

# TANK LEVEL CONTROLLER

## Installation & User Guide

### The Gulf Tank Level Control (TLC)

uses sensor inputs to monitor the level in a water tank or dam. When the water level changes the TLC sends a radio control signal to a Gulf Pump Control Unit (PCU) to switch the pump on or off.

The TLC can be powered by long-life lithium battery (supplied), or optionally from an external 12V DC or 24V AC, 1 Amp power supply (not supplied).

The unit can be used either with a float switch or with up to 4 different level probes. When operated with multiple probes the TLC is capable of switching a total of 4 pumps – one pump per level probe.

#### Antenna Connection

#### Pump On/Off Buttons

Pressing one of these buttons starts or stops the appropriate pump.

#### Pump Status Lights

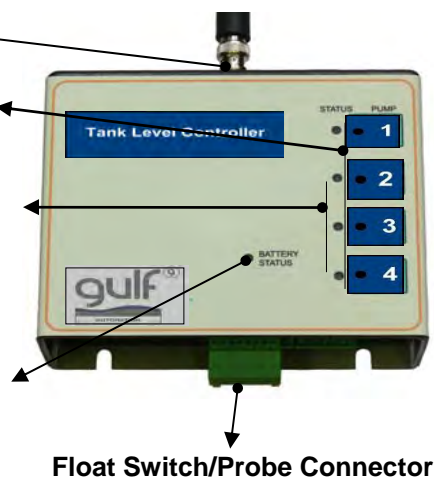
Flashes green to indicate when pump is on.  
Flashes green and red when pump is manually switched on.

Flashes red if pump has been manually switched off.

#### Battery Indication Light

Illuminates green for about 25 seconds after power-up to indicate that the TLC is functioning correctly. Then flashes green to indicate normal operation.

Flashes red to indicate when batteries need replacement.



## 1. INSTALLATION GUIDE

### 1.1 Applying Power

The Tank Level Controller may be powered either from a long-life lithium battery (supplied), or from an external 12V DC or 24V AC power supply. (Not supplied) Select which power source you require and follow the appropriate instructions below.

- **Battery Powered** — Firstly, remove the lid to the battery compartment by removing the screw. Then connect the lithium battery provided, making sure that the connector is inserted the correct way around.
- **Externally Powered** — The power source used must provide 12V DC or 24 V AC. and have a rating of at least 1 Amp. Connect the Power supply to the Input connector making sure that positive is connected to Pin 1 and the ground connected to Pin 2. See Input Connections Table on page 5

The Battery Indication light will illuminate green to indicate that the Tank Level Controller is operating. The battery indication light will switch off approximately 25 seconds after powering on the unit in order to preserve the battery life.

### 1.2 Learn Procedure

The Tank Level Controller must be used in conjunction with one or more Gulf Pump Control Units. The Pump Control Units must first “Learn” the unique identity number of the Tank Level Controller before they will respond to it. This is so that the Pump Control Unit will not react to somebody else’s equipment.

The Learning procedure is best carried out with the Pump Control Unit (PCU) in close proximity to the Tank Level Controller, although it can be performed with the PCU at its chosen site.

- Fit the rubber-duck antenna to the antenna connector of the Tank Level Controller. Ensure that the PCU is powered up and has its antenna connected (refer to the PCU Installation & User Guide if necessary).
- Place the Pump Control Unit into Learn mode by pressing the Learn Mode button on the Pump Control Unit (PCU). The Learn Mode light will illuminate red to indicate that the PCU is in Learn Mode. (If the Learn Mode button is pressed again then the PCU will exit Learn Mode).
- On the Tank Level Controller press and hold the appropriate Pump button for about 10 seconds e.g. If the Pump Control Unit is controlling Pump Number 1 then press and hold the Pump1 button, if the Pump Control Unit is controlling Pump Number 2 then press and hold the Pump2 button etc.
- The Tank Level Controller will then send a Learn transmission to the PCU. The PCU indicates that it has accepted the Learn transmission by switching off the red Learn Mode light and exiting Learn Mode.

### 1.3 Positioning.

#### 1.3 Positioning the Tank Level Controller (TLC)

The TLC must be placed in a position where it is sheltered from the weather, where the float switch or probe cable will reach the water tank or dam, and preferably as high as possible in order to maximize radio transmission range. Once a suitable position has been found, a Range Test should be conducted to ensure that the PCU is within signal range of the TLC.

- Range Test Operation** — Simultaneously press the 'Pump1' and 'Pump4' buttons on the TLC. The Tank Level Controller will then start to send Range Test signals. It will automatically stop sending after a period of approximately 40 minutes. To manually stop sending Range Test signals press the 'Pump2' and 'Pump3' buttons simultaneously.
  - Range Test Indication** —The PCU will indicate receipt of a Range Test signal by flashing the green Range Test light. A full strength signal will be indicated by the Range Test light flashing green 8 times, with each flash spaced approximately one second apart. There is then a break in the signal for about ten seconds before a further 8 transmissions are sent. This sequence is repeated continuously by the TLC while it remains in Range Test mode.
- | Num of Flashes | Signal Strength  |
|----------------|------------------|
| 8              | Very Good        |
| 7              | Average          |
| 5              | Below Average    |
| 2              | Poor             |
| 1              | Very weak        |
| 0              | No Communication |
- Antenna and Repeater Options** — If the signal strength is not good enough at the Pump Control Unit then there are several options available to improve the signal.
  - Positional Adjustment** — Try adjusting the height of the TLC and PCU so that they are as high as possible above ground. Also try to position the units so that there are little or no obstacles between them.
  - Dipole Antenna** — You can achieve a greater signal range by installing a dipole antenna instead of the standard rubberduck antenna. The dipole antenna can also be raised to a greater height thus also increasing range still further.
  - Gulf Repeater** — If there is a large obstacle such as a hill between the Tank Level Controller and the Pump Control Unit then you can get around this by installing a Gulf Repeater unit.
  - Once a position has been found with acceptable signal strength then the TLC can be mounted using the mounting holes and screws provided, taking special care to avoid drilling where there could be existing electrical wiring

### 1.4 Sensors

#### 1.4.1 Connecting a Float Switch

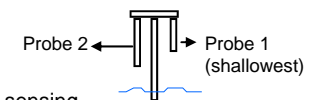
- The float switch must be connected to the Tank Level Controller such that the switch contact is in the open position when the level of the water is below the float switch level.
- If you are using a Minimatic float switch this is accomplished by connecting the Black and Brown wires of the Minimatic float switch to pins 4 and 3 of the TLC connector (it does not matter which way around they go).

#### 1.4.2 Connecting Level Sense Probes

- Each probe controls a separate pump, so you will need to cut the lengths of the probes according to your pumping requirements.
- Starting with the shallowest probe, this should be connected to Probe 1 input on the connector block. Then connect the other probes in order of depth.
- Always use a probe spacer to ensure that your probes do not come into contact with each other.
- You must go through the Learn Procedure for each individual level sense probe otherwise it remains disabled. e.g. For Probe 2 you must go through the Learn Procedure for Pump number 2.
- You can use four float switches on one TLC instead of probes, one float switch per probe

### 1.5 Probe Operation

- The Tank Level Controller (TLC) operates by sensing the electrical resistance between the Common Probe and the other probes.
- When the water level drops below a probe, the TLC will continue to sense the water level for a further 10 minutes. If the water level is still below the probe then the TLC will send a signal to switch on the pump for that probe.
- IMPORTANT**— If ONLY pump 1 has been learned the TLC will transmit the ON/OFF command after 20 seconds. And there will be no 10 minute delay.
- IMPORTANT**—If the water level drops below the level of the next probe during the 10 minute delay time then the pump will be switched on IMMEDIATELY.



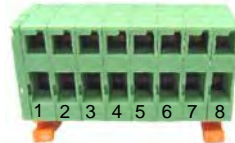
## 1.5 Probe Operation ( Cont)

- As the water level starts to rise the same principle is applied in reverse e.g. as the water level rises past Probe 4, a 10 minute delay time will commence. If the water level remains higher than Probe 4 for this period then Pump 4 is stopped. If during the 10 minute delay time the water level rises above Probe 3 then Pump 4 will be immediately switched off.
- Once the water level rises above the Probe 1 level then ALL pumps are switched off without delay.

Input Connections Table

Input Description	Connector Pin
External Supply 12VDC or 24 V AC	1
GROUND	2
GROUND	3
Float Switch/Probe 1	4
Probe 2	5
Probe 3	6
Probe 4	7
Centre Probe (Common)	8

Input Connector



## 1.6 Disabling a Probe

- There may be circumstances where you want to disable a level sense probe input. For instance, if you have a pump located some distance away which you want to control manually from the Tank Level Controller. In this case instead of fitting a probe to the relevant input on the Input Connector, you need to link the relevant probe input to the Common Probe pin (Pin 8).

## 2. OPERATING GUIDE

### 2.1 Automatic Operation

- The Tank Level Controller has a delay of approximately 20 seconds between a water level change occurring and actually sending a radio signal to the Pump Control Unit. This delay is necessary in order to prevent water ripples or waves from continuously triggering the pump operation.
- Note that the Learning procedure for each pump must first be followed before a probe becomes operational.

### 2.2 Manual Operation

- Pressing a Pump On/Off button will toggle the present state of that pump e.g. If the pump is currently off then pressing the Pump On/Off button will cause the pump to switch on. A Manual indication will be given on the relevant Pump Status light.
- There is no timeout on manual operations e.g. If the pump is manually switched on it will remain on permanently until manually switched off. Also, the Tank Level Controller will ignore all water level inputs whilst it is operated manually.
- To cancel manual operation simply press the relevant Pump On/Off button again.

### 3. MEMORY CLEAR

At times it might be necessary to clear the memory of the TLC. E.g the unit was used with 4 pumps and 4 probes but now the unit will be used with 1 pump and a float switch. To disable the other probes you can clear the memory.

Disconnect the power to the unit and remove the battery. - Reconnect the battery. - The Green Battery Status LED will illuminate for app. 5 sec and then go OFF. While the Green LED is OFF, press and hold "Pump 3" and Pump 4" buttons simultaneously until the Green Battery Status LED comes ON again. - All 4 the RED Pump Status LED's will flash briefly to indicate that the memory is cleared. - Release the buttons.

NOTE - The unit will now not respond to ANY probe input and the Pump Learn procedure must be done again before the unit will respond to any probes.



#### 4. WARRANTY

This warranty is issued by the manufacturers of the Tank Level Controller (TLC), hereinafter referred to as the Company. The Company warrants to the original purchaser that for a period of ONE YEAR from the date of purchase, the equipment is free from defect under normal use, both in workmanship and material, subject to the following conditions.

1. Repair or replacement of any part of this equipment, found by the Company to be defective, shall be at the election of the Company. The costs of such repair shall be borne by the Company in full, provided that the equipment is returned via an authorised distribution agent.
2. This warranty shall become void and cease to operate if any repairs to the equipment are effected by any persons not duly authorised by the Company, or if any substitute parts not approved by the Company are used in the equipment, or if the serial number of the equipment is removed.
3. The Company shall not be responsible for damages resulting from fire, flood, civil disturbances or any Act of God. The Company shall not, in terms of this warranty be responsible nor held liable for any consequential loss or damage of any kind caused by or due to the failure or malfunction of the equipment.
4. This warrantee does not cover the Lithium batteries supplied with each unit, since the life of the battery is dependant on the frequency of operations..
5. The Company shall not be responsible for transportation or other costs than those incurred within the provisions of Point 1 of this warranty.
6. This warranty shall not apply to the equipment if it is purchased or used beyond the borders of the Republic of South Africa, Lesotho, Swaziland, Namibia, Botswana, Mozambique, Angola and Zimbabwe.
7. Where service is requested under warranty and no fault or defect can be found by the Company, all costs incurred will be for the purchaser's account.
8. This document, as well as your invoice will serve as proof of purchase. For the purpose of warranty, it will be essential to produce this document and invoice. Failure to do so will render the purchaser liable for the service costs.