

Thernamic GS

Single Compressor Compact Heat Pump
Installation & Commissioning



Vent-Axia[®]

PLEASE RETAIN THESE INSTRUCTIONS WITH THE PRODUCT.



Contents Page

Section	Description	Page
1.....	Notes sheet	4
2.....	Safety Information	5
2.1.....	Access	5
2.2.....	Lighting	5
2.3.....	Tools and consumables	5
2.4.....	Handling	5
2.5.....	Residual hazards	5
2.6.....	Freezing	5
2.7.....	Disposal/decommissioning	5
3.....	General product information	6
3.1.....	Equipment delivery and handling	6
3.2.....	Vent-Axia Compact technical data	7
4.....	Installation.....	8
4.1.....	The Golden Rules of installing a heat pump	8
4.2	Underfloor heating schematics	8
4.2.1.....	Underfloor with a single manifold. Space heating only	9
4.2.2.....	Underfloor with multiple manifolds. Space heating only	9
4.3.....	Radiators. Space heating only	10
4.4.....	Domestic Hot Water - Schematic	10
4.4.1.....	Type of DHW tank	11
4.4.2.....	DHW tank size	11
4.4.3.....	Immersion heater	11
4.4.4.....	Three Port Diverting Valve	11
4.4.5.....	Tank Thermostat	11
4.4.6.....	DHW Timeclock	11
4.5.....	Mechanical Installation	14
4.5.1.....	Locating the Heat Pump	14
4.5.2.....	Recommended Clearances	14
4.5.3.....	Installation of the heat pump	15
4.6.....	Electrical Installation	17
4.6.1.....	Single Phase	18
4.6.1.1.....	Single Underfloor Control Unit	18
4.6.1.2	Multiple Underfloor Control Units	19
4.6.1.3.....	Radiator with Thermostat	19
4.6.2.....	Three Phase Power Supplies	20
4.6.3.....	DHW time clock and 3 way diverting valve wiring	20
4.6.4.....	Weather Compensation (Optional)	21

Contents Page

Section	Description	Page
5.....	Commissioning	22
5.1.....	Purging the slinkies of air	22
5.1.1.....	Purging procedure for multiple slinkies	22
5.1.2.....	Adding antifreeze for multiple slinkies	24
5.1.2.1.....	Pressurizing the system	25
5.1.3.....	Purging procedure and adding antifreeze for single slinkies	25
5.1.4.....	Testing of antifreeze concentration	27
5.1.5.....	Heating distribution and load side purging	28
5.1.6.....	Reassembling the heat pump	28
5.2.....	Heat pump operation	29
5.3.....	Turning the heat pump on for the first time	29
5.4.....	Altering the flow temperature from the heat pump	30
5.4.1.....	To read flow temperatures and refrigerant pressures	31
5.4.2.....	To change the heat pump return flow temperatures	31
6.....	Fault finding	33
7.....	RTB and extended warranty statement	34
7.1.....	Extending the RTB warranty	34
7.1.1.....	Parts only	34
7.1.2.....	Labour and parts	34
8.....	Antifreeze COSHH sheet.....	35
	Antifreeze Safety data sheet	36
9.....	Heat pump settings sheet	37

2. Safety information

Safe operation of this unit can only be guaranteed if it is properly installed and commissioned in compliance with the manufacturer's requirements. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

Manufacturer:-
Vent-Axia Limited
Fleming way
Crawley,
West Sussex,
RH10 9YX
Tel 01293 441523
www.vent-axia.com

The product is designed and constructed to withstand the forces encountered during normal use. Use of the product for any other purpose, or failure to install the product in accordance with these Installation and Commissioning Instructions, could damage the product, will invalidate the warranty, and may cause injury or fatality to personnel.

2.1 Access

Ensure safe access before attempting to work on the product. Arrange suitable lifting gear if required.

2.2 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

2.3 Tools and consumables

Before starting work ensure that you have suitable tools and / or consumables available.

2.4 Handling

Manual handling of large and /or heavy products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.

2.5 Residual hazards

Many products are not self-draining. Take due care when dismantling or removing the product from an installation.

2.6 Freezing

Provision must be made to protect products which are not self-draining against frost damage in environments where they may be exposed to temperatures below freezing point.

2.7 Disposal/Decommissioning

Vent-Axia offer a life time decommissioning service for this product. This is available on a return to base basis (carriage at users' cost).

Disposal of any antifreeze water mix should follow the disposal instructions as laid out on the COSHH Safety Data Sheet on page 37.

3. General Product Information

This manual explains how to install and commission a Vent-Axia ground source heat pump.

The Vent-Axia Compact Single Compressor Heat Pump is designed to provide a low cost renewable heat source for a buildings heating system. In addition, and if required, the Vent-Axia Compact can also provide domestic hot water. Heat pumps can provide lower running costs and will generate significantly lower carbon emissions compared with traditional fossil fuels.

The Vent-Axia Compact Single Compressor Heat Pump is designed for straightforward installation and requires no specialist training to install. However the installation must conform to all relevant construction and electrical codes and comply with the requirements of the Microgeneration Certification Scheme (MCS) MIS3005 'Requirements for Contractors undertaking the Supply, Design, Installation, Set to Work Commissioning and Handover of Microgeneration Heat Pump Systems'

3.1 Equipment delivery and handling.

Factory shipment

Prior to shipment, the Vent-Axia Compact Single Compressor Heat Pump is tested, calibrated and inspected to ensure proper operation.

Receipt of shipment

Each pallet should be inspected at the time of delivery for possible external damage. Any visible damage should be recorded immediately on the carrier's copy of the delivery slip.

Each pallet should be unpacked carefully and its contents checked for damage.

If it is found that some items have been damaged or are missing, notify Vent-Axia immediately and provide full details. In addition, damage must be reported to the carrier with a request for their on-site inspection of the damaged item and its shipping pallet.

Storage

If a Vent-Axia Heat Pump is to be stored prior to installation, the environmental storage conditions should be at a temperature between 0°C and 70°C (32°F and 158°F), and between 10% and 80% relative humidity (non-condensing).

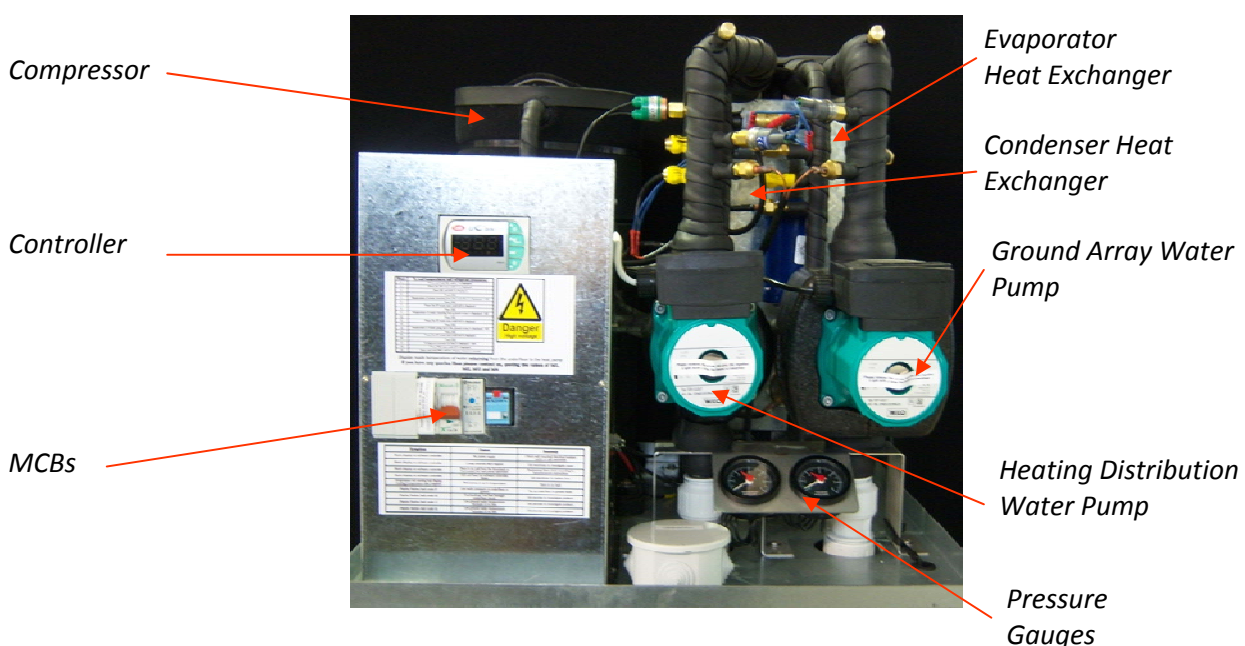


Fig 1. The internals of a heat pump

3.2 Vent-Axia Compact Technical Details—Single Compressor

Nominal Thermal Output	Power supply rating	Max running Current	Typical running current	Typical starting current	Power supply cable size (min)	Power input*	Nominal dry weight	Compressors	Dimensions	Connection size	Recommended minimum heat transfer area in DHW tank (not supplied)
kW	Amps	Amps	Amps	Amps	mm	kW	Kg	Number	HxWxD	mm OD	m ²
Single Phase—230 Volts AC 50 Hz											
4	16	15	7 (10)	25	2.5	1.5 (2.1)	85	Single	900x550x570	28	0.8
6	25	18	10 (12)	30	2.5	1.9 (2.5)	90	Single	900x550x570	28	1.2
8	25	22	13 (16)	30	2.5	2.4 (3.3)	95	Single	900x550x570	28	1.6
10	32	26	13 (18)	30	4.0	2.7 (3.8)	100	Single	900x550x570	28	2.0
12	32	30	17 (22)	40	4.0	3.4 (4.6)	110	Single	900x550x570	28	2.4
Three Phase—400 Volts AC 50 Hz											
4	16	5.7	3 (4)	23	2.5	1.4 (2.0)	85	Single	900x550x570	28	0.8
6	16	7.2	4.5 (5)	30	2.5	1.8 (2.4)	90	Single	900x550x570	28	1.2
8	16	8.0	5 (6)	36	2.5	2.3 (3.2)	95	Single	900x550x570	28	1.6
10	16	9.4	6 (7)	41	2.5	2.6 (3.7)	100	Single	900x550x570	28	2.0
12	16	12	7 (9)	51	2.5	3.2 (4.5)	110	Single	900x550x570	28	2.4

The figures above are based on a rating to BS EN14511, 0 deg C from the ground, 35 deg C flow to underfloor. The figures in parentheses are values obtained to BS EN14511, 0 deg C from the ground, 50 deg C flow to radiators.

* This figure includes the power consumption of the inbuilt water pumps

For clarification of starting currents and details on how these figures are calculated please contact Vent-Axia.

4. Installation

Note: Before actioning any installation observe the 'Safety information' in Section 1.

It is essential that the following installation guidelines are followed carefully.

The installation must conform to all relevant construction and electrical codes and comply with the requirements of the Microgeneration Certification Scheme (MCS) MIS3005 'Requirements for Contractors undertaking the Supply, Design, Installation, Set to Work Commissioning and Handover of Microgeneration Heat Pump Systems'

Any electrical work required to install or maintain this appliance should be carried out by a suitably qualified electrician in accordance with current IEE regulations.

Any plumbing work should be carried out to local water authority and WRC regulations.

4.1 The Golden Rules of Installing a Heat Pump

1. A 'D' Type MCB should be used for the heat pumps power supply. If this is not available a 'C' Type can be used on single phase units fitted with smart starts.
2. Connect the heat pump using only plastic pipe.
3. Use the Vent-Axia recommended purge pump for purging the ground arrays and heat pump.
4. On the underfloor heating manifold(s), remove the thermal mixing valve(s) if fitted.
5. On the underfloor heating manifold(s), don't fit electric actuators to more than 75% of the zones.
6. Remove the chrome screws on the water pumps, and check that both pumps are running, and moving water before turning on the compressor (25 MCB on the unit) (See section 5.3).
7. Do not install the heat pump adjacent to or beneath bedrooms or noise sensitive areas.
8. Read this manual fully before commencing installation.
9. Do not connect the heat pump to a thermal store without consulting Vent-Axia first.

4.2 Underfloor Heating Schematics

The following section includes typical schematics of how a heat pump can be connected. Only the load side is shown i.e. the heating distribution system. It is important to note that the schematics are only general arrangements and hence do not illustrate all required valves or fittings.

On the underfloor heating manifold(s) remove any thermal mixing valves, if fitted.

To avoid the heat pump from short cycling, it is important that the underfloor is capable of accepting the minimum load from the heat pump.

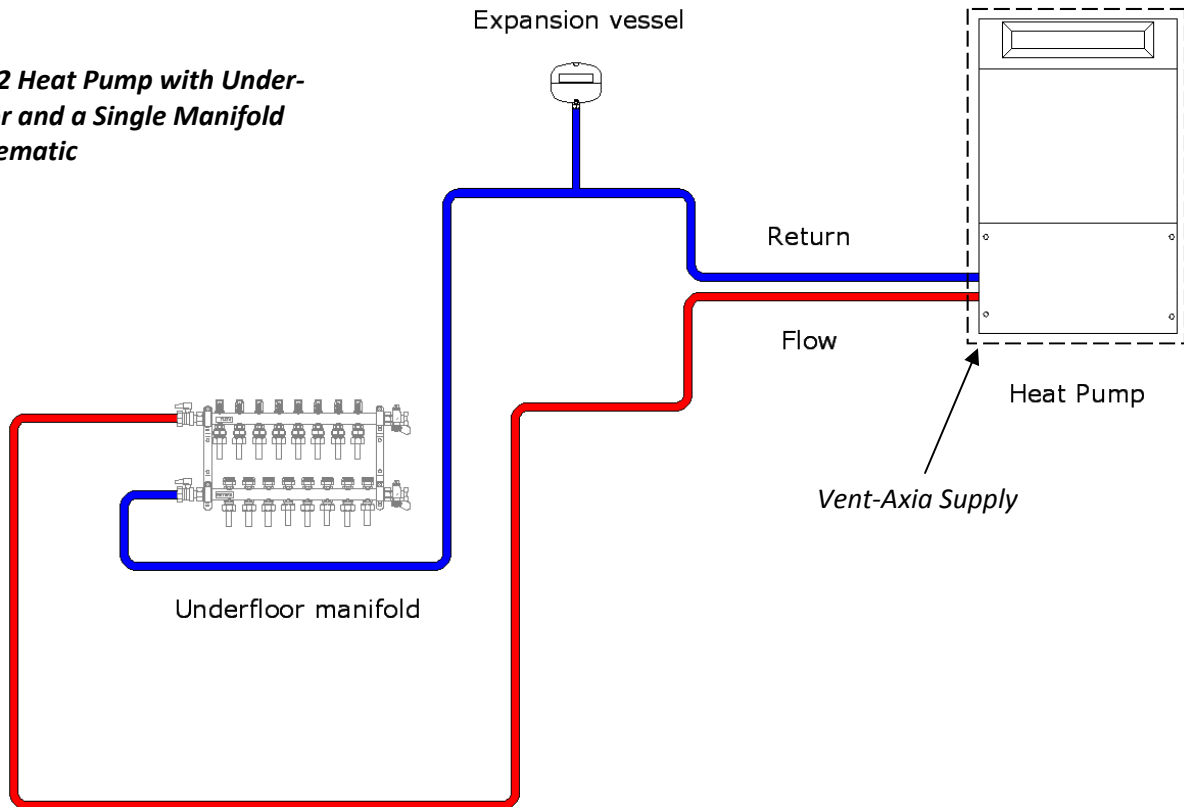
The easiest way to do this is simply to have some zones left "open" – i.e. without electric actuators. These zones will still require thermostats so can call for heat when required. In houses, the best zones to chose are ensuite bathrooms, and hallways, neither of which are likely to be overheated.

To avoid short cycling of the heat pump the smallest actuator controlled zone (plus all the open zones on that manifold) should be capable of absorbing the minimum thermal load of the heat pump. This minimum load is approximately 25% for single compressor heat pumps.

If a fully controlled zone system is required, then a buffer vessel will be required (ideally a two connection tank). This can result in a lower overall efficiency of the system (due to the higher temperatures, pump electricity usage, etc) and hence Vent-Axia would always advise that the 'open zone' method of avoiding short cycling is used.

4.2.1 Underfloor with a single manifold. Space heating only

Fig 2 Heat Pump with Under-floor and a Single Manifold Schematic



4.2.2 Underfloor with a multiple manifolds. Space heating only

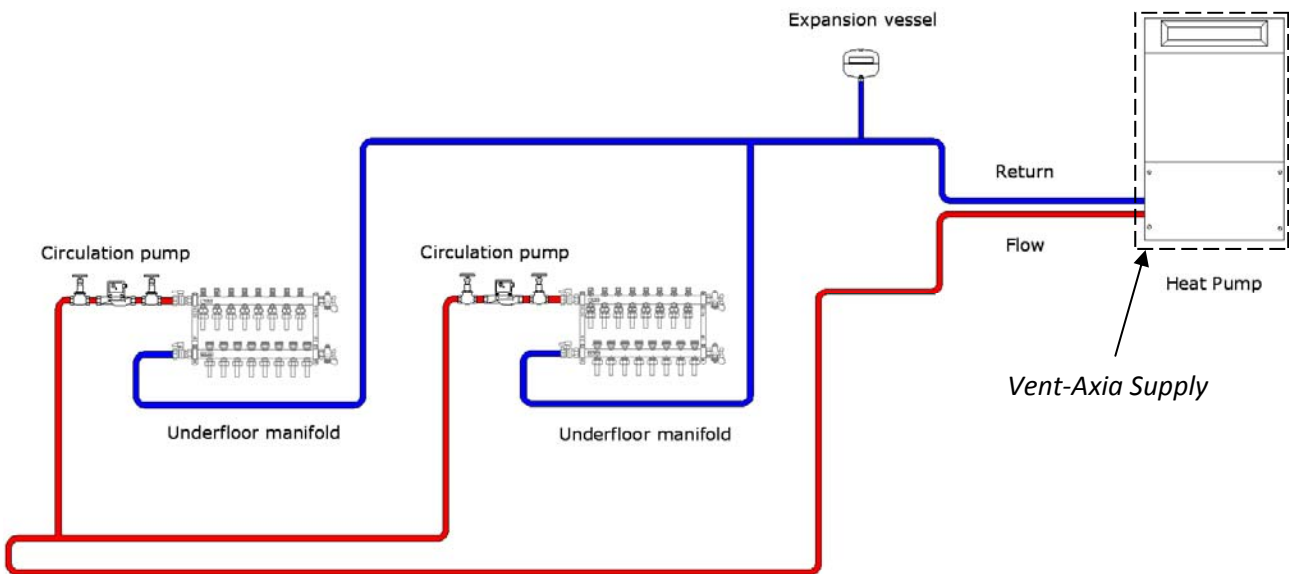


Fig 3 Heat Pump with Underfloor and Multiple Manifolds Schematic

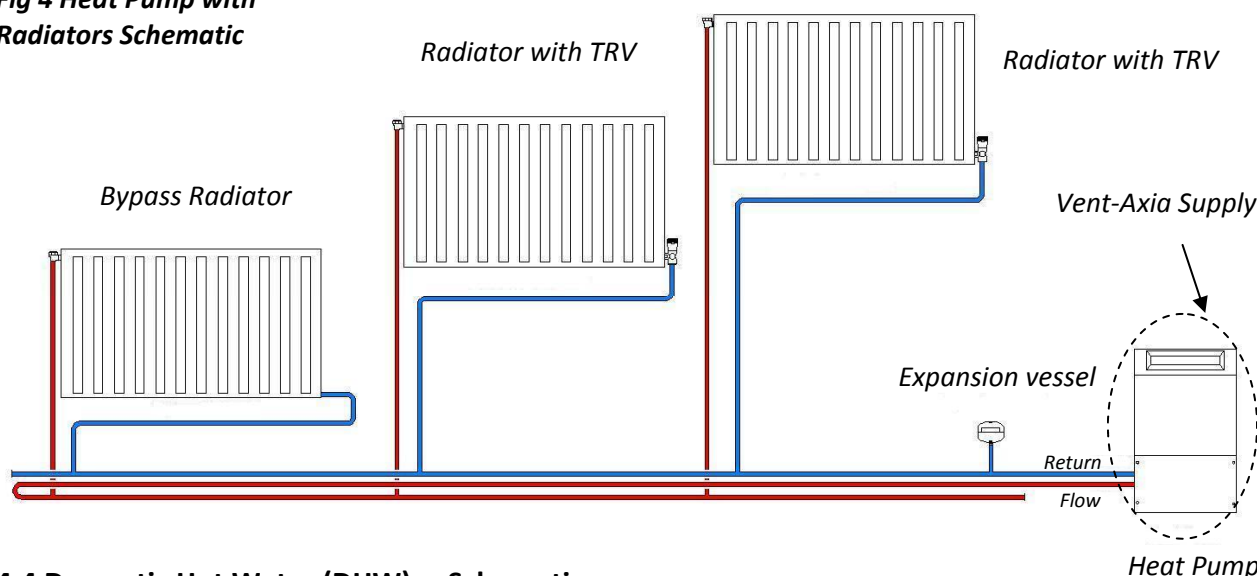
4.3 Radiators. Space heating only

The following section includes typical schematics of how a heat pump can be connected. Only the load side is shown i.e. the heating distribution system. It is important to note that the schematics are only general arrangements and hence do not illustrate all required valves or fittings. They are only a guide and should not be used as full installation plans.

When operated with radiators to avoid short circulating problems, one bypass radiator should be left 'open', i.e. any TRV is removed. This radiator can be positioned in areas such as halls or bathrooms.

Vent-Axia would always recommend fitting an expansion vessel on the heating distribution circuit.

Fig 4 Heat Pump with Radiators Schematic



4.4 Domestic Hot Water (DHW) —Schematic

The DHW option needs to be specified at time of ordering.

Warning - when a heat pump is used for heating domestic hot water, it may not get the water hot enough to kill the dangerous Legionella that can breed in hot water cylinders. Alternative arrangements should therefore be made to ensure the cylinder is pasteurised regularly.

Under normal conditions the heat pump will provide heat for the space heating distribution system at its design temperature (typically 35°C for underfloor and 45-50°C for radiators).

When the DHW time clock calls for production of DHW, the three-port valve diverts the flow from the heating distribution circuit into the indirect coil. The temperature of the water from the heat pump is raised to approximately 50°C.

When the DHW production time period ends, the three port valve switches back to the underfloor distribution and the temperature drops back to its space heating design temperature. The heat pump then reverts to space heating mode or switches off if no zones are calling for heat.

The maximum DHW temperature that the heat pump can achieve will be approximately 50-55°C. In summer, it could be higher, due to the warmer ground conditions. If 65°C is required all year round, it is recommended that an immersion heater is linked to a second channel on the DHW timeclock and this is

programmed to operate for a period immediately following the DHW production. This means that the majority of the heating load for the DHW is produced at a lower cost using the heat pump, as opposed to using only the direct immersion heater.

If 50°C water is acceptable, then it is recommended that the immersion heater is programmed to raise the temperature to 65°C once a week.

4.4.1 Type of DHW Tank

The larger size the coil within the tank, the better the heat transfer area and hence the better the DHW performance will be. (Refer to table 3.2)

4.4.2 DHW Tank Size

The tank will need to be carefully sized to meet the DHW demand, based on the number of occupants and should have an acceptable recovery rate. Due to the lower DHW temperature achieved by the heat pump, a tank 30% larger than normal is recommended. This is due to the higher demand on the tank, as less cold water is used at the point of use to mix the lower temperature DHW to an acceptable temperature.

4.4.3 Immersion Heater

Although not required by Building Regulations, it is generally advised that to provide legionella protection the tank is raised above 60°C at least once a week. To provide this we would recommend that a 3 kW electric immersion heater is fitted to the bottom of the tank, with its own dedicated 7- day timeclock. If DHW is required higher than 50°C then it is advisable that the immersion heater is programmed to operate for a period following the heat pump operation period to raise the temperature. This avoids the immersion heater taking all of the load.

4.4.4 Three Port Diverting Valve

If the DHW option is ordered, a 3 port diverting valve ('W' plan) is provided by Vent-Axia and is used to divert the flow when the timeclock calls for DHW production from space heating to the DHW tank. The valve's electrical connections are connected to the heat pump's internal wiring. Please note connection 'A' is DHW and 'B' is space heating.

4.4.5 Tank Thermostat

A tank thermostat is not required but maybe fitted and used as a tank safety stat if wired in series with the time clock. This should be set at not less than 65°C.

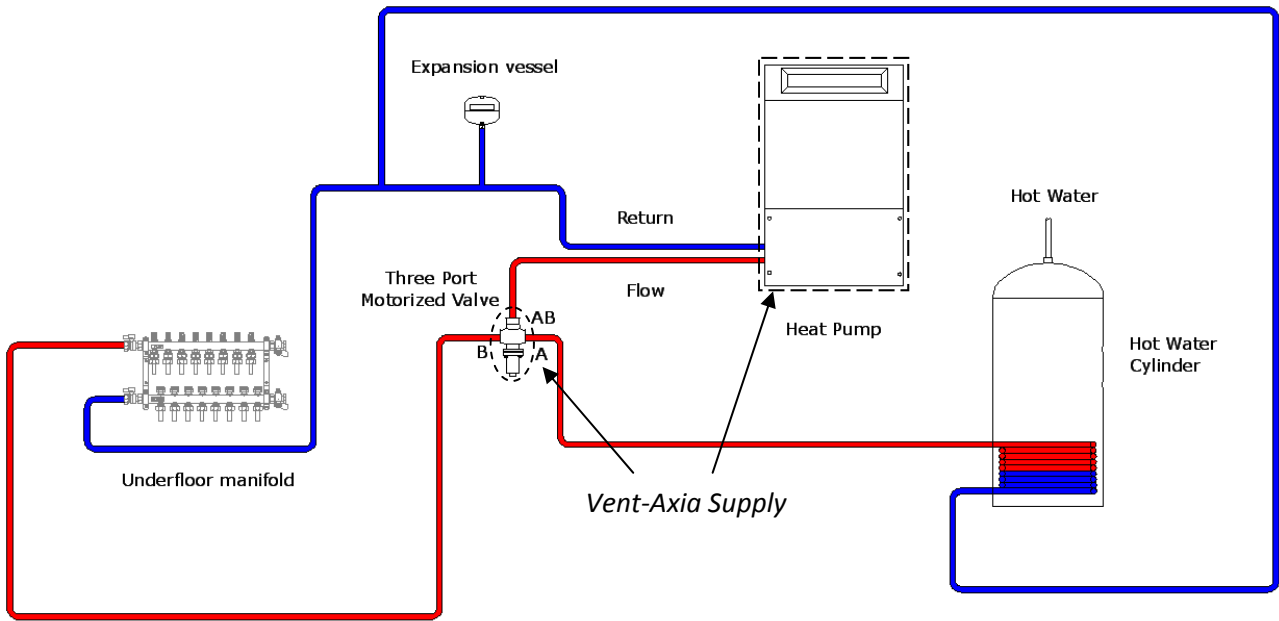


Fig 5 Underfloor with a single manifold and DHW Schematic

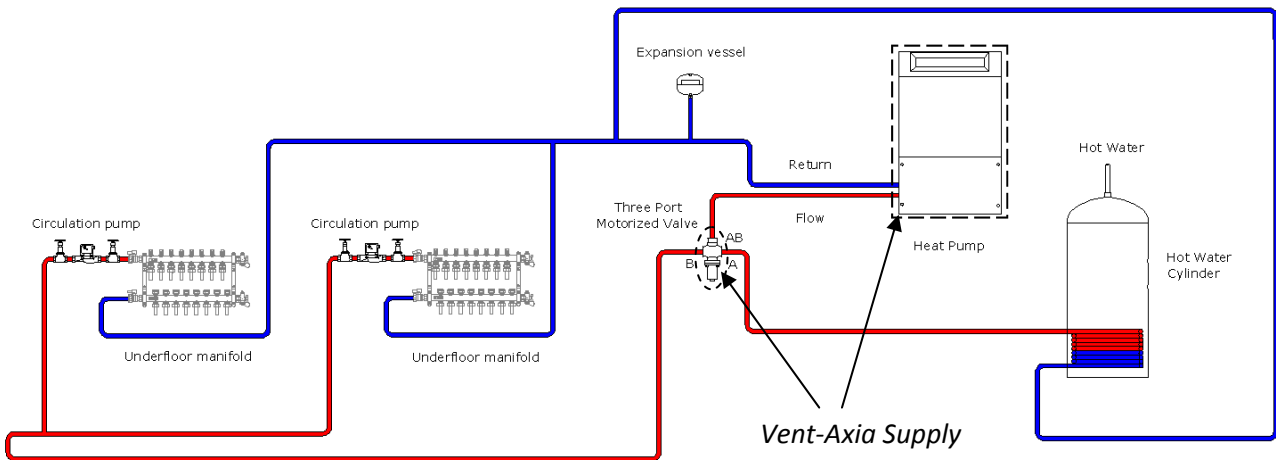


Fig 6 Underfloor with multiple manifolds and DHW Schematic

Note: Additional circulation pumps with multiple manifolds depends on the system design.

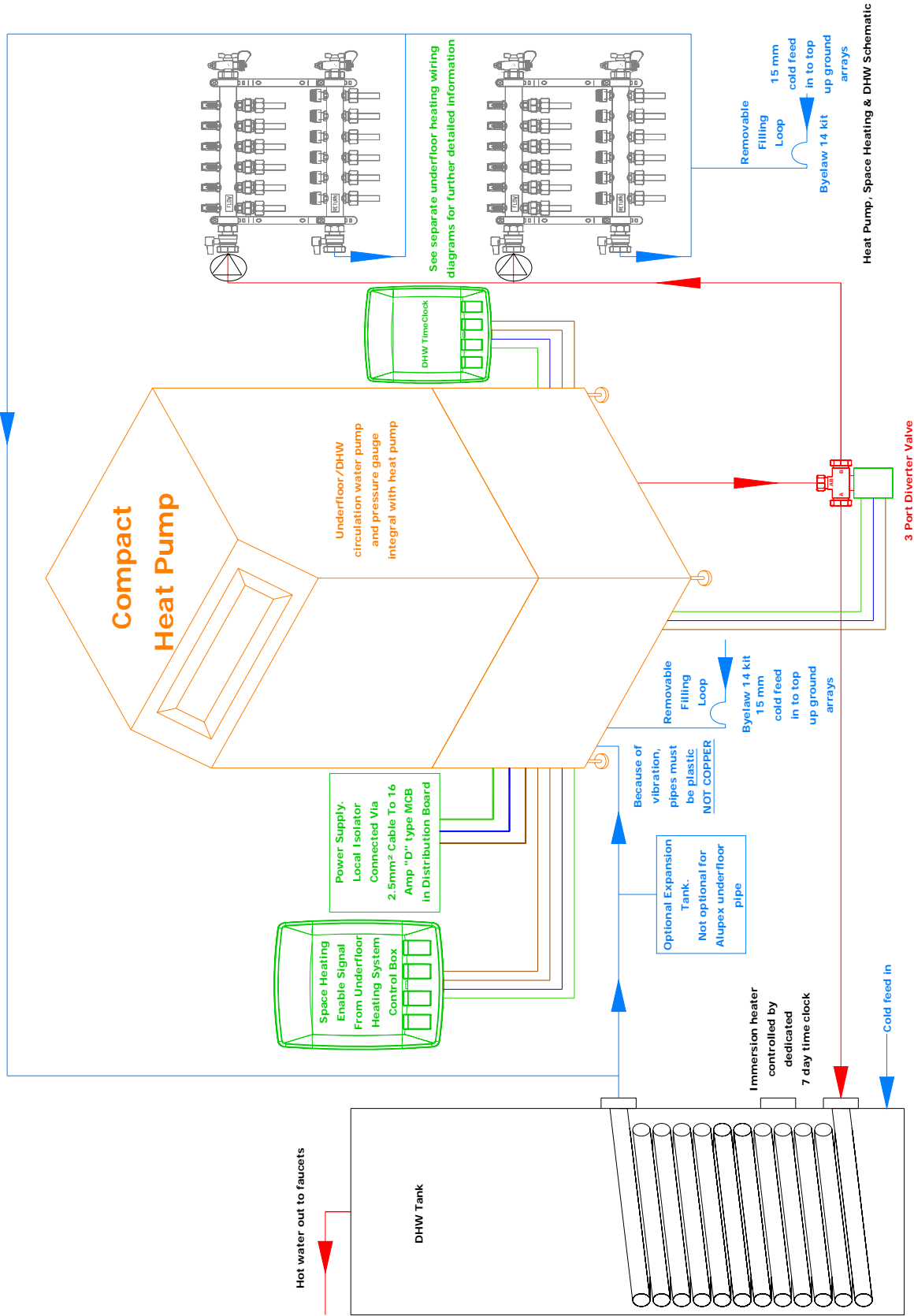


Fig 7 Heat Pump with DHW Schematic

4.5 Mechanical Installation

4.5.1 Locating the Heat Pump

Decide on a suitable location for the Heat Pump. This should ideally be in the back of a domestic garage, or a utility room. It should not be placed in any inhabited space or near any noise sensitive areas. The Compact emits limited noise and vibration, and should not be placed adjacent to, or below bedrooms or occupied spaces. Take into account the “Recommended Clearances” when finalising the location.

Check the appliance for transport damage. Under no circumstances should a damaged appliance be operated or installed.

Position the appliance on a firm, level and substantial concrete base that will absorb vibration well away from any occupied rooms

Ensure that the appliance does not stand on the electrical supply cable. If the supply cable is damaged, it must be replaced.

Ensure all pipes and wires are adequately supported where necessary, pipes are properly insulated and concentrations of inhibitor (where added) are correct. The appliance and any metal pipes should be properly earthed.

A water treatment device should be provided in hard water areas.

4.5.2 Recommend clearances

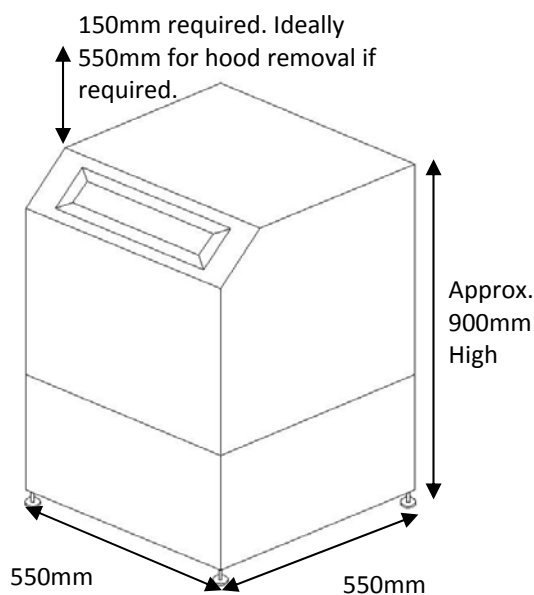
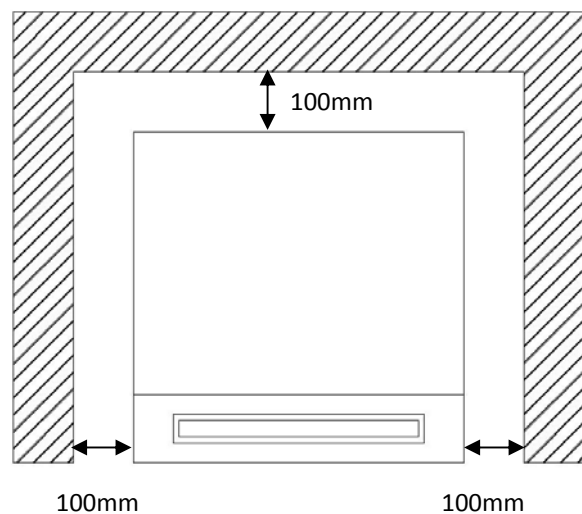


Fig 8 Heat Pump clearances



4.5.3 Installation of the heat pump

Ideally the heat pump should be placed next to an external wall allowing easy access to the externally mounted ground array manifold. Any pipes internal to the building must be insulated with vapour barrier insulation such as Armaflex. It is not recommended that the ground array manifold is installed within a building due to condensation and difficulty in lagging the manifold to overcome this.

It is possible to place manifolds in underground chambers, however due to a possible flooding risk and easier access Vent-Axia recommend that the manifold is placed on an external wall.

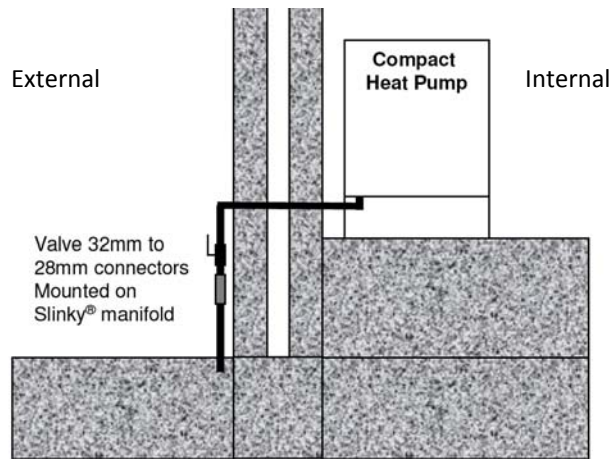


Fig 9 Positioning of Heat Pump and Manifold

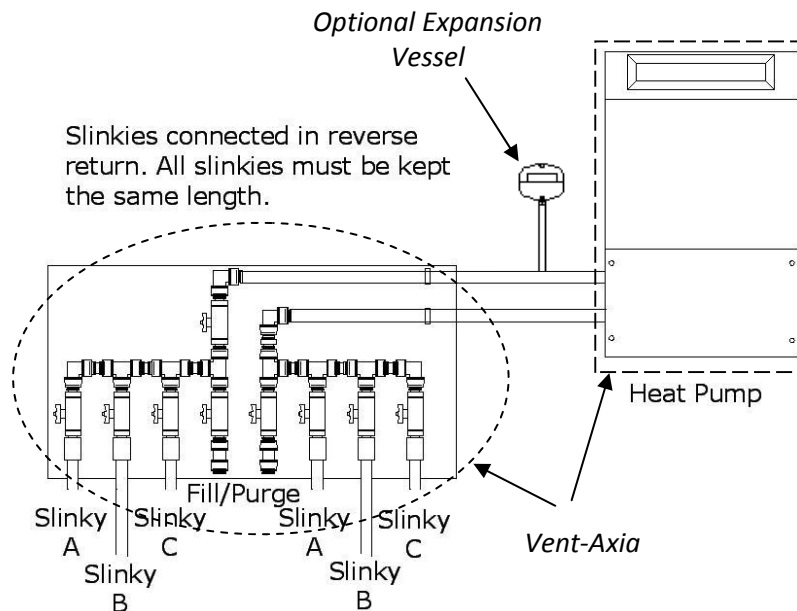
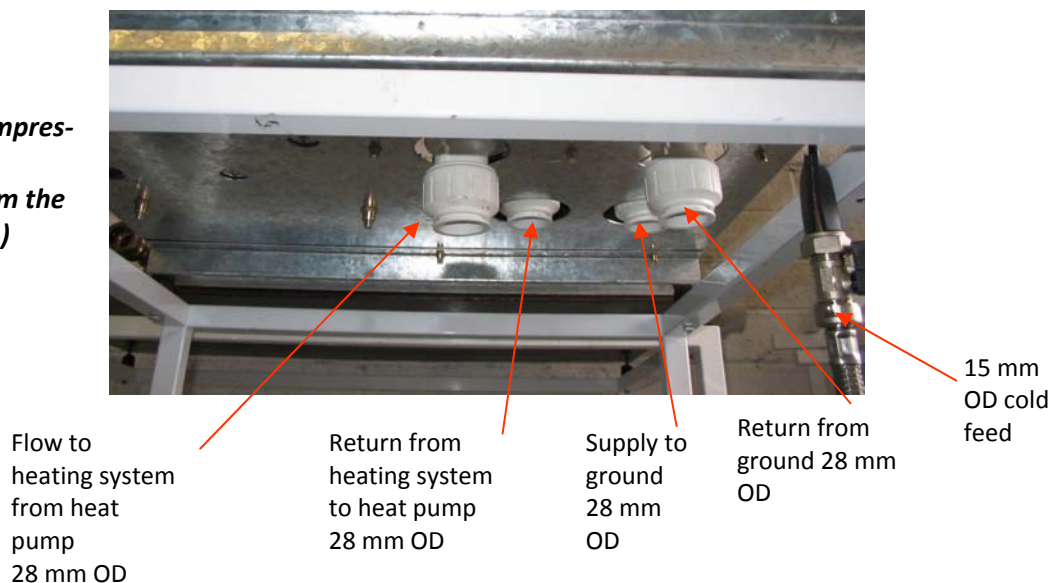


Fig 10 Manifold Slinky connections

- i. Unscrew the 4 x 5mm hex-socket screws, 2 on either side of the front panel. Remove the front panel.
- ii. Remove all three lower closure panels necessary to gain access to the pipe connections, by unscrewing the 4 x hex-socket screws on each panel.
- iii. Position the appliance on a firm, level and substantial concrete base that will absorb vibration and ensure the unit is well away from any occupied rooms.
- iv. Using the adjustable feet, level the unit and tighten the M10 locking nuts on the feet when level.
- v. Ensure the heating distribution system has been thoroughly purged of any debris.
- vi. **Using only plastic flexible pipe such as "Speedfit"**, connect the cold feed, ground feed & return pipes from the Slinky manifold (which can be connected either way round), feed & return pipes from the underfloor heating manifold (which must be connected the correct way round), according to the Illustration below. The reason for using flexible pipe is that the heat pump is suspended on anti-vibration mounts, so the connections must also be flexible. Using the stickers provided ensure the flow and return connections are indicated on the manifold.

Fig 11 Single Compressor heat pump connections (from the front of the unit.)



- vii. Thread the power supply and timeclock/room thermostat wires from under the Compact into the control box and connect them to the terminals required, (see electrical installation section).
- viii. If required fit the optional weather compensation sensor to a North facing wall, and connect with two-core minimum 0.5mm sq cable (see Section 4.6.4). The use of weather compensation on heat pumps is unlikely to give any significant cost savings and can actually increase the cost of running a heat pump. For this reason, Vent-Axia Heat Pumps are supplied with this function disabled in the software.
- ix. For applications where Domestic Hot Water has been specified a 3 port diverting valve ('W' plan) is provided by Vent-Axia and when the timeclock calls for DHW production is used to divert the flow from space heating to an indirect coil in the DHW tank, (See DHW schematic, Section 4.4). The diverting valve should be first connection in the heat pumps flow line, before any underfloor heating manifolds. The valve's electrical connections are connected to the heat pump's internal wiring. (See 4.6.3)
- x. Check and rectify any leaks that may be in the plumbing system.
- xi. The appliance should be left for 12 hours after installation before it is turned on, to allow the refrigerant to settle. The area where the heat pump is installed must be dry and rodent free.

4.6 Electrical Installation

The Vent-Axia Compact heat pump range is available in either single or three phase power supply versions.

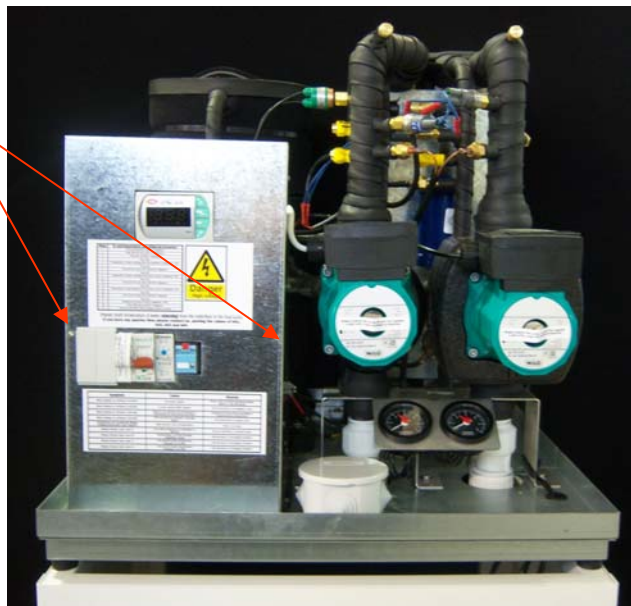
Any electrical work required to install or maintain this appliance should be carried out by a suitably qualified electrician in accordance with current IEE regulations

To access the wiring terminals :-

- i. remove the heat pump front cover by unscrewing the 2 x 5mm hex socket screws on each side of the heat pump.
- ii. remove the electronics cover plate by unscrewing the two 3mm cross head screws on the front

2 x 3mm cross
head screws

**Fig 12 Position of
Hex screws on the
Electronics cover
Plate**



Cables should enter the unit from below using the cable entry ports provided.

Controller

MCBs

Wiring Terminals



**Fig 13 Electrics box with
the front removed**

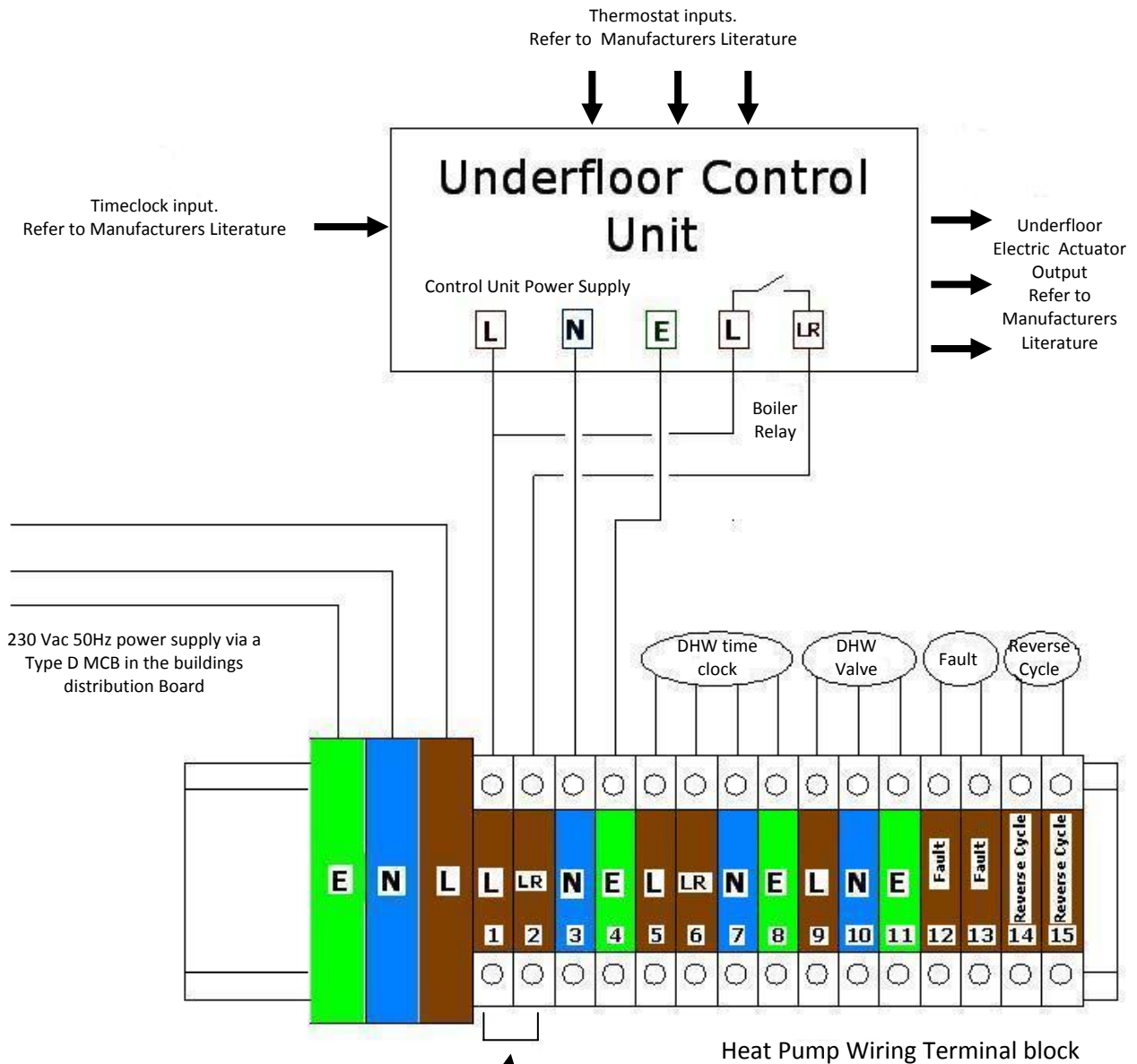
The following sections detail the wiring connections for various applications.

In all wiring diagrams the terminals marked 'Reverse Cycle' change the mode from heating to cooling (If this option is fitted). This requires a volt free relay, open is heating mode, closed cooling.

The terminals marked 'Fault' are to provide remote indication that a fault has occurred within the heat pump. This is a volt free relay and the internal relay will close if a fault occurs.

4.6.1 Single Phase

4.6.1.1 Single Underfloor Control Unit



**Fig 14 Heat pump wiring—
Single Underfloor Manifold**

Enable Signal connection is supplied with a temporary link across it . This should be removed after commissioning and connection to the heating control system.
(Terminals 1 and 2)

4.6.1.2 Multiple Underfloor Control Units

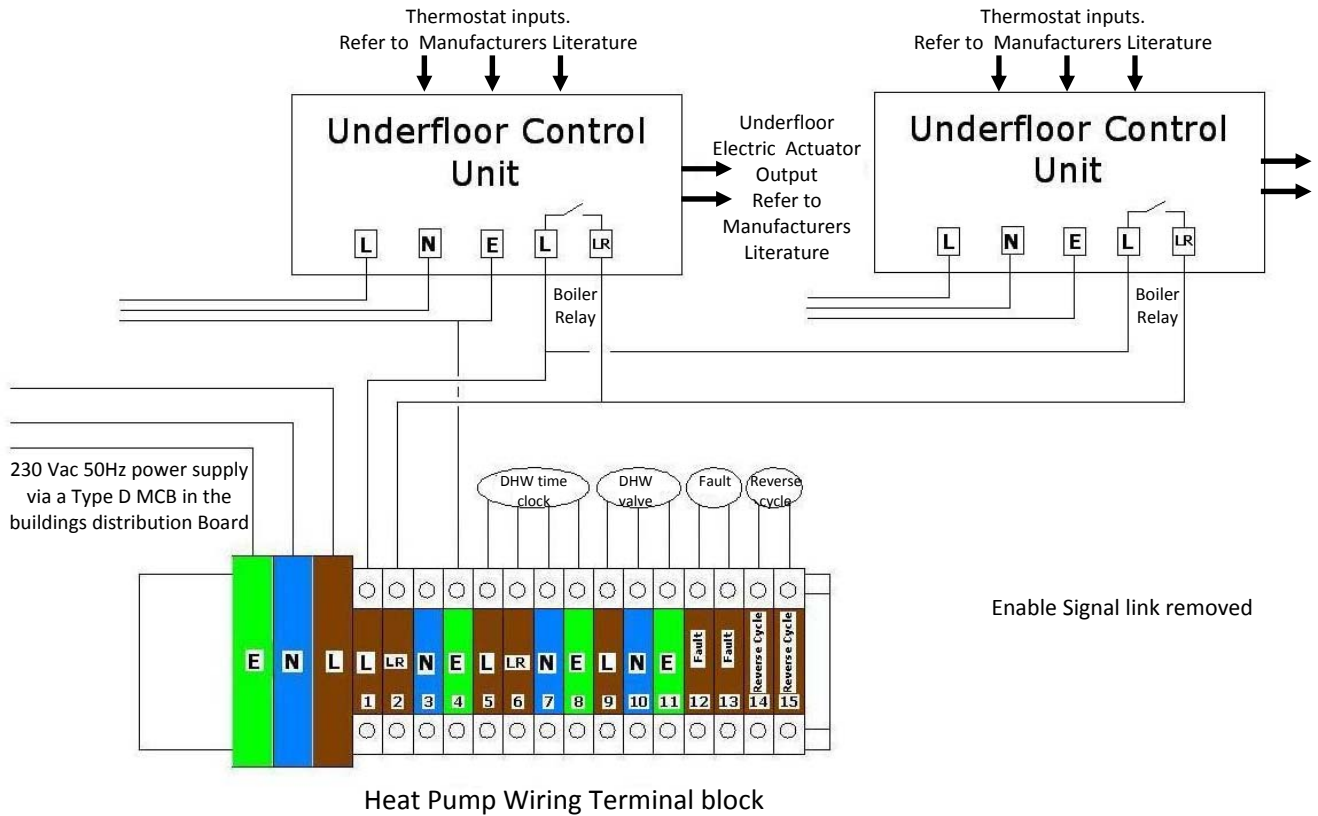
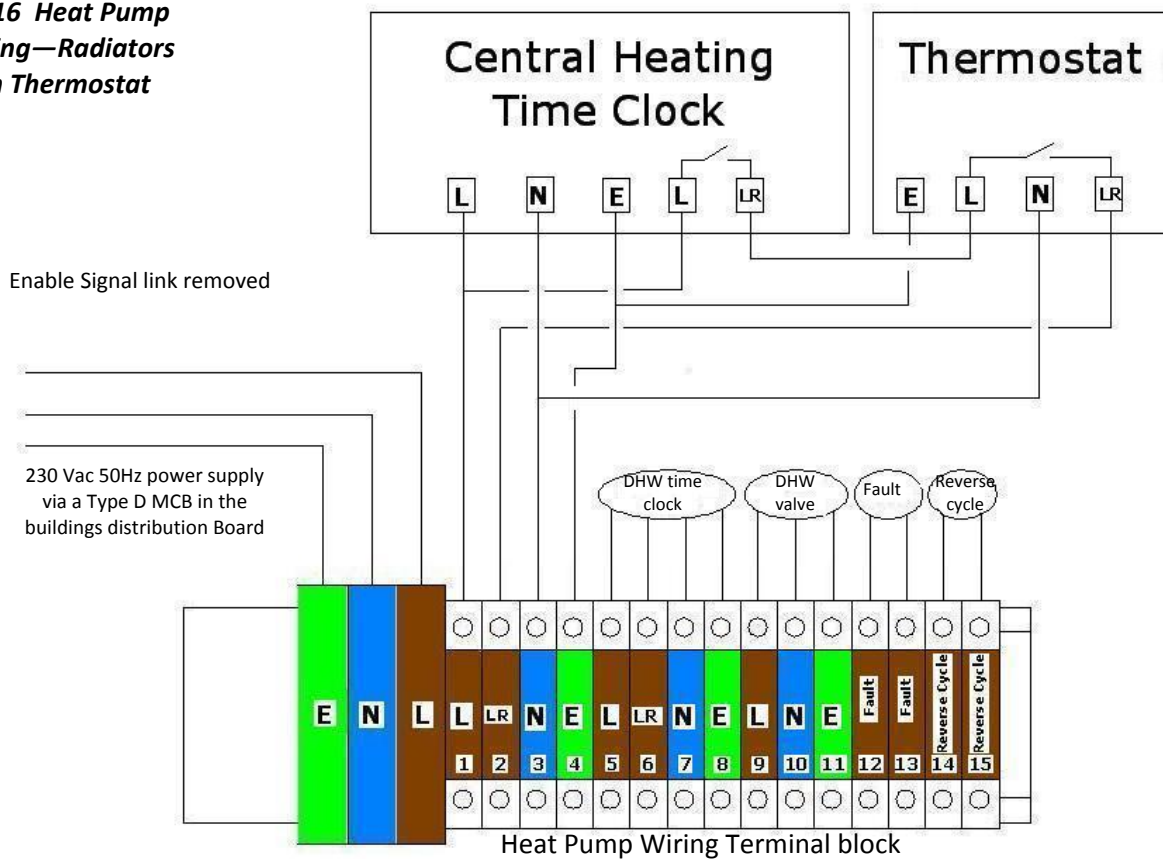


Fig 15 Heat Pump Wiring—Multiple Underfloor Control Units

4.6.1.3 Radiator with Thermostat

Fig 16 Heat Pump Wiring—Radiators with Thermostat



4.6.2 Three Phase Power Supplies

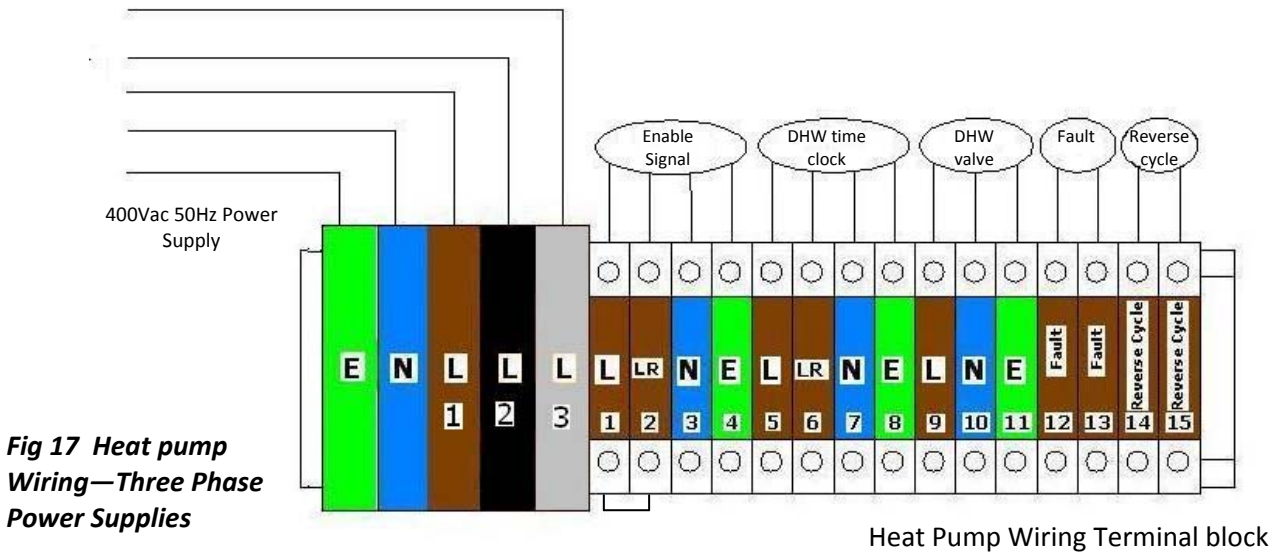


Fig 17 Heat pump Wiring—Three Phase Power Supplies

4.6.3 DHW time clock and 3 way diverting valve wiring

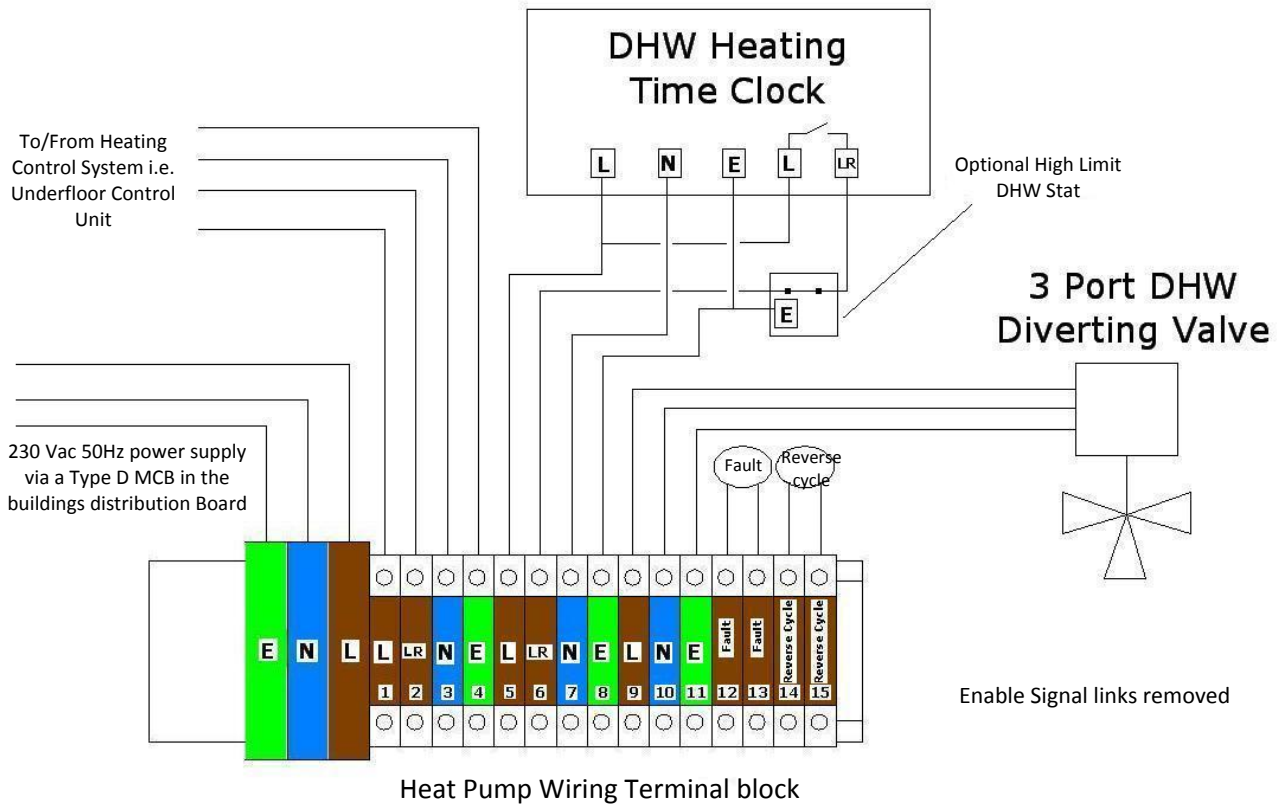


Fig 18 Heat Pump Wiring—DHW

Note: The hot water cylinder high limit stat maybe required to be wired into the live return from the DHW Heating Time Clock.

Note: If DHW option is enabled after commissioning and connection to DHW time clock, remove DHW enable link.

4.6.3 Weather Compensation (Optional)

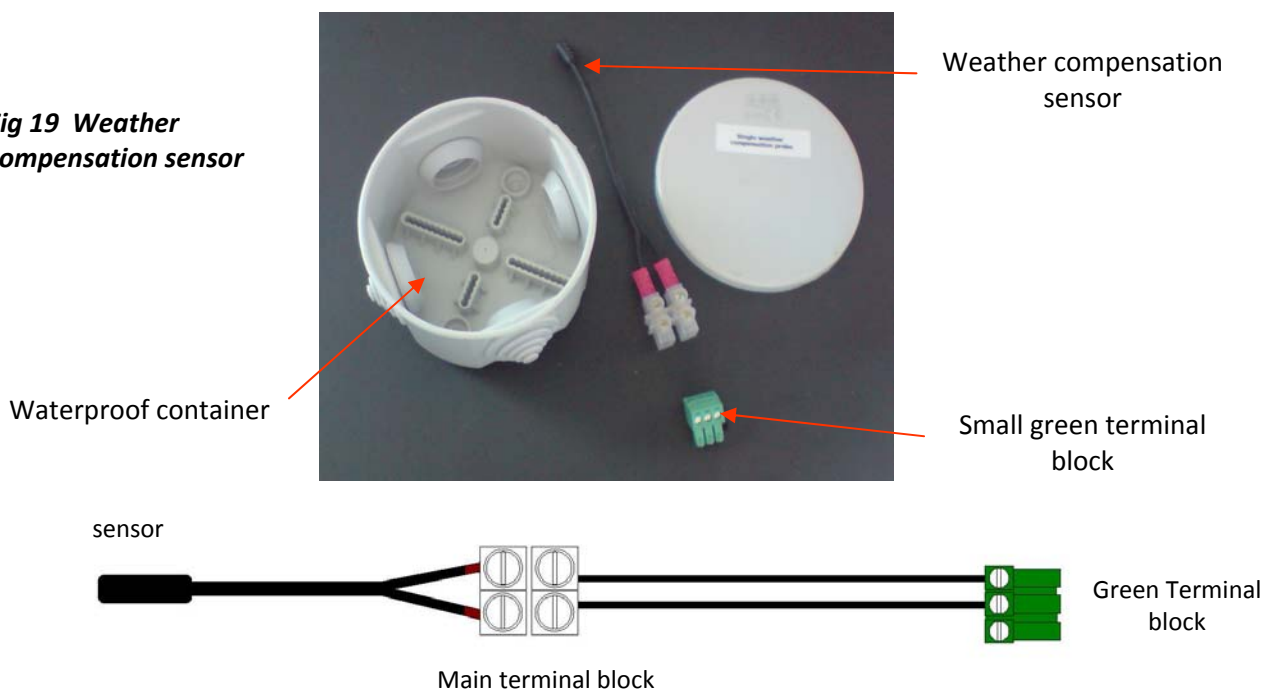
All Vent-Axia Compact Heat Pumps are supplied with Weather Compensation as standard. This facility will reduce the return water set-point against a schedule of external ambient temperatures. In more simple terms, the temperature of water flowing into the building’s radiators or underfloor heating is reduced in mild weather, which allows the heat pump to run more efficiently. This is particularly important with radiators, as much higher temperatures are required. In cold weather, many people already turn up the temperature of water flowing from their boiler by hand and are therefore weather compensating their heating system manually.

In the UK, the use of banded tariffs such as Economy 7, or more especially Economy 10, makes the use of weather compensation on heat pumps unlikely to give any significant cost savings and can actually increase the cost of running a heat pump. This is because during a banded and cheaper rate of electricity it is desirable to run the heat pump at its maximum heat output so that as much heat is forced into the building as possible, whilst being careful not to overheat it in milder weather.

For this reason, Vent-Axia Heat Pumps are supplied with the required sensors for installation, however the function is disabled in the software and it is **recommended that this function is not enabled**. Tariffs might possibly change in the future and so to enable weather compensation (if required) on your heat pump you can contact our Technical department, who can run through the reprogramming procedure.

The weather compensation sensor is supplied in a small waterproof enclosure.

Fig 19 Weather compensation sensor



This sensor needs to be fixed to a North-facing wall, and connected with 2 core 0.5 mm cable, unshielded, to the heat pump. The cable should be routed inside the heat pump case and left coiled up inside, with the small green terminal block attached. The weather compensation should then be left disabled. If weather compensation is required contact Vent-Axia Technical Department.

Do not disconnect or connect any terminal blocks until Vent-Axia Technical Department has been contacted on 01293 441523.

5. Commissioning

After all mechanical and electrical work has been completed, the following commissioning instructions should be followed.

5.1 Purging the ground array of air.

It is important for correct operation that all the air is removed from the ground arrays. Slinkies consist of a large number of 1 metre diameter loops of 32mm OD pipe and air can collect at the top of these loops. Even vertical (ie. drilled) arrays can have trapped air and should be purged.

To remove the air from ground arrays, a suitable pump will be required. For slinkies, the longest slinky trench is 50 metres, which will contain a total of approx. 300 metres of pipe. To achieve the minimum velocity required to remove the air, a minimum pump power in excess of 1 kW is required. In addition, the pump needs to have a flow of at least 60 litres per minute against a pressure of at least 1 bar. To achieve this, a multi-stage pump is required.

A normal rising cold water main in a building has insufficient flow to force out this air. Mains water is also “aerated”, so should not be used.

The recommended purge pump is the Clarke CPE130SS (part no. 051010379). The pump is supplied ready to take a 1” BSP fitting. Two x 1” BSP male to 28 mm compression fittings are required to enable the pump to be connected to the slinky manifold using 28 mm “Speedfit” or similar pipe and elbows. These are readily available from plumbing merchants.

**Fig 20 Clarke
CPE130SS Purge
Pump**



The Clarke CPE130SS can achieve as much as 5 bar pressure against a closed valve, so ensure the connections to the pump and manifold are robust.

5.1.1 Purging Procedure for Multiple slinkies (for single slinkies, see section 5.1.2)

- i. Remove the plastic blanking plugs, and connect the purge pump to the fill and purge ports on the Slinky manifold, see diagram over leaf. Keep the isolating valve to the heat pump closed. The purge ports can be connected either way round.
- ii. Connect the purge pump to draw from an 80 litre dustbin half filled with clean water. This pump must be capable of circulating 60 litres per minute against a pressure of 1 bar. If the pump’s electrical rating is less than 1 kW, then it is unlikely to be suitable. Vent-Axia only recommend the use of the Clarke CPE130SS pump as above. The water level in the dustbin will need to be topped up constantly during the following process. The pump may need priming by pouring water into its priming port until it overflows.

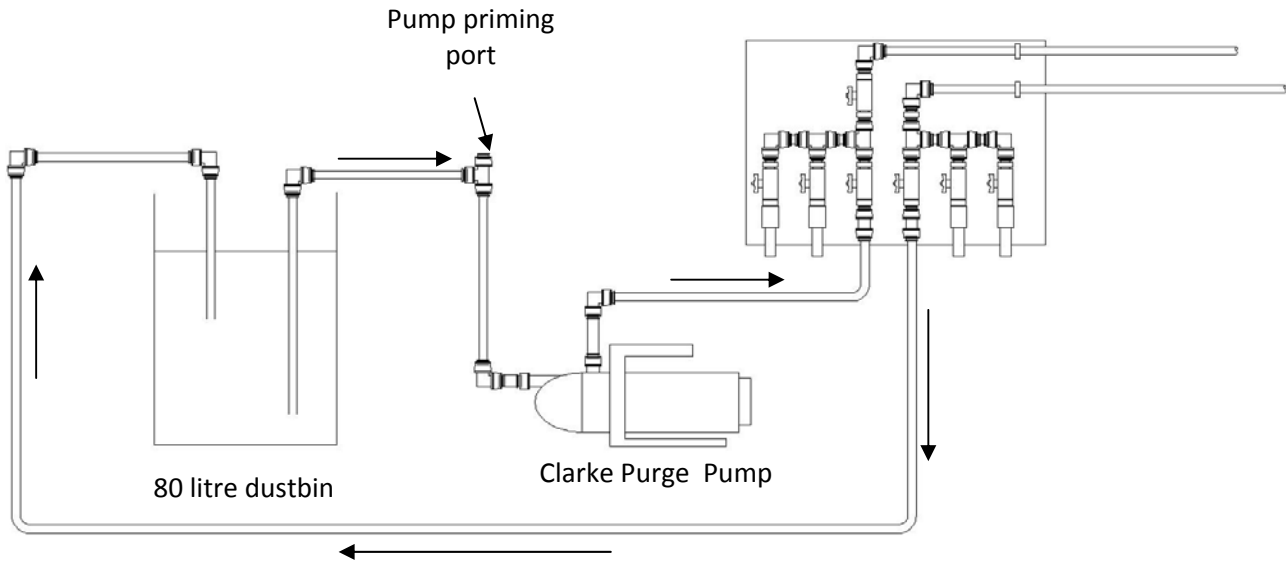


Fig 21 Slinky purging kit connected to a manifold

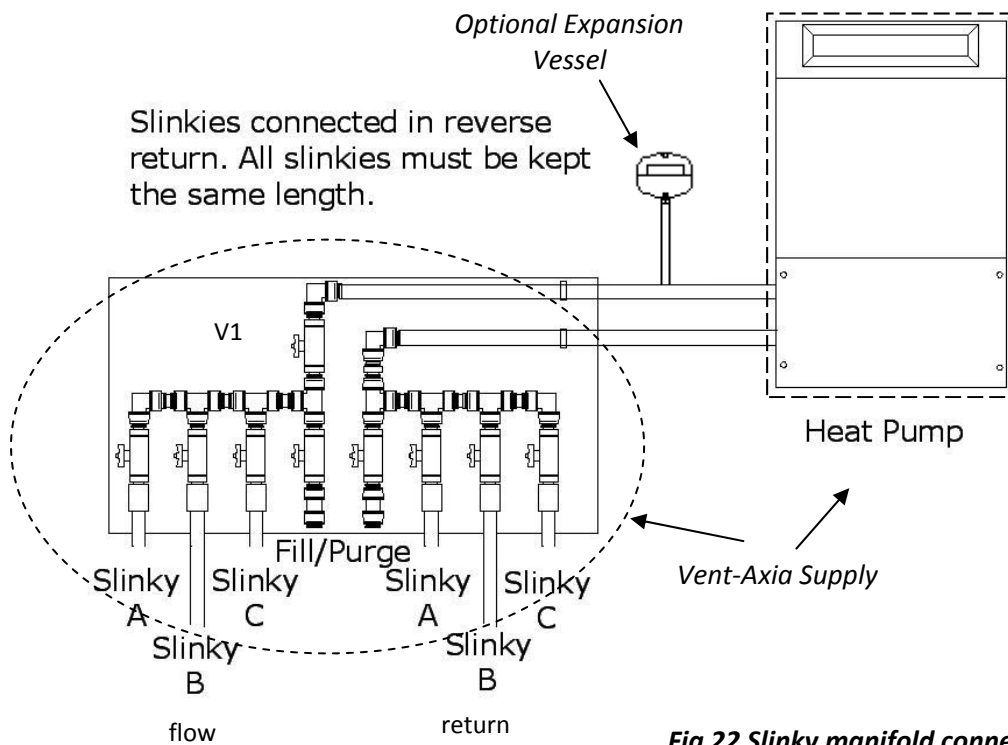


Fig 22 Slinky manifold connections

iii. Place a filter such as a kitchen sieve over the pipe returning water to the dustbin so any debris will be captured. Ensure all valves are closed including the heat pump valve V1. Open the valves on the manifold in the following order (refer to above diagram Fig 22) :-

- a. Open A_{return}
- b. Open A_{flow}
- c. Open both purge valves

Start the purge pump, being careful that the water pipe returning water to the dustbin is secure.

iv. If the water level in the dustbin does not start to drop, then repeat the pump priming. No water

should be flowing through the heat pump or through the other slinkies. The flow rate should be in excess of 30 litres per minute. This can be checked simply by holding a 10 litre bucket to collect water returning from the slinky, and ensuring that it fills in less than 20 seconds. If the flow is less than this, sufficient velocity is not being achieved to displace the air at the tops of the slinky coils.

Fig 23 Purging the Slinkies of Air



Fig 24 Slinkies Purged of Air

- v. After water has circulated for about ten minutes, and no more debris has collected in the sieve, place the return pipe below the water level in the dustbin to ensure all the air has also been expelled (Fig 24). Stop the purge pump and then the valves on the first slinky can then be closed, again ensure that the return pipe into the dustbin is secure. At this stage, the valve to the heat pump should still be closed.
 - c. Close A_{flow}
 - d. Close A_{return}

Repeat the above procedure (steps iii to v) for the next slinky (i.e. slinky B on the diagram).

- vi. When all the slinkies have been purged, the valve to the heat pump can be opened, which will purge the heat pump of air - this is likely to be very quick, and great care should be taken that the hose discharging into the dustbin is secure, as any air in the heat pump will be rapidly expelled.
 - e. Close all valves to the slinky pipes.
 - f. Open V1
- vii. Continue purging the heat pump until all the air has been expelled. (No more bubbles are expelled from the return pipe. Fig 24)
- viii. After the air has been removed it is advisable that before the antifreeze is added the system is leak tested at 5 bar for 15 mins. (See 5.1.2.1)

5.1.2 Adding Antifreeze for Multiple Slinkies

The antifreeze provides protection to the heat pump by preventing the circulating ground fluid from freezing in the heat exchanger. If not added in sufficient quantities the heat pump can freeze and cease working. All antifreeze provided with the order should be added and it is recommended that the quantity is roughly divided between the number of slinkies. This amount of antifreeze is the minimum required for a standard system. If the heat pump and manifold are a distance apart this quantity may need to be increased. Please contact Vent-Axia for further details.

It is very important to purge all the air from the system before adding the antifreeze as it is very difficult to remove the air with the antifreeze in the system due to the higher viscosity of the mixture.

Once the purging of all the air within the slinkies and heat pump has been completed the antifreeze needs to be added.

- i. Open the flow and return valves to one of the slinkies and with the purge pump running, empty some of the water out of the dustbin via the return pipe to the dustbin. This is fresh water and hence can be discharged to drain. The level needs to drop to about 200 to 250mm. Take care that the suction pipe remains covered with water to stop any air being admitted into the system.
- ii. Turn the purge pump off and close both the flow and return valves on the slinky.
- iii. Carefully pour a drum of antifreeze into the dustbin using appropriate handling protection as outlined in the COSHH (Section 8). Allow the solution to settle for a few moments to allow any trapped air to escape.

- iv. Open the valve V1 to the heat pump and start the purge pump to circulate the antifreeze around the system. Leave the pump running until antifreeze is seen returning to the dustbin. The amount of time this will take depends upon the length of the header pipe.
- v. Close the valve to the heat pump and turn the purge pump off.
- vi. Open the first slinky flow and return valve and with the return pipe inside of the dustbin start the purge pump. Once the return discharge runs clear, i.e. It's discharging fresh water, move the return pipe out of the dustbin and discharge this fresh water to drain until the antifreeze level within the dustbin drops to approximately 200-250mm. Take care that the suction pipe remains covered with water to stop any air being admitted into the system. (Depending on the length of header pipe additional antifreeze might be required to be added at this stage). The discharge pipe can then be placed back into the dustbin and the purge pump should be run for about 5-10mins and then turned off.
- vii. Close the slinky valves; add the next quantity of antifreeze to the dustbin and repeat the above steps vi and vii for each individual slinky.

5.1.2.1 Pressurising the system.

- i. Open all valves EXCEPT THE DISCHARGE PURGE CONNECTION. Keep a close eye on the level of water in the dustbin and start the purge pump. This should pressurise the whole system. If the level of water drops significantly this indicates the system hasn't been correctly purged of air and needs to be re-purged.
- ii. Close the fill purge valve on the slinky manifold with the pump running, so that the ground array is left under pressure.
- iii. Most purge pumps will attain around 5 bar, and the circuit should be left at this pressure for a minimum of 15 mins, as any leaks will become immediately apparent. The pressure will slowly fall as the pipes in the ground arrays slowly expand in the coming months, and may need topping up using the cold fill system provided.
- iv. Remove the purging equipment. Replace the plastic blanking plugs in the slinky manifold purge connections.

There should be approximately 200-250mm of water/antifreeze mix within the dustbin which can be poured back into an empty drum and disposed off according to the disposal instructions in section 8 or retained for topping up the system.

To mix the antifreeze around the ground arrays thoroughly, it is advised that the ground array circulation pump is turned on via the 4 amp MCB on the heat pump. (Note DO NOT TURN THE COMPRESSOR 25 amp MCB ON). This ground array circulation pump should be left running for two to three hours to ensure the antifreeze is mixed in all the slinkies and the heat pump. (Note: - the floor pump will also run.)

5.1.3 Purging Procedure and adding antifreeze for single slinkies

The single slinky manifold consists of two three port diverting valves, one for flow and one for the return. The manifold allows the slinky to be filled and purged.

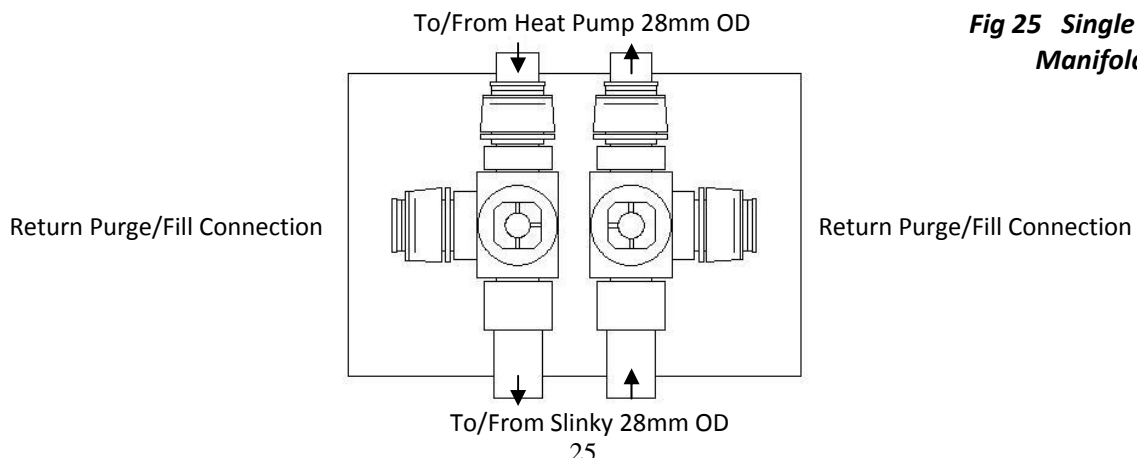
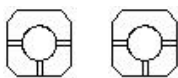


Fig 25 Single Slinky Manifold

The sequence of valve operation for a single manifold is slightly different from larger manifolds. Each slinky is connected to a three port diverting valve as above. The slots machined on the front of each valve indicate which connection is open. The previous drawing (Fig 25) is set for normal operation, i.e. both purge connections are closed and the flow and return from the slinky to the heat pump are open.

- i. Remove the plastic blanking plugs, and connect the purge pump to the fill and purge ports on the Slinky manifold, see Fig 25 above. The purge ports can be connected either way round.
- ii. Connect the purge pump to draw from an 80 litre dustbin half filled with clean water. This pump must be capable of circulating 60 litres per minute against a pressure of 1 bar. If the pump's electrical rating is less than 1 kW, then it is unlikely to be suitable. Vent-Axia only recommend the use of the Clarke CPE130SS pump for this. The water level in the dustbin will need to be topped up constantly during the following process. The pump may need priming by pouring water into its priming port until it overflows.
- iii. Place a filter such as a kitchen sieve over the pipe returning water to the dustbin so any debris will be captured. To move the position of the valve an adjustable spanner can be used. Open the valves on the manifold to the following position:-



Both purge connections are now open to ground array

- iv. Start the purge pump, being careful that the return pipe to the dustbin is secure. If the water level in the dustbin does not start to drop, then you need to repeat the pump priming. The flow rate should be in excess of 30 litres per minute. This can be checked simply by holding a 10 litre bucket to collect water returning from the slinky, and ensuring that it fills in less than 20 seconds. If the flow is less than this, sufficient velocity is not being achieved to displace the air at the tops of the slinky coils.



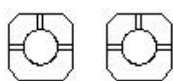
Fig 26 Purging the Slinky of Air

- v. After water has circulated for about ten minutes, and no more debris has collected in the sieve, place the return pipe below the water level in the dustbin to ensure all the air has also been expelled.



Fig 27 Slinky Purged of Air

Turn the pump off and move the valves on the manifold to the positions below, again ensure that the return pipe into the dustbin is secure.

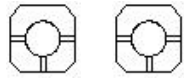


Both slinky connections are now closed. Purge ports open to heat pumps.

- vii. Start the pump and purge the heat pump of air. After the air has been removed it is advisable that before the antifreeze is added the system is leak tested at 5 bar for 15 mins.(See 5.1.2.1).

vi. When all the air has been removed reduce the level of water in the bin to 200-250mm by removing fresh water from the system (via the pump discharge pipe). Do not uncover the suction pipe. Add 1 drum of antifreeze to dustbin and using pump circulate around heat pump.

vii. Move the valves to the position below



Both purge connections are now open to slinky.

viii. Add 1 drum of antifreeze to the dustbin

ix. Start purge pump

x. When the return pipe to the dustbin runs with clean water (after a few seconds) discharge this water to waste until the level in the dustbin is approx 200-250mm. **Do not uncover the suction pipe.**

xi. Place the return pipe back into the bin.

xii. Purge for 5 to 10 mins to ensure that the antifreeze is mixed.

xiii. With the purge pump running move the return valve to the position below to close off the return purge connection and pressurize the heat pump using the purge pump.

xiv. With the purge pump still running move the flow valve back to the normal run position.

Flow Return



One purge connection is closed the other open.



Both purge connections are now closed.

There should be approximately 200-250mm of water/antifreeze mix within the dustbin which can be poured back into an empty drum and disposed off according to the disposal instructions in section 8 or retained for topping up the system.

To mix the antifreeze around the ground arrays thoroughly, it is advised that the ground array circulation pump is turned on via the 4 amp MCB on the heat pump. (Note DO NOT TURN THE COMPRESSOR 25 amp MCB ON). This ground array circulation pump should be left running for two to three hours to ensure the antifreeze is mixed in all the slinkies and the heat pump. (Note: - the floor pump will also run)
The slinky is now fully purged with the antifreeze added.

5.1 .4 Testing of Antifreeze Concentration

It is important that the concentration of the antifreeze within the ground arrays should be a minimum of 20% or a protection level of -10°C Concentrations below this could cause an A1 alarm and the heat pump to cease operation during severe prolonged cold weather.

The antifreeze concentration should be tested with a refractometer .

The concentration of antifreeze is required for the commissioning certificate and it is advised that this figure is noted in the settings table. A sample of the fluid can be obtained from the ground side Schrader

5.1.5 Heating distribution and load side purging

- i. Find the cold fill for the heating system and open the valve on the heating system to allow water into the heating system and the Compact.
- ii. Follow the manufacturer's procedures for purging the heating system.
- iii. For any systems that involves cooling, antifreeze (approximately 20%) must be added to the distribution load side.
- iv. Remove the cap from the heating pump bleed port and depress the Schrader valve using a small screw driver, as shown in the illustration (below).

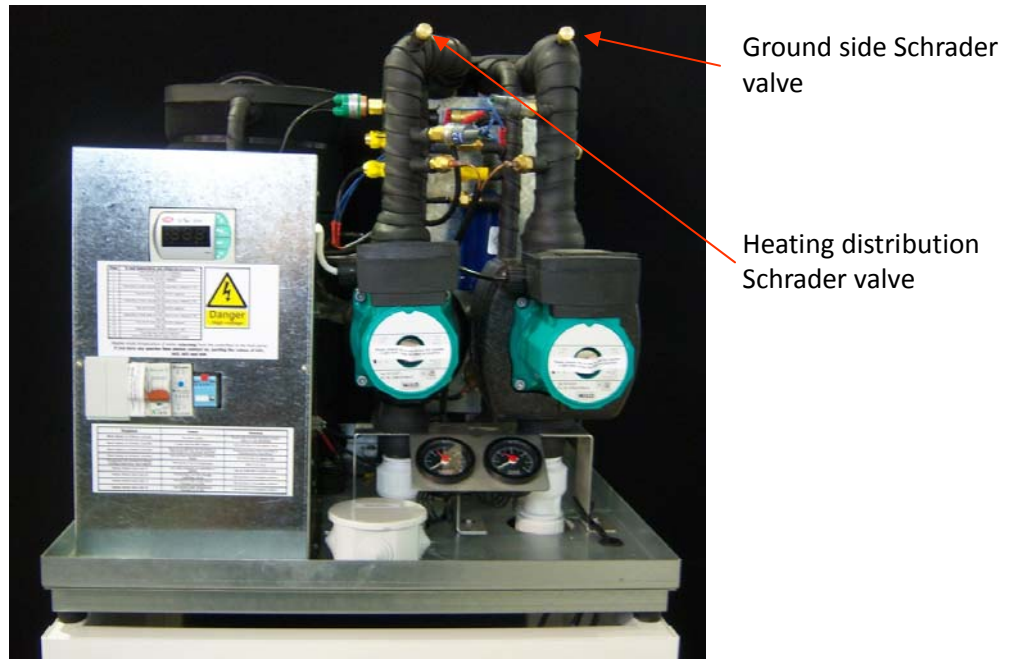


Fig 28 Location of Heat Pump Schrader Valves

- v. Alternatively, the Schrader valve core can be unscrewed completely using a car valve core remover and a 10 mm internal diameter plastic pipe placed on the outside of the valve to allow any water or air to be vented into a bucket.
- vi. When a constant stream of water comes from the valve the pump will have been bled. This procedure needs to be repeated at intervals during the commissioning procedure if there is any air in the heating system. Place the cap back on the bleed valve.

We recommend a central heating inhibitor is added to the heating water in the heating distribution circuit.

5.1.6 Reassembling the Heat Pump

- i. Ensure all tools and materials are removed from the inside of the unit.
- ii. Reposition the front cover
- iii. Using the 4 x 5mm hex socket screws secure the front cover in place.

5.2 Heat Pump Operation

Prior to use: -

- i. Turn off the power supply at the local isolator
- ii. Unscrew the 4 x 5mm hex socket screws on either side of the front panel (2 each side). Remove the front panel.
- iii. Check that the ground pressure gauge reads at least 0.3 bar. If the pressure is lower than this, open the mains cold water supply valve (fitted outside the case) fully until the gauge reads at least 1.8 bar, at which point a “click” will be heard. Close the mains cold water supply valve fully.
- iv. Check that the heating distribution system pressure gauge reads at least 0.3 bar. If the pressure is lower than this, find the mains cold water supply valve and pressurize the system until the gauge reads at least 1.8 bar, at which point a “click” will be heard. Close the mains cold water supply valve fully. Reassemble the front panel taking care to ensure that the 4 x hex screws are located correctly. A purge pump can achieve pressures of 5 bar and it is acceptable that the ground arrays are left at this pressure.
- v. Turn on the power supply at the local isolator and program the external timeclock / thermostat.

5.3 Turning the Heat Pump on for the first time.

- i. Make sure the impellers in both the ground and heating distribution water pumps are free to turn by removing the stainless steel screws (if fitted) in the centre of each water pump and inserting a flat-bladed screwdriver to spin the impellor. Do not try to spin the impellor with the power on.

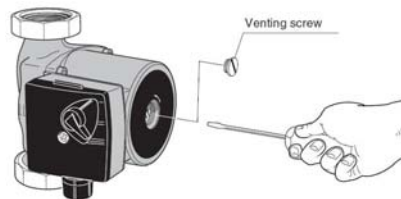


Fig 29 Spinning the pump

- ii. Turn the 4 Amp MCB on to enable the controls and water pumps to operate. Operating this MCB should result in a sudden sharp change in pressure on the underfloor pressure gauge and indicates that the pump is operational. Shortly after operating this MCB, the compressor contactor should engage. This will result in a sudden sharp change of pressure indicated on the ground array pressure gauge and this indicates that the ground array water pump is operational. **DO NOT operate the compressor MCB until Vent-Axia has been contacted and flow has been confirmed around the system.** Failure to do this will cause the unit to freeze and may invalidate the warranty.
- iii. The controller display will read the temperature of the water returning from the heating system. If the error Tp is displayed, then the heat pump will not run until both heating distribution and ground circuits are above 1.8 bar pressure.
- iv. The commissioning of the heat pump will be carried out remotely (via phone) by a Vent-Axia commissioning engineer and a heat pump commissioning certificate and checklist issued on completion. Please contact Vent-Axia to book a commissioning call.
- v. After commissioning and connection to the heating control system (with the power isolated) remove the enable link between terminals 1 and 2.
- vi. If DHW is enabled (with the power isolated) remove the enable link between the DHW terminals. (5 & 6)

5.4 Altering the flow temperature from the heat pump

Each heat pump has a dedicated display which can be interrogated to view various parameters, alter the heat pump outlet flow temperature and indicate faults/alarms.



n.b. the numbers above refer to the points below.

Fig 30 Heat Pump Display

The display normally reads the temperature of the water returning from the heating distribution system. The controller will turn the heat pump off once a pre-set temperature of water returning from the heating system has been achieved. This setting is normally 30 Deg C , which is a typical return temperature for an underfloor application.

The Vent-Axia Compact Range of heat pumps are delivered with the software pre-configured for a typical underfloor mounted in screed application.

1. The display on the controller indicates the return temperature of the underfloor circuit.
2. The left hand symbols, sun, (top left) and frost, (bottom left) indicate heating & cooling respectively (Heating only heat pumps will only use the sun symbol and cooling heat pumps only the frost symbol. Reverse cycle machines will use both symbols, the one being displayed being dependant on the operating mode selected at the time.)



Sun symbol—heating mode



Frost symbol—cooling mode

3. A number “1” will appear top right of controller this is to indicate compressor number, if the number “1” is flashing the internal timer is activated and compressor is waiting to run. When the compressor is running the number “1” and the compressor run symbol will be on.



Compressor running

A flashing error code may appear if there is a fault with the heat pump, the most common will be: -

Alarm	Description
TP	Low water pressure (ground or heating distribution)
HP	High gas pressure caused by low or no flow on the heating distribution circuit.
LP	Low gas pressure fault (can occur temporarily on first start up). Call Vent-Axia Technical Department.
A1	Anti freeze alarm, ground getting too cold / insufficient anti freeze/ unit not commissioned correctly/ low flow around ground array

(See Fault Finding Section 6 for further details)

5.4.1 To read flow temperatures and refrigerant pressures

Using the display it is possible to interrogate the heat pump to read flow temperatures and refrigerant pressures.

To read flow temperatures and refrigerant pressures: -

- 1 Press and hold SEL until -/- is displayed
- 2 Press the UP arrow until -b- is displayed
- 3 Press SEL and b01 is displayed
- 4 Press SEL
- 5 Temperature of water returning from the underfloor is displayed = b01
- 6 Press SEL
- 7 Press the UP arrow once until b02 is displayed
- 8 Press SEL
- 9 Temperature of water returning from ground arrays is displayed = b02
- 10 Press SEL
- 11 Press the UP arrow once until b03 is displayed
- 12 Press SEL
- 13 Temperature of water going out to the ground arrays is displayed = b03
- 14 Press SEL
- 15 Press the UP arrow once until b04 is displayed
- 16 Press SEL
- 17 Refrigerant pressure (in Bar) is displayed = b04
- 18 Press SEL
- 19 Press PRG twice until S-P is displayed
- 20 Press and hold PRG until the display returns to normal

5.4.2 To change the heat pump return flow temperatures.

Heat pumps are generally controlled on the return temperature from the heating distribution system and work on a temperature differential of approximately 5 degrees, i.e. if the return temperature set point is

30°C the actual flow temperature out of the heat pump is approximately 35°C.

The outlet flow temperature of the heat pump determines the efficiency of the heat pump.

For underfloor systems mounted in screed a flow temperature of 35°C is generally suitable, therefore the return temperature should be set at 30°C. However for joisted systems or systems with insulative floor coverings then a higher flow temperature may be required and hence the return flow temperature set point may need to be increased.

For radiator systems a flow temperature of 50°C is generally required. This means the return flow temperature set point should be set to approximately 45°C

Warning :- Increasing the outlet flow temperature of the heat pump will result in the unit operating at a lower efficiency with higher fuel bills.

Warning :- for underfloor systems do not increase the outlet flow temperature until the screed that the underfloor is mounted in is fully dry.

Programming can be carried out on either the upper external controller or the lower controller within the heat pump.

Changing the flow temperatures is protected by a passcode to prevent unauthorised changes. This passcode is 11 and not changeable.

- 1 For the upper external controller, press and hold SET until 0 is displayed. For the lower controller within the heat pump, press and hold SEL and PRG together until 0 is displayed.
- 2 Using the UP arrow increase the displayed number to 11
- 3 Press SEL (S-P is displayed)
- 4 Press SEL and -/- is displayed
- 5 Press the UP arrow until -r- is displayed
- 6 Press SEL and r01 is displayed
- 7 Press the UP arrow until r03 is displayed
- 8 Press SEL
- 9 The return water temperature setpoint is displayed
- 10 Press the UP or DOWN arrows to change the setpoint
- 11 Press SEL
- 12 Press PRG twice until S-P is displayed
- 13 Press and hold PRG until the display returns to normal

It is advised that any settings that are changed are noted within Section 8 'Heat Pump Settings Sheet' page 37.

6. Fault Finding

Many faults which occur on commissioning are found to be due to incorrect wiring or setting up, therefore it is recommended that a thorough check is carried out should there be a problem.

Symptom	Possible Cause	Action
Blank display on software controller	No power supply	Check wall mounted electrical isolator switch or call electrician
	Controls MCB tripped	Call electrician to investigate cause
	There is no call from the time-clock or thermostat for heat pump operation	Programme time-clock according to manufacturer's instructions
Compressor not running but display reading temperature near setpoint	Heat pump is up to temperature	No fault
Display flashes fault code tP	Low water pressure in the ground or heating system side due to pipe relaxation or other pressure loss.	Check the pressure gauges below the two water pumps. The pressures should be between 1 and 2 bar. If below this, the pressure needs to be increased above 1.8 bar To increase the pressure in either circuit, the cold fill valve will need to be opened. The Ground cold fill is provided with every Vent-Axia heat pump, and is found on the right hand side of the heat pump, underneath. The heating distribution system should have it's own fill point.
Display flashes fault code HP	Overheat warning. No or low flow around heating distribution circuit because of air in water pump, or stuck water pump impellor, or heating distribution system valves/ actuators closed.	Bleed the heating distribution system pump within the heat pump, using the schrader valve above the pump. (See Fig 28). Check that the water pumps are operational and spin the impellors. (See section 5.3)
	HP can also be temporarily displayed when the heat pump reverts from DHW to space heating mode.	No action
Display flashes fault code LP	Low gas pressure in machine. Can occur simultaneously with an A1 alarm.	Check that the water pumps are operational and spin the impellors (see section 5.3) If symptom persists outside of the two listed circumstances, contact Vent-Axia Technical department.
	Can occur temporarily on first start up when unit is new or after a long period out of use.	No action
	Insufficient antifreeze added and heat pump frozen.	Allow heat pump to defrost and add the correct antifreeze quantity.
Display flashes fault code A1	Freeze protection system activated. Low or no water flow on the ground (cold) side of the machine. Can also occur after many months of running in very cold weather.	Check antifreeze has been added and unit commissioned correctly. Check that the water pumps are operational and spin the impellors (see section 5.3) Ensure no flow restrictions and wait approximately 4 hours (with the machine turned off) for automatic reset.
Display flashes fault code E1, E2, E3 or E4	Loss of contact with probes inside heat pump. E4 could be loss of contact with weather compensation sensor	Refer to Vent-Axia Technical department

7. RTB and Extended Warranty Statement

All Vent-Axia heat pumps have a two year RTB (Return To Base) warranty as standard. The warranty runs from the date of delivery of the heat pump.

RTB means that if a product is thought to be defective, then it is returned to the manufacturer, with carriage paid by the customer. The manufacturer then examines the product. If no fault is found, then the customer pays the return carriage. The manufacturer may also charge the customer for anytime or materials expended, before returning the product. If a fault is found, then the manufacturer pays for both the parts and labour for the repair, and the return carriage is paid by the manufacturer.

The situation is the same for a suspect component, except that the component is despatched direct to the client, for which payment is made by the client, including the carriage. The client's installer then installs the new component, and sends the old component back to the manufacturer. If the manufacturer confirms the component as faulty, then the cost of the component and the carriage back to the client is paid. Most manufacturers would also meet the costs of an installer, although if the installer had received a discount on supplying the equipment, then this would usually be expected to cover minor labour costs.

The use of non-approved associated products, such as antifreezes within the ground array system, will invalidate the warranty.

7.1 Extending the RTB Warranty

The RTB warranty can be extended. The warranty extension must be requested, and paid for in full prior to delivery.

The warranty can be extended for a maximum of five years from date of delivery.

7.1.1 Parts Only

The cost of this is 5% of the original list price of the heat pump for every year that the warranty is extended.

Excluded from the warranty is neglect or misuse of the products, or their components.

7.1.2 Labour & Parts

The cost of this is 7.5% of the original list price of the heat pump for every year that the warranty is extended.

Any labour supplied under an extended warranty will be on a "planned" rather than "emergency" call out basis only.

Please note that labour may be provided by a company or person nominated by Vent-Axia Heat Pumps, or by another nominated party by written mutual agreement prior to any work being undertaken.

8. Antifreeze COSHH Sheet



CoolFlow

COOLFLOW IG

SAFETY DATA SHEET

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name	CoolFlow IG (aka IG Antifreeze)
Manufacturer / Supplier	Hydra Technologies Ltd. (aka Hydratech)
Address	Mercantile Buildings P.O. Box 222 Swansea SA5 4YT United Kingdom
Telephone No.	01792 586800
Facsimile No.	01792 561606
E-Mail	info@hydratech.co.uk

2. COMPOSITION / INFORMATION ON PRODUCT COMPONENTS

Hazardous Components for EC				
COMPONENT NAME	CAS no	CONCENTRATION	R PHASES	CLASSIFICATION
I. Mono Ethylene Glycol with corrosion, scale and biological inhibitors.	107-21-1	90 -100%	R.22	Xn -Harmful if swallowed

3. HAZARD IDENTIFICATION

Main Hazards Harmful if swallowed.

4. FIRST AID MEASURES

Health effects - Eyes	Wash eyes promptly and rinse for 15 minutes. Get medical attention.
Health effects - Skin	Remove affected person from source of contamination. Wash skin with soap or mild detergent.
Health effects - Ingestion	Following over exposure by ingestion, treatment may be needed for CNS depression and severe acidosis. Early administration of ethanol may counter the effects of monoethylene glycol. Haemodialysis or peritoneal dialysis may be effective.
First Aid - Inhalation	Remove person to fresh air at once. Perform artificial respiration if breathing has stopped. Keep the affected person warm and at rest. Get medical attention.

5. FIRE FIGHTING MEASURES

Extinguishing Media	Water, foam. Carbon Dioxide (CO ₂). Dry chemicals, sand and dolomite etc
Protective equipment for fire fighting.	Wear self contained breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions	Wear rubber or PVC gloves and goggles.
Environmental protection	Inform local authorities. Protect drains by covering.
Spill clean up	Stop leak if possible without risk. Inform authorities if large volumes involved. Absorb with inert, damp, non-combustible materials then flush with water. Disposal should be carried out in accordance with any Special Waste Regs.

7. HANDLING AND STORAGE

Handling & Storage	Avoid inhalation of any vapours. Keep away from heat or naked flame. Avoid static build up. Containers should be : kept tightly sealed and dry.
--------------------	--

8. EXPOSURE CONTROL/PERSONAL PROTECTION

See section 7	LT Exp (8 hrs) : 60mg/m ³ . ST Exp (15 mins) 125mg/m ³
Engineering Control Measures	Engineering methods to prevent or control exposure are preferred. Methods include process or personnel enclosure, mechanical ventilation (dilution and local exhaust), and control of process conditions.
Respiratory Protection	Respiratory protection if risk of exposure to high vapour concentrations.
Hand Protection	PVC gloves
Eye Protection	Chemical goggles or face shield must be worn.
Body protection	Wear overall or apron.

COOLFLOW IG

SAFETY DATA SHEET

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Liquid. Hygroscopic. Viscous.
Colour	According to specification. Eg. may be dyed one of several colours.
Odour	Almost odourless (slightly sweet)
pH at 500g/l, 20°C	Range between 7.5 - 10 pH depending on inhibitors and additives.
Density (g/cm ³)	1.04 to 1.20 depending on inhibitor concentration and dilution.

10. STABILITY AND REACTIVITY

Stability	No particular stability concerns.
Conditions to Avoid	Heat, flames sparks.
Materials to Avoid	strong oxidising agents.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity	LD 50/oral/rat:4700.00 mg/kg. Human poison by ingestion. Lethal dose to humans 100 ml. Gas or vapour is harmful on prolonged exposure or high concentration. Narcotic effect. Nephrotoxin. chronic respiratory failure. Swallowing may cause severe internal injury. Liver and/or kidney damage.
Route of entry	Ingestion. Skin and or eye contact.
Target organs	Central nervous system. Heart or cardiovascular system. Kidneys, liver respiratory system, lungs, brain.
Medical symptoms	Nausea, vomiting. Central nervous system depression. Drowsiness dizziness, disorientation, vertigo.

12. ECOLOGICAL INFORMATION

Mobility	The product will dissolve rapidly in water.
Ecotoxicity	The product is rated as : goldfish 24 hr LD50 >500mg/l. Guppy 7d LC50 : 49, 300ppm.

13. DISPOSAL

Product Disposal	Incinerate in suitable combustion chamber. Dilute with organic solvent and incinerate using gas effluent cleaner. Collect on absorbent material place in cardboard kegs and incinerate. Confirm disposal methods with environmental engineer and local regulations. Wash to drain withlots of water.
Container Disposal	Containers should be cleaned by appropriate methods and then re-used or disposed in same manner as contents.

14. TRANSPORT INFORMATION

UN Number	n/a
UN Class	n/a
UN Packaging Group	n/a
ADR/RID Substance ID No.	n/a
ADR/RID - Class	n/a

15. REGULATORY INFORMATION

General	Low hazard material, not considered dangerous for carriage.
Labeling Information	Harmful
EEC (EINECS) No	203-473-3
R Phases	R-22
S Phrases	S-2 - keep out of reach of children, S24/25 - avoid contact with skin/eyes S36/37 - Wear suitable protective clothing and gloves. S43,16 - In case of fire use sand, earth, alcohol resistant foam or water fog. S46 - If swallowed seek medical advice immediately and show container label.
UK regulatory references	Classification, packaging and label regs' 1984. COSHH 1988.
EC Annex I Classification	n/a

16. OTHER INFORMATION

MSDS first issued	28-May-99
MSDS data revised	30 April 2004

9. Heat Pump Settings Sheet

Type of ground arrays	
Ground Arrays purged	
Ground arrays leak tested @ 5 barg	
Pressure held for 15mins	
Antifreeze quantity & concentration	
Serial Number	
Visual Inspection	
Feet level on floor	
Visual check of site wiring	
Software operating	
Software errors	
Heating Status	
Ground water pressure	
Underfloor water pressure	
Make of underfloor heating	
Manifolds	
Any UFH water pumps	
Control philosophy	
B01 underfloor return temperature	
B02 ground return temperature	
B03 ground feed temperature	
B04 evaporating pressure	

Comments:

Installed by:-

Date:-

Tel:-

The **Vent-Axia** Guarantee

Applicable only to products installed and used in the United Kingdom. For details of guarantee outside the United Kingdom contact your local supplier.

Vent-Axia guarantees its products for two years from date of purchase against faulty material or workmanship. In the event of any part being found to be defective, the product will be repaired, or at the Company's option replaced, without charge, provided that the product:-

Has been installed and used in accordance with the instructions given with each unit.

Has not been connected to an unsuitable electricity supply. (The correct electricity supply voltage is shown on the product rating label attached to the unit).

Has not been subjected to misuse, neglect or damage.

Has not been modified or repaired by any person not authorised by the company.

IF CLAIMING UNDER TERMS OF GUARANTEE

Please return the complete product, carriage paid to your original supplier or nearest Vent-Axia Centre, by post or personal visit. Please ensure that it is adequately packed and accompanied by a letter clearly marked "Guarantee Claim" stating the nature of the fault and providing evidence of date and source of purchase.

The guarantee is offered to you as an extra benefit, and does not effect your legal rights

Vent-Axia

Head Office: Fleming Way, Crawley, West Sussex, RH10 9YX. Tel: 01293 526062 Fax: 01293 551188

UK NATIONAL CALL CENTRE, Newton Road, Crawley, West Sussex, RH10 9JA

SALES ENQUIRIES:

Tel: 0844 8560590 (check R.P)

Fax: 01293 565169

TECHNICAL SUPPORT:

Tel: 0844 8560594

Fax: 01293 539209

Web:-www.vent-axia.com

Email:- info@vent-axia.com

As part of the policy of continuous product improvement Vent-Axia reserves the right to alter specifications without notice.

445328A (version 6.1)