Electronic Single and Twin Pump System Pressure Managers

Installation, Commissioning & Servicing Instructions

Note: THESE INSTRUCTIONS MUST BE READ AND UNDERSTOOD BEFORE INSTALLING, COMMISSIONING, OPERATING OR SERVICING EQUIPMENT.

THE SYSTEM PRESSURE MANAGER PRESSURISATION UNITS ARE INTENDED FOR USE ONLY IN COMMERCIAL/LIGHT INDUSTRIAL APPLICATIONS.

THIS PRESSURISATION UNIT COMPLIES WITH THE ESSENTIAL REQUIREMENTS OF THE MACHINERY DIRECTIVE 89/392/EEC AMENDED BY 91/368/EEC, THE LOW VOLTAGE DIRECTIVE 73/23/EEC AMENDED BY 93/68/EEC AND THE ELECTROMAGNETIC COMPATIBILITY DIRECTIVE 89/336/EEC AMENDED BY 91/263/EEC AND 92/31/EEC

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INDEX

1.0 GENERAL REQUIREMENTS

1.1 Related Documents

Pressure Systems and Transportable Gas Containers Regulations 1989

It is the law that pressure system appliances are installed by competent persons in accordance with the prevailing regulations. Failure to install appliances correctly could lead to prosecution. It is in your own interest and that of safety, to ensure that this law is complied with.

The installation of the pressurisation unit and expansion vessel MUST be in accordance with the relevant requirements of the Pressure System Regulations, Building Regulations, IEE Regulations and the bylaws of the local water undertaking.

It should also be in accordance with any requirements of the local authority and the relevant recommendations of the following documents: -

Applicable standards and documents are:

BS7074	Application, selection and installation of expansion vessels and ancillary equipment for sealed water systems
BS6644	Installation of Gas Fired Hot Water Boilers 60 kW to 2MW
BS6880 Parts 1, 2 & 3	Code of Practice for low temperature hot water heating systems of output greater than 45 kW
BS6759 Part 1 (ISO 4126):	Specification for safety valves for steam and hot water
BS 3456 (CEE10 Part 1, CEE11 Part 1):	Safety of Household and similar electrical appliances
HSE Guidance note PM5:	Automatically controlled steam and hot water boilers.

1.2 Mains Water Connections

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All connections to local water mains must comply with WRAS Regulations including any local requirements. **The System temporary fill connection must be as per water supply bylaws and must be removed after initial filling.**

1.3 Expansion Vessels

System expansion vessels must be constructed to BS4814 or BS6144. MHG Heating Ltd have a range of products available on request including guidance of vessel sizing. The expansion vessel should be set when empty at 0.1 bar below the cold fill pressure setting.

1.4 Safety Relief Valve

Must comply with BS6759 part 1, and be sized and installed in accordance with BS6644 and BS7074.

2.0 PRODUCT DESCRIPTION

The pressurisation unit is designed to maintain the minimum pressure requirement of modern low/medium temperature, hot water sealed system. The pressurisation unit also provides replacement water for losses from the system.

The pressurisation unit is housed in a powder coated steel cabinet with removable cover. Housed in each cabinet is either a single or twin pumps, connecting pipe-work and pressure sensor. In the top of the cabinet is the header tank, with a float valve. In the front of the cabinet is the systems electronic control.

The electronics have many functions including self diagnostics all of which can be found on page 9.

3.0 TECHNICAL DATA

The basic overall dimensions are shown below in Figure 1.

All screw threads used in the unit conform to **ISO 7/1** or **ISO 228/1** for pipe threads where applicable and **ISO 262** for all general screw threads.

Figure 1 - Basic Overall Dimensions

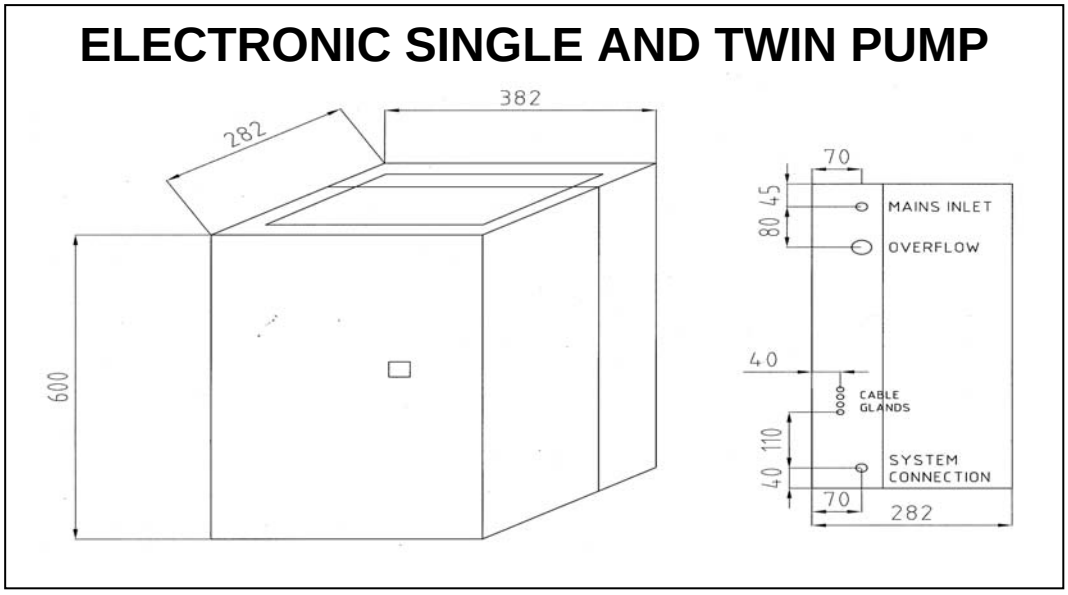

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Figure 2 – Electronic Single and Twin Pump Pressurisation Unit – Technical Data

General		Single Pump	Twin Pump
Minimum cold fill pressure	bar	0.5	
Maximum cold fill pressure	bar	3.4	
Maximum operating pressure	bar	7.0	
Maximum Flow Rate	l/min	6	
Maximum water flow rate @ Maximum cold fill pressure	l/min	0.1	
Weight (empty)	kg	19	28
Weight (full)	kg	27	36
Tank Capacity	litres	7.6	
Factory Preset Values			
Cold fill pressure	bar	1.5	
System low pressure switch	bar	1.0	
System high pressure switch	bar	2.8	
To suit system conditions			
Maximum water flow temp	°C	82	
Maximum static height	m	30	
Min. system operating pressure	bar	3.3	
Max. system operating pressure	bar	6.3	
Safety relief valve setting	bar	4.0	
Nominal pressure differential	bar	0.4	
Electrical Data			
Pressure switch contact rating		15A 240V AC	
Electrical Supply		230V AC 50Hz 1Ph	
Start current	amps	9	
Run current	amps	2.8	
Connection Data			
Mains Inlet		½" Male BSP	
Overflow		28mm Comp	
Connection to System		15mm Comp	
Electrical Cable Glands		4 x 10mm	

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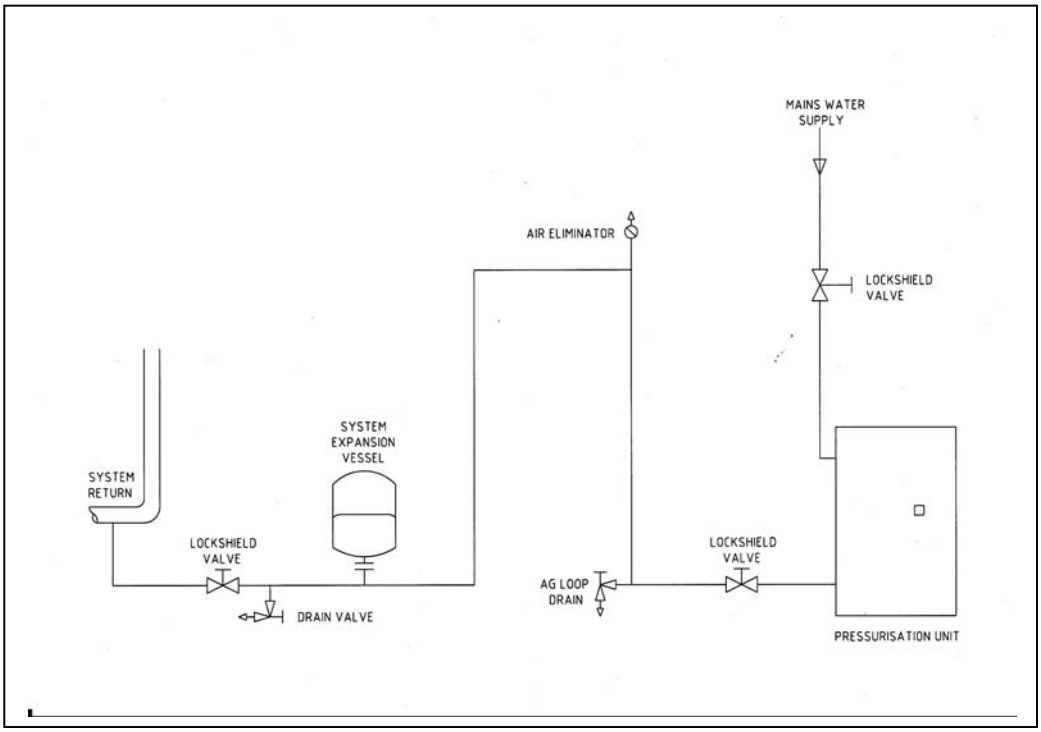
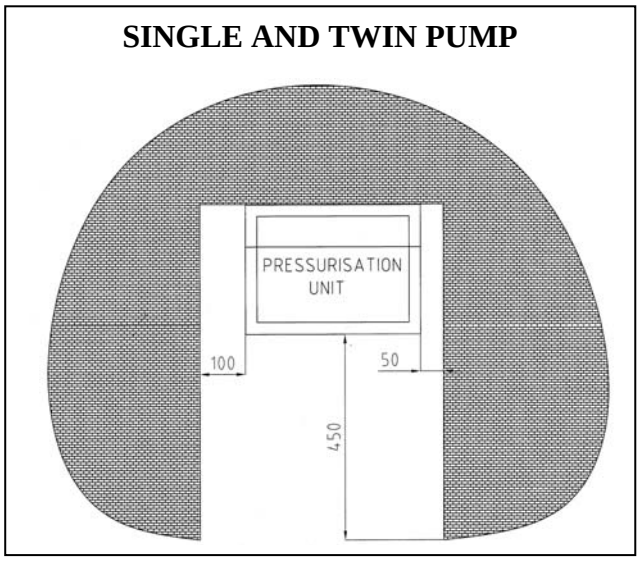
4.0 INSTALLATION

Fig 3 shows ideal layout of a typical sealed system



4.1 Location

Figure 4 - Recommended Clearance Dimensions



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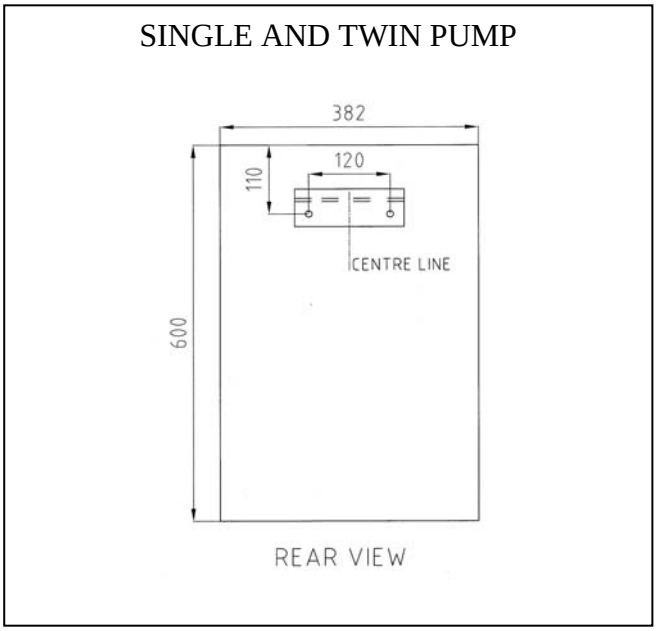
The unit is designed for wall mounting. A mounting bracket is supplied inside the unit, taped to the front of the tank. It is intended that this bracket should be fixed to the wall and the unit hung from it. The unit also has two holes in the back of the chassis for extra security. The corresponding holes in the wall should be drilled to suit once the unit is mounted on its bracket; the bracket dimensions are shown below in fig 5 below.

Figure 5 - Mounting Bracket Dimensions



4.2 Pipework Connections

1) Mains water connection - ½" Male BSP

The units have a type 'AF' air gap to prevent backflow in accordance with Water Supply (Water Fittings) Regulations 1999. The water supply connection must conform to all local WRAS regulations.

2) Overflow Connection - 28mm Compression

Overflow should be piped to where it will be safe but visible so it will be noticed and corrected.

3) System Connection – 15mm Compression

The system connection is via a 15 mm compression fitting. **The unit must be connected to the system by an antigravity loop.** The antigravity loop must be made in pipe-work no smaller than the expansion vessel connection, and have a minimum height of 2 metres. It should include a lock-shield (or lockable) valve at the system connection point for servicing and an automatic air vent fitted at the highest point of the loop. The antigravity loop must not be lagged but can be fitted with an optional kit to prevent freezing. The pipe-work and fittings must be pressure tested to 1.5 times the safety valve lift pressure.

4.3 Electrical connection

All wiring to the pressurisation unit must be in accordance with the IEE regulations, and any local regulations, which apply. Note: If in any doubt a qualified electrician should be consulted.

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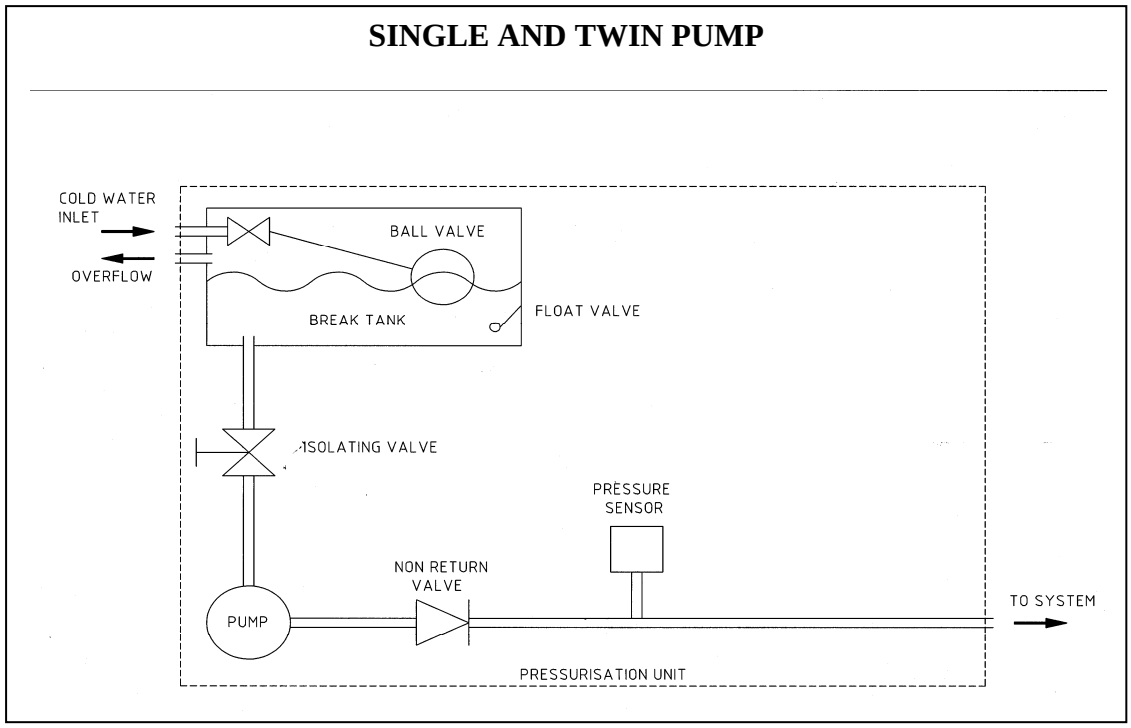
The Unit is supplied fitted with a 1m flying lead for connection to the mains supply. Mains connection must be via a fused isolator rated at 13 Amps and positioned locally to the unit.

The SPDT high and low pressure switches can be incorporated into circuits to interrupt a boiler control signal, in order to shut down the boiler in the event of a system fault condition. The boiler control system must be designed so that manual resetting is required after a system fault condition.
The circuits are rated at 230 V ~ 50 Hz, 15 A. Note: if the factory set pressure switch levels are to be altered, the terminals should not be connected at this stage.

5.0 OPERATION OF THE PRESSURISATION UNIT

Figure 6 – Schematic Layout



5.1 Unit Operation

A drop in system pressure due to, for example, loss of water, will cause the pump[s] to maintain the pressure. As the level of water in the tank reduces a ball valve allows new water into the tank. When the pressure sensor indicates that the correct pressure has been reached the pump stops.

5.2 Safety function

The unit has three volt free relays; one for low pressure setting; one for high pressure setting; one covering a variety of fault conditions – water level in tank too low; leak volume limit exceeded; pump drawing too much current possibly indicating failed pump; pump not increasing pressure in allotted time possibly indicating failed pump.

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6.0 COMMISSIONING

The unit is supplied factory set and tested to suit the system parameters as specified in section 2.0. If the application falls within these parameters the unit requires minimal commissioning checks.

6.1 Mechanical Installation

Check that the Unit and expansion vessel have been installed correctly, as detailed in section. Check also that all lock-shield or lockable valves are correctly set.

6.2 System Flushing

Ensure that the system has been flushed and all foreign matter has been removed, including pipe-scale.
Note: Should this material come into contact with the expansion vessel diaphragm it could result in premature failure of the expansion vessel assembly.

6.3 Electrical Installation

Before working on the Pressurisation unit ensure all electrical circuits connected to it are isolated.

6.4 System Expansion Vessel

To set or check the expansion vessel charge pressure the lock-shield between the Pressurisation unit and the vessel must be closed. The charge pressure must be checked with the expansion vessel empty.
Note: the expansion vessel charge pressure should be set at 0.1 bar less than the cold fill pressure. A suitable gauge should be used to check the charge pressure. Generally the Schrader valve is fitted near the top of the expansion vessel.
If the charge pressure is too high it can be reduced by depressing the centre of the Schrader valve or by using a pressure gauge with an integral air release valve.
If the charge pressure is too low a small increase can be provided using a car foot pump otherwise an oil free compressor or nitrogen bottle is recommended, the drain cock fitted on the base of the expansion vessel must be open to allow any water in the vessel to escape.
When the correct pressure is set the Schrader valve protective cap must be replaced.

Check the integrity of the pipe-work. Ensure the lock-shield valve between the Pressurisation unit and the expansion vessel is open and the drain valve is closed. Ensure the air purge plug is fitted (near the top of the expansion vessel).

6.5 Initial Setting Standard SP Pressurisation Unit

1) Check water inlet supply, it MUST have a flow greater than 8 l/min.

2) Flow Restrictors

Each standard unit comes with a selection of inserts that can be fitted into the inlet valve to achieve the required output:

Mains inlet pressure > 4 bar - H P restrictor which is white and already fitted
Mains inlet pressure < 4 bar - L P restrictor which is red and is attached to the float arm

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Figure 6 – Inlet Valve inserts

3) Connect mains water to inlet and adjust the float arm so that water level is at suitable height in the tank – 20mm below the overflow.

4) Make sure that the Pressurisation Unit is connected to the system and has a suitable isolation valve.

5) Make sure that the mains lead has been connected to a suitably fused switched isolator.

6.6 Filling the Unit

1) Open isolation valve between tank and pump.

2) Undo the priming screw on pump head[s] – allen key connection. Prime until water appears. Close the screw and turn on the pump (keeping system isolation valve closed). Pump should run for a few seconds until set pressure is reached.

Figure 7 – Priming Screw on Pump

3) Check for any leaks within the units, if OK open system isolation valve and the PU will fill the system until it reaches the set cold fill pressure. The Pressurisation can be used to top up the system but does have a 6 l/m flow restrictor.

4) The unit will now monitor the system and keep it at the required cold fill pressure allowing for differential programmed into the electronics

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7.0 Setting of Electronics

You need to get into the maintenance mode to be able to view all settings and make adjustments. Switch off power to the unit, then after 10 seconds switch the power back on whilst pressing the left hand [up arrow] button. The display should display 8888 for a few seconds then should go back to menu settings which can be accessed by using the up and down arrow keys to take you from item to item in the following sequence:-

ID	Description	Range	Default
PO	Current System Pressure	0.0 – 6.0 bar	View Only
P2	Cold Fill Cut Out Pressure This can be adjusted – A1 and P1 settings will move in line with changes made to P2, and A2 will only move upwards when P2 is only 0.2 bar below setting.	0.7 – 6.0 bar	1.8
L0	Volume of Water Introduced	0 – 9999 lts	View Only
L1	Water Introduction Alarm The alarm is in 10's of litres, therefore setting of 23 sets The alarm at 230 litres and when L2 setting reaches this Threshold then the Pressurisation Unit will stop and set off the general alarm until fault is rectified.	1 – 99	99
L2	Volume of Water Introduced since last reset This can be reset to zero by pressing enter.	0 – 999.9 lts	View
C1	Number of times pump[s] have been switched on This can be reset to zero by pressing enter.	0 – 9999	View
H1	Pump 1 Hours Run in hours and minutes This can be reset to zero by pressing enter.	00:00 – 99:59	View
H2	Pump 2 Hours Run in hours and minutes [Twin version] This can be reset to zero by pressing enter.	00:00 – 99:59	View
P1	Cold Fill Cut In Pressure Can only be moved up to 0.2 bar below P2 setting. If moved down A1 will move when only 0.2 bar lower.	0.5 – 5.8 bar	1.4
A1	Low Pressure Alarm Setting Can only be moved up to 0.2 bar below P1 setting. When pressure goes down to this setting the Low Alarm Relay is activated.	0.00 – 5.6 bar	1.2
A2	High Pressure Alarm Setting Can oly be moved down to 0.2 bar above P2 setting. When pressure goes up to this setting the High Alarm Relay is activated.	0.9 – 6.2 bar	3.6
t1	Pump Minimum Run Time Might be required to avoid hunting in unusual circumstances.	1.0 – 9.9 secs	1.0
t2	Pump Maximum Run Time	01 – 99 mins	99

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t3	Pump Minimum Cycle Time Might be required to avoid hunting in unusual circumstances.	00 – 99 mins	00
t4	Pump Duty Cycle Will cycle next pump by minimum run time.	00 – 99 days	30
FI	Pump Selection [Twin version] Can be used to manually choose just one pump if one has failed for continued operation.	1, 2, Au	Au
SC	Password Protection Password can be set so that specific number has to be entered to make changes to any setting. The number To be entered is 21.	Y , N	N
F2	Pump Failure Time Self diagnostic where electronics check that pressure is increasing by 0.005 bar within this set time. Failure to increase the pressure activates the General Alarm Relay.	01 – 99 Mins	03
FILL	Fill function By selecting this function, the unit will bring the system up to P2 setting [if within 6 hours] without activating any of the counters for – for initial filling.		

NOTE to change any settings you need to press the enter button whilst on the menu entry and then the field will either be zeroised, or you will be able to adjust the setting using the up and down arrow keys, then setting to new figure by pressing enter when you are happy with the setting.

It is advisable to take the unit out of maintenance menu once modifications are complete. To do this switch off power to the unit, wait 10 seconds, then re-establish power without holding any buttons and the standard menu will be activated only allowing changes to P2 and only displaying menu items P0 to H2.

8.0 ERROR CODES

In the event of the Pressurisation unit going into fault mode, the display will flash the following error messages. If there is more than one fault the unit will flash between the fault codes every 3 seconds.

E:A1 The Electronics are showing that the system pressure has fallen down to the low alarm setting and the Low Alarm Relay will have been activated.
The error code will reset as soon as the system pressure raises above the A1 setting. If fault persists, check for reasons why the system is at low pressure.

E:A2 The Electronics are showing that the system pressure has gone over the high alarm setting and the High Alarm Relay will have been activated.
The error code will reset as soon as the system pressure falls below the A2 setting. If fault persists, check for reasons why the system is at high pressure.

E:L1 The Electronics are showing that the system has introduced the volume of water as specified in L1 Alarm setting and the General Alarm Relay will have been activated.
The error code can be reset by either increasing the L1 setting, or by zeroising the L2 reading. Please check however why you would have lost amount of water specified

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E:L3 The Electronics are showing that the water level in the tank is too low and the General Alarm Relay will have been activated.
The error code will reset as soon as the water level in the tank is sufficient – activated by float in water tank.

E:P1 The Electronics are showing that the power drawn by Pump 1 is above the limit set in our electronics and the General Alarm Relay will have been activated.
This could indicate that the pump is faulty as it should only draw a large current if it cannot keep up with requirement – e.g. if rotor seized. By pressing the enter button the fault will be cleared and you should run pump 1 to see if it is indeed faulty.

E:P2 Twin version only and is exactly as per P1 fault but for Pump 2

E:F1 The Electronics are showing that Pump 1 has not increased the pressure in the set time and the General Alarm Relay will have been activated.
This could indicate that the pump is faulty and is a self diagnostic. By pressing the enter button the fault will be cleared and you should run pump 1 to see if it is indeed faulty. It could be that the F2 setting is not long enough for the size of system so increase this setting and re-check the pump.

E:F2 Twin version only and is exactly as per F1 fault but for Pump 2

9.0 SERVICING SCHEDULE

The following is a recommended servicing schedule for the Pressurisation unit and expansion vessel. If remedial action is required;

9.1 6 Monthly

1) Check the expansion vessel charge pressure, A significant drop in charge pressure could be due to a faulty vessel diaphragm or Schrader valve. Replacement of the diaphragm or Schrader valve should be considered.

2) Briefly run the pump to check for rotor seizure. This could occur if the pump is not run for extended periods. This can be accomplished by slightly opening the expansion vessel drain valve to initiate a leak.

9.2 12 Monthly

1) Check the ball float valve diaphragm for integrity and replace if necessary. Also check the plastic float for soundness.

2) Drain and clean the feed tank.

3) If debris is found within the feed tank the following checks should be undertaken.

   The non return valve should be accessed and cleaned. The non return valve is located at the outlet of the pump.

   The flow restrictor should be accessed and cleaned. The flow restrictor is located at the inlet to the first section of copper tube within the unit. The restrictor ensures that the tank does not empty during the pump operation.

4) Check the expansion vessel for signs of external corrosion. If any deterioration is observed then it is recommended that the frequency of inspection be increased.

5) Check the operation of the safety circuits if utilised.

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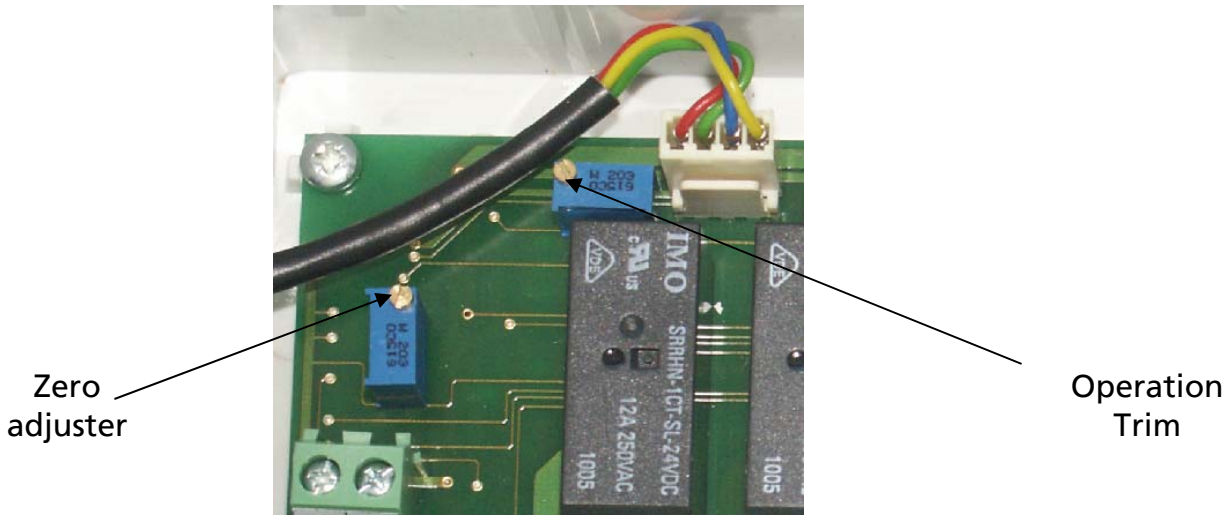
10.0 TRANDUCER RECALIBRATION.

This process should be undertaken when experiencing difficulties with the transducer and when installing a new transducer.

Following the replacement, removal, reintroduction of the pressure transducer the following calibration procedure must be undertaken.

Two potentiometers are located on the PCB mounted in the controller housing.



Zero Adjustment

Whilst the transducer is exposed to atmospheric pressure only the left-hand potentiometer can be adjusted to provide a 0.0bar 'PO' reading on the display.

Turn the potentiometer anticlockwise until a positive reading is indicated on the display. Then slowly turn the same potentiometer clockwise until a 0.0bar 'PO' reading is indicated on the display.

Operation Trim Adjustment

Whilst the transducer is exposed to the desired system pressure the right-hand potentiometer can be adjusted to provide a similar pressure reading on the display to that indicated by a suitably located system pressure gauge.

Turn the potentiometer anticlockwise until a higher than desired 'PO' reading is indicated on the display.

Then slowly turn the potentiometer clockwise until the desired 'PO' reading is indicated on the display.

Please contact MHG Heating Ltd Technical Department if further information or service assistance is required. Phone; 08456 448802 Email; info@mhgheating.co.uk

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