SWIMMING POOL

R32

INVERTER HEAT PUMP UNIT

Installation & Instruction Manual

Rev. P.S-PC-PG.1.00
05.05.2019
1.27.1010099

Safety Precautions

CAUTION

R32

REFRIGERANT

This heat pump contains and operates with refrigerant R32

THIS PRODUCT MUST ONLY BE INSTALLED OR SERVICED BY QUALIFIED PERSONNEL.

REFER TO NATIONAL AND INTERNATIONAL LEGISLATION,REFULATIONS,CODES,AND INSTALLATION & OPERATION MANUALS FOR THE TRANSPORTATION, STORAGE, INSTALLATION AND /OR SERVICE OF THIS PRODUCT.

Keep this manual where the user can easily find it.
To prevent personal injury, injury to others, or property damage, read this section carefully before you use this product, and be sure to comply to the following safety precautions.
Incorrect operation due to failure to follow the instructions may cause harm or damage.

⚠ WARNING	⚠ CAUTION
Indicate potential hazardous situation, which could result in loss of life or serious injury.	Indicate potential hazardous situation, which could result in moderate injury or damage to property.

Explanation of symbols displayed on the unit.

	**This symbol shows that this appliance uses a flammable refrigerant.If the refrigerant is leafed and exposure to an external ignition source,there is a risk of fire.**
	**This symbol shows that the Operation Manual should be read carefully.**
	**This symbol shows that a service personnel should be handling this equipment with reference to the Installation Manual**
	**This symbol shows that information is available such as the Operating Manual or Installation Manual**

After reading, keep this manual in a convenient place so that you can refer to it whenever necessary.
If the equipment is transferred to a new user, be sure also to hand over the manual.

⚠ WARNING

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
The appliance must be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).
Do not pierce or burn.
Be aware that refrigerants may not contain odour.
To avoid fire, explosion or injury, do not operate the unit when harmful gases (e.g. flammable or corrosive) are detected near the unit.

Be aware that prolonged, direct exposure to cool or warm air from the heat pump or to air that is too cool or too warm, can be harmful to your physical condition and health.
Do not place objects, including rods, your fingers, etc., in the air inlet or outlet. Product damage or personal injury may result due to contact with the unit's high-speed fan blades.
Do not attempt to repair, dismantle, reinstall or modify the heat pump yourself as this may result in water leakage, electric shocks or fire hazards.
Do not use flammable sprays near the heat pump, or otherwise fire may result.
Do not use a refrigerant other than the one indicated on the outdoor unit (R32) when installing, moving or repairing. Using other refrigerants may cause trouble or damage to the unit, and personal injury.
To avoid electric shocks, do not operate with wet hands.
Beware of fire in case of refrigerant leakage. If the heat pump is not operating correctly, i.e. not heating, refrigerant leakage could be the cause. Consult your dealer for assistance. The refrigerant within the heat pump is safe and normally does not leak.
However, in the event of a leakage, contact with a naked burner, heater or cooker may result in generation of noxious gas.
Do not use the heat pump until a qualified service person confirms that the leakage has been repaired.
Do not attempt to install or repair the heat pump yourself. Improper workmanship may result in water leakage, electric shocks or fire hazards. Please contact your local dealer or qualified personnel for installation and maintenance work.
If the heat pump is malfunctioning (giving off a burning odours, etc.), turn off power to the unit and contact your local dealer. Continued operation under such circumstances may result in a failure, electric shocks or fire hazards.
Be sure to install an earth leakage circuit breaker. Failure to install an earth leakage circuit breaker may result in electric shocks or fire.
Be sure to earth the unit. Do not earth the unit to a utility pipe, lightning conductor or telephone earth lead. Imperfect earthling may result in electric shocks.
The appliance shall be installed at well ventilated location, the minimum floor area required please refer to national regulation.
Disposal of equipment using flammable refrigerants follow national regulations.
Always follow the local regulations on flammable refrigerant for transportation, storage, installation, repair, etc.

CAUTION

1.Installation (Space)

- That the installation of pipe-work shall be kept to a minimum.
- That pipe-work shall be protected from physical damage.
- That compliance with national gas regulations shall be observed.
- That mechanical connections shall be accessible for maintenance purposes.
- In cases that require mechanical ventilation, ventilation openings shall be kept clear of obstruction.
- When disposing of the product is used, be based on national regulations, properly processed

2.Servicing

2-1.Service personnel

- Any person who is involved with working on or breaking into a refrigerant circuit should hold a current valid certificate from an industry-accredited assessment authority, which authorizes their competence to handle refrigerants safely in accord-ance with an industry recognised assessment specification.
- Servicing shall only be performed as recommended by the equipment manufacturer. Maintenance and repair requiring the assistance of other skilled personnel shall be carried out under the supervision of the person competent in the use of flammable refrigerants.
- Servicing shall be performed only as recommended by the manufacturer.

2-2. Work

- Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimised. For repair to the refrigerating system, the precautions in 2-2 to 2-8 shall be complied with prior to conducting work on the system.
- Work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapour being present while the work is being performed.
- All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out.
- Work in confined spaces shall be avoided.
- The area around the workspace shall be sectioned off.
- Ensure that the conditions within the area have been made safe by control of flam-mable material.

2-3.Checking for presence of refrigerant

- The area shall be checked with an appropriate refrigerant detector prior to and dur-ing work, to ensure the technician is aware of potentially flammable atmospheres.
- Ensure that the leak detection equipment being used is suitable for use with flam-mable refrigerants, i.e. non sparking, adequately sealed or intrinsically safe.

2-4.Presence of fire extinguisher

- If any hot work is to be conducted on the refrigeration equipment or any associated parts, appropriate fire extinguishing equipment shall be available at hand.
- Have a dry powder or CO2 fire extinguisher adjacent to the charging area.

2-5.No ignition sources

- No person carrying out work in relation to a refrigeration system which involves exposing any pipe work that contains or has contained flammable refrigerant shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion.
- All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which flammable refrigerant can possibly be released to the surrounding space.
- Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.

2-6.Ventilated area

- Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work.
- A degree of ventilation shall continue during the period that the work is carried out.
- The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

2-7. Checks to the refrigeration equipment

- Where electrical components are being changed, they shall be fit for the purpose and to the correct specification.
- At all times the manufacturer’s maintenance and service guidelines shall be fol- lowed.
- If in doubt consult the manufacturer’s technical department for assistance.
- The following checks shall be applied to installations using flammable refrigerants.
  - The charge size is in accordance with the room size within which the refrigerant containing parts are installed.
  - The ventilation machinery and outlets are operating adequately and are not obstructed.
  - If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant.
  - Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected.

- Refrigeration pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant contain-ing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

2-8. Checks to electrical devices

- Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures.
- If a fault exists that could compromise safety, then no electrical supply shall be con-nected to the circuit until it is satisfactorily dealt with.
- If the fault cannot be corrected immediately but it is necessary to continue opera-tion, an adequate temporary solution shall be used.
- This shall be reported to the owner of the equipment so all parties are advised.
- Initial safety checks shall include.
  - That capacitors are discharged: this shall be done in a safe manner to avoid pos-sibility of sparking.
  - That there no live electrical components and wiring are exposed while charging, recovering or purging the system.
  - That there is continuity of earth bonding.

3.Repairs to sealed components

- During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked upon prior to any removal of sealed covers, etc.
- If it is absolutely necessary to have an electrical supply to equipment during servic-ing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.
- Particular attention shall be paid to the following to ensure that by working on elec-trical components, the casing is not altered in such a way that the level of protection is affected.
- This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.
- Ensure that apparatus is mounted securely.
- Ensure that seals or sealing materials have not degraded such that they no longer serve the purpose of preventing the ingress of flammable atmospheres.
- Replacement parts shall be in accordance with the manufacturer's specifications.

NOTE: The use of silicon sealant may inhibit the effectiveness of some types of leak detection equipment. Intrinsically safe components do not have to be isolated prior to working on them.

4.Repair to intrinsically safe components

- Do not apply any permanent inductive or capacitance loads to the circuit without ensuring that this will not exceed the permissible voltage and current permitted for the equipment in use.
- Intrinsically safe components are the only types that can be worked on while live in the presence of a flammable atmosphere.
- The test apparatus shall be at the correct rating.
- Replace components only with parts specified by the manufacturer.
- Other parts may result in the ignition of refrigerant in the atmosphere from a leak.

5.Cabling

- Check that cabling will not be subject to wear, corrosion, excessive pressure, vibra-tion, sharp edges or any other adverse environmental effects.
- The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

6.Detection of flammable refrigerants

- Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks.
- A halide torch (or any other detector using a naked flame) shall not be used.

7.Leak detection methods

- Electronic leak detectors shall be used to detect flammable refrigerants, but the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.)
- Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used.
- Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed and the appropriate percentage of gas (25 % maximum) is confirmed.
- Leak detection fluids are suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.
- If a leak is suspected, all naked flames shall be removed/extinguished.
- If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Oxygen free nitrogen (OFN) shall then be purged through the system both before and during the brazing process.

8.Removal and evacuation

- When breaking into the refrigerant circuit to make repairs – or for any other purpose –conventional procedures shall be used. However, it is important that best practice is followed since flammability is a consid-eration.

  The following procedure shall be adhered to:

  - remove refrigerant
  - purge the circuit with inert gas
  - evacuate
  - purge again with inert gas
  - open the circuit by cutting or brazing
- The refrigerant charge shall be recovered into the correct recovery cylinders.
- The system shall be “flushed” with OFN to render the unit safe.
- This process may need to be repeated several times.
- Compressed air or oxygen shall not be used for this task.
- Flushing shall be achieved by breaking the vacuum in the system with OFN and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum.
- This process shall be repeated until no refrigerant is within the system.
- When the final OFN charge is used, the system shall be vented down to atmos-pheric pressure to enable work to take place.
- This operation is absolutely vital if brazing operations on the pipe work are to take place.
- Ensure that the outlet for the vacuum pump is not close to any ignition sources and there is ventilation available.

9.Charging procedures

- In addition to conventional charging procedures, the following requirements shall be followed.
  - Ensure that contamination of different refrigerants does not occur when using charging equipment.
  - Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
  - Cylinders shall be kept upright.
  - Ensure that the refrigeration system is earthed prior to charging the system with refrigerant.

- Label the system when charging is complete (if not already).
- Extreme care shall be taken not to overfill the refrigeration system.

• Prior to recharging the system it shall be pressure tested with OFN.
• The system shall be leak tested on completion of charging but prior to commission-ing.
• A follow up leak test shall be carried out prior to leaving the site.

10.Decommissioning

• Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its details.
• It is recommended good practice that all refrigerants are recovered safely.
• Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of reclaimed refrigerant.
• It is essential that electrical power is available before the task is commenced.
  a) Become familiar with the equipment and its operation.
  b) Isolate system electrically.
  c) Before attempting the procedure ensure that:
    mechanical handling equipment is available, if required, for handling refriger-ant cylinders;
    all personal protective equipment is available and being used correctly;
    the recovery process is supervised at all times by a competent person;
    recovery equipment and cylinders conform to the appropriate standards.
  d) Pump down refrigerant system, if possible.
  e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
  f) Make sure that cylinder is situated on the scales before recovery takes place.
  g) Start the recovery machine and operate in accordance with manufacturer's instructions.
  h) Do not overfill cylinders. (No more than 80 % volume liquid charge).
  i) Do not exceed the maximum working pressure of the cylinder, even temporarily.
  j) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
  k) Recovered refrigerant shall not be charged into another refrigeration system unless it has been cleaned and checked.

11.Labelling

• Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant.
• The label shall be dated and signed.
• Ensure that there are labels on the equipment stating the equipment contains flam-mable refrigerant.

12.Recovery

• When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.
• When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed.
• Ensure that the correct number of cylinders for holding the total system charge are available.
• All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant).
• Cylinders shall be complete with pressure relief valve and associated shut-off valves in good working order.

- Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.
- The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of flammable refrigerants.
- In addition, a set of calibrated weighing scales shall be available and in good work-ing order.
- Hoses shall be complete with leak-free disconnect couplings and in good condition.
- Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.
- The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant Waste Transfer Note arranged.
- Do not mix refrigerants in recovery units and especially not in cylinders.
- If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant.
- The evacuation process shall be carried out prior to returning the compressor to the suppliers.
- Only electric heating to the compressor body shall be employed to accelerate this process.
- When oil is drained from a system, it shall be carried out safely.

To our customers

1.Dear customers, please read this manual carefully before you install the product, otherwise it may lead to damage to the heat pump or may injure operators as well as cause financial loss.

2.With the development of science and technology, the product will be improved as well, so you are invited to keep up with the latest products.

3.If you need any further technical information, please contact our local distributor.

4.Attention:

4.1 Before install the heat pump, please check whether the local power supply corresponds with the requirement of the heat pump.

For details, refer to the label on the unit or performance data in this manual.

4.2 Please install the electrical protection devices, according to the local regulations.

4.3 Connecting the heat pump to a ground wire is necessary, in order to prevent electrical shock caused by an unexpected short circuit inside the unit.

4.4 An electrical wiring diagram is provided in this manual.

4.5 For safety reasons, please do not change or repair the heat pump by yourself. If it is necessary, please contact your local distributor for help.

4.6 Do not put any objects into the heat pump when running. It may touch the fan and damage it or lead to accidents(especially for the children).

4.7 Do not use the heat pump without the grid or plate work since it may lead to accidents or ab normal operation of the unit.

4.8 If the unit is soaked in water, please contact our local distributor immediately.

The unit can only be restarted after a completed inspection by professional technicians.

4.9 Unqualified technicians are not allowed to adjust any switches, valves or controllers in the unit.

Contents

1. Performance and installation

1.1 Performance and features

√ High efficiency

With a COP value up to 5.0 our heat pumps are very efficient when transferring heat from the air to the swimming pool water. You can save as much as 80% of cost compared to an electrical heater.

√ Long life-span

The heat exchanger is made of PVC & Titanium tube, which can withstand and prolong exposure to swimming pool water.

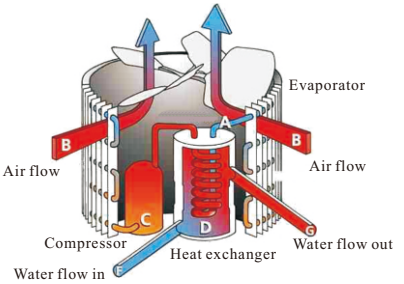
√ Easy control and operation

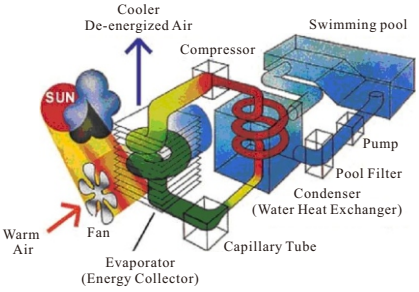
The unit is very easy to operate: simply switch it on and set the desired pool water temperature.

The system includes a micro-computer controller, allowing all operation parameters to be set.

Operation status can be displayed on the controller with LCD display.

1.2 Working principles





√ Heat pumps utilize the sun's free heat by collecting and absorbing energy from the outside air. This energy is then compressed and transferred to the pool water. Your existing water pump circulates the water through the heater, usually next to the pool equipment, and the water warms up. The heat pump timer could be set to operate during daylight hours, for example, usually 9am to 5pm.

√ The unit contains a fan that draws in outside air and directs it over the surface of the EVAPORATOR (energy collector).The liquid refrigerant within the EVAPORATOR coil absorbs the heat from the outside air becomes a gas.

√ The warm gas in the coil passes through the COMPRESSOR concentrating and increasing the heat to form a very hot gas which then passes to the CONDENSER (water heat exchanger).It is here that the heat exchange occurs as the hot gas gives off heat to the cool swimming pool water circulating through the coil.

√ The pool water becomes warmer, and the hot gas cooling as it flows through the CONDENSER coil-returns to its liquid form and, after passing on through the CAPILLARY TUBE, the whole process begins again.

√ The state of the heat pump technology can efficiently collect heat from the outside air down to the 7 to 10 range. For tropic and subtropical climates, this means that the pool can be maintained at 26℃ to 32℃

1.3 Location of heat pump installation

The unit will perform well on any location provided three factors are present:

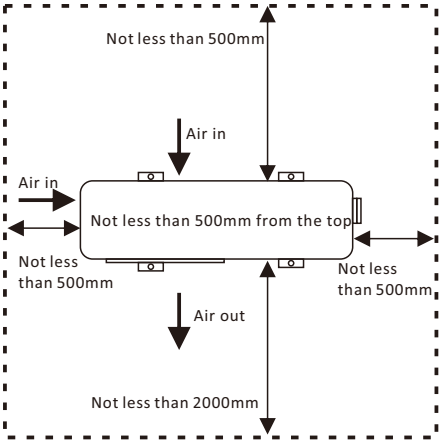
1. Fresh air - 2. Electricity - 3. Pool filter piping

The unit may be installed virtually anywhere outdoors providing minimum distance requirements are met with respect to other objects (see diagram below).For indoor pools please consult your installer. If the unit is placed in a windy area, no problems occur with e.g. the pilot light, as opposed to what is often the case with gas heaters.

Attention: Do not place the unit in an enclosed area with a limited air volume where the unit's discharged air will be re-circulatedor near shrubs that could block the air inlet. These locations deny the unit a continuous fresh air supply, which reduces its efficiency and may prevent adequate heat yield.

See diagram below for minimum required distances.

Model:Horizontal Unit



Free space requirement for the horizontal heat pump

Cautions

- Do not put your hands or any other object into the air outlet and fan. It could damage the heat pump and cause injuries.
- In case any abnormality was found in the heat pump, please cut off the power at once and contact a professional technician.
- It is strongly suggested to place a guard around the machine to keep children away from the heat pump.

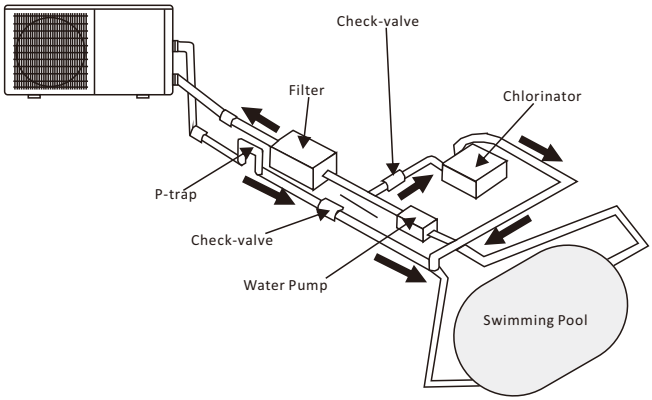
1.4 Distance from the pool

Normally, the pool heat pump is installed within a 7.5 meter radius of the pool. The greater the distance from the pool, the greater the heat loss from the piping. Since the piping is buried for the most part, heat loss is minimal for distances of up to 30 meters (15 meters to and from the pump= 30 meters total), unless the soil is wet or the water level is high. Heat loss per 30 meters could roughly be estimated at 0.6 kw-hour (2000 BTU) for every 5 ℃ temperature difference between the pool water and the soil surrounding the pipe, which translates to an operation time increase of 3-5%.

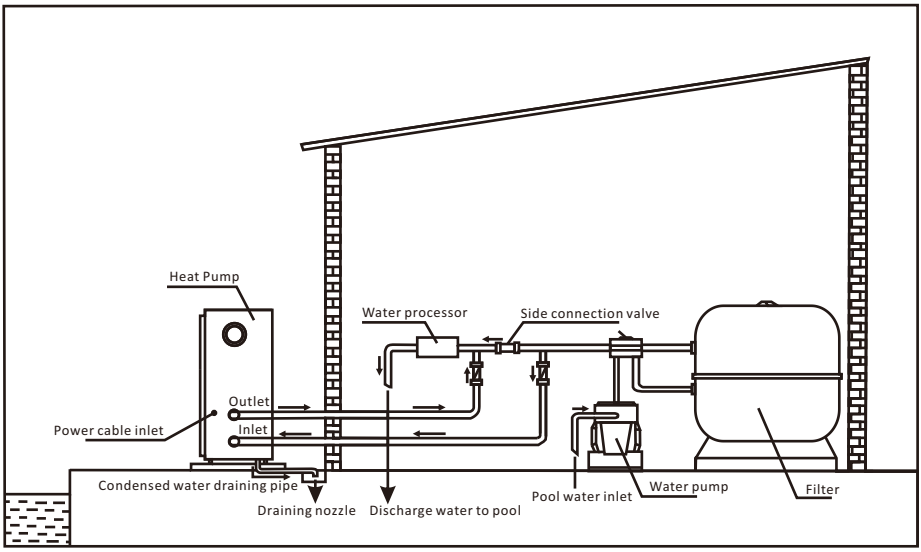
1.5 Installation of the check-valve

Attention- When using automatic chlorine and PH dosage systems, it is of uttermost importance to protect the heat pump from high concentrations of these chemicals that could corrode the heat exchanger. Therefore, such systems should add the chemicals in the conduits located DOWNSTREAM of the heat pump and it is recommended to install a check-valve in order to prevent backflow when there is no water circulation.

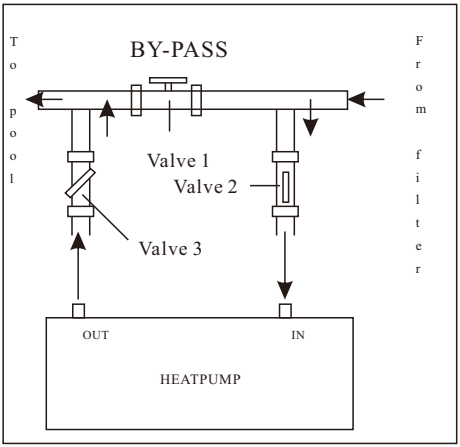
Damage to the heat pump caused by disregarding any of these recommendations will invalidate the warranty.



1.6 Pool system set up



1.7 Connecting the by-pass



Adjust the by-pass as follows:
open the 3 valves completely
slightly close valve 1 until water pressure has increased with approximately 100 to 200 grams,
close valve 3 about halfway to adjust the pressure of the refrigerant gas in the unit

1.8 **Warning:**

-Do not place your hand or any other objects into the air outlet and fan. It could damage the heat pump and cause injuries;

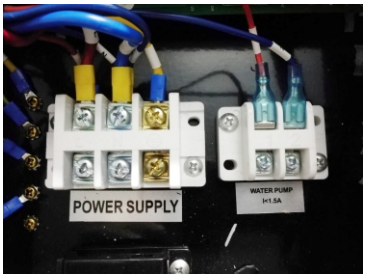
-In case of any abnormality with the heat pump, cut off the power immediately and contact a professional technician;

It is strongly advised to place a protective guard around the unit to keep children away from the heatpump.

An authorized electrician must connect the Heat Pump to the power.

Important—Although the heat pump is electrically isolated from the rest of the unit, this only prevents the passage of electricity to or from the pool water. Grounding the unit is still required to protect yourself from short circuits inside the unit. Make for adequate ground connection.

Check if the electrical mains voltage corresponds with the operating voltage of the heat pump prior to hooking up the unit.



220~240V / 1ph / 50Hz

MODEL	Voltage(volt)	Fuse(A)	Nominal current(A)	Cable diameter(mm^2) (for max.length of 15 meters)
HSI125	220-240	16	9.7	2x1.5+1.5
HSI017	220-240	25	14.2	2x4.0+2.5
HSI021	220-240	32	18.2	2x4.0+4.0

1.9 First time start-up

Note- In order for the unit to heat the pool (or spa), the filter pump must be running so that the water can circulate through the heat pump. Without this circulation, the heat pump will not start.

When all connections have been made and checked, the following steps should be followed:

1). Turn on the filter pump. Check for leaks.

2). Turn on the electrical power supply to the unit, then press the ON/OFF key on the electronic control panel. The unit should start when the time delay period has elapsed.

3). When the unit has been running for a couple of minutes, check if the air leaving the unit is cooler than the ambient temp.

4). Check the performance of the flow switch as follows: with the unit running turn the filter pump off. The unit should also switch off automatically.

5). The unit and the filter pump should run 24 hours a day until the desired pool water temperature has been reached. Once the set temperature is reached, the unit will switch itself off. As long as the filter pump is running, the unit will restart automatically when the temperature of the pool water drops more than 1°C below the set temperature.

Depending on the starting temperature of the pool water and the air temperature, it can take several days for the water to reach the desired temperature. Covering the pool can drastically reduced this period.

Water flow switch—the unit is equipped with a flow switch that is switched on when enough water has flowed through the unit and that is switched off when the water flow becomes too low. (E.g. When the filter pump is switched off).

Time delay— the unit is equipped with a built-in 3-minute start delay included to protect electrical components and contacts. After this time delay, the unit will automatically be restarted. Even a brief interruption of the power supply will activate the start delay and prevent the unit from starting immediately. Additional interruptions of the power supply during the delay period will have no effect on the 3-minute countdown.

1.10 Condensation

When the swimming pool water is being heated by the heat pump, the incoming air is cooled down quite a bit, which can cause condensation on the fins of the evaporator. Condensed volumes can attain several litres per hour under high atmospheric humidity. Sometimes, this is wrongfully interpreted as a water leak.

2. Operation of heat pump

2.1 Operation of control display

2.1.1 Control display illustration:

When heat pump is supplied with power, controller will display with full screen, shows that it is already connected. If connection fails in 10 seconds, please check connections between communication cable and control display, or replace with another control display.

Button functions:

button: ON/OFF switch to start or stop heat pump.

button:Timer button to set timer on and timer off.

M button: To switch between heating, cooling and auto mode.
To enter parameter settings and confirm settings.

"+" "-"button: To increase or decrease value.

button: To switch between SMT,PWF, QT and STD performance in running status.

Icon definitions:

--heating icon, showing heat pump is in heating mode.

--cooling icon, showing heat pump is in cooling mode.

--auto icon, showing heat pump is in auto mode.

--alarm icon, showing system alarm.

--key pad lock icon, showing buttons on the control display are locked.

PWF --powerful performance of heat pump.

QT --quiet performance of heat pump.

STD --standard performance of heat pump.

SMT --smart performance of heat pump.

Note: 1. Heat pump is not equipped with electric heater internally, only provides terminal for external connection.

2. Fan speed is automatically controlled by ambient temperature, not manually.

2.1.2Power ON/OFF heat pump

Press ⏻ button 5s to switch on heat pump.

Once the heat pump is powered on all related running component icons will be lightened to show system is in running status.

Figure 2-2 shows heat pump in standby status and figure 2-3 shows heat pump in running status.

The left temperature shows flow water temperature while the right temperature is the return water temperature.

Figure 2-2

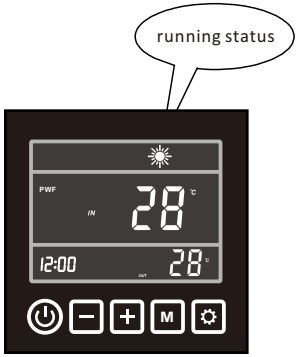


Figure 2-3

2.1.3 How to change mode

Press [M] button to select auto, heating or cooling mode, related indicator icon will be lightened as a symbol to show heat pump is in either auto △ , heating ☀ or cooling ❄ mode.

Press [☼] button to switch between SMT, PWF, QT, STD when unit is switched on.

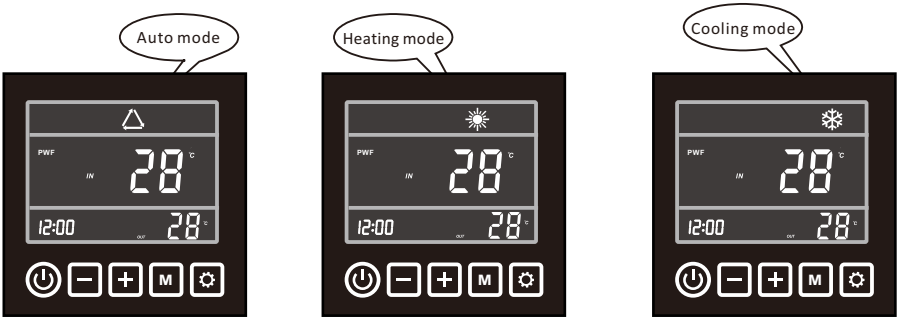


Figure 2-4

2.1.4 Adjust desired water temperature

1.First select desired mode, auto, heating or cooling.

2. When the heat pump is under running status, press “+” or “-” , display will show the desired water temp. of selected mode with a “set” value, then change the water temp. by moving “+” or “-” as requested.

3. Without any further movement on the display button in 5 seconds, it will return to main interface automatically.

2.1.5 Check and set parameters

No matter heat pump is in standby status or running status, press [M] button for 5 seconds display will show parameter number with value together.

Move “+” and “-” button to check required parameter settings.

Select desired parameter and press [M] button again for resetting parameter.

Parameter number stays fixed while parameter value remains flashing.

Move “+” and “-” button to adjust the value.

Press [M] button to confirm the setting.

Without any further movement on the display button in 30 seconds, it will return to main interface automatically.

See Parameter table for more details.

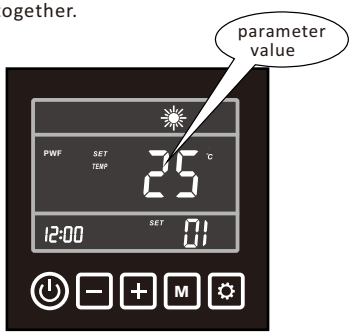


Figure 2-5

2.1.6. Setting Time

Press [⚙] button for 5 seconds to activate time setting.

When hour numbers are flashing, it is available for revision, move “+” or “-” to fix hour numbers.

Press [⚙] button to confirm hour setting.

Minute numbers start flashing once the hour numbers are confirmed, move “+” or “-” to fix minute numbers.

Press [⚙] button to confirm minute setting.

2.1.7 Setting Timer on / Timer off

Press M and ☼ button together in a quick stop to enter timer setting for **TIMER 1**.

Press ☼ button again, hour data will be flashing, move "+" or "-" to set it.

Confirm timer on hour setting by pressing ☼ button.

Minute data starts flashing once hour setting is confirmed, move "**+**" or "**-**" to set it.

Confirm timer on minute setting by pressing ☼ button.

Continue to press ☼ button to set **TIMER 2** and **TIMER 3.**

Hour data will be flashing, move "+" or "-" to set it.

Confirm timer on hour setting by pressing ☼ button.

Minute data starts flashing once hour setting is confirmed, move "+" or "-" to set it.

Confirm timer on minute setting by pressing ☼ button.

Once Timer on is set and confirmed Timer off will be activated.

Follow the same steps as setting Timer on to set Timer off.

Remark: The heat pump will forced to running in QT mode within **TIMER3** range.

2.1.8 Cancellation of Timer on / Timer off

If the starting time is set to be the same as the finishing time, then the timer function is off.

The "⏰ ⊗"signal will be off.

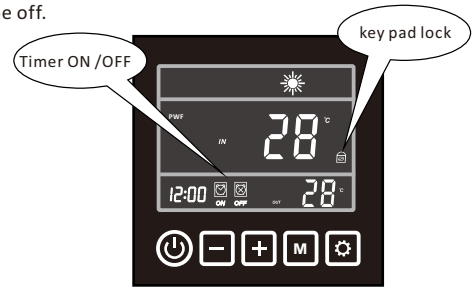


Figure 2-6

2.1.9 Key pad lock

Press "+"and "-" button together for 5 seconds, display will show lock icon. Do this again to unlock.

If the control display is not operated in 2min, it will be locked and dark with a "beep" sound.

Once the control display is operated again, it will be lightened.

2.1.10How to defrost manually

In standby status, press "+" button for about 5 seconds, the heat pump will start defrosting manually with a flashing ❄ icon.

The heat pump will stop working automatically after defrosting for 2min without failure code, and back to previous working mode.

2.2 Parameter table overview (1)

Parameter	Control Display	Range	Default	Remark
1	Desired water temp. in cooling mode	5~42℃	12℃	Adjusted by technician
2	Desired water temp. in heating mode	5~42℃	28℃	Adjusted by technician
3	Desired water temp. in auto mode	5~42℃	28℃	Adjusted by technician
4	Water temperature difference setting for heat pump restart up	1~20℃	2℃	Adjusted by technician
5	Defrosting cycle	10~90Min	40Min	Adjusted by technician
6	Evaporator temperature set point for starting defrosting	-30～0℃	-3℃	Adjusted by technician
7	Evaporator temperature set point for stopping defrosting	2~30℃	13℃	Adjusted by technician
8	Maximum duration for defrosting	1~12Min	8Min	Adjusted by technician
9	Reserved	0/1/2	0	Reserved
10	Auto restart after power failure	0(no)/1(yes)	1	Adjusted by technician
11	Different working mode of water pump: 0=water pump keeps working always 1=water pump works for 5min every 2 hours	0/1	0	Adjusted by technician
12	Reserved	0/1	0	Reserved
13	Chassis heater	0 on/1off	1	Adjusted by technician
14	Compressor running mode	0 PWF 1 STD 2 QT 3 SMT	3	Adjusted by technician
15	Fan running mode	0 Day time 1.Night time 2.Low speed	0	Adjusted by technician

2.2 Parameter table overview (2)

Parameter	Control Display	Range	Default	Remark
T01	Ambient temp.	-30～99℃		Measured Value
T02	Reserved			Reserved
T03	Inlet water temp.	-30～99℃		Measured Value
T04	Outlet water temp.	-30～99℃		Measured Value
T05	Evaporator coil temp.	-30～99℃		Measured Value
T06	Discharge gas temp.	0～130℃		Measured Value
T07	Reserved			Reserved
T08	Return gas temp.	-30～99℃		Measured Value
T09	Driving board temp.	0～130℃		Measured Value
T10	Main EEV actual steps	0～500P		Measured Value
T11	Reserved			Reserved
T12	Reserved			Reserved
T13	Compressor target frequency	0～120Hz		Measured Value
T14	Compressor running frequency	0～120Hz		Measured Value
T15	AC voltage	0～450V		Measured Value
T16	DC voltage	0～450V		Measured Value
T17	Driving board input current	0～40A		Measured Value
T18	Compressor running current	0～40A		Measured Value
T19	Compressor input power	0000		Measured Value
T20	Discharge pressure	0-50.0 Kg/cm2		Measured Value
T21	Suction pressure	0-20.0 Kg/cm2		Measured Value
T22	EVI pressure	0-50.0 Kg/cm2		Measured Value

3. Protection systems

3.1 Water flow switch

Equipped with flow switch the heat pump will not work when the filter pump is not working (and the water is not circulating).
This system prevents the heat pump from heating only the water present in the heat pump itself.
The protection also stops the heat pump if water circulation is cut off or stopped.

3.2 Refrigerant gas high and low pressure protection

The high pressure protection makes sure the heat pump is not damaged in case of over pressurisation of the gas. The low pressure protection emits a signal when refrigerant is escaping from the conduits and the unit can not be kept running.

3.3 Overheating protection on the compressor

This protection protects the compressor from overheating.

3.4 Automatic defrost control

When the air is very humid and cold, ice can form on the evaporator. In that event, a thin layer of ice appears that will grow increasingly bigger as long as the heat pump is running. When the temperature of the evaporator has become too low, automatic defrost control will be activated, which will reverse the heat pump cycle so that hot refrigerant gas is sent through the evaporator during a brief period of time to defrost it.

3.5 Temperature difference between inflowing and outflowing water

During normal operation of the heat pump, the temperature difference between inflowing and outflowing water will approximate 1 to 2℃. In the event that the pressure switch does not work and that the water stops circulating, the temperature probe monitoring the outflowing water will always detect a rise in temperature. As soon as the temperature difference between inflowing and outflowing water exceeds 13℃, the heat pump will be automatically turned off.

3.6 Low temperature cut-out

If, during cooling, the temperature of the outflowing water reaches 5℃ or drops below this temperature, the heat pump will turn itself off until the water temperature reaches or exceeds 7℃ again.

3.7 Anti-frost protection during winter

This protection can only be activated if the heat pump is in STAND-BY status.

3.8 First anti-frost protection

If the filter pump is controlled by the heat pump and when the water temperature lies between 6 and 10℃, and the air temperature is lower than 3℃, the filter pump will be automatically turned on to prevent the water from freezing in the piping. This protection is deactivated when the temperature rises again.

3.9 Second anti-frost protection

If the water temperature drops even more, that is, below 6℃ (during long frost periods), the heat pump will also start running to heat the water until its temperature approximates 6℃. When this temperature is reached, the heat pump will stop, but anti-frost protection will remain active until conditions change.

4. Direction

4.1 Swimming pool water chemistry

Special attention should be paid to the chemical balance of the pool water. The pool water values should always stay within the following limits:

	Min	Max
pH	7.0	7.4
Free chlorine(mg/1)	0.5	1.2
TAC(mg/1)	80	120
Salt(g/1)		3

Important: failure to comply with these limits will invalidate the warranty.

Note: exceeding one or several limits can damage the heat pump beyond repair. Always install water-treatment equipment (e.g. chemical dosing systems) after the water outlet of the heat pump, especially if the chemicals are automatically added to the water (e.g. automatic chemical dosing systems).

A check valve should also be installed between the outlet of the heat pump and the water-treatment equipment to prevent products from flowing back into the heat pump if the filter pump stops.

4.2 Heat pump winterizing

Important: failure to take the necessary precautions for winterizing can damage the heat pump, which will invalidate the warranty.

The heat pump, filter pump, filter and conduits must be protected in areas where the temperature can drop below freezing point. Evacuate all water from the heat pumps as follows:

1.Disconnect the electrical power supply to the heat pump

2.Close the water supply to the heat pump completely.

3.Disconnect water inlet and outlet coupling fittings of the heat pump and let the water drain out of the unit. Make sure all water is out of the heat pump.

4. Loosely reattach water inlet and outlet coupler fittings to the heat pump in order to prevent dirt from setting into the conduits.

Note: these precautions should not be taken if you choose to use the built-in anti-frost protection.

4.3 Restarting the pump after winter

If you emptied the heat pump for winterising, follow the steps below to restart it in spring:

1.First check that there is no dirt in the conduits and that there are no structural problems

2.Check that the water inlet and outlet fittings are adequately fastened. Check that ''water inlet'' and '' water outlet'' are correct according to the lables on the heat pump. (Water out from the filter unit = water inlet on heat pump)

3.Start the filter pump to start the water flow to the heat pump. Adjust the by-pass so there is enough water through the heat pump. Normally on small filter system the by-pass can be closed, so all circulated water goes through the heat pump.

4.Reconnect the electrical power supply to the heat pump and turn the heat pump ON.

4.4 Check-up

Our heat pumps have been built and developed to last long if they have been installed correctly and can operate in normal conditions. Regular check-ups are important if you want your heat pump to function efficiently for many years. Below are some recommendations to ensure optimal working conditions for your heat pump.

1). Make sure that the service panel is easily accessible.
2). Keep the area surrounding the heat pump free of organic waste.
3). Prune any vegetation around the heat pump so that there is sufficient free space around the pump.
4). Remove any water sprinklers that are near the heat pump as they could cause directly onto the heat pump from a roof. Install proper drainage.
5). Prevent rain from running directly onto the heat pump from a roof. Install proper drainage.
6). Do not use the heat pump if it has been flooded. Immediately contact a qualified technician to inspect the heat pump and carry out necessary repair.

Condensation can occur when the heat pump is running. This condensation water can flow away through an opening in the base pan of the unit. The amount of condensation water will increase when humidity is high. Remove any dirt that could block the water outlet on the bottom pan. 5 to 20 liters per day of condensation water can be produced while the unit is running. If more condensation is produced, stop the heat pump and wait for one hour before checking for water leakage (Let the filter pump keep running).

Note: a quick way to verify that the water running is because of the condensation. Shut off the unit and keep the pool pump running. If the water stops running out, it is condensation. AN EVEN QUICKER WAY IS TO TEST THE DRAIN WATER FOR CHLORINE. If no chlorine is detected, the drain water is a result of condensation.

Also make sure that the air in and out passages are free, and prevent air out from immediately re-entering to the air in. (It is important to have min. 2m free space at the air out side of the heat pump).

5. Maintenance and inspection

5.1 Maintenance

√ Check the water inlet and drainage often. The water and air inflow into the system should be sufficient so that its performance and reliability does not get compromised. You should clean the pool filter regularly to avoid damage to the unit caused by clogging of the filter.

√ The area around the unit should be spacious and well ventilated. Clean the sides of the heat pump regularly to maintain good heat exchange and to save energy.

√ Check if all processes in the unit are operational and pay special attention to the operation perssure of the refrigerant system.

√ Check the power supply and cable connections regularly. Should the unit begin to function abnormally or should you notice a smell from an electrical component, arrange fro timely repair or replacement.

√ You should also purge the water if the unit will not work for an extended period of time. You should check all parts of the unit thoroughly and completely fill the system with water before turning it on again afterwards.

5.2 Trouble shooting guide

Incorrect installation may result in an electrical charge that could lead to death or serious injury of users, installers or others by electrical shock and it may also cause damage to heat pump.

DO NOT attempt to modify the internal configuration of the heat pump.

1.Keep your hands and hair clear of the fan blades to avoid injury.

2.If you are not familiar with your pool filtration system and heat pump:

a.**Do not** attempt to carry out any adjustment or service without consulting your dealer, pool professional or air conditioning contractor.

b.Read the entire installation manual before attempting to use, service or make adjustments to the unit.

c.Wait for 24hours after the installation before start the heat pump to prevent damage to the compressor. (If the heat pump has been transported and carried all the time with the feet down, it can be started immediately).

Note: Switch off the power before carrying out any maintenance or repairs

IMPORTANT REMARK: if a malfunction cannot be resolved immediately, in order to analyse the problem we will need to know the message (error code) that is showing on the display controller as well as the values for the settings (parameters 0-A). We also need to know the status of the heat pump : the ambient temperature, water inlet / outlet temperature, if it is cold air coming out from the heat pump, if the grill (Evaporator) is cold, or if there is ice on the heat pump.

Please keep this information at hand when calling customer service (describe the issue).

On the following pages you will find an overview of the different types of failure problems that can occur together with instructions on how to solve them.

Problem:	the heat pump doesn't work
Observation:	the screen does not light up and the fan/compressor doesn't make a sound

Possible cause	Solution
No electrical power supply	Check power supply (wiring, fuses,……)

Problem:	the heat pump works normally but there is no or insufficient heating
Observation:	The screen displays the temperature but no error codes

Possible cause	Solution
1. In sufficient capacity of the heat pump in proportion to the size of the swimming pool	1. Install a larger sized model or an extra heat pump. Cover the pool to limit heat loss
2. The compressor works but the fan doesn't	2. Check the electrical wiring of the fan. Replace the condenser or the fan motor if necessary.
3. The fan works but the compressor doesn't	3. Check the electrical wiring of the compressor. Replace the condenser or the compressor if necessary.
4. The heat pump has not been placed on an optimal location	4. Make for sufficient air circulation(see manual for details)
5. Faulty temperature setting	5. Set the correct temperature
6. By-pass not adjusted	6. Have the by-pass readjusted by the installer
7. Massive ice formation on the evaporator	7. Have the settings for automatic defrost control checked by the installer
8. Not enough refrigerant	8. Have the heat pump checked by a refrigeration technician

Problem:	The heat pump works normally but the water is cooling down instead of heating up
Observation:	The screen displays the temperature but no error codes

Possible cause	Solution
1.The wrong mode has been selected	1.Verify the parameters, select the correct mode
2. The controller is out of order	2. Check the voltage in the electrical wiring to the 4-way valve. If no electric potential is measured, replace the controller
3. The 4-way valve is out of order	3. Check the voltage in the electrical wiring to the 4-way valve. If electric potential is measured, replace the coil. If the problem persists, have the heat pump checked by a refrigeration technician

Problem:	the heat pump doesn't stop
Observation:	the screen displays the temperature but no error codes

Possible cause	Solution
1.Wrong setting of parameters	1.Check the set parameters and adjust them if necessary (settings just above the capacity of the heat pump)
2. Pressure switch out of order	2. Check operation of the pressure switch by turning off the filter pump and restarting it. If the heat pump doesn't react to this, the pressure switch must be adjusted or replaced.
3. Electrical failure	3. Contact your installer

Problem:	water leak
Observation:	there's an amount of water under the heat pump

Possible cause	Solution
1.Condensation due to atmospheric humidity	1.No action required
2.Water leak	2.Try to localize the leak and check for the presence of chlorine in the water. If that is the case, the heat pump must be temporarily replaced during repair.

Problem:	abnormal amount of ice formed on the evaporator
Observation:	the evaporator is for the most part covered in ice

Possible cause	Solution
1.Insufficient air inflow	1.Check the location of the heat pump and remove any dirt that could be present on the evaporator
2.High water temperature	2.If the pool water is already quite hot (warmer than 29?),the probability of ice formation increases. Lowering the set temperature is a possible option
3.Incorrect setting of automatic defrost control	3.Check the setting of the defrosting function together with your installer.
4.The 4-way valve is out of order	4.Check the voltage in the electrical wiring to the 4 -way valve. If electric potential is measured, replace the coil. If the problem persists, have the heat pump checked by a refrigeration technician.
5.Not enough refrigerant	5.Have the heat pump checked by a refrigeration technician.

5.3 Failure code table overview (1)

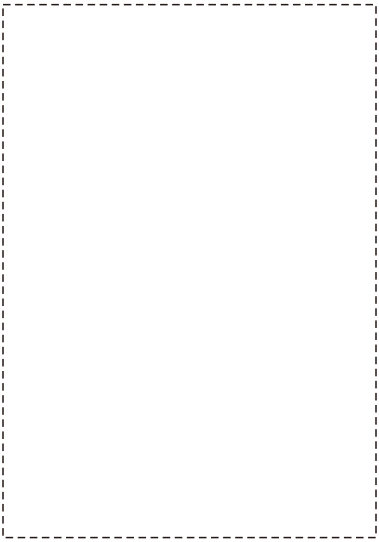
Wire controller	Protection/Failure	Check	Solution
ET1	Ambient temp. sensor failure	1. Check the connection of ambient temp. sensor. 2. Check if the sensor is broken.	1. Reconnect the sensor. 2. Replace the sensor.
ET3	Inlet water temp. sensor failure	1. Check the connection of inlet water temp. sensor. 2. Check if the sensor is broken.	1. Reconnect the sensor. 2. Replace the sensor.
ET4	Outlet water temp. sensor failure	1. Check the connection of outlet water temp. sensor. 2. Check if the sensor is broken.	1. Reconnect the sensor. 2. Replace the sensor.
ET5	Evaporator coil temp. sensor failure	1. Check the connection of coil temp. sensor. 2. Check if the sensor is broken.	1. Reconnect the sensor. 2. Replace the sensor.
ET6	Discharge gas temp. sensor failure	1. Check the connection of discharge gas temp. sensor. 2. Check if the sensor is broken.	1. Reconnect the sensor. 2. Replace the sensor.
ET8	Return gas temp. sensor failure	1. Check the connection of return gas temp. sensor. 2. Check if the sensor is broken.	1. Reconnect the sensor. 2. Replace the sensor.
P7	Winter anti-freeze protection I	No action required	No action required
P7	Winter anti-freeze protection II	No action required	No action required
E00	Communication failure of mother board and control display	Check the connection of mother board and control display.	Reconnect the connection wire of mother board and control display.
E01	Discharge gas overheat protection	Temp. sensor broken or not enough refrigerant.	Replace temp. sensor or fill in certain refrigerant.
E02	High pressure failure	1. Check if high pressure switch is broken 2. Check if there is a blockage in water circuit or water flow is not enough. 3. Check if there is a blockage in refrigerant circuit.	1. Replace high pressure switch. 2. Remove cause of blockage or increase water flow. 3. Send heat pump to dealer for detailed check.
E03	Low pressure failure	1. Check if low pressure switch is broken. 2. Check if refrigerant level is low. 3. Ambient temp. and water inlet temp. is too low.	1. Replace low pressure switch. 2. Fill up with enough refrigerant. 3. Decrease water flow. 4. Send heat pump to dealer for detailed check.
E04	Water flow switch failure	1.Check if wiring connection of water flow switch is in correct position. 2.Check water flow. 3.Check if water flow switch is broken. 4.Check if water pump is working.	1.Reconnect the wiring. 2.Increase water flow. 3.Replace flow switch. 4.Repair or replace water pump.
E05	Outlet water overheat protection	1. Check if there is any jam in the water circuit. 2. Check if the water flow volume is enough. 3. Check if the water pump is working.	1. Remove the jam. 2. Increase the water flow volume. 3. Repair or replace the water pump.
E06	Outlet water overcool protection	1. Check if there is any jam in the water circuit. 2. Check if the water flow volume is enough. 3. Check if the water pump is working.	1. Remove the jam. 2. Increase the water flow volume. 3. Repair or replace the water pump.
E07	Protection for excessive temp. difference between water inlet & outlet	1. Check if there is any blockage in the water circuit. 2. Check if the water flow volume is enough. 3. Check if the water pump is working.	1. Remove the cause of the blockage. 2. Increase the water flow volume. 3. Repair or replace the water pump.
E08	Heat pump emergency stop	Check the emergency switch on the mother board.	Release the emergency switch on the mother board.
E09	DC fan motor failure	Check the DC fan motor and mother board.	1.Reconnect the connection wire 2. Replace DC fan motor or mother board.
E11	Evaporator coil overheat protection	1. Check if evaporator coil temp. sensor is broken. 2. Check if there is a blockage in water circuit or water flow is not enough. 3. Check if there is a blockage in refrigerant circuit.	1. Replace evaporator coil temp. sensor. 2. Remove cause of blockage or increase water flow. 3. Send heat pump to dealer for detailed check.

5.3 Failure code table overview (2)

Wire controller	Protection/Failure	Check	Solution
E18	Compressor driving failure	Check the driving board.	Replace the driving board.
E19	Compressor over-current	Check the driving board.	Replace the driving board.
E21	IPM failure	Check the driving board.	Replace the driving board.
E22	IPM over current	Check the driving board.	Replace the driving board.
E23	EE Driving failure	Check the driving board.	Replace the driving board.
E24	DC bus voltage protection	Check the driving board.	Replace the driving board.
E26	AC voltage protection	Check the driving board.	Replace the driving board.
E27	AC current protection	Check the driving board.	Replace the driving board.
E32	Communication failure	Check the driving board.	Replace the driving board.
E33	EVI pressure failure	Check the driving board.	Replace the driving board.
ETA	Discharge pressure sensor failure	1. Check the pressure sensor. 2. Check the refrigeration system.	1. Replace the sensor. 2. Solve the problem on refrigerant system.
ETB	Suction pressure sensor failure	1. Check the pressure sensor. 2. Check the refrigeration system.	1. Replace the sensor. 2. Solve the problem on refrigerant system.
ETC	EVI pressure sensor failure(Reserved)	1. Check the pressure sensor. 2. Check the refrigeration system.	1. Replace the sensor. 2. Solve the problem on refrigerant system.
E88	Password expired	Check the setting.	Change the setting.

6.Name plate & wiring diagram

6.1Name plate



6.2 Wiring diagram