not defined in the dead zone.

Switching behavior with 2-point window-teach as a function of the switching function

Switching function configured as	First taught object distance	Second taught object distance	Output switching behavior
NO contact	Close	Far	
	Far	Close	
NC contact	Close	Far	
	Far	Close	

Adjusting the switching points via the teach button

The switching points of the sensor for both outputs are set to 3500mm or 6000mm (static 1-point teach) on delivery.

By means of a simple operating procedure, the switching points for each output can be individually taught to an arbitrary distance within the operating range with 1-point teach (static) or 2-point window-teach (static).

Moreover, the output function can be switched from NO contact (NO - normally open) to NC contact (NC - normally closed). An LED is permanently assigned to each output for the setting.

Selecting the output that is to be taught: OUT 1 or OUT 2

1. Press the **teach button** for **≥ 2s** to **activate teach mode**. The **yellow LED (OUT 1)** flashes at 1Hz.
While in this state, **output OUT 1** can be taught.
2. To teach **output OUT 2**, **briefly** press the **teach button** again. The **blue LED (OUT 2)** now flashes at 1Hz.
While in this state, **output OUT 2** can be taught.
3. Briefly press the teach button again to toggle between outputs **OUT 1** and **OUT 2** in this state. The flashing LED indicates which output is ready for teaching:
yellow LED flashing = OUT 1 ready for teaching,
blue LED flashing = OUT 2 ready for teaching.

Teaching output OUT 1 or OUT 2

First activate the previously described teach mode for output OUT 1 or OUT 2.

1-point teach (static)	2-point window-teach (static) ¹⁾
1. Place object at desired switching distance.	1. First, place object at desired switching distance for switching point 1 .
2. To adjust the selected output, press the teach button for 2 ... 7s until the yellow LED (OUT 1) or blue LED (OUT 2) flashes at 3Hz. The current state of the selected output is frozen during the adjustment process.	2. To adjust the selected output, press the teach button for 7 ... 12s until the yellow (blue) and green LEDs flash alternately at 3Hz .
3. Release the button. The current object distance has been taught as the new switching point.	3. Release the button. The sensor remains in teach mode and the LEDs continue to flash.
4. Error-free teach: LED states and switching behavior according to the diagram shown above. Faulty teach (object may be too close or too far away – please note operating range): green and yellow (blue) LEDs flash at 8Hz until an error-free teach event is performed. The selected output is inactive as long as there is a teaching error.	4. Then, place the object at the desired switching distance for switching point 2 . Note: The minimum distance between the switching points is as follows: range of 3500mm: 350mm range of 6000mm: 600mm
	5. Briefly press the teach button again to complete the teach event. The switching window for the selected output was taught in.
	6. Error-free teach: LED states and switching behavior according to the diagram shown above. Faulty teach (object may be too close or too far away – please note operating range): green and yellow (blue) LEDs flash at 8Hz until an error-free teach event is performed.

1) See table "Switching behavior with 2-point window-teach as a function of the switching function"

Adjusting the switching function (NC/NO) via the teach button

The switching function of the sensor is preset as follows on delivery:

- **OUT 1: NO contact**
- **OUT 2: NC contact**

The output function for each output can be individually switched from NO contact (NO - normally open) to NC contact (NC - normally closed) and vice versa. If the switching function is changed, the switching output is changed to the opposite state (toggled).

First activate the previously described teach mode for output OUT 1 or OUT 2.

Changeover of the switching function
1. To change the switching function of the selected output, press the teach button for longer than 12s. The current state of the selected output is frozen during the adjustment process.
2. The green and yellow (blue) LEDs flash alternately at 3Hz. If the yellow (blue) LED is ON afterwards, the selected output operates as an NO contact. If the yellow (blue) LED is OFF afterwards, the selected output operates as an NC contact.

Synchronization of multiple HTU330 ultrasonic sensors

If adjacent ultrasonic sensors receive the signals of other sensors, so-called crosstalk occurs, which leads to faulty measurement results. Through temporal synchronization of the adjacent sensors, this can be avoided. Via the **Sync/MUX** input, the HTU330 ultrasonic sensors can be synchronized in 2 different ways:

Synchronous operation

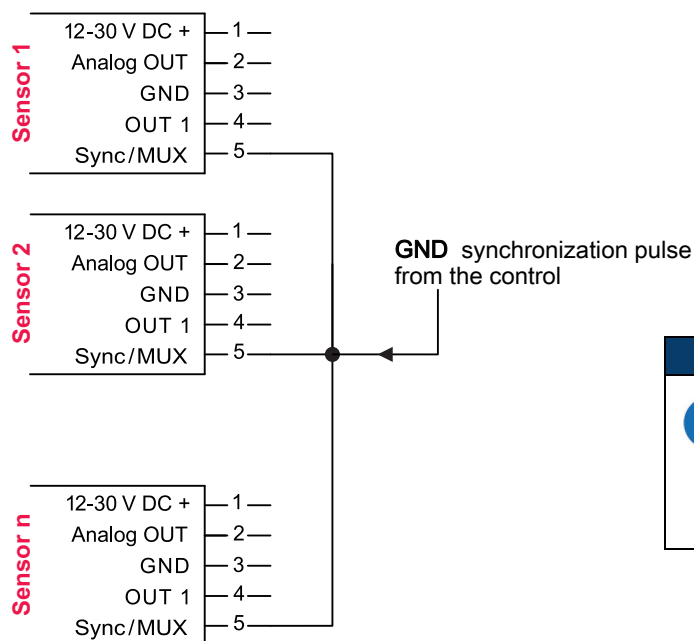
In this operating mode the mutual interference of adjacent sensors can be avoided; a minimum mounting distance between the sensors is to be maintained, however:

Working distance	Minimum mounting distance
< 1,500mm	100mm
≥ 1500mm	50mm

Sensors of the same type are wired together in a network according to the following diagram. A synchronization pulse from the control activates synchronous operation.

The devices work in synchronous operation with a **simultaneous transmission pulse**. The response time of the individual sensors in the network corresponds approximately to that of a single sensor.

Synchronous operation wiring schematic

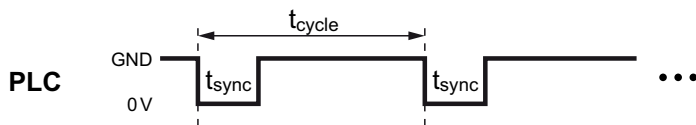


NOTE



Please make certain that the wiring is performed according to the connection diagram. The **Sync/MUX** pin 5 on all sensors in the network must be connected to **one** output of the control. Generation of the synchronization signal for all sensors in the network occurs via the control.

Timing diagram for synchronous operation



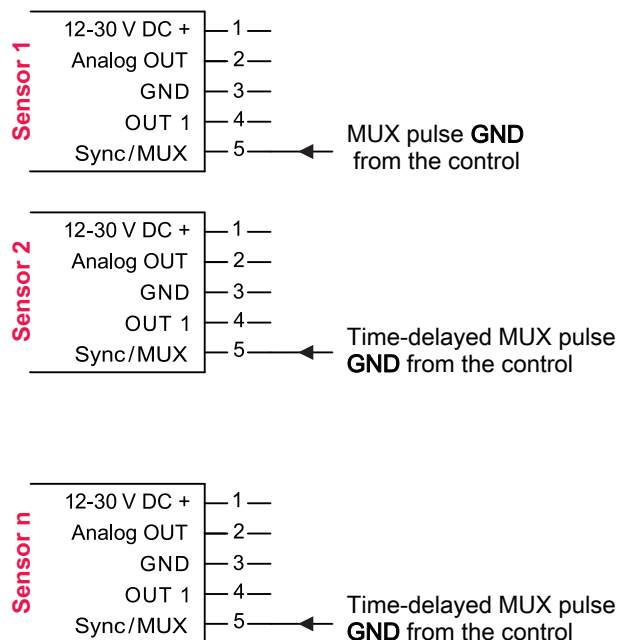
Operating range	Sync impulse duration t_{sync}	Cycle time t_{cycle}
250 ... 3500mm	0.5 ... 5ms	35ms
350 ... 6000mm	0.5 ... 1ms	60ms

Multiplex operation

In this operating mode the mutual interference of adjacent sensors can be reliably avoided. For this purpose, each sensor is wired with a separate output of the control.

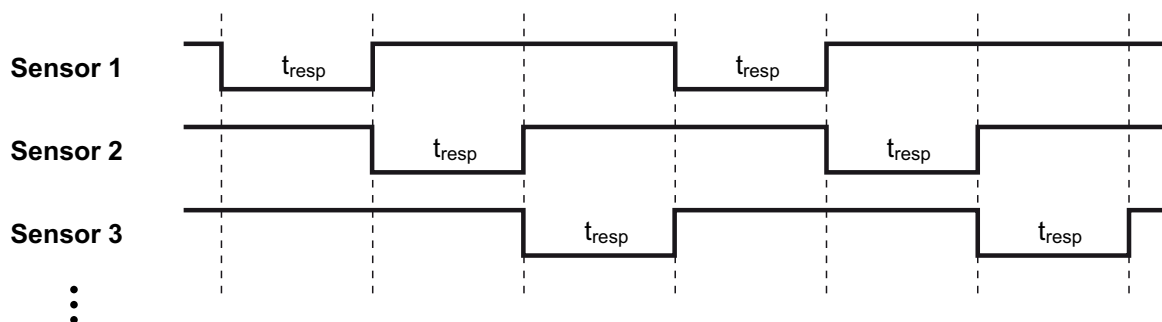
The devices operate in multiplex operation with a **cyclically time-delayed transmission pulse** and are switched to a passive state outside of the active phase.

Multiplex operation wiring schematic



NOTE	
i	Please make certain that the wiring is performed according to the connection diagram.
	The Sync/MUX pin 5 of each sensor must be connected with a separate output of the control.
	The control generates the time-delayed multiplex signals for all sensors.

Timing diagram for multiplex operation



Operating range	Response time of the switching outputs t_{resp}
250 ... 3500mm	250ms
350 ... 6000mm	500ms

Resetting to factory settings

The sensor can be reset to the factory setting (one switching point each at 3500 mm or 6000 mm).

Resetting to factory settings
1. When switching on the supply voltage (during power-on), press the teach button for > 5s.
2. Release the button. The green, yellow and blue LEDs flash alternately and very quickly for a brief time. The sensor was reset to the factory setting: switching output OUT 1: NO contact, 1 switching point at 3500 mm or 6000 mm (static 1-point teach), switching output OUT 2: NC contact, 1 switching point at 3500 mm or 6000 mm (static 1-point teach).