

# PISCES MINIFILL

## Mechanical Model



**COMPACT, WALL MOUNTED, PRESSURISATION MANAGER**

**INSTRUCTIONS FOR INSTALLATION, SERVICING &  
MAINTENANCE OF THE PISCES MINIFILL MODEL**

**M1/1 (Mechanical Single Pump) Unit,**

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## 1.0 General Notes

These instructions are intended to assist the installer, commissioning engineer, maintenance engineer and the end user with the usage of the Pisces Minifill (M1/1 Mechanical) pressurisation manager.

Please read this manual fully before commencing the installation of the unit. The Pisces Minifill pressurisation manager should only be installed by persons deemed to be competent. This manual shall be handed to the unit user following completion of the installation. The unit shall not be left to operate without being correctly commissioned.

## Installation Requirements

The installation of Pisces Minifill pressurisation manager shall be in accordance with the relevant requirements of all current Water Regulations, such as;

Water Supply (Water Fittings) Regulations 1999 (Amended Dec 2000),  
Water Byelaws 2000-Scotland,  
Local Water Authority Byelaws,  
IEE Electrical Regulations,  
Health & Safety at Work Act,  
Building Regulations,  
Construction (Design & Management) Regulations 1994,  
National, Fire Regulations, and  
Insurance Company requirements.

The following British Standards / Codes of Practice are also applicable:-

- BS 6644: 1991 Specification for gas fired hot water pressurisation units of rated inputs between 60kW and 2MW.
- BS 6880: 1988 Code of Practice for low temperature hot water heating systems of output greater than 45kW. Parts 1, 2 & 3.
- BS 7593: 1992 Code of Practice for treatment of water in domestic hot water central heating systems.
- BS 7671: 1992 Requirements for electrical installations. IEE Wiring Regulations. Sixteenth edition.

## **2.0 Product Description**

The Pisces Minifill compact cabinet housed pressurisation manager is suitable for maintaining the cold fill pressure in sealed heating, cooling, or chilled water systems.

The unit may be wall or floor mounted, and has been designed to meet the needs of the commercial/large domestic installations, where plant room space may be restricted.

### **Wall/Floor mounted with compact dimensions**

At 600mm High, 382mm Wide, and 280mm Deep, the Pisces Minifill pressurisation managers allows for site installation where space is of a premium, without compromising serviceability.

### **Versatility Of Use**

With the use of a powerful turbine peripheral pump the Pisces Minifill pressurisation managers can be configured to achieve and maintain a system Cold Fill Pressure from as low as 0.8bar up to 3.0bar.

The unit detailed in this manual utilizes a Type AF Air Gap, and is therefore compatible for use with both *Fluid Category 3 (C-3) In-House*, and *Fluid Category 4 (C-4) Other Than In-House* systems.

### **Building Management System (BMS) Compatible**

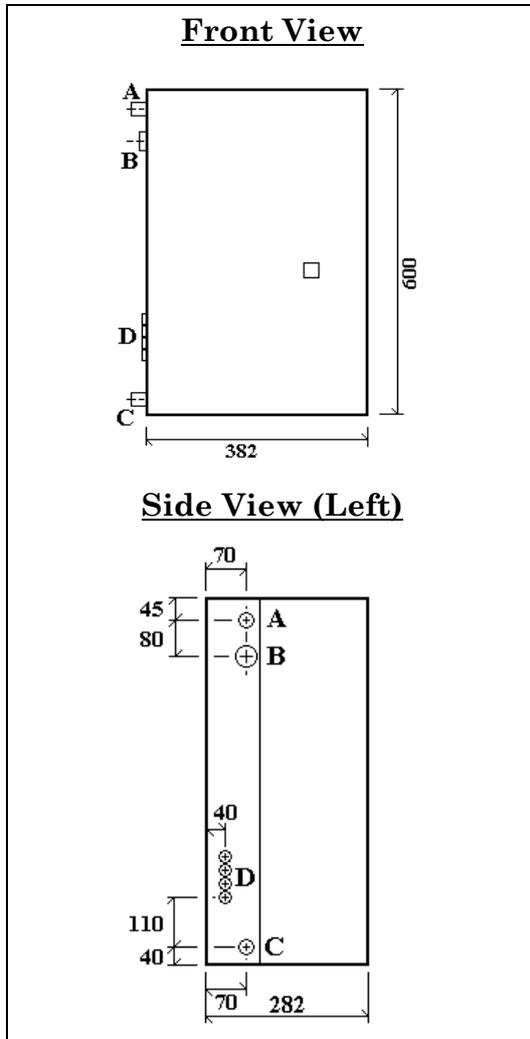
The Pisces Minifill pressurisation manager is supplied as standard with Volt Free Pressure Switches to provide remote indication of both High and Low Pressure faults. These switches are rated to accept up to 240Volts AC, with a maximum current of 0.5Amps.

### **Guarantee**

The warranties available on the Pisces Minifill pressurisation manager is as follows;

- |   |  |
|---|--|
| <b>Supply Only</b>                                  | - <b>Parts Only Warranty</b> , against manufacturing or material defects for a period of 12 months from the date for delivery.             |
| <b>Supply and Commissioned (By an MHS Engineer)</b> | - <b>Parts and Labour Warranty</b> , against manufacturing or material defects for a period of up to 15 months from the date for delivery. |

### 3.0 Technical Data & Dimensions



<b>Technical Data</b>		
Cold Fill Pressure	Min	0.8bar
	Max	3.0bar
Minimum Mains Cold Water Supply		12 ltrs/min
Power Supply (240V, 50Hz)		10 Amps
Motor Rated Fuse Required		
Start Current		2.5 Amps
Full Load Current		14.8 Amp
Break Tank Air Gap		AF
Break Tank Capacity (Max)		7.6 Ltrs
Weight (Empty)	M1/1	22.0 kg
(Filled)	M1/1	30.0 kg

<b>Connections</b>	
Mains Cold Water Inlet (A)	15mm
Waste water Outlet/Overflow (B)	28mm
Water Outlet (C)	15mm
Electrical Cable Glands (D)	3 x 10mm

### 4.0 Delivery Consignment / Unpacking

The Pisces Minifill pressurisation manager is delivered as a single carton containing the Pisces Minifill and associated fittings.

The Pisces Minifill unit carton contains:-

- Assembled and Tested Pisces Minifill unit.
- Wall mounting bracket.
- Installation Template (part of the carton).

To unpack the Pisces Minifill pressurisation manager, carefully cut along the taped seams of the carton. The carton will then un-fold to reveal the unit. Do not discard of the packaging as this can be used as a template to assist with the installation on the unit

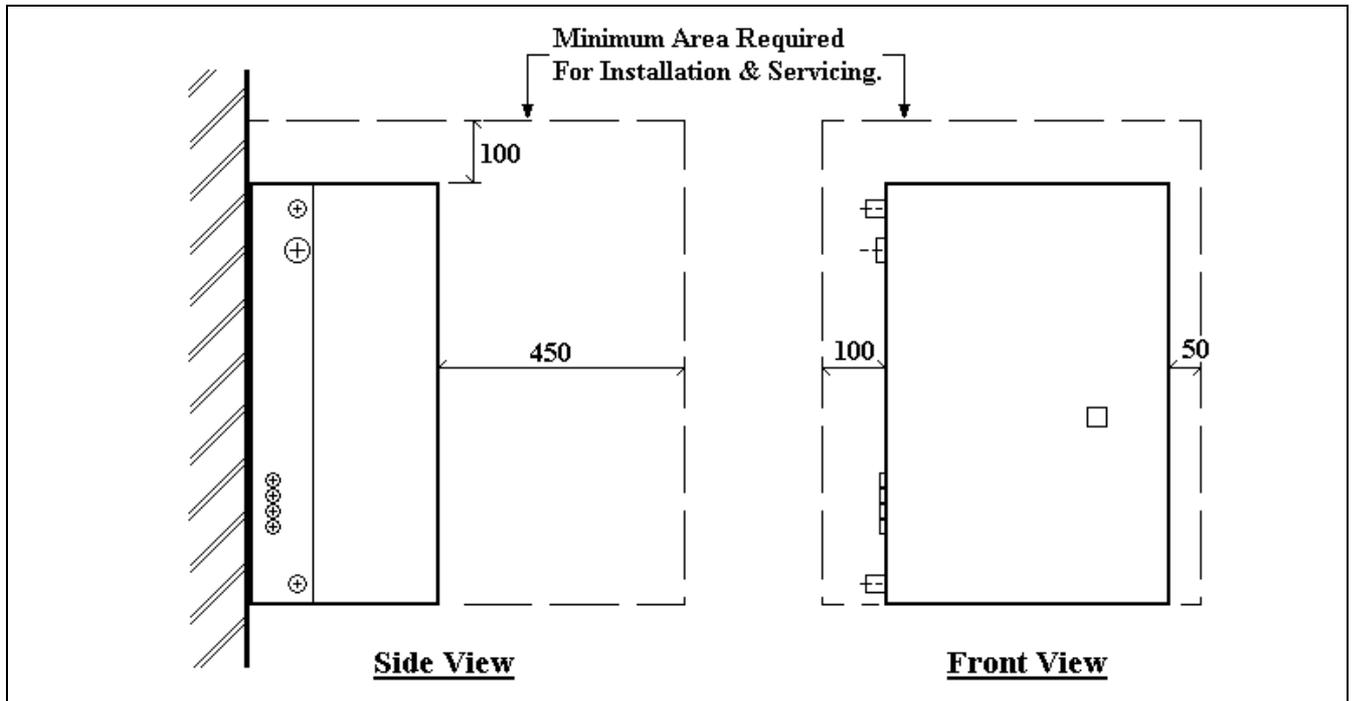
### 5.0 Locating the Pisces Minifill

The Pisces Minifill pressurisation manager is not suitable for installation external to a building. The position chosen for the appliance shall be a structurally sound wall capable of supporting the filled weight of the appliance and all associated ancillary equipment. The wall shall be truly plumb vertical to ensure correct operation.

## 6.0 Installation Clearances

For ease of installation, commissioning, servicing and maintenance the following clearances should be observed.

**NOTE: These distances are MINIMUM and MUST NOT be reduced. Failure to observe these clearances could result in the warranties on the appliance becoming VOID.**



## 7.0 Wall Mounting

The Pisces Minifill pressurisation manager can be floor mounted, however it is recommended to be wall mounted, via the wall-mounting bracket supplied. This bracket interlocks into the cutout on the rear of the appliance.

A template, detailing the fixing positions and clearances, is printed onto the appliance packaging, cut along the dotted lines and position the template in the desired location to ensure that all minimum clearances can be achieved.

The wall-mounting bracket should be securely fixed to the wall using suitable fixings for the wall construction and appliance filled weight. The wall-mounting bracket positioning detail is shown in fig 7.

The Pisces Minifill pressurisation manager should be carefully lifted so that the cutout on the rear of the Pisces Minifill unit is just above the mounting bracket, and then gently lowered to engage the bracket into the cutout. **DO NOT** lift the Pisces Minifill unit by any of the internal parts or components.

### Important Notice

When viewed from the side, the North / South axis of the Pisces Minifill unit must be vertical

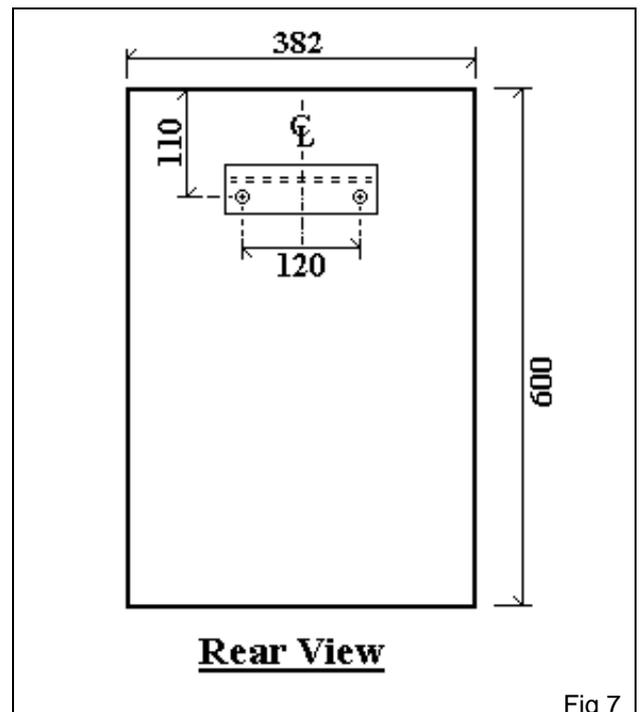


Fig 7

## 8.0 Water Connections

The Mains Cold Water Supply connection (A) shall be able to supply at least 12 litres per minute of clean water; otherwise the operation of the appliance may empty the break tank of water.

If the appliance is allowed to operated without sufficient water, air will be drawn into the pump assembly, which could result in an Air Lock, and ultimately damage to the pump assembly, which would not be covered by the manufacturing warranty. See Fig 8.1

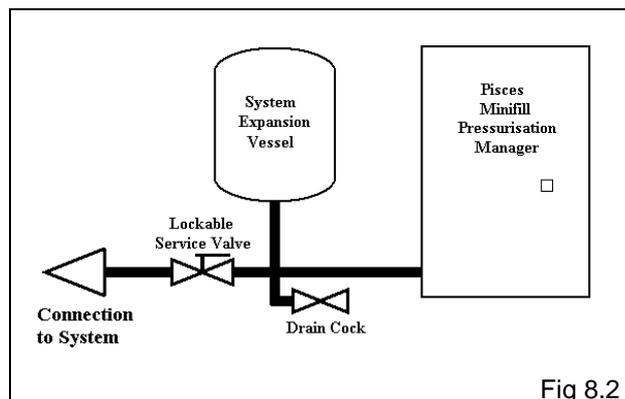
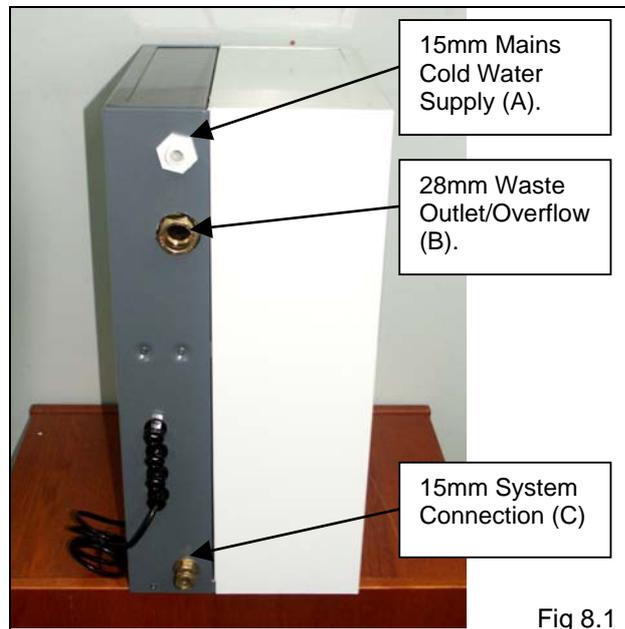
The Waste Water Outlet/Overflow (B) shall be routed to a safe discharge location that will not cause harm to persons, nor property, but shall be clearly visible, so that any water discharge will be identified and remedial action taken, ensuring that any wasted water is kept to a minimum. See Fig 8.1

The Waste Water Outlet/Overflow shall not be connected directly to any foul water system without a suitable warning method being incorporated, as above.

After the warning method, and before connection to the foul water system a suitable trap shall be incorporated to prevent the release of any vapour/effluent from the foul water system.

**The Waste Water Outlet/Overflow shall be routed in such a way to minimize the risk of blockage through freezing. If any part of the Waste Water Outlet/Overflow is to be run external to the building or is at risk of freezing, then the pipe shall be suitably insulated to protect against freezing.**

The System Connection (C) shall be connected to the system pipework in such a manner so that the suction/discharge pressure of any circulation pumps shall not influence the appliance. It is recommended that the System Connection be routed in such a manner to include/incorporate the supply connection to any system expansion vessels. See Fig 8.2



## 9.0 Electrical Connection

The Pisces Minifill pressurisation manager is supplied with a fly lead for the Mains Power Connection; this cable should not be replaced.

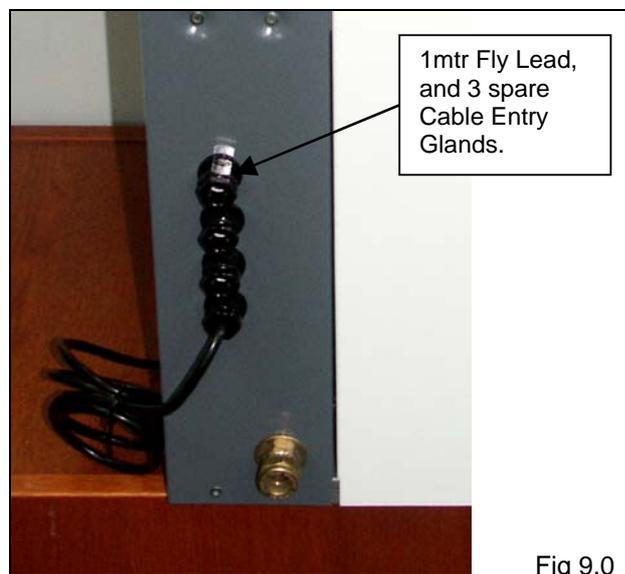
The appliance power supply, fused spur or fused plug socket, shall be positioned within 1 metre of the unit, See Fig 9.0.

The cable size serving the unit shall be sized in accordance with the IEE Electrical Regulation.

After the outer casing has been removed, the Electrical Connection rail can be located on the front-hinged inner door.

See Fig 9.1 & 9.2, on Page 7, for connections Details.

**Please Note the Appliance Serial Number when referring to these Connection Details.**



**9.1 Wiring Details - Serial No MM1-\*\*\*\*-0001 to 0082**

The Wiring Diagram in Fig 9.1 is applicable to Units with Serial Numbers **MM1-\*\*\*\*-0001 to 0082** only.

Please check the appliance Serial Number before making any electrical connections.

The High and Low Pressure Alarm switches on this model have been wired to allow for 240V Power Interruption of the associated Boiler / Chiller plant.

If Power Interruption of the associated Boiler / Chiller plant is required, the 240v 50Hz power supply for the associated Boiler / Chiller plant should be routed as follows;

**Interlock Circuit In - Term 2**  
**Interlock Circuit Out - Term 6**

In this manner if one of the Alarm Switches are activated, the power supply to the associated Boiler / Chiller plant will be interrupted.

If independent Volt Free indication of High / Low water pressure fault is required, the GREY link wire between Terminals 3 & 5 **MUST** be removed.

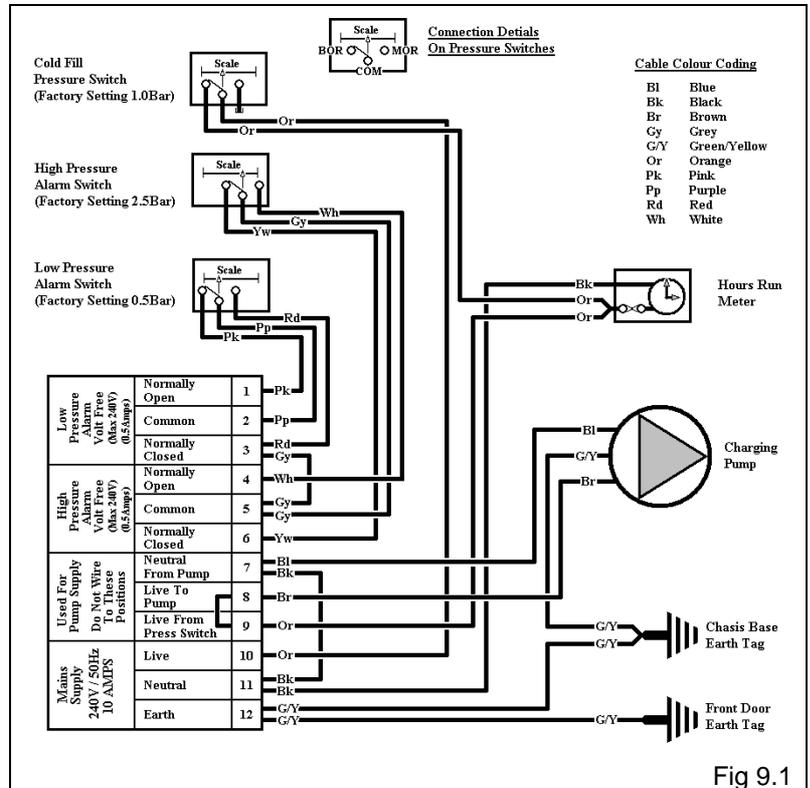


Fig 9.1

**9.2 Wiring Details - Serial No MM1-\*\*\*\*-0083 Onwards**

The Wiring Diagram in Fig 9.2 is applicable to Units with Serial Numbers **MM1-\*\*\*\*-0083 onwards**.

Please check the appliance Serial Number before making any electrical connections.

The High and Low Pressure Alarm switches on this model have been wired to allow Volt Free indication of Faults.

If Power Interruption of the associated Boiler / Chiller plant is required, the 240v 50Hz power supply for the associated Boiler / Chiller plant should be routed as follows;

**Interlock Circuit In - Term 2**  
**Link Wire Required - Terms 1 & 5**  
**Interlock Circuit Out - Term 6**

In this manner if one of the Alarm Switches are activated, the power supply to the associated Boiler / Chiller plant will be interrupted.

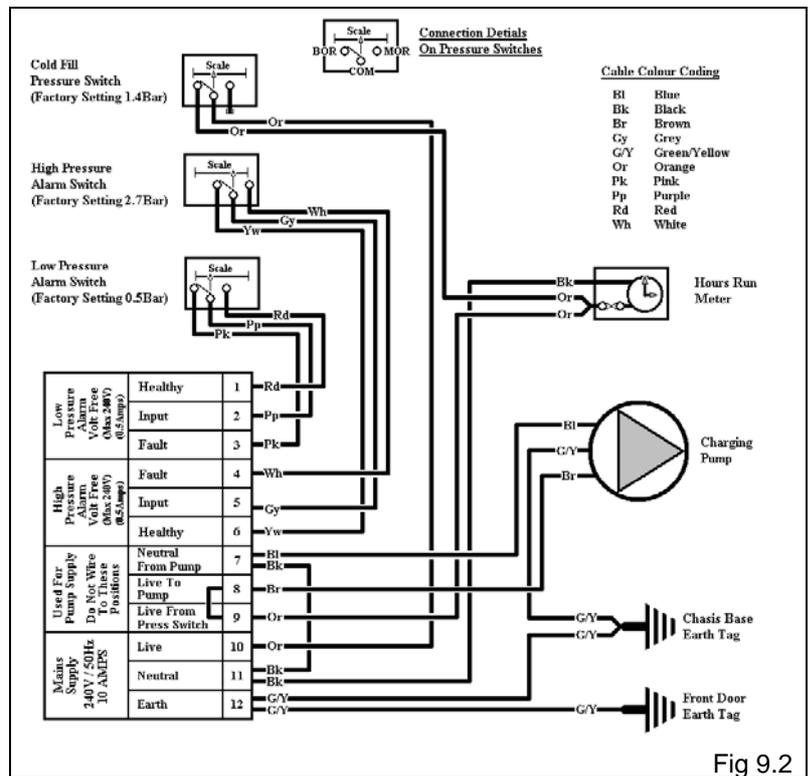


Fig 9.2

## 10.0 Determining the Cold Fill Pressure

The Cold Fill Pressure is critical to the correct operation of any Pressurisation Unit and associated system. This pressure needs to be calculated from the Static Pressure of the system (measured height in metres from the base of Pressurisation Unit to the top of the highest part of the heating system, divided by 10 to convert to bar pressure), and an allowance for venting and vapour pressure.

Therefore the Cold Fill Pressure, for a system with a maximum operating temperature up to 90°C, can be calculated as per the example below:

Static Pressure	0.8 bar	(Height of 8.0metres, divided by 10)
Venting Allowance	0.3 bar	(Allowance from Table below)
Vapour Pressure	0.0 bar	(Allowance from Table Below)
<b>Cold Fill Pressure</b>	<b>1.1 bar</b>	(Summation of Static, Venting & Vapour Pressure)

## Venting and Vapour Pressure Allowances

<b>Venting Allowance</b>	0.3	Allowance to ensure system can be correctly vented.
<b>Vapour Pressure Allowance</b>	0.0	Max Operating Temp up to 90°C
	0.2	Max Operating Temp 90°C to 95°C
	0.5	Max Operating Temp 95°C to 100°C
	0.8	Max Operating Temp 100°C to 105°C
	1.2	Max Operating Temp 105°C to 110°C
	1.6	Max Operating Temp 110°C to 115°C
	2.0	Max Operating Temp 115°C to 120°C

## 11.0 Filling the System

The Pisces Minifill Mechanical M1/1 pressurisation manager cannot be used to fill the system; however, the Pisces Minifill Electronic E1/1 and E1/2 pressurisation managers can be used to fill the system, as these appliances incorporate an Anti-Water Wastage program.

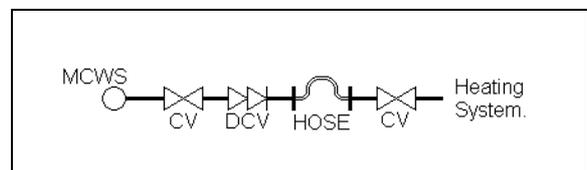
*For more information on the Pisces Minifill Electronic please contact MHS Boilers Sales Department.*

Before the Pisces Minifill Mechanical M1/1 pressurisation manager can be commissioned, the entire Heating / Cooling / Chilled Water system shall be filled, vented and completely flooded by a method approved by the Water Regulation Advisory Scheme (WRAS) for the type of heating system installed.

i.e.	Domestic ( <i>In-House</i> )	Fluid Category 3 (C-3)
	Non Domestic (Other than <i>In-House</i> )	Fluid Category 4 (C-4)

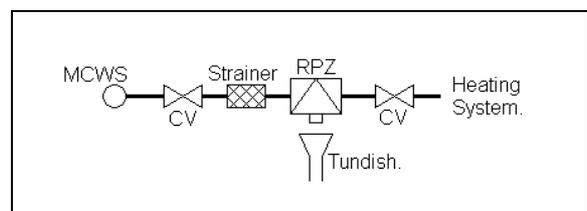
For Category 3 systems, the approved method of filling must comprise of the following components in the arrangement shown;

- Control Valve incorporating a Double Check Valve on the Mains Cold Water pipework.
- Temporary Connecting Hose, which must be disconnected after use.
- Control Valve, on the heating system.



For Category 4 systems, the approved method of filling must comprise of the following components in the arrangement shown;

- Control Valve.
- Strainer.
- Verifiable Backflow Device with Reduced Pressure Zone (RPZ Valve)
- Incorporating a 'Type BA' Air Gap.
- Tundish.
- Control Valve.



## 11.1 Introduction of Water Treatment

The Mains Cold Water Supply pipework MUST be thoroughly cleaned and flushed to remove debris, flux residues, etc. before opening the isolation valve and flooding the Pisces Minifill pressurisation manager.

After the Heating / Chilled Water system has been filled, flushed, and cleaned in accordance with BS 7593:1992, the system will need to be treated with a suitable Water Treatment for the prevention of corrosion, scale formation and micro-biological growth.

Some Water Treatments are supplied in a concentrated liquid form; following the successful commissioning of the appliance as detailed below in Section 12, and in the absence of a suitable dosing pot, the Water Treatment Chemicals may be added to the water in the Break Tank *in small doses*.

Drain an amount of water from the system (at a position some distance from the Pisces Minifill pressurisation manager), so that the system pressure drops and the Treated Water in the Break Tank is introduced into the system.

As the Break Tank is replenished with fresh water, gradually add the water treatment chemical (at the correct concentration) until the appliance turns off.

Repeat this process until the entire water treatment chemical has been fully introduced. Let the system circulate for a minimum of 1 hour, and then undertake a water analysis to ensure the correct dosage level has been obtained. See Section 12.00 Commissioning.

For specific guidance on water treatment, direct contact is advisable with:-

Betz Dearborn Limited  
(Sentinel)  
Foundry Lane  
Widnes  
Cheshire  
WA8 8UD

Tel: 0151 424 5351  
Fax: 0151 420 5447

Alpha-Fry Technologies  
(Fernox)  
Cookson Electronics  
Forsyth Road  
Sheerwater  
Woking  
Surrey  
GU21 5RZ  
Tel: 0208 665 6666  
Fax: 0208 665 4695

## 12.0 Commissioning

The commissioning of a Pressurisation Manager shall only be undertaken by a competent person, as various safety items associated with the safe operation of the heating / cooling / chilled water system need to be checked and confirmed. We would therefore recommend that a Qualified CORGI registered engineer undertake these works.

The following Items 11.1 Filling the System, and 11.2 Set Up, needs to be completed.

### 12.1 First Fill and Setting To Work

Before attempting the Set Up procedure, please ensure that the following checks have been completed;

- 1) Check the Heating / Chilled Water system expansion vessel air charge. This vessel charge should be equal to the calculated Cold Fill Pressure (+/- 0.2 bar) when the vessel is empty of water. See Section 10.0.
- 2) The Quarter Turn Isolation Valve on the underside of the Break Tank is in the CLOSED position.
- 3) The Quarter Turn Isolation Valve on the Water Outlet (on the end of the flexible pipe) is in the CLOSED position.
- 4) The Mains Water Supply has been connected, vented, and the appliance Break Tank has been filled with clean water. Any foreign bodies/debris are to be removed before the appliance is set to work.
- 5) The Electrical Supply has been connected and tested for correct polarity.  
**Power should not be applied to the appliance at this stage.**
- 6) The Heating / Chilled Water system has been fully flooded and vented as detailed in Section 11.1 above.

On completion of the above checks the unit is ready to be Set Up to the system requirements, and the following procedure shall be followed.

To Prevent duplication of setting activities, it is advisable to undertake the testing/setting of the High and Low Pressure Alarm Switches prior to setting the Cold Fill Pressure. To Prevent potential over pressurizing or loss of water treatment, the following test shall be undertaken with the outlet valve of the appliance CLOSED.

## 12.1 First Fill and Setting To Work (cont'd)

- 1) Open the Quarter Turn Isolation Valve on the underside of the Break Tank.
- 2) Vent The Pump. Located on the top of the center pipe connection of the pump assembly, is a silver hex headed vent plug. Undo this plug with a 6mm Allen Key and release any air. When all the air has been released, securely close the vent plug.
- 3) To Check/Set the operation of the **LOW WATER PRESSURE ALARM** Switch. Turn the COLD FILL PRESSURE adjuster to the Minimum position (fully clockwise). Turn ON the Electrical Power Supply to the appliance, the PUMP will operate for a short period of time. Whilst monitoring the appliance Pressure Gauge, slowly turn the COLD FILL PRESSURE adjuster, clockwise, and the PUMP will operate to increase the pressure. Continue this procedure until the appliance pressure gauge is recording the desired water pressure required for **LOW WATER PRESSURE ALARM** activation. Safely remove any Electrical Wires that has been connected to Terminals 1, 2 & 3, and make safe. Connect a Multi-meter across Terminals 1 & 2, and check for a Closed Circuit. Using the LOW WATER PRESSURE ALARM adjuster, turn the adjustment knob ANTI-CLOCKWISE to increase, and CLOCKWISE to de-crease, until the Circuit Closes at the pressure displayed on the appliance pressure gauge. *Record the Pressure Setting on the Commissioning Form on Page 12.* Re-connect any Electrical Wires previously removed from Terminals 1, 2 & 3. **Factory Setting Cut-Out 0.5 Bar, Cut-In 0.9bar (+/- 0.1 bar).**
- 4) To Check/Set the operation of the **HIGH WATER PRESSURE ALARM** Switch. Gradually turn the COLD FILL PRESSURE adjuster slowly towards the Maximum position (anti-clockwise). The PUMP will operate for a short period of time with every adjustment. Whilst monitoring the appliance Pressure Gauge, continue to slowly turn the COLD FILL PRESSURE adjuster (anti-clockwise) until the appliance pressure gauge is recording the desired water pressure required for **HIGH WATER PRESSURE ALARM** activation. Safely remove any Electrical Wires that has been connected to Terminals 4, 5, & 6, and make safe. Connect a Multi-meter across Terminals 5 & 6, and check for a Closed Circuit. Using the HIGH WATER PRESSURE ALARM adjuster, turn the adjustment knob ANTI-CLOCKWISE to increase, and CLOCKWISE to de-crease, until the Circuit Closes at the pressure displayed on the appliance pressure gauge. *Record the Pressure Setting on the Commissioning Form on Page 12.* Re-connect any Electrical Wires previously removed from Terminals 4, 5 & 6. **Factory Setting Cut-Out 2.7 Bar, Cut-In 2.3bar (+/- 0.1 bar).**
- 5) To Set the **COLD FILL PRESSURE**, firstly turn OFF the Electrical Power Supply to the Appliance and connect a small tube to the Drain Valve. Slowly loosen the bleed screw to drain water from the Drain Valve. Continue to drain the appliance until the pressure gauge indicates the desired COLD FILL PRESSURE. Turn the COLD FILL PRESSURE adjuster to the minimum position (clockwise). Turn ON the Electrical Power Supply to the appliance, the PUMP should not be running at this point. Gradually turn the COLD FILL PRESSURE adjuster until the PUMP turns ON. The PUMP should continue to operate until a pressure increase of 0.4 bar has been detected and the PUMP should then turn OFF. *Record the Pressure Setting on the Commissioning Form on Page 12.* **Factory Setting Cut-In 1.4bar, Cut-Out 1.0 Bar (+/- 0.1 bar).**
- 6) Open the Quarter Turn Isolation Valve on the Water Outlet (on the end of the Flexible Hose). The Pressure Gauge will now be recording the Current System Pressure (+/- 0.1 bar). **Care should be taken to ensure the appliance is not exposed to a backpressure in excess of 3.0 bar from the Heating / Chilled Water System.**
- 7) Open a drain facility on the system (as close to the Pressurisation Management Unit as possible) so that a gradual pressure loss is achieved. Monitor the Pressure Gauge on the Appliance and check that the Pump Cuts-In/Cuts-Out to replenish the system water at the required pressure, as set/recorded in Item 5 above. Repeat Item 5 if the pressure maintained is incorrect.
- 8) Close the drain facility on the system, and check that the Pump Cuts-Out as required.

## 13.0 Fault Diagnosis

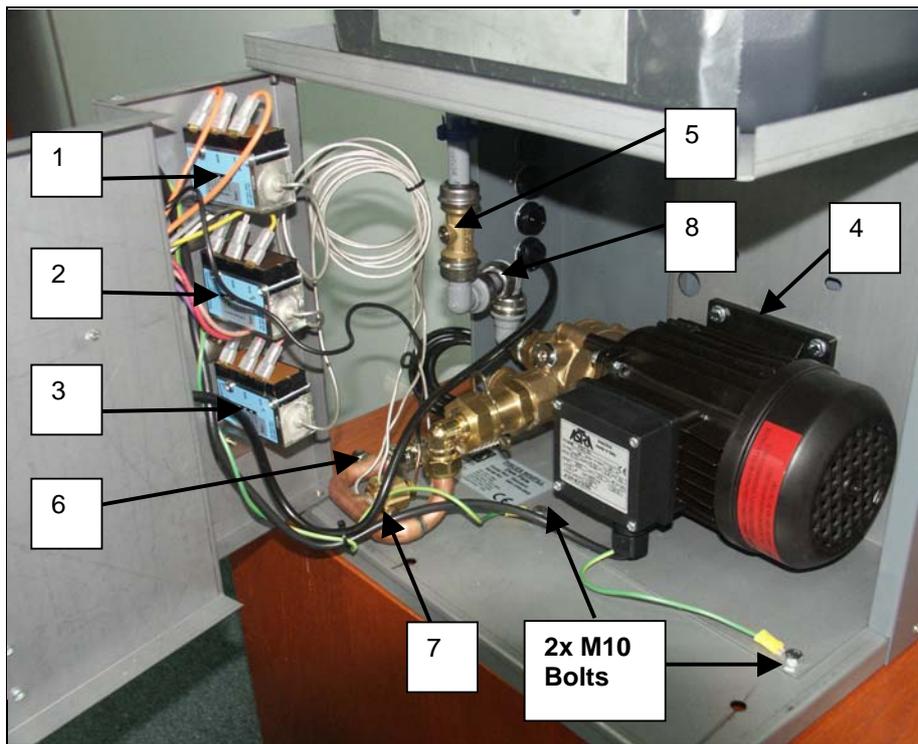
Should a problem occur with the operation of the appliance, the following procedures should be referenced. Further technical assistance is available from our MHS Boilers Technical Services Department, on 01268 591010, during normal office hours.

Symptom	Remedial Action
Pump Running, pressure not rising, but NO new water input into Break Tank	<ul style="list-style-type: none"> <li>• Mains Cold Water Supply turned OFF.</li> <li>• Quarter Turn Isolation Valve on the underside of the Break Tank closed / blocked.</li> <li>• Quarter Turn Isolation Valve on the Water Outlet closed / blocked.</li> <li>• Break Tank empty of water.</li> <li>• Pump Assembly Air Locked.</li> <li>• Non Return Valve on outlet of Pump Assembly blocked.</li> <li>• Pump Impeller Failure, replace Pump Assembly.</li> </ul>

### 13.0 Fault Diagnosis (cont'd)

Symptom	Remedial Action
Pump Running, pressure not rising, but water input into Break Tank	<ul style="list-style-type: none"> <li>Turn OFF Quarter Turn Isolation Valve on the Water Outlet, If pressure rises and pumps turns OFF, System has a leak equal or greater than the appliance can replenish. Check System.</li> </ul>
Pressure Low and Pump will not run.	<ul style="list-style-type: none"> <li>Check Mains Power Supply.</li> <li>Check Power Supply to Pump Unit (Term 8) If power - PUMP faulty, inspect / replace as needed. If NO power - check operation of COLD FILL pressure switch and adjust / replace as needed.</li> </ul>
Pressure High and Pump wont turn OFF.	<ul style="list-style-type: none"> <li>Check COLD FILL PRESSURE switch for correct operation, and adjust / replace as needed.</li> </ul>
High Pressure Alarm, pump not running.	<ul style="list-style-type: none"> <li>Check system expansion vessel for correct air charge.</li> <li>Check COLD FILL PRESSURE switch for correct operation, and adjust / replace as needed.</li> <li>Check Setting of HIGH PRESSURE ALARM switch and adjust as needed.</li> </ul>

### 14.0 Internal Components & Short Parts List



Item No	Description	Part No
1	Cold Fill Pressure Switch	PM840002
2	High Pressure Alarm Switch	PM840002
3	Low Pressure Alarm Switch	PM840002
4	Pump Assembly (Complete)	PM010044
5	Pump Inlet Isolation Valve	CP920011
6	Outlet Drain Valve	PF920005
7	Multi-way Pressure Connector	PM070004
8	Plastic Pipework Assembly Including Isolation Valve	PM010034
	Outlet Isolation Valve Complete with Flexible Pipe. (Not Shown)	PF940005
	Ball Float Valve (Not Shown)	CP000001
	Hour Run Meter (Not Shown)	EL930001

**Please Note:**

The Pump Assembly (Item 4) is mounted onto a removable pump tray. To remove, disconnect all water joints, remove the two M10 bolts (A), slightly lift the front of the pump tray and slide the tray forward, this will disengage the three location posts at the top of the tray. The tray and pump assembly can then be removed from the appliance.

### 15.0 Commissioning Form

The commissioning engineer should complete this section on the day of Setting Up the appliance; so that a record is kept of the settings made for future reference.

<b>ENGINEER:</b>	<b>COMPANY:</b>
------------------	-----------------

<b>DATE:</b>	<b>SERIAL NO:</b>
--------------	-------------------

<b>RESULTS</b>	<b>SETTING</b>
System Static Height metres	
Cold Fill Pressure bar	
System Vessel Size litres	
System Vessel Air Charge bar	
Maximum System Operating Temperature °C	
System Safety Valve Setting bar	
Final Working Pressure of System (Hot) bar	
High Pressure Alarm Switch Setting bar	
Low Pressure Alarm Switch Setting bar	
High Pressure Fault Test Yes/No	
Low Pressure Fault Test Yes /No	
Hour Run Meter Reading Hours	

<b>Comments:</b>
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