

OPERATING INSTRUCTIONS



SCOPE OF APPLICATION

The ultrasonic tank transmitters of the UTV series are suitable for monitoring the levels of holding tanks. The ultrasonic tank transmitters are designed for installation on top of the tank. They are suitable for installation on metal and plastic tanks.

The power supply is DC 11.5 - 30V. The display can be done with analogue instruments of the UTV series and with the tank monitors TCM4V.

The advantage of ultrasonic technology is based on non-contact level measurement, whereby there are no longer any moving parts in the tank that can become contaminated or damaged by the application of force. About the technology:

- The ultrasonic tank sensor generates a high-frequency sound wave and measures the transit time of the echo reflection from the surface of the medium.
- The distance from the sensor to the medium is calculated based on the speed of sound. In order to measure correctly, the sound waves from the ultrasonic tank transducer must impinge perpendicularly ($\pm 6^\circ$) on the liquid surface.
- Level fluctuations within the tank due to surge are compensated by continuous measurement and a special calculation algorithm.
- The UTV ultrasonic tank sensors have an accuracy of 1 cm. The sound dead zone is 5 cm to the underside of the sensor. This means that this area can't be detected and is undefined.
- The ultrasonic tank sensor is housed in a high-density polyethylene enclosure that is resistant to water, fuels and oils.
- The UFT sound guide tube significantly improves the measurement result.

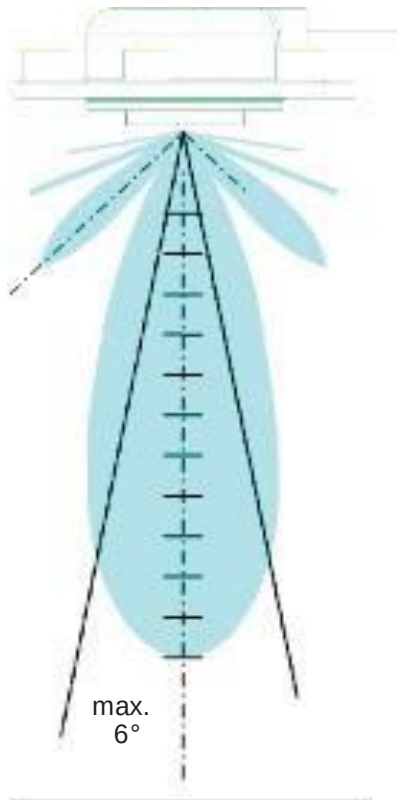


This ultrasonic sensor is not suitable for petrol tanks!

Correct measurement is not possible in inclined position or when driving in waves. Therefore, we do not recommend installation in fuel tanks.

Please note the additional installation instructions on the last two pages!

INSTALLATION



The ultrasonic tank transducer UTV must be positioned parallel to the medium to be measured and in the centre of the tank in order to ensure proper functioning or to minimise the influence on the measurement result by tilting the tank while driving. The sound wave must be reflected vertically from the liquid surface (deviation max. 6°).

The UTV ultrasonic tank sensors can be easily replaced with existing conventional tank sensors if they already have the mounting according to SAE standard.

(5 mounting holes in a 54 mm bolt circle).

The hole in the tank for the ultrasonic tank transmitter must be at least 38 mm (40 mm when using a sound guide tube).

The installation height in relation to the tank surface is 25mm.

If the measurement is faulty (e.g. in the case of holding tanks) or if the measurement is also desired at an inclination of up to 15°, the UFT sound guide tube can be fitted in the tank, which is cut to fit (to approx. 2-3 cm above the floor) and has a vent opening 5 cm below the tank transmitter.

Tip: very often the fastening screws are tightened too much and this leads to the sensor housing being bent - this can completely falsify the signal (similar to a loudspeaker membrane). Please ensure that the encoder is subjected to as little mechanical stress as possible - a second seal may have to be used.

SAE STANDARD



The seal and the (optional) spacer ring only fit in exactly one installation position.

With the seal, the side with a marking hole plus a countersunk hole faces the tank. The cable outlet is located exactly above the marking hole. When using a spacer ring, the marking must point upwards towards the cable outlet.

ELECTRICAL CONNECTION

The output signal of the ultrasonic tank transmitter UTV is a voltage signal 0.5-2.5V.

The supply voltage is DC 11.5 - 30 V.

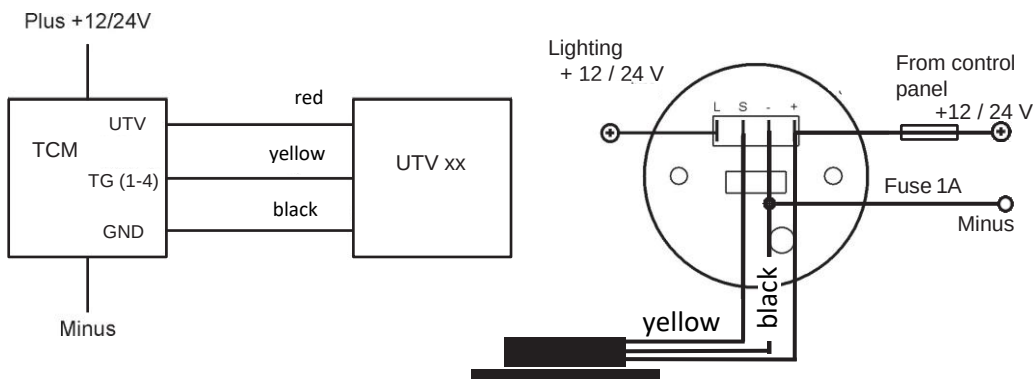
The black wire is connected to minus (GND).

The red wire is connected to the UTV terminal of the TCM tank monitor or to plus (11.5 -30V). The yellow wire provides the output signal (0.5-2.5V) and is connected to the indicator at the sensor input (on the TCM: TG 1-4).

CONNECTION DIAGRAM TCM

TUROTEST INSTRUMENTS

(Fuel-UTV, Water-UTV, Waste Water-UTV)



ATTENTION: The yellow sensor cable must never be connected to the 12/24 V supply voltage – this will destroy the sensor!

OPERATION

The power supply of the tank indicator should be switchable, since due to the power consumption (approx. 50 mA) continuous operation only makes sense while driving under engine power. Due to the averaging of the measured values in the ultrasonic tank transducer and the inertia of the display instrument, the exact display value only appears after 10-20s. Changes during operation are also displayed with a delay (50s) due to averaging.

The sensor does not react to fast level changes (from full to empty within 2 seconds) or only reacts with a strong delay (up to 7 minutes), as this is interpreted as an error.

The last "meaningful" fill level continues to be displayed. If the sensor does not receive any usable measured values after 10 minutes, empty is displayed. If necessary, interrupt the power supply of the instrument for 1 second to restart the measurement.

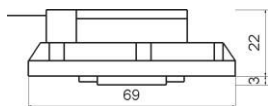
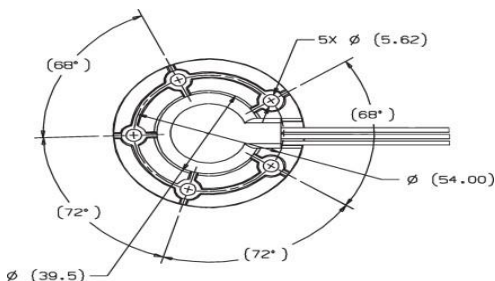
If the display does not change even though the level has changed, check whether the ultrasonic tank transmitter is parallel to the liquid surface; it may be necessary to install a sound guide pipe in the tank, see also chapter Installation.

In the area of the sonic dead zone (5 cm below the ultrasonic sensor), the sensor cannot determine the level and the displayed values are undefined.

TECHNICAL DATA

Supply voltage	DC 11.5 - 30 V
Current consumption	50mA
Output signal	0,5V (=empty) to 2.5V (=full)
Response time	200ms. Max. 5s
Averaging time of measurements	10 – 50 sec
Temperature range	-40°C to + 70°C

DIMENSIONS



AVAILABLE VERSIONS

Tank depth	Order no.
200mm	7 0219 3520 UTV20
250mm	7 0219 3525 UTV25
300mm	7 0219 3530 UTV30
350mm	7 0219 3535 UTV35
400mm	7 0219 3540 UTV40

450mm	7 0219 3545 UTV45
500mm	7 0219 3550 UTV50
600mm	7 0219 3560 UTV60
700mm	7 0219 3570 UTV70
800mm	7 0219 3580 UTV80

Sound guide tube

(incl. sealant)
also for retrofitting:
UFT40 (400mm) 7 0219 9400
UFT80 (800mm) 7 0219 9800

The sound guide tube is to the depth of the tank. Cuts (up to approx. 2-3 cm above tank bottom). There must be min. be cleaned 1x per year (for holding tanks)

DISTANCE RING to compensate for the dead zone:



incl. seal & stainless steel screws:

- 7 0219 9025 UTS 25 (5x M5 x 60mm)
- 7 0219 9050 UTS 50 (5x M5 x 80 mm)

FIT ROUND INSTRUMENTS for operation on 12V and 24V:



- 2 0778 2041 Waste Water UTV
- 2 0778 2021 Fuel UTV
- 2 0778 2001 Water UTV



DISPOSAL INSTRUCTIONS

When disposing of this appliance, observe the applicable local regulations and use the collection services/places for waste electrical/electronic equipment.



Observe the installation sequence!

DECLARATION OF CONFORMITY

This appliance complies with the requirements of the EU Directive:



2004/108/EC

"Electromagnetic Compatibility

Noise immunity EN 61000-6-1 / Noise emission EN 61000-6-3

The conformity of the appliance with the above-mentioned guideline is confirmed by the CE mark.



Please read the following instructions carefully before installation and commissioning!

Tank level measurement by means of ultrasound is a great challenge to the measurement technology, as very many interfering influences can affect the measurement in practice.

The starting principle for the measurement is a radiated sound wave that is reflected by the liquid surface and received again by the sensor. The transit time of the sound wave can thus be used for tank level measurement. Problems in determining the correct transit time arise due to echo effects from reflections, e.g. from tank walls. If, due to an inclined position of the tank, the sound wave is no longer directly reflected (angle of incidence = angle of reflection), only reflections are received, so that the actual sound wave can no longer be detected. In this case, measurement is no longer possible. Resonances caused by resonating tank walls as well as other ultrasonic measuring devices (echo sounder, fish finder) can also interfere with the measurement.

For the practice of ultrasonic measurement technology, this means:

Ultrasonic measurement technology should only be used to measure tanks at rest and is therefore not **suitable** for level measurement of **diesel and water tanks** while underway and yachts and vehicles in motion. In the holding tank, where the float sensor reaches its limits due to the contamination of its mechanics, ultrasonic measurement technology is an alternative if the tank can be measured at rest. The influence of the geometry of the tank and its interior (baffles) on the measurement is not predictable, therefore an initial test of the system is necessary before installing the tank transmitter. Especially with metal tanks, the influence of resonating tank walls is greater than with plastic tanks.

For a first test, the ultrasonic tank transmitter UTVxx is connected to the operating voltage 12V / 24V (black to minus, red to plus) when not installed, the yellow line (output signal) is connected to a multimeter for DC voltage measurement (yellow to plus, black to minus).

The output signal for a valid level measurement must be between 0.5V and 2.5V, voltages above 2.5V indicate a faulty measurement (no reception of the sound reflection).

The transmitter is first tested outside the tank by holding it parallel over a flat surface at half the distance of the tank sensor (e.g.: UTV50 - 25cm, UTV80 - 40cm). The output signal on the yellow wire must be approx. 1.5V. The sensor is then technically OK.

If the output voltage is always at a fixed value, even if the encoder is at different distances from the reflection surface, the encoder is defective. This may be the result of an incorrect electrical connection (e.g. yellow to supply voltage).

If the test is positive, the ultrasonic tank sensor should then be placed loosely on the tank opening and a function test carried out on the tank. If the displayed value is plausible, the system can be installed.

If the measurement result is not plausible, a different installation location must be tested or a different measuring system (float sensor TGx with flange GWA / pressure measurement TDS) must be used.

In this case, the company philippi is available for advice and also for the exchange of the donors.

We generally recommend the use of a sound guide tube to reduce the influence of the tank on the measurement. The sound guide tube must be cleaned regularly during subsequent operation, especially in the case of holding tanks, as deposits lead to faulty reflections and then usually indicate a too high level.

When mounting the unit, make sure that the screws are not tightened too much to prevent deformation of the housing. Deformation can lead to detuning of the sound frequency and, in the worst case, to the ultrasonic transducer tearing off the housing and thus to permanent failure.

It is also important that the rubber seals are used so that the ultrasonic transmitter is able to vibrate and emit its sound at all. We do not recommend gluing/sealing with Sikaflex or similar sealants.