its™ heat pumps

Installation Manual

Domestic Heat Pumps

NOTICE

ITS recommends that the heat pump installation be done by a person with knowledge and experience in the field of plumbing and electrical. Installing the heat pump in a manor different from prescribed in this manual will render the warrantee on the unit null and void.

PLEASE NOTE THE FOLLOWING

- It is important to note that all installations must comply with ITS heat pumps manual. If this is not done, warranties will become null & void.
- All installation must strictly comply with the relavant SANS standards.
- This document may not in any way be duplicated and distributed without prior consent of ITS heat pumps.
- All the information in the manual remains the property of ITS heat pumps.

TABLE OF CONTENTS

1 SYSTEM OVERVIEW

ITS domestic water heating heat pump products are high efficiency state of the art technology designed to provide years of trouble free operation. Due to their high efficiency and low cost it will provide the customer with a renewable energy product that has a very short payback time and provide a superior long term saving. Our heat pumps have rapidly become the preferred solution for medium to high water consumption clients.

Integration techniques developed by ITS have made installation of these units on new and existing hot water storage tanks simpler than ever and have caused a serious reduction in installation time. For this manual we will focus on the ITS-4.7HDP and ITS-5HDP domestic heat pumps with build in circulation pump.

2 SAFETY PRECAUTIONS

Be sure to follow all of the safety precautions laid out below and any other precautions that are deemed necessary for the safe installation of this product. When in doubt, please follow all guidelines as stipulated by the SABS / SANS

2.1 Electricity

- Switch off the geyser electrical mains switch at the DB board and verify/test that it is off before working on or near the geyser.

2.2 Water

- Close the stop valve on the cold water line feeding the geyser.
- Check that the geyser drip tray is in good condition to avoid damage to the house ceiling or any other water damage.

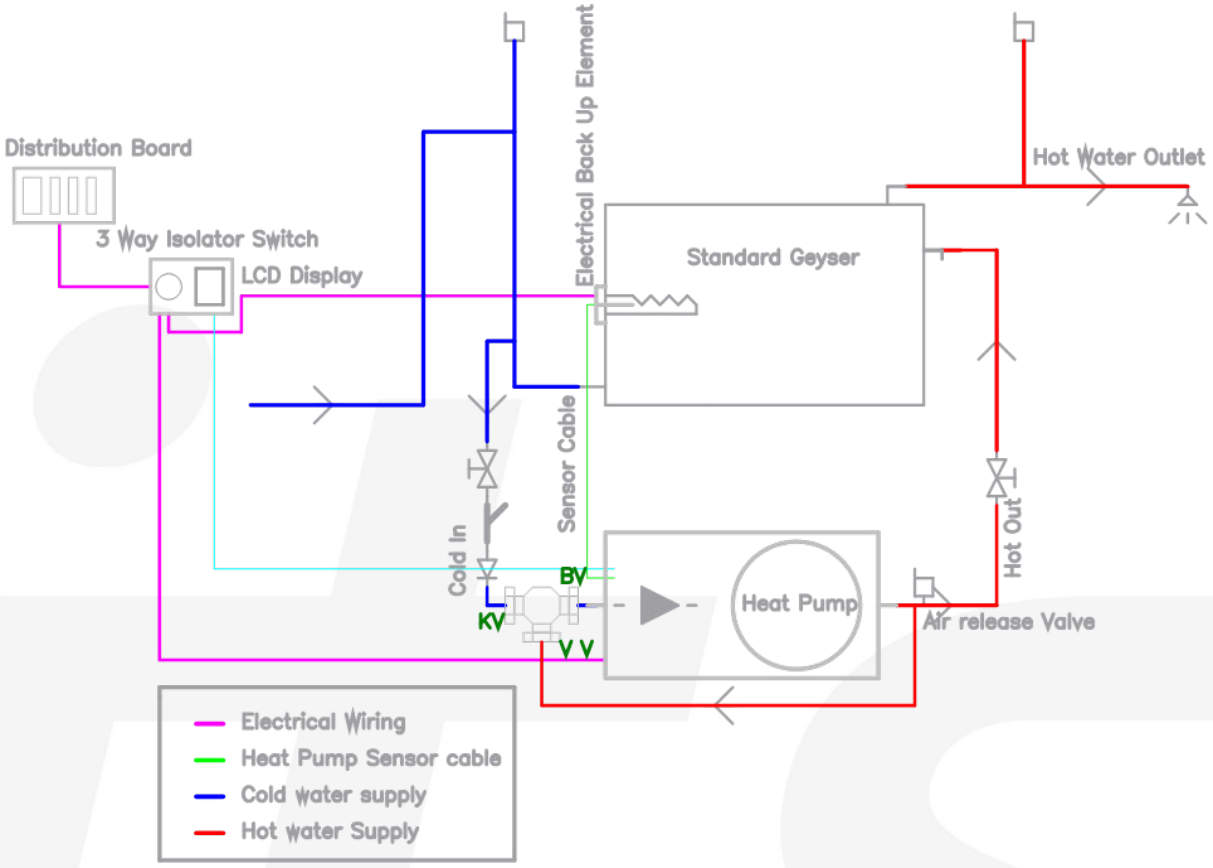
2.3 Transporting of the heat pump

- A heat pump should always be kept upright as indicated on the packaging. Permanent damage might result if the unit was transported or carried on its side or upside down.
- Take care when the unit is removed from its packaging to not damage the evaporator.
  It has thin aluminium fins that can easily be bent by pressing against it.
- The packaging has a peeping flap that can be used to see the refrigerant gas pressure in the unit.
- Always check before taking the unit to site to make sure the unit does not have a gas leak!

PLEASE NOTE

- ✓ **Always ensure the pressure gage shows that it is above 0.6MPa on the dial (R407c systems).**

3 HEAT PUMP INSTALLATION DIAGRAM AND PROCEDURE

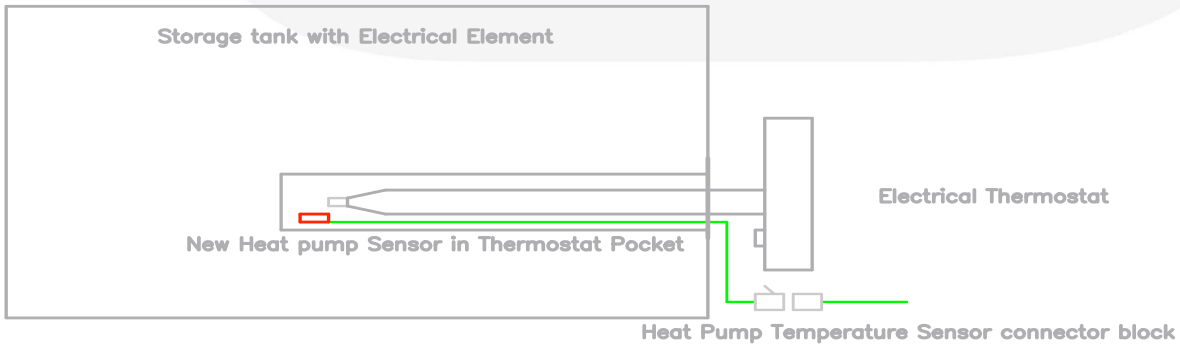


The schematics show the heat pump connected to a standard electrical geyser.

The loading valve ensures that the heat pump will always have an output water temp that is +-42°C or warmer no matter what the temperature of the cold water is.

PLEASE NOTE

- ✓ **This integration technique is patented and may not be used on any other heat pump brand - ZA Pat no. 2011/04587.**



The secondary diagram indicates the new ITS Heat pump sensor with the electrical thermostat.

This new sensor makes it possible to offer electrical element backup with ITS heat pump installations.

4 DOMESTIC HEAT PUMP PLACEMENT

- Always try and place the heat pump as close as possible to the geyser as this will minimize the thermal losses from the piping between the heat pump and the geyser.
- A maximum one way pipe distance of 15m is allowed but not ideal.
- Never install the heat pump in a roof as this will drastically cool the roof space and influence the unit's performance.
- It can either be mounted on the floor using the rubber feet provided with system or it can be mounted on a wall, using the brackets available from ITS heat pumps.
- The heat pump should be installed in places with sufficient space and good ventilation – the warmer, the better.
- If being installed near a wall, allow a gap of at least 0.3 meter for ventilation.
- During operation condensation water is discharged from the heat pump. This water must be channelled to a drain or garden.
- Make sure the unit is installed level (Make use of a spirit level)
- Do not install the heat pump where there is pollution, corrosive gas, or accumulation of dirt or fallen leaves. (if this is this case, ensure it is kept clean)
- Low level vibration noise is present and building structures might "amplify" this noise.

5 DOMESTIC HEAT PUMP – MOUNTING OPTIONS

5.1 Wall mounting

To mount the heat pump on a wall use the mounting bracket kit available from ITS.

- The mounting bracket pack consists of 16 pieces. 8 Pieces per leg of the mount.
- The Roll Bolts sizes are 14 mm
- A 14 mm drill bit can be used

- Inspect quality of masonry/brick work prior to any drilling
- Fix wall piece with Roll Bolts to the wall
- Insert Coil Spring Nuts into wall piece
- Line up coil spring nuts with holes of mounting arm
- Fasten tightly
- Ensure both arms are aligned and level
- Use a spirits level for this

Wall mounted

Floor mounted

5.2 Floor mounting

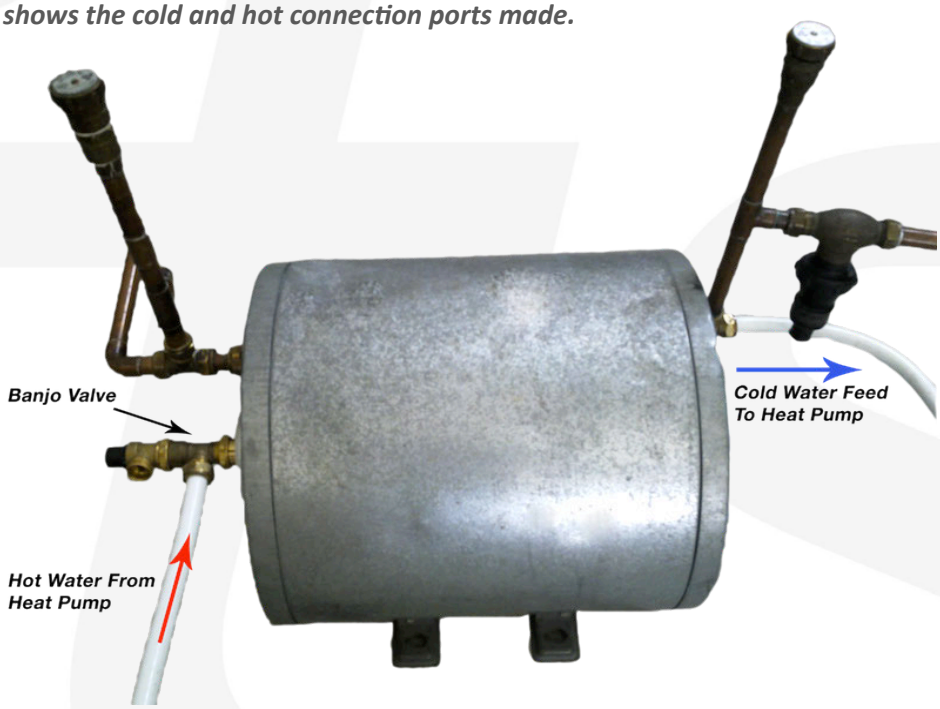
To mount the heat pump on a floor or flat roof simply use the rubber mounting feet included with the heat pump. Take care that the structure it is mounted too does not “amplify” the vibration of the unit.

6 PLUMBING AT THE GEYSER

6.1 Standard electrical geyser

- First close the main supply valve to the geyser, switch off the electric supply to the geyser and then depressurize the geyser by opening one of the warm water taps in the house.
- Two connection ports need to be added to the existing geyser.
- One is the cold connection that will supply cold (colder) water to the heat pump. This is simply made by using a 22mm T piece as shown on previous page.

The image below shows the cold and hot connection ports made.



- It is very important that this connection is made as close as possible to the geyser cold inlet port.
- The other is the hot connection where hot water from the heat pump will be fed into the geyser. This is made by installing a banjo valve as shown below.

6.1.1 Cold connection port

- The cold pipe connection to the geyser is made by simply connecting a 22mm T-piece to the cold water supply to the geyser (right above the drain cock).
- The hot pipe connection to the geyser is made by replacing the TP valve with a banjo TP valve with the same pressure rating.
- All piping must be properly thermally insulated.

6.2 Solar Geyser

For solar geysers use the exact same technique.

7 PIPING UP AND PRESSURIZING

The cold feed and hot return pipes between the geyser and the heat pump must be 22mm. Composite PEX piping is recommended but 22mm copper piping may also be used if preferred.

PEX may currently not be used outside.

7.1 Anti-siphon loops

Installing anti-siphon loops at the geyser is necessary to prevent heat from possibly siphoning away from the geyser when the heat pump is not operational. All piping must be fastened at regular intervals as required by relevant plumbing standards.

7.2 Circulation loop pipe Insulation

The quality of insulation on the heat pump circulation loop drastically influences the thermal performance of the system. It is critical (and a SANS requirement) to insulate the entire circulation loop with 3/4 inch or thicker ARMAFLEX (or similar) pipe insulation. Insulation material that will be exposed to the sun must be treated with a UV protective paint.

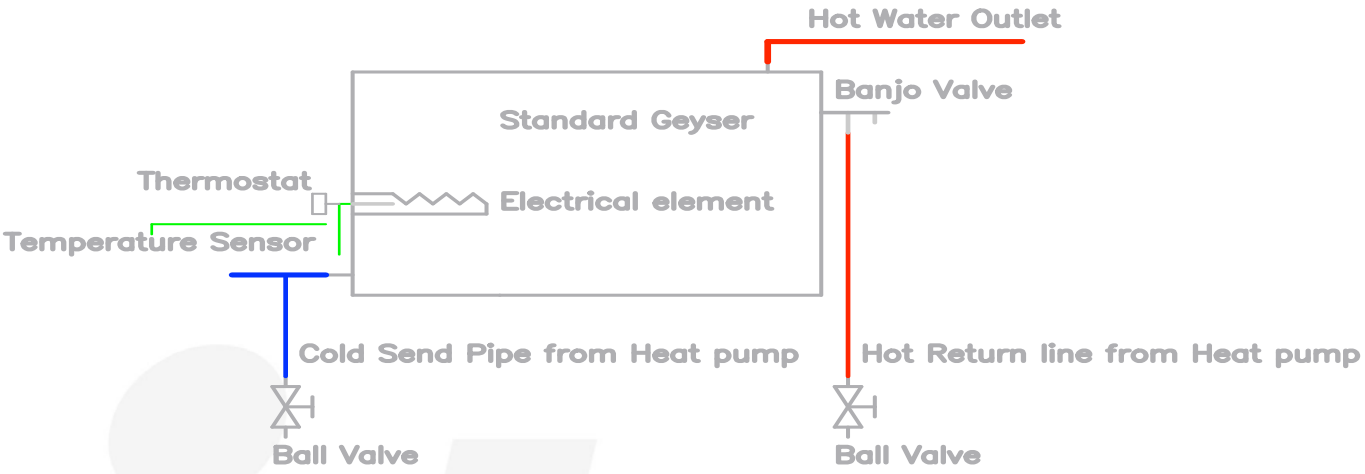
- Please use only pipe insulation material recommended or supplied by ITS.
- When using PEX pipe measure out the pipe length between the relevant port of the geyser and the heat pump including an anti-siphon loop that can be made by simply bending a loop into the pipe.
- Cut the pipe to this length and then slip on the pipe insulation before connecting the pipes.

7.3 Re-pressurizing the system

To minimize the chance of getting an EE1 error (high gas pressure due to air locks/lack of water flow) the first time the heat pump is started it is very important to follow the installation procedure as described here.

- After you have finished the plumbing at the geyser and slipped the insulation material onto the 2 pipes between the geyser and the heat pump, connect only the ball valves on the heat pump end of the pipes and close them.
- The main supply valve to the geyser can be opened.
- Now the cold send line ball valve at the heat pump side of the installation can be opened to bleed out all the air from this pipe.
- Thereafter open the hot return ball valve at the heat pump side of the installation and bleed out all the air.
- Inspect the installation so far for water leaks; paying special attention to all compression fittings.

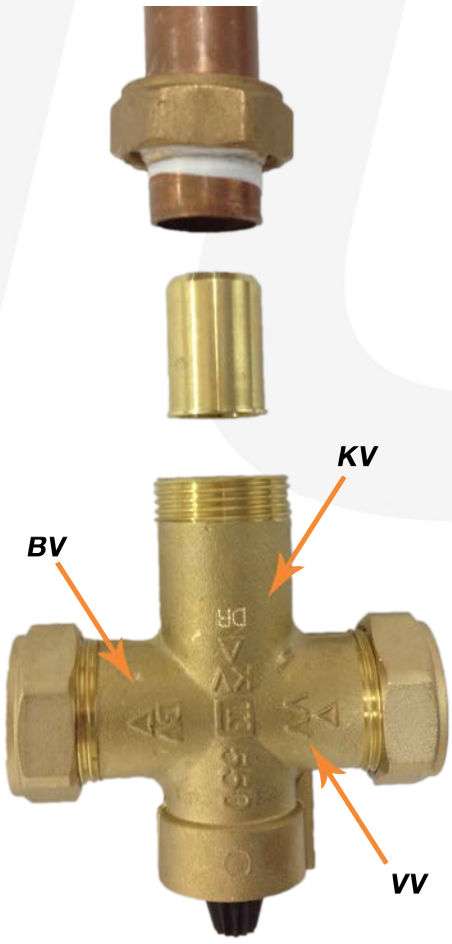
The diagram shows the installation up to now

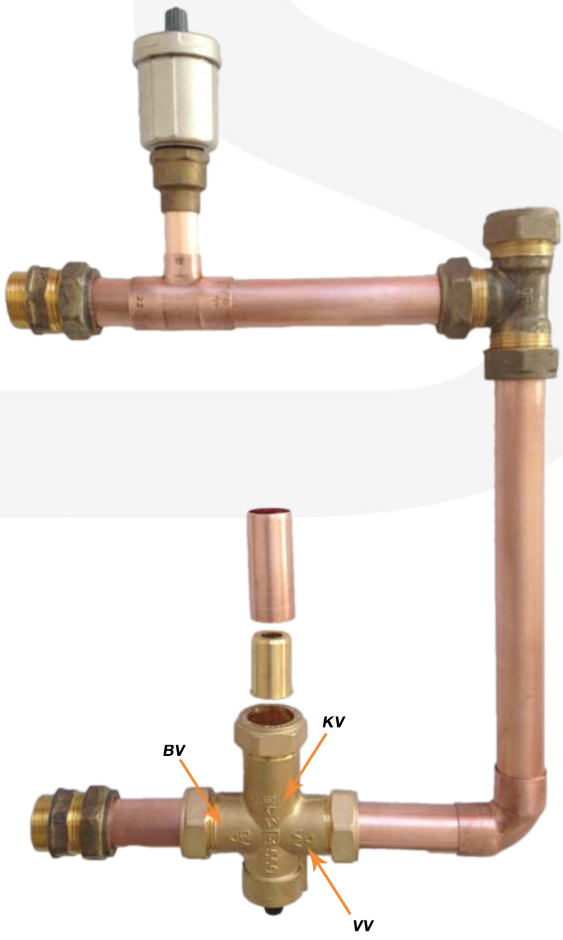


8 PLUMBING AT THE HEAT PUMP

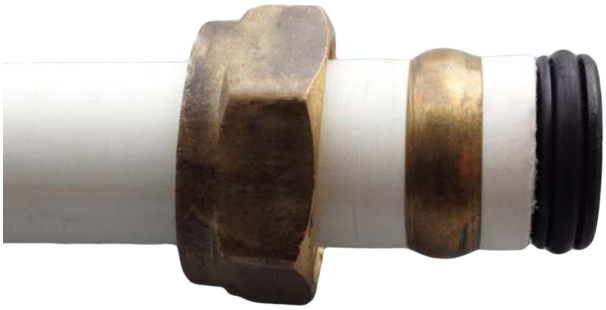
8.1 The loading valve

The loading valve is critical to the whole operation of the system and therefore care should be taken that it is installed correctly. The loading valve has three different connection ports and they are marked KV, BV and VV respectively. Please note that a y-strainer must me installed on the cold line before the loading valve.





Composite PEX Piping



- When using Composite PEX always use the end inserts supplied by the manufacturer as shown.

This photo shows how it should be done

8.2 Installing the loading valve

The air release valve must be installed on the hot outlet pipe as close as possible to the heat pump.

Please note that the black dust cap must be loosened otherwise it will not let air out.

The black dust cap should be left on to prevent dirt from getting into the valve but do not tighten it as this will close the valve off.

The image shows the installed loading valve that includes the inlet and outlet ball valves, air release valve and the Y-strainer on the cold inlet line.

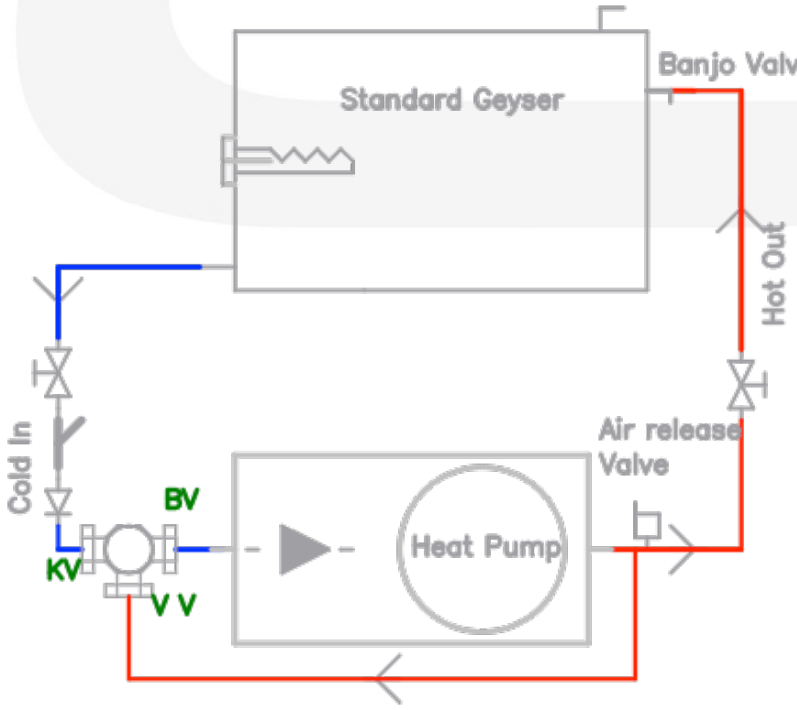
PLEASE NOTE

- **The loading valve is preset for the correct temperature.**
- **Should it be required, the loading valve can be adjusted but please first contact ITS about the correct procedure.**
- **Loading valve adjustment should only be done while no water is drawn from the geyser and the cold water in to the heat pump is below 30°C.**
- **Also the heat pump must be running for more than 15 minutes before any adjustments are made to ensure that the machine is warmed up properly.**
- **Also make sure that it is installed the right way around.**

8.3 Connecting the loading valve to the geyser piping

Special care must be taken that the hot and cold pipes are not accidentally swopped during installation as this will be difficult to detect after installation (the system will work but the geyser will only be able to provide about 50% of its normal hot water capacity due to mixing).

- First connect the cold send pipe ball valve to the Y-strainer at the cold inlet of the heat pump. The plumbing installation is therefore almost complete.
- Your installation should now be up to the point shown in the diagram below.
- Now open the cold side ball valve so that the cold water from the pressurized geyser forces all the air out of the heat pump and starts to run out the hot connection port (KV) of the loading valve
- Now the hot return ball valve may be connected to the heat pump thus completing the whole plumbing side of the installation.



9 CONTROLLER AND ELECTRICAL INSTALLATION

9.1 Connecting power to the heat pump

The unit can be connected to the geyser mains supply in the roof since the geyser element will now be disconnected from this. If the client requested the electrical element backup option then a selector switch must be installed with which the client can select to power either the element or the heat pump.

- Please make sure that there is no geyser element controlling device (ripple relay, load relay or timer) installed on this line as this will cause the power to the heat pump to switch off at times. Electrical regulations require an isolator switch mounted within reach from the heat pump.

- Please make sure the wiring complies with the latest regulations regarding household wiring and have the wiring signed off by an electrician with a wireman's license.

A dedicated breaker and line can also be installed by an electrician should this be preferred. The breaker needs to be slow re-act type.

- For the electrical switch over option, power needs to be taken from the existing electrical isolator in the roof to the switch over situated within reachable distance from the unit.

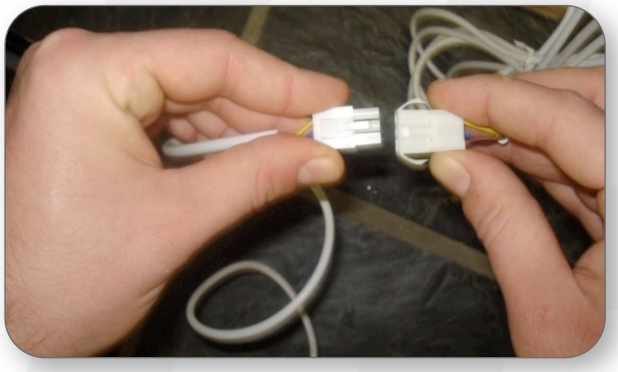
- From this point, power is taken back to the electrical geyser element as well.

- The switch will then allow you to choose to either supply power to the heat pump or the element. Thermostatic temperature control can be turned down to +- 50˚C.

9.2 Connecting the controller

The controller display module can be mounted anywhere the client would like it (in the roof, in the house or outside).

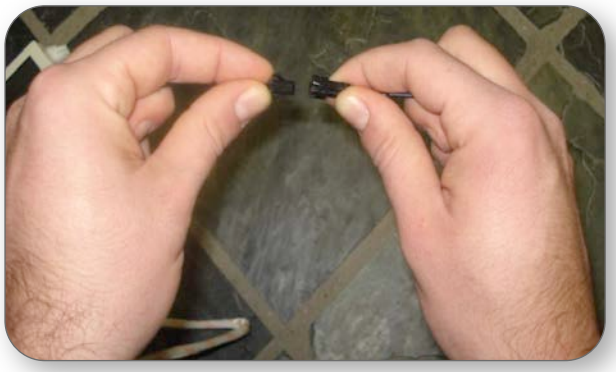
- We recommend that the controller be mounted right next to the heat pump.
- If the controller display is mounted outside it must be fitted in a weatherproof box.
- The heat pump comes standard with a 5m long controller display connection cable.
- Should a longer cable be required it can be ordered from ITS – 10m extension cable.
- ITS will not honour the guarantee if this extension is done without the extension cable supplied by ITS as it is polarity sensitive.
- Do not extend the connection cable beyond a total length of 15 meters.



- The controller display module has a small 3 pin plug that plugs into the 5m long cable from the heat pump.
- Please take care when connecting this connector as sometimes one of the pins get pushed back and will then not make contact.
- If this happens simply push this pin back in till it makes good contact.

- The photo shows the installed heat pump with a weather proof box for the electrical isolator switch as well as the controller display.

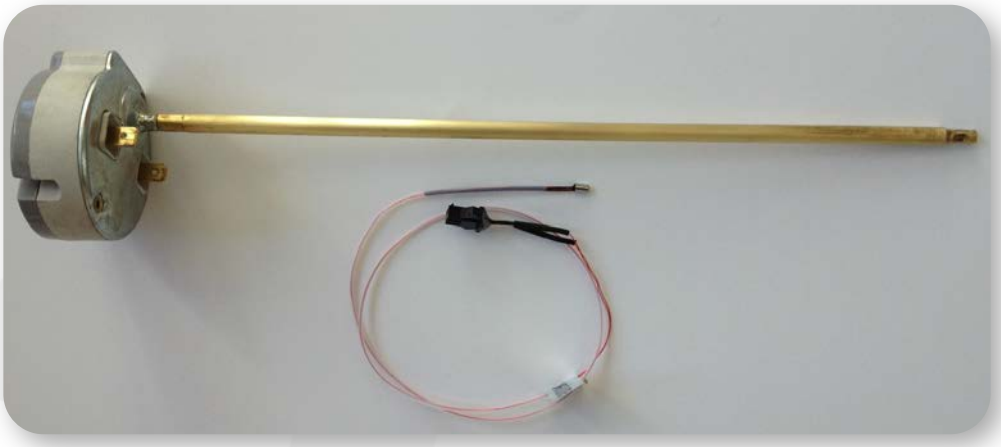
9.3 Temperature Sensor



- The heat pump comes with one geyser temperature sensor.
- This must be inserted into the geyser thermostat pocket.
- The sensor comes standard with a 5m long cable.
- This cable may be extended up to 15m using 0.5mm twin flex cable.
- The sensor does not have polarity.

9.3.1 Inserting the temperature sensor

Step 1 – Remove the thermostat



Step 2 – Insert the temperature sensor cable

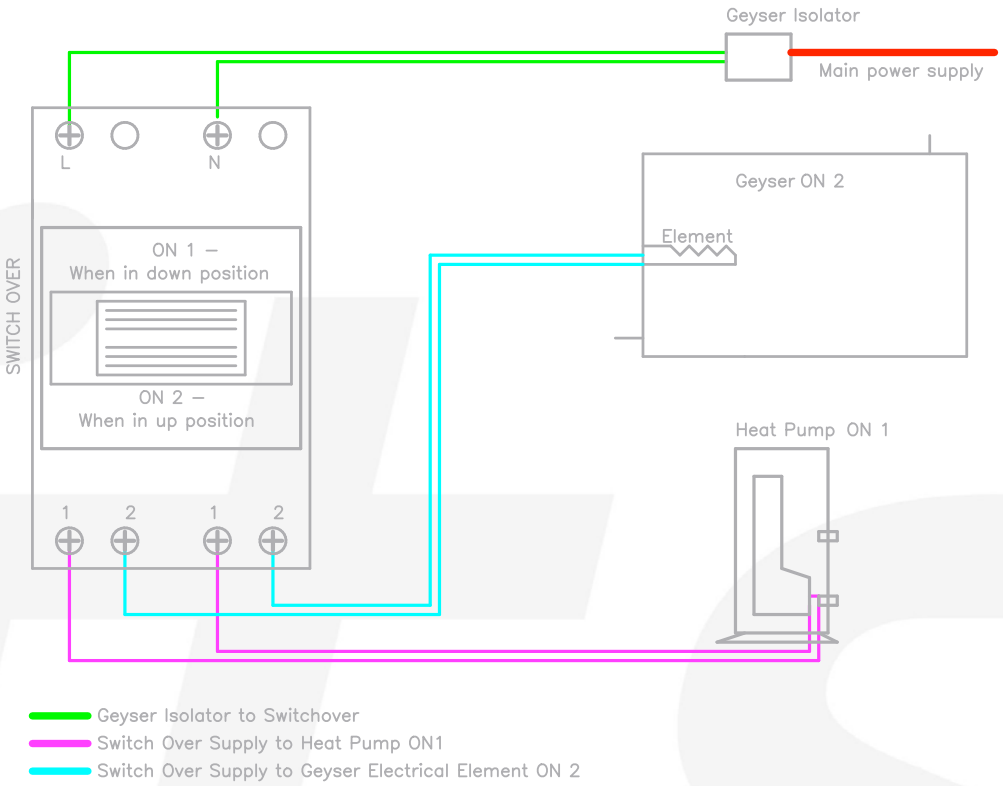
VERY IMPORTANT INFORMATION - CAUTION / TAKE CARE

- Remove the existing thermostat from the geyser.
- Insert the heat pump sensor in all the way.
- Holding the micro sensor cable on the side of the thermal well, slowly push the Thermostat back into position.
- A small amount of dishwashing liquid can be used to assist if needed.
- Secure the electrical Thermostat in place.

- Push the thermostat in all the way.
- Ensure that the Thermostat blades make proper contact.
- Now the temperature sensor wire can be connected to the heat pump extension cord.

9.4 Changeover Switch Connection

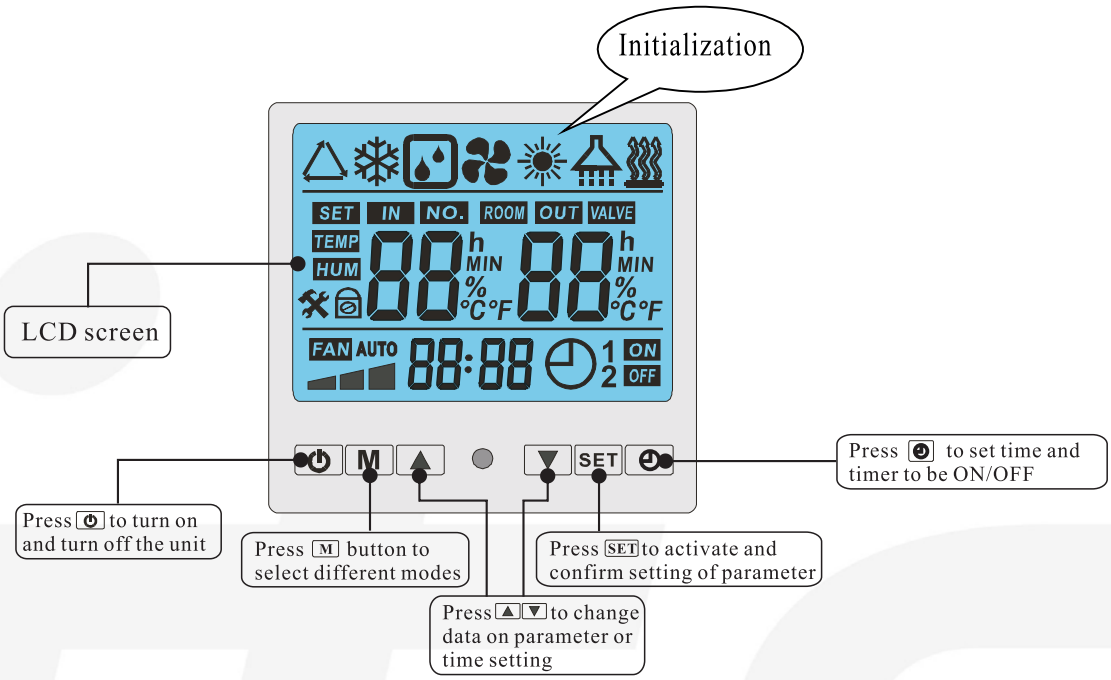
For electrical changeover from heat pump to the electrical element, the changeover switch in a IP65 weather box is available from ITS and is highly recommended.



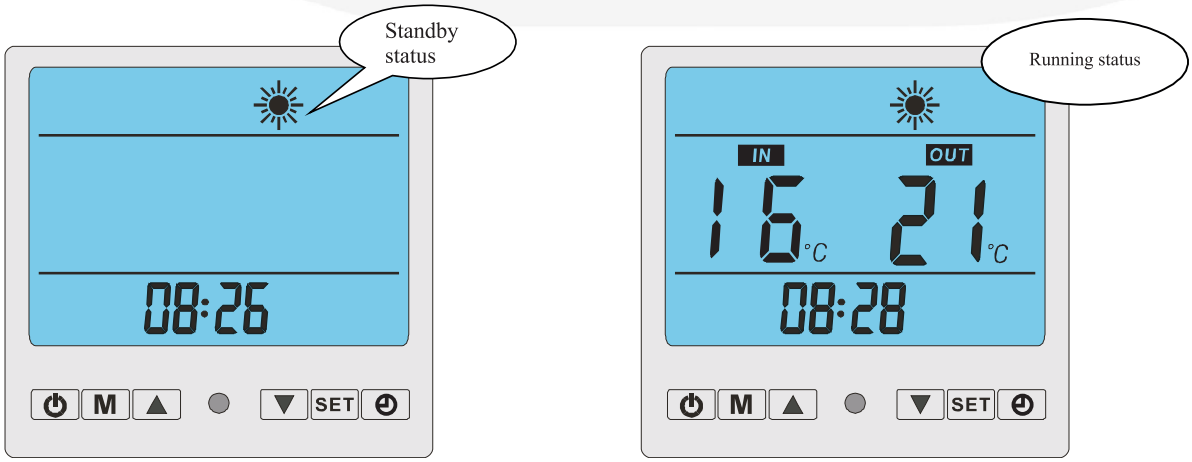
- The photo shows the changeover switch with the heat pump LCD controller in an IP65 weatherproof box.

10 SYSTEM COMMISSIONING

10.1 Controller



- When a heat pump is supplied with power, the controller will display the full screen. This shows that all segments are working on the display and power is connected.
- If all segments on the display stays on check the connections of the display cable.
- If nothing comes on or display shows EE8 then please check connections of communication cable.
- Under standby status – the controller displays the time and the running mode.
- Under the running status the controller displays the time, the water temperature in the tank and running mode.



10.1.1 Checking and setting heat pump default parameters

In Chapter 17 all default parameter for the heat pump are given.

- These need to be checked and set before switching on the heat pump.
- Please note that parameters for the old version and the new version of controller are given.
- The old version controller only displays one temperature while the unit is on while the new unit shows two temperatures on the display while the unit is running (as shown above).
- Normally the only parameters that need to be changed are the parameters shown in red but please also check that the other parameters are as they should be.
- To set any parameter press the up arrow till the parameter is shown.
- Then press "SET". The value of the parameter will now flash and can be adjusted using the up/down arrows.
- When done simply wait 10 seconds and the controller will store the new value.

10.2 Heat pump power on

- Before switching on the power please double-check all the connections.
- Also ensure that all maintenance valves are fully open.
- Most of the system commissioning involves the controller so –
- Please consult the controller manual and familiarize yourself with all of its functions and settings.

Air locks are one of the most common problems in the system, resulting in poor heat transfer and the system switching of due to hi gas pressure (EE1 error code).

- Please be aware that even with an Automatic Air Release Valve in the system the installer is still required to ensure that there is no air trapped in the piping.
- Following the procedure below will minimize the chance of getting an EE1 error at start-up.

- Without switching the heat pump on at the controller display, set parameter 9 = 0 and parameter 1= 10. In doing this you are setting the internal circulation pump to always ON while the heat pump is on but you have also set the desired temperature now to 10°C

- So when you switch the heat pump on now the compressor and fan will stay off while the circulation pump is running.

- With the circulation pump running you should feel the slight vibration of the pump on the pipe lines close to the heat pump and then also loosen the little black cap on top of the air release valve. Any air still in the system will now be pushed out and therefore you can start the heat pump without the risk of an EE1 error.

- While the pump is running it is also good to go and open and close a hot water tap in the house till all the air is out of the pipes.

- Once the air is out please set the controller parameters to the defaults required by ITS.

- Press the power button. The fan and the circulation pump will come on (if the geyser temperature is below 50°C) and the display will show the current temperature inside the geyser and the heat pump outlet temperature.

- After about 1 min the compressor will start and the unit will start to generate heat. After about another 2 min (allowing for cold start) you should be able to feel a temperature difference between the in and out ports right on the heat pump.

- The heat pump will heat the water internally till the outlet water is more or less 40°C. At this stage the loading valve will start to open and the hot water will start to move towards the geyser.

- By touching the hot side connection Banjo valve at the geyser you will detect this (If the geyser is very cold and the pipelines between the geyser and the heat pump is long this could take up to 10 minutes).

- Since the heat pump is loading the geyser with hot water from the top, at a very low flow rate when the geyser is cold, it will take quite long before the temperature sensor in the geyser sensor pocket detects any rise in temperature (the sensor pocket is positioned low in the geyser). This does however not imply there is no hot water available. The loading technique ITS developed is ensuring that hot water will be available in the minimum time.

- With a correctly installed and set loading valve heat pump output temperature as displayed should be about 50°C after about 15 minutes of operation (and with the cold water from the geyser being below 30°C).

10.2.1 Adjusting the set point temperature

The default temperature setting of the heat pump is 50°C and this should not be set higher than 53°C (R134 model can be set to 60°C).

- Please note that with the set point temperature at 53°C the loading valve will already be loading at about 60°C. To change the set point temperature:

10.2.2 Setting the time

- To set the time, consult the user manual supplier with the heat pump.

10.2.3 Time window

A single time window function is available on the unit. This can be used for example to allow the unit to come on only during the daytime. When the heat pump is mounted on the outside of a bedroom the client might prefer that the unit is inactive during the night time. ITS recommends that in most cases the time window function be left deactivated (on at all times).

- To set the time window, consult the user manual supplier with the heat pump.

- Once the time window is set the controller will display the on/ off signs as shown in the photo.

11 INSULATING ALL FITTINGS AND VALVES

Once again we cannot emphasize enough how important the thermal insulation of all the pipes and valves in this system is. Spending an hour on this and the required material, will drastically improve the overall system performance and have a big impact on the long term saving the client will have on electricity.

During the installation section we recommended that the pipes be lagged before it is installed as this greatly simplifies the process. Now all the other parts of the connection between the geyser and the heat pump must be insulated.

Insulating can be done by cutting open pipe lagging and wrapping it around all the open sections and fitting and them strapping or taping it on. Every single centimeter right up to the point where the fittings going into the geyser must be insulated since hot water will constantly be circulation through these sections.

All pipes outside the conduit must be copper even though it is insulated and therefore will not be exposed to UV. The current specification does not allow for PEX piping outside if not mounted inside a UV approved conduit.

The proper thermal insulation of the all pipe work including the loading loop and components thereof is absolutely critical.

Installed and lagged ITS heat pump. The lagging used in this installation has a wall thickness of less than ¾ inch and is therefore not allowed.

12 FAULTFINDING AND TROUBLE SHOOTING

At the end of the product manual that comes with every heat pump, there is a list of error codes and fault finding indicators. Please ensure you study these to become familiar with them.

- **When the heat pump shows an error code the main power to the heat pump must be switched off before the error will be reset.**

12.1 Most common faults

12.1.1 EE1 error

This refers to gas over pressurizing of the unit. In the manual a possible cause is the over filling of gas inside the unit. An EE1 error icon will appear when the heat created within the compressor cannot be transferred over to the water fast enough as a result of too little or no flow rate. This will cause the gas pressure to become too high and will result in the EE1 error appearing and the unit shutting down.

Should an EE1 error appears at the first start-up please first check for the stagnant circulation pump condition. The easiest way to do this is to set the set-point temperature (parameter 1 on controller) to 10 and the pump mode parameter (parameter 9 on controller) to 0. By doing this the heat pump fan and compressor will not come one but the circulation pump will be on as soon as the machine is switched on at the controller.

Now the machine can be switched on and then by carefully listening close to the water in and out ports of the heat pump you should here the spinning sound of the circulation pump. If the pump is running then set parameter 1 back to 53 and parameter 9 back to 1 and continue with further faultfinding.

12.1.2 EE8 error

This refers to communication problems between the display module and the heat pump.

- **Common cause:** Incorrect connection of cables at the connector block and /or that the actual cables within the connector block shifted backwards, not making proper contact.

12.1.3 Vibration noise

- **Common causes:** It is mostly caused by improper handling of the unit prior to installation and or not installing the unit level.

- **Result**: This can cause the rotating fan blade to touch the plastic casing or cause some of the soft copper piping inside the unit to shift and begin touching the compressor or the condenser.

- **Solution**: This can be rectified by either leveling the unit using a spirit level or, in the case of the soft copper piping, locating the points of contact and inserting a small piece of insulation foam between the 2 points.

PLEASE NOTE:

- ✓ **Under no circumstances must the heat pump be switched off for prolonged periods (periods more than 30 days) This might cause the internal circulation pump to get stuck! Should a client go away for longer, and then the timer can be set to go on for 1 minute every day. This will keep the heat pump consumption at close to nothing.**

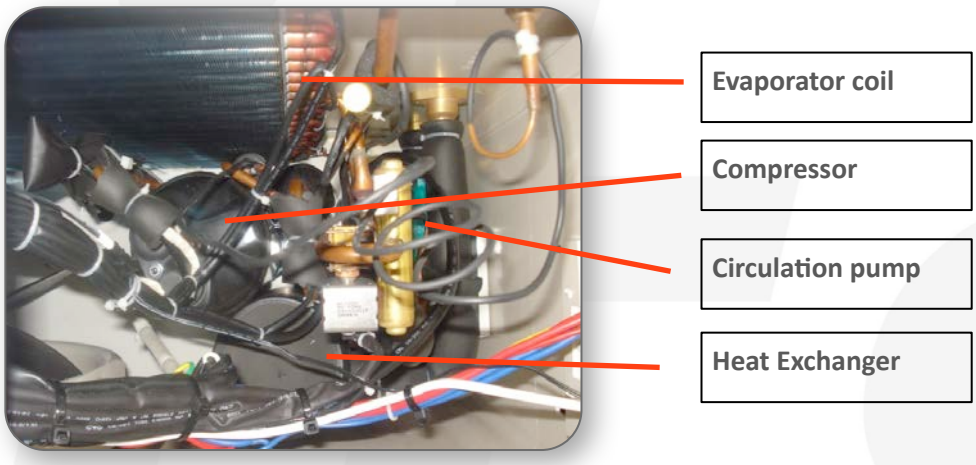
12.2 Rectifying a stagnant pump

PLEASE NOTE:

✓ **Always ensure that power supply to the heat pump has been turned off before opening the heat pump.**

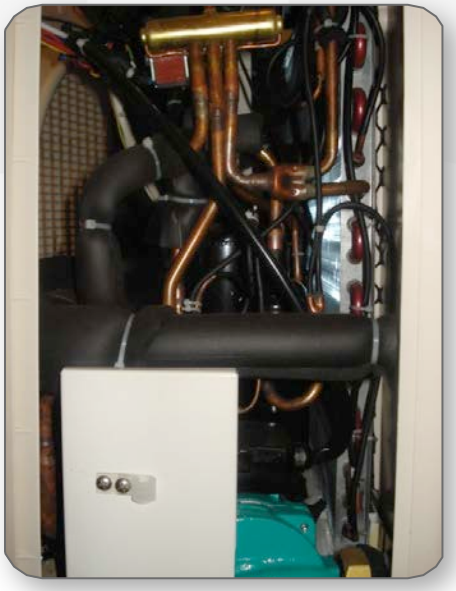
12.2.1 Top view of exposed heat pump components

From this viewpoint all pipe work can be viewed and should there be any form of Vibration, this would be the easiest viewpoint of locating the specific vibration



12.2.2 Side view of exposed heat pump components

Same applies for side view and more specifically for inspecting the Circulation pump. From this point it would be possible to fix or replace the problematic circulation pump components



12.2.3 Exposed circulation pump

- Picture indicates the circulation pump that has been loosened from the pump unions to allow access to the outlet port of the circulation pump.

Impeller access

PLEASE NOTE

- **When re-tightening pump unions, hand tighten only.**
- **Pressurize system to check for leaks.**
- **When you are 100% certain that there are no leaks, you can close the system up again.**

12.2.4 Exposed circulation pump

- A thin long hard object (thin screwdriver) can be inserted into the port point and used to turn the impeller and as a result loosen it.
- After this has been done return power to the unit while circulation pump is in this open position and start the machine as to allow the circulation pump to activate for plus/minus 10 seconds.
- This is to check that the impeller has been loosened effectively.

13 STANDARD ERROR CODES

The table below gives the meaning of the standard codes that may be displayed on the controller.

PP1	**Tank water temperature sensor failure or connection problem.**
PP2	**Outlet water temperature sensor failure**
PP3	**Coil temperature sensor failure**
PP4	**Return gas temperature sensor failure**
PP5	**Ambient temperature sensor failure**
PP6	**Discharge gas over temperature protection**
PP7	**Anti-freeze protection**
PP8	**Discharge gas sensor failure**
EE1	**High working gas pressure – water flow not enough**
EE2	**Low working pressure – possible gas leak**
EE3	**Water flow failure (swimming pool heat pumps)**
EE4	**Phase protection (3 phase models only)**
Defrost indication	**Busy defrosting**
EE8	**Communication failure between controller and display.**

14 SERVICING THE HEAT PUMP

When it comes to servicing of a heat pump this is relatively simple.

- An aircon technician can service these machines.
- The refrigerant type is indicated on the specification sticker on the side of the heat pump.
- Always ensure that the heat pump has sufficient gas. This can be seen on the pressure gage. It must always be above 0.5 MPa on the dial.
- Always ensure that the machine is kept clear of debris (front and back vents)
- Annual services are compulsory for the warranty and to be done by trained technicians.

15 ADVANCED RUST PROTECTION

BLUCHEM TREATMENT

The ITS 4.7HDP and ITS 5.0 HDP domestic heat pumps has plastic shells which makes the installation along coastal areas a lot less prone to corrosion.

However, the coil is still heavily exposed and for installations along the coast or near to the sea, ITS heat pumps highly recommend that you have the system coated with BluChem anticorrosion treatment.
Website: **http://www.bluchem.co.za**

The application of a high quality corrosive resistant coating such as Bluchem will:

- Cost a fraction when compared to replacement cost.
- Reduce electricity cost due to effective unit operation.
- Reduce discomfort due to loss of efficiency of unit.
- Reduced overall maintenance cost.
- Lengthen product life expectancy of the outdoor unit

16 WARRANTY

A) STANDARD TWELVE (12) MONTH WARRANTY EFFECTIVE FROM DATE OF PURCHASE

B) LIMITED EXTENDED TWO YEAR COMPRESSOR WARRANTY

C) LIMITED EXTENDED FIVE YEAR WARRANTY (ONLY ON REBATED SYSTEMS)

To view the full warranty, please visit our website – www.itssolar.co.za

17 SYSTEM PARAMETERS

Controller parameters

NB: The parameters in red are the ones that need to be edited depending on the model of the controller

Old controller - Single temperature on display

Parameter value information:

parameter	Description	Range	Default	parameter	Description	Range	Default
parameter 0	Reserved	1 - 30°C	15°C	**parameter A**	Fan motor working mode	0 - 1	0
parameter 1	Setting desired water temperature in water tank	10 - 60°C	**55°C**	**parameter B**	Target superheat setting	F - F	-3 to +3
parameter 2	Defrosting cycle	30 - 90 Min	45 Min	**parameter C**	manual control of EE valve	0 - 50	35
parameter 3	Temperature point of entering defrosting	0 - 30 °C	-7	**parameter D**	Temperature to start the electric heater	-5 ~ 10°C	5
parameter 4	Temperature point of stopping defrosting	2 - 30°C	13 °C	**parameter E**	Discharge gas temperature	-9 ~ 99°C	measured
parameter 5	Defrosting duration	1 - 12 min	8 Min	**parameter F**	System coil temperature	-9 ~ 99°C	measured
parameter 6	Reserved			**parameter 10**	Return-gas temperature	-9 ~ 99°C	measured
parameter 7	Memory recovery after power failure	0 -1	1	**parameter 11**	Ambient temperature	-9 ~ 99°C	measured
parameter 8	Electronic expansion valve control(manual/automatic)	0 - 1	1	**parameter 12**	Tank water temperature	-9 ~ 99°C	measured
parameter 9	Different working mode of water pump	0 - 1	1	**parameter 13**	Actual steps number of step motor in EE valve	0 - 50	measured

New controller - Dual temperature on display

Parameter	Description	Range	Default	parameter	Description	Range	Default
parameter 0	Return water temperature to start electrical heater	0-50°C	15°C	**parameter A**	Fan motor working mode 0=daytime working mode 1=night time working mode	0-1	0
parameter 1	Setting desired water temperature in water tank	10-60°C	**53°C**	**parameter B**	Target superheat setting	F-F	-3 to +3
parameter 2	Defrosting cycle	10-90min	45min	**parameter C**	Manual control of EE valve	10-50	35
parameter 3	System Coil Temperature point to start defrosting	0 - -30°C	-7	**parameter D**	Temperature to start the electric heater (ambient)	-5 ~ 10°C	5
parameter 4	System Coil Temperature point to stop defrosting	2-30°C	13°C	**parameter E**	Water temp. difference setting for heat pump restart-up	2 ~ 15°C	**3**
parameter 5	Defrosting cycle	1-12Min	8Min	**parameter F**	Inflowing water temperature	-9 ~ 99°C	measured
parameter 6	Heat Pump running controlled by (o- inflowing water temp. 1 – out flowing water temp.0	0-1	0	**parameter 10**	Out flowing water temperature	-9 ~ 99°C	measured
parameter 7	Memory recovery (Auto restart) after power failure	0-1	1 (yes)	**parameter 11**	System Coil temperature	-9 ~ 99°C	measured
parameter 8	Electronic expansion valve control(manual / automatic)	0-1	1 (yes)	**parameter 12**	Return Gas temperature	-9 ~ 99°C	measured
parameter 9	Different working mode of water pump	0-1	1	**parameter 13**	Ambient temperature	-9 ~ 99°C	measured
				parameter 14	Discharge Gas temperature	0-C7	measured