UT139573

Diffuse-reflection sensor

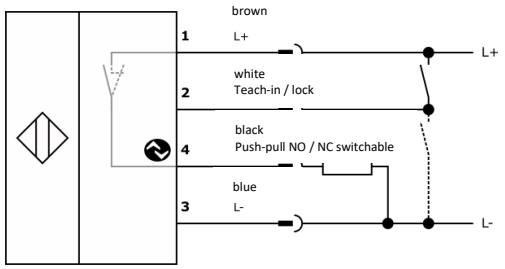
- **Setting via teach-in**
- **3 different teach modes**
- **Push-pull switching output**
- **M8-connector**

IO-Link interface
Normally open contact / normally closed contact switchable

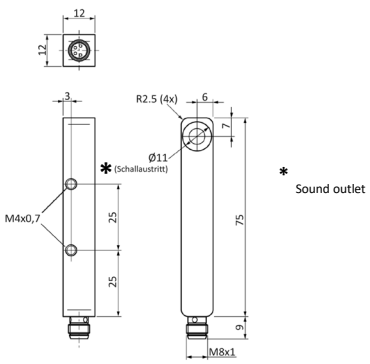
TECHNICAL DATA

Scanning range	40 … 400mm
Operating voltage U_B	18 … 30V DC
Analog output	Push-pull, no/nc switchable
Output current (max. load)	150mA
Short-circuit proof	+
Reverse polarity protected	+
Voltage drop	2.0V DC
Switching frequency	10Hz
Current consumption (without load)	40mA
Standard measuring plate	100 x 100mm
Resolution	1mm
Repeatability	0.5mm
Hysteresis	2 … 20mm (adjustable via IO-Link)
Mounting distance (sensor to sensor)	250mm
Setting	Teach-in
Carrier frequency	300kHz
Protection class	III
Insulation dielectric strength	500V
Protection class (EN 60529)	IP 67
Material (housing)	Brass nickel plated
Temperature (operation)	-25 … +70°C
Temperature drift	0.2%/K (uncompensated)
Connection	M8-connector 4-pin
Connection accessories	e.g. **VK200375**

Connection



Dimensional drawing



Proper use

Ultrasonic diffuse-reflection sensor are used as part of a higher-level overall system for the contactless detection of objects.

Function

Ultrasonic diffuse-reflection sensors work on the principle of time-of-flight measurement. The device transmits a pulse sequence, which is then reflected by an object. The device detects the reflected wave and measures the time that has elapsed between the transmission and reception processes. This time is used to determine the distance between the sensor and the object. If the results correspond to the specified values, the switching output is set accordingly.

Mounting

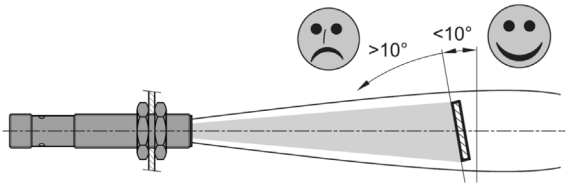
The sensor may be mounted in any position. Make sure that it is mounted in a vibration-free and vibration-damping manner. Also protect the device against mechanical loads such as shocks or impacts.
The transducer surface and the area of the detection lobe must be kept free. Make sure that there are no interfering objects between the sensor and the target object inside the lobe. Otherwise, it is possible that the interfering object will cause faulty switching.

Temperature

The speed of sound in air depends on the temperature. Operation outside the specified ambient temperature is not allowed. A temperature compensation can be switched on via IO-Link.
When temperature compensation is activated, the sensor requires about 15 minutes of warm-up time after a cold start; only then are the measured values reproducible. Also, avoid positioning two or more ultrasonic sensors opposite each other.

Transmission angle of the object in diffuse mode

Objects with a smooth surface are scanned reliably up to an angle of inclination of approx. 10°. The maximum permissible tilting angle increases for objects with a rough or heavily structured (grained) surface.

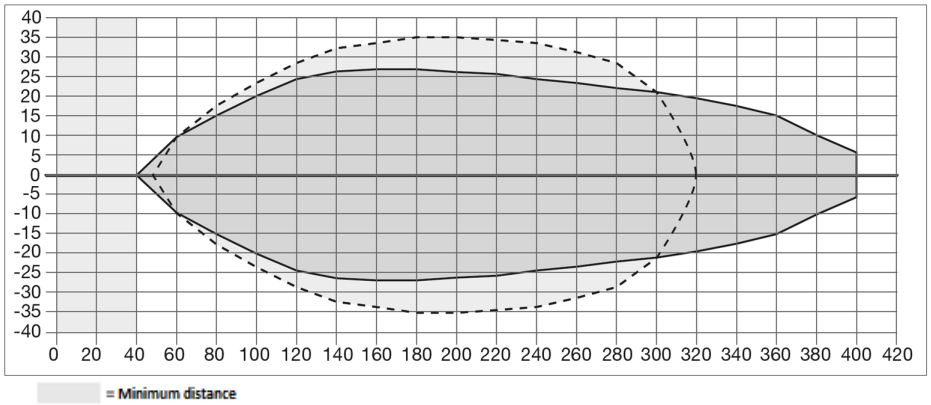


Blind range in touch mode

The range of 0 … 40mm in front of the sensor corresponds to the ultrasonic typical blind range.
Distance measurements are not possible in the blind range!
The maximum scanning distance 400 mm.

Operation as a reflex barrier can be selected via IO-Link. To do this, set the value 1 to the desired distance from the reference surface. The selected distance may vary by about 5mm. All objects that interrupt the sound between the sensor and the reference surface are detected. The blind area may be disregarded in this case.

Sound cone



——— Plate 100 x 100mm
- - - - - - Round bar Ø 10mm

Cleaning

For cleaning a soft cloth moistened with soapy water is recommended.

Commissioning and adjustment

The measuring range is taught-in and the analog output is switched over by connecting the black wire (PIN 2) to the operating voltage (PIN1).

The teach process is aborted after 20 seconds (Time Out function).
Make sure that the object to be detected is always within the scanning range limits (40 … 400mm).

In normal operation, connect the teach line to 0V to avoid interference.

1. **Teach-in of a switching window**
    1. position the object at the switching limit 1.
    2. Connect the white wire to the operating voltage for between 0.1 and 2 seconds. The LED flashes with approx. 1Hz.
    3. position the object at the switching limit 2.
    4. connect the white wire to the operating voltage for between 0.1 and 2 seconds.
    5. the switching output is active at a distance between switching limit 1 and switching limit 2.

2. **Teach-in of an object with background suppression (2-point teach)**
    1. position the object at the desired position.
    2. connect the white wire to the operating voltage for between 2 and 4 seconds. The LED flashes with approx. 1Hz.
    3. take the object out of the detection lobe so that the sensor is aligned with the background.
    4. connect the white wire to the operating voltage for between 0.1 and 2 seconds.
    5. the switching threshold is centered between object and background.

3. **Automatic teach-in (Auto-Teach)**
    1. align the sensor with the background.
    2. connect the white wire to the operating voltage for between 4 and 6 seconds. The LED flashes with approx. 2Hz.
    3. in the next 4 to 8 seconds, guide as many objects as possible past the sensor at the desired distance.
    4. the switching threshold is between object and background.

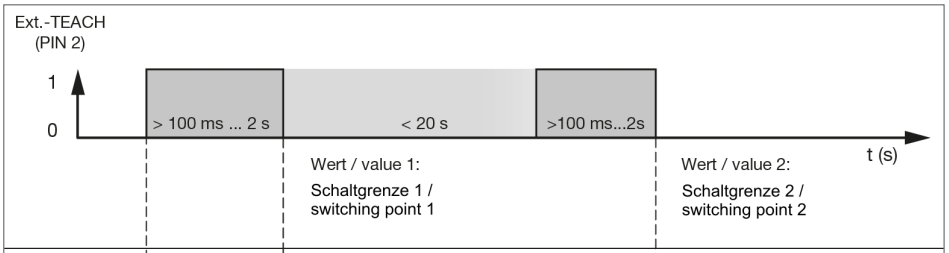
4. **Change switching function (no / nc)**
    1. connect the white wire to the operating voltage for more than 6 seconds.
    2. the switching output now works with the inverted function.

5. **LED display after each teach process**

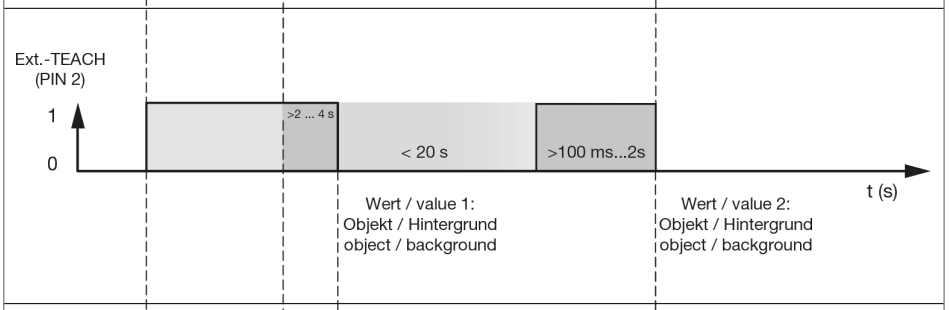
    If the status LED flashes twice, the teach process was successful and the sensor operates with the new values.
    If the status LED flashes four times, the teach process has been aborted or the time window of 20 seconds has been exceeded. The sensor operates with maximum switching distance as a normally open contact.

    On the following page the descriptions are shown again graphically.

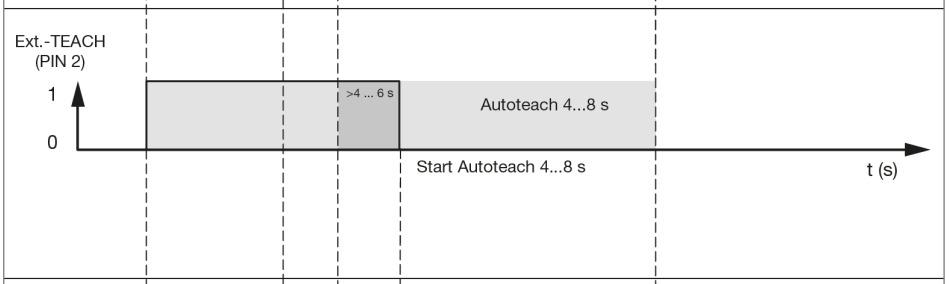
1. Teach-in of a switching window



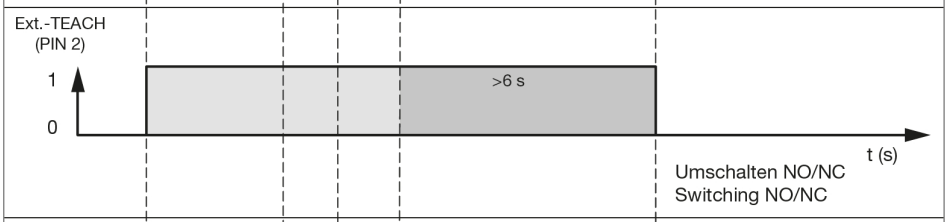
2. Teach-in of an object with background suppression (2-point teach)



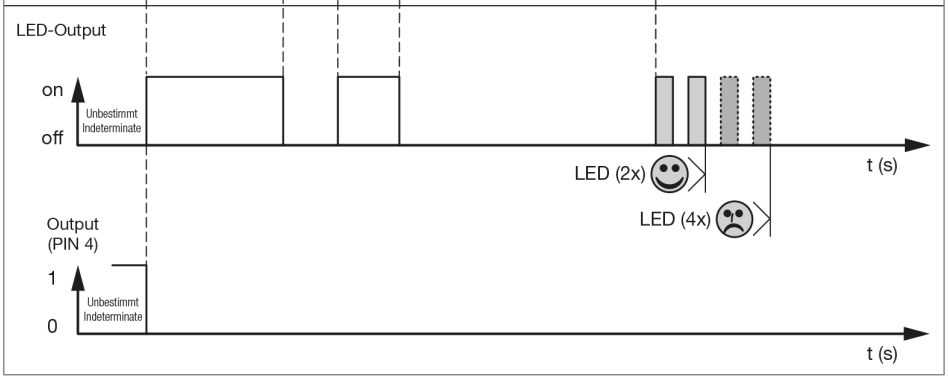
3. Automatic teach-in (Auto-Teach)



4. Change switching function



5. LED display after each teach process



Note: Resetting to the factory setting is only possible via IO-Link

SAFETY INSTRUCTIONS:

Before commissioning, please make sure that all safety instructions listed in the product documentation, if applicable, have been observed!

In case of direct impact on personal safety, the use of these products is prohibited.