

**SAMSUNG**

  
**Freedom**  
Heat Pumps

# Air Source Heat Pump

## Installation and Maintenance Manual With Pre-Plumbed Cylinders

### Model Numbers

MIM-E03CN

AE050/080/120/160RXYDEG and DGG



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# Who are Freedom Heat Pumps?

Freedom Heat Pumps is a wholesale distribution company specialising in heat pumps. We offer technical support, training, design and consultancy services.

Freedom Heat Pumps was founded in 2010 and have been market leaders in this sector with over 8500 units out in the field.

## How we work

Our approach is very straightforward. If you have a set of plans or an outline of the requirements for a project, send them to

**sales@freedomhp.co.uk**. From there, we will produce a heat loss calculation in line with today's standards, and put together a list of the kit required at your cost price.

Alternatively, if you don't currently have a heat pump project, but would like to become a heat pump installer, and don't know where to start, contact us on **02380 274833** or email us at **sales@freedomhp.co.uk** and we can set you on the correct course.

 @freedomheatpumps

 @freedomheatpump

 Freedom Heat Pumps Ltd.

 freedomheatpumps

[www.freedomhp.co.uk](http://www.freedomhp.co.uk)

Samsung are now insisting that all installer companies are registered before they can get the 7 year warranty. To do this one engineer has to attend freedom HP or Samsung training. Every warranty will be checked by Samsung to make sure it been installed by an accredited company.

You can now register for the Samsung Extended 7 year parts and labour contribution warranty, the warranty will start from the date of delivery to site. This warranty covers the Samsung components only. The warranty does not cover radiators, cylinders, UFH, valves, pumps etc. In the event of a warranty claim we will credit the maintenance engineer a labour allowance for works completed, details are on the certificate.

In order to maintain your extended warranty you will need to have a maintenance agreement in place and ensure that required checks are carried out annually. Your unit is not automatically registered for warranty, your installer needs to fill in a form Online at [www.freedomhp.co.uk](http://www.freedomhp.co.uk).

**YOU MUST submit photos of the outdoor unit serial number from the left hand side of the outdoor unit and the serial number inside the Samsung control box on the bottom right**

Once this is done a certificate and a maintenance book will be emailed to the applicant, please make sure you have a copy of this certificate, and proof of maintenance. Samsung may ask for this when a warranty claim is made.

### Installation Details

Your Name	<input type="text"/>
Your email address	<input type="text"/>
Outdoor model number	<input type="text"/>
Outdoor serial number	<input type="text"/>
You will find this on the side of the heat pump	
Indoor unit model number	<input type="text"/>
Date delivered	<input type="text"/> / <input type="text"/> / <input type="text"/>
Name of Homeowner	<input type="text"/>
End user email address	<input type="text"/>
This is where the warranty certificate will be sent by Samsung	
Installation address	<input type="text"/>
Post code	<input type="text"/>

### Installation Details

Company name	<input type="text"/>
Engineers name	<input type="text"/>
Office telephone number	<input type="text"/>
Is this your first Samsung install?	<input type="text"/> YES / <input type="text"/> NO
Date delivered	<input type="text"/> / <input type="text"/> / <input type="text"/>
Will you or your company be maintaining the Unit?	<input type="text"/> YES / <input type="text"/> NO
If No, Freedom Heat Pumps will advise of an engineer who can do this	

### Install Photos

Please take at least 6 photos showing the outdoor unit, control box and cylinder cupboard.

Please include a photo of the outdoor unit serial number (right hand side of the unit) and a photo of the Indoor unit (mim) serial number, to the right of the PCB inside the box.

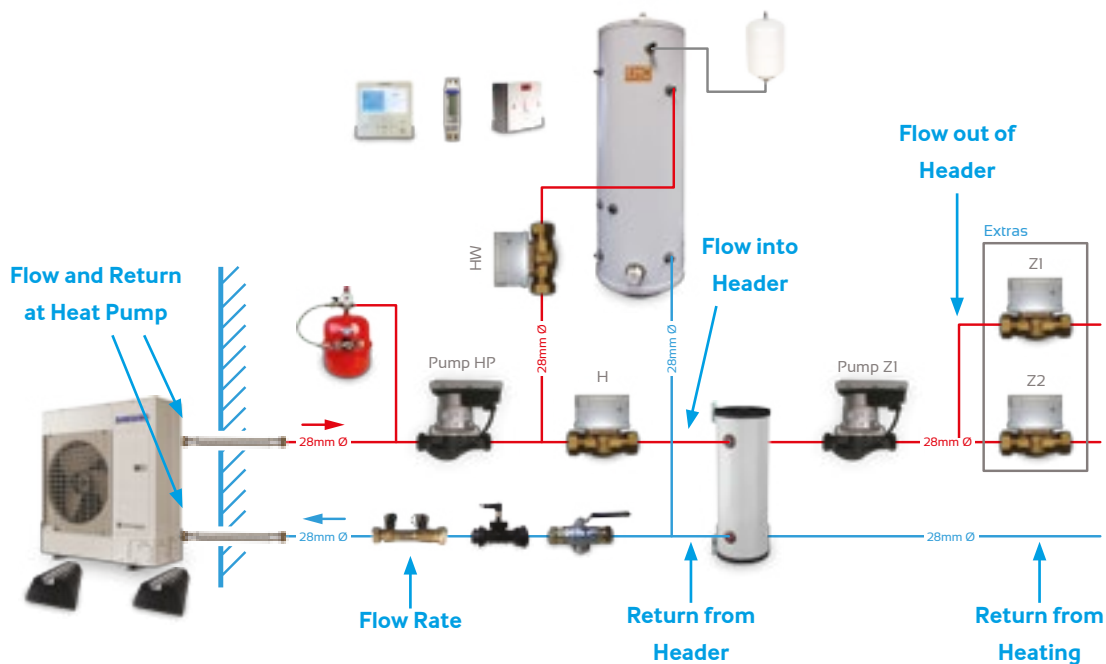
### Heating Mode Commissioning Data

What type of system do you have?

Pre-plumbed / Separate Cylinder

Is there a Header, Buffer or Heat Exchanger installed?

You need to measure the following and record the data:



Flow temperature at Heat Pump Measure with pipe thermometer	<input type="text"/>	Return from Heating into header / plate	<input type="text"/>
Return temperature at Heat Pump	<input type="text"/>	Flow rate from flow meter	<input type="text"/>
Flow temp into header / plate	<input type="text"/>	Air temp at the back of the unit	<input type="text"/>
Return from header / plate	<input type="text"/>	Ambient air temperature Measure from the garden	<input type="text"/>
Flow temp out of header / plate to heating	<input type="text"/>		

### Hot Water Mode Commissioning Data

You must be running the heat pump in hot water mode for this section

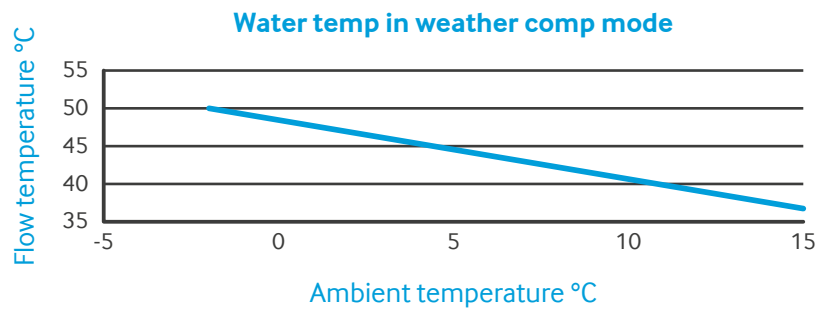
Hot water cylinder model No.	<input type="text"/>	Water flow temp at cylinder Measure with pipe thermometer	<input type="text"/>
Cylinder water temp at start-up Measure from the remote controller	<input type="text"/>	Water return temp at cylinder Measure with pipe thermometer	<input type="text"/>
Cylinder water temp after 30mins Measure from the remote controller	<input type="text"/>	Flow Rate Measure from the flow meter	<input type="text"/>

Please search YouTube for Freedom Heat pumps Handover Video for Samsung Heat Pump for Homeowners

Thank you for buying a Samsung EHS heat pump system, your Samsung heat pump heats the house and hot water cylinder much like a normal fossil fuel boiler, however there are a couple of differences which you should take notice of.

Your installer should have provided you with a room thermostat if you have radiators or a thermostat in every room if you have under floor heating. The installer will be able to run through the operation of your stats with you. The heat pump will operate from the signal sent by these stats back to the heat pump, please do not use the Samsung controller to control your heating.

Once the unit starts up it will take time to get to temperature, it is not instant. Within 10 minutes you should feel the radiators beginning to warm up. Although it may take a few days to have everything to the required temperature, please do not switch your stats off during this period.



### Weather compensation and water law

The radiator temperatures will be lower than you are used to with a gas or oil boiler. To add to this, we run them in a weather compensation mode, this means that the unit measures the outside temperature and adjusts the radiator temperature to suit.

The colder it is outside the warmer the rads will be and vice versa. This function is automatic and is designed to save you money. In very cold weather the radiator will be at their hottest, they will reach 50°C or in some cases 60°C where required.

### Running your machine efficiently

It is very expensive to heat the house up from cold, with a heat pump the best advice is to maintain the house at as close to constant temperature as possible all the time.

Please DON'T set the room temperature too low when you leave the house, ideally drop it no more than 2 degrees below your normal set temperature when you go out or it will take a long time and a lot of money to recover.


To switch off the heating in summer set your room thermostats down to 16°C to avoid the heating starting up. Your radiators will have thermostatic valves on them, you can adjust each room's temperature with these.

## General Advice

The heat pump comes with a Samsung controller which looks like this, you should not use this or press the buttons, it is used for commissioning and fault diagnosing the system only.

On Youtube (search for freedom heat pumps) there are videos showing how to use the controller, faults etc.

Normally the remote controller will look like this: it will show Zone, on SET 0.0°C and DHW set 48.0°C standard. The on/off button will be lit up in white. This is normal.

If the system goes into fault, the screen will show a number at the bottom starting with E, for example E911 – A00. The on/off  button will flash. The engineer will want to know this error code when you call.

Please avoid turning the unit off at the power supply especially in cold weather. If the unit is off and the weather is very cold, it cannot protect itself and your warranty will be at risk.

If the unit is off and the temperature outside is cold, it will automatically run the pump for a few minutes to stop freezing. In extreme weather, below -2°C the water pump will run continuously, you cannot stop this.



## Hot Water

On the right of the controller it will say DHW set 48°C standard, this means your unit is monitoring the cylinder temperature.

The unit is set up to maintain the water between 43 and 50°C for efficiency, this can be increased to operate between 53 and 60°C all the time if required.

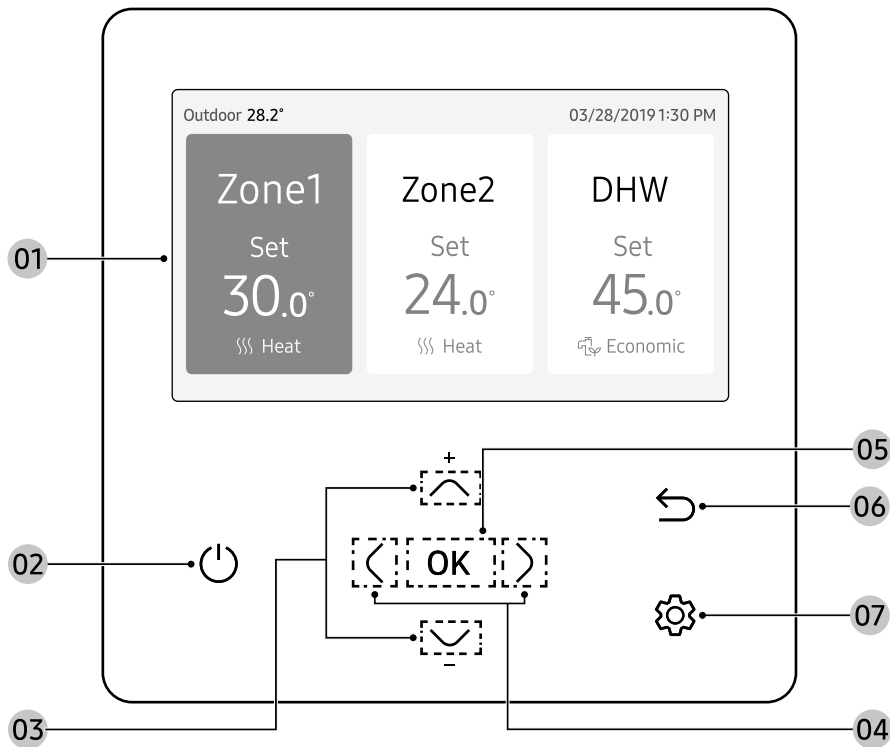
As you use the water the heat pump will constantly top up the cylinder. The hot water cylinder has priority over the heating, if the cylinder temperature falls 5 degrees below its set point the unit will automatically switch to heating the cylinder. This should take less than an hour.

Once set temperature is achieved the unit will go back to heating the house. The hot water cylinder loses almost no heat (1/3 a degree an hour) if no hot water is used.

If you want to heat the cylinder quickly press right so the DHW is highlighted in blue, press ok the screen will show the set temperature, you can adjust this here. It should be on 48°C. Press ok and the screen offers options of economic, standard, power and forced, scroll down 2 x to forced, press ok. This will heat the tank to set temperature immediately with the HP and Immersion together. It will return to standard after 1 hour.

An anti-legionella / disinfection operation will be completed at a 3am every Tuesday morning. The unit will heat the cylinder with the immersion to 60°C, the hot water will be hotter on a Wednesday morning than the rest of the week. If legionella is not completed this **e919** will flash on screen, you need to call an engineer to check it.

If you don't require 24/7 hot water It is possible to time clock the hot water to reduce costs, the timer video on you tube will show you how to do this.



Location	Function
1	<b>Operation status display</b> - Displays the operation/function settings and statuses.
2	<b>Operation On/Off button (LED display)</b> - Turns the Air to Water Heat Pump power On/Off
3	<b>Up/Down button</b> - Moves between items vertically or changes the set temperature.
4	<b>Left/Right button</b> - Moves between items horizontally or changes the item value.
5	<b>OK button</b> - Saves your new settings.
6	<b>Save &amp; Return button</b> - Saves your new settings and returns to the previous step.
7	<b>Option button</b> - Selects the detailed setting function.

### Please Note

- The operation mode display on the remote controller changes depending on the selected language.
- Some functions may not be available, depending on the product specifications.
- You can see the operation status on the LED display.
  - ON: Operating
  - Blinking: An error occurred
  - OFF: Turns off



The Samsung heat pump should be maintained at least once a year to comply with warranty and RHI. You must log your maintenance at [www.freedomhp.co.uk](http://www.freedomhp.co.uk) for the 7-year warranty.

## Maintenance procedure

To clean the filter balls, stop the unit, shut the valve, undo the back nut and pull out the strainer out clean and refit.

Test the concentration of the Anti-freeze (glycol) in the system using a Glycol tester the level should be 25%. If you don't have a glycol tester a glycol tester / refractometer can be bought from your heat pump supplier or online.

Refill the unit, pressure should be 1-2 bar.

We need to **test the operation of the unit** against the hot water cylinder. So first we need to draw off 50 litres of water, run a couple of taps for 5 mins to achieve this. The unit should start up automatically in hot water mode, if it doesn't press the **DHW power** button on the controller, in 3-4 mins it will start heating the cylinder, a coke can symbol will show in the status section of the remote controller.

The heat pump should be able to achieve 48°C cylinder temperature without using the immersion heater.

When the system is not running, check the outdoor unit for damage & debris, the coil needs washing, we recommend you use an approved EHS heat pump cleaning chemical, your distributor will stock this. Instructions are given on the bottle. You also need to clean and polish the outside casing we recommend car wax to do this.



## Hot Water Cylinder

Check electrical connections, the DHW sensor must be above the immersion and fully inserted into the sensor pocket and secured to prevent it misreading the DHW temperature and the overheat thermostat is set to 70°C. On a Telford cylinder set the stat to 5

If you want to test the cylinder quickly press right so the DHW is highlighted in blue, press ok the screen will show the set temperature, you can adjust this here. It should be on 48°C. Press ok and the screen offers options of economic, standard, power and forced, scroll down 2 x to forced, press ok. This will heat the tank to set temperature immediately with the HP and Immersion together. It will return to standard after 1 hour. Measure the immersion heater current it should draw 12-13 Amps.

With the unit running flat out measure the temperature of the air as it enters the coil and the temperature of the air in the garden. They should be the same check cold air is not recirculating.



### Installing the Outdoor Unit (Boiler)

Position the outdoor unit so that the air flows into an open area, where there are no plants and animals. If the unit is to be installed within a mile of the sea you need to have the unit coated using Blygold, ask us for details. If you are applying for any Government funding scheme and going through MCS you need to make sure the system meets MIS020

Install the outdoor unit on a flat, stable surface, it needs to be securely mounted at least 100mm off the ground on rubber feet. The unit must be bolted down for security using 10mm bolts and Zebedee's.

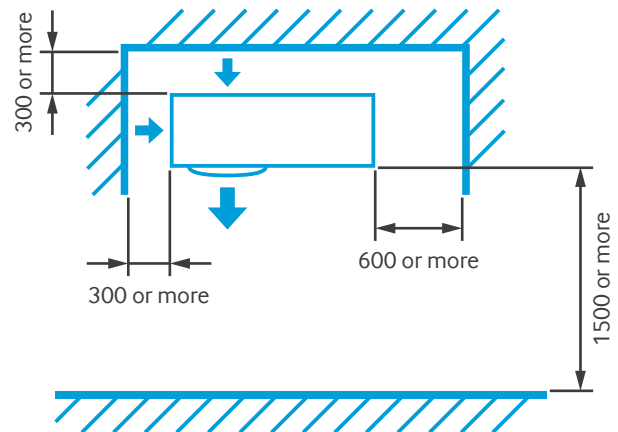
The unit must have adequate drainage away from the unit; it can produce up to 6 L / hour of condensate. If you are installing the unit at height you can install a drain pan under the unit but its best to let the unit drain into the ground.

#### Dimensions:

Size 12 and 16	- 1420mm (h) 940mm (w) 330mm (d) 103kg
Size 8	- 998mm (h) 940mm (w) 330mm (d) 75kg
Size 5	- 798mm (h) 880mm (w) 310mm (d) 59kg

#### The space around the unit is very important, allow:

300mm to the left hand side (facing the front of the unit),  
 600mm to the right of the unit,  
 300mm to the rear of the unit and 1500mm to the front of the unit.



**NOTE:** An air source heat pump with more than three reflective surfaces (for example those within small lightwells) will not meet the MCS planning standards. A reflective surface is any surface within 1m of the heat pump, the ground underneath the heat pump is classed as a reflective surface.

### Installing the Control Box MIM-E03CN

The control box contains the flow switch, cylinder sensor (blue) 2 red safety sensors, some cables for a backup heater, a black cable for smart grid connections and the remote controller.

Install the control unit indoors, it's not waterproof.

It needs to be sited within 15m of the hot water cylinder, less than 100m from the outdoor unit and as near as possible to the pump, flow switch and any zone valves.

The box is 329mm wide, 439mm high, 168mm deep, and weighs 3.5kg

The Samsung remote controller **MUST** be in a heated space above 5°C.

This relay configuration will ensure that the secondary pump runs whenever the primary pump runs AND the heating valve is open, ensuring that the system has the required minimum circulating water volume, without the use of large, expensive buffers or volumizers, and access to the secondary side when in defrost mode.

If the combined system volume of the primary + secondary circuit is less than 30l for a 5Kw or less than 50l for an 8Kw, 12Kw and 16Kw, you will still need a volumizer or buffer.

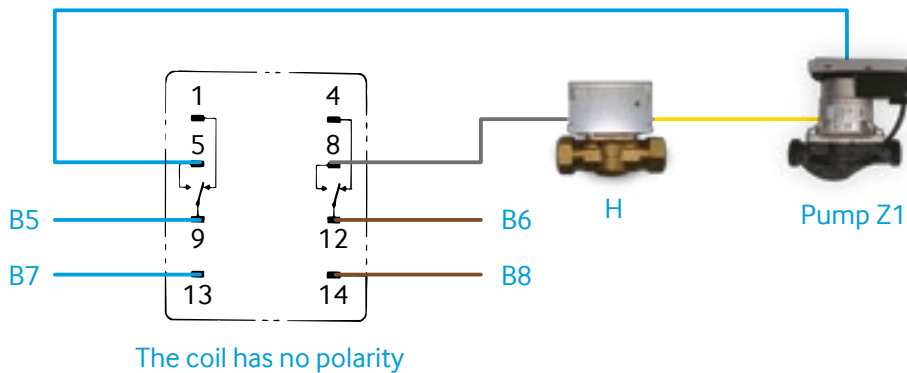
Typically, will not be an issue unless working on a very small house/flat with less than 5 radiators or below 60m<sup>2</sup> floor area.

## Relay wiring for secondary pump – Double pole double throw

- Coil of relay goes across pump terminals B8 (L) to 14 and B7 (N) to 13
- Permanent supply to C (common) from B6 (L) to 12 and B5 (N) to 9
- Neutral from NO contact 5 straight to Pump z1
- Live on NO contact 8 to grey of 2-port valve for heating (H)
- Orange from 2-port valve for heating (H) to live of pump Z1



**Omron MY2-GS  
Relay Head**

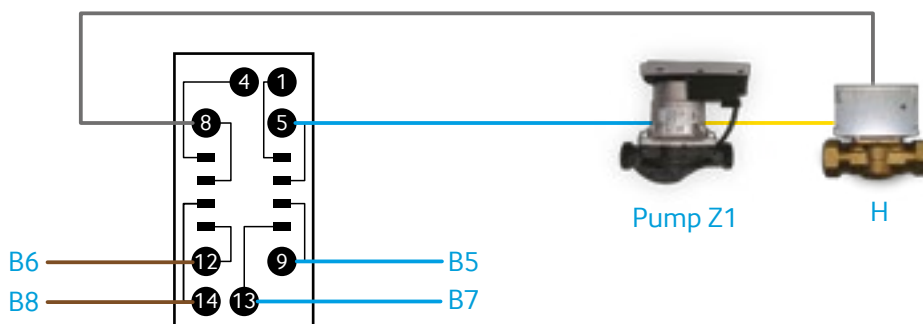


## Terminal arrangement

- Coil of relay goes across pump terminals B8 (L) to 14 and B7 (N) to 13
- Permanent supply to C (common) from B6 (L) to 12 and B5 (N) to 9
- Neutral from NO contact 5 straight to Pump z1
- Live on NO contact 8 to grey of 2-port valve for heating (H)
- Orange from 2-port valve for heating (H) to live of pump Z1



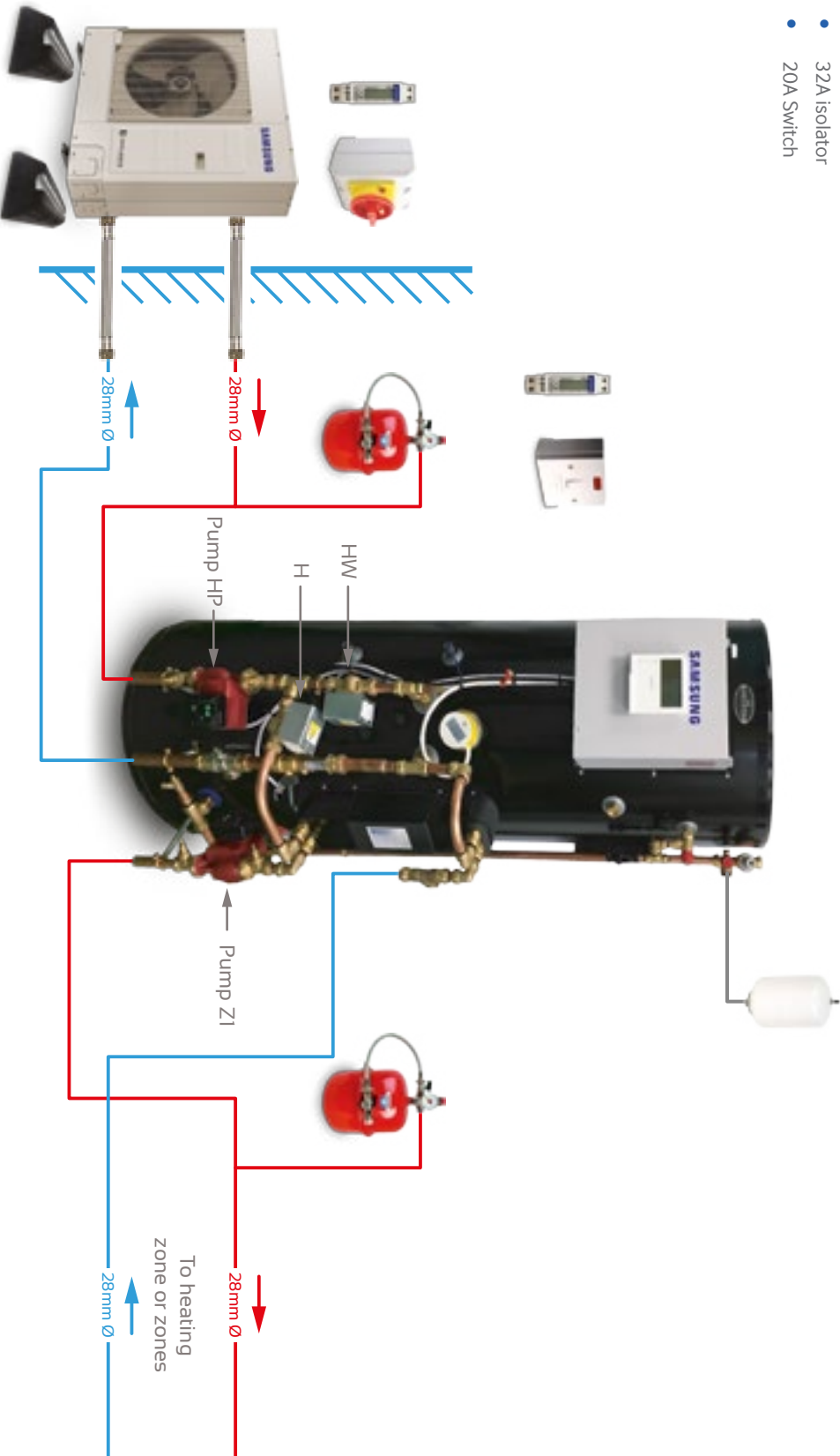
**Omron PYFZ-08-E  
Relay Socket**



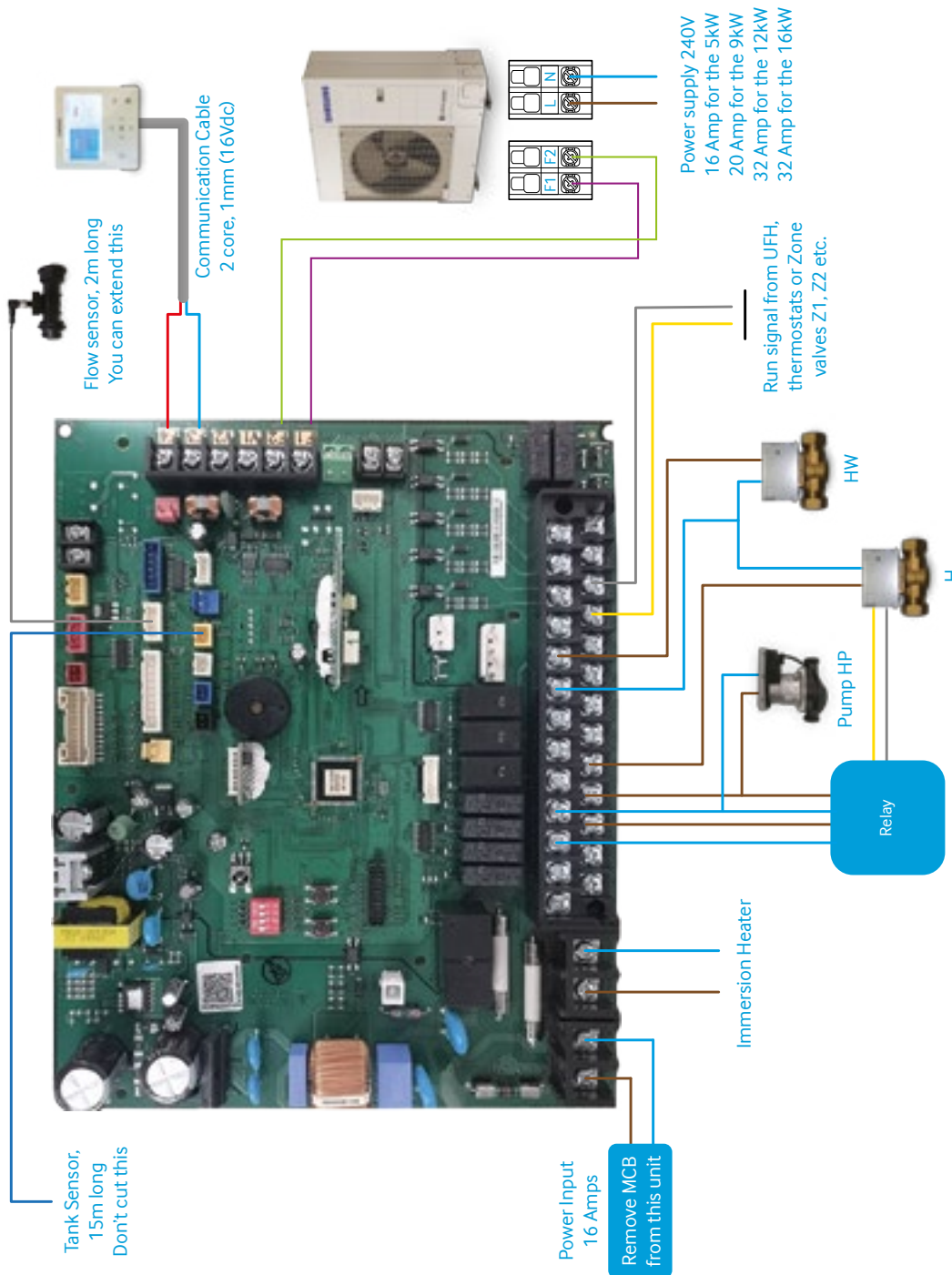
### Mono: pre-plumbed install pack Telford

- Samsung unit
- 2x Feet
- 2x Flexi hoses
- 2x Ball valves
- 2x Robokit
- Glycol
- 32A isolator
- 20A Switch
- 2x Electric meter optional
- Pre-plumbed cylinder
- Delivery
- Install & handover manuals

The header, plate heat exchanger or buffer is in the heating part of the circuit only.  
Pump Z1 only runs when there is a heating demand, it is driven by the external run signal form under floor manifold or stat.



## Wiring Diagram Pre-Plumbed



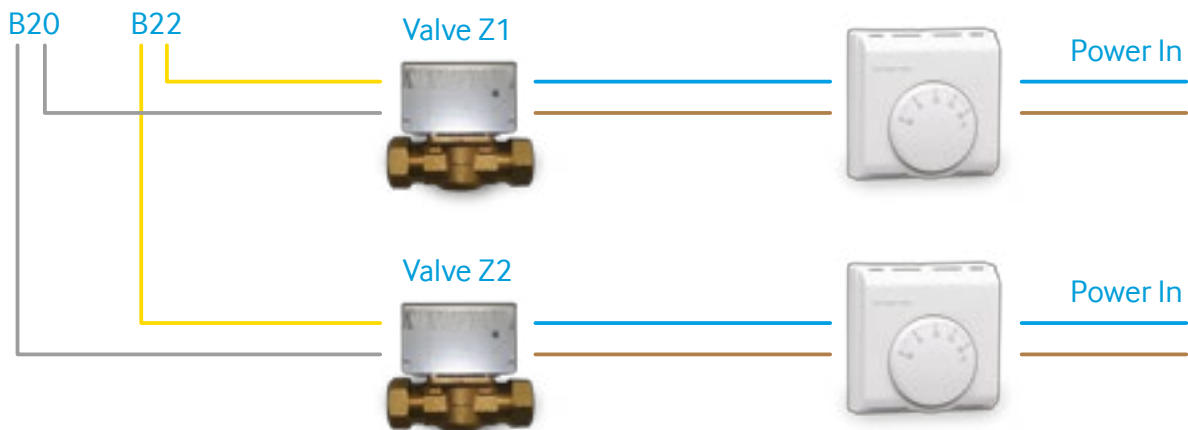
**Pump HP** is wired Live to B8 and Neutral to B7, 11.5W maximum **DO NOT** connect 2 pumps to these terminals

2 port valve for **Hot water**, wire brown to B17 and blue to B15,

2 port valve for **Heating** wire brown to B10 and blue to B15. Orange and Grey wires are not used on these 2 valves.

The **heating run signal** links permanent live B20 - B22. If you need Neutral use B19.

### Run Signal to Heat Pump



As many heating zone valves as you like can be connected to the system.

When commissioning this system you need to follow the procedure below **don't skip this**, if you do the unit won't work properly. Fill in the warranty card on pages 4 and 5 and register online at [www.freedomhp.co.uk](http://www.freedomhp.co.uk) Complete page 3 of the Handover and Maintenance Log Book and leave this with the end user.

### Start-up Procedure

Filling and flushing, when installing any heat pump, we insist on a thorough system flush prior to connection in line with BS7593:2019. Using the power flusher fill the system with water and 25% Propylene Glycol, there is no pressure sensor in the unit so we can operate from open vented to 3 bar maximum.

### Setting up the cylinder immersion heater

To avoid the immersion heater cutting out before the legionella function is complete you have to set the stat in the immersion heater to 70°C minimum, on a Telford cylinder set it to 5.



### Check the tank sensor

The blue tank sensor **MUST** be installed above the immersion heater and it must be securely fixed in the tank right into the back of the pocket, You should use heat paste and cable ties to do this.

### Powering Up

Makes sure all your room thermostats are off and all underfloor run signals are off.

Apply power to outdoor and indoor unit, you should see red lights on the PCBs of both units. If there are no lights you will need the electrician to check for power.

The remote controller will light up immediately, it will say scanning 0, after a few seconds it will say scanning 1.

Scanning 0 means the indoor unit is ok, scanning 1 means the outdoor unit is ok. If scanning 1 does not show after 30 seconds check the outdoor unit is powered up. Remove the cover and check the PCB is lit up.



## Setting up the controller and the time.

1. Press the gear button, bottom right. Press v, then > option, press OK
2. User Mode, press OK
3. Wired remote controller, press ok
4. LED > to on
5. Button Mute > on
6. Current time >
7. Date > OK
8. Adjust day with ^ and v, press > adjust the Month with ^ and v, press > adjust Year adjust with ^ and v press, ok.
9. Go to Time
10. Adjust hour with ^ and v, press > adjust the mins with ^ and v, press ok.
11. To get back to the normal screen press return 5 times



The cylinder timer and field settings will already be set up for you.

## Cylinder Timer, if you are heating a hot water cylinder

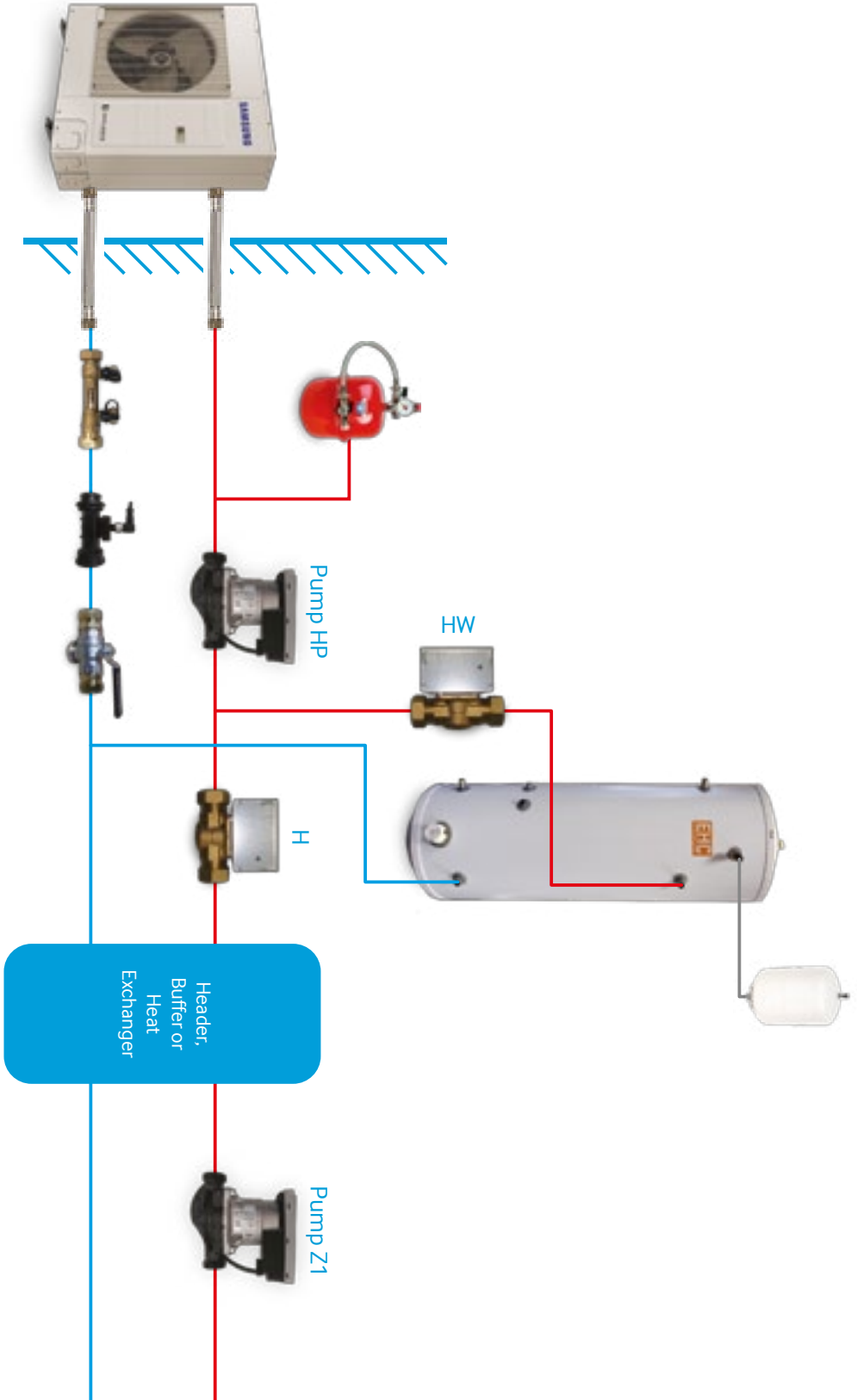
To avoid the cylinder heating being switched off accidentally we normally add 2 on timers a day, one at 3-00 am and one at 15-00 pm. This stops nuisance tripping, resets the unit after power cuts and insures the cylinder is hot 24 hours a day. We don't normally set any off times.

To set the cylinder up as above:

1. From the front screen press the gear button, scroll right > to schedule, press ok.
2. If any timers are showing highlight them and select delete. When no timers are shown we can add some new ones.
3. Highlight + add schedule, press ok
4. Highlight daily schedule, press ok
5. Type - quiet will show, press v to DHW, do not use quiet
6. Press > press ^ to set to Standard, press >, adjust hour to 3, am press ok
7. Scroll up ^ to + add a timer
8. Highlight + add schedule, press ok
9. Highlight daily schedule, press ok
10. Type quiet will show, press v to DHW, do not use quiet
11. Press > press ^ to set to Standard, press >, adjust hour to 3, pm press ok



Now turn to page 21 to start and test the unit



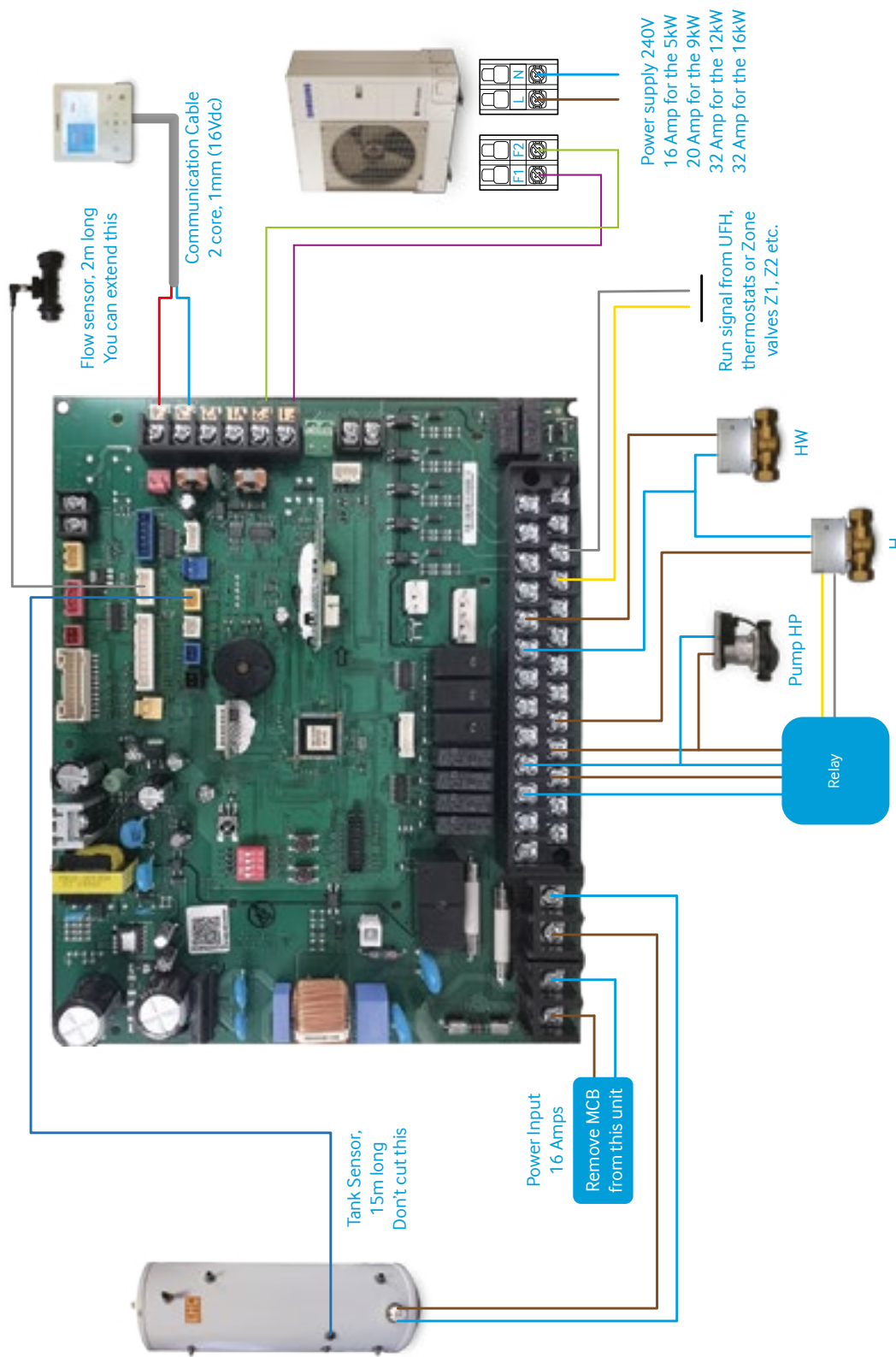
### Reduced Glycol System.

If you want to reduce the amount of Glycol to be used in the system, you can install a plate heat exchanger. The heat exchanger needs to be suitably sized if in doubt please ask.

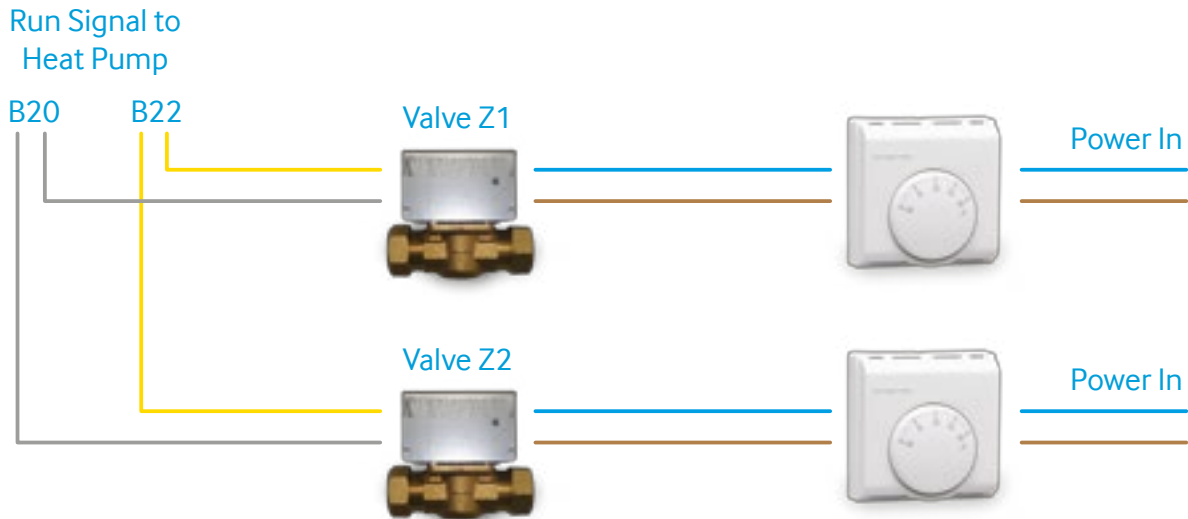
If you use a plate heat exchanger you must add a separate robotkit for the secondary system.



## Wiring Diagram Heating & Hot Water



**Pump HP** is wired Live to B8 and Neutral to B7, MAX pump power is 115 watts.  
 2 port valve for **Hot water**, wire brown to B17 and blue to B15,  
 2 port valve for **Heating** wire brown to B10 and blue to B15. Orange and Grey wires are not used on these 2 valves.  
 The **heating run signal** links permanent live B20 - B22. If you need Neutral use B19.



As many heating zone valves as you like can be connected to the system.

When commissioning this system you need to follow the procedure below **don't skip this**, if you do the unit won't work properly. Fill in the warranty card on pages 4 and 5 and register online at [www.freedomhp.co.uk](http://www.freedomhp.co.uk) Complete page 3 of the Handover and Maintenance Log Book and leave this with the end user.

### Start-up Procedure

Filling and flushing, when installing any heat pump, we insist on a thorough system flush prior to connection in line with BS7593:2019. Using the power flusher fill the system with water and 25% Propylene Glycol, there is no pressure sensor in the unit so we can operate from open vented to 3 bar maximum.

### Setting up the cylinder immersion heater

To avoid the immersion heater cutting out before the legionella function is complete you have to set the stat in the immersion heater to 70°C minimum, on a Telford cylinder set it to 5.

### Check the tank sensor

The blue tank sensor **MUST** be installed above the immersion heater and it must be securely fixed in the tank right into the back of the pocket, you should use heat paste and cable ties to do this.



### Powering Up

Makes sure all your room thermostats are off and all underfloor run signals are off.

Apply power to outdoor and indoor unit, you should see red lights on the PCBs of both units. If there are no lights you will need the electrician to check for power.

The remote controller will light up immediately, it will say scanning 0, after a few seconds it will say scanning 1.

Scanning 0 means the indoor unit is ok, scanning 1 means the outdoor unit is ok. If scanning 1 does not show after 30 seconds check the outdoor unit is powered up. Remove the cover and check the PCB is lit up.



## Setting up the controller and the time.

1. Press the gear button, bottom right. Press v, then > option, press OK
2. User Mode, press OK
3. Wired remote controller, press ok
4. LED > to on
5. Button Mute > on
6. Current time >
7. Date > OK
8. Adjust day with ^ and v, press > adjust the Month with ^ and v, press > adjust Year adjust with ^ and v press, ok.
9. Go to Time
10. Adjust hour with ^ and v, press > adjust the mins with ^ and v, press ok.
11. To get back to the normal screen press return 5 times



## Field settings for heating

1. Press ok to wake the controller up.
2. Press ^ and v together for 6 seconds, password shows you need to set 0202.
3. Press v 8 times to Field setting Value, press >
4. 10\*\* will show press v to 20\*\*Water law press >
5. 201\* will show Outdoor temp
6. Set low to 15 and set high to -2 (-5°C in Scotland) using ^ and v press ok
7. Go to 202\* water out, press ok
8. Set low to 37 and set high to 50 for radiators and 45 for underfloor heating using ^ and v press ok
9. Press v seven times to 2091, press ok, press v to use Signal on off WL interlink Off water pump 3, press ok, press return.

You have now set up the weather compensation. The water in the rads UFH will be warmer in cold weather and cooler in warm weather.

### Field settings for Hot Water

10. Then v to 30\*\* DHW, press ok
11. 3011 Domestic Hot Water Tank press OK, press v to hysteresis thermo on/ off state, press ok
12. Go to 302\* heat pump, press ok, press v 4 times to 3025 Max DHW operating time, press ok
13. Use ^ and v to set to 60 mins for 200 litre or 90 mins for 300 Litre cylinders, press ok
14. Press v to 303\* booster heater, press ok.
15. Press v to 3032 delay time, press ok, use ^ and v to set to 30 mins, press ok
16. Press v to 304\* disinfection, press ok
17. Press v to 3042 interval, press ok, press ^ or v to get to Tue, press ok
18. Press v to 3043 start time, press ok, use ^ and v to set to 3am, press ok.
19. Press v to 3044 target temp, press ok, use ^ and v to set to 60°C, press ok
20. Press v to 3045 duration, press ok, use ^ and v to set to 10 mins, press ok.
21. Press return nine times to return to the normal screen

The cylinder maintains the tank within 5°C of set point. It heats the cylinder for the max time adjusted in line 14. To begin with it uses just the heat pump, but after the time set in line 16 the immersion comes in to help.

### Cylinder Timer, if you are heating a hot water cylinder

To avoid the cylinder heating being switched off accidentally we normally add 2 on timers a day, one at 3-00 am and one at 15-00 pm. This stops nuisance tripping, resets the unit after power cuts and insures the cylinder is hot 24 hours a day. We don't normally set any off times.

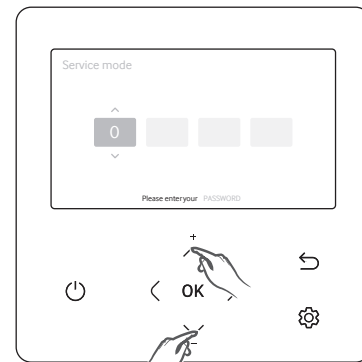
To set the cylinder up as above:

1. From the front screen press the gear button, scroll right > to schedule, press ok.
2. If any timers are showing highlight them and select delete. When no timers are shown we can add some new ones.
3. Highlight + add schedule, press ok
4. Highlight daily schedule, press ok
5. Type - quiet will show, press v to DHW, do not use quiet
6. Press > press ^ to set to Standard, press >, adjust hour to 3, am press ok
7. Scroll up ^ to + add a timer
8. Highlight + add schedule, press ok
9. Highlight daily schedule, press ok
10. Type quiet will show, press v to DHW, do not use quiet
11. Press > press ^ to set to Standard, press >, adjust hour to 3, pm press ok



## Use of self-test mode

1. Press OK to wake the controller up.
2. Press ^ and v together for 6 seconds, password shows you need to set 0202.
3. Press >, then ^ twice, > twice, ^ twice then press OK
4. Press v nine times to self-test mode, press ok
5. Press v to water pump press > the main water pump will come on, leave it on.
6. Press v to booster heater, press > to switch it on, this is the immersion heater in the tank, check it works, press < to switch it off again.
7. Press v to DHW (3 port valve) this is the hot water valve, it will be closed, check it, press > to on, the valve will open, check it, press > to close it again.
8. Press v to Zone 1 valve this is the heating valve before the header or plate hex, it will be open, check it, press > to on, the valve will now close, check it, press > to open it again.
9. Now check the flow rate as per instructions below



Service mode	
Reset All Service Mode	>
Power Master Reset	>
ODU K3 Reset	>
Field Setting Value	>
Self-Test Mode	>
Indoor Unit Option	>

## Checking flow rate

First you need to clean the filter balls. Shut the valve, undo the back of the valve, remove the strainer, clean it and replace it then open the valve.

Start the pump, see above, the unit will be running in heating mode. Check the flow rate, we need 12l/min on the 5kW unit, 20l/min of flow on the 8kW unit and 30l/min on the 12 and 16kW unit. If there is not enough flow the unit will never operate and it will give fault E911 see fault code page.

If you look into the flow meter you can see the flow in litres per minute. The flow rate is the low figure, in this picture you can see a flow rate indicated, this shows 0l/min NOT 16l/min. Make sure you clean the filter ball, turn up all the pumps, open all the valves and get rid of the air to keep flow rate up.

To exit test mode press return 4 times to get back to the normal screen



### Starting the unit in heating mode

Press the left button so the Zone is highlighted in blue, press the power button a temperature will show will show, the unit is automatic mode using an external run signal. Turn up your thermostats or underfloor heating to send a run signal to the unit, the display will change to set 0.0c the pump will start within 3 minutes. The compressor in the outdoor unit starts after 3 minutes, the pipework will begin to heat up.

If you press the ok button, you can see the water outlet flow temperature rising.

If the outdoor unit doesn't start after 5-minutes, see the trouble shooting page.

Over time the unit will warm up, now check all the radiators or under floor loops are hot as well.

### Starting the System in hot water mode

Clean the filter balls again.

Press return to get to the normal screen. With the zone highlighted in blue press the power button, heating will stop. Now press > to highlight the DHW and press the power button again.

The DHW will start the display will show 48°C set standard

Press ok

The cylinder set temperature and current temperature will show.

To adjust the temperature press ^ and v set it to 48°C.

Press ok to switch between standard , eco (cold water) and forced only used in emergencies.

The heat pump will start heating the cylinder if its colder than 43°C and will heat it up to 50°C then it will stop. The unit will take up to 6 minutes to start in Hot water mode, be patient

When the unit is heating the cylinder, the HW valve will open but the heating valve will not close for 40 seconds, this is normal.

### Run test in hot water mode

Make a note of the hot water cylinder temperature, after 15 minutes of running check the hot water temperature again, it should have risen, again note the temperature. If the unit is running well it should heat the cylinder to 48°C without needing the immersion heater. Now clean the filter ball again.

The Water storage temperature is lower (48°C) than a normal cylinder. It's important to check that any shower or bath mixers do not further reduce the water temperature. Using your thermometer check that the hot water comes out the tap

**Now handover the system to the end user, see page 6-8, fill in the warranty card on page 4 and online. Your system is now fully commissioned, congratulations.**



## How to read the flow rate from the controller.

1. Press OK to wake the controller up.
2. Press ^ and v together for 6 seconds, password shows you need to set 0202.
3. Press >, then ^ twice, > twice, ^ twice then press OK
4. Press v to indoor zone option, press ok
5. Press v to indoor status information press ok

All the sensors are listed including flow sensor.

Press return 4 times to return to normal screen.

## More advanced testing

In the service menu:

6. Press ok to wake the controller up.
7. Press ^ and v together for 6 seconds, password shows you need to set 0202.
8. Press >, then ^ twice, > twice, ^ twice then press OK
9. Press v 9 times to Self test mode, press >
10. You can see all the sensors on the unit at once

## Resetting the controller back to factory settings

1. Press ok to wake the controller up.
2. Press ^ and v together for 6 seconds, password shows you need to set 0202.
3. Press >, then ^ twice, > twice, ^ twice then press OK
4. Press v until you get to reset all service modes, press ok.
5. Erase all service modes, ok
6. Erase all service mode data, press ok
7. Initialize remote controller, press ok
8. The controller goes blank for 30 seconds and then wakes up completely blank but....
9. All field settings will still stay on the pcb.



### 00 shows on the remote controller

00 shows when the MIM control box is first powered up it means the MIM PCB has activated but no outdoor unit can be seen. Check the F1 F2 wiring is ok between the outdoor and indoor unit and check the outdoor unit has power.

### 01 shows on the remote controller

01 means that the remote controller has power and it can see the outdoor unit too, this is good, in a few seconds this will disappear.

### E911 low flow alarm

If your flow rate is good (see above) but you see an E911 low flow alarm you need to test your flow switch.

E911 is not a fault, it's a warning, it stops the unit because the water is moving too slowly through the system. With the pump running test the flow rate see page 21 and 22

If your flow rate is less than recommended you need to turn up the pumps, open any valves that might be closed, clean filters and get rid of any air. The unit MUST have the correct flow rate before it will try to run. Also check the flow switch is in the right way round (there is an arrow on it) and its plugged in.



### Cold Weather Protection, my unit won't start

Check the flow temperature see page 21. If this is below 10°C the compressor will not start.

#### **If you are commissioning the unit from cold**

You must warm up the water to get the unit to run, the easiest way to do this is to add a cylinder and use the immersion to warm up the cylinder first, the warm water from the cylinder will preheat the heat pump and it will start to operate.



## E904

Indicates a problem with the blue hot water cylinder sensor E904 only shows if field setting 3011 is set to 1 (unit has a hot water cylinder)

To test this sensor, press the **view button** until the tap icon appears, this will show the temperature its measuring, if this reading is -50 the sensor is not plugged into the yellow socket on the control box PCB

## E101, E102, E201

E101 shows on the indoor unit remote controller if the indoor unit cannot see the outdoor unit. E202 shows on the outdoor unit if it can't see the indoor unit This error appears if the power has been reset to either unit or the outdoor unit is not on.

First wait 3 mins to see if the error disappears, if not remove the cover of the outdoor unit (the one with Samsung written on it) and check the outdoor PCB display is lit up, If its not there is no power to the outdoor unit.

If there is power at the outdoor unit check F1 F2 cable is connected to the indoor PCB and the outdoor unit correctly, the cable must have no breaks or switches in it. If the cable is ok, it's possible one of the PCBs is at fault. The hardest thing for an engineer to do is work out which end has the communication error.

In the middle of the control box (indoor unit) PCB there are two LEDs, the red one shows the communication leaving the control box, the orange / green led shows the communication coming back from the outdoor unit. If there is a comms error E201 one or both of the LEDs will not be lit indicating which PCB is at fault.

## E919 legionella failure

If the cylinder does not reach the legionella set temperature in 8 hours, E919 shows on the screen. The immersion heater is switched off automatically. The unit stops. If you reset it (press on off) the unit will run for another week then trip again.

Check 3041 =1, 3042 = Wednesday, 3043 =3AM, 3044 = 60°C

Check the immersion works, check the tank sensor is in the tank 100mm and is above the immersion heater. Check the tank thermostat on the immersion is set to above 60°C.

Every Samsung heat pump fault code is now available on YouTube, search freedom heat pumps and the fault code and a simple to use video will show you what you need to know.



Below is a list of the components you will need to buy for each of the systems:

### Flexible hoses

The water connections to the back of the unit are 1 inch BSP male. We recommend connecting the water pipework with flexible hoses for ease of maintenance and to avoid any vibration from the unit going into the house. All external pipework has to be insulated to meet MCS standards.

### Mounting feet

The outdoor units need to be mounted 100mm above the ground, we recommend using rubber feet with unistrut channel. These come with mounting bolts included.

### An expansion vessel, pressure gauge, pressure relief valve and filling loop

In pressurised heating systems most, heating engineers use a Robokit which combines all these components into one box. The expansion vessel is sized the same way as when using a boiler. If you want to run the system open vented you don't need these components, the Samsung units are happy to run at anywhere from 0 – 3Bar pressure

### Pump

Your pump needs to supply 12l/min for the 5kW, 20l/min for the 8kW and 30l/min for the 16kW unit. Don't use a 15/60 pump use at least a 15/75 . As a rough guide.

Assuming you use a plate exchanger for heating, 2 zone valves and 6 elbows, a filter ball, flow meter and our 15-75 pump you can run measuring from the heat exchanger to the heat pump

20m separation on 22mm copper for the 5kW, 20 m separation on 28mm copper for the 9kW, 7.5m separation on 28mm copper for the 16kW

If you use a low loss header instead of a plate

30m separation on 22mm copper for the 5kW, 30 m separation on 28mm copper for the 9kW, 20m separation on 28mm copper for the 16kW

If your runs exceed this give us a call as you might need 2 pumps.

### Water Filter

In all cases a strainer needs to be installed in the return to the heat pump. The filters ensure that debris/foreign materials do not cause damage to the heat exchanger in the unit, voiding warranties.

### Flow switch and flow meter

The heat pumps have to have continuous uninterrupted flow at all times despite the loading on the system, it is ideal to have a hydraulic break in the system like a buffer or a low loss header. To measure that the flow is correct there is an ultrasonic type flow switch which needs to go into the primary pipework. The flow switch comes with the control box.

The flow switch is not IP65 rated (weatherproof) and so must not be installed externally. It can be installed in either horizontally or vertically with at least 150mm of straight pipe either side, connection is compression fittings. The wire is 1.5m long 4 core, it needs to connect into the PCB. This wire can be extended to suit.

We recommend a flow meter is installed in every system rated 0-40l/min



## Diverter valves

If you require domestic hot water and heating, 2 x 2 port diverter valves are required, you need to supply these and they need to be 28mm diameter.

## Glycol / anti-freeze

In Monobloc heat pumps the water goes outside the building. The unit can protect itself from freezing up, but if the power goes off there is a risk that the unit will freeze causing damage. To prevent this, we recommend putting propylene glycol mixture in the system. It is important that the glycol concentration is adequate to protect the unit, if the unit freezes up there will be no warranty. Manufacturer dependant, a mix of 25% is normal for UK conditions.

Adding too much glycol is not a good idea as it increases the water pump power and slightly reduces the capacity of your system.

## Heat meters

If you are using more than one heat source, heat pump + boiler you MUST measure the heat produced by the heat pump and the electricity used. This is essential for RHI. The heat meter goes in the return to the heat pump with a sensor in the flow. The electricity meter must measure only the power consumed by heat pump. See hybrid drawings.

## The Cylinder

If you want to heat water with a heat pump you need a dedicated heat pump cylinder.

The cylinder needs to be installed less than 15m from the control box to allow for the temperature sensor cable. Note the size and weight of the cylinder. Full installation instructions will be included with the cylinder.

Ideally Cylinders should only be used IF the coil area is more than 2.5m<sup>2</sup>. Smaller coils give very long recovery times and increase usage of the immersion heater. Cylinders can be pressurised or open vented. We can work out the run cost for you if you tell us the coil size.



### Power

The EHS system needs 2 power supplies:

**Outdoor unit**, 16 Amp for the 5kW, 20 Amp for the 8kW and 32 Amp for the 16kW.

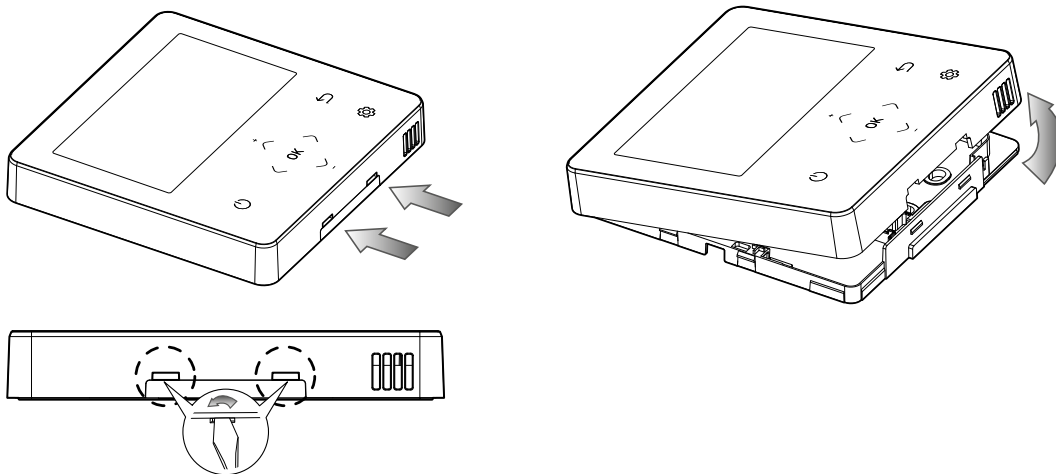
The control box needs a 16 Amp supply, this wires into the top of the breaker (MCB) in the box. Many people remove the MCB from the control box as there is already one in the distribution board. In this case wire Live to L1 and Neutral to N2.

The **Immersion heater** is connected into the control box terminals A3 Live and A4 Neutral; the control box controls the operation of the immersion heater. If a fused spur is used it must be labelled "do not turn off" as switching it off will cause an error.

**Communication cable** must be run from the outdoor unit terminals F1 F2 to the control box, terminals F1 F2. Use 2 core flex 0.5-1mm (its 16V AC). It must not have any breaks in it or switches.

**Remote controller** is normally installed next to the control box out of easy reach, it is mainly used for commissioning. You need to supply a 2 core 0.5 – 0.75mm 2 core flex from F3 and F4 in the remote controller to F3 and F4 in the control box. Maximum distance is 100m.

Push the two hooks at the bottom of the Wired Remote Controller at the same time, and then pull up the front cover to separate it from the rear cover



When you open the control box you will find all these wires:

The **red safety sensors** are not used and can be thrown away.

**Red and blue sensors ARE NOT INTERCHANGEABLE.**

The **black cable** with the red plug is not used and can be thrown away.

**The red, white and brown cables are not used throw them away**



The **blue cylinder sensor** plugs into a **yellow socket** CNS042 on the controller PCB and into the cylinder in the top ½ of the cylinder. **It must be installed above the immersion heater.** You must fix it so it can't be pulled out of the cylinder. Keep it well away from any mains cables.

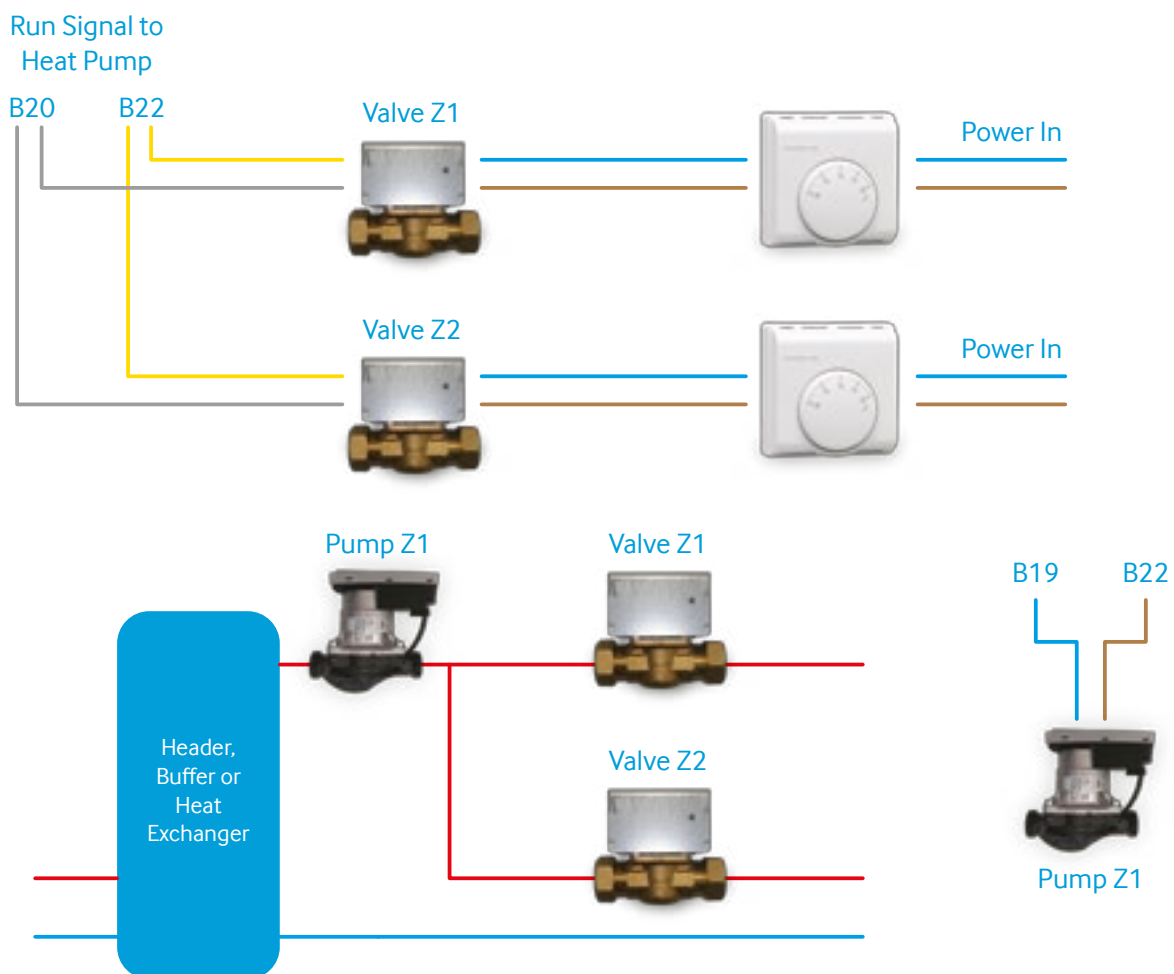


## Thermostats/ timers and under floor heating manifolds

The heating is controlled with a field supplied room stat / setback stat, time clock or a run signal from an under floor manifold. B20 is permanently 240V AC. The run signal goes into B22.

## When using multi zone heating systems on a header, buffer or HEX

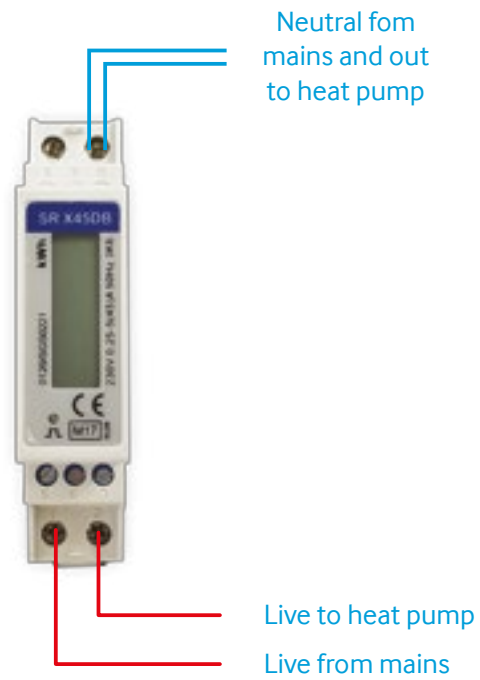
When the stat is made it will drive its zone valve open, inside the zone valve a switch links the orange to the grey wire when the valve is open. We connect the grey to B20 permanent live and the orange to B22, the run signal. So when the valves open the heat pump will run. **NOTE the pump will run on for 1minute after the unit is told to stop.** Hot water production is not affected and will always take priority.



## Pump

The circulation pump must be wired Live to B8 and Neutral to B7, MAX pump power is 115 watts. If two pumps are used DO NOT wire them both to these terminals, you MUST use a separate relay.

It is now a requirement to measure the electricity being used by the heat pump so the end user can see what the unit costs to run, although the unit can now estimate the energy used we always recommend 2 smart electric meters are used. Ideally it should measure the total draw for the heat pump (outdoor and indoor unit combined). The outdoor unit takes most of the current so in many installations it will only be used to measure the outdoor unit.





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