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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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.

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.



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.	TANK TEMPERATURE 62 PUMP AUTO SET INFO MAINT 0 1 0 2 0 3
2.	Using the arrow buttons select the "TANK SET TEMPERATURE" then select "ACCEPT" button 2.	TANK SET TEMPERATURE 65 ACCEPT 1 0 2 0 3
3.	Using the arrow buttons select the "TANK LOW LIMIT TEMPERATURE" then select "ACCEPT" button 2.	TANK LOW LIMIT [↑] TEMPERATURE 60 ACCEPT J 1 2 3

DDSTAT OPERATION

To program the "Return Temperature"	
1. From home screen select "SET" button 1.	TANK TEMPERATURE RETURN TEMP PUMP AUTO SET INFO MAINT O 1 O 2 O 3
 Using the arrow buttons select the "MEASURE RETURN TEMPERATURE YES" then select "ACCEPT" button 2. 	MEASURE RETURN ↑ TEMPERATURE YES ACCEPT ↓ 0 1 0 2 0 3
 Using the arrow buttons select the "RETURN TEMP LOW LIMIT" then select "ACCEPT" button 2. 	RETURN TEMP 1 LOW LIMIT 1 60 4 ACCEPT 4 0 1 0 2 0 3
To program the "Alternate Pump Operation"	
1. From home screen select "SET" button 1.	TANK TEMPERATURE RETURN TEMP PUMP AUTO SET INFO MAINT 0 1 0 2 0 3
 From "MEASURE RETURN TEMPERATURE" screen select "ACCEPT" button 2. 	MEASURE RETURN TEMPERATURE YES ACCEPT 0 1 0 2 0 3
3. From "RETURN TEMP LOWER LIMIT" screen select "ACCEPT" button 2.	$ \begin{array}{c c} $
 Using the arrow buttons select the "ALTERNATE PUMP OPERATION YES" then select "ACCEPT" button 2. 	ALTERNATE PUMP OPERATION YES EXIT ACCEPT 1 0 2 0 3
5. Using the arrow buttons select the "SWAP PUMP EVERY 12 HOURS or 24 HOURS" then select "ACCEPT" button 2.	SWAP PUMPS EVERY 1 12 HOURS 1 ACCEPT 0 1 1 2 0 3
 From "CONTINUE TO ADVANCED SETUP" screen select "YES" button 3 to continue with further BMS programming or "NO" button 1 to finalise and exit. 	CONTINUE TO ADVANCED SET UP NO YES 0 1 0 2 0 3
To program the "Connectivity options to BMS" - Using Volt Free Contac	ts Only , go to page8
To program the "Connectivity options to BMS" - MODBUS With DHCP, g	go to page8
To program the "Connectivity options to BMS" - MODBUS Without DHC	P, go to page9
To program the "Connectivity options to BMS" - BACNET With DHCP, g	o to page10
To program the "Connectivity options to BMS" - BACNET Without DHC	P , go to page11

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

1.	Follow steps 1 through 5 on page 7.	TANK TEMPERATURE RETURN TEMP PUMP AUTO SET INFO MAINT O 1 O 2 O 3
2.	From "CONTINUE TO ADVANCED SETUP" screen select "YES" button 3.	CONTINUE TO ADVANCED SET UP NO YES 0 1 0 2 0 3
3.	Using the arrow buttons select the "BMS CONNECTION PROTOCOL NONE" then select "ACCEPT" button 2.	BMS CONNECTION PROTOCOL NONE ACCEPT ↓ 04 01 02 03
4.	Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.	BMS CONNECTION RELAY NORMALLY OPEN ACCEPT 0 1 0 2 3

To program the "Connectivity options to BMS" - MODBUS With DHCP

1. Follow steps 1 through 5 on page 7.	TANK TEMPERATURE RETURN TEMP PUMP AUTO SET 0 SET INFO MAINT 0 1 0 2 0 3
2. From "CONTINUE TO ADVANCED SETUP" screen select "YES" button 3.	CONTINUE TO ADVANCED SET UP NO YES 1 2 3
 Using the arrow buttons select the "BMS CONNECTION PROTOCOL MODBUS" then select "ACCEPT" button 2. 	BMS CONNECTION PROTOCOL MODBUS ACCEPT 1 0 2 0 3
4. Using the arrow buttons select the "BMS CONNECTION USE DHCP? YES" then select "ACCEPT" button 2.	BMS CONNECTION USE DHCP? YES ACCEPT 1 2 3
 Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX.XX" then select "ACCEPT" button 2. 	$ \begin{array}{c} $
6. Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.	BMS CONNECTION RELAY NORMALLY OPEN ACCEPT J 1 2 3

DDSTAT OPERATION

To program the "Connectivity options to BMS" - MODBUS Without DHCP

1.	Follow steps 1 through 5 on page 7.	TANK TEMPERATURE RETURN TEMP PUMP AUTO SET INFO MAINT O 1 O 2 O 3
2.	From "CONTINUE TO ADVANCED SETUP" screen select "YES" button 3.	CONTINUE TO ADVANCED SET UP NO YES 1 2 3
3.	Using the arrow buttons select the "BMS CONNECTION PROTOCOL MODBUS" then select "ACCEPT" button 2.	BMS CONNECTION PROTOCOL MODBUS ACCEPT 1 0 2 0 3
4.	Using the arrow buttons select the "BMS CONNECTION USE DHCP? NO" then select "ACCEPT" button 2.	BMS CONNECTION USE DHCP ? NO ACCEPT 1 2 3
5.	Using the arrow buttons select the "BMS CONNECTION STATIC IP ADDRESS 000.000.000.000" then select "ACCEPT" button 2.	BMS CONNECTION STATIC IP ADDRESS 000.000.000 ACCEPT ↓ 04
6.	Using the arrow buttons select the "BMS CONNECTION STATIC IP GATEWAY 000.000.000.000" then select "ACCEPT" button 2.	BMS CONNECTION STATIC IP GATEWAY 000.000.000 ACCEPT ↓ 04
7.	Using the arrow buttons select the "BMS CONNECTION STATIC IP MASK 000.000.000" then select "ACCEPT" button 2.	BMS CONNECTION STATIC IP MASK 000.000.000.000 ↑ ●
8.	Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX" then select "ACCEPT" button 2.	$ \begin{array}{c} $
9.	Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.	BMS CONNECTION ↑ RELAY NORMALLY OPEN ACCEPT ↓ 0 1 0 2 0 3

To program the "Connectivity options to BMS" - BACNET With DHCP

1. Follow steps 1 through 5 on page 7.	TANK TEMPERATURE RETURN TEMP PUMP AUTO SET 0 0 1 0 2 0 3
2. From "CONTINUE TO ADVANCED SETUP" screen select "YES" button 3.	CONTINUE TO ADVANCED SET UP NO YES 1 0 2 0 3
 Using the arrow buttons select the "BMS CONNECTION PROTOCOL BACNET" then select "ACCEPT" button 2. 	BMS CONNECTION T PROTOCOL BACNET ACCEPT 1 2 3
 Using the arrow buttons select the "BMS CONNECTION USE DHCP? YES" then select "ACCEPT" button 2. 	BMS CONNECTION USE DHCP ? YES ACCEPT J 0 1 0 2 0 3
5. Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX.XX" then select "ACCEPT" button 2.	$ \begin{array}{c} $
 Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or NORMALLY CLOSED" then select "ACCEPT" button 2. 	BMS CONNECTION RELAY NORMALLY OPEN ACCEPT 1 0 2 0 3 BMS CONNECTION RELAY NORMALLY CLOSED ACCEPT 0 1 0 2 0 3
 Using the arrow buttons select the "CONTROLLER ID 1" then select "ACCEPT" button 2. 	CONTROLLER ID 0001 ACCEPT 0 1 0 2 3 4 4 4 4 4 4 4 4 4 4 4 4 4

To program the "Connectivity options to BMS" - BACNET Without DHCP

1. Follow steps 1 through 5 on page 7.	TANK TEMPERATURE RETURN TEMP PUMP AUTO SET INFO MAINT
2. From "CONTINUE TO ADVANCED SETUP" screen select "YES" button 3.	CONTINUE TO ADVANCED SET UP NO YES 1 2 3
 Using the arrow buttons select the "BMS CONNECTION PROTOCOL BACNET" then select "ACCEPT" button 2. 	BMS CONNECTION PROTOCOL BACNET ACCEPT 0 1 0 2 0 3
 Using the arrow buttons select the "BMS CONNECTION USE DHCP? NO" then select "ACCEPT" button 2. 	BMS CONNECTION T USE DHCP? NO ACCEPT J 1 2 3
 Using the arrow buttons select the "BMS CONNECTION STATIC IP ADDRESS 000.000.000.000" then select "ACCEPT" button 2. 	$ \begin{array}{c} $
6. Using the arrow buttons select the "BMS CONNECTION STATIC IP GATEWAY 000.000.000.000" then select "ACCEPT" button 2.	$ \begin{array}{c} $
7. Using the arrow buttons select the "BMS CONNECTION STATIC IP MASK 000.000.000" then select "ACCEPT" button 2.	$ \begin{array}{c c} BMS CONNECTION & \uparrow \\ STATIC IP MASK \\ 000.000.000 \\ $
 Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX.XX" then select "ACCEPT" button 2. 	$ \begin{array}{c} $
 Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or NORMALLY CLOSED" then select "ACCEPT" - button 2. 	BMS CONNECTION RELAY NORMALLY OPEN ACCEPT 1 0 1 0 2 0 3 0 4 0 0 4 0 0 4 0 0 4 0 0 4 0 0 4 0 0 4 0 0 4 0 0 4 0 0 0 0 0 0 0 0 0 0 0 0 0
10. Using the arrow buttons select the "CONTROLLER ID 1" then select "ACCEPT" button 2.	CONTROLLER ID 1 0001 ACCEPT 0 1 2 3

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

Refer to the tables below for registers and data points.

When using BACNET protocol please note:

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

INPUT REGISTER INFORMATION					
Category	Input Register	Function	Size (16 bit words)	Value	BACNET
	30002	Product Set	1	DDSTAT	Included elsewhere
Product	30004	Major Version	1	Firmware Major version	In Device Info
	30007	Serial Number	2		In Device Info
Terreneratura	30011	Tank thermistor temp.	1	decidegrees (e.g. 260 = 26.0 deg C)	Analog Input
remperatures	30012	Second thermistor temp.	1	decidegrees (e.g. 260 = 26.0 deg C)	Analog Input
	30021	Pump 1 Run Timer	2	Number of hours	Analog Input
Duran Ctatus	30023	Pump 2 Run Timer	2	Number of hours	Analog Input
Pump Status	30031	Pump 1 state	1	on, off	Binary Output
	30032	Pump 2 state	1	on, off	Binary Output
	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
Fault status	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			BACNET			
Product information	40001	Product Set	1	DDSTAT	Multi State Value	
	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	
Specific	40023	Pumps alternating	1	true, false	Multi State Value	
Configuration	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	40031	Tank thermistor enabled	1	true, false	Binary Value	
Configuration	40032	Second thermistor enabled	1	true, false	Binary Value	
	40041	Tank Temp Set Point	1	degrees C	Analog Value	
Set Points	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	
1. I Tom the nome screen select many button 5.	
2. Select "PUMP" button 2.	EXIT PUMP TEMP
	◯1 ◯2 ◯3
3. Use the arrow buttons to manually operate the pump on and off, selec	t OFF 4
"ACCEP1" button 2 to run command.	ACCEPT 4
	$\bigcirc 1 \bigcirc 2 \bigcirc 3$
If a second pump has been configured you have the option to manually operate this pump also.	
To view system temperatures	
To view system temperatures	
To view system temperatures	TANK TEMPERATURE 62
To view system temperatures 1. From home screen select "MAINT" button 3.	TANK TEMPERATURE 62
To view system temperatures 1. From home screen select "MAINT" button 3.	TANK TEMPERATURE 62 PUMP AUTO SET INFO MAINT 0 1 0 2 0 3
To view system temperatures 1. From home screen select "MAINT" button 3.	
To view system temperatures 1. From home screen select "MAINT" button 3. 2. Select "TEMP" button 2. sustem temperatures will then be displayed	TANK TEMPERATURE 62 PUMP AUTO SET INFO MAINT 0 1 0 2 0 3 MAINTENANCE MODE SET FUNCTION
 To view system temperatures 1. From home screen select "MAINT" button 3. 2. Select "TEMP" button 3, system temperatures will then be displayed. 	TANK TEMPERATURE 62 PUMP AUTO SET INFO MAINT O 1 O 2 O 3 MAINTENANCE MODE SET FUNCTION EXIT PUMP TEMP
 To view system temperatures 1. From home screen select "MAINT" button 3. 2. Select "TEMP" button 3, system temperatures will then be displayed. 	TANK TEMPERATURE 62 PUMP AUTO SET INFO MAINT 0 1 0 2 0 3 MAINTENANCE MODE SET FUNCTION EXIT PUMP TEMP 0 1 0 2 0 3
 To view system temperatures 1. From home screen select "MAINT" button 3. 2. Select "TEMP" button 3, system temperatures will then be displayed. 	TANK TEMPERATURE 62 PUMP AUTO SET INFO MAINT 0 1 0 2 0 3 MAINTENANCE MODE SET FUNCTION EXIT PUMP TEMP 0 1 0 2 0 3 TEMPERATURES
 To view system temperatures 1. From home screen select "MAINT" button 3. 2. Select "TEMP" button 3, system temperatures will then be displayed. 	TANK TEMPERATURE 62 PUMP AUTO SET INFO MAINT 0 1 0 2 0 3 MAINTENANCE MODE SET FUNCTION EXIT PUMP TEMP 0 1 0 2 0 3 TEMPERATURES TANK: 62 4
 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. 	TANK TEMPERATURE 62 PUMP AUTO SET INFO MAINT O 1 O 2 O 3 MAINTENANCE MODE SET FUNCTION EXIT PUMP TEMP O 1 O 2 O 3 TEMPERATURES TANK: 62 EXIT MODEL
 To view system temperatures From home screen select "MAINT" button 3. Select "TEMP" button 3, system temperatures will then be displayed. Tank temperature will be shown. 	TANK TEMPERATURE 62 PUMP AUTO SET INFO MAINT 0 1 0 2 0 3 MAINTENANCE MODE SET FUNCTION EXIT PUMP TEMP 0 1 0 2 0 3 TEMPERATURES TANK: 62 EXIT MODEL 0 1 0 2 0 3
 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. 	TANK TEMPERATURE 62 PUMP AUTO SET INFO MAINT O 1 O 2 O 3 MAINTENANCE MODE SET FUNCTION EXIT PUMP TEMP O 1 O 2 O 3 TEMPERATURES TANK: 62 EXIT MODEL O 1 O 2 O 3 TEMPERATURES TANK: 62 EXIT MODEL O 1 O 2 O 3 C 1 O 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 To view system temperatures From home screen select "MAINT" button 3. Select "TEMP" button 3, system temperatures will then be displayed. Tank temperature will be shown. 	TANK TEMPERATURE 62 PUMP AUTO SET INFO MAINT O 1 O 2 O 3 MAINTENANCE MODE SET FUNCTION EXIT PUMP TEMP O 1 O 2 O 3 TEMPERATURES TANK: 62 EXIT MODEL O 1 O 2 O 3 O 4 O 4 O 4 O 4 O 4 O 4 O 4 O 4

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To view controller configuration

1.	From home screen select "MAINT" button 3.	TANK TEMPERATURE 62 0 SET PUMP AUTO INFO MAINT 1 2 3
2.	Select "TEMP" button 3, system temperatures will then be displayed.	MAINTENANCE MODE SET FUNCTION EXIT PUMP TEMP 0 1 0 2 0 3
3.	From the Temperature screen select "MODEL" button 2.	TEMPERATURES TANK: 62 RETURN: 74 EXIT MODEL O 1 O 2 O 3
4.	The Controller configuration will then be displayed select "EXIT" button 2 to return to home screen.	CURRENT MODEL IS 1 DD5-6, VA0.3 2 PUMP, IT, CM, ID1 EXIT
		01 02 03
То	view pump status and run times	01 02 03
T o 1.	From the home screen select "INFO" button 2.	TANK TEMPERATURE 62 PUMP AUTO SET INFO MAINT 0 1 0 2 0 3
1. 2.	From the home screen select "INFO" button 2. If one pump has been configured the pump operation status and run time hours will be displayed.	TANK TEMPERATURE 62 PUMP AUTO SET INFO MAINT 0 1 0 2 0 3 PUMP ON TOTAL RUN HOURS 0 0 0 1 0 2 0 3

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

PUMP RUN HOURS PUMP 1: 0 PUMP 2: 0 OK

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03

DDSTAT ERROR DETECTION

To view displayed arrars

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).

	view displayed errors	
1.	From the home screen select "INFO" button 2.	TANK TEMPERATURE 0 RETURN TEMP. 7 ERROR SET INFO MAINT
2.	For Error 1 the following screen will be displayed.	CLEAR OK
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.	BETURN TEMP FROM HD UNIT TOO LOW CLEAR 0 0 1 0 2 0 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 0 1 0 2 0 3
5.	To remove any of the errors select the "CLEAR" button 1. followed by "CLEAR" button 2. BETURN TEMP FROM HD UNIT TOO LOW CLEAR OK O 1 O 2 O 3	RETURN TEMP FROM HD UNIT TOO LOW EXIT CLEAR 0 1 0 2 0 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 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.

DDSTAT OPERATION



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).



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'	TANK TEMPERATURE 17 COLLECTOR TEMP. 37 PUMP COLLECTING INFO MAINT
	$\bigcirc 1 \bigcirc 2 \bigcirc 3$
No solar gain pump 'IDLE'	TANK TEMPERATURE 34 COLLECTOR TEMP.30 PUMP IDLE INFO MAINT
	◯ 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.

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.



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.	TANK TEMPERATURE 65 COLLECTOR TEMP. 80 4 COLLECTOR TEMP. 80 PUMP IDLE 4 PUMP IDLE MAINT 4 O 1 O 2 0 3
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.	NUMBER OF PUMPS 1 EXIT ACCEPT 1 0 1 0 2 0 3
3.	Using the arrow buttons select the "ALTERNATE PUMP OPERATION YES" then select "ACCEPT" button 2.	ALTERNATE PUMP OPERATION YES EXIT ACCEPT 1 2 3
4.	Using the arrow buttons select the "SWAP PUMP EVERY 12 HOURS or 24 HOURS" then select "ACCEPT" button 2.	SWAP PUMPS EVERY 12 HOURS 4 ACCEPT J 1 0 2 3
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.	CONTINUE TO ADVANCED SET UP NO YES 4
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.	USE FROST MODE IN AUTO? VES ACCEPT J 1 0 2 3
	To program the "Connectivity options to BMS" - Using Volt Free Contacts	Only , go to page18
	To program the "Connectivity options to BMS" - MODBUS With DHCP, go	to page19
	To program the "Connectivity options to BMS" - MODBUS Without DHCP,	go to page19
	To program the "Connectivity options to BMS" - BACNET With DHCP, go a	to page20
	To program the "Connectivity options to BMS" - BACNET Without DHCP,	go to page20
То	program the "Connectivity options to BMS" - Using Volt Free Co	

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.	BMS CONNECTION ↑ PROTOCOL NONE ACCEPT ↓ 0 1 0 2 0 3
2.	Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.	BMS CONNECTION T RELAY NORMALLY OPEN ACCEPT J 1 2 3

То	program	the	"Connectivity	options to	BMS"	- MODBUS	With DHCP
	P. 0 3		•••••••	•••••••••••••••••••••••••••••••••••••••			

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	BMS CONNECTION PROTOCOL MODBUS ACCEPT
2.	Using the arrow buttons select the "BMS CONNECTION USE DHCP? YES" then select "ACCEPT" button 2.	BMS CONNECTION 1 USE DHCP? YES ACCEPT 1 0 1 0 2 3
3.	Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX" then select "ACCEPT" button 2.	$ \begin{array}{c} $
4.	Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.	BMS CONNECTION RELAY NORMALLY OPEN ACCEPT 1 2 3
То	program the "Connectivity options to BMS" - MODBUS Without	DHCP

 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 	BMS CONNECTION PROTOCOL MODBUS ACCEPT 0 1 0 2 0 3
 Using the arrow buttons select the "BMS CONNECTION USE DHCP? NO" then select "ACCEPT" button 2. 	BMS CONNECTION USE DHCP ? NO ACCEPT 1 O 2 O 3
 Using the arrow buttons select the "BMS CONNECTION STATIC IP ADDRESS 000.000.000.000" then select "ACCEPT" button 2. 	BMS CONNECTION STATIC IP ADDRESS 000.000.000.000 ACCEPT ↓ 04 010203
4. Using the arrow buttons select the "BMS CONNECTION STATIC IP GATEWAY 000.000.000.000" then select "ACCEPT" button 2.	BMS CONNECTION STATIC IP GATEWAY 000.000.000.000 ACCEPT ↓ 0 4 0 4 0 4 0 4 0 4 0 4 0 4 0 4 0 4 0
5. Using the arrow buttons select the "BMS CONNECTION STATIC IP MASK 000.000.000" then select "ACCEPT" button 2.	BMS CONNECTION STATIC IP MASK 000.000.000.000 ACCEPT ↓ 04 01 0 2 0 3
 Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX.XX" then select "ACCEPT" button 2. 	$ \begin{array}{c} $
7. Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.	BMS CONNECTION RELAY NORMALLY OPEN ACCEPT 0 1 0 2 0 3

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.	BMS CONNECTION PROTOCOL BACNET ACCEPT 0 1 0 2 0 3
2.	Using the arrow buttons select the "BMS CONNECTION USE DHCP? YES" then select "ACCEPT" button 2.	BMS CONNECTION T USE DHCP ? YES ACCEPT J 1 2 3
3.	Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX" then select "ACCEPT" button 2.	$ \begin{array}{c} $
4.	Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.	BMS CONNECTION T RELAY NORMALLY OPEN ACCEPT J 1 2 3
5.	Using the arrow buttons select the "CONTROLLER ID 1" then select "ACCEPT" button 2.	CONTROLLER ID 1 0001 0 ACCEPT 0 0 1 0 2 0 3
То	program the "Connectivity options to BMS" - BACNET Without I	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.	BMS CONNECTION PROTOCOL BACNET ACCEPT 0 1 0 2 0 3
		BMS CONNECTION T

- 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.

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NO ACCEPT

BMS CONNECTION STATIC IP ADDRESS 000.000.000.000

ACCEPT

BMS CONNECTION STATIC IP GATEWAY 000.000.000.000 ACCEPT

BMS CONNECTION STATIC IP MASK 000.000.000.000

ACCEPT

BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX.XX ACCEPT

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		DDSOLAR OPERATION
7.	Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.	BMS CONNECTION RELAY NORMALLY OPEN ACCEPT 1 0 2 0 3
8.	Using the arrow buttons select the "CONTROLLER ID 1" then select "ACCEPT" button 2.	CONTROLLER ID 0001 ACCEPT 1 0 2 0 3

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

Refer to the tables below for registers and data points.

When using BACNET protocol please note:

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

INPUT REGISTER INFORMATION							
Category	BACNET						
	30002	Product Set	1	DDSTAT	Included elsewhere		
Product	30004	Major Version	1	Firmware Major version	In Device Info		
	30007	Serial Number	2		In Device Info		
Tomporaturas	30011	Tank temperature	1	decidegrees (e.g. 260 = 26.0 deg C)	Analog Input		
remperatures	30012	Collector thermistor temp.	1	decidegrees (e.g. 260 = 26.0 deg C)	Analog Input		
	30021	Pump 1 Run Timer	2	Number of hours	Analog Input		
Dump Status	30023	Pump 2 Run Timer	2	Number of hours	Analog Input		
Pump Status	30031	Pump 1 state	1	on, off	Binary Output		
	30032	Pump 2 state	1	on, off	Binary Output		
	30041	Fault state	1	true, false	Binary Value		
	30042	Pump 1 condition	1	e.g. working or failed	Binary Value		
Foult Status	30043	Pump 2 condition	1	e.g. working or failed	Binary Value		
rault Status	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	
	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	
Specific	40024	Interrupt Mode	1	interrupting, not interrupting	Multi State Value	
Comgaration	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	40031	Tank thermistor enabled	1	true, false	Binary Value	
Configuration	40032	Collector thermistor enabled	1	true, false	Binary Value	

DDSOLAR OPERATION

To isolate and maintain the pump(s)

1.	From the home screen select "MAINT" button 3.	TANK TEMPERATURE 65 COLLECTOR TEMP. 80 PUMP IDLE SET INFO MAINT O 1 O 2 O 3
2.	Select "PUMP" button 2.	MAINTENANCE MODE SELECT FUNCTION EXIT PUMP TEMP 0 1 0 2 0 3
3.	Use the arrow buttons to manually operate the pump on and off, select "ACCEPT" button 2 to run command.	PUMP ↑ OFF ↓ ACCEPT ↓ 1 2 3
4.	If a second pump has been configured you have the option to manually operate this pump also.	PUMP 2 1 OFF ↓ ACCEPT ↓ 0 1 0 2 0 3
то	o view pump status and run times	
1.	From the home screen select "INFO" button 2.	TANK TEMPERATURE 65 COLLECTOR TEMP. 80 PUMP IDLE SET INFO MAINT

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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.	TANK TEMPERATURE 34 COLLECTOR TEMP. 30 PUMP IDLE SET INFO MAINT O 1 O 2 O 3	
2. No temperature rise within a predetermined time	e during a solar gain period.	ERBOR NO SOLAR TEMPERATURE RISE PUMP DISABLED OK
3. 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 EXIT CLEAR
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 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. 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.		RING MAIN PERATURE: 3 PUMP AUTO INFO 2	
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.	ALT C EXIT	ERNATE PUM PERATION YES ACCEPT	
4.	Using the arrow buttons select the "SWAP PUMP EVERY 12 HOURS or 24 HOURS" then select "ACCEPT" button 2.	SWAF	PUMPS EVEN 12 HOURS ACCEPT	
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.		DATINUE TO ANCED SET U	
	To program the "Connectivity options to BMS" - Using Volt Free Contacts	Only, go	to page	
	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 pa	ge	27
	To program the "Connectivity options to BMS" - BACNET With DHCP, go t	to page		
	To program the "Connectivity options to BMS" - BACNET Without DHCP,	go to pag	ge	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.	BMS CONNECTION PROTOCOL NONE ACCEPT 1 0 2 0 3			
2.	Using the arrow buttons select the "BMS CONNECTION PROTOCOL NONE" then select "ACCEPT" button 2.	BMS CONNECTION PROTOCOL NONE ACCEPT J 0 1 0 2 0 3			
3.	Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.	BMS CONNECTION RELAY NORMALLY OPEN ACCEPT 1 0 2 0 3 BMS CONNECTION RELAY NORMALLY CLOSED ACCEPT 0 1 0 2 0 3 0 1 0 2 0 3			
	To program the "Connectivity options to BMS" - MODBUS With DHCP				
То	program the "Connectivity options to BMS" - MODBUS With DH	CP			
T a 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.	CP BMS CONNECTION T PROTOCOL MODBUS ACCEPT 1 0 2 0 3			
T a 1. 2.	Program the "Connectivity options to BMS" - MODBUS With DH 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. Using the arrow buttons select the "BMS CONNECTION USE DHCP? YES" then select "ACCEPT" button 2.	CP $ \begin{array}{c} $			
To 1. 2. 3.	 program the "Connectivity options to BMS" - MODBUS With DH 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. Using the arrow buttons select the "BMS CONNECTION USE DHCP? YES" then select "ACCEPT" button 2. Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX.XX" then select "ACCEPT" button 2. 	CP $ \begin{array}{c} $			

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

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BMS CONNECTION RELAY NORMALLY CLOSED ACCEPT

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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.	BMS CONNECTION T PROTOCOL MODBUS ACCEPT J ACCEPT J ACCEPT J ACCEPT J
2.	Using the arrow buttons select the "BMS CONNECTION USE DHCP? NO" then select "ACCEPT" button 2.	BMS CONNECTION 1 USE DHCP ? NO ACCEPT J 1 2 3
3.	Using the arrow buttons select the "BMS CONNECTION STATIC IP ADDRESS 000.000.000.000" then select "ACCEPT" button 2.	$ \begin{array}{c c} BMS CONNECTION \\ STATIC IP ADDRESS \\ 000.000.000 \\ ACCEPT \end{array} \begin{array}{c} 1 \\ \end{array} \begin{array}{c} 0 \\ 2 \\ 3 \end{array} \begin{array}{c} 3 \end{array} $
4.	Using the arrow buttons select the "BMS CONNECTION STATIC IP GATEWAY 000.000.000.000" then select "ACCEPT" button 2.	BMS CONNECTION STATIC IP GATEWAY 000.000.000 ACCEPT ↓ 04
5.	Using the arrow buttons select the "BMS CONNECTION STATIC IP MASK 000.000.000" then select "ACCEPT" button 2.	$ \begin{array}{c c} $
6.	Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX" then select "ACCEPT" button 2.	$ \begin{array}{c} $
7.	Using the arrow buttons select the "BMS CONNECTION RELAY . NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.	BMS CONNECTION RELAY NORMALLY OPEN ACCEPT 0 1 0 2 3 BMS CONNECTION RELAY NORMALLY CLOSED ACCEPT 0 4 0 1 0 1 0 1 0 2 0 3 0 3 0 1 1 0 1 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1

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.	BMS CONNECTION PROTOCOL BACNET ACCEPT 1 2 3
2.	Using the arrow buttons select the "BMS CONNECTION USE DHCP? YES" then select "ACCEPT" button 2.	BMS CONNECTION 1 USE DHCP? YES ACCEPT J 1 2 3
3.	Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX" then select "ACCEPT" button 2.	BMS CONNECTION ↑ MAC ADDRESS XX.XX.XX.XX.XX.XX ACCEPT ↓ 04 01 02 03
4.	Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.	BMS CONNECTION RELAY NORMALLY OPEN ACCEPT 1 0 4 1 2 3 BMS CONNECTION RELAY NORMALLY CLOSED ACCEPT 1 0 1 2 3
5.	Using the arrow buttons select the "CONTROLLER ID 1" then select "ACCEPT" button 2.	CONTROLLER ID 0001 ACCEPT 0 1 0 2 0 3

To program the "Connectivity options to BMS" - BACNET Without DHCP

 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. 	BMS CONNECTION T PROTOCOL BACNET ACCEPT J 0 1 0 2 0 3
 Using the arrow buttons select the "BMS CONNECTION USE DHCP? NO" then select "ACCEPT" button 2. 	$ \begin{array}{c} $
3. Using the arrow buttons select the "BMS CONNECTION STATIC IP ADDRESS 000.000.000.000" then select "ACCEPT" button 2.	$ \begin{array}{c c} $
4. Using the arrow buttons select the "BMS CONNECTION STATIC IP GATEWAY 000.000.000.000" then select "ACCEPT" button 2.	$ \begin{array}{c c} $
5. Using the arrow buttons select the "BMS CONNECTION STATIC IP MASK 000.000.000" then select "ACCEPT" button 2.	$ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c}$
6. Using the arrow buttons select the "BMS CONNECTION MAC ADDRESS XX.XX.XX.XX.XX.XX" then select "ACCEPT" button 2.	$ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} $ } \\ \end{array}
7. Using the arrow buttons select the "BMS CONNECTION RELAY NORMALLY OPEN or CLOSED" then select "ACCEPT" button 2.	BMS CONNECTION RELAY NORMALLY OPEN ACCEPT , 0 1 0 2 0 3 BMS CONNECTION RELAY NORMALLY CLOSED
 Using the arrow buttons select the "CONTROLLER ID 1" then select "ACCEPT" button 2. 	t (1) (1) (2) $(2$

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

Refer to the tables below for registers and data points.

When using BACNET protocol please note:

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

INPUT REGISTER INFORMATION						
Category	Input Register	Function	Size (16 bit words)	Value	BACNET	
	30002	Product Set	1	DDSTAT	Included elsewhere	
Product	30004	Major Version	1	Firmware Major version	In Device Info	
internation	30007	Serial Number	2		In Device Info	
Temperatures	30011	Return thermistor temp.	1	decidegrees (e.g. 260 = 26.0 deg C)	Analog Input	
	30021	Pump 1 Run Timer	2	Number of hours	Analog Input	
Duran Chatura	30023	Pump 2 Run Timer	2	Number of hours	Analog Input	
Pump Status	30031	Pump 1 state	1	on, off	Binary Output	
	30032	Pump 2 state	1	on, off	Binary Output	
	30041	Fault state	1	true, false	Binary Value	
	30042	Pump 1 condition	1	e.g. working or failed	Binary Value	
Fault Status	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	
	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	
Specific	40023	Pumps alternating	1	true, false	Multi State Value	
Configuration	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	
	40045	Ring Main Temp Set Point	1	degrees C	Analog Value	
Set Points	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.		RING MAIN IPERATURE:: PUMP AUTO INFO 2	
2.	Select "PUMP" button 2.	MAIN SEL EXIT		
3.	Use the arrow buttons to manually operate the pump on and off, select "ACCEPT" button 2 to run command.	 1	PUMP OFF ACCEPT	
4.	If a second pump has been configured you have the option to manually operate this pump also.	 1	PUMP 2 OFF ACCEPT	
То	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.	PUMP 1: OFF PUMP 2: OFF PUMP 1 IS ACTIVE OK O1 O2 O3
When Ring-Main temperature within 5°C less of set point, one pump is operational.	PUMP 1: 0N PUMP 2: 0FF OK 0K 0 4 0 4 0 4 0 4 0 4 0 4 0 5
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 0K 0 4 0 4 0 4 0 4 0 4

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.	RING MAIN TEMPERATURE: 34 PUMP AUTO SET INFO MAINT 1 2 3
Main temperature 5°C low error screen image.	RING MAIN TEMPERATURE ERROR SET INFO MAINT 1 2 3
Pump 1 disabled screen.	EBROR MAIN TEMP 5 deg. LOW PUMP 1: DISABLED OK 0 1 0 2 0 3
Main temperature 10°C low error screen image.	EBBOR MAIN TEMP 10 deg. LOW PUMPS DISABLED CLEAR OK 0 1 0 2 0 3
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.	BING MAIN TEMPERATURE: ERROR SET INFO MAINT
To remove any of the errors select the "CLEAR" button 1. followed by "CLEAR" button 2.	THERMISTOR ERROR RING OPEN EXIT CLEAR

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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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.