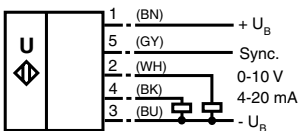## Ultrasonic sensor
# UC2000-30GM-IUR2-T-V15

## Features

- Parameterisation interface for the application-specific adjustment of the sensor setting via the service program ULTRA 2001
- Current and voltage output
- Synchronisation options
- Adjustable acoustic power and sensitivity
- Temperature compensation

## Dimensions



ø40
25
5
128
36
22
27.5
LED
Temperature probe
Coded plug
M30x1.5

## Technical data

$C\epsilon$
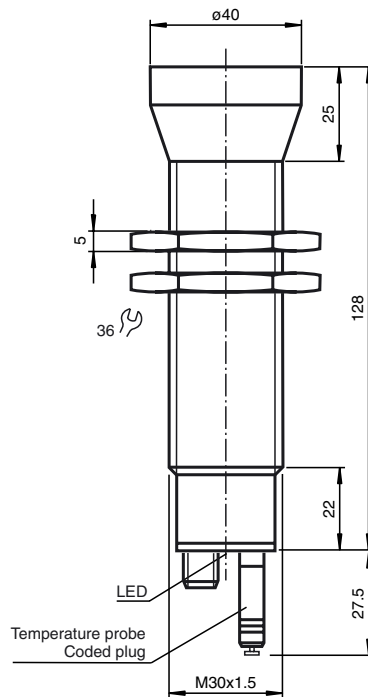
**General specifications**

| | |
|---|---|
| Sensing range | 80 ... 2000 mm |
| Adjustment range | 120 ... 2000 mm |
| Unusable area | 0 ... 80 mm |
| Standard target plate | 100 mm x 100 mm |
| Transducer frequency | approx. 175 kHz |
| Response delay | 65 ms minimum |
| | 195 ms factory setting |

**Indicators/operating means**

| | |
|---|---|
| LED green | permanent: Power-on |
| | flashing: Standby mode or TEACH-IN function object detected |
| LED yellow 1 | permanent: object in evaluation range |
| | flashing: TEACH-IN function |
| LED yellow 2 | permanent: object in detection range |
| | flashing: TEACH-IN function |
| LED red | permanent: temperature/TEACH-IN plug not connected |
| | flashing: fault or TEACH-IN function object not detected |
| Temperature/TEACH-IN connector | temperature compensation , TEACH-IN for evaluation range , output function setting |

**Electrical specifications**

| | |
|---|---|
| Operating voltage | 10 ... 30 V DC , ripple 10 %$_{SS}$ |
| Power consumption $P_0$ | $\leq$ 900 mW |

**Interface**

| | |
|---|---|
| Interface type | RS 232, 9600 Bit/s , no parity, 8 data bits, 1 stop bit |

**Input/Output**

| | |
|---|---|
| Synchronisation | bi-directional |
| | 0 level -$U_B$...+1 V |
| | 1 level: +4 V...+$U_B$ |
| | input impedance: > 12 KOhm |
| | synchronisation pulse: $\geq$ 100 µs, synchronisation interpulse period: $\geq$ 2 ms |
| Synchronisation frequency | |
|   Common mode operation | $\leq$ 30 Hz |
|   Multiplex operation | $\leq$ 30/n Hz, n = number of sensors |

**Output**

| | |
|---|---|
| Output type | 1 current output 4 ... 20 mA |
| | 1 voltage output 0 ... 10 V |
| Resolution | evaluation range [mm]/4000, but $\geq$ 0,35 mm |
| Deviation of the characteristic curve | $\leq$ 0,2 % of full-scale value |
| Repeat accuracy | $\leq$ 0,1 % of full-scale value |
| Load impedance | current output: $\leq$ 500 Ohm |
| | Voltage output: $\geq$ 1000 Ohm |
| Temperature influence | $\leq$ 2 % from full-scale value (with temperature compensation) |
| | $\leq$ 0.2 %/K (without temperature compensation) |

**Standard conformity**

| | |
|---|---|
| Standards | EN 60947-5-2 |

**Ambient conditions**

| | |
|---|---|
| Ambient temperature | -25 ... 70 °C (248 ... 343 K) |
| Storage temperature | -40 ... 85 °C (233 ... 358 K) |

**Mechanical specifications**

| | |
|---|---|
| Protection degree | IP65 |
| Connection | connector V15 (M12 x 1), 5 pin |
| Material | |
|   Housing | stainless steel 1.4303 |
| | plastic parts PBT |
|   Transducer | epoxy resin/hollow glass sphere mixture; polyurethane foam |
| Mass | 210 g |

## Electrical connection

**Standard symbol/Connection:**
(version IU)



| | | |
|---|---|---|
| 1 | (BN) | + $U_B$ |
| 5 | (GY) | Sync. |
| 2 | (WH) | 0-10 V |
| 4 | (BK) | 4-20 mA |
| 3 | (BU) | - $U_B$ |

Core colours in accordance with EN 60947-5-2.

## Connector V15



129684_ENG.xml

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## UC2000-30GM-IUR2-T-V15

### Description of the sensor functions

This ultrasonic sensor features a four-pole temperature/TEACH-IN plug, that can be connected in four different positions. These have the following significance.

| Plug position | Meaning |
|---|---|
| A1 | TEACH-IN evaluation limit A1 |
| A2 | TEACH-IN evaluation limit A2 |
| E2/E3 | Rising/falling ramp/output characteristic of the voltage output by zero point |
| T | Temperature compensation |

### Description of the TEACH-IN procedure

### TEACH-IN the evaluation limits 1 or 2

- Cut supply voltage
- Remove TEACH-IN plug
- Restore supply voltage (Reset)
- Set object to desired switching point
- Plug and remove the TEACH-IN plug in pos. A1 or A2. This teaches the evaluation limits A1 or A2.
  **Caution:** Removing the temperature/TEACH-IN plug, the values of the object position will be adopted.
- The TEACH-IN procedure is controlled with the LED. The green LED flashes, when object is detected, the red LED flashes when no object is detected.
- Connect TEACH-IN plug in pos. T. This completes the TEACH-IN procedure and saves the distance.
- The sensor works in normal mode

### TEACH-IN the analogue function

- Cut supply voltage
- Remove TEACH-IN plug
- Restore supply voltage (Reset)
- Connect TEACH-IN plug in pos. E2/E3. By multiple plugging, three different modes of operation can be set in cyclical sequence:
  1) rising ramp, LED A2 flashes,
  2) falling ramp, LED A1 flashes,
  3) zero line, LED A1 and A2 flash
- Connect TEACH-IN plug in pos. T. This completes the TEACH-IN procedure and saves the mode of operation.
- The sensor works in normal mode

**Note:** If the temperature/TEACH-IN plug has not been plugged in within 5 minutes in position T, the sensor will return to normal mode (with the latest permanent stored values) without temperature compensation.

### Synchronisation

The sensor features a synchronisation input for the suppression of mutual interference. If this input is not used, the sensor will operate using an internally generated clock rate. It can be synchronised by applying a square wave voltage. A falling edge leads to the transmission of a single ultrasonic pulse. A low level $\geq 1$ s or an open synchronisation input will result in the normal operation of the sensor.

A high level > 1 s will result in the standby mode of the sensor (indicator green LED). The outputs pause in the latest status.

Synchronisation cannot be performed during TEACH-IN and vice versa.

Multiple operating modes are possible:
1. Two to five sensors can be synchronised by interconnecting their synchronisation inputs. In this case, the sensors alternately transmit ultrasonic pulses.
2. Multiple sensors can be controlled by the same synchronisation signal. The sensors are synchronised.
3. The synchronisation pulses are sent cyclically to individual sensors. The sensors operate in multiplex mode.
4. A high level at the synchronisation input disables the sensor.

The response time increases when the sensor is synchronised, because the synchronisation increases the measurement cycle time.
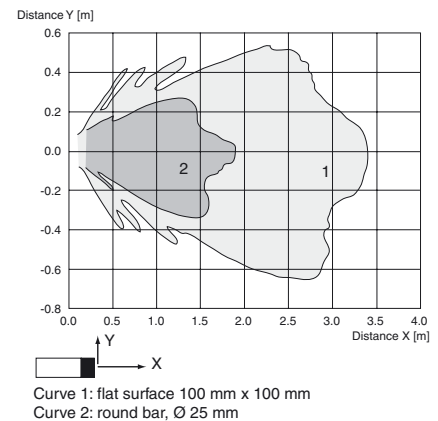
### Note:

If the option for synchronisation is not used, the synchronisation input has to be connected to ground (0V) or the sensor has to be operated via a V1 cable connector (4-pin).

### Characteristic curves/additional information

### Characteristic response curve



Curve 1: flat surface 100 mm x 100 mm
Curve 2: round bar, Ø 25 mm

### Programmed analogue output function



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**2**
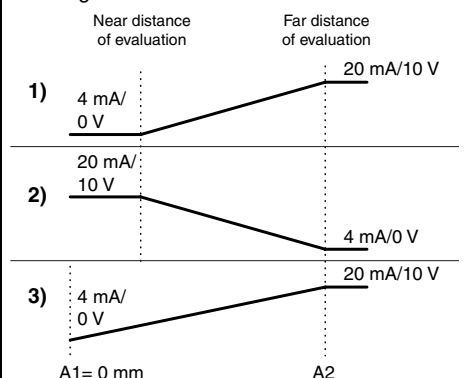
## Default setting

A1:                     unusable area
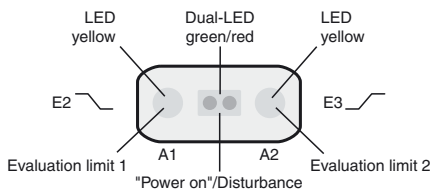A2:                     nominal sensing range
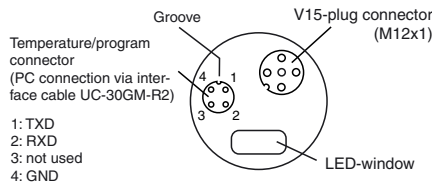Mode of operation:     rising ramp

## LED Displays/Analogue output

| Displays in dependence on operating mode | Dual LED green | Dual-LED red | LED yellow A1 | LED yellow A2 | analogue output |
|---|---|---|---|---|---|
| TEACH-IN evaluation limit A1 | | | | | unchanged |
| object detected | flashing | off | flashing | off | |
| object not detected | off | flashing | flashing | off | |
| TEACH-IN evaluation limit A2 | | | | | unchanged |
| object detected | flashing | off | off | flashing | |
| object not detected | off | flashing | off | flashing | |
| TEACH-IN mode of operation (E2/E3) | | | | | unchanged |
| rising ramp | on | off | off | flashing | |
| falling ramp | on | off | flashing | off | |
| zero line | on | off | flashing (synchronised) | flashing (synchronised) | |
| Normal mode temperature compensated | on | off | on, if target in evaluation range | on, if target in detection range | analogue value |
| plug pulled/shorted | off | on | | | |
| Standby | flashing | off | previous state | previous state | unchanged |
| Interference (e.g. compressed air) | off | flashing | previous state | previous state | unchanged or error value |

## LED-Window



LED yellow    Dual-LED green/red    LED yellow

E2                                          E3

Evaluation limit 1    A1    A2    Evaluation limit 2

"Power on"/Disturbance

## RS 232-connection



Groove          V15-plug connector (M12x1)

Temperature/program connector (PC connection via interface cable UC-30GM-R2)

1: TXD
2: RXD
3: not used
4: GND

LED-window

### Note on communication with the UC-30GM-R2 interface cable

The UC-30GM-R2 interface cable allows for communication with the ultrasonic sensor using the ULTRA 2001 service program. The cable creates a connection between the PC-internal RS 232 interface and the plug-in connection for the temperature/program plug on the sensor. When setting up the connection on the sensor, make certain the plug is lined up correctly; otherwise no communication will be possible. The protrusion of the round plug must be inserted into the groove of the plug connection on the sensor side and **not** into the arrow symbol on the sensor.

### Adjustable parameter with service program ULTRA 2001
- Evaluation limits A1 and A2
- Rising/falling ramp/zero line
- Mode of operation
- Sonic speed
- Temperature offset (The inherent temperature-rise of the sensor can be considered in the temperature compensation)
- Expansion of the unusable area (for suppression of unusable area echoes)
- Reduction of the detection range (for suppression of remote range echoes)
- Time of measuring cycle
- Acoustic power (interference of the burst duration)
- Sensitivity
- Behaviour of the sensor in case of echo loss
- Behaviour of the sensor in case of a fault
- Average formation via an allowed number of measuring cycles
- Selection of the parameter set, RS 232 or manually.

## Accessories

### Mounting aids

BF30
BF5-30

### External temperature probe

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UC-30GM-TEMP

**Extension cable**

UC-30GM-PROG

**Programming tools**

Service program ULTRA 2001
Interface cable UC-30GM-R2

**Process indication- and control unit**

DA5-IU-2K-V

**Cable sockets** [*)]

V15-G-2M-PVC
V15-W-2M-PUR


[*)] For additional cable sockets see section „Accessories".

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