

OPERATING INSTRUCTIONS/INSTALLATION

TANK Sensor TDT 10-250

1 Introduction

The pressure sensor TDT is mounted as a screw-in sensor (1/2") on the outer tank wall near the bottom. The sensor measures the current level of the liquid via the hydrostatic pressure of the liquid. It can be used in water, waste water and diesel tanks and is designed for connection to the digital tank monitor TCM4V or the tank interface CMT 2 of the P-BUS system.

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2 Safety Instructions



No changes may be made to the device, otherwise the CE - sign will become invalid. The installation of the submersible measuring sensor in diesel tanks should be carried out by a qualified technician. This applies especially to the installation of the sensor in stationary underground tanks or external oil tanks (Article 19I of the Federal Water Act (WHG)).

The built-in level measuring sensor is not a safety device, even in conjunction with an electronic display unit. It therefore does not replace the function of a limit value transmitter.

These installation and operating instructions are part of the component delivery. It must - important for later maintenance work - be kept in a safe place and passed on to any subsequent owners of the meter.

2.1 Disclaimer of liability

Neither compliance with the operating instructions nor the conditions and methods of installation, operation, use and maintenance of the TDT 10-250 can be monitored by philippi elektrische systeme gmbh. Therefore, we do not assume any responsibility or liability for loss, damage or costs resulting from incorrect installation and improper operation.

2.2 Guarantee

On the basis of our "General Terms and Conditions - Paragraph 7", we provide a guarantee for the delivered equipment. These terms and conditions are the basis of all sales and delivery offers, they are printed in our catalogues and attached to all offers and order confirmations.

2.3 Declaration of conformity



This device complies with the requirements of the EU directives:
2004/108/EC "Electromagnetic compatibility"

The conformity of the device with the above mentioned directive is confirmed by confirms the CE mark.

2.4 Disposal instructions



When disposing of this device, observe the applicable local regulations and use the collection services/collection points for old electrical/electronic devices.

3 Scope of delivery

- Tank sensor TDT 10-250
- Fuse holder ASH-1A
- Operating instructions

4 Guarantee

Warranty is granted for a period of two years from the date of purchase. Defects due to Material or manufacturing defects are eliminated free of charge if

:- the device is sent to the manufacturer free of charge -

the purchase receipt is enclosed-

the device has been handled and used in accordance with its intended purpose.

- no third-party spare parts have been installed or tampered with. The

warranty does not cover damage caused by



:- overvoltage at the inputs or reverse polarity of the connections -
lightning

Not covered by the warranty are consequential costs and natural wear and tear.

When asserting claims under guarantee and warranty, a detailed description of the defect is essential. Detailed instructions facilitate and accelerate the processing. Please understand that we cannot accept shipments that are sent to us carriage forward.

5 Safety Instructions



- No changes may be made to the device, otherwise it will be invalidated
the CE - sign -

Pay attention to the correct polarity of the batteries!

- This appliance is not intended for use by children.

These installation and operating instructions are part of the component delivery. It must - important for later maintenance work - be kept in a safe place and passed on to any subsequent owners of the meter.

6 Technical data

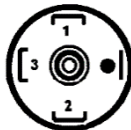
Supply voltage:	DC 9 - 30 V
Power consumption:	5 mA @ 12 V
Measuring range:	Standard 0 - 250 mbar, 0 - 250 cm
Exit:	4 ... 20 mA, 2-wire principle (Pin 1: + / Pin 2: -) (Pin 1: + / Pin 2: -)
Supply voltage...:	10 ... 30V DC
Measuring cell:	ceramic Al2O3 , strain gauge measuring bridge
Setting time:	50 ms
Deviation :	< 1 % v ME
Temperature drift:	< 0.05 % / K Zero point < 0.05 % / K Span
Work area:	-25 ... +80 °C
Housing:	Stainless steel 1.4404 (316 L, V4A)
Screw-in thread:	G ½"
Fields of application:	Fuel oil, diesel, water, faeces Not for gasoline, kerosene, paraffin. Not for use in EEx zone.

7 Installation

Pin assignment:

Pin 1: +

Pin 2: -



Pin 1 must be connected to the positive supply voltage via the enclosed fuse, pin 2 to the corresponding tank input Tx of the TCM4V / CMT2.

IMPORTANT!



Since the TDT 10-250 has an output of 4-20mA to ground, the TCM4V must be adapted in hardware at our factory (CMT2 can be adapted via DIP switch).

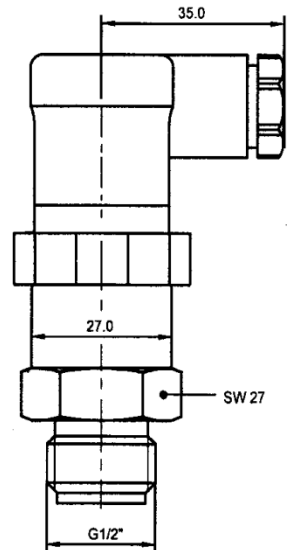
Software requirements:

PSM V16 + CMT V14 or higher / TCM4 V4H TCM 4V V4H or higher

Hardware requirements:

The following devices can be adapted at the factory:

CMT, TCM 4, TCM4V, TCM1 & TCM2 as of year 2009



8 Calibration - Physical principles

8.1 Hydrostatic pressure

The hydrostatic pressure for liquids is calculated according to Pascal's law:

$$p(h) = \rho g h$$

Unit: N/m² (= Pa, Pascal) or bar (1 bar = 100,000 N/m²) with:

$p(h)$ - Hydrostatic pressure as a function of the liquid level

g - Acceleration due to gravity (for Germany: $g \approx 9.81 \text{ m/s}^2$)

ρ - density (for water: $\rho \approx 1000 \text{ kg/m}^3$)

h - Height of the liquid level [1]

Examples

Water (height 1 m): $1 \text{ m} \times 1000 \text{ kg/m}^3 \times 9.81 \text{ m/s}^2 \approx 9,810 \text{ N/m}^2 \approx 98 \text{ mbar}$

Diesel (height 1 m): $1 \text{ m} \times 830 \text{ kg/m}^3 \times 9.81 \text{ m/s}^2 \approx 8,140 \text{ N/m}^2 \approx 81 \text{ mbar}$

The hydrostatic pressure does not depend on the shape of a vessel. Only the height of the liquid level is decisive for the pressure at the bottom, not the absolute amount of liquid in the vessel. This phenomenon is also known as hydrostatic paradox.

8.2 CALIBRATION

The measuring range of the TDT 10-250 tank sensor is 0 - 250 mbar.

The tank sensor supplies a current of 4 mA at a pressure of 0 mbar.

The tank sensor supplies a current of 20 mA at a pressure of 250 mbar.

At the TCM / CMT the tank sensor is operated against ground via an external or internally integrated series resistor of 180 ohms.

Thus the value range:


0 mbar = 0.72 V

250 mbar = 3.60 V

A pressure change of 10 mbar corresponds to an output signal change of 0.64 mA, this corresponds to a measuring signal change of 0.115 V

A filling height of 10 cm water corresponds to a voltage change of: 0.115 V

9 Settings in the TCM4V

When the sensor is installed for the first time, the zero point must be calibrated. This is done before the sensor is installed in the tank or when the tank is empty. For this purpose, the sensor type TDS must be selected in the tank menu. Now the value for 0% is taken over by pressing  the key: (Take over measured value) this measured value.

The tank is then filled and the other values are determined by calculation or measurement.



For the levels 25, 50, 75 and 100%, the respective voltage values must be entered or determined metrologically.

You have two ways to do this:

Method 1 (tank is filled step by step) :

The tank is empty. You go to the setup up to the setting value for 0%. Then press the measured value transfer key. The current measured value for 0% is accepted.

Then fill the tank to 25%. Then go to the 25% setting in Setup and press the Acceptance button again. Proceed analogously with the values 50%, 75%, 100%.

It is best to make a note of the displayed voltage values so that you can access them again at a later date. Every value (0%, 25%, 50%, 75%, 100%) must be entered.

This method has the advantage that the contents are reproduced correctly even if the tank shape is unusual.



Please make sure that the tank nozzle remains empty when determining the 100% value, otherwise the measured value for 100% will be determined incorrectly.

Method 2 (installation with full tank):

the sensor is located outside the tank. You go in the setup up to the setting value for 0%. Then press the take over button. The current measured value for 0% is accepted.

Then install the sensor and press the measured value transfer button at the set value 100%. To obtain the values for 25%, 50% and 75%, you must first divide the difference between the values 0% and 100% by 4. Add this value to the voltage value at 0% - this way you get the input value for 25%. By adding the values further, you will get the values for 50% and 75%.

These values can be entered manually in the Setup menu at the 25%, 50% and 75% settings using the + / - buttons.

10 Settings in the PSM (CMT2)

Please select the setting in the setup under sensor type:

TDS / Free setting V. This setting is selected for tank sensors with a voltage output (0-5V).



Attention: CMT V14 or higher necessary!

When using a tank sensor with a 4-20mA current output, the hardware must first be adapted at the factory! With the CMT2 this is done by DIP switch on the device.

Input at TDS/free setting V:

The voltage values must be entered or metrologically determined for 5 filling levels (0, 25, 50, 75, 100%).

Method 1 (tank is filled step by step) :

The sensor is located in the empty tank. Then press the 0% button in Setup, 2nd page for about 2 seconds. The current measured value is taken over for 0%.

Then fill the tank to 25%. Then press the 25% button for about 2s.

Proceed analogously with the values 50%, 75%, 100%.

It is best to make a note of the displayed voltage values so that you can access them again at a later date. Every value (0%, 25%, 50%, 75%, 100%) must be entered.

This method has the advantage that the contents are reproduced correctly even if the tank shape is unusual.



Please make sure that the tank nozzle remains empty when determining the 100% value, otherwise the measured value for 100% will be determined incorrectly.

Method 2 (installation with full tank):

The sensor is located outside the tank. Then press the 0% button in Setup, 2nd page for about 2 seconds. The current measured value is taken over for 0%.

Then install the sensor and press the 100% button for about 2s. To obtain the values for 25%, 50% and 75%, you must first divide the difference between the values 0% and 100% by 4. Add this value to the voltage value at 0% to get the input value for 25%. By adding the values further, you will get the values for 50% and 75%.

You can enter these values in the setup menu by briefly touching the corresponding buttons.

Example:

For a 100cm deep rectangular tank you would have to enter the following values:

0% = 0,72 V

25% = 1,00 V

50% = 1,29 V

75% = 1,58 V

100% = 1,87 V

11 Hint

We recommend cleaning the tank from time to time. If you are absent for a longer period of time, it is recommended to fill the tank with water up to the level of the sensor so that no deposits are formed in the sensor.

If the temperature is below freezing point, use antifreeze, otherwise freezing water residues could destroy the sensor!