



HEAT PUMP CONTROLLER V1.1 MANUAL

INSTALLATION
OPERATION
MAINTENANCE



RECLAIM
ENERGY

IMPORTANT

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

WARNING

This appliance may deliver water at high temperature. Refer to the Plumbing Code of Australia (PCA), local requirements and installation instructions to determine if additional delivery temperature control is required.

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OVERVIEW

This controller is designed to work only with the Reclaim CO2 domestic hot water heat pump. The key difference between V1 and V1.1 controller is the introduction of Option 6 which is a remote option control in V1.1. All functionalities between controllers are the same so for more information on how the controller works, please refer to the heat pump installation manual.



v1 CONTROLLER

Times at which temperature mode is enabled:

Option 1: 24/7

Option 2: 10 pm- 7 am

Option 3: Midnight -6 am

Option 4: 10 am- 4 pm

Option 5: two cycles – first must set for a minimum of 6 hours and second can be set as little as 0 hours!

One shot boost: this activates the heat pump if temperature is less than 59°C and heating up until 59°C at sensor level is achieved.

v1.1 CONTROLLER

All options are same as V1 with additional of option 6 as below:

Option 6: One shot boost is activated by a dry contact signal from home management or PV inverters or dry contact smart switches

This is called "Remote" option.

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	<p>Philips 1 screwdriver for lid screws (if required to remove cover)</p> <p>Pozi 2 screwdriver for mounting screws</p>
	<p>READ THESE SAFETY PRECAUTIONS and LIMIT OF LIABILITY BEFORE YOU BEGIN</p> <p>The following pages contain instructions for qualified personnel only. They involve potentially hazardous adjustments and high voltage mains wiring information.</p>
General Safety Precautions	<p>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.</p>
WARNING	<p>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.</p>
Installation Precautions	<p>Make sure the controller is installed out of direct sunlight, flammable liquids or radiant heat sources. Power leads must face directly down.</p> <p>Ensure controller is in a safe environment for users to inspect display panel.</p> <p>Sensor leads should be kept 300mm (12 inches) away from mains and comms cables if run parallel to those cables.</p> <p>A readily accessible power disconnect device is required.</p>



CAUTION

**Dangerous Voltages may be present.
No user serviceable parts.**

**Protective enclosure must only be opened
by qualified personnel.**

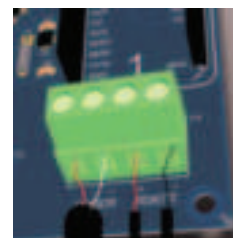
**Remove ALL power sources before removing
protective cover. The Reclaim Controller must
be installed by a qualified person.**

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



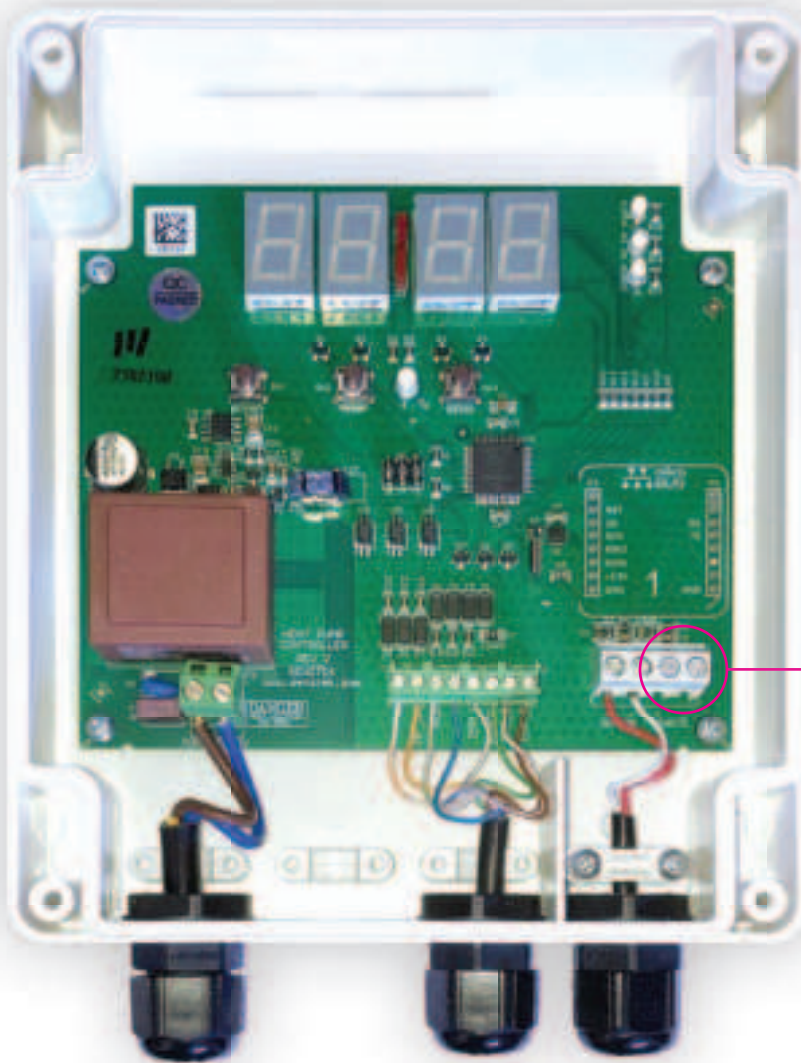
INSTALLING THE RECLAIM CONTROLLER

Mounting	<p>Follow these steps:</p> <ol style="list-style-type: none"> 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	<p>WARNING: It is CRITICAL the sensor is mounted correctly for accurate readings, safe and efficient operation of the system, durability of the sensors</p> <p>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.</p>
Connect to Heat Pump	Plug RJ45 cable into the heat pump.
Connect PV Remote wires (only if applicable)	<p>A 'clean set of contacts' (passive only) is expected for this input. If not, then the controller could be damaged.</p> <p>The remote input is accessible by removing the cover. Ensure mains power is isolated during this work.</p> <p>Loosen the cable gland and thread the cable next to the sensor cable.</p> <p>Wire in as indicated on diagram on the right.</p>
Plug in the controller to the power source	<p>Before power up read all safety instructions, warnings and liability statements.</p> <p>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.</p>



SENSOR REMOTE

RECLAIM CONTROLLER WITH THE COVER REMOVED



Dry contact terminals for option 6 (page 9).



FIRST TIME COMMISSIONING PROCEDURE

The following steps are required during the commissioning of controller:

1. The controller is connected to the power point and has power on it.
2. The correct version of controller is chosen on the heat pump
4. Connect the RJ 45 cable and initiate the purge cycle. The controller communication cable is connected to the heat pump. V1.1 controller: RJ 45 terminal block to be used.

- a. V1.1 controller requires "r1" to be set at "1". This can be checked as follows on the PCB main of the heat pump
 - i. Change the value of "r1" to "2" as follows:
 - ii. Press and hold UP(▲) and DOWN(▼) buttons.
 - iii. The value displayed is "r1" & "1"
 - iv. Change the value of "r1" to "2" by pressing the RIGHT (►) or LEFT(◄) button.
 - v. Press and hold UP(▲) and DOWN(▼) button to complete the setting when display returns to its original display (i.e. blank display).
 - vi. To check if "r1" & "2" is established, try step 1 one additional time and then go to step 4 to exit.

3. The controller shows the correct time of day> SETTING THE TIME OF DAY

- a. Press the Menu Button, "Menu" is displayed.
- b. Press Temperature Button (move to next parameter), "TIME" is displayed.
- c. Press the Menu Button, Time of day "XX:XX" is displayed, alternatively with "AdJ-", indicating you are in data change or adjust mode).
- d. Use the Boost Button to increment the Time UP, or the temperature button to decrement the Time DOWN. The longer the button is pressed the faster the time will change. Note that the "AdJ-" prompt is not displayed whilst the up/down buttons are pressed.
- e. Once the correct time of day is displayed, press the Menu button.
- f. "TIME" will be displayed. Press the Boost button (exit) to revert to the normal display.

Note: If no button is pressed for 30 seconds, the display reverts to Normal Display Mode.

Note that the clock is always in 24hr mode, and all adjustments for day light saving must be done manually.



5. **Initiate the purge cycle. To activate Purge Mode, perform the following steps:**
 - a. Ensure the module is in the Normal Display mode, displaying either Time of day, or Temperature.
 - b. Press and hold down the Menu button for approximately 5 seconds.
 - c. The Display will commence flashing "Purg".
 - d. The heat Pump output will be disabled.
 - e. The Purge output will be enabled.
 - f. Purge mode will remain active for 5 minutes.
 - g. All menu and display modes are disabled during Purge Mode.
 - h. After 5 minutes has elapsed, the purge output will turn off.
 - i. All control functionality will resume.
 - j. When the test operation display above disappears and the purge mode is complete, open the PTRV on tank for 5 seconds.
 - k. When water comes out from the PTRV on tank, close the PTRV.
6. **Select among the 6 operational modes. To see if the option is selected correctly, after setting up the option, please go back to the main menu and press "temp" button. Then, the current tank option and active option will be shown within seconds.**

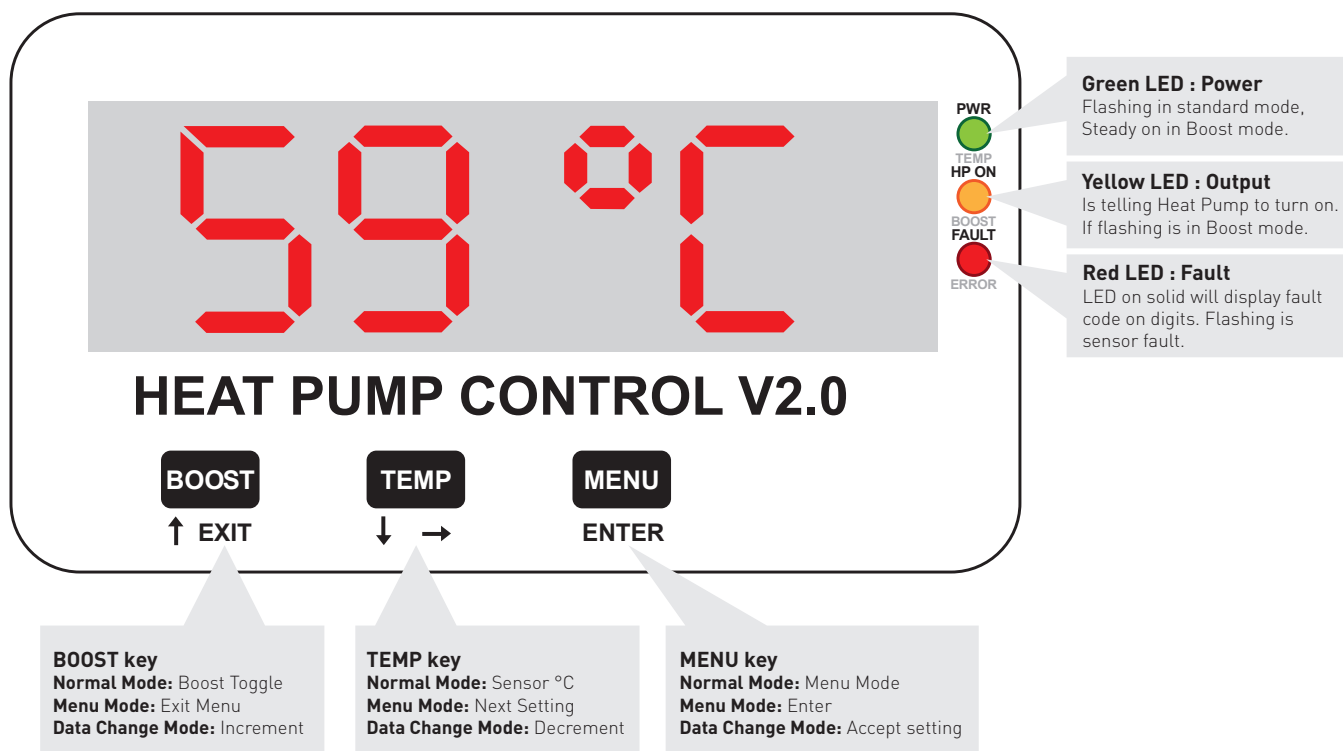
Note: Purge mode can be turned off at any time, by pressing and holding the menu button for 5 seconds. Purge mode is automatically turned off if the module is currently displaying a heat pump error code.

CAUTION

Make sure to complete the air purg before heating operation. It can cause unit failure



FRONT PANEL OPERATION



MODES OF OPERATION

TIME CONTROL MODE:

The temperature control mode can be enabled and disabled during certain periods within the 24 hour cycle, as outlined in the options page. The user can select to permanently enable, four preset time periods or can opt for two adjustable time periods (e.g. time zone 1 minimum hours is 3 hours and time zone 2 minimum hours is 0 hours. Also note regardless of what is set for the first time zone, the system for the first cycle only runs until it reaches the set point temperature of 59°C). For the second and subsequent time settings, the time control takes priority over the temperature mode (i.e. the heat pump operation may stop due to time settings before the Toff temperature of 59°C is reached.) When the Time Control Mode is active the Power ON LED flashes.

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.



Dry contact wiring between a dry contact switch and controller

TEMPERATURE CONTROL MODE:

The "temperature control" turns the heat pump on at the T-on setting (37°C), and off at the T-off setting (59°C). On first start, the heat pump is turned on if the temperature is less than 59°C. On the subsequent starts the heat pump is turned on when the temperature in the tank drops to the T-on setting (37°C) and turns off when the temperature reaches the T-off setting (59°C).

LEGIONELLA TIME CYCLE CHECK

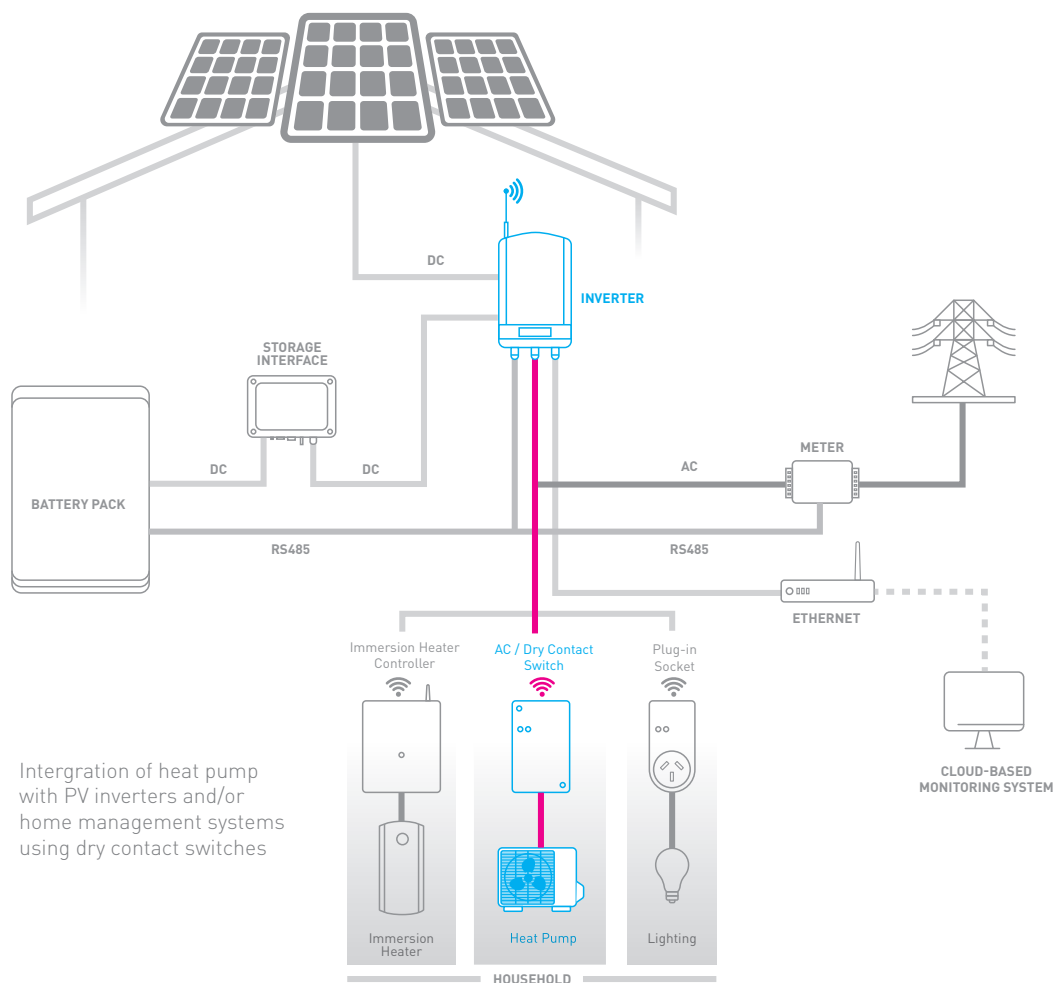
For the effective elimination of Legionella, the system control will automatically heat the temperature of 59°C at least once every 24 hours.

DETAILS OF OPERATIONAL MODES

The temperature mode can be enabled by various time switch modes. These are selectable in the "User Menu". Whenever the temperature mode is enabled by one of these options, the Power ON LED will flash. Details of options are given in Table 8.

Option 1	Temperature only control mode.
Option 2	Temperature control starting at 22:00 and remain enabled for 9 hours.
Option 3	Temperature control starting at 00:00 (midnight) and remain enabled for 6 hours.
Option 4	Temperature control starting at 10:00 and remain enabled for 6 hours.
Option 5	User Settable for two operational windows. The first must be at least 3 hours and the second can be set for 0 hours or more.
Option 6	With option 6, following a remote contact closure, it does finish the heating cycle even if the contacts open again. Also it will remain in Temperature mode so long as the contacts remain closed.

Please note with activation/closure of dry contact the one shot boost function will be activated so the system will stop once the temperature is reached 59°C. The boost function is triggered by a change in state from open to closed contact. If the dry contact remains closed, the system will go under the "temperature mode" and the green light will be flashing and the next time the system will be running if temperature drops below 37°C. With option 6, if the dry contact does not get closed in a 18 hr cycle, the system will automatically run to meet the legionella requirement 18 hours after the last time that 59°C has reached.



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:

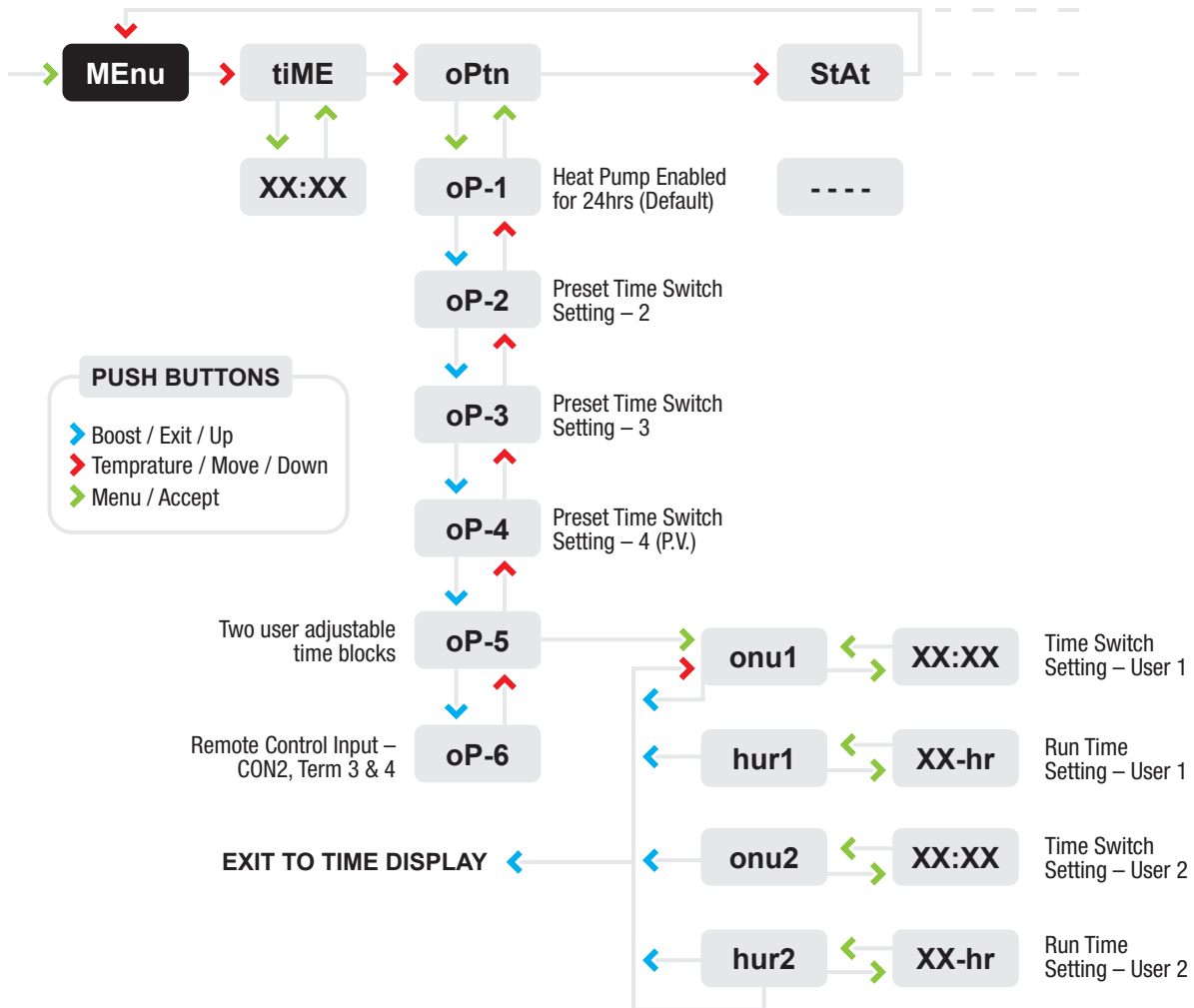
1. Ensure the module is in the Normal Display mode, displaying either Time of day, or Temperature.
2. Press and hold down the Menu button, for approximately 5 seconds.
3. The Display will commence flashing Purg
4. The heat Pump output will be disabled.
5. The Purge output will be enabled.
6. Purge mode 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






Notes:

- 1 x = Current Value
- 2 In Data Change mode, when "Adj" is toggled on the display, the value can be changed by using the UP button or the DOWN button



BUTTON FUNCTIONS

BUTTON	NORMAL MODE	MENU MODE	SETTINGS CHANGE MODE
	Boost On / Off	Menu Exit	Increment / Up
	Temperature Display	Next Value	Decrement / Down
	Menu Mode	Enter	Accept

**BOOST BUTTON:**







Press to switch Heat Pump into boost mode. 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. After one-shot boost is complete, the controller reverts back to the last programmed setting.

TEMPERATURE BUTTON:

Press to display current tank temperature (latches on for 20 sec). The current control option is also briefly displayed- refer to menu details for other functionality. The current "tank temperature" and "active operational option" can be read by pressing this button. The temperature is displayed for 4 seconds (Figure 34), then the currently selected user option is displayed for 4 seconds (Figure 34), before reverting back to the tank temperature for a remaining 12 seconds. Note that this feature is disabled whilst in Menu Mode, during Purge Mode and whilst displaying a heat pump fault code or temperature sensor fault.








EXAMPLES**SETTING THE TIME**

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

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






















CHANGING AN OPTION – MODE OF OPERATION

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

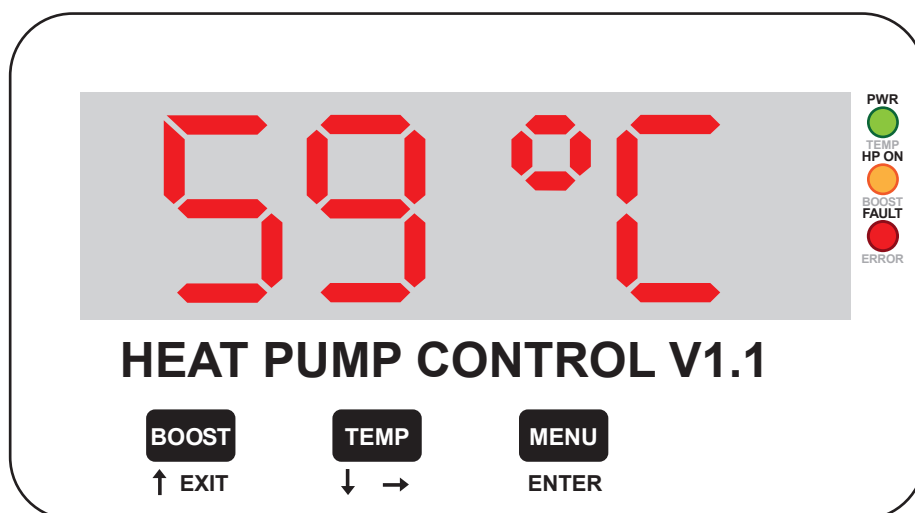
7. Press  button, MEMu appears on display
8. Press  button, t1me appears on display
9. Press  button, optn appears on display
10. Press  button, the option and ADJ alternatively flash on the display
11. Press  to increase the option number or to decrease the option 
12. When finished press  optn appears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

SETTING THE CONTROL OPTION

With reference to the Menu Structure, carry out the following steps.

1. Press  "Menu" is displayed.
2. Press  (to move to next parameter), "TIME" is displayed.
3. Press  (to move to next parameter), "OPtn" is displayed.
4. Press  option currently set "OP-X" is displayed, alternatively with "AdJ-", indicating you are in data change or adjust mode).
5. Use the  button to increment the Option UP, or the temperature button to decrement the Option DOWN). Note that the "AdJ-" prompt is not displayed whilst the up/down buttons are pressed.
6. If setting the Option 1 to 4, then press  to return to the main menu loop
then press the  to exit menu mode and return to normal mode.
7. If the Option is set to option 5, then this is the User Selectable time switch settings.
Press  "Menu" to enter User Time-ON-1, "onu1" is displayed.
8. This is the time of day you want the heat pump temperature mode enabled.
9. Press  to display the current time-On setting. The "AdJ-" prompt will again appear.
10. Use the  to increment the Time-ON UP, or the temperature button to decrement the Time-ON DOWN). The longer the button is pressed the faster the time will change. Note that the "AdJ-" prompt is not displayed whilst the up/down buttons are pressed.
11.  Once the correct time-ON is displayed, press the Menu button to Accept.
12. Press  button to move to the User Hours-Run-1, "hru1" is displayed.
13. Press  button to display the current Hours Run setting. The "AdJ-" prompt will again appear.
14. Use the  Use the Boost Button to increment the Hours Run UP, or the temperature button to decrement the Hours Run DOWN). The longer the button is pressed the faster the time will change. Note that the "AdJ-" prompt is not displayed whilst the up/down buttons are pressed.
15. Press  Once the correct Hours Run is displayed, press the Menu button to accept.
16. Press  A second user selectable time switch setting is also available. Press the Temperature button to move to the User Time-ON-2, "onu2" is displayed. Repeat steps 9 to
17. Press  button to move to the User Hours-Run-2, "hru2" is displayed.
18. Press  to adjust, but if not required move to the next step.
19. Use the  button to increment the Hours Run UP, or the temperature button to decrement the Hours Run DOWN). The longer the button is pressed the faster the time will change. Note that the "AdJ-" prompt is not displayed whilst the up/down buttons are pressed. If the second user selectable time switch is not required, it can be disabled by setting the user hours run-2 period to 00 hrs.
20. Press  Once the correct Hours Run is displayed, press the Menu button to accept.
21. Press  Once finished, simply press the Boost button (exit) to revert to the normal display or wait 30 seconds for auto

STATUS OF OPERATION LED AND BUTTON FUNCTION SUMMARY



CONTROLLER STATUS LEDS

LED	LED ON - SOLID	LED ON - FLASHING
	Power On	Temperature Mode Enabled
	Heat Pump on Call	Heat Pump in boost Mode
	Heat Pump Fault	Temperature Sensor Fault

Eg during Options 2 – 6; When the heating is disabled due to the time period, the Green LED will be solid, when temperature mode is enabled due to the time, the Green LED will flash.

IMPORTANT

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

HEAT PUMP FAULTS

Should the heat pump unit go into fault mode, it will generate a fault code which this module will display. The Fault LED will turn on, and one of the error code categories on Table 10 will be displayed. It is noticeable that each error code on the external controller has been synced with a corresponding fault condition on the heat pump PCB board where more details can be obtained on the heat pump PCB display. When an error is showing on the external controller, the piping cover on the left side of heat pump needs to be removed in order to get access to the heat pump PCB display.

ERROR CODE	DESCRIPTION
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.
Eg-10	<p>Tank has not heated to 59°C in the last 24 hours. This error will clear if the boost button is pressed or the tank heats to 59°C or more</p> <p>This error will only appear 24 hours after any of these actions:</p> <ul style="list-style-type: none"> • The last sensor reading of 59°C (or more), resets the timer every time this temperature is measured • Boost button is pressed • There was a power up sequence <p>This is a good way of alerting the user if the heat pump is not heating properly</p>

IMPORTANT

- 1 If tank is cold and no hot water available at taps after a consecutive 24-hour cycle and no error codes on display, this is a symptom for a faulty RJ45 PATCH cable. The connections for this cable should be checked at its two ends (on the controller and on the heat pump PCB board) or replaced before conducting more diagnosing.
- 2 Temperature control mode is disabled for Eg-8 and Eg-9 faults, however boost mode is still operational.
- 3 Eg-8 and Eg-9 faults have a fixed 3 second time delay for both fault on and fault off occurrences.

Details of error codes and the procedure of trouble-shooting is summarized in Table 11. ONLY a licensed installer should conduct the troubleshooting process per instructions given in the “Service Manual”.

COMMUNICATION/TEMPERATURE SENSOR CABLE EXTENSION GUIDE

The RJ45 and sensor cables can be extended up to 15 metres

Note: There are 2 different RJ45 wiring sequences for all RJ45 cables (CAT5 or CAT6). Take special note of the **SEQUENCE** of the wires and the associated plug pin positions of your replacement cable.

These 2 wiring standards are known as **T-568A** and **T-568B**

In this example the photo of the controller is using **T-568B**

Take note of the replacement (longer) cable you select and determine if it is type **A** or **B**. Then wire into the controller to match the type you have.

Note: Positions 1, 2, 3 and 6 are the only differences.



Isolate the mains power before removing the cover and performing this modification

LENGTHENING SENSOR WIRE

15 Metre sensor cables are available and the best option to extending the sensor cable.

Note: The controller will only accurately measure Sensors Specification: NTC 10K @25°C Beta 3435K

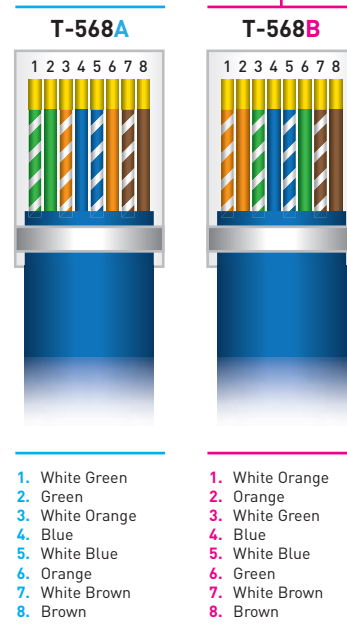
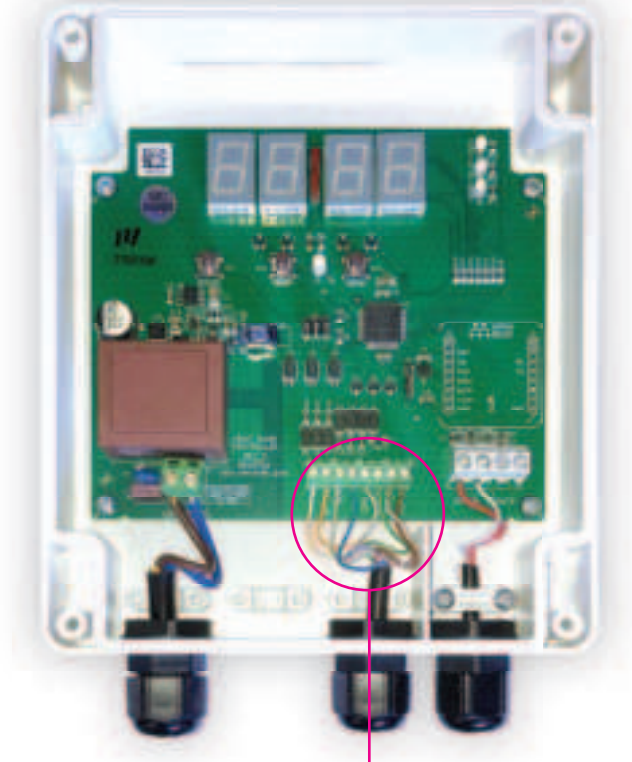
Do not use other sensors

REPLACING A SENSOR



Isolate the mains power supply during this procedure

1. Remove the four screws that hold the lid on.
2. Unscrew the existing sensor from the terminal block.
3. Loosen the cable gland for the sensor lead.
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.



**RJ45 PINOUT
CONFIGUARTIONS**

SENSOR PROBE T10K

Temperature Versus Resistance Table [ITS-90]

Resistance: 10.0k ohms at 25 deg. C **B Value:** 3435K at 25/85 deg. C

TEMPERATURE °C	RESISTANCE KOHMS	TEMPERATURE °C	RESISTANCE KOHMS	TEMPERATURE °C	RESISTANCE KOHMS	TEMPERATURE °C	RESISTANCE KOHMS
-50	326.9	0	27.25	50	4.162	100	0.9737
-49	308.5	1	26.10	51	4.027	101	0.9490
-48	291.3	2	25.00	52	3.897	102	0.9250
-47	275.2	3	23.96	53	3.773	103	0.9018
-46	260.1	4	22.97	54	3.653	104	0.8793
-45	246.0	5	22.03	55	3.537	105	0.8574
-44	232.8	6	21.13	56	3.426	106	0.8363
-43	220.3	7	20.28	57	3.319	107	0.8157
-42	208.7	8	19.46	58	3.216	108	0.7958
-41	197.7	9	18.69	59	3.117	109	0.7764
-40	187.4	10	17.95	60	3.022	110	0.7576
-39	177.5	11	17.23	61	2.929	111	0.7392
-38	168.2	12	16.55	62	2.839	112	0.7214
-37	159.4	13	15.90	63	2.753	113	0.7041
-36	151.1	14	15.27	64	2.670	114	0.6873
-35	143.4	15	14.68	65	2.589	115	0.6710
-34	136.1	16	14.11	66	2.512	116	0.6552
-33	129.2	17	13.57	67	2.438	117	0.6398
-32	122.8	18	13.05	68	2.366	118	0.6248
-31	116.7	19	12.56	69	2.296	119	0.6103
-30	110.9	20	12.09	70	2.229	120	0.5961
-29	105.4	21	11.63	71	2.164	121	0.5823
-28	100.1	22	11.20	72	2.101	122	0.5689
-27	95.22	23	10.78	73	2.040	123	0.5559
-26	90.57	24	10.38	74	1.981	124	0.5432
-25	86.18	25	10.00	75	1.925	125	0.5309
-24	82.04	26	9.633	76	1.870	126	0.5189
-23	78.13	27	9.281	77	1.817	127	0.5072
-22	74.44	28	8.945	78	1.766	128	0.4959
-21	70.94	29	8.623	79	1.716	129	0.4849
-20	67.64	30	8.314	80	1.669	130	0.4741
-19	64.44	31	8.016	81	1.622	131	0.4636
-18	61.42	32	7.730	82	1.577	132	0.4534
-17	58.57	33	7.456	83	1.534	133	0.4435
-16	55.87	34	7.193	84	1.492	134	0.4338
-15	53.31	35	6.941	85	1.451	135	0.4243
-14	50.88	36	6.700	86	1.412	136	0.4152
-13	48.59	37	6.468	87	1.374	137	0.4062
-12	46.41	38	6.246	88	1.337	138	0.3975
-11	44.35	39	6.033	89	1.301	139	0.3890
-10	42.39	40	5.829	90	1.266	140	0.3808
-9	40.50	41	5.630	91	1.233	141	0.3727
-8	38.70	42	5.440	92	1.200	142	0.3648
-7	37.00	43	5.257	93	1.169	143	0.3572
-6	35.38	44	5.081	94	1.138	144	0.3497
-5	33.85	45	4.912	95	1.108	145	0.3424
-4	32.39	46	4.750	96	1.080	146	0.3353
-3	31.00	47	4.594	97	1.052	147	0.3284
-2	29.69	48	4.444	98	1.025	148	0.3217
-1	28.44	49	4.300	99	0.9990	149	0.3151
						150	0.3087



1300 383 815

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