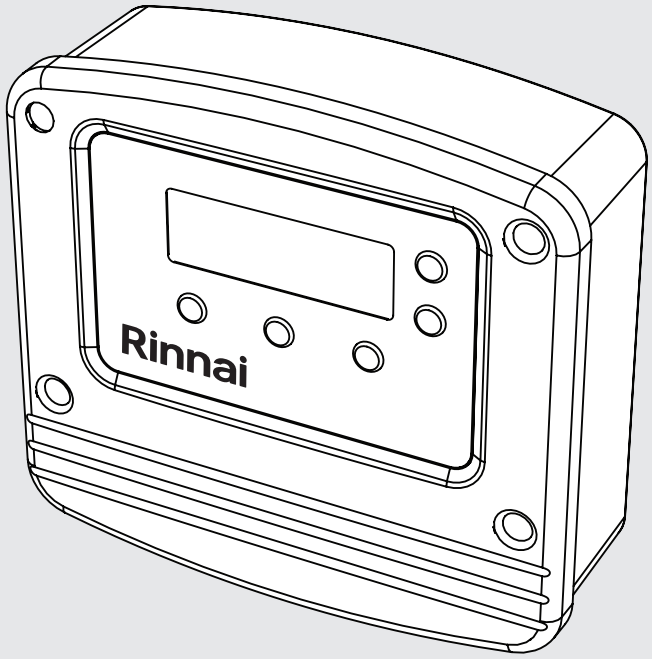
Models:

DDSTAT
DDSOLAR
DDPCDEL



Commercial Controller

Operation & Installation Manual

Rinnai

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

For continued safety of this appliance it must be installed and maintained in accordance with the manufacturer's instructions.

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WARNING & REGULATORY

IMPORTANT

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.

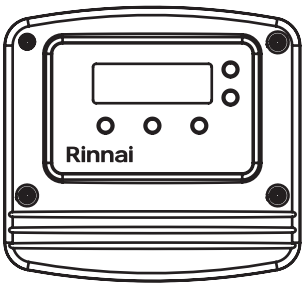
Take care when opening or unpacking this controller. Failure to do so may result in serious injury or product failure.

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

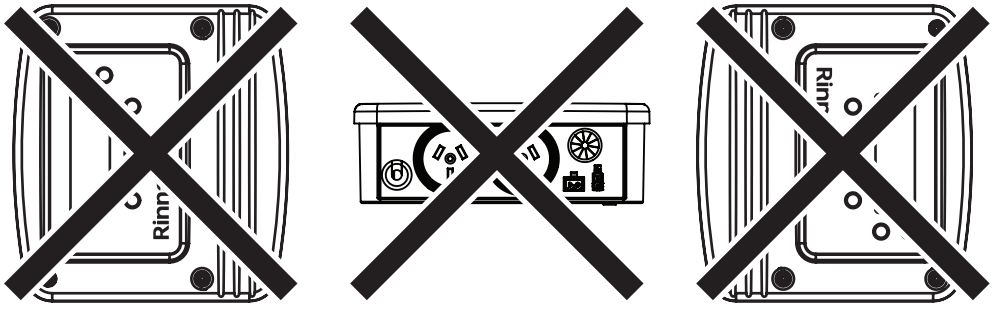
CAUTION

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.**



The controller **MUST** be installed in an upright and vertical orientation **ONLY!**



DO NOT install the controller on its side or back!

DDSTAT OPERATION

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

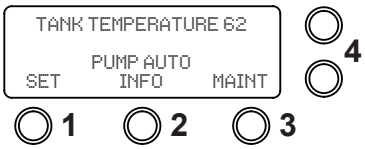
For DD systems with 2 pumps either simultaneous or alternation operation mode can be set.

Basic Operation

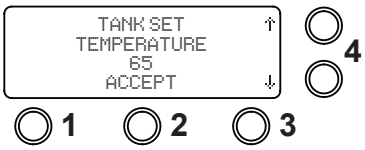
Once the controller has power, the tank temperature (home) screen is displayed. If the temperature probe connected to the controller a temperature reading will be displayed, if no probe is connected then an error will be registered and displayed.

To program the “Tank Set Temperature”

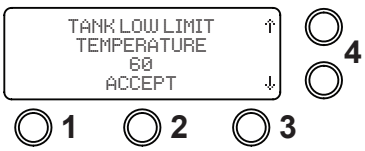
1. From home screen select "SET" button 1.



2. Using the arrow buttons select the "TANK SET TEMPERATURE" then select "ACCEPT" button 2.

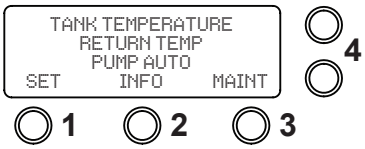


3. Using the arrow buttons select the "TANK LOW LIMIT TEMPERATURE" then select "ACCEPT" button 2.

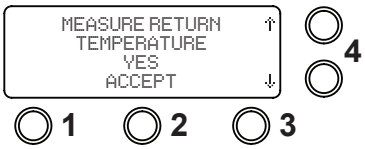


To program the “Return Temperature”

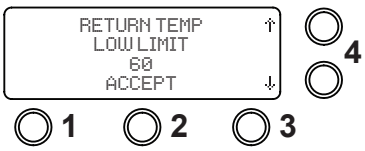
1. From home screen select "SET" button 1.



2. Using the arrow buttons select the "MEASURE RETURN TEMPERATURE YES" then select "ACCEPT" button 2.

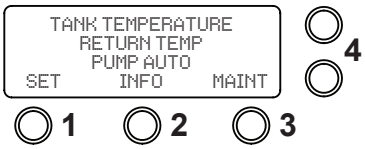


3. Using the arrow buttons select the "RETURN TEMP LOW LIMIT" then select "ACCEPT" button 2.

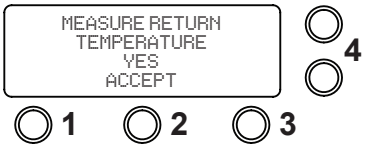


To program the “Alternate Pump Operation”

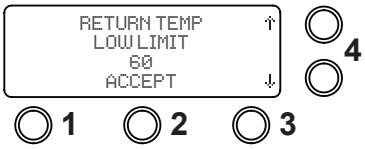
1. From home screen select "SET" button 1.



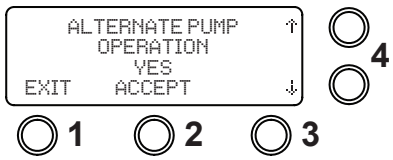
2. From "MEASURE RETURN TEMPERATURE" screen select "ACCEPT" button 2.



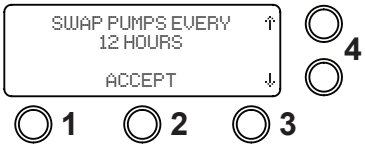
3. From "RETURN TEMP LOWER LIMIT" screen select "ACCEPT" button 2.



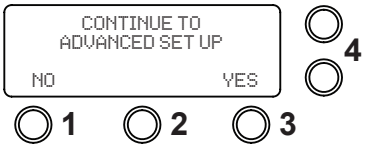
4. Using the arrow buttons select the "ALTERNATE PUMP OPERATION YES" then select "ACCEPT" button 2.



5. Using the arrow buttons select the "SWAP PUMP EVERY 12 HOURS or 24 HOURS" then select "ACCEPT" button 2.



6. From "CONTINUE TO ADVANCED SETUP" screen select "YES" button 3 to continue with further BMS programming or "NO" button 1 to finalise and exit.



*To program the “**Connectivity options to BMS” - Using Volt Free Contacts Only**, go to page 8*

*To program the **“Connectivity options to BMS” - MODBUS With DHCP**, go to page 8*

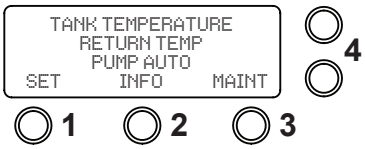
*To program the **“Connectivity options to BMS” - MODBUS Without DHCP,** go to page 9*

*To program the **“Connectivity options to BMS” - BACNET With DHCP**, go to page 10*

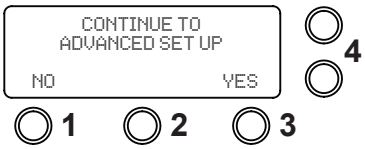
*To program the **“Connectivity options to BMS” - BACNET Without DHCP**, go to page 11*

To program the “Connectivity options to BMS” - Using Volt Free Contacts Only

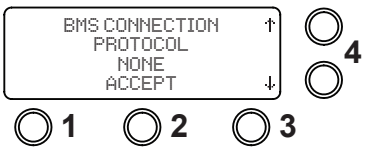
1. Follow steps 1 through 5 on page 7.



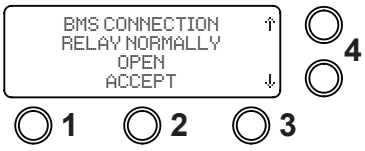
2. From "CONTINUE TO ADVANCED SETUP" screen select "YES" button 3.



3. Using the arrow buttons select the "BMS CONNECTION PROTOCOL NONE" then select "ACCEPT" button 2.

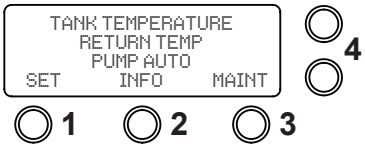


4. Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.

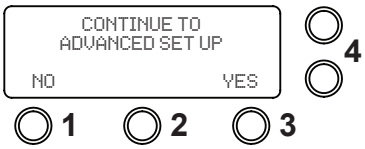


To program the “Connectivity options to BMS” - MODBUS With DHCP

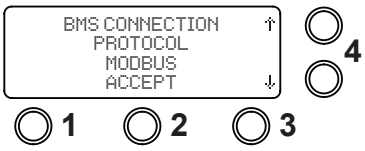
1. Follow steps 1 through 5 on page 7.



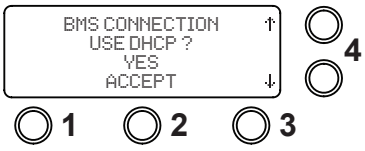
2. From "CONTINUE TO ADVANCED SETUP" screen select "YES" button 3.



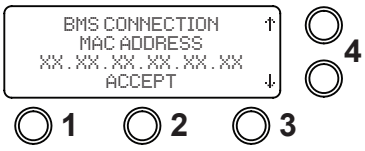
3. Using the arrow buttons select the "BMS CONNECTION PROTOCOL MODBUS" then select "ACCEPT" button 2.



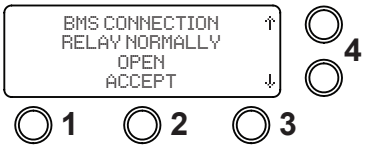
4. Using the arrow buttons select the "BMS CONNECTION USE DHCP? YES" then select "ACCEPT" button 2.



5. Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX.XX" then select "ACCEPT" button 2.

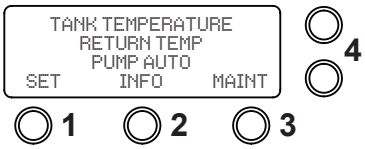


6. Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.

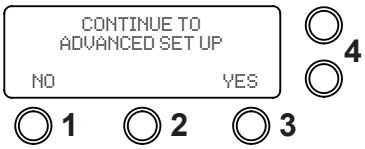


To program the “Connectivity options to BMS” - MODBUS Without DHCP

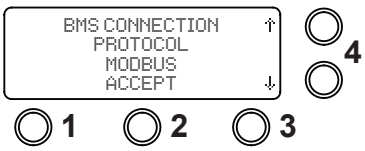
1. Follow steps 1 through 5 on page 7.



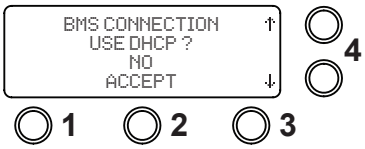
2. From "CONTINUE TO ADVANCED SETUP" screen select "YES" button 3.



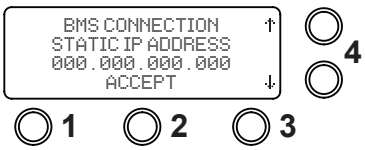
3. Using the arrow buttons select the "BMS CONNECTION PROTOCOL MODBUS" then select "ACCEPT" button 2.



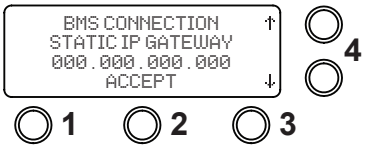
4. Using the arrow buttons select the "BMS CONNECTION USE DHCP? NO" then select "ACCEPT" button 2.



5. Using the arrow buttons select the "BMS CONNECTION STATIC IP ADDRESS 000.000.000.000" then select "ACCEPT" button 2.

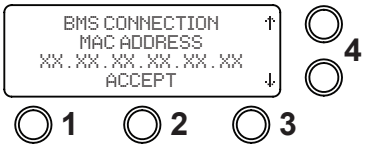


6. Using the arrow buttons select the "BMS CONNECTION STATIC IP GATEWAY 000.000.000.000" then select "ACCEPT" button 2.



7. Using the arrow buttons select the "BMS CONNECTION STATIC IP MASK 000.000.000.000" then select "ACCEPT" button 2.

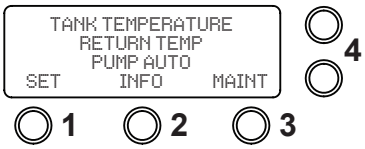
8. Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX.XX" then select "ACCEPT" button 2.



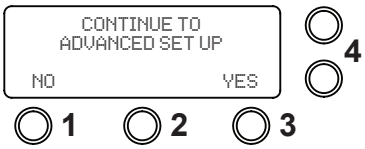
9. Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.

To program the “Connectivity options to BMS” - BACNET With DHCP

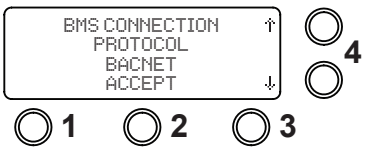
1. Follow steps 1 through 5 on page 7.



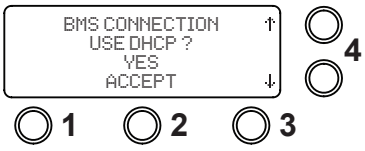
2. From "CONTINUE TO ADVANCED SETUP" screen select "YES" button 3.



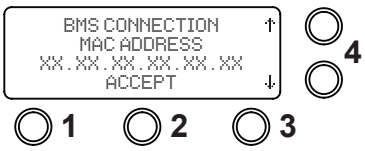
3. Using the arrow buttons select the "BMS CONNECTION PROTOCOL BACNET" then select "ACCEPT" button 2.



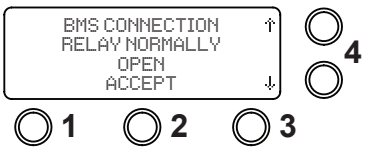
4. Using the arrow buttons select the "BMS CONNECTION USE DHCP? YES" then select "ACCEPT" button 2.

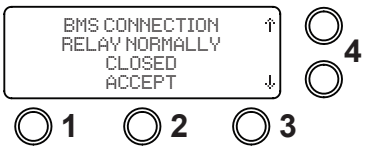


5. Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX.XX" then select "ACCEPT" button 2.

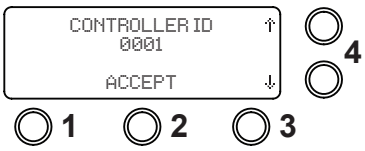


6. Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or NORMALLY CLOSED" then select "ACCEPT" button 2.



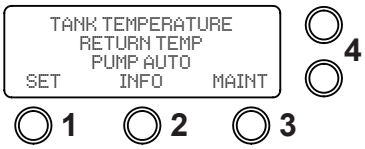


7. Using the arrow buttons select the "CONTROLLER ID 1" then select "ACCEPT" button 2.

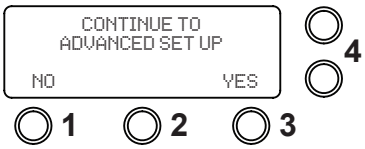


To program the “Connectivity options to BMS” - BACNET Without DHCP

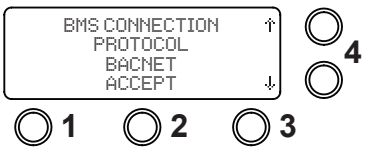
1. Follow steps 1 through 5 on page 7.



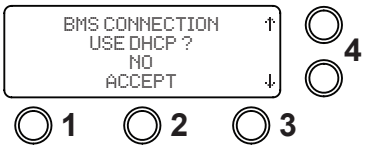
2. From "CONTINUE TO ADVANCED SETUP" screen select "YES" button 3.



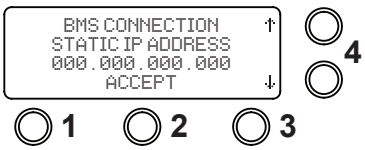
3. Using the arrow buttons select the "BMS CONNECTION PROTOCOL BACNET" then select "ACCEPT" button 2.



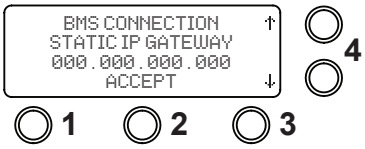
4. Using the arrow buttons select the "BMS CONNECTION USE DHCP? NO" then select "ACCEPT" button 2.



5. Using the arrow buttons select the "BMS CONNECTION STATIC IP ADDRESS 000.000.000.000" then select "ACCEPT" button 2.

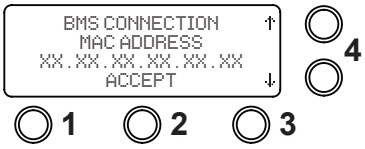


6. Using the arrow buttons select the "BMS CONNECTION STATIC IP GATEWAY 000.000.000.000" then select "ACCEPT" button 2.

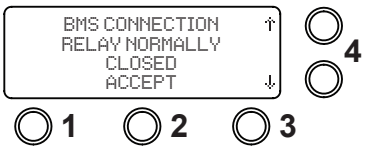


7. Using the arrow buttons select the "BMS CONNECTION STATIC IP MASK 000.000.000.000" then select "ACCEPT" button 2.

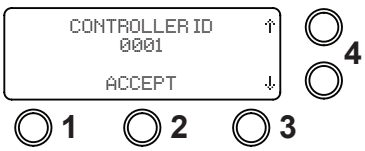
8. Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX.XX" then select "ACCEPT" button 2.



9. Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or NORMALLY CLOSED" then select "ACCEPT" button 2.



10. Using the arrow buttons select the "CONTROLLER ID 1" then select "ACCEPT" button 2.



DDSTAT REGISTER

When setting up your controls monitoring interface, it is necessary to know the registry information to select the data you wish to monitor.

All parameters are READ-ONLY.

When using MODBUS protocol please note:

- MODBUS Data is Big-Endian
- Temperatures are provided in fixed point
- MODBUS Coils and Discrete inputs are not used

When using BACNET protocol please note:

- The device object contains parameters such as version info, serial number, etc
- Temperatures are in floating point

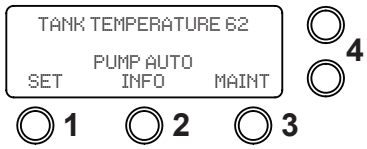
Refer to the tables below for registers and data points.

INPUT REGISTER INFORMATION					
Category	**Input Register**	**Function**	**Size (16 bit words)**	**Value**	**BACNET**
Product information	30002	Product Set	1	DDSTAT	Included elsewhere
	30004	Major Version	1	Firmware Major version	In Device Info
	30007	Serial Number	2		In Device Info
Temperatures	30011	Tank thermistor temp.	1	decidegrees (e.g. 260 = 26.0 deg C)	Analog Input
	30012	Second thermistor temp.	1	decidegrees (e.g. 260 = 26.0 deg C)	Analog Input
Pump Status	30021	Pump 1 Run Timer	2	Number of hours	Analog Input
	30023	Pump 2 Run Timer	2	Number of hours	Analog Input
	30031	Pump 1 state	1	on, off	Binary Output
	30032	Pump 2 state	1	on, off	Binary Output
Fault status	30041	Fault state	1	true, false	Binary Value
	30042	Pump 1 condition	1	e.g. working or failed	Binary Value
	30043	Pump 2 condition	1	e.g. working or failed	Binary Value
	30044	Tank Thermistor condition	1	e.g. working, open, short	Multi State Value
	30045	Second Thermistor condition	1	e.g. working, open, short	Multi State Value
	30047	Tank Temp Below Limit Fault	1	true, false	Binary Value
	30048	Second Temp Below Limit Fault	1	true, false	Binary Value

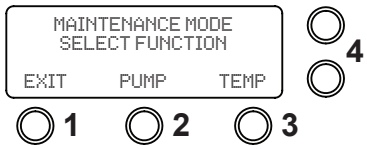
HOLDING REGISTER INFORMATION					
Category	**Holding Register**	**Function**	**Size (16 bit words)**	**Value**	**BACNET**
Product information	40001	Product Set	1	DDSTAT	Multi State Value
Specific Configuration	40011	BMS relay normally open	1	open, closed	Binary Value
	40022	Pump swap period	1	12 hours, 24 hours, 0 if not alternating	Analog Value
	40023	Pumps alternating	1	true, false	Multi State Value
	40024	Interrupt Mode	1	interrupting, not interrupting	Multi State Value
	40025	Interrupt Stop Time Seconds	1	seconds	Analog Value
	40026	Interrupt Run Time Minutes	1	minutes	Analog Value
Thermistor Configuration	40031	Tank thermistor enabled	1	true, false	Binary Value
	40032	Second thermistor enabled	1	true, false	Binary Value
Set Points	40041	Tank Temp Set Point	1	degrees C	Analog Value
	40042	Tank Temp Low Limit	1	degrees C	Analog Value
	40043	Second Temp Low Limit	1	degrees C	Analog Value

To isolate and maintain the pump(s)

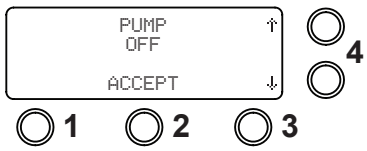
1. From the home screen select "MAINT" button 3.



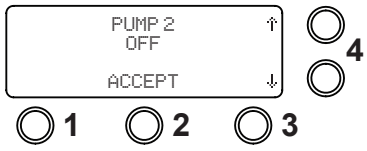
2. Select "PUMP" button 2.



3. Use the arrow buttons to manually operate the pump on and off, select "ACCEPT" button 2 to run command.

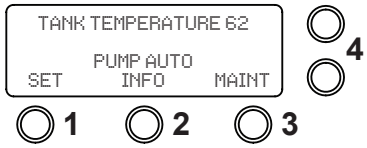


4. If a second pump has been configured you have the option to manually operate this pump also.

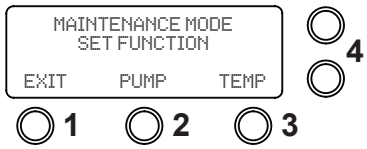


To view system temperatures

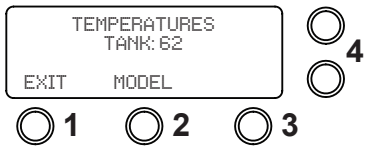
1. From home screen select "MAINT" button 3.



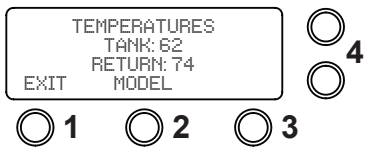
2. Select "TEMP" button 3, system temperatures will then be displayed.



3. Tank temperature will be shown.

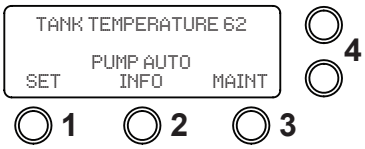


4. If the second temperature sensor has been enabled a return temperature from the HD heat source will be shown.

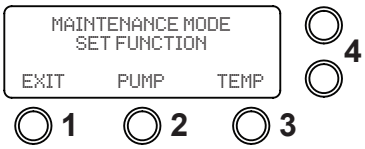


To view controller configuration

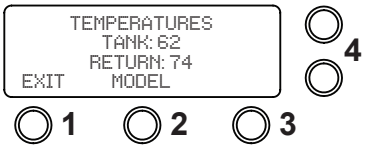
1. From home screen select "MAINT" button 3.



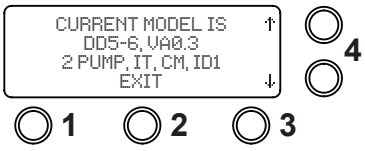
2. Select "TEMP" button 3, system temperatures will then be displayed.



3. From the Temperature screen select "MODEL" button 2.

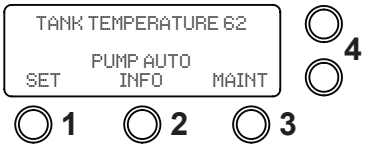


4. The Controller configuration will then be displayed select "EXIT" button 2 to return to home screen.

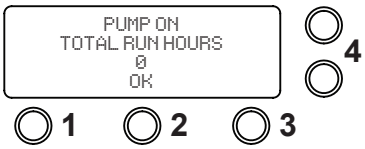


To view pump status and run times

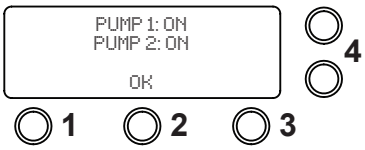
1. From the home screen select "INFO" button 2.

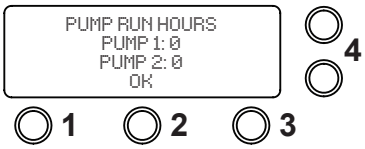


2. If one pump has been configured the pump operation status and run time hours will be displayed.



3. If two pumps have been configured the screen will scroll through pump operation status and run time hours.





DDSTAT ERROR DETECTION

The DDSTAT controller has in-built system error detection that is connected to internal voltage free contacts. The voltage free contacts can connect to BMS and be either programmed to open or close on error detection.

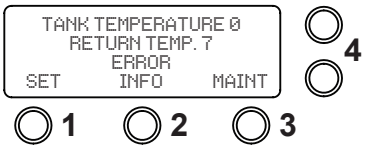
Errors that are present are displayed on the home operating screen and can be accessed via the MODBUS and BACNET protocols.

With the second sensor connected and enabled, the controller has the ability to detect three predetermined errors, see below:

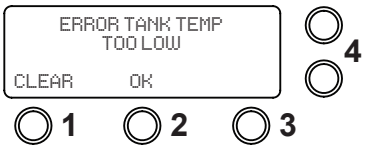
- Error 1, Tank Temperature falls below low set point and does not rise to temperature set point within the prescribed period of time. This generally indicates a faulty pump.
- Error 2, With the second sensor enabled only. The temperature of the water returning from the HD Water Heaters is insufficient.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

To view displayed errors

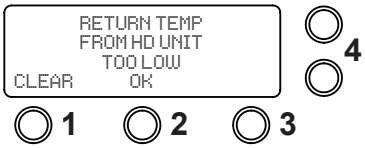
1. From the home screen select "INFO" button 2.



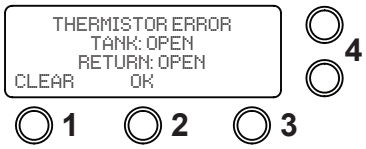
2. For Error 1 the following screen will be displayed.



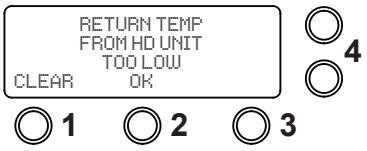
3. For Error 2 the following screen will be displayed. If both errors are present then they will scroll through each display every 3 seconds.

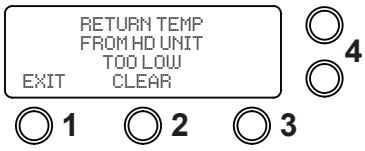


4. For Error 3 the following screen will be present for any one or both of the sensors. If more than 1 error is present the screen will scroll through each error.



5. To remove any of the errors select the "CLEAR" button 1. followed by "CLEAR" button 2.





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 on page 16. 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 on page 16.

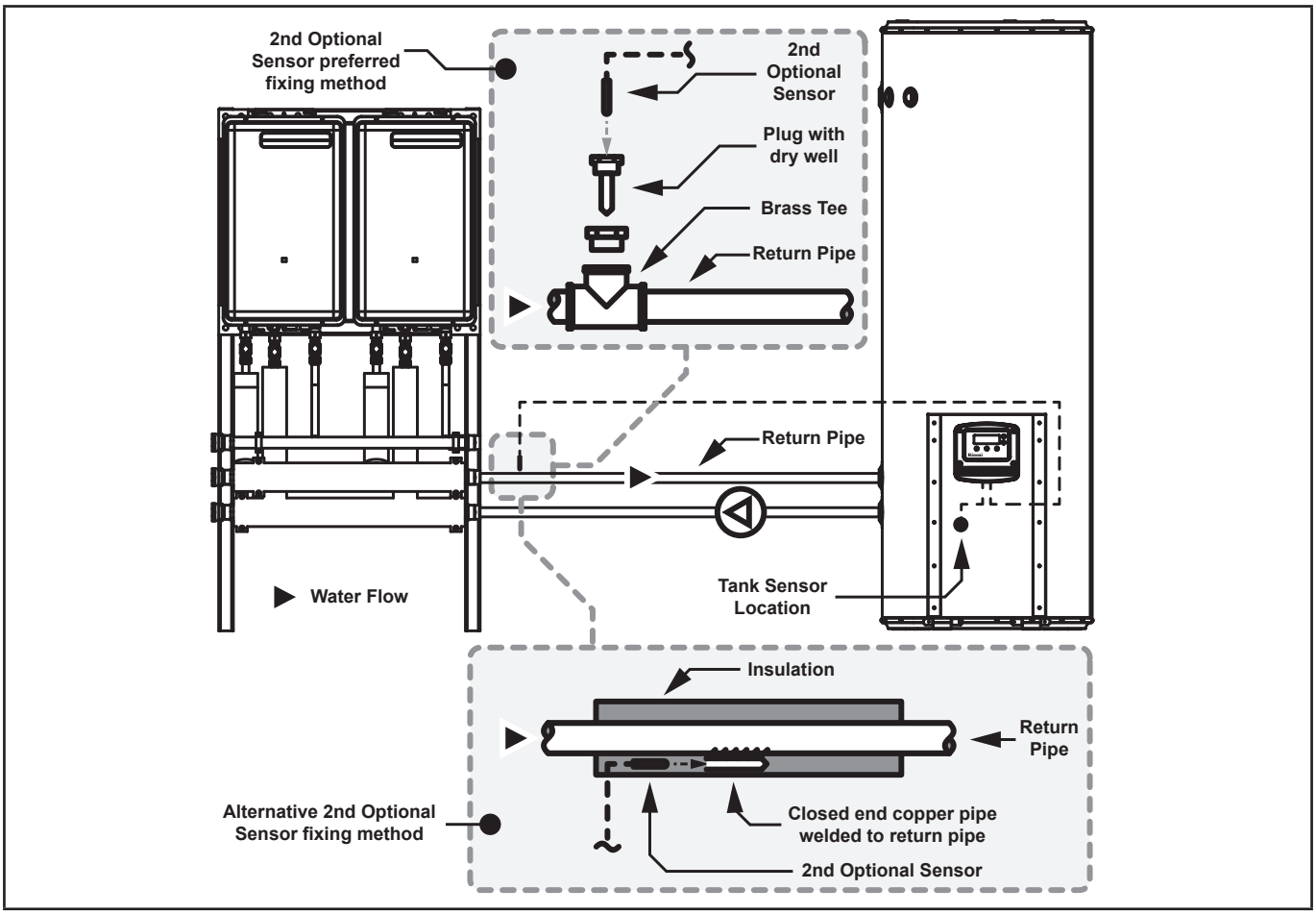


Figure 1. Approximate Sensor Locations

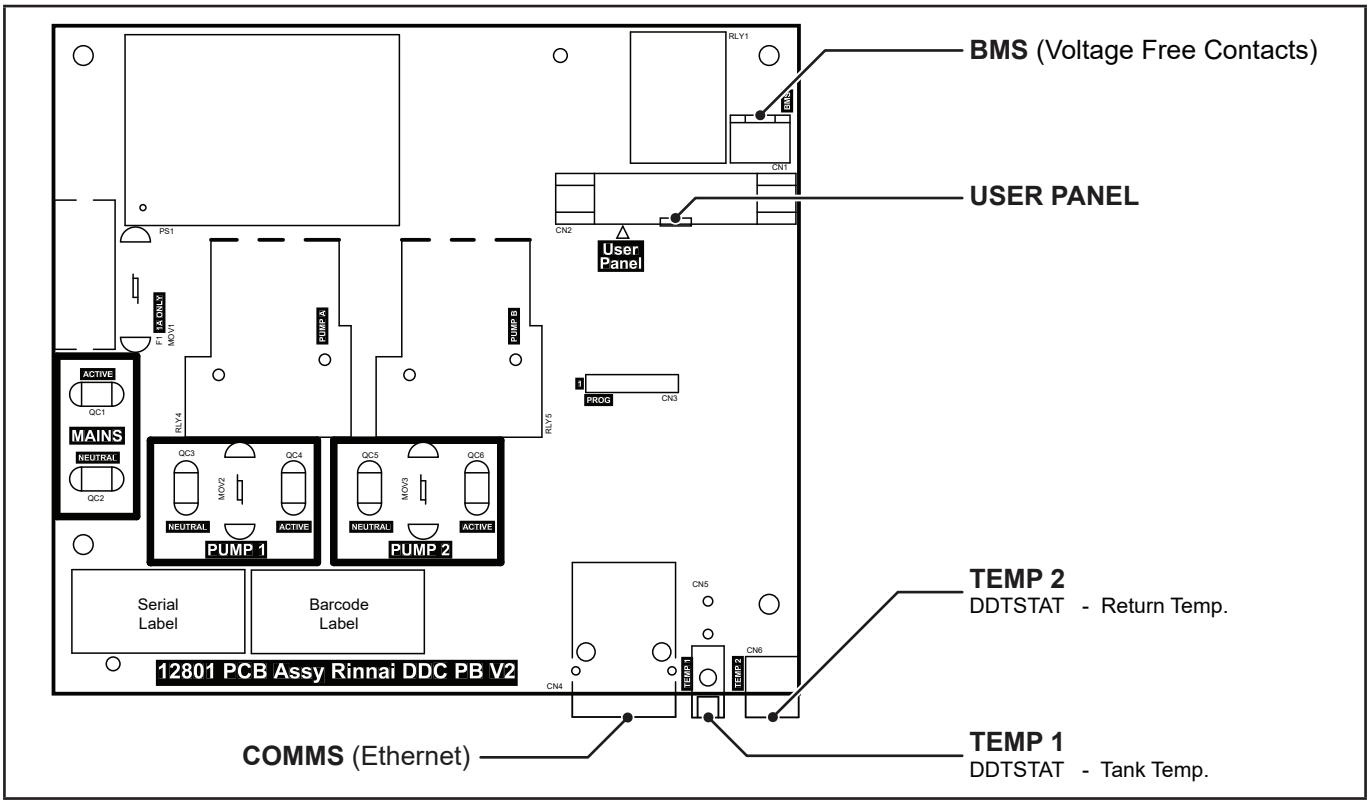


Figure 2. DDSTAT Internal PCB showing Thermistor Connections

DDSOLAR OPERATION

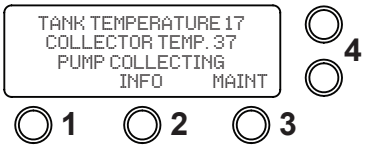
DDSOLAR (COMMERCIAL SOLAR CONTROLLER)

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).

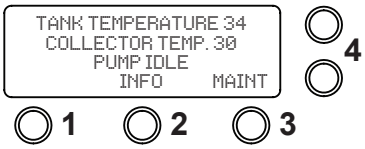
IMPORTANT **For single pump systems the pump MUST be plugged into the right hand GPO.**

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'



No solar gain pump 'IDLE'



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.

Over Temp. Protection

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.

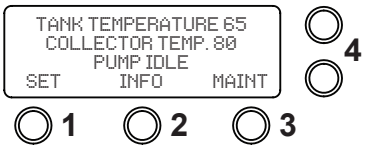
Frost Protection

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 SET menu.

IMPORTANT **This function MUST be enabled, in areas that may experience low temperatures and to comply with warranty conditions.**

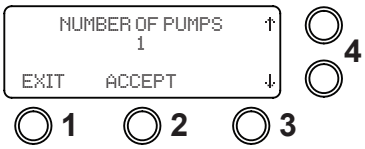
To program the “Alternate Pump Operation” & Frost Protection

1. From home screen select "SET" button 1.

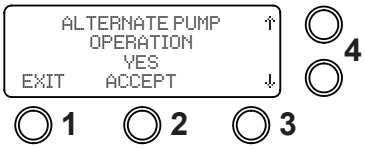


2. Using the arrow buttons select the"NUMBER OF PUMPS" then select "ACCEPT" button 2.

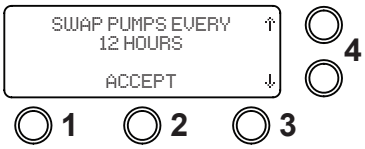
   If "1" selected go to Step 5, if 2 selected go to Step 3.



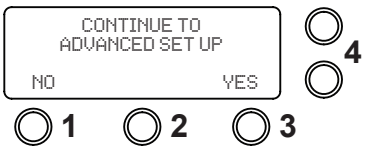
3. Using the arrow buttons select the "ALTERNATE PUMP OPERATION YES" then select "ACCEPT" button 2.



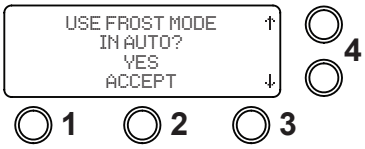
4. Using the arrow buttons select the "SWAP PUMP EVERY 12 HOURS or 24 HOURS" then select "ACCEPT" button 2.



5. From "CONTINUE TO ADVANCED SETUP" screen select "YES" button 3 to continue to set up the Frost Protection Mode or "NO" button 1 to finalise and exit.



6. Using the arrow buttons select either "YES" or "NO" for Frost Protection Mode then select "ACCEPT" button 2. This will take you to the BMS screen.



*To program the **“Connectivity options to BMS” - Using Volt Free Contacts Only**, go to page 18*

*To program the **“Connectivity options to BMS” - MODBUS With DHCP**, go to page 19*

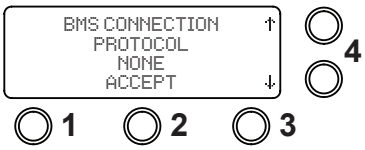
*To program the **“Connectivity options to BMS” - MODBUS Without DHCP,** go to page 19*

*To program the **“Connectivity options to BMS” - BACNET With DHCP**, go to page 20*

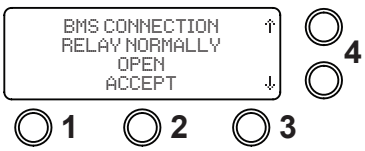
*To program the **“Connectivity options to BMS” - BACNET Without DHCP**, go to page 20*

To program the “Connectivity options to BMS” - Using Volt Free Contacts Only

1. Follow steps 1 through 6 above to get to the BMS home screen. Then using the arrow buttons select the "BMS CONNECTION PROTOCOL NONE" then select "ACCEPT" button 2.

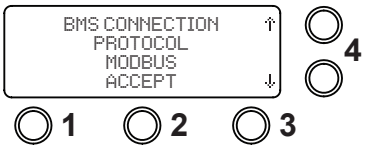


2. Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.

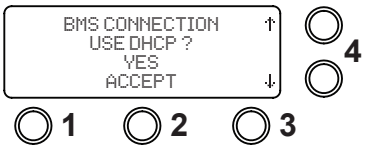


To program the “Connectivity options to BMS” - MODBUS With DHCP

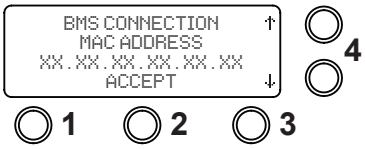
1. Follow steps 1 through 6 on page 18 to get to the BMS home screen. Then using the arrow buttons select the "BMS CONNECTION PROTOCOL MODBUS" then select "ACCEPT" button 2



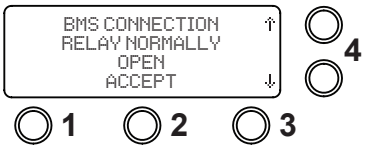
2. Using the arrow buttons select the "BMS CONNECTION USE DHCP? YES" then select "ACCEPT" button 2.



3. Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX.XX" then select "ACCEPT" button 2.

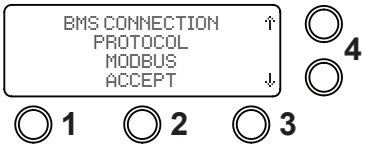


4. Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.

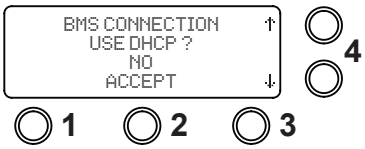


To program the “Connectivity options to BMS” - MODBUS Without DHCP

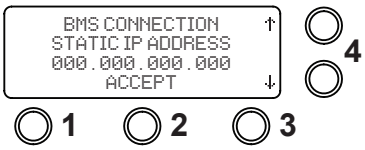
1. Follow steps 1 through 6 on page 18 to get to the BMS home screen. Then using the arrow buttons select the "BMS CONNECTION PROTOCOL MODBUS" then select "ACCEPT" button 2



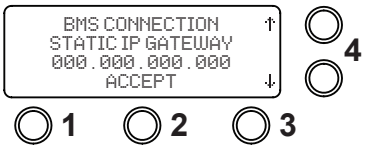
2. Using the arrow buttons select the "BMS CONNECTION USE DHCP? NO" then select "ACCEPT" button 2.



3. Using the arrow buttons select the "BMS CONNECTION STATIC IP ADDRESS 000.000.000.000" then select "ACCEPT" button 2.

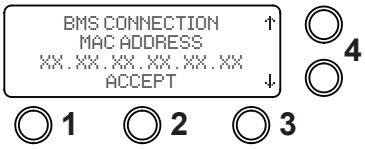


4. Using the arrow buttons select the "BMS CONNECTION STATIC IP GATEWAY 000.000.000.000" then select "ACCEPT" button 2.

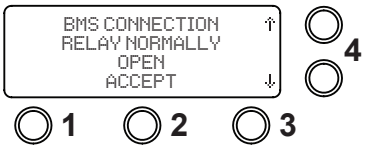


5. Using the arrow buttons select the "BMS CONNECTION STATIC IP MASK 000.000.000.000" then select "ACCEPT" button 2.

6. Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX.XX" then select "ACCEPT" button 2.

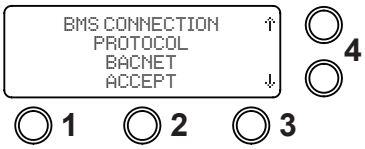


7. Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.

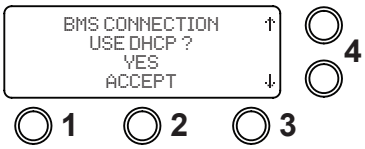


To program the “Connectivity options to BMS” - BACNET With DHCP

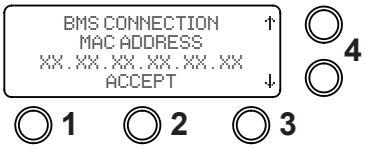
1. Follow steps 1 through 6 on page 18 to get to the BMS home screen. Then using the arrow buttons select the "BMS CONNECTION PROTOCOL BACNET" then select "ACCEPT" button 2.



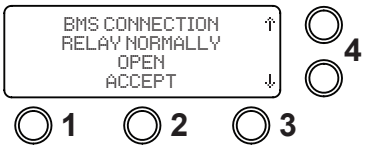
2. Using the arrow buttons select the "BMS CONNECTION USE DHCP? YES" then select "ACCEPT" button 2.



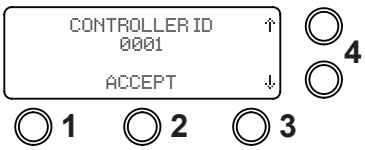
3. Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX.XX" then select "ACCEPT" button 2.



4. Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.

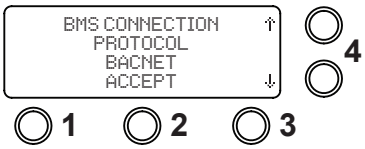


5. Using the arrow buttons select the "CONTROLLER ID 1" then select "ACCEPT" button 2.

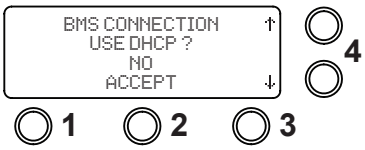


To program the “Connectivity options to BMS” - BACNET Without DHCP

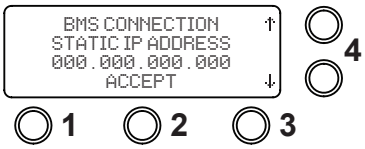
1. Follow steps 1 through 6 on page 18 to get to the BMS home screen. Then using the arrow buttons select the "BMS CONNECTION PROTOCOL BACNET" then select "ACCEPT" button 2.



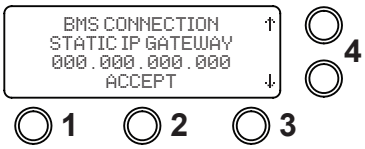
2. Using the arrow buttons select the "BMS CONNECTION USE DHCP? NO" then select "ACCEPT" button 2.



3. Using the arrow buttons select the "BMS CONNECTION STATIC IP ADDRESS 000.000.000.000" then select "ACCEPT" button 2.

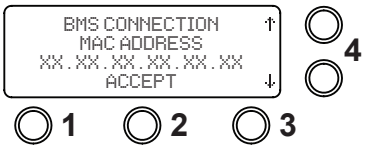


4. Using the arrow buttons select the "BMS CONNECTION STATIC IP GATEWAY 000.000.000.000" then select "ACCEPT" button 2.

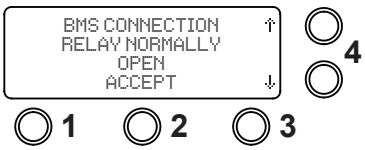


5. Using the arrow buttons select the "BMS CONNECTION STATIC IP MASK 000.000.000.000" then select "ACCEPT" button 2.

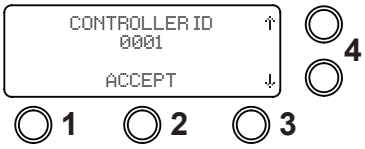
6. Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX.XX" then select "ACCEPT" button 2.



7. Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.



8. Using the arrow buttons select the "CONTROLLER ID 1" then select "ACCEPT" button 2.



DDSOLAR REGISTER

When setting up your controls monitoring interface it is necessary to know the registry information to select the data you wish to monitor.

All parameters are READ-ONLY.

When using MODBUS protocol please note:

- MODBUS Data is Big-Endian
- Temperatures are provided in fixed point
- MODBUS Coils and Discrete inputs are not used

When using BACNET protocol please note:

- The device object contains parameters such as version info, serial number, etc
- Temperatures are in floating point

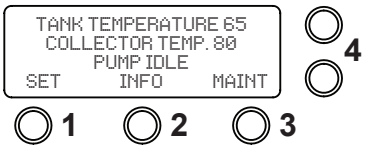
Refer to the tables below for registers and data points.

INPUT REGISTER INFORMATION					
Category	**Input Register**	**Function**	**Size (16 bit words)**	**Value**	**BACNET**
Product information	30002	Product Set	1	DDSTAT	Included elsewhere
	30004	Major Version	1	Firmware Major version	In Device Info
	30007	Serial Number	2		In Device Info
Temperatures	30011	Tank temperature	1	decidegrees (e.g. 260 = 26.0 deg C)	Analog Input
	30012	Collector thermistor temp.	1	decidegrees (e.g. 260 = 26.0 deg C)	Analog Input
Pump Status	30021	Pump 1 Run Timer	2	Number of hours	Analog Input
	30023	Pump 2 Run Timer	2	Number of hours	Analog Input
	30031	Pump 1 state	1	on, off	Binary Output
	30032	Pump 2 state	1	on, off	Binary Output
Fault Status	30041	Fault state	1	true, false	Binary Value
	30042	Pump 1 condition	1	e.g. working or failed	Binary Value
	30043	Pump 2 condition	1	e.g. working or failed	Binary Value
	30044	Tank thermistor condition	1	e.g. working, open, short	Multi State Value
	30045	Collector thermistor condition	1	e.g. working, open, short	Multi State Value
	30049	No Solar Gain Fault	1	true, false	Binary Value

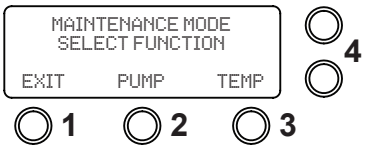
HOLDING REGISTER INFORMATION					
Category	**Holding Register**	**Function**	**Size (16 bit words)**	**Value**	**BACNET**
Product information	40001	Product Set	1	DDSTAT	Multi State Value
Specific Configuration	40011	BMS relay normally open	1	open, closed	Binary Value
	40022	Pump swap period	1	12 hours, 24 hours, 0 if not alternating	Analog Value
	40023	Pumps alternating	1	true, false	Multi State Value
	40024	Interrupt Mode	1	interrupting, not interrupting	Multi State Value
	40025	Interrupt Stop Time Seconds	1	seconds	Analog Value
	40026	Interrupt Run Time Minutes	1	minutes	Analog Value
	40044	DDSOLAR Frost Mode enabled	1	true, false	Binary Value
Thermistor Configuration	40031	Tank thermistor enabled	1	true, false	Binary Value
	40032	Collector thermistor enabled	1	true, false	Binary Value

To isolate and maintain the pump(s)

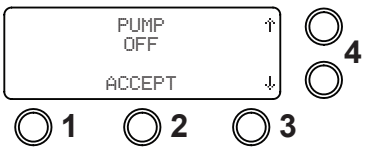
1. From the home screen select "MAINT" button 3.



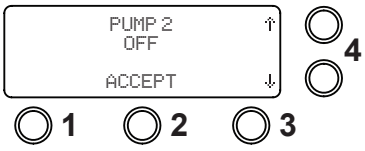
2. Select "PUMP" button 2.



3. Use the arrow buttons to manually operate the pump on and off, select "ACCEPT" button 2 to run command.

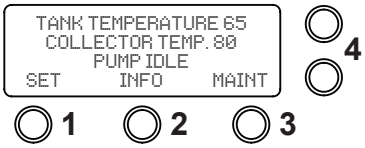


4. If a second pump has been configured you have the option to manually operate this pump also.

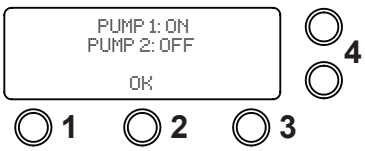


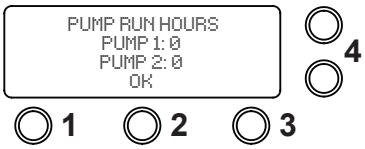
To view pump status and run times

1. From the home screen select "INFO" button 2.



2. The screen will alternate between pump operation status and run time hours.



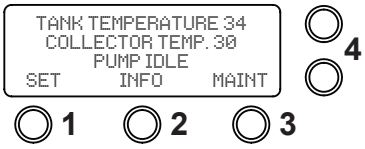


DDSOLAR ERROR DETECTION

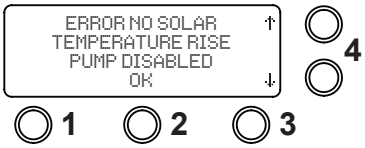
The DDSOLAR controller has in-built system error detection that is connected to internal voltage free contacts. The voltage free contacts can connect to BMS and be either programmed to open or close on error detection. Errors that are present are displayed on the home operating screen and can be accessed via the MODBUS and BACNET protocols. During solar gain if there is no temperature rise within 2 hours then an error will be displayed, this usually means there is a fault with the pump. Errors that are present are displayed on the main operating screen. See the two errors listed below.

To view displayed errors

1. From the home screen select "INFO" button 2.

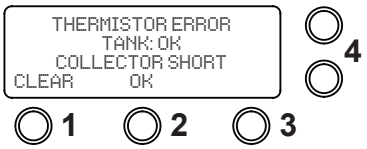


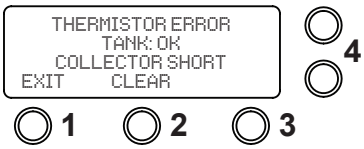
2. No temperature rise within a predetermined time during a solar gain period.



3. If one or both thermistors are outside the predetermined measurement range. This screen justifies an error with the collector short.

   To remove any of the errors select the "CLEAR" button 1. followed by "CLEAR" button 2.





Sensor Mounting

For BMS (voltage free contacts) connection to the controller, remove the cover and wire the connections to the points identified in Figure 3 below.

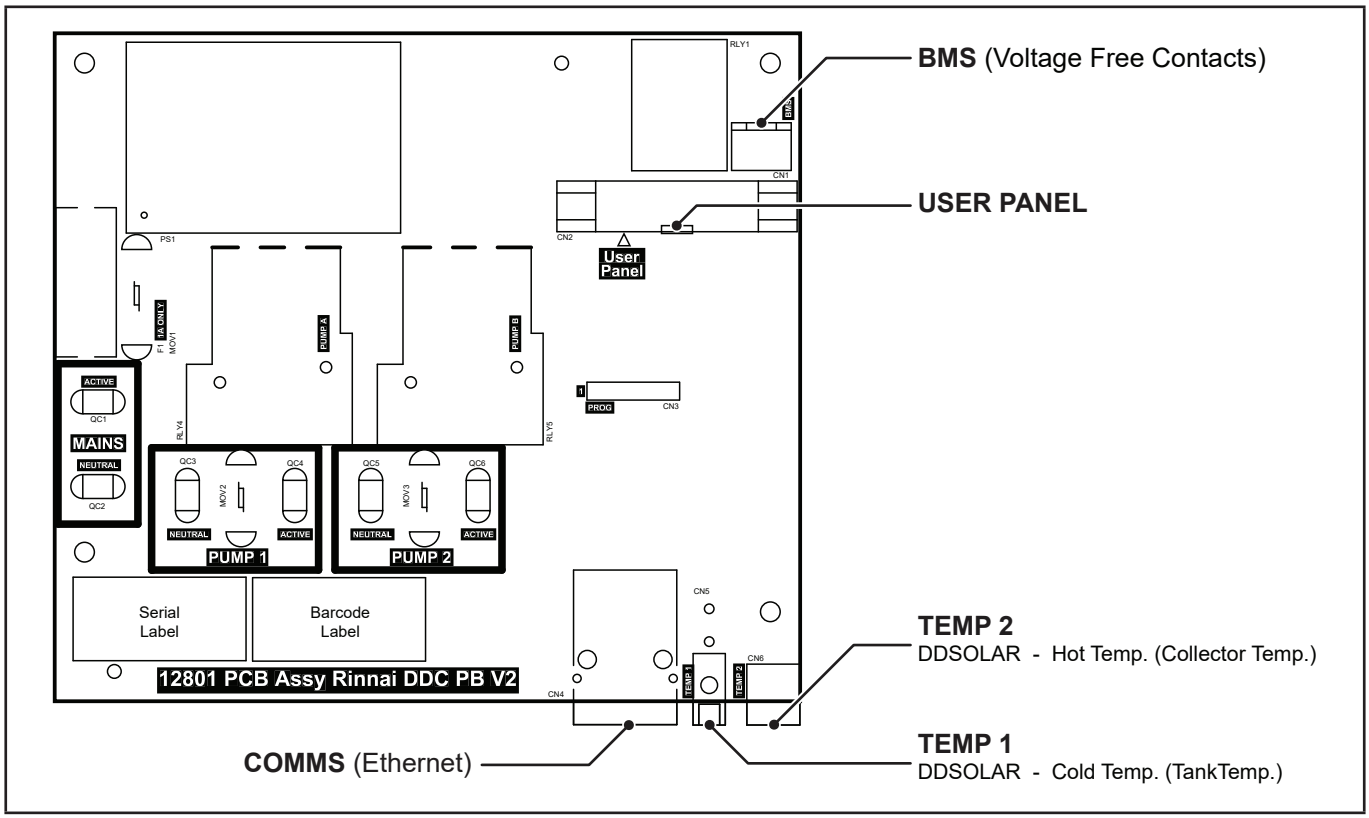


Figure 3. DDSOLAR Internal PCB showing Thermistor Connections

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. 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.

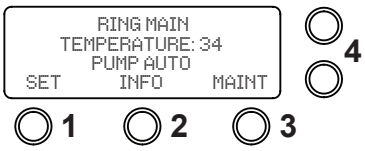
The features of this controller are:

- Operating temperature selection range of 40°C to 80°C with 1°C increment setting.
- 12 hour or 24 hour changeover cycle between pumps.
- 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).
- Easy connection to BMS (if required).

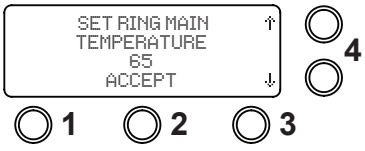
On initial start up the controller will run in "AUTO" mode, energise pump one and display the current temperature reading from the thermistor.

To program the "Ring-Main Temperature" & “Alternate Pump Operation”

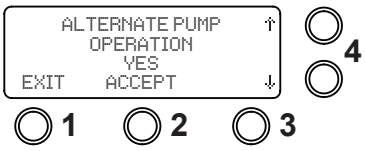
1. From home screen select "SET" button 1.



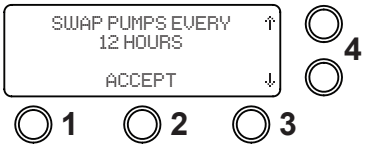
2. Using the arrow buttons select the "RING-MAIN TEMPERATURE" then select 'ACCEPT" button 2.



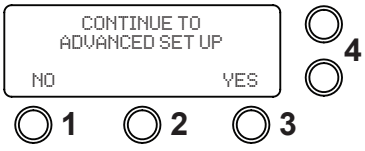
3. Using the arrow buttons select the "ALTERNATE PUMP OPERATION YES" then select "ACCEPT" button 2 or the "EXIT" button 1 to finalise and exit programming at this point.



4. Using the arrow buttons select the "SWAP PUMP EVERY 12 HOURS or 24 HOURS" then select "ACCEPT" button 2.



5. From "CONTINUE TO ADVANCED SETUP" screen select "YES" button 3 to continue to set up BMS connectivity or "NO" button 1 to finalise and exit.



*To program the “**Connectivity options to BMS” - Using Volt Free Contacts Only**, go to page 26*

*To program the **“Connectivity options to BMS” - MODBUS With DHCP**, go to page 26*

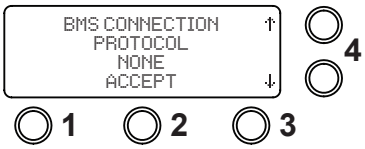
*To program the **“Connectivity options to BMS” - MODBUS Without DHCP,** go to page 27*

*To program the **“Connectivity options to BMS” - BACNET With DHCP**, go to page 28*

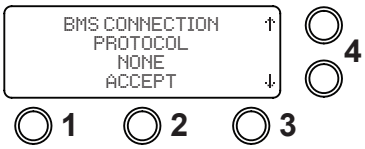
*To program the **“Connectivity options to BMS” - BACNET Without DHCP**, go to page 29*

To program the “Connectivity options to BMS” - Using Volt Free Contacts Only

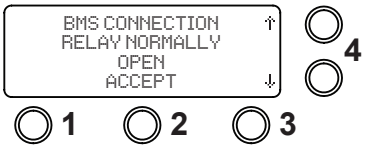
1. Follow steps 1 through 5 on page 25 to get to the BMS home screen. Then using the arrow buttons select the "BMS CONNECTION PROTOCOL NONE" then select "ACCEPT" button 2.

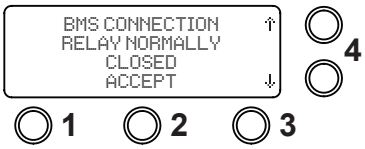


2. Using the arrow buttons select the "BMS CONNECTION PROTOCOL NONE" then select "ACCEPT" button 2.



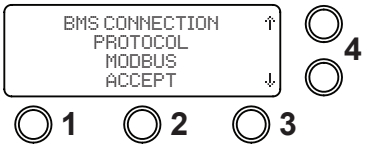
3. Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.



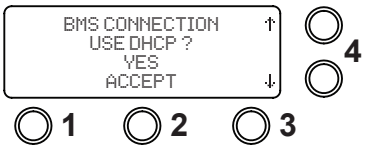


To program the “Connectivity options to BMS” - MODBUS With DHCP

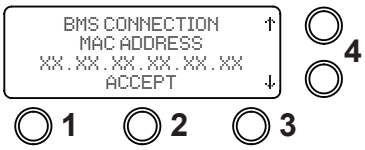
1. Follow steps 1 through 5 on page 25 to get to the BMS home screen. Then using the arrow buttons select the "BMS CONNECTION PROTOCOL MODBUS" then select "ACCEPT" button 2.



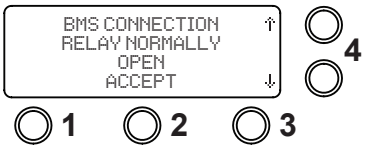
2. Using the arrow buttons select the "BMS CONNECTION USE DHCP? YES" then select "ACCEPT" button 2.

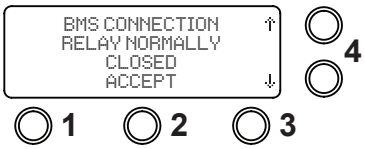


3. Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX.XX" then select "ACCEPT" button 2.



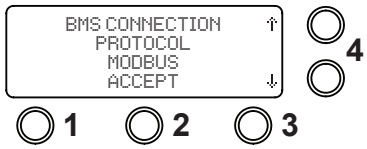
4. Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.



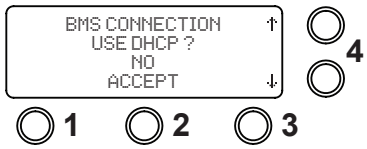


To program the “Connectivity options to BMS” - MODBUS Without DHCP

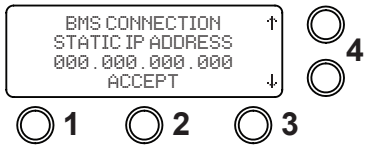
1. Follow steps 1 through 5 on page 25 to get to the BMS home screen. Then using the arrow buttons select the "BMS CONNECTION PROTOCOL MODBUS" then select "ACCEPT" button 2.



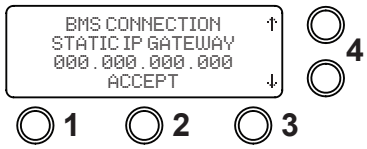
2. Using the arrow buttons select the "BMS CONNECTION USE DHCP? NO" then select "ACCEPT" button 2.



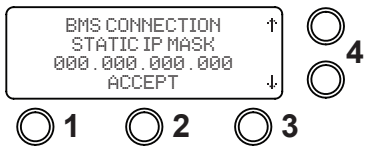
3. Using the arrow buttons select the "BMS CONNECTION STATIC IP ADDRESS 000.000.000.000" then select "ACCEPT" button 2.



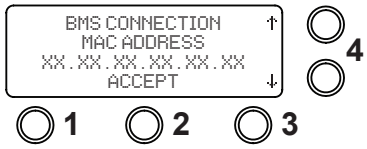
4. Using the arrow buttons select the "BMS CONNECTION STATIC IP GATEWAY 000.000.000.000" then select "ACCEPT" button 2.



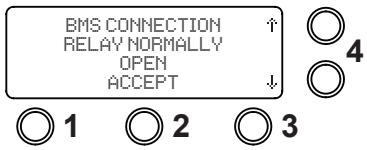
5. Using the arrow buttons select the "BMS CONNECTION STATIC IP MASK 000.000.000.000" then select "ACCEPT" button 2.

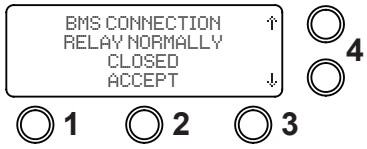


6. Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX.XX" then select "ACCEPT" button 2.



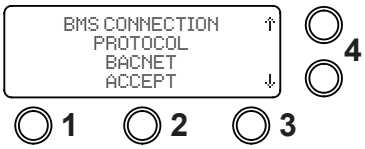
7. Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.



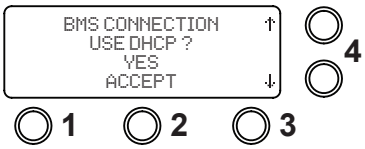


To program the “Connectivity options to BMS” - BACNET With DHCP

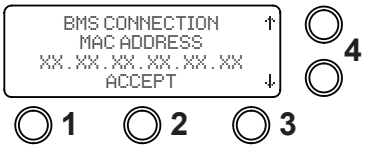
1. Follow steps 1 through 5 on page 25 to get to the BMS home screen. Then using the arrow buttons select the "BMS CONNECTION PROTOCOL BACNET" button 2.



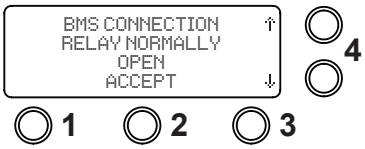
2. Using the arrow buttons select the "BMS CONNECTION USE DHCP? YES" then select "ACCEPT" button 2.

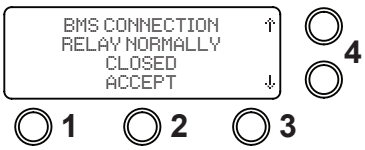


3. Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX.XX" then select "ACCEPT" button 2.

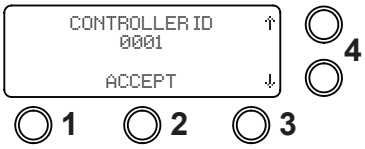


4. Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.



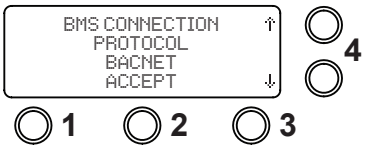


5. Using the arrow buttons select the "CONTROLLER ID 1" then select "ACCEPT" button 2.

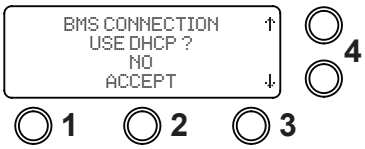


To program the “Connectivity options to BMS” - BACNET Without DHCP

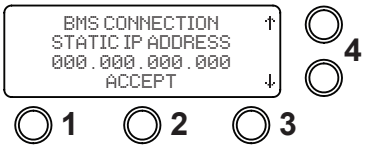
1. Follow steps 1 through 5 on page 25 to get to the BMS home screen. Then using the arrow buttons select the "BMS CONNECTION PROTOCOL BACNET" button 2.



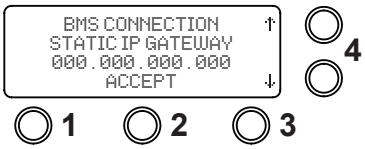
2. Using the arrow buttons select the "BMS CONNECTION USE DHCP? NO" then select "ACCEPT" button 2.



3. Using the arrow buttons select the "BMS CONNECTION STATIC IP ADDRESS 000.000.000.000" then select "ACCEPT" button 2.



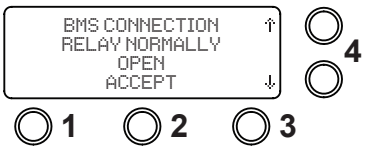
4. Using the arrow buttons select the "BMS CONNECTION STATIC IP GATEWAY 000.000.000.000" then select "ACCEPT" button 2.

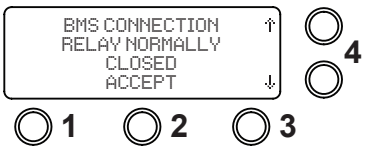


5. Using the arrow buttons select the "BMS CONNECTION STATIC IP MASK 000.000.000.000" then select "ACCEPT" button 2.

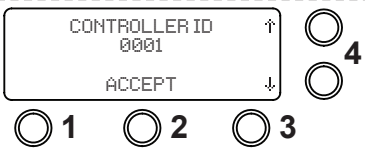
6. Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX.XX" then select "ACCEPT" button 2.

7. Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.





8. Using the arrow buttons select the "CONTROLLER ID 1" then select "ACCEPT" button 2.



DDPCDEL REGISTER

When setting up your controls monitoring interface it is necessary to know the registry information to select the data you wish to monitor.

All parameters are READ-ONLY.

When using MODBUS protocol please note:

- MODBUS Data is Big-Endian
- Temperatures are provided in fixed point
- MODBUS Coils and Discrete inputs are not used

When using BACNET protocol please note:

- The device object contains parameters such as version info, serial number, etc
- Temperatures are in floating point

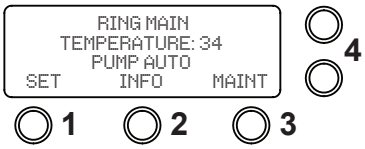
Refer to the tables below for registers and data points.

INPUT REGISTER INFORMATION					
Category	**Input Register**	**Function**	**Size (16 bit words)**	**Value**	**BACNET**
Product information	30002	Product Set	1	DDSTAT	Included elsewhere
	30004	Major Version	1	Firmware Major version	In Device Info
	30007	Serial Number	2		In Device Info
Temperatures	30011	Return thermistor temp.	1	decidegrees (e.g. 260 = 26.0 deg C)	Analog Input
Pump Status	30021	Pump 1 Run Timer	2	Number of hours	Analog Input
	30023	Pump 2 Run Timer	2	Number of hours	Analog Input
	30031	Pump 1 state	1	on, off	Binary Output
	30032	Pump 2 state	1	on, off	Binary Output
Fault Status	30041	Fault state	1	true, false	Binary Value
	30042	Pump 1 condition	1	e.g. working or failed	Binary Value
	30043	Pump 2 condition	1	e.g. working or failed	Binary Value
	30044	Return thermistor condition	1	e.g. working, open, short	Multi State Value
	30050	Low temperature Fault	1	true, false	Binary Value

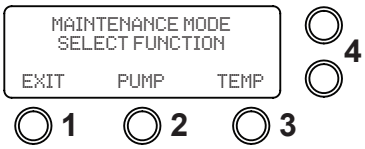
HOLDING REGISTER INFORMATION					
Category	**Holding Register**	**Function**	**Size (16 bit words)**	**Value**	**BACNET**
Product information	40001	Product Set	1	DDSTAT	Multi State Value
Specific Configuration	40011	BMS relay normally open	1	open, closed	Binary Value
	40022	Pump swap period	1	12 hours, 24 hours, 0 if not alternating	Analog Value
	40023	Pumps alternating	1	true, false	Multi State Value
	40024	Interrupt Mode	1	interrupting, not interrupting	Multi State Value
	40025	Interrupt Stop Time Seconds	1	seconds	Analog Value
	40026	Interrupt Run Time Minutes	1	minutes	Analog Value
Thermistor Configuration	40031	Return thermistor enabled	1	true, false	Binary Value
Set Points	40045	Ring Main Temp Set Point	1	degrees C	Analog Value
	40046	Ring Main Temp Below Amount	1	degrees C	Analog Value

To isolate and maintain the pump(s)

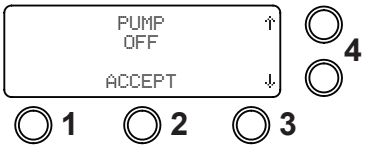
1. From the home screen select "MAINT" button 3.



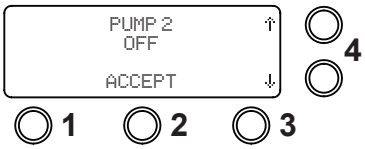
2. Select "PUMP" button 2.



3. Use the arrow buttons to manually operate the pump on and off, select "ACCEPT" button 2 to run command.

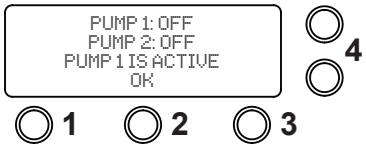


4. If a second pump has been configured you have the option to manually operate this pump also.

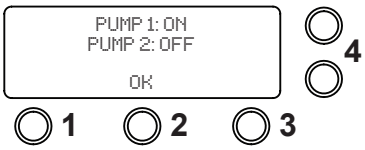


To View Pump Status

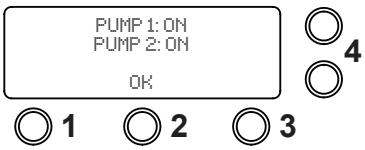
When Ring-Main temperature reaches the set point all pumps will be de-energised, the active pump is identified as the next to operate.



When Ring-Main temperature within 5°C less of set point, one pump is operational.



When the Ring-Main temperature is between 5°C to 10°C less the set temperature both pumps energised.



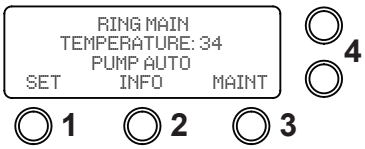
DDPCDEL ERROR DETECTION

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.

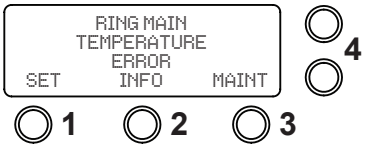
When operating in "AUTO" mode and the Ring-Main temperature drops below the set point for a prescribed period of time then an error is displayed and the controller automatically switches to the alternative pump.

To view displayed errors

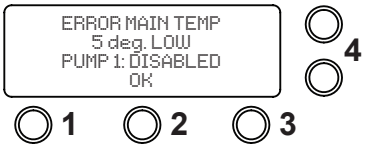
1. From home screen select "INFO" button 2.



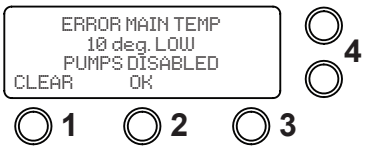
Main temperature 5°C low error screen image.



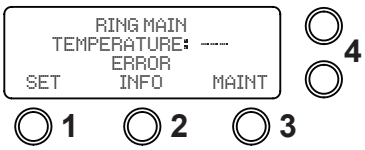
Pump 1 disabled screen.



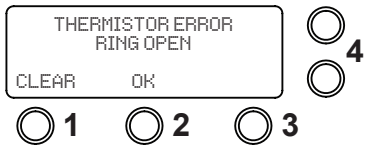
Main temperature 10°C low error screen image.

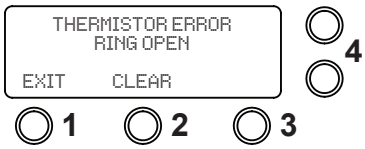


The controller has an additional inbuilt function to identify a thermistor error. It will display an error when the thermistor values are outside the prescribed range.



To remove any of the errors select the "CLEAR" button 1. followed by "CLEAR" button 2.





Sensor Mounting

For BMS (voltage free contacts) connection to the controller, remove the cover and wire the connections to the points identified in Figure 4 below.

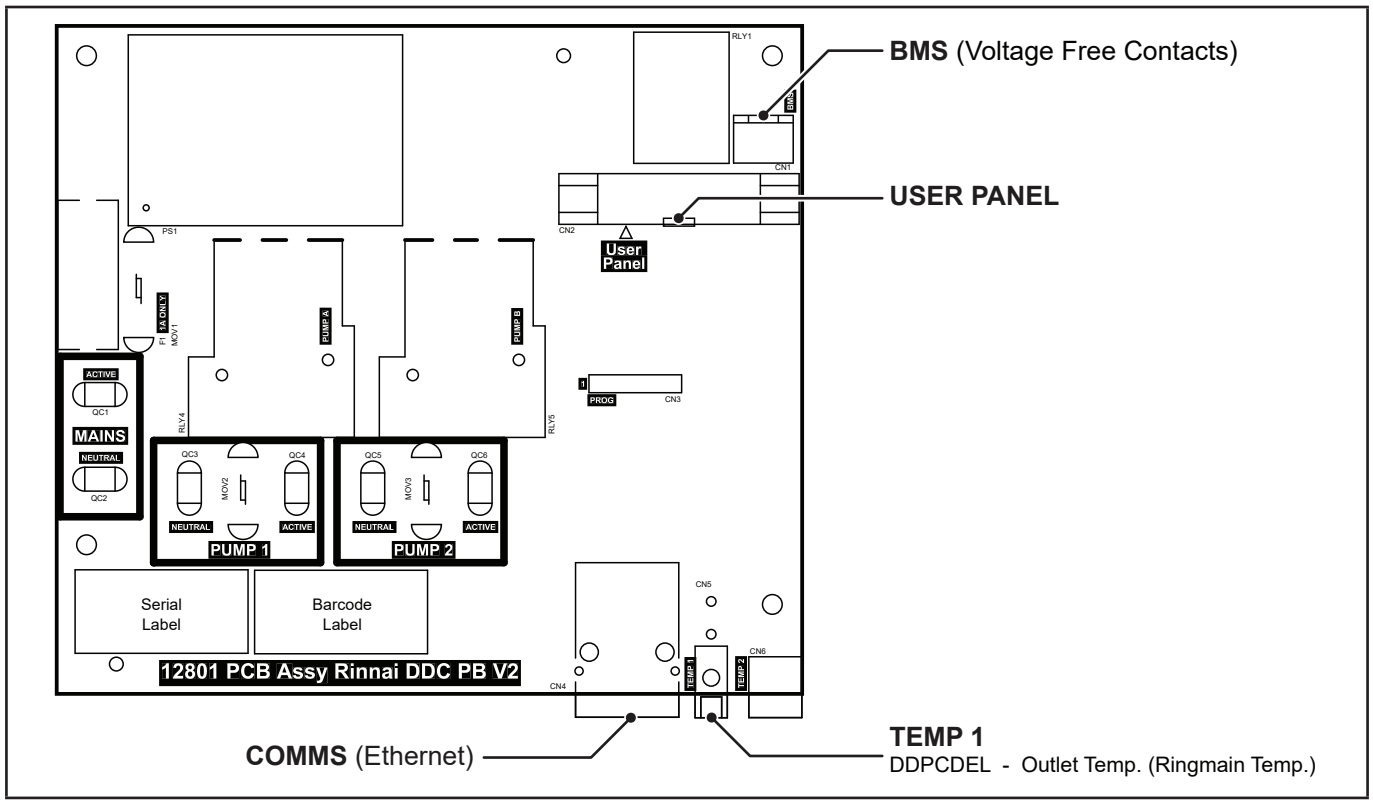
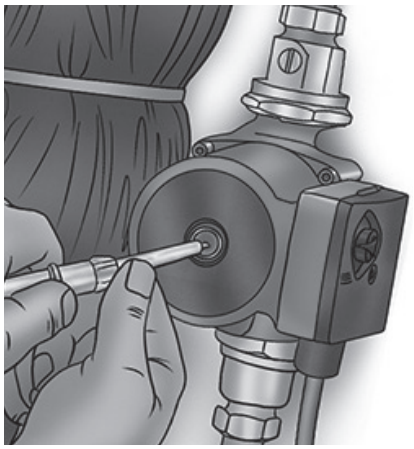


Figure 4. DDPCDEL Internal PCB showing Thermistor Connections

Final Setup

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.



NOTES

NOTES

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National Help Line
Tel: 1300 555 545* Fax: 1300 555 655
Monday to Friday, 8.00 am to 5.00 pm EST.

After Hours Hot Water Service Line
Tel: 1800 000 340*

**Cost of a local call higher from mobile or public phones.*

For further information visit **www.rinnai.com.au** or email **enquiry@rinnai.com.au**

Rinnai has a Service and Spare Parts network with personnel who are fully trained and equipped to give the best service on your Rinnai appliance. If your appliance requires service, please call our National Help Line. Rinnai recommends that this appliance be serviced every 3 years.

With our policy of continuous improvement, we reserve the right to change, or discontinue at any time, specifications or designs without notice.