Rinnai

Operation Manual
Rinnai Commercial Controller
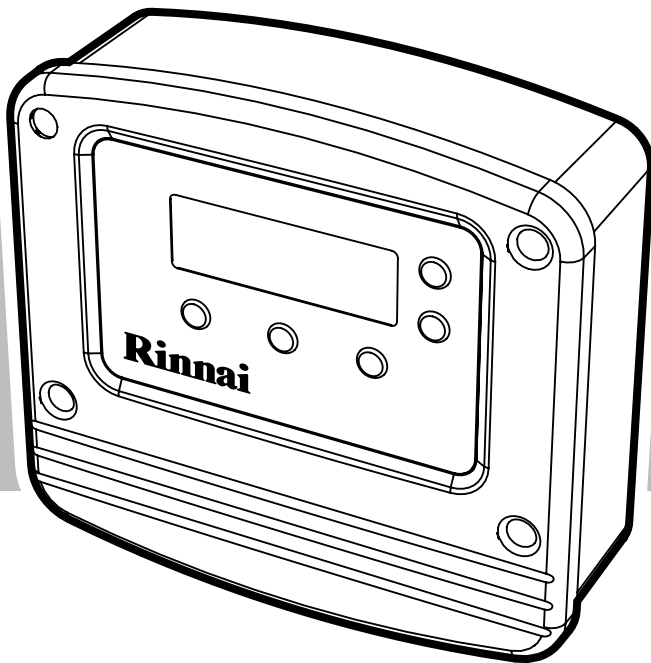
Models
DDSTAT | DDSOLAR | DDCPDEL

Part No. 1540117

WARNING & REGULATORY

READ ALL INSTRUCTIONS BEFORE USING THIS COMMERCIAL CONTROLLER

Always comply with the following precautions to avoid dangerous situations and to ensure optimum performance.

Failure to carefully read and follow all instructions in this manual can result in equipment malfunction, property damage, personal injury and/or death.

WARNINGS: WHEN IGNORED, CAN RESULT IN SERIOUS INJURY OR DEATH.

CAUTIONS: WHEN IGNORED, CAN RESULT IN MINOR INJURY OR PRODUCT DAMAGE.

⚠️ **WARNING**

REGULATORY / INSTALLATION

This controller shall be installed in accordance with:

- Manufacturer's Installation Instructions.
- Current AS/NZS 3000.
- Local Regulations and Municipal Building Codes including local OH&S requirements.

This controller must be installed, maintained and removed by an Authorised Person.

For continued safety of this controller must be installed and maintained in accordance with the manufacturers instructions.

Take care when opening or unpacking this controller. Failure to do so may result in serious injury or product failure.

DO NOT modify the electrical wiring of this controller. If the wiring is damaged or deteriorated then it must be replaced by an Authorized Person. Failure to do so may result in electric shock, fire, serious injury or product failure.

⚠️ **CAUTION**

CONTROLLER INSTALLATION POSITIONING

- When installing and locating the Controller (other than the default factory position), please ensure that the position is dry and free from constant exposure to water droplets, both GPO should be in use, if not the unused GPO should be plugged.
- Do not use power boards with this Controller.

DDSTAT

The DDSTAT model is used in conjunction with Demand Duo systems and operates by measuring the temperature of the water in the storage tank. If the temperature of the water falls below the "tank set temperature" and the "tank low limit temperature" the controller will switch ON the pump(s) and circulate water from the tank through the HD water heater(s) and back to the tank.

The DDSTAT is configured with a power feed to the controller, a tank temperature probe, 2 integrated GPOs for pump or HD power supplies, and a second temperature probe that can be utilised to detect hot water return temperatures from the HD heat source(s) if required.

- Available "TANK SET TEMPERATURE" range is 60°C to 82°C (factory default setting 65°C)
- Available "TANK LOW LIMIT TEMPERATURE" range is: 3°C less "tank set temperature" to 50°C (factory default setting 5°C).

For example:

Tank Set Temperature	Tank Low Limit Temperature Range Available
82°C	50°C to 79°C
71°C	50°C to 68°C
60°C	50°C to 57°C

The DDSTAT Controller can be set up with the following pump operation:

System Description	Model Name	LH GPO	RH GPO
DD with 1 HD & 1 Pump	DD 1	Permanently active for HD	Pump
DD with 2 or more HDs & 1 Pump	DD 2 + (1 Pump system)	Disabled	Pump
DD with 2 or more HDs & 2 Pumps	DD 2 + (2 Pump system)	Pump 1	Pump 2

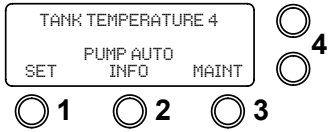⚠ **NOTE** **For DD systems with 2 pumps either simultaneous or alternation operation mode can be requested.**
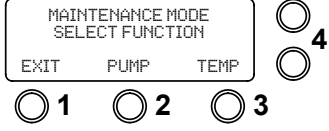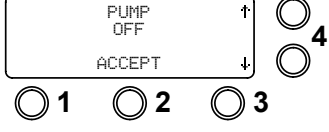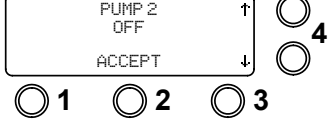
DDSTAT BASIC OPERATION

Once the controller has power, the tank temperature (home) screen is displayed. If the temperature probe is in place a temperature reading will be displayed, if no probe is attached then an error will be registered and displayed.
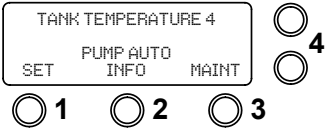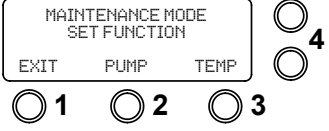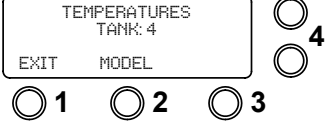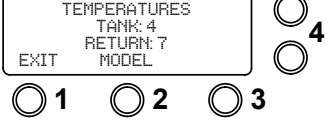
To program the "Tank Set Temperature":

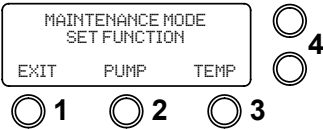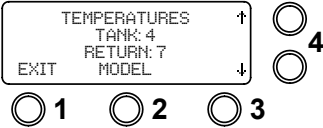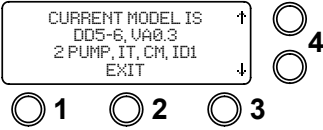| 1. From home screen select "SET" button 1.	TANK TEMPERATURE 4 PUMP AUTO SET INFO MAINT ○1 ○2 ○3 ○4
2. Using the arrow buttons select the "TANK SET TEMPERATURE" then select "ACCEPT" button 2.	TANK SET TEMPERATURE 65 ACCEPT ○1 ○2 ○3 ○4
3. Using the arrow buttons select the "TANK LOW LIMIT TEMPERATURE" then select "ACCEPT" button 2.	TANK LOW LIMIT TEMPERATURE 60 ACCEPT ○1 ○2 ○3 ○4

To isolate and maintain the pump(s):

4. From the home screen select "MAINT" button 3.	TANK TEMPERATURE 4 PUMP AUTO SET INFO MAINT ○4 ○1 ○2 ○3
5. Select "PUMP" button 2.	MAINTENANCE MODE SELECT FUNCTION EXIT PUMP TEMP ○4 ○1 ○2 ○3
6. Use the arrow buttons to manually operate the pump on and off, select "ACCEPT" button 2 to run command.	PUMP ↑ OFF ACCEPT ↓ ○4 ○1 ○2 ○3
7. If a second pump has been configured you have the option to manually operate this pump also.	PUMP 2 ↑ OFF ACCEPT ↓ ○4 ○1 ○2 ○3
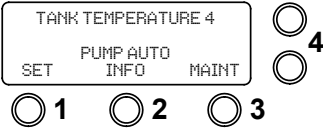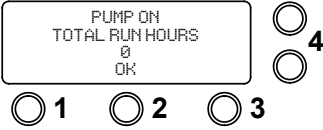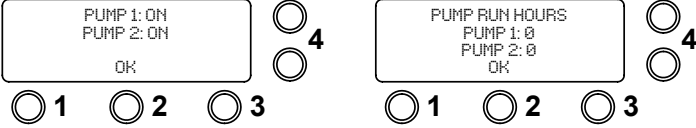
To view system temperatures:

1. From home screen select "MAINT" button 3.	TANK TEMPERATURE 4 PUMP AUTO SET INFO MAINT ○4 ○1 ○2 ○3
2. Select "TEMP" button 3 system temperatures will then be displayed.	MAINTENANCE MODE SET FUNCTION EXIT PUMP TEMP ○4 ○1 ○2 ○3
3. Tank temperature will be shown.	TEMPERATURES TANK: 4 EXIT MODEL ○4 ○1 ○2 ○3
4. If the 2nd temperature sensor has been enabled a return temperature from the HD heat source will be shown.	TEMPERATURES TANK: 4 RETURN: 7 EXIT MODEL ○4 ○1 ○2 ○3

To view controller configuration:

1. For controller configuration information, from home screen select "MAINT", Select "TEMP" button 3.	MAINTENANCE MODE SET FUNCTION EXIT PUMP TEMP ○ **4** ○ **1** ○ **2** ○ **3**
2. From the Temperature screen select "MODEL" button 2.	TEMPERATURES ↑ TANK: 4 RETURN: 7 ○ **4** EXIT MODEL ↓ ○ **1** ○ **2** ○ **3**
3. The Controller configuration will then be displayed select "EXIT" button 2 to return to home screen.	CURRENT MODEL IS ↑ DD5-6, VA0.3 2 PUMP, IT, CM, ID1 ○ **4** EXIT ↓ ○ **1** ○ **2** ○ **3**

To view pump status and run times:

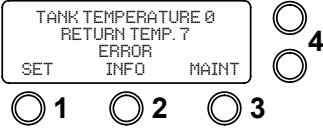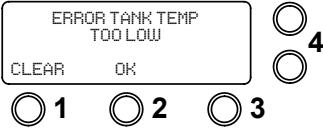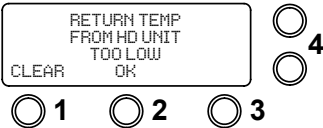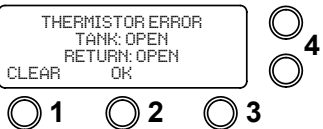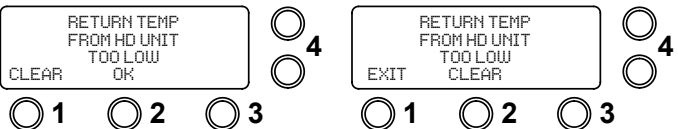|	
1. From the home screen select "INFO" button 2.	TANK TEMPERATURE 4 ○ **4** PUMP AUTO SET INFO MAINT ○ ○ **1** ○ **2** ○ **3**
2. If one pump has been configured the pump operation status and run time hours will be displayed.	PUMP ON TOTAL RUN HOURS ○ **4** 0 OK ○ ○ **1** ○ **2** ○ **3**
3. If two pumps have been configured the screen will scroll through pump operation status and run time hours.	PUMP 1: ON ○ **4** PUMP RUN HOURS ○ **4** PUMP 2: ON ○ PUMP 1: 0 ○ PUMP 2: 0 OK OK ○ **1** ○ **2** ○ **3** ○ **1** ○ **2** ○ **3**

DDSTAT ERROR DETECTION

The DDSTAT controller has in-built system error detection connected to voltage free contacts. Errors that are present are displayed on the home operating screen.

The voltage free contacts can connect to BMS and be either programmed to open or close on error detection. With the 2nd sensor connected and enabled, the controller has the ability to detect three predetermined errors, see below:

- Error 1, Tank Temperature falls below low set point and does not rise to temperature set point within the prescribed period of time. This generally indicates a faulty pump.
- Error 2, With the 2nd sensor enabled only. The temperature of the water returning from the HD Water Heaters is insufficient. This generally indicates a faulty heat source
- Error 3, If any one or both of the sensors are faulty (outside of measurement range).

DDSTAT ERROR DETECTION CONTINUED

To view displayed errors:

1. From the home screen select "INFO" button 2.	TANK TEMPERATURE 0 / RETURN TEMP. 7 / ERROR / SET INFO MAINT — 4, 1 2 3
2. For Error 1 the following screen will be displayed.	ERROR TANK TEMP / TOO LOW / CLEAR OK — 4, 1 2 3
3. For Error 2 the following screen will be displayed. If both errors are present then they will scroll through each display every 3 seconds.	RETURN TEMP / FROM HD UNIT / TOO LOW / CLEAR OK — 4, 1 2 3
4. For Error 3 the following screen will be present for any one or both of the sensors. If more than 1 error is present the screen will scroll through each error.	THERMISTOR ERROR / TANK: OPEN / RETURN: OPEN / CLEAR OK — 4, 1 2 3
5. To remove any of the errors select the "CLEAR" button 1. Followed by "CLEAR" button 2.	RETURN TEMP / FROM HD UNIT / TOO LOW / CLEAR OK — 4, 1 2 3 RETURN TEMP / FROM HD UNIT / TOO LOW / EXIT CLEAR — 4, 1 2 3

Sensor Mounting:

With the second temperature sensor enabled, the mounting location **MUST BE** close to the hot outlet of the HD unit(s) where the hot water returns to the tank, refer Figure 1. The sensor should be securely mounted in a dry-well and bonded in-place with a thin film of heat conducting medium and must be protected against moisture and water ingress. Refer to Figure 1.

Care should be taken when fixing the correct sensor to the correct location as both sensor cables look identical. For BMS (voltage free contacts) connection to the controller, remove the cover and wire the connections to the points identified in Figure 2.
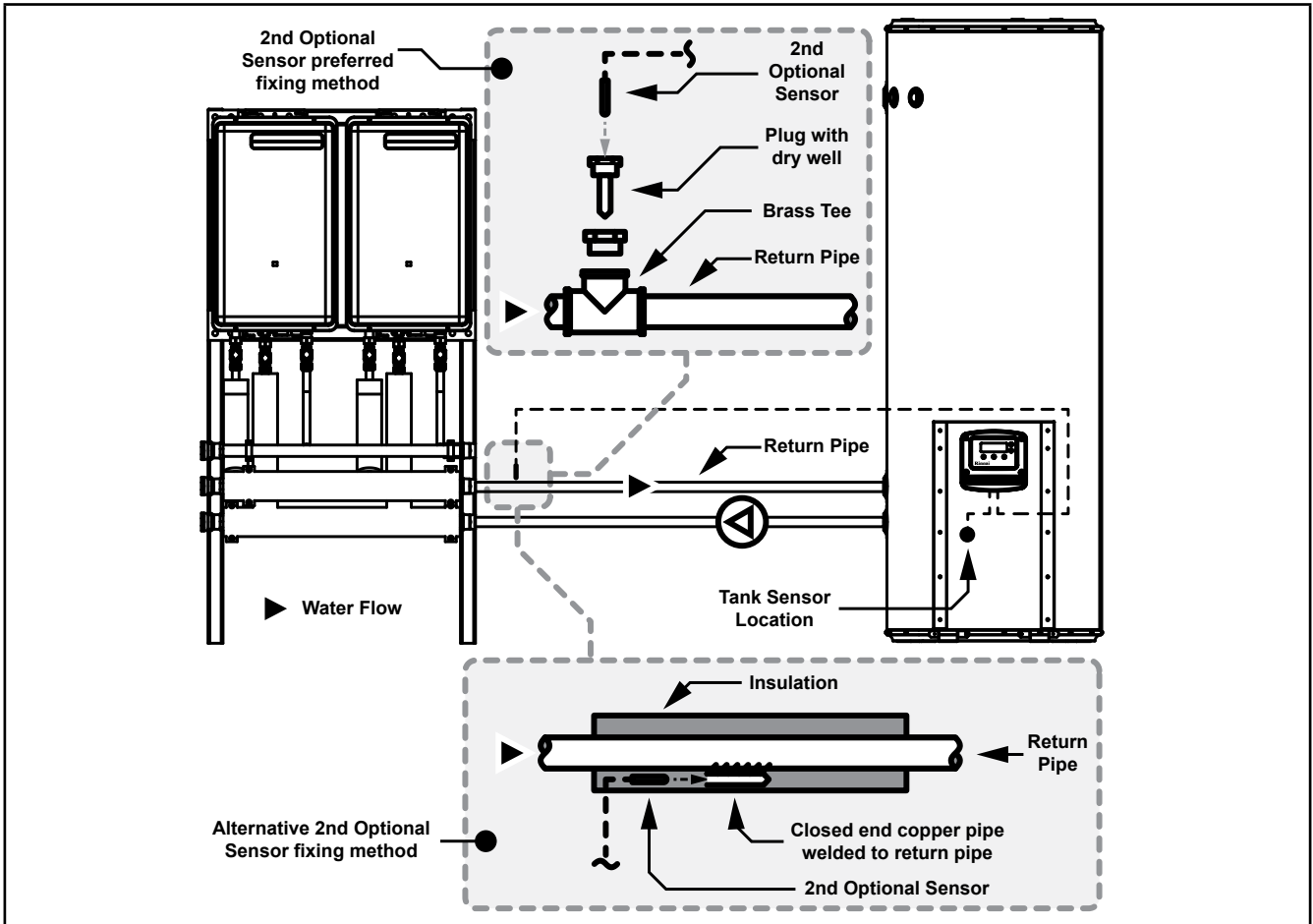
2nd Optional Sensor preferred fixing method

2nd Optional Sensor

Plug with dry well

Brass Tee

Return Pipe

Return Pipe

Water Flow

Tank Sensor Location

Insulation

Return Pipe

Alternative 2nd Optional Sensor fixing method

Closed end copper pipe welded to return pipe

2nd Optional Sensor

Fig. 1 Approximate Sensor Locations

BMS Connection (VOLTAGE FREE CONTACTS)

USER PANEL Connection

TEMP 2
DDTSTAT - Return Temp

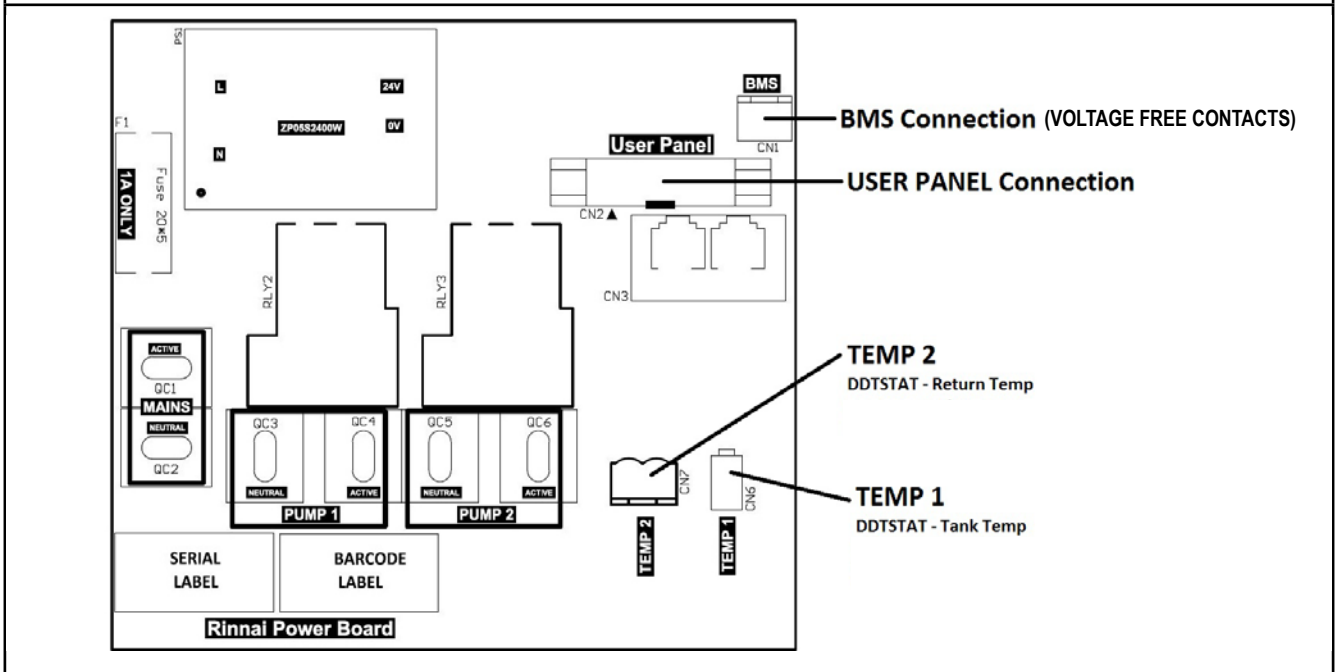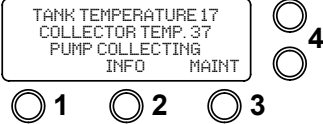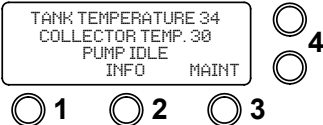**TEMP 1**
DDTSTAT - Tank Temp

Fig. 2 DDSTAT Internal PCB showing Thermistor Connections

DDSOLAR OPERATION

DDSOLAR (COMMERCIAL SOLAR CONTROLLER)

The solar controller's function is to turn the solar pump on and off to collect and transfer solar heated water to the storage water cylinder. It can be supplied to operate single or dual pumps with the further option to have dual pumps switched simultaneously or alternatively (12 hour cycle).

The controller determines if there is capacity in the cylinder(s) to store more solar heated water and when the temperature difference between the cylinder(s) and collector(s) is suitable for energy collection the controller will activate the circulating pump(s).

Solar gain pump 'ON'	TANK TEMPERATURE 17 COLLECTOR TEMP. 37 PUMP COLLECTING INFO MAINT 4 1 2 3
No Solar gain pump idle.	TANK TEMPERATURE 34 COLLECTOR TEMP. 30 PUMP IDLE INFO MAINT 4 1 2 3

When there is a differential temperature between the solar collector (hot sensor) and the tank (cold sensor) the circulating pump is switched on. When differential falls to below the predetermined limit the circulation pump is then switched off.
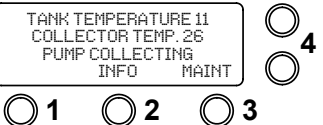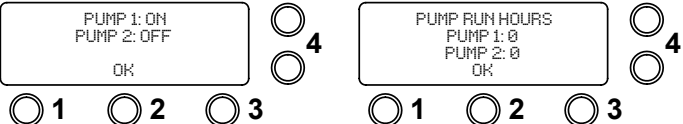
When the tank temperature sensor reaches the predetermined set point the pump is de-energised. This prevents water that is too hot returning from the solar collectors to the storage cylinder and activating the P&TR valve.

Alternatively if the collector temperature is over the safe operating temperature the controller de-energises the pump.
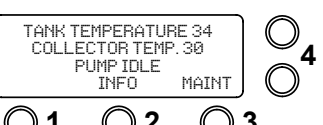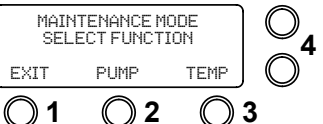
The other function of the controller is to circulate water through the collectors when there are low ambient temperature frost conditions to prevent the collector from freezing. When the hot temperature sensor (in collector) drops below the pre-determined limit the pump activates to prevent freezing. The circulator will stop once the hot sensor temperature increases.

This is a function that is selected from the Maintenance menu. This function MUST be enabled, in areas that may experience low temperatures and to comply with warranty conditions.
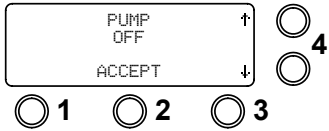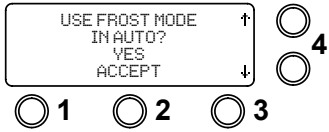
To view pump status and run times:

1. From the home screen select "INFO" button 2.	TANK TEMPERATURE 11 COLLECTOR TEMP. 26 PUMP COLLECTING INFO MAINT 4 1 2 3
2. The screen will alternate between pump operation status and run time hours.	PUMP 1: ON PUMP 2: OFF OK 4 1 2 3 PUMP RUN HOURS PUMP 1: 0 PUMP 2: 0 OK 4 1 2 3
Activating Frost Protection	
1. From home screen select "MAINT" button 3.	TANK TEMPERATURE 34 COLLECTOR TEMP. 30 PUMP IDLE INFO MAINT 4 1 2 3
2. From the Maintenance screen select "PUMP" button 2.	MAINTENANCE MODE SELECT FUNCTION EXIT PUMP TEMP 4 1 2 3
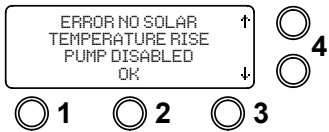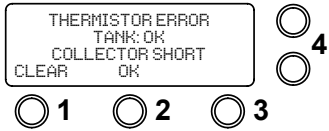
Activating Frost Protection Continued:

3.	From the Pump screen select "ACCEPT" button 2.	PUMP OFF ACCEPT 1 2 3 4
4.	Using the arrow buttons select either "YES" or "NO" for Frost Mode then select "ACCEPT" button 2. This will take you back to the Maintenance screen.	USE FROST MODE IN AUTO? YES ACCEPT 1 2 3 4

DDSOLAR ERROR DETECTION

The DDSolar controller has in-built system error detection connected to voltage free contacts. During solar gain if there is no temperature rise within 2 hours then an error will be displayed, errors that are present are displayed on the main operating screen. See the two errors listed below.

1.	No temperature rise within a predetermined time during a solar gain period.	ERROR NO SOLAR TEMPERATURE RISE PUMP DISABLED OK 1 2 3 4
2.	If one or both thermistors are outside the predetermined measurement range. This screen justifies an error with the collector short.	THERMISTOR ERROR TANK: OK COLLECTOR SHORT CLEAR OK 1 2 3 4

The voltage free contacts can connect to BMS and either programmed as open or closed on error detection.

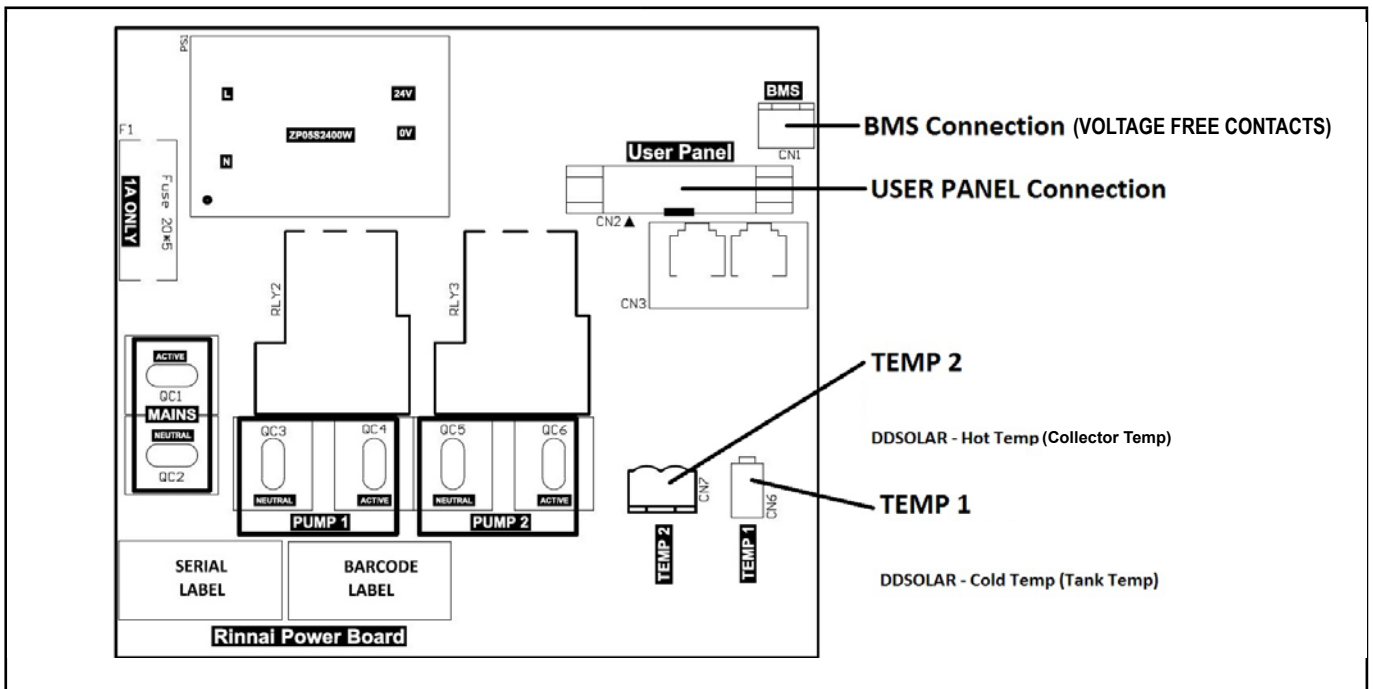Refer to Figure 3 for BMS connection and thermistor locations.

Fig. 3 DDSOLAR Internal PCB showing Thermistor Connections
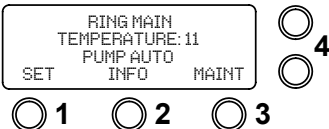
DDPCDEL OPERATION

DDPCDEL (DELUXE PUMP CONTROLLER)

The DDPCDEL is used to monitor commercial flow and return systems. The main functionality of the controller in this mode is to extend the life of the pumps by regular alternation or overcome any issues with faulty pump if present.
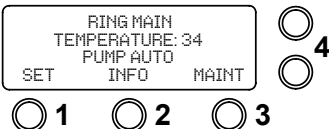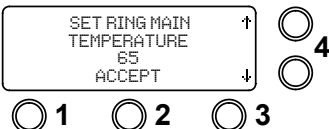
The features of this controller are:

- Operating temperature selection range of 40°C to 80°C with 1°C increment setting.
- 12 hour changeover cycle between pumps (this is the factory Pre-set but 24 hours is available on request).
- Capability of controlling dual pump systems up to a power load of 900 Watts per pump.
- Numerical display of monitored water temperature.
- Thermistor temperature sensor (to be located on pipework common to both pumps).
- Voltage free contacts selectable as open or closed on fault for easy connection to BMS.

On initial start up the controller will run in "AUTO" mode, energise pump one and display the current temperature reading from the thermistor. It can also be factory configured to run 2 pumps simultaneously.
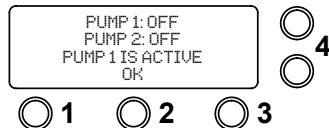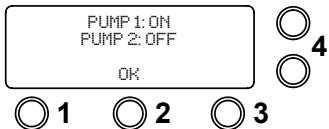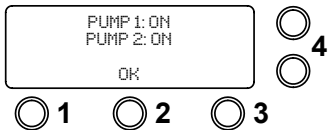
1. Home Screen image.	RING MAIN TEMPERATURE: 11 PUMP AUTO SET INFO MAINT ○**4** ○ **1** ○ **2** ○ **3**

TO PROGRAM THE "RING-MAIN TEMPERATURE"
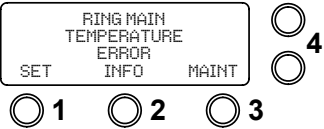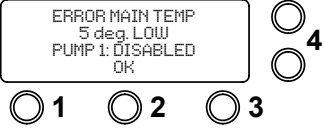
1. From home screen select "SET" button 1.	RING MAIN TEMPERATURE: 34 PUMP AUTO SET INFO MAINT ○**4** ○ **1** ○ **2** ○ **3**
2. Using the arrow buttons select the "RING-MAIN TEMPERATURE" then select 'ACCEPT' button 2.	SET RING MAIN ↑ TEMPERATURE 65 ACCEPT ↓ ○**4** ○ **1** ○ **2** ○ **3**

Once the controller has been configured to suit the application it will begin to monitor the Ring-Main temperature and adjust accordingly. If the temperature reaches the set point all pumps will be de-energised, thus saving energy, if the temperature reduces, within the set range, a single pump will be energised. This single pump will remain energised to maintain this temperature for the set period of time (12 hours) when in "AUTO" mode. When the time period has elapsed the controller will automatically switch to the second pump and continue to maintain the temperature.

If you press the "INFO" button the pump run hours and active pumps are displayed.

When Ring-Main temperature reaches the set point all pumps will be de-energised, the active pump is identified as the next to operate.	PUMP 1: OFF PUMP 2: OFF PUMP 1 IS ACTIVE OK ○**4** ○ **1** ○ **2** ○ **3**
When Ring-Main temperature within 5°C less of set point, one pump is operational.	PUMP 1: ON PUMP 2: OFF OK ○**4** ○ **1** ○ **2** ○ **3**
When the Ring-Main temperature is between 5°C to 10°C less the set temperature both pumps energised.	PUMP 1: ON PUMP 2: ON OK ○**4** ○ **1** ○ **2** ○ **3**

When operating in "AUTO" mode and the Ring-Main temperature drops below the set point for a prescribed period of time then an error is displayed and the controller automatically switches to the alternative pump.

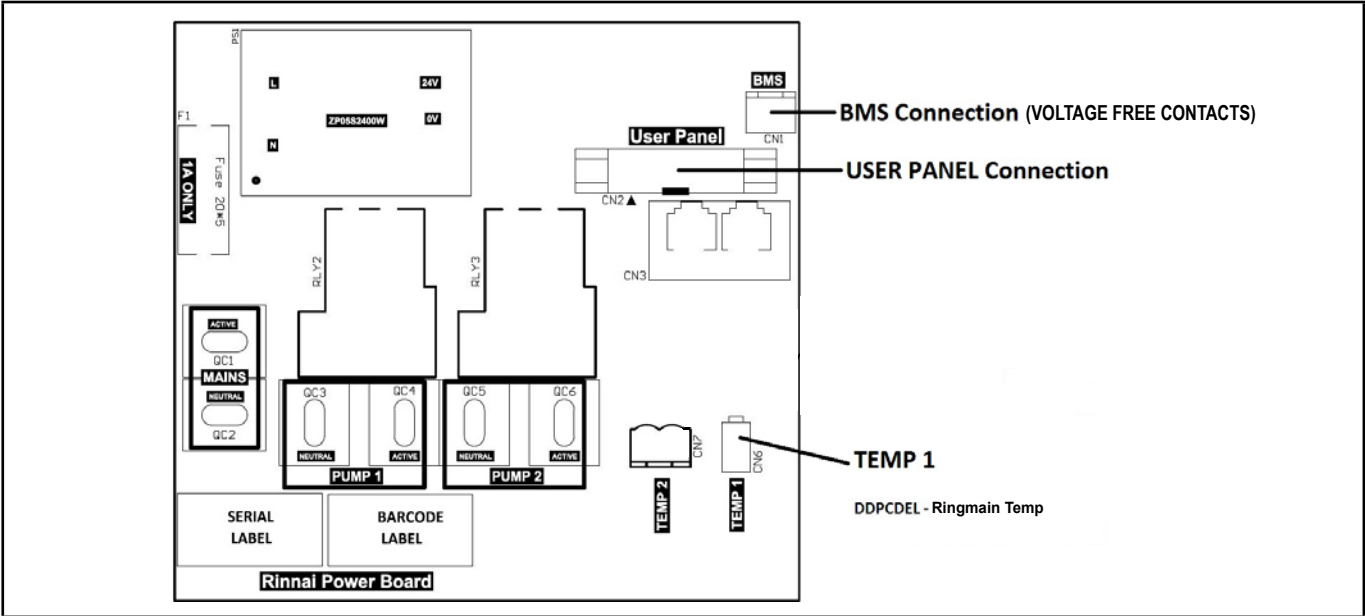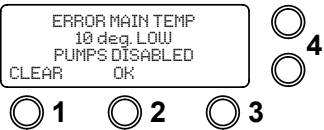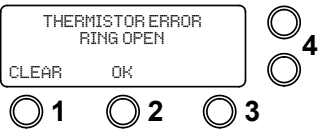| Main temperature 5°C low error screen image.	RING MAIN TEMPERATURE ERROR SET INFO MAINT 4 1 2 3
Pump 1 disabled screen.	ERROR MAIN TEMP 5 deg. LOW PUMP 1: DISABLED OK 4 1 2 3

Fig. 4 DDPCDEL Internal PCB showing Thermistor Connections

If the temperature returns to the set point, within a prescribed period of time, the controller will stop alternating to the affected pump and continue to display a pump error.

If the Ring-Main temperature drops below the set point for a prescribed period of time while both pumps are operating simultaneously then the low temp error is displayed however both pumps continue to operate. If the temperature recovers, within a prescribed time frame, then the error is removed and the controller returns to normal operation. If the temperature continues to drop in excess of 10°C below the set point and does not recover for a prescribed period of time the controller will disable both pumps.

Main temperature 10°C low error screen image.	ERROR MAIN TEMP 10 deg. LOW PUMPS DISABLED CLEAR OK 4 1 2 3

The controller has an additional inbuilt function to identify a thermistor error.

Thermistor open circuit. Thermistor values are outside the prescribed range,	THERMISTOR ERROR RING OPEN CLEAR OK 4 1 2 3

As a final setup prior to operating the flow and return pump system, ensure all pipework with the flow and return system is full of water and all air has been purged.

This can be done using the air vent screw that good quality pumps are supplied with, see example right.

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