System Pressure Manager Standard

&

System Pressure Manager Plus

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.

THESE SYSTEM PRESSURE MANAGERS COMPLY 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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INTRODUCTION

The pressurisation units in the MHG Heating Ltd System Pressure Manager range are designed to maintain the minimum pressure requirement of modern low/medium temperature, hot water sealed systems. The pressurisation units also provide replacement water for losses from the systems.

Note! **The System Pressure Manager can be used for the initial filling of the system.**
The unit must not be allowed to fill the system for more than 8 hours.
The unit's case must be removed during system filling.

The System Pressure Managers are housed in a powder coated steel cabinet with removable cover. Housed in each cabinet is a pump, connecting pipe-work and pressure switches. In the top of the cabinet is the header tank, with a float valve. In the front of the cabinet is the systems pressure indication gauge.

The range has 2 models:

1) The Standard with the following features:

Cold fill pump control pressure switch
Non-return valve
0 – 6 bar system pressure gauge

2) The Plus with:

All of the features of the Standard plus:
High/Low pressure switches
Isolating Valve (between tank and pump)

1.0 TECHNICAL DATA

The basic overall dimensions of both units are shown below in Figure 1.

All screw threads used in the System Pressure Managers 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

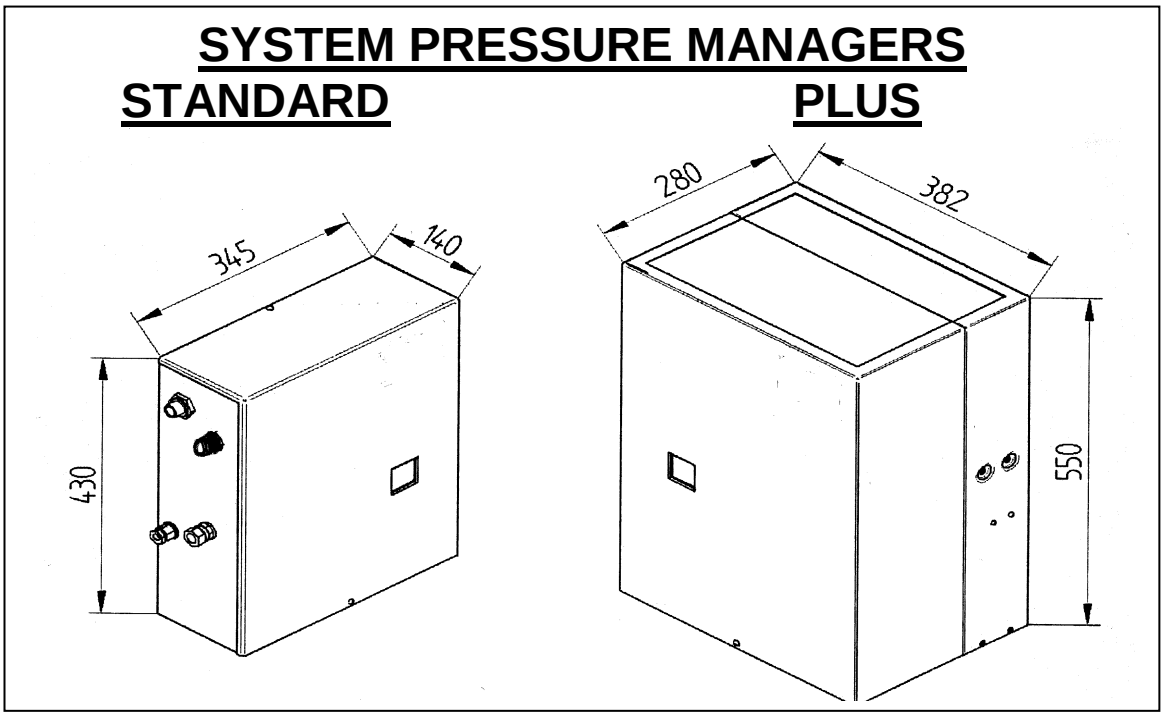

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Figure 2 – System Pressure Manager – Technical Data

Model		Standard	Plus
Minimum cold fill pressure	bar	0.7	0.7
Maximum cold fill pressure	bar	3.4	3.4
Maximum operating pressure	bar	7.0	7.0
Maximum Flow Rate	l/min	6	6
Maximum water flow rate @ Maximum cold fill pressure	l/min	0.1	0.1
Weight (empty)	kg	13	19
Weight (full)	kg	16	27
Tank Capacity	litres	2.6	7.6
Factory Preset Values			
Cold fill pressure	bar	1.5	1.5
System low pressure switch	bar	–	0.8
System high pressure switch	bar	–	2.7
To suit system conditions			
Maximum water flow temp	°C	82	82
Maximum static height	m	16.5	16.5
Min. system operating pressure	bar	1.0	1.0
Max. system operating pressure	bar	6.3	6.3
Safety relief valve setting	bar	<4.0	<4.0
Nominal pressure differential	bar	0.4	0.4
Electrical Data			
Pressure switch contact rating		15A 240V AC	15A 240V AC
Electrical Supply		230V AC 50Hz 1Ph	230V AC 50Hz 1Ph
Start current	amps	9	9
Run current	amps	2.8	2.8

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2.0 SEALED SYSTEM FUNCTION

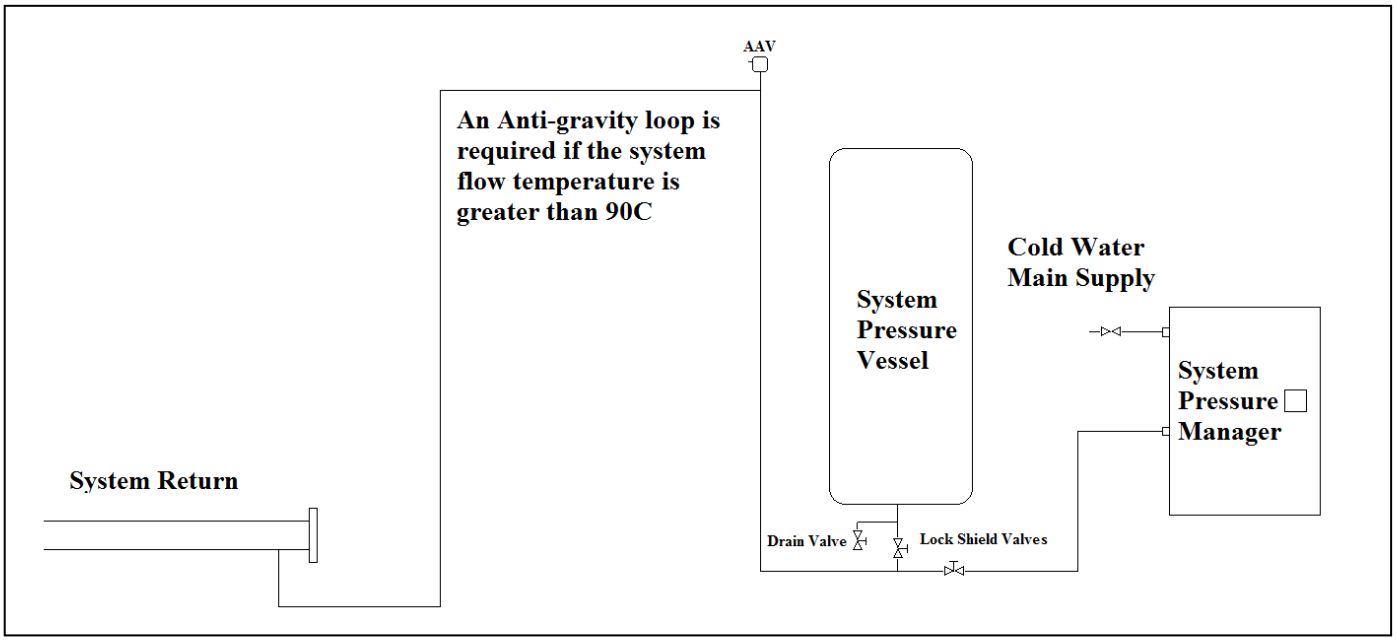
Figure 3 shows the layout of a typical sealed system.

2.1 Terminology

Expansion Vessel Charge Pressure
The air/nitrogen pressures within the expansion vessel, with water connection open to atmosphere.

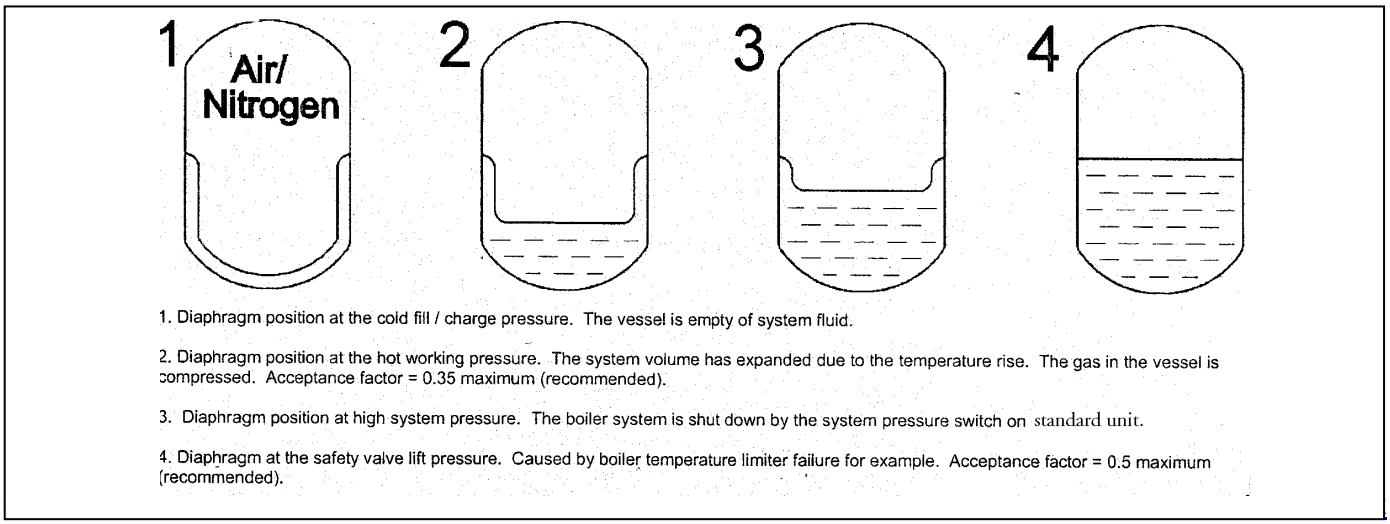
System Cold Fill Pressure
The water pressures within the system, which the pressurisation unit is set to maintain.

Figure 3 – Typical System Schematic Layout



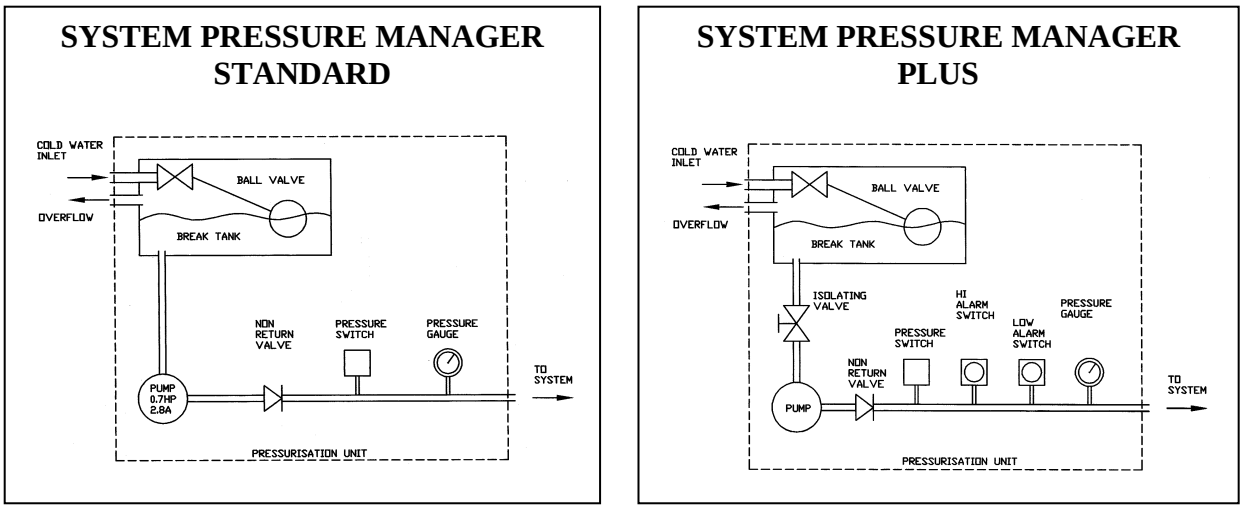
The system expansion vessel charge pressure should be set 0.1 bar below the cold fill pressure. (When the water connection is open to atmosphere.) Before operation of the boiler, with the system at cold fill pressure the expansion vessel is empty. As the system heats up the expanded volume is absorbed by the expansion vessel. A small pressure rise occurs which is accommodated by the vessel. When the system cools and the pressure drops, the pressurisation of the expansion vessel will provide replacement fluid.

Figure 4 – Expansion Vessel Operation



3.0 OPERATION OF THE PRESSURISATION UNIT

Figure 5 – Schematic Layout if the Standard and Compact Units



3.1 Unit Operation

A drop in system pressure due to, for example, loss of water, will cause the pump to maintain the pressure. As the level of water in the tank reduces a ball valve allows new water into the tank. When the pump pressure switch is satisfied the pump stops.

3.2 Safety function – Plus Only

The PLUS unit is fitted with two extra pressure switches. A pressure above the high pressure limit set on the unit will switch over the SPDT high pressure switch and a pressure below the low pressure limit set on the unit will switch over SPDT low pressure switch.

4.0 GENERAL REQUIREMENTS

4.1 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 above 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: –

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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.

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4.2 Mains Water Connections

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.**

4.3 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

5.4 Safety Relief Valve

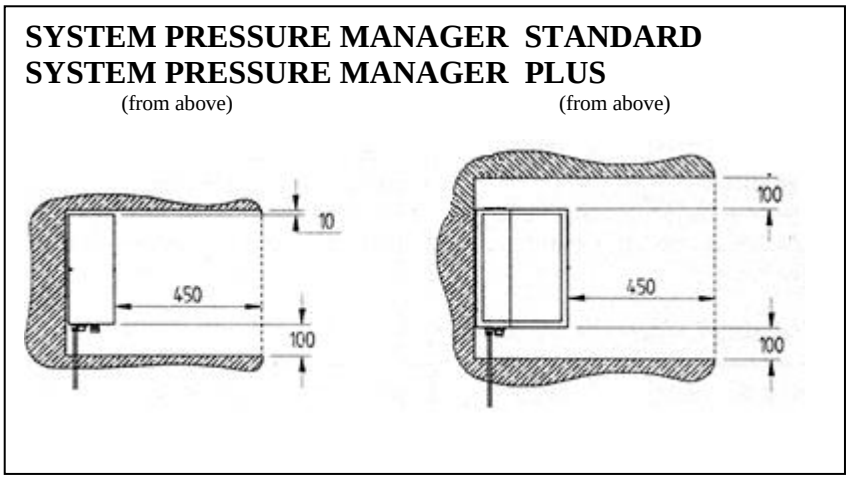
Must comply with BS6759 part 1, and be sized and installed in accordance with BS6644 and BS7074.

6.0 INSTALLATION

The units are supplied inside a strong cardboard box with padding and should be left in this packaging until they arrive on site and are installed.

6.1 Location

Figure 6 – Recommended Clearance Dimensions



The units are 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. Each 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 7 below.

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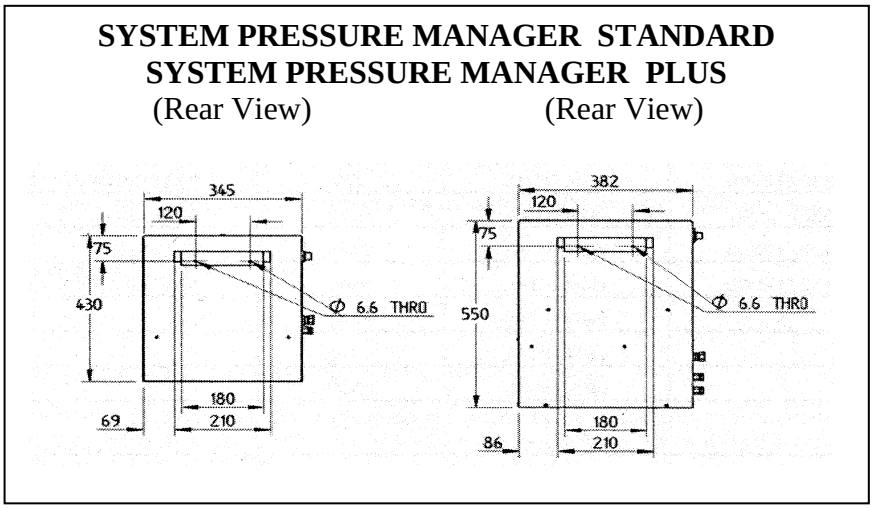
Figures 7 - Mounting Bracket Dimensions



The pressurisation units may be floor or wall mounted, when securing to a wall, ensure the unit is supported with the plate provided as well as through the holes in the chassis.

6.2 Pipework Connections

1) Mains water connection - ½" BSP Male

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 - ¾" BSP Male

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

3) System Connection

The system connection is via a ½" BSP on the Standard and 15 mm compression on the Plus. 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.

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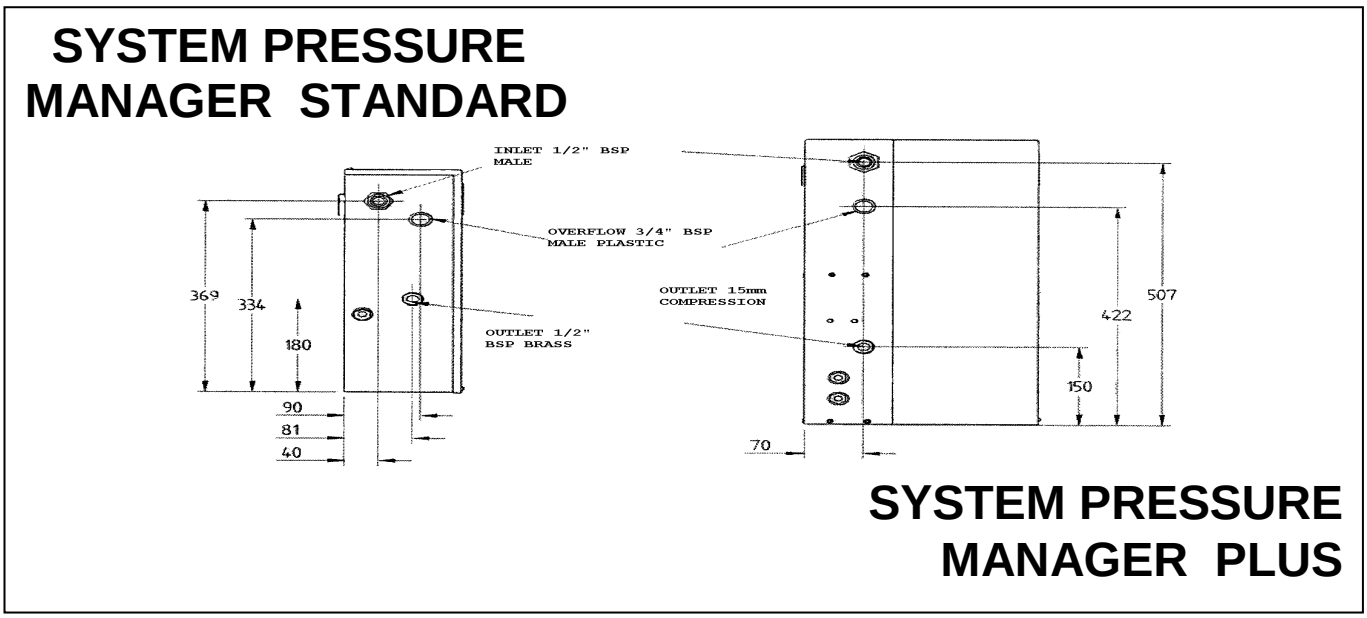
Figure 8 – Pipework Connections



6.3 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.

Both the Standard and Plus are 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 (supplied in tank) and positioned locally to the unit.

System Pressure Manager PLUS units only have:
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.

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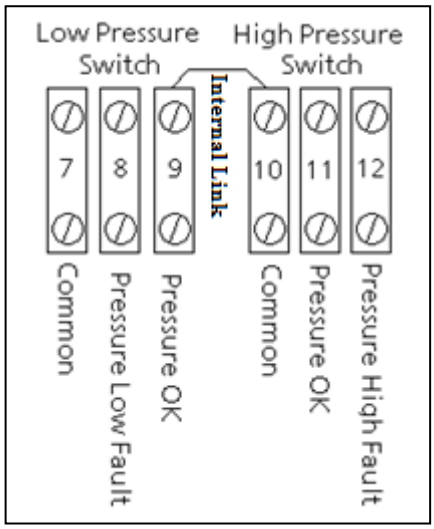
Figure 9 - Plus Alarm Terminal



7.0 COMMISSIONING

System Pressure Manager are supplied factory set and tested to suit the system parameters as specified. If the application falls within these parameters the unit requires minimal commissioning checks.

7.1 Mechanical Installation

Check that the System Pressure Manager Unit and expansion vessel have been installed correctly, as detailed in section 6.2: Pipe-work connections. Check also that all lock-shield or lockable valves are correctly set.

7.2 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.

7.3 Electrical Installation

Before working on System Pressure Manager units ensure all electrical circuits connected to it are isolated.

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7.4 System Expansion Vessel

To set or check the expansion vessel charge pressure the lock-shield between the System Pressure Manager unit and the vessel must be closed and the vessel drained and vented to atmosphere.

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 System Pressure Manager 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).

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7.5 Initial Setting Of Both Standard and Plus Units

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

2) Flow Restrictors

Standard

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

Mains inlet pressure > 1 bar – H P restrictor
Mains inlet pressure < 1 bar – No restrictor

Plus

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
Mains inlet pressure < 4 bar – L P restrictor

7.6 Filling the Unit

1) Check all connections and pressures. Open inlet isolation valve and fill the tank.

2) Undo the priming screw on pump head. 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 10 – Priming Screw – Standard

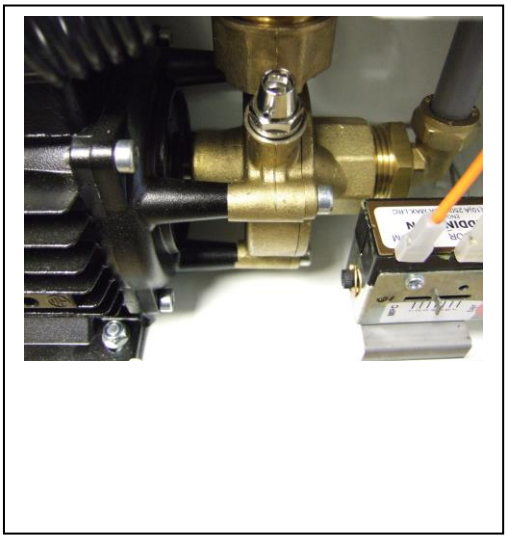

Figure 11 – Priming Screw – Plus

3) Check for any leaks within the units, if OK open system isolation valve and fill system via filling loop.

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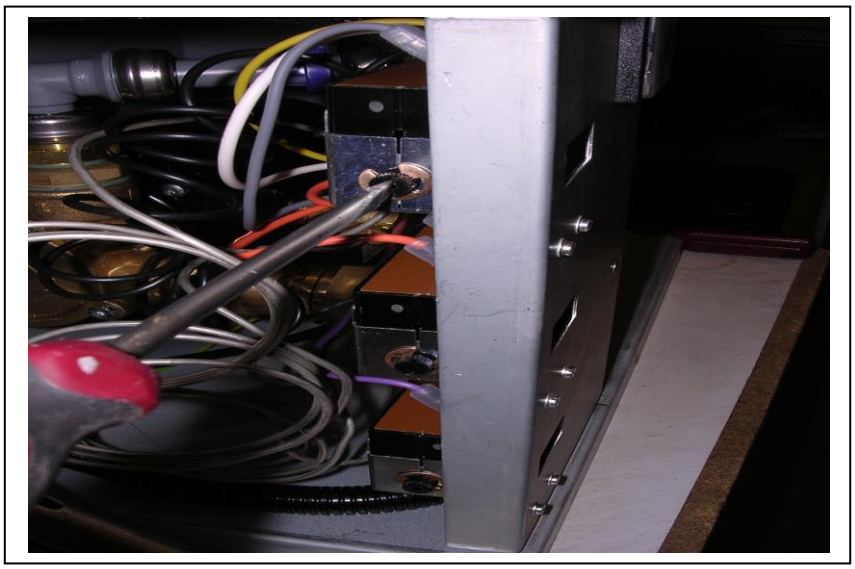
4) The unit will now monitor the system and keep it at the required pressure.

7.7 Pressure Switch Adjustment

The pressure switches are fitted with a scale to indicate the pressure at which they are set. This scale is to be used for indication only. As all the pressure switches and the pressure gauge take readings from the same place, the unit's pressure gauge can be used to give an accurate reading when setting switching levels. The switches should be set last, after all the other commissioning tasks are complete.

Figure 12 – Pressure Switch Adjustment



All the pressure switches have a nominal differential (Hysteresis) of 0.4 bar. This means that there will be 0.4 bar between the pressure at which the switch changes state during a pressure rise and the pressure at which it will change when the pressure is falling again or vice versa. For example, if the cold fill pressure switch is set to 1.5 bar then the switch will operate when the pressure rises to 1.5 bar causing the pump to stop. The switch will not change over and start the pump until the pressure has fallen back to 1.1 bar.

7.8 Pressure Switch Adjustment Apparatus

When adjusting pressure switches the unit must be set up with the apparatus similar to that shown in connected to the outlet.

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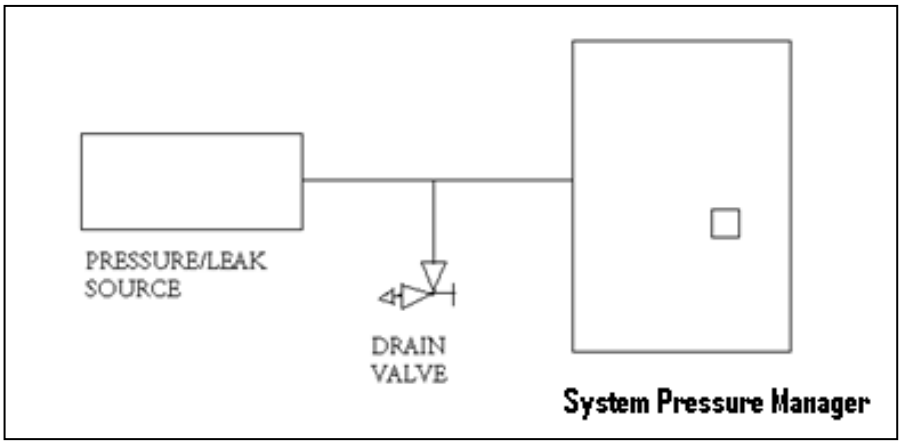
Figure 13 – Pressure Switch Adjustment Apparatus



7.8.1 Cold Fill Pressure Switch

Designed to stop the pump when pressure reaches a preset level.
Setting procedure as follows:

1) Ensure the system pressure is lower than the pressure the switch is to be set to.
2) Switch the unit on.
3) Introduce a small leak at the outlet.
4) Adjust the cold fill pressure switch until the pump cuts out at the desired working pressure.

7.8.2 Low Pressure Switch – Plus Only

Designed to prevent the boiler operating if the pressure falls below the preset level. Setting procedure as follows:

1) After setting the cold fill pressure switch, allow the system to run to pressure.
2) Isolate the System Pressure Manager unit from the mains electrical supply and from the boiler circuits.
3) The Low pressure switch is lowest on the panel which pivots around corner for easy access.
4) Set the Low pressure switch to its lowest position, this ensures that the terminals at either end of the switch form a closed circuit.
5) Introduce a small leak until the unit's pressure gauge reading equals the required Low pressure setting.
6) Stop the leak.
7) Adjust the switch until the circuit is open. A meter across the two terminals will signal the change.
8) Re-connect all the electrical supplies, ensure that the pump switches on and the pressure increases and that the low pressure switch operates to open circuit and that the unit reaches the desired cold fill pressure

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7.8.3 High Pressure Switch – Plus Only

Designed to prevent the boiler operating if the pressure exceeds the preset level. Setting procedure follows:

1) Isolate the System Pressure Manager unit from the mains electrical supply and boiler circuits.
2) Set the High pressure switch to its highest position.
3) Use a pressure source to increase the system pressure until the gauge reads the required high level pressure.
4) Adjust the switch down until the circuit is closed. A meter across the two terminals will signal the change

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8.0 FAULT FINDING

General fault finding – If the System Pressure Manager unit still does not operate satisfactorily, consult MHG Heating Ltd for assistance.

Figure 14 – Fault finding guide

Fault	Possible Causes	Action
Pump will not run	Unit up to pressure	None
	No power to the unit	Check at source
	Isolator fuse blown	Replace fuse in isolator. Note investigate cause of blown fuse before restarting the unit
	Cold Fill Pressure switch set incorrectly	Check wiring and/or adjust Pressure switch setting
	Pump seized or faulty	Free the shaft via the case access hole. (Units From 2014) Service or replace pump
Pumps runs but will not build up pressure	Pump isolating valve closed – Standard only	Open Valve
	Pump not primed with water	Prime pump (see section 7.6)
	No water in tank	Check water level and investigate if necessary
	Pump non return valve jammed	Check valve
	Flow restrictor blocked	Remove and clean. See (9.2.3)
	Air in sealed system, pump cannot overcome resistance	Remove air from system
Pumps cuts in and out rapidly (hunting)	Pressure switches set incorrectly	Adjust pressure switches (see section 7)
	Non return valve not sealing correctly	Clean valve seat or replace valve if necessary
	System Leak	Trace leak and ensure system is sound
Pump runs continuously	Cold fill pressure switch set incorrectly	Adjust pressure switches (see section 7)
	Cold fill pressure switch fault	Replace faulty switch
	System Leak	Trace leaks and ensure system is sound.

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Figure 14 – Fault finding guide cont…

Fault	Possible Causes	Action
Pumps cuts out at wrong pressure	Cold fill pressure switch set incorrectly Cold fill pressure switch faulty	Adjust pressure switches (see Section 7) Replace faulty switch
Maximum system working pressure too high	Cold fill pressure switch set incorrectly Cold fill pressure switch faulty	Adjust pressure switches (see Section 7) Replace faulty switch
Boiler switches off unexpectedly	Hi or Lo pressure switches set incorrectly Hi or Lo pressure switches and circuits wired incorrectly	Adjust pressure switches (see section 7) Check wiring.
System pressure runs consistently at cold fill pressure	Small system leak	Trace leak and ensure system is sound

9.0 SERVICING SCHEDULE

The following is a recommended servicing schedule for the System Pressure Manager 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.

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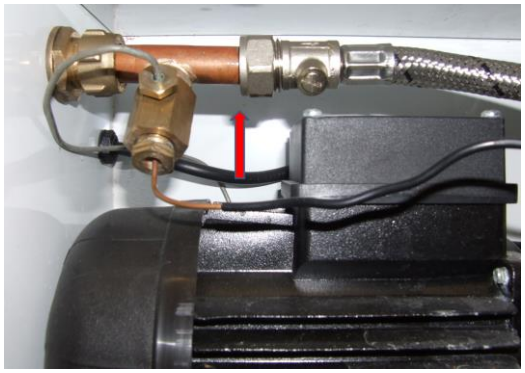
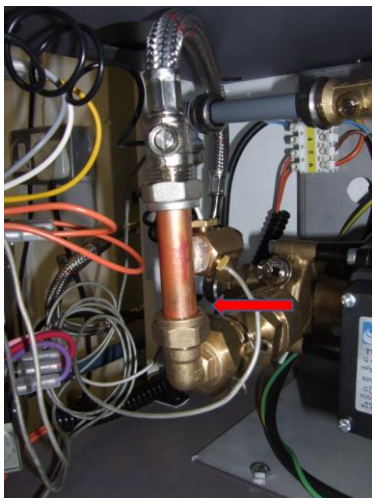
The non return valve should be accessed and cleaned. The non return valve is located at the outlet of the pump.

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.

Standard Unit



Plus Unit



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 on the Plus Unit.

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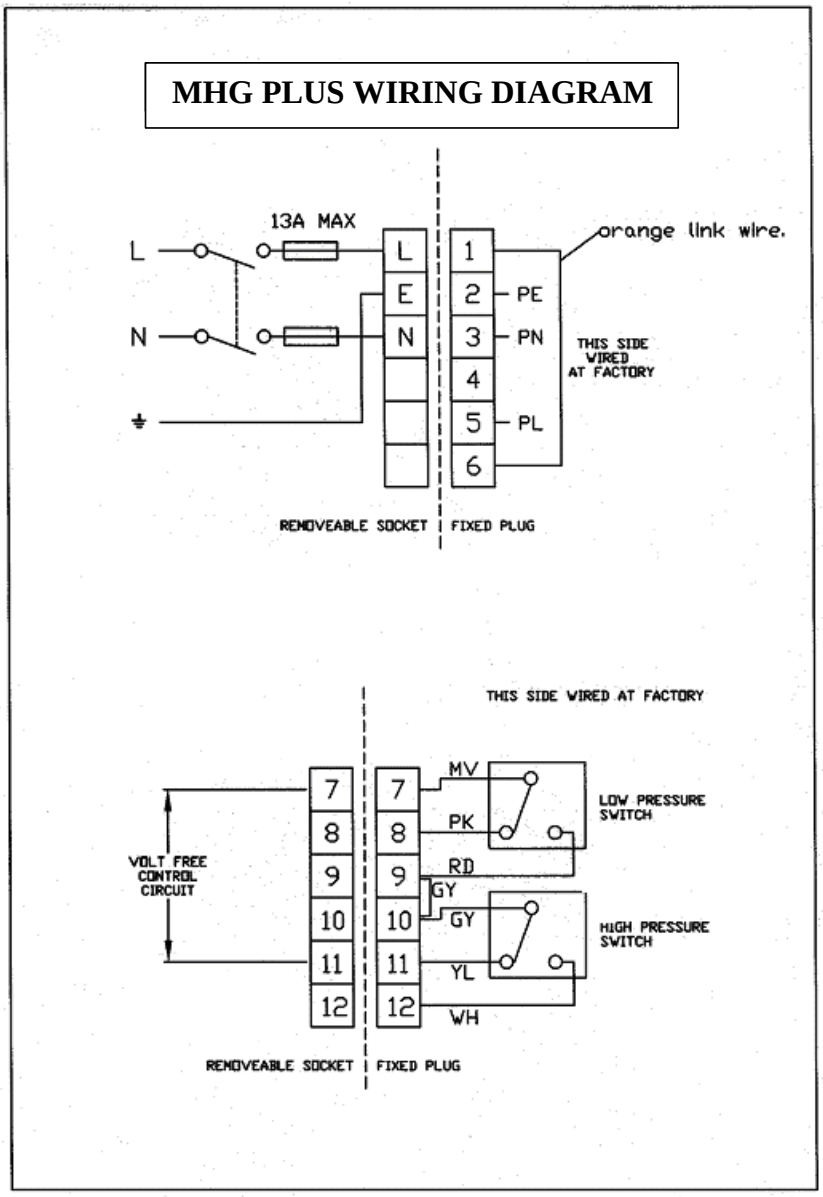
10.0 Electrical Diagram Plus



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Notes

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