# HTU430B ADVANCED ultrasonic sensors with 2 switching outputs

en 04-2019/05/14 50125024-01

300 … 3000mm
600 … 6000mm

15 - 30 V DC

IO-Link

- Function largely independent of surface properties, ideal for detection of liquids, bulk materials, transparent media, …
- Small design at long operating range
- Temperature-compensated operating range
- 2 independent PNP switching outputs
- **NEW** – Both outputs can easily be taught using a button
- **NEW** – Stable all-metal design
- **NEW** – Process data and configuration via IO-Link interface
- **NEW** – Five operating modes: scanning, synchronous, multiplex, activation and throughbeam operation

IP 67

IEC 60947...

IEC 60947...

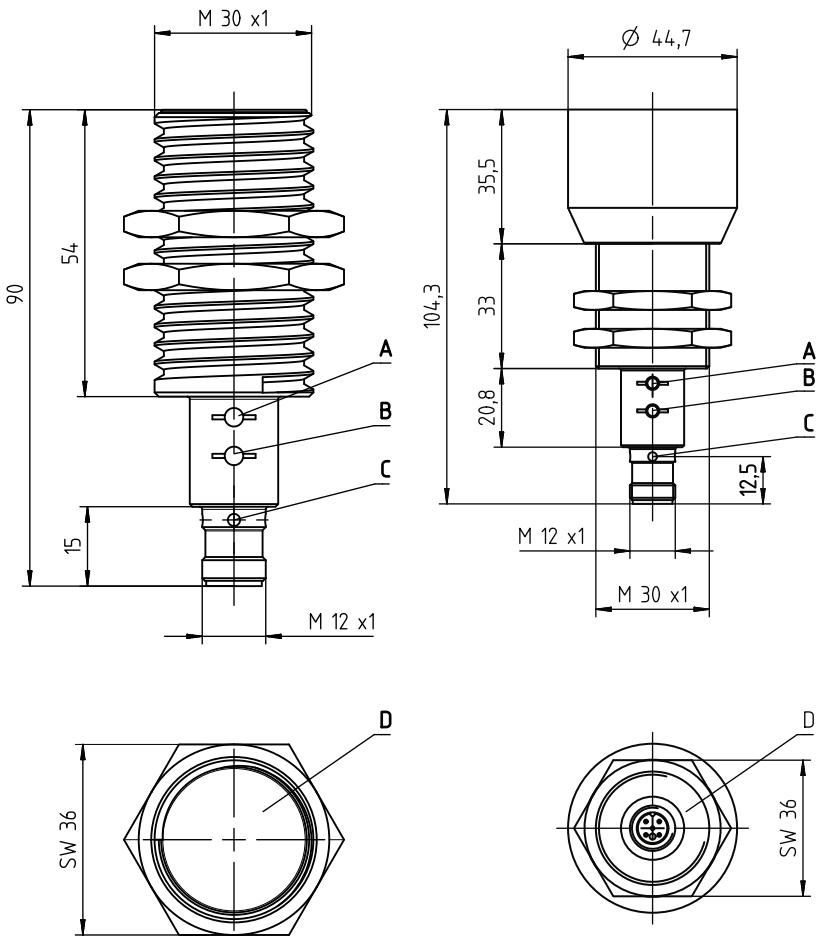
IP 68

## Accessories:

**(available separately)**

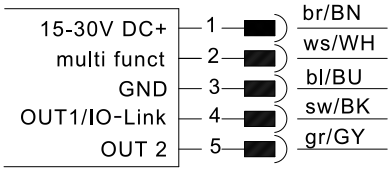
- Mounting systems
- Cables with M12 connector (K-D …)
- Teach adapter PA1/XTSX-M12 (Part no. 50124709)
- USB IO-Link master 2.0 (Part no. 50121098)

## Dimensioned drawing




**A** Control button **2**
**B** Control button **1**
**C** Indicator diodes
**D** Active sensor surface

## Electrical connection




Factory setting for pin 2 **multi funct**: teach input

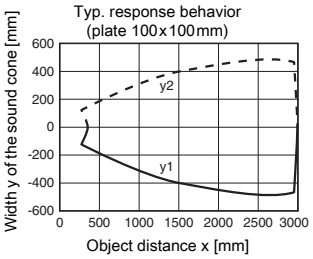
# Technical data

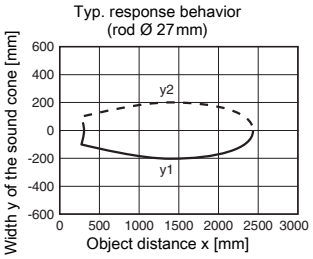
| Ultrasonic specifications | HTU430B-3000.X3/… | HTU430B-6000.X3/... |
|---|---|---|
| Operating range [1] | 300 … 3000 mm [2] | 600 … 6000 mm [2] |
| Adjustment range | 300 … 3000 mm | 600 … 6000 mm |
| Ultrasonic frequency | 120 kHz | 75 kHz |
| Typ. opening angle | 15° | |
| Resolution of switching output | 1 mm | |
| Direction of beam | Axial | |
| Accuracy | ± 0.5 % of end value [1] | |
| Reproducibility | ± 0.15 % of end value [1] | |
| Switching hysteresis | 25 mm | 50 mm |
| Temperature drift | ± 1.5 % of end value [1] | |
| **Sensor operating modes** | | |
| IO-Link | COM2 (38.4 kBaud) | |
| SIO | Is supported | |
| **Time behavior** | | |
| Switching frequency | 4 Hz | 1.6 Hz |
| Response time | 125 ms | 380 ms |
| Readiness delay | < 300 ms | |
| **Electrical data** | | |
| Operating voltage $U_B$ [3] | SIO mode: 15 … 30 V DC (incl. ± 10 % residual ripple), COM2 mode: 18 … 30 V DC (incl. ± 10 % residual ripple) | |
| Residual ripple | ± 10 % of $U_B$ | |
| Open-circuit current | ≤ 50 mA | |
| Switching output | OUT1:1 x PNP transistor, IO-Link SIO mode, OUT2:1 x PNP transistor, configurable | |
| Function (PNP) | 2 x NO contact, reversible | |
| Output current | SIO mode: max. 150 mA per contact, COM2 mode: max. 100 mA per contact | |
| Switching range adjustment | OUT1: control button 1 or teach input<br>OUT2: control button 2 or teach input | |
| Changeover NO/NC | OUT1: control button 1 or teach input<br>OUT2: control button 2 or teach input | |
| **Indicators** | | |
| Yellow LED | OUT1: object detected | |
| Yellow LED, flashing | Teach-in / teaching error / cable short circuit | |
| Green LED | Object within the operating range | |
| Green LED flashing | IO-Link communication | |
| **Mechanical data** | | |
| Housing | All metal - brass, nickel-plated | |
| Weight | 110 g | 215 g |
| Ultrasonic transducer | Piezoceramic [4] | |
| Connection type | M12 connector, 5-pin | |
| Installation position | Any | |
| **Environmental data** | | |
| Ambient temp. (operation/storage) | -25 °C … +70 °C/ -40 °C … +85 °C | -25 °C … +50 °C |
| Protective circuit [5] | 1, 2, 3 | |
| VDE protection class | III | |
| Degree of protection | IP 67 and IP 68 | |
| Standards applied | EN 60947-5-2 | |
| Certifications | UL 508, C22.2 No.14-13 [3] [6] [7] | |

1) At 20 °C
2) Target: 100 mm x 100 mm plate
3) For UL applications: use is permitted exclusively in Class 2 circuits according to NEC
4) The ceramic material of the ultrasonic transducer contains lead zirconium titanate (PZT)
5) 1=short-circuit and overload protection, 2=polarity reversal protection, 3=wire break and inductive protection
6) These proximity switches shall be used with UL Listed Cable assemblies rated 30 V, 0.5 A min, in the field installation, or equivalent (categories: CYJV/CYJV7 or PVVA/PVVA7); Use tool for buttons
7) Ambient temperature 85 °C. Use same voltage supply for all circuits.

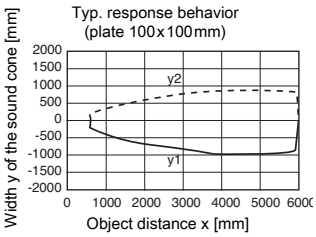
# Diagrams

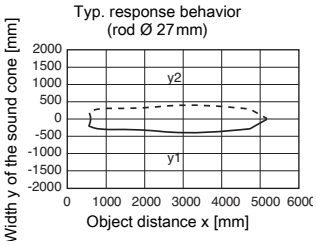
## HTU430B-3000…-M12

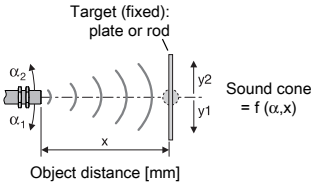



## HTU430B-6000...-M12




# 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.

## HTU430B ADVANCED ultrasonic sensors with 2 switching outputs

## Part number code

| H | T | U | 4 | 3 | 0 | B | - | 3 | 0 | 0 | 0 | . | X | 3 | / | L | T | 4 | - | M | 1 | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Operating principle**

| | |
|---|---|
| **HTU** | Ultrasonic sensor, scanning principle, with background suppression |
| **DMU** | Ultrasonic sensor, distance measurement |

**Series**

| | |
|---|---|
| **430B** | 430B Series, cylindrical M30 construction |

**Operating range in mm**

| | |
|---|---|
| **3000** | 300 … 3000 |
| **6000** | 600 … 6000 |

**Equipment (optional)**

| | |
|---|---|
| **X** | "Advanced" design |
| **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 |
| **L** | IO-Link communication or push-pull (SIO) |

**Pin assignment of connector pin 2 / white cable wire (Teach-IN)**

| | |
|---|---|
| **T** | Teach input |

**Pin assignment of connector pin 5 / gray cable wire (OUT2)**

| | |
|---|---|
| **4** | PNP output, NO contact preset |
| **P** | PNP output, NC contact preset |
| **V** | Analog voltage output 0 … 10 V |
| **C** | Analog current output 4 … 20 mA |
| **X** | Connection not assigned (n. c.- not connected) |

**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** | | |
| 300 … 3000 mm | HTU430B-3000.X3/LT4-M12 | 50124273 |
| 600 … 6000 mm | HTU430B-6000.X3/LT4-M12 | 50142209 |

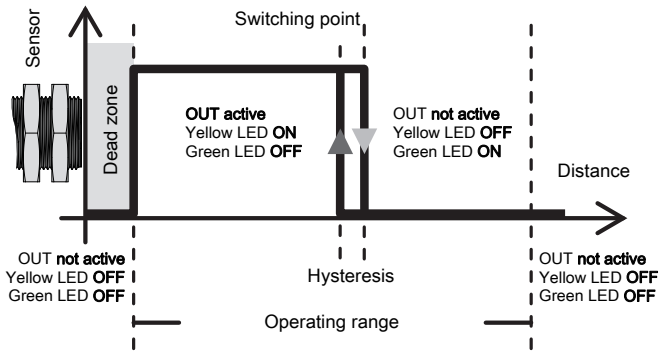
## Device functions and indicators

The sensor has two buttons for adjusting output **OUT1** and output **OUT2**. Alternatively, all adjustments can also be made via **IO-Link**. The **multi funct** teach input can be used to perform the 1-point teach and the changeover of the switching function (NO contact/NC contact).

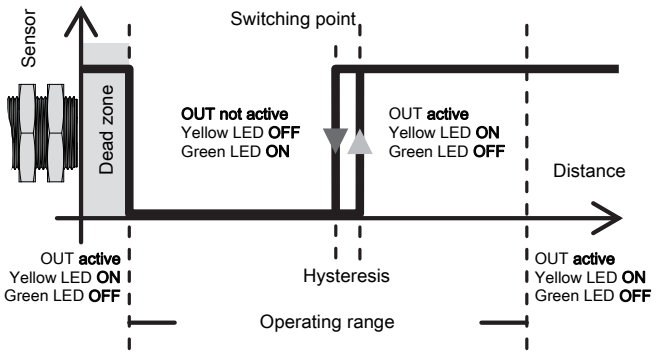
### Switching behavior

**1-point teach (1 switching point per output)**

**Switching behavior NO contact**

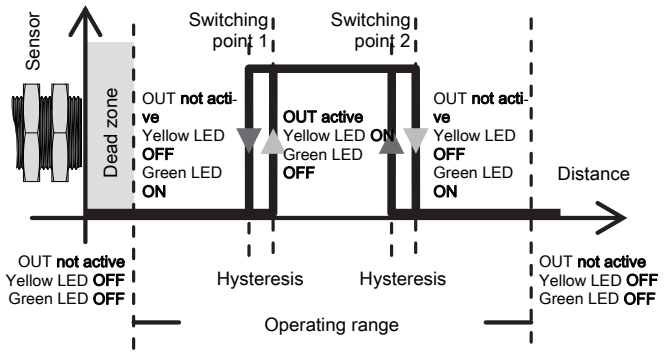



**Switching behavior NC contact**

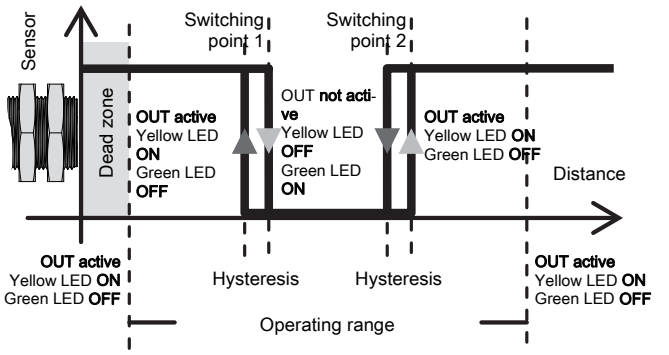



**2-point window-teach (2 switching points per output)**

**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 (normally open)<br>NC (normally closed) | Far | Close |  |
| | Close | Far |  |

**Note!**
**In measurement operation, the yellow and green LED only indicate the behavior of output OUT1.**
**The behavior of output OUT2 is not indicated.**

**The 2-point window-teach can be configured either with the control buttons or via the IO-Link interface. Adjustment via the teach input is not possible.**

## Adjustment of the switching points (Teach) using the control buttons

The two switching points of the sensor are both set to 3000 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). A button is permanently assigned to each output for the setting (see dimensioned drawing).

| 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 output **OUT1**, **press button 1**, to adjust output **OUT2**, press **button 2** for **2 … 7 s** until the **yellow LED flashes at 3 Hz**. | 2. To adjust output **OUT1**, **press button 1**, to adjust output **OUT2**, press **button 2** for **7 … 12 s** until the **yellow and green LED flash alternately at 3 Hz**. |
| 3. **Release** the **teach button** to complete the teach event. 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)**:** **yellow LED flashes at 5 Hz** until an error-free teach event is performed. The affected output is inactive as long as there is a teach 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<br>range of 3000 mm: **250 mm**<br>range of 6000 mm: **500 mm** |
| | 5. **Briefly press** the **teach button** again to complete the teach event. The switching window 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 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"

**Note!**
**All operating functions are identical for outputs OUT1 and OUT2.**

## Adjusting the switching function (NO/NC) using the control buttons

The control buttons can be used to switch the output function from NO contact to NC contact (or vice versa).
To do this, proceed as follows:

| Action / Description | Control button | Indicator diode GREEN / YELLOW |
|---|---|---|
| **Changeover of the switching function**: Switching outputs **OUT1** and **OUT2** are set as **NO contact ex works.** If the switching function is changed, the respective switching output is changed to the opposite state (toggled). | **Press the button** for the desired switching output **for longer than 12 s**. | **Both LEDs flash alternately** for a short time at 3 Hz. If the **yellow LED** is then **ON**, the output functions as an **NO contact**. If the **yellow LED** is then **OFF**, the output functions as an **NC contact**. |

**Note!**
**For 2-point window-teach, the switching behavior is dependent on the selected object distances for switching points 1 and 2. See previous page!**

## Adjusting the switching points (teach) via the teach input

The switching points of the sensor outputs **OUT1**/**OUT2** are set to 3000 mm or 6000 mm on delivery.

By means of a simple teach event, the two switching points can be individually taught to an arbitrary distance within the operating range. The Leuze **PA1/XTSX-M12** Teach Adapter can be used for this purpose. The adapter can also be used to easily switch the output function from NO contact to NC contact.

| 1-point teach of output OUT1 | 1-point teach of output OUT2 |
|---|---|
| 1. **Place** object at desired switching distance. | 1. **Place** object at desired switching distance. |
| 2. For the adjustment of **OUT1**, **connect** input **Teach-IN** to **GND** for **2 … 7 s** (Leuze teach adapter: position "Teach-GND"). The current state of output **OUT1** is frozen during the teach event. | 2. For the adjustment of output **OUT2**, **connect** input **Teach-IN** to **GND** for **7 … 12 s** (Leuze teach adapter: position "Teach-GND"). The current state of output **OUT2** is frozen during the teach event. |
| 3. The **yellow LED flashes at 3 Hz** and is **then ON**. The current object distance has been taught as the new switching point. | 3. The **yellow LED flashes at 3 Hz**. The current object distance has been taught as the new switching point. |
| 4. Error-free teach: switching behavior according to the diagram shown above. **Faulty teach** (object may be too close or too far away – please note operating range)**:** **yellow LED flashes at 5 Hz** until an error-free teach event is performed. Output **OUT1** is inactive as long as there is a teach error. | 4. Error-free teach: switching behavior according to the diagram shown above. **Faulty teach** (object may be too close or too far away – please note operating range)**:** **yellow LED flashes at 5 Hz** until an error-free teach event is performed. Output **OUT2** is inactive as long as there is a teach error. |

**Note!**

Please note that **the switching point is taught when GND is connected** and **the output function is reversed when UB is connected**. **If no sensor action is desired, pin 2 must remain unconnected**!

**The 2-point window-teach can be configured either with the control buttons or via the IO-Link interface. Adjustment via the teach input is not possible.**

## Adjusting the switching function (NC/NO) via the teach input

The switching function of both sensor outputs is set to normally open (NO) on delivery.

If the switching function is changed, the switching output is changed to the opposite state (toggled).

| Changeover of the switching function of output OUT1 | Changeover of the switching function of output OUT2 |
|---|---|
| 1. To change the switching function, **connect** input **Teach-IN** to **UB** for **2 … 7 s** (Leuze teach adapter: position "Teach-$U_B$"). The current state of output **OUT1** is frozen while the adjustment is made. | 1. To change the switching function, **connect** input **Teach-IN** to **UB** for **7 … 12 s** (Leuze teach adapter: position "Teach-$U_B$"). The current state of output **OUT2** is frozen while the adjustment is made. |
| 2. The **green and yellow LEDs flash alternately at 2 Hz**. The switching function was changed over. The switching behavior corresponds to the diagram shown above. | 2. The **green and yellow LEDs flash alternately at 5 Hz**. The switching function was changed over. The switching behavior corresponds to the diagram shown above. |

## IO-Link interface

The ultrasonic sensor features an IO-Link interface acc. to specification V1.1. and satisfies the Smart Sensor Profile.

As a result, the sensor can easily, quickly and, thus, economically be configured and diagnostic information read out. With a small amount of effort, the sensor can also be integrated in a control.

### Overview of the configuration options via IO-Link

| Function block | Function | Description |
|---|---|---|
| **Operating mode** | Standard operation | The sensor operates as a diffuse sensor with background suppression. |
| | Multiplex operation | A max. of 10 sensors – 1 master and 9 slaves – can be wired together in a network. To do this, the sensors must be electrically connected with one line. The master generates a timing signal and all networked sensors are activated with time-delay. |
| | Synchronous operation | A max. of 10 sensors – 1 master and 9 slaves – can be wired together in a network. To do this, the sensors must be electrically connected with one line. The master generates a timing signal and all networked sensors are activated simultaneously. |
| | Activation operation | The sensor can be activated through an external signal. |
| | Operation as throughbeam sensor | The sensor can either be configured as a scanner or as a throughbeam sensor. Operation as a throughbeam sensor requires 2 sensors, which are electrically connected through one line. |
| **Switching outputs OUT1 / OUT2** | Switching point 1/2 | The switching points can be directly entered as distance value in mm. |
| | Switching output (OUT1 and OUT2) | Adjustment as PNP or NPN switching output. |
| | Switching function | Adjustment as NC / NO contact.[1)] |
| | Switching behavior in the case of error | The switching behavior of output OUT1 of the sensor, for objects which are located outside of the operating range, can be adjusted. |
| | 2-point behavior | If a switching output is to operate with 2 switching points, a choice can be made between 2-point window-teach (factory setting) or 2-point teach (e.g. for simple pump controls with minimum and maximum fill levels). |
| | Delay times | The time module can be used to configure a switch-on or switch-off delay at the output. This delay time is dependent on the update interval of the respective device and is calculated using the following formula:<br>Delay [ms] = Update interval [ms] * Switch-on/-off delay |
| | Teach switching output OUT1 | The switching output OUT1 can be taught via the IO-Link interface. |
| | Teach offset | An additional or shorter distance at the switching point can be entered directly as a distance value in mm. This parameter applies only for 1-point teach. |
| | Teach lock | Adjustment for locking of control buttons. |
| **Temperature** | Temperature compensation | Adjustment option for internal (sensor works with the integrated temperature sensor) or external (with a constant application temperature, this can be manually entered. The sensor then compensates the measured values at a fixed rate with this temperature). |
| | Unit | Adjustment option to ºC or ºF. |
| | Temperature value | Entry temperature value in ºC or ºF (if external temperature compensation is desired). |

1) NO contact: normal switching behavior (not inverted switching);
NC contact: inverted switching behavior (inverted switching).

In addition to the configuration functions, a range of sensor information, such as sensor status, sensor diagnostics as well as the process data, can be called up.

Further information and the device-specific description of the IO-Link interface (**IODD**) can be found on the Internet at *www.leuze.com* in the **Downloads** area of the respective sensor.