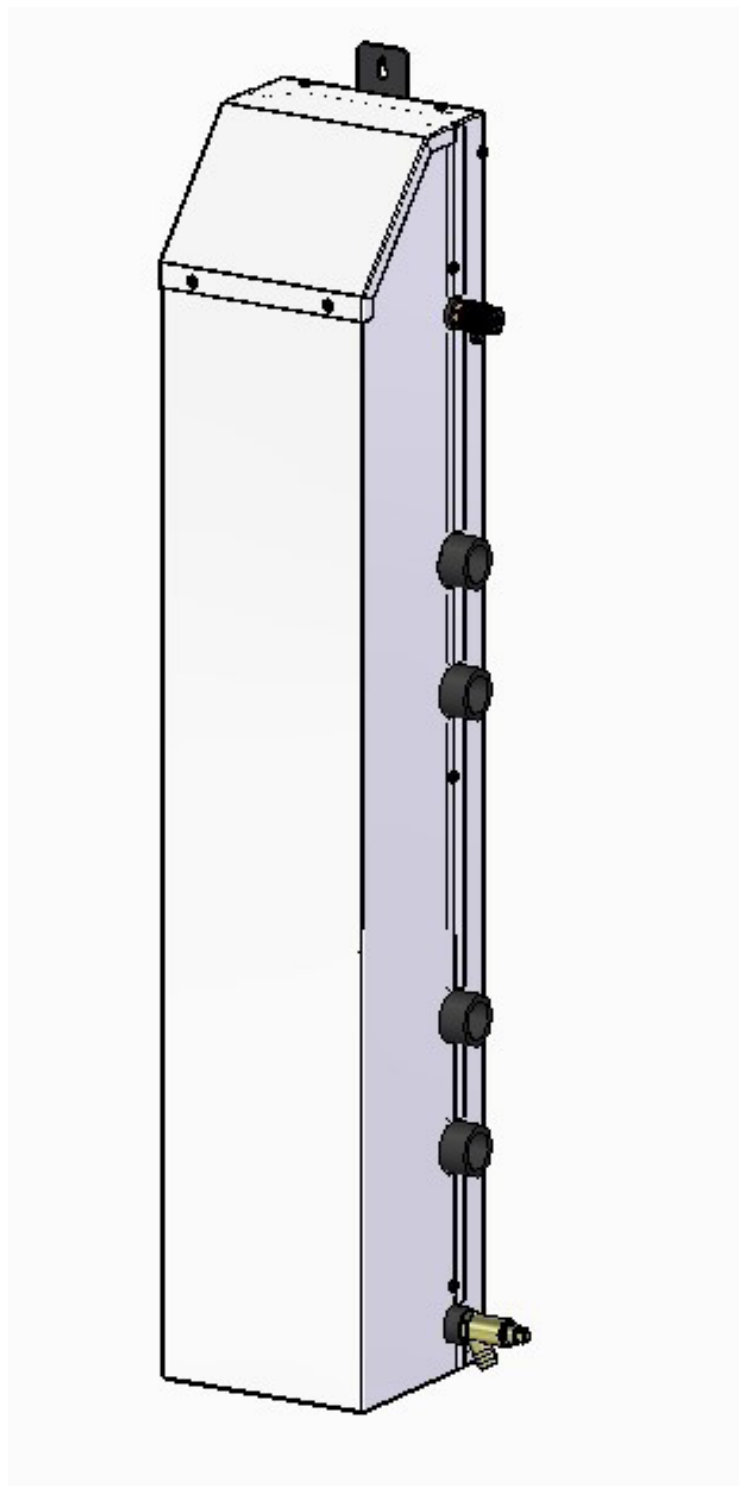


Grant

Combined Volumiser/Low Loss Header

Installation Instructions



IMPORTANT NOTE FOR USERS

These installation instructions are intended to guide the installer in the installation of the Grant Combined Volumiser/Low Loss Header.

SPECIAL TEXT FORMATS

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

! WARNING !

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

! CAUTION !

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

! NOTE !

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

PRODUCT CODES COVERED

These instructions cover the following product codes:

Product code	Product Description
HPIDSYSLLHKIT	Grant Combined Volumiser / Low Loss Header

SERVICING

The Low Loss Header/Volumiser should be inspected at least every twelve months, when the heat source and/or heating system is serviced.



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! NOTE !

These Installation Instructions must be read in conjunction with the Aerona³ Installation and Servicing Instructions supplied with the heat pump.

1 INTRODUCTION

1.1 GENERAL

The Grant Combined volumiser/low loss header provides the functions of both a volumiser and low loss header in one unit, with an integral 3kW electric immersion heater, for use with Grant Aerona³ air source heat pumps.

As a volumiser it provides an extra 11.5 litres to the system volume connected to the heat pump.

As a low loss header it gives hydraulic separation of the primary circuit of the heat pump from the secondary system circuit. This allows the flow rate through the heat pump to be maintained irrespective of the different temperatures and flow rate in the secondary system circuit.

The factory-fitted 3kW electric immersion element provides a supplementary heat source, if required. Refer to Section 4 for full details on the electrical connections for the immersion heater.

The Grant Combined volumiser/low loss header also provides a means for connection two Aerona³ heat pumps to be used together on the same system. Whether one or two heat pumps are used, they can be connected to either the right-hand or left-hand side of the volumiser/header. However, if two heat pumps are used, they must both be connected to the same side. Refer to Sections 3.7 and 3.8 for further information of heat pump and system connections.

The Grant Combined volumiser/ low loss header can be used as a volumiser only, either using the factory-fitted electric immersion heater to provide a supplementary heat source or not, as required.

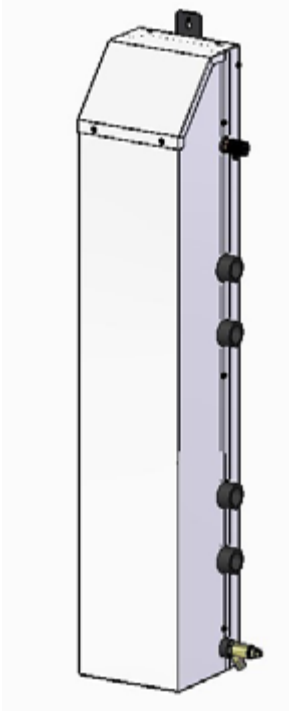


Figure 1-1: Grant Combined volumiser/low loss header

The Combined volumiser/low loss header is larger than normal for a low loss header (e.g. 50mm, 75mm or 100mm diameter). This is for two reasons:

- To accommodate the 3kW immersion heater to provide a supplementary heat source.
- To minimise the internal turbulence that would normally occur when the system mass flow of water exceeds that for the primary heat pump circuit.

1.2 CONSTRUCTION

The Grant Combined volumiser/low loss header is an insulated rectangular tank fitted with an integral 3kW electric immersion heater. This is housed within a weatherproof external casing with a removable cover at the top to access the electrical connections and immersion heater.

It is designed to be located internally, fixed to a wall using the mounting brackets on the header.

The volumiser/header tank is a mild steel welded construction, insulated with mineral wool, enclosed within an outer galvanised steel casing with a white powder coated paint finish.

It has two groups of three pipe connections located on the left-hand side of the unit and two groups of two pipe connections on the right-hand side. All of these are 1" BSPF connections, refer to Section 2 – Technical Data for further details on dimensions.

The unit is supplied with a manual air vent, to allow the volumiser/header to be vented following filling, and a 1/2" drain cock, to allow it to be drained down if required. Both are supplied loose to be fitted on site to their respective connections provided on the right-hand side of the unit.

The 3kW electric immersion element is supplied, factory fitted and located inside a removable panel on the top of the unit. This can be used provide a backup heat source, if required, controlled by the Grant Aerona air source heat pump to which it is connected. Refer to Section 4 – Electrical.

! WARNING !

The immersion heater must NOT be used unless it is fully immersed in water, i.e. the volumiser/header is completely filled and vented.

Always ensure that the electrical supply to the immersion heater is isolated BEFORE draining down the volumiser/header.

Also, ensure that volumiser/header is fully refilled with water and vented BEFORE switching the electrical supply back on.

1.3 PRODUCT CONTENTS

The Grant Combined volumiser/low loss header is supplied with the following items in a plastic bag located inside the top cover:

- 1 off 1/4" manual air vent
- 1 off 1/2" drain cock
- 1 off 3/8" x 1/4" reducing bush
- 4 off 1" blanking plugs

The following items are also supplied with the volumiser/header:

- 2 off 28mm isolating valves
- 1 off Installation instructions.

2 TECHNICAL DATA

2.1 TECHNICAL SPECIFICATION

Table 2-1: Volumiser/Low Loss Header technical data

Grant Combined Volumiser/Low Loss Header	
Nominal capacity (litres)	11.5
Weight - empty (kg)	18.5
Weight - full (kg)	30.0
Inlet/outlet connections	1" BSP
Drain cock connection	½" BSP
Manual air vent connection	¾" BSP
Materials	
Shell	Mild steel
Outer casing	Galvanised mild steel, polyester powder coated
Insulation	Mineral wool
Immersion Heater	
Make	Cothemr TSR
Output (kW)	3
Electrical supply	230V 50Hz 1ph

2.2 DIMENSIONS

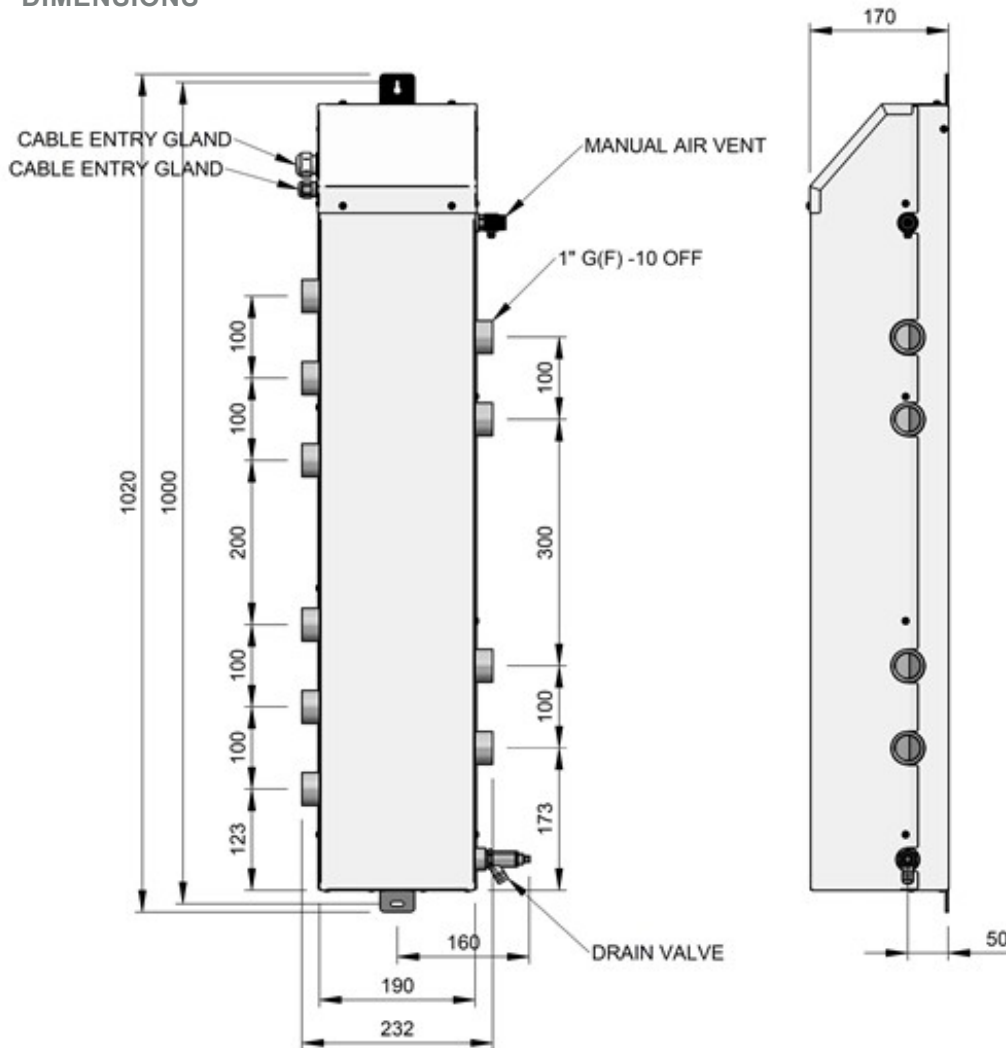


Figure 2-1: Grant Volumiser/Low Loss Header dimensions

3 INSTALLATION

3.1 GENERAL

This section gives details of the installation process for the Grant Combined volumiser/low loss header with backup immersion heater.

These installation instructions must be read in conjunction with the Grant Aeronas³ air source heat pump installation instructions (provided with the heat pump).

Before starting any installation work on the Grant Aeronas³ air source heat pump and volumiser/low loss header, please read the Health and Safety information given in Section 14 of the Aeronas³ Installation Instructions.

3.2 REGULATIONS AND STANDARDS

The installation of the Grant Aeronas³ air source heat pump and the volumiser/low loss header must be in accordance with the following recommendations, as applicable:

- Building Regulations for England and Wales, and Building Standards for Scotland
- Local Bylaws (check with the Local Authority for the area)
- Water Supply (Water Fittings) Regulations 1999
- MCS Installer Standards (if applying for the Renewable Heat Incentive)
- MIS3005 Requirements for contractors undertaking the supply, design, installation, set to work, commissioning and handover of microgeneration heat pump systems.
- MCS020 MCS Planning Standard

The installation should also be in accordance with the latest edition of the following standards and Codes of Practice:

- BS7671 and amendments
- BS EN 12831

3.3 LOCATION

The Grant Combined volumiser/low loss header can be mounted on any suitable wall surface capable of carrying the weight of the unit when full of water and where the required clearances can be achieved.

The unit **MUST** be installed vertically, with the immersion heater at the top, as shown in Figure 2-1.

It **MUST** only be installed inside a property, and not located externally, as it not designed to be weatherproof.

! NOTE !

The Grant volumiser/low loss header MUST NOT be installed externally.

3.4 CLEARANCES

The Grant Combined volumiser/low loss header must be installed such that adequate clearance is available for maintenance. In particular, a suitable clearance of 300mm must be available immediately above the unit to allow the removal and replacement of the electric immersion heater.

Suitable clearance should also be allowed on the right-hand side of the volumiser/header for access to, and the use of, the air vent, drain cock, and any system isolating valves, as and when required.

3.5 UNPACKING

The Grant Combined volumiser/low loss header is supplied wrapped in bubble wrap with a separate kit of components in a plastic bag located inside the top cover. Refer to list of components given in Section 1.3 of these Instructions.

! NOTE !

Take care if cutting the bubble wrap with a knife not to damage the volumiser/low loss header casing immediately beneath.

3.6 INSTALLATION PROCEDURE

To install the Grant Volumiser/Low Loss Header:

1. Using a suitable thread sealant, fit the 3/8" x 1/4" reducing bush into the 3/8" socket at the top of the right-hand side of the volumiser/header and then fit the 3/8" manual air vent into the reducing socket. Refer to Figure 2-1. Position the air vent such that the outlet is pointing downwards.
2. Again, using a suitable thread sealant, fit the drain cock into the 1/2" socket at the bottom of the right-hand side of the header/volumiser. Refer to Figure 2-1. Position the drain cock such that the outlet is facing downwards.
3. Position the volumiser/header with the back against the wall on which it is to be mounted and mark the two fixing centres from both the top and bottom fixing brackets.
4. Note that when filled with water, the volumiser/header will weight 30kg. Ensure that the wall concerned is structurally capable of carrying this weight.
5. Drill the wall to take suitable wall fixings (not supplied) for the type of wall construction and the weight of the volumiser/header when full of water and fit the wall fixings.
6. Re-position the volumiser/header against the wall, align the holes in the top and bottom fixing brackets with the two wall fixings, and secure the header/volumiser to the wall with screws.

! WARNING !

The immersion heater must NOT be used unless it is fully immersed in water.

Always ensure that the volumiser/low loss header is full of water BEFORE switching on the electrical supply.

3.7 HEAT PUMP FLOW AND RETURN CONNECTIONS

The heat pump flow and return connections can be made to either the right-hand or left-hand connections of the Grant Combined volumiser/low loss header, but **BOTH** connections must be made to the same side. Refer to Figures 3-1 and 3-2 for connection details.

A second heat pump can also be connected to the volumiser/header, but it must be connected to the same side as the first heat pump.

This second heat pump will operate as a 'supplementary' unit controlled from the other 'lead' heat pump. Refer to Section 5 of these instructions for the required parameter settings for both heat pumps for this control configuration.

All unused connections should be sealed using the brass blanking plugs provided.

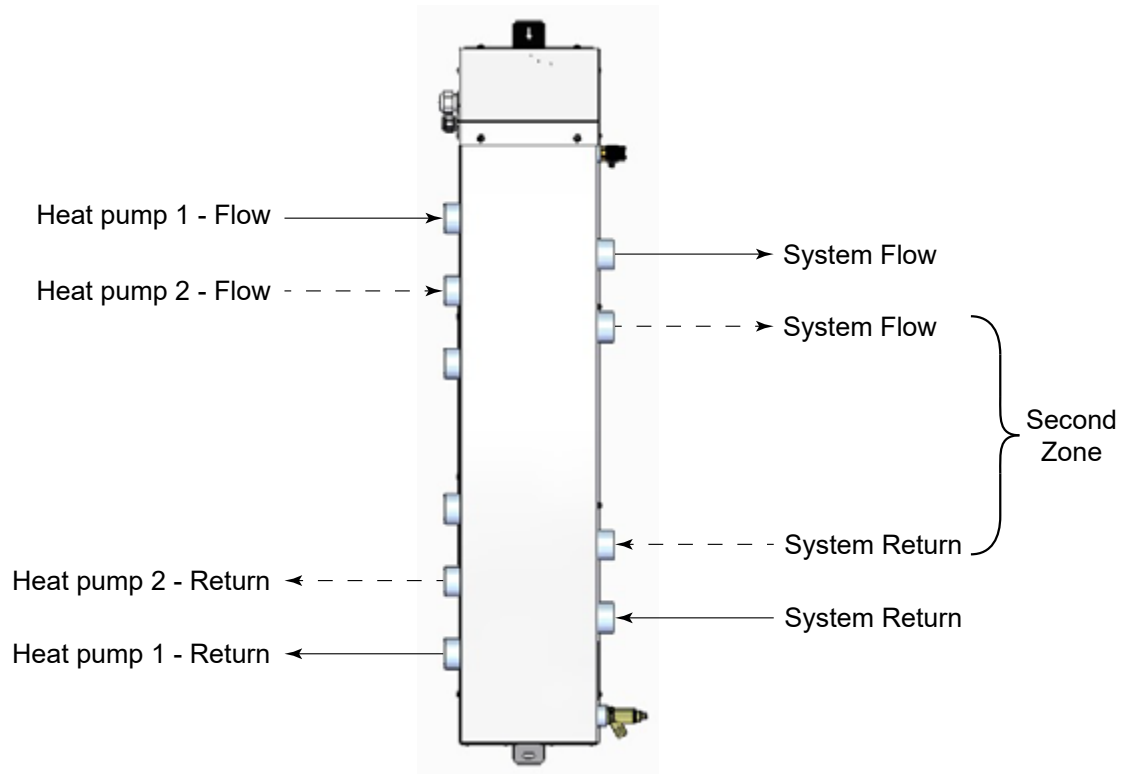


Figure 3-1: Heat pump connections on left hand side

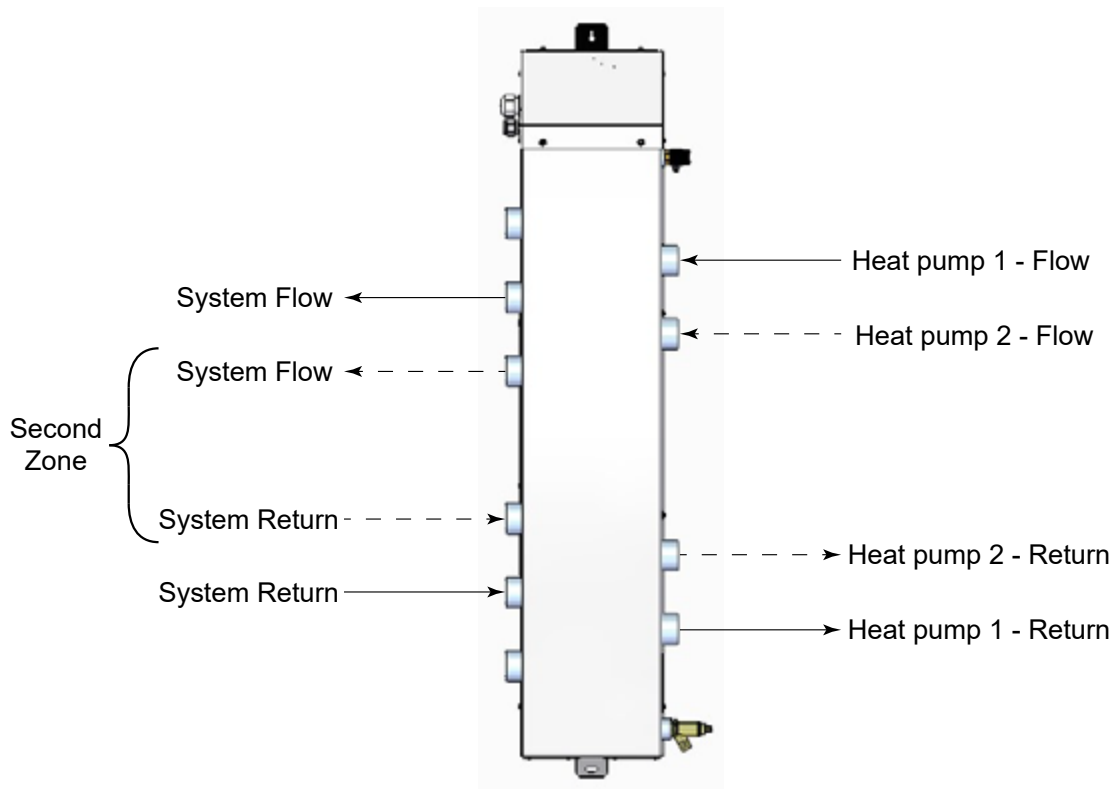


Figure 3-2: Heat pump connections on right hand side

ISOLATION VALVES

Two 28mm isolating valves are supplied with the volumiser/header. One of these must be fitted in the system flow pipe and the other in the system return pipe, close to where they are connected to the header/volumiser.

FLOW REGULATOR

A flow regulator is supplied with the heat pump. This must be fitted in the return pipe from the volumiser/header to the heat pump. Refer to Figure 3-3.

The flow regulator can be fitted vertically or horizontally but must be installed such that the arrow on the brass body points in the direction of flow.

For an accurate and stable reading, ensure that there is straight pipe of at least 5 times the pipe diameter (i.e. for 28mm pipe: 5 x 28mm = 140mm) before the inlet to the regulating valve.

During system commissioning, the flow regulator must be set to achieve the required flow rate in the primary circuit between the heat pump and the volumiser/header.

The required flow rate will be dependent on the required heat pump output (at design conditions) and the temperature differential between the heat pump flow and return.

This flow rate can be calculated as follows:

$$\text{Flow rate} = \frac{\text{Heat output (kW)} \div \text{Temperature differential (K)}}{\div \text{Specific heat capacity of water (4.2kJ/kgK)}} *$$

Example:

Heat output = 12kW

Differential = 5K

Specific heat capacity of water = 4.2 kJ/KgK

$$\begin{aligned} \text{Flow rate} &= 12 \div 5 \div 4.2 = 0.571 \text{ kg/sec} \\ &= 0.571 \times 60 = 34.3 \text{ kg/min (or 34.3 litres/min)} \end{aligned}$$

! NOTE !

* The use of an antifreeze/inhibitor/biocide fluid will alter the value of Specific Heat Capacity but, as the difference is minimal, use 4.2kJ/kgK as a constant for the calculation of flow rate.

To set the flowrate, the system should be set to maximum demand, i.e. with all emitters and zone valves open. The flow rate is then adjusted by rotating the regulating valve until the required flow rate is indicated on the flow regulator scale.

- To increase the flow rate - rotate valve anticlockwise
- To decrease the flow rate - rotate valve clockwise

The actual flowrate must be read from the LOWER edge of the float, in the flow regulator window. Refer to Figure 3-3.

If two heat pumps of the SAME output are connected to the low loss header/volumiser, both flow regulators should be set to the SAME flowrate, as calculated for the output of each heat pump.

If the two heat pumps are of DIFFERENT outputs:

- Calculate the required flow rate for each heat pump, based on their respective outputs.
- Set the flow rate of each heat pump separately, i.e. with only one heat pump operating at a time.

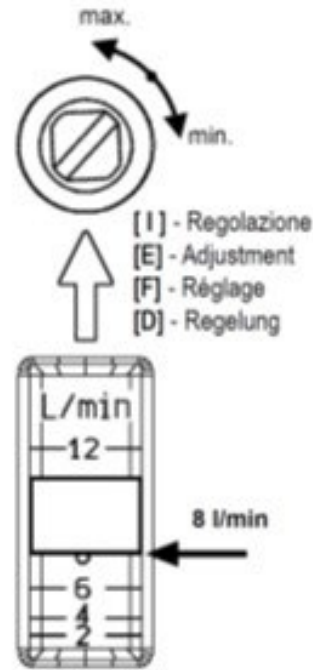


Figure 3-3: Flow regulator adjustment

Grant Aeronas heat pumps are supplied with the circulating pumps set to the highest of three possible performance curves. In order to achieve the required flow rate it may be necessary to select one of the other pump performance curves.

This is done by adjusting the setting of DIP switches DIP SW5 and DIP SW6 on the Terminal PCB of the heat pump. Follow the guidance given in Section 8.3.6 of the Grant Aeronas Installation and Servicing instructions supplied with the heat pump

3.8 SYSTEM CONNECTIONS

The heating system flow and return connections can be made to either the right-hand or left-hand connections of the Grant Combined volumiser/low loss header, but BOTH connections must be made to the opposite side of the volumiser/header to the heat pump connections. Refer to Figures 3-1 and 3-2 for connection details.

A second pair of system flow and return connections, i.e. for a second zone, can also be connected to the volumiser/header, but must be connected to the same side as the other system connections. Refer to Figures 3-1 and 3-2 for connection details.

3.9 VOLUMISER ONLY CONNECTIONS

It is possible, if required, to use the Grant Combined volumiser/low loss header as a volumiser only, either using the integral 3kW immersion as a supplementary heater or not.

The volumiser/header must be fitted in the flow pipe from the heat pump as follows:

- The flow pipe from the heat pump should be connected to lowest connection on either the right-hand or left-hand side of the volumiser/header.
- The outlet pipe from the volumiser/header should be connected to one of the upper set of connections on either the right-hand or left-hand side of the volumiser/header.

Refer to Figure 3-4.

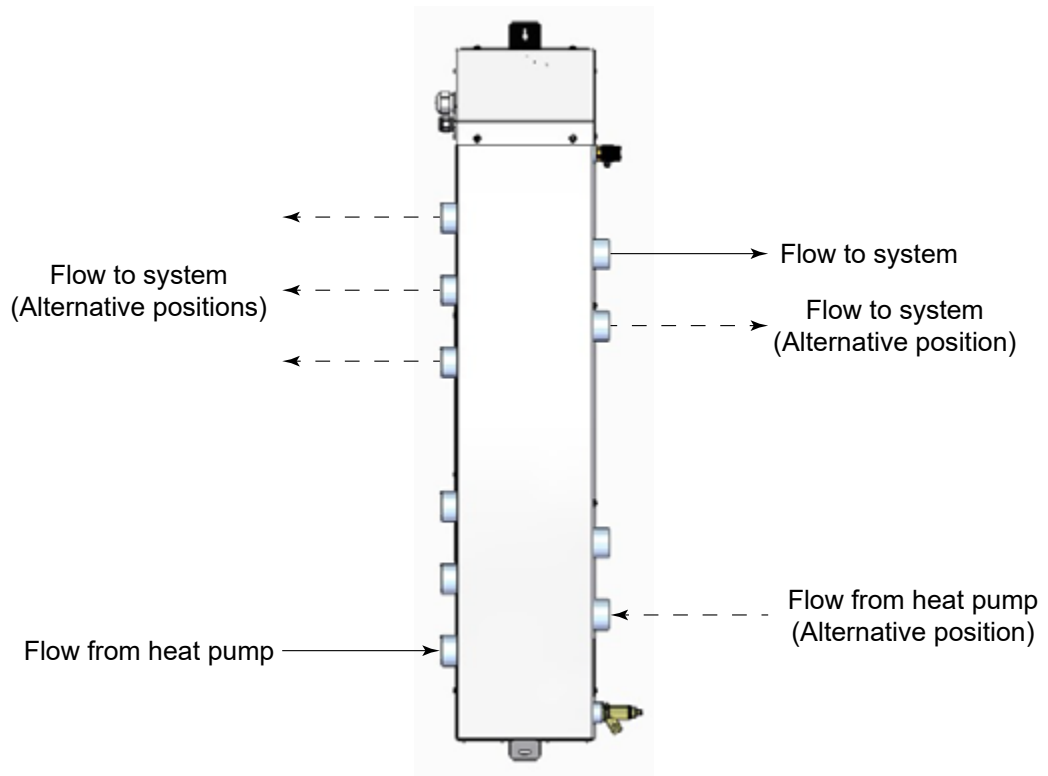


Figure 3-4: Volumiser only connections

4 ELECTRICAL

! WARNING !

Electric shock may cause serious personal injury or death.

All electrical work must be undertaken by a competent person and in accordance with the current edition of BS7671 (the I.E.T. Wiring Regulations), including any amendments. Failure to observe this legislation could result in an unsafe installation and will invalidate all guarantees.

The equipment supplied must be wired according to these Installation Instructions to ensure that the heat pump and supplementary immersion heater function safely. All electrical connections made on-site are solely the responsibility of the installer.

4.1 GENERAL

The electric immersion heater is located at the top of the volumiser/header and is accessed by undoing the four screws and removing the sloping cover. Refer to Figure 4-1.

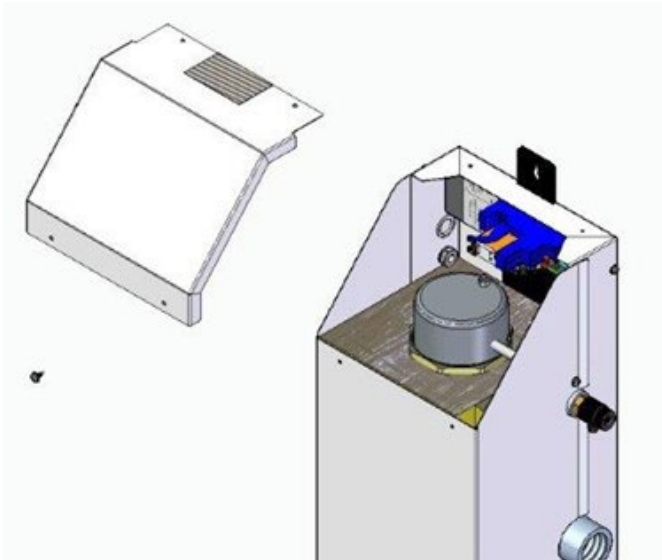


Figure 4-1: Location of immersion heater

If the immersion heater fitted to the Grant Combined volumiser/low loss header is to be used, it requires a 230V 50Hz single phase electrical supply. Refer to Section 4.2 – Electrical Connections.

In order for the immersion heater to be controlled by the Aeronas³ as a supplementary heat source, the volumiser/header will also need to be connected to the heat pump terminal PCB. Refer to Section 4.2 – Electrical Connections.

4.2 ELECTRICAL CONNECTIONS

! WARNING !

Ensure that all electrical supplies to the heat pump and volumiser/header are isolated before making any electrical connections.

The immersion heater is supplied factory-fitted in the volumiser/header. However, check that it is securely fitted before proceeding with the electrical connections.

IMMERSION HEATER POWER SUPPLY

The immersion heater uses a dedicated power supply from a correctly sized circuit breaker in the consumer unit. The final supply connection must be made from a 2-pole switch located adjacent to the volumiser/header.

To connect this power supply to the electrical terminals in the volumiser/header, refer to Figure 4-2 and proceed as follows:

1. Remove the access cover from the top of the volumiser/header. To do this unscrew and remove the four screws and remove the cover.
2. Feed the immersion heater supply cable through the upper (larger) of the two cable glands on the left-hand side of the volumiser/header and connect it to the LOWER immersion heater electrical terminals as follows:
 - Live to Terminal L (Brown terminal block)
 - Neutral to Terminal N (Blue terminal block)
 - Earth to Earth Terminal (Green terminal block)Refer to Figure 4-3 for volumiser/header connection diagram.
3. Tighten the cable gland to securely grip the cable.

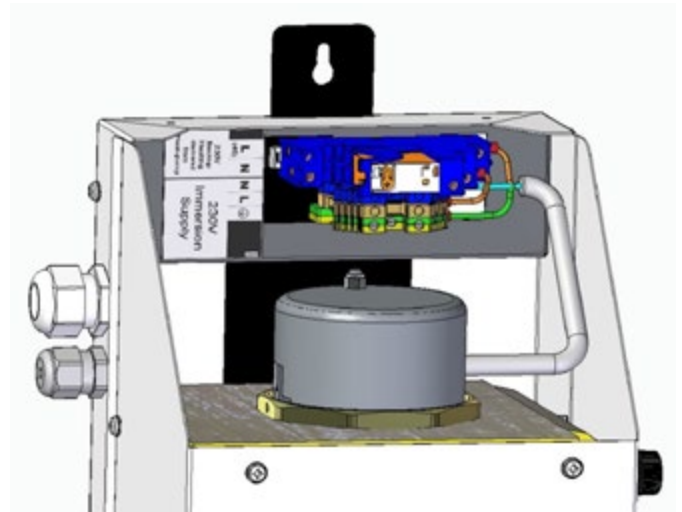


Figure 4-2: Electrical connections

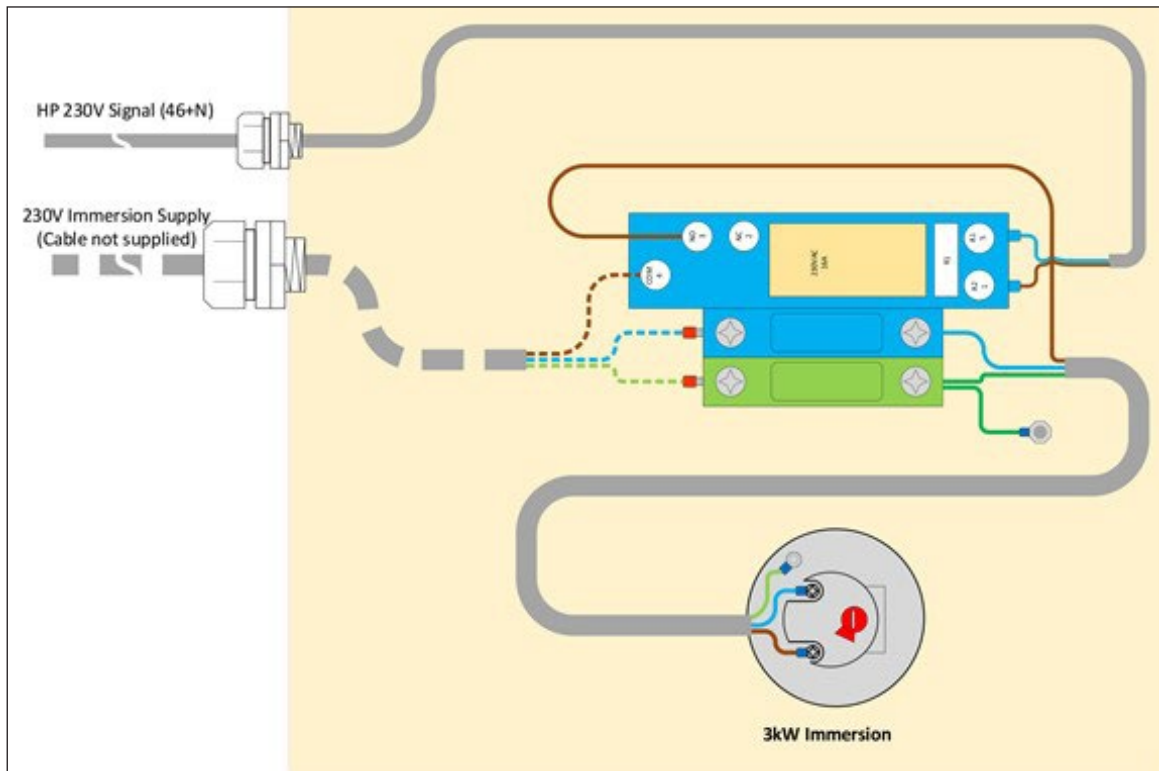


Figure 4-3: Connection diagram for Grant Combined Volumiser/Low Loss Header

IMMERSION HEATER CONTROL WIRING

The operation of the immersion heater as a supplementary heat source is controlled by the Grant Aeronas³ heat pump.

To connect the immersion heater control wiring to the electrical terminals in the volumiser/header, refer to Figure 4-3 and proceed as follows:

1. Connect a cable to the 230V output from the 'Electric heater' terminal (terminals 46 and N) on the Aeronas³ Terminal PCB.
2. Pass this cable through the lower (smaller) of the two cable glands on the left-hand side of the header/volumiser and connect it to the UPPER electrical terminals as follows:
 - Terminal 46 on heat pump terminal PCB to Terminal L (A2 on the backup heater relay)
 - Terminal N on heat pump Terminal PCB to Terminal N (A1 on the backup heater relay)

Refer to Figure 4-3 for header/volumiser connection diagram.

3. Tighten the cable gland to securely grip the cable.

4.3 IMMERSION HEATER

The Grant Combined volumiser/low loss header is supplied factory-fitted with a pre-wired 3kW Cotherm Type TSR immersion heater to provide a supplementary heat input if required.

! WARNING !

This immersion heater must NOT be used unless it is fully immersed in water. Always ensure that the volumiser/header is full of water BEFORE switching on the electrical supply.

The immersion heater control thermostat is pre-set on position 4 at a temperature of approximately 65°C. This can be adjusted as required. Refer to Figure 4-4.

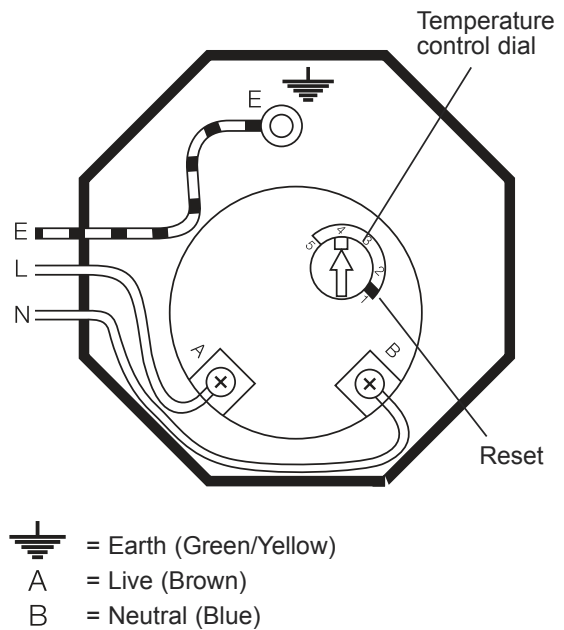


Figure 4-4: Immersion heater wiring connections

The wiring connections are also shown in Figure 4-4. Follow the wiring instructions connecting the live, neutral and earth as indicated.

OVER-TEMPERATURE CUT-OUT

This immersion heater is fitted with a Cotherm type TSR thermostat that incorporates an independent non-self-resetting over-temperature cut-out to prevent excessive water temperatures.

The reset pin is located in a small opening to the side of the control dial and indicated by small triangle with the word 'safety'. Refer to Figure 4-4.

In normal operation the reset pin will be approximately 2-3mm below the surface of the plastic thermostat housing.

Should the over-temperature cut-out operate, the reset pin will be pushed up to become level or slightly above the surface of the housing.

To reset the over-temperature cut-out:

- Isolate the volumiser/header and immersion element from the mains electrical supply.
- Wait for the temperature in the volumiser/header to fall sufficiently.
- Using a suitably sized implement, push the reset pin using hand pressure only to return it to its normal operating position.

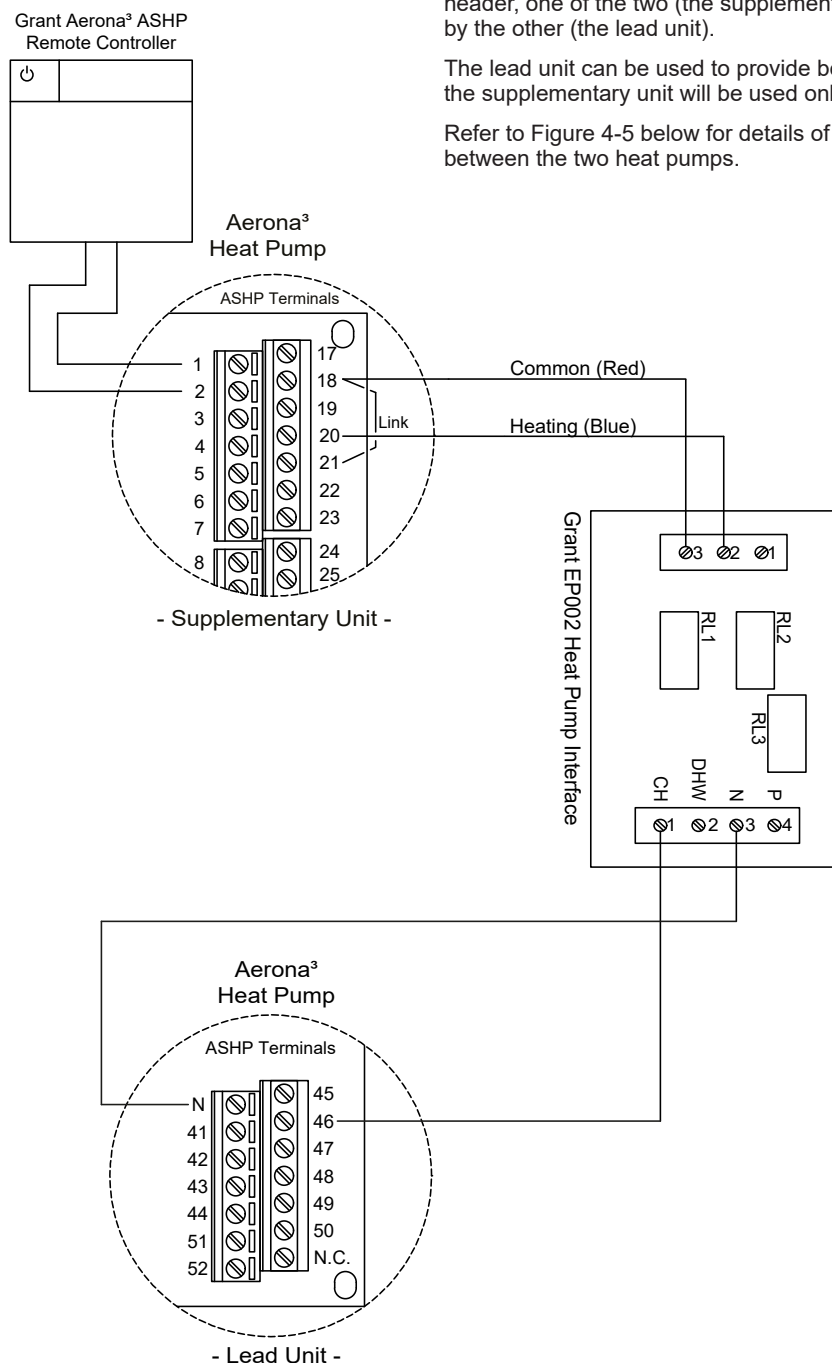


Figure 4-5: Wiring connections between lead and supplementary heat pumps

! WARNING !

Ensure the volumiser/header and immersion heater is isolated from the mains before attempting to reset to over-temperature cut-out.

If the immersion heater needs to be replaced it must be fitted to the volumiser/header using the gasket provided on the unit. Only use a correctly shaped spanner. Stilsons or pipe grips should NOT be used. The use of sealing compound is not recommended.

! WARNING !

Always ensure that the immersion heater cap is not covered.

4.4 ELECTRICAL CONNECTIONS BETWEEN LEAD AND SUPPLEMENTARY HEAT PUMPS

When using two Aeronas³ heat pumps connected to the volumiser/header, one of the two (the supplementary unit) will be controlled by the other (the lead unit).

The lead unit can be used to provide both Heating and DHW, but the supplementary unit will be used only for Heating.

Refer to Figure 4-5 below for details of the electrical connection between the two heat pumps.

5 OPERATION

5.1 GENERAL

Before starting to commission the installation, including the Aerona³ air source heat pump, must be completed as detailed in Sections 3 and 4 of these instructions.

! NOTE !

In order to commission the installation, the following information must be used in conjunction with the Aerona³ installation instructions supplied with the heat pump.

5.2 AERONA³ HEAT PUMP PARAMETER SETTINGS

Switch on the power to the heat pump, via the external isolator.

Press and hold the ON/OFF button on the heat pump remote controller for three seconds to turn the heat pump on – refer to Aerona³ installation instructions Section 9.1.

Set the day and time on the heat pump remote controller – refer to Aerona³ installation instructions Section 9.2

Access the heat pump parameter setting menus via the heat pump remote controller – refer to Aerona³ installation instructions Section 9.3

If the factory-fitted electric immersion heater is to be used as a back-up heater refer to Section 5.3 for the correct parameter settings.

If a second Grant Aerona³ heat pump is to be used, refer to Section 5.5 for the correct parameter settings for the operation of a supplementary heat pump

5.3 PARAMETER SETTINGS FOR SUPPLEMENTARY IMMERSION HEATER OPERATION

Set the parameters as detailed in the table below.

Table 5-1: Aerona³ heat pump parameter settings for supplementary immersion heater operation

Level	Parameter		Function description	Display and input value			
	Group	Code		Default	Min.	Max.	Setting
I	46	00	Backup heater type of function 0 = disable 1 = Replacement mode 2 = Emergency mode 3 = Supplementary mode	0	0	3	3
I	46	01	Manual water set point	50°C	40	55	55
I	46	04	Heater activation delay time	5 mins	0	900	0
I	46	05	Integration time for starting heaters	600	0	900	0
I	46	13	Outdoor air temp to enable backup heaters (supplementary mode)	5.0°C	-20.0	+20	5
I	46	14	Outdoor air hysteresis to disable Backup heaters	5.0°C	0.5	10.0	2
I	51	46	Terminal 46: DHW electric heater or Backup heater 0 = DHW electric heater 1 = Backup heater	0 or 1	0	1	1

! NOTE !

Refer to the Aerona³ installation instructions, supplied with the heat pump, for further details on how to access and adjust the above heat pump parameters.

5.4 PARAMETER SETTINGS FOR ASSISTING DEFROST PROCESS

Depending on the overall system volume in place at the time of the defrost, it may be useful energising the supplementary immersion heater fitted to the Grant Combined volumiser/low loss header to assist the defrost process.

The overall time for a defrost should never be more than 5 minutes (including the compressor protection 'off' time of 3 minutes) so the total power used during a defrost period by the immersion element would not be more than 250W.

After the defrost function is completed, the immersion heater will switch off when the flow temperature has reached the minimum flow target temperature (Parameter 46 23) + 5°C

Set the parameters as detailed in the table below.

Table 5-2: Aerona³ heat pump parameter settings for assisting defrost process

Level	Parameter		Function description	Display and input value			
	Group	Code		Default	Min.	Max.	Setting
I	46	00	Backup heater type of function 0 = disable 1 = Replacement mode 2 = Emergency mode 3 = Supplementary mode	0	0	3	3
I	46	20	Freeze protection functions 0 = disable 1 = enabled during start-up 2 = enabled during Defrost 3 = enabled during start-up and Defrost	0	0	3	2
I	46	23	Outgoing water set point during Defrost	24	10	50	30
I	51	46	Terminal 46: DHW electric heater or Backup heater 0 = DHW electric heater 1 = Backup heater	0 or 1	0	1	1

! NOTE !

Refer to the Aerona³ installation instructions, supplied with the heat pump, for further details on how to access and adjust the above heat pump parameters.

5.5 PARAMETER SETTINGS FOR LEAD / SUPPLEMENTARY HEAT PUMP OPERATION

Set the parameters as detailed in the table below.

Table 5-3: Lead heat pump settings

Level	Parameter		Function description	Display and input value			
	Group	Code		Default	Min.	Max.	Setting
I	46	00	Backup heater type of function 0 = disable 1 = Replacement mode 2 = Emergency mode 3 = Supplementary mode	0	0	3	3
I	46	01	Manual water set point	50°C	40	55	55
I	46	04	Heater activation delay time	5 mins	0	900	0
I	46	05	Integration time for starting heaters	600	0	900	0
I	46	13	Outdoor air temp to enable backup heaters (supplementary mode)	5.0°C	-20.0	+20	10
I	46	14	Outdoor air hysteresis to disable Backup heaters	5.0°C	0.5	10.0	2
I	51	46	Terminal 46: DHW electric heater or Backup heater 0 = DHW electric heater 1 = Backup heater	0 or 1	0	1	1

! NOTE !

Refer to the Aerona³ installation instructions, supplied with the heat pump, for further details on how to access and adjust the above heat pump parameters.

Table 5-4: Supplementary heat pump settings

Level	Parameter		Function description	Display and input value			
	Group	Code		Default	Min.	Max.	Setting
I	21	00	Enable outgoing water set point 0 = Fixed set point 1 = Climatic curve	1	0	1	0
I	21	01	Fixed outgoing water set point	45°C	23.0	60.0	55

! NOTE !

Refer to the Aeron³ installation instructions, supplied with the heat pump, for further details on how to access and adjust the above heat pump parameters.



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