

OPERATION MANUAL

PRESSURE SENSOR TDS 200 (Diesel, Water, Waste) Tank Sensor TDW 200 (Water, Waste)



1 INTRODUCTION

The pressure sensor TDS is submerged to the bottom of the tank. The current tank level is being measured via the hydrostatic pressure of the liquid. The PUR connection cable of the sensor contains a thin air hose for the pressure compensation of the measuring unit. Thereby barometric variations can be compensated automatically and don't result in falsification of the measured values. This sensor is suitable for diesel, water, grey & waste water tanks, but not for petrol, kerosene, petroleum (EEEx-zone). The pressure sensor TDS is intended 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 PRECAUTIONS



No modification may be made to the device, otherwise the CE symbol will be extinguished. The installation of the submersible probe in diesel tanks should be carried out by a qualified technician. This applies in particular to the probe installation in stationary underground tanks or oil-filled tanks.

(§ 19 I Wasserhaushaltsgesetz (WHG)).

The built-in level measuring probe is not a safety device, even in conjunction with an electronic display device. Therefore the TDS does not replace the function of a limit value transmitter.

The present assembly and operating instructions are part of the component delivery. This Manual has to be stored carefully and be re-examined before every contact with the device, as it contains all information about the operation of the device. It has to be passed on to subsequent owners.

2.1 DISCLAIMER OF LIABILITY

Both the observance of the operating instructions as well as the conditions and methods for the installation, operation, use and maintenance of the TDS200 / TDW200 cannot be monitored by philippi elektrische systeme gmbh. Therefore, we assume no responsibility and liability for losses, damages or costs resulting from faulty installation and improper operation.

2.2 WARRANTY

philippi elektrische systeme gmbh grants a two year limited and non-transferable warranty for the delivered equipment due to our "Terms of sale and delivery – chapt.7". These terms are the basis of all quotations, orders and confirmations. These terms are printed in our catalogues and part of all quotations and order confirmations.

The warranty does not apply to:

1. Non-observance of the present manual
2. Mechanical or electrical modifications and interventions to the device
3. Improper use
4. Traces of moisture
5. Non-observance of the power supply tolerance
6. Mistake while connecting the device
7. Impact during transport, installation or operation.
8. Intervention by persons not authorized by philippi elektrische systeme GmbH
9. Connection to not authorized elec. interfaces
10. Costs of packaging and postage

11. Obvious or hidden damage caused by transport and / or carriage (Reclamations must be addressed to the carrier)

Our Warranty can in no event justify claims of damages. philippi elektrische systeme GmbH cannot be held responsible for damages occurring due to the operating of the device through the operator.

2.3 DECLARATION OF CONFORMITY



This device complies with the requirements of EU directives

2004/108/EC

"Electromagnetic compatibility"

2006/95/EC

"electrical equipment designed for use

within

certain voltage limits"

A declaration of conformity can be sent on request.

3. SCOPE OF DELIVERY

- pressure sensor TDS including, Mounting flange and seal
- fuse holder ASH-1A
- Manual

An installation pipe with an 25 mm outer diameter can be inserted into the mounting flange for mechanical stabilization of the encoder

4. TECHNICAL DATA

DC supply voltage	DC 8-32 V
DC current consumption	5 mA @ 12 V
Measuring range :	Standard 0 - 200 mbar,
Outlet:	4 ... 20 mA, 2- Ader-Prinzip
DC supply voltage	10 ... 30V DC
Measuring cell:	ceramic Al2O3 , DMS-measuring bridge
Set-up time:	50 ms
Deviation :	< 1 % v ME
Temperature drift:	< 0,05 % / K zero < 0,05 % / K span
Worksspace:	-10 ... +40 °C (higher on request)
Housing:	TDS200: stainless steel 1.4404 (316 L, V4A) TDW200: Brass

Weight gauge head:	Aproxx.. 0,2 kg, without cable
Submersible cable :	- PUR black, 2,5 m, Oil resistant- with capillary For air pressure compensation
Fields of application:	TDS 200: Heating oil, diesel, water, feces TDW 200: Water , feces Not for gasoline, kerosene, p petroleum Not for use in EEx zone.

5. INSTALLATION

The probe cable has a length of 2.5 m. The two connectors; red (+) and black (-) can be electrically extended to 100 m and more, e.g. by adding $\geq 2 \times 0,4$ mm. If interfering electrical power cables run parallel, a shrouded cable must be used for the extension and the cable shielding **has to be set to grounded potential (GND)**.

In addition to the red (+) and black (-) wires, the probe cable also contains an air capillary with an anti-moisture filter. By this the air pressure compensation of the measuring cell is achieved.

The cable installation must be carried out in such a way that no moisture can enter the cable end, but nevertheless a pressure compensation is possible.

The red cable must be connected to the positive supply voltage via the included fuse, the black cable to the corresponding tank input Tx of the TCM4V / CMT2.



IMPORTANT!

Since the TDS200/TDW2000 has an output of 4-20mA against ground, the TCMM4V has to be in terms of the hardware adjusted 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 in the factory:

CMT, TCM 4, TCM4V, TCM1 & TCM2 from year 2009

6. CALIBRATION – PHYSICAL BASICS

6.1 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 in dependence of the height 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): $1 \text{ m} \times 830 \text{ kg / m}^3 \times 9.81 \text{ m / s}^2 \approx 9.810 \text{ N / m}^2 \approx 82 \text{ mbar}$

The hydrostatic pressure does not depend on the shape of a vessel. Decisive for the pressure on the ground is only the height of the liquid level, not the absolute quantity of the liquid. This phenomenon is known as the hydrostatic paradox.

6.2 CALIBRATION

The measuring range of the tank probe TDS200 / TDW200 is 0 - 200 mbar.

The tank probe delivers a current of 4 mA at a pressure of 0 mbar.

The tank probe delivers a current of 20 mA at a pressure of 200 mbar.

If connected to the TCM / CMT, the tank probe is operated via an external or internally integrated series resistor of 180 Ohm against ground.

Thus the value range is:

0 mbar = 0.72 V

200 mbar = 3.60V

A pressure change of 10 mbar corresponds to an output signal change of 0.8 mA, which corresponds to a measurement signal change of 0.144 V

A filling height of 10 cm water corresponds to a voltage change of: 0.144 V

7 SETTINGS IN THE TCM4V

When the probe is installed for the first time - the zero point must be calibrated. This happens before the probe is admitted into the tank or when the tank is empty. Therefore, the sensor type TDS must be selected in the tank menu. Now the value for 0% is adopted by pressing the key:



(Measured value acquisition)

Only after that, attach the probe and allow it to sink completely to the bottom of the container.

Afterwards, the tank is filled and the other values are determined by calculation or metrological



For filling levels 25, 50, 75 and 100%, the corresponding voltage values must be entered or measured.

You have two options to do this:

Method 1 (tank is gradually filled):

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

Then fill the tank to 25%. Then, in the setup, go to the setting value for 25% and press the readout button again.

You can do the same with the values 50%, 75%, 100%.

It is best to note the displayed voltage values so that they can be accessed again at a later time. Every value (0%, 25%, 50%, 75%, 100%) must be entered.

This method has the advantage that the content is reproduced correctly, even if the tank shape is unusual.



Please ensure that when determining the 100% value of the tank, the tank nozzle remains empty; otherwise the 100% value is determined incorrectly.

Method 2 (Installation of TDS200 / TDW200 with a full tank):

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

Then insert the probe and press the measured value key at the setting value 100%. To get the values of 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 for 0% - this gives you the input value of 25%. By further additions you get the values for 50% and 75%.

These values can be entered manually in the setup menu at the setting values for 25%, 50% and 75% with the + / - buttons.

8. SETTINGS IN THE PSM (CMT2)

In the Setup please select the setting TDS / Free setting V (under Sensor type).

This setting is selected for tank sensors with a voltage output of 0-5V.



Attention: CMT V14 or higher necessary!

If a tank sensor with a current output of 4-20mA is used, the hardware has to be adjusted in advance! On the CMT2, this is not necessary since the device is adjustable through the DIP switches.

Input at TDS / TDW:

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

Method 1 (tank is gradually filled):

The probe is in the empty tank. On Page 2 of the setup is the "0%" key press it for 2 seconds, by that the current measured value is accepted. Then fill the tank to 25%, afterwards press the 25% button for approx. 2s.

You can do the same with the values 50%, 75%, 100%. It is best to note the displayed voltage values so that they can be accessed again at a later time. Every value (0%, 25%, 50%, 75%, 100%) must be entered.

This method has the advantage that the content is reproduced correctly, even if the tank shape is unusual.



Please ensure that when determining the 100% value of the tank, the tank nozzle remains empty; otherwise the 100% value is determined incorrectly.

Method 2 (Installation with a full tank):

The probe is outside the tank. On Page 2 of the setup is the "0%" key press it for 2 seconds, by that the current measured value is accepted. Then insert the probe and press the 100% key for approx. 2s-. To get the values of 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 for 0% - thereby you acquire the input value of 25%. By further additions you get the values for 50% and 75%.

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