

# Ultrasonic Sensors

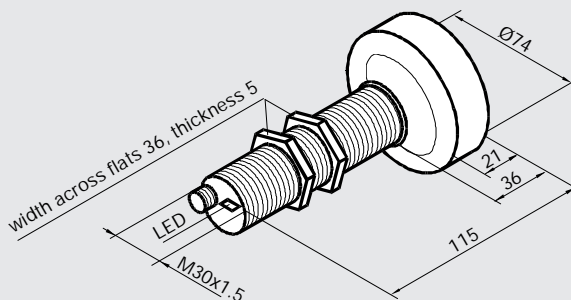
## Single Head System with one Switch Output

- 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 synchronised input. If the input is unswitched, the sensor 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  $\geq 1$  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 synchronisation 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, normally closed function
5. Detection of presence of object

### Detection range:

800 mm ... 6000 mm

Figure 1

### Version:

Transceiver with one switch output

### Order code: pnp nnp

UB 6000-30GM-E2-V15  
UB 6000-30GM-E0-V15

### Operating data:

Detecting range 800 mm ... 6000 mm  
Standart test plate (min. flat surface) 100 mm x 100 mm  
Close range (unsuitable for switching) 0 mm ... 800 mm  
Aperture angle of sonic lobe approx. 5° at -3 dB  
Transducer frequency approx. 65 kHz  
Response time approx. 480 ms  
Switching hysteresis  $\leq 1\%$  of the set operating distance  
Reproducibility  $\leq 1\%$   
Temperature drift 0.2 % / K  
Operating cycle frequency max. 1.2 Hz  
Measuring cycle time  $t_m$  approx. 66 ms  
Synchron. frequency equi-pulsed  $\leq 1 / t_{m1}$   
Synchron. frequency multiplex  $\leq 1 / t_{m1} + 1 / t_{m2} + \dots$

### Electrical Data:

Operating voltage  $U_B$  20 V DC ... 30 V DC  
Ripple  $\pm 10\%_{ss}$ ,  $U_B = 33$  V  
Rated operating current  $\leq 60$  mA  
Switch output 200 mA (k),  $U_B -3$  V short circuit/overload resistant  
E2  
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  $\geq 100$  µs  
Synchronisation pause width  $\geq 100$  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)  
IP 65  
b  $\leq 30$  g, T  $\leq 11$  ms  
f  $\leq 55$  Hz, a  $\leq 1$  mm  
Equipment connector - V15

### In compliance with

EN 60974-5-2

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

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## Single Head System with one Switch Output

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 with 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:

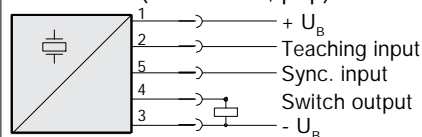
A1: Near range  
A2: Nominal range

### Note:

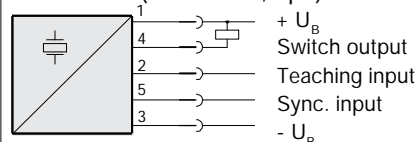
A programming Unit UB-PROG1 is obtainable for the basic setting of the switch points and output functions.

### 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	flashing	off	off
No object detected	flashing	off	on
Object uncertain (teaching invalid)	off	flashing	off
Normal operation	on	off	switch condition
Interference (e.g. comp. air)	off	flashing	last condition

### Programmed switching output function

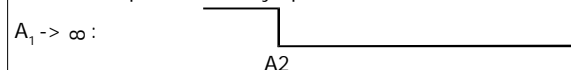
Window operation, normally open function



Window operation, normally closed function



One switch point, normally open function



One switch point, normally closed function



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

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