Ultrasonic Sensors
Single Head System with one Switch Output

- **Switch output**
- **5 different output functions available**
- **Teaching input**
- **Can be synchronised**
- **Can be deactivated**
- **Watchdog**

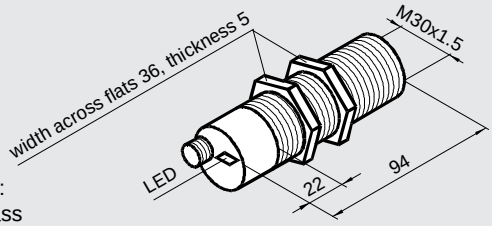


Figure 1
Housing material:
Nickel plated brass
Transducer material:
Epoxy resin/hollow glass sphere mixture
Polyurethane foam
Cover: PBT (Polybutylenterephthalate)

Synchronisation:

In order to suppress mutual interference, the sensor operates via one sychronised input. If the input is unswitched, the senor operates at an internally generated pulse rate. The sensor can be synchronised by the super position of the square - shaped voltage. One synchronising pulse at the synchronisation input enables one measuring cycle to be completed. The pulse width must be greater than 100 µs. The measuring cycle commences with the descending flank. The state of the switching output changes after the switching threshold has been exceeded five times, as determined internally by five measurements. A low level ≥ 1 s, or an open synchronisation input results in normal operation of the sensor. Synchronisation cannot take place during teaching and vice versa.

Two operating modes are possible:

1. Multiple sensors are controlled with the same synchronising signal. The sensors operate on the same pulse.
2. The synchronising pulses are fed cyclically to only one sensor at a time. The sensors operate in multiplex mode. A high level at the sychronisation input deactivates the sensor.

To set the Switch Points:

The ultrasonic sensor is provided with a switching output with two teachable switch points. These are set up by applying the supply voltage $-U_B$ bzw. $+U_B$ to the teaching input. The supply voltage should be applied to the teaching input for at least 1 s. During the teaching process the LED's indicate whether the sensor has recognised the target. The switch points A1 and A2 are taught by voltage $-U_B$ and $+U_B$, respectively.

Five functions can be set:

1. Window mode, normally open function
2. Window mode, normally closed function
3. One switch point, normally open function
4. One switch point, normaly closed function
5. Detection of presence of object

Detection range:	**60 mm ... 500 mm** **Figure 1**
Version:	Transceiver with one switch output
Order code: pnp	**UB 500-30GM-E2-V15**
npn	**UB 500-30GM-E0-V15**
Operating data:	
Detecting range	60 mm ... 500 mm
Standart test plate (min. flat surface)	100 mm x 100 mm
Close range (unsuitable for switching)	0 mm ... 60 mm
Aperture angle of sonic lobe	approx. 5° at -3 dB
Transducer frequency	approx. 375 kHz
Response time	approx. 38 ms
Switching hysteresis	≤ 1 % of the set operating distance
Reproducibility	≤ 1 %
Temperature drift	0.2 % / K
Operating cycle frequency	max. 13 Hz
Measuring cycle time t_m	approx. 6.5 ms
Synchron. frequency equi-pulsed	≤ 1 / t_{m1}
Synchron. frequency multiplex	≤ 1 / t_{m1} + 1 / t_{m2} + ...
Electrical Data:	
Operating voltage U_B	20 V DC ... 30 V DC
Ripple	± 10 $\%_{ss}$, U_B = 33 V
Rated operating current	≤ 60 mA
Switch output	200 mA (k) , U_B -3 V short circuit/overload resistent
pnp	E2
npn	E0
Teaching input	$-U_B$ ... ($-U_B$+2 V) near switch point ($+U_B$-2 V) ... $+U_B$ far switch point
Synchronising input	$-U_B$ ... ($-U_B$+1 V) Low level ($-U_B$+5 V) ... $+U_B$ High level Input impedance 27 kΩ
Synchronisation pulse width	≥ 100 µs
Synchronisation pause width	≥ 100 µs
Indicators:	
LED green	"Power on", teaching function object detected
LED red	"Fault", object uncertain
LED yellow	Switching condition indicator, teaching function, no object detected
Mechanical Data:	
Operating temperature range	248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)
Storage temperature range	233 Kelvin ... 358 Kelvin (-40 °C ... +85 °C)
Protection class to DIN 40 050	IP 65
Permissible shock and vibration loading[5]	b ≤ 30 g, T ≤ 11 ms f ≤ 55 Hz, a ≤ 1 mm
Connection type	Equipment connector - V15
in compliance with	EN 60974-5-2

5) to IEC 68-2-6 and IEC 68-2-27

Date of issue 05.06.1996

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Teach window operation, normally open function:

- Set target at near switch point
- Teach switch point A1 with - U_B
- Set target at far switch point
- Teach switch point A2 with + U_B

Teach window operation, normally closed function:

- Set target at near switch point
- Teach switch point A2 with + U_B
- Set target at far switch point
- Teach switch point A1 with - U_B

Teach one switch point, normally open function:

- Set target at near switch point
- Teach switch point A2 with + U_B
- Cover sensor with the palm of the hand, or remove all objects from the detection range of the sensor
- Teach switch point A1 with - U_B

Teach one switch point, normally closed function:

- Set target at near switch point
- Teach switch point A1 with - U_B
- Cover sensor with the palm of the hand, or remove all objects from the detection range of the sensor
- Teach switch point A2 with + U_B

Teach detection of presence of object:

- Cover sensor witch the palm of the hand, or remove all objects from the detection range of the sensor
- Teach switch point A1 - U_B
- Teach switch point A2 + U_B

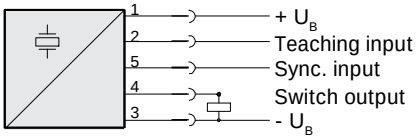
Pre-setting of the switch points:

A1: Near range
A2: Nominal range

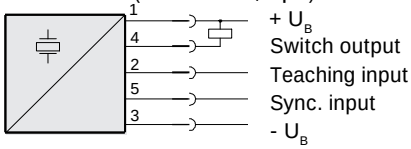
Note:
A programming Unit UB-PROG1 is obtainable for the basic setting of the switch points and output functions.

Standard symbol / Connections:

Transceiver (version E2, pnp)



Transceiver (version E0, npn)



V15 Connector arrangement



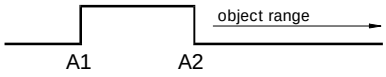
Accessories:
Cable connectors, see catalogue of inductive, capacitive and magnetic sensors and section 3.9 - Accessories.

Operating condition - Indications	Green LED	Red LED	Yellow LED
Switch point teaching Object detected No object detected Object uncertain (teaching invalid)	 flashing flashing off	 off off flashing	 off on off
Normal operation	on	off	switch condition
Interference (e.g. comp. air)	off	flashing	last condition

Programmed switching output function

Window operation, normally open function

$A_1 < A_2$:



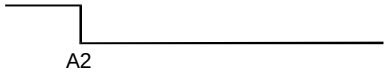
Window operation, normally closed funktion

$A_2 < A_1$:



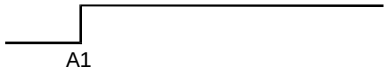
One switch point, normally open function

$A_1 \rightarrow \infty$:



One switch point, normally closed function

$A_2 \rightarrow \infty$:



$A_1 \rightarrow \infty$, $A_2 \rightarrow \infty$: Detection of presence of object

Object detected: Switch output closed
No object detected: Switch output open

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