

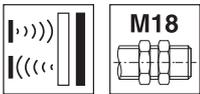
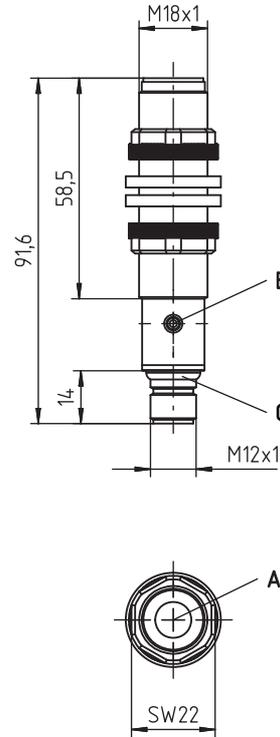
HTU318

Ultrasonic sensors with 2 switching outputs

en 01-2017/02 50135816



Dimensioned drawing



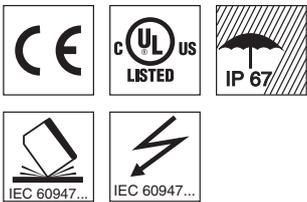
50 ... 400 mm
150 ... 1600 mm



- Function largely independent of surface properties, ideal for detection of liquids, bulk materials, transparent media, ...
- Small dead zone at long scanning 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 scanning range

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

Electrical connection



Accessories:

(available separately)

- Mounting systems
- Mounting adapter M18-M30: BTX-D18M-D30 (Part no. 50125860)
- Cables with M12 connector (KD ...)

We reserve the right to make changes • PAL_HTU318_400_1600_2SWO_en_50135816.fm

Technical data

Ultrasonic specifications

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

HTU318-400.3/...-M12

50 ... 400mm ²⁾
 50 ... 400mm
 300kHz
 $8^\circ \pm 2^\circ$
 $< 2\text{mm}$
 Axial
 $\pm 0.5\% \text{ }^1 \text{ }^3)$
 $1\% \text{ }^3)$
 $\leq 5\% \text{ }^4)$

HTU318-1600.3/...-M12

150 ... 1600mm ²⁾
 150 ... 1600mm
 230kHz
 $8^\circ \pm 2^\circ$
 $< 2\text{mm}$
 Axial
 $\pm 0.5\% \text{ }^1 \text{ }^3)$
 $1\% \text{ }^3)$
 $\leq 5\% \text{ }^4)$

Timing

Switching frequency
 Response time
 Readiness delay

10Hz
 500ms
 $< 500\text{ms}$

2Hz
 250ms
 $< 500\text{ms}$

Electrical data

Operating voltage U_B ⁵⁾
 Residual ripple
 Open-circuit current
 Switching output / Function

10 ... 30V DC (incl. $\pm 7\%$ residual ripple)
 $\pm 7\%$ of U_B
 $\leq 50\text{mA}$

.../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

Max. 100mA

Output current
 Switching range adjustment

1-point teach: teach-in button 2 ... 7s,
 2-point teach: teach-in button 7 ... 12s
 Teach-in button $> 12\text{s}$

Changeover
 NO/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
 Teaching error
 Object within the scanning range

Mechanical data

Housing
 Active surface
 Weight
 Ultrasonic transducer
 Connection type
 Fitting position

Plastic (PBT)
 Epoxy resin, glass fiber reinforced
 70g
 Piezoceramic ⁶⁾
 M12 connector, 5-pin
 Any

Environmental data

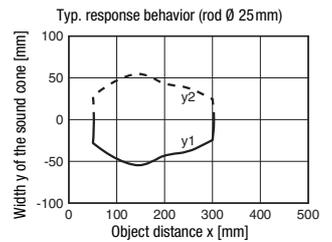
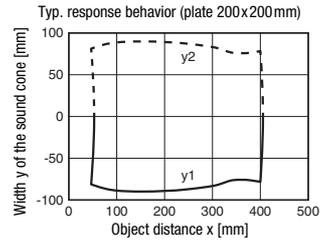
Ambient temp. (operation/storage)
 Protective circuit ⁷⁾
 VDE protection class
 Degree of protection
 Standards applied
 Certifications

$-20^\circ \dots +70^\circ\text{C}/-20^\circ \dots +70^\circ\text{C}$
 1, 2, 3
 III
 IP 67
 EN 60947-5-2
 UL 508, CSA C22.2 No.14-13 ^{5) 8)}

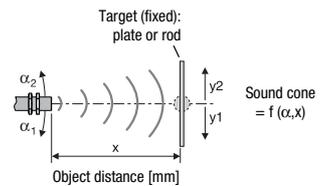
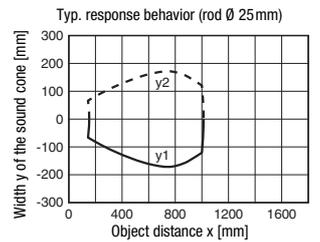
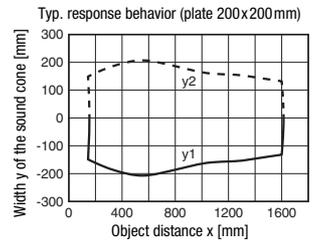
- 1) At 20°C
- 2) Target: 200mm x 200mm plate
- 3) From end value
- 4) Over the temperature range $-20^\circ\text{C} \dots +70^\circ\text{C}$
- 5) For UL applications: use is permitted exclusively in Class 2 circuits according to NEC
- 6) The ceramic material of the ultrasonic transducer contains lead zirconium titanate (PZT)
- 7) 1=short-circuit and overload protection, 2=polarity reversal protection, 3=wire break and inductive protection
- 8) 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

HTU318-400.3/...-M12



HTU318-1600.3/...-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.

HTU318

Ultrasonic sensors with 2 switching outputs

Part number code

H	T	U	3	1	8	-	1	6	0	0	.	3	/	4	P	K	-	M	1	2
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Operating principle

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

Series

318 318 series, cylindrical short M18 design

Scanning range in mm

400 50 ... 400
1600 150 ... 1600

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

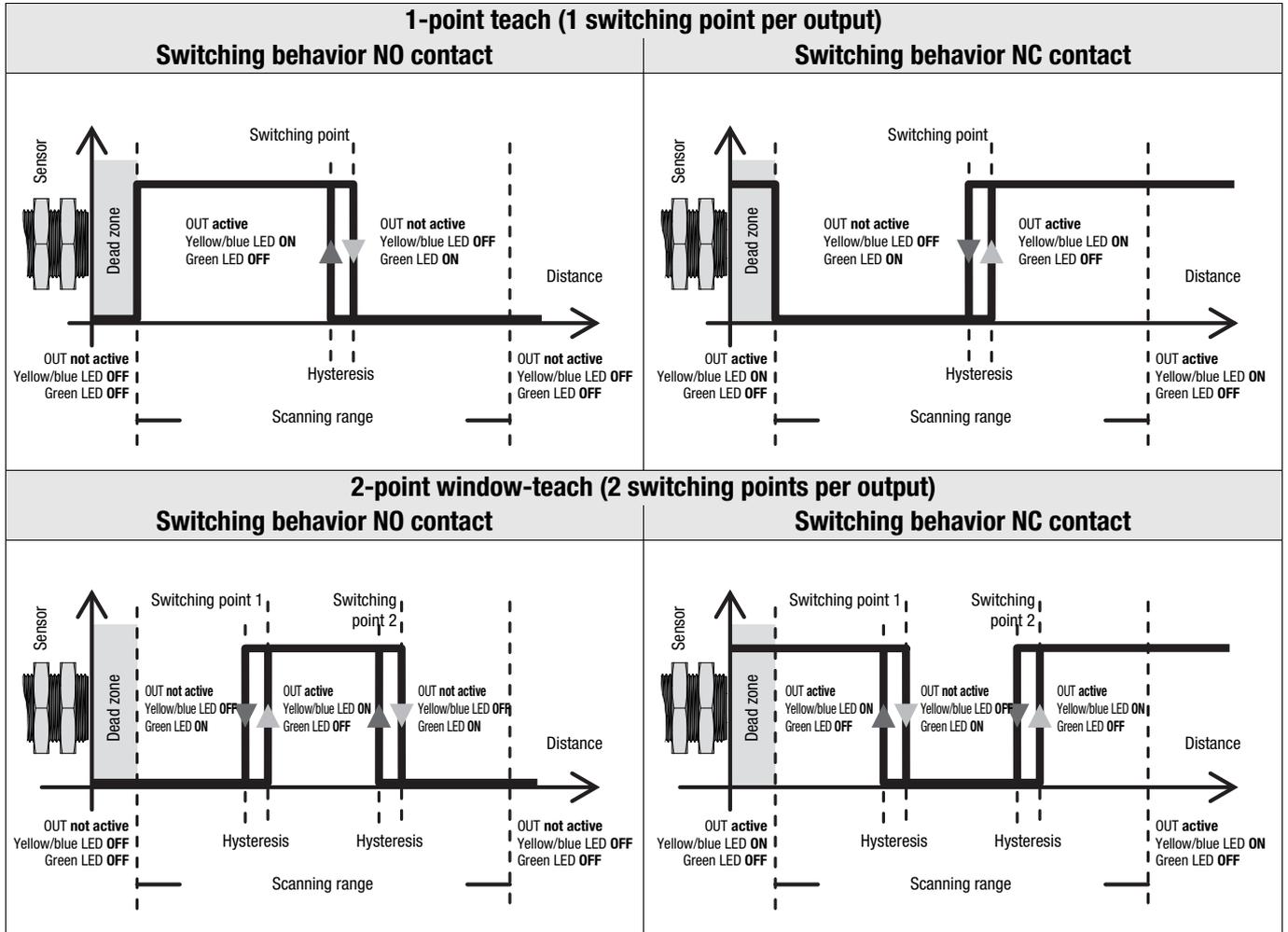
The sensors listed here are preferred types; current information at www.leuze.com.

Scanning range / switching output / teach-in	Designation	Part no.
50 ... 400mm / 2 x PNP / teach button	HTU318-400.3/4PK-M12	50136082
50 ... 400mm / 2 x NPN / teach button	HTU318-400.3/2NK-M12	50136083
150 ... 1600mm / 2 x PNP / teach button	HTU318-1600.3/4PK-M12	50136088
150 ... 1600mm / 2 x NPN / teach button	HTU318-1600.3/2NK-M12	50136089

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 (normally open)	Close	Far	
	Far	Close	
NC (normally closed)	Close	Far	
	Far	Close	

Adjusting the switching points via the teach button

The switching points of the sensor for both outputs are set to 400mm or 1600mm (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 scanning 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: OUT1 or OUT2

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 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 scanning 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: scanning range of 400mm: 40mm scanning range of 1600mm: 160mm
	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 scanning 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 .

HTU318

Ultrasonic sensors with 2 switching outputs

Synchronization of multiple HTU318 ultrasonic sensors

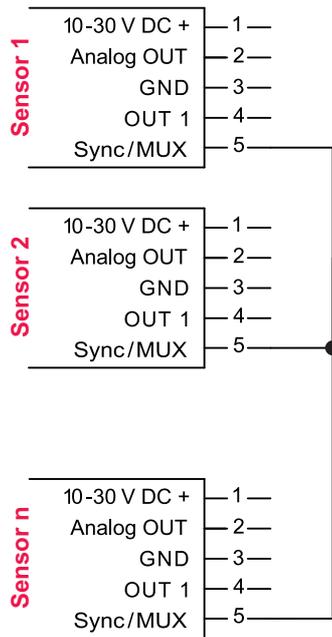
If adjacent ultrasonic sensors receive the signals of other sensors, so-called crosstalk occurs, which leads to faulty measurement results. Through temporal synchronization of the adjacent sensors, this can be avoided. Via the **Sync/MUX** input, the HTU318 ultrasonic sensors can be synchronized in 2 different ways:

Synchronous operation

In this operating mode the mutual interference of adjacent sensors can be avoided. For this purpose, up to 6 sensors of the same type are wired together in a network according to the following diagram.

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. However, an additional delay time of approx. 20ms occurs in comparison to the specified response time in standard operation.

Synchronous operation wiring schematic



	<p>NOTE</p> <p>Please make certain that the wiring is performed according to the connection diagram. Sync/MUX pin 5 on all sensors in the network must be connected to one another. Generation of the synchronization signal for all sensors in the network occurs automatically.</p>
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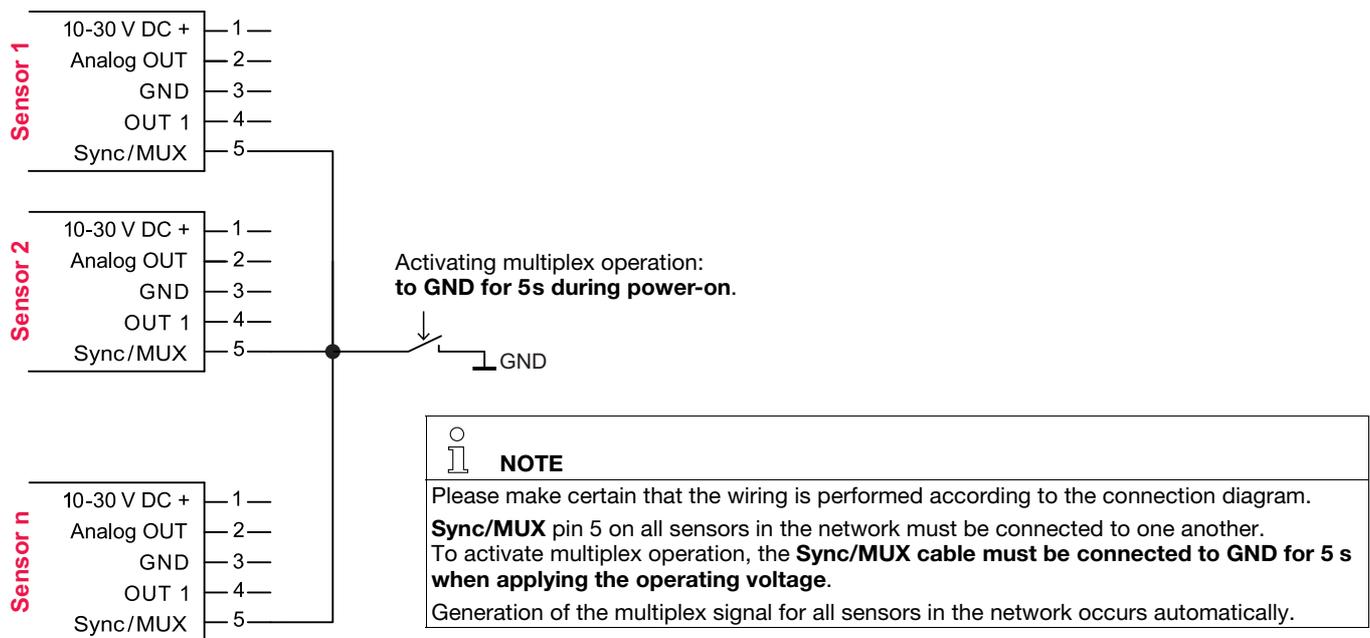
Multiplex operation

In this operating mode the mutual interference of adjacent sensors can be reliably avoided. For this purpose, up to 4 sensors of the same type are wired together in a network according to the following diagram.

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, whereby the states of the outputs are frozen until the next active phase. The response time of the individual sensor in the network is therefore extended with respect to the response time of a single sensor as follows:

Response time in the network = (Response time of sensor * n) + 25ms (n = number of sensors in the network)

Multiplex operation wiring schematic



Resetting to factory settings

The sensor can be reset to the factory setting (one switching point each at 400 mm or 1600 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 400 mm or 1600 mm (static 1-point teach), switching output OUT 2: NC contact, 1 switching point at 400 mm or 1600 mm (static 1-point teach).