3P Technik UK

3P RainForce

H Series

Installation & Operating Manual

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Installation

Safety

Mains Voltage – There are exposed electrical conductors inside this appliance. This appliance must be installed and serviced by a competent electrical technician to the current requirements of BS7671 and IEEE recommendations. Before servicing this appliance, normal safe isolation procedures should be implemented.

Do not touch the PCB while energised, it carries mains voltage.

Do not touch any connection terminals while energised.

Do not attempt to service this item when wet, or in a wet or high humidity environment.

If the housing of the control panel becomes damaged, you must shut down and securely isolate this appliance immediately.

You must connect this appliance to a grounded 3 wire supply, protected by suitable overload protection. Connected pumps and solenoids are earthed via the control panel, and may otherwise become live.

If the power cables are damaged, either to of from the controller then shut down and isolate this appliance.

The combined loading of pumps and solenoids connected t this appliance must not exceed 20A using the supplied mains flex. Contact the manufacturer for advice if you need to exceed this rating.

Do not attempt to repair any part of the circuit board. Refer to the manufacturer for advice.

We recommend that the product and it's installation should be fully tested after installation and be inspected and tested periodically thereafter.

Included Components

1 x Control Panel
1 x 2m Mains Flex 2.5mm
4 x Header tank level sensors – connected to junction box
1 x 20m 7-2-8c Multicore Shielded Sensor Cable
1 x Pressure transmitter with 20m cable (300H) or 1 x float switch 20m (200H)

Layout

Unlike other wall mounted controllers, the 3P RainForce does not contain a pump, solenoid, or mains top-up unit, these items are external to the control panel. This means you can install the control panel anywhere you wish within the building.

You will need to consider the following constraints,
The control panel cannot be mounted outside, it is not weather resistant.

Voltage drop will affect the cable size needed to take power to your pumps. Over very long runs, you may find it more economical to install contactors near to the pumps, allowing you to control the pumps with a sensible cable size. It is strongly recommended that you calculate voltage drop for cable runs in excess of 20m. Failure to do so may result in cable overheating, conductor migration, and risk of fire. The same caution applies to solenoid valves, although the current draw is usually so small that only extreme distances are likely to present a problem.

Also note that all control cabling (sensor and switch wiring) beyond a few metres and installed in electrically noisy environments may need to be shielded to avoid false switch detection or unstable level readings.

Note – it is recommended that you earth the shielding on cables (where present) to an earth terminal within the controller. Do not earth to DC 0v as the DC power supply is isolated and will not function as a ground.

Do not install control cabling next to mains power cables, particularly over long distances. Adequate separation from power cables will reduce potential problems. Where control cabling must cross mains wiring it should be done at right angles and kept to a minimum.

We do not make any recommendation as to the specific cable or layout to be used. It is the responsibility of the installer to install control cabling appropriately giving consideration to length and proximity to electromagnetic noise.

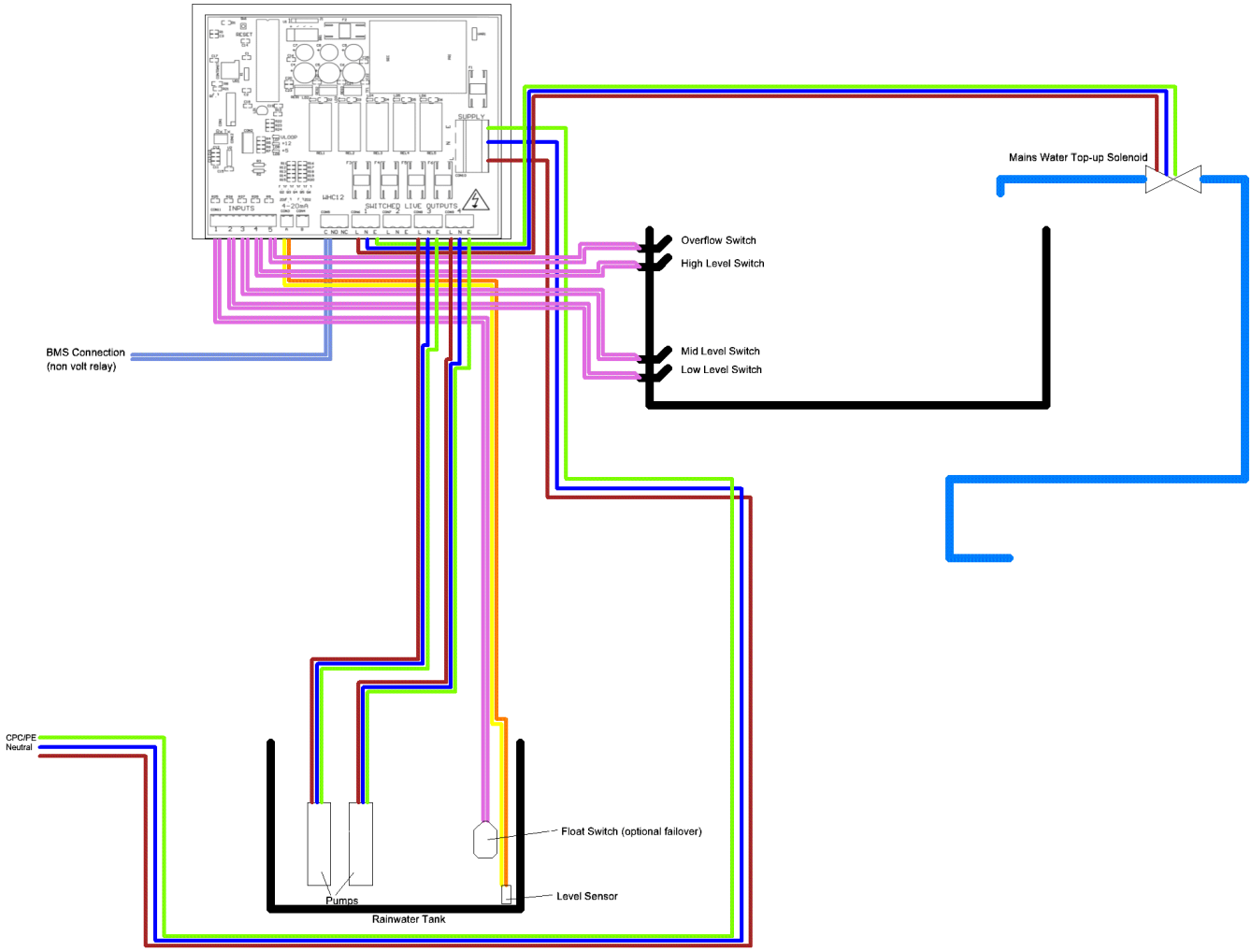
It is expected that the installer is suitably competent with regard to electrical installation, and the provisions of and testing in accordance with the current regulations in force in your area. It is also expected that the installer is competent to install, validate and resolve any issues with regard to control cabling.

In the event of unresolved interference to switch inputs, it is possible to create a separate powered sensor circuit at low voltage operating relays near to the control panel to act as inputs. This will have much higher immunity to parasitic voltages than the transistor based inputs on the control panel.

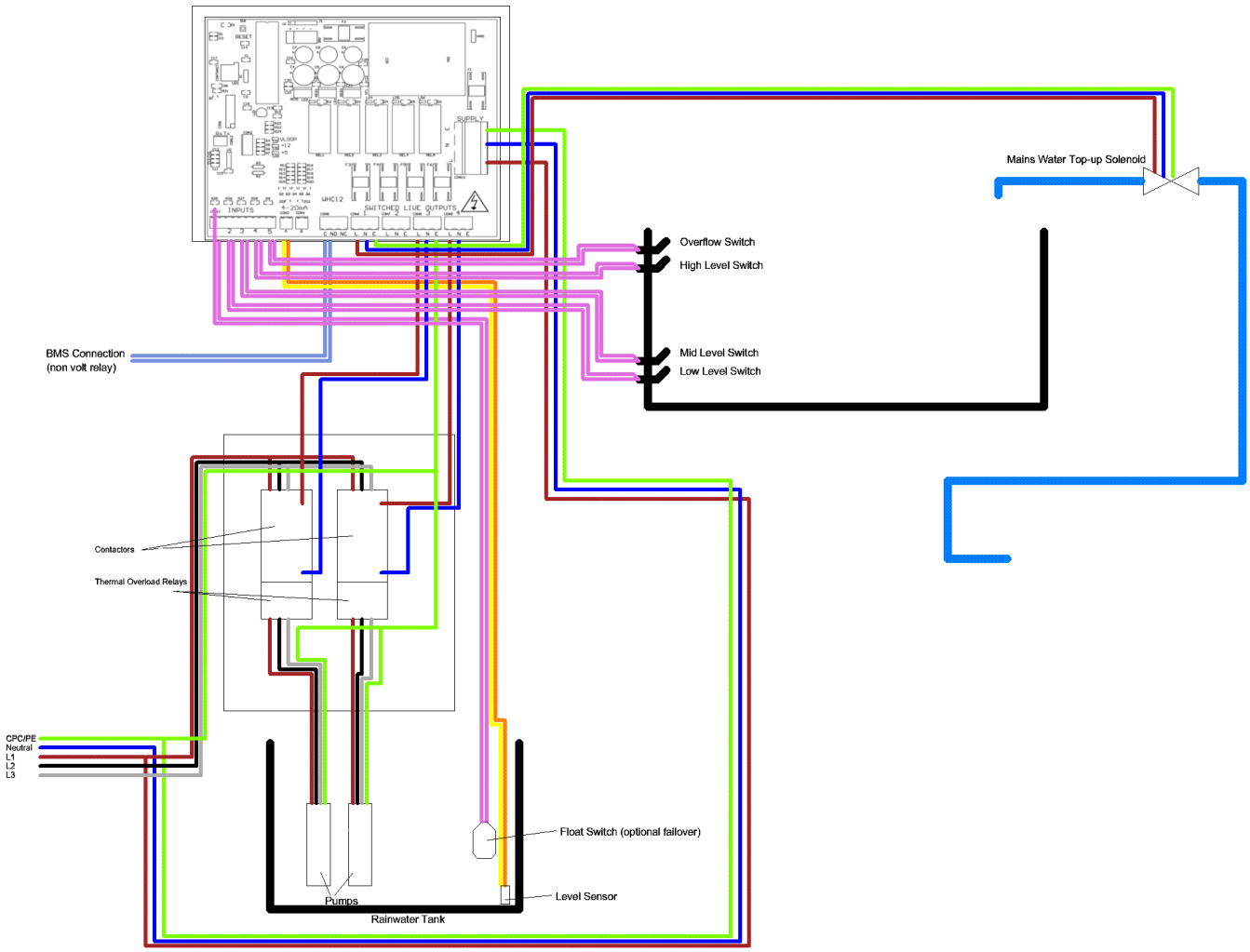
Most instability of the level sensor caused either by interference or turbulence in the water itself can be compensated in software by adjustment of the probe stability setting.

Pressure transmitter cable is of a special type incorporating a vent tube to equalise the pressure within the transmitter to atmospheric pressure (3P part no. IRVENT or IRVENTX depending on type). The vent should terminate in a dry location. If not then it must be extended in vented cable to a suitable location, or terminated in a sealed box with moisture resistant breather plug.

Wiring Schematic – Single Phase



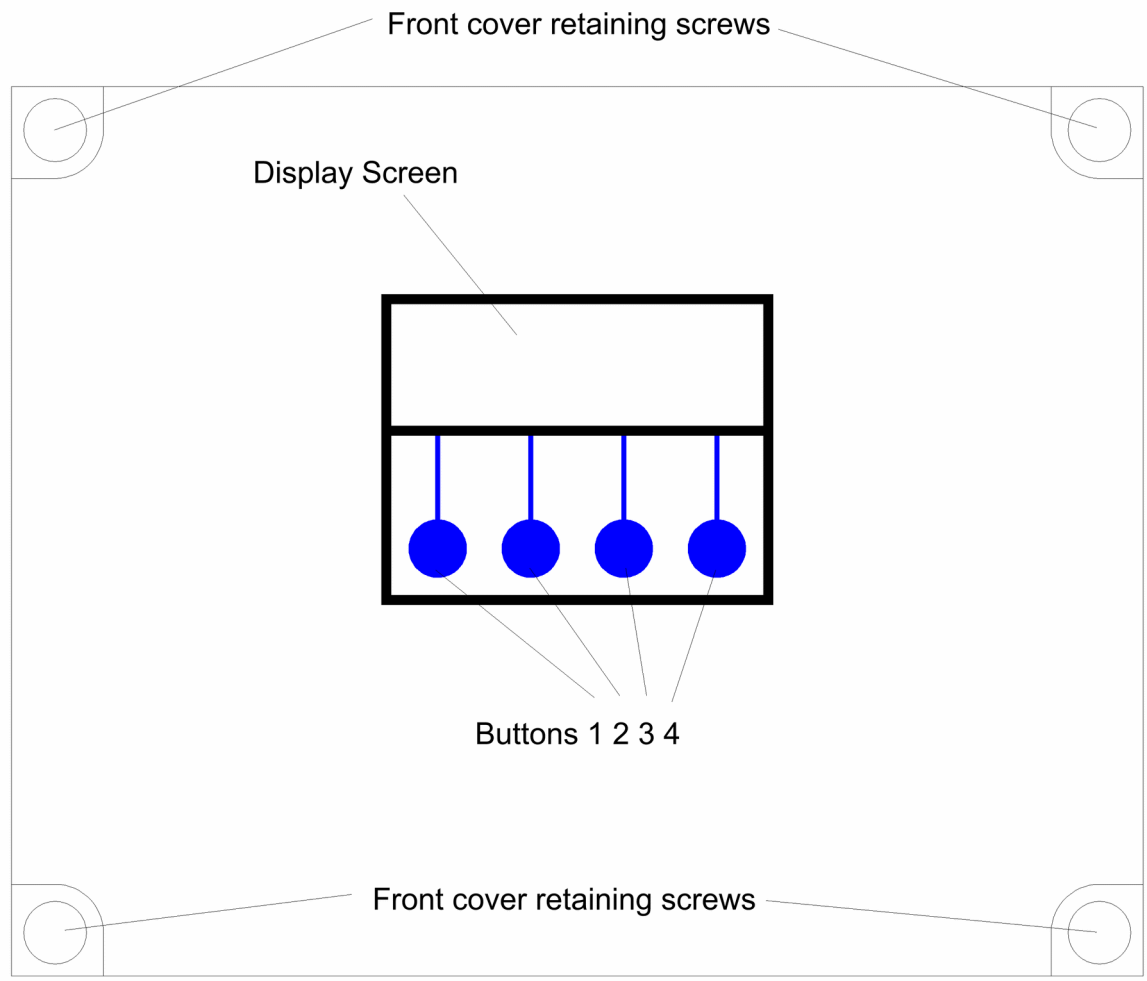
Wiring Schematic – Three Phase



Control Panel Mounting

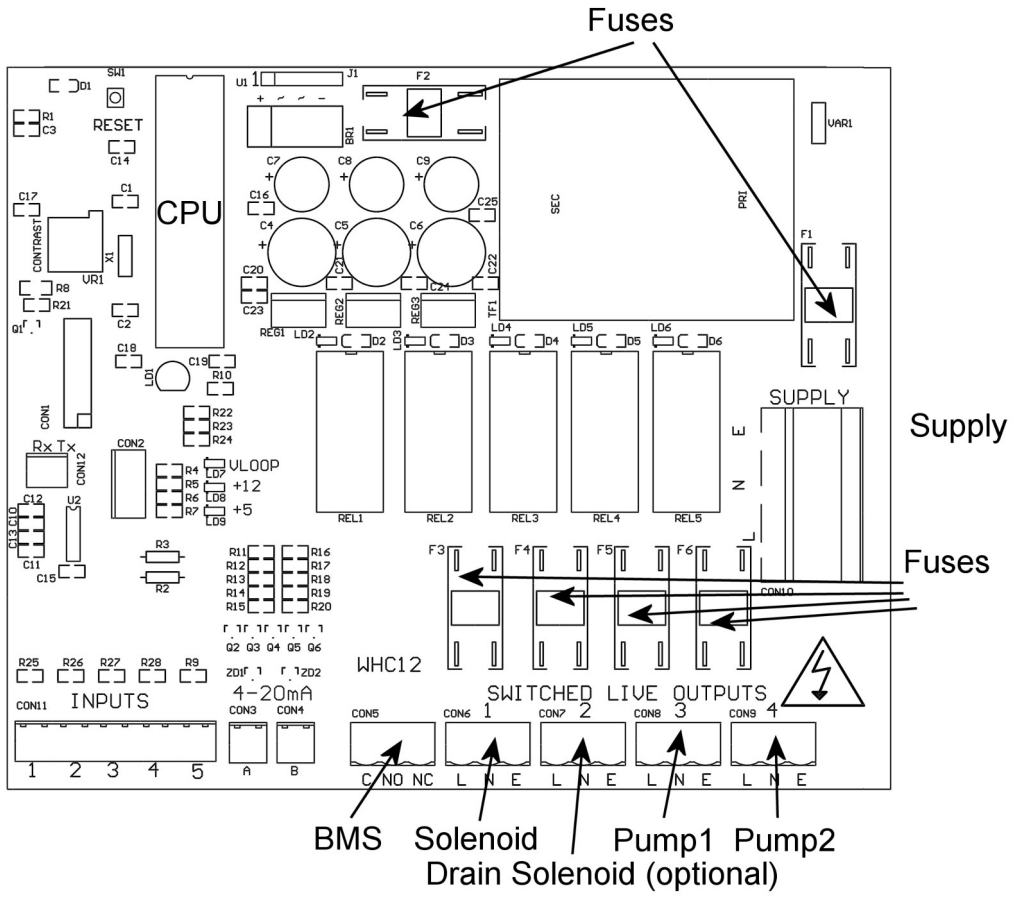
Having selected a suitable location, unlock the 4 locking screws on the corners of the front cover and withdraw the front panel. The LCD display, buttons and alarm LED are connected to the PCB. Remove and re-plug these cables afterwards if necessary in accordance with the diagram.

The 4 screw mounting holes are located on the main enclosure in recesses adjacent to the front panel mounting holes. Mark drilling points on the wall accordingly. Withdraw the casing from the wall and drill holes appropriate for your selected fixings.



Mains Power Connection

The power supply to the control panel enters via a cable gland on the bottom right of the housing. Insert the cable, connect to the incoming power terminal on the right of the PCB, and tighten the cable gland.



Pump Power Connections

Pumps are powered from the rightmost green terminals on the lower right of the PCB. From left to right terminal 4 supplies pump1, and terminal 5 supplies pump2. The terminal blocks are socketed and can be withdrawn from the PCB for ease of access.

Solenoid Power Connections

Solenoids are powered from terminals 2 and 3. Terminal 2 powers the mains top-up solenoid, while terminal 3 powers the optional header tank drain solenoid. Connect as with pump connections.

Header Tank Sensor Installation and Connection

There are 4 header tank sensors.

Sensor 1 – Low level sensor
Sensor 2 – Mid level sensor
Sensor 3 – High level sensor
Sensor 4 – Overflow alert sensor

Sensors are installed in the header tank in line from bottom to top, and should be installed such that they sit horizontal with the toggles flapping upwards.

Before drilling the header tank and fitting these sensors, please consider their function in order to locate at the appropriate spacing. In normal use (Eco mode) the controller will try and maintain water level between the mid and high levels.

Sensor 1 detects the header tank being out of water, and should normally be installed just above the supply outlet level of the header tank.

Sensor 2 determines the point at which the pump or solenoid will be activated to replenish the header tank. It is therefore prudent to allow sufficient space between the mid and low level sensors to maintain a reserve suitable for handling peak demands which may exceed the delivery rate of the pump or solenoid.

Sensor 3 determines the maximum fill level of the header tank and should be installed as high as possible beneath the overflow, whilst still allowing space for the overflow alert sensor.

Sensor 4 should be installed just below the overflow height, and will provide overflow alert and system shutdown in the event of a potential overflow, usually preventing an overflow condition before it occurs.

In considering the placement of the sensors, a judgement must be made as to the location of Sensor 2 (the mid level sensor). The higher this is placed, the more water will be available as reserve for peak demands, and the pumps and solenoid will activate more often. The lower it is placed, pumps and solenoid will activate less frequently (and for longer duration) thus increasing component lifespan, but as water will fall to a lower level before being replenished, less is available for peak demand.

To install the sensors, mark and drill holes as appropriate on the header tank using a 16mm bit. Remove the back-nut from each sensor and install from the inside wall of the tank, with the toggle free to move downward (it must flap down, not up). Re-attach the back-nut.

Sensors are then to be connected to the 10 pin plug on the bottom left of the PCB marked “inputs” using the shielded cable provided, in the following order.

Low level sensor – Pins 3 and 4
Mid level sensor – Pins 5 and 6

High Level Sensor – Pins 7 and 8
Overflow sensor – Pins 9 and 10

Pins 1 and 2 are used for the RW tank conductivity probe or float switch (100H / 200H only)
Polarity is unimportant.

Note – If cables need to be routed into the controller other than with the cables glands fitted, ensure they enter the bottom of the casing and do not cross over the circuit board. If necessary use trunking to route cables appropriately.

Rainwater tank sensor and connection

Connect the tank level sensor as follows

Pressure Transmitter (300H) - Connect to the socket on the underside of the control panel.

The pressure transmitter should be lowered onto the bottom of the rainwater tank and not suspended.

Float Switch – (200H) – Connect the 2 wires than form a closed contact when the float switch is in the up position to pins 1 and 2 on the 10pin input block in the lower left corner.

As the float switch cannot determine the actual water level only the switch point, it must be attached within the tank to hang at the intended switching point. You should ensure this is at least several inches above the top of the pump to prevent pump damage during cold weather.

BMS connection

The BMS connection provides a non-voltage relay capable of switching any 230V source up to 10A. Three contacts are provided, Common, NO and NC. Connect your live conductor from the BMS system to Common, and output will be switched to NC in the absence of an alarm condition, switching to NO upon an alarm.

Troubleshooting

Refer to the Safety instructions. No electrical works should be carried out other than by an appropriately qualified Electrician. Permits to work may be required at local site conditions. If in any doubt, consult your system supplier.

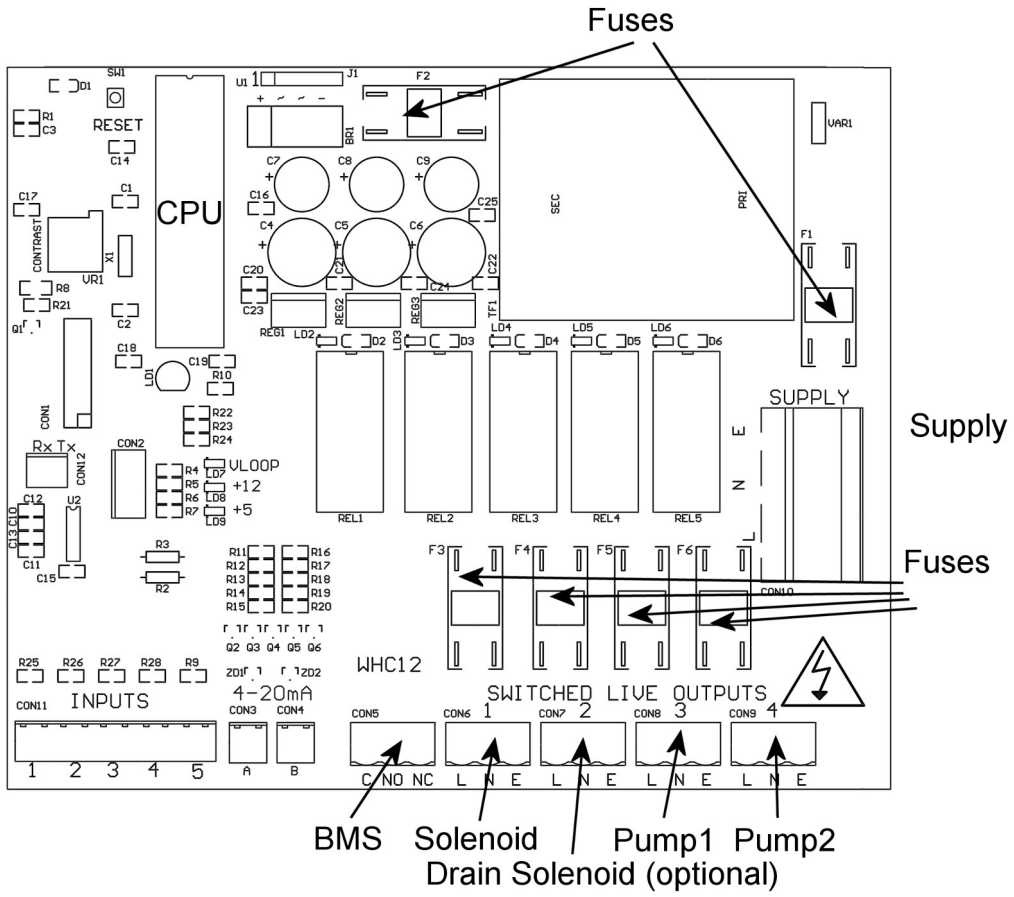
Problem	Probable Cause	Solutions
No Power – controller	No power supply from	Check 240 vac 50hz supply at

dead – no backlight on LCD	distribution board Fuse failed PCB damaged	power input terminals. Check Fuse F1 Replace PCB, contact manufacturer.
Backlight on – no display – no operation	CPU chip missing CPU chip badly inserted or bent pins CPU chip wrong way round CPU chip faulty PCB damaged	Insert CPU Insert CPU correctly or replace if necessary Remove and re-insert correctly Replace CPU Replace PCB, contact manufacturer.
Controller Frozen – operates normally but keypad unresponsive	Keypad not connected or connected wrongly	Check connection
Controller Frozen – does not operate normally	CPU or oscillator damaged	Replace CPU, if no success replace PCB
Float switch appears not to function (200H)	Not connected Cable damaged Float not constrained properly Float faulty	Check connection to control panel Test continuity, replace if necessary Tie float in tank such that it switches up/down around switch point Replace
Tank level sensor does not function (error 6)	Not connected Connected wrongly Sensor faulty Input circuit faulty	Check wiring to controller Check wiring polarity and correct if needed Test with loop calibrator, replace sensor if necessary Test with loop calibrator, replace PCB if necessary
Tank Level sensor	Cable vent tube blocked or	Ensure vented section of cable

reads incorrectly	sealed	terminates to atmospheric pressure
	Wrong sensor specification installed	Replace with original OEM spec part
	Sensor faulty	Test with loop calibrator, replace if necessary
Header tank sensor fault (errors 3,4,5)	Faulty or disconnected sensor	Verify with continuity test, replace if necessary.
	Faulty multicore cable or connection box	Verify with network cable tester. Rewire or replace if necessary.
	Faulty input on control panel	Insert temporary jumper link to verify. Replace PCB if necessary.
	Sensor installed wrong way up.	Toggle should tilt downward, rotate sensor to fix.
	Sensors installed in wrong order.	Check inputs using diagnostic menu. Swap sensors to fix.
Header tank overflow detected (error 10)	Sensor installed wrong way up	Check orientation, toggle should hang downward.
	Sensor installed too low	Relocate above other sensors
	High level sensor failure causes overflow	Test and replace sensor
	Solenoid stuck open	Isolate power, test and replace solenoid
Pump 1 Insufficient or Faulty	Pump not connected	Check wiring
	Pump cannot keep up with demand	Replace with correctly sized pump
	Pump faulty (this fault can show temporarily when filling a large header tank for the first time, in which case it	Replace pump

	should be ignored).	
Pump 2 Insufficient or Faulty	Pump not connected Pump cannot keep up with demand Pump faulty (this fault can show temporarily when filling a large header tank for the first time, in which case it should be ignored).	Check wiring Replace with correctly sized pump Replace pump
Pump 1 Disabled	Pump not connected for over 20 minutes Fuse failed on output Pump cannot keep up with demand for over 20 minutes Pump faulty (most likely)	Check wiring Check and replace if necessary Replace with correctly sized pump Replace pump
Pump 2 Disabled	Pump not connected for over 20 minutes Fuse failed on output Pump cannot keep up with demand for over 20 minutes Pump faulty (most likely)	Check wiring Check and replace if necessary Replace with correctly sized pump Replace pump
Top-up Solenoid Faulty or Insufficient	Solenoid cannot keep up with demand Fuse failed on output Solenoid not connected Solenoid faulty	Replace with correctly sized solenoid Check fuse and replace if necessary Check wiring Test and replace if necessary

Note – References to loop calibrator refer to a current loop calibrator 4-20mA, NOT a loop impedance test.



Fuse Listing

F1 – 500mA 20mm quick-blow
F2 – 1A 20mm glass passivated
F3 – 10A 20mm glass passivated
F4 – 10A 20mm glass passivated
F5 – 10A 20mm glass passivated
F6 – 10A 20mm glass passivated

Inputs (left to right) – Con1

1 – Rainwater tank float switch
2 – Header tank Low Level Sensor
3 – Header tank Mid Level Sensor
4 – Header tank High Level Sensor
5 – Header tank Overflow Sensor

Pressure Sensor Inputs (left to right)

Con3 (left) – Rainwater tank level sensor
Con4 (right) – Unused

BMS Output

Type – Non contact relay
Terminals – Common, Normally Open, Normally Closed
Power Rating max 10A 230Vac

Pump/Solenoid Control Outputs (left to right)

1 – Top-up solenoid(s)
2 – Header tank drain solenoid (optional)
3 – Pump1
4 – Pump2

Upgrades and Modifications

The following parts of the system can be upgraded at any time without any modification to the control panel.

Replacement/upgrade of pump(s)
Replacement/upgrade of solenoid(s)

Note – there is no need to reprogram or adjust the control panel settings when replacing a pump with one of a different power output or consumption. Diagnostic functions are not dependent on current monitoring.

Installation of 3 phase pump(s) via external contactor/relay.

Software upgrade by either on-site reprogramming, or by CPU replacement. Reprogramming is unlikely to ever be necessary, but is provided for to allow for custom software to be retrofitted to the control panel. It is carried out by an approved engineer via an on-board programming port, or via replacement of the CPU. The CPU is socketed in a 40pin DIP socket for ease of replacement. The CPU is a

When replacing the CPU, always use a proper DIP Extraction Tool, and follow the instruction provided with the replacement CPU.

Specifications

Control Panel

Dimensions	240mm x 190mm x 110mm
Supply Voltage	230-240 Vac 50Hz
Power Consumption	7w
Operating temperature range 0	to 40 degrees Celsius
Ingress Protection	IP65
Electrical Insulation	Class 2

Float Switch (200H)

Type	2 way 3 wire fluid float switch
Length	as required
Medium	Water without suspended solids

RW Tank Pressure Sensor

Type	Pressure Transmitter 2 wire
Measurement Range	0-0.6 bar
Input	8 to 30 Vdc
Output	4-20mA

Switched Outputs (pump/solenoid control)

Voltage	230-240vac 50hz (exact voltage as supply voltage)
Current	10A (peak 16A)

Operation

Safety Considerations

Mains Voltage – There are exposed electrical conductors inside this appliance. This appliance must be installed and serviced by a competent electrical technician to the current requirements of BS7671 and IEEE recommendations. Before servicing this appliance, normal safe isolation procedures should be implemented.

Do not touch the PCB while energized, it carries mains voltage.

Do not touch any connection terminals while energised.

Do not attempt to service this item when wet, or in a wet or high humidity environment.

If the housing of the control panel becomes damaged, you must shut down and securely isolate this appliance immediately.

You must connect this appliance to a grounded 3 wire supply, with suitable circuit protection. Connected pumps and solenoids are earthed via the control panel, and may otherwise become live. If the power cables are damaged, either to or from the controller then shut down and isolate this appliance.

The combined loading of pumps and solenoids connected to this appliance must not exceed 20A using the supplied mains flex. Contact the manufacturer for advice if you need to exceed this rating.
Do not attempt to repair any part of the circuit board. Refer to the manufacturer for advice.
Description of Operation

Description of Operation

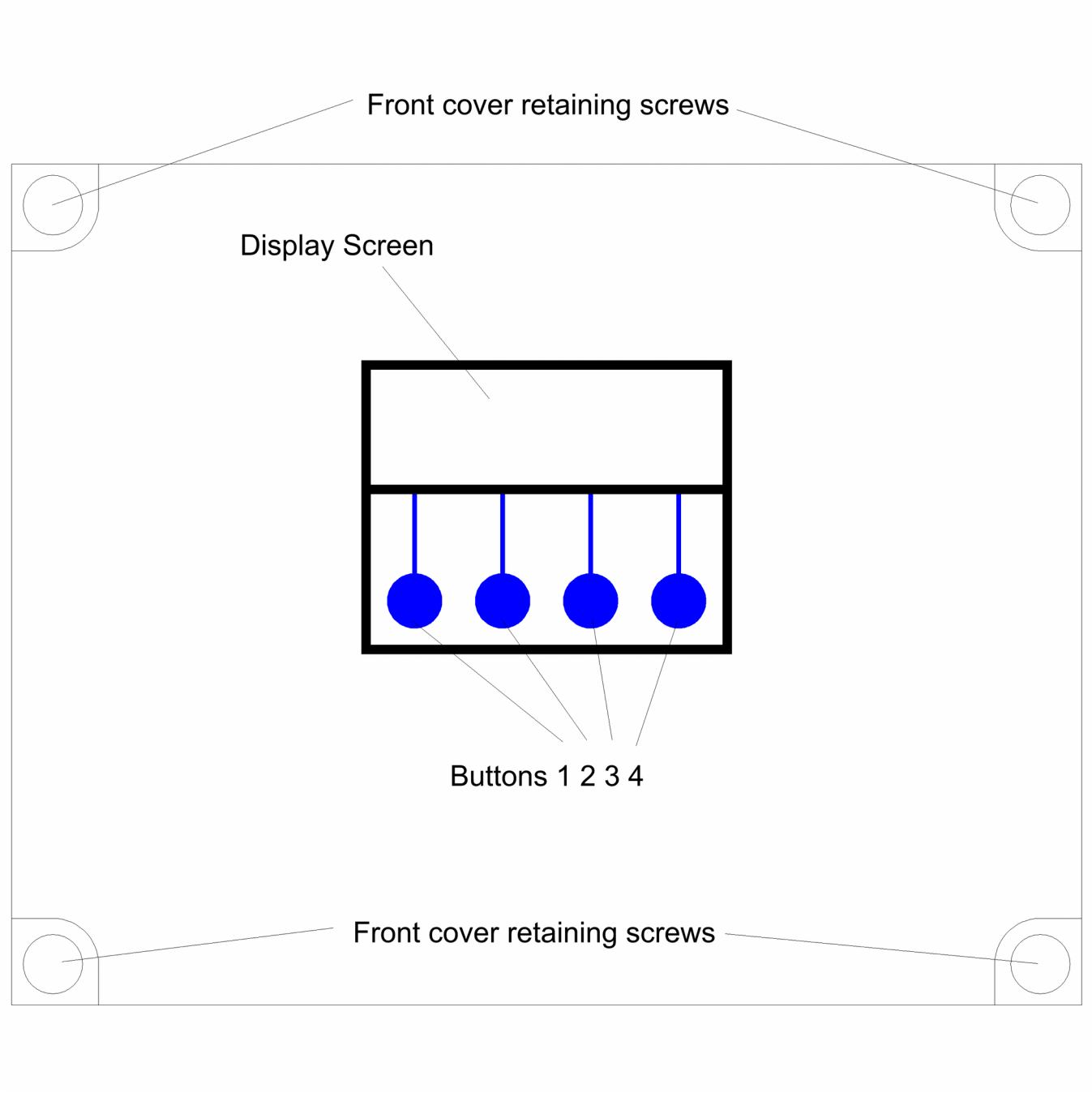
The 3P RainForce H Series is an advanced Rainwater Manager, specifically designed to manage the supply of water from an underground rainwater harvesting tank to a header tank situated within the building. Like all of the RainForce commercial controllers it has been designed to prioritise the maximum availability of water (preferring rainwater where possible) with minimal power consumption, whilst keeping possible points of failure to a minimum.

Functions within the Control Panel are all menu driven, and menu options are displayed on screen. All adjustable settings are available from the menu structure.

The last (bottom) line of the display screen always shows *up to* four Menu Options, which can be selected by pressing once on one of the four corresponding Buttons beneath the display description . The Menu Options displayed will change (or toggle) as you enter different areas of the software.

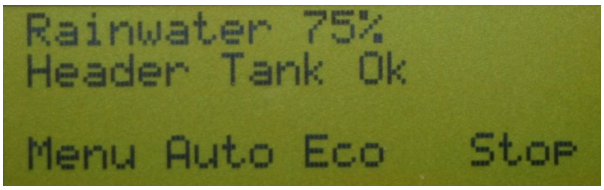
Control Panel Operations

The Control Panel is a simple interface with a four line LCD and 4 Menu buttons below:



Start Up Screen Menus and Functions

Upon first applying power, the LCD panel will display a start-up Message followed by automatic calibration of the rainwater tank sensor (300H only) for approximately 3 seconds. It will then immediately commence operation.



Line One The main screen displays the Rainwater Level, shown as either a % (300H) or simply as OK or Empty (100H/200H). See below.

The Header Tank Status is shown in Line Two. See below.

Rainwater Tank Level

Rainwater Level Display - 300H only

The current rainwater level will be shown in %, and is measured by a submerged pressure sensor at the bottom of the rainwater tank. The scale is adjusted automatically as the control panel learns the maximum and minimum rainwater levels within the tank, with 0% being the minimum height of water detected during operation, and 100% being the highest water level detected. Initially therefore, the display will be inaccurate until the system self calibrates with changes in rainwater tank level. This self calibration does not affect other level related functions such as top-up level, etc.

Rainwater Tank Status -200H only

The current rainwater tank status is displayed either as “OK” or “Empty”.

Header Tank Status

The condition of the Header Tank is shown as either “Low”, “OK”, or “Full” depending on the water level within the header tank.

Menu Options

The last (bottom) line of the Start Up Screen display shows four Menu Options, which can be selected by pressing one of the four corresponding blue buttons beneath the display. These Modes are described below.

Start Up Screen, Buttons 2, 3 and 4: Operational Modes

The Operational Mode options are reached via these three (of four total) buttons beneath the LCD display. The options displayed will change as you enter different areas of the software.

Source Control Mode (Auto/Mains/Rain) - Button 2.

From the Start Up screen, Button 2 can be used to change the preferred water source. By default this Mode is set to Auto, but this can be changed to any one of the three settings described below.

> ***Auto*** – In this Mode rainwater is used when possible, only switching to mains water when either the rainwater tank is empty, OR if water is being drawn from the header tank faster than it can be refilled by pumped rainwater supply alone, at which point Top-up Assist Mode will be automatically activated. This Top-Up Assist Mode will top up simultaneously with *both* rainwater and mains water, as well as bringing in any second rainwater pump (where fitted).
>
> ***Mains*** – In this Mode, *only* mains water will be used. The rainwater pump will not activate.
>
> ***Rain*** – In this Mode *only* rainwater will be used. No mains water will be used. In the event that the rainwater supply is exhausted, operation will be paused until the rainwater supply is replenished.

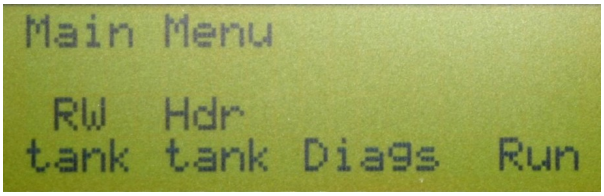
Header Tank Working Mode (Eco/Max) – Button 3

From the Start Up screen, Button 3 allows you to choose between “Eco Mode” and “Max Mode”. Eco Mode is set by default and should be used for most purposes. Max Mode keeps the header tank topped up to its maximum level at all times, which may be useful if you are expecting a scheduled power cut, or if you are expecting or experiencing large instantaneous demand(s) for water.

Stop Mode – Button 4

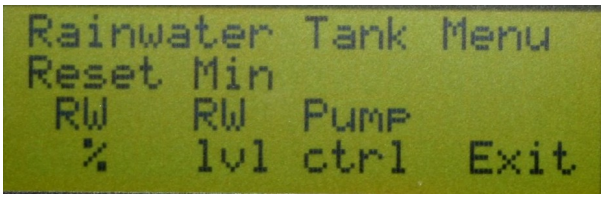
Pressing the fourth button, beneath the “Stop” symbol, will halt all operations and activate the BMS alarm. Its function is similar to an emergency stop button.

Start Up Screen, Button 1 Menu Options – Configuration and Diagnostics



All other Options, the Configurable Options, can be found via Button 1 from within the start-up screen. Whilst in this area all operations are disabled, whilst the configurable options are being set by the Operator. To exit press “Run”.

Rainwater Tank Menu - “RW Tank” – via Button 1.



All options under this Menu are related to operations within the Rainwater Tank.

Level Probe Menu (300H only)

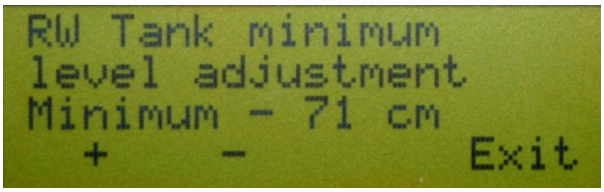
This is a sub-menu providing the following options

Reset Rainwater % - “Reset RW %” – 300H only

Selecting this option will cause the Rainwater Manager to disregard previously learned water depths within the rainwater tank. The system will re-set, and then begin to re-learn the maximum and minimum water levels, over time.

Minimum Rainwater Level Control “Min RW Lvl” – via Button 2.

This setting allows you to change the water level at which the rainwater tank is considered empty, and so the level at which the Rainwater Manager switches to mains water operation. The default level is 60cm.



NOTE – it is essential that you allow sufficient depth of water above the pump to protect the pump from frost during the winter, or from cavitation. We would suggest a minimum of 20cm above the top of the pump.

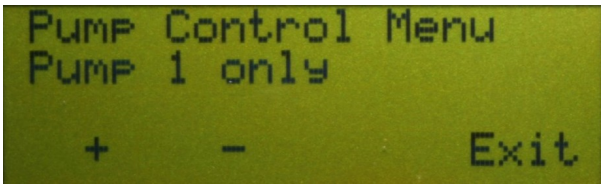
Probe Stability

If the probe reading is being affected by momentary disturbances such as turbulence in trhe water or electrical interference from nearby devices or cables, you can increase the probe stability setting to compensate. This setting performs oversampling of the analogue probe, in which severeal samples are taken in rapid succession and the average reading calculated. Each value selected represents how many times the probe will be sampled to gain an avaerage reading.

Note that each increment will introduce a delay of approximately 100ms (0.1 seconds) to the response time, up to a maximum of 5 seconds delay. If your header tank is capable of being overflowed within 5 seconds of the water level reaching the highest sensor, of drained to empty within 5 seconds of the lowest sensor, you should use this option with caution. The default setting is 1, minimum is 1 and maximum 50.

Pump Control "Pump Ctrl" – via Button 3.

Here you can select which pump you would like to use. The default setting is Pump 1. If your system has 1 pump only then you should leave it on this setting.



If you have a second pump fitted, you can then choose to:

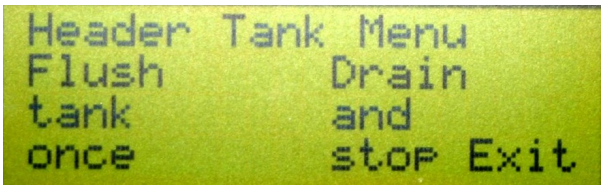
Leave one of the pumps as an unused standby (redundant spare), run each pump alternately (5 start cycles), or run both pumps together.

In the event that a pump fails to deliver water, or fails to deliver sufficient water to the header tank, a warning will be activated. The Rainwater Manager will notify you by warning message and the BMS output, that the pump may be insufficient or faulty. If this condition persists, the system will abandon the pre-selected pump and attempt to use the other pump (where fitted). The BMS will activate during pump failure events, but will reset itself once a working pump has been found and the header tank levels are restored to normal.

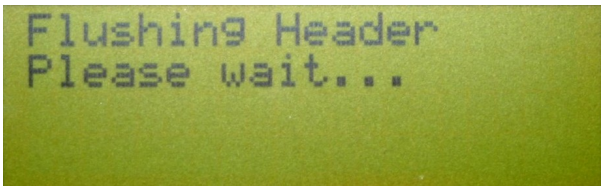
In the event that a second pump fails, or fails to deliver sufficient water (or is not fitted), then the system will continue to alternate pumps every 20 minutes in an attempt to locate a working pump and deliver sufficient water to the Header Tank. During this time, the BMS alarm is continuously active, alerting the Operator to this condition.

Header Tank Menu (Hdr Tank) – Button 2.

Note - these features require the fitting of an optional drain-down solenoid on the header tank. There are two options, once the "Hdr Tank" menu is selected via Button 2.

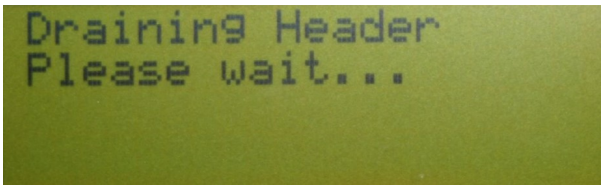


Flush Once



This option will cease all pump/top-up activity while initiating a drain down of the header tank. Once complete, normal operation is resumed and the header tank will refill, as normal. This can be used to flush and refresh the contents of the header tank after periods of inactivity, if ever required.

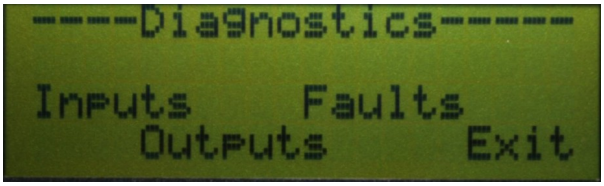
Drain and Stop



This option will cease all pump/top-up activity and drain the header tank. Once drained all operation will cease, and all functions will be locked out until the controller is switched off at the supply and switched on again, when normal operation will resume. This option should be used for servicing of the header tank (replacement of sensors, cleaning, etc.).

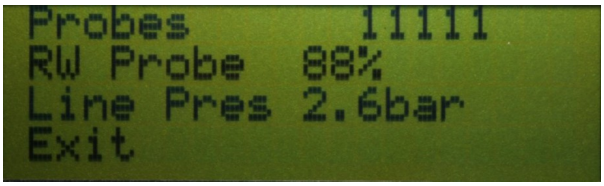
Diagnostics Menu

Once selected via Button 3, there are three buttons or menu options available under the "Diagnostics" menu.



Input Monitor

Selecting this option shows the status of all sensor inputs to the controller. The following information is displayed.



Line 1, Switched inputs 1 to 5, whose assignment is as follows

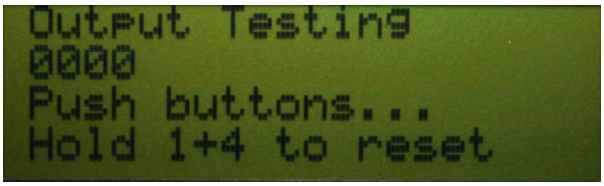
1 – Rainwater tank float switch (200H model only, unused on 300H)
2 – Header tank low level probe
3 – Header tank mid level probe
4 – Header tank high level probe
5 – Header tank overflow sensor

1 = off, 0 = on

Line 2, Rainwater tank level sensor (300H only) shown in centimetres
Line 3, Delivery line pressure (normally unused) shown in bar

Output Testing

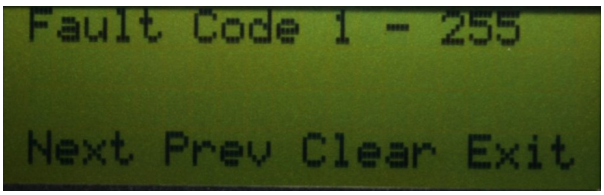
This option allows you to fire the 230V outputs of the controller. NOTE – you will not be allowed to do this if the header tank is full.



Button 1 – Top-up solenoid
Button 2 – Drain down solenoid (if fitted)
Button 3 – Pump 1
Button 4 – Pump 2.

Read Stored Fault Codes

This RainForce Controller is equipped with Advanced Fault Tracking, and unlike all other controllers will remember the last 5 faults that have occurred (even after power outage). This gives the Operator much greater insight into any fault, should one occur, as the fault history can be examined, and an informed judgement made.



Fault Code List

1. Rainwater Tank Float Switch Fault (200H only)
2. Pump 1 Insufficient
3. Header Tank Low Level Sensor Fault
4. Header Tank Mid Level Sensor Fault
5. Header Tank High Level Sensor Fault
6. Rainwater Tank Level Sensor Fault (300H/500H only)
7. Not Used
8. Pump 2 Insufficient
9. Top-up Solenoid Faulty or Insufficient
10. Header Tank Overflow Detected
11. Pump 1 Disabled – Changed to Pump 2
12. Pump 2 Disabled – Changed to Pump 1
13. Both Pumps Faulty or Insufficient

These faults will halt system operation, which will resume if the fault is resolved.
These faults will activate BMS output but not halt operation

Note – Instability errors are logged only when the readings from a probe or sensor are too erratic for RainForce to make a reliable assessment of it's status. These faults are usually caused by electrical interference from poorly routed or unshielded sensor cabling. Minor stability errors are ignored by the in-built Sensor Stability Compensation algorithm.

The normal sequence of sensor activation in the header tank is as follows, note that the presence of water at a level is indicated by the switch being open and not closed. This is done to ensure a fault occurs if any wiring becomes disconnected.

	Low Switch	Mid Switch	High Switch	Overflow Switch
Tank Low	On	On	On	On
Tank OK	Off	On	On	On

Tank OK	Off	Off	On	On
Tank Full	Off	Off	Off	On
Tank Overflowing	Off	Off	Off	Off

Faults 3,4,5 and 10 indicate the header tank switch likely to be at fault. However there may be more than one possible fault which can disrupt the normal sequence . The sensor reported will be the one predicted most likely to be at fault, for example if the Low and High switches detect water but the Mid level switch does not a fault with the mid level switch will be reported, however it might be both Low and High level switches which are faulty.

The position of header tank switches can be viewed in the Diagnostics Menu.

The Menu Options now available are

Clear Stored Fault Codes

Selecting this option clears all stored fault codes from the controllers memory.

Run

Resume operation. Select this to return to the main operational display when configuration/diagnostic is finished.

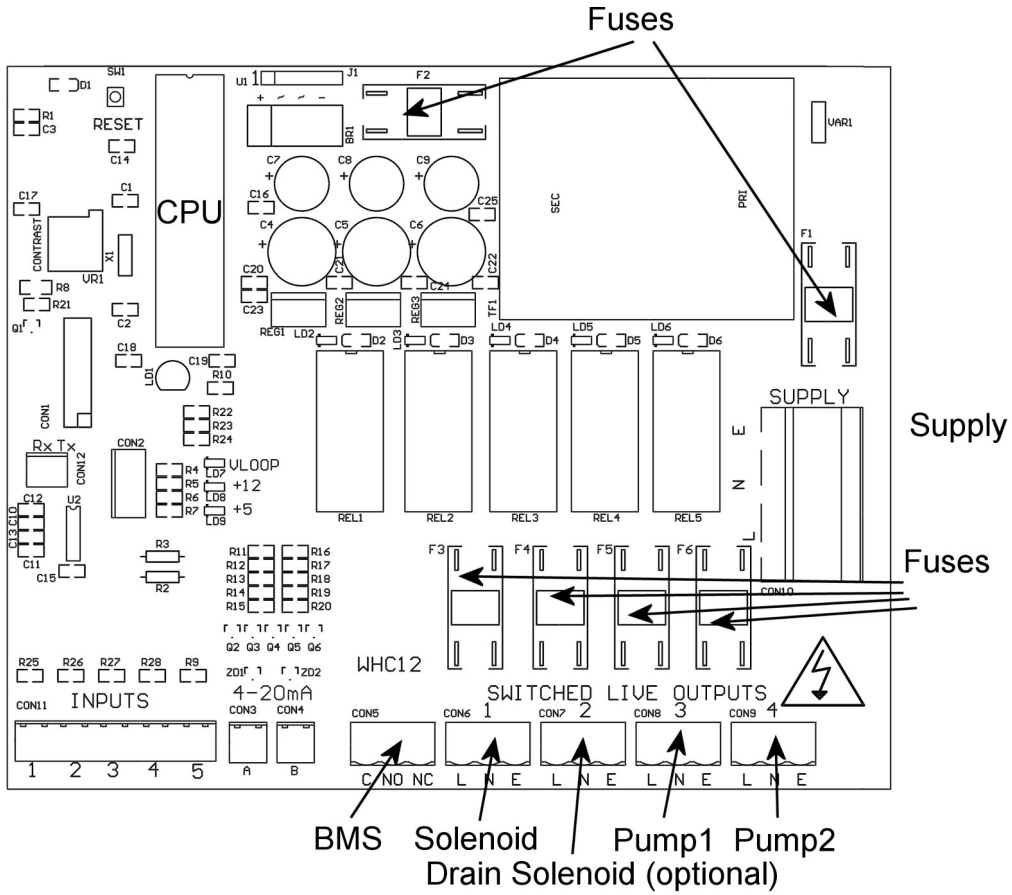
Troubleshooting

Refer to the Safety instructions. No electrical works should be carried out other than by an appropriately qualified Electrician. Permits to work may be required at local site conditions. If in any doubt, consult your system supplier.

Problem	Probable Cause	Solutions
No Power – controller dead – no backlight on LCD	No power supply from distribution board	Check 240 Vac 50hz supply at power input terminals.
	Fuse failed	Check Fuse F1
	PCB damaged	Replace PCB, contact manufacturer.
Backlight on – no display – no operation	CPU chip missing	Insert CPU
	CPU chip badly inserted or bent pins	Insert CPU correctly or replace if necessary
	CPU chip wrong way round	Remove and re-insert correctly
	CPU chip faulty	Replace CPU
	PCB damaged	Replace PCB, contact manufacturer.
Controller Frozen – operates normally but keypad unresponsive	Keypad not connected or connected wrongly	Check connection
Controller Frozen – does not operate normally	CPU or oscillator damaged	Replace CPU, if no success replace PCB
Float switch appears not to function (200H)	Not connected	Check connection to control panel
	Cable damaged	Test continuity, replace if necessary
	Float not constrained properly	Tie float in tank such that it switches up/down around switch point
	Float faulty	Replace
Tank level sensor does not function (error 6)	Not connected	Check wiring to controller
	Connected wrongly	Check wiring polarity and correct if needed
	Sensor faulty	Test with loop calibrator, replace sensor if necessary

	Input circuit faulty	Test with loop calibrator, replace PCB if necessary
Tank Level sensor reads incorrectly	Cable vent tube blocked or sealed	Ensure vented section of cable terminates to atmospheric pressure
	Wrong sensor specification installed	Replace with original OEM spec part
	Sensor faulty	Test with loop calibrator, replace if necessary
Header tank sensor fault (errors 3,4,5)	Faulty or disconnected sensor	Verify with continuity test, replace if necessary.
	Faulty multicore cable or connection box	Verify with network cable tester. Rewire or replace if necessary.
	Faulty input on control panel	Insert temporary jumper link to verify. Replace PCB if necessary.
	Sensor installed wrong way up.	Toggle should tilt downward, rotate sensor to fix.
	Sensors installed in wrong order.	Check inputs using diagnostic menu. Swap sensors to fix.
Header tank overflow detected (error 10)	Sensor installed wrong way up	Check orientation, toggle should hang downward.
	Sensor installed too low	Relocate above other sensors
	High level sensor failure causes overflow	Test and replace sensor
	Solenoid stuck open	Isolate power, test and replace solenoid
Pump 1 Insufficient or Faulty	Pump not connected	Check wiring
	Pump cannot keep up with demand	Replace with correctly sized pump
	Pump faulty (this fault can show temporarily when filling a large header tank for the first	Replace pump

	time, in which case it should be ignored).	
Pump 2 Insufficient or Faulty	Pump not connected Pump cannot keep up with demand Pump faulty (this fault can show temporarily when filling a large header tank for the first time, in which case it should be ignored).	Check wiring Replace with correctly sized pump Replace pump
Pump 1 Disabled	Pump not connected for over 20 minutes Fuse failed on output Pump cannot keep up with demand for over 20 minutes Pump faulty (most likely)	Check wiring Check and replace if necessary Replace with correctly sized pump Replace pump
Pump 2 Disabled	Pump not connected for over 20 minutes Fuse failed on output Pump cannot keep up with demand for over 20 minutes Pump faulty (most likely)	Check wiring Check and replace if necessary Replace with correctly sized pump Replace pump
Top-up Solenoid Faulty or Insufficient	Solenoid cannot keep up with demand Fuse failed on output Solenoid not connected Solenoid faulty	Replace with correctly sized solenoid Check fuse and replace if necessary Check wiring Test and replace if necessary



Fuse Listing

F1 – 500mA 20mm quick-blow
F2 – 1A 20mm glass passivated
F3 – 10A 20mm glass passivated
F4 – 10A 20mm glass passivated
F5 – 10A 20mm glass passivated
F6 – 10A 20mm glass passivated

Inputs (left to right) – Con1

1 – Rainwater tank float switch
2 – Header tank Low Level Sensor
3 – Header tank Mid Level Sensor
4 – Header tank High Level Sensor
5 – Header tank Overflow Sensor

Pressure Sensor Inputs (left to right)

Con3 (left) – Rainwater tank level sensor
Con4 (right) – Unused

BMS Output

Type – Non contact relay
Terminals – Common, Normally Open, Normally Closed
Power Rating max 10A 230Vac

Pump/Solenoid Control Outputs (left to right)

1 – Top-up solenoid(s)
2 – Header tank drain solenoid (optional)
3 – Pump1
4 – Pump2

Upgrades and Modifications

The following parts of the system can be upgraded at any time without any modification to the control panel.

Replacement/upgrade of pump(s)
Replacement/upgrade of solenoid(s)

Note – there is no need to reprogram or adjust the control panel settings when replacing a pump with one of a different power output or consumption. Diagnostic functions are not dependent on current monitoring.

Installation of 3 phase pump(s) via external contactor/relay.

Software upgrade by either on-site reprogramming, or by CPU replacement. Reprogramming is unlikely to ever be necessary, but is provided for to allow for custom software to be retrofitted to the control panel. It is carried out by an approved engineer via an on-board programming port, or via replacement of the CPU. The CPU is socketed in a 40pin DIP socket for ease of replacement. The CPU is a

When replacing the CPU, always use a proper DIP Extraction Tool, and follow the instruction provided with the replacement CPU.

Warranty

All products are covered by a 12 month limited RTB (Return To Base) warranty against materials and manufacturing defects from the date of purchase. The warranty does not cover malfunctioning due to a failure to properly install and / or commission the product in accordance with the installation instructions. The warranty does not cover modification, physical damage or misuse, or operation outside of the products electrical or environmental limits. The warranty is limited to the repair, replacement or cost of replacement of the product at the discretion of 3P Technik UK Limted and does not cover inconvenience or consequential losses. We do not guarantee continuity of operation of any product under any circumstances. For full details see 3P Technik UK Limited terms and conditions.

Specifications

Control Panel

Dimensions (W x H x D) 240mm x 190mm x 110mm
Weight
Supply Voltage 230-240 Vac 50Hz
Power Consumption max 7w
Operating temperature range 0 to 40 degrees Celsius
Ingress protection (100H/200H) IP54
Ingress protection (300H) IP65
IP68 available on request
Protection Class Class1

Float Switch (200H)

Type	2 way 3 wire fluid float switch
Length	as required
Medium	Water without suspended solids

RW Tank Pressure Sensor (300H)

Type – Pressure Transmitter 2 wire
Measurement Range 0-0.6 bar
Input 8 to 30 Vdc
Output 4-20mA

Switched Outputs (pump/solenoid control)

Voltage 230-240 Vac 50hz (exact voltage as supply voltage)
Current 10A (peak 16A)