

*its*TM *heat pumps*

Product Manual Domestic Heat Pumps



A MESSAGE FROM ITS

Thank you for buying an ITS high performance heat pump. We would like to ensure you that you have made the right decision in selecting our heat pump and would like to wish you years of water heating savings. Please be sure to read this manual to familiarise yourself with the technology and the associated operation principles of it. Keep it in a safe place for future reference.

Best regards,

The ITS Team

PRECAUTIONS

WARNING

- Failure to observe a caution/ warning may result in injury or damage to the equipment.

WARNING

- All heat pumps are to be installed by an accredited ITS heat pump installer. Failure to use an accredited installed may result in the warranty being made null and void.
- All servicing conducted on an ITS heat pump must be carried out by an accredited installer.
- As a precaution, if you detect abnormalities such as a burning smell or abnormal noise, switch off the power supply and call your dealer for assistance.
- Do not insert fingers, rods or other objects into the air inlet or outlet/ fan covers. When the fan is rotating at high speed, it may cause injury as well as damage the heat pump.
- Never use a flammable spray such as hair spray, lacquer paint near the unit. It may cause a fire.
- Never inspect or service the unit yourself.

CAUTION



- Do not use the air source domestic water heat pump for any other purpose.
- Before cleaning the unit, be sure to first stop the operation of the unit and switch off the power isolating switch.
- In order to avoid injury, do not remove the front cover, lid or any other piece of the unit.
- Do not touch the heat exchanger fins. It can be damaged and can also cause lacerations to your limbs.
- The heat pump must be installed level either on the ground or on a set of brackets. Installing the unit on an uneven surface will result in excessive vibration and possible damage to the unit.
- All heat pump installations must be signed off by a qualified electrician and a qualified plumber.
- The heat pump can heat the water up to 60°C, so ensure that smaller children have supervision when they are operating the taps within your home.

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PLEASE NOTE THE FOLLOWING:

Dear customers, please read these instructions carefully upon having your heat pump installed. This will ensure that you are aware of how your heat pump works and give you a better understanding of the technology. Should you require any further information please contact your installer.



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1 ITS INTRODUCTION

ITS domestic water heating heat pumps are high efficiency state of the art technology designed to provide years of trouble free operation. ITS heat pumps are optimized for the highest possible efficiency and therefore provide a quick return on investment and a superior long term saving. Over the last few years ITS heat pumps have become the preferred renewable energy water heating solution. An unique integration technique developed by ITS have made the installation of these units on new and existing hot water storage tanks simpler than ever and have increased the hot water delivery capability drastically. This manual will focus on the domestic range of heat pumps.

2 PRODUCT INTRODUCTION

SAFE AND RELIABLE -

ITS heat pumps have been designed by a team of highly qualified engineers and boast many safety features ensuring reliable operation for many years.

QUIET OPERATION, AND AESTHETICALLY PLEASING

ITS Heat pumps are design for low operating noise and can be installed anywhere around the house.

USES UP TO 75% LESS HOUSEHOLD ENERGY IN HEATING YOUR WATER

Due to their amazing efficiency, ITS heat pumps will save you a lot of money each year.

CAN BE USED IN CONJUNCTION WITH SOLAR HEATERS

Solar water heaters and ITS heat pumps can be used in conjunction with one another creating a hybrid system.

ENVIRONMENTALLY FRIENDLY

ITS heat pumps use the natural energy in the ambient air and therefore seriously reduce the green house gas emissions associated with the use of electricity

FULLY AUTOMATED ANTI FREEZE FUNCTION

ITS heat pumps can operate in sub-zero temperatures and can defrost themselves automatically.

BEAUTIFUL FINISH AND SUPERIOR CORROSION RESISTANCE

ITS uses high purity metals and quality finishes in the manufacturing of our heat pumps to ensure the product will remain good looking even after many years and offer superior corrosion resistance.

5 YEAR WARRANTEE

ITS Heat pumps have a limited extended 5 year warranty and a full 1 year warranty. The system life expectancy is more than 10 years.



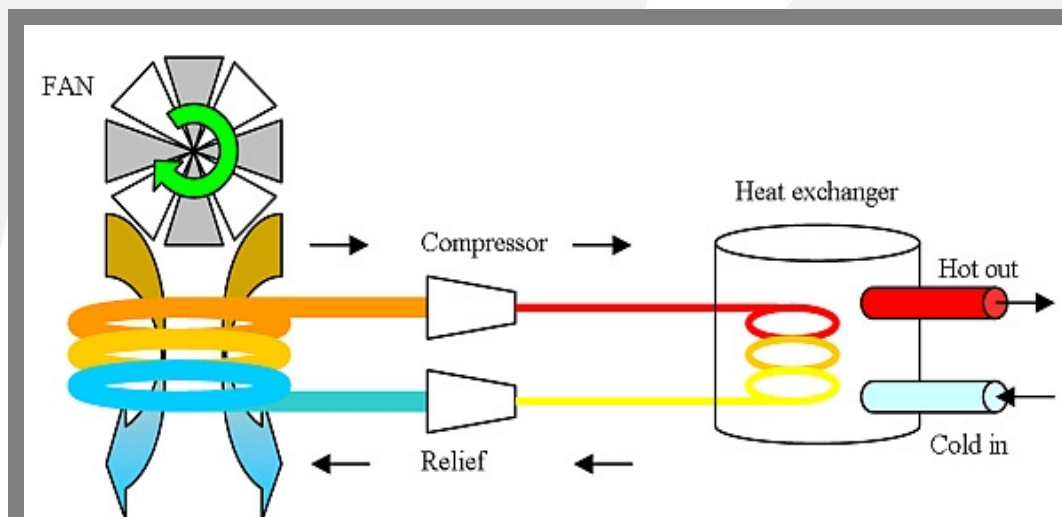
3 OPERATION PRINCIPLES

A heat pump works in the same manner as an air conditioner but in a reverse configuration. That is, instead of removing heat from your home and expelling hot air outside it absorbs heat from the air outside and uses this energy to heat water.

The modern domestic heat pump is a very efficient water heating device which uses a small amount of electricity to drive a compressor which forms the heart of the heat pump. The heat energy produced is as much as four times the electrical energy used to drive the compressor. This means that your electricity consumption for water heating can be divided by four (i.e. 75% saving).

The heat pump is not reliant on sunshine or direct radiation but can extract thermal energy from the surrounding air any time of the day or night. A heat pump therefore is a solar water heater but in an indirect way. Even in extremely cold conditions (sub 0°C) the heat pump can still provide a saving of more than 50%. In most cases in South Africa, where our daytime temperatures are relatively high, the efficiency is going to be at least 3 times that of an element heated water system. Even in the colder climates like northern Europe heat pumps are extensively used in domestic applications.

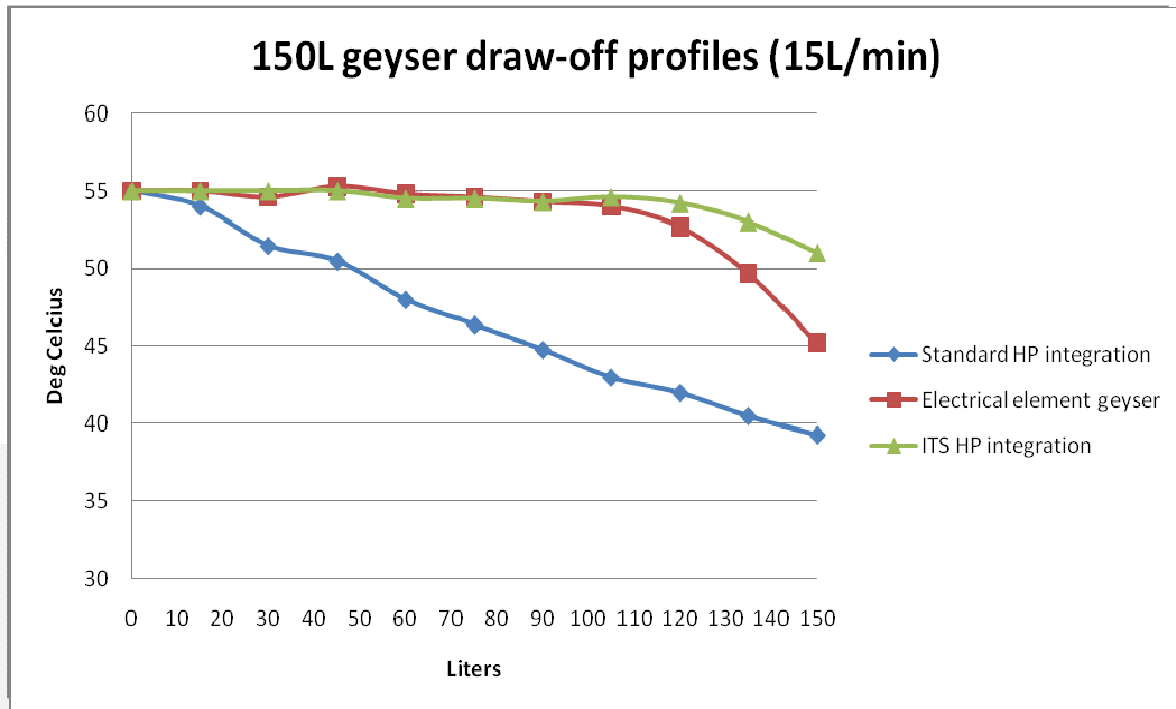
ITS heat pumps look similar to an air conditioner and can also be wall mounted. It is quiet and unobtrusive with a user friendly controller, has no greenhouse gas emissions and requires almost no maintenance.



4 ITS PATENTED INTEGRATION TECHNOLOGY

ITS have developed and patented an integration technique (ZA patent No 2011/04587) that enables our heat pumps to be connected to any existing geyser. This technique utilizes a loading valve and increases the hot water delivery capacity of the geyser. Most of the other integration techniques commonly used will cause up to a 40% decrease in hot water delivery capacity of the geyser. This is also one of the only installation techniques that requires no interference with the existing geyser and therefore does not affect the guarantee of the existing geyser at all. Another added bonus of this technique is that even if someone should completely empty the geyser there will be hot water available again after only a few minutes -this is especially great for people who enjoy a long hot bath and want to top up the heat from time to time.

Below is a graph showing the measured hot water draw-off temperature values of a standard 150L electrical geyser. The 3 different sets of measurements were done on the same 150L geyser but with 3 different heating methods. The graph called “Standard HP Integration” is the data with a heat pump connected in the standard way that most other companies are doing it. The graph called “Electrical element geyser” is the data with no heat pump connected and the standard electrical element doing the heating. The graph called “ITS HP integration” is the data with the heat pump connected using the Integration technique developed by ITS.



In all three cases above the geyser was heated to 55 °C and then the hot water from the geyser was used at 15L/min while measuring the temperature of the water. On the graph it can clearly be seen that when using the standard way of integrating the heat pump the temperature almost immediately starts to drop as water is being used.

Practically, if for example the user was taking a shower, he would have to from time to time adjust the taps to maintain the same temperature of water in the shower. Also it can be seen that after about 80L are used the water gets to the temperature where the client will consider the water to be too cold.

The graph also shows that with the electrical element heated geyser almost the whole 150L is available for use. This is what you would expect from a SABS approved geyser. Then when the ITS heat pump integration is used with an ITS heat pump, the graph shows the geyser has got even more hot water available than what the electrically heated geyser.

CONCLUSION:

From the above graph it is clear to see that using the ITS heat pump integration technique provides the user with the most usable hot water and therefore it is also easy to understand why many people have in the last years moved over to ITS heat pumps.

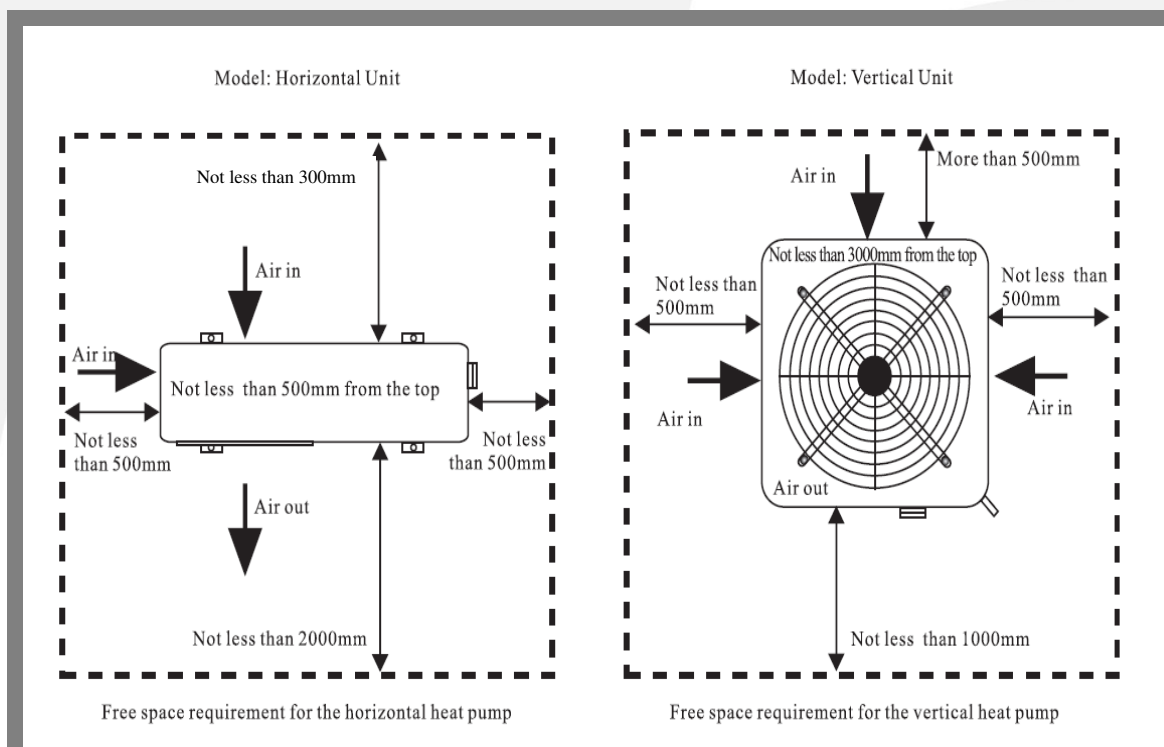
5 PERFORMANCE DATA

code		ITS-3HD	ITS-4.7HDP	ITS-11.8HD	ITS-17VD	ITS-24.5VD3
Rated Heating Capacity	W	3000	4700	11800	17000	24500
Power Supply	V/PH/HZ	220V/1/50HZ				380V/3/50HZ
Input Power	KW	0.75	1.17	2.95	4.25	6.1
Running Current	A	3.5	5.8	14.1	20	9.3x3
Casing		metal	plastic	metal	metal	metal
Refrigerant		see label	see label	see label	see label	see label
Circulation pump		Internal pump	Internal pump	none	none	none
Ambient operating temperature range	deg C	0 - 45 deg	0 - 45 deg	0 - 45 deg	0 - 45 deg	0 - 45 deg
Hot Water Generated	L/h	75	110	325	475	650
Thermostat Factory Setting	°C	50°C				
Maximum water outlet temp.	°C	60°C				
Water Connections	inch	3/4"	3/4"	1"	1"	1"
Fan Motor Input	W	80	90	100	220	220
Fan Speed	RPM	900	900	920	830	830
Noise	dB(A)	52	52	52	58	58
Net Dimension	L	760	960	1110	670	670
	W	260	360	470	660	660
	H	620	600	690	960	960
Packing Dimension	L	830	980	1165	740	740
	W	308	400	485	700	700
	H	625	690	820	990	990
Weight	Net Weight	37	48	99	118	123
	Gross Weight	41	55	114	126	132

6 INSTALLATION SPACING

Always try and install 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.

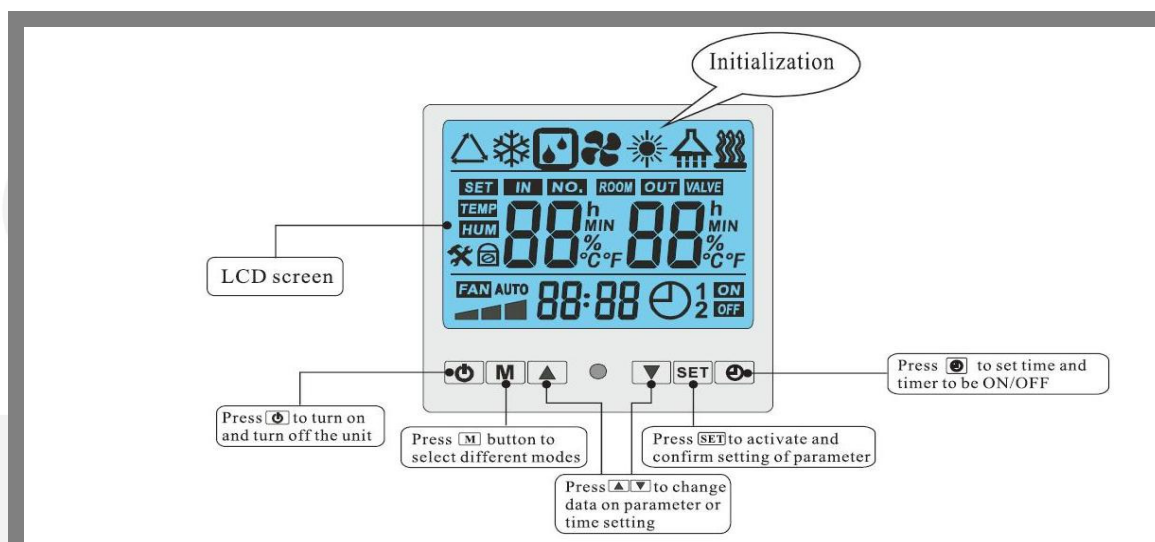
- Never install the heat pump in a roof as this will drastically cool the roof space and influence the unit's performance.
- The heat pump can either be mounted on the floor using the rubber feet provided with it or it can be mounted on a wall, using the brackets available from ITS Solar.
- The heat 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 metre for ventilation.
- During operation condensation water is discharged from the heat pump. This water is very clean and can be channelled to a drain or garden.
- Make sure the unit is installed level.
- Do not install the heat pump where there is pollution, corrosive gas, or accumulation of dirt or fallen leaves as this might block or damage the unit.
- Low level vibration noise is present and building structures might "amplify" this noise.



7 SYSTEM OPERATION

ITS heat pumps are equipped with a state-of-the-art digital controller. The controller is pre-programmed by the installer and automates all the heat pump functions. The controller also has extensive system diagnostics and will display a relevant error code should an error occur.

Below is an image of the controller's digital display user interface.

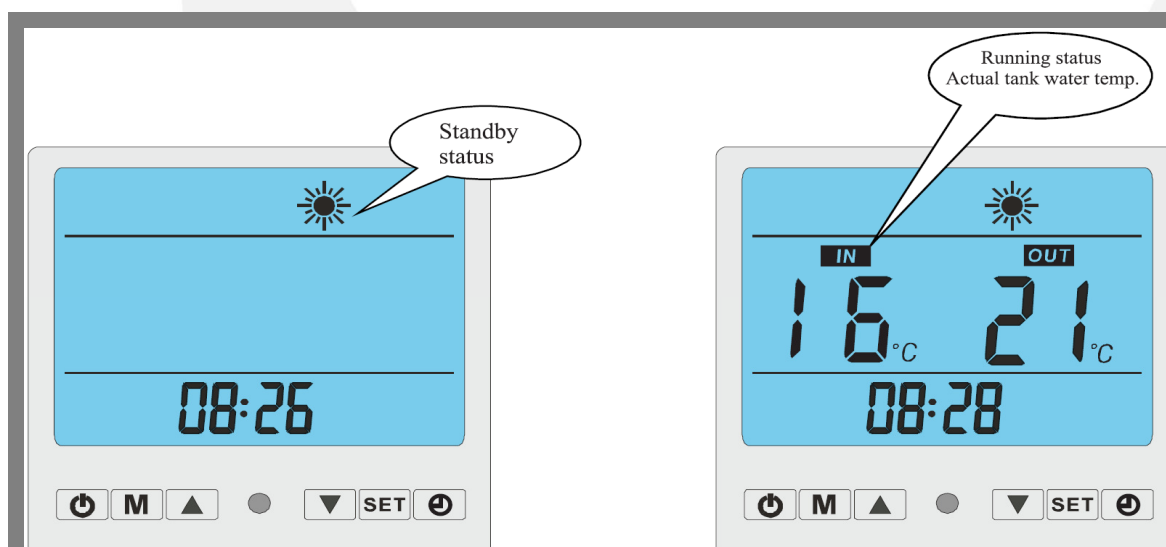


7.1 HEAT PUMP POWER ON

When the power to the heat pump is switched on the controller will display the full screen for a few seconds. This shows that all segments are working on the display and power is connected.

When the heat pump is in standby (off) mode the controller displays only the time and not any temperatures. This is shown in the left side image below. To switch the heat pump on press the power on button on the display.

When the heat pump is in running (on) mode the controller displays the time, the water temperature in the bottom of the tank and the temperature of the water out of the heat pump. This is shown in the right side image below.



7.2 HEAT PUMP OPERATION LOGIC

The “IN” temperature as displayed on the controller display is the temperature as measure by a heat pump sensor installed in the bottom of your geyser. The controller has been programmed to start heating the water in the geyser as soon as the “IN” temperature falls below 50°C. The heat pump will then heat the water till the “IN” temperature reaches 53°C and automatically switch off the heating process. Only once the water in the bottom of the geyser has again cooled down to below 50°C will the heat pump start heating again.

Please note that due to the patented loading valve technique used on ITS heat pumps the upper section of the geyser will already be at 60°C when the bottom of the geyser reaches 53°C.

The heat pump geyser temperature sensor is mounted in the bottom of the geyser (geyser thermostat pocket) which is close to where the cold water inlet of the geyser is. This is ideal since it enables to the heat pump to quickly detect when water is being used and start the heating process.

Please note that because the geyser temperature sensor is situated close to the cold water inlet port of the geyser it will not give an accurate temperature reading of the water at the hot outlet of the geyser. The sensor might be reading only 20°C but the water available from the taps could still be close to 60°C.

The following points describe in more detail the heating process:

- When the “IN” temperature fall below 50°C the controller will activate the internal fan and water circulation pump.
- After about 1 minute the compressor will start and the unit will start to generate heat.
- The heat pump will first re-circulate water through itself via the loading valve till the outlet water is more or less 50°C. At this stage the loading valve will start to open and the hot water will start to move towards the geyser.
- Since the heat pump is loading the geyser with hot water from the top it is normal for the “IN” temperature display to take long before showing any increase in temperature. This does however not imply there is no hot water available. The ITS loading technique is ensuring that hot water will be available within minutes from switching on.
- During certain operating conditions the heat pump might switch off the fan and only let the compressor work.
- When the “IN” temperature reaches the set point temperature (53°C) the heat pump will first switch off the internal compressor. The fan will run for another 30 seconds and the circulation pump for another 60 seconds.

7.3 ADJUSTING THE SET POINT TEMPERATURE

The installer will set the set-point temperature to 53°C. As stated before, a set-point of 53°C will result in an outlet water temperature of about 60°C. **Under no circumstances should the set-point be set higher than 53°C** as this will drastically increase the chance for an EE1 error in future and it also reduce the electrical saving you will make. The set-point may be reduced should you find that the water is warmer than needed. Reducing the set-point temperature will improve the electrical saving. To change the set point temperature:

- Press the up arrow twice (display will show parameter “1” and the current set point temperature).
- Press “SET” - Temperature Flashes on right hand side.
- Adjust temperature to desired degree using up/down arrow.

7.4 SETTING THE TIME

To set or adjust the time displayed on the controller display, follow these steps:

- Press **SET** to activate time setting.
- When hour display is flashing, move “**Up**” or “**Down**” to adjust. Fix and confirm setting by pressing **SET** again.
- When minute display is flashing, move “**Up**” or “**Down**” to adjust.
- To fix and confirm setting press **SET** again.

7.5 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 it might be preferred 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 activate and adjust the time window:

- Press “clock” to activate time setting for **ON**. 00:00 and **ON** icon will be flashing together.
- Press “clock” again, controller displays with flashing hour and **ON** icon only, move “**Up**” or “**Down**” to adjust. Press clock again to fix the hour on the timer to start the unit.
- Do the same to set the Minute timer.
- After **TIMER ON** is completed, press “clock” to activate **TIMER OFF** setting. 00:00 and **OFF** icon will be flashing together. Set and operate in the same way as above.
- Press “clock” for final confirmation.
- Controller will display with the “**ON**” and “**OFF**” symbols if the timer has been set.

To cancel the time window:

- Press “clock” to activate timer. **ON/OFF** will both be flashing.
- Press **SET** to cancel timer.
- When the “**ON**” and “**OFF**” symbols are not displayed on the controller the timer has been cancelled.

8 STANDARD ERROR CODES

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

The most common error code is EE1. If for example the municipal water pressure drops, your heat pump controller may display an EE1 error code. To fix this all you need to do is switch the mains power off and then on again. This will reset the error and let the heat pump work again. Should the conditions that caused the heat pump to give an EE1 error still remain the heat pump will try 3 times after which it will again shut down and show EE1 on the display. In this case please call your installer.

PP1	PP1 Tank water temperature sensor failure or connection problem.
PP2	PP2 Outlet water temperature sensor failure
PP3	PP3 Coil temperature sensor failure
PP4	PP4 Return gas temperature sensor failure
PP5	PP5 Ambient temperature sensor failure
PP6	PP6 Discharge gas over temperature protection
PP7	PP7 Anti-freeze protection
PP8	PP8 Discharge gas sensor failure
EE1	EE1 High working gas pressure - water flow restriction
EE2	EE2 Low working pressure - possible gas leak
EE3	EE3 Water flow failure (swimming pool heat pumps)
EE4	EE4 Phase protection (3 phase models only)
Defrost Indication	Busy defrosting
EE8	Communication failure between controller and display.

9 STANDARD CONTROLLER PARAMETERS

Parameter	Description	Range	Default
parameter 0	Return water temperature to start electrical heater	0-50 °C	15 °C
parameter 1	Setting desired water temperature in water tank.	10-60 °C	53 °C
parameter 2	Defrosting cycle	10-90min	45min
parameter 3	System Coil Temperature point to start defrosting	0 - -30 °C	-7
parameter 4	System Coil Temperature point to stop defrosting	2-30 °C	13 °C
parameter 5	Defrosting cycle	1-12Min	8Min
parameter 6	Heat Pump running controlled by (o-inflowing water temp. 1 - out flowing water temp.0	0-1	0
parameter 7	Memory recovery (Auto restart) after power failure	0-1	1 (yes)
parameter 8	Electronic expansion valve control(manual / automatic)	0-1	1 (yes)
parameter 9	Different working mode of water pump	0-1	1

	Description	Range	Default
parameter A	Fan motor working mode 0=daytime working mode 1=night time working mode	0-1	0
parameter B	Target superheat setting	F-F	-3 to +3
parameter C	Manual control of EE valve	10-50	35
parameter D	Temperature to start the electric heater (ambient)	-5 - 10 °C	5
parameter E	Water temp. difference setting for heat pump restart-up	2 - 15 °C	3
parameter F	Inflowing water temperature	-9 - 99 °C	measured
parameter 10	Out flowing water temperature	-9 - 99 °C	measured
parameter 11	System Coil temperature	-9 - 99 °C	measured
parameter 12	Return Gas temperature	-9 - 99 °C	measured
parameter 13	Ambient temperature	-9 - 99 °C	measured
parameter 14	Discharge Gas temperature	0-C7	measured
parameter 15	Real time paces of EE valve	10-50	measured

10 SERVICING THE HEAT PUMP

ITS heat pumps are designed to be virtually maintenance free but due to external factors (water quality, air quality, accumulation of dirt or leaves on the evaporator) the units need to be serviced at least one per year. The service mostly entails the cleaning of certain components and making sure all parameters are within specification thereby ensuring that the machine will have a long lifetime. When it comes to the servicing of an ITS heat pump, this must be done by an accredited ITS installer. Failure to have the unit serviced by an accredited ITS installer may result in the warranty being made null and void.

LOOKING AFTER YOUR HEAT PUMP

- Always ensure that your heat pump is kept clean of debris (leaves and other items) which may obstruct the inlet / outlet vents.
- Always ensure the unit is switched off when you wish to remove items which are stuck in the vent etc.
- Should you wish to go on holiday for periods longer than 2 - 3 months, it is always recommended that you set the timer to switch the unit on for a few minutes every day. Doing this will prevent the pump from becoming stagnant.
- Keep shrubs pruned back at least 50cm around all sides of the heat pump.
- We can't re-iterate it enough how important it is for you to have your heat pump serviced at least once a year. This will prolong the life span of the heat pump ensuring you are guaranteed years of water heating savings.

11 ADVANCED RUST PROTECTION

BLUCHEM TREATMENT

The ITS 4.7kW domestic heat pump has a plastic shell which makes the installation along coastal areas a lot less prone to corrosion. The evaporator coil however is still exposed and so for installations along the coast or near to the ocean (20-35km radius) ITS Solar highly recommend that all heat pumps be coated with BluChem or other ITS approved anti-corrosion coating.

For more information on BluChem please visit: www.bluchem.co.za

The application of a high quality corrosive resistant coating such as BluChem will -

- Reduce electricity cost due to effective unit operation.
- Reduced overall maintenance cost.
- Lengthen product life expectancy of the outdoor unit.

12 WARRANTY

All ITS heat pumps come with a standard twelve month warranty and a limited extended five year warranty effective from the date of purchase. To view the full warranty, please visit our website - www.itsolar.co.za

