

Grant AERONA Air Source Heat Pump

Air to Water Heat Pump Range

Installation & User Instructions



APPROVED PRODUCT



Tested to BS EN 14511

Part No. DOC.87 Rev.05 January 2011



STOP!

Before continuing with the installation of your new Aerona Heat pump, please spend a few minutes confirming the suitability of the Heat Pump to your system. Failure to do so may result in poor performance and wasted time.

- Has a heat loss calculation been carried out? kW
- Is this system designed for Mono or Bivalent
.....
- If Mono, total heating capacity? kW
- If Bivalent, what is the load capacity of Heat Pump? kW
- If Bivalent, what is/are additional heat source(s)?
 - i) kW
 - ii) kW
 - iii) kW
- Type of system design?
 - i) S-plan
 - ii) Y-plan
 - iii) Other
- Will a buffer be used? Yes/No
- If yes, what is the capacity of Buffer? litres
- Has cavity wall insulation been installed? Yes/No
- Has loft insulation of 270mm been installed? Yes/No
- Have all system pipes been lagged correctly? Yes/No
- Are the existing controls being upgraded? Yes/No

If any of the above questions cannot be answered accurately, please do **NOT** proceed with the installation. While any errors made now may be able to be compensated for after the installation is completed, you will incur unnecessary delays and additional costs.

Legislation

All work that is required regarding the refrigerant circuit must be carried out by an F-gas registered (or equivalent) refrigeration Engineer. On no account should maintenance or repair be carried out on the refrigerant circuit by unqualified personnel.

Information regarding the refrigerant used in this Heat Pump. R407c

R407C is a mixture of three refrigerants, each of which boil at different temperatures. R407C has a range or glide of approximately 5°C. The lubricating oils used in this heat pump are known as Polyolester or POE oils. They are considered to be superior oils, less liable to breakdown however they are more hygroscopic – they must therefore be kept from contact with air as far as is practical.

Information regarding the charging / recharging of the unit.

Always add R407C as a liquid to ensure that the correct mix is added.

Charge the heat pump with the correct weight of refrigerant. See data plate for this information.

Never 'top-up' refrigerant. Always recover the remaining refrigerant first for recycling.

Information regarding a refrigerant leak or if the circuit is opened accidentally.

Recover the remaining refrigerant as quickly as possible for recycling.

Avoid entry of air into the heat pump as much as possible.

Replace or install a drier if necessary.

LEGISLATION

The installation of the Grant Aerona Heat Pump requires a power supply cable from the customer's consumer unit to an external isolation switch and from this switch to the heat pump. It will require a final connection to an individual MCB or RHBO within the existing consumer unit or from a newly installed consumer unit.

This work MUST be carried out by a qualified electrician or by a Part-P competent installer who has passed an examination proving their competency in these works.

Failure to follow this legislation will invalidate all warranties.

Please seek advice from a competent person before commencing any electrical work.

CE Marking

The Grant Aerona range of Air Source Heat Pumps are CE marked and conform to the requirements of the following Directives and Standards:

Low Voltage	73/23 EEC, modified 93/68 EEC.
Electromagnetic Compatibility (EMC)	89/336 EEC, modified 92/31
Pressure Equipment Directive (PED)	97/23/EC
Electrical Equipment	EN 60 335-2

The following Standards and Directives should also be considered in the installation and application of the heat pumps:

BS7671: 2008 IEE Wiring Regulations - 17th edition (including and any amendments)

BS EN 15450: 2007 Heating systems in buildings – Design of Heating Systems

EC Regulation No. 842/2006

HVAC TR/30 Guide to good practice - Heat pumps

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1 Introduction & General Information

1.1 General Information

The Grant Aerona Heat Pump is a low water content – low temperature heat source, designed to be highly efficient when installed and used in line with these installation and user instructions.

It is important that these installation instructions are understood and followed to ensure reliable operation in all weather conditions. Failure to do so will result in erratic temperature swings, poor efficiency and an unhappy customer.

It is not within the scope of this manual to design the heating system or provide any advice regarding the layout of the system or any of the controls required for any individual heating system.

These instructions do not replace the installation or users manuals for any additional components used in the design of your system e.g. cylinders, motorised valves, programmers, solar thermal devices, buffers, etc.

Grant Engineering UK Ltd offer a design service for an additional fee – please contact info@grantuk.com for more information or visit our website at www.grantuk.com Note: this service is subject to the terms and conditions in force at the time of the design.

These instructions must be left with the householder for their reference.

1.2 Warranty

This appliance is guaranteed for two years, covering parts and labour. When making a claim against this warranty, the following information must be provided at the initial point of contact.

- Appliance model number
- Appliance Serial number
- Date of Installation
- Date of Commissioning (if different)
- Evidence of Heat Loss calculation

- Description of fault together with any relevant fault codes

Please ensure that the caller is on site to assist us in providing a fast response.

The warranty will begin only when a completed registration card is returned to Grant, or when the registration is completed online at www.grantuk.com. Failure to complete the registration at the time of installation will result in the warranty being suspended. This does not affect the consumer's statutory rights.

If a Grant Engineer is required to visit the site and no fault is found with the heat pump, a charge will be made for this visit. The original caller will be responsible for this charge.

Refer to Section 17 for full details of the Grant Heat Pump warranty.

1.3 Important Advice

1. It is essential that the full layout of the system is understood before the installation of any component is undertaken. If you are in any doubt, please stop and seek advice from a qualified heating engineer or from Grant Engineering UK Ltd. Please note that Grant Engineering will not be able to offer specific advice about your system unless we designed it. In this case, we will always refer you to seek the advice of a qualified system designer.
2. The Heat Pump must be installed and commissioned in accordance with these installation instructions. Deviations of any kind will invalidate the warranty and may cause an unsafe situation to occur. Please seek advice from Grant Engineering UK Ltd if any of these installation instructions cannot be followed for whatever reason.

3. The heat pump contains high pressures and high temperatures during normal working conditions. Care must be taken when accessing the internal workings of the heat pump.
4. The heat pump contains an electrically driven fan which rotates at high speed. Disconnect the heat pump from the electrical supply before removing the top cover.

1.4 Immersion Heater

All Grant Aerona Heat pumps are supplied with a factory fitted 3kW immersion element. This is designed to operate at low ambient air temperatures to increase the output of the unit to meet the design heat load. Refer to Section 11 of these instructions for details of the automatic operation of the immersion element.

If required, all Grant Aerona Heat pumps are available with a 6kW back-up immersion element (in place of the standard 3kW unit).

This is a factory fitted option ONLY and must be specified when ordering the heat pump.

For the starting and running current, along with the required MCB rating/type for units with either the 3kW or 6kW immersion elements refer to Section 8 (page 19) of these instructions.

IMPORTANT

Grant Aerona heat pumps should be stored and transported in an upright position. If not, the heat pump MUST be positioned in an upright position for at least 4 hours before being operated.

2 Specifications and Controls

2.1 Specifications

Model		HPAW65	HPAW85	HPAW110	HPAW130	HPAW155
Heating Capacity	kW	6.78	8.73	11.32	12.58	15.5
Max. Running Current at 240V*	A	23	27	28	30	36
Power supply	V	220/240	220/240	220/240	220/240	220/240
Phase		Single	Single	Single	Single	Single
Frequency	Hz	50	50	50	50	50
Mechanical Protection		IP X4	IP X4	IP X4	IP X4	IP X4
Refrigerant		R407c	R407c	R407c	R407c	R407c
Mass of R407c	g	1300	1750	1900	2200	2300
Built In Immersion	kW	3	3	3	3	3
Circulating Pump	m head	6	6	6	6	15
Flow Rate	litres/sec	0.311	0.422	0.54	0.61	0.724
Sound Level at 1m	dB(A)	53	56	56	59	63
Water Connections	BSPF	3/4"	3/4"	1"	1"	1"
COP @ Air 7°C/Water 35°C		4.1	3.9	4.3	4.8	5.8
Weight (empty)	kg	100	121	141	144	172
Weight (full)	kg	116	139	159	162	191

* Includes 3kW immersion heater.

2.2 Dimensions

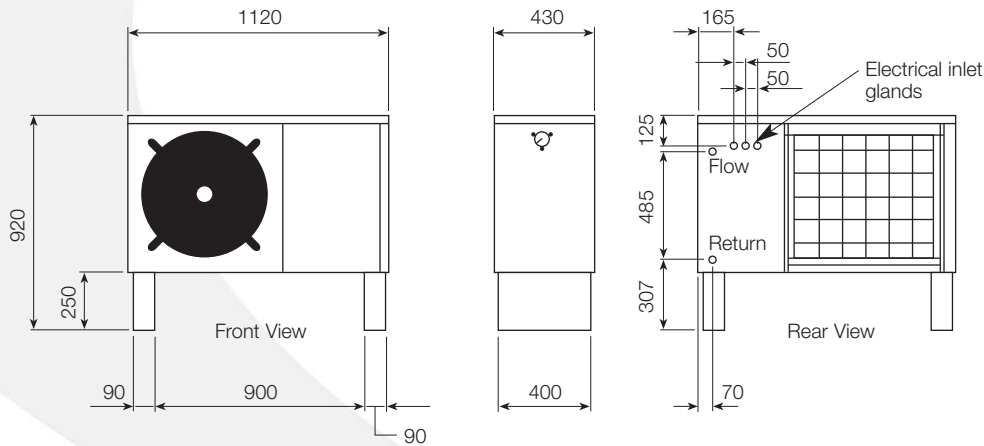


Figure 2-1: HPAW65 model

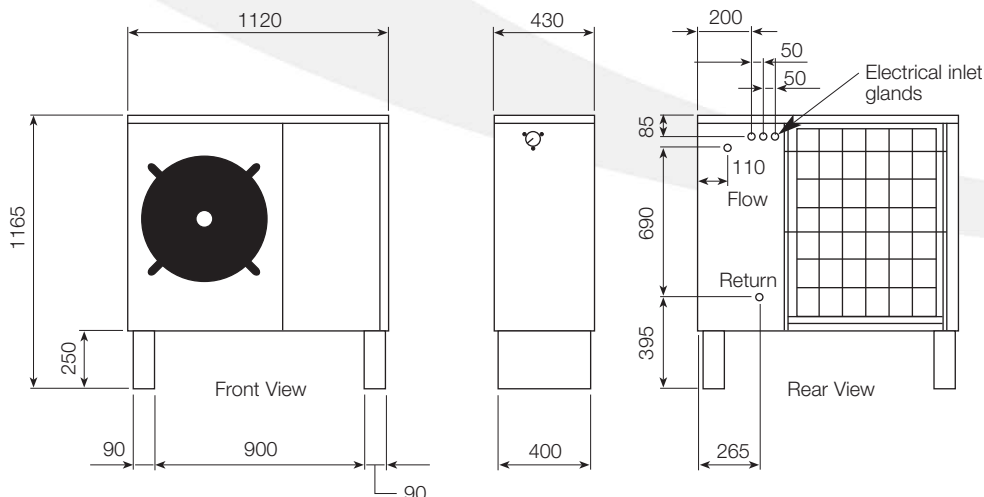


Figure 2-2: HPAW85, HPAW110 & HPAW130 models

2.2 Dimensions

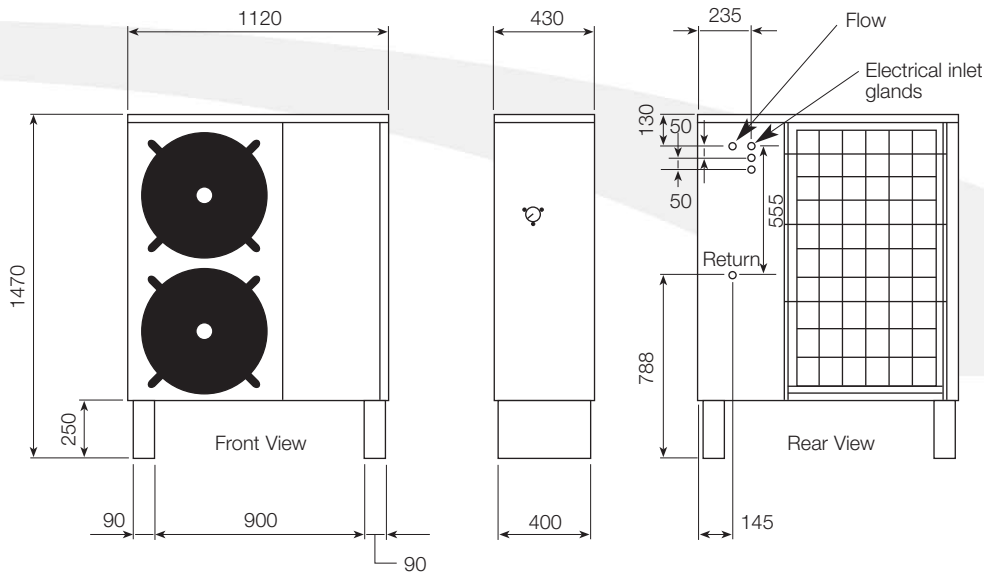


Figure 2-3: HPAW155 model

2.3 Main Components

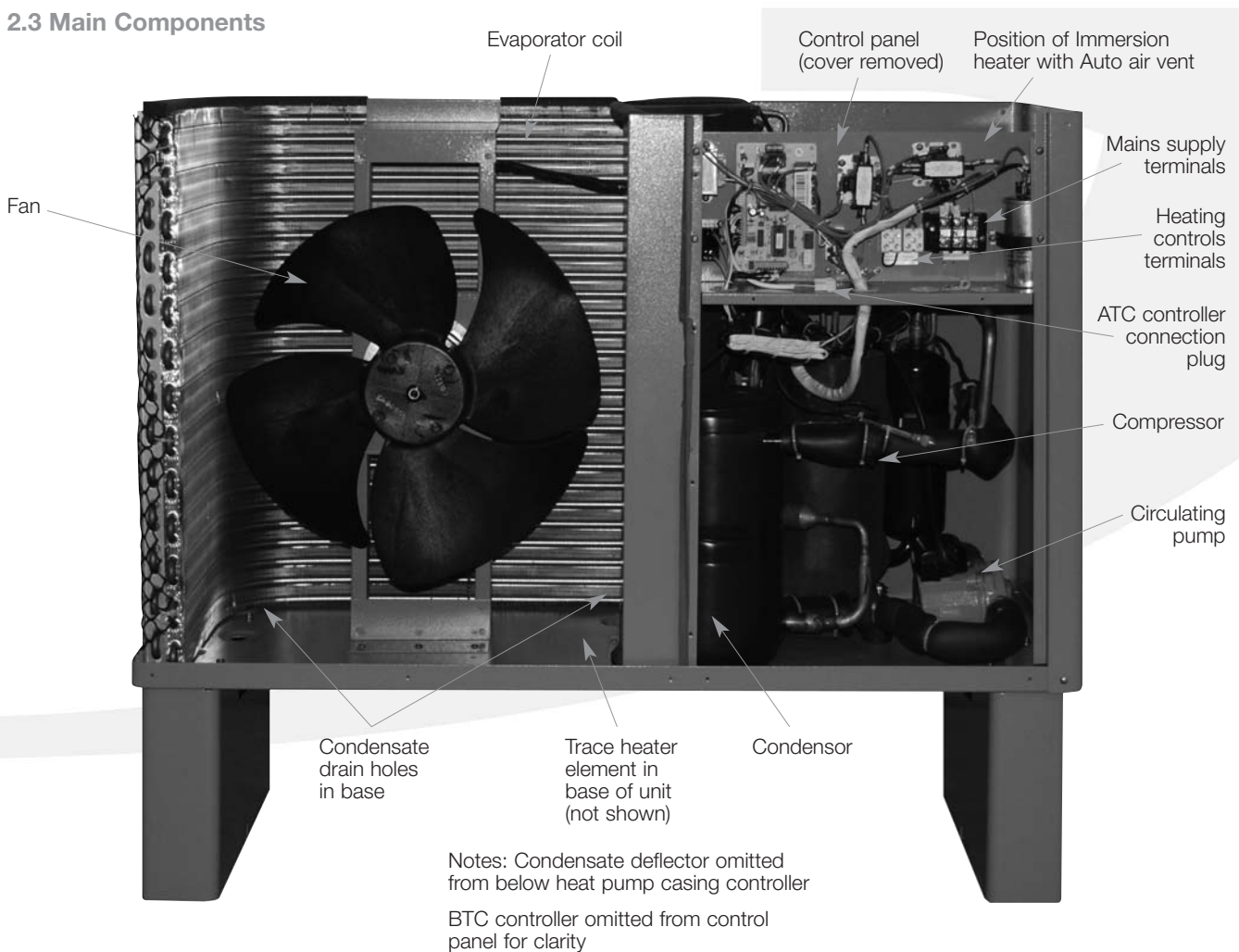


Figure 2-4: Main internal components

2 Specifications and Controls

2.4 Heat Pump Curves

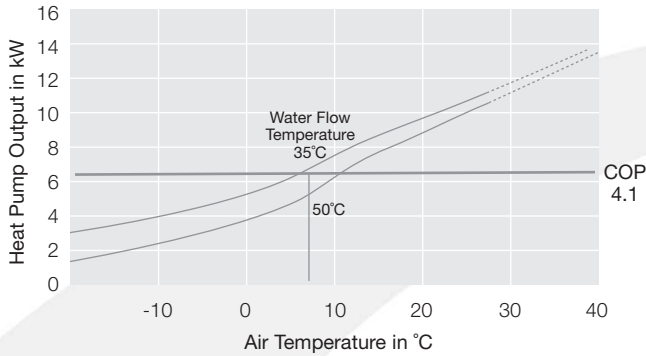


Figure 2-5: Grant HPAW65

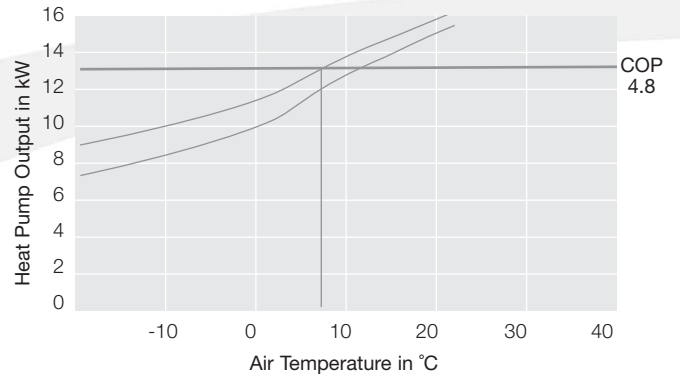


Figure 2-8: Grant HPAW130

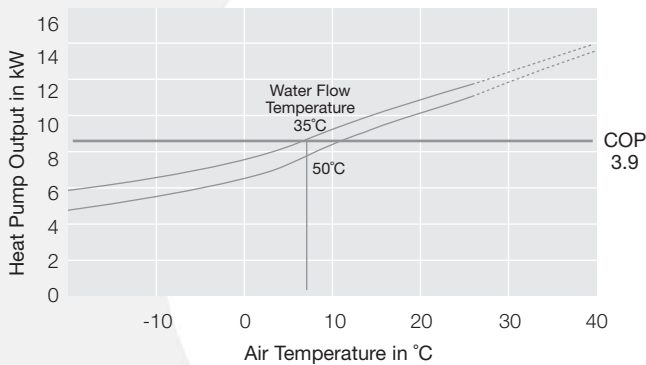


Figure 2-6: Grant HPAW85

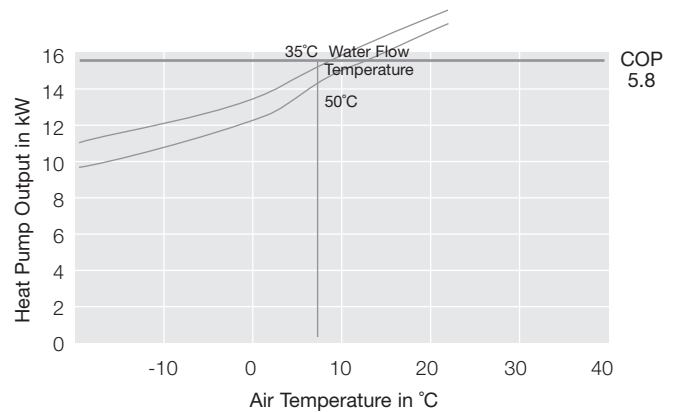


Figure 2-9: Grant HPAW155

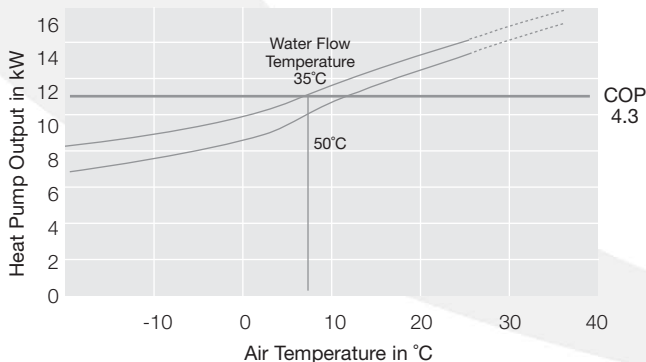


Figure 2-7: Grant HPAW110

! NOTE

All Grant Aerona heat pumps have been independently third party tested to BS EN 14511. The COP data given above is based on 7°C ambient air and 35°C water temperature. This information should be used as guidance only and **not** to estimate the COP at other temperatures.

2.5 Pump Curves

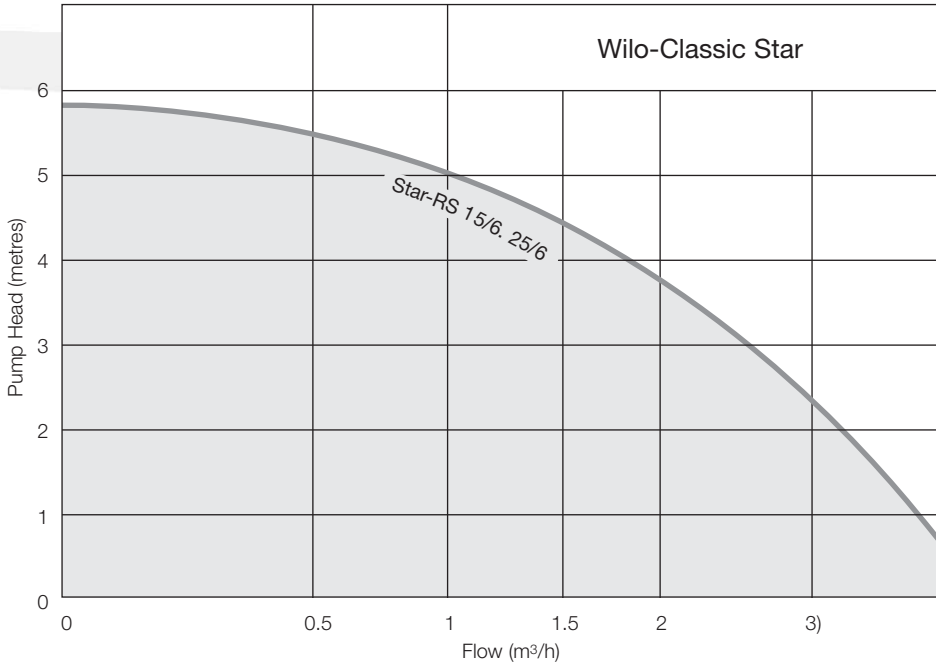


Figure 2-10: Pump curve for HPAW65, HPAW85, HPAW110 & HPAW130

15.5kW Pump Curve

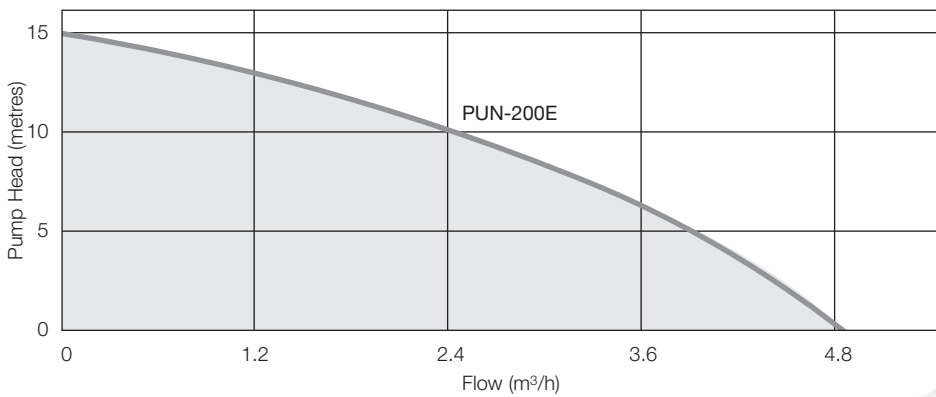


Figure 2-11: Pump curve for HPAW155

2.6 Heat Pump Operating Sequences

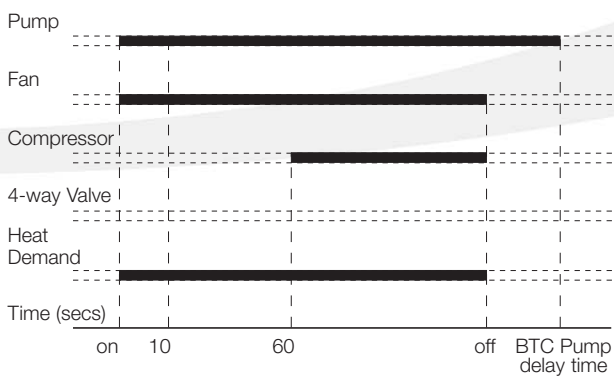


Figure 2-12: Normal operating sequence

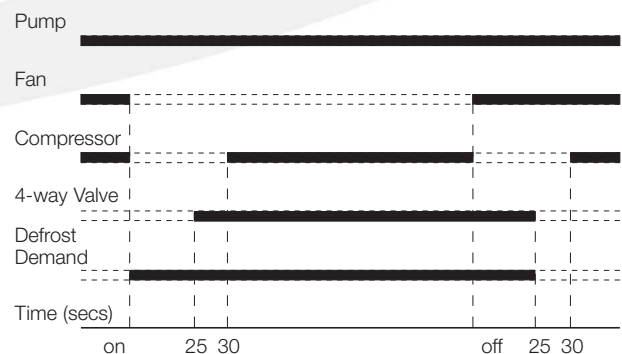


Figure 2-13: Defrost cycle

2 Specifications and Controls

2.7 Controls

All Grant Aeron Heat Pumps are supplied with 2 controllers. 1 x heat pump controller (ATC) and 1 x temperature controller (BTC).

The ATC is positioned inside the house/building and is normally used in an automatic condition. There are a few parameters that can be adjusted including time and maximum water temperature. The details of these settings can be found in Section 11 of this manual.

The BTC is a split temperature controller located inside the heat pump. For many installations, the HW temperature and the CH temperature will be different. The BTC allows for 2 different design temperatures to be entered, maximising the efficiency of the Grant Aeron heat pump. The details of these settings can be found in Section 11 of this manual.

All other controls (programmers, motorised valves, thermostats, etc) are not supplied but their use is covered in Sections 4 and 8 of this installation manual.

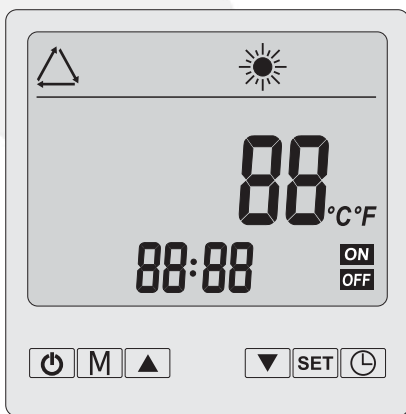


Figure 2-11: ATC Controller

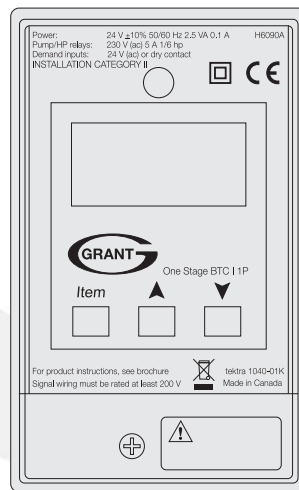


Figure 2-12: BTC Controller

3 Siting the Heat Pump

3.1 Position

1. Base

The heat pump should be installed on a flat trowelled finished concrete base 150mm thick. This base should extend at least 100mm beyond the unit on three sides. The edge of the concrete base on the side closest to the building should be flush with that face of the heat pump. Refer to Figure 3-1.

To avoid bridging the DPC, leave a gap of at least 300mm between the concrete base and the wall of the house.

The Underside of the heat pump is fitted with a condensate deflector that directs the condensate to the rear of the unit. To allow this condensate to safely drain away, there should be a shallow trench at least 150mm wide, filled with stone chippings, along the rear edge of the concrete base. This trench can extend across the gap between the concrete base and the house (minimum distance 300mm) but the chippings must be below the building DPC level.

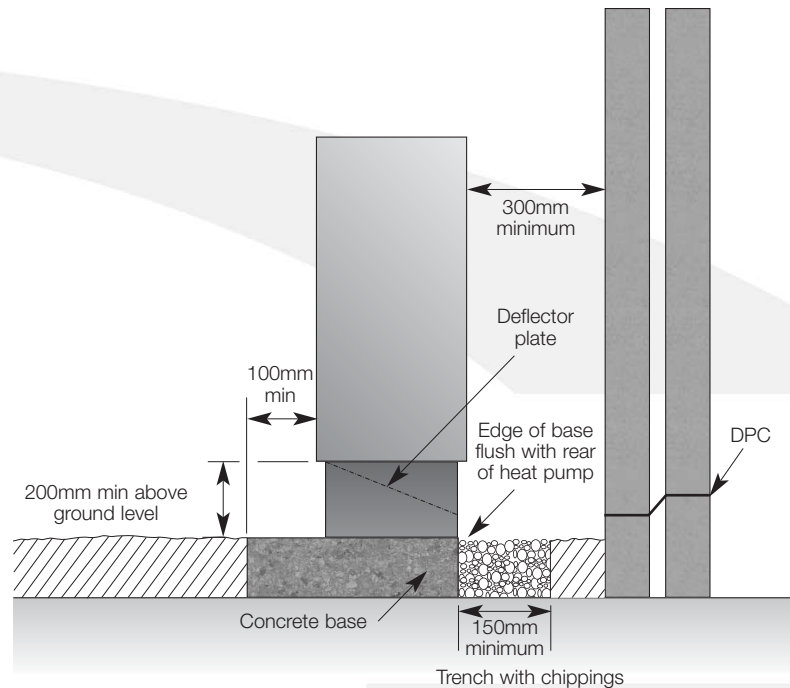


Figure 3-1: Installation details

IMPORTANT

It is essential that the condensate is able to drain away and not allowed to run onto any adjacent paths or driveways where, in winter, this will result in icing and a potential hazard for anyone walking near the heat pump.

The top of the concrete base must be either level with, or above, the surrounding ground level. Always ensure at least 200mm vertical clearance between the surrounding ground level and the underside of the heat pump to allow for adequate air movement. Refer to Figure 3-1 for details.

2. Clearances

The Heat pump should have a minimum of 300mm from the rear of the unit to any wall and not have any obstruction within 1000mm from the front or either side of the unit. Do not rest objects on top or against any part of the heat pump under any circumstances. Do not insert **objects into the fan guard**.

3. Noise Level

All heat pumps make a noise. Discuss the potential nuisance factor with the end-user when considering the final position of the heat pump. Take opening windows and doors into account. It is not essential for the heat pump to be positioned next to a wall of the house. Behind an out-building may be more suitable so discuss the options with the end-user.

4. Insulation

Remember, all pipe work, irrespective of length, must be well insulated to prevent heat loss. The use of barrier plastic pipe together with double thick insulation is strongly recommended, particularly when considering longer pipe runs.

3 Siting the Heat Pump

3.2 Orientation

The North face of a building will usually have colder ambient air than any other side. To ensure maximum efficiency from the Grant Aeron heat pump, position the unit on a warmer side. In order of preference, site the unit on a South face followed by either South East or South West, then by East or West. Only install on a North face if there is no other alternative.

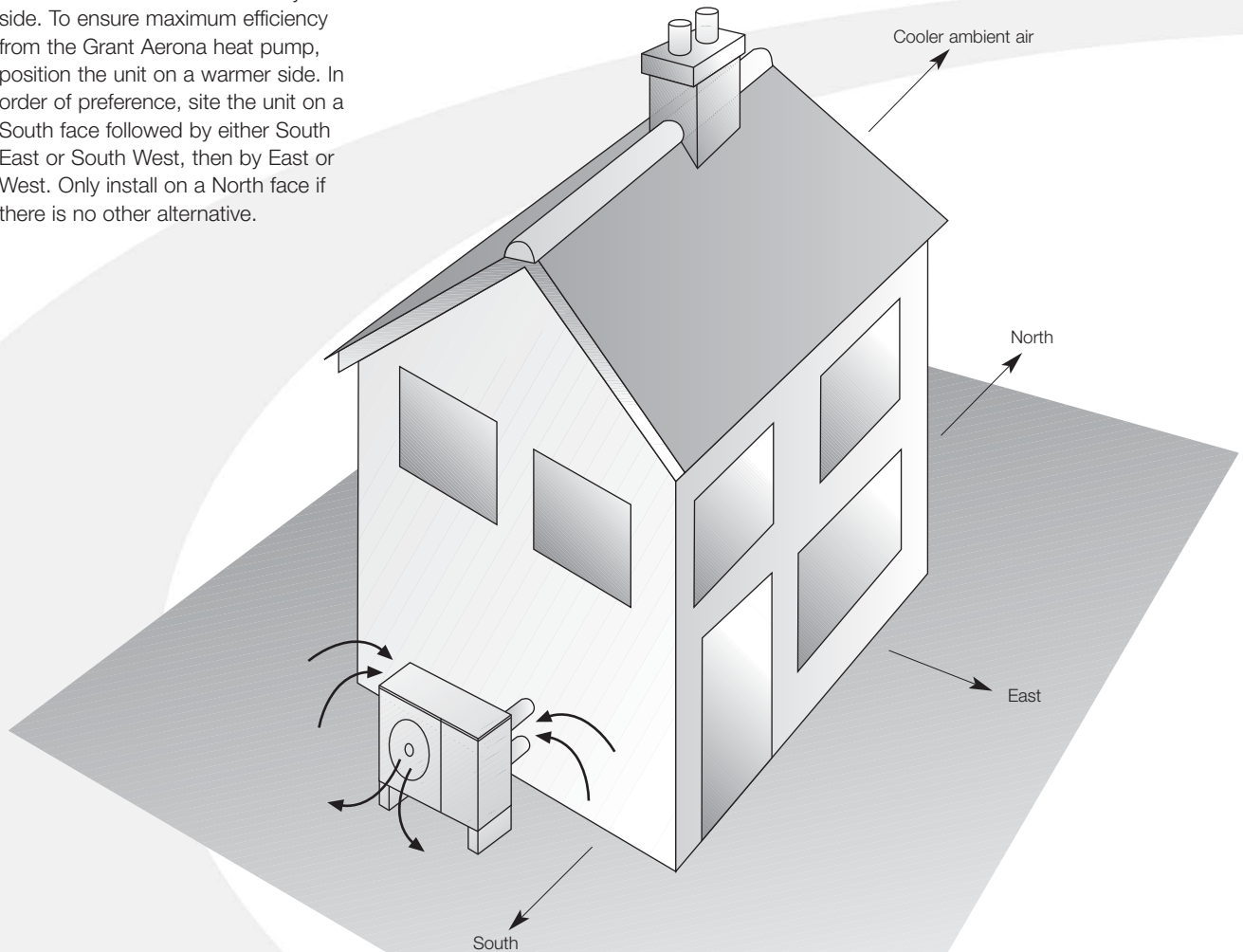


Figure 3-2: Location of air source heat pump

4 Hydraulic Diagrams

IMPORTANT

The following system diagrams are only concept drawings and not detailed engineering drawings. They are not intended to describe complete systems, nor any particular system.

It is the responsibility of the system designer, not Grant Engineering UK Ltd., 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.

The following are examples of suitable systems

4.1 S-Plan Type - Monovalent

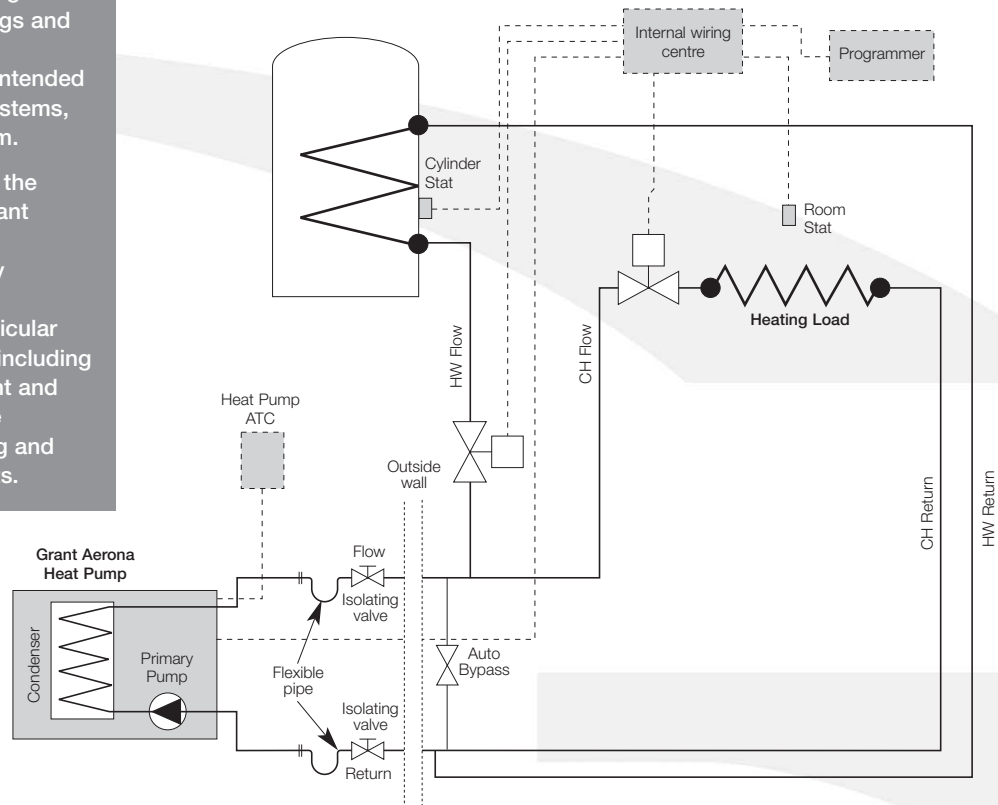


Figure 4-1: Monovalent system - with S-Plan type controls

4.2 Extended S-Plan Type - Monovalent

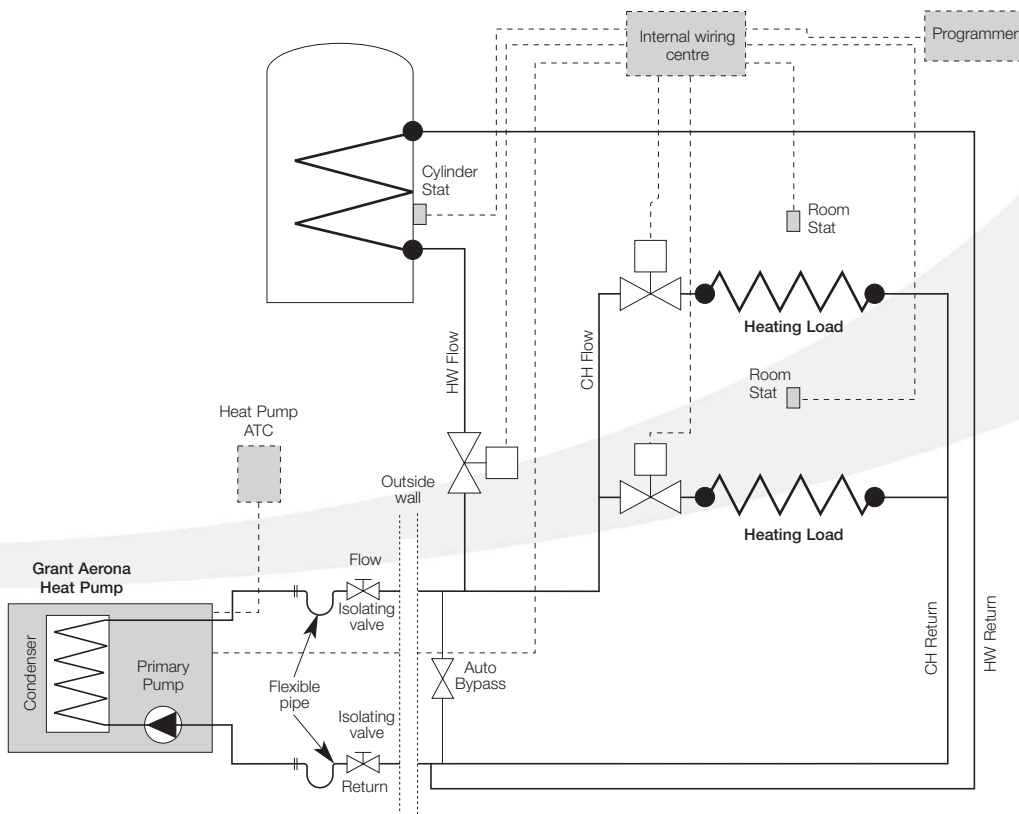


Figure 4-2: Monovalent system - with extended S-Plan type controls

4 Hydraulic Diagrams

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The following are examples of suitable systems

4.3 S-Plan Type - Bivalent

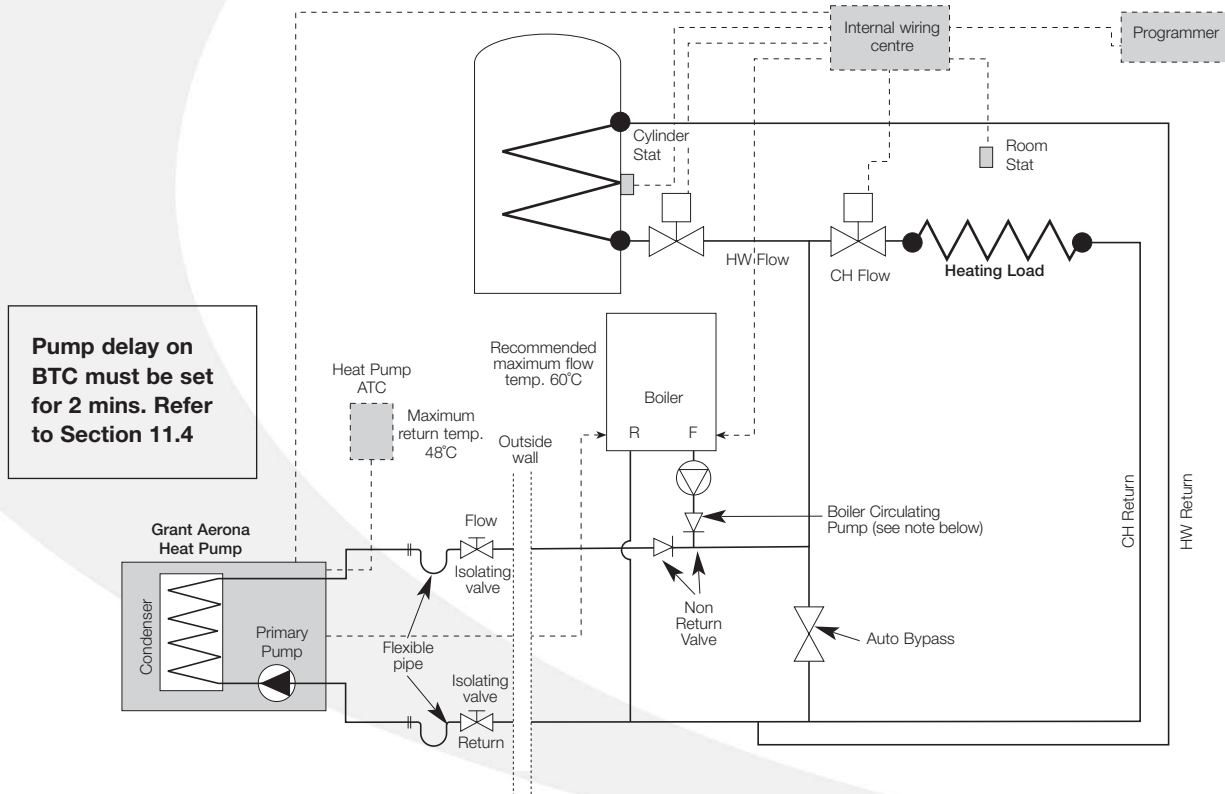


Figure 4-3: Bivalent system - with boiler manifold and S-Plan type controls

NOTE

Boiler circulating pump maybe fitted in Return (between manifold and boiler). Check with boiler manufacturer for guidance on pump location.

4.4 Extended S-Plan Type - Bivalent

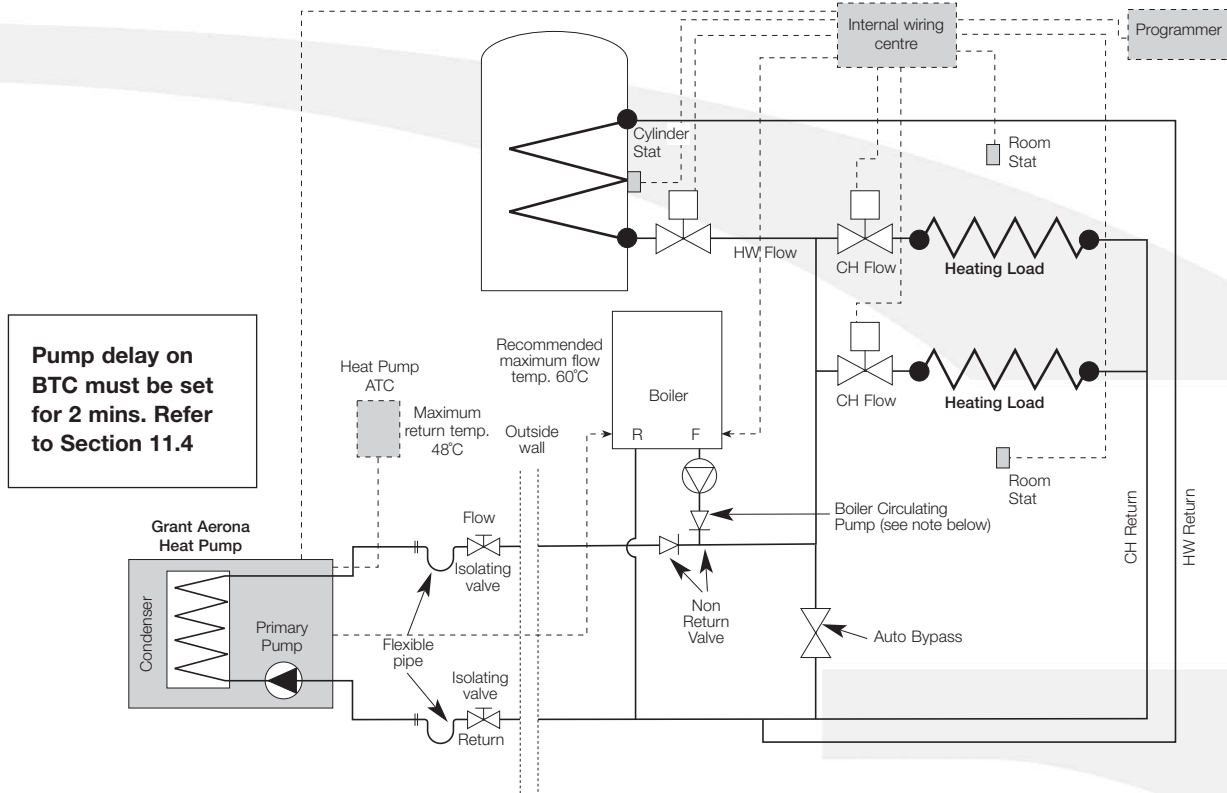


Figure 4-4: Bivalent system - with boiler and extended S-Plan type controls

! NOTE

Boiler circulating pump maybe fitted in Return (between manifold and boiler). Check with boiler manufacturer for guidance on pump location.

4 Hydraulic Diagrams

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The following system diagrams are only concept drawings and not detailed engineering drawings. They are not intended to describe complete systems, nor any particular system.

It is the responsibility of the system designer, not Grant Engineering UK Ltd., 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.

4.5 Buffers Tanks

The use of a buffer with the current Aerona heat pump is not necessary in the majority of installations. However, it is possible to utilise a buffer if the end-user wishes to store hot water when there is no other demand placed on the system. There are two main considerations when deciding when and where a buffer tank should be used.

1. It may act as an initial boost when a heating demand is placed on the system from cold.
2. Storing water for this function will result in heat losses from the buffer over time, reducing the overall COP and therefore the overall efficiency of the heat pump and the system.

When considering the use of a buffer, also consider the space the buffer will take up – it may not be possible to house both a cylinder and a buffer tank.

The following diagrams show both an S-Plan and an extended S-Plan for use with a buffer tank.

NOTE

When using a buffer tank with the heat pump, the weather compensation function of the built-in BTC controller is NOT used.

A cylinder thermostat (with immersion probe) should be fitted to the buffer tank. This must be wired to switch between terminals 1 & 3 (the Common and HW terminals) on the S-Plan controls terminal block in the heat pump control panel. Refer to Figure 8.15 in Section 8 for wiring diagram. The BTC setting for 'DHW BOIL TARGET' should be set to 48°C.

4.6 S-Plan with Buffer - Monovalent

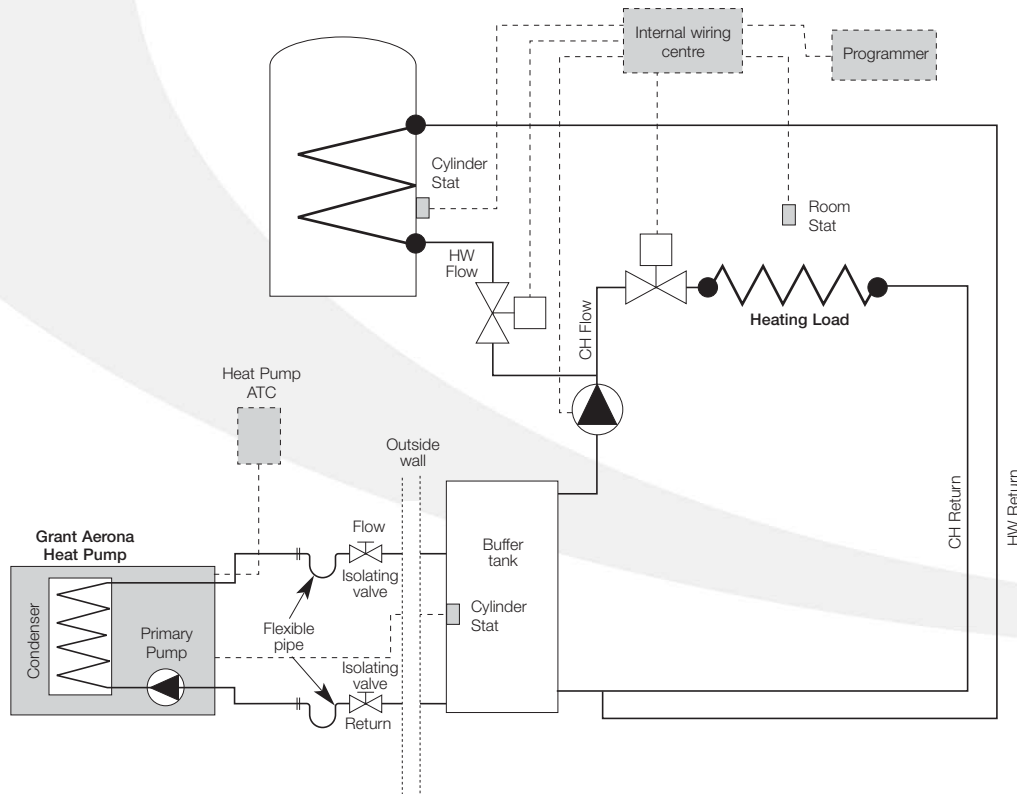


Figure 4-5: Monovalent system - with Buffer and S-Plan type controls

4.7 Extended S-Plan with Buffer - Monovalent

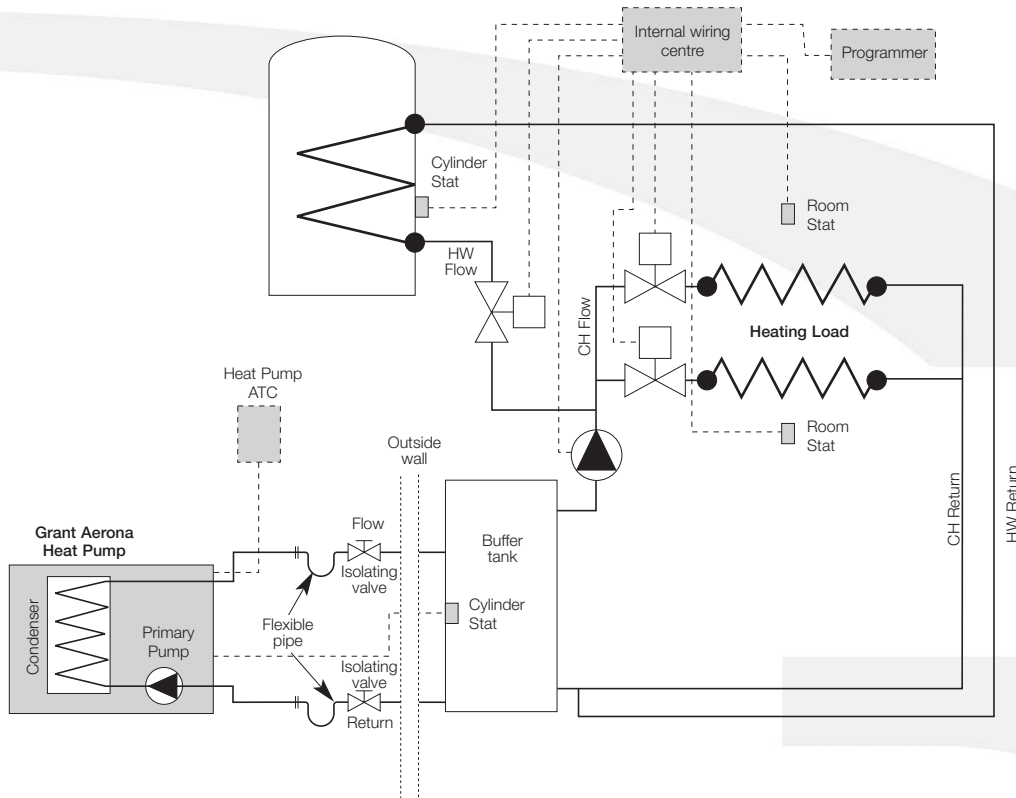


Figure 4-6: Monovalent system - with Buffer and extended S-Plan type controls

! NOTE

The hydraulic diagrams do not show the isolation valves, any expansion vessels, pressure relief valves or filling loops. More information on these components can be found in Section 7.

5 System Design Criteria

Unlike a typical condensing oil or gas fired boiler that operates at a flow of 70°C and a return of 50°C, a heat pump operates with a flow of between 30°C and 50°C. The return temperature will depend on the load of the system at a given point in time.

The design of any system in the UK is typically based on 2 parameters.

1. That the outside air temperature can fall to as low as -3°C and that the house comfort temperature will be 21°C.
The BTC incorporated in the heat pump will adjust the output according to the external ambient air temperature but the system must be designed in the first place to meet this maximum demand.
2. The second factor to consider is achieving this maximum demand using much lower water temperatures than with oil or gas fired appliances.

Designing a new system for use with a low-grade heat source is straight forward, and assuming the insulation properties of the dwelling meets or exceeds current building regulations, there should be no issue with achieving the heat demand.

The use of a heat pump in an existing system can be straightforward if the following rules are followed.

1. The loft has insulation to a depth of 270mm
2. Cavity wall insulation has been installed
3. The radiators have been changed or upgraded to match the new water temperature
4. An accurate heat loss calculation for each room of the house has been carried out
5. All primary and secondary pipes have been well insulated to prevent heat loss

While underfloor heating is the preferred heat emitter, a combination of underfloor heating and radiators, or radiators only, works just as efficiently. It is necessary, however, to calculate the size of radiator required accurately – if this is not done, the house will fail to reach the target temperature and will be costly to rectify after the installation is complete.

It must be understood that your final design working temperature will have an effect on the overall system efficiency, the COP of the heat pump and the complete system. Put simply, the lower your design working temperature, the better the COP. If you are in any doubt about the suitability of the heating system, stop and seek the advice of a qualified heating engineer or experienced system designer.

Refer to Section 6 to determine the size of radiators required for your installation.

When tested to BS EN14511, the Coefficient of Performance and Heat Output for an Air Source Heat Pump are declared at the test conditions of 7°C outside air temperature and 35°C water flow temperature.

At all other values of outside air temperature and water flow temperature the actual Heat Pump output will vary, e.g. the heat output will

- a) decrease with lower outside air temperatures and increase with higher outside air temperatures at any given water flow temperature, and
- b) decrease with higher water flow temperatures and increase with lower water flow temperatures at any given outside air temperature

The table below gives the approximate percentage output at different temperature conditions, compared to the rated heat output at 7°C ambient air/35°C water flow.

Example: A Grant Aerona HPAW65 Heat Pump with a rated output of 6.78kW at 7°C air/35°C water would give approximately 83% of this value (5.6kW) at -1°C outside air temperature and approximately 80% (5.4kW) at -3°C.

However, the same Heat Pump operating at 11°C outside air temperature would give approximately 113% of the rated output (7.6kW).

The factory fitted 3kW electric immersion heater should not be added to the rated output of the Heat Pump for sizing/selection purposes. This electric immersion heater serves as a back-up and will only be called into operation when the heat pump is operating at low air temperatures. Provided that the Heat Pump is sized correctly for the system, this back-up heater will compensate for any short fall in meeting the design heat load for the property at the minimum design air temperatures.

Air Temp	Approximate Heat Percentage (%) Heat Output					
21°C	212	193	181	167	150	129
19°C	186	169	159	146	132	113
17°C	164	149	140	129	116	100
15°C	145	132	124	114	103	88
13°C	132	120	113	104	93	80
11°C	124	113	106	98	88	76
9°C	118	107	101	93	83	82
7°C	110	100	94	86	78	67
5°C	105	95	89	82	74	64
3°C	100	91	86	79	71	61
1°C	95	86	81	74	67	58
-1°C	91	83	78	72	65	56
-3°C	88	80	75	69	62	54
-5°C	85	77	72	67	60	52
-7°C	80	73	69	63	57	49
-9°C	77	70	66	61	54	47
Water Temp	30°C	35°C	40°C	45°C	50°C	55°C

6 Calculating Radiator Sizes

Existing Systems

Most existing wet heating systems will use radiators as emitters. When the original system was installed, the radiators would have been sized according to the manufacturer's specifications. Typically, this would have been 82°C flow and 71°C return with the connections being flow at the top and return at the opposite bottom corner.

With the advent of condensing boilers, most installations were found to have oversized radiators and as such, little or no adverse effects were found when the system temperatures fell to 70°C flow and 50°C return.

However, as heat pumps work at temperatures lower than even this, it is important that each radiator is checked again for its suitability and replaced with one of the correct size/output if necessary.

Below is a typical radiator correction factor table and a worked example of sizing radiators for use with a heat pump*

°C	Correction Factor
5	0.050
10	0.123
15	0.209
20	0.304
25	0.406
30	0.515
35	0.629
40	0.748
45	0.872
50	1.000
55	1.132
60	1.267
65	1.406
70	1.549
75	1.694

As can be seen, the size of radiator required will be larger than conventional systems. This can be controlled to an extent by choosing a suitable design water temperature. The trade off will be a slightly lower COP. As we have already discussed, the higher the running temperature, the harder the heat pump has to work to reach the desired temperature.

Please advise the customer that, in any case, the radiator will not get 'hot'. The perception may well be that the system is not working correctly because the radiators are only 'warm'.

A typical heat pump operating to feed radiators will run at a flow temperature of **50°C** and a return temperature of **40°C** – giving a mean water temperature of **45°C**.

In the case of a system using both radiators and Underfloor heating (UFH) a flow of **40°C** and a return of **30°C** – giving a mean water temperature of **35°C** – would usually be preferred.

For a living room with a design temperature of **21°C** and heat loss of 1.8kW.

The $T = 45°C - 21°C = 24°C$.

From the radiator manufacturers correction factor table: for $T = 24°C$ factor ≈ 0.406 .

For a design heat loss of 1.8 kW: the required corrected output is $1.8 / 0.406 = 4.43kW$.

Select a radiator from manufacturer's information that would give 4.43kW output (at 75°C mean water temperature) – this will give the required 1.8 kW output at 45°C mean water temperature produced by the heat pump.

Similarly, for a bedroom with the same design heat loss but design temperature of **18°C**.

The $T = 45°C - 18°C = 27°C$.

From the radiator manufacturers correction factor table: for $T = 27°C$ factor ≈ 0.46 .

For a design heat loss of 1.8 kW: the required corrected output is $1.8 / 0.46 = 3.48kW$.

Thus, select a radiator from manufacturer's information that would give 3.48kW output to give the required 1.8 kW output at 45°C mean water temperature.

*** Where possible reference should be made to radiator manufacturers own information for the correction factors for different types of radiator.**

7 Sealed Systems

The following components are required to use the Grant Aerona heat pump as part of a sealed heating system. Due to the lack of space these components are not located within the heat pump, but have to be fitted external to the unit.

- a) expansion vessel (of the correct size to suit the volume of the system)
- b) Pressure relief valve – 3 bar
- c) Pressure gauge
- d) Filling loop
- e) Tundish

These items may already be installed on the existing system. If so, they should be checked to ensure the integrity and suitability of the components before proceeding to re-use them.

Refer to Section 15 for details of the Grant sealed system kits designed for use with the Grant Aerona heat pump range.

The expansion vessel can be fitted to either the flow or return pipes but ensure that there is no automatic or manual valve in line that may prevent the heat pump utilising the expansion vessel.

The filling loop can be sited anywhere in the system, but it must always be sited within visual distance of the pressure gauge. The nominal filling pressure for the system when cold is 1 bar.

Before filling the system check the expansion vessel charge pressure. This should be 0.2 – 0.3 bar higher than the cold fill pressure for the system.

It is good practice to have automatic air vents at all high points of the system, particularly where pipes fall vertically – e.g. drop feed systems. The immersion unit within the heat pump has a factory fitted manual air vent.

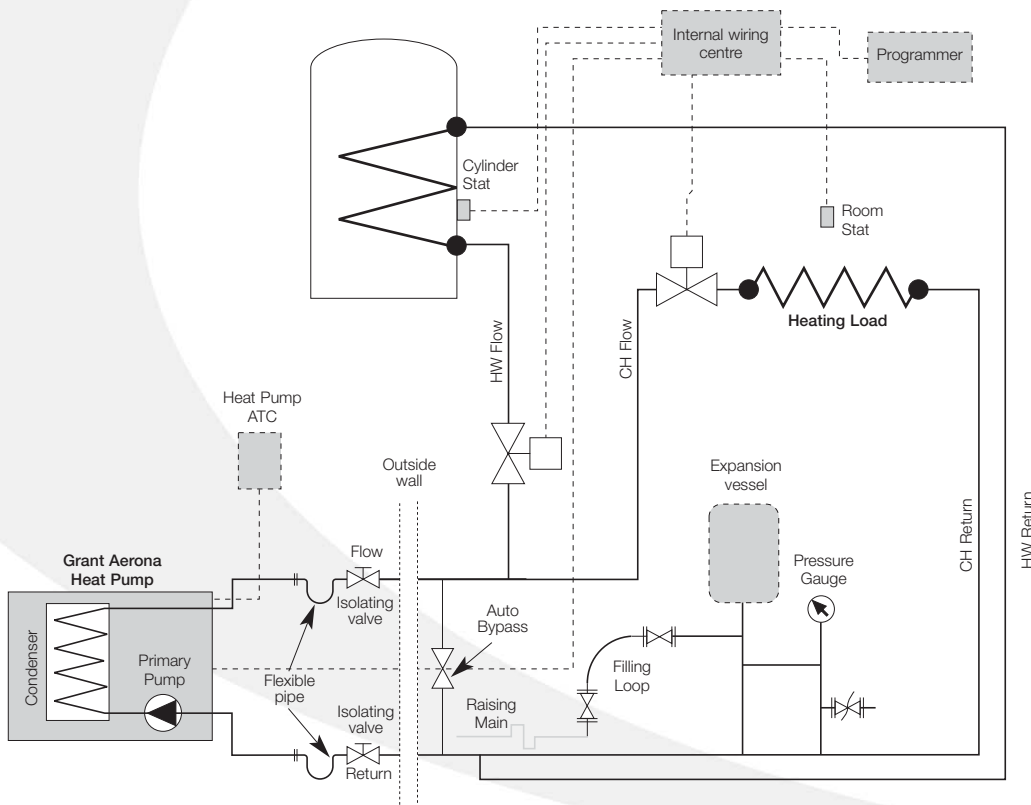


Figure 7-1: Sealed system layout

8 Electrical

IMPORTANT

All electrical work must be undertaken by a competent person. Failure to observe this legislation could result in an unsafe installation and will invalidate all warranties.

8.1 General

The Grant Aerona Heat Pump is very simple to install and to wire. The units are designed to meet the need for simplicity – both in installation and in servicing. As a result, the wiring involved is both minimal and simple compared to other heat pumps available.

For Monovalent systems, the following cables are required.

- 1 x Twin and Earth cable suitable for the current and length of run from the consumer board to the external isolator.
- 1 x 3-core SWA suitable for the current from the external isolator to the heat pump.
- 1 x 3-core+Earth 0.75mm² from the systems wiring centre to the heat pump
- 1 x 3-core umbilical cable from the heat pump to the ATC (heat pump controller) mounted inside the house. A 5m length of this cable, complete with fitted plugs is supplied with the heat pump.

For Bivalent systems, an additional Twin+Earth 0.75mm² cable is required from the heat pump to the boiler.

8.2 Basic Circuits – Making the Connection

The diagram below is of a typical S-Plan type control system as used with a gas or oil fired boiler.

FOR INFORMATION ONLY – DO NOT FOLLOW THIS DIAGRAM AS IT WILL CAUSE IRREPARABLE DAMAGE TO THE HEAT PUMP.

NOTE

It is possible for some components to have 2 power supplies feeding them. It is also possible for mistaking an internal circuit to be dead when it is receiving power from another source. Please label all controls and devices if this is possible, advising to check and isolate in one or more locations as required.

To help remove as much of this risk as possible, take all heating system, heat pump and immersion element circuits from a single supply at the consumer unit.

NOTE

Note that the two wires that feed both motorised valves to Gr (grey) terminate at L, giving them a permanent supply of 230Vac. The two wires leaving the motorised valves at O (orange) are the switched output and will also be at mains potential. The switches inside the motorised valves make the connection between L (permanent Live) and 10 (switch live) to feed the boiler and the pump.

In contrast, the heat pump switches at 0V and therefore a simple re-wiring (for existing systems) must take place at the wiring centre before it is safe to connect to the heat pump.

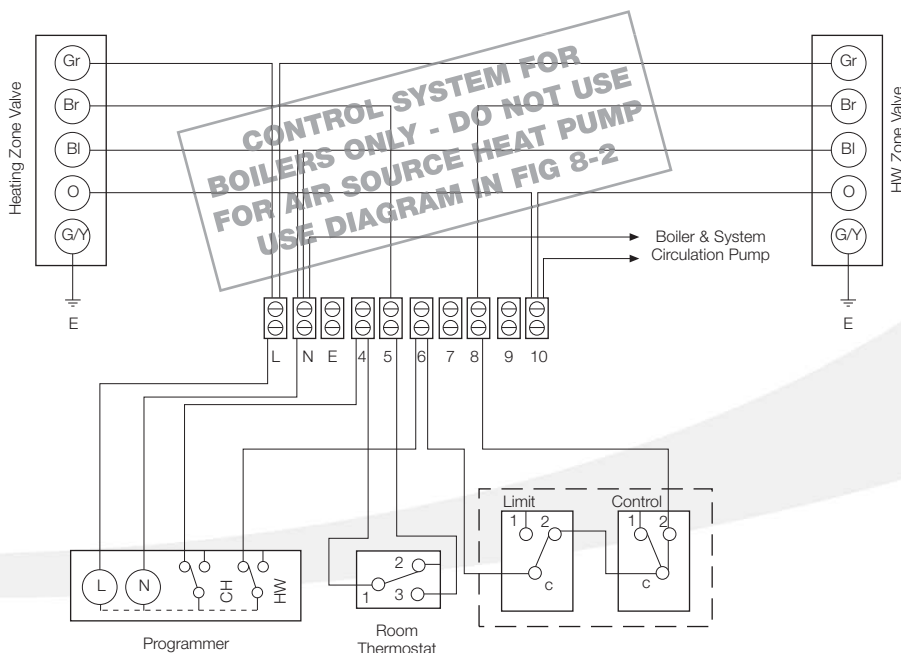


Figure 8-1: S-Plan type system for normal boiler connection

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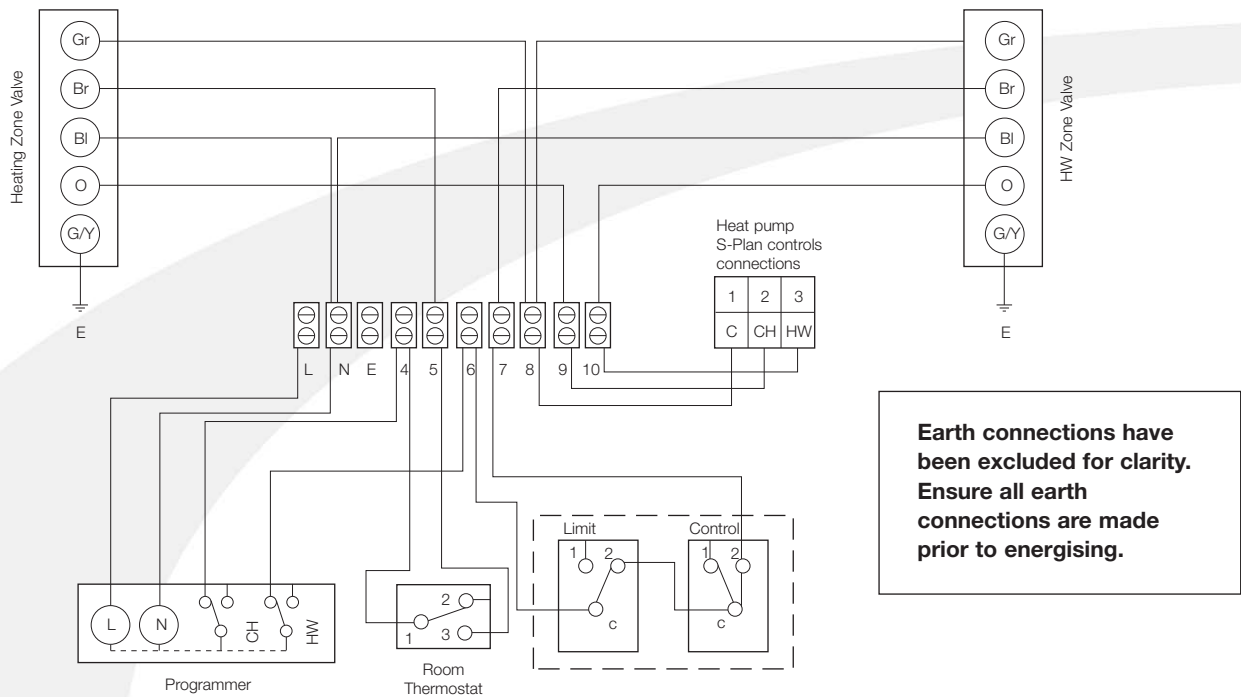


Figure 8-2: S-Plan type system for connection to Aerona heat pump

NOTE

Note that both wires from Gr (grey) now terminate on their own at position 8. The wires from O (orange) from each valve now terminate on their own at positions 9 and 10. The feed from the cylinder thermostat and the feed to Br (brown) on the HW motorised valve, now terminates at position 7. When that is completed, the 3-core 0.75mm² cable can now connect at positions 8, 9 and 10.

Within the heat pump control panel, connect the wires from the wiring centre as follows:

Wiring Centre	Heat Pump
8	1 – Common
9	2 – Heating
10	3 – HW

For multiple heating zone valves, follow the above and join all oranges from the heating motorised valves into 9 in the wiring centre, and all greys to terminal 8.

8.3 Controller



Figure 8-3: ATC connection

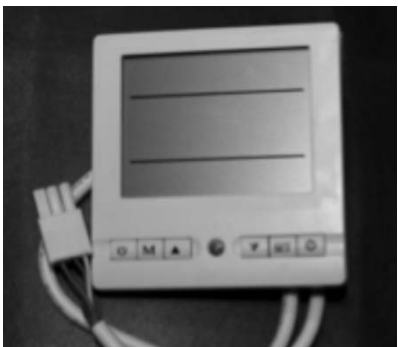


Figure 8-5: ATC control unit



Figure 8-4: Umbilical cable

Using the 5m of umbilical cable, connect the controller (right) to the heat pump (left). The controller fits all standard single patresses (surface and flush). Use one of the cable glands at the rear of the heat pump to protect this cable. To extend (if required) simply splice a new section into the middle, ensuring all connections are sound and water proof. The size of cable is 0.5mm², and operates at ultra low voltage (<50Vdc).

8.4 Mains Supply Cable

All Grant Aerona Heat Pumps contain a 3kW immersion element as a boost heat source. This element will energise under either one or two conditions :

1. When the external ambient air temperature drops between -5°C and +5°C. This figure is variable and adjustable at the ATC.
2. When the heat pump has not seen a temperature rise of 1°C or more in the Return water from the heating system, in a 20 minute period.

The cable sizing to the heat pump must include for this additional 3kW load.

For Bivalent systems where a Gas, Oil or Wood Pellet boiler is switched from the heat pump the immersion heater is disconnected. Refer to Section 8.8.

If the boiler is to be used with the 3kW immersion heater still connected, the additional load must be taken into account and the maximum demand must be determined for each heat pump.

8.5 Voltage Drop

Where a weak power supply is encountered (usually in rural locations), the starting current on any compressor may result in a significant drop in voltage. This voltage drop will reduce the starting torque of the compressor. This could affect the whole of the electrical installation in the property by reducing the voltage to the lighting circuit, ring circuit, etc. This reduction would last typically for 300 to 400 milliseconds and could cause lights to dim. **This voltage drop is caused by inadequate power supplies and does not signify a fault with the heat pump.**

Always assume maximum possible load when considering cable sizing.

The cable supplying power from the consumer unit to the heat pump must be connected via an external 2 pole isolator. This allows the service engineer to isolate the power supply before working on the heat pump in safety.

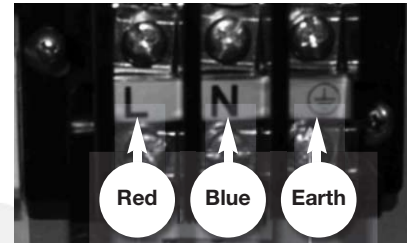


Figure 8-6: Mains supply cable connections

Electrical installation requirements

Heat Pump Model	Max. Running Current (A)*	MCB Rating (A)	MCB Type	Length of Cable Run (m) and Cable Size (mm ²)				
				5	10	15	20	30
HPAW65	23	32	D	6	6	6	6	6
HPAW85	27	32	D	6	6	6	6	6
HPAW110	28	32	D	6	6	6	6	6
HPAW130	30	40	D	10	10	10	10	10
HPAW155	36	40	D	10	10	10	10	10

*Includes 3kW immersion heater.

Heat Pump Model	Max. Running Current (A)*	MCB Rating (A)	MCB Type	Length of Cable Run (m) and Cable Size (mm ²)				
				5	10	15	20	30
HPAW130	43	50	D	10	10	10	10	10
HPAW155	49	63	D	10	10	10	10	10

*Includes 6kW immersion heater.

IMPORTANT

The above tables of cable sizes are based on the following:

1. Cable is surface mounted (clipped to masonry) - Method C as Table 4A2 of BS7671:2008 (17th edition Wiring Regs). For any other cable installation method the cable size **MUST** be recalculated in accordance with BS7671:2008.
2. Earth loop impedance value does not exceed 0.36Ω for a type D MCB.

8 Electrical

8.5 Heat Pump Wiring Diagrams

Heat pump with 3kW electric element

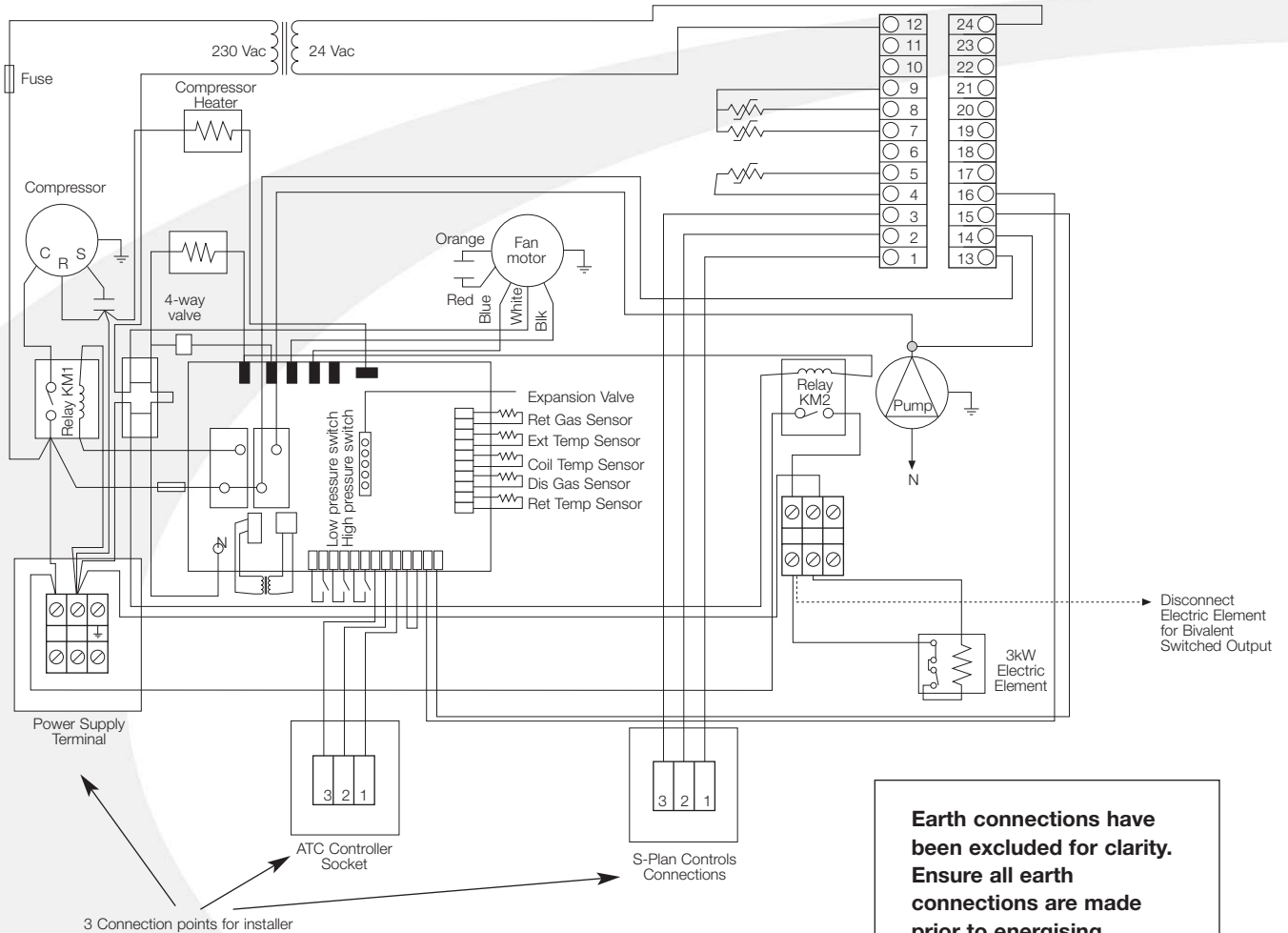


Figure 8-7: Connection diagram for heat pump with 3kW electric element

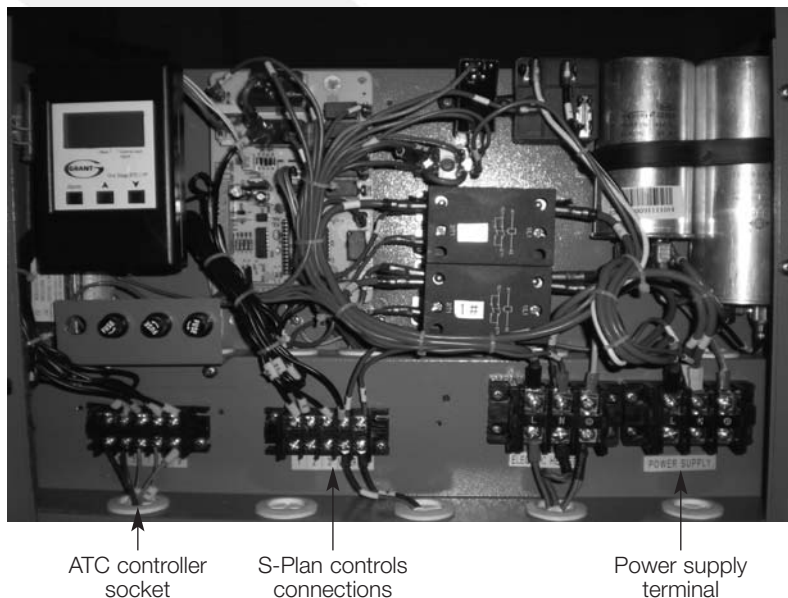


Figure 8-8: Location of connections in control panel

Heat pump with 6kW electric element

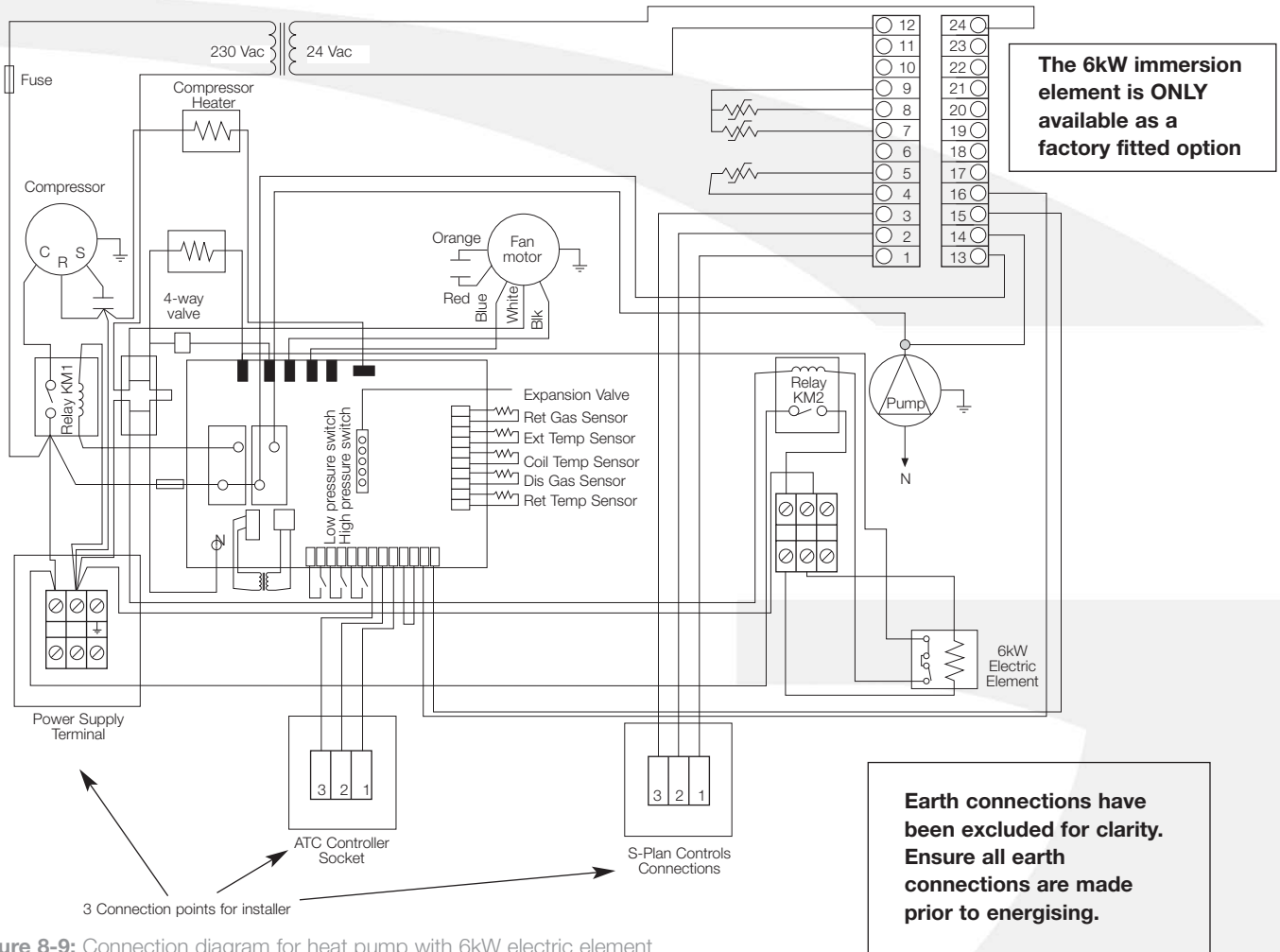


Figure 8-9: Connection diagram for heat pump with 6kW electric element

8 Electrical

8.6 System Control Wiring Diagrams

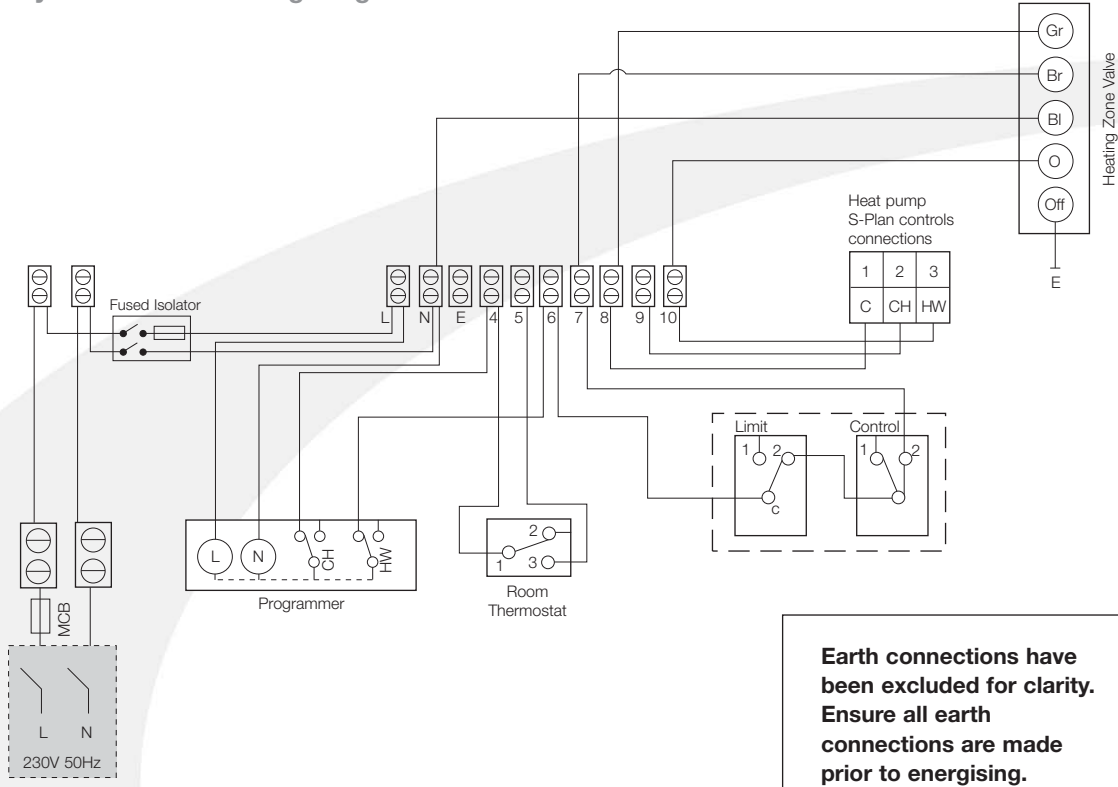


Figure 8-10: Domestic hot water connection diagram

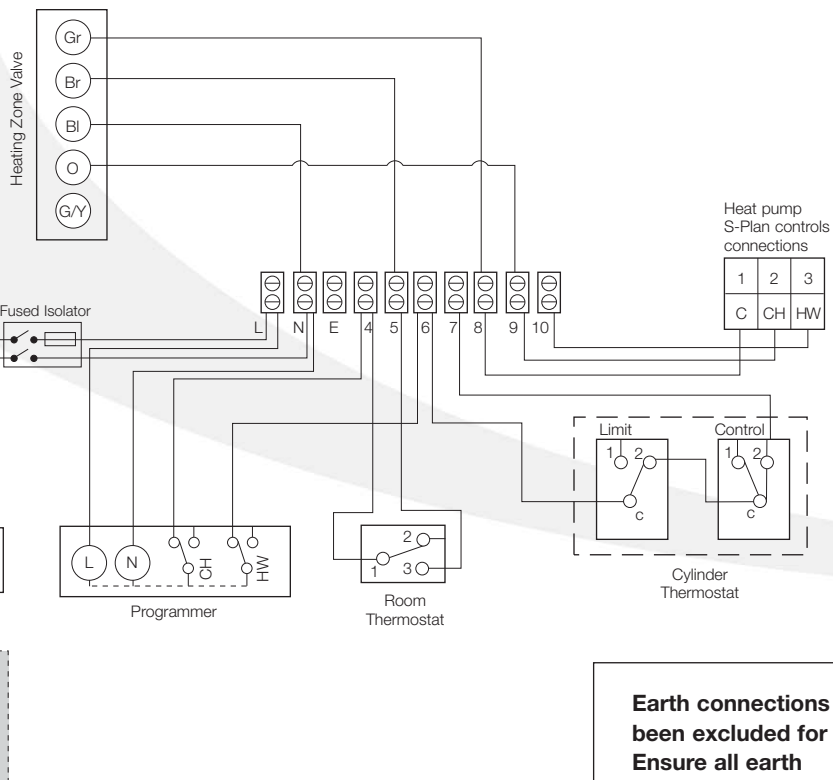


Figure 8-11: Central Heating connection diagram

8.7 Wiring Diagrams

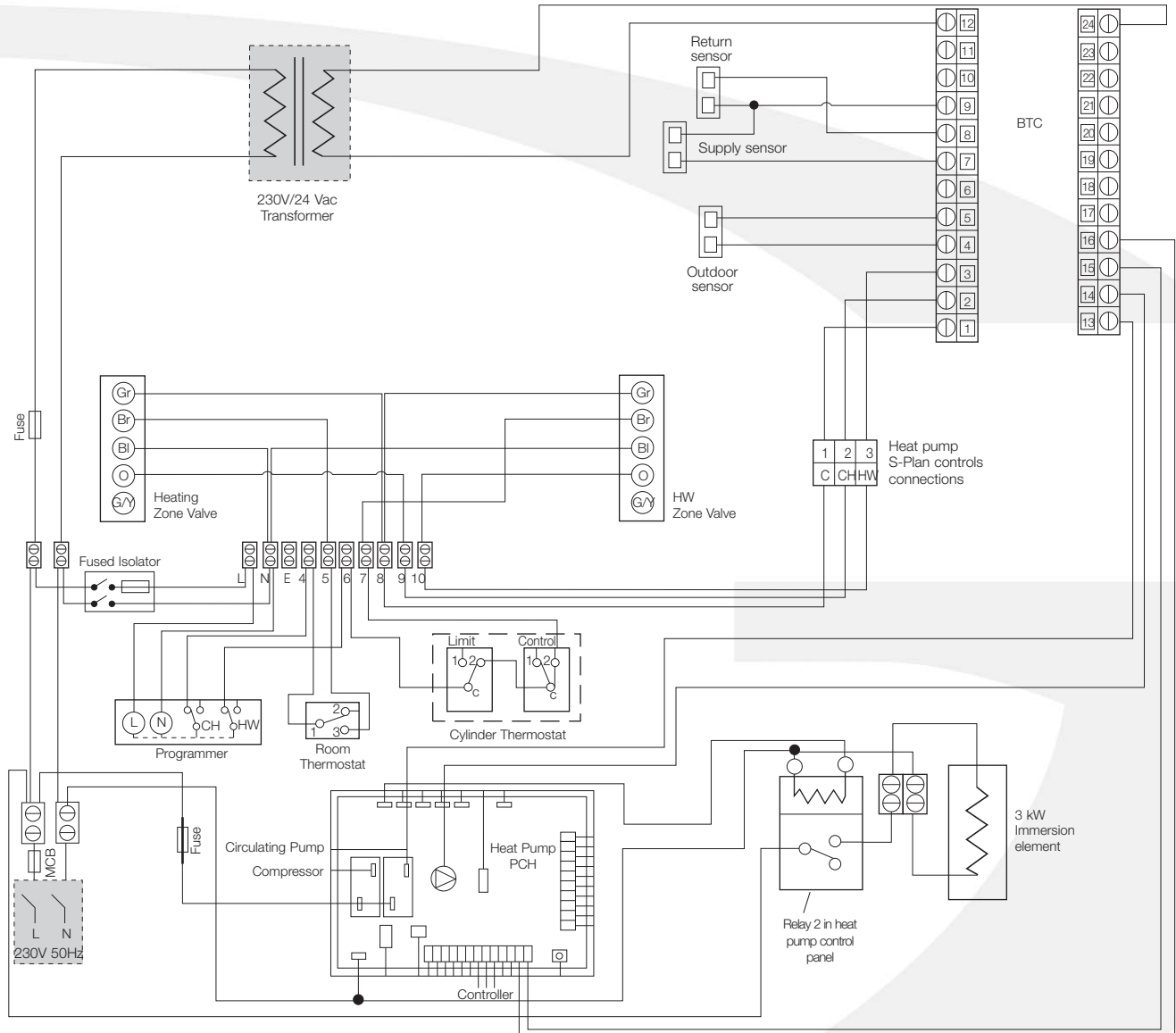


Figure 8-12: Monovalent system connection diagram

Earth connections have been excluded for clarity. Ensure all earth connections are made prior to energising.

8 Electrical

8.7 Wiring Diagrams

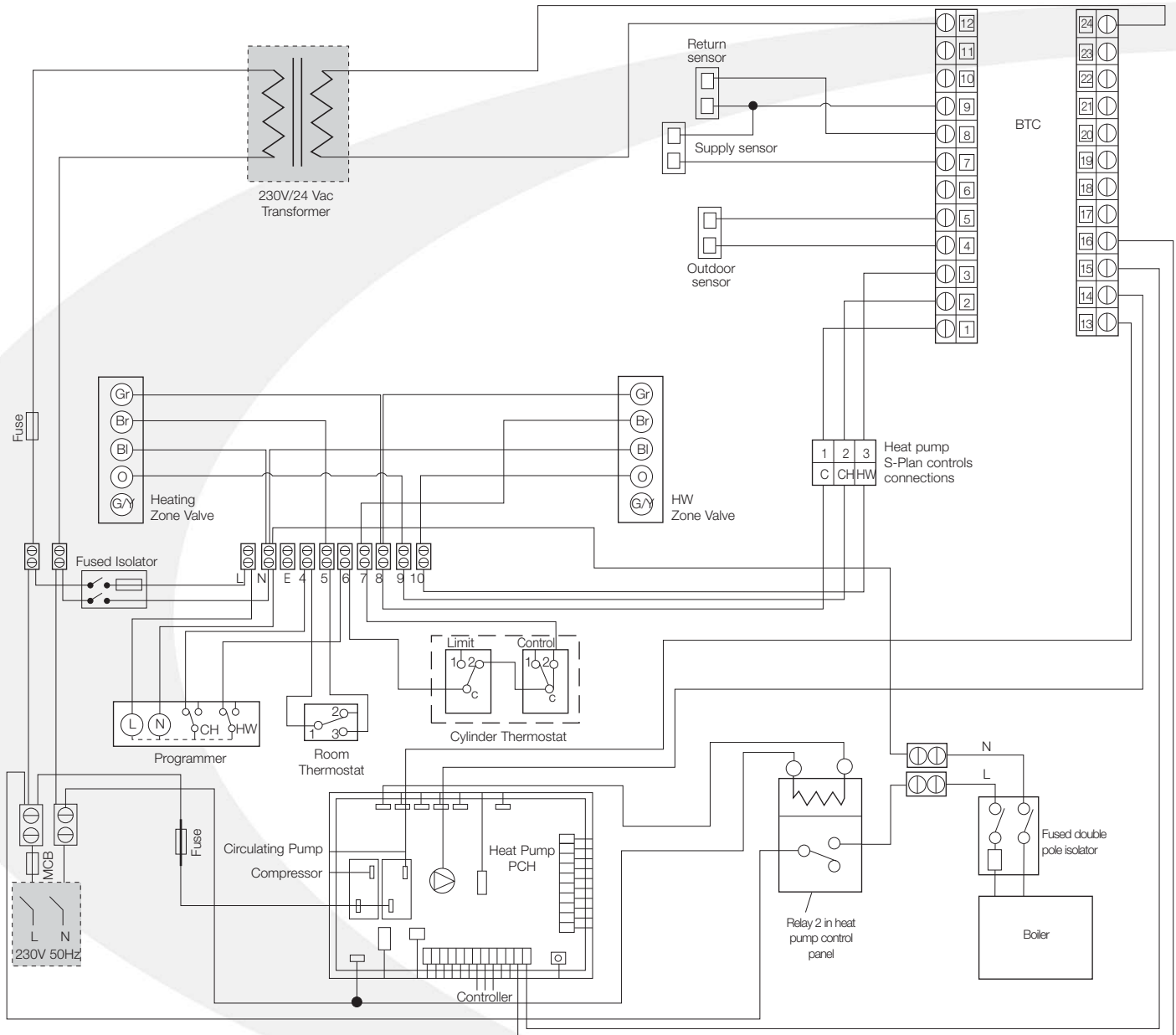


Figure 8-13: Bivalent system connection diagram

Earth connections have been excluded for clarity. Ensure all earth connections are made prior to energising.

8.8 Bivalent Systems

For the connection of a boiler for a bivalent system it is necessary to disconnect the immersion element from the relay in the heat pump.

Take the live for the boiler from this relay. The neutral for the boiler must be taken from the heating controls wiring centre. Refer to Figure 8-13.

Isolate this supply via a fused double pole isolator switch and mark on the switch that the supply comes from the heat pump.

Follow the wiring diagram as shown in Figure 8-13 for a bivalent system.

8.9 Solar Thermal

It may be part of the system design to incorporate Solar Thermal into the design.

This is easily done with the use of an additional two-pole relay. Following the diagram in Figure 8-14 below will give the solar thermal system a priority over the heat pump when there is a demand for HW only.

This can, of course be added to both monovalent and bivalent systems. It is much easier to carry out all these types of systems based on S-plan type controls only.

Y and W type plans can be used, but the need for additional relays is not practical. It is much easier to convert Y and W type plans to S types from the start.

8.10 Buffer Tanks

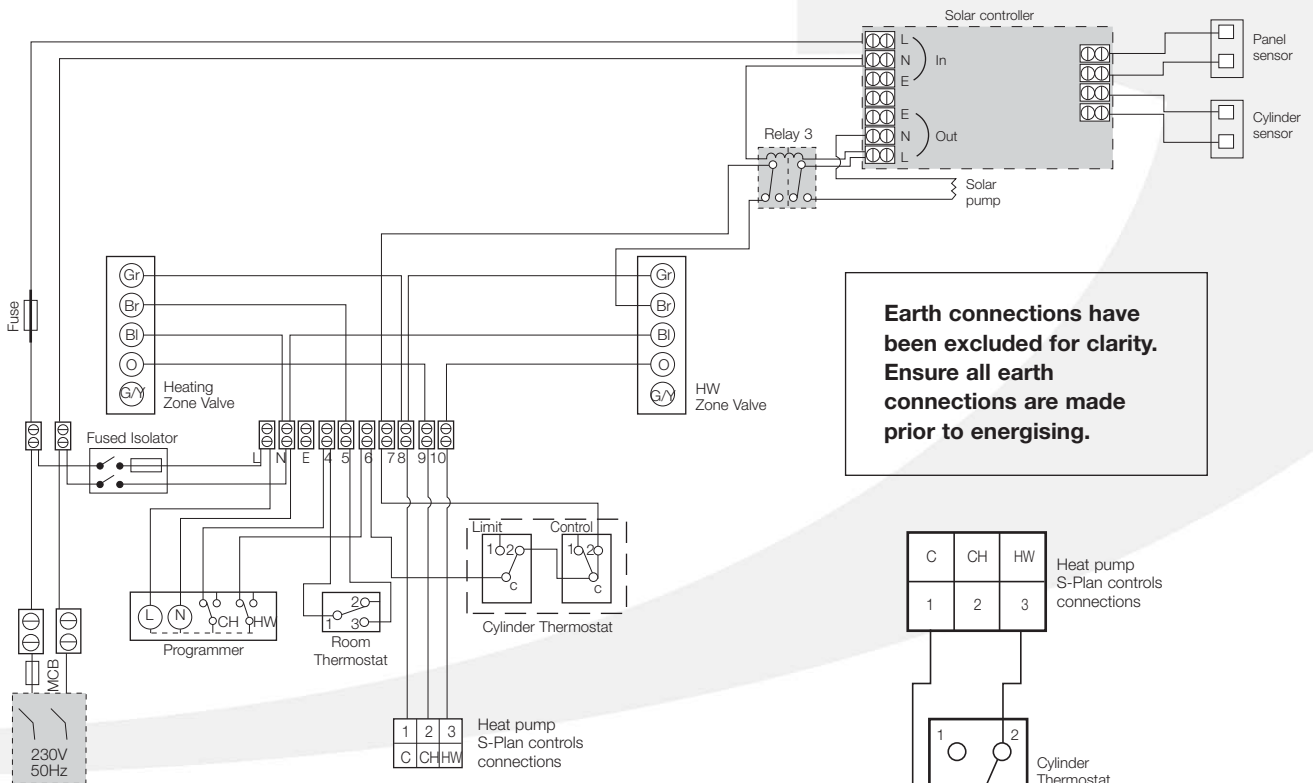
When using a buffer tank with the heat pump, the weather compensation function of the built-in BTC controller is NOT used.

A cylinder thermostat (with immersion probe) should be fitted to the buffer tank. This must be wired to switch between terminals 1 & 3 (the Common and HW terminals) on the S-Plan controls terminal block in the heat pump control panel. Refer to Figure 8.15 in Section 8 for wiring diagram. The BTC setting for 'HW BOIL TARGET' should be set to 48°C.

Refer to Fig 8-15 for connection details.

IMPORTANT

Do not take the Neutral from the heat pump to feed the boiler circuit. This will create an imbalance at the MCB and cause nuisance tripping. Always take the neutral supply from the existing S-Plan wiring centre.



Earth connections have been excluded for clarity. Ensure all earth connections are made prior to energising.

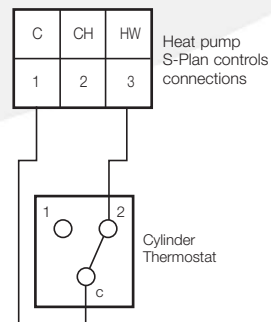


Figure 8-14: Connection diagram for Grant solar thermal system

Figure 8-15: Buffer tank thermostat

9 Domestic Hot Water

9.1 Temperature Control

The desired hot water temperature stored in the cylinder can be adjusted on the BTC controller. As already mentioned, the heat pump works most efficiently at lower temperatures but these temperatures are not suitable for domestic hot water which should always be stored at about 60°C.

9.2 Heat Pump Cylinders

As the water temperature from the heat pump is lower than from a traditional system using a boiler, a much larger coil is required inside the cylinder to transfer the heat efficiently.

Grant has a range of seven single coil (from 120 to 400 litres) and five twin coil (from 170 to 400 litres) unvented stainless steel heat pump cylinders

These cylinders have been specifically designed to match the output from the Grant Aerona heat pumps. These are fitted with larger coils (up to 4m² area) for maximum efficiency and faster re-heat times when compared to standard type indirect cylinders.

Visit www.grantuk.com for more information.

In order to ensure that a minimum of at least 5K temperature difference is maintained between cylinder flow and return, the correct Grant single coil cylinder must be selected to match the heat pump output, as in the following table:

Heat Pump Model	Output (kW)	Grant Single Coil HP Cylinder Size (litres)	
		Min.	Max.
HPAW65	6.5	125	250
HPAW85	8.5	200	300
HPAW110	11.0	250	300
HPAW130	13.0	300	400
HPAW155	15.5	300	400

Failure to use the correct cylinder can result in a reduced heat transfer in the cylinder and a lower temperature differential, causing the high pressure cut-out to operate and the heat pump to shut down.

For twin coil installations, where the heat pump is used in conjunction with solar thermal, the same minimum and maximum surface area requirement applies to the upper coil of the cylinder. Thus, the correct Grant HP twin coil cylinder should be used, as follows.

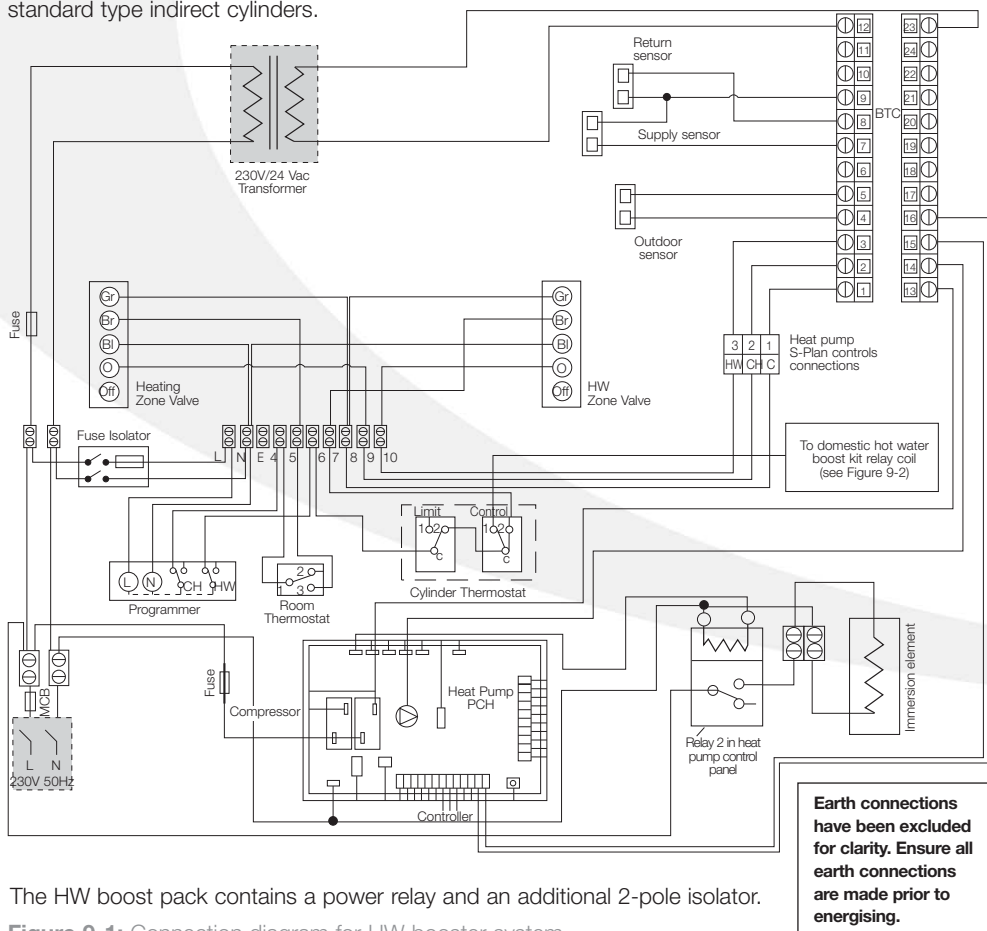
Heat Pump Model	Output (kW)	Grant Twin Coil HP Cylinder Size (litres)	
		Min.	Max.
HPAW65	6.5	170	250
HPAW85	8.5	200	300
HPAW110	11.0	250	300
HPAW130	13.0	300	400
HPAW155	15.5	300	400

9.3 Temperature Boost

It is possible to use the heat pump to raise the HW cylinder to 60°C. During the summer, when the external ambient air temperature is high, this may be preferable. However, during the winter it would not be economical for any heat pump to try and raise the water

temperature in the cylinder to this level. As the heat pump works more efficiently when heating water to a lower temperature Grant has developed a control system that will automatically take the temperature of the water in the cylinder from around 45 - 50°C up to 60°C, after the cylinder thermostat has switched off the hot water operation of the heat pump.

This system uses both the existing cylinder immersion element and cylinder thermostat, but operated via a relay and 'by-pass' switch enclosed in a separate unit to be mounted next to the cylinder. This system is fully automatic but can be overridden by the user if required, i.e. the user can switch on the immersion element, using the 'by-pass' switch, to manually boost the hot water cylinder temperature – irrespective of the programmer or cylinder thermostat setting or whether the heat pump is operating. NB. Setting this 'by-pass' switch to OFF does NOT stop



The HW boost pack contains a power relay and an additional 2-pole isolator.

Figure 9-1: Connection diagram for HW booster system

the automatic operation of the immersion element via the relay.

The required relay, manual by-pass switch and enclosure are available as a kit from Grant Engineering UK Ltd. For details of this Automatic Domestic Hot Water Boost Kit (Grant Ref. HPDHWBK1) refer to Section 15 of these instructions.

Installation

The Automatic HW Boost kit comes with the relay and by-pass switch pre-wired within the enclosure, but the connections from the cylinder thermostat, Immersion switch and immersion element have to be made on site.

When fitted, this kit interrupts the electrical supply between the existing immersion heater and the fused immersion switch. Refer to Figures 9-1 and 9-2 for electrical connection details.

In order to connect and use this kit, the existing cylinder thermostat must have two output terminals – one 'make on rise' and the other 'make on fall'. If not, then the cylinder thermostat must be replaced with one that does.

The use of any other type of cylinder thermostat, or the modification of to an existing thermostat, will invalidate the product warranty and may result in a potentially dangerous installation

Important: Do not alter the pre-wired configuration within the enclosure and only make the external connections as shown in the wiring diagrams.

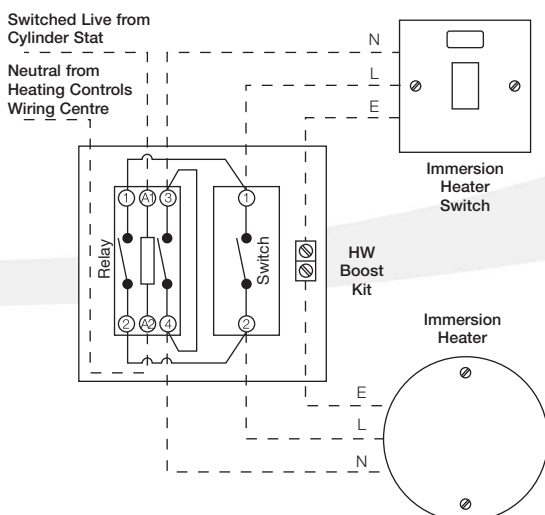


Figure 9-2: Connection of immersion element using HW booster kit

WARNING

Where a 3-phase supply is present, ensure that BOTH the Immersion switch and heating system controls are taken from the same phase. If in doubt consult a qualified Electrician.

Operation

With the Boost Kit fitted, the HW cylinder thermostat should be set to between 45 to 50°C for optimum operation. When the heat pump raises the HW cylinder to this temperature, the cylinder thermostat switches to the 'satisfied' position, i.e. switches from contacts C-1 to C-2.

The HW motorised valve fed from the cylinder thermostat contact (1) will close. The resulting switched live from the normally open contact (2) of the cylinder thermostat operates the relay in the booster kit and energises the existing immersion element in the cylinder, controller and protected by its own internal thermostat and limit thermostat. The immersion heater thermostat should be set to 60°C

When hot water is drawn off, if the temperature falls below the cylinder thermostat setting, it will detect the drop in cylinder temperature, and switch back from C-2 to C-1, creating a demand for the heat pump to operate to re-heat the cylinder. The switched live to the boost kit relay will cease and the immersion element is de-energised.

If the temperature detected by the cylinder thermostat does not fall to the below it's setting (45 - 50°C), the immersion

element will continue to operate, via the relay, to re-heat the cylinder.

The automatic operation of the boost kit can only function when the HW channel of the programmer is in an ON condition.

IMPORTANT

For this system to operate the existing immersion switch must be left set permanently to ON.

To totally prevent operation of the immersion element the existing immersion switch must be set to OFF.

WARNING

Two separate power supplies are connected within the HW boost kit enclosure – one from the immersion heater switch and the other from the heating controls circuit. Ensure that BOTH supplies are isolated before commencing any work on the boost kit relay or switch.

A warning label informing the users has been fixed on the enclosure. THIS LABEL MUST NOT BE REMOVED FROM THE ENCLOSURE.

IMPORTANT

This domestic hot water booster pack is optional and is only used if the customer wants the most efficient form of heating their hot water. If not, then the BTC can be programmed to deliver hot water up to 60°C with no additional wiring.

Earth connections between fused immersion switch, override switch and immersion element not shown.



Figure 9-3: HW booster kit with cover removed to show relay

10 Filling the System

10.1 Filling and Venting - Sealed Systems

NOTE

For technical details and requirements for Sealed Systems, refer to Section 7 of these instructions.

For details of the Grant Sealed System kits for use with the Grant Aerona heat pump range refer to Section 15.

IMPORTANT

As with all wet heating systems, it is the responsibility of the installer to remove all the air from the heating system after filling.

1. To vent the heat pump – All Grant Aerona heat pumps are fitted with a single automatic air vent on the top of the electric immersion element housing.

Check that the small cap on the automatic air vent is screwed on fully, then unscrew it one complete turn - leave the cap in this position. Note. Cap is supplied loose in bag attached to air vent.

2. Before filling the system check charge pressure in the expansion vessel (as supplied in the Sealed System kit).

This should be 0.2 - 0.3 bar lower than the cold fill pressure for the system.

The nominal filling pressure for the system when cold is 0.5 - 1 bar.

3. If a flexible filling loop is to be used to fill the system (as supplied in the Sealed System kit), ensure it is connected between the two filling valves and that both valves are closed.

A valve is open when the operating lever is in line with the valve and closed when at right angles to it.

4. To fill the system, ensure that the mains cold water supply valve (stop cock) is open, then open the filling valve on the cold water supply.

Gradually open the filling valve on the heating circuit (at the other end of the filling loop) until water is heard to flow into the system.

Fill the system until the required system pressure is indicated on the sealed system pressure gauge (as supplied in the Sealed System kit). Then close both filling valves.

5. Vent each UFH circuit and then each radiator in turn, starting with the lowest one in the system, to remove air.
6. It is important the circulating pump(s) are properly vented to avoid them running dry and the bearings being damaged. Vent pump via plug on pump head.
7. Check the operation of the safety valve (as supplied in the Sealed System kit) by turning the head anticlockwise until it clicks. The click is the safety valve head lifting off its seat allowing water to escape from the system. Check that this is actually happening.
8. After venting, check system pressure and top-up using the filling loop, as required.

10.2 Flushing and Corrosion Protection

To avoid the danger of dirt and foreign matter entering the Heat pump the complete heating system should be thoroughly flushed out – both before the heat pump is operated and then again after the system has been heated and is still hot.

This is especially important where the heat pump is installed as a replacement for a boiler on an old system.

In this case the system should be first flushed hot, before the old boiler is removed and replaced by the heat pump.

For optimum performance after installation, this heat pump and the central heating system must be flushed in accordance with the guidelines given in BS 7593:1992 'Treatment of water in domestic hot water central heating systems'.

This must involve the use of a proprietary cleaner, such as Sentinel X300 or X400, or Fernox Restorer.

After flushing, a suitable thermal fluid should be used (such as Sentinel R600) specifically designed for use in air source heat pump installations. This provides long term protection against corrosion and scale as well as the risk of the freezing in the external section of the heating system (i.e. the flexible hoses, condenser and circulating pump within the heat pump casing) in the event of power failure during winter months.

In order to avoid bacterial growth, due to the lower system operating temperatures, a suitable Biocide (such as Sentinel R700) should also be used in conjunction with the thermal fluid.

Both the thermal fluid and biocide should be added to the system water when finally filling the heating system.

Alternatively, Fernox HP5C can be used (or HP15C for greater frost protection). This is a suitable thermal fluid that already contains a suitable biocide.

Full instructions on the correct use of thermal fluids and biocides are supplied with the products, but further information can be obtained from either www.sentinel-solutions.net and www.fernox.com

Failure to implement the above guidelines by fully flushing the system and using a suitable thermal fluid and biocide corrosion inhibitor will invalidate the Heat Pump product warranty.

11 Commissioning

11.1 Switching on First Time


IMPORTANT
BEFORE switching on power supply to the heat pump and the heating control system for the first time the following procedures MUST be carried out in the order they appear, to prevent damaging the internal heat pump controller.

1. Ensure the external mains power isolation switch is set to the 'OFF' position.
2. Ensure the power supply to the heating control system is isolated at the fused isolator.
3. Disconnect the three control wires (from terminals 1, 2 and 3 in the heat pump) at terminals 8, 9 and 10 in the wiring centre – refer to either Figure 8-12 or 8-13 as appropriate.
4. Switch on the power supply to the heating control system at the fused isolator.
5. Create a CH demand and HW demand (if applicable) using the timer/programmer.
6. Confirm the CH and HW motorised valves have opened. You may need to adjust the room thermostat and/or cylinder thermostat to achieve this.

7. At the wiring centre terminals, confirm that:
 - there is NO voltage present at terminals 8, 9 or 10 (refer to Figure 8-12 or 8-13 as appropriate)
 - there IS continuity between terminals 8 & 9 for CH and also 8 & 10 for HW

IMPORTANT
If voltage (230Vac) is present at terminals 8, 9 or 10, check the wiring as shown in Figure 8-12 or 8-13 and correct as necessary. These terminals MUST be 'voltage free' or the heat pump internal controller will be damaged.

6. Remove CH and HW demands.
7. Isolate the power supply to the heating control system at the fused isolator.
8. Re- connect the three control wires (from terminals 1, 2 and 3 in the heat pump) to terminals 8, 9 and 10 in the wiring centre – refer to either Figure 8-12 or 8-13 as appropriate.
9. Switch on the power supply to the heating control system at the fused isolator.
10. Create a CH and HW demand using the timer/programmer.
11. Confirm the CH and HW motorised valves have opened.

12. Switch the external isolator to 'ON'.
13. Check power is established – the ATC and BTC should now show display default settings.
14. Using the ATC, set the heat pump to 'Automatic'  and switch it ON. Refer to Section 11.2 for details.
15. Within 30 seconds, the circulating pump and fan will start.
16. Within 60 seconds the compressor will start.
17. Once the compressor has started, pay attention to the pressure gauge on the side of the heat pump. If the pointer starts to rise quickly, (enters the yellow or red zone within 30 seconds) switch off at the external isolator and remove all air from the system.
18. If the heat pump fails to start refer to Section 13.1.
19. When satisfied that all air has been expelled, start this process again from step 12.
20. Remove demand for CH and HW.
21. Compressor and fan will stop.
22. Circulating pump will continue to run for a period of time (as set on the BTC.).
23. Set the ATC and BTC controls. Refer to Sections 11.2 and 11.4 respectively.

IMPORTANT

When putting the heat pump into use for the first time, watch the refrigerant pressure gauge on the side of the heat pump. The needle will rise over time when the temperature of the refrigerant increases. However, if this happens very quickly (e.g. rises into the yellow or red zone within 1 minute) then an air lock is present. Switch off power to the heat pump immediately, and purge any remaining air from the system.

IMPORTANT

Grant Aerona heat pumps should be stored and transported in an upright position. If not, the heat pump MUST be positioned in an upright position for at least 4 hours before being operated.

11 Commissioning



11.2 Setting the ATC Controller



The main purpose of the ATC controller is to give an overall maximum temperature control over the heat pump. In contrast, the BTC controller will give accurate control over both CH and HW temperatures, even if they each have different target temperatures.

The ATC controller must be set to either OFF or AUTOMATIC as follows:

1. OFF – This is indicated when NO temperature reading is shown in central section of the display.

In this setting the heat pump will not operate irrespective of any demand from either the heating system controls or the BTC controller.

Note – either the  or  symbol will still be visible at the top of the display and the time will be shown at the bottom.

If the  symbol is visible, press the M button to switch to .

To switch heat pump ON


Press the  button.

The return water temperature will appear on the display and the heat pump will start.

To switch the heat pump OFF

Press the  button.



The return water temperature will disappear from the display and the heat pump will stop.



2. AUTOMATIC – This is indicated when the  symbol is visible at the top right of the display.

In this setting the heat pump is in a fully automatic condition (provided it is switched ON – see 1 above).

Functions including normal running, defrosting, and frost protection are all operative.



IMPORTANT

If the symbol  is visible at the top left of the display the Frost protection and Back-up Immersion heater will NOT operate. Do NOT leave the ATC control set in this condition. Press the M button to switch to 'Automatic' and the  will be visible at the top right of the display.

Note – It is possible to switch from  to  when the ATC is switched OFF by pressing the M button.

Setting the ATC clock function

For the heat pump to operate correctly, the clock function of the ATC must be correctly set using the following procedure:

1. Press the 'SET' button twice. The hour segments will flash. Alter the hour setting using the .
2. Press the 'SET' button again to set the minutes. Alter the minute setting using the .
3. Press the 'SET' button to confirm the time setting.
4. The clock is now set.


Setting the ATC parameters:


In order for the heat pump to operate correctly, the ATC operating parameters must be set as indicated in the table on page 31.


IMPORTANT

Please note that ALL operating parameters MUST be checked during commissioning and, if not correct, set to the the value given in the table on page 31.

Incorrectly set parameters will adversely affect the operation and efficiency of the heat pump and will invalidate all warranties.

To check the parameter settings, press either of the  buttons to enter the list of parameters. Then repeatedly press either of the buttons to scroll through the different parameters. Check the setting of each parameter against the correct values listed in the table on page 31.

To alter the setting of any parameter, press the 'SET' button once, then use the  buttons to alter the value of that parameter. Once set correctly, press the 'SET' button to exit back to the parameter list and continue to check settings.

To exit the parameter list stop pressing the  buttons. The ATC will automatically return to the normal operation.

NOTE


If no button is pressed for a period of 10 seconds, the ATC will automatically revert back to normal operation.

ATC timer function

In order for the heat pump to operate correctly the ATC timer function MUST be switched off.

If the 'ON' and 'OFF' indicators are NOT showing on the display, then the timer function is already switched off and no further action is required.

If the 'ON' and 'OFF' indicators are showing on the display:

Press the  button and then the 'SET' button. The 'ON' and 'OFF' will disappear from the display indicating that the timer function has been switched off.

Fault finding

The ATC also has a series of fault codes which will help in any fault diagnosis, should an internal fault occur. Refer to Section 13.3 for details.

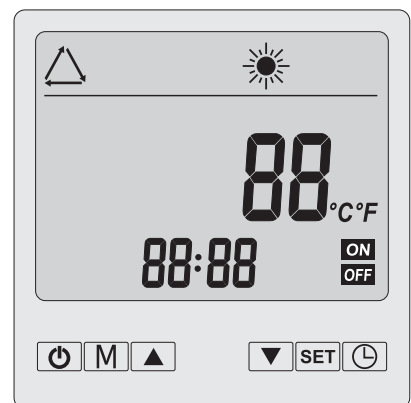



Figure 11-1: ATC display and buttons

NOTE

If the  is flashing on and off, this indicates that the heat pump is in the defrost mode.

11.3 Additional Operating Information about the ATC

Fan Motor Operation

With Parameter 'A' set to either 0 or 1 the fan operates at a single constant speed.

- a) When in heating mode (CH or HW), the fan motor starts up to 60 seconds before the compressor starts.
- b) During defrosting, the fan motor does not operate.

Circulating Pump Operation

In all conditions, the circulating pump will operate when the ambient air temperature falls below 5°C. This is part of the frost protection and cannot be adjusted by the installer or user.

Electric Immersion Heater and Trace Heater Operation

Started by ambient temperature - Parameter 'd' setting (Refer to Table of ATC Parameters below).

Regardless of whether the ATC is ON or OFF (i.e. when no Return Temperature is displayed), when either:

- a) The Return water temperature is 2°C lower than the parameter 'd' temperature setting (default setting 3°C),
OR
 - b) The Ambient temperature is at parameter 'd' temperature setting (default setting 3°C).
- BOTH the Electric Immersion backup heater and the Trace Heater (in the base tray) will be energised. Both will remain energised until either:
- a) The Return water temperature has reached either
8°C with no demand from the BTC,
OR
 - b) The ambient temperature is higher than the parameter 'd' temperature setting (default setting 3°C).

In Normal Operation

With ATC set to ON

If the Return water temperature falls to less than Parameter 0 setting (default setting 2°C) the Electric Immersion backup heater (and trace heater) will be energised to increase the heat output of the heat pump.

The Electric Immersion heater (and Trace heater) will be switched off when the Return water temperature reaches Parameter 1 setting (default setting 47°C).

Bivalent Systems

In a Bivalent system the electric immersion element is disconnected and the switched live for the back-up boiler is taken from the immersion element live terminal – refer to Figures 8-7 and 8-11.

Thus the back-up boiler will be energised under the same parameters as given above for the electric immersion element and trace heater.

Frost Protection

Regardless of whether the ATC is ON or OFF (i.e. when no Return Temperature is displayed) the following TWO levels of Frost protection will operate:

1. When the Return water temperature is equal or less than parameter 0 (default setting 2°C) AND the Ambient air temperature is equal or less than 7°C the Heat Pump

enters the first level of Frost Protection and the circulating pump will start.

The pump will remain ON until the Return water temperature increases to 2°C above parameter 0 (i.e. 4°C with parameter 0 setting of 2°C).

2. When the Return water temperature is equal or less than parameter 0 (default setting 2°C) AND the Ambient air temperature is equal or less than 5°C the Heat Pump enters the second level of Frost Protection and the Heat Pump will start.

The Heat Pump will remain ON until the Return water temperature is equal or greater than 8°C.



NOTE
When either of these Frost Protection measures are in operation the code PP7 will be displayed on the ATC. This does NOT indicate a fault condition.

ATC Parameters

Parameter	Description	Setting
0	Return water temperature to start electrical heater	2°C
1	Max return water temperature setting	47°C
2	Defrost cycle	40 mins
3	Coil temperature point to start defrosting	-3°C
4	Coil temperature point to stop defrosting	18°C
5	Max time for defrosting	8 mins
6	Reserved	
7	Restart after power failure	1
8	EEV manual / auto control	1
9	Water pump working mode, 0= Continuous, 1=Normal	1
A	Fan motor working mode* 0= daytime working mode, 1=night time working mode	1
b	Target superheat	3
C	Manual control paces of EEV	35
d	Temperature point to start electrical element (ambient)	3°C
F	Coil temp.	} Readouts only
10	Return gas temp.	
11	Ambient temp.	
12	Tank water temp.	
13	EEV actual open paces	

* This feature is not enabled, see Section 11.3 - Fan Motor Operation

Take a note of these settings and write them in the table on page 34.

IMPORTANT - Only set parameters as shown above unless instructed otherwise by Grant UK.

11 Commissioning

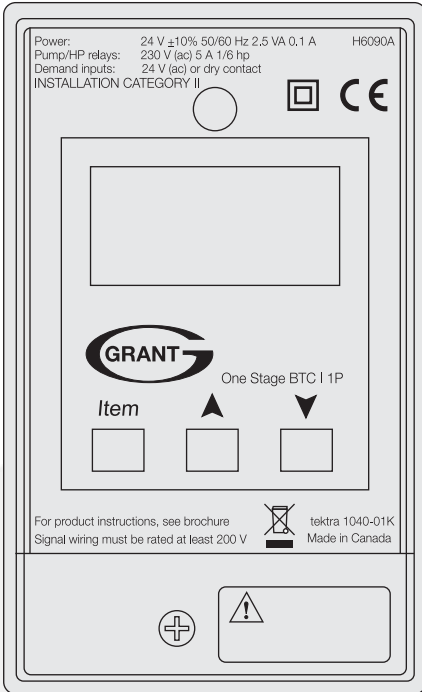


Figure 11-2: BTC display and buttons

11.4 BTC Controller

The BTC incorporates 2 digital temperature controls – one for the CH and one for the HW.

The purpose is to give far greater control over the heating system than conventional controls allow.

If UFH (Under Floor Heating) and Radiators are on the same system you may want the system to work around a flow temperature of 50°C. If UFH alone, then the flow temperature could be a 35°C flow. When a HW demand is present, you may want to use the heat pump to take the water to 60°C, or alternatively you may wish to preserve the COP and therefore the efficiency and only raise the cylinder to 50°C using the heat pump. Refer to Section 9.3.

This control allows you to be in control.

When operating in HW mode, the ambient air temperature is ignored. In CH mode (without HW demand) the ambient outside temperature is used to determine how much input power is required to achieve the desired target temperature.

This provides a very efficient way to weather compensate the heating system which will add to the heat pump and the system efficiency.

NOTE

This increase in efficiency, due to weather compensation in the CH mode, has NOT been taken into account in determining the COP's quoted on the technical specifications table.

11.5 Checking the BTC Controller

To check the operating status of the heat pump:

With the BTC in 'VIEW' display mode – see Figure 11-3.

1. OUTDR (outdoor) temperature is displayed.
2. Press 'Item' button – TARGET temperature is displayed.

NOTE

If no TARGET temperature is displayed this indicates there is no demand from either Central Heating or DHW.

3. Press 'Item' button – BOIL OUT (Flow) temperature is displayed.
4. Press 'Item' button – BOIL IN (Return) temperature is displayed.
5. Press 'Item' button – ΔT (Differential) is displayed.
6. Press 'Item' button – BOIL (hours run) is displayed. Note: this record of hours run is not present on all versions of the BTC control.
7. Press 'Item' button – OUTDR (outdoor) temperature is displayed again.

To check for Heating or DHW demand:

If 'Dem' is shown on the display, this indicates a demand on the heat pump:

Dem1 – Heating – operating to achieve the BOIL DSGN temperature.

Dem2 – DHW – operating to achieve the TARGET DHW temperature.

When Dem 1 is displayed: Boil is shown next to the

When Dem 2 is displayed: DHW is shown next to the

To check for Heat Pump operation:

When is shown on the display, this indicates Heat pump is operating.

When 'Dem', and are not showing on the display indicates no demand from either Heating or DHW, and that Heat Pump is not operating.

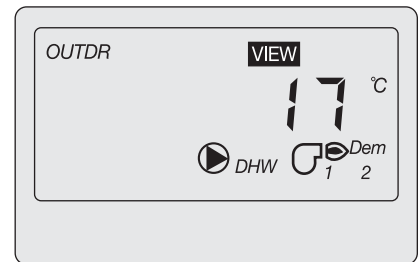


Figure 11-3: View display

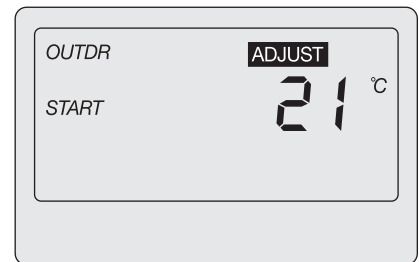


Figure 11-4: Adjust display

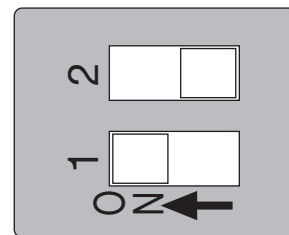


Figure 11-5: DIP switch

11.6 Setting the BTC Controller

To set the BTC controller parameters:

1. Remove outer cover.
2. Remove screw and inner cover.
3. Set the lower DIP switch (1) to ON (move it to the left). Refer to Figure 11-5.
4. Replace both inner and outer covers.
5. Press all 3 buttons for 1 second to enter the 'ADJUST' display mode. Refer to Figure 11-4.
6. OUTDR START setting should be displayed. If so, go to step 9 below.
7. If MODE is displayed, press either the ▲ or ▼ buttons until 'MODE 3' is displayed.
8. Then, press 'Item' button – OUTDR START setting will be displayed.
9. To adjust the OUTDR START setting – use the ▲ or ▼ buttons.
10. Press 'Item' button to move on to next parameter – adjust as necessary.
11. Repeat this process to check and adjust all settings, as necessary.



NOTE

If no buttons are pressed for a period of 20 seconds the BTC will automatically return to the 'VIEW' display.

IMPORTANT

In order for the BTC and Heat Pump to function correctly the BTC parameters must be set as shown in the table above.

BTC Parameters

Note: The actual parameter displayed on the BTC ADJUST view will depend on the version of the BTC control fitted to the Heat Pump, as follows:

BTC Version 1	BTC Version 2	BTC Version 3	Setting
OUTDR START	OUTDR START	OUTDR START	21°C
OUTDR DSGN	OUTDR DSGN	OUTDR DSGN	-3°C
BOIL START	BOIL START	START	30°C
BOIL DSGN	BOIL DSGN	DSGN	40°C
BOIL MAX	BOIL TARGET MAX	TARGET MAX	55°C
BOIL MIN	(not displayed)	(not displayed)	OFF
MASS	(not displayed)	(not displayed)	2
DIFF	DIFF	DIFF	10°C
(not displayed)	MIN ON	MIN ON	3 mins
(not displayed)	MIN OFF	MIN OFF	3 mins
BOIL TARGET DHW	TARGET TANK	DHW TARGET	46°C
MODE DHW	(not displayed)	(not displayed)	1
DLY (Pump)	DLY (Pump)	DLY (Pump)	8 mins
WWSD	WWSD	WWSD	24°C
°C/°F	°C/°F	(not displayed)	°C

Notes:

- a) Depending on the version of the control fitted to the heat pump, some parameters may be displayed with the prefix 'BOIL' – e.g. BOIL START, BOIL DSGN, etc. In this application of the control this is referring to the heat pump (and not any external boiler).
- b) The OUTDR Start, OUTDR DSGN and START settings shown above are suitable for a system design of -3°C to 21°C. If any other design criteria are used, alter these settings to match the design criteria.
- c) The BOIL DSGN (or DSGN) parameter can be adjusted to suite the heating system eg. 50°C for a radiator system.
- d) Depending on the version of the control fitted to the heat pump, the MASS parameter may not be displayed on the control. In this case it will be automatically set to a value of 2. If it is displayed, manually set it to 2.
- e) Depending on the version of the control fitted to the heat pump, the DIFF parameter may not be displayed on the control. In this case it will be automatically set to 10°C. If it is displayed, manually set it to 10°C.
- f) Depending on the version of the control fitted to the heat pump, Min ON and Min OFF parameters may not be displayed. In this case the values will be automatically set to 3 mins. If they are displayed these parameters must be set to 3 mins – resulting in a maximum of 10 on/off cycles per hour.
- g) DHW TARGET setting of 46°C assumes the cylinder thermostat setting of 45°C and thereafter, heated by an auxiliary source – e.g. immersion element, boiler etc. refer to Section 9.3.
- h) Pump Delay should be set to 8 minutes. Pump delay should be set to 2 minutes for bivalent system (Refer to Section 4.3 and 4.4).
- i) WWSD should always be set 3°C higher than the OUTDR Start setting. Note: WWSD does not operate when there is a hot water demand.

Take a note of these settings and write them in the table on page 34.

IMPORTANT - Only set parameters as shown above unless instructed otherwise by Grant UK

11 Commissioning

11.5 Record of ATC and BTC Settings

Please complete the following settings:

ATC

Parameter	Description	Set Value
0	Return water temperature to start electrical heater	°C
1	Max return water temperature setting	°C
2	Defrost cycle	mins
3	Coil temperature point to start defrosting	°C
4	Coil temperature point to stop defrosting	°C
5	Max time for defrosting	mins
7	Restart after power failure	
9	Water pump working mode 0 = Cont, 1 = Normal	
A	Fan motor working mode 0 = daytime working mode 1 = night time working mode	
B	Target superheat	
C	Manual control paces of EEV	
d	Temperature point to start electric element (ambient)	°C

BTC

Item	Set Value
OUTDR Start	°C
OUTDR DSGN	°C
START	°C
DSGN	°C
MAX	°C
MIN	°C
DIFF	
HW TARGET	°C
'pump' DLY	secs
WWSD (Warm Weather Shut Down)	°C
Min ON	mins
Min OFF	mins

12 Servicing & Maintenance

12.1 General

Grant Aeron Heat Pumps require only the minimum of routine servicing and maintenance. This basically consists of a visual check of the unit and should be regularly carried out (e.g. annually) to ensure that the heat pump continues to operate in a safe and efficient manner.

12.2 Air Inlet and Outlet

The air inlet grille and evaporator must be checked and leaves or any other debris removed from the space between the grille and the evaporator fins.

IMPORTANT

Take care not to damage or distort the Aluminium fins of the evaporator when removing any debris.

Ensure that both the air inlet to the evaporator and the discharge from the fan outlet are unobstructed. Any foliage, plants, etc. near the heat pump must not be allowed to grow over the unit.

Under no circumstances should anything be stacked on or against the unit.

Refer to Section 3.1 for the required clearances around the unit.

12.3 Condensate Disposal

Check that condensate drain holes in the bottom of the unit are not blocked.

12.4 Heating System Connections

Check the condition of the flexible hoses. Replace if damaged or leaking.

12.5 Heat Pump Controls

Check that settings on both the ATC and BTC controllers are as set when commissioned. Refer to Table of Recorded Settings on Page 34 of these Instructions. Reset to commissioned settings as necessary.

12.6 Refrigerant

Under no circumstances should the refrigerant be vented from the charging points on the refrigerant circuit of the Heat Pump.

If any work is required to be carried out on the refrigerant circuit, it MUST be undertaken by an F-gas registered refrigeration Engineer (or equivalent).

On no account should any such work be carried out by unqualified personnel.



WARNING

If it is necessary to carry out any remedial work on the Heat Pump, e.g. replacement of the flexible hoses, switch the heat pump to off (set the on/off switch on the ATC controller to OFF) and isolate the electrical supply at the external isolator (and at consumer unit/MCB) **BEFORE** starting any work on the heat pump or system.

13 Fault Finding

13.1 If Heat Pump Fails to Start

1. Initial checks

First check power supply to both heating system controls and heat pump. Check heating system is fully vented and refer to Section 13.6.

2. If heat pump fails to start

First check ATC is set to ON – is the return temperature shown on the ATC display? If not – set the ATC to ON. Refer to Section 11.2 for ATC details.

3. If heat pump still fails to start

Then check BTC display. Is it indicating a DHW demand – is DEM2 shown on the BTC display?

If not indicating DHW demand – set BTC to DHW. Refer to Section 11.4 for BTC setting details.

4. If heat pump still does not operate

Check heating system controls. Is the programmer, cylinder thermostat and motorised valve calling for DHW? Set controls to call for DHW if necessary. Refer to Section 13.2 below for further guidance.

5. If BTC is indicating DHW demand –

increase the START parameter setting as required to start the heat pump.

Once the heat pump has started, reset START parameter setting to the original value as given in the table on page 33.

13.2 Heating System Controls

1. If no continuity can be found between terminals 1 & 2 and/or 1 & 3 when either the CH or DHW is calling, this indicates a fault with S-plan heating control system. See Figure 13-1 for location of terminals.

2. Check the heating controls S-plan wiring. Refer to Section 8 of this installation manual. Check the demand for CH and DHW in isolation, from the programmer, via either room or cylinder thermostats to the CH and DHW motorised (zone) valves. Check that when the valves are energised that their end switches close – completing the 'volt-free' circuit between terminals 1 & 2 (CH) and 1 & 3 (DHW).

3. Ensure that when the end switches of the motorised (zone) valves

make, that there is no mains voltage present at 8, 9 and 10 in the wiring centre (refer to Section 11.1 and either Figures 8-11 or 8-12 as appropriate).

IMPORTANT
Mains voltage on these terminals will do irreparable damage to the heat pump and will not be covered by the warranty.

13.3 Warm Weather Shut Down (WWSD)

The WWSD (warm weather shut down) function of the BTC operates under only under 2 conditions.

- When the ambient (outdoor) air temperature is at 24°C or equal to the indoor temperature and
- When the CH is the only demand on the heat pump. WWSD is active when WWSD appears on the display of the BTC.

13.4 Operation of MCB/RCD's

MCB's and RCD can trip for a variety of reasons. Common causes of MCB/RCD tripping are:

- Incorrect rating or type of MCB/RCD
- A component leaking to earth
- A component with a dead short
- Incorrect polarity
- Incorrect cable size
- Damaged cable or component



WARNING

Only qualified electricians should work on power installations. If you are in any doubt, contact an electrician for assistance – and not the Grant technical helpline, as we will only direct you to contact an electrician.

13.5 Temperature Sensors

If a sensor fault code is displayed on either the ATC or BTC controls, refer to the table of fault codes on page 38 of this installation manual for guidance.

A common cause is that a sensor wire has either become loose or disconnected. Check all sensor wires for security before calling our technical helpline for assistance.

There are 6 sensors in total fitted to the heat pump. The ATC has 3 sensors identified by black tails on the wires. The BTC also has 3 sensors with blue tails on the wires. The resistance/temperature tables for the ATC and BTC sensors are given in Figures 13-4 and 13-5.

13.6 Refrigerant Pressure Gauge

The pressure gauge on the side of the heat pump indicates the refrigerant pressure (NOT the heating system water pressure) and can be a useful tool to help fault finding.

If the heat pump goes out due to high refrigerant pressure, the pressure gauge will be in the red zone and the high pressure cut out on the refrigerant circuit will have shut down the heat pump. This is most likely to be due to an air lock in the heating (primary) water circuit.

An air-lock that cannot be cleared by the pump will have the same effect as that of an ordinary boiler. It will overheat as it cannot get rid of the heat it is producing. This will be evident if, when switched on from cold or warm, the pressure gauge rises quickly towards the yellow or red zones.

If this happens, switch off, and purge the heating system. Remember to check the circulating pump is vented and working. In normal working conditions, the pointer on the gauge will remain in the green zone.

13.7 Power Capacitors

Capacitors store an electrical charge. The capacitors in the heat pump are power capacitors and can cause a large electric shock if care is not taken.



WARNING

DO NOT attempt to test the functionality of a capacitor using a screwdriver or multi-meter. NEVER try to short out the connections – even with the mains voltage removed. Always seek the help of a qualified electrician or Qualified heating engineer who has been suitably trained by Grant Engineering UK Ltd.

13.7 General Notes

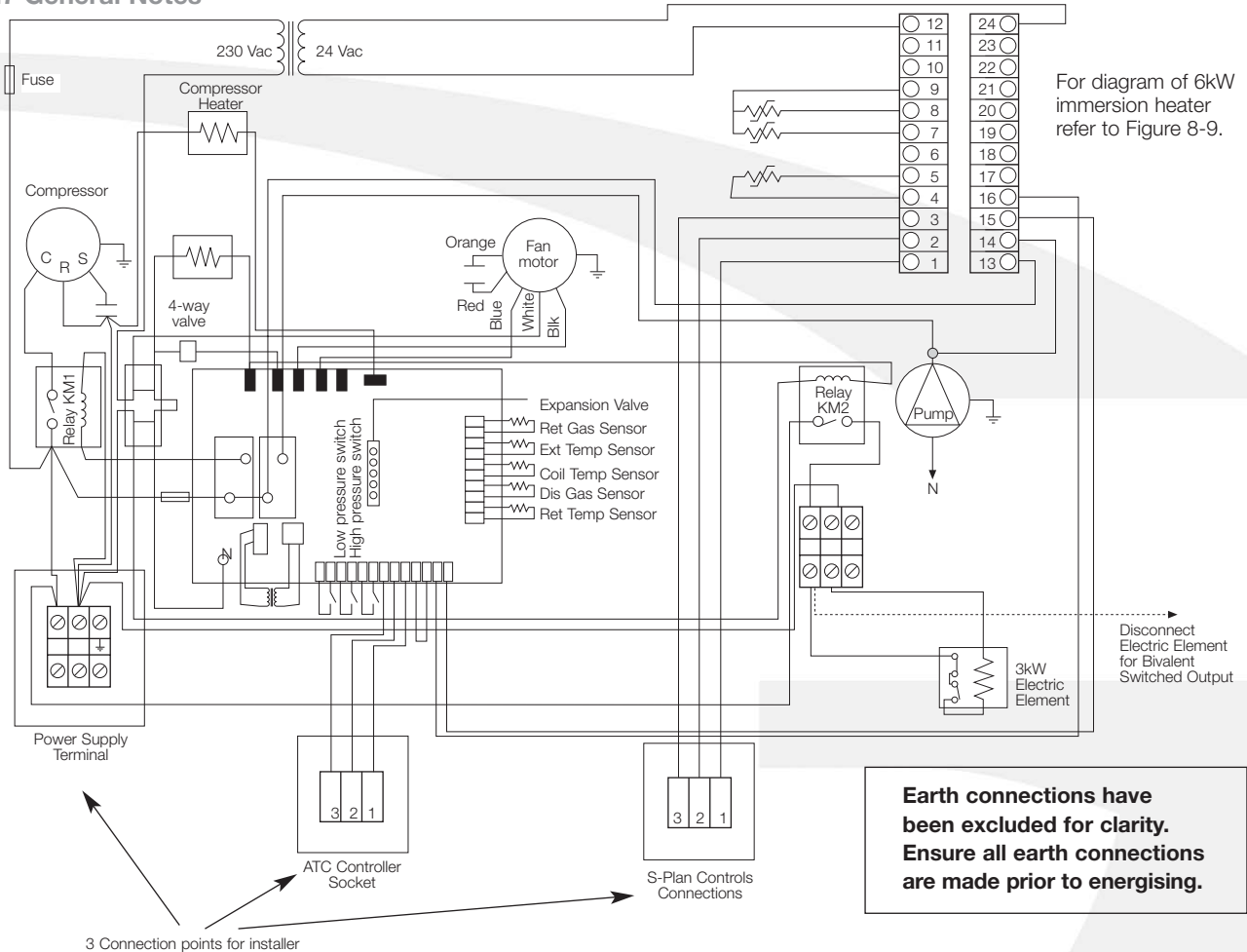


Figure 13-1: Heat pump wiring diagram

Display	Protection/Fault
No display	12V transformer failure
PP 1	Inlet (return) water temperature sensor failure
PP2	Discharge gas sensor failure
PP 3	Coil temperature sensor failure
PP4	Return gas sensor failure
PP 5	Ambient temperature sensor failure
PP 6	Discharge gas overheat protection*
PP 7	Winter anti-freeze protection in operation**
EE 1	High pressure - circulating pump failure or circuit air locked
EE 2	Low pressure
EE 3	Open circuit between PCB terminals 23-24
EE4	Supply L and N are reversed
EE 8	Communication failure
☀ On and Off	Defrosting

* 1 - When return water temperature is too high causing compressor discharge gas to be too high. 2 - Insufficient refrigerant to compressor causing discharge gas to be too hot.

** This is NOT a fault condition.

Figure 13-2: ATC fault codes

Item Field	Num Field	Fault
E01	Err	Internal control fault
BOIL OUT	SHr	HP flow sensor short
BOIL OUT	OPn	HP flow sensor open
BOIL IN	SHr	HP return sensor short
BOIL IN	OPn	HP return sensor open
SUP	SHr	Supply sensor short
SUP	OPn	Supply sensor open
OUTDR	SHr	Outdoor sensor short
OUTDR	OPn	Outdoor sensor open

Figure 13-3: BTC fault codes

13 Fault Finding

ATC

Temperature °C	Resistance kΩ	Temperature °C	Resistance kΩ	Temperature °C	Resistance kΩ	Temperature °C	Resistance kΩ
-20	37.4111	2	13.0055	24	5.1978	46	2.3276
-19	35.5384	3	12.4391	25	5.0000	47	2.2493
-18	33.7705	4	11.9008	26	4.8109	48	2.1740
-17	31.1009	5	11.3890	27	4.6300	49	2.1017
-16	30.5237	6	10.9023	28	4.4569	50	2.0320
-15	29.0333	7	10.4393	29	4.2912	51	1.9651
-14	27.6246	8	9.9987	30	4.1327	52	1.9007
-13	26.2927	9	9.5794	31	3.9808	53	1.8387
-12	25.0330	10	9.1801	32	3.8354	54	1.7790
-11	23.8412	11	8.7999	33	3.6961	55	1.7216
-10	22.7133	12	8.4377	34	3.5626	56	1.6663
-9	21.6456	13	8.0925	35	3.4346	57	1.6131
-8	20.6345	14	7.7635	36	3.3120	58	1.5618
-7	19.6768	15	7.4498	37	3.1943	59	1.5123
-6	18.7693	16	7.1506	38	3.0815	60	1.4647
-5	17.9092	17	6.8652	39	2.9733	61	1.4188
-4	17.0937	18	6.5928	40	2.8694	62	1.3746
-3	16.3203	19	6.3328	41	2.7697	63	1.3319
-2	15.5866	20	6.0846	42	2.6740	64	1.2908
-1	14.8903	21	5.8475	43	2.5821	65	1.2511
0	14.2293	22	5.6210	44	2.4939	66	1.2128
1	13.6017	23	5.4046	45	2.4091		

Figure 13-4: ATC sensor resistance table

BTC

Temperature °C	Resistance kΩ	Temperature °C	Resistance kΩ	Temperature °C	Resistance kΩ	Temperature °C	Resistance Ω
-46	490.813	-7	46.218	32	7.334	71	1,689
-43	405.710	-4	39.913	35	6.532	74	1,538
-40	336.606	-1	34.558	38	5.828	77	1,403
-37	280.279	2	29.996	41	5.210	79	1,281
-34	234.196	4	26.099	43	4.665	82	1,172
-32	196.358	7	22.763	46	4.184	85	1,073
-29	165.180	10	19.900	49	3.760	88	983
-26	139.402	13	17.436	52	3.383	91	903
-23	118.018	16	15.311	54	3.050	93	829
-21	100.221	18	13.474	57	2.754	96	763
-18	85.362	21	11.883	60	2.490	99	703
-15	72.918	24	10.501	63	2.255	102	648
-12	62.465	27	9.299	66	2.045	104	598
-9	53.658	29	8.250	68	1.857	107	553

Figure 13-5: BTC sensor resistance table

14 Spare Parts List

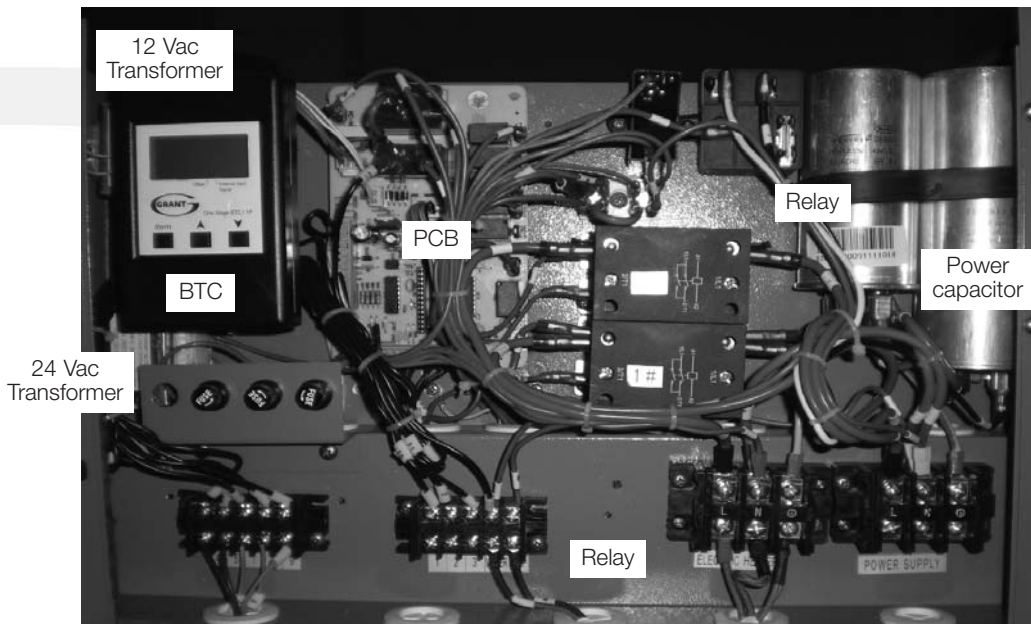


Figure 14-1: Heat pump control panel components

Part Number	Description	HPAW65	HPAW85	HPAW110	HPAW130	HPAW155
HPAS10	Power Capacitor 50 μ F	1	1	-	-	-
HPAS11	Power Capacitor 60 μ F	-	-	1	1	-
HPAS12	Power Capacitor 70 μ F	-	-	-	-	1
HPAS13	Power Capacitor 100 μ F	-	-	1	1	1
HPAS14	Fan Capacitor 4 μ F	1	-	-	-	-
HPAS15	Fan Capacitor 6 μ F	-	1	1	1	2
HPAS16	Fan Motor A	1	-	-	-	-
HPAS17	Fan Motor B	-	1	1	1	2
HPAS18	PCB	1	1	1	1	1
HPAS19	12Vac Transformer	1	1	1	1	1
HPAS20	24Vac Transformer	1	1	1	1	1
HPAS21	Controller ATC	1	1	1	1	1
HPAS22	Compressor A	1	-	-	-	-
HPAS23	Compressor B	-	1	-	-	-
HPAS24	Compressor C	-	-	1	-	-
HPAS25	Compressor D	-	-	-	1	-
HPAS26	Compressor E	-	-	-	-	1
HPAS27	Controller BTC	1	1	1	1	1
HPAS28	Relay 1	2	2	2	2	2
HPAS29	Circulating Pump A	1	1	1	1	-
HPAS30	Circulating Pump B	-	-	-	-	1
HPAS31	Immersion element 3kW	1	1	1	1	1
HPAS32	Flexible Hoses 3/4"	2	2	-	-	-
HPAS33	Flexible Hoses 1"	-	-	2	2	2
HPAS34	Isolation Valves 22mm	2	2	-	-	-
HPAS35	Isolation Valves 28mm	-	-	2	2	2

15 Accessories



Figure 15-1: Sealed system kit



Figure 15-2: Automatic hot water boost kit

15.1 Sealed System Kits

These are required when the Grant Aerona Heat Pump is used as part of sealed heating system – refer to Section 7 for further details.

Kit 1 (Grant Ref. HPAW55K12) 12 litre expansion vessel kit

For use on heating systems with a volume of up to 110 litres*

Kit contents:

12 litre expansion vessel
Wall bracket and fixing band
3 bar pressure relief valve
Manifold
Pressure gauge
Filling loop kit (isolation valve, non-return/isolation valve and filling hose)

Kit 2 (Grant Ref. HPAW55K18) 18 litre expansion vessel kit

For use on heating systems with a volume of up to 165 litres*

Kit contents:

18 litre expansion vessel
Wall bracket and fixing band
3 bar pressure relief valve
Manifold
Pressure gauge
Filling loop kit (isolation valve, non-return/isolation valve and filling hose)

Kit 3 (Grant Ref. HPAW55K50) 50 litre expansion vessel kit

For use on heating systems with a volume of up to 460 litres*

Kit contents:

50 litre expansion vessel
Wall bracket and fixing band
3 bar pressure relief valve
Manifold
Pressure gauge
Filling loop kit (isolation valve, non-return/isolation valve and filling hose)

*maximum system volumes shown for all sealed system kits are based on a vessel charge and initial (cold) system pressure of 1 bar.

15.2 Immersion Heater Kits

Kit 4 (Grant Ref. HPDHWBK1) Automatic domestic hot water boost kit - with manual override

This kit, installed next to the hot water cylinder, allows the stored hot water temperature to be automatically boosted in winter periods using the existing cylinder immersion element and thermostat. Refer to Section 9 for further details.

Kit contents:

Enclosure (containing)
Pre-wired Relay and By-pass switch

16 Glossary of Terms

Efficiency

The word “efficiency” is defined as the ratio of useful heat output to energy input. For example, if we use 1 kW of energy to produce 500W of heat it is deemed to be 50% efficient.

COP

The COP or ‘Coefficient of Performance’ is found by dividing the useful heat output by the energy input. For example; a heat pump that produces 4 kW of heat for 1 kW of input power has a COP of 4.

Source

This is wherever the heat is being extracted from e.g. the outside air or ground.

Emitters

A term used to describe radiators or underfloor heating. This is the component that ‘emits’ the heat into the building.

Refrigerant

The working fluid within the heat pump. It evaporates in one part and condenses in another. By doing so, heat is transferred from cold to hot. This fluid is sealed in and will not degrade within the life of the heat pump. Refrigerant handling should only be carried out by persons qualified to do so.

Heat Exchanger

A component that allows the transference of heat from one circuit to another without the two circuits mixing. Two heat exchangers are housed within the heat pump, one for the hot side (the condenser which transfers the heat to the heating circuit) and one for the cold side (the evaporator).

Buffer Tank

This is simply a large water cylinder that can be used to improve the efficiency and durability of a system. In fact, it reduces the number of stop/starts the compressor makes.

Heat Pump Rating

A heat pump is given a kW heat output rating. This value will vary depending on the working temperatures. The electrical power input will be typically between a half and a quarter of the heat output.

Monovalent

A monovalent system is one where all of the energy required for the heat load of the building is available from the heat pump.

Bivalent

Bivalent systems are those which require an additional source to meet the buildings heat load.

17 Warranty

17.1 The Grant Heat Pump Warranty

Dear Customer

You are now the proud owner of a Grant Aerona Air Source Heat Pump from Grant Engineering (UK) Ltd, that has been designed to give years of reliable, trouble free operation.

Grant Engineering (UK) Ltd. guarantees the manufacture of the heat pump including all electrical and mechanical components for a period of twelve months from the date of purchase provided the heat pump is installed in full accordance with the installation instructions provided. This will be extended to a period of two years if the system is registered with Grant UK within thirty days of installation and it is serviced at twelve month intervals. See Terms and Conditions below.

Important

Please register your Grant Air Source Heat Pump with Grant UK within thirty days of installation, as follows:

Either

- a) visit www.grantuk.com and follow the links to the 'Householder Zone', or
- b) go to www.grantuk.com/heatpumpregistration.aspx,

where you can register your Heat Pump for a further one year warranty (giving two years from the date of purchase). This does not affect your statutory rights.

Breakdown during the Manufacturer's Warranty

If your Grant Heat Pump should fail within the first two years, you must contact Grant Engineering (UK) Ltd, who will arrange for the repair under the terms of their Warranty, providing that the system has been correctly installed and commissioned, serviced (if older than twelve months) and the fault is not due to misuse, or the failure of any external components not supplied by Grant UK (e.g. pipework, etc.). This extended two year warranty only applies if the system is registered with Grant UK within thirty days of installation.

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 (UK) Ltd Service Department on 01380 736920 who will arrange for a qualified service engineer to attend to the fault.

Free of Charge Repairs:

During the first two years no charge for parts or labour will be made providing that the Heat Pump has been installed and commissioned correctly in accordance with the manufacturer's instructions, serviced at twelve month intervals and the system was registered with Grant UK within thirty days of installation. 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 Heat Pump has not been commissioned, or serviced in accordance with the installation and servicing manual.**
- **The system has been installed for over two years.**

Remember before you contact Grant:

Please register your Grant Air Source Heat Pump within thirty days of installation.

Terms of Manufacturer's Guarantee

1. The Grant Heat Pump guarantee starts from the date of purchase.
2. All electrical and mechanical components supplied with the Grant Heat Pump are guaranteed for a period of two years.
3. The Heat Pump is registered within thirty days of installation. Failure to do so does not affect your statutory rights.
4. The Grant Heat Pump must be installed by a competent installer and in accordance with the Codes of Practice and Regulations in force at the time of the installation.
5. The Grant Heat Pump and its components must not have been modified or tampered with.
6. The installation must be serviced every twelve months as per the installation instructions. (Receipts should be kept as proof.)
7. All claims under this guarantee must be made to Grant Engineering (UK) Ltd 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 (UK) Ltd.
8. This guarantee is transferable providing the installation is serviced prior to the dwelling's new owners taking up residence. Grant Engineering (UK) Ltd must be informed of the new owner's details.
9. Grant Engineering (UK) Ltd 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.
10. This guarantee applies to Grant Heat Pumps installed on the UK mainland, Isle of Man and Channel Islands only. Provision of in-warranty cover elsewhere in the UK is subject to agreement with Grant Engineering (UK) Ltd.

17.2 Extended Warranty

For further peace of mind Grant Engineering (UK) Ltd offer the option to insure all the components of your Grant Air Source Heat Pump for a further three years, following on from the two year product warranty period. For a single premium payment (inclusive of Insurance Premium tax) you get five years of protection against breakdown costs. At the end of this period you will have the opportunity to continue this cover on an annual basis.

To access full details and an application form for this extended cover, first visit www.grantuk.com.

Follow the links to the 'Householder Zone', register your Heat Pump for a further one year product warranty (giving two years from the date of purchase), and then download the extended warranty details and application form.

Please note that this special offer is only available if the application form is submitted to Bluefin Insurance Services Ltd. within three month of the installation date.



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APPROVED PRODUCT

