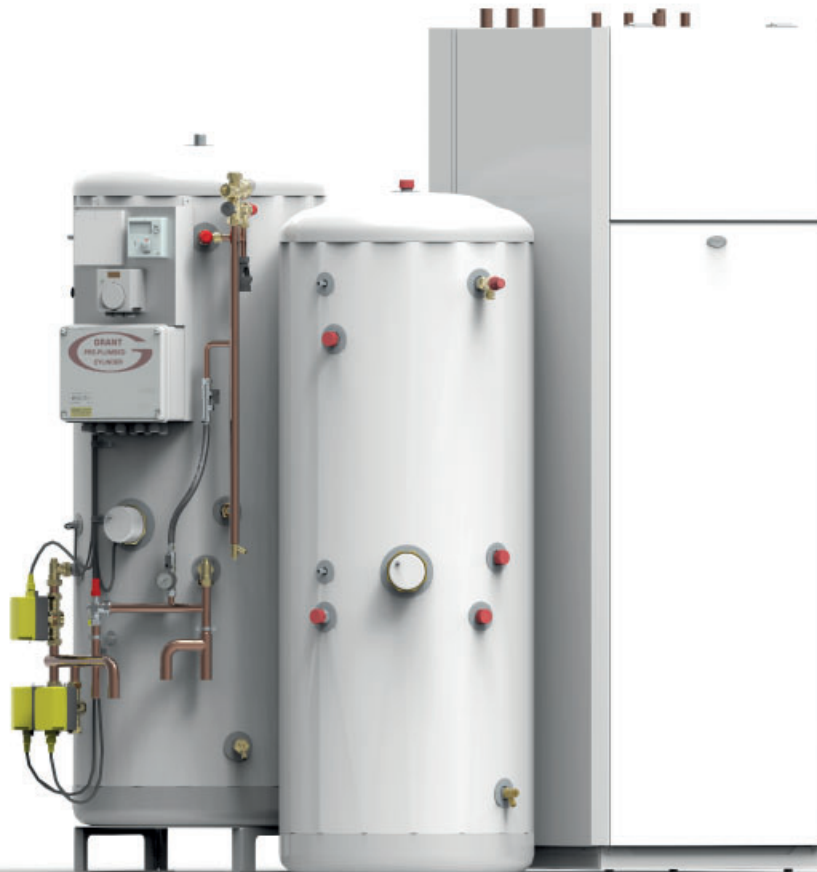


# Grant Cylinders

## Standard and Pre-plumbed Cylinders

### Installation and Servicing Instructions





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This manual is accurate at the date of printing but will be superseded and should be disregarded if specifications and/or appearances are changed in the interests of continued product improvement.

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## IMPORTANT NOTE FOR INSTALLERS

These instructions are intended to guide Installers on the installation, commissioning and servicing of the Grant Wave HP (high performance) Standard and Pre-Plumbed cylinder. After installing the cylinder, leave these instructions with the user.

## SPECIAL TEXT FORMATS

The following special text formats are used in these instructions for the purposes listed below:



**Warning of possible human injury as a consequence of not following the instructions in the warning.**



**Caution concerning likely damage to equipment or tools as a consequence of not following the instructions in the caution.**



**Used for emphasis or information not directly concerned with the surrounding text but of importance to the reader.**

## PRODUCT CODES COVERED

These instructions cover the following product codes.

HPMONOPP210G
HPINT210G
HPMONO210
HPMONO300
HPDUO210G
HPDUO300G
HP180SLERP
HPMONOSLIM/180G

## SERVICING

The cylinder should be serviced at least every twelve months and the details entered in the Service Log .



**Do NOT fit on well or private water supply as this will invalidate the warranty.**

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# 1 INTRODUCTION

## 1.1 INSTALLATION REQUIREMENTS

Thank you for purchasing a Grant unvented hot water storage cylinder from our Wave range.

These Installation and User instructions must be read carefully before you begin installing the cylinder.

The cylinder must be installed by a competent person in compliance with all current legislation, codes of practice and local by-laws covering the installation of an unvented hot water cylinder.

Please also make sure that the installation complies with the information contained in these Installation and User Instructions.

To prevent damage to the coil, cylinder and cylinder connections, make any soldered joints before connecting pipework to the cylinder.

## 1.2 WATER SUPPLY REQUIREMENTS

We recommend that your Grant unvented cylinder is installed with an uninterrupted water supply.

Where possible, the unit should be fed via a Ø22 mm supply pipe. It requires a supply pressure of 1.5 bar with a flow rate of at least 20 litres per minute as a minimum for it to function.

Even with this pressure and flow rate, the flow from the outlets will be disappointing if several outlets are used simultaneously. Generally speaking, the higher the supply pressure, the better the system will function.

The cylinder control equipment is factory set to limit the incoming system operating pressure to 3 bar. The maximum supply pressure into the pressure reducing valve (PRV) is 12 bar. **DO NOT FIT ON A WELL OR PRIVATE WATER SUPPLY.**

## 1.3 LOCATION

The unit is designed to be floor standing, vertically mounted, internally in a frost-free environment. When choosing a suitable location for the cylinder, consideration should be given to the routing of the discharge pipe to a convenient point and also the availability of an adequate power supply for connecting the immersion heaters.

The cylinder may stand on any flat and level surface without any special foundation requirements, provided that it is sufficiently robust to support the full weight of the cylinder.

The position of the cylinder should be such that easy access is provided for servicing the controls and replacing the immersion heater should the need arise.

Generally, pipe runs should be made as short as possible and lagged to prevent heat loss.

## 1.4 STORAGE AND HANDLING

If the cylinder is not being installed immediately, it should remain in its packaging to prevent damage. We recommend that the cylinder be transported to its installation position on a sack truck or similar whilst still within the packaging.

## 1.5 ABOUT YOUR CYLINDER

The pre-plumbed cylinders are factory fitted with the following:

Primary circuit pipework

- 1 x 2-port zone valve for hot water
- 2 x 2-port zone valves for heating (for two separate heating zones)
- 1 x Digital dual stat (cylinder thermostat and high limit thermostat)
- 1 x 22 mm bypass valve
- Fill Loop and System Pressure

Cold water inlet pipework

- 1 x Temperature and pressure relief valve
- 1 x Cold water inlet manifold
- 1 x Tundish

Electrical

- 1 x Wiring Centre (pre-wired to the zone valves and digital thermostat)
- 1 x Immersion Time Clock
- 1 x 3kW immersion heating element

Both pre-plumbed and standard versions have a single coil designed for connection to an air source heat pump, such as the Grant Aerona<sup>3</sup> range. If another make of heat pump is to be connected, please refer to the manufacturer's installation instructions for more information.

The coil must be connected using a 2-port motorised valve (factory fitted on the pre-plumbed versions) to shut off the flow from the primary source and electronically interlocked with the heat source via the cylinder control and high limit thermostat. This valve is factory fitted on the pre-plumbed versions and supplied loose with the standard cylinder versions.

Failure to fit this 2-port valve will invalidate all guarantees and will be in breach of the Building Regulations Approved Document G3 (2010) (U.K) More information on electrical wiring is given in Section 5 of these instructions.

## 1.6 OPEN VENTED HOT WATER SYSTEMS

If required, your Wave HP cylinder can be used as part of an open vented hot water system, i.e. fed from a cold water storage cistern and fitted with an open vent pipe, provided the maximum head does not exceed 30 metres.

When used in this way, it will not be necessary to install the expansion vessel and cold inlet manifold supplied with the cylinder.

## 1.7 PRIMARY CIRCUIT PIPEWORK CONNECTIONS

All primary circuit pipework connections to the cylinder **MUST** be made in accordance with Figures 3-1 to 3-6 as appropriate. Refer to Section 3 (Primary Circuit Installation).

## 1.8 CYLINDER BY-PASS

The pre-plumbed version of the cylinder is supplied with a factory fitted coil bypass, fitted between the primary flow and return pipes. This by-pass must be set during commissioning. Refer to Section 6.7 of these Installation and User Instructions.

## 1.9 SECONDARY CIRCUIT PIPEWORK CONNECTIONS

All secondary circuit primary pipework connections to the cylinder



**With pre-plumbed cylinders, do not use the pipework as a carrying handle when lifting, moving and positioning the cylinder.**



**Do not use the Temperature and Pressure relief valve (T&P relief valve) as a handle when moving and positioning the cylinder.**

MUST be made in accordance with Figures 2-3 or 2-4 as appropriate. Refer to Section 4 – Secondary Circuit Installation.

## 1.10 TAPS AND FITTINGS

All taps and fittings incorporated in the unvented hot water system should have a rated operating pressure of 7 bar or above.

## 1.11 INSULATION

All Grant Cylinders are insulated with 50mm thick CFC/HFC free, fire retardant, polyurethane foam injected between the stainless steel cylinder and the outer casing. This polyurethane foam has a Global Warming Potential (GWP) of less than 3.1 and an Ozone Depletion Potential (ODP of 0).

## 1.12 HEALTH AND SAFETY

The information supplied will help you assess the safest way to manoeuvre your cylinder into position. Please use the table to find the empty weight of your cylinder and then consider how you can safely move it into its final position.

Please leave these Installation and User Instructions with the householder after installation.



NOTE

**The temperature and pressure relief (T&P) valve must be left connected to the cylinder (as supplied).**



WARNING

**Do not fit on a well or private water supply as this will invalidate the warranty.**

## 2 TECHNICAL DATA

Name	Volume size	Empty	Full	Packed	24 hr Standing Loss	Reheat time based on EN12897 Coil 80°C. Cylinder temp 15°C to 60°C	Coil Type use	kW	Area m <sup>2</sup> /sq	1/2" inlet 15mm outlet (fitted)	spec	Heating Expansion tank	Exp. Tank charge	Potable Expansion Tank	Tundish	Dual stat	Motorised valve	Brass joiner 411 x 1" x 28mm compression
Monowave 210 ltr heatpump cylinder Pre-plumbed	210L	59	296		1.79kW for 24hrs 75W/hr	23.5	HP type	32kW @80°C	2.35m <sup>2</sup>	7 Bar, 90°C	(1 off) 3 Kw 240V 1.83/4"	n/a	n/a	18 litre c/w bracket	15-22mm*	Cylinder thermostat ZCYS1072 (1200mm)	3 off 2 way 22mm*	3 off
Grant Awake Integrated 210 Unit	210L				1.79kW for 24hrs 75W/hr	23.5	HP type	32kW @80°C	2.35m <sup>2</sup>	7 Bar, 90°C	(1 off) 3 Kw 240V 1.83/4"	18 litre*	1.0 bar	19 litre*	15-22mm*	Cylinder thermostat ZCYS1072 (1200mm)	3 off 2 way 22mm*	
Monowave 210 ltr heatpump cylinder	210L	54	264		1.79kW for 24hrs 75W/hr	23.5	HP type	32kW @80°C	2.35m <sup>2</sup>	7 Bar, 90°C	(1 off) 3 Kw 240V 1.83/4"	n/a	n/a	18 litre c/w bracket	15-22mm*	Cylinder thermostat ZCYS1058	1 off -Supplied	n/a
Monowave 300 ltr heatpump cylinder	300L	68	368		2.24kW for 24hrs 93W/hr	34.0	HP type	31.8kW @80°C	2.35m <sup>2</sup>	7 Bar, 90°C	(1 off) 3 Kw 240V 1.83/4"	n/a	n/a	18 litre c/w bracket	15-22mm*	Cylinder thermostat ZCYS1058	1 off -Supplied	n/a
GRANT DUOWAVE 210	210L	59	269		1.79kW for 24hrs 75W/hr	23.5	HP & solar	32kW @80°C	2.35m <sup>2</sup>	7 Bar, 90°C	(1 off) 3 Kw 240V 1.83/4"	n/a	n/a	19 litre c/w bracket	15-22mm*	Cylinder thermostat ZCYS1058	1 off -Supplied	n/a
GRANT DUOWAVE 300	300L	77	377		2.24kW for 24hrs 93W/hr	34.0	HP & solar	31.8kW @80°C	2.35m <sup>2</sup>	7 Bar, 90°C	(1 off) 3 Kw 240V 1.83/4"	n/a	n/a	24 litre c/w bracket	15-22mm*	Cylinder thermostat ZCYS1058	1 off -Supplied	n/a
GRANT TRIPLEWAVE 300	300L	72	372		2.32kW for 24hrs 97W/hr	52.0	Solar, Boiler and solid fuel		0.9m <sup>2</sup>	7 Bar, 90°C	(2 off) 3 Kw 240V 1.83/4"	n/a	n/a	24 litre c/w bracket	15-22mm*	Cylinder thermostat ZCYS1058	1 off -Supplied	n/a
GRANT MONOWAVE SIMULINEI 80 LT	180L	43	217		1.72kW for 24hrs 72W/hr	1bc	HP Type	30kW	1.7m <sup>2</sup>	7 Bar, 90°C	(1 off) 3 Kw 240V 1.83/4"	19	3 bar	24 litre c/w bracket	15-22mm*	1 off -Supplied by Grant to Kingspan for reference to list	1 off -Supplied	n/a

\* Insulation-Nominal cylinder thickness is 50mm with a GWP of 1.

\* Expansion tank charge = 3bar

Inlet group setting =3.0 bar

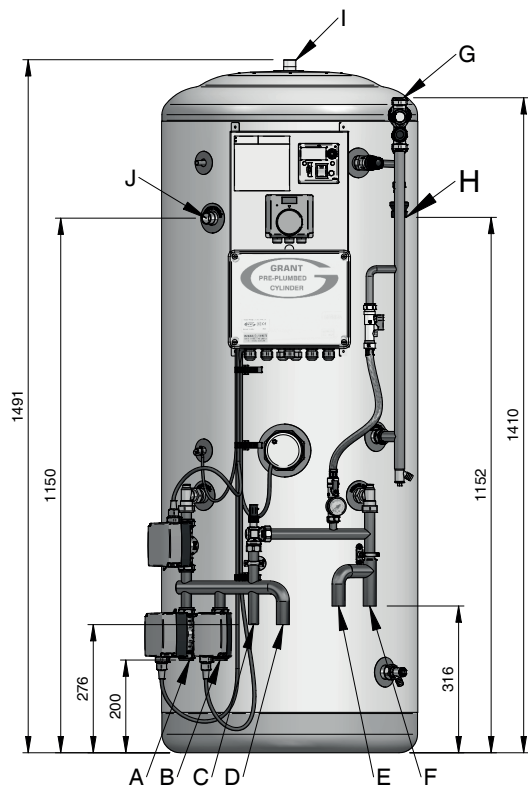
Expansion relief valve =6.0 bar

\* Working pressure = 6 bar

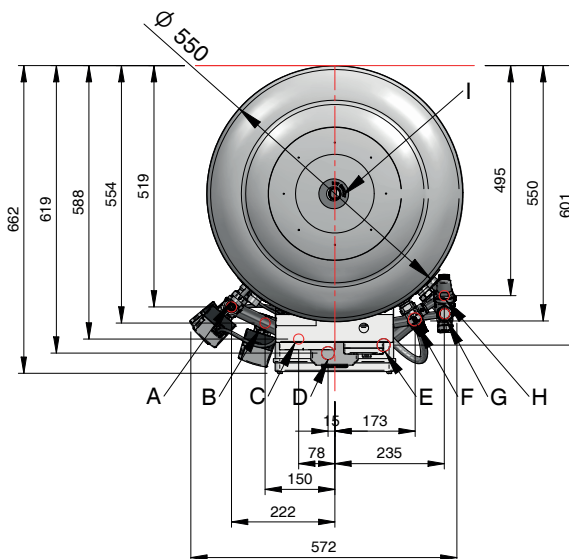
Test pressure = 15 bar



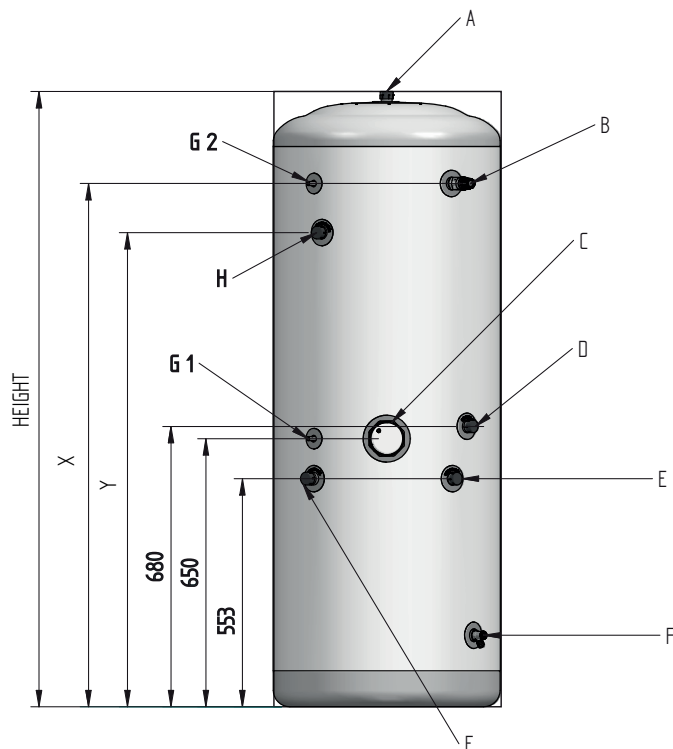
## 2.1 MONOWAVE 210 LTR HEATPUMP CYLINDER PRE-PLUMBED



Index	Connection Type
A	Heating Flow Zone 1
B	Heating Flow Zone 2
C	Heating Flow Zone 3 (Optional)
D	Flow From Appliance
E	Heating return From System
F	Return to Appliance
G	Cold Water Inlet
H	Tundish Discharge
I	Hot Water Draw off
J	Secondary Hot Water Return



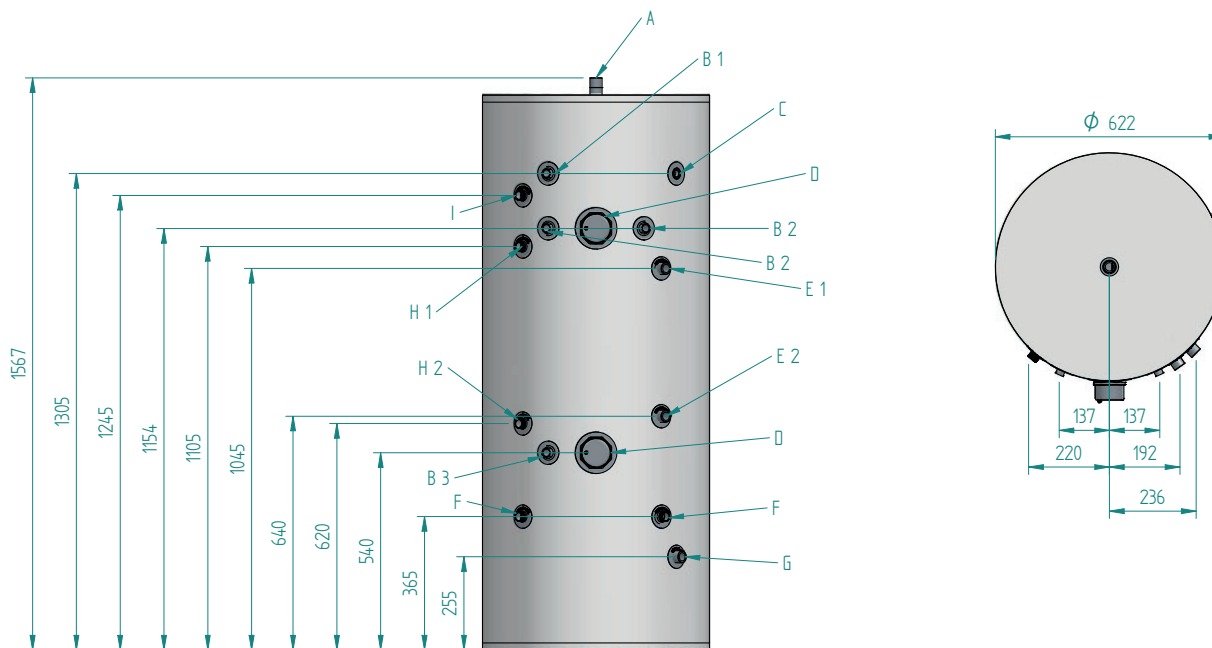
## 2.2 GRANT 210 UNIT



Index	Connection Type
A	Hot water draw
B	T&P
C	Immersion
D	Cold Inlet
E	28mm Coil In/Out (flow/return)
F	Drain Valve
G 1	10mm Stat Pocket
G 2	10mm Stat Pocket
H	Secondary Return

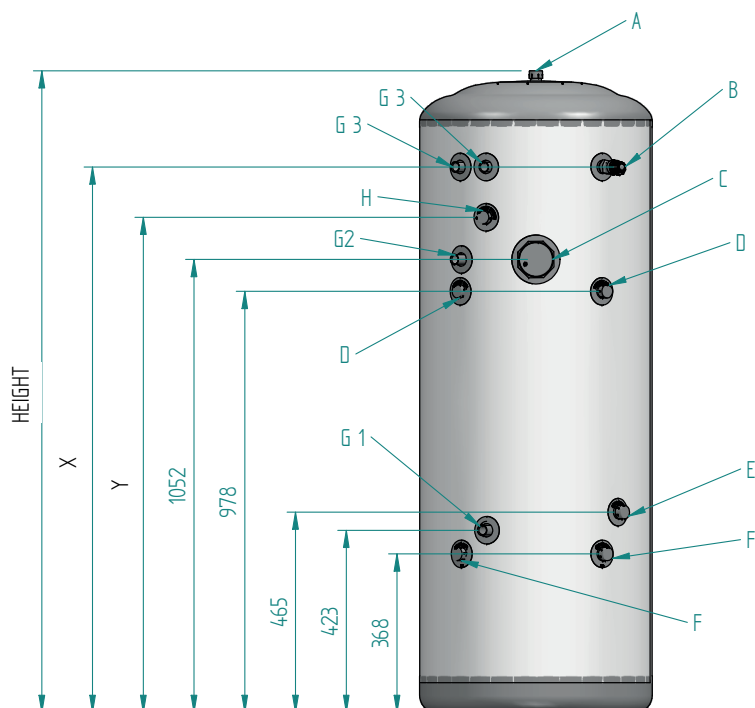
Grant Ref. Name	SIZE	HEIGHT	X	Y
HPMONO210G	210L	1491	1269	1150

## 2.3 GRANT TRIPLEWAVE 300LTR



Index	
A	Hot water draw
B 1	Dry stat pocket (high limit)
B 2	Dry stat pocket (boiler)
B 3	Dry stat pocket (solar)
C	T&P boss
D	Immersion
E 1	28mm Coil In (flow)
E 2	28mm Coil Out (return)
F	Solar Coil In/Out (flow/return)
G	Cold Inlet
H 1	22mm Coil In (flow)
H 2	22mm Coil Out (return)
I	Secondary Return

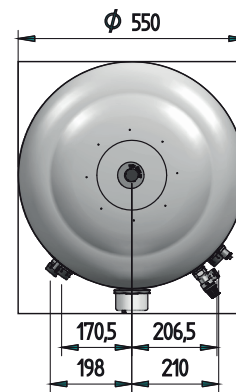
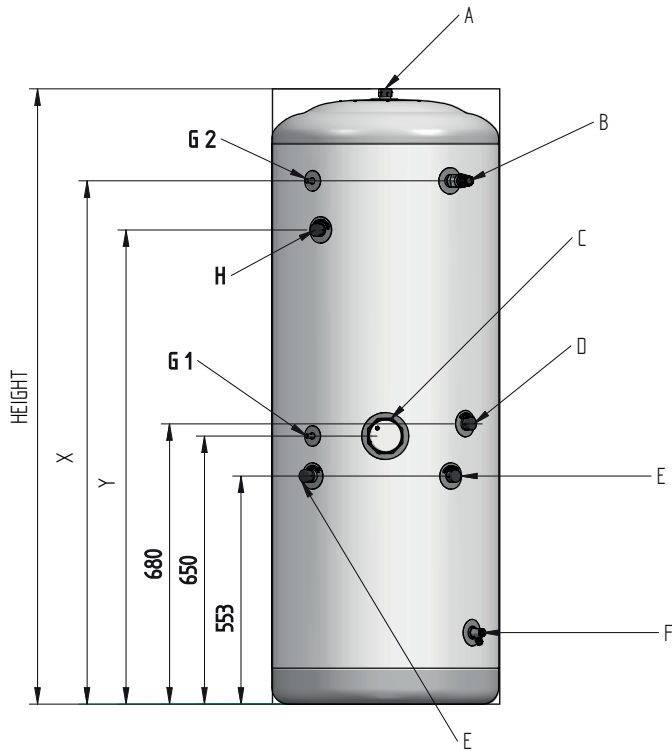
## 2.4 GRANT DUO COIL T31016 SOLAR 210L/300L



Index		Connection Type
A	Hot water draw	22mm Compression
B	T&P	15mm Compression
C	Immersion	-
D	Cold Inlet	22mm Compression
E	28mm Coil In/Out (flow/return)	22mm Compression
F	Drain Valve	-
G 1	10mm Stat Pocket	-
G 2	10mm Stat Pocket	-
H	Secondary Return	22mm Compression

Grant Ref. Name	SIZE	HEIGHT	X	Y
HPMONO210G	210L	1491	1269	1150
HPMONO300G	300L	2054	1832	1600

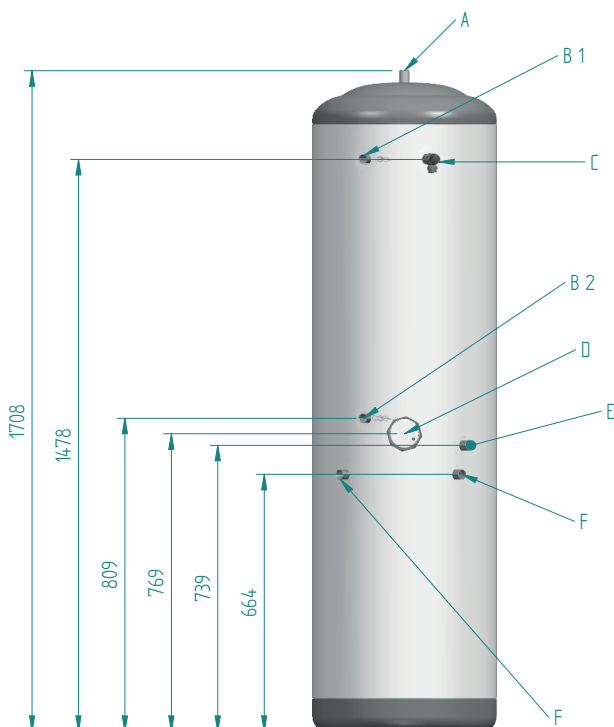
## 2.5 NON- PREPLUMBED 210LTR & 300 LTR



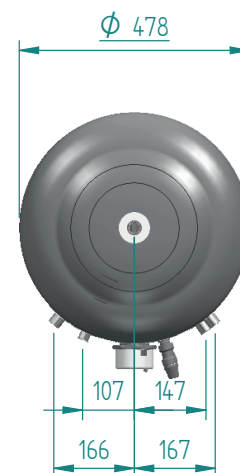
Grant Ref. Name	SIZE	HEIGHT	X	Y
HPMONO210G	210L	1491	1269	1150
HPMONO300G	300L	2054	1832	1600

Index		Connection Type
A	Hot water draw	22mm Compression
B	T&P	15mm Compression
C	Immersion	-
D	Cold Inlet	22mm Compression
E	28mm Coil In/Out (flow/return)	22mm Compression
F	Drain Valve	-
G 1	10mm Stat Pocket	-
G 2	10mm Stat Pocket	-
H	Secondary Return	22mm Compression

## 2.6 GRANT MONOWAVE SLIMLINE 180LTR

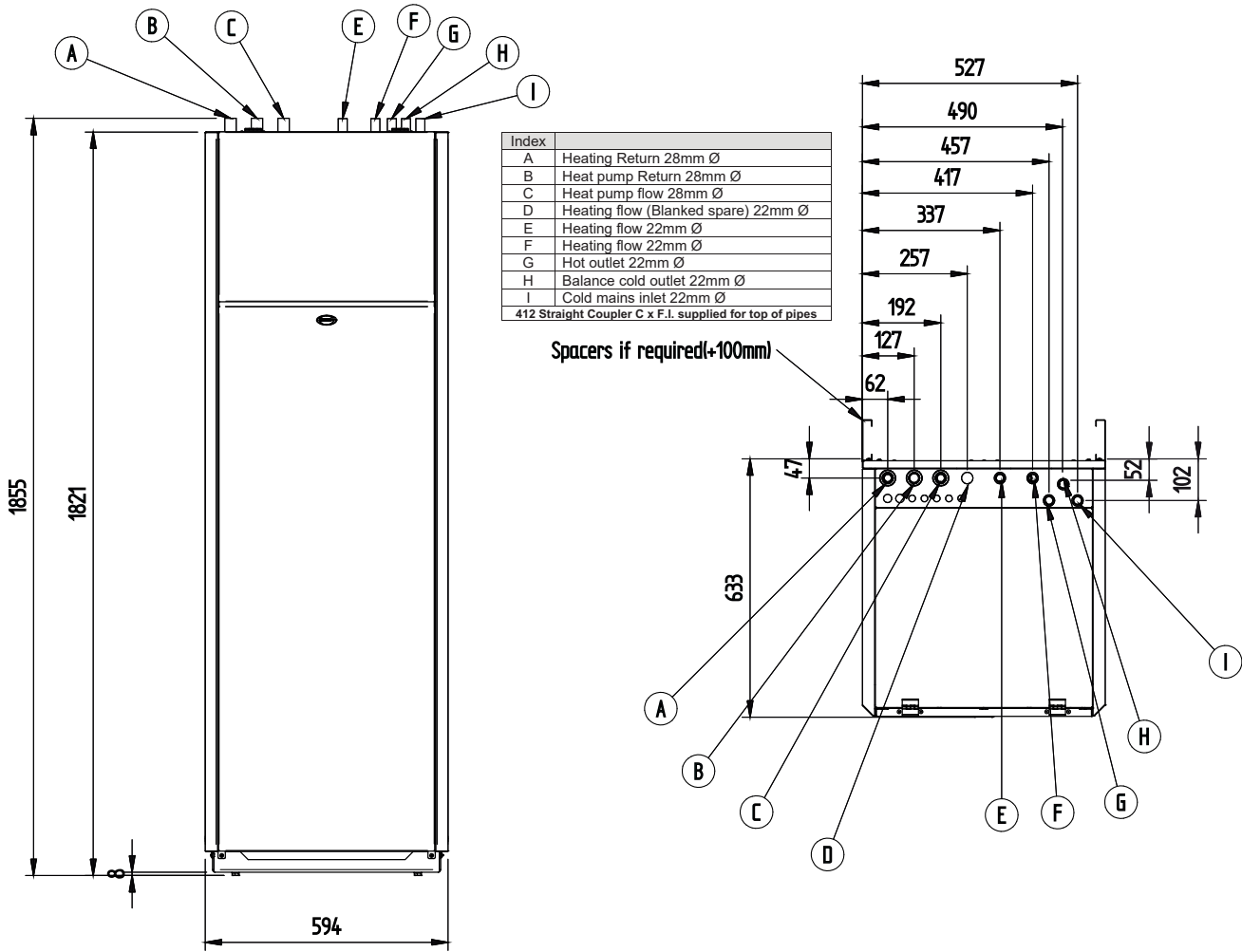


Index		Connection Type
A	Hot water draw	22mm Compression
B 1	20mm stat pocket	-
B 2	20mm stat pocket	-
C	T&P	15mm Compression
D	Immersion	-
E	Cold Inlet	22mm Compression
F	28mm coil In/Out (Flow/Return)	22mm Compression



Grant Ref. Name	SIZE	HEIGHT
HPMONOSLIM/180G	180L	1708

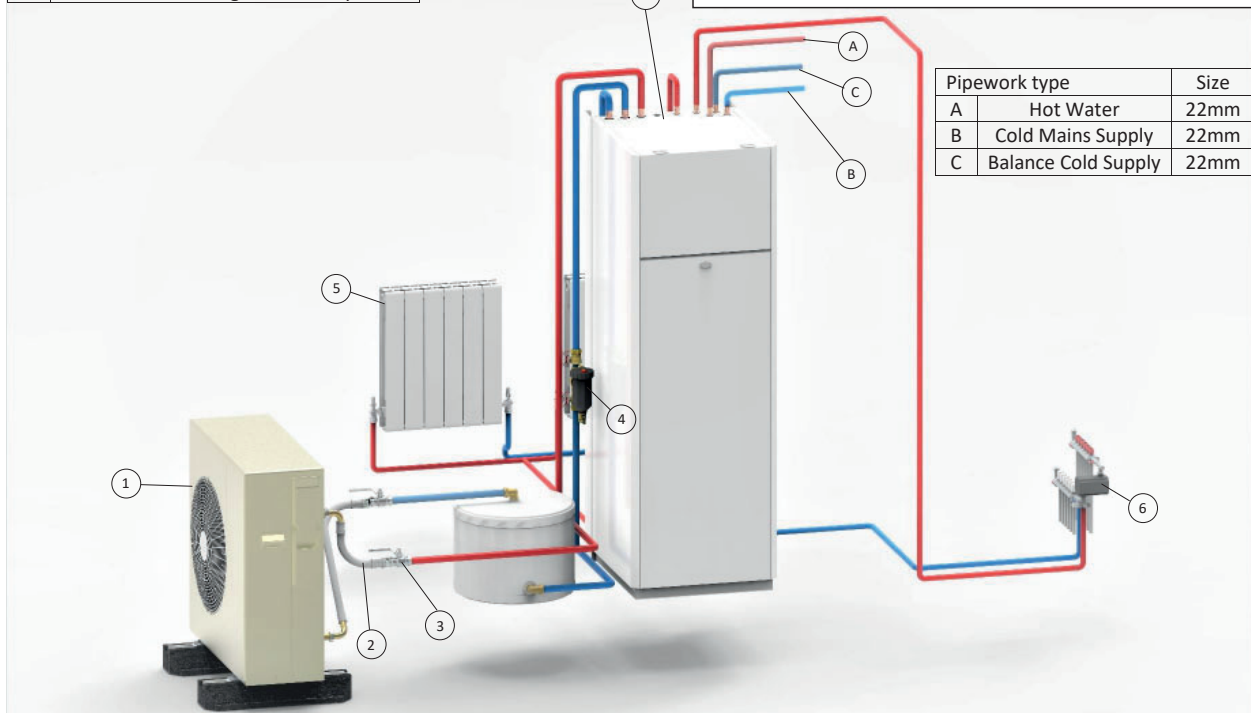
## 2.7 GRANT AWAVE INTEGRATED CYLINDER DIMENSIONS



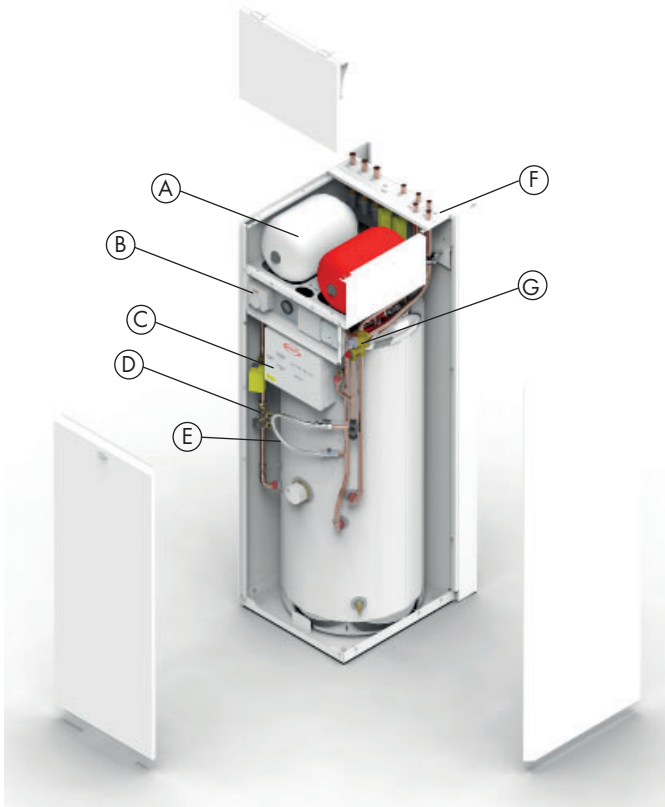
## 2.8 HEATING SYSTEM COMPONENTS

1	Heat Pump
2	Flexible Hose
3	Isolation Valve
4	Magnetic Filter c/w 1" BSP valves
5	Radiators
6	Underground heating manifold
7	A Wave, Grant Integrated 210l Cylinder

The system diagram is only a concept drawing, not a detailed engineering drawing, and is not intended to describe complete systems, nor any particular system. It is the responsibility of the system designer, not Grant IRL, to determine the necessary components for and configuration of the particular system being designed including any additional equipment and safety devices to ensure compliance with building and safety code requirements.



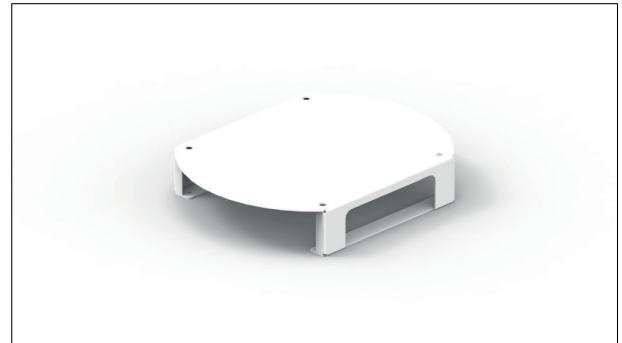
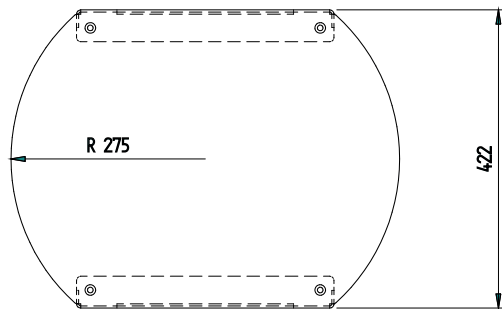
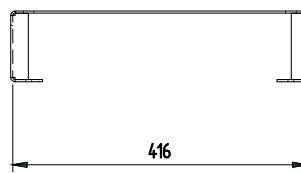
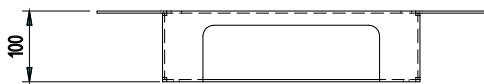
## 2.9 CABINET CYLINDER EXPLODED VIEW



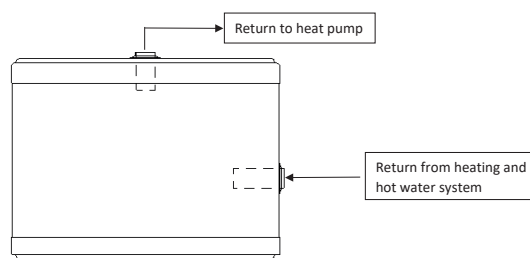
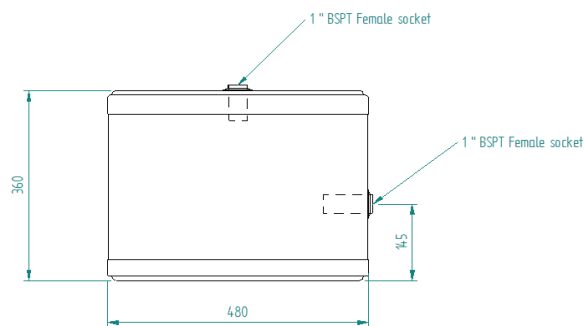
Index	
A	Potable and heating expansion tanks located inside the unit
B	Digital stat, pressure gauge, heat pump controller and immersion timer all easily accessible behind the top door
C	Labelled wiring center
D	Flush and fill valve
E	Filling loop
F	Label for identifying pipes on panel.
G	Inlet group designed to control the pressure from the mains supply

AWave Cabinet Cylinder Weights		
Weight (kg)	Unpacked Empty	135kg
	Unpacked Full	345kg
	Packed Empty	155kg

## 2.10 OPTIONAL PLINT DIMENSIONS



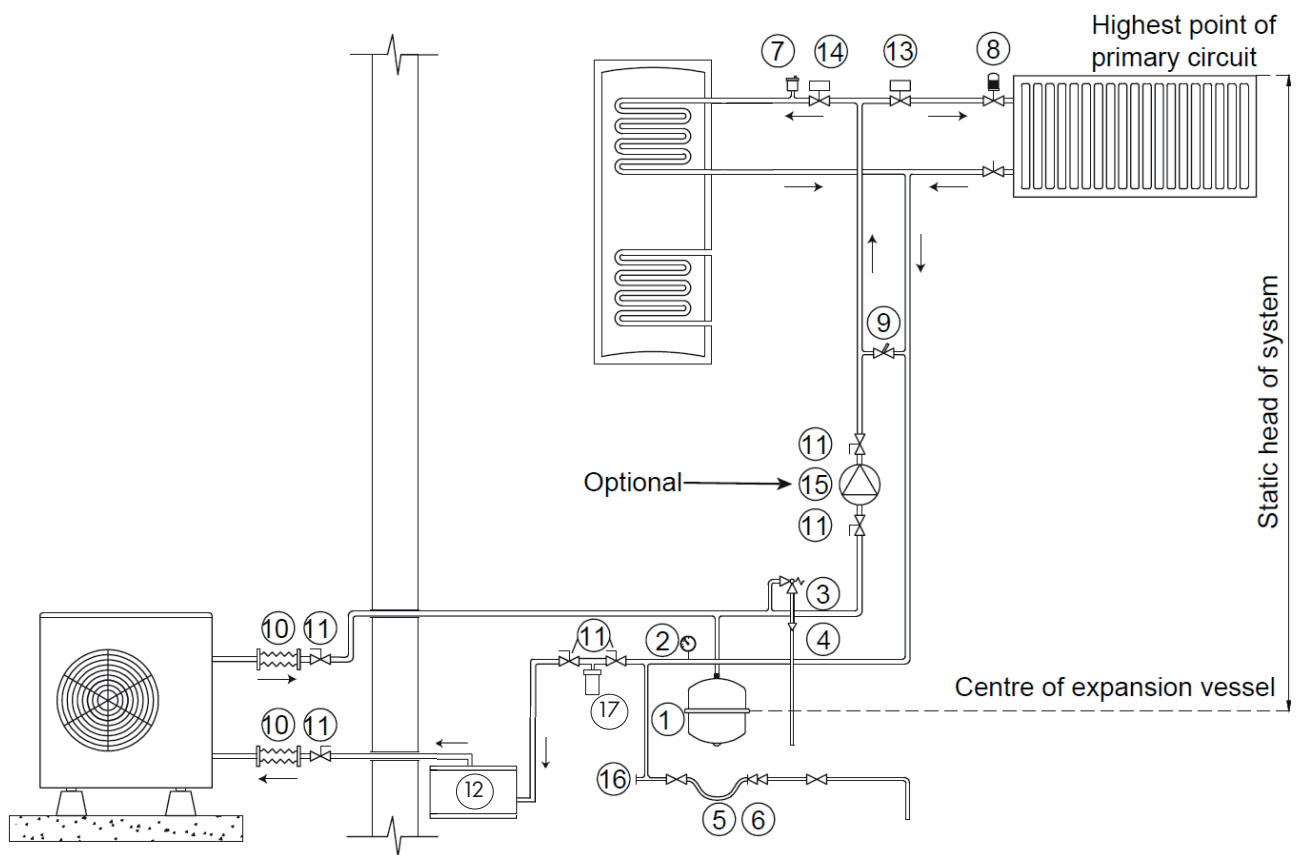
## 2.11 VOLUMISER DIMENSIONS AND CONNECTIONS



Volumiser		
Height	360	
Diameter (mm)	475	
Weight (kg)	Empty	8
	Full	41.5
Capacity (actual) (L)	33.5	
Connections (BSP)	1" (2 off)	
Max system operating pressure (bar)	3	
Materials		
Shell	Stainless steel (duplex 2034)	
Outer casing	Steel (acrylic coated)	
Top/Bottom Caps	ABS (acrylic capped)	
Insulation	Polyurethane foam (40mm thick nominal) GWP <3 ODP=3	

## 2.12 GRANT VOLUMISER TECHNICAL SPECIFICATIONS

Key	Description
1	Expansion vessel
2	Pressure gauge
3	Pressure relief valve
4	Tundish
5	Removable filling loop
6	Double check valve
7	Automatic air vent
8	Thermostatic radiator valve
9	Automatic bypass
10	Flexible hose
11	Isolation valve
12	Volumiser
13	Motorised 2-port valves(CH)
14	Motorised 2-port valves (DHW)
15	Optional additional circulating pump (refer to Section 8.3.7)
16	Drain point
17	Mag One magnetic filter



# 3 PRIMARY CIRCUIT INSTALLATION

## 3.1 GRANT CYLINDERS

Grant cylinders are specifically designed for connection to most fully pumped Air Source Heat Pump systems (such as the Grant Aeron<sup>3</sup> Heat Pump range) - either open vented or sealed systems having a maximum working pressure of 3 bar and a maximum working temperature of 90°C.

If you are in any doubt over the suitability of an Air Source Heat Pump (other than a Grant Aeron<sup>3</sup> heat pump) for use with the cylinder, consult the heat pump manufacturer.

## 3.2 PRIMARY CONNECTIONS: PRE-PLUMBED CYLINDERS

1. The primary flow and return connections from the heat pump should be made to the flow and return connections of the cylinder. Refer to Figures 2.7 as appropriate.

1. The motorised valve (supplied) must be fitted into the primary flow. For all Grant Wave Cylinders.

- The primary flow and return fittings are 22mm compression.
- The valve has 22mm compression connections.
- The primary flow and return fittings are 28mm compression.
- The valve has 22mm compression connections.

2. Any automatic or manual air vent fitted to vent air from the upper coil should be installed on the primary flow pipe to the coil.

## 3.3 HARD WATER AREAS

If the cylinder is to be used with a boiler, in a hard water area, we recommend that the primary flow temperature be limited to 75°C. This will help reduce the migration of suspended solids in the water and help prevent the build up of lime scale



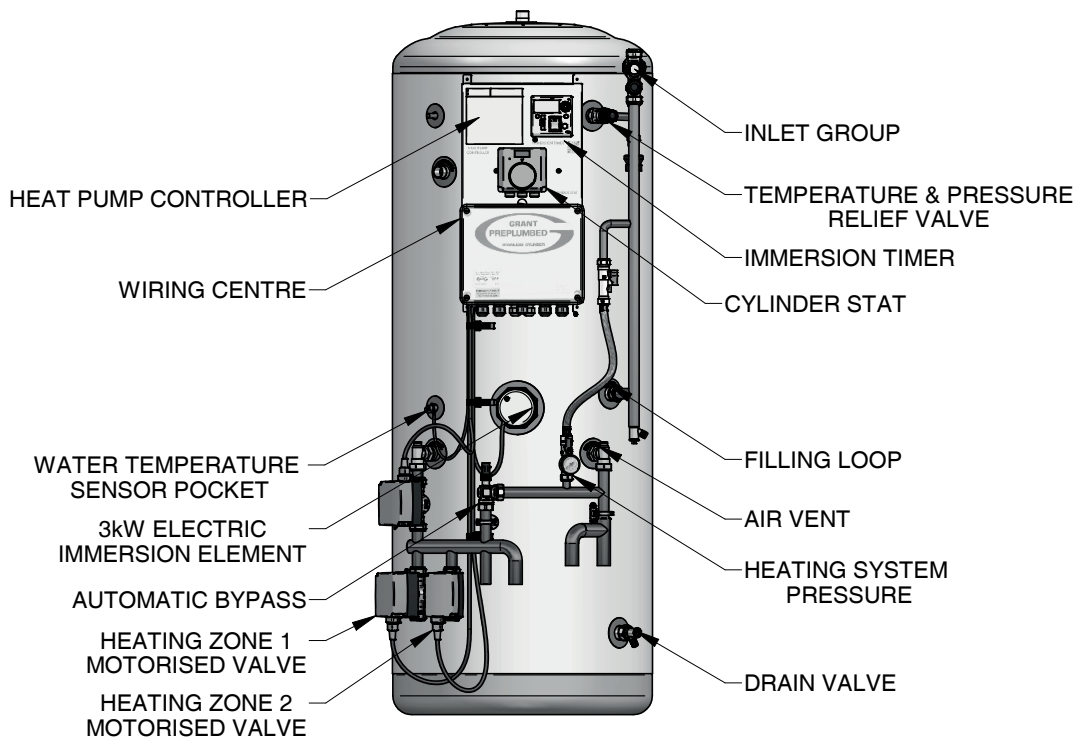
**Cylinder not suitable for installation on a well or private water supply**



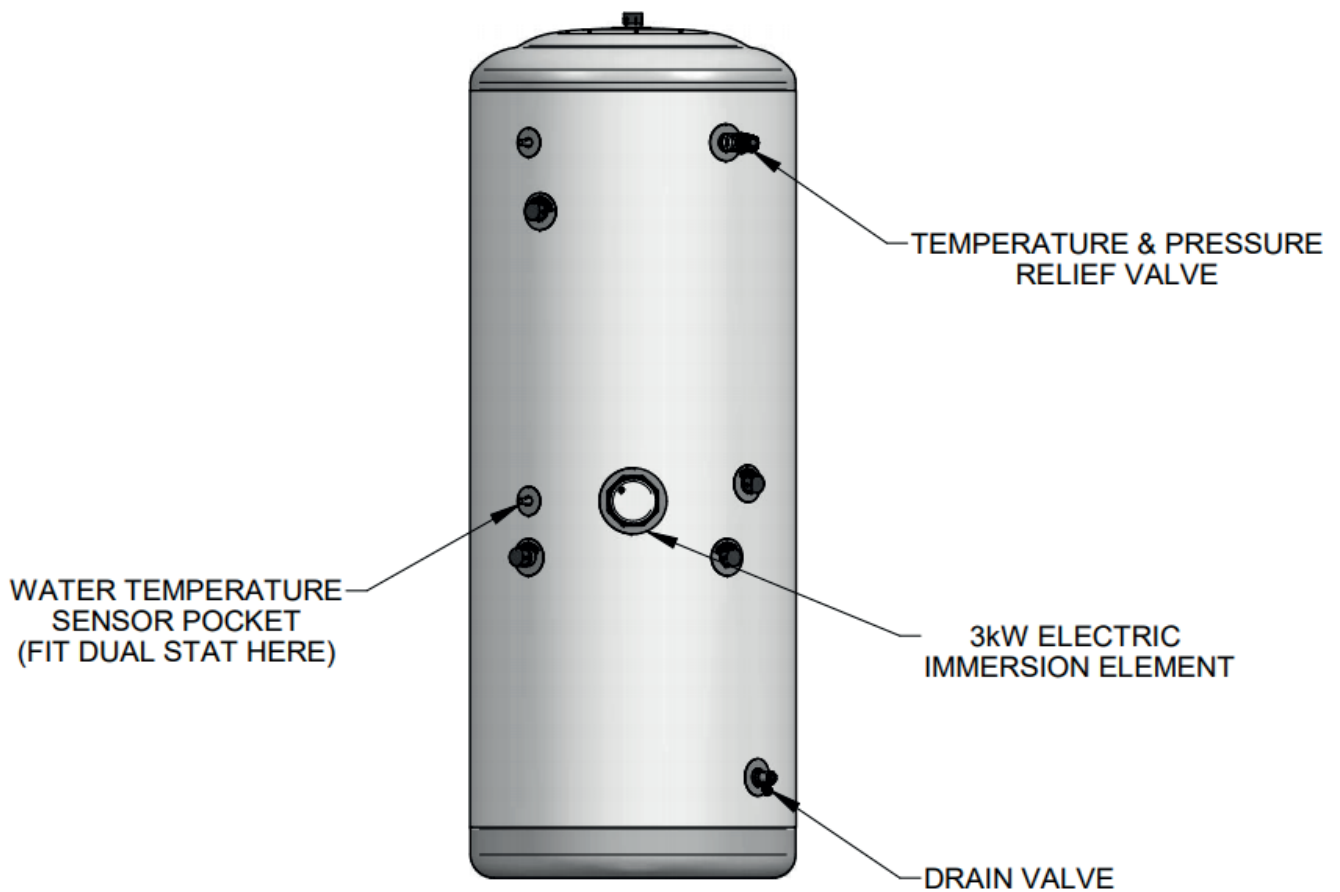
**Solid fuel or wood burning boilers and gravity circulation systems must not be used on the primary circuit of an unvented hot water system.**



### 3.4 210 LTR PREPLUMBED CYLINDER



### 3.4 210/300 LTR NON PREPLUMBED CYLINDER



# 4 SECONDARY CIRCUIT INSTALLATION

## 4.1 GENERAL

Grant Wave indirect HP cylinders are supplied with the safety devices and components loose in a kit, with the exception of the Temperature & Pressure (T&P) relief valve which is factory fitted. These safety devices and components **MUST** be fitted to the cylinder as detailed in the following Sections 4.2 to 4.13. For a list of these safety devices and components refer to either Table 2-3 or 2-4, as appropriate.

For commissioning and maintenance purposes, it is essential to fit a service valve (not supplied) in the cold water supply pipe, immediately before the inlet manifold.

The ½" drain cock (supplied in the kit) must be fitted in the cold feed to the cylinder to provide a means of draining the unit. Refer to Figures 2-6 to 2-10 (as appropriate) for a suitable drain cock position that will enable most of the cylinder to be drained off when required.

## 4.2 COLD WATER INLET MANIFOLD

This manifold contains a pressure reducing valve (with integral strainer), double check valve, expansion relief valve with a stainless steel seat.

The pressure reducing valve is factory set to 3 bar. The set pressure is shown on top of the valve. The maximum inlet pressure to this valve is 12 bar.

A balanced cold water connection is provided on the inlet manifold. Refer to Figure 4-1. This should only be used to provide balanced cold supplies to shower valves and mixer taps. If the balanced cold water outlet is not required, blank off this port.

## 4.3 INSTALLATION

1. Cold water supply pipe to be 22mm nominal size.
2. Flush supply pipework before connection to remove all flux and debris prior to fitting the inlet controls.  
Failure to do this may result in irreparable damage to the controls and will invalidate the warranty.
3. Once the pipework is flushed connect the cold supply to the Inlet manifold.

The manifold can be installed in any position as long as it is installed in the correct flow direction. Refer to the arrows on the side of the body.

Make sure that the head of the expansion relief valve is offset from the cylinder for ease of access.

4. The expansion relief valve should be either horizontal or upright - if fitted inverted, debris may be deposited on the seat and cause fouling of the seat when the valve operates. Check direction of flow arrows.
5. The smaller black plastic plug in the inlet manifold body is a pressure gauge connection to enable pressure monitoring to be carried out, should the system develop a fault. It is recommended that this be accessible.
6. The larger black plastic plug in the inlet valve manifold body is an expansion vessel connection.
7. The expansion relief drain pipework must be connected to a safe visible discharge point via the tundish (supplied in the unvented hot water safety kit) and the pipework must have a continuous fall.
8. Connect the expansion relief valve outlet into the discharge pipe from the temperature and pressure Relief valve using a 1.5mm copper pipe and tee piece (not supplied). Fit the tundish below this tee piece using a short length of copper pipe. Refer to Sections 4.7, 4.8 and 4.9 for further information on Tundish and Discharge pipe.
9. The pressure reducing valve has two outlets, the second one is for a balanced cold water supply, to a shower or a bidet (over rim type only, ascending spray type requires type AA, AB or AD air gap).  
Major shower manufacturers advise fitting a mini expansion If the dwelling has a shower mixing valve (manual or thermostatic) or a Bidet (over rim type) use the cold water supply from the balanced cold water connection on the inlet manifold for these outlets.  
Do not use the balanced cold connection to supply bath taps as this can reduce the flow of water available to the cylinder. If the balanced cold water outlet is not required, blank off the connection.
10. The Benchmark book enclosed with the cylinder should be completed after commissioning of the system.
11. The cylinder must be registered with Grant Engineering (IRL) ULC within thirty days of installation and it is serviced at twelve monthly intervals. See main Terms and Conditions.

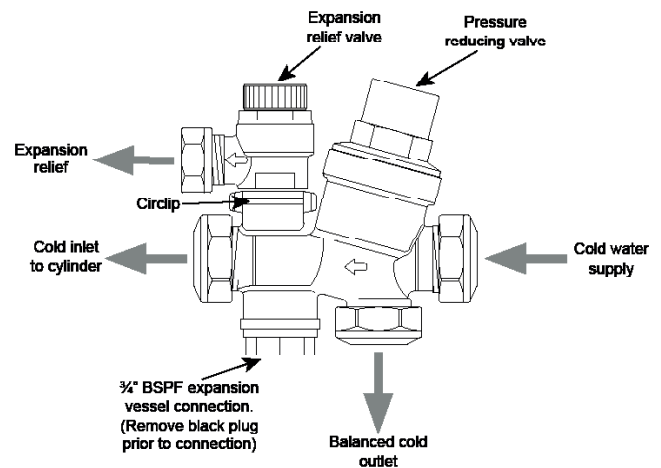


Figure 4-1: Cold water inlet manifold

## 4.4 EXPANSION VESSEL

A suitable expansion vessel with a pre-charge pressure of 3bar is supplied for fitting to all cylinders.

This expansion vessel must be connected into the cold water supply, between the expansion relief valve (in the inlet manifold) and the cylinder.

The vessel is supplied with a 22 mm compression connection and should be connected to the 22 mm connection on the cold water pipe just below the inlet manifold body.

Mount the expansion vessel in a suitable position on an adjacent wall to the cylinder using the wall brackets on the vessel. The expansion vessel must be positioned with the connection point at the bottom.

No valve should be fitted between the expansion vessel and cylinder.

The air charge pressure in the expansion vessel must be regularly checked (e.g. at every service) and topped up as necessary. The correct air charge pressure is 3.0bar. Refer to Sections 7.1 and 7.5 for further details.

## 4.5 TEMPERATURE AND PRESSURE RELIEF VALVE

The temperature and pressure relief valve (T&P Valve) is supplied factory fitted to the cylinder. The T&P valve must not be removed from the cylinder or tampered with in any way. The valve is pre-set to lift at 7bar or 90°C and any attempt to adjust it will invalidate the

## 4.6 HOT WATER SUPPLY

Connect the hot water supply pipe to the top outlet of the cylinder.

## 4.7 PREVENTION OF SCALDING

Building Regulations Approved Document G (Part G3)(U.K), requires that the hot water temperature supplied to a bath should be limited to a maximum of 48°C by using an in-line blending valve (not supplied with the cylinder) with a maximum temperature stop.

The length of the supply pipe between the blending valve and the bath hot water outlet should be kept to a minimum to prevent the colonisation of waterborne pathogens (e.g. legionella). Refer to Approved Document G for further details.

## 4.8 SECONDARY RETURN

All Wave HP cylinders are fitted with a secondary return connection. If a secondary return circuit is required it should be connected to the Wave HP cylinder as shown in Figure 4-2

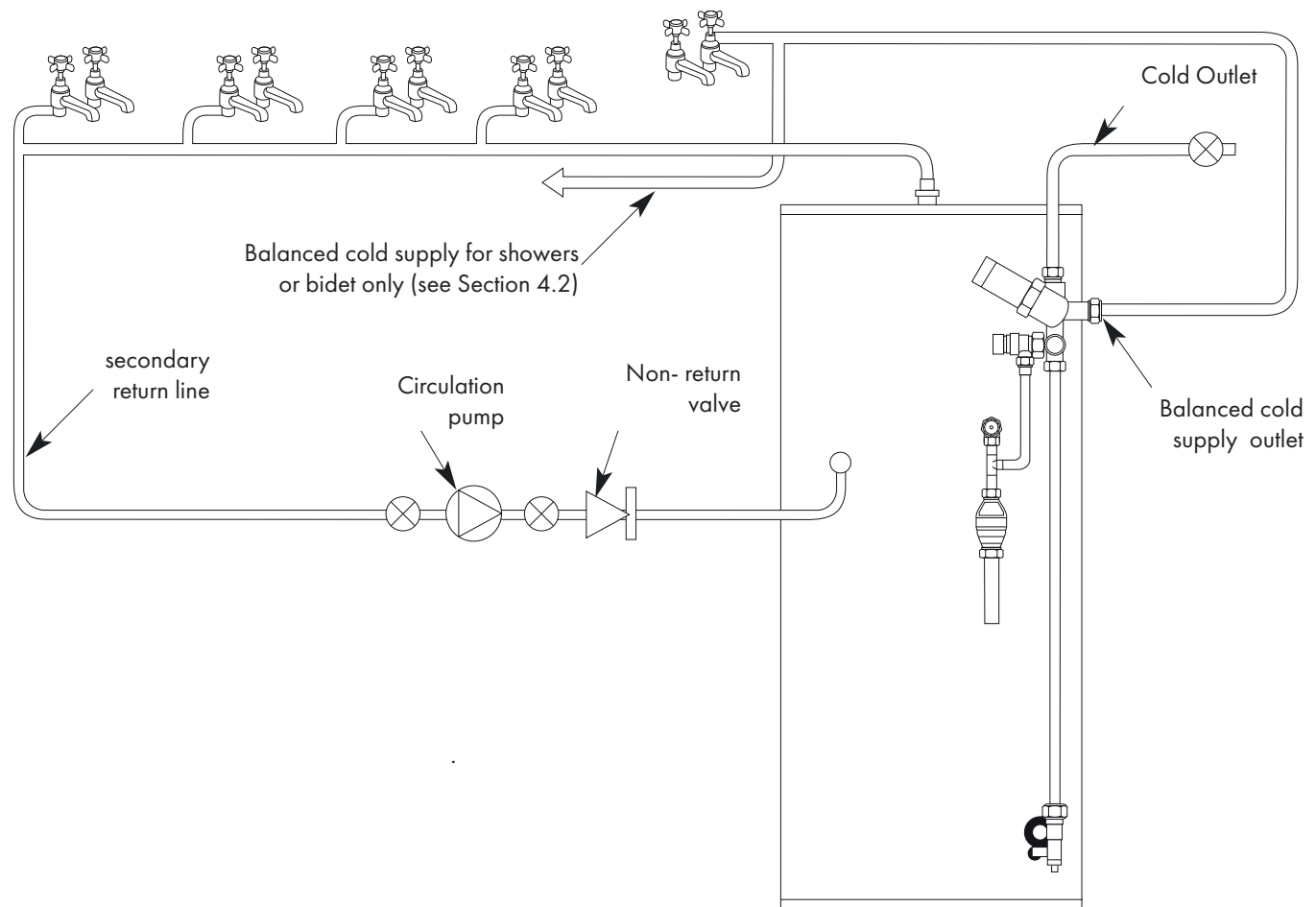


Figure 4-2: Secondary return circuit

## 4.9 TUNDISH

A suitable tundish is supplied with the cylinder for fitting in the common discharge pipe from the T&P and Expansion relief valves. On the pre-plumbed cylinders this is factory-fitted on the secondary circuit pipework. On the standard cylinders this is supplied loose and must be fitted by the installer.



**The tundish must NOT be positioned above or in close proximity of any electrical current carrying devices or wiring.**

A discharge pipe must be fitted to the outlet of the tundish. This must conform to the requirements as given in Section 4.9 of these Installation and User Instructions.

## 4.10 DISCHARGE PIPE

- The discharge pipe from the tundish should terminate in a safe place where there is no risk to persons in the vicinity of the discharge, be of metal and:
  - Be at least one pipe size larger than the normal outlet size of the safety device unless its total equipment hydraulic resistance exceeds that of a straight pipe 9m long, i.e. discharge pipes between 9m and 18m equivalent resistance length should be at least larger than the normal outlet size of the safety device, between 18m and 27m at least three sizes larger and so on.  
Bends must be taken in to account in calculating the flow resistance. Refer to sections 4.10, 4.11 and 4.12.
  - Have a vertical section of pipe at least 300 mm long, below the tundish before any elbows or bends in the pipe work.
  - Be installed with a continuous fall of 1:40 (2.5°).
  - Have discharges visible at both the tundish and the final point of discharge but where this is not possible or practically difficult there should be clear visibility at one or other of these locations.
- Examples of acceptance discharge arrangements are:
  - ideally below a fixed grating and above the water seal in a trapped gully.
  - downward discharges at a low level; i.e. up to 100mm above external surfaces such as car parks, hard standings, grassed areas etc. are acceptable providing that where children may play or otherwise come in to contact with discharges, a wire cage or similar guard is positioned to prevent contact, whilst maintaining visibility.
  - discharges at high level; e.g. in to metal hopper and metal down pipe with the end of the discharge pipe clearly visible (tundish visible or not) or onto a roof capable of withstanding high temperature discharges of water and 3m from any plastics guttering systems that would collect such discharges (tundish visible).
- Where a single pipe serves a number of discharges, such as in blocks of flats, the number served should be limited to not more than 6 systems so that any installation can be traced reasonably easily.

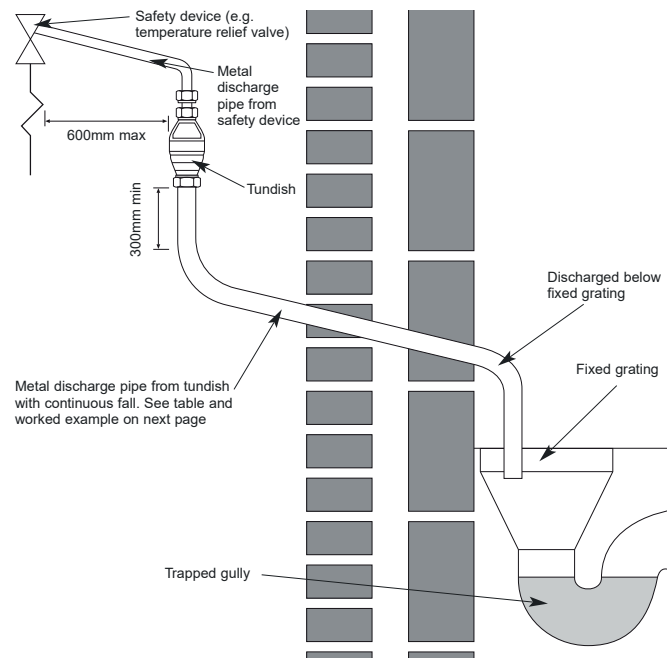
The single common discharge pipe should be at least one pipe size larger than the largest individual discharge pipe to be connected.

If unvented hot water storage systems are installed where discharges from safety devices may not be apparent i.e. in dwellings occupied by blind, infirm or disabled people, consideration should be given to the installation of an electronically operated device to warn when discharge takes place.



**The discharge will consist of scalding water and steam. Asphalt, roofing felt and non-metallic rainwater goods may be damaged by such discharges.**

## 4.11 DISCHARGE PIPE ARRANGEMENT



**Figure 4-3:** Typical discharge pipe arrangement

## 4.12 DISCHARGE PIPE SIZING

Refer to Table 4-3 (discharge pipe sizing).

Valve outlet size Diameter (inches)	Minimum size of discharge pipe D1 (mm)	Minimum size of discharge pipe D2 from tundish (mm)	Maximum resistance allowed, expressed as a length of straight pipe, i.e. no elbows or bends	Resistance created by each elbow or bend (m)
½	15	22	Up to 9	0.8
		28	Up to 18	1.0
		35	Up to 27	1.4
¾	22	28	Up to 9	1.0
		35	Up to 18	1.4
		42	Up to 27	1.7
1	28	35	Up to 9	1.4
		42	Up to 18	1.7
		54	Up to 27	2.3

**Table 4-4:** Discharge pipe sizing



NOTE

**The above table is based on copper tube. Plastic pipes may be of a different bore and resistance.**

**Sizes and maximum lengths of plastic pipe should be calculated using data for the type of pipe being used.**

## 4.13 WORKED EXAMPLE

The example below is for a 1/2" diameter temperature relief valve with a discharge pipe (D2) having 4 elbows and a length of 7 m from the tundish to the point of discharge. From Maximum resistance allowed for a straight length of Ø22mm copper discharge pipe (D2) from a 1/2" diameter temperature relief valve is - 9.0m.

Subtract the resistance for quantity of 4 Ø22mm elbows at 0.8m each = 3.2m. Therefore, the maximum permitted length equates to 5.8m. 5.8m is less than the actual length of 7m; therefore calculate the next largest size.

Maximum resistance allowed for a straight length of Ø28mm-pipe (D2) from a 1/2" diameter temperature relief valve equates to - 18m. Subtract the resistance for a quantity of 4 Ø28mm elbows at 1.0 each = 4m.

Therefore the maximum permitted length equates to 14m.

As the actual length is 7m, a Ø28mm diameter copper pipe will be satisfactory.

# 5 ELECTRICAL

All electrical wiring must be carried out by a competent person and in accordance with the current edition of BS7671 (the I.E.T. Wiring Regulations), including any amendments.

The control equipment supplied must be wired according to these Installation and User Instructions to ensure that the cylinder functions safely.

From an economic and convenience point of view, it is intended that these controls operate in conjunction with other control packages, for example, an "S-plan" type system that incorporates a programmer, etc.

## 5.1 IMMERSION HEATER

Only immersion heaters with a thermal cut-out that comply with the BS EN 60335-2-73 may be used. To help ensure this, the immersion have a special 13/4" thread. They are rated at 3kW at 240V and are of a low noise Incoloy construction.

They have both a thermostat and a high limit cut-out. Please order the correct replacement via ourselves ([info@grantengineering.ie](mailto:info@grantengineering.ie)) fitting non-approved immersions may affect your guarantee. When fitting, ensure the 'O' ring is positioned correctly on the head of the immersion heater and lubricate before fitting. Fit it by hand until almost home then tighten gently, as the 'O' rings will seal easily.

Do not operate the immersion heater/s until the cylinder is full of water.

Do not operate the immersion heater/s if any sterilisation liquid is in the cylinder as this will cause premature failure.

If the water quality is aggressive or the cylinder is to be used on a system with a heat pump that struggles to achieve the set temperature, we recommend exchanging the immersion heater for titanium element.

Note: Immersion heaters should never be used as the primary heat source except for the lower immersion on a direct cylinder.

Selected cylinder models feature a smart control, fitted to the lower immersion heater.



**The discharge will consist of scalding water and steam. Asphalt, roofing felt and non-metallic rainwater goods may be damaged by such discharges.**

## 5.2 IMMERSION HEATER WIRING INSTRUCTIONS

Ensure that the supply voltage corresponds to the voltage rating of the immersion heater as shown on the rating label on the terminal cover. Each 3kW 230V 50Hz-immersion heater should be wired in accordance with the instructions given in Figure 5-1.

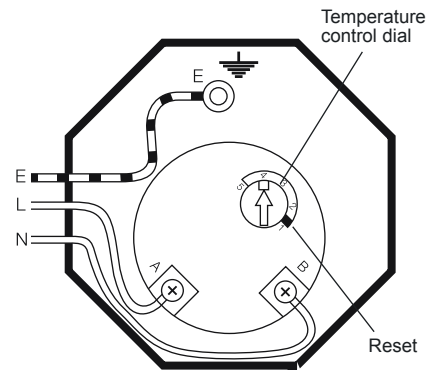
The cable must be routed through the strain relief bush. The cable grip should be secured using only the screws provided.

It should be wired through a double pole isolator switch or suitable controller, with a minimum break capacity of 13 amp and contact separation of at least 3mm.

Use 85°C heat resistant rubber insulated HOFR sheathed flexible cable, with minimum cross sectional area of 1.5mm<sup>2</sup>, to comply with BS 6141 table 8 and must be fully earthed.



**Always ensure that the immersion heater cap is not covered.**



-  = Earth (Green/Yellow)
- A = Live (Brown)
- B = Neutral (Blue)

**Figure 5-1:** Immersion Wiring Instructions



**This immersion heater must be earthed.**



**The manual reset high limit thermostat must not under any circumstances be by-passed. This is pre-set to 80°C and to prevent nuisance tripping, the control thermostat should always be left in position 4.**

## 5.3 IMMERSION HEATER SAFETY CUT-OUT

The immersion heater incorporates an independent non self-resetting over temperature cut-out device to prevent excessive water temperatures.

In normal operation the reset pin positioned to the side of the control knob and indicated by a triangle (with the word 'safety' below) will be approximately 2-3mm below the upper surface of the thermostat cap.

Should the over temperature cut-out operate, the reset pin will be pushed upwards to become level or slightly above the cover.

Wait until the temperature has fallen sufficiently. Then Investigate and identify the cause of the cut-out operation and rectify the fault.

Then manually reset the cut-out by pressing in the reset pin to its normal operating position using hand pressure only with a suitably sized implement.



**Before removing the immersion heater covers to either reset the safety cut-out or check/alter the thermostat setting, ensure that the electrical supply is isolated.**

Ensure the cover to the immersion heater cover is replaced correctly and the retaining nut is fitted. Finally switch the mains electricity supply back on.

## 5.4 DUAL THERMOSTAT

This is a combined cylinder control and high limit (overheat) thermostat supplied with every Grant Wave cylinder, to control the operation of the heat pump primary coil.

The cylinder control thermostat has an adjustment range between 25°C and 65°C. It is recommended that it is set to 60°C. The high limit (overheat) thermostat will automatically operate at 90°C.

### PRE-PLUMBED CYLINDERS

The Digital Thermostat is supplied factory fitted and connected to the wiring centre on the cylinder. For details on the correct wiring connections, refer to Figures 5-2, 5-3 or 5-6, as appropriate.

### STANDARD CYLINDERS

The Dual Thermostat is supplied separately in the unvented hot water safety kit, and is fitted on the Pre-plumbed and AWave cylinders. It should be fitted into the stainless steel sensor pocket in the cylinder and secured in place using the retaining screws on the thermostat housing. Refer to Figures 2-3 or 2-4 for sensor pocket position.

## 5.5 2-PORT VALVES

To comply with the regulations governing the installation of indirect unvented hot water cylinders, a 2-port motorised valve must be fitted in the primary flow to prevent gravity circulation when the boiler switches off.

This acts as a positive energy cut-out should the high limit (overheat) thermostat (in the dual thermostat) operate. If this happens, the 2-port zone valve will operate and shut off the primary flow to the cylinder.

When installed as part of an "S-plan" type of heating control system, this motorised valve will also control the temperature of the domestic stored water via the cylinder control thermostat, (located in the dual thermostat).

This valve should be wired in accordance with the wiring diagrams (Figures 5-2 to 5-7 as appropriate), to comply with current legislation.

For other makes of air source heat pump, other than the Grant Aerona<sup>3</sup>, consult the heat pump manufacturer for electrical connection details.

## 5.6 PRE-PLUMBED CYLINDER WIRING

The Grant MonoWave 'pre-plumbed' HP cylinder is supplied with three factory-fitted 2-port zone valves, as follows:

- 2 x 2-port zone valves for space heating (for two separate heating zones)
- 1 x 2-port zone valve for hot water heating

These are pre-wired to the factory-fitted wiring centre mounted on the cylinder.

To independently control these three zones valves (two space heating zones and one hot water zone) a thermostat is required on each zone.

### If the cylinder is to be used with a Grant Aerona<sup>3</sup> air source heat pump:

Refer to the wiring diagram Figure 5-2 or 5-3 as appropriate, depending on whether the buffer or volumiser option is being used. A Grant HPWC11R wiring center (supplied with the cylinder) MUST be used to provide the voltage free switching for the Aerona<sup>3</sup> air source heat pump, as shown in Figure 5-2 and 5-3.

### If the cylinder is connected to a boiler:

Refer to the wiring diagram Figure 5-6. The Grant wiring center is not required in this case.

## 5.7 STANDARD CYLINDER WIRING

The Grant Wave 'standard' HP cylinder is supplied with a single 2-port zone valve is supplied separately in the unvented hot water safety kit.

This valve MUST be fitted in the primary flow pipe to the cylinder coil. It MUST be wired in accordance with the wiring appropriate wiring diagram as detailed.

## 5.8 Time boost kit for Legionella protection (Model T205-C)



NOTE

Your unit may be fitted with either of the following options Model T205-C or Model PPSF247

- Timer Spur must not be mounted on a flammable surface.
- Ensure that the Timer Spur does not come into contact with any combustible materials such as towels or bedding.
- Ensure at least a 300mm air space is allowed around the Timer Spur switch.
- A 12mm pattress is provided if extra spacing is required
- Twin Earth terminal provided.
- Fixing screw caps must be installed to maintain class 2 status



NOTE

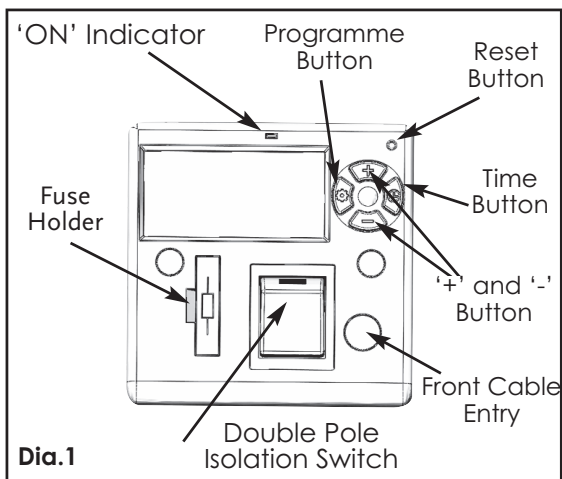
This unit should be installed by a competent person in accordance with the current IET Wiring Regulations. If in doubt consult a qualified electrician.



NOTE

Where earthing termination is required this must be connected to a earth terminal as provided in a metal back box.

### 5.8.1 Operating Instructions

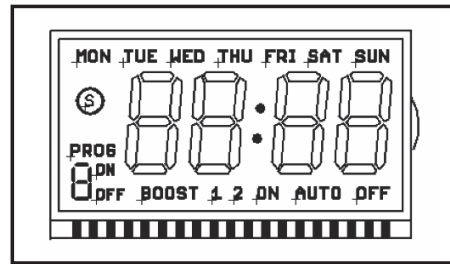


Dia.1

### 5.8.2 Reset The Device

1. To fully reset this unit press the recessed 'Reset' button with a insulated blunt probe.
2. A full display will show when the battery is charged, then revert to the default screen (- - - -). No display indicates that the battery requires charging for a minimum 3 hour period. (Dia.2 - Full display)

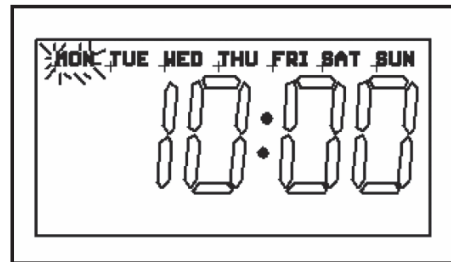
### Dia.2



### 5.8.3 Setting the Day and Time of the week

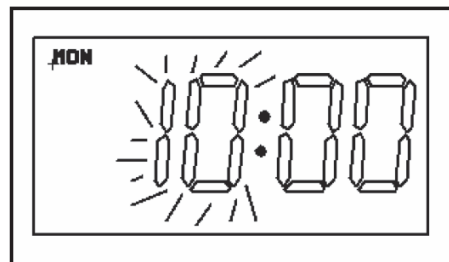
1. Press the 'TIME' button Setting for 2 seconds. Day of week will start flashing (example shows 7 Day setting Dia.3)

### Dia.3



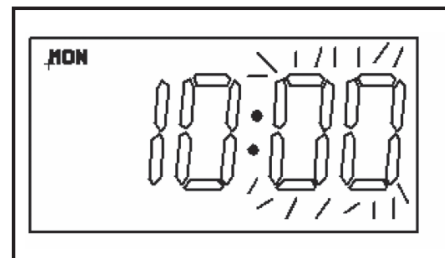
2. Use the '+' or '-' button to change the display to the correct day of the week.
3. Press the 'TIME' button and the hour digits will flash. (Dia.4)

### Dia.4



4. Use the '+' or '-' button to set the hours.
5. Press the 'TIME' button and the minute digits will flash. (Dia.5)

### Dia.5



6. Use the '+' or '-' button to set the minutes.
7. Press the 'TIME' button to save the setting and return to operating mode.



NOTE

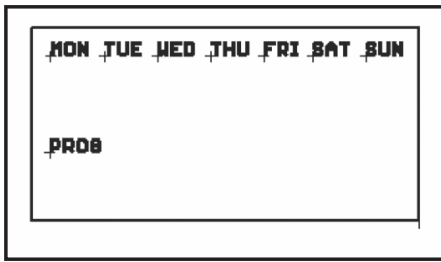
If '+' or '-' button is held for more than 2 seconds, the selected time digit will add or decrease quickly (about 5 steps per second), if no key is pressed within 60 seconds the display will return to operating mode.



### 5.8.4 Programming the ON/OFF times

1. Press the 'PROG' button and hold for 2 seconds, after 2 seconds the display will show (example shows 7 Day setting Dia.6)

Dia.6



**Only ONE of the following options can be used at one time.**

2. Use the '+' or '-' button to change the day grouping (PROG) at the top of the display. This will step through the following programming options:

7 DAY - MON TUES WED THU FRI SAT SUN

All of them have the same programming.

**OR**

5 DAY - MON TUE WED THU FRI

Are grouped as one group, and they will all have the same programming. SAT and SUN will be programmed individually.

**OR**

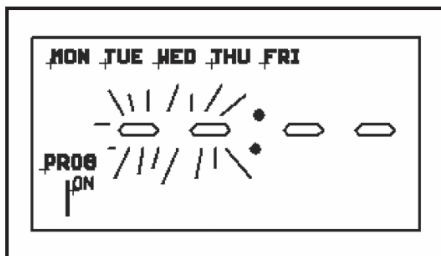
INDIVIDUAL DAY -

Each day will have its program set individually. MON followed automatically in programming by each of the other days. To copy times set for an individual day to another day (e.g. copy Sat set times to Sun), please see PROGRAM DUPLICATION below.

3. Once the desired day grouping is selected, press 'PROG' button to move onto programming ON/OFF times. Display will show PROG 1 ON, and the hour digits flashing (24 hour clock) (Dia.7).

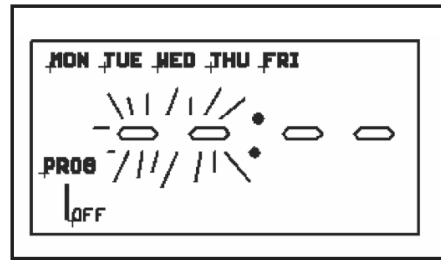
**(Example shown is for 5 + 1 + 1 + day program)**

Dia.7



4. Use the '+' or '-' to set the hours and the 'PROG' to change between hours and minutes. Followed by '+' or '-' again to set the minutes. Press 'PROG' to change to program OFF time. (Dia.8)

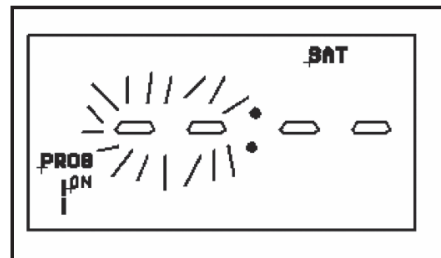
Dia.8



5. Use the '+' or '-' to set the OFF time in the same way as for PROG 1 ON time.

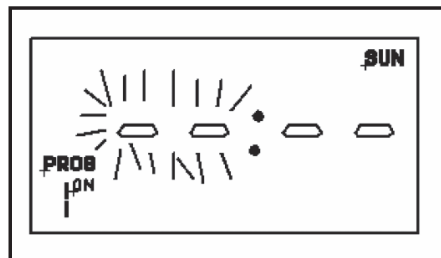
6. Press 'PROG' to scroll through program 2 ON, program 2 OFF, program 3 ON, program 3 OFF, program 4 ON, program 4 OFF, adding in times as required. If you wish to omit programmes just leave dashes in that ON/OFF location. Press 'PROG' to move to the next linked day (SAT follows the 5 day group automatically) (Dia.9).

Dia.9



7. Set ON/OFF times as before. Press 'PROG' to move to the next linked day (SUN follows the SAT automatically) (Dia.10).

Dia.10



8. Set ON/OFF times as before.

9. Once program 4 OFF has been set, press 'PROG' to exit program mode and return to operating mode.

### 5.8.5 Program Duplication

There are two copy functions: copy one day to another, or copy one day to all other days. When programming for 'Individual Day' or '5 Day' you can copy the programmed data from one day to another day.

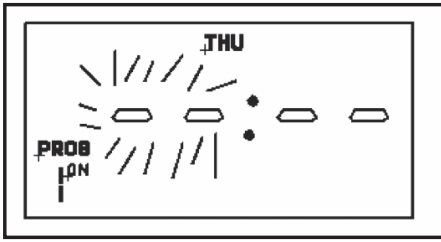
1. When setting ON time of 'PROG' 1, press 'TIME' button and then use '+' or '-' to select the day you want to copy.

2. Press 'TIME' button twice to copy the data of the selected day to current day. Or press 'TIME' button for 2 seconds to copy the data of the selected day to the following days.

**(Example shown for copying data TUE to THU)**

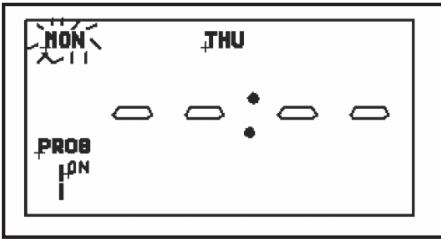
When the ON/OFF times for WED are set, the display will show 'THU':- (Dia.11).

**Dia.11**



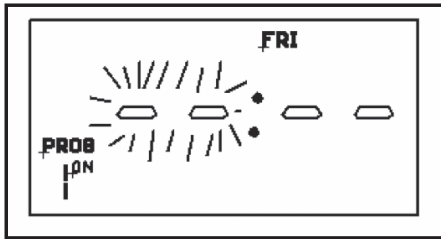
3. Press 'TIME' button then the icon 'MON' will be flashing (Dia.12).

**Dia.12**



4. Use '+' or '-' button to select 'TUE', then press 'TIME' button twice to copy the data. The display will show: (Dia.13).

**Dia.13**



**5.8.6 Modifying or adding new programmes**

1. Press 'PROG' button and hold for approx 2 seconds, the display will show: (Dia.14).

**Dia.14**



2. Use '+' or '-' button to select the day grouping which requires modifying or a new day grouping for a new programme.

3. For modification press 'PROG' repeatedly to arrive at the programme time requiring modification then use '+' or '-' button to make the change. Press 'PROG' repeatedly again to arrive at the next time requiring modification and use '+' or '-' button to make the change.

**5.8.7 Operating mode**

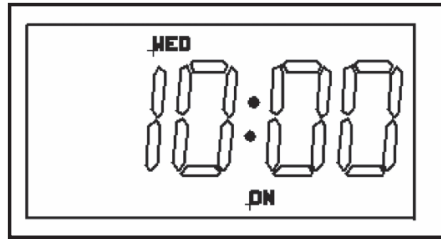


**Operating mode needs to be set to allow programmed times to function**

1. Use '+' button to set the output mode.

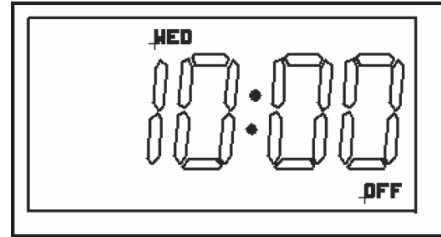
**ON** - Output to permanently ON and omit the program (Dia.15).

**Dia.15**



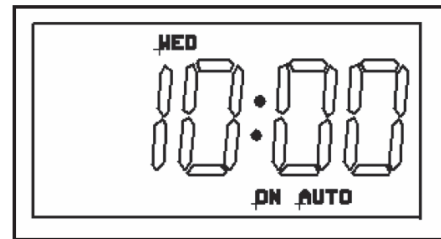
**OFF** - Output to permanently OFF and omit the program (Dia.16).

**Dia.16**



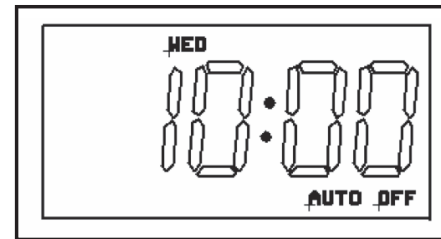
**ON AUTO** - Output to ON until next program OFF period (Dia.17).

**Dia.17**



**OFF AUTO** - Output to OFF until next program ON period (Dia.18).

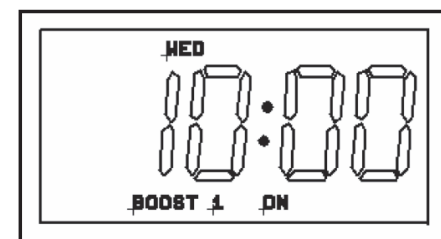
**Dia.18**



**5.8.8 One and two hour boost**

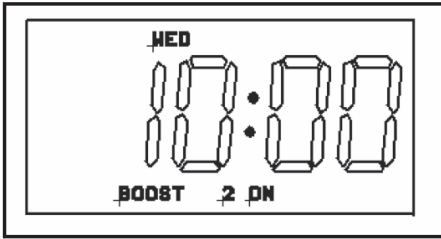
1. Pressing '-' (Boost) once in normal operating mode turns on for 1 hour period (Dia.19).

**Dia.19**



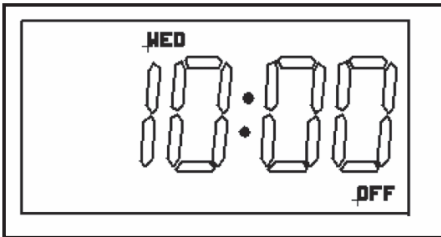
2. Pressing '-' (Boost) twice turns output on a for 2 hour period (Dia.20).

**Dia.20**

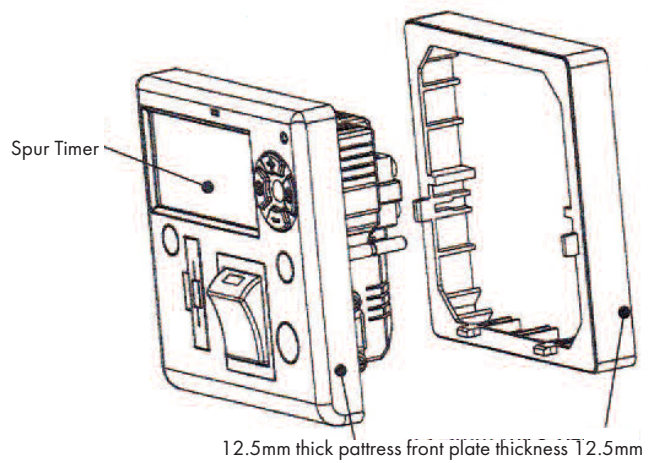


3. Pressing '-' (Boost) button three times cancels the (Boost) ON period (Dia.21).

**Dia.21**



**DIMENSIONS**



**5.9 Operation**

With the Automatic DHW Boost Kit 3 fitted, the HW cylinder thermostat should be set to 47°C for optimum operation. When the heat pump raises the cylinder to this temperature the cylinder thermostat will be 'satisfied'

The time boost kit should be set as required to raise the temperature in the cylinder to 60°C, usually for an hour or two weekly, or as determined by the installer to match the occupants requirements.

If an amount of hot water drawn off is small, the temperature drop in cylinder may be minimal and the cylinder thermostat may not detect it. In this case the cylinder thermostat will continue to supply the demand to the Boost Kit and the Immersion heater will continue to operate.

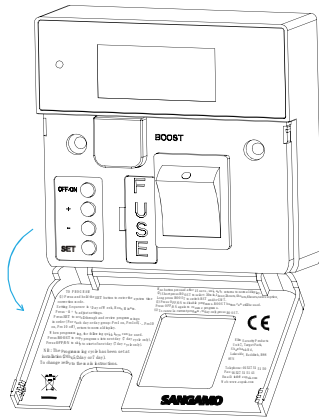
**5.10 Fused Timer Spur Switch - 7 Day**

Ideal for control of towel rails, panel heaters, immersion heaters & fan heaters.

- Energy saving
- Easy to program
- 'Boost' and 'Advance' controls
- Surface/flush mounting
- Front cable entry
- Will fit 25 - 47mm back boxes

T205 - C	
Product Finish	White
Product Dimensions	86.5 x 86.5 x 40mm (46.5mm including switch on front)
Product Weight	180 gms
Barcode	5012739634949
Voltage	230V - 50Hz
Rated Impulse Voltage	2,500V
Pollution Degree	2
Display	LCD
Operating Temp	-5°C to +40°C
Battery Life	700 hrs
Max Load	Resistive 13A inductive 6A
Isolation	Double Pole Isolation Switch
Settings	28 ON and OFF Easy set - day / 5 day / 7 day blocks
Max Wattage	3000W
Operating Temp	-5°C to +40°C
Main housing material	Polycarbonate
Fixings	2 x 35mm, 3.5mm/2 x 25mm, 3.5mm Fixing screws
Guarantee	1 Year
Certification & Conformity	BS 1363-4:1995+A4:2012, BS EN 60730-1:2011, BS EN 60730-2-7:2010, BS 4662:2006+A1:2009

## 5.11 Time boost kit for Legionella protection (Model PPSF247)



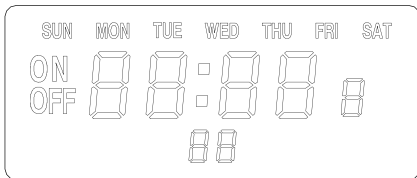
- 24 hour, 5/2 day & 7 day electronic timer
- Up to 10 program operations per
- 15 mins, 30 mins, 1 hour, 2 hour, 4hour and 6 hour boost function
- Automatic Summer/Winter time change
- With changeable fuse
- With double pole switch to turn on/off power of the load
- Fits directly onto a single gang pattress box



**This unit should be installed by a competent person in accordance with the current IET Wiring Regulations. If in doubt consult a qualified electrician.**

### 5.11.1 Operating Instructions

For Reset/Initial setting, all LCD segments flashing displays as below:



PPSF247 has a double pole switch to turn on/off power to the loads. Before setting, put the double pole switch to the ON position, and then flip down the front panel to show the hidden panel, and complete the initial setting.

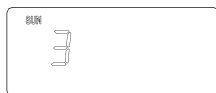
1. Press "SET" to enter program cycle setting, press "-" and/or "+" to select program from cycle 1 to cycle 3 as below:



Cycle 1 (default): Daily (24 Hour) Cycle, all the days will flash simultaneously



Cycle 2: Weekly (5/2 Day) Cycle, the week-days and weekend will take turns to flash.



Cycle 3: 24/7 (7 Day) Cycle, every day will take turns to flash. If Cycle 3 is selected each day is programmed separately. Quick functions include;

- ON/OFF to move to the next day
- Boost to copy the previous day settings

These are only available on pressing SET button to enter timer setting. These functions are unavailable if the programming is being edited and '-' is flashing.



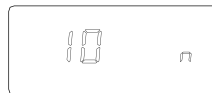
NOTE

**This programming cycle selection is only offered as part of the initial product setup or if a Product Reset has been carried out. Under normal conditions the programming cycle selection display is not shown.**

2. Press "SET" button to enter system time setting.



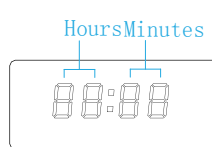
The year starts to flash, press "-" and/or "+" to set the year from 00 to 99.



Press "SET" button again, the month starts to flash, press "-" and/or "+" to set the month from 1 to 12.



Press "SET" button again, the day starts to flash, press "-" and/or "+" to set the day from 1 to 31.



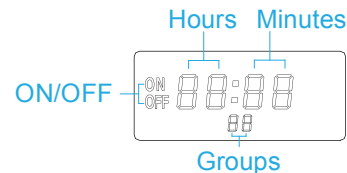
Press "SET" button again, the hours display will flash, press "-" and/or "+" to adjust the hour from 00 to 23;

Press "SET" button again, the minutes display starts to flash, press "-" and/or "+" to adjust the minutes from 00 to 59.

(Holding down "-" and/or "+" will adjust the data quickly).

Correct the system time: when at normal display interface, press and hold the SET button to enter the time correction mode.

3. After completing system time setting, press "SET" button to enter timer setting:



Firstly, the LCD will display "--:00" and "01" "ON", which means it has entered the timer on time setting for the first group. The default display "--: 00" means no timer control has been set.

Press "SET" button again, the hours display will flash, press "+" it will scroll "--, 00,01...23", press "-" it will scroll "--,23..00";

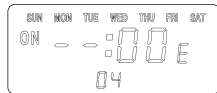
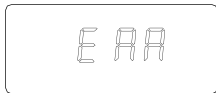
Press "SET" button again, the minutes display starts to flash, press

"-" and/or "+" to adjust the minutes from 00 to 59.(Holding down "-" and/or "+" will adjust the data quickly).

Press "SET" button again, the hours will flash, and show 01, OFF, which means it has entered the timer off time setting for the first group. Set the timer off timer according to above method of setting timer on time.

4. Please complete the timer setting for other groups according to the above method.

If it is not required to set 10 groups of timer, you can press and hold the "SET" button to save and exit the initial setting directly.



All groups timer must be in consecutive order, i.e. group 1 must be before group 2 & group 2 before group 3. If the wrong order is programmed, error messages will be displayed. Please press "SET" again to reset the timer for this group. The already set timer for other groups will not be affected.

5. Cancel the timer control setting: After completing the initial/reset setting, if timer control for one of the group needs to be cancelled, please set the timer on time to "--:00". When the timer on time is cancelled, the timer off time is default to be cancelled as well.

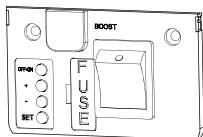


NOTE

**Programming past midnight is NOT allowed. To overcome this, the program needs to be split in two parts from midnight as per example:**

Desired program period - on 22:00 off 07:00  
make Prog 1 - on 00:00 off 07:00  
make Prog 2 - on 22:00 off 00:00

6. Press once = 1/4 hour (The LCD will display 0:15)  
Press twice = 1/2 hour (The LCD will display 0:30)  
Press three times = 1 hour (The LCD will display 1:00)  
Press four times = 2 hour (The LCD will display 2:00)  
Press five times = 4 hour (The LCD will display 4:00)  
Press six times = 6 hour (The LCD will display 6:00)  
Press seven times = Cancel function (The LCD will show 0:00 and return to normal display) Duration can be extended or cancelled by successive presses.



7. Timer Control Override Function: If during a timer On time you wish to turn off the load, simply press the BOOST button once. Press BOOST button again, to enter Boost control. The load will keep on until the BOOST period is over or the timer on time of next group is due



NOTE

**Using the Timer Control Override Function will not affect the timer control settings & the next time it will function as normal.**

8. Off (Holiday) Function: Allows you to suspend timer control whilst still allowing the Boost function to be used using the OFF/ON button.

Press once = Suspend timer control (LCD display will include OFF)  
Press twice = Cancel (LCD will return to normal display)



NOTE

**This is NOT an override function for timer setting. BOOST button is still active.**

9. Keypad Lock: Press - & + together for 5 seconds to lock settings = display briefly shows L, and then return to normal display.



NOTE

**BOOST button is still active during keypad lock mode. Display shows L when other buttons pressed. Press - & + together for 5 seconds to unlock settings.**

10. Product Reset (return to default settings):

Switch off power to unit. Hold in BOOST button whilst switching power back on.

All LCD segments flashing displayed, Load On = Unit Reset

Press BOOST = 1 displayed

Press SET = 2 displayed

Press - = 3 displayed

Press + = 4 displayed

Press OFF/ON = software version displayed

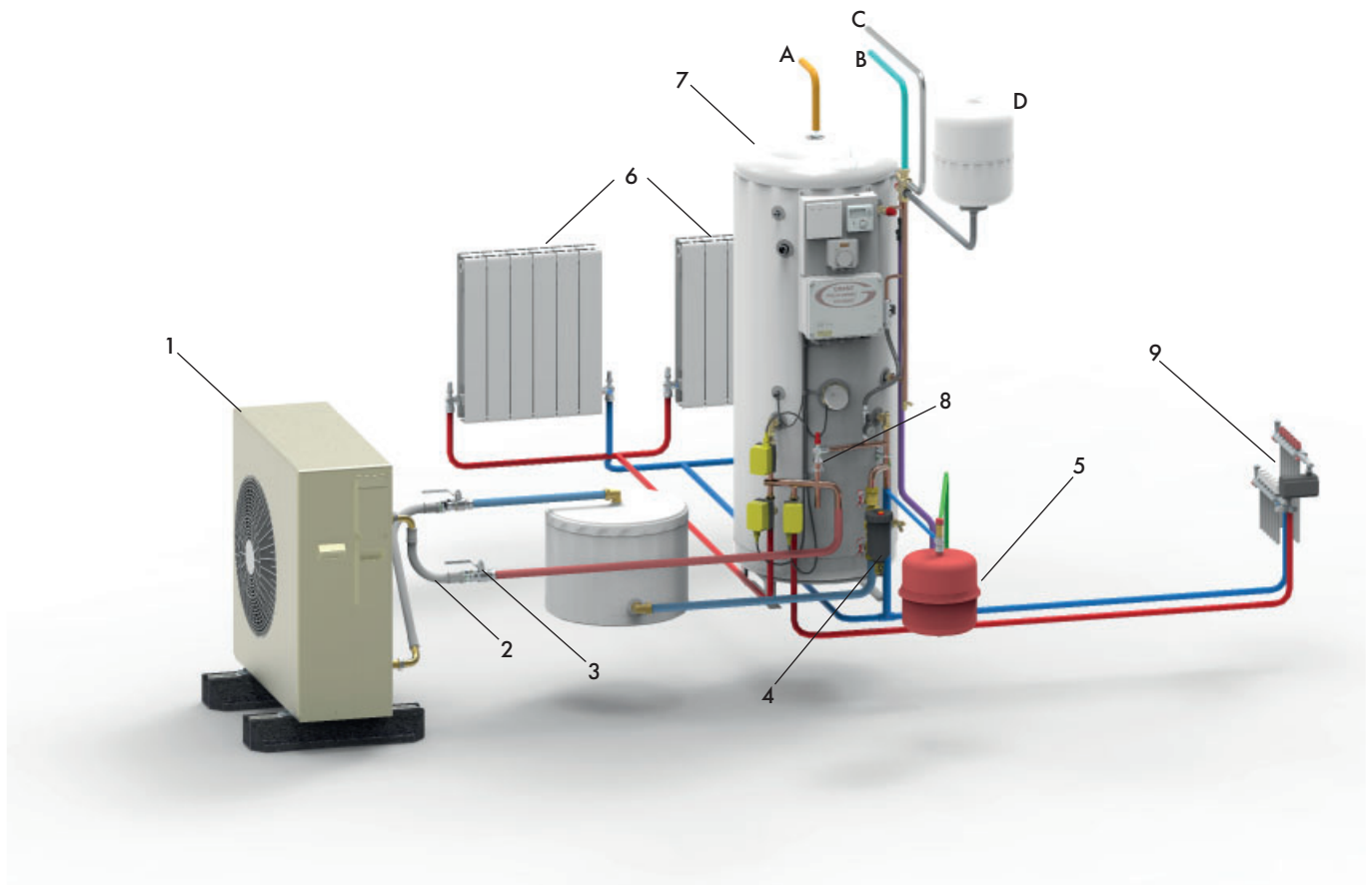
Press SET to reprogram = All LCD segments flashing displayed, Load Off.

Load Status Indicator Light: There is a load status indicator light on the front panel. When the load is on, the green load status indicator light will illuminate; when the load is off, the indicator light will turn off.

## 5.11.2 Specifications

- Supply: 230V 50/60 Hz
- Fused: Supplied with BS1362 13A Fuse
- Switch Rating: 13A Resistive (3kW)
  - 750W Incandescent, Halogen lighting
  - 500W Fluorescent lighting
  - 200W LED lighting
  - 100W Compact Fluorescent lighting
- Terminals: suitable for max. 2.5 mm<sup>2</sup> flexible and 4.0 mm<sup>2</sup> fixed cabling
- Live Parts Protection: This unit is totally protected by the enclosure
- Case Material: ABS
- Temperature Rating: T40
- Operation Temperature: 0°C to 40°C
- Memory Reserve: Permanently reserve setting
- Display: LCD
- Program Settings: Max 10 On/Off Operations each day program cycle selected:
  1. Daily (24 Hour) Cycle - All days programmed the same
  2. Weekly (5/2 Day) Cycle - Mon-Fri are programmed the same. Sat-Sun have separate set of programs.
  3. 24/7 (7 Day) Cycle - Each day is independently programmable
    - Boost Settings: User selectable - 1/4, 1/2, 1, 2, 4 or 6 hours
    - Accessory Pack: 2x M3.5mm

## 5.12 Installation of Heatpump and preplumbed Cylinder

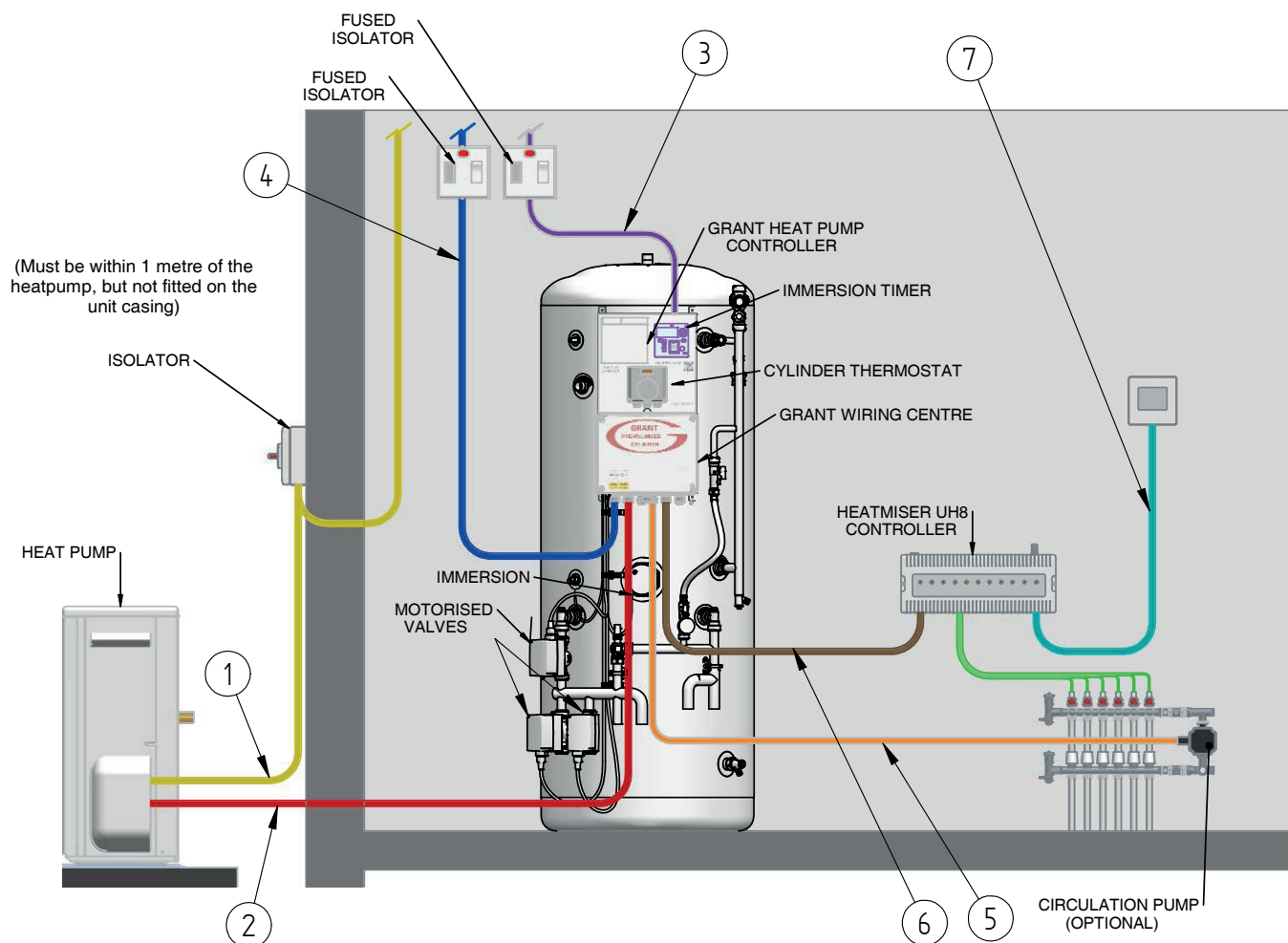


1	Heat Pump
2	Flexible Hose
3	Isolation Valve
4	Magnetic Filter c/w 1" BSP valves
5	Sealed system kit
6	Radiators
7	Hot water storage cylinder
8	Auto bypass valve
9	Underfloor heating manifold

**The system diagram is only a concept drawing, not a detailed engineering drawing, and is not intended to describe complete systems, nor any particular system. It is the responsibility of the system designer, not Grant IRL, to determine the necessary components for and configuration of the particular system being designed including any additional equipment and safety devices to ensure compliance with building and safety code requirements.**

Pipework type		Size
A	Hot water	22mm
B	Cold mains supply	22mm
C	Balanced cold supply	22mm
D	DHW cylinder expansion vessel	22mm

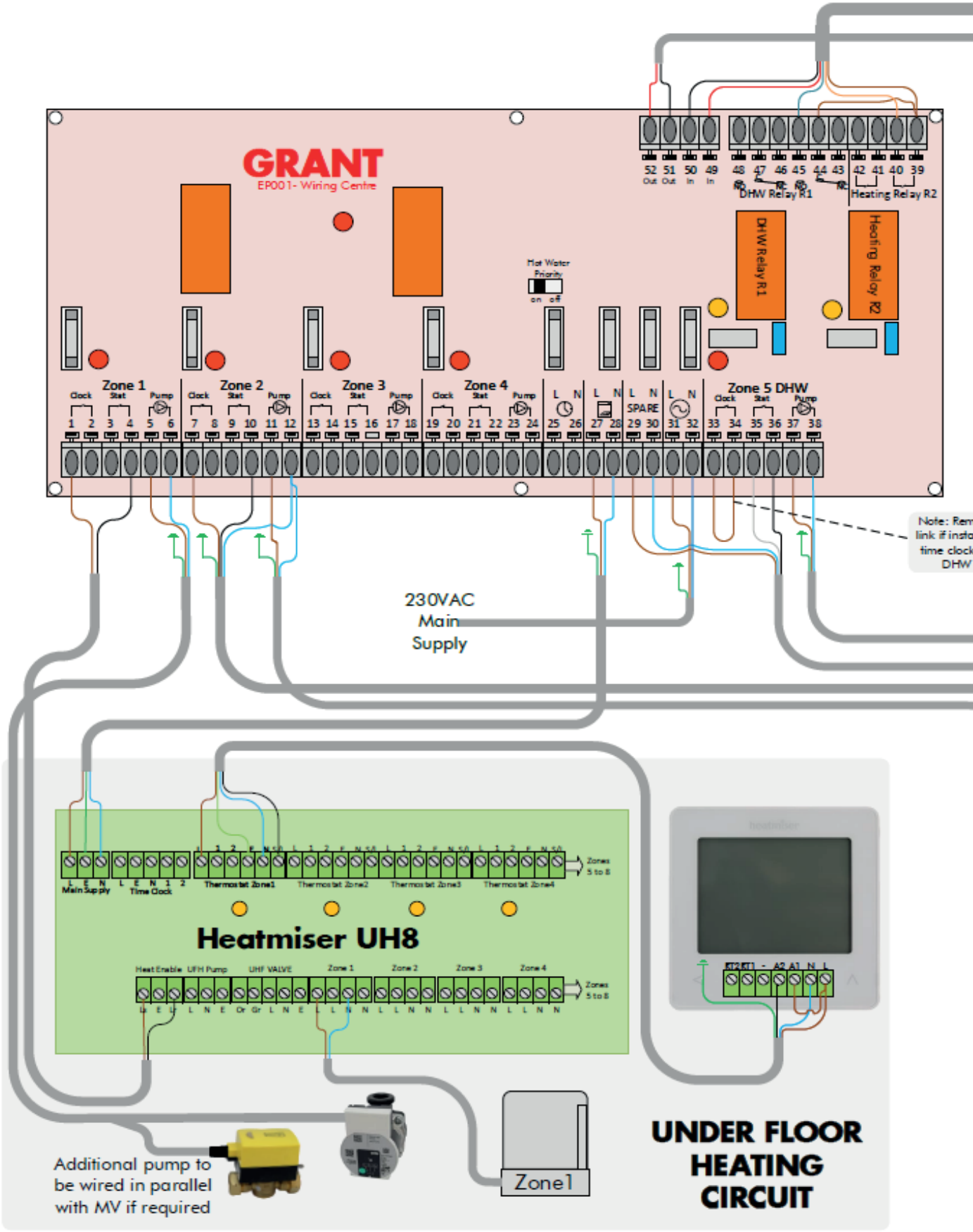
## 5.13 Wiring first fix options



The system diagram is only a concept drawing, not a detailed engineering drawing, and is not intended to describe complete systems, nor any particular system. It is the responsibility of the system designer, not Grant IRL, to determine the necessary components for and configuration of the particular system being designed including any additional equipment and safety devices to ensure compliance with building and safety code requirements.

No.	Description	CABLE	
		CORE	CSA mm <sup>2</sup>
1	Main Supply Grant AERONA <sup>3</sup> 6kW HP1D6R32 (11.2A)	3	2.5*
	Main Supply Grant AERONA <sup>3</sup> 10kW HP1D10R32 (17.5A)	3	4.0*
	Main Supply Grant AERONA <sup>3</sup> 13kW HP1D13R32 (23.0A)	3	6.0*
	Main Supply Grant AERONA <sup>3</sup> 17kW HP1D17R32 (25.3A)	3	6.0*
2	Signal cable Heat Pump - Remote - Volt Free	5	0.75
	Signal cable Heat Pump - Remote - 230V	3	0.75
3	Fuse Board to Immersion kit	3	2.5
4	Fuse board to Grant Wiring Centre	3	0.75
5	Grant Wiring Centre to Circulating pump	3	0.75
6	Grant Wiring Centre to Heatmiser UH8	3	0.75
7	Heatmiser UHF to Room Stats	4	0.75

\* Indicative only -Final cable sizing to be determined by the installer

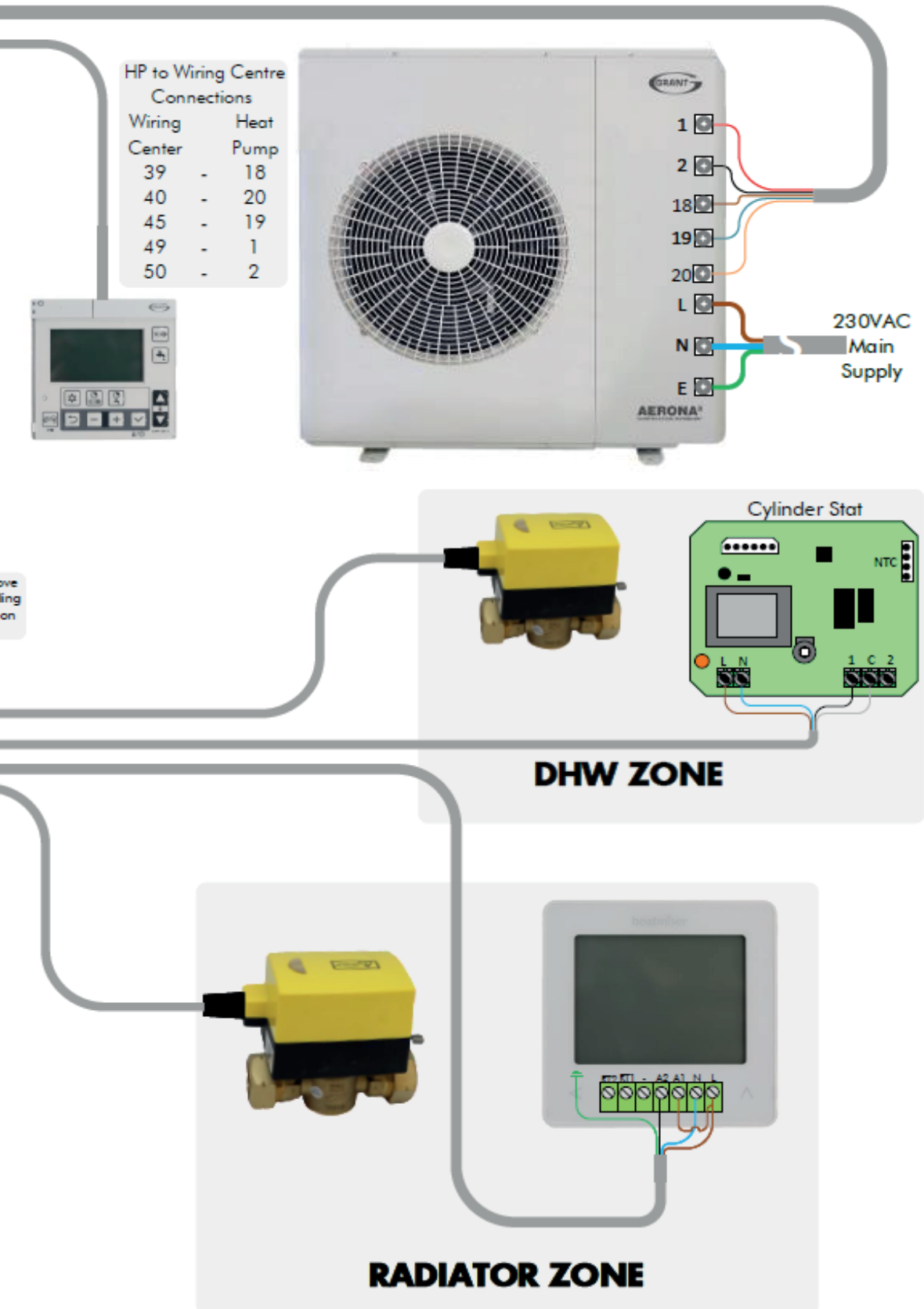




## 5.14 SECOND FIX WIRING

The below system diagram is only a concept drawing, not a detailed engineering drawing, and is not intended to describe complete systems, nor any particular system.

It is the responsibility of the system designer, not Grant IRL, to determine the necessary components for and configuration of the particular system being designed including any additional equipment and safety devices to ensure compliance with building and safety code requirements.



# 6 COMMISSIONING, DRAINING DOWN AND SAFETY

## 6.1 FILLING THE CYLINDER



**Before filling the cylinder check that the immersion heater has not loosened in transit. Tighten as necessary using a shaped spanner. Stillsons or pipe grips should not be used.**

1. Ensure that all connections are fully tightened.
2. Ensure that the service valve in the cold water supply is closed.
3. Open all hot water taps supplied by the cylinder.
4. Slowly open the service valve in the cold water supply.
5. Continue to fill the cylinder until water flows from all taps
6. Open the service valve fully and close all the hot taps.
7. Allow system to stabilise for five minutes.
8. Open each hot water tap in turn to expel air from the system pipe work.
9. Check for leaks.
10. Manually operate Temperature and Pressure Relief Valve (12) – Figures 2-3 or 2-4, to ensure free water flow through discharge pipe. (Turn knob to left).
11. Heat the water to 60°C and then close the service valve.
12. Drain the cylinder to flush out any flux/solder from the installation process. Refer to Section 6.2 below.
13. Remove the filter from the inlet manifold, clean and re-fit it.
14. Re-fill the cylinder – as described above.
15. Re-heat cylinder to the required temperature and re-check for leaks.

## 6.2 DRAINING DOWN

1. Switch off the electrical power to the immersion heater (important to avoid damage to the element).
2. Switch off the heat pump.
3. Turn off the cold water service valve (or stop cock).
4. Open all hot water taps.
5. Open drain cock in cold water supply to drain unit down. Refer to Figures 2-3 or 2-4.

## 6.3 IMMERSION HEATER SAFETY CUT-OUT

The immersion heater incorporates an independent non self-resetting over temperature cut-out device to prevent excessive water temperatures. Refer to Section 5.3 for further details.

The safety cut-out will operate if:

- a. The wiring is incorrect.
- b. The immersion heater thermostat or cylinder thermostat fails.
- c. Thermostat is set too high.

To reset the safety cut-out:

1. Unscrew and remove the nut holding the immersion heater cover in place.
2. Remove the immersion heater cover.



**Before removing the immersion heater cover, to either reset the safety cut-out or check/alter the thermostat setting, ensure that the electrical supply is isolated.**

3. The safety cut-out reset pin is positioned to the side of the control knob (indicated by a triangle with the word 'safety' below). Refer to Figure 5-1.
4. If the cut-out has operated, the reset pin will be pushed upwards (to be level or slightly above the cover).
5. Wait until the temperature has fallen sufficiently.

6. Investigate and identify the cause of the cut-out operation and rectify the fault.
  7. Press in the reset pin (to its normal operating position) to reset the cut-out. Use hand pressure only with a suitably sized implement.
  8. Refit the immersion heater cover correctly and secure in position with retaining nut.
  9. Switch the mains electricity supply back on.
- If the problem persists, please contact your installer.

## 6.4 COLD WATER DISCHARGE FROM TUNDISH

There are two reasons why cold water will discharge from the tundish:

1. The pressure reducing valve has malfunctioned (This will cause a large volume of water to flow through the tundish).
2. The Expansion relief valve is letting by (This will cause a very low volume of water to flow through the tundish).

In both cases, identify the defective component and replace. All repairs must be carried out by a competent person.

## 6.5 HOT WATER DISCHARGE FROM TUNDISH

There are four reasons why hot water will discharge from the tundish:

1. Thermal cut-out has malfunctioned.
2. The control thermostat has malfunctioned.
3. The T & P valve is letting by.
4. The expansion vessel has failed or lost its charge.

In all cases, should a repair be necessary, the work must be carried out by a competent person.

Isolate the cylinder from all electrical supplies before commencing maintenance work.

## 6.6 EXPANSION VESSEL

1. The expansion vessel is connected into the cold water supply to the cylinder.



NOTE

**No valve should be fitted between the expansion vessel and the supply pipe.**

2. Ensure that the air charge in the vessel matches the pressure setting shown on the pressure reducing valve.
3. The expansion vessel must be installed even if an accumulator is fitted.
4. The charge of the vessel must be checked at every annual service.

## 6.7 SETTING THE CYLINDER BYPASS

The pre-plumbed Grant MonoWave cylinder is supplied with a factory-fitted coil by-pass fitted between the primary flow and return pipes (below the heating zone valves).

## 6.8 CUSTOMER HANDOVER

1. Complete the Benchmark book supplied with the cylinder and leave it with the user.
2. Explain the operation of the system to the User, referring to Section 12 of these instructions.
3. In particular, make the user aware of what to do if water is seen to flow from either the T&P Valve or Expansion relief Valve.
4. Refer the user to the Information given in Section 12 of these instructions.



NOTE

**Leave these Installation, Servicing and User instructions with the user for future reference.**

## 7.1 SERVICING AND MAINTENANCE

1. Servicing and maintenance must only be carried out by a competent unvented hot water installer, or by Grant Engineering Ireland authorised personnel.
2. Before any work whatsoever is carried out on the installation, it MUST first be isolated from the electricity supply.



**Both the primary and secondary systems will contain very hot water that will scald; therefore care should be taken when opening any joints, seals or valves.**

1. Only use spare parts authorised by Grant Engineering Ireland. The use of unauthorised spare parts will invalidate the guarantee.
2. Drain the cylinder – When draining the cylinder, always switch off the boiler and the immersion heater first. Turn off the water supply at the service valve or mains stopcock.  
Connect a hose pipe to the drain cock (see Figures 2-3 or 2-4) and route it to a convenient gully. Open the drain cock and all hot taps that are served by the cylinder. The cylinder may take several minutes to empty completely.
3. In hard water areas it may be necessary from time to time to remove and de-scale the immersion heater element. Replace the gasket each time it is removed.
4. Remove the cartridge from the pressure-reducing valve (PRV). Check the strainer and if necessary remove any debris from in front of it. Replace the cartridge. Refer to Section 7.3 (Pressure Reducing Valve).
5. Remove the expansion relief valve cartridge. Check and clean valve seat. Replace cartridge. Refer to Section 7.4 (Expansion Relief Valve Cartridge).
6. Check the charge pressure in the expansion vessel and top up as necessary. The charge pressure should be 3.0 bar. Refer to section 7.5 (Expansion Vessel).
7. Whilst the hose pipe is connected, the drain cock open and with the immersion heater removed, the cylinder may be flushed out to remove any debris, sand or lime scale particles that may have collected in the bottom by using a further hose pipe connected to the cold water main.
8. Close the drain cock, disconnect the hose, refit the immersion heater and close all hot water taps before re-opening the stopcock. Allow the cylinder time to fill whilst checking for any leaks. Release any air from the system by opening each hot water tap individually, starting with the one furthest from the cylinder.
9. Manually lift the expansion relief and temperature and pressure relief valve one at a time, every 12 months (more frequently in hard water areas) to prevent debris from building up behind the valve seat. Whilst carrying out this operation, check that the discharge to waste is unobstructed. Check that each valve seals correctly when released. As the valves are pre-calibrated, they require no further maintenance.
10. Finally switch on the mains electricity supply to the immersion heater and the boiler. As the system heats up, check again for any leaks and rectify as necessary.

## 7.2 INLET MANIFOLD ASSEMBLY

The inlet manifold assembly should not, under normal circumstance, require any maintenance. During annual servicing it may be necessary to inspect and/or clean the line strainer, the pressure reducing valve cartridge, expansion relief valve cartridge. The frequency of cleaning will depend on the local water conditions.

## 7.3 PRESSURE REDUCING VALVE

1. Isolate the cold water supply.
2. Unscrew the retaining nut of the valve. The complete operating mechanism, including the strainer can be removed.
3. Clean the filter mesh and the cartridge under running water.
4. Replace cartridge ensuring that strainer is correctly located and reassemble the unit.

## 7.4 EXPANSION RELIEF VALVE CARTRIDGE

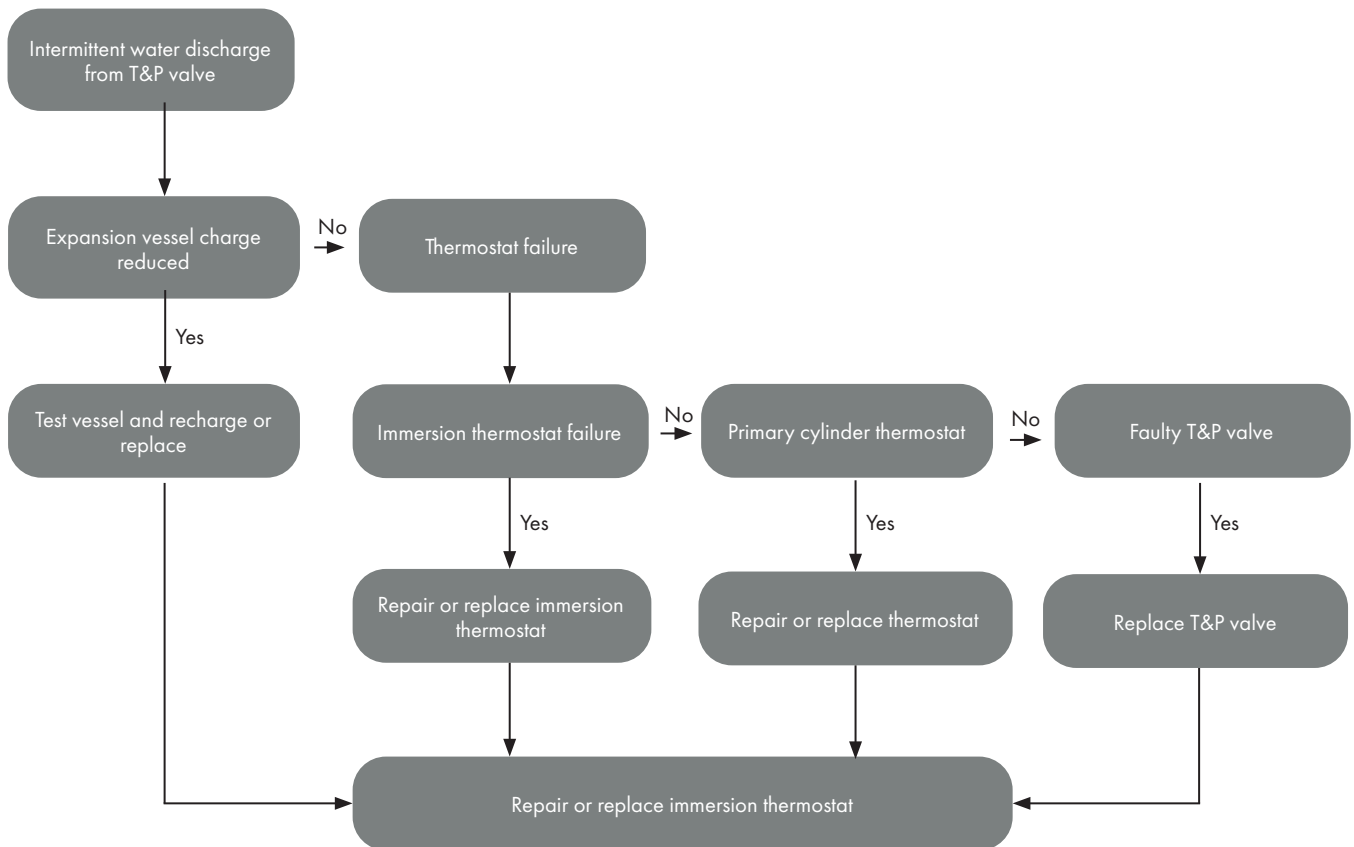
1. Isolate the cold water supply.
2. Remove grub screw (allen key type) from body of valve and withdraw valve ensuring not to damage o-ring.
3. Clean valve seat face and seating - do not scratch or damage either seat face or seating.
4. Refit in reverse order. Do not overtighten.

## 7.5 EXPANSION VESSEL

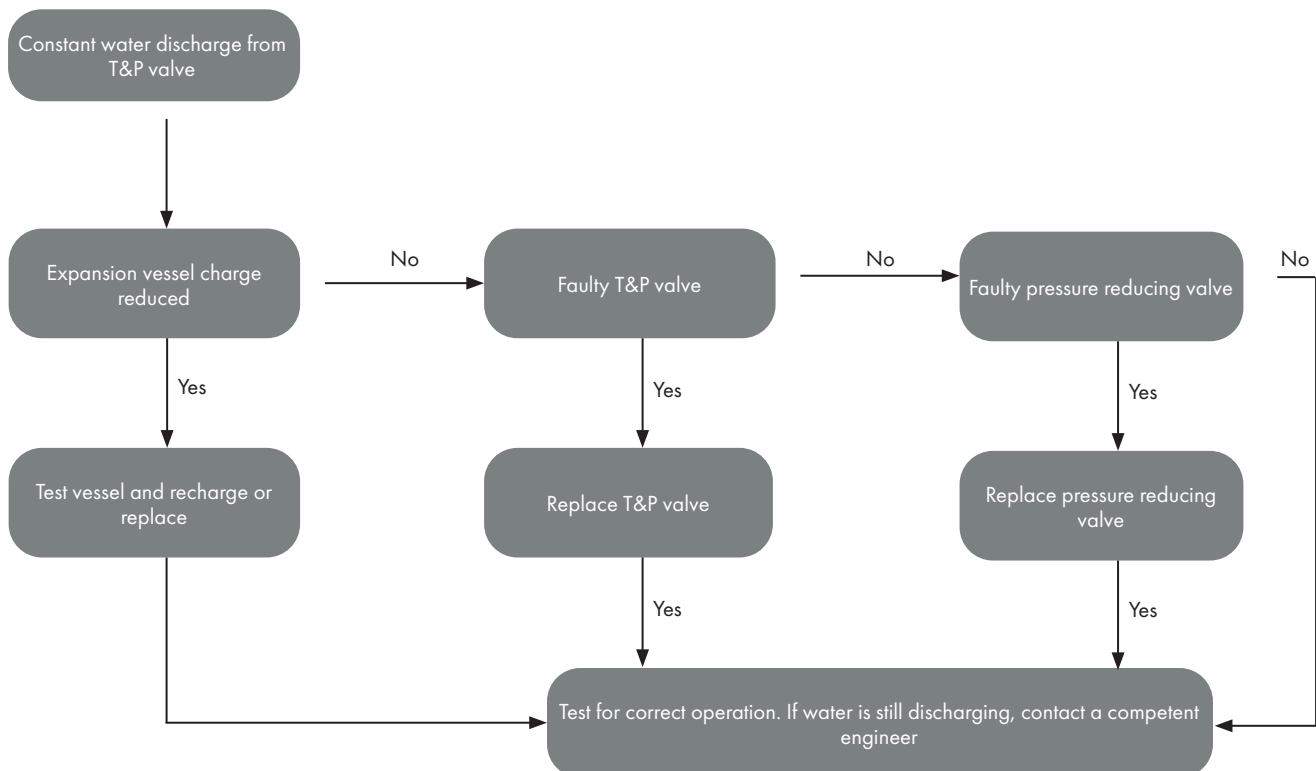
1. Isolate the cold water supply.
2. Open hot water taps.
3. Drain cylinder to below the expansion vessel flexible hose connection.
4. Check expansion vessel air charge.
5. Replace expansion vessel if necessary.
6. Close drain off cock and turn on cold water supply.
7. Refill cylinder whilst checking for leaks.
8. When water is flowing freely from taps close taps.

# 8 FAULT FINDING

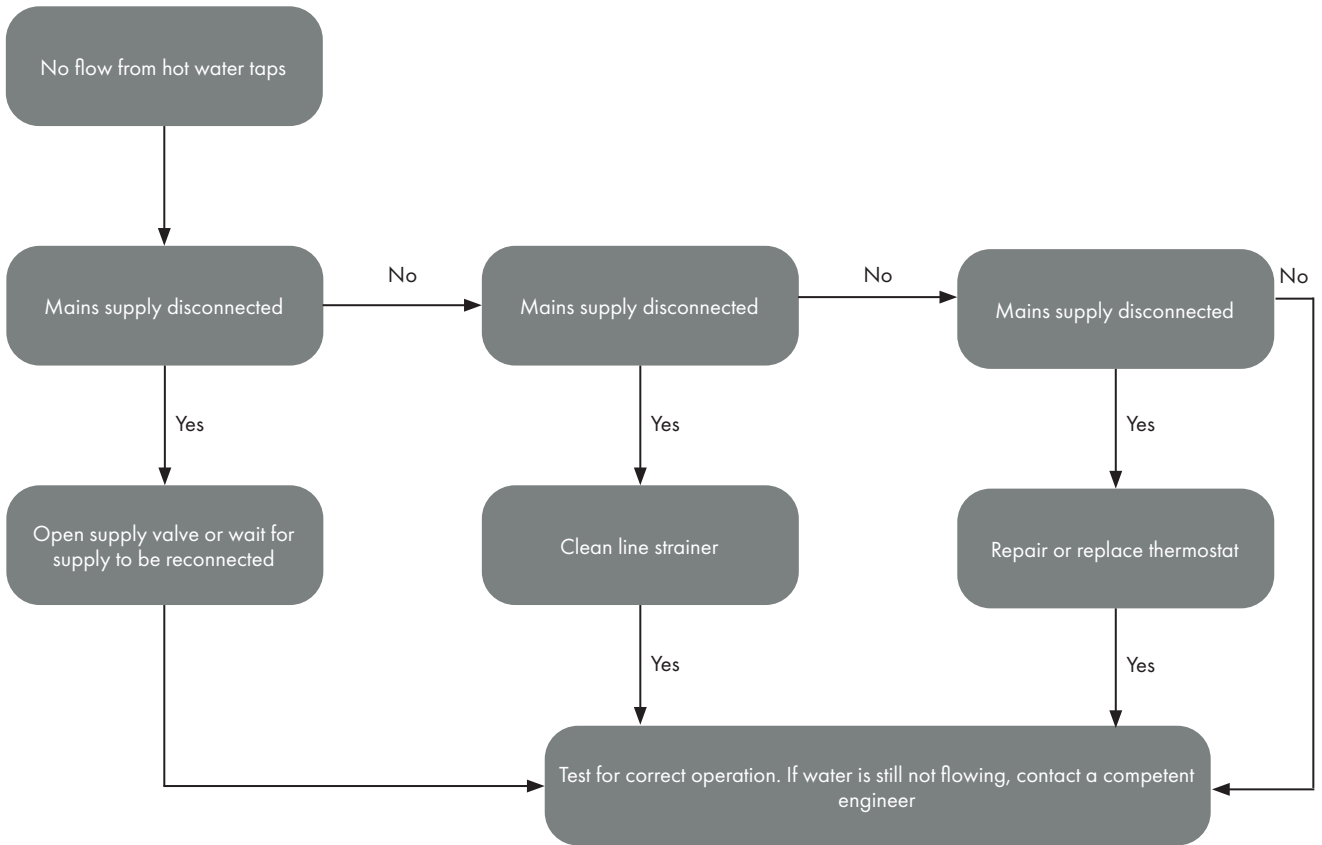
## 8.1 INTERMITTENT WATER DISCHARGE



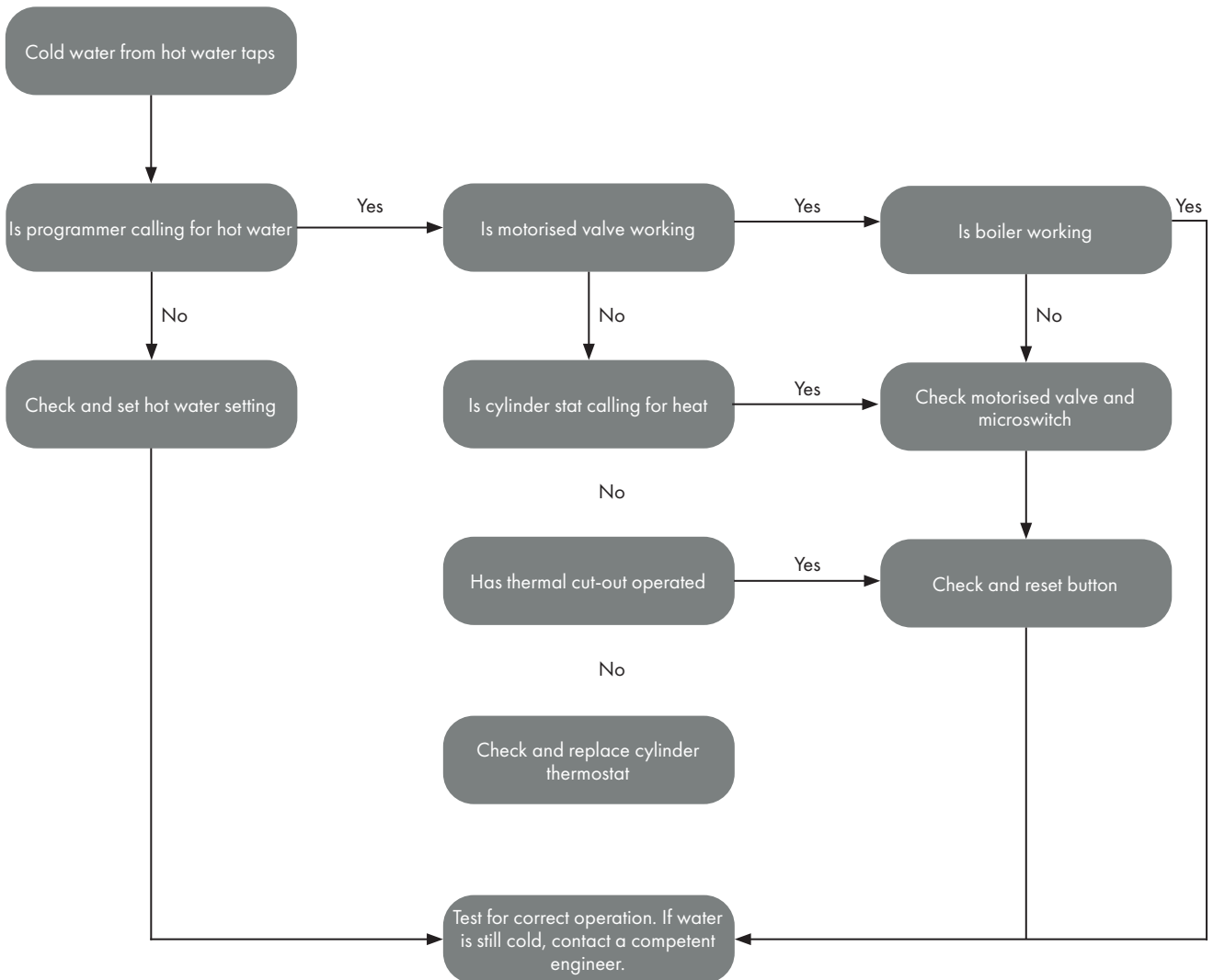
## 8.2 CONSTANT WATER DISCHARGE



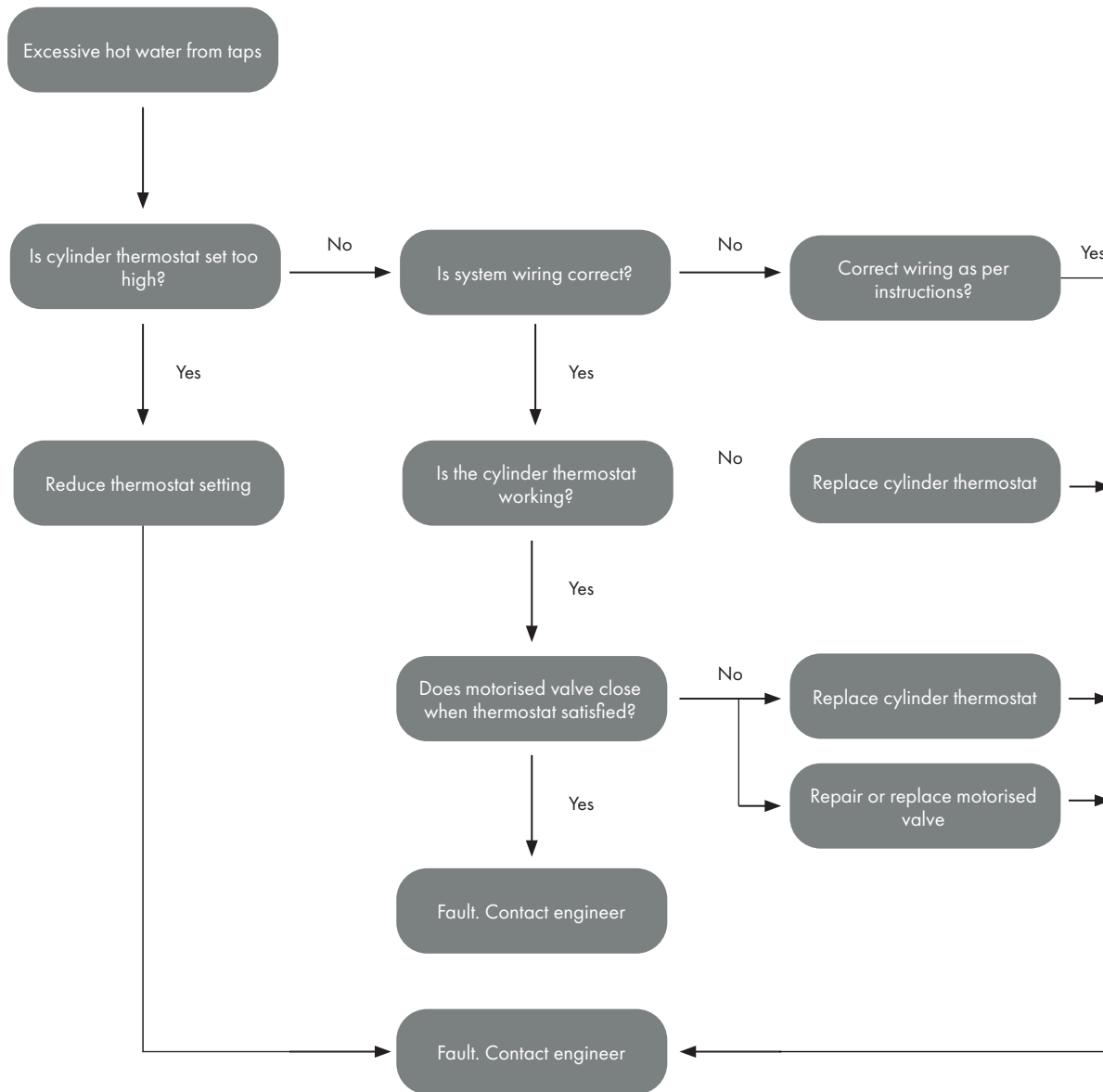
### 8.3 NO FLOW FROM HOT WATER TAPS



### 8.4 COLD WATER FLOW FROM HOT WATER TAPS



## 8.5 EXCESSIVE HOT WATER FROM TAPS



## 9.1 SPARE PARTS

Product description	Product code
FILLING LOOP	0026957
RETURN PIPESET MANIFOLD	1002642
FLOW PIPESET MANIFOLD	1002644
COLD FEED PIPESET	0025033
PIPESET 15MM DISCHARGE	0025038
TUNDISH	1000093
BY-PASS VALVE (ERES)	0025430
INLET CONTROL GROUP (3 BAR & 6 BAR)	0027827
EXPANSION VESSEL 19L	0008960
EXPANSION VESSEL 24L	0008961
T&P VALVE (7BAR/90C)	0025490
IMMERSION HEATER (3kW x 1.¾ BSP)	0025054

# 10 PRODUCT FICHE

Product fiche concerning the  
COMMISSION DELEGATED REGULATIONS  
(EU) No 812/2013 of 18 February 2013  
(EU) No 814/2013 of 2 August 2013

Model	Name	Volume Size	Energy Rating	24 HR Standing Heat Loss
HPMONOPP210G	Monowave 210 ltr heatpump cylinder Pre-plumbed	210L	C	1.79kWh for 24hrs 75W/hr
HP210GAWERP	Grant Awave Intergrated 210 Unit	210L	C	1.79kWh for 24hrs 75W/hr
HPMONO210	Monowave 210 ltr heatpump cylinder	210L	C	1.79kWh for 24hrs 75W/hr
HPMONO300	Monowave 300 ltr heatpump cylinder	300L	C	2.24kWh for 24hrs 93W/hr
HPDUO210G	Grant Duowave 210	210L	C	1.79kWh for 24hrs 75W/hr
HPDUO300G	Grant Duowave 300	300L	C	2.24kWh for 24hrs 93W/hr
HPMONOSLIM/180G	Monowave 180 ltr slimline heatpump cylinder	180L	C	1.72kWh for 24hrs 72W/hr



# 11 END OF LIFE INFORMATION

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## GENERAL

Grant hot water storage cylinders and thermal stores incorporate components manufactured from a variety of different materials. The majority of these materials can be recycled whilst the smaller remainder cannot.

Materials that cannot be recycled must be disposed of according to local regulations using appropriate waste collection and/or disposal services.

## DISASSEMBLY

There is little risk to those involved in the disassembly of the cylinder or thermal store if the process is undertaken with care and reasonable precautions are taken.

## RECYCLING

Many of the materials used in Grant hot water storage cylinders and thermal stores can be recycled, as listed below:

<b>COMPONENT</b>	<b>MATERIAL</b>
Shell	Stainless steel (duplex 2034)
Internal coils	Stainless steel
Compression connections	Brass
Outer casing	Steel (acrylic coated)
Top/bottom caps	ABS (acrylic capped)
T&P valve	Brass
Immersion heater	Brass/stainless steel
Dual thermostat	Plastic/copper
Expansion vessel	Stainless steel
Cold water inlet manifold	Brass

## DISPOSAL

All materials other than those listed above must be disposed of responsibly as general waste.



R&D Manager

# 12 USER INSTRUCTIONS

## 12.1 USER INSTRUCTIONS

Your Grant MonoWave HP cylinder has been designed to give many years of trouble-free service and is made from hygienic high grade stainless steel.

### IMMERSION HEATERS

Your Grant Wave HP cylinder is fitted with one 3kW immersion heater except the Triple Coil cylinder which has 2 x 3kW immersion heaters. Refer to Section 5.1 for further details.

The immersion heater in the cylinder can be used to heat your hot water when your heat pump (or boiler) is switched off, e.g. during the summer months.

The cylinder immersion heater has been factory-set to position 4 (refer to Figure 5-1) to give a hot water temperature of around 60°C.

The immersion heater incorporates an independent non self-resetting over temperature cut-out device to prevent excessive water temperatures. If this safety cut-out operates it can be re-set. Refer to Section 6.3.

If the problem persists, please contact your installer.

### DIGITAL DUAL THERMOSTAT

Your Grant MonoWave HP cylinder is also fitted with a Digital Thermostat (mounted on the cylinder). Refer to Section 5.3 for further details.

The cylinder control thermostat has an adjustment range between 25°C and 65°C. It is recommended that it is set to 48°C.

The high limit (overheat) thermostat will automatically operate if the water temperature reaches 90°C. If this operates it can be re-set. To do this, first wait for the cylinder to cool down. Then remove the dial and press in the small re-set pin.

If the problem persists, please contact your installer.

### TEMPERATURE SETTINGS

The hot water temperatures on the cylinder immersion heater and dual thermostat should not be set any higher than 60°C otherwise nuisance tripping of either the immersion heater safety cut-out, or the high limit thermostat (in the digital thermostat) will occur.

If you are in any doubt, these temperature adjustments should be best left to your installer.

### HOT WATER

When a hot tap is turned on there may be a short surge of water, this is quite normal with unvented systems and does not mean there is a fault.

When you first fill a basin the water may sometimes appear milky. This is due to very tiny air bubbles in the water, which will clear very quickly.



**If water is seen to flow from either the Temperature & Pressure Relief (T&P Valve) valve or the Expansion Relief**

**Valve (EV) on the cylinder seek expert advice immediately.**

**If water is flowing from the T&P Valve, immediately:**

- 1. Shut off the electrical supply to the immersion heater(s).**
- 2. Shut down the boiler or other heat sources to the cylinder e.g. solar, heat pump, etc.**
- 3. DO NOT SHUT OFF THE WATER SUPPLY TO THE CYLINDER.**
- 4. Contact your installer to check the system.**

#### **IMPORTANT**

**Do NOT tamper with any of the Safety controls fitted to the cylinder. If you suspect a fault always contact a competent installer who is qualified to work on unvented water cylinders.**

# 13 GUARANTEE

You are now the proud owner of a Grant Cylinder from Grant Engineering Ireland, which has been designed to give you years of reliable, trouble free operation.

Grant Engineering Ireland guarantees all electrical and mechanical components supplied with the cylinder for a period of one year from the date of purchase. In addition, the stainless steel used in the manufacture of the cylinder is guaranteed for a period of ten years with the manufacturing process of the cylinder guaranteed for one year from the date of purchase.

## Breakdown during the Manufacturer's Warranty

If your Grant Cylinder should fail during the first year, you must contact Grant Engineering Ireland, who will arrange for the repair under the terms of their guarantee, providing that the system has been correctly installed and commissioned, and the fault is not due to misuse, or the failure of any external components not supplied by Grant Engineering Ireland, (e.g. pipework, etc.).

## In the first Instance:

Contact your installer or commissioning engineer to ensure that the fault does not lie with the system or any other components, or any incorrect setting of the system controls.

## If a Fault is Found:

Ask your installer to contact Grant Engineering Ireland, service department on 057 9120089 who will arrange for a qualified service engineer to attend to the fault.

## Free of Charge Repairs:

During the first year no charge for parts or labour will be made providing that the cylinder has been installed and commissioned correctly in accordance with the manufacturer's instructions and serviced at twelve month intervals. Proof of 'purchase' date must be provided upon request.

## Chargeable Repairs:

**A charge will be made if the cause of the breakdown is due to any of the following:**

- **Faults caused by the plumbing or heating system, external electrics and external components.**
- **The Grant Cylinder has not been commissioned, or serviced in accordance with the installation and servicing manual.**
- **The system has been installed for over one year.**

## Terms of Manufacturer's Guarantee

1. The Grant Cylinder guarantee starts from the date of purchase.
2. All electrical and mechanical components supplied with the Grant Cylinder are guaranteed for a period of one year. The stainless steel used in the manufacture of the cylinder is guaranteed for a period of ten years with the manufacturing process of the cylinder guaranteed for one year.
3. The Grant Cylinder must be installed by a competent/licensed installer and in accordance with the Codes of Practice and Regulations in force at the time of the installation.
4. The Grant Cylinder and its components must not have been modified or tampered with.
5. The installation must be serviced every twelve months as per the installation instructions. (Receipts should be kept as proof).
- 6. The Grant Cylinder must be connected to a mains water supply (installations utilising a well or private water supply are not covered by this guarantee)**
7. Breakdown/failure due to lime-scale will not be covered by this guarantee
8. The Grant Cylinder must not be sited in a location where it may be subjected to frost.
9. All claims under this guarantee must be made to Grant Engineering Ireland prior to any work being undertaken. Proof of purchase and date of installation must be provided on request. Invoices for call out/repair work by any third party will not be accepted unless previously authorised by Grant Engineering Ireland.
10. This guarantee is transferable providing the installation is serviced prior to the dwelling's new owners taking up residence. Grant Engineering Ireland must be informed of the new owner's details.
11. Grant Engineering Ireland will endeavour to provide prompt service in the unlikely event of a problem occurring, but cannot be held responsible for any consequence of delay however caused.
12. This guarantee applies to Grant Cylinders installed in the Republic of Ireland and Northern Ireland. Provision of in-warranty cover elsewhere is subject to agreement with Grant Engineering Ireland.

# 14 SERVICE LOG

Service:	Date:
Engineer's Name:	
Company Name:	
Tel. No:	
Comments:	
Signature:	

Service:	Date:
Engineers Name:	
Company Name:	
Tel. No:	
Comments:	
Signature:	

Service:	Date:
Engineer's Name:	
Company Name:	
Tel. No:	
Comments:	
Signature:	

Service:	Date:
Engineer's Name:	
Company Name:	
Tel. No:	
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Engineer's Name:	
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Service:	Date:
Engineer's Name:	
Company Name:	
Tel. No:	
Comments:	
Signature:	

Service:	Date:
Engineer's Name:	
Company Name:	
Tel. No:	
Comments:	
Signature:	

# 15 COMMISSIONING CHECKLIST

## MAINS PRESSURE HOT WATER STORAGE SYSTEM COMMISSIONING CHECKLIST

This Commissioning Checklist is to be completed in full by the competent person who commissioned the storage system as a means of demonstrating compliance with the appropriate Building Regulations and then handed to the customer to keep for future reference.

Failure to install and commission this equipment to the manufacturer's instructions may invalidate the warranty but does not affect statutory rights.

Customer Name \_\_\_\_\_ Telephone Number \_\_\_\_\_  
 Address \_\_\_\_\_  
 Cylinder Make and Model \_\_\_\_\_  
 Cylinder Serial Number \_\_\_\_\_  
 Commissioned by (print name) \_\_\_\_\_ Registered Operative ID Number \_\_\_\_\_  
 Company Name \_\_\_\_\_ Telephone Number \_\_\_\_\_  
 Company Address \_\_\_\_\_ Commissioning Date \_\_\_\_\_

To be completed by the customer on receipt of a Building Regulations Compliance Certificate \*: Building Regulations Notification Number (if applicable) \_\_\_\_\_

**ALL SYSTEMS PRIMARY SETTINGS** (indirect heating only)  
 Is the primary circuit a sealed or open vented system? Sealed  Open   
 What is the maximum primary flow temperature? \_\_\_\_\_ °C

**ALL SYSTEMS**  
 What is the incoming static cold water pressure at the inlet to the system? \_\_\_\_\_ bar  
 Has a strainer been cleaned of installation debris (if fitted)? Yes  No   
 Is the installation in a hard water area (above 200ppm)? Yes  No   
 If yes, has a water scale reducer been fitted? Yes  No   
 What type of scale reducer has been fitted? \_\_\_\_\_  
 What is the hot water thermostat set temperature? \_\_\_\_\_ °C  
 What is the maximum hot water flow rate at set thermostat temperature (measured at high flow outlet)? \_\_\_\_\_ l/min  
 Time and temperature controls have been fitted in compliance with Part L of the Building Regulations? Yes   
 Type of control system (if applicable) Y Plan  S Plan  Other   
 Is the cylinder solar (or other renewable) compatible? Yes  No   
 What is the hot water temperature at the nearest outlet? \_\_\_\_\_ °C  
 All appropriate pipes have been insulated up to 1 metre or the point where they become concealed Yes

**UNVENTED SYSTEMS ONLY**  
 Where is the pressure reducing valve situated (if fitted)? \_\_\_\_\_  
 What is the pressure reducing valve setting? \_\_\_\_\_ bar  
 Has a combined temperature and pressure relief valve and expansion valve been fitted and discharge tested? Yes  No   
 The tundish and discharge pipework have been connected and terminated to Part G of the Building Regulations Yes   
 Are all energy sources fitted with a cut out device? Yes  No   
 Has the expansion vessel or internal air space been checked? Yes  No

**THERMAL STORES ONLY**  
 What store temperature is achievable? \_\_\_\_\_ °C  
 What is the maximum hot water temperature? \_\_\_\_\_ °C

**ALL INSTALLATIONS**  
 The hot water system complies with the appropriate Building Regulations Yes   
 The system has been installed and commissioned in accordance with the manufacturer's instructions Yes   
 The system controls have been demonstrated to and understood by the customer Yes   
 The manufacturer's literature, including Benchmark Checklist and Service Record, has been explained and left with the customer Yes

Commissioning Engineer's Signature \_\_\_\_\_  
 Customer's Signature \_\_\_\_\_  
 (To confirm satisfactory demonstration and receipt of manufacturer's literature)

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# NOTES

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