PROVISIONAL COPY

Grant ASHE Air Source Heat Pump
Air to Water High Efficiency Heat Pump Range

Installation & User Instructions

GRANT

STOP!

- 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

Contents

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 5ºC. 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

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		ASHE65	ASHE85	ASHE125	ASHE175	ASHE215
Heating Capacity	kW	6.66	8.74	12.30	17.80	21.20
Max. Running Current at 230V*	A	22	24	28	36	40
Power supply	V	230	230	230	230	230
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		R410A	R410A	R410A	R410A	R410A
Mass of R410a	g	2000	2200	2400	2 x 2000	2 x 2800
Built In Immersion	kW	3	3	3	3	3
Circulating Pump	m head	6	6	8	15	15
Flow Rate	litres/sec	0.328	0.416	0.579	0.840	1.020
Sound Power Level at 1m**	dB(A)	62.5	62.5	64	68.5	63
Sound Pressure Level at 1m	dB(A)	47.7	48	49	53	48.5
Water Connections	BSPF	$3/4$"	$3/4$"	1"	1"	1"
COP @ Air 7℃/Water 35℃		4.17	4.26	4.15	4.02	3.92
Weight (empty)	kg	116	145	173	233	334
Weight (full)	kg	119	148	176	237	339

* Includes 3kW immersion heater.
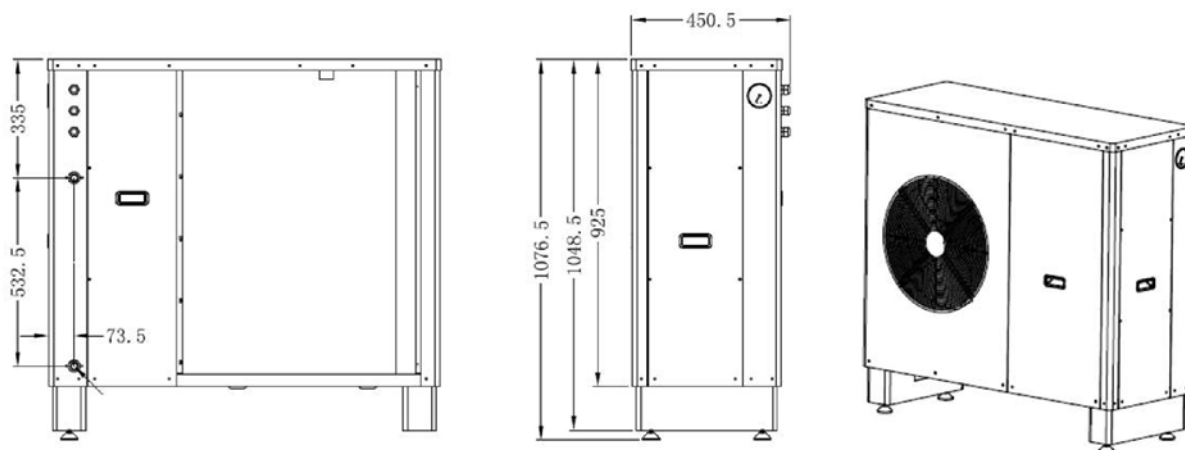** To EN14511.

2.2 Dimensions

Figure 2-1: ASHE65 Dimensions

2.2 Dimensions continued
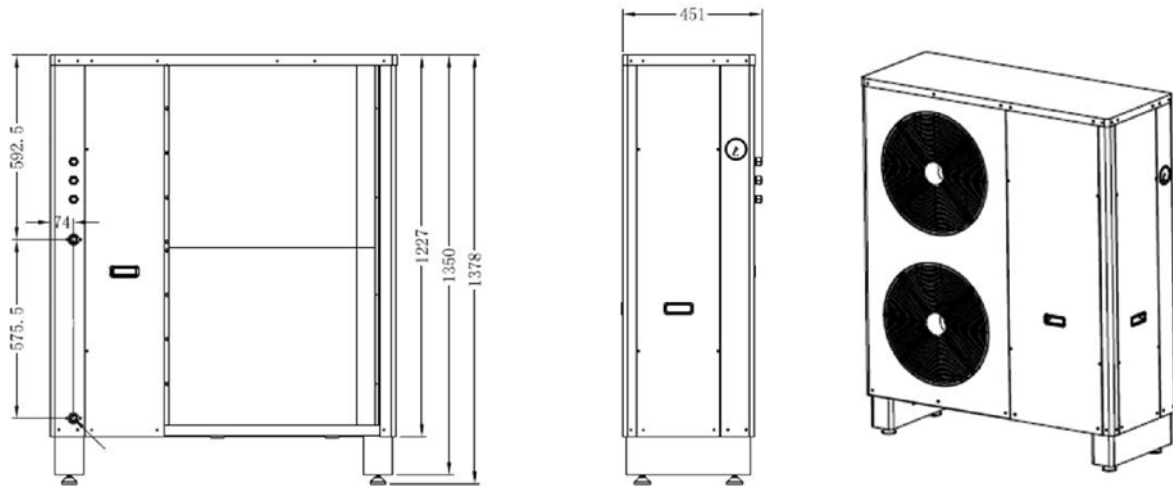
Figure 2-2: ASHE85 & ASHE125 Dimensions
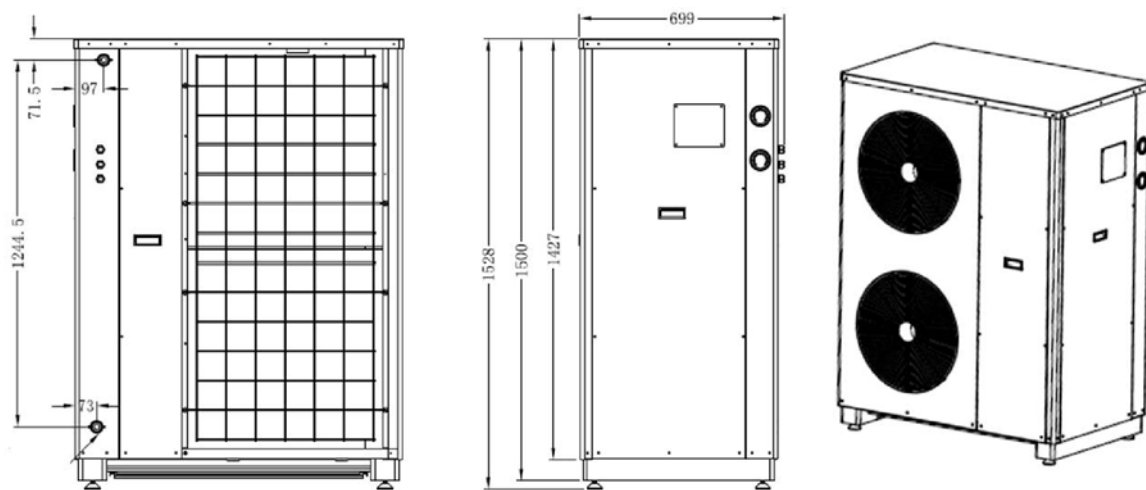
Figure 2-3: ASHE175 Dimensions
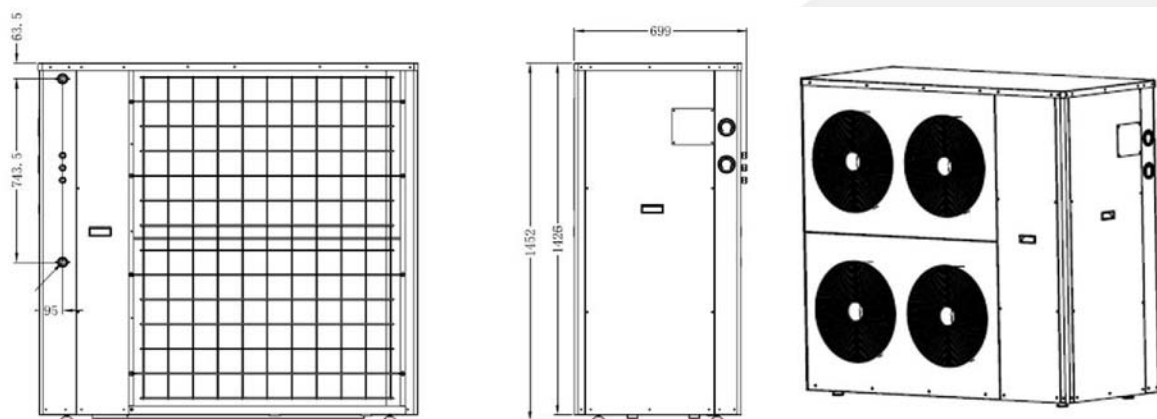
Figure 2-4: ASHE215 Dimensions

Specifications and Controls

2 Specifications and Controls

2.3 Heat Pump Operating Sequences

ASHE65, ASHE85 and ASHE125
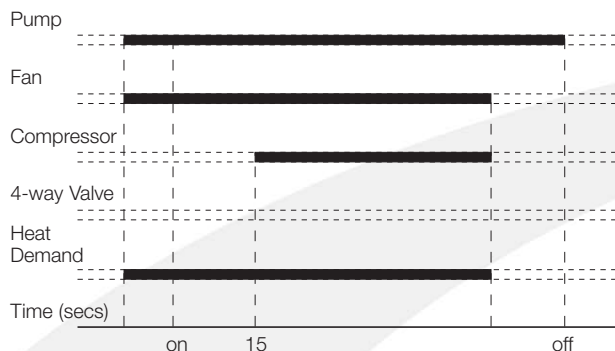
Figure 2-5: Normal operating sequence
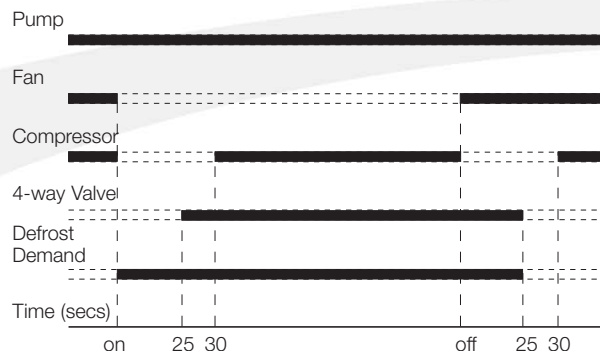
Figure 2-6: Defrost cycle

ASHE175 and ASHE215
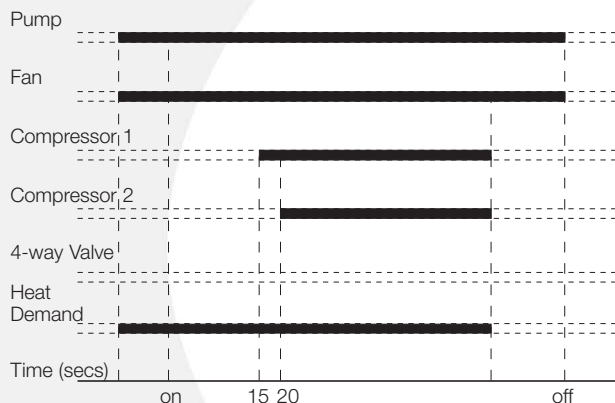
Figure 2-7: Normal operating sequence
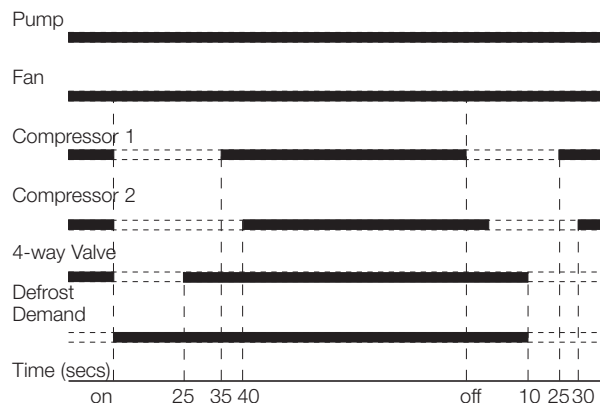
Figure 2-8: Defrost cycle

2.4 Controls

All Grant Aerona 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 Aerona 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.
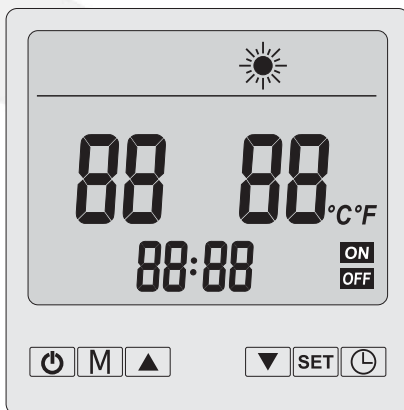
Figure 2-9: ATC Controller
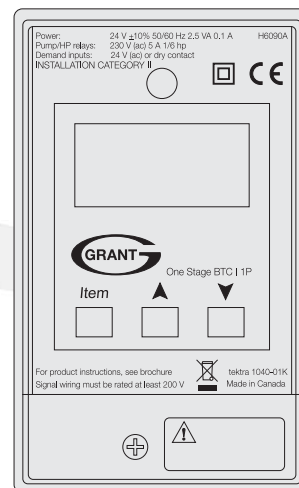
Figure 2-10: BTC Controller

Specifications and Controls
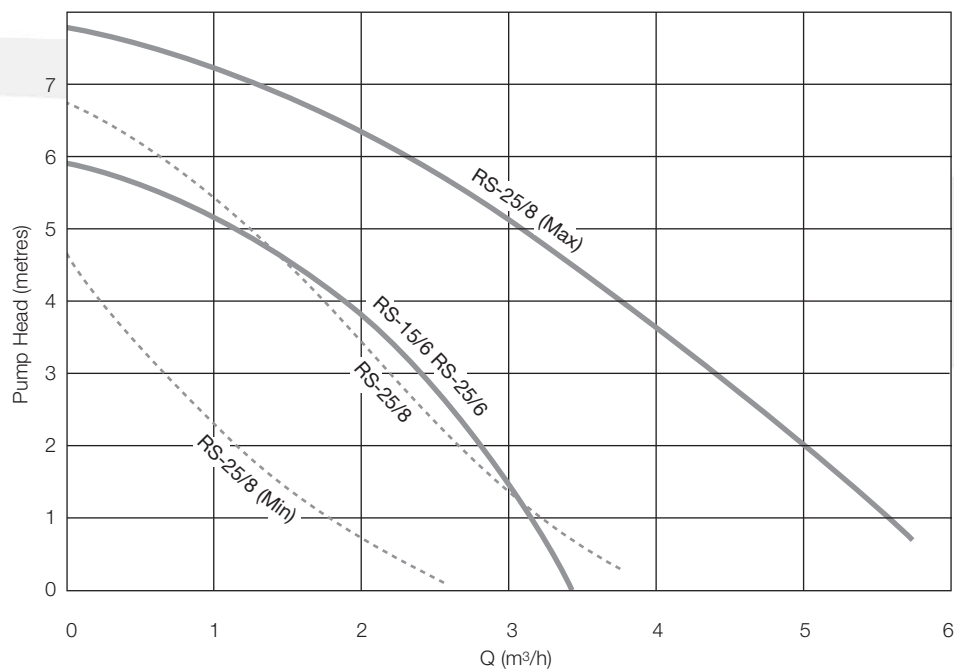
2.5 Pump Curves

Figure 2-11: Pump curves for ASHE65, ASHE85 (RS-15/6) and ASHE125 (RS-25/8)
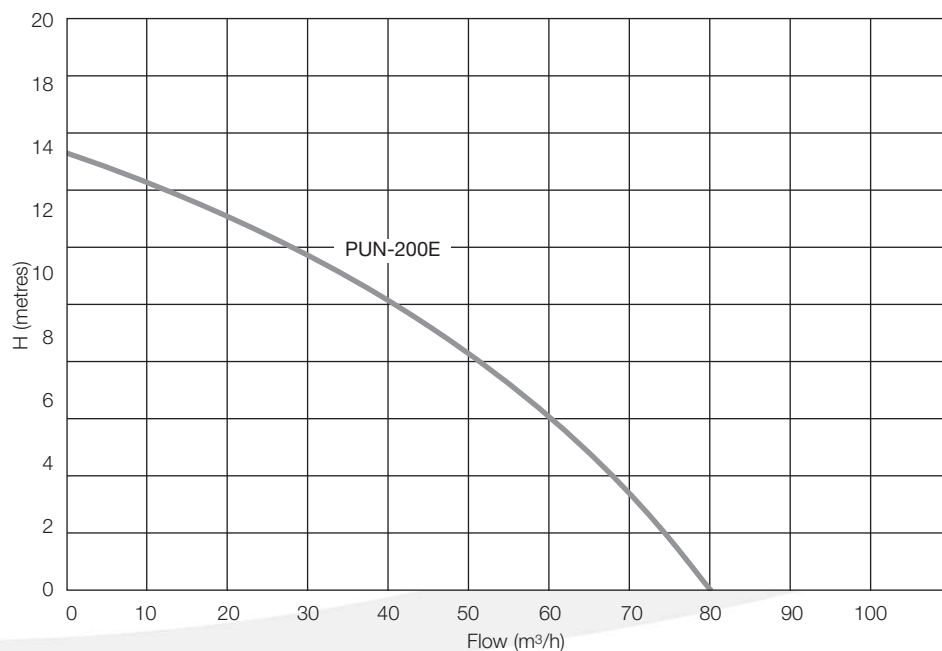
Figure 2-12: Pump curve for ASHE175 and ASHE215

2 Specifications and Controls

2.6 Performance Graphs

ASHE65
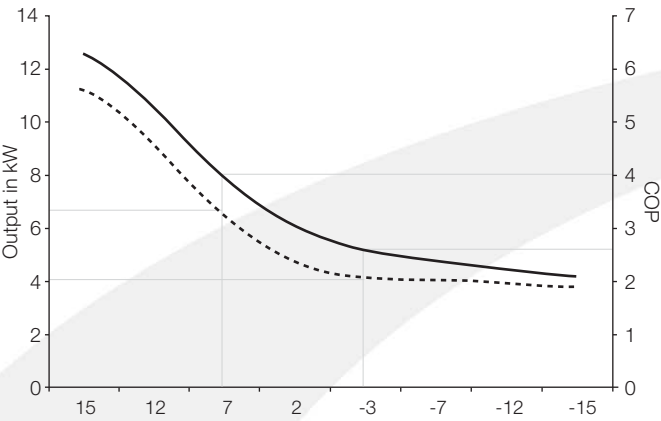
ASHE175
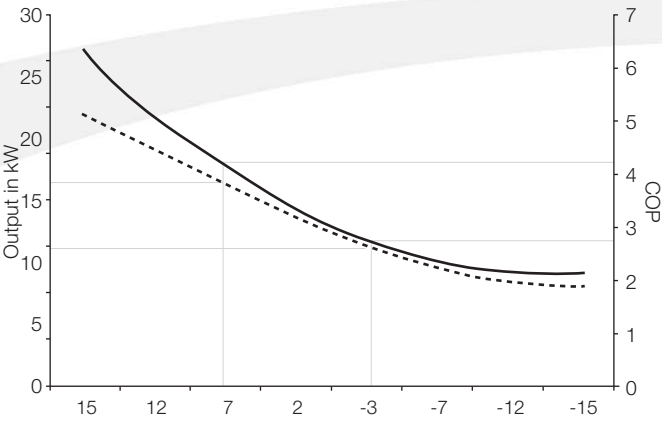
ASHE85
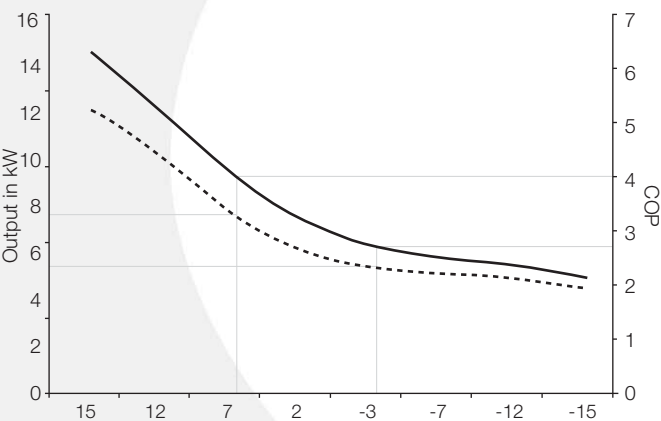
ASHE215
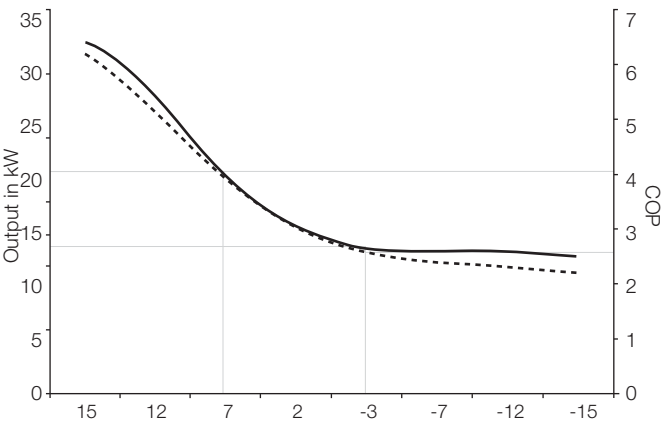
ASHE125
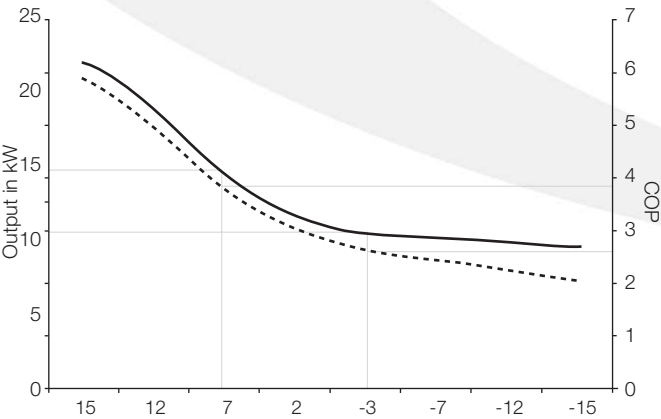
! NOTE

All Grant ASHE Heat Pumps have been independently third party tested to BS EN 14511: 2007. 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 should not be used to estimate the COP at other temperatures.

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.
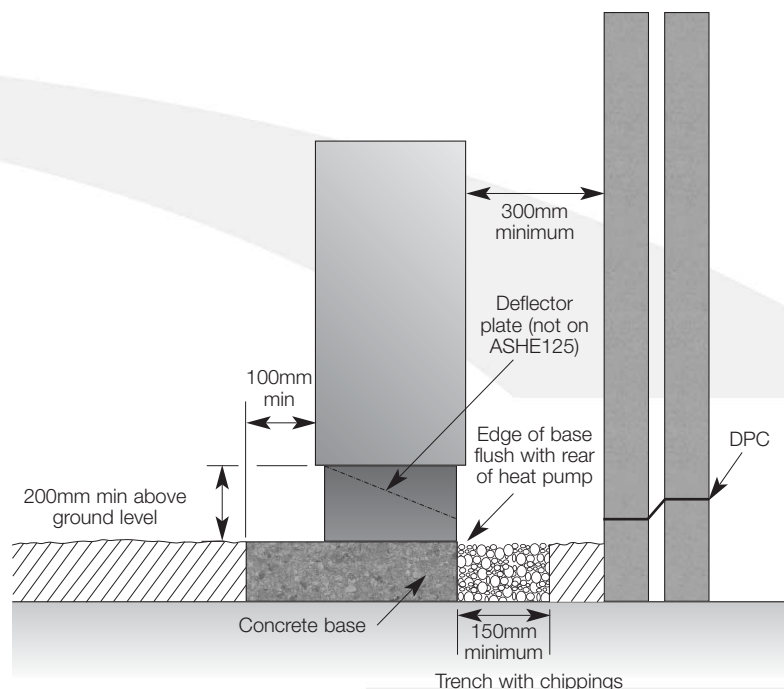
Figure 3-1: Installation details

(Figure labels: 300mm minimum; Deflector plate (not on ASHE125); 100mm min; Edge of base flush with rear of heat pump; DPC; 200mm min above ground level; Concrete base; 150mm minimum; Trench with chippings)

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 Aerona 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.

Cooler ambient air

North

East

South
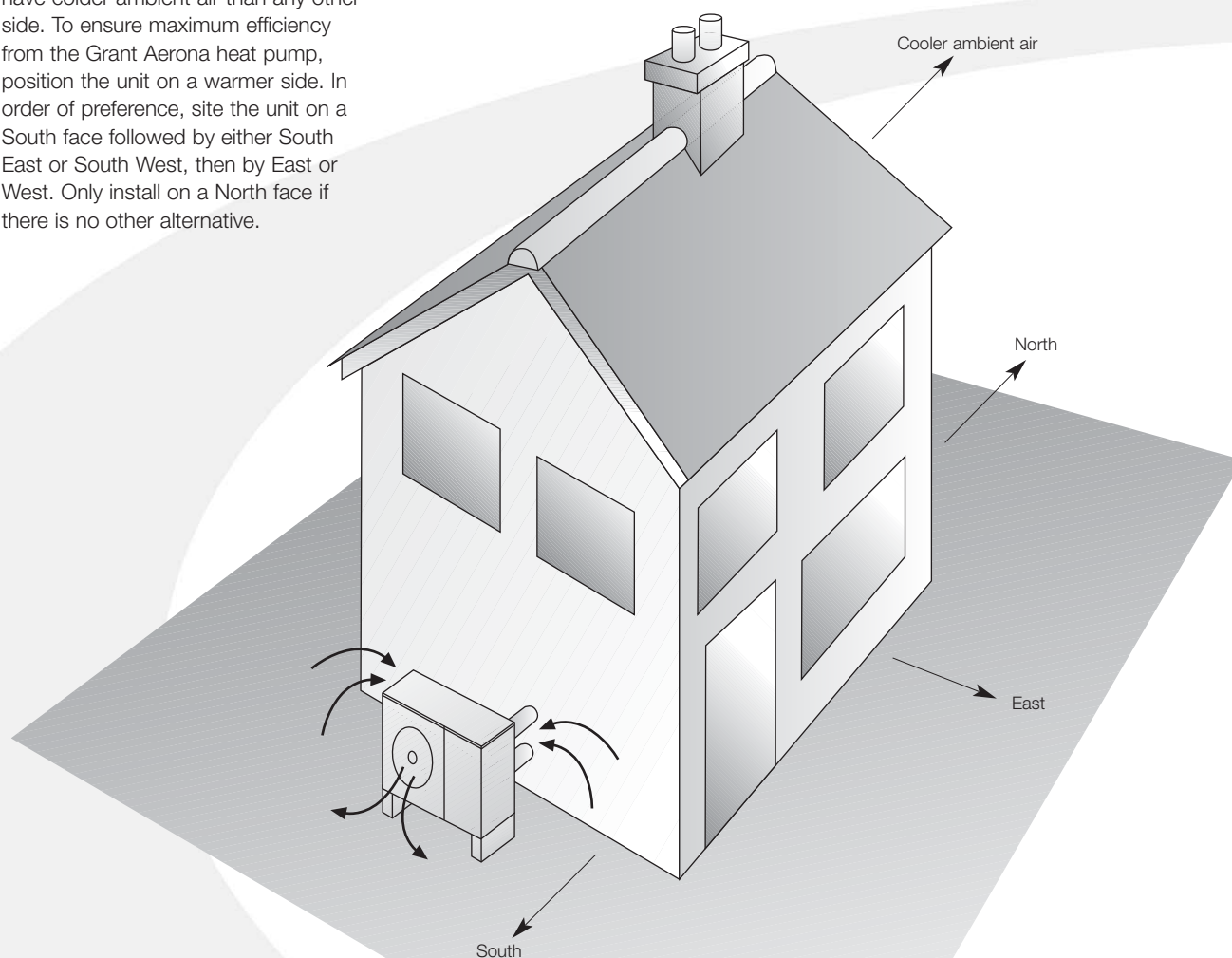
Figure 3-2: Location of air source heat pump

4 Hydraulic Diagrams

The following are examples of suitable systems

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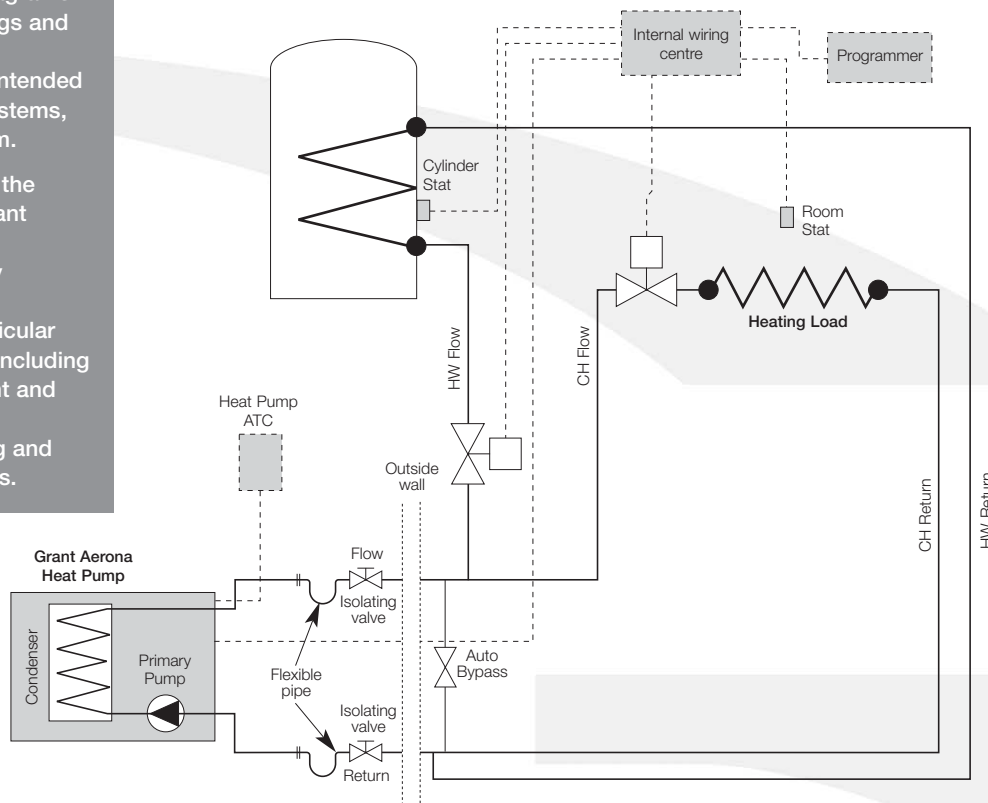
Figure 4-1: Monovalent system - with S-Plan type controls

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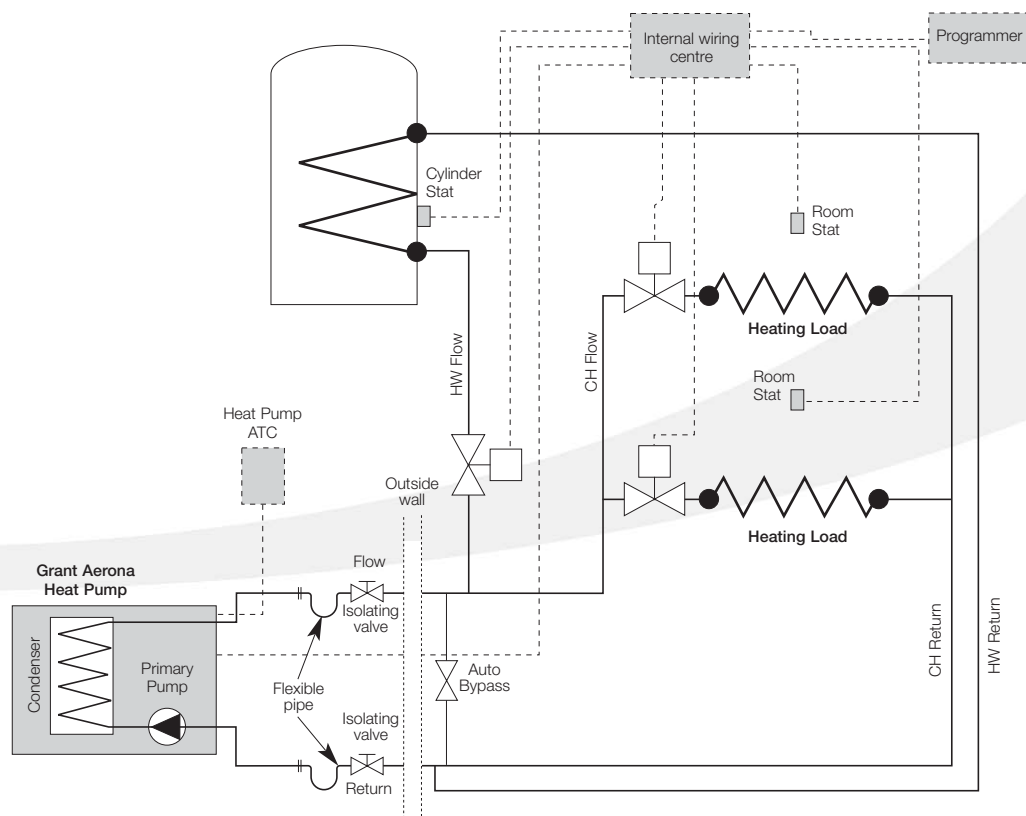
Figure 4-2: Monovalent system - with extended S-Plan type controls

Hydraulic Diagrams

4 Hydraulic Diagrams

The following are examples of suitable systems

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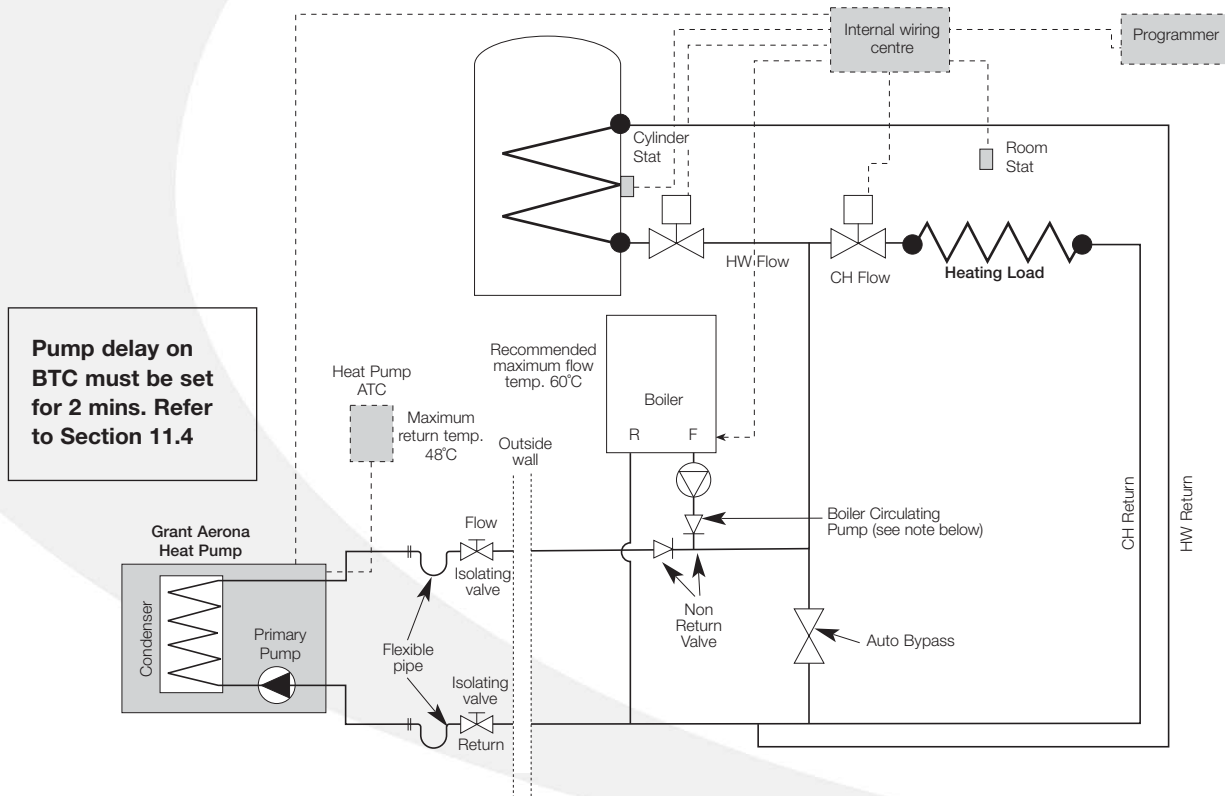
Figure 4-3: Bivalent system - with boiler manifold and S-Plan type controls

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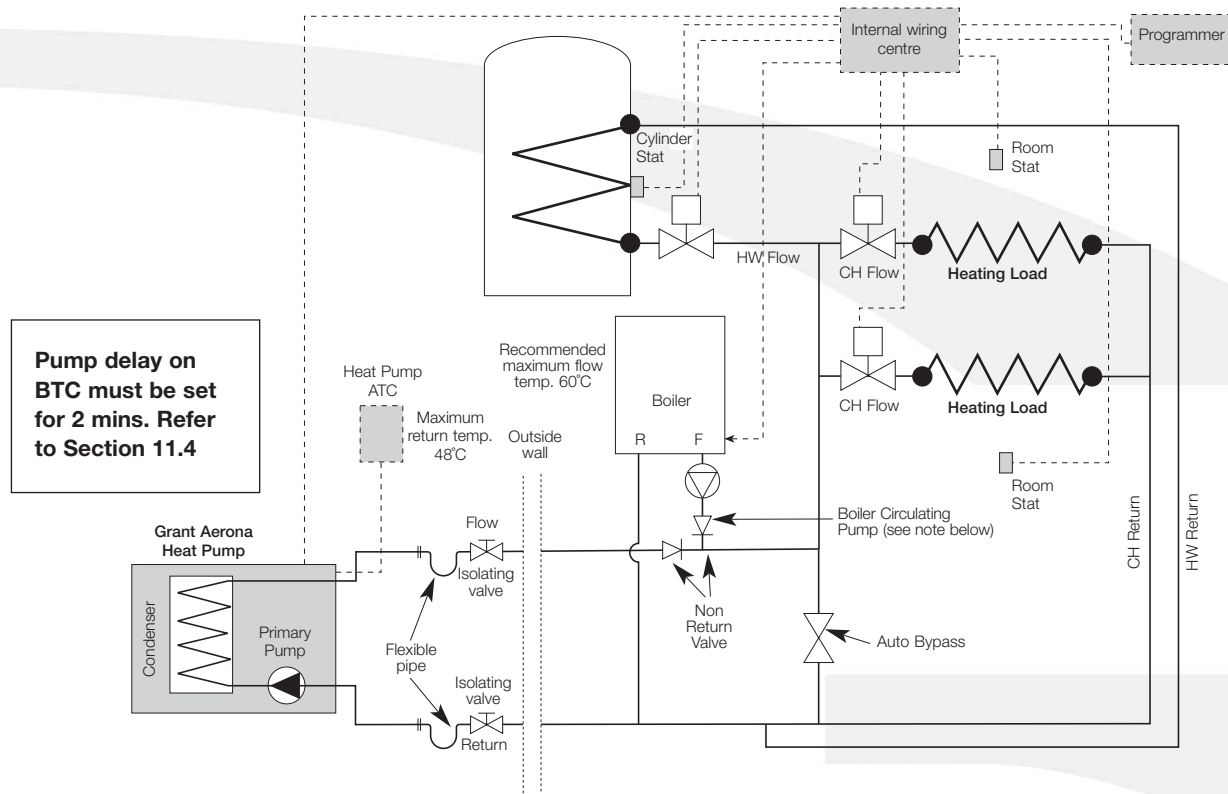
Figure 4-4: Bivalent system - with boiler and extended S-Plan type controls

Within the diagram:

Internal wiring centre

Programmer

Cylinder Stat

Room Stat

HW Flow

CH Flow

Heating Load

Pump delay on BTC must be set for 2 mins. Refer to Section 11.4

Heat Pump ATC

Recommended maximum flow temp. 60°C

Boiler

CH Flow

Heating Load

Maximum return temp. 48°C

Outside wall

R   F

Room Stat

CH Return

HW Return

Grant Aerona Heat Pump

Flow

Isolating valve

Boiler Circulating Pump (see note below)

Condenser

Primary Pump

Flexible pipe

Isolating valve

Non Return Valve

Auto Bypass

Return

! **NOTE**

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

4 Hydraulic Diagrams

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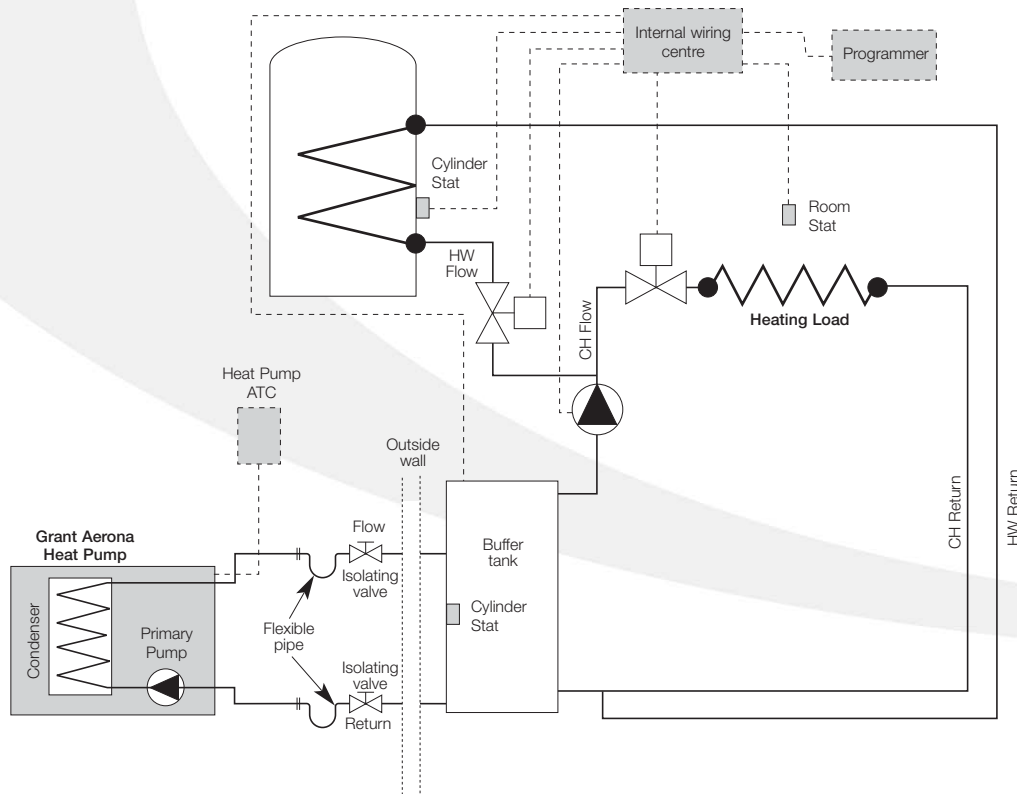
Figure 4-5: Monovalent system - with Buffer and S-Plan type controls

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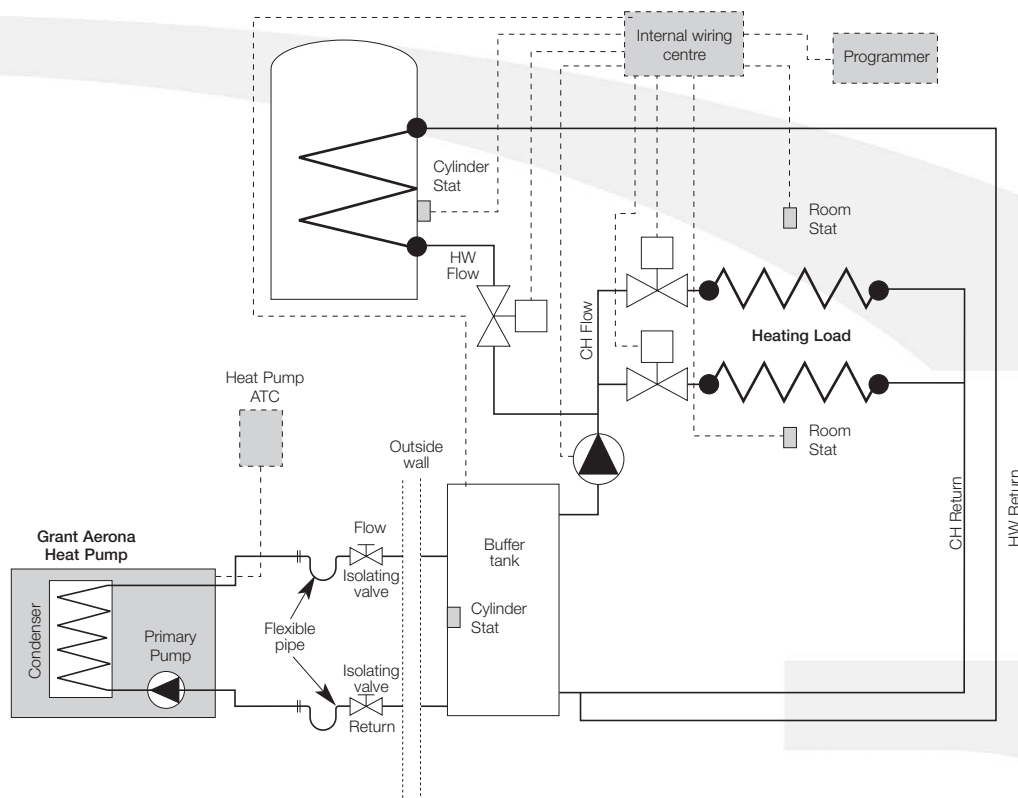
Figure 4-6: Monovalent system - with Buffer and extended S-Plan type controls

> ⚠ **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℃ and a return of 50℃, a heat pump operates with a flow of between 30℃ and 50℃. 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℃ and that the house comfort temperature will be 21℃.
    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

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.

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.

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 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.

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 82ºC flow and 71ºC 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 70ºC flow and 50ºC 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

ºC	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

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

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

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

The T = 45ºC – 21ºC = **24ºC.**

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.

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'.

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.
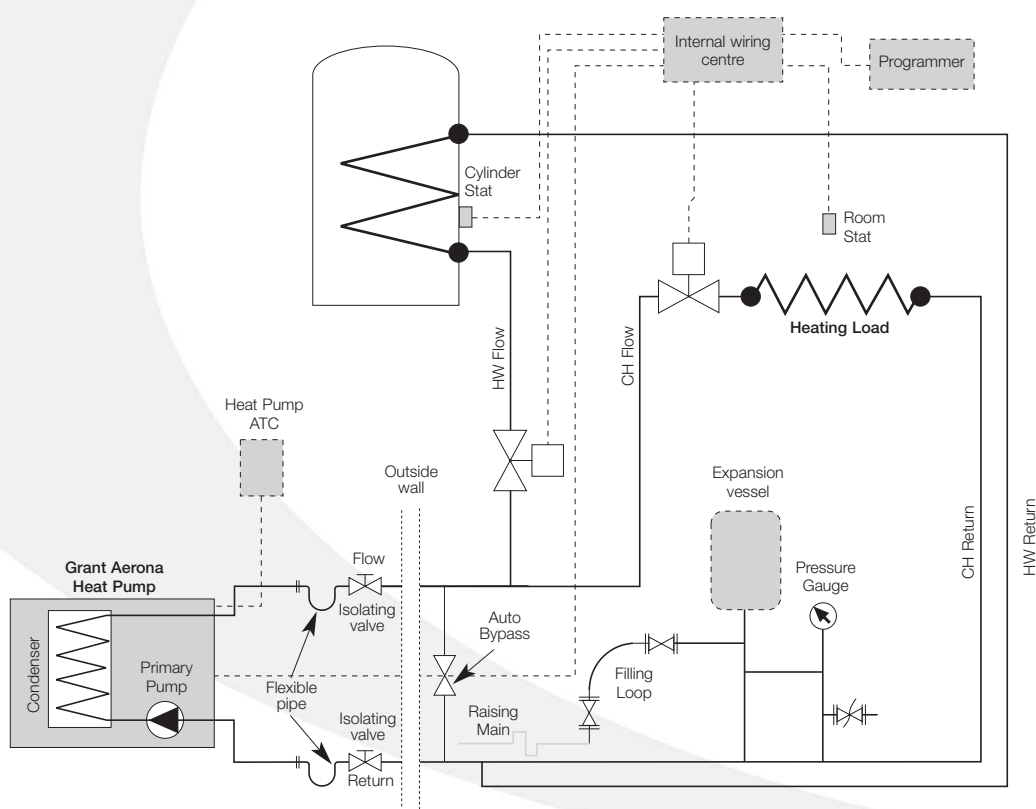
Figure 7-1: Sealed system layout

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.

a) 1 x Twin and Earth cable suitable for the current and length of run from the consumer board to the external isolator.

b) 1 x 3-core SWA suitable for the current from the external isolator to the heat pump.

c) 1 x 3-core+Earth 0.75mm² from the systems wiring centre to the heat pump

d) 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.

Figure 8-1: S-Plan type system for normal boiler connection
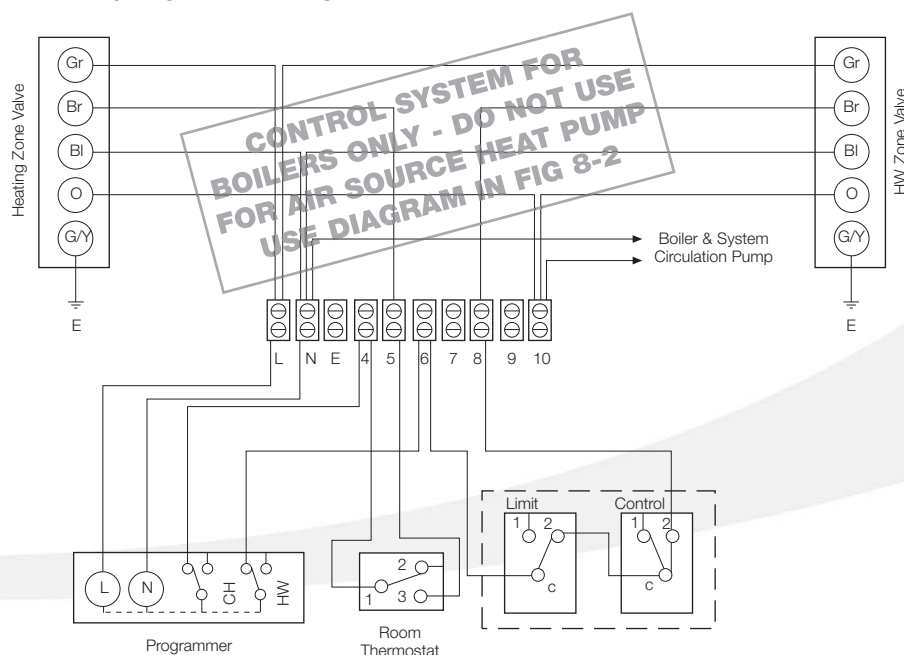
> **! NOTE**
>
> It is possible for some components to have 2 power supplies feeding them. It is also possible for mistaking an internal circuit to be dead when it is receiving power from another source. Please label all controls and devices if this is possible, advising to check and isolate in one or 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.

Electrical

8 Electrical

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
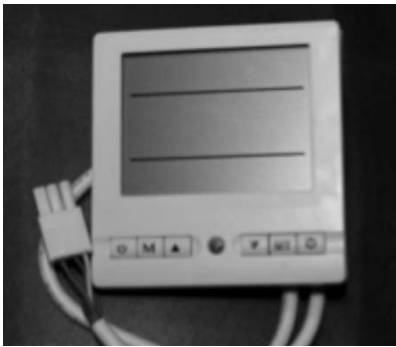
Figure 8-5: ATC control unit

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).

Electrical

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.

When parameter '14' on the ATC is met -default value = -3°C.

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

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.

Electrical installation requirements
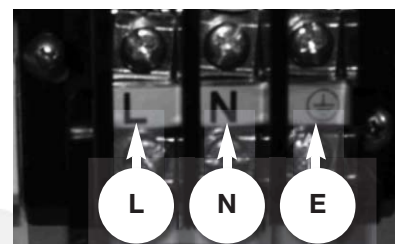
Figure 8-6: Mains supply cable connections

Heat Pump Model	Max. Running Current (A)*	MCB Rating (A)	Type	Length of Cable Run (m) and Cable Size (mm²)				
				5	10	15	20	30
ASHE65	20.6	32	C	6	6	6	6	6
ASHE85	24.1	32	C	6	6	6	6	6
ASHE125	26.0	32	C	6	6	6	6	6
ASHE175	28.1	40	C	10	10	10	10	10
ASHE215	33.7	40	C	10	10	10	10	10

*Includes 3kW immersion heater.

Electrical

8 Electrical

8.5 Heat Pump Wiring Diagrams

Figure 8-7: ASHE65, ASHE85 and ASHE125 circuit diagram

Figure 8-8: ASHE175 circuit diagram
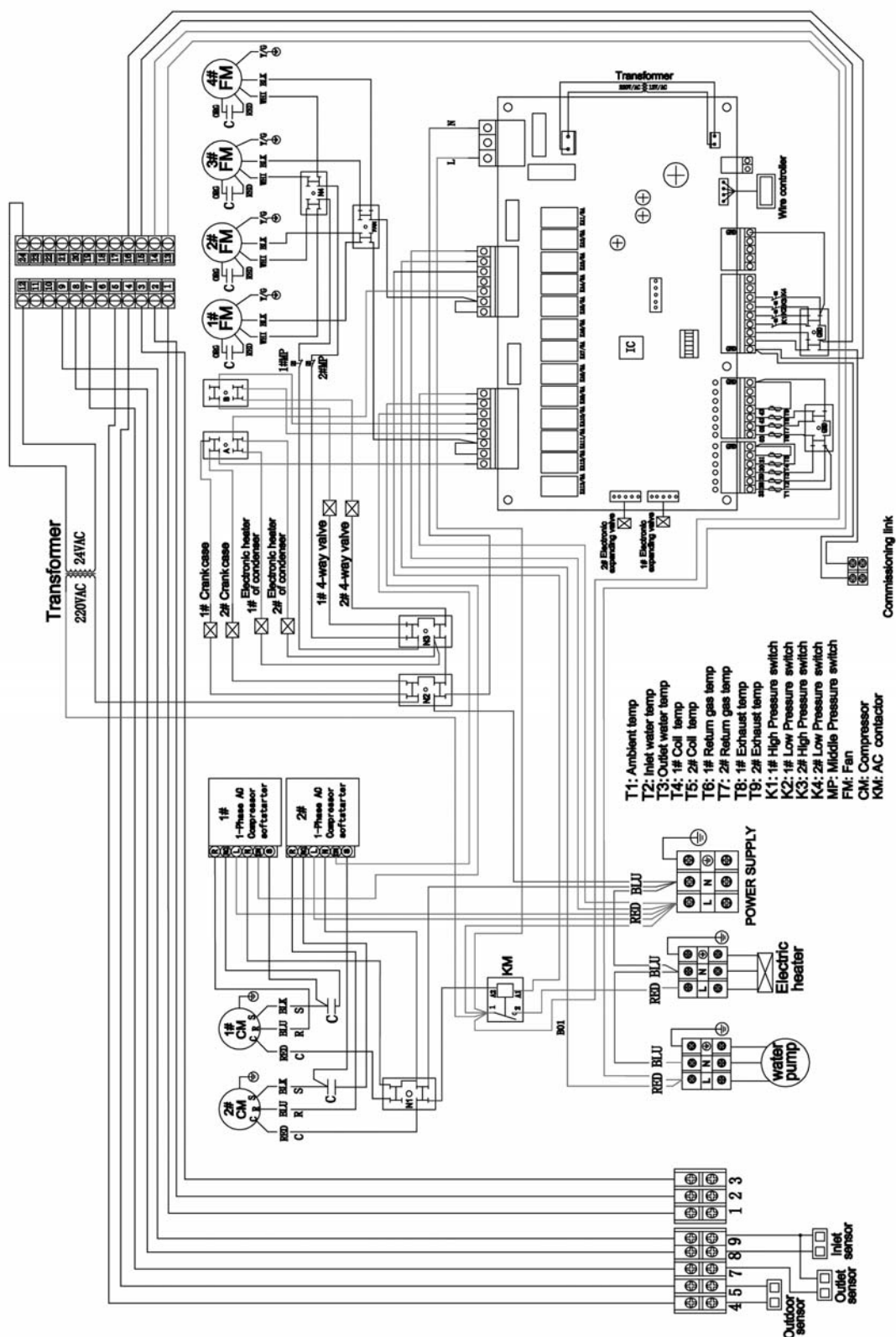
8 Electrical

Figure 8-9: ASHE65, ASHE85 and ASHE125 circuit diagram

Electrical

BTC controller terminals   External controls connections   Back-up heater terminals   Power supply terminals
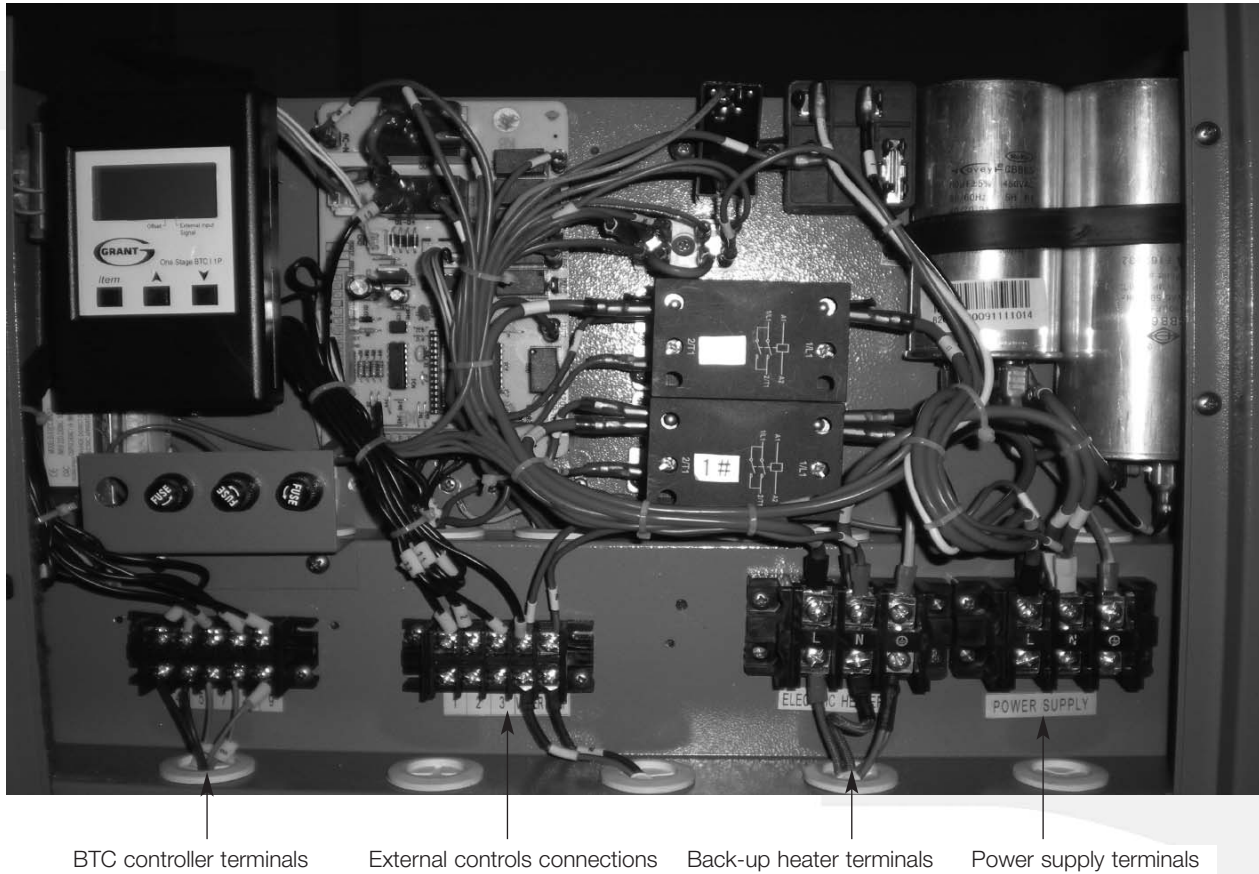
Figure 8-10: Location of connections in control panel

8 Electrical

8.6 System Control Wiring Diagrams
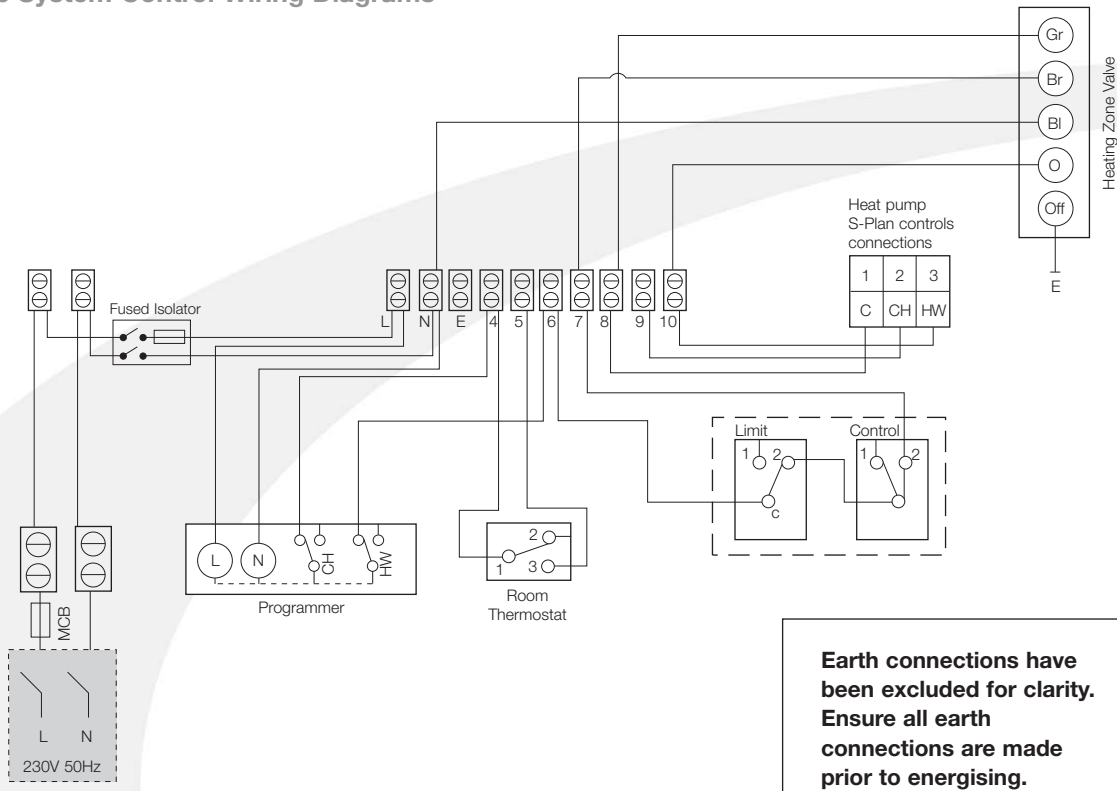
Figure 8-11: Domestic hot water connection diagram

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

Figure 8-12: Central Heating connection diagram

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

Electrical

8.8 Bivalent Systems

For the connection of a boiler for a bivalent system it is necessary to add an outdoor sensor or frost thermostat. The wiring shown in Figure 8-12 must be followed to ensure that the secondary heat source only switches on when the outside (ambient) temperature drops below the desired set-point.

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 8-14 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.
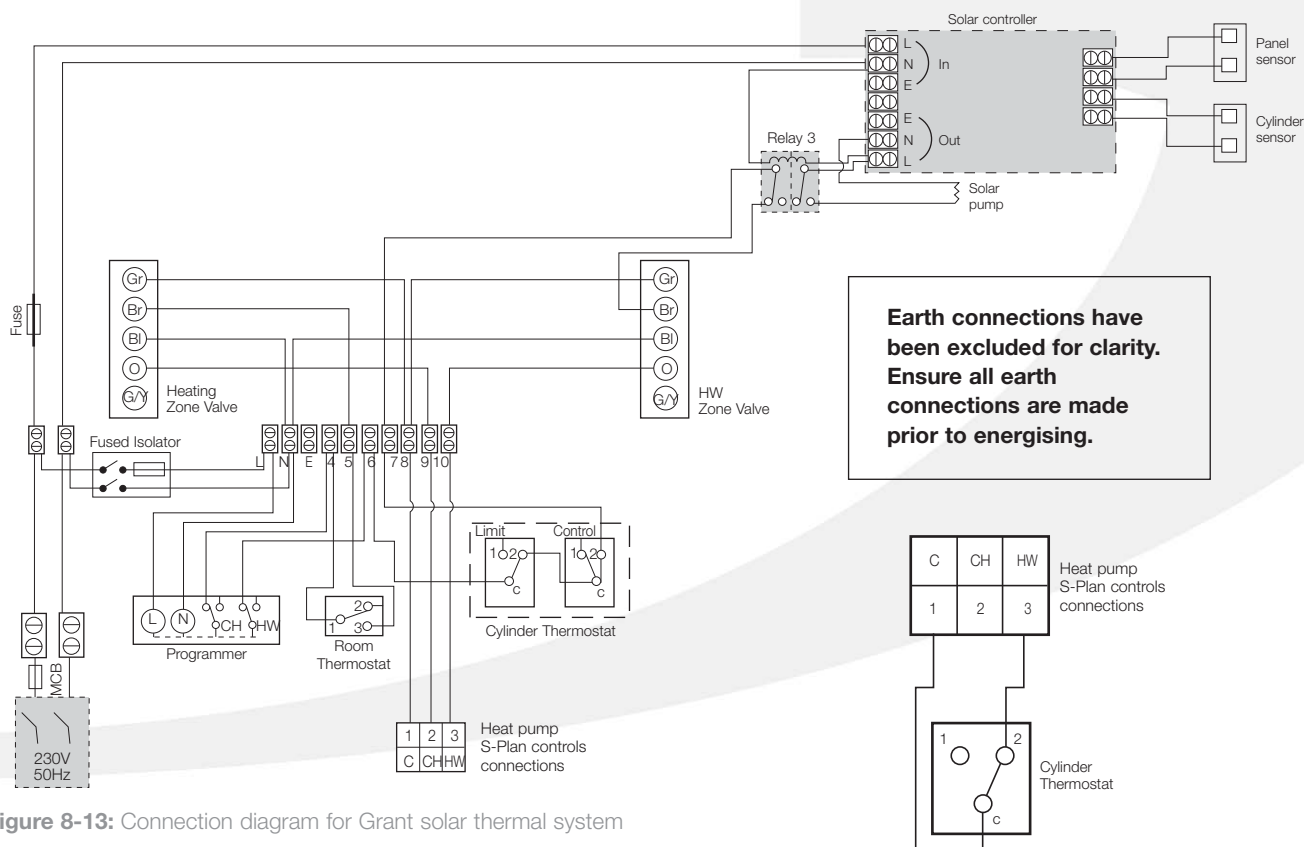
Figure 8-13: Connection diagram for Grant solar thermal system

Earth connections have been excluded for clarity. Ensure all earth connections are made prior to energising.
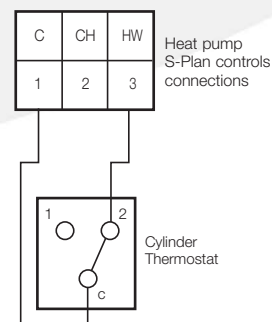
Figure 8-14: Buffer tank thermostat

8 Electrical

8.11 Bivalent Electrical Diagram
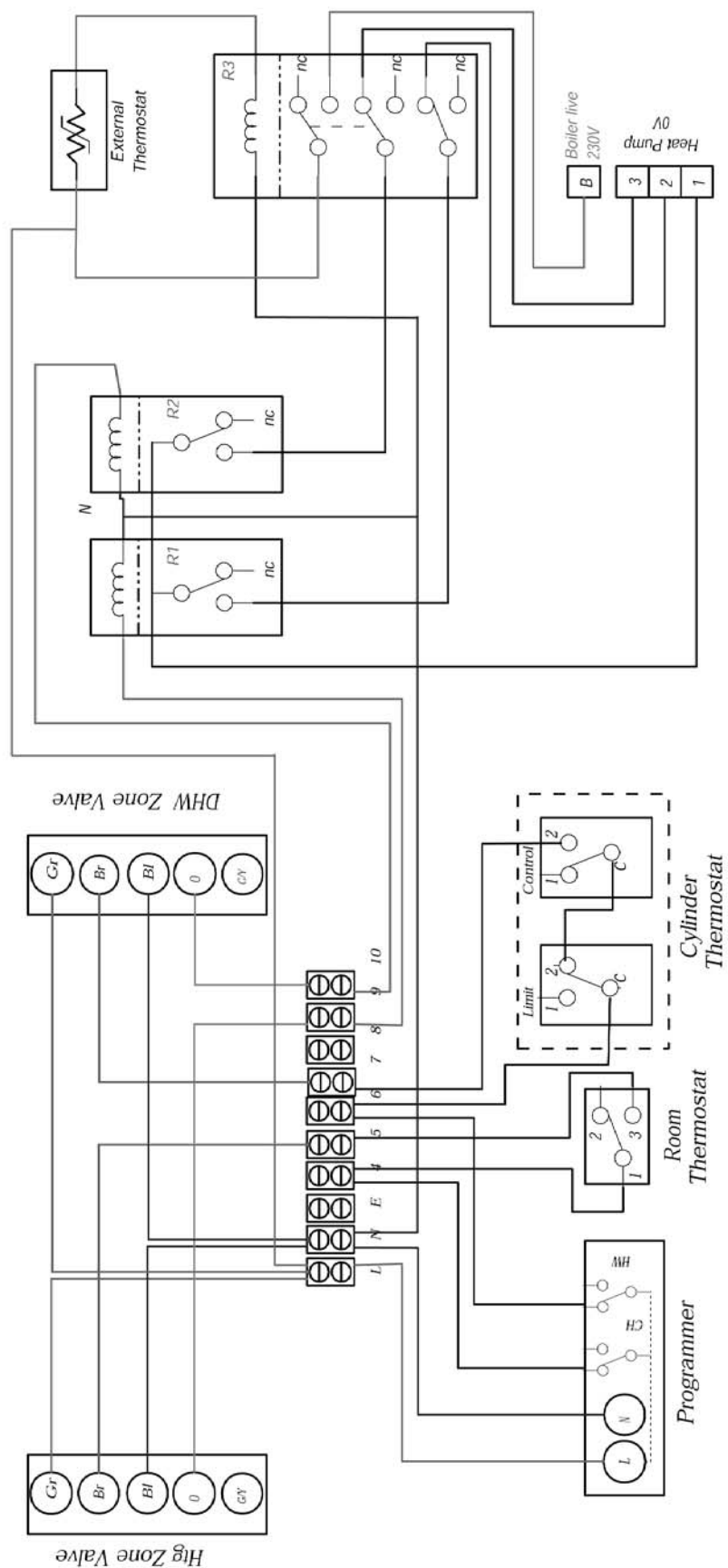
9 Domestic Hot Water

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 60ºC.

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 cylinder 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.
ASHE65	6.6	125	250
ASHE85	8.5	200	300
ASHE125	12.5	250	300
ASHE175	17.8	300	400
ASHE215	21.5	300	400

* Output at 7˚C ambient and 35˚C water

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.
ASHE65	6.6	170	250
ASHE85	8.5	200	300
ASHE125	12.5	250	300
ASHE175	17.8	300	400
ASHE215	21.5	300	400

* Output at 7˚C ambient and 35˚C water

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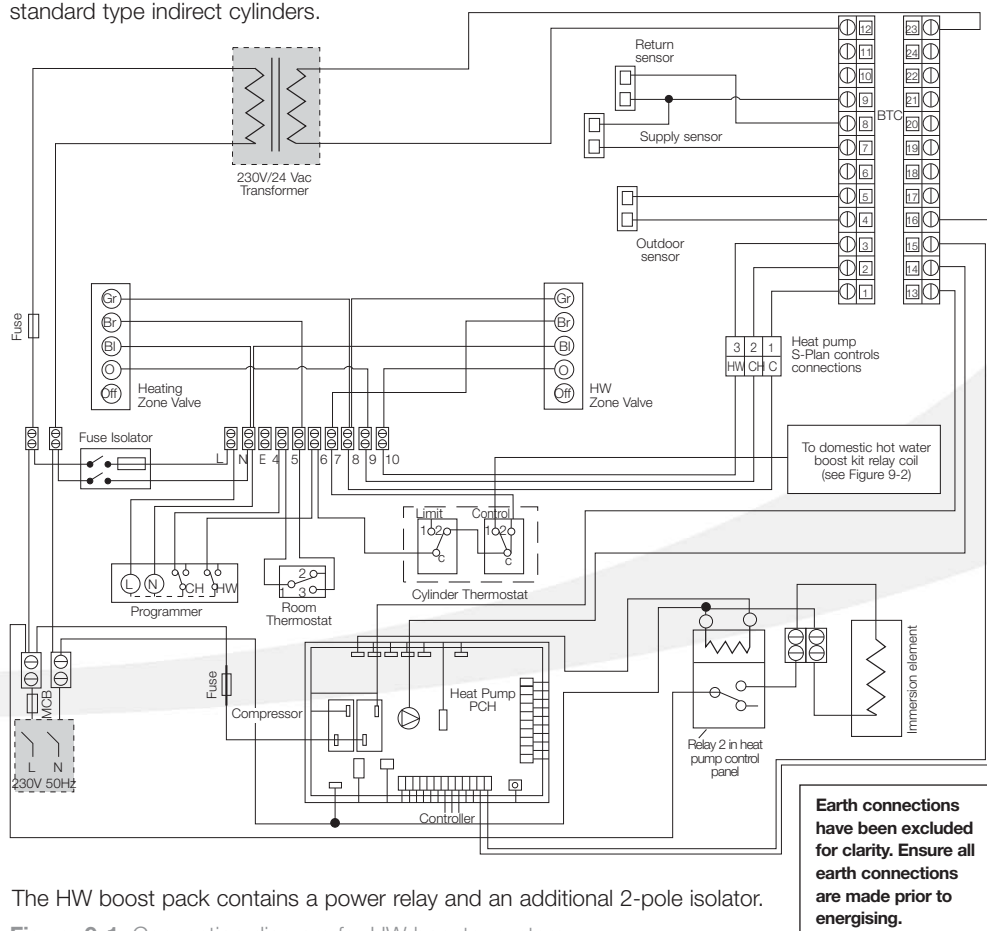
The HW boost pack contains a power relay and an additional 2-pole isolator.

Figure 9-1: Connection diagram for HW booster system

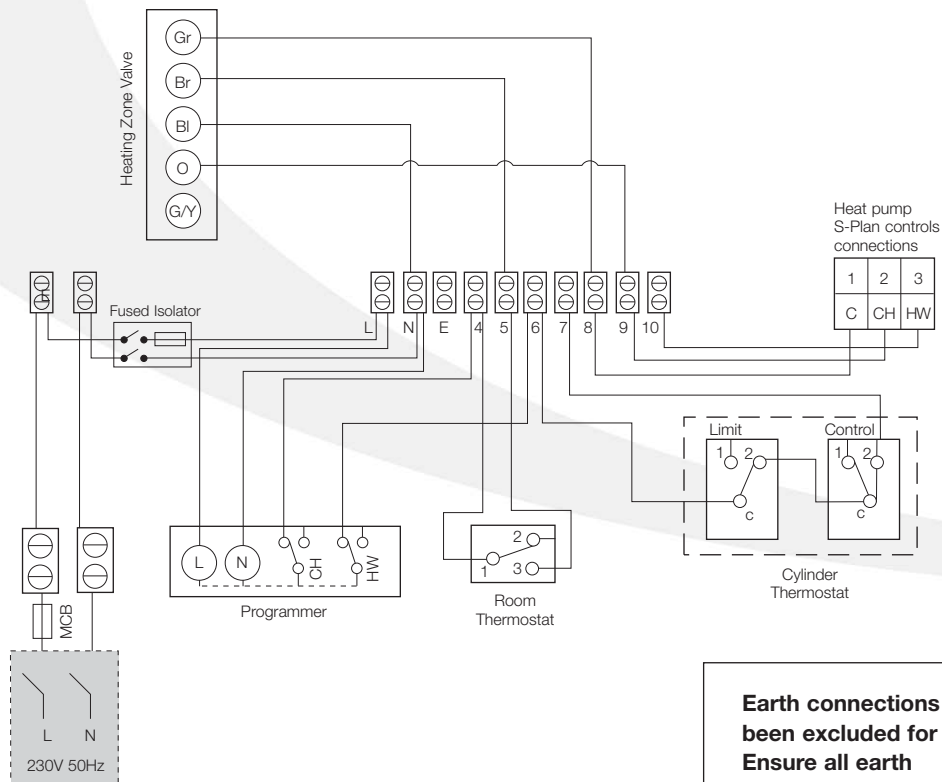**Earth connections have been excluded for clarity. Ensure all earth connections are made prior to energising.**

9 Domestic Hot Water

NB. Setting this 'by-pass' switch to OFF does NOT stop 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.
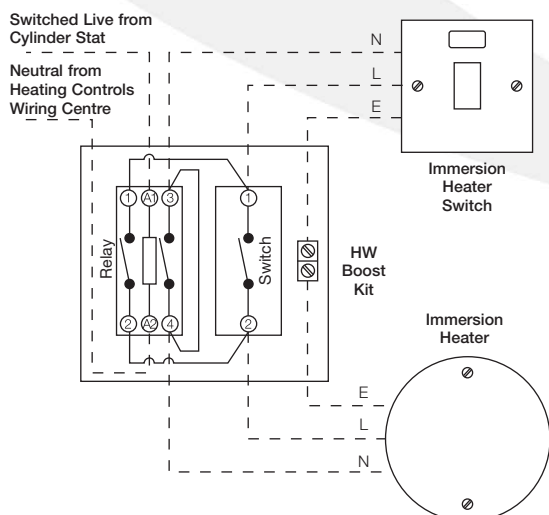
⚠ WARNING

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 60ºC with no additional wiring.

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

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

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

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.**

11.2 Setting the ATC Controller

The main purpose of the ATC controller is to give an overall control over the heat pump. This includes temperatures, defrost settings, timings. In contrast, the BTC controller gives accurate control over both central heating and domestic hot water temperatures, even if they have a different target temperature.

The ATC controller is either on (2 temperature displays showing) or off (only the clock display showing).

1. OFF

In this setting, the heat pump will not operate irrespective of any demand on the heating or hot water system.

To switch heat pump off, press the ⏻ button.

However, should the outdoor temperature fall to low levels, one or more safety stages will operate to prevent the heat pump from damage.

These stages are:

a) When the ambient temperature falls to below 5℃, the circulating pump will start.

b) When the ambient temperature falls to below 2℃, the fans and compressor(s) will start.

c) The conditions will remain active until either

1. The ATC is turned on, in which case the ATC will control the heat pump as normal. Or

2. The ambient temperature rises to above 3℃ (the compressor(s) stop) or to above 6℃ (the circulating pump stops).

! NOTE

In the event of power failure, the heat pump's safety stages will not be available. For this reason, anti-freeze solution must be added to the heating system's water. See section 10.2).

If this stage is energised, the code 'PP7' will be displayed on the ATC. This is not a fault code - it is advising you that the unit has entered frost protection mode.
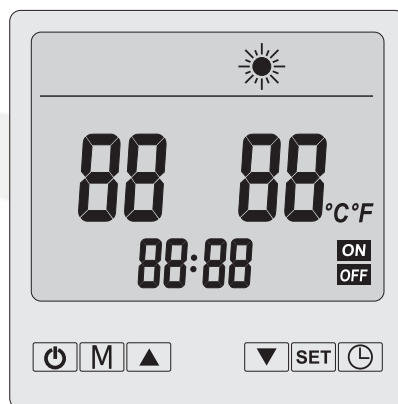
Figure 11-1: ATC display and buttons

2. ON

To switch the heat pump on, press the (ON/OFF) ⏻ button.

! NOTE

As the heat pump is normally controlled by the heating system controls within the house, it is advised that you leave the heat pump's ATC in this position unless servicing or repairs are being carried out.

You will hear a small beep, and the display will now show two temperature readings in addition to the clock.

The left temperature is the Flow and the right is the Return.

3. Setting the Clock

1. To set the clock, press the 'SET' button twice. The hour segment will flash. Alter he hour setting using the up and down arrows.

2. Press the 'SET' button again to set the minutes using the up and down arrows.

3. Press the 'SET' button to confirm the new time.

4. You will hear two short beeps to confirm the new setting.

5. The clock is now set.

4. Setting the ATC Parameters

The ATC operating parameters must be set in order for your heat pump to operate correctly.

Please note: ALL operating parameters must be adjusted and checked during commissioning as per the table shown on page 36.

Incorrect parameters will adversely affect the operation and efficiency of the heat pump and will invalidate any warranties and may result in excessive energy bills.

For ASHE65, ASHE85 and ASHE125

To check the parameters, press the up or down arrow to enter the list of parameters. Depending on your model, a different number of parameters will be available for adjustment.

To alter any parameter, scroll through the list until you find the appropriate function, the press the 'SET' button. The parameter function is shown on the left of the display and the value of the parameter is shown on the right.

Alter the value using the up and down arrows until the value shown on page 36 is shown.

Press the 'SET' button and the new value will be displayed.

There is no button to exit the parameter list. If no button is pressed for 10 seconds, the ATC automatically comes out of the parameter list and reverts back to the normal operating display.

For ASHE175 and ASHE215 Setting Procedure

At set ATC Time

1. Press 'SET' for 1 second.

2. The Hour icon will flash on the screen. To change to correct time use up/down buttons.

3. When correct hour has been selected press 'SET'. The minute icon will now flash.

4. Use up/down buttons to set correct minutes. On completion press 'SET' to exit the time menu.

Alternatively, once time has been adjusted leave to controller for 15 seconds to self exit the program.

To Change Parameter Settings.

1. Press and hold "SET" on ATC until 'beep' is heard.

2. Icons for both parameter setting and level will flash on main screen.

3. Use up/down buttons to traverse through parameter levels.

If parameter level setting is to be changed.

a) Press 'SET' to enter the level. Use up/down buttons to alter setting.

b) On completion press 'SET' to exit the parameter level.

c) The screen parameter level icon will flash. To continue moving through the parameter levels, press up/down button.

d) Once all changes have been made leave the ATC for 15 seconds - ATC will self exit the parameter change program.

To set Timed Function (once on, once off)

1. Press 'Clock' button on ATC to set the timed function.

2. Hour icon will flash for the 'ON' period. To alter, press up/down buttons on ATC. When correct hour has been set, press 'Clock' function button. Minute icon will flash for the 'On' period. Use up down buttons to change minute setting, pressing 'Clock' function on completion.

3. The ATC will then automatically jump to the 'OFF' period setting. Repeat above to set for 'OFF' period.

Leave controller for 15 seconds once settings have been made. The ATC will self exit the program and display the current flow/return temperature and current status.

To switch the Heat Pump on:

1. Press 'ON' button on ATC controller. "Star" icon will be displayed on main screen. The ASHP will now be controlled depending on parameter settings for both the ATC and BTC.

5. **Setting the Timer Function**
   In most circumstances, it is not advisable to use the timer function on the ATC as it will override the systems controls - programmers, thermostats, motorised valves, etc.

   If you are using your heating systems controls to control the operation of the heat pump, do NOT use the ATC timer function.

   If the 'ON/OFF' segments are showing on the ATC display, it means the timer function has bee set. If you want to remove the timer function, press the (timer) button and then the 'SET' button. The 'ON/OFF' will disappear from the display indicating that the timer function has been switched off.

To set the timer function:

a) Press the (timer) button. The 'ON' segment is now flashing.

b) Adjust the 'TIMER ON' by using the up and down arrows.

c) Press the 'SET' button.

d) Adjust the 'TIME OFF' by using the up and down arrows.

e) Press the 'SET' button.

f) The timer is now set and the heat pump will only operate between these settings.

6. Fault Finding

The ATC also has a series of fault finding codes that will help identify any fault should one occur. Refer to section 13.3 for information and a key to the fault codes.

Other ATC display symbols

In the one position, there are symbols that will appear during normal operation. When the unit has a demand that has not been satisfied by the heat pump, the 'SUN' symbol will appear above the top line on the ATC. This means the heat pump has started or is about to start.

If, during cold weather, you see this symbol and it is flashing, it means that the heat pump has entered into defrost mode and will revert back to a steady condition once defrost is finished and the heat pump is producing heat again.

On the bottom left of the ATC display, a 'FAN' symbol will be displayed whenever the fan is operating.

! NOTE

The 'FAN' symbol will not be present during defrost as the fan will not operate during defrost. This is normal operation.

When the ATC temperature parameters have been reached, the ATC will switch off the fan and compressor. The fan and sun symbols will disappear. This may happen even though the demand of the house has not been satisfied. eg. the room thermostat is still 'calling' for heat.

ATC Parameters - Applicable for ASHE65, ASHE85 and ASHE125 units only

Parameter	Description	Default
0	Parameter selection to stop defrost	0
1	Maximum heating system water temperature	55°C
2	Compressor run time before defrost	40 mins
3	Coil temperature to start defrost	-3°C
4	Coil temperature to stop defrost	18°C
5	Maximum time for defrost function	12 mins
6	Special defrosting value	0
7	ATC controlled by flow or return sensor	1
8	Memory recovery after power failure	1
9	Operation of EEV valve	1
10	Circulation pump operation	0
11	Fan operation	0
12	Target superheat	3
13	Manual steps of the EEV	35
14	Ambient temperature to start back up heater	-3°C
15	Flow/return differential	5
16	Discharge gas temperature	Reading Only
17	Coil temperature	Reading Only
18	Return gas temperature	Reading Only
19	Ambient temperature	Reading Only
20	Return temperature	Reading Only
21	Flow temperature	Reading Only
22	Actual steps of EEV	Reading Only

ATC Parameters - Applicable for ASHE175 and ASHE215 units only

Parameter	Description	Default
0	Parameter selection to stop defrost	0
1	Maximum heating system water temperature	55°C
2	Compressor run time before defrost	40 mins
3	Coil temperature to Start defrost	-3°C
4	Coil temperature to Stop defrost	18°C
5	Maximum time for defrost function	12 mins
6	Special defrosting value	0
7	ATC controlled by flow or return sensor	1
8	Memory recovery after power failure	1
9	Operation of EEV valve	1
10	Circulation pump operation	0
11	Fan operation	0
12	Target superheat	3
13	Manual steps of the EEV	35
14	Ambient temperature to start back up heater	-3°C
15	Flow/Return differential	5
16	Ambient temperature to start 2nd compressor	12°C
17	Compressor control	0
18	Discharge gas temperature compressor 1	Reading Only
19	Coil temperature compressor 1	Reading Only
20	Return gas temperature compressor 1	Reading Only
21	Ambient temperature	Reading Only
22	Return temperature	Reading Only
23	Flow temperature	Reading Only
24	Actual steps of EEV compressor 1	Reading Only
25	Coil temperature compressor 2	Reading Only
26	Return gas temperature compressor 2	Reading Only
27	Discharge gas temperature compressor 2	Reading Only
28	Actual steps of EEV compressor 2	Reading Only

11 Commissioning

11.3 Additional Operating Information about the ATC

Fan Motor Operation

a) During all periods, the fan motor works at full speed.

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 user.

Electric Immersion Heater

Started by ambient temperature '14' setting.

The element will remain energised until the ambient air temp is 1℃ above parameter 14.

Trace Heater Operation

The trace element will be switched on when the ambient temperature falls below 7℃ and will switch off at 9℃. This is non-adjustable. The compressor crankcase heater will energise along with the trace element.

Frost Protection

1. When the ambient air temperature is less than 5°C), the circulating pump will start. The pump will stop when air temperature is above 6℃.

2. When ambient air temperature is less than 0°C) AND the return water temperature is less than 5°C, the heat pump (compressor, fan and immersion element) will start. The heat pump will stop when the return water temperature is above 8°C.

11.4 Additional Information about the ATC for ASHE175 and ASHE215

The ASHE175 and ASHE215 have two separate refrigeration systems and the ATC controller must be adjusted to ensure that the second circuit is energised at the correct ambient temperature.

The temperature at which the second circuit is energised depends on the heat load of the property and how well matched the heat pump is to the heating system.

For example, if the heat loss of the property is 12kW at a design temperature of -3℃, the ambient temperature to switch on the second circuit will be lower than a heat loss of 14kW under the same design criteria.

Grant Engineering have designed a set of software tools that allow you to calculate this figure on site. To qualify to receive this software, you must attend a Heat Pump product training course run by Grant Engineering.

If you prefer, please phone (01380) 736920 and have to following information ready:

1. Model number

2. Model serial number

3. Heat loss of property

4. Minimum design temperature

5. Flow temperature

6. Is the system Mono or Bi valent

With this information, we will be able to tell you the value of parameter 16 to start the second circuit and also the value of parameter 14 to start the back up heater.

(Note: To comply with MIS3005, the back up element must not be energised before the minimum design temperature is reached).
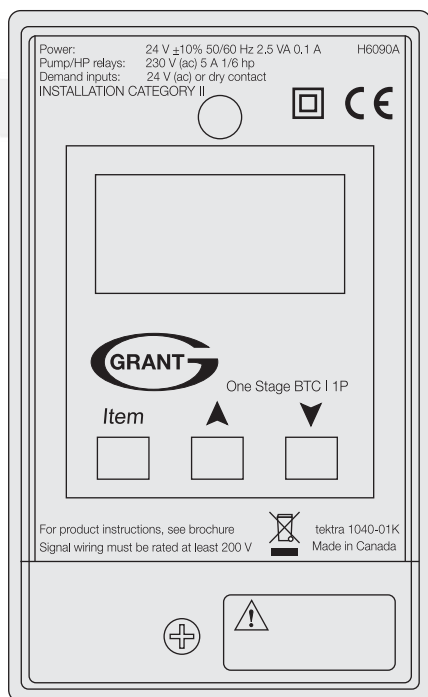
Figure 11-2: BTC display and buttons

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℃. If UFH alone, then the flow temperature could be a 35℃ flow. When a HW demand is present, you may want to use the heat pump to take the water to 60℃, or alternatively you may wish to preserve the COP and therefore the efficiency and only raise the cylinder to 50℃ 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
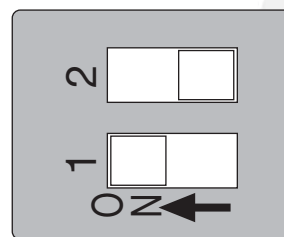
Figure 11-5: DIP switch

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.**
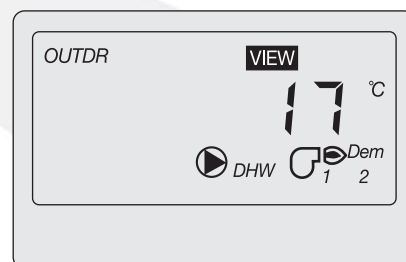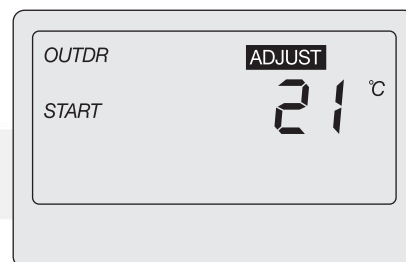
BTC Parameters

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 that 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**

11.7 ATC Commissioning Data - Applicable for ASHE65, ASHE85 and ASHE125 units only

Parameter	Description	Default	ASHE65	ASHE85	ASHE125
0	Parameter to stop defrosting	0 or 1	0	0	0	0
1	Maximum water temperature	20-60	55	55	55	55
2	Compressor run time for defrost	5-120 mins	40	62	60	57
3	Coil temperature to start defrost	-30 to 0	-3	-3	-3	-3
4	Coil temperature to stop defrost	2 to 30	18	18	18	18
5	Maximum time for defrost	1 to 12	12	12	12	12
6	Defrosting value for Par 3 - but still can only defrost when this parameter 3 AND parameter 2 have been met	0 or 1	0	1	1	1
7	Parameter 1 flow or return	0 or 1	1	1	1	1
8	Mem recovery after power failure	0 or 1	1	1	1	1
9	EEV valve	0 or 1	1	1	1	1
10	Water pump working mode	0 or 1	0	1	1	1
11	Fan working mode	0 or 1	0	1	1	1
12	Target superheat	F to F	3	2	2	3
13	EEV manual steps	(10-50)	35	35	35	35
14	Ambient temperature to start immersion	-7 to 1	-3	Ref Chart	Ref Chart	Ref Chart
15	Water temperature difference to start heat pump	2 to 15	5	5	5	5
16	Discharge gas temperature		Reading Only			
17	Coil temperature		Reading Only			
18	Return gas temperature		Reading Only			
19	Ambient actual		Reading Only			
20	Return temperature		Reading Only			
21	Flow temperature		Reading Only			
22	EEV actual step		Reading Only			

11 Commissioning

ATC Commissioning Data - Applicable for ASHE175 and ASHE215 units only

Parameter	Description	Default	ASHE175	ASHE215
0	Parameter to stop defrosting	0 or 1	0	0	0
1	Maximum water temperature	20-60	55	55	55
2	Compressor run time for defrost	5-120 mins	40	57	62
3	Coil temperature to start defrost	-30 to 0	-7	-7	-7
4	Coil temperature to stop defrost	2 to 30	18	18	18
5	Maximum time for defrost	1 to 12	12	12	12
6	Defrosting value for par 3 - but still can only defrost when this parameter 3 AND parameter 2 have been met	0 or 1	0	1	1
7	Parameter 1 flow or return	0 or 1	1	1	1
8	Mem recovery after power failure	0 or 1	1	1	1
9	EEV valve	0 or 1	1	1	1
10	Water pump working mode	0 or 1	0	1	1
11	Fan working mode	0 or 1	0	1	1
12	Target superheat	F to F	3	2	5
13	EEV manual steps	100 to 500 (10-50)	35	35	35
14	Ambient temperature to start immersion	-7 to 1	-3	Ref Chart	Ref Chart
15	Water temperature difference to start heat pump	2 to 15	5	5	5
16	Ambient to start 2nd compressor	8 to 15	12	7	7
17	Compressor control	0, 1 or 2	0	0	0
18	Discharge gas temperature 1		Reading Only		
19	Coil temperature 1		Reading Only		
20	Return gas temperature 1		Reading Only		
21	Ambient temperature		Reading Only		
22	Return temperature		Reading Only		
23	Flow temperature		Reading Only		
24	EEV actual 1		Reading Only		
25	Coil temperature 2		Reading Only		
26	Return gas temperature 2		Reading Only		
27	Discharge gas temperature 2		Reading Only		
28	EEV actual 1		Reading Only		

ATC Commissioning Data - Applicable for ASHE65, ASHE85 and ASHE125 units only

Please record the following settings for the ATC:

Parameter	Description	Setting
0	Parameter selection to stop defrosting	
1	Maximum heating system water temperature	
2	Compressor run time for defrost	
3	Coil temperature to start defrost	
4	Coil temperature to stop defrost	
5	Maximum time for defrost function	
6	Special defrosting value	
7	ATC controlled by flow or return sensor	
8	Memory recovery after power failure	
9	Operation of EEV valve	
10	Circulation pump operation	
11	Fan operation	
12	Target superheat	
13	Manual steps of the EEV	
14	Ambient temperature to start back up heater	
15	Flow/return differential	

ATC Commissioning Data - Applicable for ASHE175 and ASHE215 units only

Please record the following settings for the ATC:

Parameter	Description	Setting
0	Parameter selection to stop defrosting	
1	Maximum heating system water temperature	
2	Compressor run time for defrost	
3	Coil temperature to start defrost	
4	Coil temperature to stop defrost	
5	Maximum time for defrost function	
6	Special defrosting value	
7	ATC controlled by flow or return sensor	
8	Memory recovery after power failure	
9	Operation of EEV valve	
10	Circulation pump operation	
11	Fan operation	
12	Target superheat	
13	Manual steps of the EEV	
14	Ambient temperature to start back up heater	
15	Flow/return differential	
16	Ambient temperature to start 2nd compessor	
17	Compressor control	

11.8 Record of BTC Settings

Please record the following settings:

Item	Set Value	Item	Set Value	Item	Set Value
OUTDR Start	℃	MAX	℃	'pump' DLY	sec
OUTDR DSGN	℃	MIN	℃	WWSD (warm weather shut down)	℃
START	℃	DIFF		Min ON	mins
DSGN	℃	HW TARGET	℃	Min OFF	mins

12 Servicing & Maintenance

12.1 General

Grant Aerona 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.

a) When the ambient (outdoor) air temperature is at 24°C or equal to the indoor temperature and

b) 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:

a) Incorrect rating or type of MCB/RCD
b) A component leaking to earth
c) A component with a dead short
d) Incorrect polarity
e) Incorrect cable size
f) 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 Fault Finding

ATC Fault/Notification Codes	Display
12V transformer failure	No display
Return water sensor failure	PP 1 1
Flow sensor failure	PP 2 1
Coil sensor failure	PP 3
Ambient sensor failure	PP 5
PCB failure	PP 6
Anti-freeze protection (not a fault)	PP 7
High pressure sensor	EE 1 1
Low pressure sensor	EE 2 1
Communication failure	EE 8
Flashing sun symbol	Defrosting

Following only applicable on ASHE175 and ASHE215

Return water sensor failure	PP 1 2
Flow sensor failure	PP 2 2
High pressure sensor	EE 1 2
Low pressure sensor	EE 2 2

BTC Fault Codes	Display	Meaning
E01	ERR	Internal fault code
BOIL OUT	SHr	Flow sensor short
BOIL OUT	OPn	Flow sensor open
BOIL IN	SHr	Return sensor short
BOIL IN	OPn	Return sensor open
SUP	SHr	Supply sensor short
SUP	OPn	Supply sensor open
OUTDR	SHr	Out door sensor short
OUTDR	OPn	Out door sensor open

ATC

Temperature ℃	Resistance kΩ	Temperature ℃	Resistance kΩ	Temperature ℃	Resistance kΩ	Temperature ℃	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 ℃	Resistance kΩ	Temperature ℃	Resistance kΩ	Temperature ℃	Resistance kΩ	Temperature ℃	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 Accessories

Figure 14-1: Sealed system kit

Figure 14-2: Automatic hot water boost kit

14.1 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 to165 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.

14.2 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)
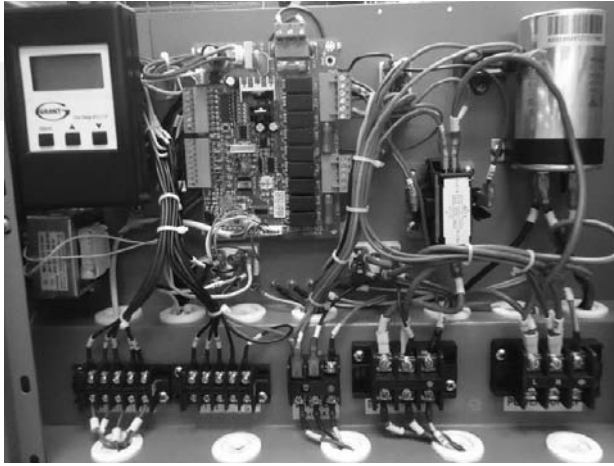Pre-wired Relay and By-pass switch

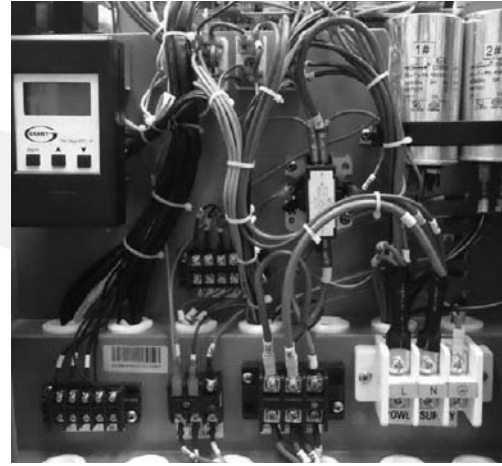# 15 Spare Parts

Figure 15-1: ASHE65, ASHE85 and ASHE125

Figure 15-2: ASHE175 and ASHE215

Part No	Description	ASHE65	ASHE85	ASHE125	ASHE175	ASHE215
HPAS100	PCB 'A'	1	1	1	-	-
HPAS101	PCB 'B'	-	-	-	1	1
HPAS102	RUN CAP	1	-	-	-	-
HPAS103	RUN CAP	-	1	-	-	-
HPAS104	RUN CAP	-	-	1	-	-
HPAS105	RUN CAP	-	-	-	1	-
HPAS106	RUN CAP	-	-	-	-	1
HPAS107	FAN MOTOR 'A'	1	2	2	-	4
HPAS108	FAN MOTOR 'B'	-	-	-	2	-
HPAS109	ATC 'A'	1	1	1	-	-
HPAS110	ATC 'B'	-	-	-	1	1
HPAS111	COMPRESSOR 'A'	1	-	-	-	-
HPAS112	COMPRESSOR 'B'	-	1	-	-	-
HPAS113	COMPRESSOR 'C'	-	-	1	-	-
HPAS114	COMPRESSOR 'D'	-	-	-	2	-
HPAS115	COMPRESSOR 'E'	-	-	-	-	2
HPAS115	3Kw ELEMENT	1	1	1	1	1
HPAS31	3Kw THERMOSTAT	1	1	1	1	1
HPAS32	FLEX HOSES ¾"	2	2	-	-	-
HPAS33	FLEX HOSES 1"	-	-	2	2	2
HPAS34	ISOLATION VALVES 22mm	2	2	-	-	-
HPAS35	ISOLATION VALVES 28mm	-	-	2	2	2
HPAS19	12V TRANSFORMER	1	1	1	1	1
HPAS20	24V TRANSFORMER	1	1	1	1	1
HPAS29	6m CIRCULATION PUMP	1	1	-	-	-
HPAS117	8m CIRCULATION PUMP	-	-	1	-	-
HPAS30	15m CIRCULATION PUMP	-	-	-	1	1
HPAS118	IMMERSION CONTACTOR 16A	1	1	1	1	1
HPAS14	FAN CAPACITOR	1	2	2	2	4

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.

17.1 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 Warranty

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.

Notes

Notes

GRANT ENGINEERING (UK) LTD
Hopton House, Hopton Industrial Estate, Devizes, Wiltshire. SN10 2EU
Telephone: 01380 736920   Fax: 01380 736991
Email: info@grantuk.com   Website: www.grantuk.com