

TANKMASTER MP TYPE Combined Temperature and Liquid Level Controller

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

These instructions should be carefully read and understood by all operators before installing and commissioning the equipment. Failure to comply with instructions could invalidate the warranty. The TANKMASTER is manufactured from high performance materials and should give trouble free service provided it is installed, operated and maintained in accordance with these instructions

Models Covered:

TKMP16
TKMP23
TKMP27
TKMP28



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1. Controller description

The Tankmaster MP is a microprocessor controlled temperature & liquid sensing controller capable of controlling liquid and temperature parameters within a process.

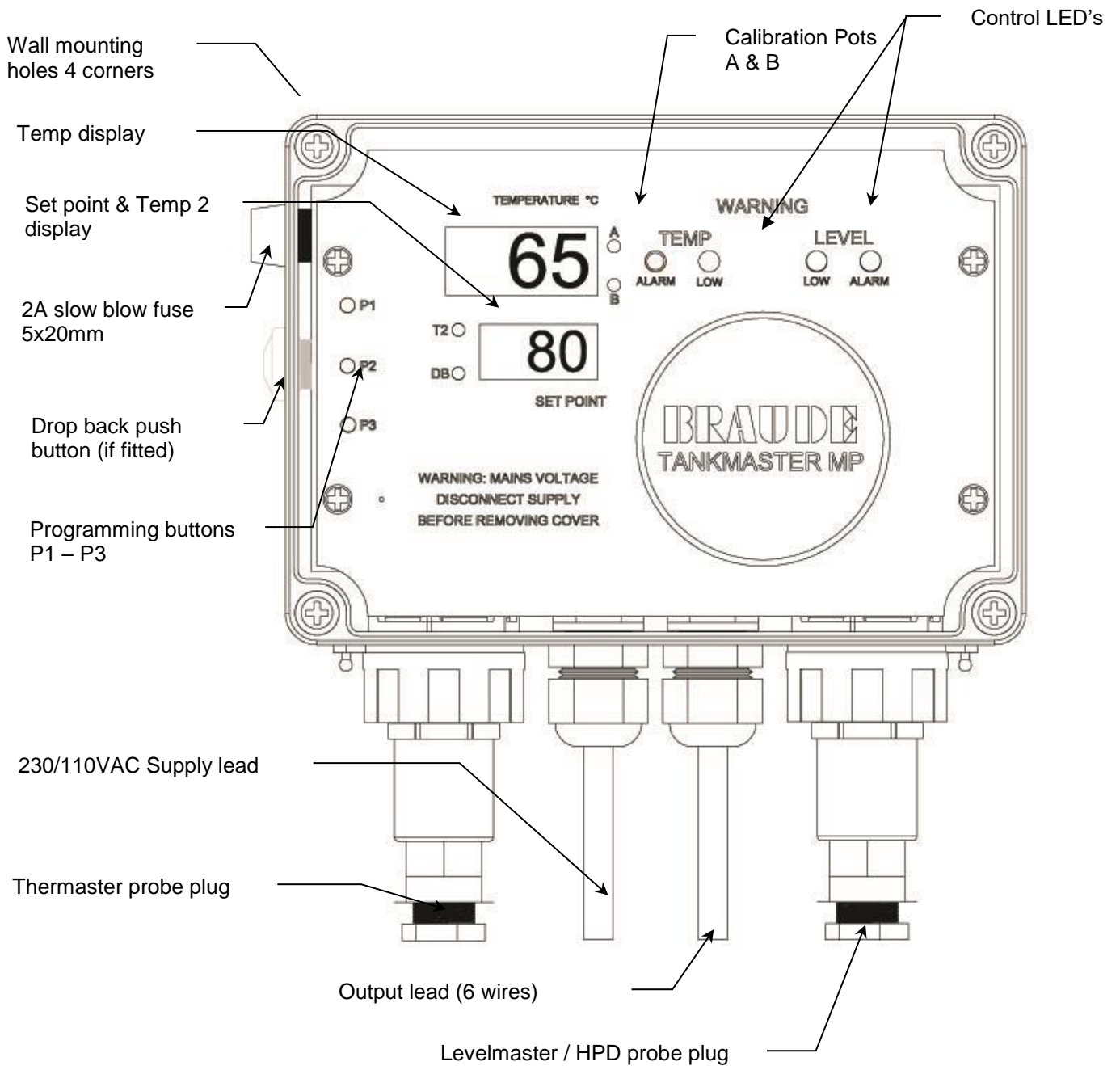


Fig 1: Tankmaster controller

Additional programmable features of the controller are:-

- a) Two independent temperature sensing circuits
- b) Two independent liquid level sensing circuits
- c) Variable temperature hysteresis
- d) High/low temperature alarm circuit (no volt or 110/250volt output)
- e) Manual energy saving function for overnight/weekend shutdown periods (not timer operated)
- f) No volt or 110/240v output relay to operate heater / pump

Please contact Braude if you require further information.

2. Warning Notice

We strongly recommend that installation is carried out by a qualified electrician. This controller is manufactured from top quality non-corrodable materials and should give trouble free service provided it is installed, operated and maintained properly.

Warning-Mains Voltage

- Always disconnect supply before removing cover or attempting connections.
- The Tankmaster MP is supplied as standard with **Volt free** relays UNLESS specified at the time of order.
- Should the Tankmaster MP be ordered as a mains output voltage type the grey output lead (marked with a red warning label and fitted with a protective cap) becomes live once the mains supply lead is connected to 230/110VAC. Always connect output lead first.
- The controller is rated at 5 amps, any heater or pump likely to draw more current should be connected through a contactor as shown in the wiring diagrams Fig 3 or 4.

Note: Failure to connect the earth may result in a serious safety hazard.

- Your Tankmaster controller is sealed to IP65 standard. If the cover is removed ensure that the gasket is firmly seated in the locating groove before tightening the remaining screws.

Caution The controller must be isolated from the electrical supply during installation.

3. Mounting

Remove the clear plastic cover by undoing the 4 plastic screws at the corners. The controller should be fixed to a suitable surface within reach of the probe leads using suitable screws through the 4 fixing holes in the corner pillars. The unit should be positioned within easy reach of the equipment to which it will be connected.

4. Electrical Connection

The controller is fitted with flying leads for easy connection. The output lead is grey in colour and marked with a red warning label. The other lead is the mains supply. See Fig.1

4.1 Power Supplies

The Tankmaster MP is equipped with an auto sensing circuit designed to accept either 110 or 230 volt AC without the need for changing any internal parts.

4.2 Relay Operation

Your Tankmaster controller is configured for **VOLT FREE** operation (unless specified at the time of order placement) and is fitted with a grey 6 wire output lead. The 6 wire output lead connections are shown in the table below (Refer to wiring diagram Fig 4 on page 7)

Black 1 – Heater relay output	This is a volt free relay- the output lead connection B1/B2 is volt free
Black 2 - Heater relay common	
Black 3 – Alarm relay common	This relay is volt free and any voltage between 12 and 240v may be applied across it
Black 4 – Alarm relay output	
Black 5 – Level control output (pump)	This is a volt free relay – the output lead connection B5, is volt free
Black 6 – not used (isolate)	

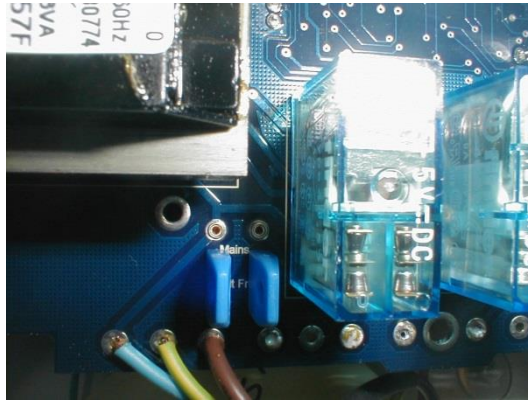
Any suitable control voltage up to 240V may be connected to the common of the relay.

4.3 Conversion to internal mains contacts

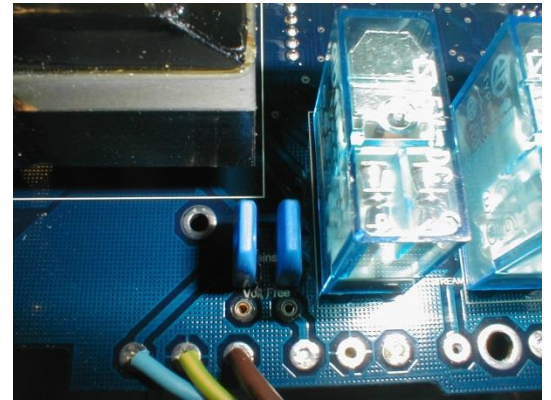
The relay can be converted to internal mains contacts (110/240v) as follows:

- a. Remove the clear cover, blue faceplate and PCB taking great care not to damage any of the electronic components. It is advisable to earth yourself prior to carrying out this operation. It is also recommended that this conversion be done in a clean environment.
- b. Locate the blue jumpers sited on the underside of the printed circuit board between the transformer and the relay as shown in the pictures below.
- c. **Both** jumpers should be moved to select the desired operation. The pictures below show both configurations of jumpers.

NB **both** blue jumpers must be moved otherwise the PCB will be damaged.



Volt free relay



Mains relay

4.4 Connections for a live relay controller

Refer to wiring diagram Fig 3 on page 7

Black 1 – Heater contactor Live	This is a live relay- the output lead connection B1/B2 is 110/240 volts
Black 2 - Heater contactor Neutral	
Black 3 – Alarm relay common	This relay is volt free and any voltage between 12 and 240v may be applied across it
Black 4 – Alarm relay output	
Black 5 – Level control Live (i.e. pump)	This is a live relay – the output lead connection B5, is 110/240 volts
Black 6 – not used (isolate)	

5. Description of controller display

The blue faceplate, as shown in Fig 2 on page 6, has two LED displays, six LED's and three push buttons. The larger of the two displays, referred to as the main display throughout this document, displays the temperature of probe T1 normally situated in the process tank. The small LED display located below the main display is principally used to display the temperature set point. To the right of the main display are four LED's. These indicate the various states of temperature and liquid level being monitored by the controller.

5.1 Temperature LED's

The '**Alarm**' LED indicates when the process tank temperature exceeds the UPPER temperature limit or is below the LOWER temperature limit. This alarm light is NOT activated on standard Tankmaster controllers.

The '**Low**' LED indicates when the process tank temperature is BELOW the set point temperature. This is standard on all Tankmaster controllers.

The **T2** LED located to the left of the small LED display, indicates when temperature probe T2 is showing in the small LED display. This light is NOT activated on standard Tankmaster controllers.

The '**DB**' drop-back LED located to the left of the small LED display indicates when the drop-back circuit is activated. This light is NOT activated on standard Tankmaster controllers.

5.2 Liquid Level LED's

The '**low**' level LED indicates when the liquid level is below the low level sensor on the level probe. This is standard on all Tankmaster controllers

The '**Alarm**' level LED indicates when the liquid level is above the High High or Low sensors on the second level probe. This LED indicator is NOT activated on standard Tankmaster controllers configured for on one level probe.

5.3 Push buttons P1 to P3

These buttons are used to configure and display the various functions of the controller. For the standard Tankmaster controller they are used to change the SET POINT and should be operated as follows.

5.4 Setting the SET POINT

- a) Press P1 once to display the SET POINT, which is shown in the main LED display as '**SP**'. The actual set point value is shown in the small LED display window below it.
- b) Press P2 to decrease the set point value or P1 to increase it.
- c) Once you have selected the desired set point value press P3 once to accept it.

5.5 Setting the Hysteresis

The main LED display will now show the letters HYC meaning Hysteresis Customer setting. This is factory set to +/- 1 degree about the set point. If you wish to keep this value press P3 once. If you wish to change it, press P1 and P2 to adjust and then press P3 to confirm. Both displays will revert back to normal operation.

5.6 Calibration points A and B

Two potentiometers A and B have been provided to calibrate the Tankmaster against temperature probes attached to it. These calibration points are located to the right of the main LED display and are marked A and B. See Fig 2.

The Tankmaster is calibrated for use with a standard temperature probes, type TPOMKV (0.5m probe with 2m flying lead) unless specified on the despatch paperwork. Should you attach a longer temperature probe, it will be necessary to re-calibrate the controller in order for it to display the correct temperature. Calibration point A is for calibrating

temperature probe T1 (standard) and point B for probe T2 should your Tankmaster be configured for a two probe system.

To calibrate the controller insert a small flat ended screwdriver into the correct hole until it engages with the potentiometer slot below. You can now rotate the screwdriver CW and CCW to increase or decrease the displayed temperature. It is recommended you use a glass thermometer as a reference temperature to perform this operation as detailed below. Also ensure that you do not apply undue pressure once you reach the end stops on the potentiometers otherwise damage will occur

5.7 Immersion Method Against Known Temperature.

Place the probe and a thermometer in a container of ice and water and allow to settle for approx. 5 minutes.

Adjust potentiometer A or B until the Tankmaster display reads the same as the thermometer.

Place the thermometer and the sensor in a second container with water at an elevated temperature of say 70°C and allow to settle (5 minutes)

Adjust potentiometers A or B until the Tankmaster display reads the same as the thermometer.

Repeat the above procedure until satisfied the display is stable. The unit is now calibrated.

NB The above procedures are recommendations and do not constitute part of a certifiable test. It is recommended that you contact a standard testing centre if certification is required.

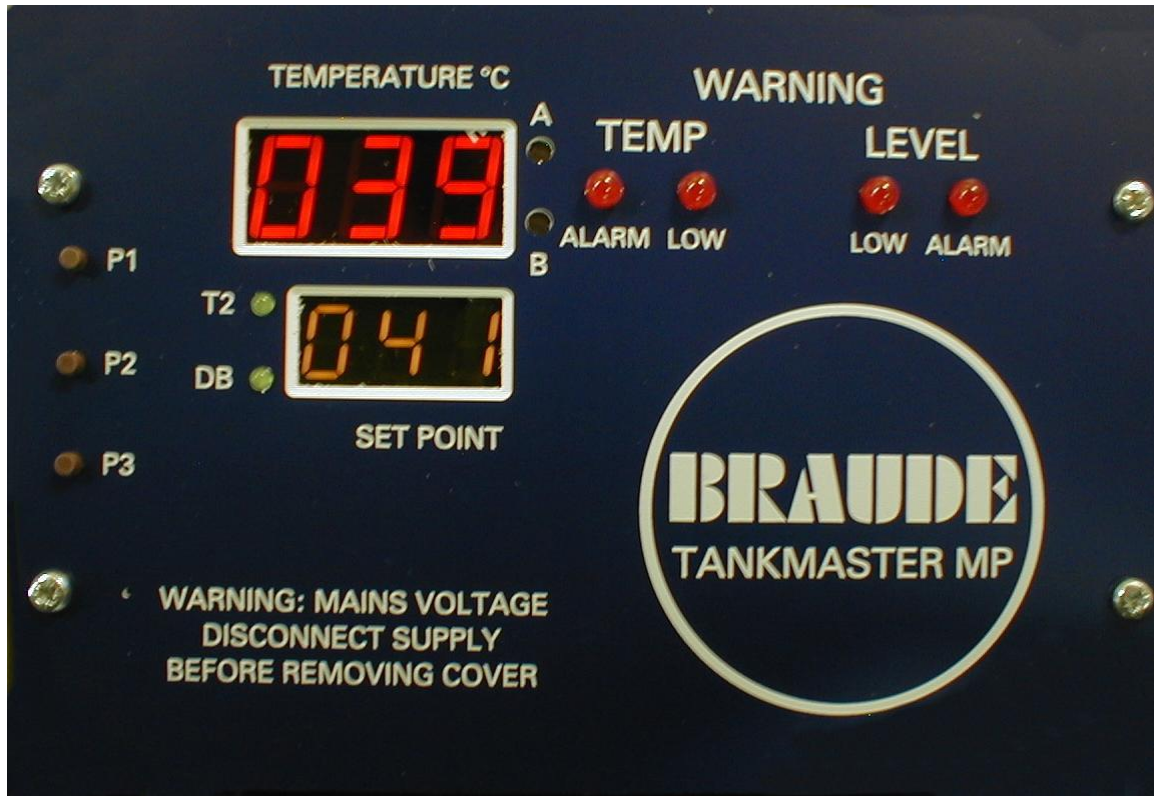


Fig .2

Temp and Liquid level status	TEMPERATURE		LEVEL		HEATER	PUMP
	Alarm *	Low *	Low *	Alarm *		
Temperature below set point	OFF	ON	-	-	ON	-
Temperature above set point	OFF	OFF	-	-	OFF	-
Liquid level low	-	-	ON	OFF	OFF	ON
Liquid level high	-	-	OFF	OFF	ON	OFF

Table showing LED and heater / pump status.

6. Wiring connection

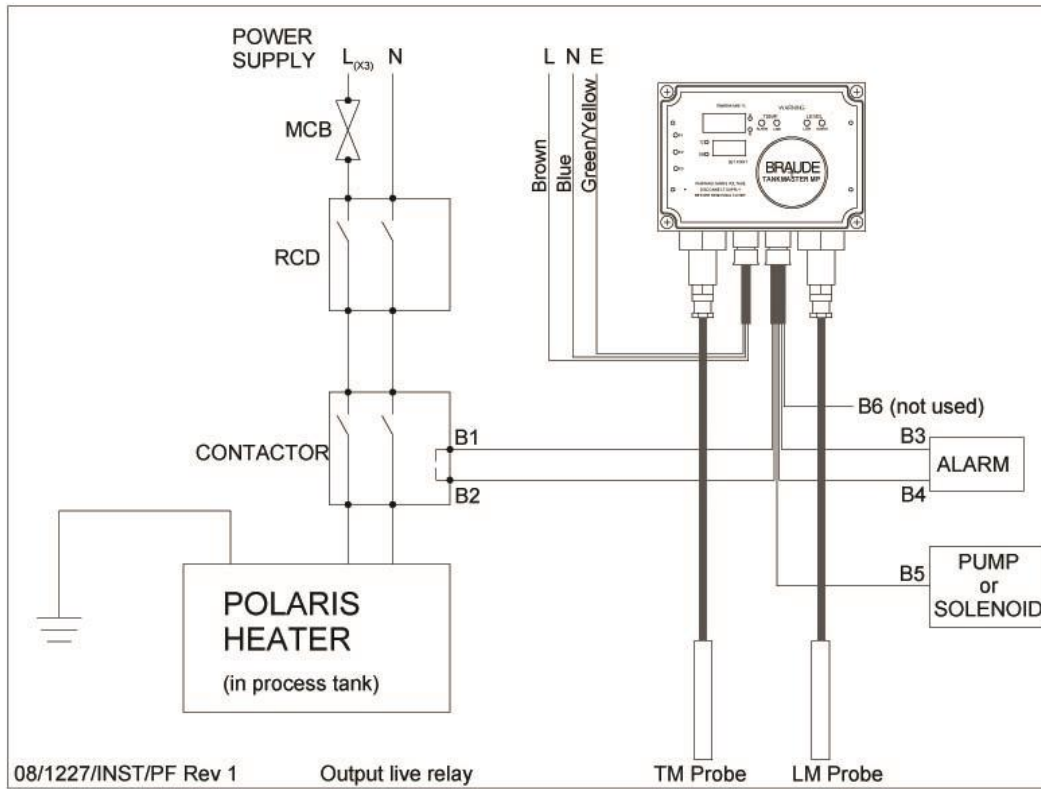


Fig 3: Wiring diagram for Tankmaster connected to Polaris heater (Live relay)

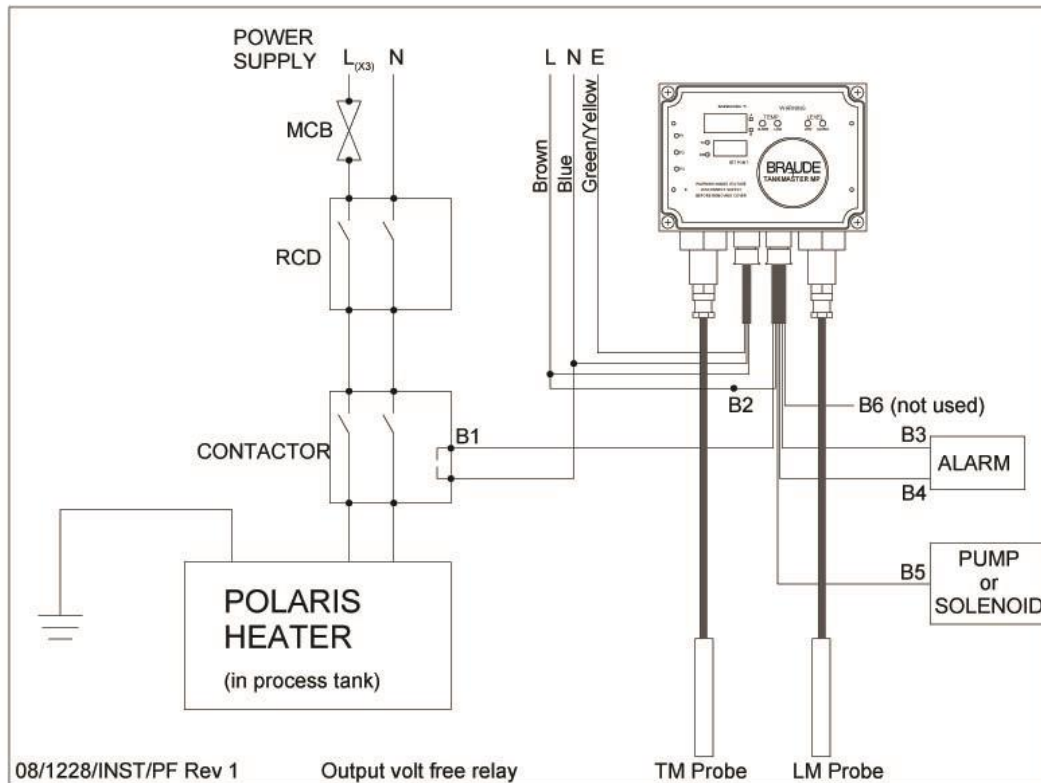


Fig 4: Wiring diagram for Tankmaster connected to Polaris heater
(Volt free relay)

7. Installation of Sensors

Probe Mounting: Position the probes at a suitable point in the tank where they will not be damaged. The probes may be fixed using the clip provided with the black shroud above the solution level.

The probe is supplied with a two or three pin IP66 standard plug which should be connected to the appropriate sockets on the underside of the controller. Ensure that the locking ring is tightened.

Double check all connections before supply is switched on.

8. Temperature Setting

Switch on the mains supply. The digital display will illuminate to indicate that power is on, the Temp low LED will illuminate if the temperature of the solution is below set point.

Adjust the temperature Set Point to the required value as described in section 5.4 above

Once set, the Tankmaster should not require re-calibration. However, for Quality Control purposes the unit can be re-calibrated, please contact our Technical Department.

9. Fault Display

Should a fault occur in the Thermaster temperature probe circuit, the main display will show the following:-

- Open circuit T/M probe 188
- Short circuit T/M probe '17

Check connections in probe plug, secure if disconnected. Check probe and replace if there is a short or open circuit. Controller and probe can be returned to E. Braude (London) Ltd., for Calibration, Service and Repair.

10 Liquid Level Setting

10.1 Single level control (using 3 wire Levelmaster probe)

10.1.1 Low level only

- Cut the red sensor to the low level required.
- Cut the white sensor 50mm higher than the low level sensor.
- Cut the green sensor to not less than 30mm below the lowest level required.
- The ends of all the sensors should be stripped to expose approximately 5mm of carbon filament.
- Fit the probe assembly in clip.

10.1.2 High level only

- Cut the white sensor to the high level required.
- Cut the red sensor to 50mm below the high level.
- The ends of all the sensors should be stripped to expose approximately 5mm of carbon filament.
- Fit the probe assembly in clip

10.1.3 Wire B1 on the output lead will be live at high liquid level. Wire B5 on the output lead will be live at low level, off at high level.

ALWAYS INSULATE AND ISOLATE ANY WIRE NOT IN USE

10.1.4 Power to the LED displays indicates main supply present. The level low LED indicates solution level below the red sensor.

10.2 Dual level control (using 3 wire levelmaster probe)

10.2.1 Level Setting

- Cut the white sensor to the high level required.
- Cut the red sensor to the low level require
- Cut the green sensor to not less than 30mm below the lowest level required.
- The ends of all the sensors should be stripped to expose approximately 5mm of carbon filament.
- Fit the probe assembly in clip.

10.2.2 Connect the wire B1 to the heater contactor and wire B5 to the pump contactor (if required). Wire B2 is a neutral for both.

10.2.3 Power to the LED displays indicates main supply present. The level low LED indicates solution level below the red sensor.

10.3 Level control using polaris heater HPD probe (applies to TKMP27 and TKMP28)

INSTALLATION

Mount the POLARIS in the tank following the relevant installation instructions, supplied with your immersion heater. If the HPD is used to control more than one heater, the POLARIS fitted with an HPD probe must be mounted slightly higher than the others.

Plug the probe lead into the right hand side of the Tankmaster controller and screw the locking ring firmly home. The level warning light will come on when the solution level falls below the HPD probe which is located at the top of the POLARIS.

Connect wire B1 on the output lead to the contactor for the heater. Wire B5 will be live under low level conditions and could be used to power a remote alarm, otherwise it should be isolated.

OPERATION

The level control is fully automatic and does not require attention once installed. However, it is recommended that the HPD probe in the POLARIS is cleaned as part of the regular maintenance schedule set out in the POLARIS installation instructions.

For de-ionised water and similar low conductivity solutions a special high sensitivity controller is supplied with stainless steel sensors. These are marked as follows:

- White - high level
- Red - low level
- Green - common

During commissioning of the standard units, if tap water is used for testing add a small amount of common salt to increase the conductivity of the solution.
It is recommended that the probe assemblies are cleaned as part of the regular maintenance schedule to avoid build up of scale or other solids.

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