

Set-up Instructions for the Pneumatic Tank Gauge

The Sterling pneumatic tank gauge in its basic configuration consists of two parts: The pneumatic pump and the L.E.D. display panel. As an optional extra the system can be upgraded with a remote control unit which can monitor up to eight different tanks.

Functions of the System Components

Pneumatic Pump: The pump housing contains a small air pump which supplies the compressed air required to make the system work. It also contains the pressure transducer to measure the back pressure. This information is then digitised and sent to the L.E.D. display via a loom. In order to save power the unit pumps air for about 15 seconds every hour and measures and holds that reading. This is the regular operation under normal circumstances; however in the event of a tank being active (i.e. filling or emptying fast) you can switch the unit to continuous monitoring by pressing the continuous pump button. The pump is rated for a durability of two years on continuous use. On standard use (i.e. 15 secs per hour) one can expect a much longer pump life. However, a defective pump can be replaced easily and at relatively low costs.

L.E.D. Display: The L.E.D. (light emitting diode) display contains the main processor software and is the heart of the system. The digital information is sent to the processor where it is interpreted and can be displayed either as a bar display (i.e. a bar of L.E.D.s will show the fill level) or - to save power - as a dot display (i.e. a single L.E.D. will show the fill level). The display mode can be altered by moving a dip switch on the back of the panel.

In order for the pneumatic tank gauge to work correctly, you must make the following adjustments:

- A) Type of liquid to be measured (i.e. petrol, diesel, water, sewage)
- B) Maximum tank depth.

Alarm Functions: When the fill level for petrol, diesel or water falls below 20%, the unit gives an alarm by a flashing L.E.D. Because this does not make sense for sewage tanks, the alarm function is reversed when the tank gauge is set for sewage, giving alarm only when the fill level is above 80%.

Remote Control (optional extra): The optional remote control with L.C.D. (liquid crystal display) and active scan can be used if the tank information is required elsewhere on the boat, e.g. closer to the aft deck or on the chart table. etc. It will automatically scan up to eight inputs, i.e. eight tanks, and will display the information as percentage of the available tank volume. A full tank will be displayed as 100%, and an empty tank will be displayed as 0%. For each tank that is to be monitored by the remote control, a separate pneumatic pump and L.E.D. Display is required.

Installation

L.E.D. Display Set-up:

On the back of the L.E.D. display there are two groups of dip switches (a set of eight and a set of four) which are used to input the liquid type and the tank depth.

Liquid Type: (switches 1 and 2 of the set of 4 dip switches)

petrol	switch 1 ON	switch 2 OFF
diesel	switch 1 OFF	switch 2 OFF
water	switch 1 OFF	switch 2 ON
sewage (Reverses the alarm functions!)	switch 1 ON	switch 2 ON

Display Format Type: (switch 3 of the set of 4 dip switches)

dot display	switch 3 ON
bar display	switch 3 OFF

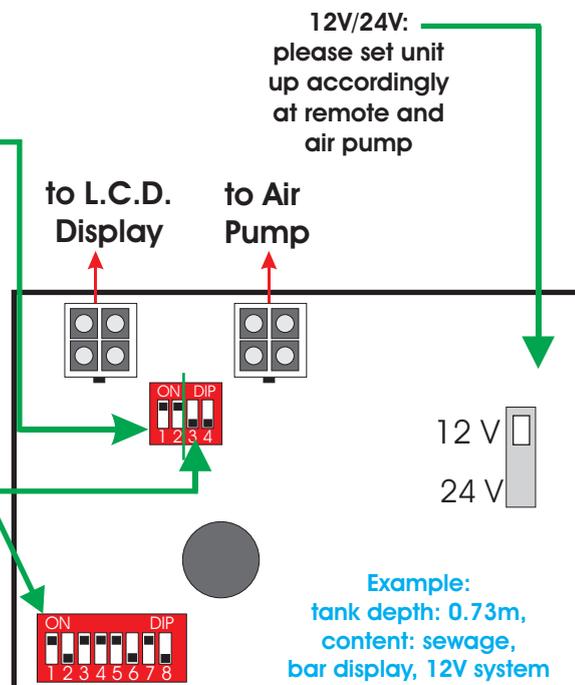
Tank Depth:

(Very important! - adjust by setting the group of 8 dip switches)

The pneumatic tank gauge is suitable for a maximum tank depth of 2.0m (water). The set-up is done with the group of eight dip switches on the back of the L.E.D. Display.

**Without a correct set-up the tank gauge cannot work correctly!
Ensure that all 8 dip switches are in the OFF position prior to set-up!**

Every single dip switch represents a fixed length. The correct tank depth is set up by adding the lengths that are represented by all dip switches that are switched on. Thereby it is possible to adjust the tank depth with an accuracy of about 0.8cm.



Settings for Tank Depth:

switch 8 ON =	100cm
switch 7 ON =	50cm
switch 6 ON =	25cm
switch 5 ON =	12,50cm
switch 4 ON =	6,25cm
switch 3 ON =	ca.3,12cm
switch 2 ON =	ca.1,56cm
Switch 1 ON =	ca.0,78cm

Example: Say your tank is 73cm deep. First, set all eight dip switches to OFF! Then switch on the dip switch that represents the length just below the tank depth, i.e. switch 7. This represents 50cm and leaves 23cm to be set. Switch on switch 5 which represents another 12.5cm and leaves 10.5cm to be set. Next, switch on switch 4 which represents a further 6.25cm and leaves 4.25cm to be set. Now, switch on switch 3 which represents 3.12cm and leaves 1.13cm. Finally, switch on switch 1 which represents 0.78mm. This setting leaves a negligible difference of only 0.35cm to the actual tank depth.

Important: To set the tank depth actually means to determine the length of the pipe inside the tank. This means that when the content of the tank has sunk to the level of the tube end, the system will show 0%. However, there could still be some liquid in the tank, i.e. below the level of the tube end. Therefore, the distance from the end of the tube to the bottom of the tank should not differ from the recommended 10mm to keep any inaccuracy as low as possible.

Installing the device into a tank

In order for the unit to work a simple 6mm - 8mm bore pipe must be placed about 10mm above the base of the tank. (Do not use a smaller pipe as the volume of air which is pumped by the air pump will cause a back pressure and as such will give inaccurate readings.)

A suitable standard pipe (1m) can be purchased from your Sterling dealer (part no. TGT). This standard pipe can be shortened as required. For deeper tanks it can be extended up to a maximum of 2m. Ideally, on a new boat the pipe should be fitted during the tank construction stage.

Unfortunately, it is almost impossible to provide specific fitting instructions for any existing type of tank. Some have got inspection hatches (which makes things easy) and some have not. The bottom line is to get a tube running from the top of the tank to about 10mm off the bottom. On tanks with unusual shapes you can either bend the pipe or lay a flexible plastic pipe (8mm internal diameter), in which case you have to make sure that the inner cross section of the tube is not reduced.

If you use the Sterling standard tube, it comes with a set of nuts and bolts for tanks with inspection covers.

Important Safety Advice

The subsequent safety guidelines must be followed when installing the pneumatic tank gauge:

- 1) When working on tanks, especially when drilling, all relevant safety measures have to be taken. If you have any problems or concerns seek professional advice!
- 2) Always ensure the tank is completely empty before working on it.
- 3) In case you intend to use the pneumatic tank gauge for a petrol tank, it is mandatory to have the tube installed by a professional.

Explosion Risk!!!

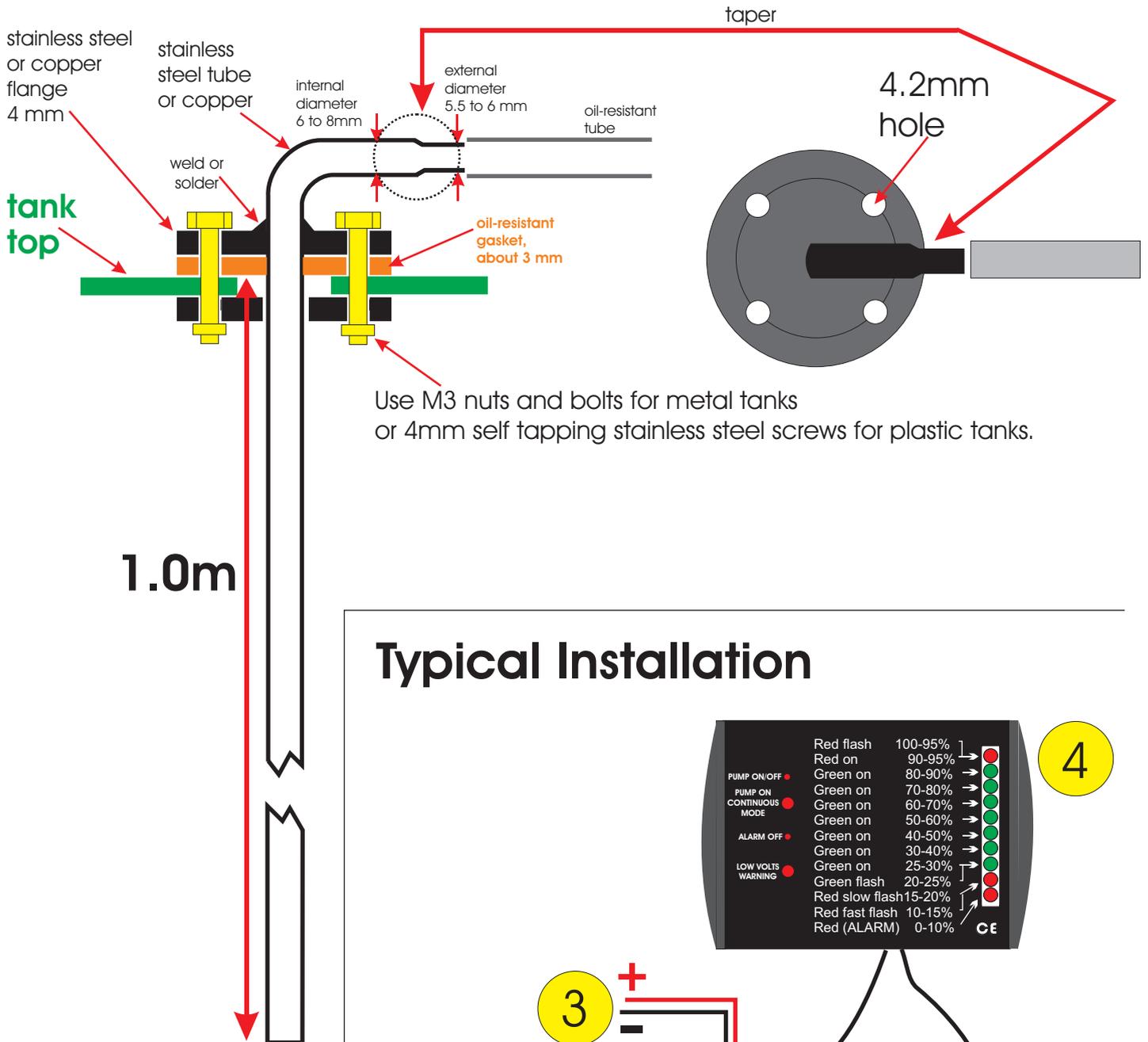
Pump Positioning

The pump unit must be positioned at least 50 mm above the top of the tank. This is to prevent any possibility of siphoning liquid back into the pump.

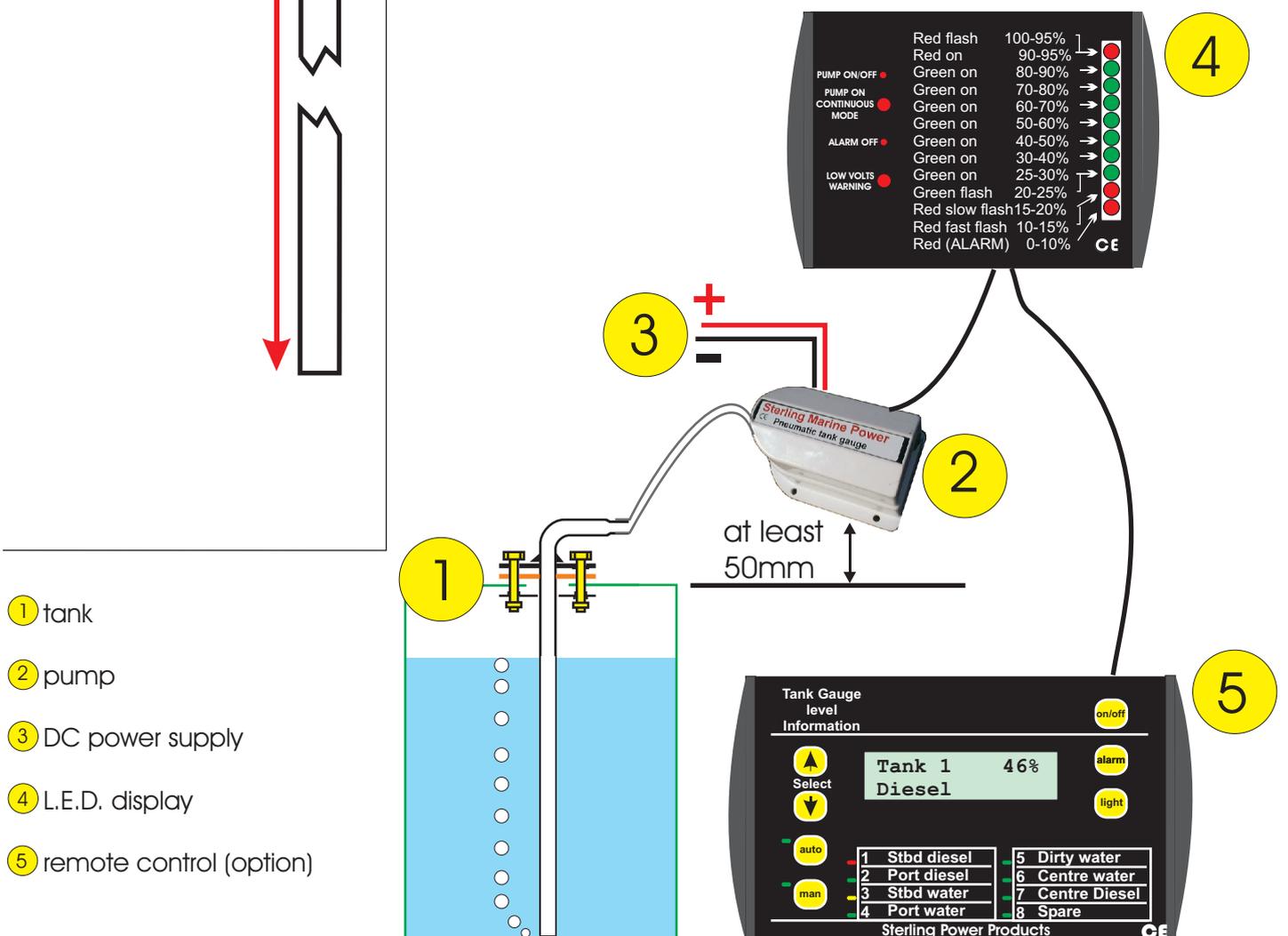
Electrical Connections

Before switching on, the d/c voltage of the boat must be set on the side of the pump housing to either 12 or 24 volts. The system is pre-loomed and only requires the d/c power to be connected to the pump housing. The L.E.D. display must be connected to the pump by using the supplied connection cable.

Installation Layout



Typical Installation



Frequently Asked Questions

What accuracy can I expect of the pneumatic tank gauge?

The tank content is calculated by an 8 bit system, which results in a resolution of 256 part units. Relating this to a maximum tank depth of 2m means that each step represents approximately 7.8mm. For a tank depth of, for instance, 80cm this results in a theoretical inaccuracy of about 1%. However, in practice one would expect a somewhat higher inaccuracy, on average around 3% to 4%. This is due to the fact that determining and setting the tank depth will always be subject to some imprecision. Further deviations can occur on tanks with non-linear pressure progression.

Can the pneumatic tank gauge be used on toilet holding tanks?

In general, the pneumatic tank gauge can also be used for toilet holding tanks. In this case you must use the setting for sewage. Depending on the actual type of tank ventilation it is possible that the backpressure building up inside the tank during measurements will be higher than in ordinary water or fuel tanks. Therefore, an increased inaccuracy may occur.

Sterling Power Products Ltd.
86A Blackpole Trading Estate West
Worcester, WR3 8TJ
Great Britain
www.sterling-power.com