

UT129021

Ultrasonic sensors
Diffuse reflection



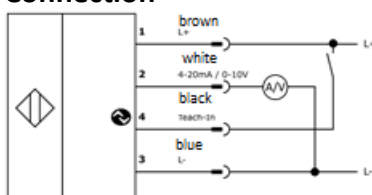
- / Setting via teach-in
- / Analog output
- / M12 connector

IO-Link-interface
4 ... 20mA / 0 ... 10V switchable

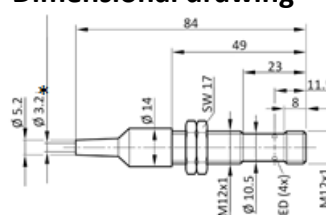
TECHNICAL DATA

Adjustable distance	0 ... 150mm
Operating voltage U_B	18 ... 30V DC
Analog output	0 ... 10V, 4 ... 20mA switchable, not reverse polarity protected
Load resistance (4 ... 20mA)	< 400 Ω
Load resistance (0 ... 10V)	> 10k Ω
Switching output (adjustable via IO-Link)	push-pull, no/nc switchable
Output current (max. load)	150mA
Short-circuit proof	+
Reverse polarity protection	+
Voltage drop	2.0V DC
Switching frequency	20Hz
No load current	40mA
Norm measuring plate	20 x 20mm
Resolution	1mm
Repeat accuracy	0.5mm
Linearity error	0.4%
Mounting distance (Sensor to Sensor)	60mm
Setting	Teach-in
Carrier frequency	400kHz
Protection class	III
Insulation dielectric strength	500V
Degree of protection (EN 60529)	IP 67
Housing material	Brass nickel plated
Ambient temperature	-25 ... +70°C
Temperature drift	0.2%/K (uncompensated)
Connection	M12 connector 4-pole
Mounting accessories	For example VK200325

Connection



Dimensional drawing



Approved use

The ultrasonic diffuse-reflection sensors are used as part of a higher-level overall system for the contactless detection of objects.

Function

The ultrasonic diffuse-reflection sensors operate on the principle of time-of-flight measurement. The device sends a pulse train, 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. From this time, the distance between sensor and object is determined. If the results correspond to the specified values, the analog output, outputs a value proportional to the distance and the switching output is set accordingly.

Mounting

The diffuse-reflection sensor can be mounted in any position; however, a vibration-free or vibration-dampening assembly must be observed. Also protect the device against mechanical stresses such as shocks or impacts.

The transducer surface as well as the field of the detection beam must be kept free mandatorily. You need to pay attention on having no disturbing objects between the sensor and the target object within the detection beam. It is otherwise possible that the interfering object causes faulty switching. Also avoid positioning two or more ultrasonic sensors opposite each other.

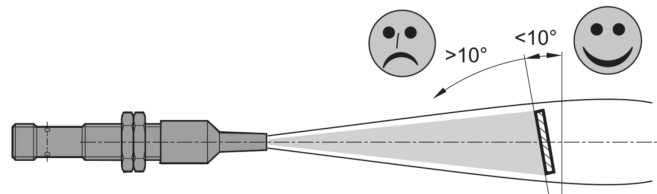
Temperature

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.

Transmission angle of the object in diffuse mode

Objects with a smooth surface are reliably detected up to a tilting angle of approx. 10°. The max. allowed tilting angle increases on objects with a rough or heavy structured (granular) surface.

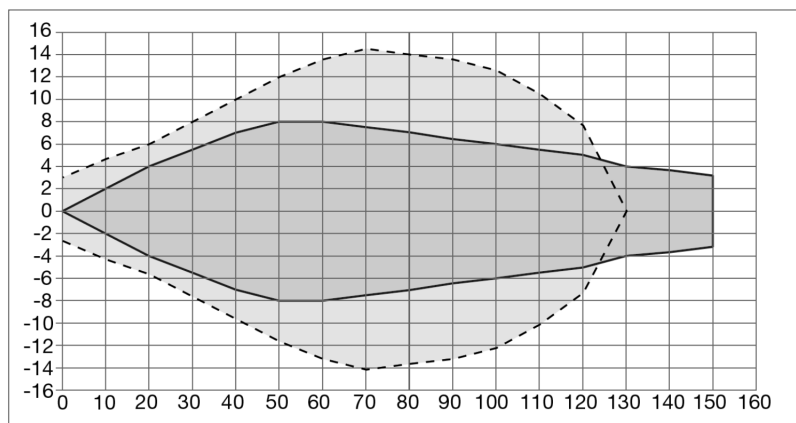


Blind range in touch mode

The installed focusing nozzle completely covers the blind range of the ultrasonic sensor, so that the device can be used between 0 and 150mm.

The focusing nozzle must not be removed under any circumstances!

Detection beams



— Plate 20 x 20mm
 - - - Round bar Ø 10mm

Cleaning

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

Commissioning and setting

The measuring range is taught-in and the analog output is switched over by connecting the black wire (PIN4) to the operating voltage (PIN1).

After 20 seconds, the teach process is aborted (time out function).

Make sure that the object to be detected is always within the adjustable distance limits (20 ... 150mm). The distance between value 1 and value 2 must be at least 100mm.

1. Teach-in of the measuring range

1. Position the object at the point where the analog value should be 4mA or 0V.
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 point where you want the analog value to be 20mA or 10V.
4. Connect the white wire to the operating voltage for between 0.1 and 2 seconds.
5. The analog output now operates within the defined measuring limits.

2. Changing the output function

1. Connect the white wire to the operating voltage for longer than 6 seconds.
2. The physical quantity of the analog output is changed (instead of current output 4 ... 20mA voltage output 0 ... 10V or vice versa).

Note: Keep in mind that a considerably larger load resistance is required for operation as a voltage output (see technical data). It is therefore recommended to disconnect the analog output before each change of the output function in order to avoid device damage.

3. 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 measuring range.

On the following page the descriptions are shown again graphically.

The following additional settings can be made using the IO-Link interface:

Measurement ranges < 100mm

The function of the black wire (PIN4): Teach-in of the analog output

Switching output (push-pull, PNP or NPN)

Synchronization (see "Master/slave function" on page 4)

Multiplex (see „Master/slave function“ on page 4)

If "Switching output" is activated, the switching mode, the switching function and the hysteresis can also be set

Analog output: 0 ... 20mA, 4 ... 20mA, 0 ... 10V, deactivate

Teach switching points (the state of the switching output is always output via IO-Link)

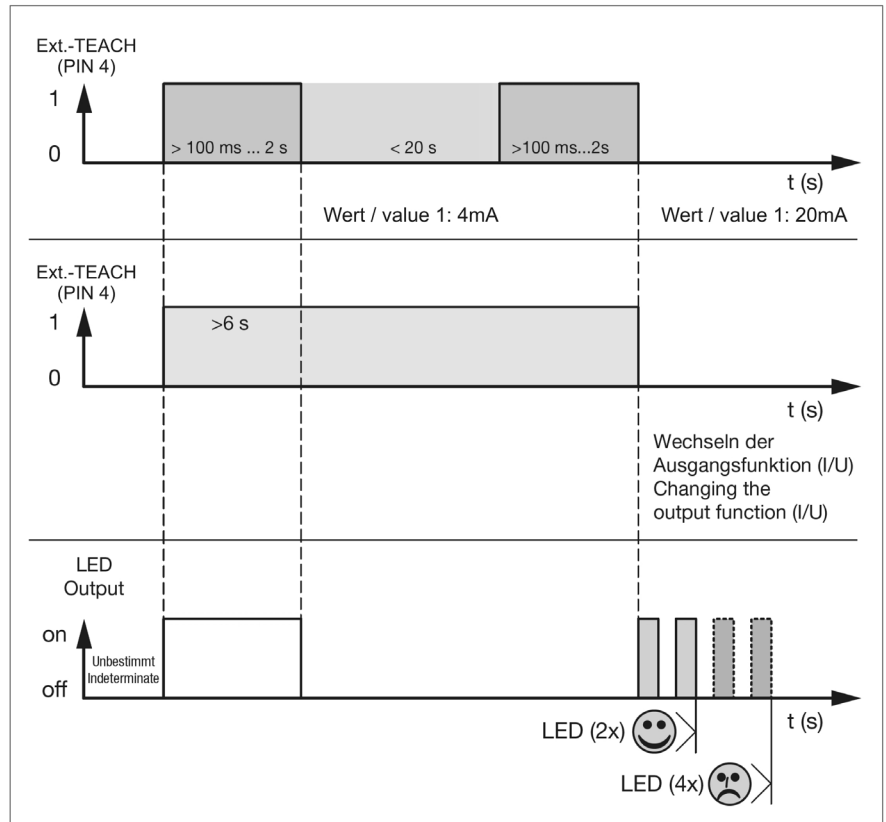
Switch-on and switch-off delay for switching output

Restore factory settings

1. Teach-in of the measuring range

**2. Changing the output function
(4 ... 20mA – 0 ... 10V)**

3. LED display after each teach process



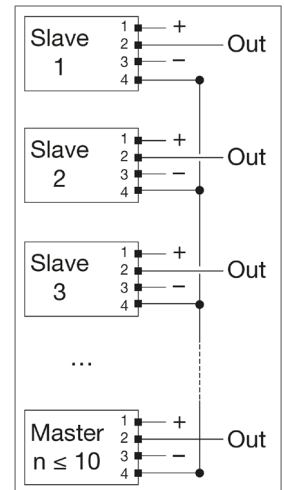
Master/slave function

With the help of this function, up to 10 sensors of the same type can be operated in parallel. To do this, configure the devices accordingly via IO-Link. Define one sensor as the master and all others as slaves. The master must be assigned the highest number in the network.

Then connect the black wire (PIN4) together (see connection diagram).

The following operating modes can be selected:

- 1. Synchronous operation: The transmission pulse of all sensors occurs simultaneously with synchronized evaluation. Select this function for monitoring large areas.
- 2. Multiplex operation: The transmission pulses of the sensors are time-delayed in a defined sequence. This means that the devices can no longer influence each other, and smaller distances between them are possible.



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

SAFETY INSTRUCTION:

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.