en 2022/02/11   50135825
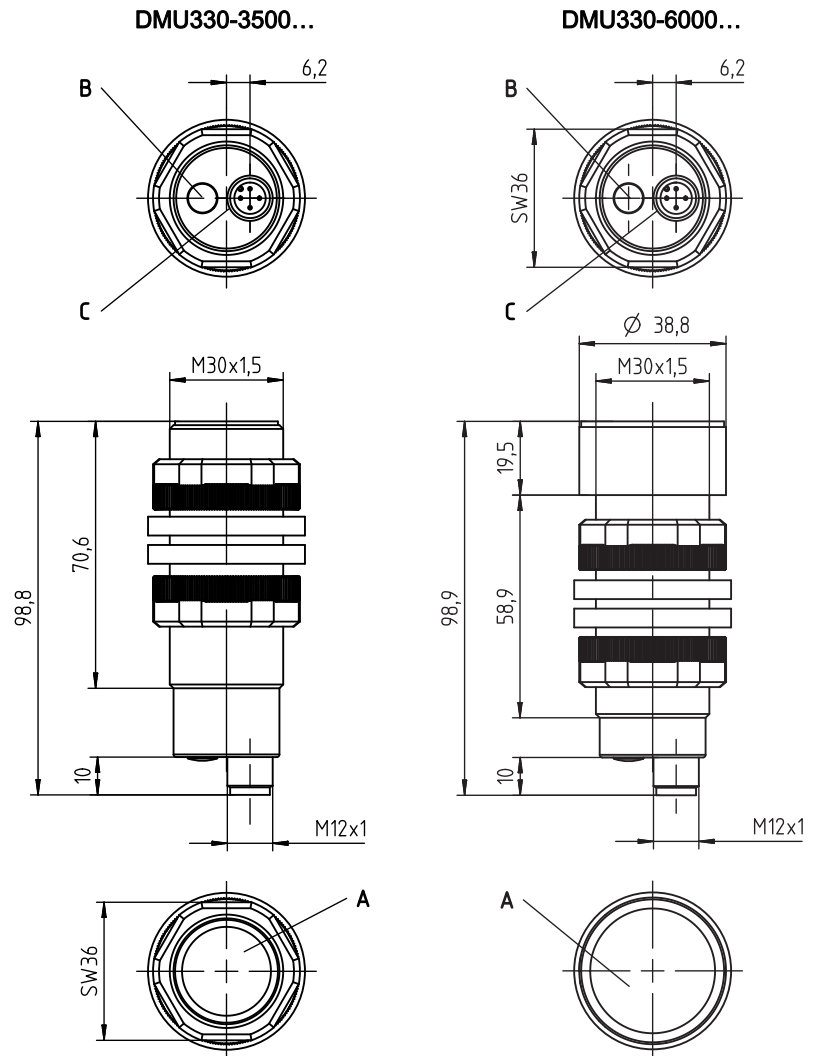
250 … 3500mm
350 … 6000mm

- 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
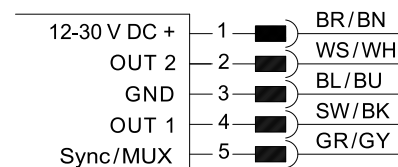- **NEW** – Temperature-compensated range

We reserve the right to make changes ? PAL_HTU330_3500_6000_2SWO_en_50135825.fm

Accessories: (available separately)

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

Dimensioned drawing

DMU330-3500…   DMU330-6000…

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

Electrical connection

12-30 V DC +	1	BR / BN
OUT 2	2	WS / WH
GND	3	BL / BU
OUT 1	4	SW / BK
Sync / MUX	5	GR / GY

Technical data

Ultrasonic specifications

	HTU330-3500.3/…-M12	HTU330-6000.3/…-M12
Operating range [1]	250 … 3500 mm [2]	350 … 6000 mm [3]
Adjustment range	250 … 3500 mm	350 … 6000 mm
Ultrasonic frequency	112 kHz	75 kHz
Typ. opening angle	± 7°	± 9°
Resolution	5 mm	6 mm
Direction of beam	Axial	Axial
Reproducibility	± 0.5 % [1] [4]	± 0.5 % [1] [4]
Switching hysteresis	1 % [4]	1 % [4]
Temperature drift	≤ 8 % [5]	≤ 8 % [5]

Time behavior

Switching frequency	2 Hz	1 Hz
Response time	250 ms	500 ms
Readiness delay	≤ 500 ms	≤ 500 ms

Electrical data

Operating voltage U_B [6]	12 … 30 V DC (incl. ± 5 % residual ripple)
Residual ripple	± 5 % of U_B
Open-circuit current	≤ 50 mA
Switching output / Function …/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	Max. 100 mA
Switching range adjustment	1-point teach: teach-in button 2 … 7 s,
	2-point teach: teach-in button 7 … 12 s
Changeover of normally open contact (NO)/normally closed contact (NC)	Teach-in button > 12 s

Indicators

Yellow LED	OUT1: object detected
Blue LED	OUT2: object detected
Flashing yellow or blue LED	Teach-in
Flashing green and yellow/blue LEDs	Teach error
Green LED	Object within the operating range

Mechanical data

Housing	Plastic (PBT)
Active surface	Epoxy resin, glass fiber reinforced
Weight	140 g / 170 g
Ultrasonic transducer	Piezoceramic [7]
Connection type	M 12 connector, 5-pin
Installation position	Any

Environmental data

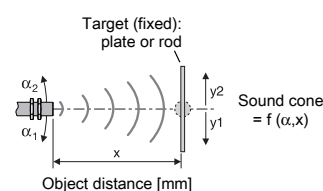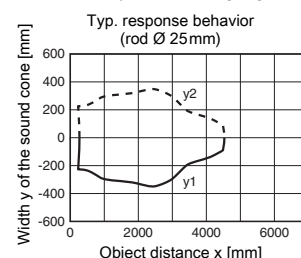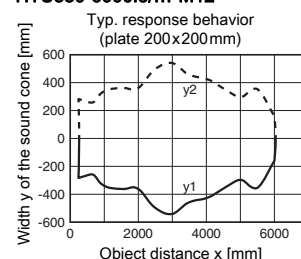|	
Ambient temp. (operation/storage)	-20° … +70°C/-20° … +70°C
Protective circuit [8]	1, 2, 3
VDE protection class	III
Degree of protection	IP 67
Standards applied	EN 60947-5-2
Certifications	UL 508, CSA C22.2 No.14-13 [6] [9]

1) At 20 °C
2) Target: 200 mm x 200 mm plate
3) Target: 400 mm x 400 mm plate
4) From end value
5) Over the temperature range -20 °C … +70 °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

Typ. response behavior (plate 200 x 200 mm)

Typ. response behavior (rod Ø 25 mm)

HTU330-6000.3/…-M12

Typ. response behavior (plate 200 x 200 mm)

Typ. response behavior (rod Ø 25 mm)

Target (fixed): plate or rod
Sound cone = f (α,x)
Object distance [mm]
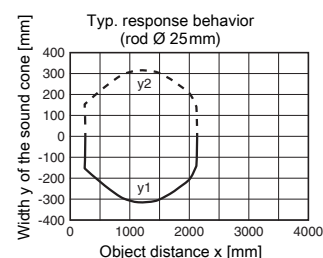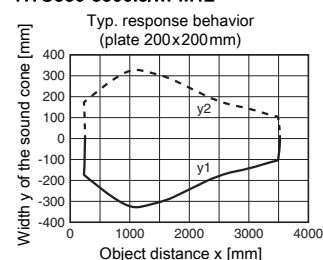
Notes

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.

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 … 20mA

V   Analog output 0 … 10V

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**.

[2]

	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

1-point teach (1 switching point per output)	
Switching behavior NO contact	**Switching behavior NC contact**

2-point window-teach (2 switching points per output)	
Switching behavior NO contact	**Switching behavior NC contact**
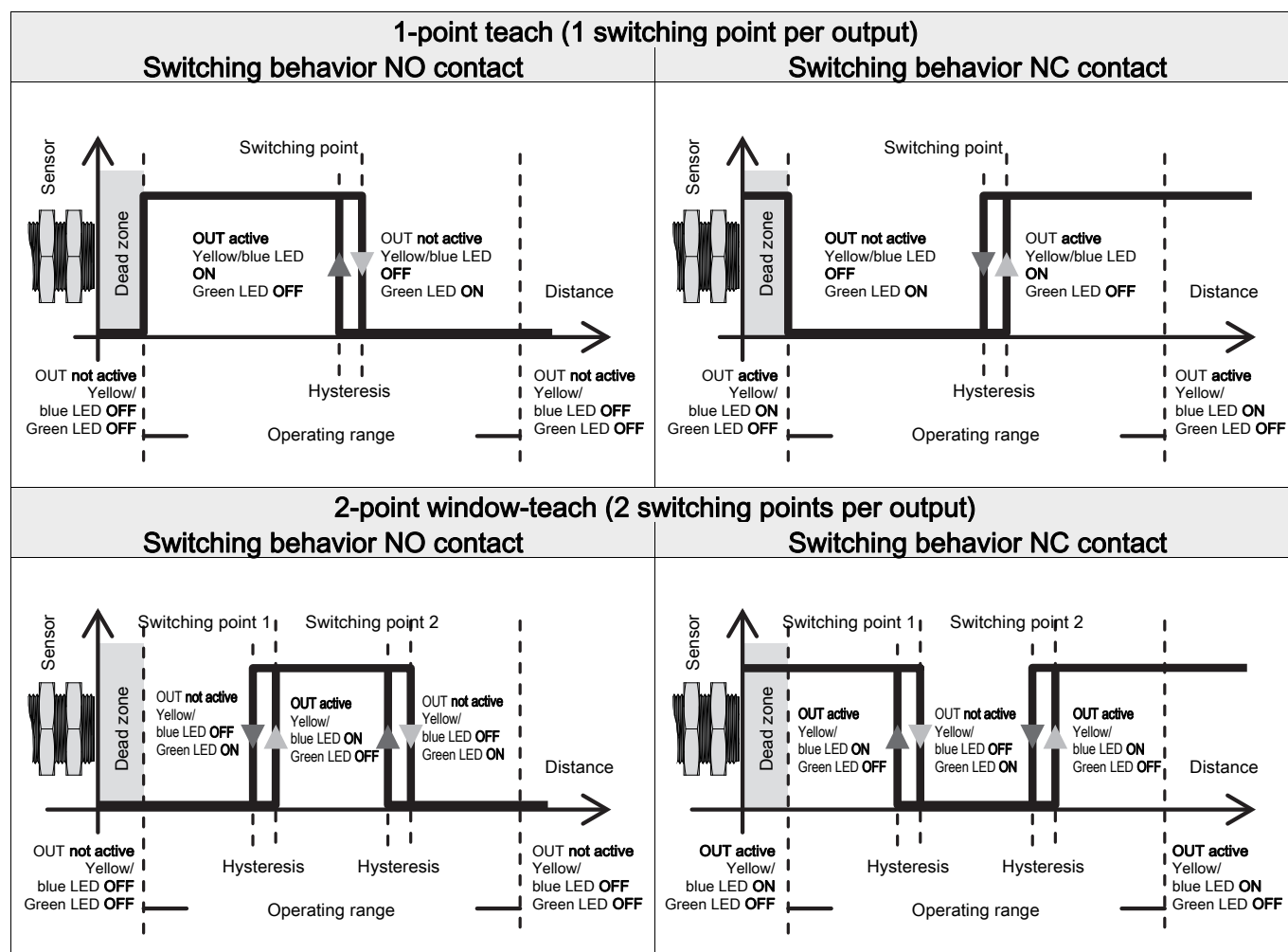
> **NOTE**
>
> The switching behavior is not defined in the dead zone.

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 3500 mm or 6000 mm (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 1 Hz.
   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 1 Hz.
   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 3 Hz. 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 3 Hz**.
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 8 Hz** 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 3500 mm: **350 mm** range of 6000 mm: **600 mm**
	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 8 Hz** 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 12 s**. The current state of the selected output is frozen during the adjustment process.
2. The **green and yellow (blue) LEDs flash alternately at 3 Hz**. 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:
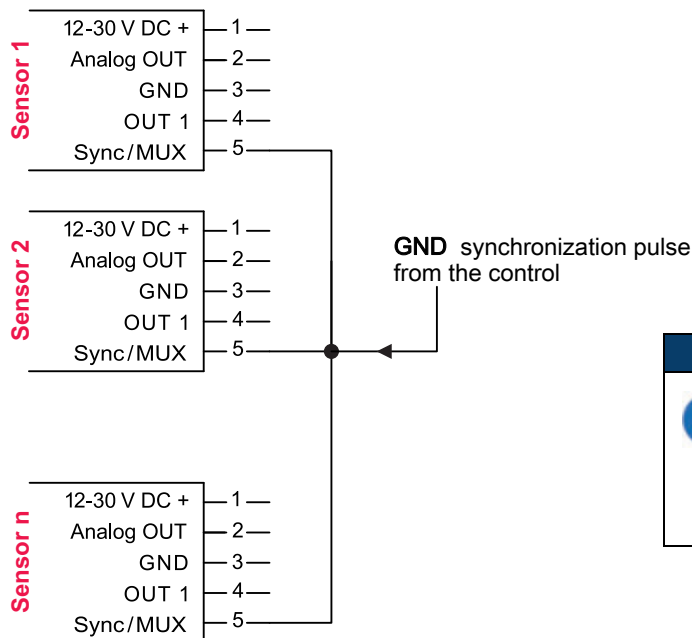
Synchronous operation

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
< 1,500 mm	100 mm
≥ 1500 mm	50 mm

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*

Sensor 1
12-30 V DC + — 1 —
Analog OUT — 2 —
GND — 3 —
OUT 1 — 4 —
Sync/MUX — 5 —

Sensor 2
12-30 V DC + — 1 —
Analog OUT — 2 —
GND — 3 —
OUT 1 — 4 —
Sync/MUX — 5 —

GND synchronization pulse from the control

Sensor n
12-30 V DC + — 1 —
Analog OUT — 2 —
GND — 3 —
OUT 1 — 4 —
Sync/MUX — 5 —

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
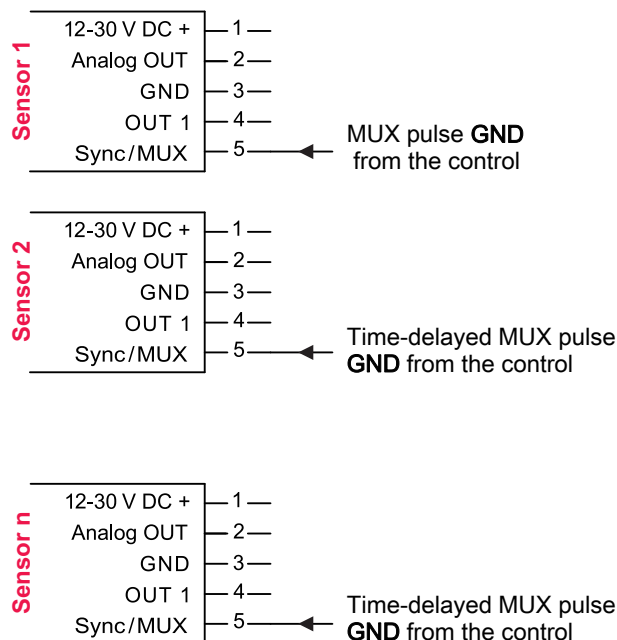
t_{cycle}

PLC
GND
0 V
t_{sync} t_{sync} • • •
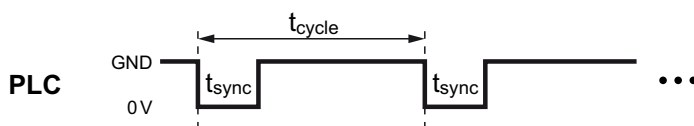
Operating range	Sync impulse duration t_{sync}	Cycle time t_{cycle}
250 … 3500 mm	0.5 … 5 ms	35 ms
350 … 6000 mm	0.5 … 1 ms	60 ms

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

Sensor 1

12-30 V DC +	1 —
Analog OUT	2 —
GND	3 —
OUT 1	4 —
Sync/MUX	5 — ← MUX pulse **GND** from the control

Sensor 2

12-30 V DC +	1 —
Analog OUT	2 —
GND	3 —
OUT 1	4 —
Sync/MUX	5 — ← Time-delayed MUX pulse **GND** from the control

Sensor n

12-30 V DC +	1 —
Analog OUT	2 —
GND	3 —
OUT 1	4 —
Sync/MUX	5 — ← Time-delayed MUX pulse **GND** from the control

NOTE
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

Sensor 1 — t_{resp} — t_{resp}

Sensor 2 — t_{resp} — t_{resp}

Sensor 3 — t_{resp} — t_{resp}
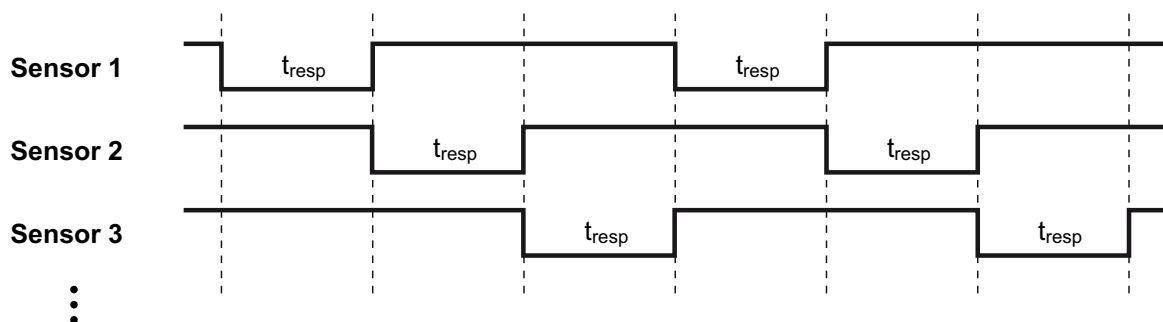
Operating range	Response time of the switching outputs t_{resp}
250 … 3500 mm	250 ms
350 … 6000 mm	500 ms

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).