

Reclaim Heat-Pump Controller V1.1



www.reclaimenergy.co.nz

OVERVIEW

This controller is designed to work only with the Reclaim hot water heat pump distributed by Apricus Australia and New Zealand. The purpose of this controller is to improve efficiency and cost effectiveness for the user.

The controller measures the tank temperature and compares that to set points that it has stored in memory. These set points can be dependant on time of day depending on the option set. Once the lower temperature is reached the controller signals the heat pump to start heating via the RJ45 cable. Once an upper temperature is attained the controller signal the heat pump to stop heating. The controller automatically manages Legionella safety, heating once a day if the Legionella safe temperature has not been attained during the day.

The 7 segment display defaults to time of day but can also show the measured temperature. 3 status LEDs show additional information as shown on page 5

The onboard Real Time Clock is maintained by a Super Capacitor on the main circuit board. This will keep the time running for 3 weeks with no power applied but itself should last for the lifetime of the controller.

The controller is prewired to be 'plug n play' and there is usually no need to remove the cover on installation. The enclosure is water resistant (to rain) and is UV resistant. The case is made of non-burning tough polycarbonate.

Before You Begin Installation

Case tools required Philips1 screwdriver for lid screws (if required to remove cover)
 Pozi 2 screwdriver for mounting screws

READ THESE SAFETY PRECAUTIONS and LIMIT OF LIABILITY BEFORE YOU BEGIN

The following pages contain instructions for qualified personnel only. They involve potentially hazardous adjustments and high voltage mains wiring information.

General Safety Precautions The installation to be checked at least annually for damage or malfunction. All servicing to be carried out by qualified personnel only. All aspects of the installation must comply with local electrical and plumbing regulations

Installation Precautions Make sure the controller is installed out of direct sunlight, flammable liquids or radiant heat sources. Power leads must face directly down.
 Ensure controller is in a safe environment for users to inspect display panel.
 Sensor leads should be kept 300mm (12 inches) away from mains and comms cables if run parallel to those cables.
 A readily accessible power disconnect device is required

Warning These products are not designed for use in, and should not be used for, applications which are in conjunction with items that are critical to any person's health (e.g. life support systems). In any critical installation, independent fail-safe back-up systems must always be implemented



CAUTION:

Dangerous Voltages may be present. No user serviceable parts. Protective enclosure must only be opened by qualified personnel.

Remove ALL power sources before removing protective cover. The Reclaim Controller must be installed by a qualified person.

Ensure suitable over-current protection and RCD protection for the Reclaim Controller is in place.



INSTALLING THE RECLAIM CONTROLLER

Mounting

Follow these steps:

1. Allow for the enclosure dropping 5mm (1/5 inch) from screw centres once mounted (keyhole mounting).
2. Place the printed drill guide template (that ships with the controller) against the wall, checking for level alignment. All four mounting holes should be used with at least two firmly secured into wood or masonry.
3. Mark and drill/screw as appropriate leaving the heads of the screws above the surface by approximately 3mm (1/8 inch).
4. Place the unit over the four screw heads. The unit should slide down 5mm into the 'key' slots and become secured to the wall. You might need to adjust the screw height to obtain a secure fit.

Sensor Mounting



WARNING: It is critical the sensor is mounted correctly for accurate readings, safe and efficient operation of the system, durability of the sensors

The sensor should be fitted into a dry metal immersion 'pocket' in the hot water cylinder. Apply plenty of heat transfer compound (available from your distributor) between the sensor and the lining of the 'pocket' then seal against water ingress where the cable exists the cylinder with neutral cure silicon.

Connect to Heat Pump

Plug RJ45 cable into the heat pump

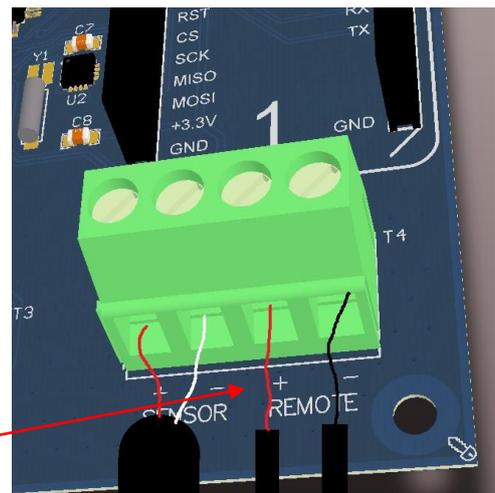
Connect PV Remote wires (only if applicable)

A 'clean set of contacts' (passive only) is expected for this input. If not, then the controller could be damaged

The remote input is accessible by removing the cover. Ensure mains power is isolated during this work

Loosen the cable gland and thread the cable next to the sensor cable.

Wire in as indicated



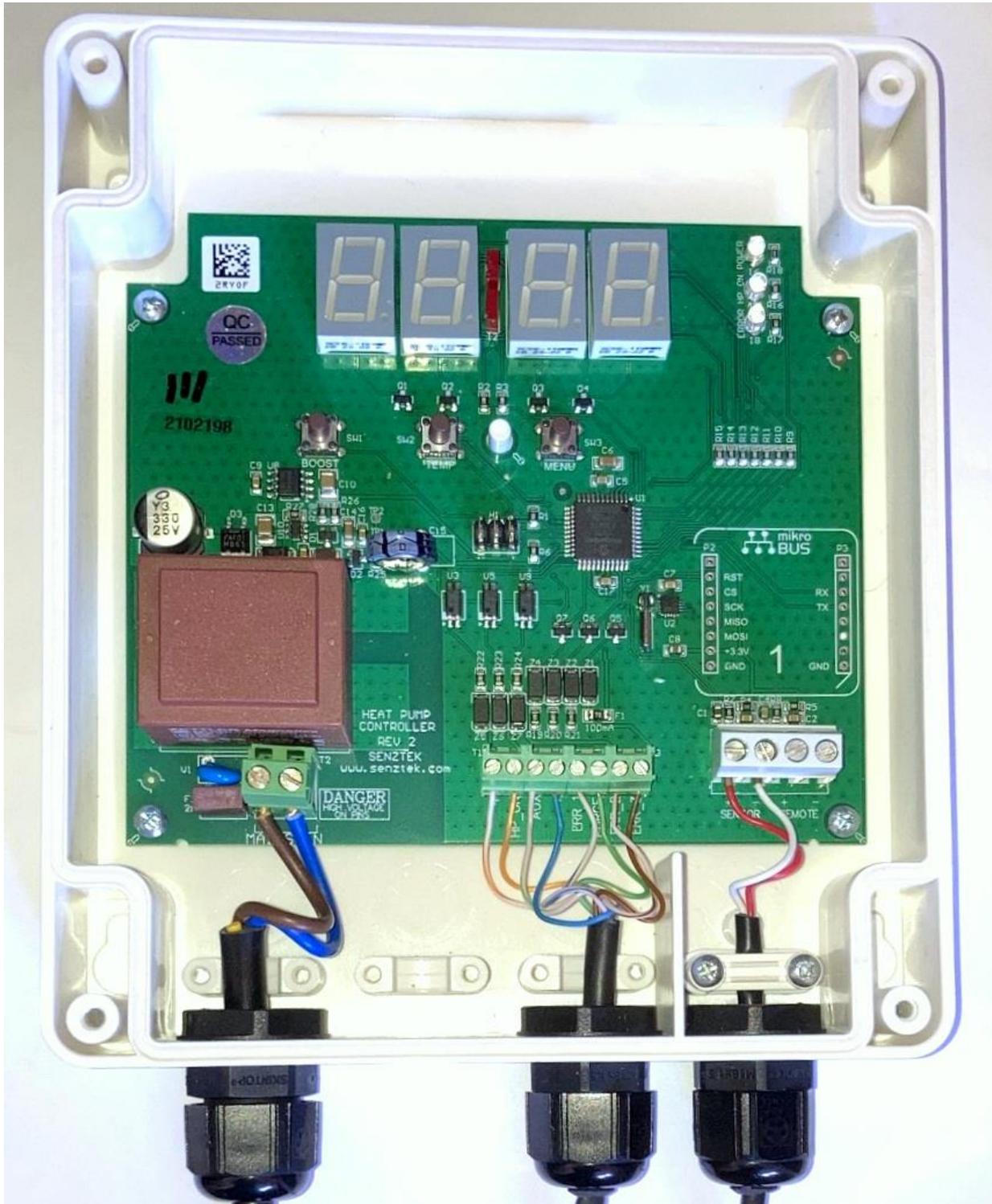
SENSOR REMOTE

Plug in the controller to the power source

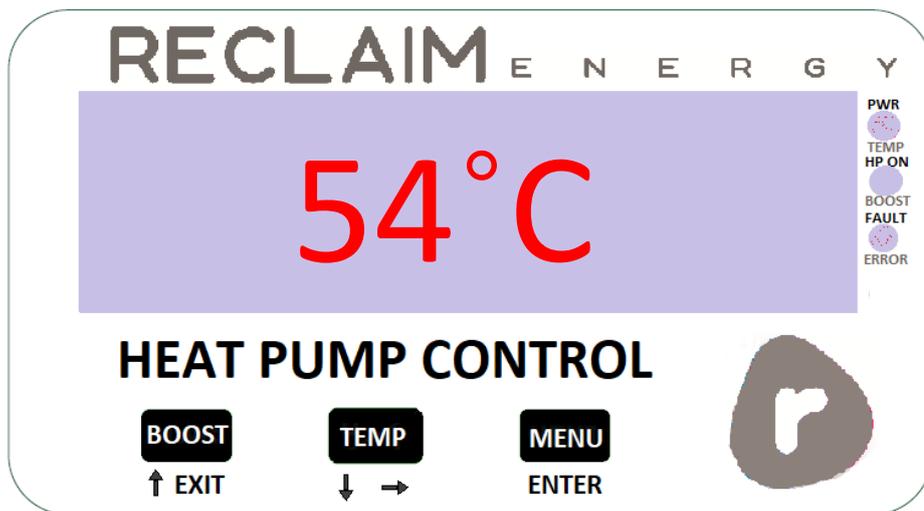
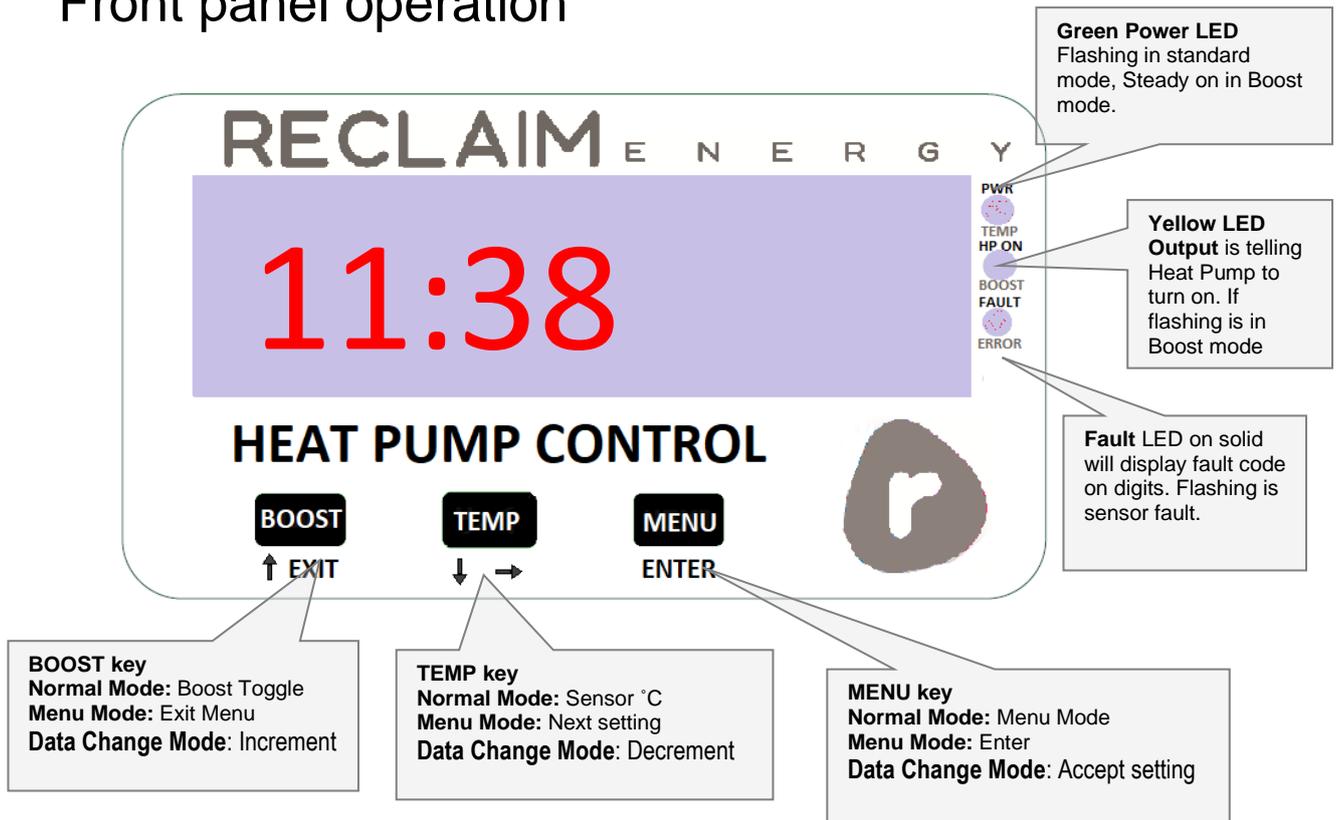
Before power up read all safety instructions, warnings and liability statements

Controller will run through start up checks including lighting all LEDs. Then first display will be the time of day the controller thinks it is. Page 7 has details on how to adjust the time.

Reclaim controller with the cover removed.



Front panel operation



Modes of operation

Time control Mode:

Temperature control mode can be enabled and disabled during certain periods within the 24 hour period, as set in the options page.

On entering the start time of an option, there will be a boost cycle initiated, then once at target temperature, will continue to reheat when the tank temperature falls below 'Ton'.

The user can select between permanent enable, four preset time periods, a remote input option or two user selectable fully adjustable time periods.

When the Time Control Mode is active the Power ON LED flashes.

Temperature Control Mode:

On first start, the heat pump is turned on if the temperature is less than 59°C (default).

On subsequent starts the heat pump is turned on when the temperature in the tank drops to the T-on setting (37°C -default) and turns off when the temperature reaches the T-off setting (59°C - default). Both switch points have a fixed time delay of 3 seconds.

This mode is disabled if a faulty temperature sensor is detected (Eg-8 and Eg-9), although the boost mode is still operational.

There is an additional inbuilt time delay for the T-OFF temperature, called T-OFF Maintain time. The default is 0 minutes, but if set to 1 minute, then the T-OFF temperature must stay at the T-OFF value or greater for one minute(plus the 3 seconds), before the heat pump is turned off.

Option1:

Temperature only control mode.

Option2:

Temperature control starting at 22:00 and remain enabled for 9 hours.

Option3:

Temperature control starting at 00:00 (midnight) and remain enabled for 6 hours.

Option4:

Temperature control starting at 10:00 and remain enabled for 6 hours.

Option5:

User Settable

Option6:

Temperature control starting on contact closure on REMOTE input and remain enabled for duration of contact closure. Once contact is open, heating cycle will finish.

Boost Mode:

The Boost mode can also be turned on and off via a momentary press of the boost button.

When activated, temperature control mode is enabled, as above, allowing the heat pump to turn on. The heat pump will remain on until the temperature reaches 59°C (plus 3 seconds), or the 6 hour period has elapsed, whichever occurs first. The On Call LED will start flashing, indicating the heat pump has been turned on via Boost Mode. If inadvertently pressed, boost mode can be turned off by pressing the Boost button again.

Note that if a faulty temperature sensor is detected (eg-8 or eg-9), the Boost function will still operate, and turn the heat pump on for 6 hours.

Heat Pump Faults:

Should the heat pump unit go into fault, it will generate a fault code which this module will display.

The Fault LED will turn on, and one of the following error codes will be displayed.

Eg-1 Heat Pump Sensor error (not the controller sensor)

Eg-2 Compressor error or Refrigerant shortage

Eg-3 PCB error – heat pump PCB faulty

Eg-4 Circulation failure

Eg-5 Pump error

Eg-6 Fan Motor error

Eg-7 Discharge temperature error

Refer to heat pump manual for further information on the above.

Eg-8 Tank Temperature sensor not detected (open circuit)

Eg-9 Tank Temperature sensor fault (short circuit)

Note: Temperature control mode is disabled for **Eg-8** and **Eg-9** faults, however boost mode is still operational.

Heat Pump Purge Mode:

On occasion the heat pump needs to be purged of air in the system.

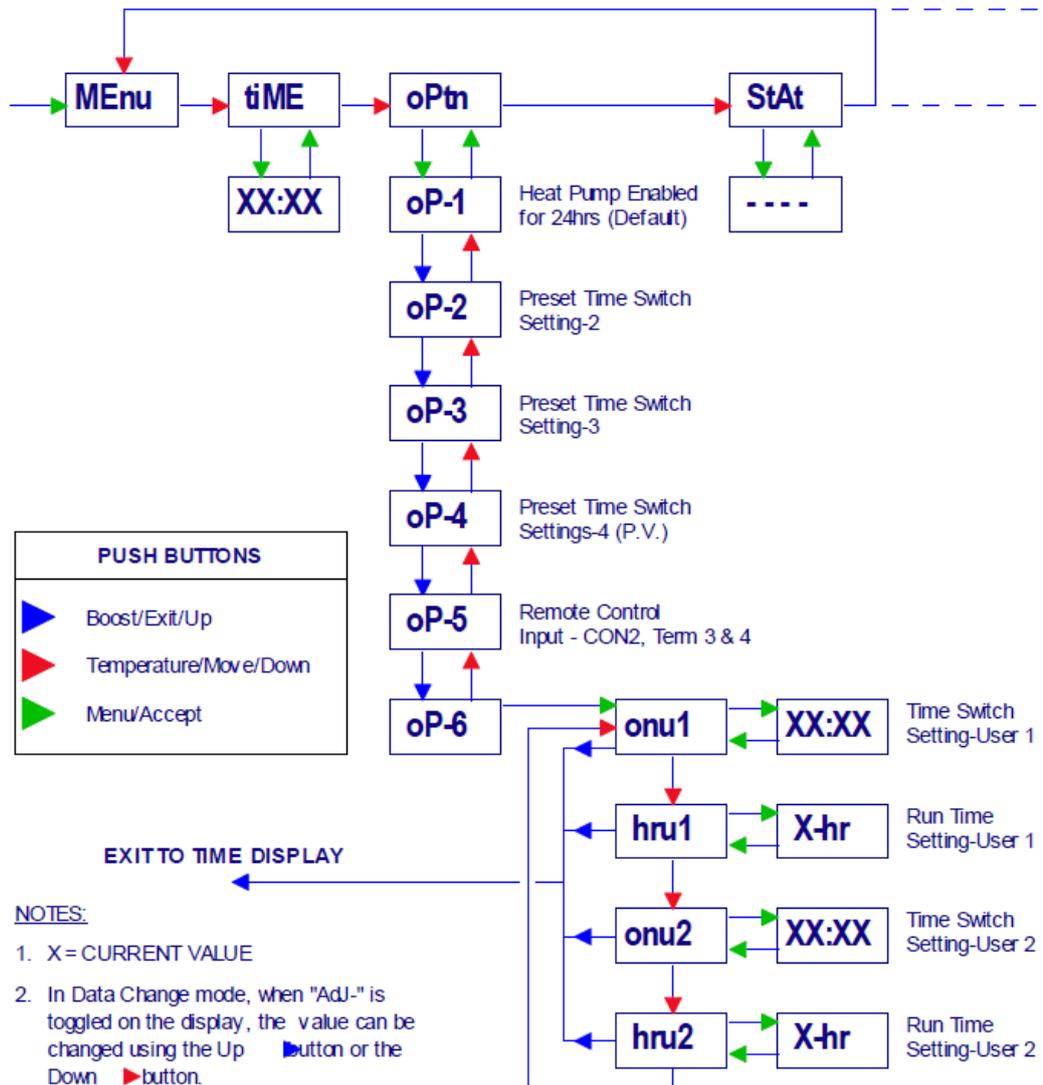
To activate Purge Mode, perform the following steps:-

1. Ensure the module is in the Normal Display mode, displaying either Time of day, or Temperature.
2. Press and hold down the Menu button, for approximately 5 seconds.
3. The Display will commence flashing **Purg**
4. The heat Pump output will be disabled.
5. The Purge output will be enabled.
6. Purge mode will remain active for 5 minutes.
7. All menu and display modes are disabled during Purge Mode.
8. After 5 minutes has elapsed, the purge output will turn off.
9. All control functionality will resume.

Note: Purge mode can be turned off at any time, by again pressing and holding the menu button for 5 seconds.

Purge mode is automatically turned off if the module is currently displaying a heat pump error code.

USER ACCESS



Example:

Setting the time

Note: There is a 12 second no button press timeout.

1. Press MENU
ENTER button, **MEMu** appears on display
2. Press TEMP
↓ → button, **t1me** appears on display
3. Press MENU
ENTER button, the time and **ADJ** alternatively flash on the display
4. Press BOOST
↑ EXIT to **increase** the time or TEMP
↓ → to **decrease** time
5. When finished press MENU
ENTER **t1me** appears on display
6. Wait 12 seconds for menu timeout. New time will appear.

Example:

Changing an option – mode of operation

Note: There is a 12 second no button press timeout.

7. Press  button, **MEMu** appears on display
8. Press  button, **t1me** appears on display
9. Press  button, **optn** appears on display
10. Press  button, the option and **ADJ** alternatively flash on the display
11. Press  to **increase** the option number or  to **decrease** the option
12. When finished press  **optn** appears on display
13. Wait 12 seconds for menu timeout. New time will appear.

PARAMETER	DEFAULT
Control Option	# 1
Turn On Value (tpon)	37°C
Turn Off Value (tpof)	59 °C
On Timer #2 Time	22:00
Timer #2 Run Time	9 hours
On Timer #3 Time	00:00
Timer #3 Run Time	6 hours
On Timer #4 PV Time	10:00
Timer PV Run #4 Time	6 hours
Boost Mode Run Time	6 hours
Legionella time cycle check	18 hours
Temperature OFF Maintain Time	0 minutes
On Timer User-1 Time	23:00
Timer Run User-1 Time	6 hours
On Timer User-2 Time	12:00
On Run User-2 Time	0 hours

BioSafe If the sensor readings do not exceed the target BioSafe temperature (59°C) over the Biosafe time of 24 hours, a BioSafe heat cycle will be triggered. Each reading above the target temperature will continuously reset the BioSafe timer. BioSafe will use the sensor for control and will run every 24 hours to comply with AS 3498 Clause 7.1 (j) for Australia / New Zealand regulations.

Lengthening Sensor Wire The absolute maximum cable length is 100m (328 feet).
 Over 20m (66 feet), care must be taken to avoid electrical interference being picked up. In noisier electrical environments, screened cable may be required. Firmly attach wires to each other by either soldering (heat-shrink over each joint) or by quality screw terminals. Joints must be kept dry.

Replacing a Sensor Remove the mains power supply.

1. Remove the four screws that hold the lid on.
2. Unscrew the damaged sensor from the terminal block.
3. Loosen the cable gland for the sensor leads.
4. Carefully pull the wire back through the opening in the bottom case.
5. Thread the new sensor wire back through where the old one came from.
6. Place the wires of the new sensor into the terminal block where the old sensor came from.
7. Do not allow the sensor cable to come within 10mm of the high voltage components inside the enclosure. Tighten the cable clamp.
8. Replace the lid, replace the four screws and tighten.
9. Reconnect the Reclaim controller and turn on the power.
10. Check that the sensor is reading correctly.

Sensor Resistances The table below has the correct resistance values of the sensor at different temperatures. The sensor must be removed from the controller to measure these values correctly

Sensor Resistances		
Temperature	Resistance in kΩ	
0°C	27.25	A 'short' circuit can be caused by the sensor wires being connected together. Check the wires are not partially cut and that moisture is not getting into the sensor causing corrosion.
25°C	10.00	
50°C	4.162	
75°C	1.925	
100°C	0.973	
Above 300°	<.050	An 'open' circuit can be caused by the sensor wires being broken, cut or corroded due to water ingress of the outer cable sheath
Below -40°C	>200	

CONTROLLER SPECIFICATIONS

Power Supply:

Supply Voltage	240 Vac +/- 10% 50 to 60 Hz
Quiescent power usage	3VA typical

Sensor:

PVC Sensor	-20 ~ +120°C tip 5.8mm diameter stainless steel -20 ~ +105°C cable, UV resistant
Accuracy	+/-1°C @ 25°C

Interface:

Outputs:	Heat and Purge (on): 3Hz @ 50% duty cycle +/-1% max
----------	---

EMC and Safety Compliances:

Emissions	AS/NZS 61000.6.3:2012
Safety Compliance	AS/NZ 60950.1:2003 AS/NZ 3820:2009 AS/NZ 2712: 2007 (Legionella control)

General Specifications:

Control Range	-40 ~ +299°C
Operating Temperature	0~60°C
Operating Humidity	5 ~ 85% RH. Non-Condensing
Enclosure Construction	Polycarbonate - Impact Resistant UL94 V-2 Non Burning, UV A & B Stabilized Water resistant to IP54
Dimensions	L = 167mm
(excluding glands and cables)	W = 142mm H = 40mm
Weight	160 grams
(Standard model + cables + sensors + packaging)	

Note: Do not exceed these specification limits. Exceeding these limits can result in damage to the unit and voiding of the warrantee.

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 and are based on Standard Calibration Units at 25°C, unless otherwise specified. Each product is subject to the 'Conditions of Sale'.