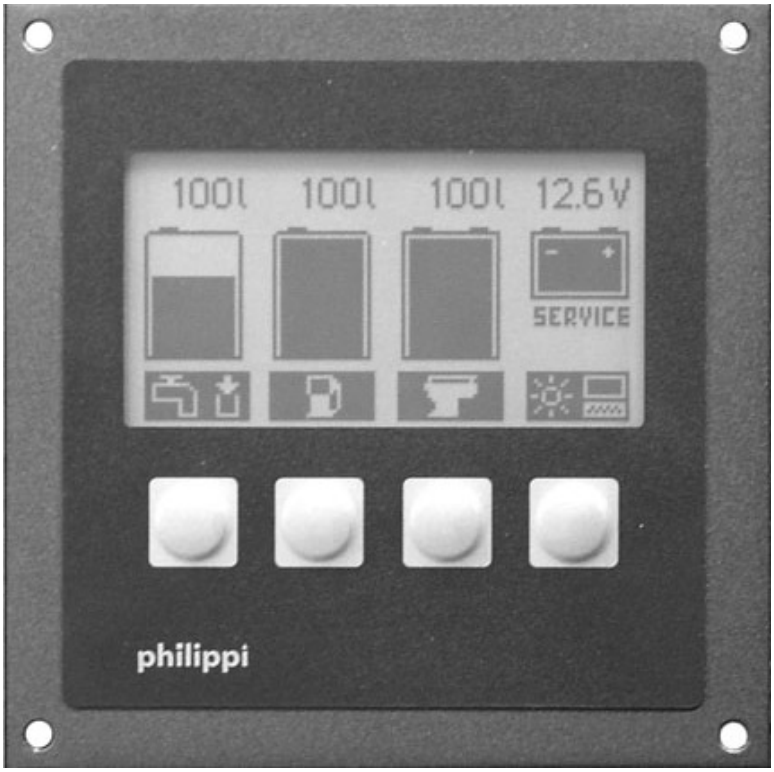
# INSTRUCTION MANUAL




## INDEX



**philippi elektrische systeme gmbh**
Neckaraue 19
D-71686 Remseck am Neckar

www. philippi-online.de
info@philippi-online.de
Telefon: +49 (0)7146/8744-0, Fax -22

## 1. INTRODUCTION

Dear customer,

thank you for buying the tankmonitor TCM 1 / TCM 2. This digital unit is state of the art in tank monitoring.

On the large, illuminated display you can read:

- the actual filling level of up to three tanks
- the voltage of up to two battery banks

The tank levels are shown as a bar and in % or litres.

The TCM is easy to operate and well readable. You have a quick overview of up to three tank levels and two battery voltages.

For level-sensoring we recommend the sensors of our TGT / TGW - series, the ultrasonic sensors UTV and the fresh water flow sensor DFS (TCM 2). These sensors are not part of the purchased parts package.
Sensors of other manufacturers can be connected as well; depending on the type you may need a hardware adaption at our company.
In the SETUP- menu the display will be configurated to the connected sensors. Also you have the possibility to adjust the tankmonitor to your given tank - geometry to show the real tank filling level correctly.
The acquiring data is made in intervals of time targeting the optimum rate information/energy consumption.
When the battery voltage decreases below 12V, the acquiring rate is reduced in order to save energy.

Please note: only when using the flow sensors DFS the shown display of litres is correct, because it measures the flowed litres. If you`re using other sensors, the TCM calculates the remaining tank capacity by the tank volume and the actual level. Depending on the accuracy of the sensors it cannot be litre-correct.

**Please, read the Instruction Manual carefully and follow all instructions before putting the equipment in operation.**

## 1.1. PURPOSE

The tankmonitors of the TCM-series can only be used with suitable tank sensors for low voltage purposes DC 10-30V. They were designed for the use on yachts or camper vans and must be used in an enclosed environment which is protected against rain, moisture, dust and condensation. Don`t use the TCM tankmonitors in places where there could be danger of explosion by gas or dust.

## 1.2.CONTENT

- Tankmonitor TCM 1 or TCM 2
- Plug-in clamp
- This Instruction Manual

## 1.3. ACCESSORIES (TO BE ORDERED SEPARATELY)

| | | |
|---|---|---|
| ● Flow sensor for fresh water | DFS | Ord.-Nr.: 7 0003 0304 |
| ● Tank sensor | TGT / TGW 200-800 | Ord.-Nr.: 6 6011 7xxx |
| ● Ultrasonic tank sensor | UTV 20-80 | Ord.-Nr.: 7 0219 35xx |

## 1.4. WARRANTY

philippi elektrische systeme gmbh grants a two year limited and not transferable warranty for the first buyer of this equipment, commencing on the date of purchase and covers defects in manufacturing, parts and materials.
Production or material defects will be corrected without costs if:

- the equipment will be send to us at the expense of the sender
- enclose the receipt (copy) of purchase
- the equipment was treated in the intended use
- no strange spare parts were built in or external effects happened

Not included in the warranty are damages from:

- overvoltage in the inputs or reverse polarity
- entered liquids in the device or oxydation through condensation
- lightning

Not under warranty are follow-up costs and normal wear and tear.

In case of warranty there must be a specification of the defect. A detailed description of the defect will ease and speed up the repair.
Please note that we cannot accept carriage forward deliveries.

### 1.5. EXCLUSION OF LIABILITY

Both the adherence to the operating instruction, and the conditions and methods during installation, using and maintenance of the TCM cannot be supervised by philippi electrical systems. Therefore we do not take any responsibility for loss, damage or costs, which develop due to incorrect installation and/or inappropriate enterprise.

## 1.6. QUALITY MANAGEMENT

During the process of manufacturing all devices pass several checks, controls and tests. Production, controls and tests are due to given protocols.
The assembly and testing of all TCM devices is carried out completely in our company at Remseck am Neckar.

## 2. SAFETY REFERENCES

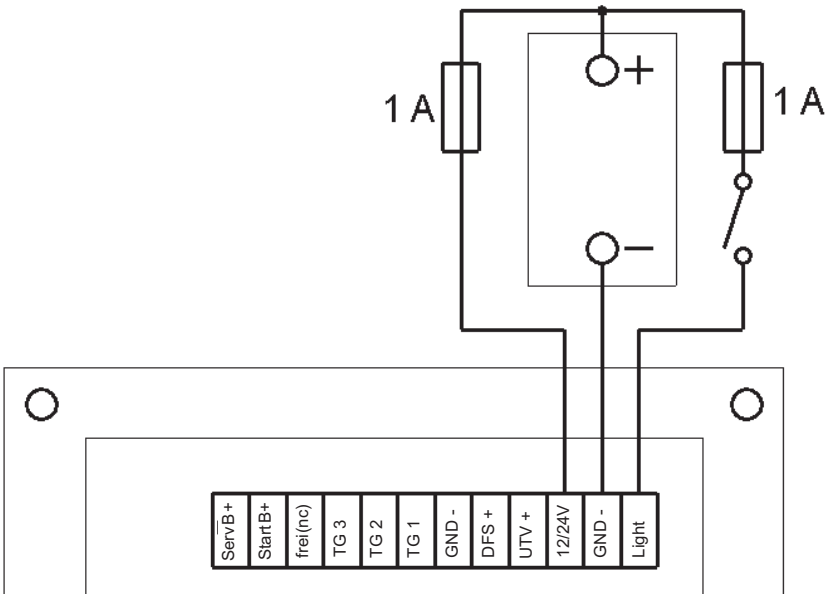
- unautorised change to the equipment will invalidate the CE sign
- the installation of the TCM may be made only by electrical specialists.
- Important! Pay attention to the correct polarity of the batteries!

The assembly and operating instruction is a component of the TCM package. It must be kept (for reference). Importantly: - for later maintenance work - and for the use of subsequent owners of the equipment.

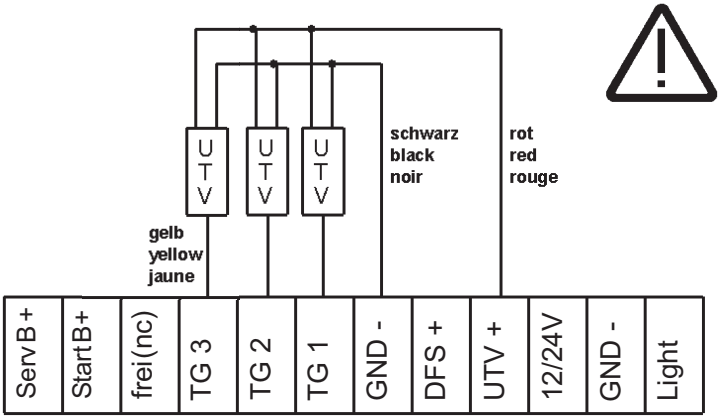
## 3. INSTALLATION

Please install the TCM in a visible place, so that it can be read off at any time.
The necessary installation cutout is 88 x 88 mm, the necessary minimum depth is 40 mm.
The TCM supervises up to three tanks at the same time. If you have less sensors, start connecting the first sensor at terminal TG 1 ( if you`re using two, connect them to TG 1 and TG 2 and so on)
**You can use both passive (resistance) and active (ultrasonic) sensors at the same time. For the connection have a look at the connection diagramms.**
**The flow sensor DFS has to be connected to terminal TG 1 (only TCM 2)!**
**If you want to use tank sensors with an output of 4-20 mA or 0-10 V you need a hardware-adaption at our company. Please ask.**

The power supply of the TCM is either directly from the battery or over a power distribution panel. Use a cable 1,5 mm² cross section which has to be fused (1A).
The display is lit when you press a button or you can connect the terminal “Light” to a switch and switch it on/off manually.
The sense lines for the voltage measurement (Serv-B+ / Start-B+) has to be connected to the plus-poles of the relating batteries via fuses located near to the batteries.

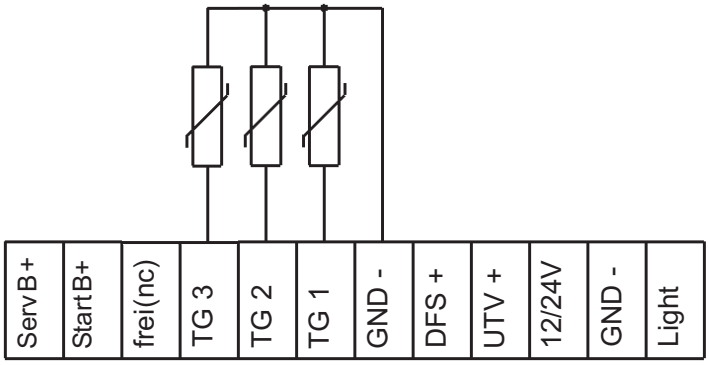


Connection of ultrasonic sensor UTV or over active sensors:

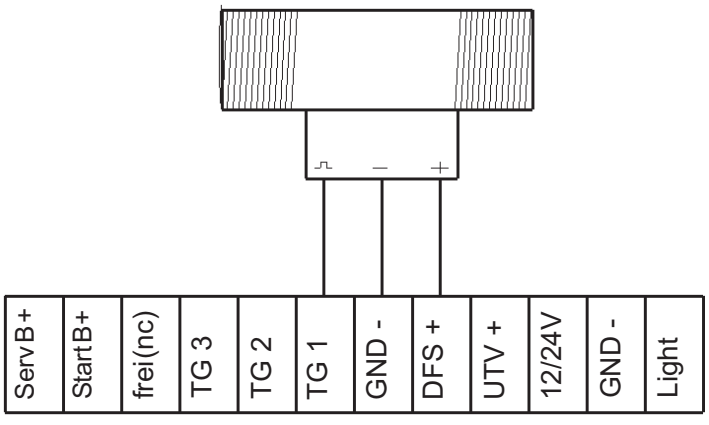



ATTENTION:
If the power supply of an ultrasonic sensor is connected directly to the on board DC system, not through the tank-monitor, this connection wire has to be fused by an 1A fuse!

Connection of passive (resistance) sensors like TGT / TGW and other:

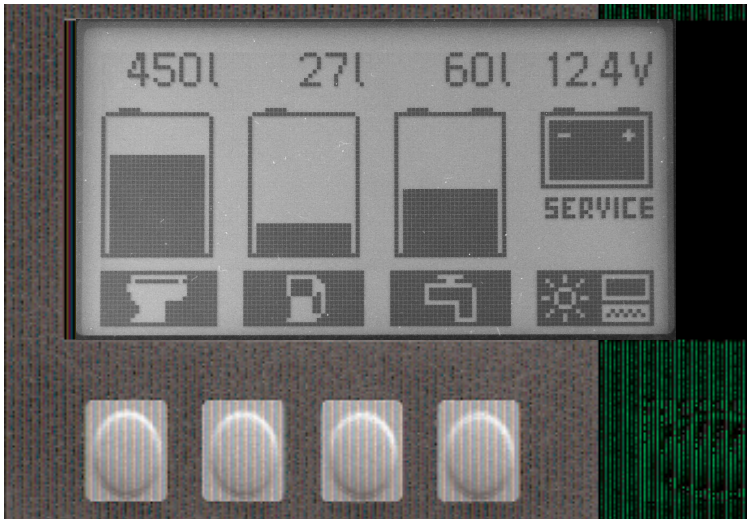



Connection of flow sensors DFS (only TCM 2):

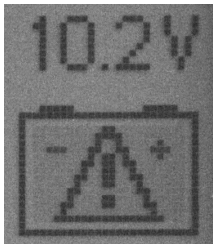


## 4. OPERATION

The display shows the tank levels automatically after switching on.
In the SETUP-menu you can adjust each tank-display individually to the medium (fuel, water...), to the type of sensor used and to the compensation value for the tank-geometry.
In case of a power supply breakdown all of these adjustments are saved and immediately available after switching on.
While switching on the actual software-revision is shown in the tanks (starting from software rev.F April 2011).
The measured levels are shown in a bar diagram and additonally either in litres or in percent.




### LOW- & HIGH- BATTERY VOLTAGE ALARM

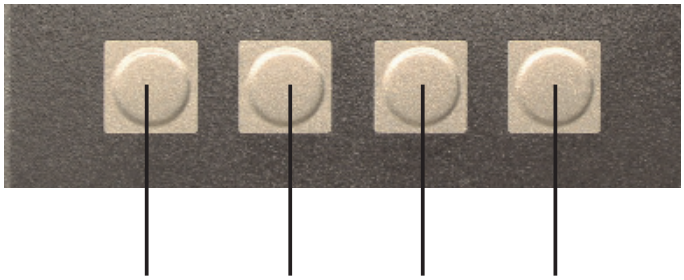



A warning symbol is displayed when the displayed voltage of the service or the start battery decreases below 11,5V / 23V ( 12V/24V ). or increases over 15V / 30V (12V/24V).
(Alarmthreshold before software F: 10,8V / 21,6V)

## 5. HANDLING

When pressing the push buttons the display light is lit during 30 s. If you connect the terminal “Light” to the power supply via the power distribution panel the light can be activated manually.
The alarm can be acknowledged by pressing a button.

Following actions are activated by pressing:



Button 1 Button 2 Button 3 Button 4

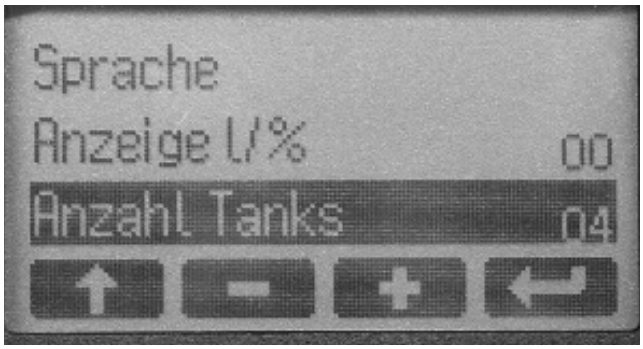
**Starting from software Rev.F (April 2011):**

| | | |
|---|---|---|
| **Button 1** | Long pressing (10s) | Setup for tank 1 |
| | Short pressing (1s) | Tank is being filled up in 10% steps until the maximum value (only TCM2 - flow sensor) |
| **Button 2** | Long pressing (10s) | Setup for tank 2 (only if amount of tanks > 1) |
| **Button 3** | Long pressing (10s) | Setup for tank 3 (only if amount of tanks > 2) |
| **Button 4** | Short pressing (1s) | Change of the displayed battery voltage. (Service or start) |
| | Long pressing (10 s) | Basic SETUP of tank type, -capacity, contrast, language and display |

## 6. SETUP

In the SETUP-menu all adjustments can be changed:

Following is the key function:




| | |
|---|---|
| Arrow: | selection of the line to be modified |
| Plus: | increase the value |
| Minus: | decrease the value |
| Return: | save the values and return to the tank display |

### BASIC SETTINGS

| | |
|---|---|
| **Number of tanks** | 3 (reducing to the display of only 2 tanks is possible - see page 9) |
| **Display** | 0 = display of the remaining tank capacity in litres (l)<br>1 = display of the remaining tank capacity in percentage (%) |
| **Language** | Language for the SETUP-menu. Available are following languages: German / English / French |
| **Contrast** | Display contrast attitude + = dimmer, - = brighter |

In the tank menu you can adjust the tank type (e.g. water, fuel, waste and the type of the sensor), the capacity and the compensation-value (adjustment of the tank-geometry).

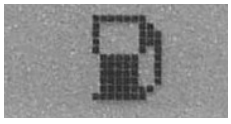
**The inverted line can be changed.**

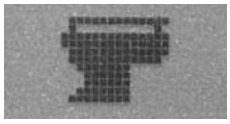
## ADJUSTMENTS OF THE TANK DISPLAY:

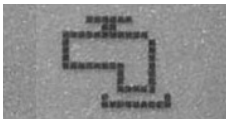
**Capacity of the tank** By pressing the +/- - button you can adjust the capacity of the tank. The capacity is displayed in litres.

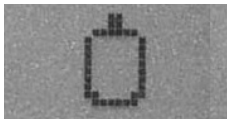
**Tanktype (Tank 1- 3)** 5 differents tank symbols are available for each tank:

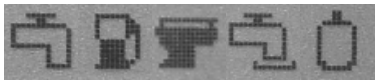

Fresh Water


Fuel


Waste Water


Grey-water


Gas

| Tanktype | | | | | Sensor | Measurement range | Attention |
|---|---|---|---|---|---|---|---|
|  | | | | | | | |
| 00 | 01 | 02 | 03 | 04 | philippi TRG | 6 levels (6..190 Ohm) | |
| 05 | 06 | 07 | 08 | 09 | philippi TGT / TGW | 5..180 Ohm | |
| 10 | 11 | 12 | 13 | 14 | philippi UTV | 0,5..2,5V | |
| 10 | 11 | 12 | 13 | 14 | philippi UTA | 4..20mA | Hardware adjustment! |
| 15 | 16 | 17 | 18 | 19 | | 0..10 V | Hardware adjustment! |
| 20 | 21 | 22 | 23 | 24 | | 240..33 Ohm | UTR not possible! |
| 25 | 26 | 27 | 28 | 29 | | 300..10 Ohm | |
| 30 | 31 | 32 | 33 | 34 | | 90..0 Ohm | |
| 35 | 36 | 37 | 38 | 39 | | 0..90 Ohm | |
| 40 | 41 | 42 | 43 | 44 | 5 Stab Büschelgeber | 4 levels | Auxiliary hardware PB43! |

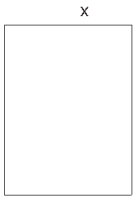
Incorrect display information can occur due to not compatible parts. Please ensure that the tank type matches the sensor.

**Starting from software Rev.F (April 2011):**

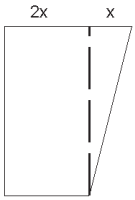
**Tanktype 50 - DFS (only TCM 2) for tank 1:**
after filling up of the tank the shown content is being filled up in 10% steps until the maximum value by pressing of the button 1.

**Tanktype 45 (only TCM 1)- displayed tank can be erased :**
in case you want to display only the content of two tanks, you can erase the content and symbol of tank 3 by choosing the tanktype 45 in the setup of tank 3. Then only an empty tank is shown.

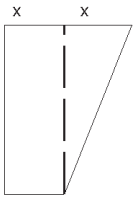
**Compensation (Tank 1-3)**
Tank1...3 : Adjustment of tank geometry



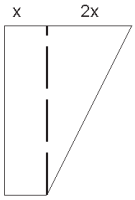

K = 50



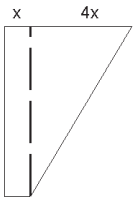

K = 45



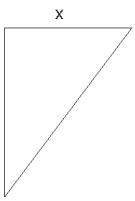

K = 40




K = 35




K = 30




K = 25

With non rectangular tanks the level height is not proportional to the content of liquid in the tank. By means of the compensation value this can be considered in the display. The compensation value changes the tank characteristic in such a way that the indicated level is approximated to geometry of the tank.
The value to be entered is value the tank display should indicate with the half level height of the tank is. The following examples shows which values the compensation value with different geometry will be:

If tank geometry is strongly deviating from the examples, then the correction value can be determined.

The correction value is computes by capacity of level iof half height divided by the capacity of entire level in the tank multiplyied by 100.

$$\text{Correction value } K = \frac{\text{Capacity of half level height}}{\text{Level of fuel in the tank entirely}} \times 100$$

Example: The tank has a total volume of 150 l with a maximum filling height (tank height) of 50 cm.

In order to determine the correction value, the tank is filled up only up to the half filling height (= 25 cm). Computationally or by filling up a value of 65 l results.

Inserted into the formula results for the correction value a value of:

K = 65 l/150 l x 100 = 43

This is deposited accordingly now in the Setup.

## 7. TROUBLESHOOTING

If the tankmonitor shows wrong values, please check first the sensor and the correct connection of the sensor. Check also the wiring between the sensor and the tankmonitor. This is the main source of defect. If the shown values are totally implausible, check the supply voltage of the sensors. The supply voltage has to be min. 10 V (see the data sheet of the sensor).

## 8. MAINTENANCE

The tank monitor does not request special maintenance. The frontpanel can be cleaned with a damp cloth without using agressive detergents.

## 9. TECHNICAL DATA

| | |
|---|---|
| Power supply | DC 10 - 30 Volt |
| Power consumption | ca. 8 mA when using resistance sensors,<br>60 mA if the display is lit (12 V)<br>12 mA when using a flow sensor DFS<br>when using ultrasonic sensors UTV:<br>50 mA per sensor |
| Dimensions: | 105 x 105 x 40 mm |
| Installation cutout: | 88 x 88 mm |

## 10. CE-CONFORMITY

**philippi elektrische systeme gmbh**
Neckaraue 19
71686 Remseck am Neckar
Germany

certifies herewith, that the products: Tankmonitor TCM 1 / TCM 2

fulfill the requirements of the European Regulation 2004/108/EG

Following harmonised standards were implemented:

| | |
|---|---|
| Immunity: | EN 61000-6-1:2007 |
| Emission: | EN 61000-6-3:2007 |

Remseck, January 2008

Dipl.-Ing. Michael Kögel
general manager philippi

Own adjustments:

| Tank | | Type | Capacity(l) | Type of sensor |
|---|---|---|---|---|
| 1 | ☐ | Fresh water | | |
| | ☐ | Fuel | | |
| | ☐ | Grey water | | |
| | ☐ | Waste water | | |
| | ☐ | Gas | | |
| 1 | ☐ | Fresh water | | |
| | ☐ | Fuel | | |
| | ☐ | Grey water | | |
| | ☐ | Waste water | | |
| | ☐ | Gas | | |
| 1 | ☐ | Fresh water | | |
| | ☐ | Fuel | | |
| | ☐ | Grey water | | |
| | ☐ | Waste water | | |
| | ☐ | Gas | | |

| Tank | | Type | Capacity(l) | Type of sensor |
|---|---|---|---|---|
| 1 | ☐ | Fresh water | | |
| | ☐ | Fuel | | |
| | ☐ | Grey water | | |
| | ☐ | Waste water | | |
| | ☐ | Gas | | |
| 1 | ☐ | Fresh water | | |
| | ☐ | Fuel | | |
| | ☐ | Grey water | | |
| | ☐ | Waste water | | |
| | ☐ | Gas | | |
| 1 | ☐ | Fresh water | | |
| | ☐ | Fuel | | |
| | ☐ | Grey water | | |
| | ☐ | Waste water | | |
| | ☐ | Gas | | |