SolaStat

OmniStat-Plus

CE ISO9001 REGISTERED SUPPLIER TECHNOLOGY & QUALITY AWARD Z985

Installation Guide.

OmniStat-Plus Installation Guide Index.

OmniStat-Plus.
Gas Booster Controller.

SolaStat

Features.

· **Advanced Temperature Control for Gas Hot Water Heating.**
· **Up to Three Sensors for Comprehensive Monitoring.**
· **Large 20mm Soft Green Digital LED Display c/w 8 Status Lights.**
· **High Quality, Efficiency, Reliability and +/-1C Accuracy.**
· **Stainless Steel, Water Resistant Temperature Sensors.**
· **Pre-wired with Mains Plugs and Sockets, no Electrician Required.**
· **Pre-Programmed to Customer's Specification at No Extra Cost.**
· **All Values and Functions Installer Adjustable.**
· **Access Code Protected Front Panel Programming.**
· **Sensor Diagnostics and Smart Shutdown.**
· **Easy to Install with External Mounting Holes.**
· **Complies with Safety & EMC standards.**
· **Enclosure and cables UV resistant.**
· **Water Resistant and Rear Cable Entry Options.**
· **1HP (750W) Relay Std.**

ISO9001 REGISTERED SUPPLIER   CE

TECHNOLOGY & QUALITY AWARD   Z985

OmniStat Models Include:
OmniStat-Plus: Controller c/w Display.
SolaStat-Rmt: Remote Display.
SolaStat-Rly: Slave Relay for HWC Control.
SolaData: PC Datalogging & Comms.

Introduction.

The OmniStat-Plus is an advanced temperature control system designed for intelligent gas hot water heating. The OmniStat-Plus is easy to install, easy to use, easy to programme and visually appealing.

The OmniStat-Plus has advanced functions and takes the basics of setpoint control and adds sensor diagnostics, smart shutdown, comprehensive status displays and digital temperature display. Options also exist to add digital communications, remote display units and a sophisticated PC graphic datalogging and energy calculating software suite.

Senztek NZ Ltd has experience in designing and manufacturing control systems to Industrial Electronic Standards for over 15 years. This has earned SolaStat a reputation for Quality, Accuracy, Efficiency and Reliability.

Ordering Information.

OmniStat-Plus Standard; 1 x 1hp Relay, Digital Display, 8 Status Lights, 1 x 10m Temperature Sensors, 2m Mains Cable and Pump Outlet.

OmniStat-Plus Ranging Options.						
Relay Options	Rly	Power Supply	PS	Adjustable Value	Specify Within	Std.Model
1 x 1hp	1	85~264Vac/dc	H	Tank Off	1-100C	75C
		22~90Vdc	M	Tank On	0-99C	70C
		10~28Vac/dc	L			

High temperature silicon sensor cable, water resistant enclosure, and rear cable entry options are available.

Quality Assurance Programme.

The modern technology and strict procedures of the ISO9001 Quality Assurance Programme applied during design, development, production and final inspection grant the long term reliability of the instrument.

OmniStat-Plus Users Guide.

Your OmniStat-Plus has a microcomputer at its core that intelligently and automatically controls your Gas Boosted hot water system at maximum efficiency. The OmniStat-Plus measures the temperature of the cylinder and activates the pump at the optimum time. Although it was designed primarily to control the heating of a hot water cylinder through a gas booster, it is capable of controlling any temperature-based system.

The OmniStat-Plus has advanced features that protect the system from damage, run self diagnostics, self correct some problems and will keep you informed as to what the OmniStat-Plus is measuring and what decisions it is making.

Principle of operation.
The OmniStat-Plus has up to three sensors. One is used to control the system, and the other two are for logging and monitoring purposes only.
>   The control sensor is called: 'TANK'
>   The first extra sensor is called: 'SENSOR A'
>   The second extra sensor is called: 'SENSOR B'

The OmniStat-Plus controls the system based on an activation and deactivation point. If the sensor drops below its activation point, the relay is switched on. Once the system has been activated, the sensor must reach its' deactivation point before it is turned off again.

The placement of the sensor will affect the behaviour of the system. If the sensor is located at the bottom of the cylinder, any use may flush the sensor with cold water and turn the heating on. If the sensor is located at the top, the entire cylinder maybe cold before the heating system is activated. Also the type of HWC used, pipe work, Gas Boost kW capacity, etc., will all affect system behaviour.

In most cases, overuse of the heating system can lead to water temperatures present in the tank beyond what it is designed to handle (close to boiling). This is especially true of ceramic lined tanks. Also pressure can build which can cause other plumbing problems. To protect the hot water tank and stop pressure problems ensure that the deactivation point for the system is set to a safe temperature.

The OmniStat-Plus has other special features in addition to those mentioned above.

·   **Sensor diagnostics:** The OmniStat-Plus constantly checks the sensors. If the tank sensor is below -20C the display reads 'Lo'. If Sensor A or Sensor B is below -20C or Sensor A and Sensor B have a 100K resistor connected into their terminals on the PCB, then the display will not indicate these sensor temperatures. If a sensor is above 140C the display reads 'Hi'. If a sensor is outside the specified temperature range of -40C to 150C then the Display reads 'SSd' and the controller enters Smart Shutdown mode. When the display reads 'SSd' the sensor has either a steady light for a temperature above 150C (possibly shorted sensor or wire) or a flashing light for a temperature below -40C (possibly open sensor or broken wire). For example if the 'Tank' sensor wire is cut during some building work then the OmniStat-Plus display reads 'SSd', the 'Outlet' light flashes and the controller enters Smart Shutdown mode until the wire is repaired.

·   **Smart Shutdown (SSd):** In Smart Shutdown mode, the Display reads 'SSd' and the heating system is disabled. The sensor indicators to the left of the display will light to indicate the location and nature of the fault.

·   **System override:** For added flexibility you can make the relay operate manually. The pump will turn on as long as the 'Pump' button is held down unless of course the system is already on in normal operation.

·   **Test:** Briefly pressing this button will cause all the lights to flash on for 3 seconds then display for 3 seconds the number of times the OmniStat-Plus has operated the pump. This count will reset and start again after '999'.

OmniStat-Plus Display Panel Description.
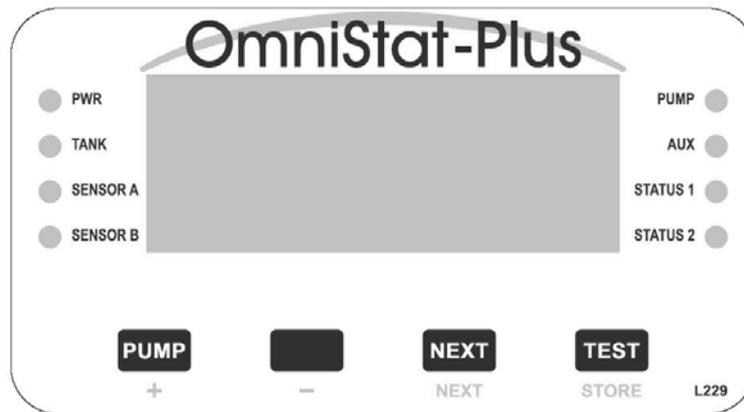
· The 'PWR' light on indicates that power is being applied to the unit.

· 'TANK', 'SENSOR A' and 'SENSOR B' lights will be on to indicate which temperature is being displayed. Only 1 of the 3 can be on in normal operation. If more than 1 of these lights are on then it is in Smart Shutdown mode and 'SSd' will be on the display.

· The 'PUMP' light will be on when the pump is on.

· The 'AUX', 'STATE 1' and 'STATE 2' lights are unused and have been included for potential further expansion.

· The 'PUMP' button will turn the pump on as long as the button is held down, unless of course the pump is already on in normal operation.

· The 'NEXT' button will step from Tank to Sensor A to Sensor B and the display will show the relevant temperature in C. If a sensor is below -20C the display reads 'Lo'. If a sensor is above 140C the display reads 'Hi'. If a sensor is outside the specified temperature range of -40C to 150C then the Display will read 'SSd' and the 'NEXT' button is disabled.

Note: If you order an OmniStat-Plus with less than three sensors, either or both of 'SENSOR A' and 'SENSOR B' will be unavailable. If both are disconnected, pressing 'NEXT' will have no effect in normal operation (as there is only one viewable temperature)

· The 'TEST' button will check the system (all lights flash) then display the number of times the pump has been on. This count will reset and start again after '999'.

Optional System Enhancements.

SolaStat-Rmt	A remote display which repeats the display information of the OmniStat-Plus.
SolaStat-Rly	An external high-power isolated slave relay module
SolaData	A data comms option that will transmit what the OmniStat-Plus is doing to your PC and visually present the information with graphs, logic states and status information.

OmniStat-Plus System Adjustable Values.

Installer to fill in at installation time or after any change in program Adjustable Values.

System Adjustable Values		
Function	OmniStat-Plus Factory Values	Installation Values
Tank Off	75C	_____C
Tank On	60C	_____C

Notes.

1.   Tank OFF must always be higher than Tank ON.

Installer Details.

Contact: ....

Phone: ....

Address: ....

....

....

OmniStat-Plus Safety Instructions and Limit of Liability.

Read safety instructions and limit of liability before proceeding with the installation.

General Safety Instructions.
1. This installation guide is for the installation of OmniStat-Plus controllers only and is not an installation guide for any other part.
2. The complete installation should be checked at least annually for damage or malfunction.
3. All servicing to be carried out by an authorised service agent only.
4. All aspects of the installation must comply with local electrical and plumbing regulations (and any special solar hot water regulations).

Installation Precautions.
1. Must be installed away from water sources such as rain, leaking pipes, or wet floors and must not be installed in damp areas like bathrooms.
2. Must be installed away from direct sunlight, flammable liquids or radiant heat sources.
3. Power leads must be facing directly down, not sideways or upwards.
4. Must be in a safe environment for users to inspect display panel.
5. Failure to mount sensors correctly can lead to a poorly controlled hot water system with safety issues like overheating and over pressure damage to the plumbing and hot water tank and freezing damage to the solar hot water collector.
6. Alteration of installer level program values outside those recommended values by SolaStat and other parts suppliers (especially hot water tank manufacturer's maximum recommended temperature) can lead to dangerous conditions and/ or damage to parts of the hot water system.

Electrical Precautions.

⚠	**CAUTION:** **Dangerous Voltages may be present. The OmniStat has no user serviceable parts.** ⚡ **Protective enclosure only to be opened by qualified personnel.** **Remove ALL power sources before removing protective cover.**

1. All mains voltage electrical work to be carried out by a qualified electrician, especially external power outlet socket installation.
2.   A readily accessible disconnect device, overcurrent device and RCD Protection rated to suit the size of the pump plus 5VA must be incorporated in the power supply wiring. The overcurrent device for a 1500W, 240Vac pump must not exceed 10Amps.
3. It is recommended that sensor leads be kept 300mm away from mains and comms cables.
4. Do not use mains power extension cords unless approved by the manufacturer. Water resistant plugs and sockets should be used.
5. The OmniStat-Plus controlled output is connected to the input power supply wiring and is not isolated from it. Supply voltages will be output through that outlet during activation.
6. Always use within specified voltage and load ranges. Never use with damaged leads, plugs or sockets.
7. Do not allow the sensor cables to come within 10mm of the high voltage connectors or components inside the enclosure.

OmniStat-Plus Mounting.

Where to mount the OmniStat-Plus.
1. Against a flat vertical surface with sufficient strength to hold the enclosure and any additional weight from the plugs, sockets and cables.
2. Power leads must be facing directly down, not sideways or up.
3. Safe for users to inspect.
4. The display can be easily read and buttons accessed.
5. Allow for cable runs, location of power outlets and lengths of wires.
6. Allow space for SolaStat-Rly if used.

Mounting the OmniStat-Plus.
1. There is no need to open the enclosure during a standard installation.
2. Allow for the enclosure dropping 5mm from screw centres once mounted (keyhole mounting system).
3. Place drill guide template against wall, checking for level alignment. 4 screws are supplied, 2 are chip board screws and 2 are combination Gib/ wood screws. It is recommended that all 4 mounting holes are used with at least 2 firmly secured into wood. The outer plastic Gib anchors will self tap into Gib board and their inner metal screws fix into the centre of the plastic anchors.
4. Mark and drill/ screw as appropriate leaving the heads of the screws above the surface by approximately 3mm.
5. Place unit over the 4 screw heads, unit should slide down 5mm into the 'key' slots and become secured to the wall. You will need to adjust screw height to obtain a secure fit.

Mounting the Sensors.

This is Critical to the Success of the Installation.

The sensor is the only way the OmniStat-Plus can efficiently control and protect the system.
1. **The 10m TANK Sensor**.
   The 'TANK' sensor is best fitted into a metal immersion 'pocket' in the upper region of the HWC. The position of the Tank sensor will vary the amount of water in the HWC that will be controlled at the required temperature. As an example for a 300l vertical tank mounting the sensor 1/3 of the way down from the top of the HWC will give about 100l of water that is heated within the control parameters. This increases efficiency as only the amount of water required in normal household use is controlled rather than all the water in the HWC. The sensor must be mounted above the electric element. Liberally apply heat transfer compound between the sensor and the lining of the 'pocket'. If a 'pocket' is not available then bond the sensor against the metal wall of the tank (not the outside cladding or insulation) using thermal transfer compound between the tank and sensor.
2. **The10m SENSOR A Sensor**.
   The 'SENSOR A' sensor is mounted as per the 'TANK'' sensor. It is not used for control and so may be placed anywhere the user requires it.
3. **The 10m SENSOR B Sensor**.
   The 'SENSOR B' sensor is mounted as per the 'TANK'' sensor. It is not used for control and so may be placed anywhere the user requires it.

SENSOR A and SENSOR B can be used in conjunction with SolaData to perform calorimetry calculations on the energy input to the tank from the gas booster unit. For this use the sensors should be placed at the Process Return and Draw Off points in the cylinder, preferably within the pipes leading to and from the pump.

Warning.
1. Removing or cutting the cladding may void hot water tank warranty.
2. Sensors must not be immersed in water.
3. It is recommended that sensor leads be kept 300mm away from mains and comms cables.
4. Ensure the correct sensors are mounted in the correct place.
5. Failure to properly mount the sensors as prescribed above can result in;
   a. The system may not operate at greatest efficiency.
   b. There may be inaccurate limit sensing. HWC or other components may get damaged.
   c. Hot water readings on the display may be misleading.

Warning:

These products are not designed for use in, and should not be used for patient connected applications. In any critical installation an independent fail-safe back-up system must always be implemented.

OmniStat-Plus Operation.
Connect the Pump.

Plug in the pump to the 'PUMP' socket on the OmniStat-Plus. This should be the correct type of pump for domestic hot water circulation and not exceed the horse power (hp) or Wattage (W) rating as specified on the label on the side of the enclosure.

Basic OmniStat-Plus Installation.

The OmniStat-Plus controlling the circulating pump.
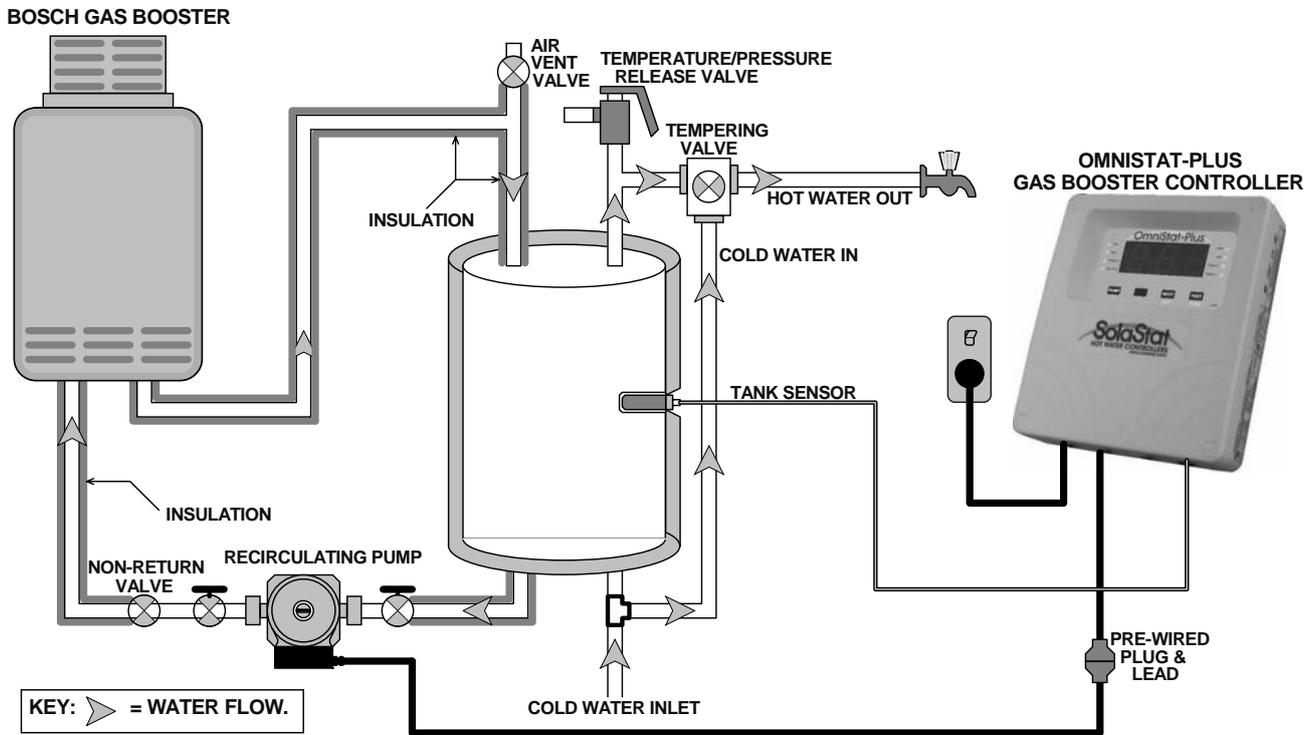
Note. This diagram is only to be used as a general guide and not all the required components are shown. Each installation needs to be customised to suit its situation. Always use best plumbing and electrical practices, and comply to any regulatory requirements.

OmniStat-Plus Power Up.

Before you connect the power;
1.   Read safety instructions, warnings and limit of liability before proceeding.
2.   Complete all the installation and securely mount the OmniStat-Plus.
3.   Power outlet socket to be installed by a qualified electrician.
4.   SolaStat-Rly to be installed by qualified person if used.
5.   Ensure suitable over-current protection and RCD Protection for the OmniStat-Plus and pump is in place.
6.   There is no water, metal shavings or other electrical hazards to contaminate the plug, socket and surrounding environment.

Only then;
Plug it in and turn it on.

What You Should See.

The first thing you should see after power up is;
1.   A digital readout of the 'TANK' temperature in degrees Celsius.
2.   On the left the 'PWR' light and the 'TANK' light should be on.
3.   On the right the lights will be on depending on how the solar hot water system is operating.

The pump operation can be tested by pressing the 'PUMP' button. This will turn the pump on as long as the button is held down, unless of course the pump is already on in normal operation.

The OmniStat-Plus is now installed and should be working. It would be best to observe some hot water pump cycles but this will rely on temperatures present in the tank. Check all functions are working correctly before leaving the installation.

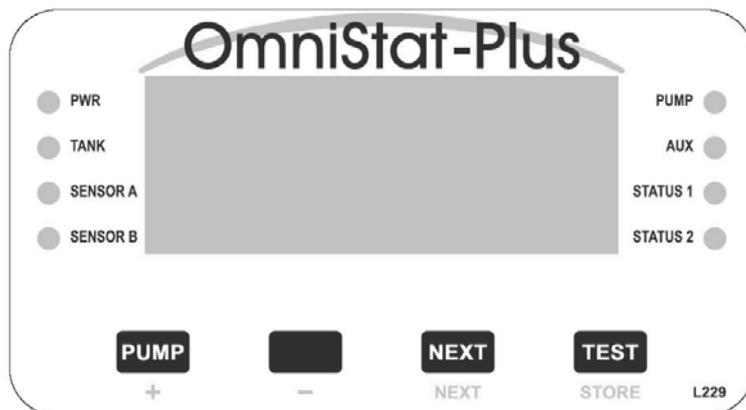Note 1.   See User Guide for explanation of display and status lights.
Note 2.   See "Trouble shooting" section if system not working correctly.

OmniStat-Plus Programming.

If the Adjustable Values from the factory are inappropriate for the installation (see included document stating programmed values) then the unit needs to be programmed.

The programming access code is for distributor or installer use only, as using incorrect Adjustable Values can cause inefficiencies in the system or cause damage to the system voiding the warranty.

Once new values are 'stored' they are permanently written into memory and will be retained when power is removed.

```
┌─────────────────────────────────────────────────┐
│              OmniStat-Plus                       │
│  ○ PWR                           PUMP  ○         │
│  ○ TANK                          AUX   ○         │
│  ○ SENSOR A                      STATUS 1 ○      │
│  ○ SENSOR B                      STATUS 2 ○      │
│                                                  │
│   [PUMP]   [   ]   [NEXT]   [TEST]               │
│     +        −      NEXT     STORE     L229      │
└─────────────────────────────────────────────────┘
```

Note: Immediately after reprogramming please fill out the 'Installation Adjustable Values' in the 'System Adjustable Values' table in the user guide. (Page 6.)

These instructions refer to the small yellow letters/words under the buttons on the OmniStat-Plus.

1.   Enter the installer programming access code. Available from distributors.

2.   Every 10 seconds the characters 'PRG' will flash on the display indicating programming mode.

5.   The 'PUMP' light will be flashing to indicate the number being displayed is the 'Tank Off' value.

6.   The 'Tank Off' can be adjusted using the '+' and '-'.

      * Press 'NEXT' to move on to the next value.

7.   Now the 'PUMP' light will be on continuously to indicate the number being displayed is the 'Tank On' value.

8.   The 'Tank On' can be adjusted using the '+' and '-'.

9.   All the values are now entered. The values can be checked by simply pressing 'NEXT' to cycle through all the values noting which light is on and what value is displayed (as per OmniStat-Plus Programming Table).

10.   To store all the values in permanent memory press 'STORE' at any stage. The values will be written to memory and the unit will exit programming mode and return to automatic operation. The unit will also store the values and exit if no key is pressed for a minute while in the programming mode.

11.   Fill out the 'System Adjustable Values' in the user guide. (Page 6.)

Notes.   (Also refer principle of operation.)

1.   Tank OFF must always be higher than Tank ON.
2.   Fill out programming record in User Guide.

·   A maximum temperature must be observed for ceramic lined hot water tanks and other fittings and caution should be exercised to allow for stratification of hot water in the tank. We recommend a conservative value somewhat lower than the hot water tank manufacturers' maximum temperature. It is vital the sensors are mounted as recommend in the installation guide for the system to work correctly.

OmniStat-Plus Programming Table for Adjustable Values.

Programming Table for Adjustable Values			
Adjustable Values	**Light indication**	**Typical**	**Range**
Tank Off	Pump flash	75C	1-100C
Tank On	Pump steady	60C	0-99C

OmniStat-Plus Sensor Maintenance.

Lengthening OmniStat-Plus Sensor Wire.

The sensor wire can be lengthened within certain guidelines. Poor connections or induced interference can cause false temperature readings.

1. The sensor is not polarized- it can be connected either way around.
2. The wire normally used for sensor lengthening is twin 0.5mm^2 stranded speaker wire.
3. Firmly attach wires to each other by either soldering (heatshrink over each joint) or by quality screw terminals. Joins must be kept dry.
4. It is recommended that sensor leads be kept 300mm away from mains and comms cables.
5. Over 20 metres; extra care must be taken to avoid electrical interference being picked up.
6. In 'noisier' electrical environments screened cable may be required.
7. The absolute maximum cable length is 100 metres.

Adding or Replacing an OmniStat-Plus Sensor.

> ⚠ **CAUTION:** **Dangerous Voltages may be present. The OmniStat has no user serviceable parts.** ⚡
> **Protective enclosure only to be opened by qualified personnel.**
> **Remove ALL power sources before removing protective cover.**

If a sensor/s needs to be added or a damaged sensor needs to be replaced, then the cover of the enclosure will need to be opened unless the choice is made to join the wires externally (see "Sensor Wire Lengthening" section).

1. Remove the mains power supply, preferably remove the plug from the wall socket. Make sure no other power source is feeding back through other connections.
2. Remove the 4 screw covers on each corner of the lid of the enclosure. This will require a fine tipped tool such as a screw driver. Be careful not to damage the lid. Always press the tool away from you to avoid injury if you slip.
3. Remove the 4 screws that hold the lid on.
4. Loosen the cable clamp for the sensor leads.
5. If adding another sensor/s: Unscrew the 100K resistor from the terminal block.
    If replacing a damaged sensor: Unscrew the damaged sensor from the terminal block.
6. Carefully pull the wire back through the opening in the bottom case.
7. Thread the new sensor wire back through the sensor hole.
8. Place the wires of the new sensor into the terminal block where the old sensor or 100K resistor came from and retighten the screws.The sensor is not polarized- it can be connected either way around.
9. Do not allow the sensor cables to come within 10mm of the high voltage connectors or components inside the enclosure. Tighten the screws on the cable clamp.
10. Replace the lid, replace the 4 screws and tighten.
11. Push in 4 new screw covers available from your distributor or Senztek NZ Ltd. Note: there are locating lugs to ensure correct orientation.
12. Reconnect the OmniStat-Plus and turn on the power.
13. Check sensor is reading correctly and check OmniStat-Plus operation as per "What You Should See" section of this manual.

The table below has the correct resistance values of the sensor at different temperatures. The sensor must be removed from the OmniStat-Plus to measure these values correctly. Follow the above procedure for removal of the sensor.

Sensor Resistances	
Temperature	**Resistance in kᴡ**
0ºC	27.25
25ºC	10.00
50ºC	4.162
75ºC	1.925
100ºC	0.973
Above 150C or 'short'. 'SSd' on Display Sensor Light On	<0.300
Below -40C or 'open'. 'SSd' on Display Sensor Light Flashing	>200

A 'short' circuit can be caused by the sensor wires being connected together. Check the wires are not partially cut. (eg Sharp roofing iron.) or moisture is not getting into the sensor causing corrosion.

An 'open' circuit can be caused by the sensor wires being broken. Check the wires are not cut. (eg Sharp roofing iron.) or moisture is not getting into the sensor causing corrosion.

OmniStat-Plus Specifications.

Power Supply.

Supply Voltage.	-H	85~264Vac/dc (standard model)
	-M	22~85Vdc. (Must be specified at time of ordering.)
	-L	10~28Vac/dc. (Must be specified at time of ordering.)
Max power usage.		5VA + external loads.

Relay Outputs.

Relay Outputs.	-Currently only one option can be ordered. (All ratings at 240Vac.)
	1 x 1hp motor. (750W); (½ hp @ 120Vac)
	10A resistive flexible wiring.

Sensors.

Display range	-20 ~ +140C
Control Range	-40 ~ +150C
Stainless steel tip	-40 ~ +150C; 6mm diameter x 30mm
PVC Sensor cable	-40 ~ +105C; 4mm diameter, UV resistant. (Standard Models)
Teflon Sensor Cable	-40 ~ +250C; 4mm diameter, UV resistant. (Special Order)
Accuracy	+/-1C @ 25C

Adjustable Values Range. (Adjustable in programming mode.)

Tank Off	1~100C
Tank On	0~99C

EMC and Safety Compliances.

Emissions:	EN 55022-A, CTick.
Immunity:	EN 50082-1.
Safety Compliance:	EN 60950, CTick.

General Specifications. (Unless otherwise stated in other input specifications.)

Operating Temperature:	0~60C
Operating Humidity:	90% RH Max. Non-Condensing
Enclosure Construction	Polycarbonate - Impact Resistant
	UL94 V-2 Non Burning, UV Stabilized
	Water resistant or rear entry option available.
Dimensions	L=167, W=142, H=40mm, excluding glands and cables
Weight.	Standard model + sensors + packaging = 1200grams

Product Liability. This information describes our products. It does not constitute guaranteed properties and is not intended to affirm the suitability of a product for a particular application. Due to ongoing research and development, designs, specifications, and documentation are subject to change without notification. Regrettably, omissions and exceptions cannot be completely ruled out. No liability will be accepted for errors, omissions or amendments to this specification. Technical data are always specified by their average values at 25C and are based on Standard Calibration Units at 25C, unless otherwise specified. Each product is subject to the 'Conditions of Sale'.

OmniStat-Plus Trouble-shooting Guide.

This is intended as an initial guide to minimise service calls.

Trouble Shooting		
Symptom	**Cause**	**Solution**
No operation, no display and no lights	a. No power.	a. Check mains outlet. b. Check fuses.
POWER light ON but no display or corrupted display.	a. Power brown out. b. Unit faulty	a. Remove power while brownout condition is present. b. Remove power for 10 minutes, repower and see if unit is operating. If not unit needs repair.
Display on, pump not running and yet cylinder is cold. PUMP light is ON.	a. Pump damaged or disconnected.	a. See if pump has become unplugged.
Display on, pump not running and yet cylinder is cold. PUMP light is OFF.	a. Sensors not mounted properly.	a. Check sensors are thermally bonded to cylinder.
Display on, pump not operating and cylinder is hot. PUMP light is OFF.	a. Tank Off temperature exceeded	a. If Tank temperature greater than Tank Off programmed value then is working normally.
Pump running continuously.	a. Pump is cavitating. b. Special installation. c. Settings incorrect.	a. If pump is making noise like stones passing through it then it is cavitating. See OmniStat Plumbing Issues. b. Special installation where long pump on times are normal. c. Check programming.
Hot Water drops significantly overnight yet little or no draw off of hot water by the user.	a. Tank losing heat.	c. Install better insulation on hot water tank.
Pump never comes on.	a. Tank Electric Element Thermostat temperature is too low.	a. Increase Tank Electric Element Thermostat Temperature to greater than sensor set points.
'Lo' on Display	a. Tank Sensor below -20C.	a. Check cylinder temperature.
'Hi' on Display	a. Sensor above 140C.	a. Check cylinder temperature.
'SSd' on Display. TANK Light Flashing.	a. Wire to Tank sensor broken. b. Tank Sensor Damaged. c. Tank Sensor below -40C.	a. Repair wire. b. Replace Tank Sensor. c. Check Cylinder Temperature.
'SSd' on Display. TANK Light ON.	a. Wire to Tank Sensor shorted. b. Tank Sensor Damaged. c. Tank Sensor above 150C.	a. Repair Wire. b. Replace Tank Sensor. c. Check Temperature.
'SSd' on Display. SENSOR A Light Flashing	a. Wire to Sensor A broken. b. Sensor A Damaged. c. Sensor A below -40C.	a. Repair wire. b. Replace Sensor A. c. Check Temperature.
'SSd' on Display. SENSOR A Light ON	a. Wire to Sensor A shorted. b. Sensor A Damaged. c. Sensor A above 150C.	a. Repair Wire. b. Replace Sensor A. c. Check Temperature.
'SSd' on Display. SENSOR B Light Flashing	a. Wire to Sensor B broken. b. Sensor B Damaged. c. Sensor B below -40C.	a. Repair wire. b. Replace Sensor B. c. Check Temperature.
'SSd' on Display. SENSOR B Light ON	a. Wire to Sensor B shorted. b. Sensor B Damaged. c. Sensor B above 150C.	a. Repair Wire. b. Replace Sensor B. c. Check Temperature.

OmniStat-Plus Plumbing Issues.

Disclaimer.

For full information on compliance and safety standards for hot water systems the appropriate local standards must be referred to. All plumbing to be carried out by qualified plumbers only.

We provide the following information as a guideline only to help obtain the greatest efficiency from the system. Any information supplied here is based on feedback to us by experienced hot water professionals and in no way represents a complete guide to plumbing such a system, as we are not plumbers and do not represent ourselves as such. Best plumbing practices must be used in all instances.

Introduction.

Senztek NZ Ltd recommends any installation is carried out by a registered and qualified plumber. All parts including the pump must be rated for the elevated temperatures found in hot water systems.

Hot Water Specifics.

1. Tempering valve.

It is vital a tempering or 'mixing' valve is fitted so the domestic supply from the tank does not burn the end users. The tempering valve must be installed to best plumbing practices. The tempering valve must be rated to handle these elevated temperatures.

2. Pressure relief valves.

Hotter water expands more and needs high quality pressure relief valves to avoid possible catastrophic rupturing somewhere in the system, probably the tank.

Qualified plumbers using best industry practice must decide on adequate pressure relief valves, the number and placement of them.

3. Cavitation.

A pump is used to circulate the water between the tank and the heat source.

If the pressure at the inlet or impellor of the pump falls below the vapour pressure of the liquid being pumped, cavitation will occur. Cavitation in a pump is more likely to occur as the temperature of the water rises and/or the pressure of the water decreases.

Bubbles form when the water is sucked into the pumps impellor and collapse again as small implosions when the water is ejected out of the impellor which can be so rapid that a rumbling/cracking noise is produced (it sounds like stones passing through the pump) and there can be damage to the impellor and other sensitive components as well as a drop in water volume moved.

To minimise cavitation.

Mains pressure hot water systems are less susceptible to cavitation than low pressure systems as the extra pressure will make it less likely that vapour bubbles will form.

As cavitation gets worse, less and less water is moved, often reaching a point where no water at all moves. Since the hot water controller is still reading a lower temperature requiring water to flow then the pump stays on until the vapour point drops. The vapour point drops either by water pressure increasing or water temperature decreasing. When the pump is cavitating it may run continuously for several hours.

1. Make sure the pump is appropriate for the installation.

2. If a variable speed pump then select the best setting (a slower speed that still has enough head pressure is best as this will create the lowest pressure difference in the pump).

3. Mount the pump as low as is possible to achieve highest water pressure out of the tank feeding into the pump.

4. Lower the resistance to water flow into the pump, such as less bends or more gradual bends, or wider diameter pipes. Recommended minimum diameter pipe 1/2".

5. In exceptional cases a larger pump with a larger impellor may need to be fitted to reduce vacuum at the impellor.

6. Convert the system to mains pressure.

OmniStat Distributor.