# Data Sheet
## Ultrasonic Sensor

**9.3A-70004-C05**

### Functional Description
The ultrasonic sensor is a solid-state proximity type switch for 24 VDC, which uses the echo delay time method for distance sensing. It senses a sound-reflecting object, which enters the sound cone from any direction. The objects to be sensed can be solid, liquid or powdery.

### Installation
Figure I (dimensions in mm)
Mounting position: any
Keep free space around the sound cone of a distance "x" (= 60 mm) from reflecting objects (Figure II)

### Connection
By means of cable socket (Figure III) part no. 237-13442-4 (included in the scope of delivery)

| Pin | | |
|---|---|---|
| 1 | L+ | DC 20...30 V |
| 2 | S1 | Switching output "High level" (NO) |
| 3 | L- | Ground (GND) |
| 4 | S2 | Switching output "Low level" (NC) |

The connections are polarized, short-circuit proof and overload-proof. In the case of electrical faults we recommend to use shielded lines.

### Switching Range (Figure IV)
| | |
|---|---|
| a | Unusable blind zone |
| b | Sensing range |
| c | Overfill range |
| HV | Hysteresis high level |
| HL | Hysteresis low level |

The objects are sensed reliably in the set switching range within an opening angle of the sound cone of approx. 5°. If the reflecting conditions are good, the objects can also be sensed outside the sound cone.
Keep the blind zone "a" free from objects. These would cause undefined switching states.
Take care that the surface of the transducer is clean!

Display:

| | |
|---|---|
| Reservoir empty: | H2 is lit |
| Filling level O.K. | H2 is not lit |
| Reservoir full | H1 is lit |
| Supply voltage: | H3 is lit: green |
| Overfill signal: | H3 is lit: red |

### Part Numbers

| Ultrasonic sensor adjusted for reservoir: | Part no.: |
|---|---|
| 4L (pump 205) | 664-36939-1 |
| 5L (pump 205) | 664-36939-2 |
| 8L (pump 205) | 664-36939-3 |
| 10L (pump 215) | 664-36939-4 |
| 30L (pump 215) | 664-36939-5 |
| 100L (pump ZPU 08/14/24) | 664-34009-3 |

### Special Accessories
Cable socket with 5 m cable, part no. 237-13429-6*
Cable socket with 10 m cable, part no. 236-10022-7*
Interlock protection for EX-area 237-10254-1
* in combination with interlock protection also applicable in the EX-area

### Technical Data

| | | |
|---|---|---|
| Ambient temperature | | - 25...70°C |
| Sensing range | | 50...500 mm * |
| Sensing distance "high level" | S1 | 60 mm * |
| Sensing distance "low level" | S2 | depends on the reservoir size |
| Hysteresis "high level" | HV | 20 mm |
| Hysteresis "low level" | HL | 50 mm |
| Switching point default | | 0.17% / K |

**measured on the housing surface*

### Supply:

| | | |
|---|---|---|
| Rated operational voltage | $U_E$ | 24 VDC |
| Operating voltage range | $U_B$ | 20...30 VDC |
| Admissible residual ripple | | 10 % |
| Open-circuit | | < 60 mA |

### Switching Output:

| | | |
|---|---|---|
| Rated normal current | $I_e$ | ≤ 200 mA |
| Voltage drop | $U_d$ | ≤3 V |
| Spurious switch-on pulse | | suppressed |
| Switching function "high level": | | NO contact, switching on "plus" |
| "low level" | | NC contact; switching on "plus" |

### Typical Values:

| | |
|---|---|
| Availability delay | 250 ms |
| Reflection area | 10 x 10 mm² |
| Ultrasonic frequency | 400 kHz |
| Switching frequency | 8 Hz |
| Resolution | 1 mm |
| Protection | IP 65 |



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**Relevant Data for EX- Protection:**
The accordance with directive 94/9/EEC (ATEX) is proved by the compliance with the standards EN 50021, EN 50281-1-1 and EN 60947-5-2

Appropriate Use
Application in areas subject to explosion hazards
Zone 2 according to classification II 3G (gas atmosphere)
Zone 22 according to classification II 3D (dust atmosphere)
Special conditions for safe operation:

- Protect the environment of the push-in type connection against mechanical damages.
- Secure the push-in type connection with an interlock protection (part no. 237-10254-1) to make a separation by hand impossible.
- Protect plug against dust or water when unpacking.

Installation and start-up

- The admissible ambient temperature for the devices is - 20°C to +70°C.
- Installation, connection and start-up of the devices must be carried out by authorized and qualified personnel.
- The installation requires knowledge regarding the assignment of classifications to the allowed areas subject to explosion hazards.
- The push-in type connection must not be connected or separated when voltage is applied.

Maintenance and Troubleshooting

- The devices do not require maintenance.
- The devices must not be modified at all.
- Repairs of the devices are not possible.
- In the case of replacement consider the above points.



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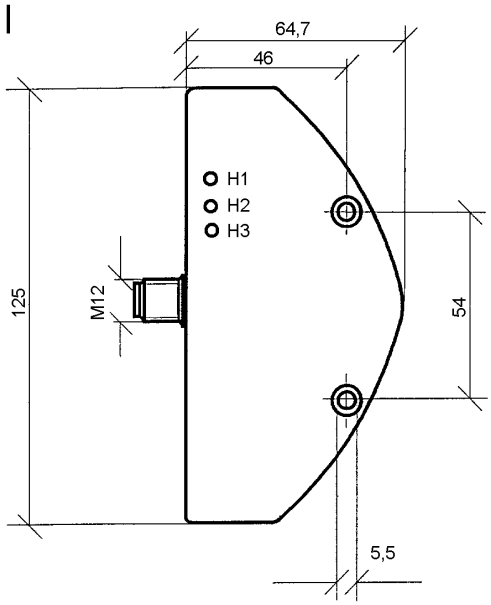
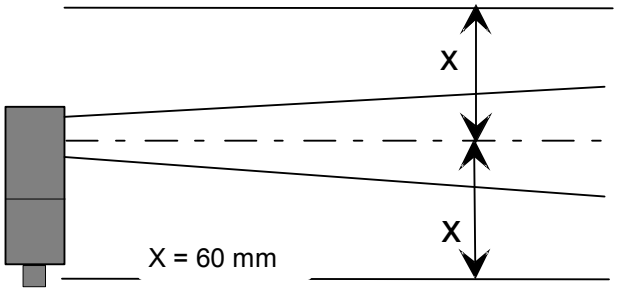
I

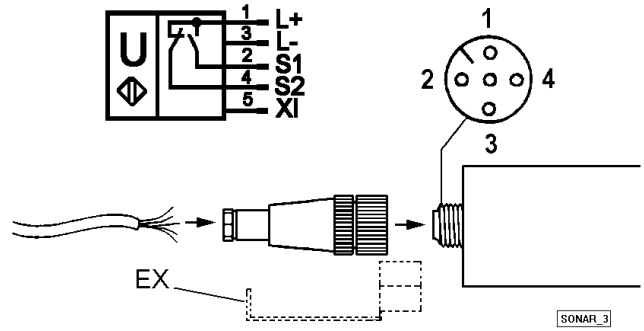



30 mm high

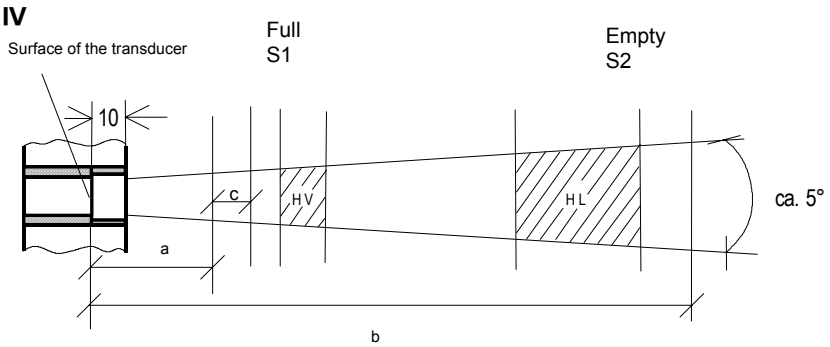
II

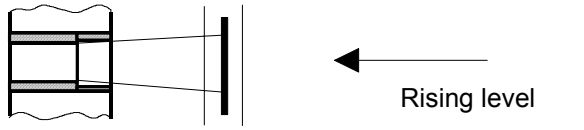



III



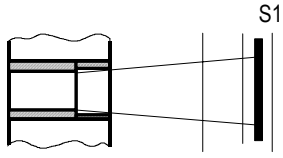

IV



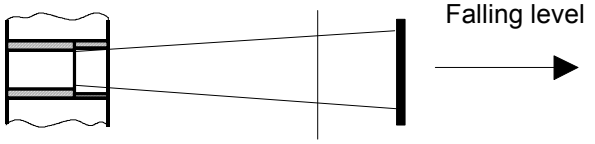

Overfull

| Full | Empty | |
|---|---|---|
| S1 | S2 | |
| 1 | 1 | |
| H1 | H2 | H3 |
| on | off | red |

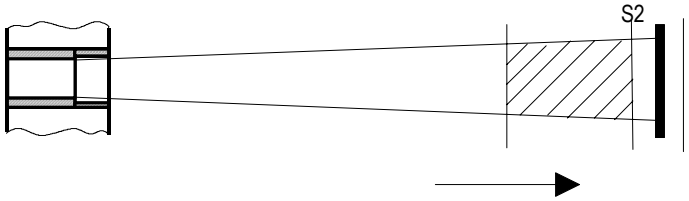



Full

| S1 | S2 | |
|---|---|---|
| 1 | 1 | |
| H1 | H2 | H3 |
| on | off | green |




| S1 | S2 | |
|---|---|---|
| 0 | 1 | |
| H1 | H2 | H3 |
| off | off | green |




Empty

| S1 | S2 | |
|---|---|---|
| 0 | 0 | |
| H1 | H2 | H3 |
| off | on | green |



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