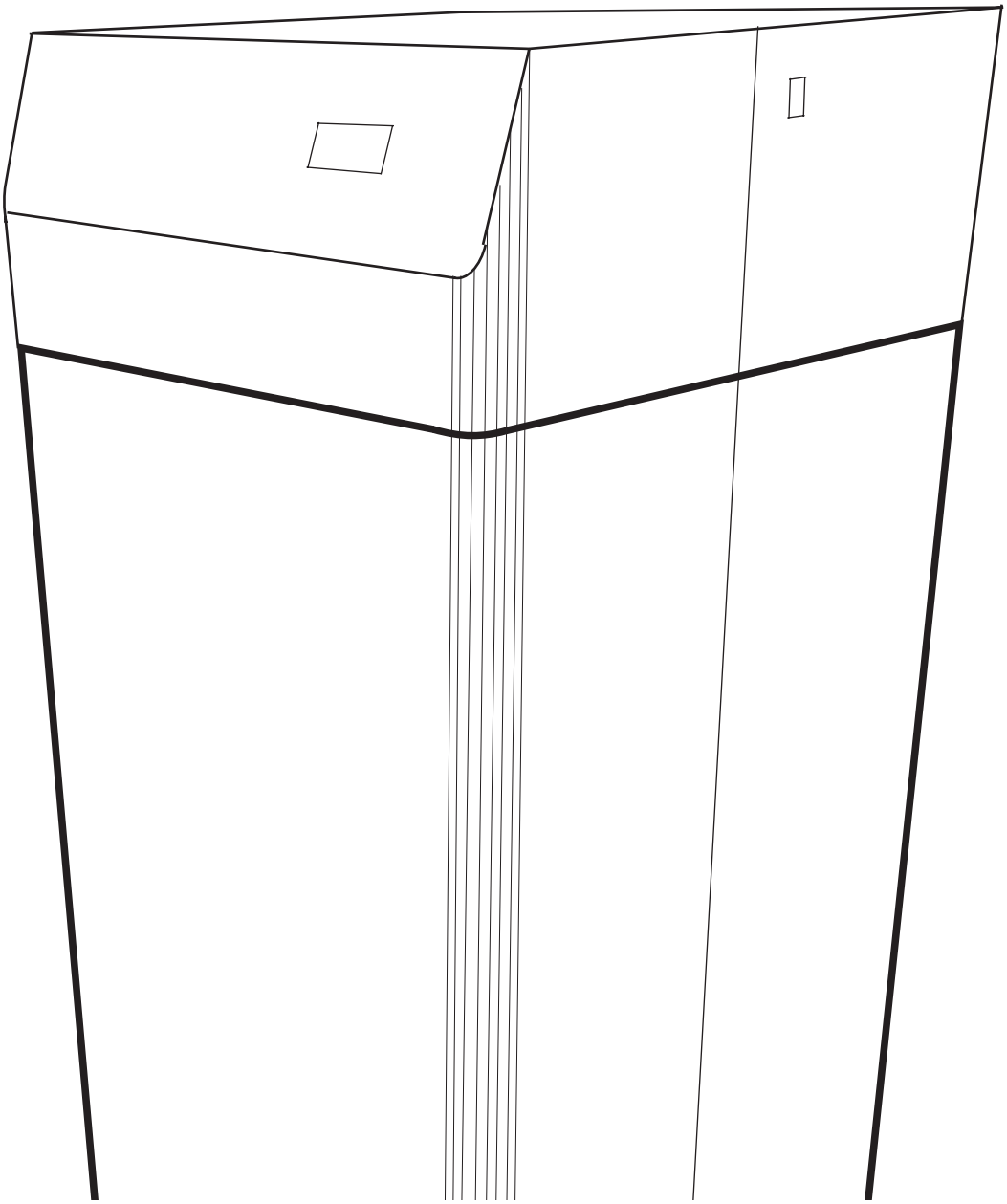
SAHP



HEAT PUMP WATER HEATER
SAHP 130 / 200 / 300
INSTALLATION AND MAINTENANCE INSTRUCTIONS

V3 June 2021US - SD667052

CONTENTS

GENERAL NOTES

1.1 The installation of the SAHP 130 / 200 / 300 is the responsibility of the purchaser. Read the information supplied with the equipment carefully before installing and using it. The manufacturer declines any responsibility as regards damages deriving from an incorrect installation, It is the responsibility of the installer to ensure the installation complies with all relevant local and national standards and regulations.

1.2 Each component of the SAHP is supplied complete with its own instruction sheet, which must be read in conjunction with this instruction manual, and installed and maintained accordingly.

1.3 Copies of this manual and the instructions supplied with each individual component must be handed to the client or user of the system for their future reference and for the purpose of future maintenance.

HEALTH AND SAFETY

Care should be taken when moving the product. Check the weight before any lifting. This is for the safety of the installer and customer. Ensure the product and in particular the box are installed in a safe location and the mounting structure is adequate to withstand the additional loads. Take care when moving equipment to ensure there is no damage to the equipment or existing structure and fittings.

IMPORTANT:
This appliance can be used by children from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children should not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.

2.1 The SAHP domestic hot water cylinder range has been designed to heat domestic hot water to 130°F in vented or unvented potable water systems.

2.2 The SAHP has integral safety devices to protect the product from internal and external faults. An adjustable digital thermostat controls the water temperature.

2.3 The SAHP is manufactured in the United Kingdom in an ISO9001: 2000 certified factory and under ISO9001:2008 Quality management system.

2.4 Before installing the SAHP System please read this Installation Manual and information individually supplied with any additional equipment carefully and ensure all requirements are met.

2.5 The SAHP should be installed and maintained by persons suitably qualified to do so.

2.6 All systems upon completion should be subjected to the appropriate local and national water pressure test requirements, or, to not less than 1.5 times its maximum working pressure for one hour. Systems containing plastic pipework should be pressure tested in accordance with the pipe manufacturers instructions. It is also recommended that the existing system be pressure tested for water tightness before commencing work in order to ascertain the condition of the system.

HEALTH AND SAFETY

2.7 Solar Assisted Heat Pumps must be stored in the supplied packaging in an upright orientation and should be stored in a dry environment. The equipment should always remain in an upright position during transport and installation. If turned on its side, return the box to the upright position, check the compressor for signs of leakage and leave to rest for 12 hours, before turning the unit on. SAHP declines any responsibility as regards damages deriving from incorrect transportation.

2.8 If transporting in the horizontal orientation, ensure the unit is laid down on it's left hand side, so that the left hand side is facing the ground. Failure to do so may cause permanent damage. SAHP declines any responsibility as regards damages deriving from incorrect transportation.

2.9 Care should be taken when moving the product. Check the weight before any lifting. This is for the safety of the installer and customer. Ensure the product is installed in a safe location and the mounting structure is adequate to withstand the additional load. Take care when moving the equipment to ensure there is no damage to the equipment or existing structure and fittings.

2.10 Safe manual handling and lifting procedures must be used when carrying products.

DESCRIPTION OF THE SYSTEM

3.1 The SAHP heat pump water heater (SAHP) consists of a Solar Assisted heat pump, coupled with either a 32, 54 or 79 gallon capacity hot water storage tank. The Solar Assisted Heat Pump is integral to and positioned on top of the unit within the unit casing.

3.2 The SAHP is designed to heat the domestic hot water within the tank up to 130°F. The maximum temperature is influenced by the individual installation, pipe lengths and insulation. It uses an exterior aluminium panel (evaporator) to absorb energy from the ambient air. A copper coil(condenser) is wrapped around the external wall of the inner cylinder which heats the water inside the cylinder. The product has a reciprocating compressor for quiet and efficient performance. With these features the SAHP is designed to have a long, trouble free life.

3.3 The SAHP has integral safety devices to protect the product from internal and external faults. An adjustable digital thermostat, locted at the front of the SAHP controls the water temperature.

3.4 The SAHP is designed to store potable water supplied from the public mains with a maximum of 200 p/m NaCL.

3.5 The SAHP has a built in timer which once a week heats the water in the cylinder above 140°F to provide pasteurization.

3.6 The SAHP is manufactured in the United Kingdom in an ISO9001: 2000 certified factory and tested to EN16147, UL1995, CE, CSA.

3.7 SAHP supplies an Installation Kit which contains items that will be needed on the installation of the SAHP's refrigeration and plumbing circuits.

DESCRIPTION OF THE SYSTEM continued

3.8

Specifications	SAHP 130	SAHP 200	SAHP 300
Maximum cylinder volume (US gal)	34	52	79
Mean thermal capacity (BTU/hr)	2580-6800	2580-6800	2580-6800
power consumption (W)	Typically 600	Typically 600	Typically 600
Operating current (a)	4-5	4-5	4-5
Voltage (v) / frequency (Hz)	220-240, 50/60	220-240, 50/60	220 - 240, 50/60
Operating temperature range (°F)	32-105	32-105	32-105
Refrigerant fluid and charge (lbs)	R134a/513a / 2.64	R134a/513a / 2.64	R134a/513a / 2.64
Max. Hot water temperature (°F)	130	130	130
SAHP weight unfilled/filled (lbs)	183/470	234/675	322/983
Dimensions (height x width x depth(")	50.8 x 21.7 x 21.7	66.1 x 23.6 x 23.6	84.6 x 25.6 x 25.6
Clearances Top/front (")	4/15	4/15	4/15
Max water circuit working pressure (psi)	45	45	45
Cold water input connections (")	3/4	3/4	3/4
Hot water output connections (")	3/4	3/4	3/4
Single panel weight (lbs)	17.64	17.64	17.64
Single panel dimensions (h x w x d ")	66.9 x 31.5 x 1	66.9 x 31.5 x 1	66.9 x 31.5 x 1
Double panel weight (lbs)	33.06	33.06	33.06
Double panel dimensions (h x w x d ")	66.9 x 31.5 x 4	66.9 x 31.5 x 4	66.9 x 31.5 x 4
panel input / output	3/8 / 3/8	3/8 / 3/8	3/8 / 3/8
Lubricant in the compressor	ESTER / IOSS	ESTER / IOSS	ESTER / IOSS
Sound Power Level	41Db(A)	41Db(A)	41Db(A)
R134a / 513a Global Warming potential	(GWP) 1430 / 631	(GWP) 1430 / 631	(GWP) 1430 / 631

PLUMBING INSTALLATION

4.1 The SAHP must be installed on a stable base which must be capable of supporting the weight when the cylinder is full of water.

4.2 Access for maintenance of all equipment should be considered when positioning the cylinder. Care should be taken that the immersion heater can be withdrawn for servicing if required these are 15" long. Relevant local and national standards should always be followed when installing discharge pipe work from the safety valves.

4.3 We recommend that the hot and cold water requirements of the property and user are ascertained before the installation of the SAHP.

4.4 The minimum incoming cold water mains inlet requirements for the SAHP is 20psi operating pressure and 5 US gal per minute flow rate.

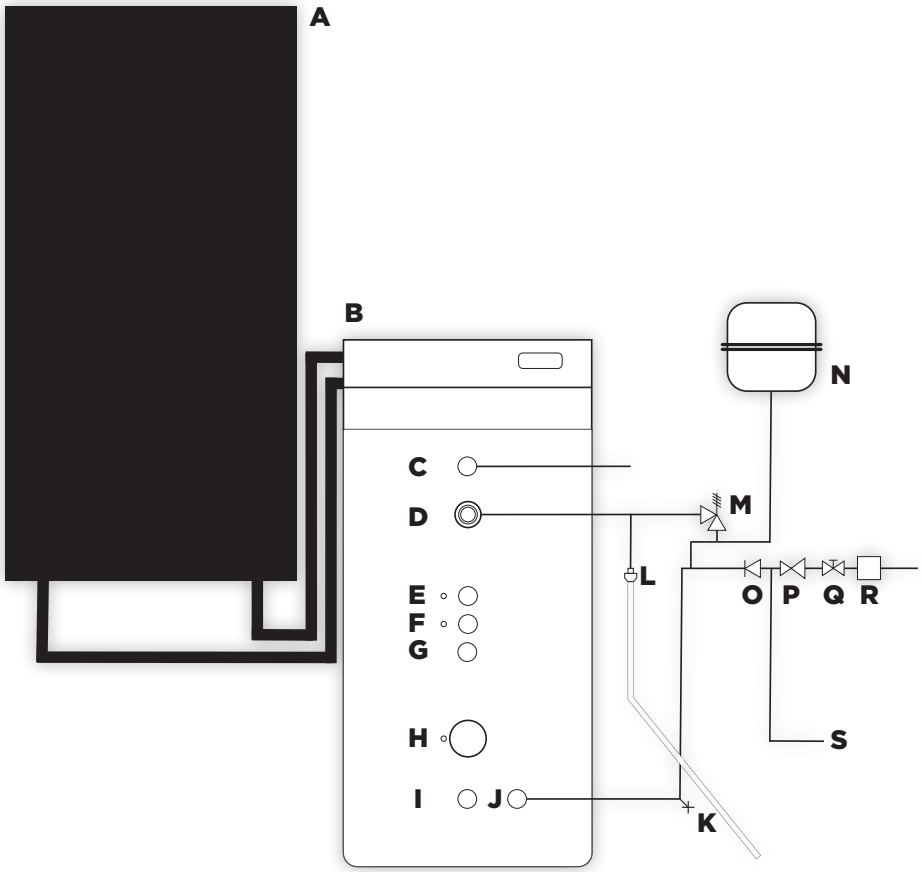
4.5 Adjustable pressure reducing valve factory set at 43.5 psi is supplied with the SAHP which must be fitted in the incoming cold water supply to the cylinder. The pressure reducing valve will deliver maximum of 13 US gal per minute.

4.6 In hard water areas we recommend that a water treatment unit is fitted to eliminate the formation of limescale in the system.

4.7 Do not install the equipment in the following places as they will lead to a malfunction of the equipment: areas with corrosive gases, factories where the electrical voltage experiences wide fluctuations, places with strong electromagnetic waves, places with inflammable materials or gases, other special environments.

PLUMBING INSTALLATION continued

Fig **4.8**



A	Evaporator panel
B	SAHP
C	Hot water outlet
D	Pressure & temperature relief valve
E	Dual thermostat
F	Sensor pocket
G	Boiler flow
H	Immersion heater
I	Boiler return
J	Cold water in
K	Drain
L	Tundish
M	Pressure relief valve
N	Expansion tank
O	One way valve
P	Pressure reducing valve
Q	Isolating valve
R	Cold main
S	Isolating valve

PLUMBING INSTALLATION continued

4.9 A full bore cold water isolating valve must be fitted in the cold water supply to the SAHP before the adjustable pressure reduction valve. This valve is not supplied with the fitting kit of the unit.

4.10 It is good practice to position the mains inlet control manifold at the top of the unvented unit to ensure that the cylinder does not have to be drained down for the purpose of maintenance.

4.11 The expansion vessel can be mounted in any Orientation. Access must be available to the top and bottom of the vessel. The vessel should be fixed to a solid wall using the brackets provided. Please remember that the vessel will get much heavier once it has water in it.

4.12 For mixer showers and taps a balanced cold feed at the same pressure as the hot feed may be necessary. A 3/4" balanced connection on the inlet manifold is provided for this purpose. Pipe work should initially run in 3/4" then this can be reduced where necessary.

4.13 NOTE: We highly recommend installing a thermostatic mixing valve in system where the set point temperature of either the heat pump or any heat sources connected to the boiler coil are set to 120°F or above.

4.14 All exposed pipe work should be insulated and additional considerations should be taken to protect the unit from frost damage. Particular care is needed if the cylinder is to be installed in an exposed location such as an out building or garage.

4.15 Before filling and pressuring the cylinder care should be taken to check and tighten all connections including factory fitted connections as they may work loose during transportation and positioning. All of the pipe work connections on the cylinder are either 3/4" compression or 3/4" copper tube should only be used to connect to these connections. Good working practices should be used when preparing pipe work such as using correct pipe cutters and de-burring.

4.16 The boiler coil connections supplied are compression connections. The boiler circuit must be positively pumped, gravity circulation will not provide the required heat transfer through the coil.

PLUMBING INSTALLATION continued

4.17 The boiler coil has a maximum working pressure of 50psi. With pressurized boiler circuits an additional expansion vessel needs to be sized to suite the circuit volume and installed along with a safety relief valve and filling loop.

4.18 The boiler coil connection must be complete with thermostatic temperature controls. Uncontrollable heat sources such as wood burning store are not suitable. The included two port motorised zone valve should be installed into the primary flow before the cylinder.

4.19 The discharge pipework of the SAHP unit must be fitted to comply with the latest version of relevant local and national standards.

4.20 Before filling please ensure the pressure in the expansion vessel is 43.5psi. This is the same as the setting of the pressure reducing valve. The valve is a Schrader type. **If the pressure reducing valve setting is amended, the expansion tank pressure must be amended to match the same settings.**

4.21 Upon completion the whole installation must be thoroughly flushed to remove all installation dirt, fluxes and manufacturing oils before being put into operation. To flush the system first fill the system. Close the cold water supply full bore isolating valve. Completly drain the tank (outlets may need to be opened during this process.) Open the cold water supply full bore isolating valve. Refill the tank with water and repeat until water runs clean from the cylinder.

REFRIGERATION INSTALLATION

5.1 Aluminum Panel (evaporator) Connections

The aluminum panel evaporator has a 3/8" male flare connection Liquid inlet and 3/8" male flare connection gas outlet that allows connection of the panel to the SAHP.

Connecting 3/8" copper refrigeration pipework must be flared and secured using 3/8" flare nuts. To help eliminate leaks, use refrigeration oil on the thread of the 3/8" flare connections before tightening the flare nut, **No soldering or brazing of the copper line connecting the Evaperator panel to the SAHP is permitted.** The heat pump liquid line must be correctly connected to the panel liquid inlet. Incorrect orientation will resort in compressor failure **The Liquid inlet can be identified by the three inflated tubes extending from the connection. Please see figure 2**

Fig 2

5.2 Panel Location

The evaperator panel can be located facing any aspect.

On either an exterior wall or pitched roof. If the panel is installed on a roof it should be fixed using appropriate solar roof mounting kits in accordance with relevant local and national standards.

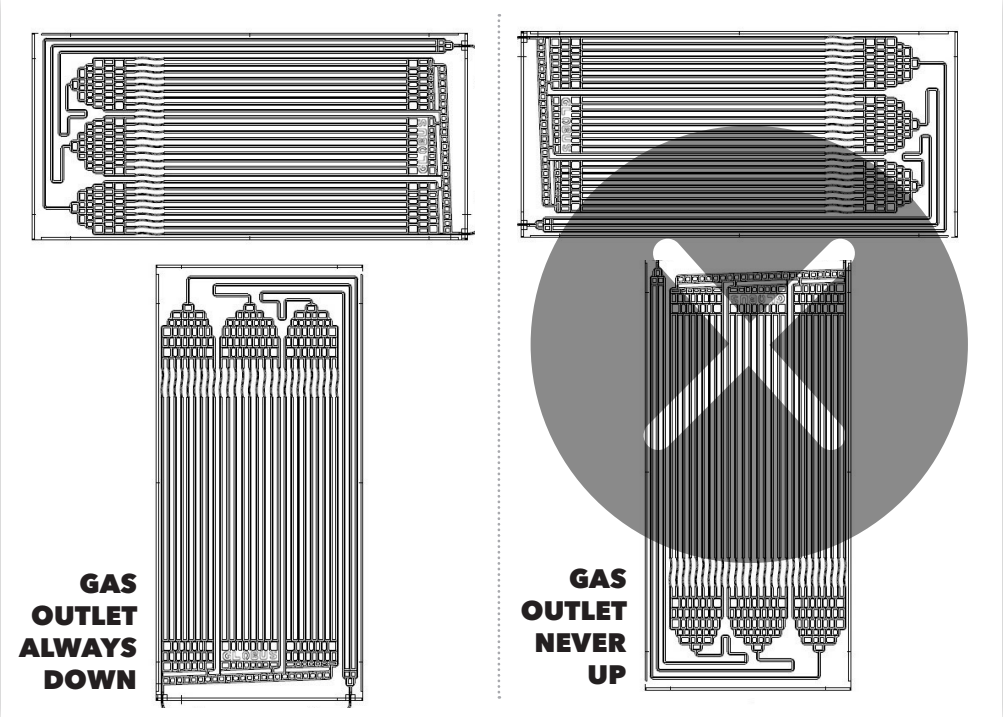
5.3 The evaperator panel can be installed in a vertical (portrait) position or horizontal (landscape) orientation but there must be a minimum of a 30° tilt. the panel cannot be laid flat, also ensure the gas outlet is always orientated to the lowest point of the as per the figure 3. Incorrect installation will inhibit the free flow of lubricating oil

NOTE: Vertical panel orientation offers optimum performance allowing even flow of refrigerant across the panel.

NOTE: For increased performance, install the panel parallel to the prevailing wind allowing the air to pass freely over the surface of the panel.

REFRIGERATION INSTALLATION continued

Fig 3



5.4 Panel Fixing

To fix the panel to an exterior wall use the supplied L-brackets, nuts, bolts, fixing screws and plugs which are all supplied in the installers pack.

5.5 Fix the L brackets to the evaperator panel as shown in Figure 4. Ensure the Bolts are fixed with the bolt head facing out.

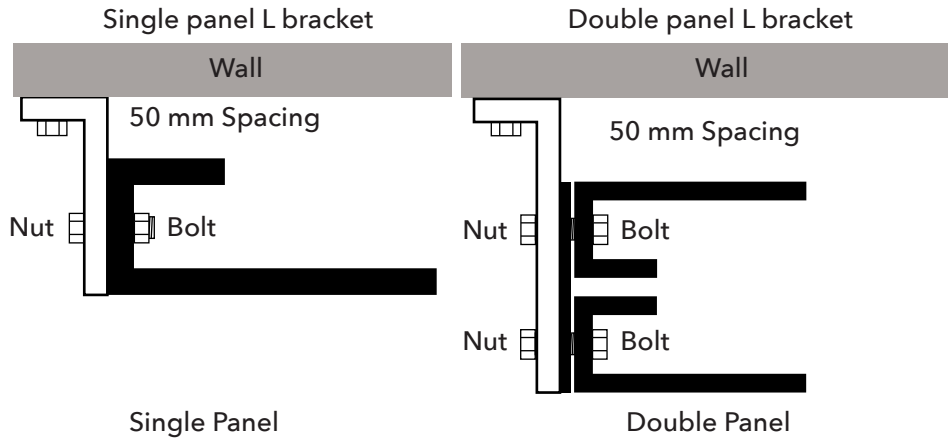
5.6 Fix and secure the evaperater panel to a wall as show in figure 4. Ensure to fix all 6 Brackets to the panel and exterior wall.

NOTE: Ensure that the SAHP is connected to the evaperator panel correctly as shown in figure 5 failure to do so can result in compressor failure and will invalidate any guarantee.

NOTE: Do not paint over the panel. This will decrease efficiency and potentially cause system failure.

REFRIGERATION INSTALLATION continued

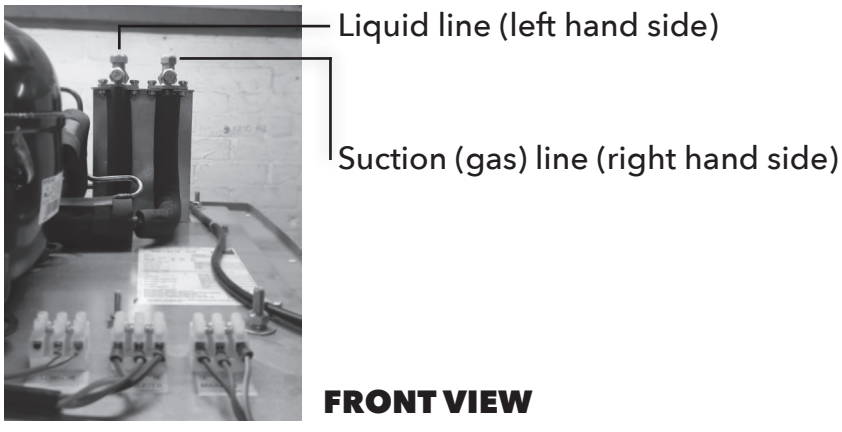
Fig 4



5.7 Refrigeration Connections

The SAHP has a 3/8" male flare connection Liquid outlet and 3/8" male flare connection suction line (as seen in figure 5), that connect the SAHP to the evaperator panel.
Connecting 3/8" copper refrigeration pipework must be flared and secured using 3/8" flare nuts. The heat pump liquid must be connected to the corresponding aluminum panel liquid line. Incorrect orientation WILL result in compressor failure. To help eliminate leaks, use refrigeration oil on the thread of the 3/8" flare connections before tightening the flare nut.

Fig 5



5.8 Pipework Installation

All refrigeration pipework should be installed in accordance with ISO 5149.

5.9 The SAHP is factory pre-charged with refrigerant R134a / 513a with enough refrigerant for up to 26 foot of pipe length each way between the SAHP and the thermodynamic Panel.

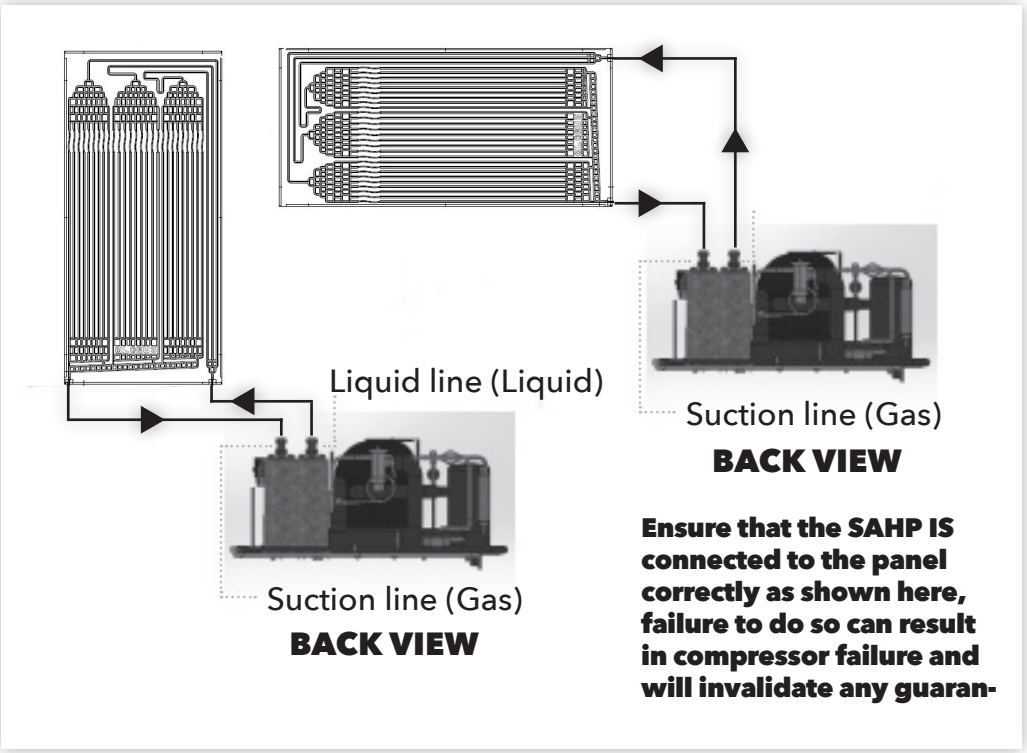
REFRIGERATION INSTALLATION continued

5.10 The pipe length can be extended up to 50 foot each way. However for every extra 3 ft of physical separation between the SAHP and panel 1.6 ozs of refrigerant gas must be added. The minimum pipe length between the panel and the SAHP is 10 ft.

5.11 A double panel can be installed instead of a single panel. If a double panel is used an additional 3.52 ozs of refrigerant gas is required to speed recovery time by up to 10%, this is in addition to any gas added as per 5.10.

5.12 The refrigeration circuit shall be designed with as few bends as possible, with no single bend to exceed a 90^{O} bend radiance to minimize the load loss and it shall be supported properly with a view not to transmit stresses or vibrations

Fig 5



REFRIGERATION INSTALLATION continued

5.13 Ensure that refrigeration quality copper pipes are used to connect the Panel to the SAHP only. It must also be ensured all refrigeration pipework is insulated with flexible anti-condensation insulation.

NOTE: Direct contact between the refrigeration outlet and refrigeration inlet line shall be avoided to prevent energy losses in the system.

NOTE: Ensure the SAHP liquid outlet is connected to the Panel liquid inlet, and the SAHP suction side is connected to the Panel gas inlet.

NOTE: Do not loosen or open service ports until all connections are made and the system has been fully leak checked and vacuumed.

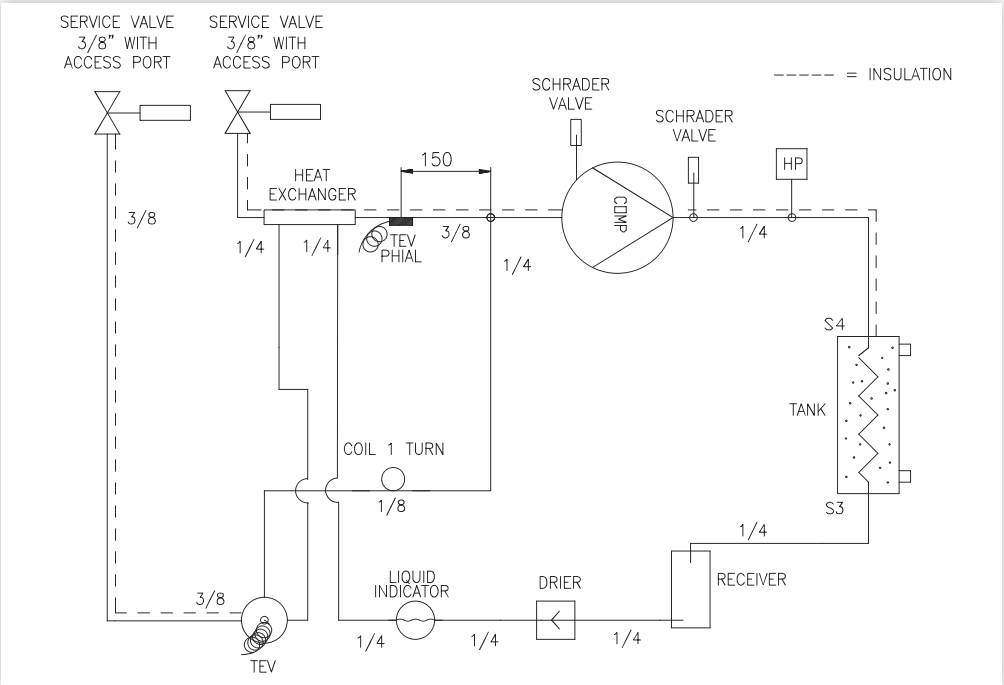
NOTE: Do not cover the brass plate nuts with the anti-vibration insulation as this may create a freeze / thaw action on the brass which may result in the flare nut breaking down over time.

5.14 Nitrogen Pressure Test

First pressure test the refrigeration circuit with Oxygen Free Nitrogen. Nitrogen can be introduced using the service port connections as shown in figure 5.

Fig 6

Refrigeration circuit



REFRIGERATION INSTALLATION continued

5.15 Fill the system to 115psi, hold and monitor for 45 minutes. Check all the refrigeration connections with a leak detector. If during the 45 minutes of monitoring the pressure in the system declines, tighten or re-flare the connection and restart the test. Repeat if necessary until pressure is maintained for the 45 minutes.

NOTE: Ensure through the process that the pressure does not exceed 145psi in the Evaperator Panel and/or the pipe work

5.16 Vacuum

Once the pressure test has been successfully completed and no leakage of nitrogen has been confirmed, the nitrogen can be vented. The vacuum pump must be connected into the service port to begin vacuuming / evacuating the system. Vaccum the system to 0.5 torr (500 microns) for a minimum of 45 minutes.

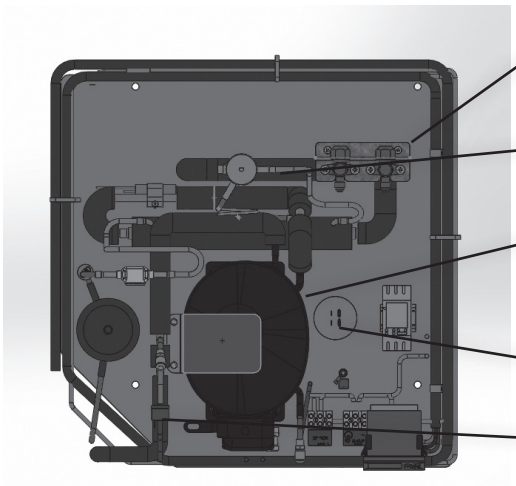
5.17 Releasing Refrigerant

Once the System has been successfully pressure tested and vacuumed, next release the factory pre-charged 2.64 lbs of R134a / 513a refrigerant gas.

5.18 To do this use a 4mm allen key and rotate both service port valves counter clockwise until fully open. See note below.

NOTE: Open the liquid line service port first and then the gas line service port

Fig 7



ELECTRICAL INSTALLATION

Electrical connections

6.1 The SAHP shall be electrically connected once all the refrigerant connections and plumbing connections are completed. All electrical work is to be carried out in accordance with the NEC standards, latest issue or local codes of practice as applicable. Ensure to also install the equipment in line with EMC2004/108/EC.

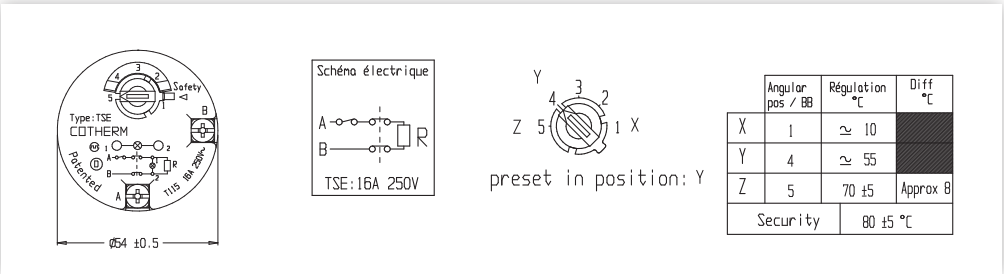
6.2 The power supply of the SAHP is single phase: 220V - 240V / 50Hz - 60Hz with ground connection. This supply needs to be separately isolated and protected by an appropriately sized fuse (13Amps)

NOTE: In Area's with 110V branch circuits within the home, you will be required to install a dedicated single phase 220 - 240V circuit from the electrical consumer panel to provide 220 - 240V power supply to the SAHP. Be sure to clearly label the wires 220 - 240V on each end for safety.

NOTE: In areas with 4 conductor L1, L2, N and G wiring, connect L1 to L, L2 to N and G to ground.

6.3 The power supply of the integral Immersion Heaters is single phase: 220V – 240V / 50Hz – 60Hz with ground connection. Only use the manufacturers supplied immersion heater. Immersion heaters should not have a higher capacity than 5000btu/1.5kW if directly connected to the Heat Pump controller. If Immersion Heaters with a capacity higher than 1.5kW/5000btu are specified, they must be independently wired to a separate fused switch. Also available are 3kW/10000btu and 6kW/20000btu immersion heaters from the manufacture. contact your distributer.

Fig 8

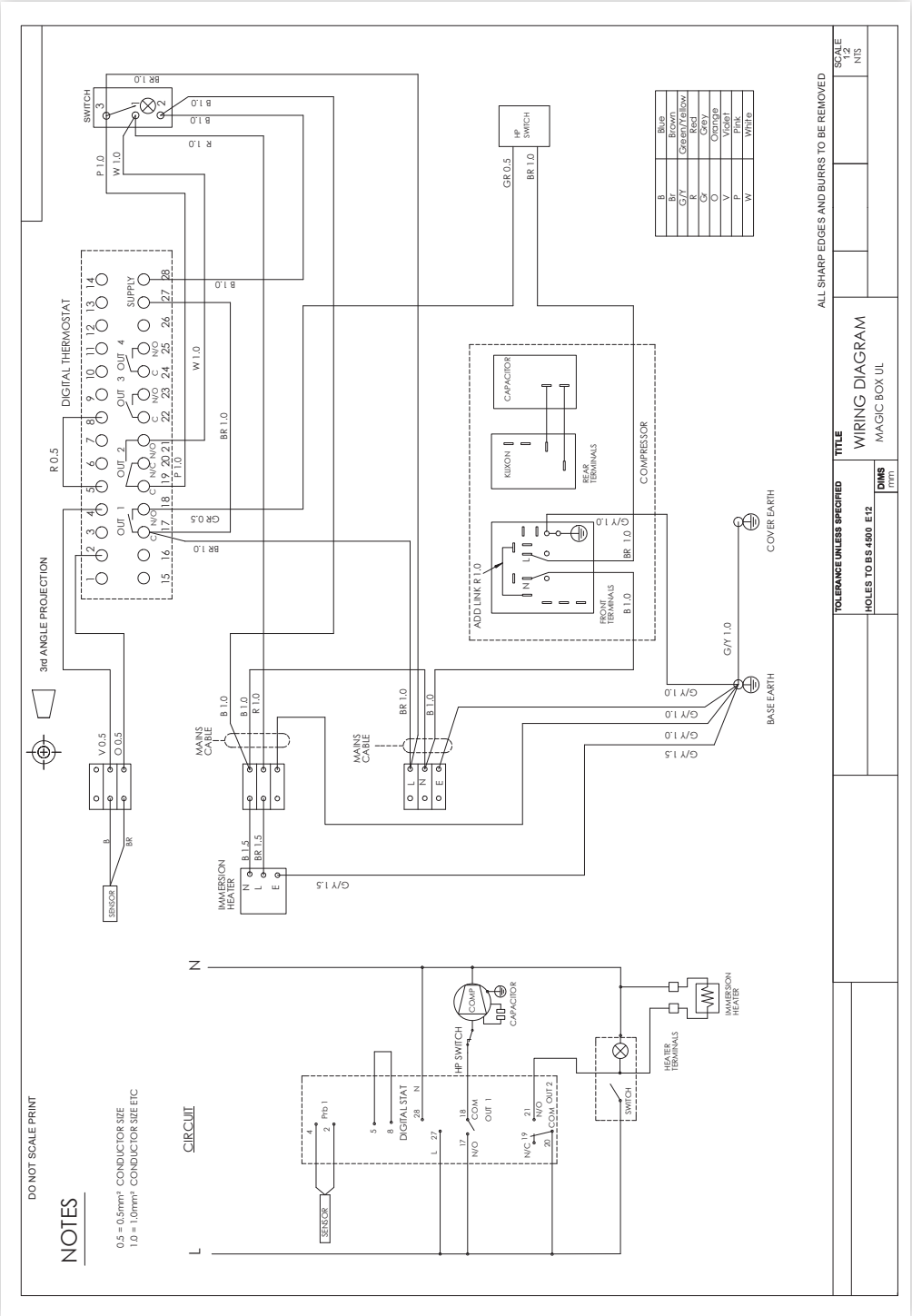


6.4 Each immersion comes complete with integral control thermostat and a high limit cut-out.

ELECTRICAL INSTALLATION continued

Fig 9

Wiring diagram



ELECTRICAL INSTALLATION continued

PV connectivity

6.5 To replace the immersion first dissconnect the power supply and drain the tank. disconnect the immersion wiring before unscrewing the immersion heater. Screw in the new immersion heater - reconnect the wiring, refill the tank and reconnect the electrical supply.

6.6 Correct wire sizing must be carried out based on the power, wire length and wire enclosures however in most domestic applications 14 gauge wire is suitable. Heat resistance sheathed flex complying to relevant local and national standards should be used.

6.7 Do not energize the immersion heater until the cylinder has been flushed and filled with water as this will cause damage to the element.

6.8 Do not operate the immersion heater if any cleaning agents are in the cylinder as this will also cause premature failure of the immersion element.

6.9 The SAHP Heat Pump controller has the functionality to connect to a Solar PV PV inverter system. If you are not connecting the SAHP to a PV Inverter proceed to section 7.

Controller

6.10 To connect the SAHP to a PV inverter a 2 conductor wire is required. There is no maximum or minimum distance requirements of this 2 conductor wire. The cable will be carrying a voltage free signal.

6.11 Connect the 2 core conductor to the unoccupied terminals 5 and 8 as per the wiring diagram, located on the SAHP controller sensor terminal located on the top right hand side of the back of the controller. Connect the other end of the two core cable to a N/O relay of the PV inverter.

6.12 In cases where a N/O relay is not available within the inverter, the controller can be connected via a 2 conductor voltage free wire to an independent 7 days timer instead which allows the controller to be automatically actuated at a predefined range of hours which can correspond to the assumed maximum PV energy generation.

6.13 When the PV inverter generates electricity, the N/O relay will close, which will subsequently signal the controller to enter Eco Mode, a programme in which SAHP will automatically raise the set point temperature input of the controller of the water within the connected cylinder to 140°F and re initiate heating again once the water temperature falls below 135°F.

TESTING AND COMMISSIONING

Controller settings

7.1 Convert °C to °F
Press and Hold P - 'C.cl' is displayed
Press ▲▼ arrow keys until 'r.p' is displayed - Press P
Press ▲▼ arrow keys until '281' is displayed on the controller - Press P
Press ▲▼ arrow keys until 'In' is displayed on the controller - Press P
Press ▲▼ arrow keys until 'I.uP' is displayed on the controller - Press P
Within I.uP:
C0 = °C with 1° res.
F0 = °F with 1° res.
C1 =°C with 0,1° res.
F1 = °F with 0,1° res.
Press ▲▼ arrow keys until 'F0' is displayed on the controller - Press P
Hold U key for 5 seconds - 'I.uP' is displayed
Press ▲▼ arrow keys until 'SP' is displayed on the controller - Press P
Press ▲▼ arrow keys until 'S.HS' is displayed on the controller - Press P
Press ▲▼ arrow keys until '130' is displayed on the controller - Press P
Hold U key for 5 seconds - 'SP' is displayed - Press P
Press ▲▼ arrow keys until 'SPE' is displayed on the controller - Press P
Press ▲▼ arrow keys until '140' is displayed on the controller - Press P
Hold U arrow key for 5 seconds - 'SP' is displayed
Press ▲▼ arrow keys until ']rE' is displayed - Press P
Press ▲▼ arrow keys until 'r.d' is displayed - Press P
Press ▲▼ arrow keys until '10' is displayed - Press P
Hold U arrow key for 5 seconds - 'r.d' is displayed
Press ▲▼ arrow keys until 'r.Ed' is displayed - Press P
Press ▲▼ arrow keys until '5' is displayed - Press P
Hold U arrow key for 5 seconds - Repeat untill main screen is displayed which will display the current temperature of the water at the plane of the sensor within the SAHP
Single Press P - 'S.P' will flash - the set point temperature will then display
Press ▲▼ arrow keys until '130' is displayed on the controller - Press P
The display will revert to the 'Main Screen' which will display the current temperature of the water at the plane of the sensor within the SAHP.

NOTE: Through this process we are first altering the units of measurements from °C to °F. We are then altering the maximum set point from 55°C to 130°F. DO NOT increase the set point temperature above 55°C / 130°F. If you do this may invalidate the warranty.

TESTING AND COMMISSIONING cont.

Controller settings

7.2 The Controller utilizes a real time clock to actuate the automatic Anti-legioanlla cycle at the appropriate time. To set the real time clock of the controller:

Press and hold 'P' for 5 sec

'c.CL.' is shown

Press 'P' to confirm

'h. (xx)' is shown, 'h' stands hours (from 1 to 23)
Select the appropriate hour

Press 'P' to confirm

'n.(xx)' is shown, 'n' stands for minutes (from 1 to 59)
Select the appropriate minute

Press 'P'
d. (xx) is shown, 'd' stands for day of the week. d.(01) = Monday, d.(02) = Tuesday etc
Select the appropriate day

Press 'P' to confirm

'c.CL.' is shown

Select 'c.dt' scrolling with the arrow down, 'c.dt' stands for date

Press 'P' to confirm

'y.(xx)' is shown, 'y' stands for year (from 1 to 99)
Select the appropriate year

Press 'P' to confirm

'n.(xx)' is shown, 'n' stands for month (from 1 to 12)
Select the appropriate month

Press 'P' to confirm

'c.dt' is shown
During the Anti-legionella mode the controller will automatically heat the water within the cylinder to 140°F as an anti-legionella measure. It uses the heat pump not the immersion heater to heat the water to this temperature.

TESTING AND COMMISSIONING contin-

Controller settings

7.3

(a) The controller has two different setting programs, Standard and Eco mode generation.

(b) Standard Mode: The controller will raise the temperature to 130°F (or the programmed temperature) and then switch off. It will automatically start again to raise the water temperature once it falls to 120°F.
(or 10°F lower than programmed temperature).

(c) To view the set point temperature, press the P button. SP is displayed alternatively with the set temperature. Using the buttons with the arrow pointing upwards / downwards we can increase / reduce the set point temperature. Once set, press the "P" button or leave and the program will revert to displaying the actual water temperature. This is displayed in figures 14 & 15

(d) The temperature range is from 50 to 130°F. The unit will raise the temperature to 130°F (or the programmed temperature) and then switch off. It will automatically start to raise the water temperature once it falls to 130°F. (or 10°F lower than programmed temperature).

(e) Standard Mode also incorporates an Anti-legionella cycle, this is is actuated automatically, once a week (every Monday between 05:00 to 07:00) using the integral real-time clock within the controller.

(f) During the Antilegionalla mode the controller will automatically heat water within the cylinder to 140°F as an anti-legionella measure. It uses the heat pump not the immersion heater to heat the water to this temperature.

7.4

(a) Eco mode is activated when the controller receives a signal from the installed 2 conductor wire (refer to section 6) that the connected PV inverter is generating electricity.

(b) When Eco mode is active, The controller displays the temperature of the water at any time but will intermittently flash 'Eco' across the controller screen.

(c) When in Eco mode the controller will raise the temperature to 140°F and then switch off. It will automatically start again to raise the water temperature once it falls to 130°F.

(d) When the controller stops receiving a signal from the installed 2 conductor wire that the connected PV inverter is generating electricity, the Controller will exit Eco Mode and enter standard Mode.

TESTING AND COMMISSIONING continued

7.5 (a) Ensure the SAHP fused switch is off (supplied in the Installers Kit). Connect the SAHP Controller (housed within the cover) to the controller cable junctions, and the earthing point within the lid to the free earth cable. The controller is keyed to ensure correct orientation during connection.

(b) Turn the SAHP on at the fused switch. The SAHP digital controller will light up showing the current temperature of the cylinder. After a 60 seconds delay the compressor will start to run. This time delay function has been introduced to improve the efficiency of the system and the life of the compressor.

(c) Leave the system running for a minimum of 30 minutes and check:

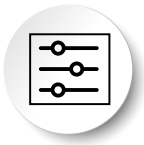
(1) **The sight glass to make sure it is clear and dry. A fully functioning properly charged system should show no bubbles.**

(2) **The set temperature is 130°F.**

(3) **The unit is increasing the temperature of the water within the cylinder as displayed on the controller.**

(4) **Position the top casing onto the SAHP and secure in place with the supplied fixing screws.**

(5) **Suction pressure is between 25 to 60 psi**



7.6 (a) The digital thermostat displays the temperature of the water at any time.

(b) This thermostat is preset at 130°F.

(c) The unit will raise the temperature to 130° (or the programmed temperature) and then switch off. It will automatically start again to raise the water temperature once it falls to 120°F. (or 10°F lower than programmed temperature).

COMMISSIONING CHECK LIST

To be completed by the installer and left with the customer

The SAHP is installed on a level sturdy base that when fill with water can withstand the weight	☐
Clearance spaces are retained in accordance with the installation manual	☐
A dedicated water supply isolation valve has been installed	☐
The water quality entering the cylinder has been tested and is less than 200 ppm NaCL	☐
The pipework for the hot water supply has been properly insulated	☐
In areas subject to freezing protection has been provided	☐
There is no hot water leaking from the water supply/hot water supply pipes and temperature and pressure relief valve(s)	☐
Pipework is installed from the temperature and pressure relief valve and the tundish to a suitable drain with appropriate protection to prevent discharged water from scolding people	☐
The expansion vessel has been installed in accordance with the installation manual and the pressure charge of the expansion vessel (accessed & charged via the schrader valve ontop of the expansion vessel) is checked / charged to match the pressure setting of the pressure reducing valve	☐
The pressure reducing valve(s) have been discharge tested	☐

COMMISSIONING CHECK LIST

To be completed by the installer and left with the customer

The cylinder has been filled, completely drained and refilled to remove manufacturing and installation fluxes and oils	☐
The liquid line of the heat pump is correctly connected to the liquid line of the panel evaporator	☐
The panel evaporator has a minimum 30° pitch (if installed on a vertical wall this yields a 90° pitch inclination)	☐
All refrigeration pipework has been insulated with anti-condensation insulation (excluding brass flare nuts) and no rips, tares or holes are present within the insulation	☐
If a heat source has been connected to the boiler coil, a dual thermostat and motorized isolation valve have been installed and appropriately set up	☐
The hot water and heat pump systems comply with the appropriate regulations	☐
The system has been installed and commissioned in accordance with the manufacturers instructions	☐
The system controls have been demonstrated to and understood by the customer	☐
The manufacturers literature, including this checklist, have been explained to and left with the customer.	☐

Commissioning Technician signature

Customer signature
(to confirm satisfactory demonstration and receipt of manufactures literature)

INSPECTION AND MAINTENANCE

8.1 Annual Inspection & Maintenance

(a) The SAHP cylinder requires an annual service to ensure continued safe operation and optimum efficiencies. It is essential that the following tasks are carried out by a service technician on an annual basis.

(b) Turn the cap of the expansion relief valve on the cold inlet manifold, water should be allowed to flow for at least 5 seconds. Upon release make sure it reseats fully. Carry out the same procedure with the pressure / temperature relief valve. In both cases check that the discharge pipe work (D1 and D2) is carrying the water away adequately. If not check for any potential blockages and clear them where necessary. WARNING: THE DISCHARGING WATER MAY BE HOT!

(c) Check that the factory installed immersion heater is working with an amp meter and the internal thermostat is controlling the water at the required temperature.

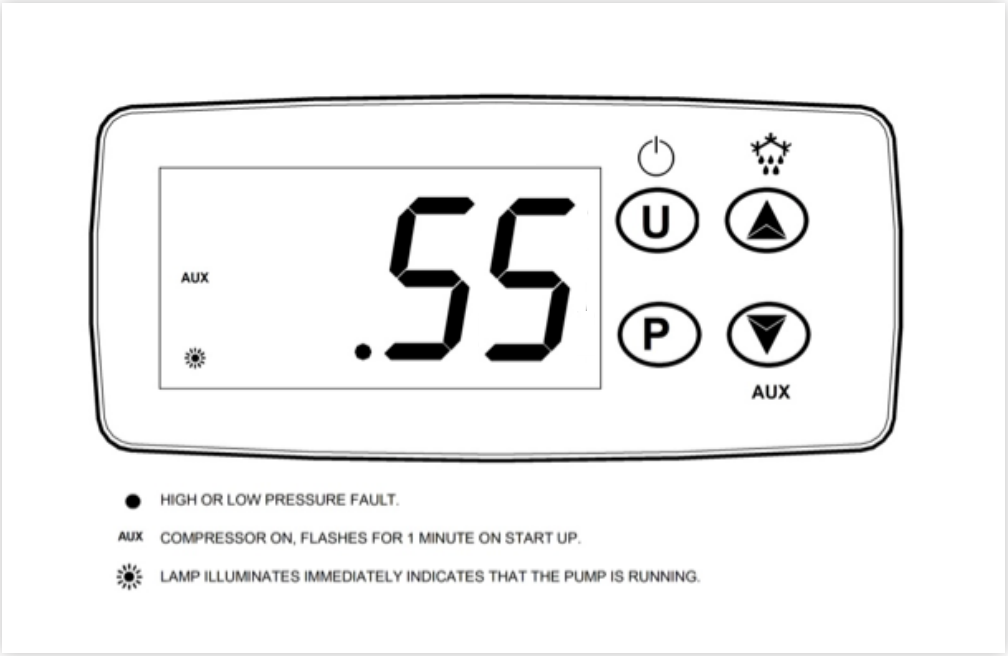
8.2 The unit should be cleaned with water only and if necessary non-abrasive detergent.
Note: When cleaning please ensure that the main electrical supply is turned off to the SAHP and don't clean the panel if in direct sunlight.

8.3 The system should be drained off if the SAHP is out of use for a prolonged time period and the electrical supply to the unit should be isolated.

USING THE CONTROLLER

Using the SAHP

Fig 10

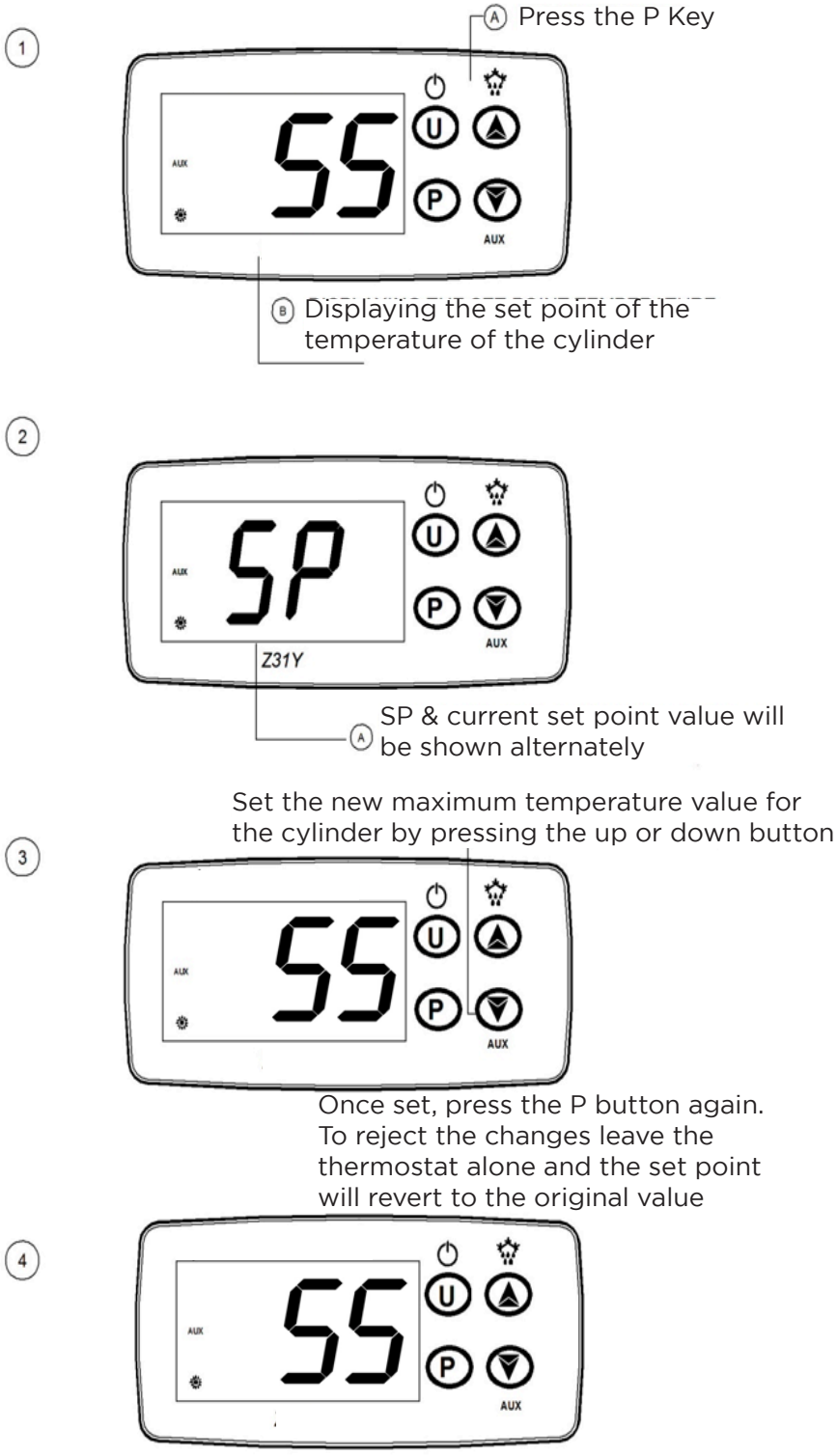


DESCRIPTION	ACTION	COMMENTS
P BUTTON	Press to show SP program mode to change operating temperature of the compressor	The temperature of the cylinder is pre-set at 130°F Never exceed 130°F in Standard mode. Never exceed 140°F in Eco mode.
UP BUTTON	Increases the temperature	
DOWN BUTTON	Decreases the temperature	

USING THE CONTROLLER continued

Using the SAHP

Fig 11



TROUBLESHOOTING

PROBLEMS	CAUSES	SOLUTION
The screen doesn't show any information.	Lack of power.	Check the power supply. Check that the power switch is on.
The system starts and stops, the screen switches off. A Dot appears on the screen (when off).	Incorrect refrigerant charge. Air in the plumbing circuit. High Pressure switch is on.	Please check the gas through the sight glass. Verify the cleanliness of the plumbing circuit. Check the pressure switches function properly. Lime deposits inside the plumbing circuit: Clean the filter in the plumbing circuit and clean the whole system. Check the functioning of the water pump and bleed the pump. Bleed the air through into air vent. Check the R134a / 513a load (check the sight glass for the refrigerant)
E1 error appears on screen.	Non condensable gases in the refrigeration circuit. Temperature probe.	Empty the refrigeration circuit and refill with clean refrigerant. Check the continuity of the probe using a multimeter. Check the temperature probe connection.

TROUBLESHOOTING GUIDE

PROBLEMS	CAUSES	SOLUTION
The water is cold and the compressor is working.	Lower set temperature.	Check the temperature set point on screen.
	The temperature sensor is disconnected to the cylinder.	Check the right placement of the temperature sensor inside the cylinder.
	The pipework between the panel and the SAHP is not properly insulated.	Check the proper insulation of the plumbing circuit and the cylinder.
	Incorrect refrigerant charge.	Check the R134a / 513a charge (check the sight glass for the refrigerant).
The panel is frosting.	Frost could appear during the normal operation and it melts once the LMTB stops.	
The water does not reach temperature.	Incorrect refrigerant charge.	Check the R134a / 513a charge (check the sight glass for the refrigerant).
	Incorrect Installation.	Ensure panel is installed and unit installed correctly.
	Refrigerant Leak or charge.	Check for leaks. If pipe run over 27 " extra refrigerant must be added (check the sight glass for the refrigerant).

REPLACEMENT OF PARTS

10.1 For quality and consistency of performance it is recommended that only Manufacturers supplied and approved parts be used for initial installation and replacement.
No guarantee of performance can be given if non Manufacturer approved parts are used.

1. **240V 1.5 Kw immersion heater 1 3/4" thread**
2. **Unvented cold feed combination control set**
3. **Secondary expansion vessel**
4. **Mounting bracket**
5. **Pressure and temperature relief valve**
6. **Control and high limit thermostat**
7. **Hot water multi port zone valve**
8. **Tundish**

REPLACEMENT OF PARTS continued

10.2 Replacement of heat pump

First Contact SAHP to determine and confirm with the manufacturer the heat pump is beyond repair. Once this has been confirmed by SAHP, complete and return the 'returns under warranty' forms that will be supplied by SAHP upon confirmation the heat pump is beyond repair. A replacement Heat Pump will subsequently be couriered to you.
The steps to replace the heat pump are outlined below.

10.3 Recover Refrigerant

R134a / 513a, as well as other refrigerants, should always be recovered and never be released directly into the environment. You must also use a qualified technician to recover refrigerant gases.

(a) Collect the refrigerant using a refrigerant recovery unit and recovery bottle. Use R134a / 513a refrigerant recovery equipment, refrigerant recovery equipment for other refrigerants may damage the equipment or the unit.

(b) When carrying out the refrigerant collection on site, unit operation is prohibited, ensure the unit is turned off at the fused switch.

(c) Connect a recovery machine to the suction line service valve highlighted in figure 7. Ensure to fully open the respective suction line and liquid line service valves to facilitate removal of refrigerant within the evaporator during recovery.

(d) Actuate recovery equipment to begin recovery of refrigerant gas within the system. Continue to recover refrigerant down to 0 psi. At this point cease operation of the recovery refrigerant, do not create a vacuum within the unit as this may damage the equipment or unit.

(e) Please note where recovery machines withdraw liquid refrigerant and not vapor , the quantity recovered may not match what the system was charged with.

(f) Remove recovery equipment and dispose of recovered refrigerant appropriately.

REPLACEMENT OF PARTS continued

10.4 Remove existing heat pump

(a) Following successfully recovery of refrigerant, proceed to remove the heat pump 4x M8 nuts secure the heat pump to the SAHP cylinder top base. Remove these M8 nuts, keep in a safe place to use later on.

(b) On the front left hand side of the unit, 2x 3/8" pipes protrude from the SAHP cylinder top base. Cut these pipes using appropriate refrigeration pipe cutting equipment. Once completed, ensure to prevent debris from entering the newly exposed pipework.

(c) Disconnect the suction and liquid line evaporator pipe work from the respective service valves highlighted in figure 7.

(d) Disconnect the sensor cable and power supply cables to the heat pump, immersion heater and immersion heater rocker switch from the terminal blocks located at the front of the unit. Ensure to appropriately mark these cables for reconnection later on.

(e) Lift and remove the existing heat pump plate. Ensure to take care when removing the heat pump as this will be required to be couriered back to SAHP for investigation for claims under warranty.

10.5 Installing replacement heat pump

(a) Locate the replacement heat pump onto the 4x M8 bolts protruding from the SAHP cylinder top plate. Secure heat pump in place using 4x M8 nuts removed in section 10.4.

(b) Align the condenser flow and return ¼" refrigeration copper pipe to the protruding 3/8" condenser refrigeration copper pipe from the SAHP cylinder top plate. From front, the right hand side copper pipe, connected to the compressor is the condenser flow, the left hand side copper pipe, connected to the receiver is the condenser return.

NOTE: incorrect condenser connect may result to damage to the unit.

(c) Continue to braze the respective ¼"and 3/8" refrigeration copper pipes together. Ensure to use Nitrogen when brazing to prevent carbonization within the pipework during brazing.

REPLACEMENT OF PARTS continued

10.6 Nitrogen pressure test

(a) Once the replacement heat pump has successfully brazed, proceed to pressure test the refrigeration circuit with oxygen free nitrogen. Ensure the service ports remain open, nitrogen may then be introduced using the service port connection as shown in figure 5.

(b) Fill the system to 115 psi, hold and monitor for 45 minutes. Check all the newly brazed refrigeration connections with a leak detector. If during the 45 minutes of monitoring the pressure in the system declines, re-braze, tighten or re-flare connections and restart the test. Repeat if necessary until pressure is maintained for the 45 minutes.

NOTE: Ensure through the process that the pressure does not exceed 145 psi in the Panel and/or the pipe work

10.7 Vacuum

(a) Once the replacement heat pump has been successfully pressure tested and no leakage of nitrogen has been confirmed, the nitrogen can then be vented.

(b) The vacuum pump must then be connected into the service port to begin vacuuming the system. Vacuum the system to 0.5 torr (500 microns) for a minimum of 45 minutes.

REPLACEMENT OF PARTS continued

10.8 Charge with Refrigerant

(a) Once the replacement heat pump has been successfully vacuumed, proceed to charge the unit with the appropriate volume of R134a / 513a refrigerant.

(b) To charge the system first ensure to place the R134a / 513a refrigerant bottle onto appropriate and accurate weighing scales and zero the scales to allow you to monitor accurately the quantity of refrigerant entering the system. Ensure the refrigeration gauges and connected lines have been purged with R134a / 513a before use. Proceed to connect the refrigeration charging line to the suction line service valve.

(c) A SAHP requires 2.6 Ibs of refrigerant to be charged for pipework separation distances up to 26.2' between the heat pump and evaporator. If the pipework separation is greater than 26.2', an additional 1.6 oz per 3 ft of R134a / 513a will be required (up to 12.8 oz additionally R134a / 513a – 3.4 Ibs maximum refrigeration quantity within the system).

(d) When charging, the differential in pressure between the R134a / 513a bottle and SAHP refrigeration circuit will facilitate the passive movement of refrigerant into the SAHP. When passive movement ceases to facilitate the entry of refrigerant, turn the unit on at the fuse spur. The compressor will actuate after 1 minute, and will proceed to draw R134a / 513a refrigerant from within the refrigerant bottle. Monitor the weight of refrigerant carefully until the required quantity of refrigerant has been transferred to the SAHP, at which time close all refrigeration isolation valves.

(e) Proceed to remove any connected refrigeration equipment suitably and follow the commissioning guidelines outlined within section 7 and section 13 of this manual.

GUARANTEE TERMS AND CONDITIONS

The product must be installed and commissioned in line with the manufacturers recommendations as set out in this installation manual. The guarantee must be activated within 30 days of commissioning. SAHP will not be able to provide free assistance under these terms if you do not activate your warranty within 30 days of installation. This does not affect your statutory rights.
The guarantee Registration Form should be completed by the installation engineer and returned to the address below or the Registration Form completed on the website:
www.sahp.info

The installer/sales company should always be the end-users first point of contact, in the event of a breakdown or other malfunction of the product. Only if/when confirmed that there is a fault with the Product and not with the installation design or operation, then contact should be made with SAHP. SAHP is not responsible for shipping costs associated with warranty returns.

By this guarantee, SAHP Ltd., registered at 44/54 Orsett Road, Grays, Essex RM17 5ED, UK.Company No. 11807156, guarantees that the solar assisted heat pump has a 2 year compliance guarantee from date of invoice, based on all EU directives in force at time of manufacture; a full 2 year guarantee on a 'return to factory' basis where the unit will be either repaired or replaced.

The SAHP stainless steel cylinder components including controls, valves and electrical parts are guaranteed for 12 months from the date of purchase.

IT SHOULD BE NOTED THAT THE FACTORY FITTED TEMPERATURE AND PRESSURE RELIEF VALVE MUST NOT BE REMOVED OR ALTERED IN ANY WAY OR THE GUARANTEE WILL NOT BE VALID. MBI WILL NOT BE RESPONSIBLE FOR ANY CONSEQUENTIAL LOSS OR DAMAGE HOWEVER IT IS CAUSED.

GUARANTEE TERMS AND CONDITIONS contin-

The guarantee for the stainless steel SAHP vessel itself is guaranteed for 25 years against material defect or manufacturing faults if the original unit is returned to us AND PROVIDED THAT:

- It has not been modified
- It has not been subjected to wrong or improper use or left uncared for.
- It has only been used for the storage of potable water supplied from the public mains, max 200mg/litre chloride.
- It has not been subjected to frost damage.
- The benchmark service record is completed after each annual service.
- The unit has been serviced annually.
- Any disinfection has been carried out strictly in accordance with BS6700.

The roll bond evaporator panel is guaranteed for 10 years from the date of purchase.

The guarantee shall only be valid subject to the following conditions: Its installation shall be carried out in accordance with the manufacturer's instructions and in compliance with all the technical and safety standards applicable whether they are European, national or autonomous; it shall also be undertaken by qualified staff.

The present guarantee does not have effect if the general conditions of sale have not been met between the supplier and the domestic end user for the specified equipment, or if the agreed payment terms have not been respected. The end user or customer does not have any right to make any claim for compensation during the time the equipment is damaged or under repair or for damages caused directly or indirect.

IN ORDER THAT THE GUARANTEE TAKES EFFECT, IT IS ESSENTIAL THAT THE GUARANTEE COMPLETED ON LINE WITHIN 30 DAYS OF INSTALLATION AT: WWW.SAHP.INFO

GUARANTEE TERMS AND CONDITIONS continued

The Guarantee shall be subject to the following conditions:
Its installation shall be carried out in accordance with the manufacturer's instructions and in compliance with all the technical and safety standards applicable whether they are European, national or autonomous; it shall also be undertaken by qualified staff.

The Guarantee shall be null and void if any of the following takes place:

- **Incorrect equipment is used for installation.**
- **The equipment has been installed by staff other than an F Gas qualified engineer.**
- **The equipment has been used for purposes other than those described in the use and deployment standards or in some way other than that recommended in the mentioned standards.**
- **The usage and maintenance instructions have not been complied with.**
- **Water supply for the unit that meets some of the following criteria: Chlorides content > 200mg/L, pH value<6 (scale Sorensen a 25°C), Sulphate content > 2000mg/L, Chloride and sulphate content > 300mg/L, CaCO3 content >300ppm. In general water with values exceeding ceilings set by legislation.**
- **Absence of security group in the inlet system according to the legislation.**
- **System malfunction arising from improper installation of the hydraulic circuit components and/or buffer tank.**
- **Installation of elements outside the specifications of the installation manual.**
- **Damage resulting from improper anchoring equipment.**
- **Unit malfunction due to lack of thermal insulation in the installation**
- **Incorrect placement of solar panel or box**
- **The equipment has received an overload of any nature: electrical, water pressure etc.**
- **Malfunctions brought about by chance or force majored: atmospheric, geological phenomena etc.**
- **The equipment has not been delivered in its original box.**
- **Damage from atmospheric and external agents: Freezing, dirt, transport, or accidental impacts.**
- **Damages derived from an unusual supply of electricity, water or air (included over pressure and over voltage).**
- **Damage caused by daily wear in metal or plastic.**
- **Breakdowns caused by the replacement of parts or elements not original or authorized in writing by the manufacturer.**
- **Damages caused by the unusual corrosion of the heat exchanger and/ or the hydraulic circuit caused from reaction with the circulating fluid.**
- **Damages caused from the installation itself.**
- **Damaged caused by vandalism acts, war, fire, etc.**

SERVICE RECORD

Date of visit _____

Engineer Name _____

Job Role _____

Company Name _____

Telephone Number _____

Comments _____

_____

Signature _____

Date of visit _____

Engineer Name _____

Job Role _____

Company Name _____

Telephone Number _____

Comments _____

_____

Signature _____

Date of visit _____

Engineer Name _____

Job Role _____

Company Name _____

Telephone Number _____

Comments _____

_____

Signature _____

DISASSEMBLY AND RECYCLING

USE TRAINED TECHNICIANS

Only trained technicians can carry out work on equipment containing F gases, including:

installation
testing for leaks
general maintenance
disposal or decommissioning when you no longer need the SAHP

Check that anyone working on your equipment is qualified.

CHECK FOR LEAKS

Any leaks from the product must be stopped.

Engineers that install, maintain or dispose of equipment share responsibility for trying to stop leaks with the operators of equipment. They must check all equipment for leaks.

RECOVER F GASES WHEN DISPOSING OF EQUIPMENT

You must use a qualified technician to recover F gas when disposing of equipment.

RECYCLE RECOVERED F GAS

It may be possible to recycle the following gases at your premises when the engineer decommissions the system.

Ask the technician recovering the F gas if it's possible to recycle it. The technician will carry out a basic cleaning process when they recover the gas if it's possible. The gas can then be re-used.