Service Manual

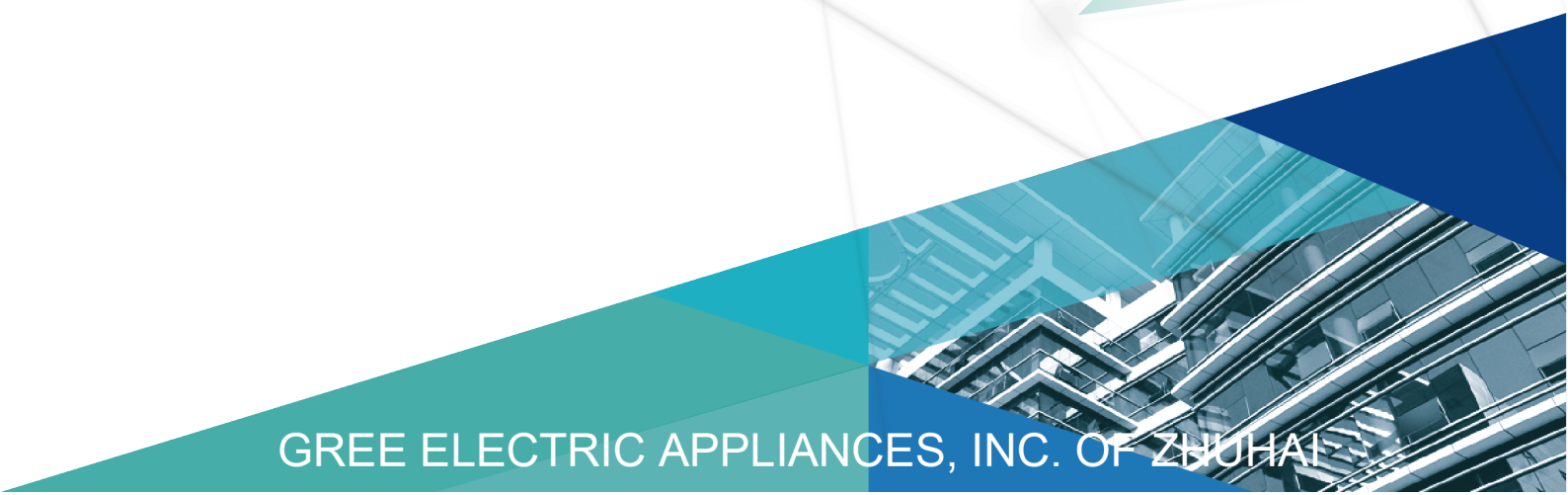
SWIMMING POOL HEAT PUMP (R32)

(GC202306-I)

Capacity: 2.2~18.8kW

Rate Frequency: 50Hz/60Hz

Operation Range: -15~45°C



GREE ELECTRIC APPLIANCES, INC. OF ZHUHAI

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Safety Notices (Please be Sure to Abide Them)

SPECIAL WARNING:

(1) Be sure to comply with national gas regulations.

(2) Do not pierce or burn.

(3) Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

(4) Be aware that refrigerants may not contain an odor.

(5) The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).

PROHIBITED: This sign indicates that the items must be prohibited. Improper operation may cause severe damage or death to people.

WARNING: If not abide them strictly, it may cause severe damage to the unit or the people.

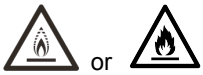
NOTE: If not abide them strictly, it may cause slight or medium damage to the unit or the people.

OBSERVED: This sign indicates that the items must be observed. Improper operation may cause damage to people or property.

WARNING:

This product can't be installed at corrosive, inflammable or explosive environment or the place with special requirements. Otherwise, it will affect the normal operation or shorten the service life of the unit, or even cause fire hazard or serious injury. As for the above special places, please adopt special unit with anti-corrosive or anti-explosion function.

Please read this operating manual carefully before operating the unit.



The unit is charged with inflammable refrigerant R32 (GWP: 675).

Before using the unit, please read the instruction manual.

Before installing the unit, please read the instruction manual.

Before repairing the unit, please read the instruction manual.
The figures in this manual may be different with the material objects, please refer to the material objects for reference.

PROHIBITED!
(1) The unit should be grounded to avoid electric shock. Do not connect the ground wire to gas pipe, water pipe, lightning arrester or telephone wire. (2) It is forbidden to change the power cord, socket or grounding mode without authorization.
(3) Please cut off the power supply immediately in case of abnormal conditions (such as burning smell).
(4) The appliance shall be stored in a well-ventilated area where the room size corresponds to the room area as specified for operation.
(5) This unit is not suitable for use in places with strong magnetic field, high salinity, high acidity and extremely unstable voltage.
(6) The appliance shall be stored in a room without continuously operating open flames (for example an operating gas appliance) and ignition sources (for example an operating electric heater).
(7) According to federal/state/local laws and regulations, all packages and transportation materials, including nails, metal or wooden parts, and plastic packing material, must be treated in a safe way.
(8) The power supply voltage of the unit must be between 180V and 264 V.Otherwise; the unit may fail to operate normally.

WARNING!
(1) Please install according to the instructions. The installation work must be carried out by professional installation personnel.
(2) 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 authorises their competence to handle refrigerants safely in accordance with an industry recognised assessment specification.
(3) 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.
(4) Please cut off the power supply during maintenance.
(5) The appliance shall be installed in accordance with national wiring regulations.
(6) The fixed wires connecting to the appliance must be configured with all-pole disconnection device under voltage grade III according to wiring rules.
(7) The unit should be stored with protective measures against mechanical damage caused by accident.
(8) It is forbidden to stand or place articles on the unit.
(9) If the installation space for unit pipe is too small, adopt a protective measure to prevent the pipe from physical damage.
(10) During installation, use the specialized accessories and components, otherwise water leakage, electric shock or fire hazard may occur.
(11) Please install the unit in a secure place that can withstand the weight of unit. Insecure installation may cause the unit falling down and lead to injury.
(12) Be sure to adopt independent power circuit. If the power cord is damaged, it must be repaired by the manufacturer, service agent or other professional agents.
(13) The unit can be cleaned only after it is turned off and power-disconnected, otherwise electric shock may occur.
(14) The unit is not intended to be cleaned or maintained by children without supervision.
(15) Do not alter the setting of pressure sensor or other protective devices. If the protective devices are short-circuited or changed against rules, fire hazard or even explosion may occur.
(16) Do not operate the unit with wet hands. Do not wash or sprinkle water on the unit, otherwise malfunction or electric shock will occur.

WARNING!
(17) If the unit is to be installed in a small space, please adopt protective measures to prevent the concentration of refrigerant from exceeding the allowable safety limit; Excessive refrigerant leakage may lead to explosion.
(18) When installing or re-installing the unit, please keep the refrigerant circuit away from substances other than the specified refrigerant, such as air. Any presence of foreign substances will cause abnormal pressure change or even explosion, resulting in injury.
(19) Only professionals are allowed to carry on daily maintenance.
(20) Before contacting any wire, make sure power is cut off.
(21) Do not let any inflammable objects near the unit.
(22) Do not use organic solvent to clean the unit.
(23) If you need to replace a component, please ask a professional to repair with a component supplied by the original manufacturer so as to ensure the unit's quality.
(24) Improper operation may get the unit broken, hit by electric shock or cause fire.
(25) Do not make the unit wet or electric shock may be lead, ensure that the unit will not be cleaned by water rinsing under any circumstance.
(26) Once the unit is started, it must be operated for at least 6 minutes before shutdown, otherwise the service life of the unit will be affected. Do not manually start and stop the unit frequently.
(27) When using this product in winter (the temperature may be lower than 0°C), please ensure that the unit is always powered on; If it is not used in winter or the unit fails to use due to failure, please be sure to drain the water in the unit and pipeline immediately after power failure to prevent the system from freezing and cracking.
(28) Keep ventilation openings clear of obstruction.
(29) The inlet and outlet pipes connected to the unit must be made of insulation, and the length must be ≥1.5m.

This marking indicates that this product should not be disposed with other household wastes throughout the EU. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. To return your used device, please use the return and collection systems or contact the retailer where the product was purchased. They can take this product for environmental safe recycling.

NOTES!
(1) Do not put a finger or other objects into the air inlet or air return grill.
(2) Please adopt safety protection measures before touching the refrigerant pipe, otherwise your hands may be hurt.
(3) Please arrange the drain pipe according to the instruction manual.
(4) Never stop the unit by directly cutting off the power.
(5) Never install the unit in the following places: 1) Places with oil smoke or volatile liquid: plastic parts may deteriorate and fall off or even cause water leakage. 2) Places with corrosive gas: copper pipe or the welding parts may be corroded and cause refrigerant leakage.
(6) Adopt proper measures to protect the outdoor unit from small animals because they may damage the electric components and cause malfunction of the unit.
(7) Do not replace accessories on your own. It is recommended to conduct regular inspection and maintenance every year. Please contact the local after-sales maintenance personnel, who will provide you with paid services.
(8) After the warranty period of the product, it is necessary to maintain or replace the power cord, heat exchanger and other key parts. It is not recommended to use it for a long time. Otherwise, our company may not be able to assume the relevant legal liability for all losses incurred.

NOTES!

(9) This appliance can be used by children aged 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.(for GRS-CP11Pd/NhA-K and GRS-CP18Pd/NhA-K)

(10) This appliance is not intended for use by persons (including children) with reduced physical,sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. (for GRS-CP11Pd/NhA-S and GRS-CP18Pd/NhA-S)

(11) Children shall not play with the appliance.

OBSERVED!

Only use soft dry cloth or slightly wet cloth with neutral detergent to clean the casing of the unit.

PRODUCT

1.Product List

Model Name	Heating Capacity(kW)	Power Supply	Ref	Appearance
GRS-CP11Pd/NhA-K GRS-CP11Pd/NhA-S	11.8	1Ph 220-240 V 50/60 Hz	R32	
GRS-CP18Pd/NhA-K GRS-CP18Pd/NhA-S	18.8	1Ph 220-240 V 50/60 Hz		

2.Nomenclature

GRS	-	CP	11	Pd	/	Nh	A	-	K
1		2	3	4		5	6		7

NO.	Description	Options
1	Product type	Gree swimming pool heat pump
2	Application	Swimming pool heat pump
3	Heating capacity	High temperature heating capacity (kW)
4	Compressor type	Fixed frequency-omitted
		Inverter-Pd
5	Refrigerant	R22-omitted
		R32-Nh
		R410a-Na
		Others to be applied for when they are used
6	Design revision	Arranged based on A, B, C, D,and so on
7	Power Supply	K : 220 ~ 240V 1Ph~,50/60Hz S : 220 ~ 240V 1Ph~,50/60Hz D : 208/230V 1Ph~,60Hz

3.Product Features

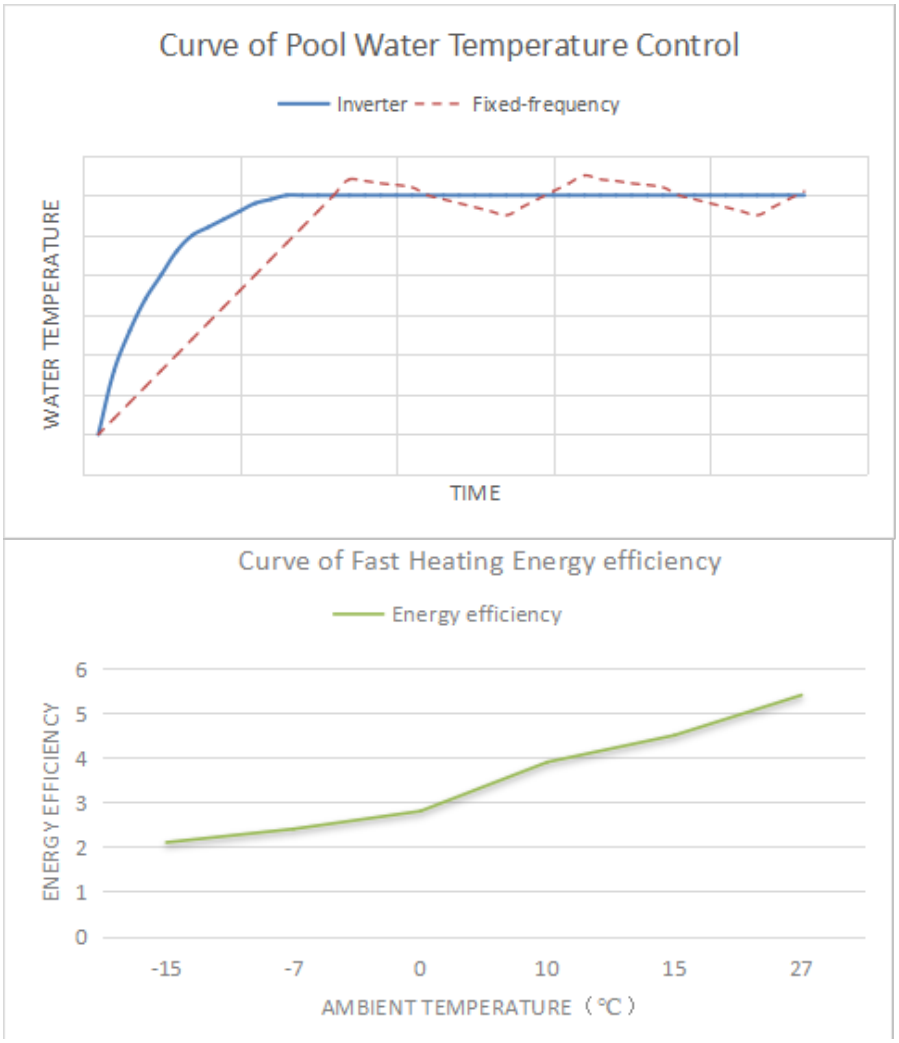
3.1 General Introduction

The swimming pool heat pump is a new, efficient, energy-saving and eco-friendly product. It uses the principle of heat pump to drive the compressor with electric energy. Through the thermal cycle, the heat absorbed in the air is transferred to the water-side heat exchanger for water supply (hot water), or the heat absorbed by the water-side heat exchanger (cold water) is released into the air through the thermal cycle.

3.2 Features

(1) R32 DC Inverter Technology

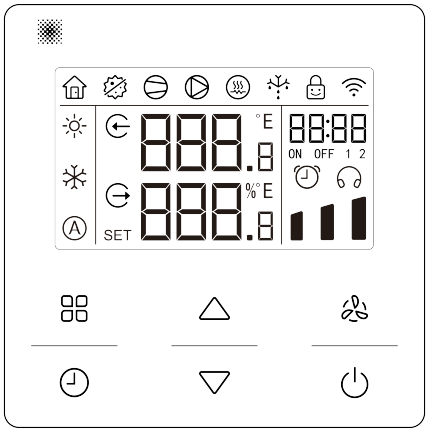
The adoption of DC fan, inverter compressor and electronic expansion valve contributes to a constant temperature control of the swimming pool and high-efficient operation of the system.

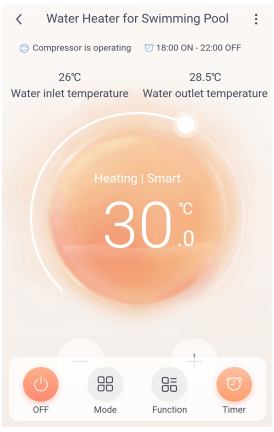


(2) Multi-function Intelligent Control

Controller: ON/OFF, Cooling, Heating, AUTO, Timer, Energy saving mode, Fast heating, etc.

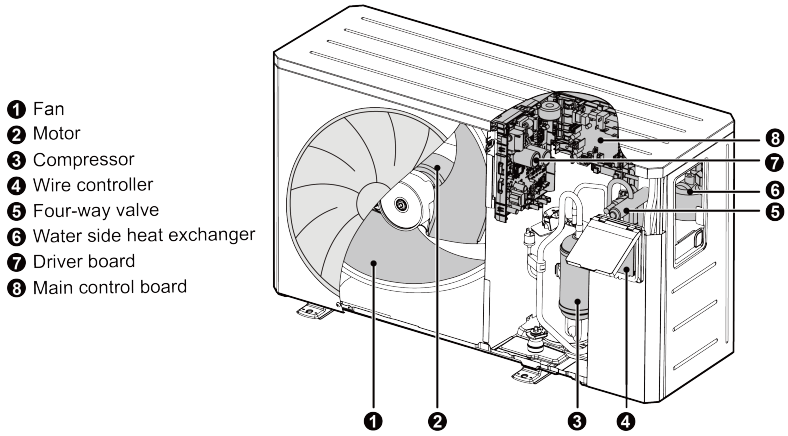
WiFi (on Gree+ APP): ON/OFF, Cooling, Heating, AUTO, Timer, Energy saving mode, Fast heating, etc.





(3) Compact Design & Easy Maintenance

Thanks to the dedicated of fan heat exchange system and electronic control system, as well as the three-dimensional space layout of electronic control system, Gree swimming pool heat pump has concise appearance and compact structure which contributes to easy maintenance.



(4) Anti-corrosion

Due to the adoption of seamless titanium water side heat exchanger with rigid polyvinyl chloride (PVC) material shell, Gree swimming pool heat pump can achieve high acid resistance, great alkali resistance, excellent corrosion resistance, and with low flow resistance, which makes it more suitable for the heat exchange of frequently-disinfected swimming pool water.

(5) Wide applicable range

The product can offer 10~40℃ constant temperature water for the swimming pool or spa. It can operate stable under the power voltage of 180~264V. Its power frequency is 50/60 Hz, applicable for most countries or regions with T1 working condition.

(6) Complete protection

Units are equipped with a series of protection to accurately identify errors and protect the units, which has ensured reliable and safe operation.

4.Specifications

4.1 Specifications

Model			GRS-CP11Pd/NhA-K GRS-CP11Pd/NhA-S	GRS-CP18Pd/NhA-K GRS-CP18Pd/NhA-S
High-temperature & high-humidity heating: ambient temperature: 27°C/80%, 26°C water inlet	Heating capacity	kW	2.2~11.8	5.5~18.8
	Energy efficiency	—	13.0~5.8	11.0~5.2
Medium-temperature & medium-humidity heating: ambient temperature: 15°C/70%, 26°C water inlet	Heating capacity	kW	2.0~8.8	3.0~15.1
	Energy efficiency	—	6.3~4.5	6.0~4.0
Cooling ambient temperature: 35°C/-, 30°C water inlet	Cooling capacity	kW	4.3	7.8
	Energy efficiency	—	3.2	4.0
Maximum power ①		kW	2.5	4.0
Maximum current ①		A	11	17.5
Nominal Water flow		m^3/h	3.8	6.5
Water resistance (Max)		kPa	5	12
Noise ②		dB(A)	52	55
Dimension(W×D×H)		mm	980×376×554	1085×402×657
Weight		kg	43	52.5
Hydraulic connection		mm	PVC 50/50	
Compressor		—	Hermetic Rotary DC Inverter Compressor	
Fan motor		—	DC Fan Motor	
Refrigerant		—	R32	
Refrigerant charge ③		kg	0.52	0.73
Power supply		—	Single phase 220-240V ~ 50/60Hz	
Protection		—	IPX4	
Max. pool volume ④		m^3	75	95
Mode		—	Heating/Cooling/Automatic	

NOTES:

① The above maximum power or maximum current don't include the power or current of external water pump.

② The noise data is the average sound pressure value measured under high temperature and high humidity heating conditions (Dry air 27℃-Relative humidity 80% - Water inlet temperature 26℃) with a distance of 1m away from the unit.

③ This parametric is the maximum refrigerant charge amount of the unit.

④ The recommended maximum pool volume is based on the ideal heating condition that the pool is well shaded; the filtration system runs for 15h per day, water temperature is maintained at 26℃,and ambient temperature ≥28℃.

4.2 Operation Range

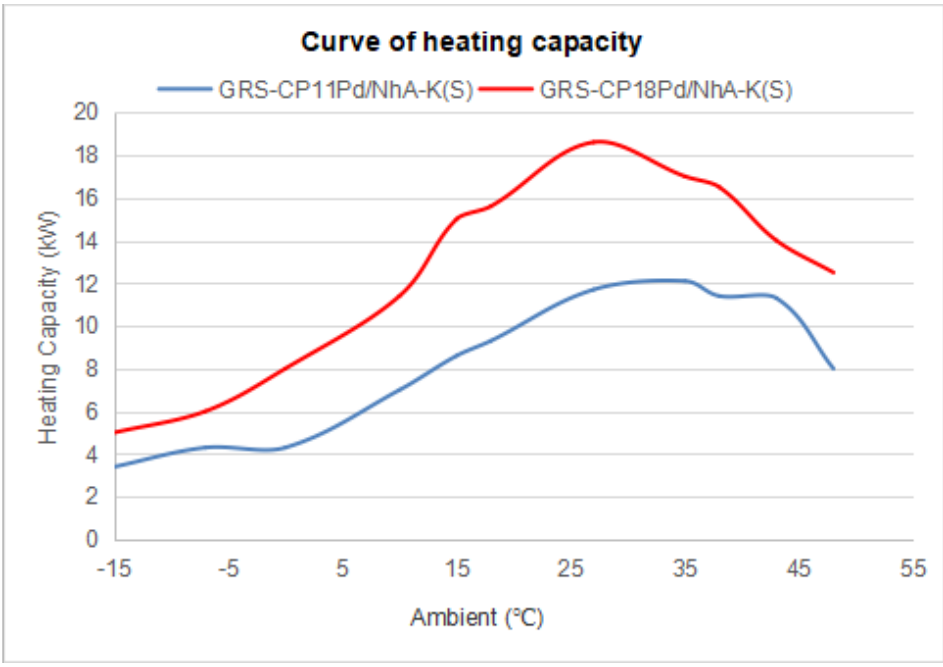
Use the swimming pool heat pump unit within the following ranges of temperature and water pressure to ensure safe and efficient operation.

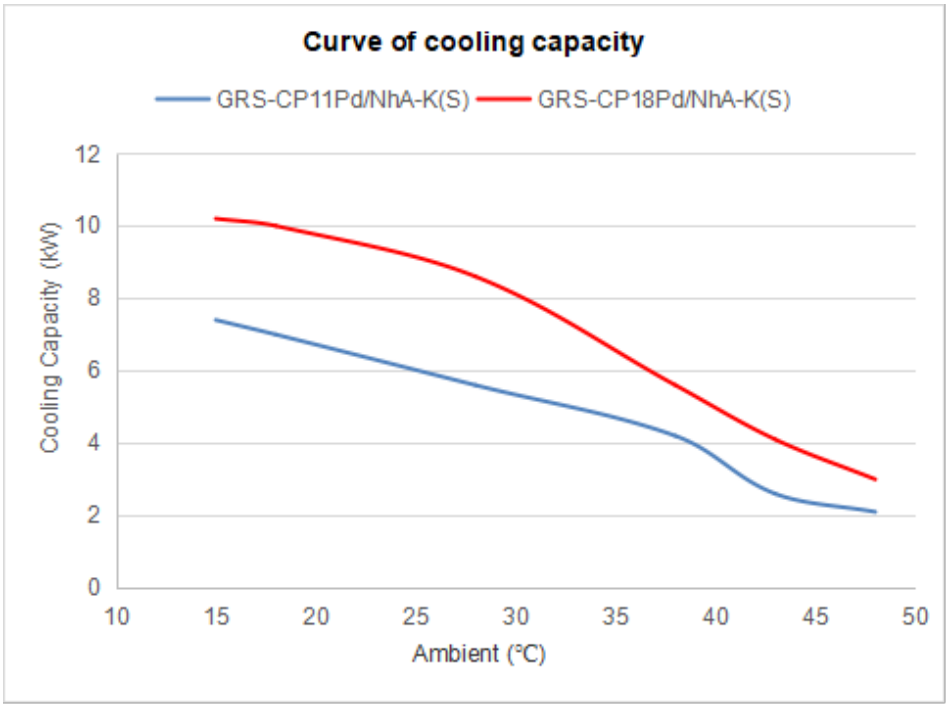
-	Heating Mode	Cooling Mode
Outside temperature	-15°C ~ 45°C	16°C ~ 45°C
Water temperature	10°C ~ 40°C	10°C ~ 40°C
Water temperature setting range	15°C ~ 40°C	10°C ~ 40°C
Water pressure	0.1 ~ 0.5MPa	0.1 ~ 0.5MPa

4.3 Electrical Specifications

Model	Power Type	Minimum Diameter of Power Cord(mm^2)	Circuit Breaker Capacity (A)
GRS-CP11Pd/NhA-K GRS-CP11Pd/NhA-S	220-240V ~ 50/60Hz	2.5	20
GRS-CP18Pd/NhA-K GRS-CP18Pd/NhA-S	220-240V ~ 50/60Hz	2.5	25

5.Capacity Curve and Model Selection





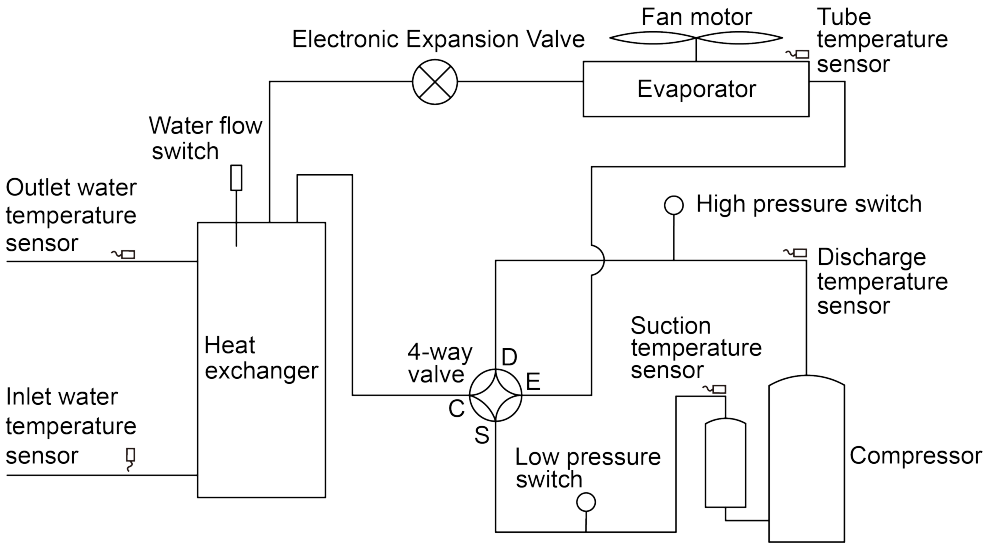
According to the temperature of swimming pool water of 26~28℃, the corresponding unit output capacity under different ambient temperature is shown in the figure as below. Please refer to below table for the model selection based on the unit capacity output.

-	Swimming Pool Volume (m³)		
Model	Ambient Temperature ≥25℃	Ambient Temperature 15 ~ 24℃	Ambient Temperature -15 ~ 15℃
GRS-CP11Pd/NhA-K GRS-CP11Pd/NhA-S	40 ~ 75	15 ~ 40	<15
GRS-CP18Pd/NhA-K GRS-CP18Pd/NhA-S	55 ~ 95	20 ~ 55	<20

Remark: The capacity curve based on inlet water temperature 26℃. The model selection should be comprehensively evaluated according to water refill temperature, wind speed on the surface of the swing pool, ambient temperature, etc. If the ambient temperature is below 15℃, it is suggested to add the secondary heat source for auxiliary heating to improve the comfort.

6.Principal of Operation

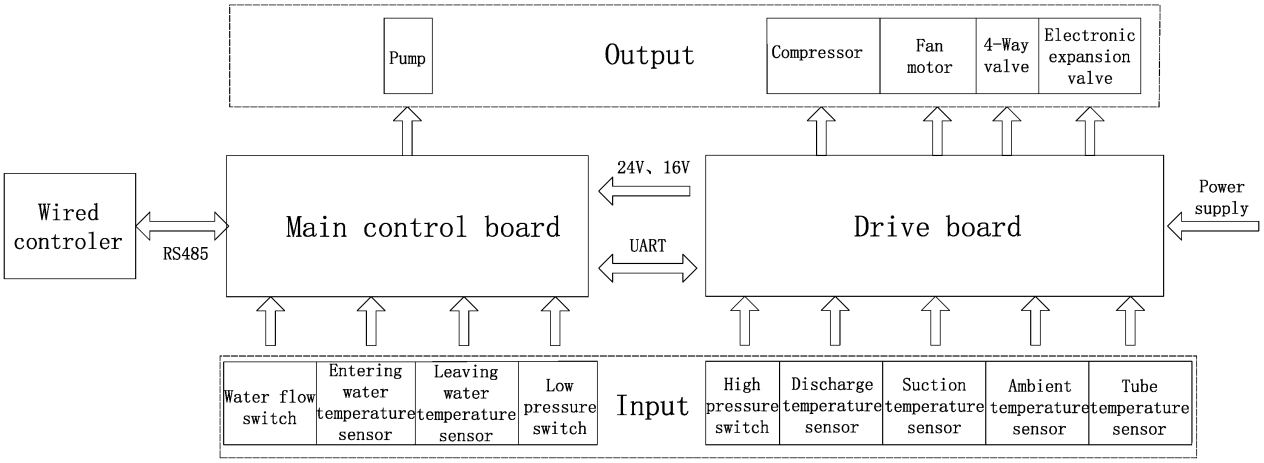
Through the thermal cycle, the heat absorbed in the air is transferred to the water-side heat exchanger for water supply (hot water), or the heat absorbed by the water-side heat exchanger (cold water) is released into the air through the thermal cycle.



CONTROL

1.Units' Control

1.1 Schematic Diagram of Units' Control



1.2 Key Control Logics

(1) Control on compressor

After power is connected, start the system by the manual operator and detect the outdoor ambient temperature sensor. If the outdoor ambient temperature is not lower than -15°C and when no fault is detected and start up conditions of the compressor are met, the system starts.

(2) Control on fan motor

When start up conditions of the compressor are met, the system starts. The electronic expansion valve resets and is initialized, and the external fan motor starts. After 10s, the compressor starts.

(3) Control on defrosting

When the unit is heating under low ambient temperature and high humidity, there is be frost on the surface of the heat exchanger of finned tube. The unit will judge the frost according to the tube temperature of heat exchanger and operation time. If the frost has affected the heat exchange of complete unit, the unit will start defrosting. The 4-way valve coil is energized for reversing. The fan stops operation, and the compressor and electronic expansion valve operates according to the setting parameters. Meanwhile, tube temperature will be detected by the pipeline temperature sensor of heat exchanger to judge whether the frost is removed. If yes, the unit will exit from the defrosting process to resume heating (the loads will resume original operation status).

(4) Control on antifreeze function

When the heat pump unit is turned off or under fault status, if ambient temperature is lower than 2℃ and water inlet temperature is lower than the set anti-freezing temperature (eg: 5℃), the water pump will be energized firstly for operation and then the heat pump starts working (if ambient temperature is lower than the lower temperature limit of unit, the heat pump will be turned off).

2.Controller

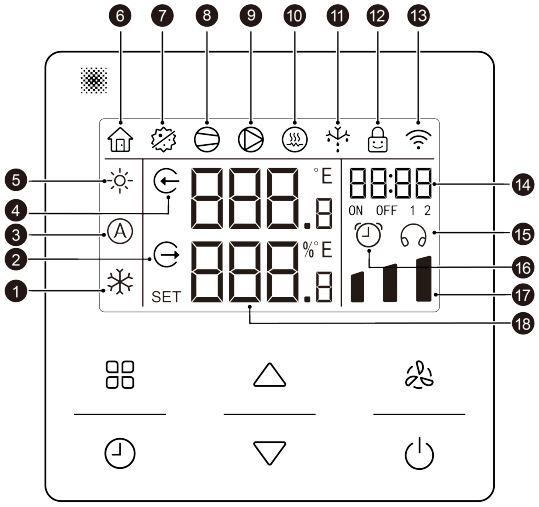


Fig. 2-1 LCD Display of Wired Controller

Table.2.1 LCD Display Description

No.	Symbols	Instructions
1		Cooling mode
2		Water outlet icon; water outlet icon and lower part of temperature area jointly refers to water outlet temperature.
3		Auto mode
4		Water inlet icon; water inlet icon and upper part of temperature area jointly refers to water inlet temperature.
5		Heating mode
6		Absence
7		Sterilization
8		Operating status of compressor
9		Operating status of water pump
10		Auxiliary electric heating
11		Defrosting status
12		Child lock
13		WiFi status
14	ON OFF 1 2	Timer area
15		Timer ECO icon
16		Timer ON/OFF icon
17		Grade
18		Temperature area
NOTE: When wired controller is connected with different indoor units, some functions will be different.		

3.Query Parameters

This function is provided for the debugging personnel to query running status of the unit. After pressing and holding " ⊞ " + " △ " button for 5s, the parameter displays area blinks. 00 is displayed by default. The " △ "or " ▽ " button can be pressed to switch the query item.

Query codes are described in the following table.

Query Code	Query Parameter
00	Communication protocol version
01	Error code
04	Temperature of the outdoor ambient temperature sensor (℃/℉)
05	Temperature of the discharge temperature sensor (℃/℉)
06	Temperature of the suction temperature sensor (℃/℉)
07	Temperature of the tube temperature sensor (℃/℉)
08	Temperature of the Water outlet temperature sensor (℃/℉)
09	Temperature of the Water inlet temperature sensor (℃/℉)
10	Opening of electronic expansion valve 1
12	Display of single or dual temperature sensor (01 indicates single temperature sensor; 02 indicates dual temperature sensor)
14	Operation frequency of compressor
15	Accumulated operation time of compressor (h)
16	Accumulated operation times of compressor
17	Accumulated defrosting times
18	Accumulated operation time for hot water (h)
19	Accumulated operation time under high ambient temperature for hot water (h)
20	Accumulated operation time under low ambient temperature for hot water (h)

4.Operation Instructions

4.1 ON/OFF

Press " ⏻ " button to turn on the unit. Press " ⏻ " button again, the unit is turned off and stopped operation. ON state and OFF state interface of the unit are shown as below:

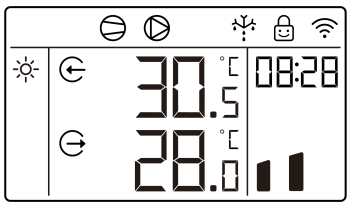


Fig. 4-1 ON State Interface

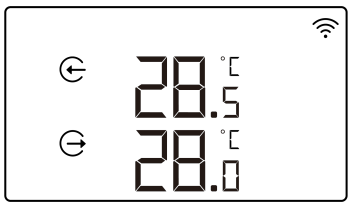


Fig. 4-2 OFF State Interface

4.2 Mode Setting

In the ON state interface, each time press the " ⊞ " button for once, the mode will switch among heating, cooling and auto modes, the order for switching is shown as the figure.

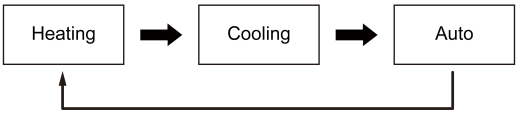


Fig. 4-3 Mode Setting

4.3 Grade setting

In the ON state interface, each time press the " " button for once, the grade will switch among smart, fast and energy saving grades, the order for switching is shown as the figure.

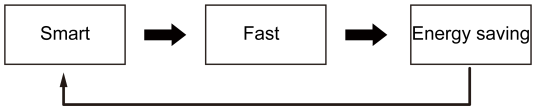


Fig. 4-4 Grade Setting

4.4 Temperature Setting

In the ON state, press " △ " or " ▽ "button, the set temperature will increase or decrease for 0.5 degree Celsius or Fahrenheit; when press and hold the buttons, the set temperature will continuously increase or decrease for 1 degree Celsius or Fahrenheit.

The settable highest temperature of different modes is different. For the settable water temperature range of each model shall refer to actual unit.

4.5 Timer Setting

4.5.1 Setting of System Time

(1) Press " " button, the hour of clock icon flashes, press" △ "or " ▽ "button can adjust the hour.

(2) Press " " button again, the minute of clock icon flashes, press " △ "or " ▽ " button can adjust the minute.

(3) During setting, press " " button or no button operation for 20 seconds, it will automatically return to the homepage and the setting system time is done.

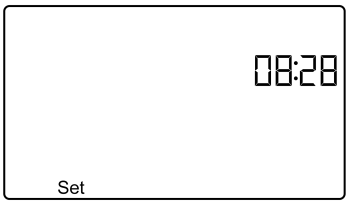


Fig. 4-5 Setting of System Time

4.5.2 Timer ON/OFF Setting

(1) Press " " button to enter setting interface of system time, after the system time is set, press " " button to enter timer ON/OFF setting interface, the temperature area " ON " or " OFF " are flashing, press " △ " or " ▽ " button can set timer ON/OFF, when it displays " ON ", it refers timer ON is activated; when it displays " OFF ", it refers the timer setting is off.

(2) Press " " button again, set the timer ON hour, " " and " ON " icons are constantly on, and timer ON hour icon flashes, press " △ "or " ▽ "button to adjust timer ON hour;

(3) Press " ⏲ " button again, set the timer ON minute," ⏰ " and "ON" icons are constantly on, and timer ON minute icon flashes, press" △ "or " ▽ "button to adjust timer ON minute;

(4) Press " ⏲ " button again, set the timer OFF hour, " ⏰ "and " OFF " icons are constantly on, and press" △ "or " ▽ " button to adjust timer OFF hour;

(5) Press " ⏲ " button again, set the timer OFF minute, " ⏰ " and " OFF " icons are constantly on, and press" △ "or " ▽ "button to adjust timer OFF minute;

(6) During setting, press " ⏻ " button or no button operation for 20 seconds, it will automatically return to the homepage and the setting of timer ON/OFF time is done.

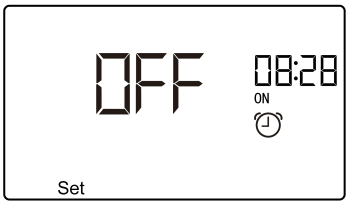


Fig. 4-6 Setting of Timer ON/OFF Time

4.5.3 Timer ECO Setting

(1) Press " ⏲ " button to enter setting interface of system time, after the system time is set, press " ⊞ "button to enter timer ON/OFF setting interface, press" ⊞ " button again to enter the setting interface of timer ECO.

(2) Timer ECO " 🎧 " is constantly on, " ON " or " OFF " in temperature area are flashing, press " △ "or " ▽ "button to set ON/OFF of timer ECO function. When it displays " ON " it refers to the timer ECO function is activated, when it displays " OFF " it refers to the timer ECO function is turned off.

(3) Press " ⏲ " button again, set the timer ON hour of ECO function, " 🎧 " and " ON " icons are constantly on, and timer ECO hour icon flashes, press " △ "or " ▽ " button to adjust timer ON hour of ECO function;

(4) Press " ⏲ " button again, set the timer ON minute of ECO function, " 🎧 " and " ON " icons are constantly on, and timer ECO minute icon flashes, press" △ "or " ▽ " button to adjust timer ON minute of ECO function;

(5) Press " ⏲ " button again, set the timer OFF hour of ECO function, " 🎧 " and " OFF " icons are constantly on, and press" △ "or " ▽ "button to adjust timer OFF hour of ECO function;

(6) Press " ⏲ " button again, set the timer OFF minute of ECO function, " 🎧 " and " OFF " icons are constantly on, press" △ "or " ▽ "button to adjust timer OFF minute of ECO function;

(7) During setting, press " ⏻ " button or no button operation for 20 seconds, it will automatically return to the homepage and the setting of timer ECO timer is done.

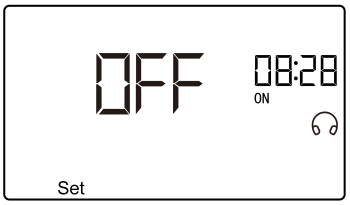


Fig. 4-7 Setting of Timer ECO Time

4.5.4 Multistep Timer Setting

(1) In ON or OFF status, or setting interface of system time, press and hold " ◷ "button for 5 seconds to enter setting of multistep timer ON/OFF and multistep ECO function.

(2) Press" ⊞ "button again, the icons status will switch in timer ON/OFF 1, timer ON/OFF 2, timer ECO 1, and timer ECO 2.

(3) In timer ON/OFF 1 interface, " ⏰ " and "ON" and " 1 " icons are constantly on, press " ◷ " button can set the ON/OFF time of timer ON/OFF 1, for setting methods please see "Timer ON/OFF setting".

(4) In timer ON/OFF 2 interface," ⏰ " and "ON" and " 2 " icons are constantly on, press " ◷ " button can set the ON/OFF time of timer ON/OFF 2, for setting methods please see "Timer ON/OFF setting".

(5) In timer ECO 1 interface, " 🎧 " and " ON " and " 1 " icons are constantly on, press " ◷ " button can set the ON/OFF time of timer ECO 1, for setting methods please see "Timer ECO setting" .

(6) In timer ECO 2 interface, " 🎧 " and " ON " and " 2 " icons are constantly on, press " ◷ " button can set the ON/OFF time of timer ECO 2, for setting methods please see "Timer ECO setting".

(7) During setting, press " ⏻ " button or no button operation for 20 seconds, it will automatically return to the homepage and the setting of timer is done.

4.5.5 Weekly Timer Setting

Switch timer ON/OFF 2 as weekly timer, for setting method please see the setting of Timer 2 type in "Special parameters setting".

(1) Press and hold " ◷ " button, switch to setting interface of timer ON/OFF 2 according to "Multistep timer setting", then it is weekly timer setting.

(2) " ON " or " OFF " in temperature area are flashing, press" △ "or " ▽ " buttons to set on and off of weekly timer, when it displays " ON ", the weekly timer is activated, when it displays " OFF ", the weekly timer is turned off.

(3) Press " ◷ " button again, " ⏰ " and " 2 " icons are constantly on, "d：XX" is flashing, it refers to what day of the week currently. Press" △ "or " ▽ " button can adjust the time.

(4) Press " ◷ " button again, " ⏰ " and " 2 " and " ON " icons are constantly on, "d：XX" is flashing, it refers to it will turn on in what day of the week. Press " △ "or " ▽ " button can adjust the weekly timer ON time.

(5) Press " ◷ " button again, " ⏰ " and " 2 " and " OFF " icons are constantly on, "d：XX" is flashing, press " △ "or " ▽ " button can adjust the weekly timer OFF time.

(6) During setting, press " ⏻ " button or no button operation for 20 seconds, it will automatically return to the homepage and the setting of timer is done.

The following shows the current time, ON time, OFF time of weekly timer setting.

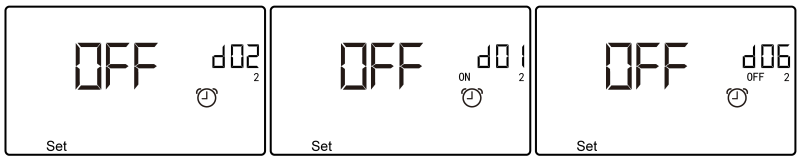


Fig. 4-8 Display of Weekly Timer

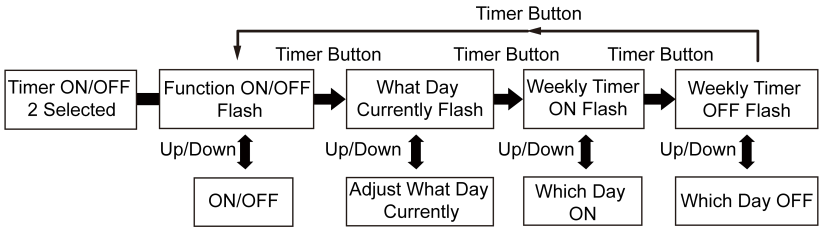


Fig. 4-9 Setting Steps of Weekly Timer

4.6 WiFi Function Setting

You can use “Gree+” App to control it, please scan the QR code in the home page to download it.

Only common functions of WiFi wired controller can be set through App: ON/OFF, mode, set temperature, grade, timer ON/OFF, timer ECO.

If you use the App for the first time, please reset WiFi at first (restore ex-factory setting for WiFi).

When the wired controller is ON/OFF, long press “ ⏲ ” + “ △ ” buttons for 5 seconds, the prompting sound will occur 3 times and the wired controller will display “YES” for 5 seconds, WiFi reset is successful.

If there’s WiFi communication error, after long press “ ⏲ ” + “ △ ” buttons for 5 seconds, the prompting sound will occur 2 times and the wired controller will display “JF” for 5 seconds, the current reset is invalid.

4.7 Other Functions

4.7.1 Child Lock Function

In the ON state or OFF state without error, press “ △ ” and “ ▽ ” buttons simultaneously for 5 seconds, the wired controller will enter into child lock function, the LCD will display “ 🔒 ”; press “ △ ” and “ ▽ ”buttons simultaneously for 5 seconds again can quit the child lock function.

Under child lock status, there will be no response for pressing other buttons. If the function is set before power failure, after re-energizing the unit, the unit will still in child lock mode.

4.7.2 Clean Setting

When the wired controller is off status, when the clean function is not activated, press and hold “ ♨ ” button for 5 seconds, the clean function is activated, “ ⇢ ” and “ ⇠ ” icons flash, temperature area displays ON, and timer area displays the started time of clean function.

After clean function is activated, the following operations can turn off the clean function.

(1) Press and hold “ ♨ ” button for 5 seconds;

(2) Press “ ⏻ ” button (it will not change the ON/OFF status) to quit the clean function;

(3) After clean function is activated for 30min, it will automatically quit after the clean is done.

When the clean function is turned off, “ ⇢ ” and “ ⇠ ” icons flash, temperature area displays

“ OFF ” for 5 seconds, after the clean function is turned off, it will return to temperature display interface.

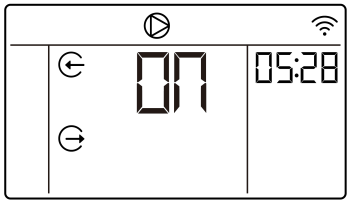


Fig. 4-10 Clean Function is ON

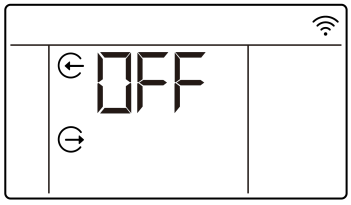


Fig. 4-11 Clean Function is OFF

4.7.3 Special Parameters Setting

(1) In ON or OFF state interface, press and hold “ ⊞ ” + “ △ ” buttons for 5 seconds, temperature area displays “ 00 ”.

(2) When the system parameters inquiry interface is “ 00 ”, press and hold “ ⊞ ” + “ △ ” buttons for 5 seconds, temperature area displays “ E00 ”.

(3) When the engineering parameters interface is “ E00 ”, press and hold “ ⊞ ” + “ ✿ ” buttons for 5 seconds, temperature area displays “ F00 ”.

(4) Press “ △ ” or “ ▽ ” button can adjust the value of special parameters;

(5) Press “ ⊞ ” button to select special parameters value;

(6) Press “ △ ” or “ ▽ ” buttons to adjust the parameter option “ 01 ” or “ 00 ” of special parameter value;

(7) Press “ ⊞ ” button to confirm the parameter option, then the setting is done.

Table.4.1 Instruction for Special Parameters

Special Parameters	Special Parameter Value	Parameter Option	Instruction	Remarks
ON/OFF memory after power failure	E01	01	ON/OFF memory after power failure	Settable in both ON and OFF states
		00	No ON/OFF memory after power failure	
Temperature display transition setting	E02	01	Fahrenheit (°F)	Settable in both ON and OFF states
		00	Celsius (℃)	
Resume to Ex-factory Setting	E12	01	Resuming to ex-factory setting of wired controller is on	Settable in OFF states
		00	Resuming to ex-factory setting of wired controller is off	
Timer 2 type	E16	00	Timer ON/OFF 2 is clock timer	Settable in both ON and OFF states
		01	Timer ON/OFF 2 is weekly timer	
Anti-overheating setting	E04	Adjust within the range of 62 ~ 79℃		Settable in both ON and OFF states
Water pump stop time	E19	Adjust within the range of 0~60 (Unit: min)		Settable in both ON and OFF states
Water pump operating time	E20	Adjust within the range of 0~60 (Unit: min)		Settable in both ON and OFF states

Special Parameters	Special Parameter Value	Parameter Option	Instruction	Remarks
ON/OFF control temperature sensor	F04	Selectable value: 00; 01; 02		Settable in both ON and OFF states
Water temperature compensatory status value	F05	00	Valid	Settable in both ON and OFF states
		01	Invalid	
Heating startup temperature difference	F10	Adjust within the range of 0.5 ~ 12		Settable in both ON and OFF states
Cooling startup temperature difference	F11	Adjust within the range of 0.5 ~ 12		Settable in both ON and OFF states

Notes:

① Resuming to ex-factory setting is available only in the OFF state.

② During the setting, press " ⏻ " button or no operation for 180 seconds, the unit will automatically quit the setting, and the setting is invalid.

③ Except for the aforesaid special parameter setting, other special parameter setting can only be set by installing and debugging personnel, please do not alter by yourself, otherwise it may cause malfunction of units.

4.8 Reset to Ex-factory Setting

If the functions of units cannot work well due to ex-factory setting is altered by misoperation, user can reset to ex-factory setting via wired controller.

Method 1: press and hold " ⏻ " button for 5 seconds, the unit will resume to ex-factory setting. This operation is only valid for some models.

Method 2: please set according to "Special Parameters Setting" section.

INSTALLATION

1.Installation Safety Precautions

Please read the instructions for use, installation and maintenance carefully before use.

(1) For the product to be installed, moved and repaired, please contact the local technical service personnel and seek the support of professional institutions. Otherwise, our company may not be able to assume the relevant legal liability in case of any damage.

(2) If the user uses self-prepared installation materials for installation, resulting in pipeline leakage, crash, and bad installation affecting the normal operation and use of the product, our company may not be able to assume the relevant legal liability.

(3) The unit adopts environment-friendly, colorless, odorless and flammable R32 refrigerant.

(4) The room area for installation, operation and storage of combustible refrigerant unit shall be larger than the specified space area.

(5) Do not puncture or ignite the unit.

(6) The relevant gas regulations of the country or region where the installation is carried out shall be observed.

(7) Avoid installing the unit in a narrow room to prevent the concentration of refrigerant in the room from exceeding the limit value in case of refrigerant leakage, resulting in hypoxia or suffocation.

(8) Unless specially recommended by the manufacturer, do not use any method to accelerate the defrosting process or clean the frosted part.

(9) The unit shall be stored to prevent mechanical damage caused by accidents.

(10) The unit shall be stored in a room without continuous fire source (such as open fire, ignited gas appliance, and open electric heater).

(11) Before maintenance or repair of heat pump unit using combustible refrigerant, safety inspection must be carried out to ensure that the risk of fire is minimized.

(12) When installation:

1) Be sure to use special accessories and parts;

2) It is forbidden to violate the nitrogen filling welding process;

3) It is forbidden to short circuit or cancel the pressure switch;

4) The unit controlled by the wire controller must be connected to the wire controller before being powered on.

(13) Before installation, please check the safety of the power supply used and whether it is consistent with the power supply required on the nameplate. After the power cord is connected, be sure to install the electrical box cover.

(14) The heat pump unit shall use a special power cord with proper power capacity, and the wiring

sectional area shall not be less than the specification requirements of the power cord in the Manual.

(15) The unit shall use special circuit and socket, and be equipped with appropriate leakage protection switch and circuit breaker (air switch). The circuit breaker shall be full-pole open, with the contact breaking distance of at least 3 mm.

(16) According to the relevant laws, regulations and electrical standards, special branch leakage devices shall be installed.

(17) The connection method of the unit and the power cord and the interconnection method of each independent component shall be subject to the circuit diagram attached to the unit body.

(18) All wiring must use crimping terminals or single-core wires. The direct connection of multi-stranded wires with the terminal block may cause a spark.

(19) Do not change the internal wiring of the unit at will, otherwise, our company may not assume relevant legal responsibilities in case of relevant losses.

(20) The model and rating of the fuse shall be subject to the silk screen identification on the corresponding controller or fuse sleeve.

2.Unit Installation Diagram

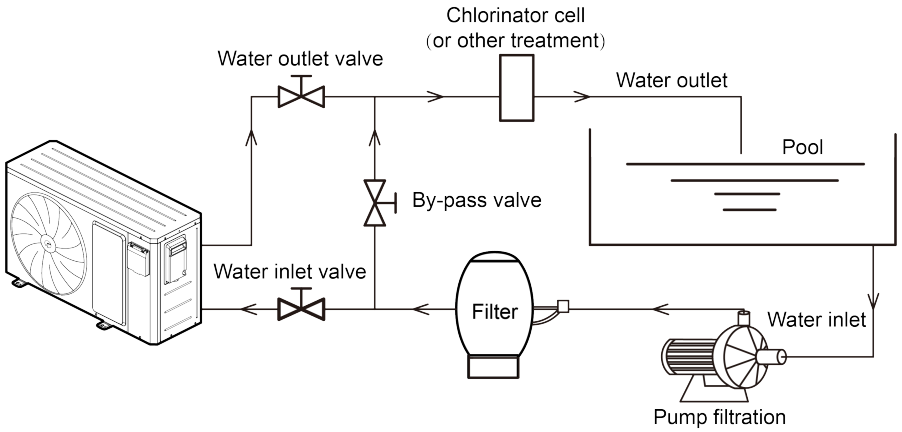


Fig. 2-1 Unit installation diagram

3.Dimensional Requirements of Installation Space

(1) The dimensional requirements of installation space of the unit are shown in the figure below.

(2) The installation distance of the unit from the swimming pool shall not exceed 15 m.

(3) The heat pump must be installed at a minimum distance from the pool in compliance with NFC15-100 (3.5 m from the water for France) or in compliance with installation standards applicable in other countries.

Unit: mm

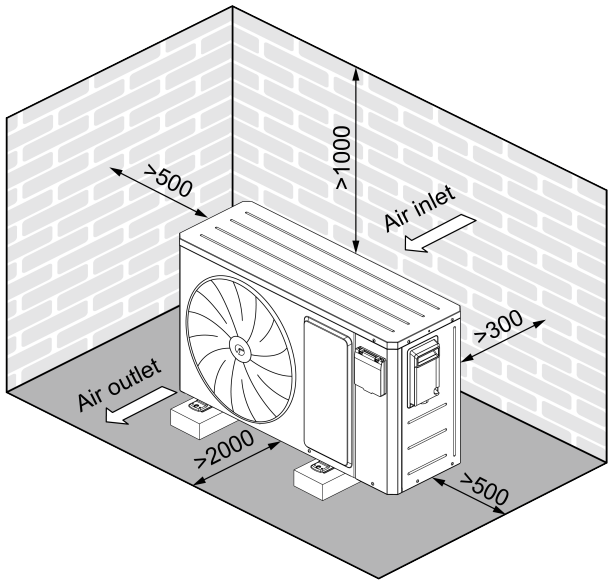


Fig. 3-1 Dimensions of units installation space

4.Unit Installation Requirements

(1) Ensure that the sound and air flow of unit operation will not affect others or animals and plants.

(2) Ensure that the unit has good ventilation. If a canopy is installed to protect the unit, the heat dissipation and absorption shall not be affected.

(3) The unit shall be installed at a place with a solid foundation. The unit shall be installed vertically more than 15 cm above the horizontal ground, and shall be fully firmly installed with the impact of strong wind, typhoon and earthquake fully considered.

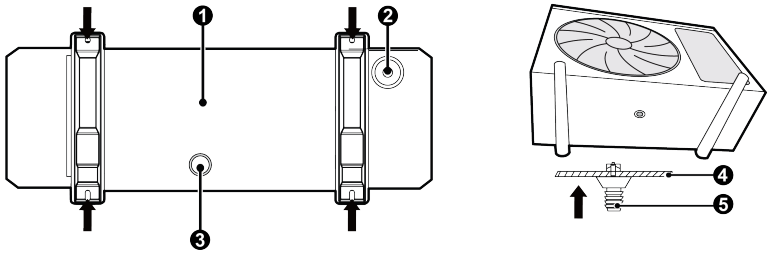
(4) The wooden base with the unit should be removed when conducting installation.

(5) We recommend sheltering the unit to avoid the possibility that snow accumulates and damages the evaporator.

(6) Drainage ditch should be reserved next to the unit for condensate discharging as well as evacuating water for disuse in winter.

(7) If the unit is installed in a place that does not require drainage, it is recommended that all drainage holes be unblocked. Special attention should be paid to: at this time, the water discharge from the drainage holes are easy to freeze in the temperature below 0°C,please set up warning signs or isolation fences at the unit install site to avoid unnecessary injures such as sliding.

(8) If the unit is installed in the designated place with drainage requirements, choose the drain pipe mounting hole as shown in the following figure to clamp into the drainage joint to guide the drainage, other drainage holes are sealed with drain caps.



❶ Bottom
❷ Drain cap
❸ Drain pipe mounting hole
❹ Chassis
❺ Drain connection

Fig. 4-1 Drainage pipe connection

5.Water System Connection

5.1 Installation Requirements of Water System Piping

(1) The design and construction of the water system must meet the requirements of the local plumbing design specifications and relevant standards.
(2) For an appliance intended to be permanently connected to the water mains and not connected by a hose set.
(3) The water pipe connecting parts must be sealed with raw tape to prevent water leakage.
(4) The water inlet and outlet connection parts of each pipeline shall be pasted with water inlet and outlet signs to avoid connection errors.
(5) The water pipe installation shall be arranged horizontally and vertically, and the pipe layout shall be reasonable to minimize bending, reducing the resistance loss of the water system.
(6) All valves must be installed strictly, and the installation sequence must be consistent with the unit installation diagram.
(7) The pipeline shall be arranged in a centralized way. The water outlet of the unit shall not be too far from the hot water use point, and there shall be a drainage floor drain nearby.
(8) All water system pipelines, valves and pipe joints must be laid with insulation layer to reduce heat loss. Common insulation materials include soft polyethylene foam (PEF), glass wool, rubber insulation cotton, and the thickness of insulation layer shall be ≥ 30 mm.

5.2 Water Supply Pipeline Connection

The heat pump unit is equipped with two pipe joints (PVC Φ50 mm), which are used to connect the pipeline from the filter pump and the water outlet pipeline, and connect to the circulating hot water system of the swimming pool.

To guarantee the safe usage of unit, a reduction valve should be installed in the water inlet pipe if the water inlet pressure exceeds 0.5MPa.

Note: The water entering the unit must be the water passing through the swimming pool filter to prevent the impurities from blocking the heat exchanger of the heat pump unit, and the swimming pool disinfection device must be installed at the downstream of the water outlet pipeline of the heat pump unit to prevent the chemical composition of the disinfection device from affecting the heat exchanger of the unit.

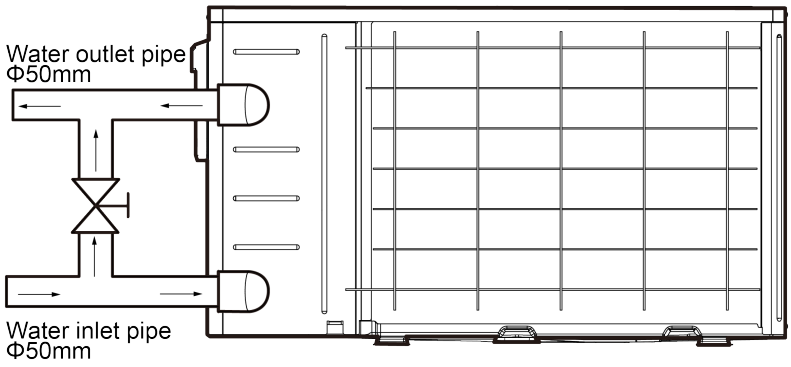


Fig. 5-1 Water outlet and water inlet pipe connection

6.Electrical Installation

WARNING!

- The heat pump pool heater is a class I electrical appliance. Please be sure it is installed by professional personnel according to the relevant standards of the region or country where it is installed.
- Only the power specifications indicated on the nameplate can be used. Before installation, make sure the power supply and the carrying capacity of the power cord and socket meet the requirements.
- The fixed circuit must be equipped with a leakage protection switch and circuit breaker that have sufficient capacity and can be completely disconnected from the power supply. The leakage protection switch and circuit breaker should be directly connected to the power terminal, and the contact distance on all poles is fully interrupted under Class III over-voltage category conditions.
- Be sure to have reliable grounding. The ground wire should be connected to the special grounding device of the building.
- Do not connect socket converters, extension cords, or terminal blocks to the power cord of this unit. Do not use other power cords to adapt to the home power supply. This unit should be wired separately. Do not share the circuit with other electrical appliances.
- If the power cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid danger. Never use extension cords.

6.1 Electrical Wiring

6.1.1 Selection of Power Cord Diameter & Circuit Breaker

Tab.6.1 Unit power supply configuration

Model	Power supply	Minimum Diameter of Power Cord(mm²)	Circuit Breaker Capacity (A)
GRS-CP11Pd/NhA-K GRS-CP11Pd/NhA-S	220-240V ~ 50/60Hz	2.5	20
GRS-CP18Pd/NhA-K GRS-CP18Pd/NhA-S	220-240V ~ 50/60Hz	2.5	25

6.1.2 Wiring Diagram

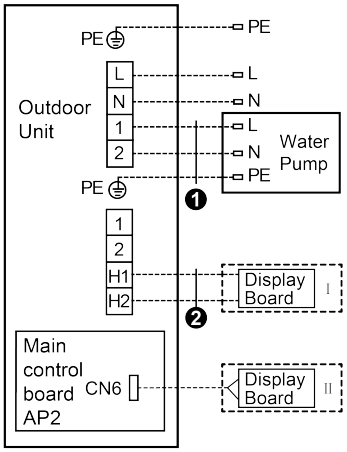
(1) The external wiring diagram of the unit is as follows. For the internal wiring diagram, please refer to the circuit diagram attached on the machine.

(2) The following two installation methods can be used for the display board（wire controller）.

If the display board needs to be installed in an indoor area other than the unit's panel, its wiring method should be in accordance with method I in the figure.

If the display board needs to be installed on the unit's panel, its wiring method should be in accordance with method II in the figure.

(Note: Connect according to either method I or method II).



GRS-CP11Pd/NhA-K GRS-CP18Pd/NhA-K GRS-CP11Pd/NhA-S GRS-CP18Pd/NhA-S
① Water pump power cord: 3×1.0 mm² ② Display board cord: 2×0.75 mm²

Fig. 6-1 External wiring

6.2 Electrical Wiring & Connection Requirements

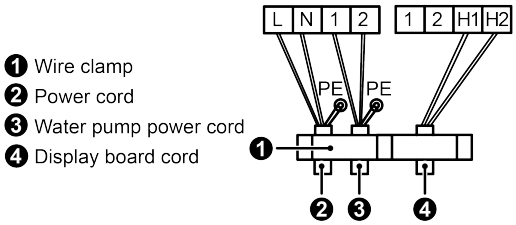


Fig. 6-2 External wiring and fixing diagram

(1) After the wiring is completed, the power cord, water pump power cord and display board cord must be secured with wire clamps, which should be fastened on the outer sheath of the wire.

(2) When wiring outside the unit, the display board (wire controller) cord should be separated from the power cord and the water pump power cord. The minimum distance between parallel wires should be greater than 20cm; otherwise, the unit communication may be abnormal. Strong and weak cords should be sheathed separately.

(3) A buckle magnetic ring should be installed on the external power cord. Below are details of how to install a buckle magnetic ring:

1) Use a cable tie to restrict the magnetic ring on the power cord (Refer to Mark 4 in the figure below) so that the magnetic ring does not slide down the power cord;

2) Then bind the magnetic ring on the power cord with a cable tie to prevent the magnetic ring from getting loose (Refer to Mark 3 in the figure below).

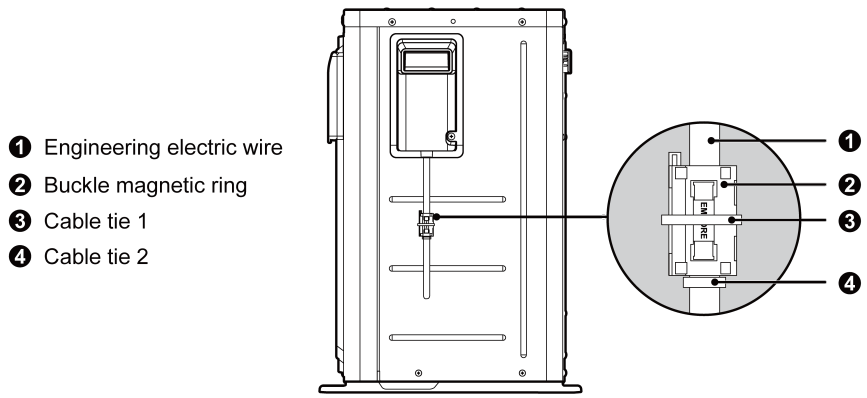


Fig. 6-3 Installation diagram for power cord with buckle magnetic ring (for GRS-CP11Pd/NhA-K、GRS-CP11Pd/NhA-S)

(4) For GRS-CP18Pd/NhA-K, both the power cord and the water pump power cord should be equipped with magnetic rings. For the installation process, see the third point in Section 3.6.2 for steps to install a magnetic ring on an external power cord.

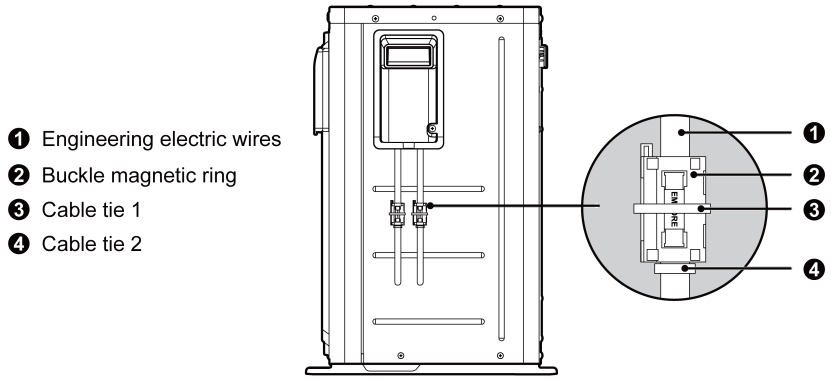


Fig. 6-4 Installation diagram for power cord and water pump power cord with buckle magnetic ring (for GRS-CP18Pd/NhA-K、GRS-CP18Pd/NhA-S)

6.3 Engineering Load Installation

6.3.1 Water Pump Connection

The water supply of the pool machine is realized through the access of the engineering water pump, which can be installed according to the actual engineering needs.

(1) This unit provides the power control signal for the engineering water pump. Please connect if needed. If the rated current of the external water pump is less than 5A, power can be directly taken from the unit; If the rated current of the external water pump exceeds 5A, power cannot be directly taken from the unit and the AC contactor coil should be connected.

(2) When the power supply of the circulating water pump is not connected to the heat pump unit, it is necessary to ensure that the water pump is started in advance and reaches the water flow required by the heat pump unit before the heat pump unit is started, otherwise the heat pump unit will be started.

6.3.2 Wire Controller Connection

The wire controller is installed on the front panel of the unit by default. When it needs to be adjusted to other places outside the unit, to be in compliance EN 55014.

Table.6.2 Instruction of Interface

Interface	A/B
Type	485 communication interface (nonpolar)
Parameter	24VDC input

(1) Requirement for Installation Location

1) Please do not install the wired controller in the position where is likely to be spattered with water;
2) Please do not install the wired controller near the high-temperature object or under direct sunlight;
3) Before installation, please first cut off the power source of heavy current wire embedded inside the installing hole, hot-line work is not allowed during the whole course of the installation;
4) In order to prevent malfunction due to electromagnetic interference or related reasons, please pay attention to the following notices:
   ① Make sure that the interface of communication wire is correctly connected, otherwise it may cause communication error;
   ② Communication wire of wired controller should be separate with the power cord and outdoor connecting wire, the minimum distance should be over 20cm, otherwise it may cause communication error of unit;
   ③ If the product is installed in the position where is likely to be interfered by electromagnetism, the signal wire of wired controller must adopt STP wire.
5) The wired controller should only be installed indoors or in the unit, the working temperature range is -15℃~45℃(5℉~113℉).

(2) Indoor Installation

The above figure shows the simple installation of wired controller, and the following points should be noted:

1) Before installation, please cut off the power source first, hot-line work is not allowed during the whole course of installation.
2) Pull out the 2–core STP wire inside the installing hole of wall, and thread the wire through the wire connecting hole in the back of soleplate of wired controller.
3) Stick the soleplate of wired controller on the wall, use screw M4×25 to fix the soleplate into the installing hole of wall.
4) Connect the 2–core STP wire to the two wiring terminals respectively in the back of wired controller, and screw up the screws.
5) Buckle the wired controller panel and wired controller soleplate together, the installation is done.
6) The length of the communication cable between the wired controller and the unit can't be more than 8m.

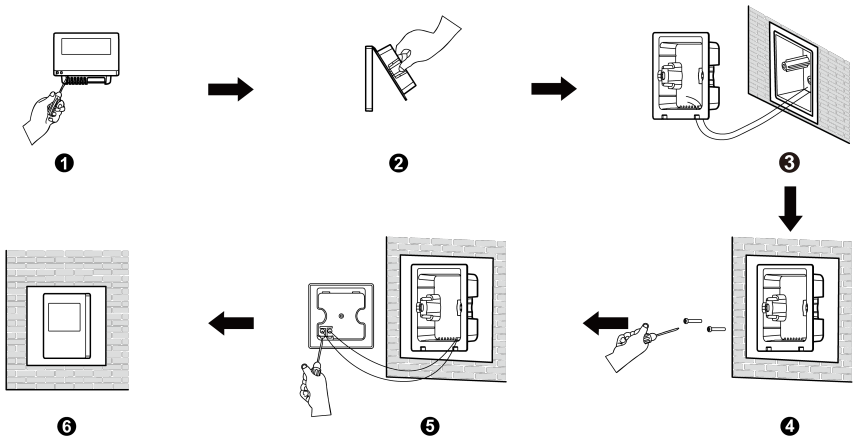


Fig. 6-5 Installation of Wired Controller

(3) Install in The Unit

The wired controller can be directly installed in the unit by installation personnel.

(4) Removal

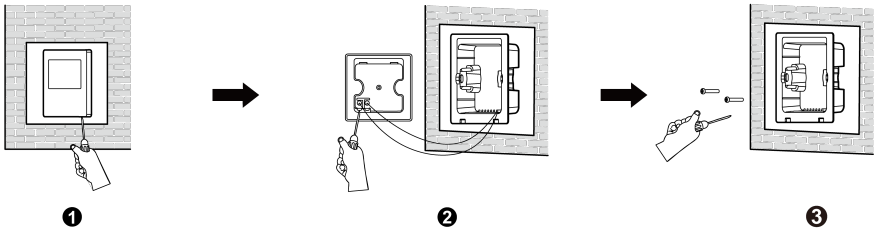


Fig. 6-6 Removal of Wired Controller

Caution!

For removing wired controller in figure ①, please use slot type screwdriver for easily lever the panel and soleplate of wired controller. If the rear cover of wired controller is required to remove, please unscrew the screws of wiring terminals first.

7.Commissioning

WARNING!

- Safety measures must be taken for outdoor operation. All commissioning personnel and maintenance personnel must master the building construction safety specifications and strictly follow the specifications.
- Refrigerators, electricians, welders and other special types of workers must hold special work permits, and it is prohibited to work in different types of work. When operating the equipment, the power supply of the whole unit must be cut off, and the operation must be carried out in strict accordance with the equipment safety requirements.
- All installation and maintenance operations must comply with the design requirements of this product and the safety specifications of the country or region where it is located. Illegal operations are strictly prohibited.

7.1 Inspection before Commissioning

After the heat pump unit, wire controller, water system and electrical wiring have been installed, be sure to check the unit according to the following table.

Tab. 7.1 Unit installation checklist

Items to be Checked	Possible Situation in Case of Improper Installation
Check whether the water pipeline system is complete.	System protection caused by pipeline leakage.
Check whether the power supply is consistent with the power supply required in this manual and the unit nameplate.	Abnormal unit or burnt-out parts.
Check whether the specification of the power supply line is consistent with that required in this Manual.	Abnormal unit, heated or even blown line.
Whether the unit is firmly installed.	The unit operation may produce noise or vibration, and even cause falling hazards.
Whether there are obstacles at the air outlet and air inlet of the unit.	Abnormal unit operation.

7.2 Commissioning

The whole unit can be commissioned only after the installation and inspection of the unit are qualified. The commissioning steps are as follows:

(1) Keep the valve fully open first.

(2) When the water supply pump of the unit is not connected to the heat pump unit, the water supply pump shall be connected and adjusted to the nominal flow of the unit before starting. If the water supply pump is controlled by the heat pump unit, the whole unit shall be powered on and the flow shall be adjusted to ensure that there is no water leakage in the pipes and joints.

(3) When the whole unit is powered on, it is necessary to confirm that the leakage protection switch is in "ON" before starting and running. After the unit is powered on, observe whether the wire controller displays normally. If there is no fault, it is normal.

(4) Time calibration of controller by wire controller system.

(5) Refer to the manual of the wire controller for WiFi connection.

(6) Start the wire controller and check whether the unit operates normally: Gradually adjust the bypass valve from fully-open to half-open, the fan operates normally, and the whole unit operates stably without obvious shaking or abnormal noise. After running for 10 min, the unit inlet and outlet wind energy feel obvious temperature difference. Adjust the inlet and outlet bypass valves, so that the heat pump water flow reaches the rated flow, and the unit inlet and outlet water temperature difference is about 2°C.

(7) After commissioning or setting wire controller, close the lid of the box and fix it with the tapping screw that comes with the unit to avoid rain or misoperation.

8.Non-Fault Phenomenon

Phenomenon	Cause Analysis
Start up immediately after shutdown.	In order to protect the unit, start the unit immediately after shutdown, and the microcomputer control will delay its operation for about 5 min.
Unit frosting.	In heating mode, the outdoor ambient temperature is low and frosting is a normal operation process. The unit will defrost regularly to ensure reliable operation.
During operation, you will hear the sound of "rushing" or "hissing" like running water.	The sound of refrigerant flowing is normal.
The unit has condensate discharge.	Normal phenomenon during unit operation.

MAINTENANCE

1.Notices on Maintenance

1.1 Information on Servicing

The manual shall contain specific information for service personnel who shall be instructed to undertake the following when servicing an appliance that employs a flammable refrigerant.

1.1.1 Checks to the Area

Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimized. For repair to the refrigerating system, the following precautions shall be complied with prior to conducting work on the system.

1.1.2 Work Procedure

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.

1.1.3 General Work Area

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 flammable material.

1.1.4 Checking for Presence of Refrigerant

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

1.1.5 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 to hand. Have a dry powder or CO_2 fire extinguisher adjacent to the charging area.

1.1.6 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.

1.1.7 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.

1.1.8 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 followed. If in doubt consult the manufacturer's technical department for assistance.

The following checks shall be applied to installations using flammable refrigerants:

(1) The charge size is in accordance with the room size within which the refrigerant containing parts are installed.
(2) The ventilation machinery and outlets are operating adequately and are not obstructed.
(3) If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant.
(4) Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected.
(5) Refrigeration pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

1.1.9 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 connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, 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:

(1) Those capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking.
(2) That no live electrical components and wiring are exposed while charging, recovering or purging the system.
(3) That there is continuity of earth bonding.

1.2 Repairs to Sealed Components

(1) 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 servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.

(2) Particular attention shall be paid to the following to ensure that by working on electrical 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.

1.3 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.

1.4 Cabling

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

1.5 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.

1.6 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 consideration. The following procedure shall be adhered to：

(1) Remove refrigerant.

(2) Purge the circuit with inert gas.

(3) Evacuate.

(4) Purge again with inert gas.

(5) 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 atmospheric pressure to enable work to take place. This operation is absolutely vital if brazing operations on the pipework are to take place.

Ensure that the outlet for the vacuum pump is not close to any ignition sources and there is ventilation available.

1.7 Charging Procedures

In addition to conventional charging procedures, the following requirements shall be followed.

(1) 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.
(2) Cylinders shall be kept upright.
(3) Ensure that the refrigeration system is earthed prior to charging the system with refrigerant.
(4) Label the system when charging is complete (if not already).
(5) Extreme care shall be taken not to overfill the refrigeration system.
(6) 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 commissioning. A follow up leak test shall be carried out prior to leaving the site.

1.8 Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. 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:

(1) Become familiar with the equipment and its operation.
(2) Isolate system electrically.
(3) Before attempting the procedure ensure that:
    1) Mechanical handling equipment is available, if required, for handling refrigerant cylinders.
    2) All personal protective equipment is available and being used correctly.
    3) The recovery process is supervised at all times by a competent person.
    4) Recovery equipment and cylinders conform to the appropriate standards.
(4) Pump down refrigerant system, if possible.
(5) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
(6) Make sure that cylinder is situated on the scales before recovery takes place.
(7) Start the recovery machine and operate in accordance with manufacturer's instructions.
(8) Do not overfill cylinders (No more than 80 % volume liquid charge).
(9) Do not exceed the maximum working pressure of the cylinder, even temporarily.
(10) 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.

(11) Recovered refrigerant shall not be charged into another refrigeration system unless it has been cleaned and checked.

1.9 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 flammable refrigerant.

1.10 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 is 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 working 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 Notice 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.

1.11 After-Sales Services

Any quality or other issues encountered in the purchased units, please contact the local Gree after-sales service department.

2.Daily Maintenance

(1) In the use season of the pool heat pump unit, it is recommended to clean the filter every week.

(2) In the use season of the swimming pool, check that the electrical connection of the heat pump unit is safe and reliable, the water system pipeline is smooth and free of water leakage, there are no obstacles around the unit that affect the heat exchange, and the radiator-fan heat exchanger is clean before use.

(3) Thermal insulation: The water temperature of the swimming pool is affected by environmental temperature, surface wind speed, heat conduction of the pool materials and other factors. In order to avoid heat loss, the protective heat shield is usually used to cover the pool during the shutdown stage to avoid heat loss and reduce the energy consumption of the pool unit.

3.Maintenance in Winter

When using this product in winter (the temperature may be lower than 0°C), please ensure that the unit is always powered on, the water supply for the unit is continuous and the water pipe is wrapped with insulation layer; If it is not used in winter or the unit fails to use due to a fault, please be sure to drain the water in the water-side heat exchanger and connecting pipe of the unit immediately after the power failure to prevent the stored water from freezing and cracking the equipment and pipe.

After disconnecting the water inlet/outlet pipes, draining all of the water of heat exchanger and pipeline, seal the pipe inlet/outlet to prevent debris from entering and assure a normal use next time.

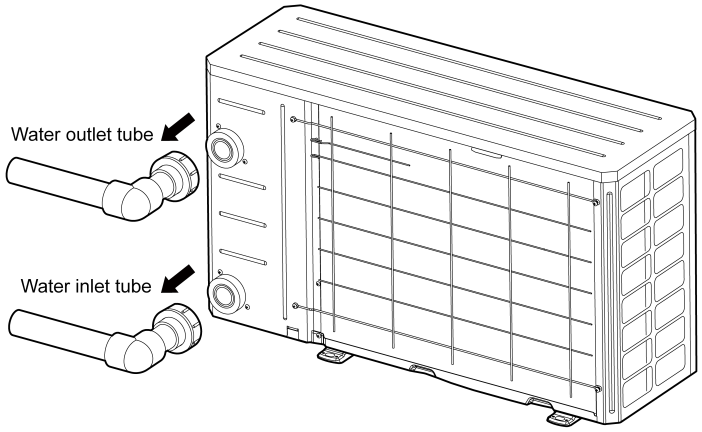
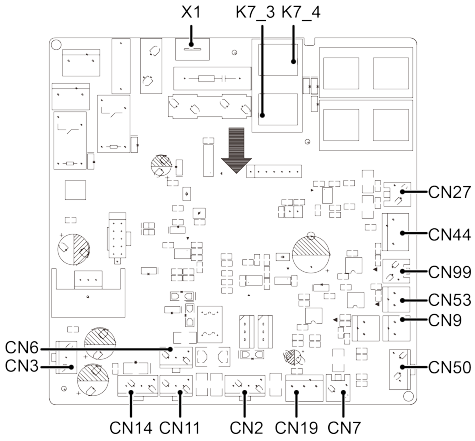


Fig. 3-1 Schematic diagram of removing the pipes of water outlet and water inlet for water drainage

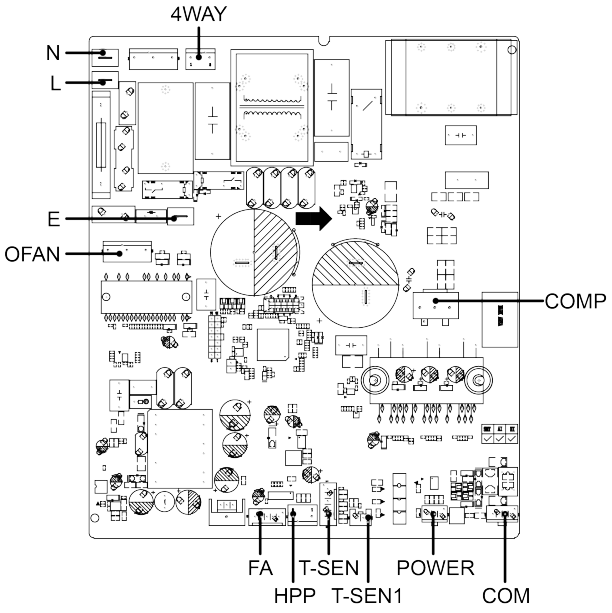
4.Control Board Description & Fault Code

4.1 Main Control Board

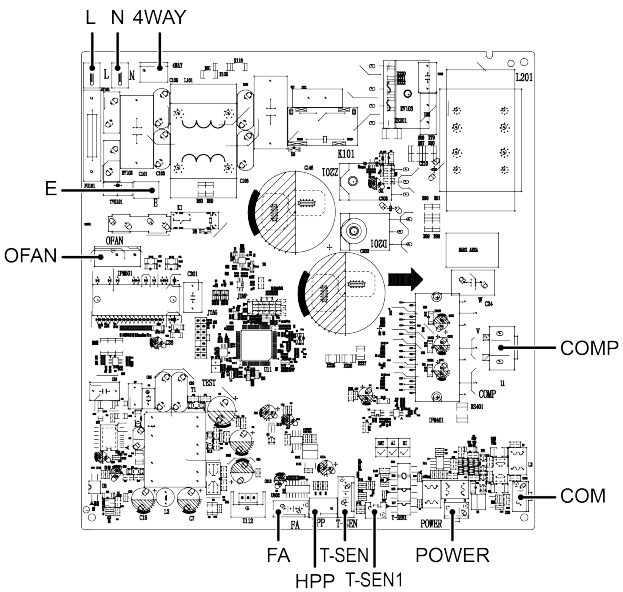


Silk Screen	Introduction
X1	Power supply zero line(only for GRS-CP18Pd/NhA-K、GRS-CP18Pd/NhA-S)
K7_3	Load power supply fire wire
K7_4	Water pump fire wire
CN3	Power input
CN9	Electronic anode power supply (Reserved)
CN50	Water outlet (50 K), water inlet (50 K) temperature sensor
CN7	Water tank (50 K) temperature sensor (Reserved)
CN19	Low pressure sensor (Reserved)
CN99	Water flow switch
CN44	Low pressure switch
CN11	Communication interface of external wire controller
CN6	Communication interface of panel wire controller
CN2	(Reserved)
CN14	Drive communication
CN27	External third-party control (Reserved)
CN53	Remote control (Reserved)

4.2 Drive Control Board



(a) GRS-CP11Pd/NhA-K、GRS-CP11Pd/NhA-S



(b) GRS-CP18Pd/NhA-K、GRS-CP18Pd/NhA-S

Silk-Screen	Introduction
N	Power input zero line
L	Power input fire wire
E	Filter ground wire
OFAN	DC fan interface
FA	Electronic expansion valve interface
HPP	High-pressure switch interface
T-SEN	Ambient temperature, discharge and pipe temperature sensor
T-SEN1	Suction temperature sensor
POWER	Main control board power interface
COM	UART communication interface
COMP	Compressor interface
4WAY	Four-way valve interface

4.3 Main Control Fault Information

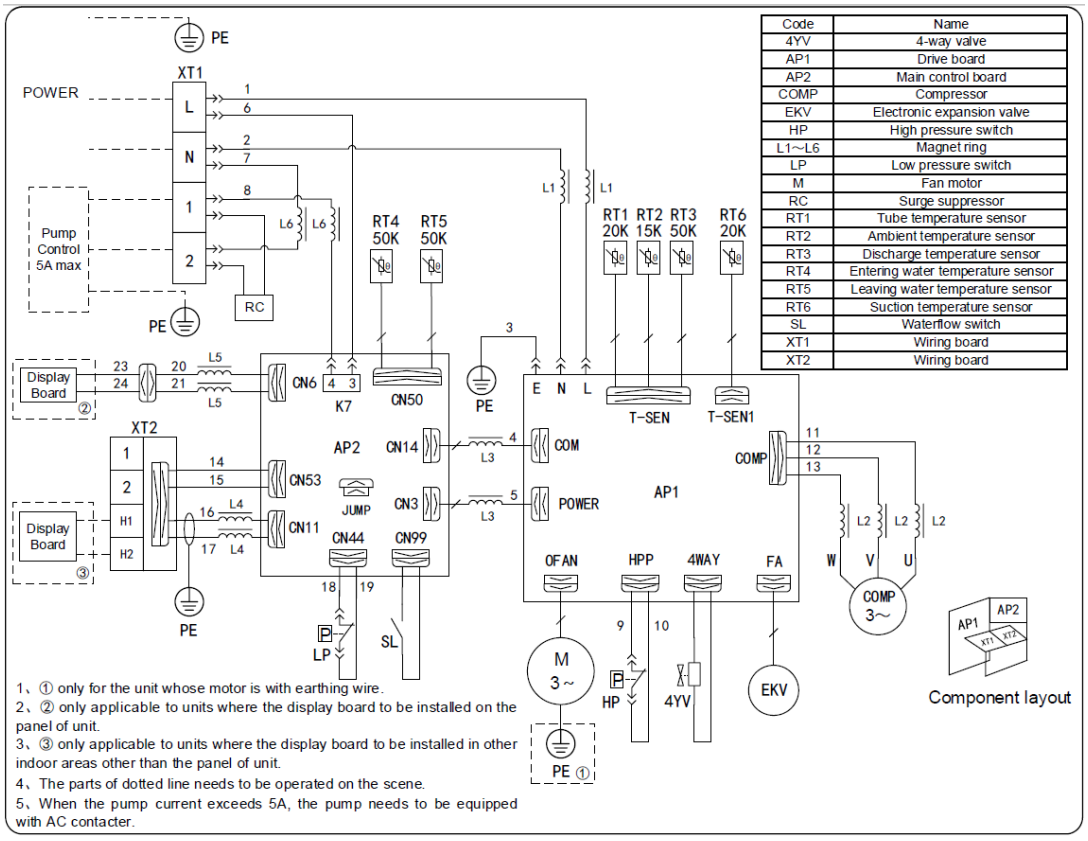
Error Code	Error Name	Possible Causes	Solution
E1	High-pressure protection	Insufficient water flow; Poor contact caused by loose pressure switch wire; Abnormal pressure switch; Main board fault; Abnormal heat exchange of water-side heat exchanger; Over-high ambient temperature.	After the fault is repaired, power on again to recover.
E3	Low-pressure protection	Poor contact caused by loose pressure switch wire; Abnormal pressure switch.	
E4	Discharge protection	Abnormal resistance value of the exhaust temperature sensor; Unit refrigerant leakage or insufficient refrigerant.	
E6	Communication fault	Loose or damaged communication line wiring; Display board fault; Main board fault.	Automatic recovery after fault repair.
F3	Ambient temperature sensor fault	Damaged temperature sensor; Main board fault.	
F4	Discharge temperature sensor fault		
F6	Outdoor heat exchanger tube temperature sensor fault		
Fd	Suction temperature sensor fault		
F8	Water inlet temperature sensor fault		
F9	Water outlet temperature sensor fault		
L6	Out of operating range	The ambient temperature exceeds the operating range of the unit.	-
Ec	Water flow switch protection	Insufficient water flow; Water flow switch fault; Loose water flow switch wire.	Automatic recovery after fault repair.
C5	Jumper cap fault	Wrong jumper cap; Poor contact of jumper cap.	

4.4 Fault Information Table (Drive Board)

S/N	Error Code	Error Name	S/N	Error Code	Error Name
1	EE	EPROM memory chip fault	21	AA	AC current protection (input side) of variable frequency external fan
2	H5	Drive IPM module protection of variable frequency compressor	22	AC	Start failing of variable frequency external fan
3	HC	Drive PFC protection of variable frequency compressor	23	Ad	Phase loss protection of variable frequency external fan
4	H7	Out-of-step protection of variable frequency compressor	24	AE	Drive current detection circuit fault of variable frequency external fan
5	Lc	Start failing of variable frequency compressor	25	Ar	Temperature sensor fault of variable frequency external fan drive electric box
6	Ld	Phase-loss protection of variable frequency compressor	26	AL	Low voltage protection/voltage drop fault of variable frequency external fan drive DC busbar
7	LF	Power protection of variable frequency compressor	27	AJ	Out-of-step protection of variable frequency external fan
8	PA	Drive AC current protection (input side) of variable frequency compressor	28	AH	Over-voltage protection of variable frequency external fan drive DC busbar
9	Pc	Drive current detection circuit fault of variable frequency compressor	29	AP	Abnormal drive AC input voltage protection of variable frequency external fan
10	PF	Temperature sensor fault of variable frequency compressor drive electric box	30	AU	Drive charging circuit fault of variable frequency external fan
11	PH	Over-voltage protection of variable frequency compressor drive DC busbar	31	A0	Drive module reset of variable frequency external fan
12	PL	Low voltage protection/voltage drop fault of variable frequency compressor drive DC busbar	32	A1	Drive IPM module protection of variable frequency external fan
13	PP	Abnormal drive AC input voltage protection of variable frequency compressor	33	A6	Drive communication fault of main control & variable frequency external fan
14	PU	Drive charging circuit fault of variable frequency compressor	34	A8	Over-temperature protection of variable frequency external fan drive module
15	P0	Drive module reset of variable frequency compressor	35	A9	Temperature sensor fault of variable frequency external fan drive module
16	P5	Overcurrent protection of variable frequency compressor	36	U9	Abnormal drive AC input zero-crossing protection of variable frequency external fan
17	P6	Drive communication fault of main control & variable frequency compressor	37	An	Drive memory chip fault of variable frequency external fan
18	P7	Temperature sensor fault of drive module of variable frequency compressor	38	AF	Drive PFC protection of variable frequency external fan
19	P8	Drive module over-temperature protection of variable frequency compressor	39	UL	Overcurrent protection of variable frequency external fan
20	P9	Abnormal drive AC input zero-crossing protection of variable frequency compressor	40	UP	Power protection of variable frequency fan

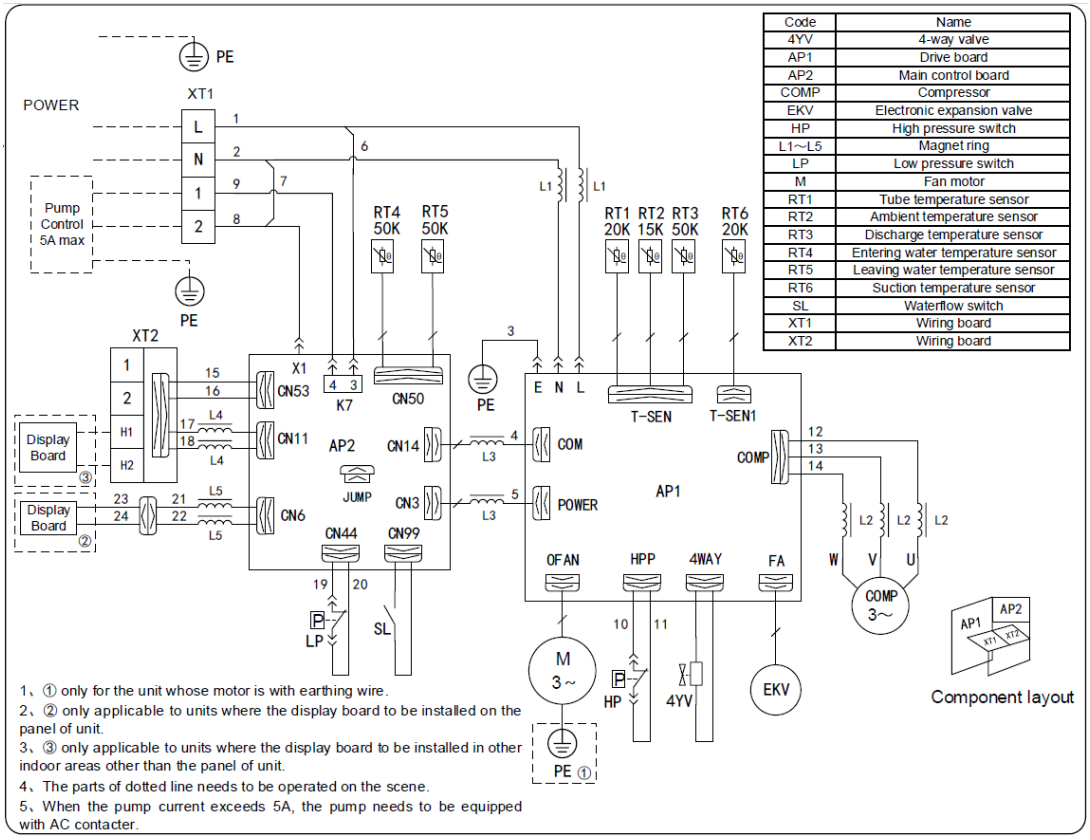
5.Circuit Diagram

The following are for reference only, the circuit diagram can be found on the unit.



Code	Name
4YV	4-way valve
AP1	Drive board
AP2	Main control board
COMP	Compressor
EKV	Electronic expansion valve
HP	High pressure switch
L1~L6	Magnet ring
LP	Low pressure switch
M	Fan motor
RC	Surge suppressor
RT1	Tube temperature sensor
RT2	Ambient temperature sensor
RT3	Discharge temperature sensor
RT4	Entering water temperature sensor
RT5	Leaving water temperature sensor
RT6	Suction temperature sensor
SL	Waterflow switch
XT1	Wiring board
XT2	Wiring board

Fig. 5-1 The circuit diagram of GRS-CP11Pd/NhA-K and GRS-CP11Pd/NhA-S



Code	Name
4YV	4-way valve
AP1	Drive board
AP2	Main control board
COMP	Compressor
EKV	Electronic expansion valve
HP	High pressure switch
L1~L5	Magnet ring
LP	Low pressure switch
M	Fan motor
RT1	Tube temperature sensor
RT2	Ambient temperature sensor
RT3	Discharge temperature sensor
RT4	Entering water temperature sensor
RT5	Leaving water temperature sensor
RT6	Suction temperature sensor
SL	Waterflow switch
XT1	Wiring board
XT2	Wiring board

Fig. 5-2 The circuit diagram of GRS-CP18Pd/NhA-K and GRS-CP18Pd/NhA-S

6.Troubleshooting

Troubleshooting principle

6.1 “E6” Communication malfunction

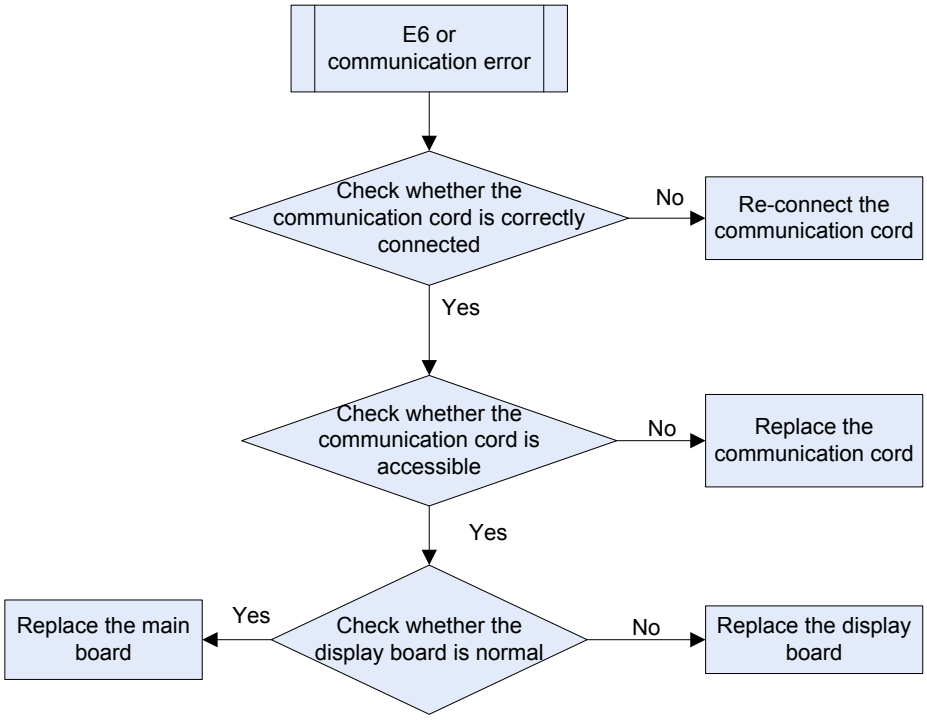
Possible cause:

(1) Exception or incorrect connection of the communication cable;

(2) Display error;

(3) Mainboard error.

Troubleshooting:



6.2 “E1” High pressure protection

Possible cause:

(1) Abnormal heat exchange;

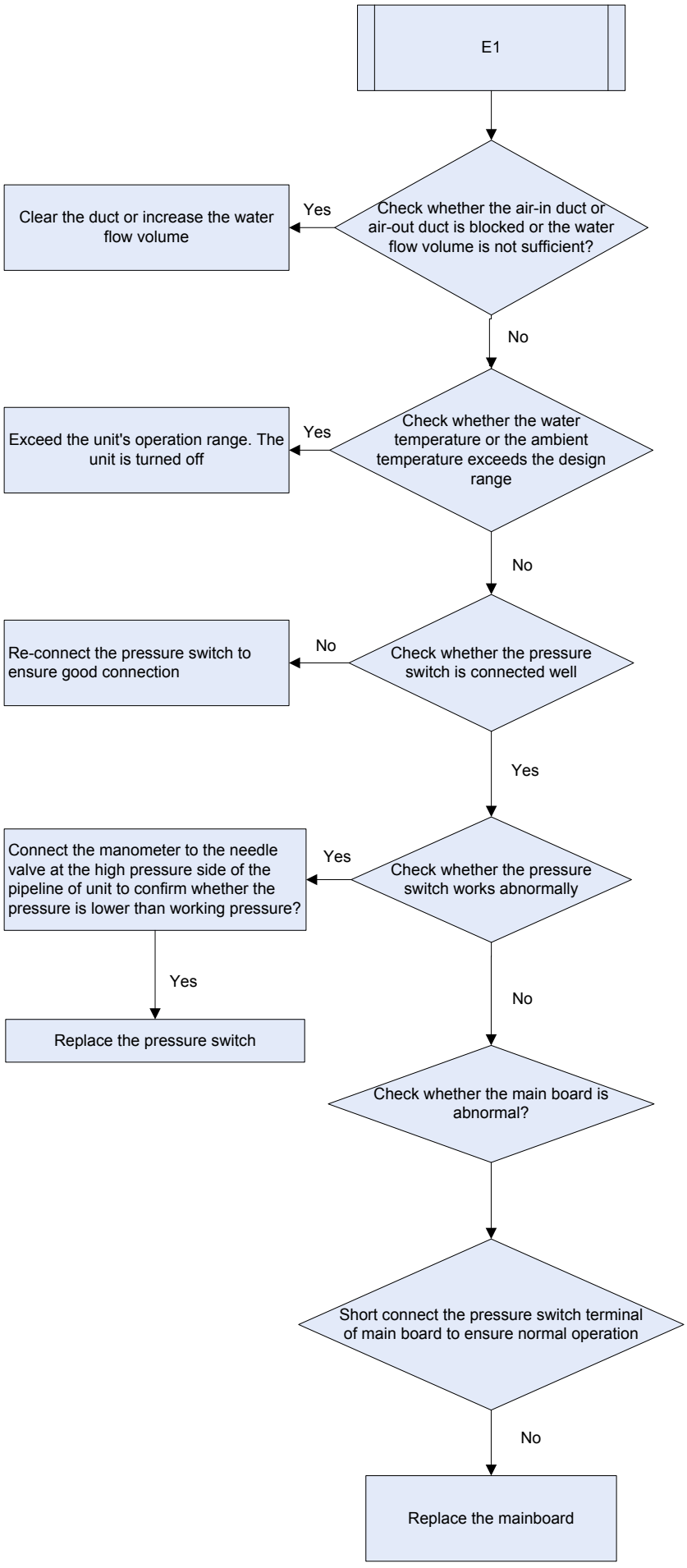
(2) Poor connection of the water temperature sensor;

(3) Loose pressure switch cable;

(4) Pressure switch error;

(5) Main board error.

Troubleshooting:


E1
Check whether the air-in duct or air-out duct is blocked or the water flow volume is not sufficient?
Yes
Clear the duct or increase the water flow volume
No
Check whether the water temperature or the ambient temperature exceeds the design range
Yes
Exceed the unit's operation range. The unit is turned off
No
Check whether the pressure switch is connected well
No
Re-connect the pressure switch to ensure good connection
Yes
Check whether the pressure switch works abnormally
Yes
Connect the manometer to the needle valve at the high pressure side of the pipeline of unit to confirm whether the pressure is lower than working pressure?
Yes
Replace the pressure switch
No
Check whether the main board is abnormal?
Short connect the pressure switch terminal of main board to ensure normal operation
No
Replace the mainboard

6.3 “E3” Low-pressure protection

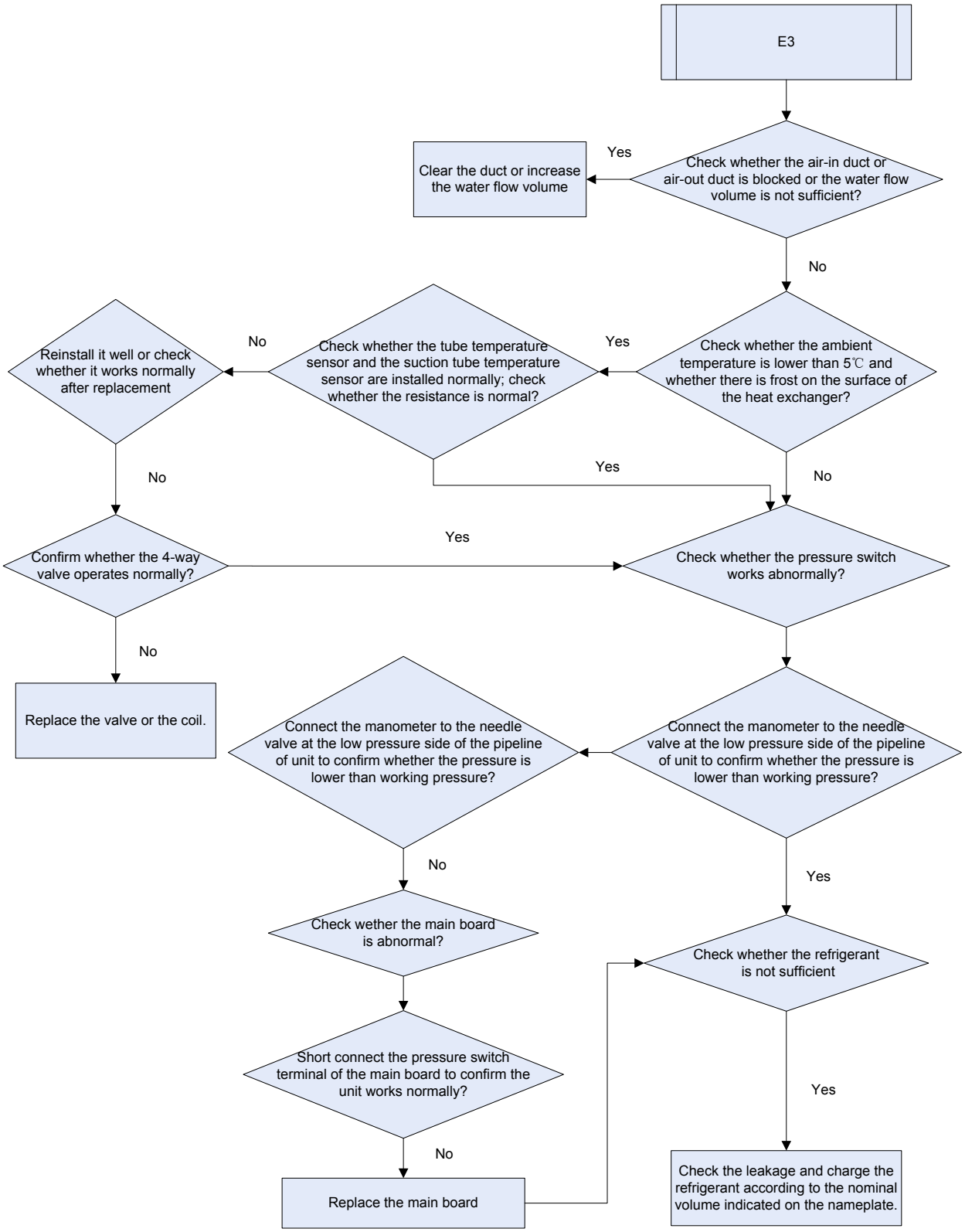
Possible cause:

(1) Poor contact of low pressure switch;

(2) Low pressure is too low;

(3) Main board error.

Troubleshooting:



6.4 “E4” Discharge temperature protection

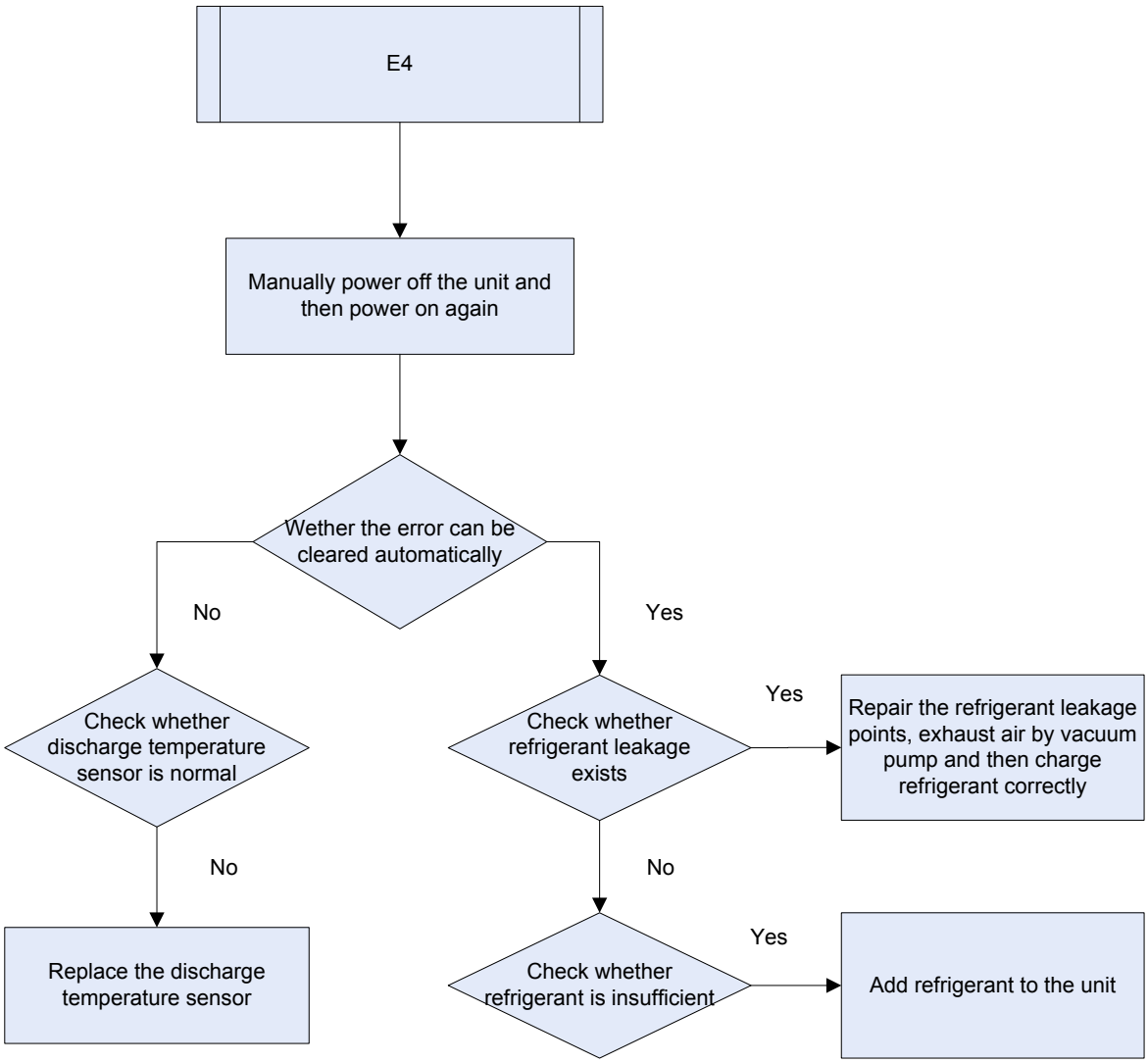
Possible cause:

(1) Discharge temperature sensor error;

(2) Refrigerant leakage;

(3) Insufficient refrigerant.

Troubleshooting:



6.5 “Ec” Water flow switch protection

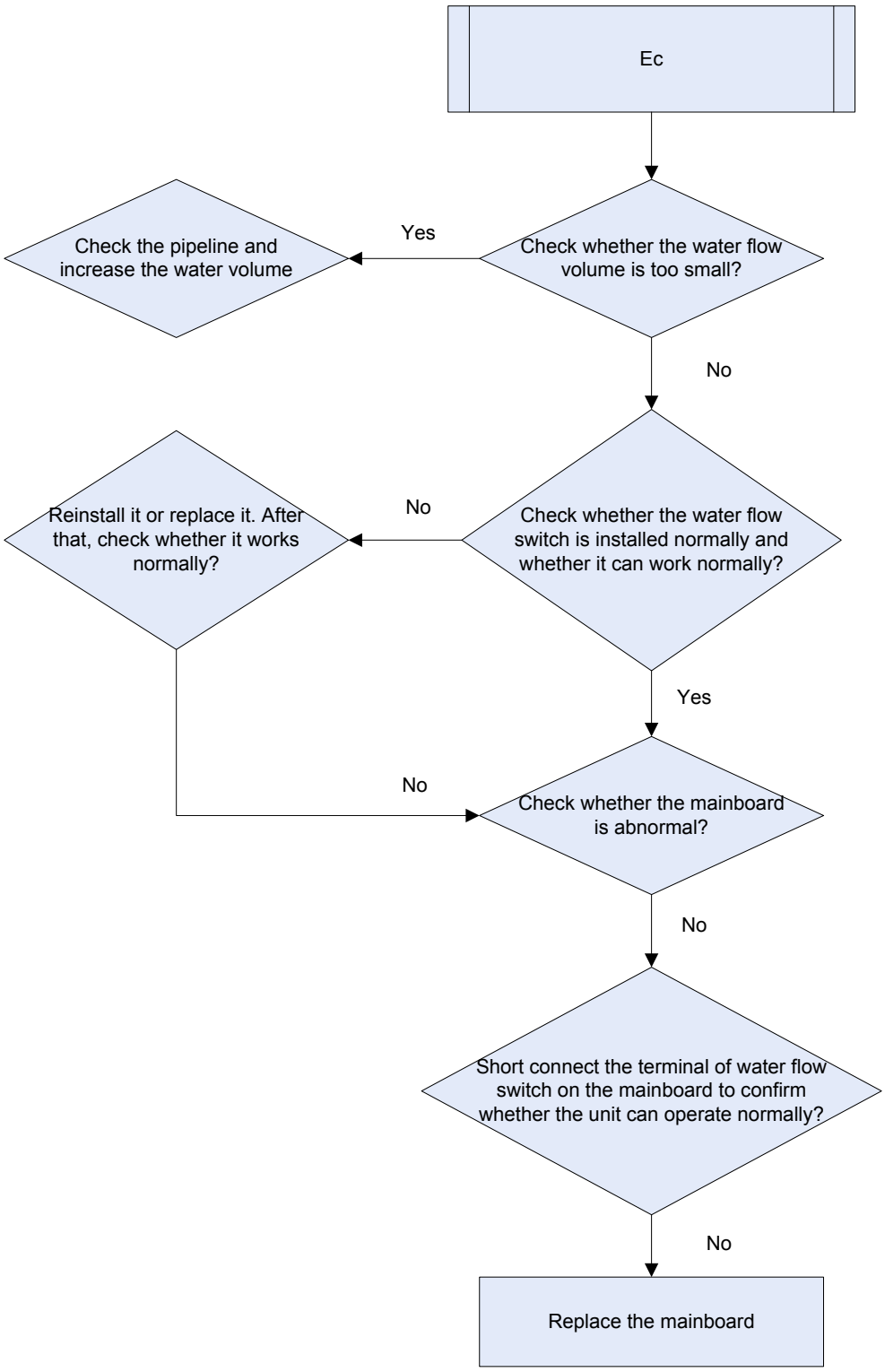
Possible cause:

(1) Insufficient water flow;

(2) Loose water flow switch wire;

(3) Water flow switch fault.

Troubleshooting:



6.6 Mafunction of temperature sensor

Error code: F3, F4, F6, Fd, F8, or F9

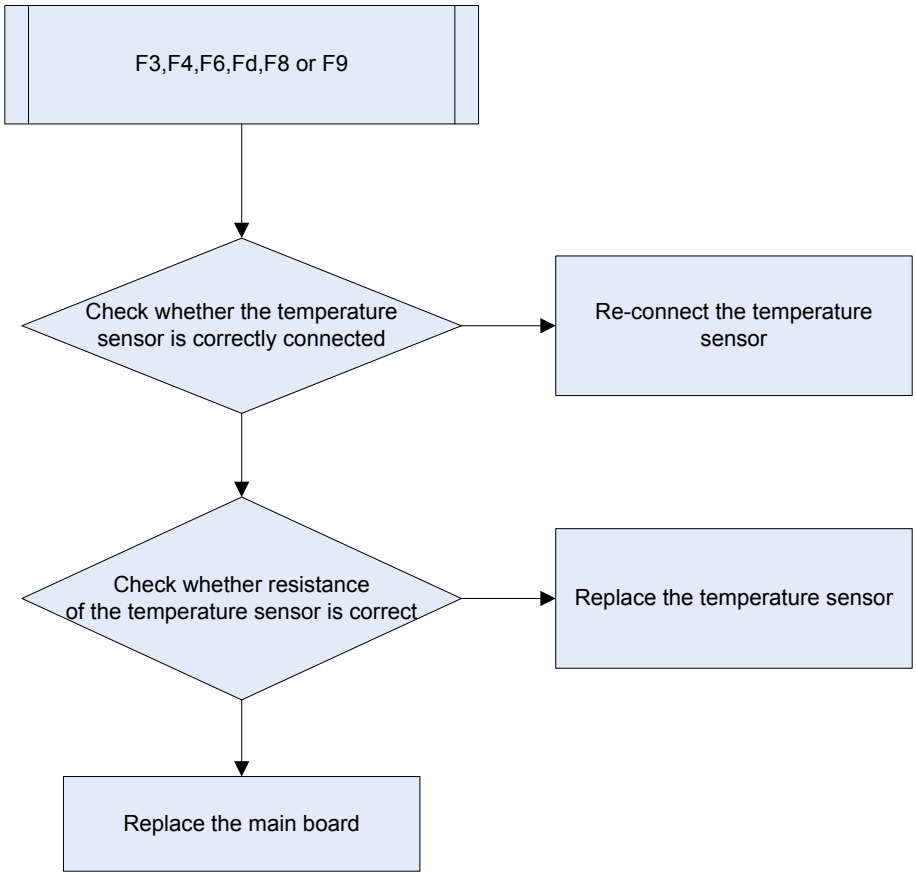
Possible cause:

(1) Incorrect connection of temperature sensor;

(2) Temperature sensor error;

(3) Mainboard error.

Troubleshooting:



6.7 “EE” Memory Chip Error

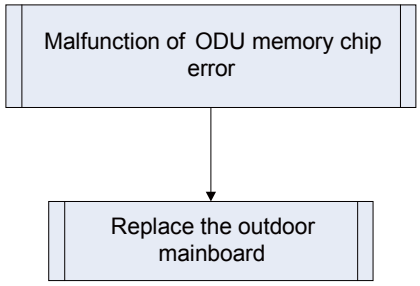
Possible cause:

(1) Memory chip on the ODU mainboard is damaged;

(2) Memory chip is weakly welded;

(3) Memory chip lead is short-circuited.

Troubleshooting:



6.8 “PF” Electric Box Sensor Error

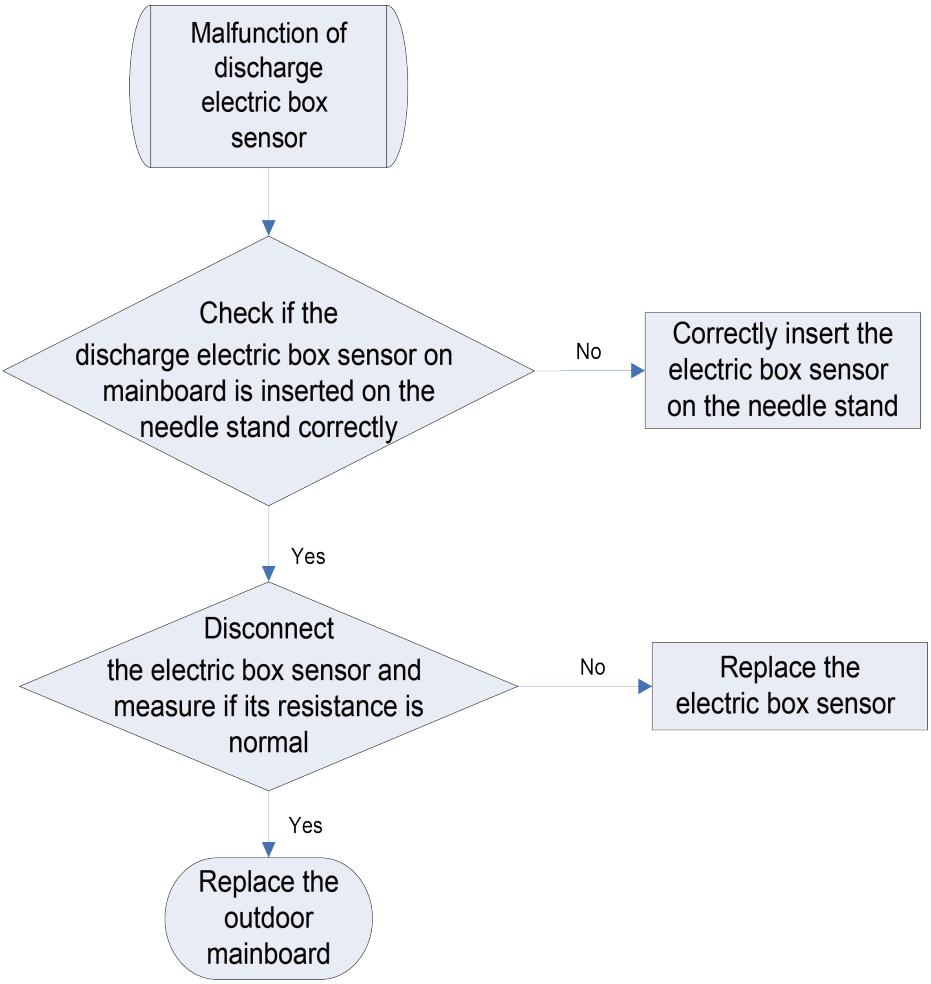
Possible cause:

(1) Poor contact between temperature sensor and terminal in mainboard interface;

(2) Temperature sensor is abnormal;

(3) Detecting circuit is abnormal.

Troubleshooting:



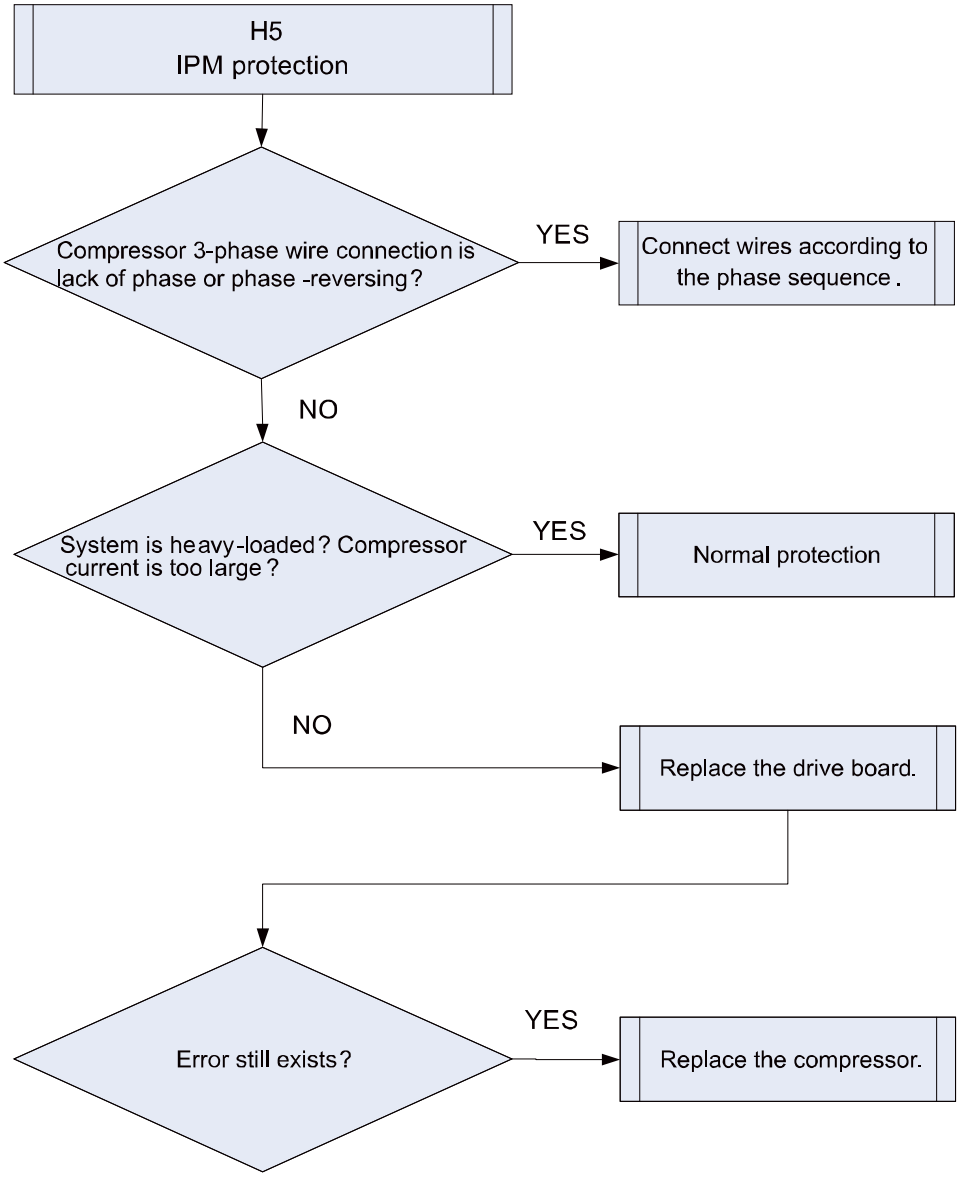
Note: Please refer to Appendix 1 for the relation between temperature and resistance of temperature sensor.

6.9 “H5” IPM Protection

Possible reason:

(1) Compressor 3-phase wire connection is lack of phase or phase-reversed;
(2) System is overloaded and compressor current is too large;
(3) Drive board IPM module is damaged;
(4) Drive board IPM module’s 15V power supply is lower than 13.5V;
(5) Drive board 6-line PWM signal and the corresponding element are abnormal;
(6) Drive board compressor current sampling circuit element is damaged or drive chip current sampling AD terminal is abnormal;
(7) Compressor is damaged.

Troubleshooting：



6.10 “H7” Driver Out-of-Step Protection

Possible reason:

(1) Compressor 3-phase wire connection is lack of phase or phased-reversed;

(2) Compressor phase wire connection is bad;

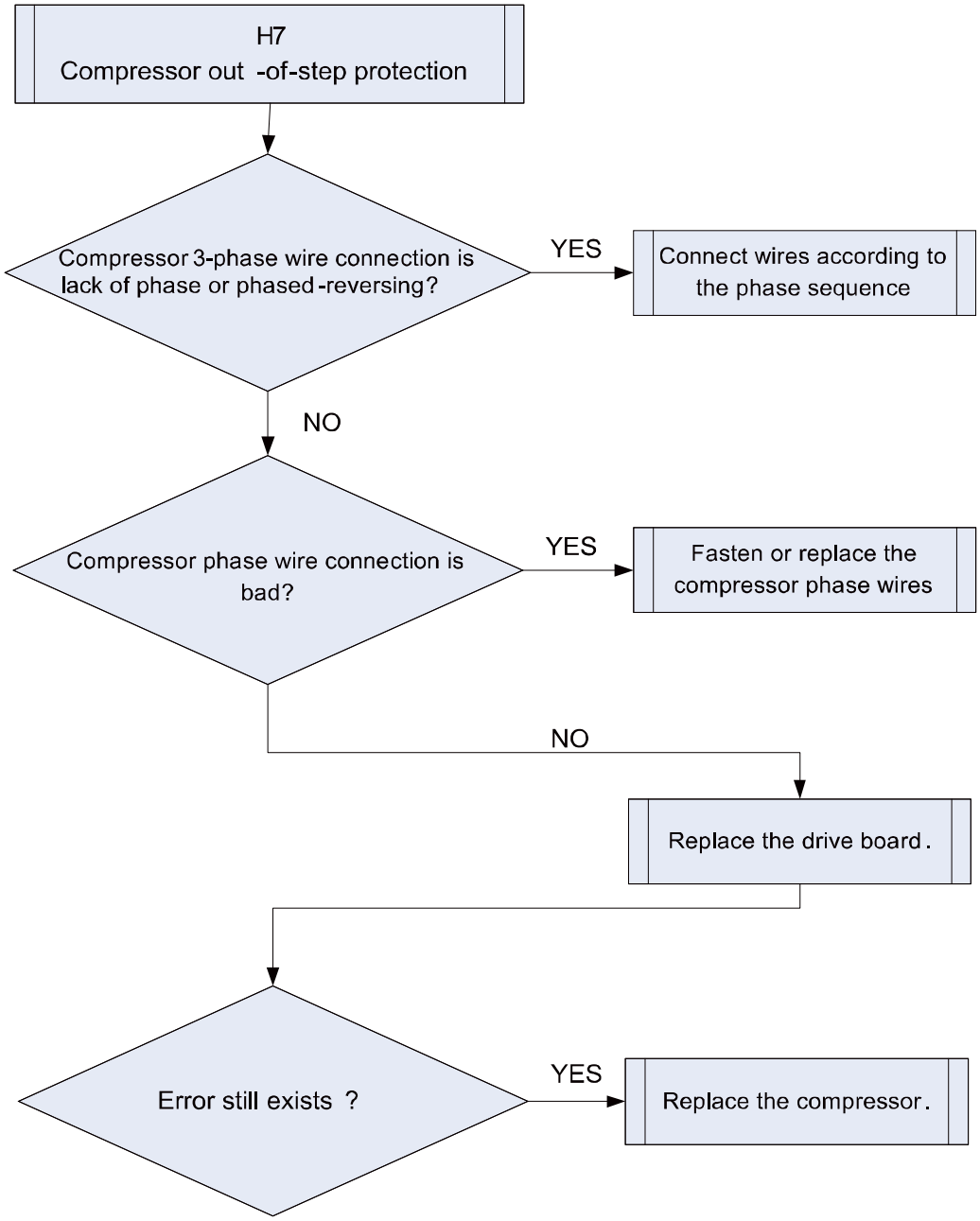
(3) System is blocked, short of refrigerant or compressor oil;

(4) Drive board IPM module is damaged;

(5) Drive board compressor current sampling circuit element is damaged or drive chip current sampling AD terminal is abnormal;

(6) Compressor is damaged.

Troubleshooting：

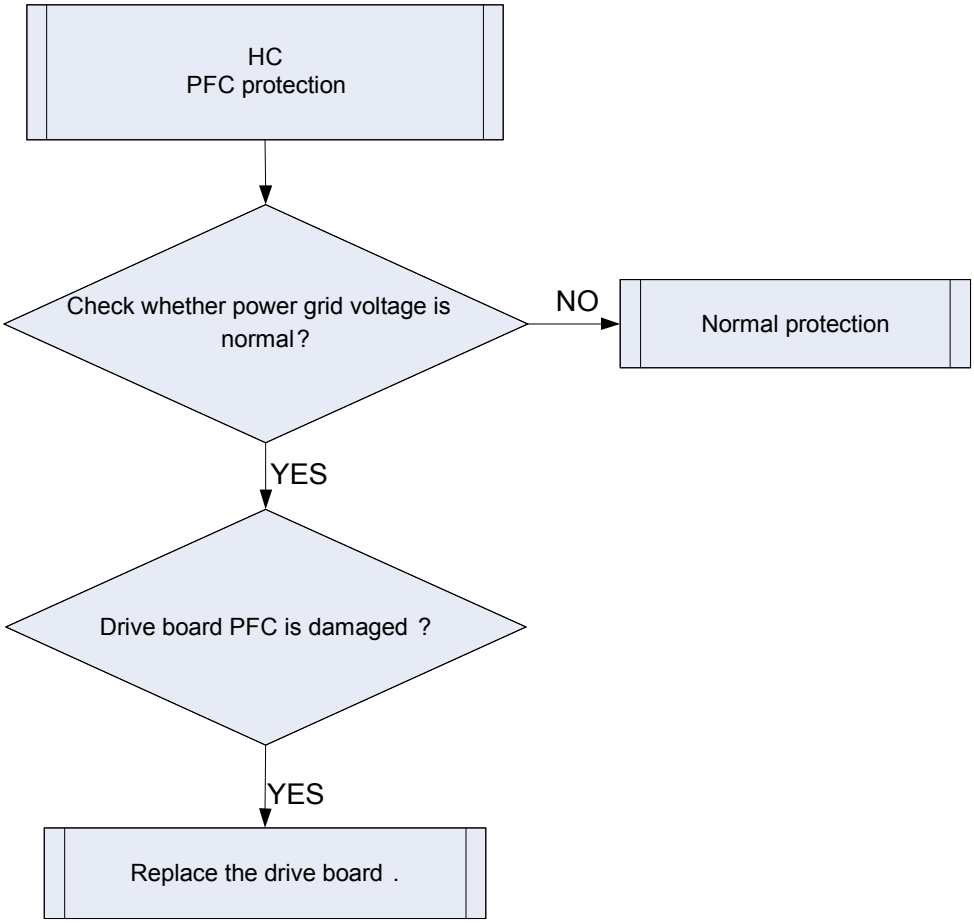


6.11 “HC” PFC Protection

Possible reason:

(1) Power grid voltage is abnormal;
(2) Drive board PFC module is damaged;
(3) Drive board IPM module’s 15V power supply is lower than 13.5V;
(4) Drive board PWM signal for PFC and the corresponding element are abnormal;
(5) Drive board PFC current sampling circuit element is damaged or drive chip current sampling AD terminal is abnormal.

Troubleshooting：



6.12 “Lc” Startup Failure

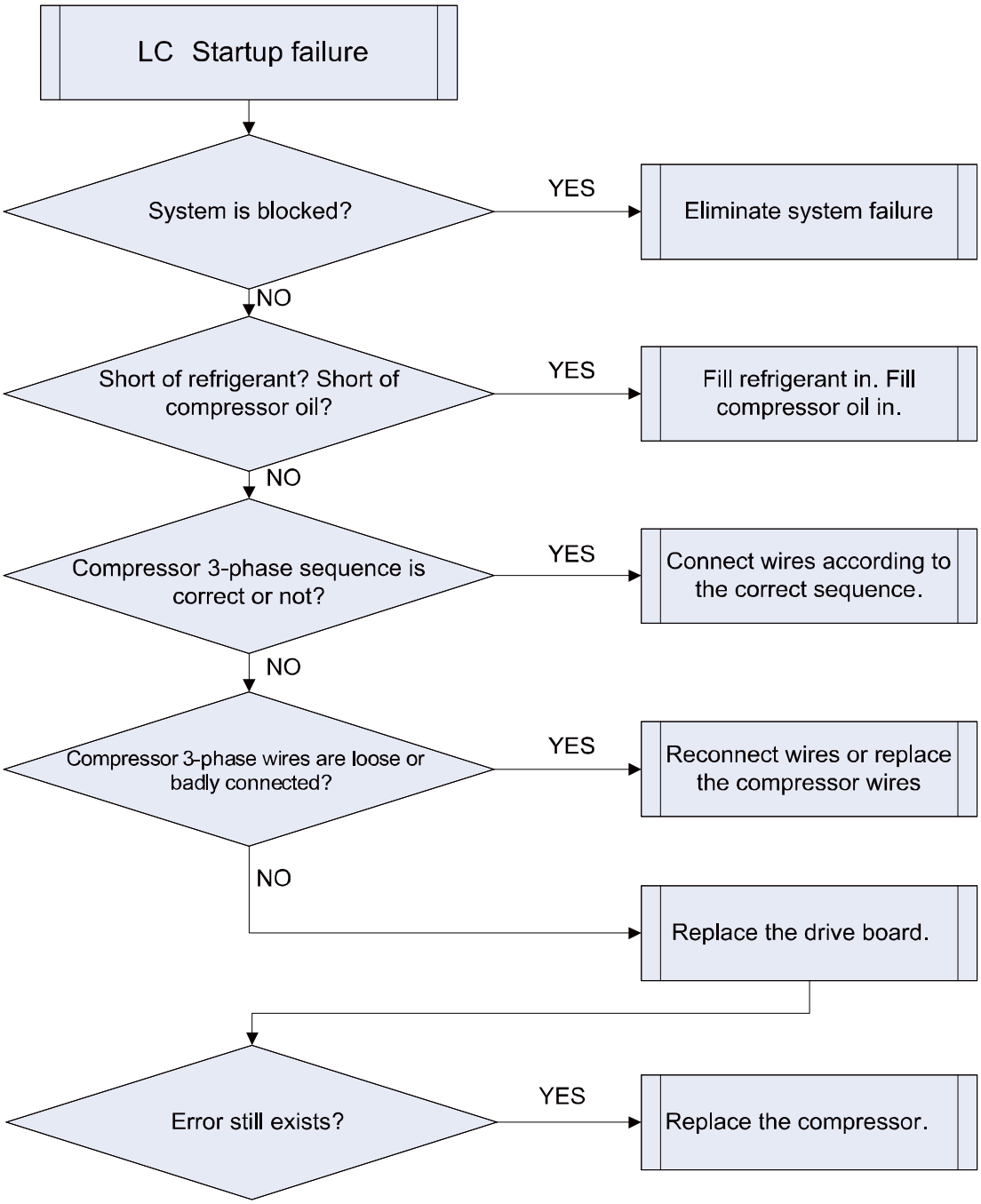
Possible reason:

(1) Poor contact of compressor UVW wire;

(2) Compressor is broken;

(3) Compressor drive board is broken.

Troubleshooting：



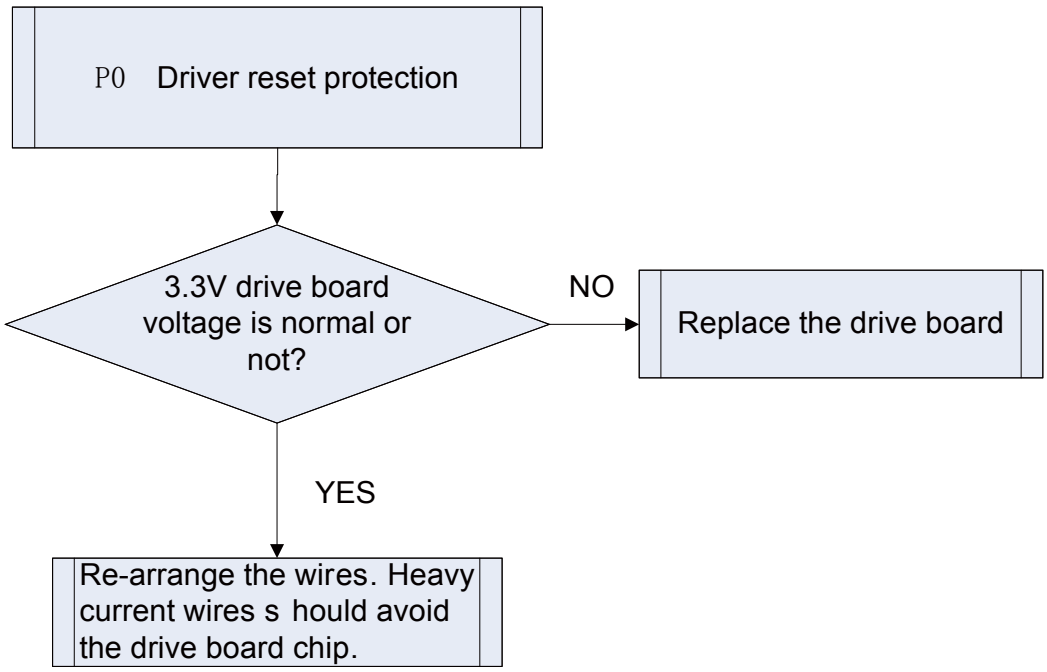
6.13 “P0” Driver Reset Protection

Possible reason:

(1) 3.3V drive chip supply voltage drop;

(2) TRST lead of JTAG programming is interrupted.

Troubleshooting：



6.14 “P5” Over-Current Protection

Possible reason:

(1) System load is too much and compressor current is too large;

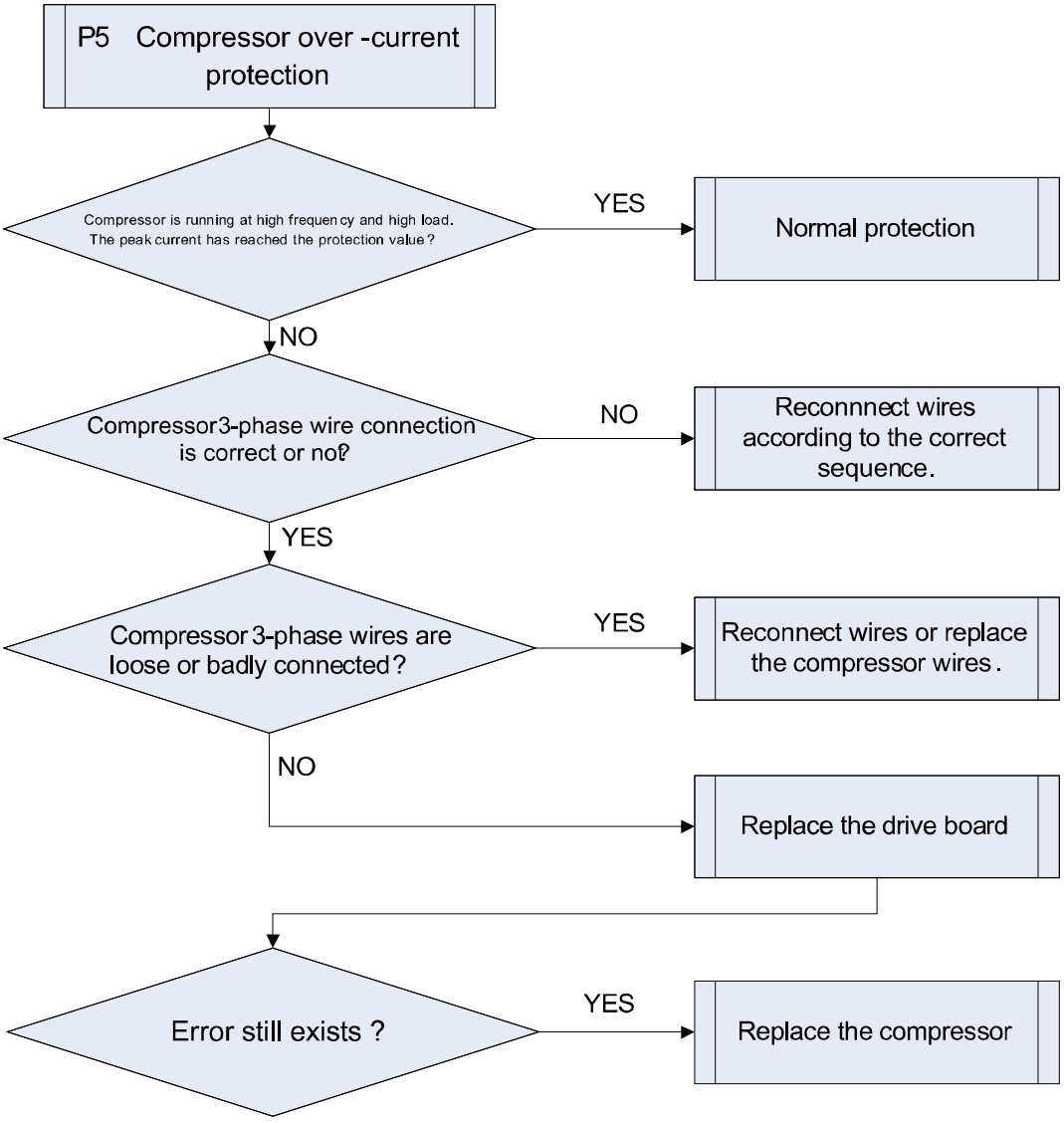
(2) Compressor 3-phase wire connection is lack of phase or phase-reversed;

(3) Compressor phase wire is loose or has bad contact;

(4) Drive board current sampling circuit element is damaged or drive chip current sampling AD terminal is abnormal;

(5) Compressor is damaged.

Troubleshooting：



6.15 “P6” Master Control and Driver Communication Error

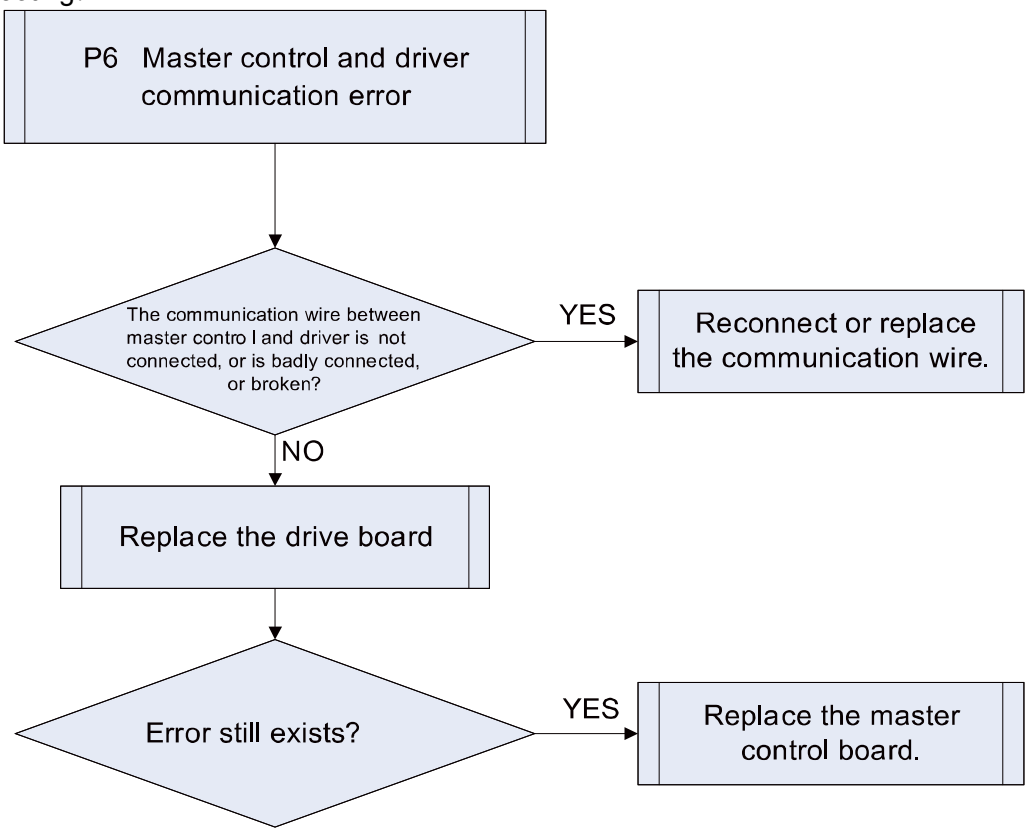
Possible reason:

(1) Communication wire between master control and driver is not well connected, or has bad contact, or is broken;

(2) The switch power of drive board is abnormal, therefore, the 3.3V power voltage is abnormal;

(3) Communication circuit of the drive board or the master control board is abnormal.

Troubleshooting：



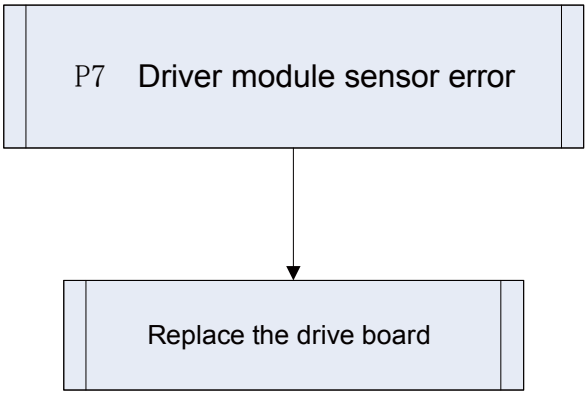
6.16 “P7” Driver Module Sensor Error

Possible reason:

(1) Module temperature sensor is short-circuited or broken-circuited;

(2) Drive board current sampling circuit element is damaged or drive chip current sampling AD terminal is abnormal.

Troubleshooting：



6.17 “P8” Driver Module High Temperature Protection

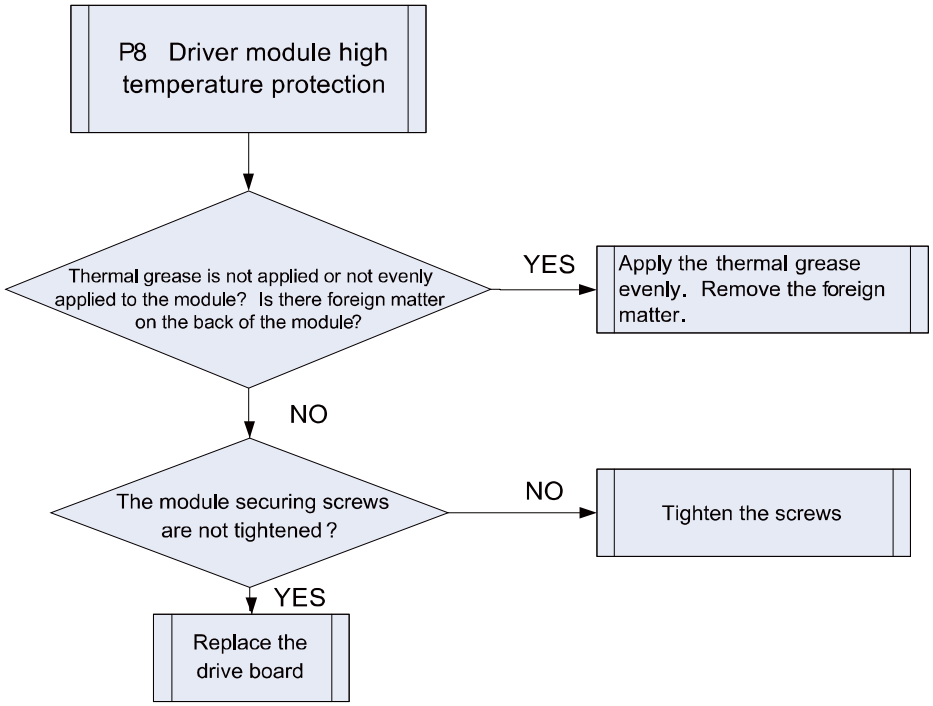
Possible reason:

(1) Thermal grease is not applied or not evenly applied to the module, or there is other substance on the back of the module;

(2) The module securing screws are not tightened up;

(3) Drive board temperature sampling circuit element is damaged or drive chip temperature sampling AD terminal is abnormal.

Troubleshooting：



6.18 “PA” AC Current Protection

Possible reason:

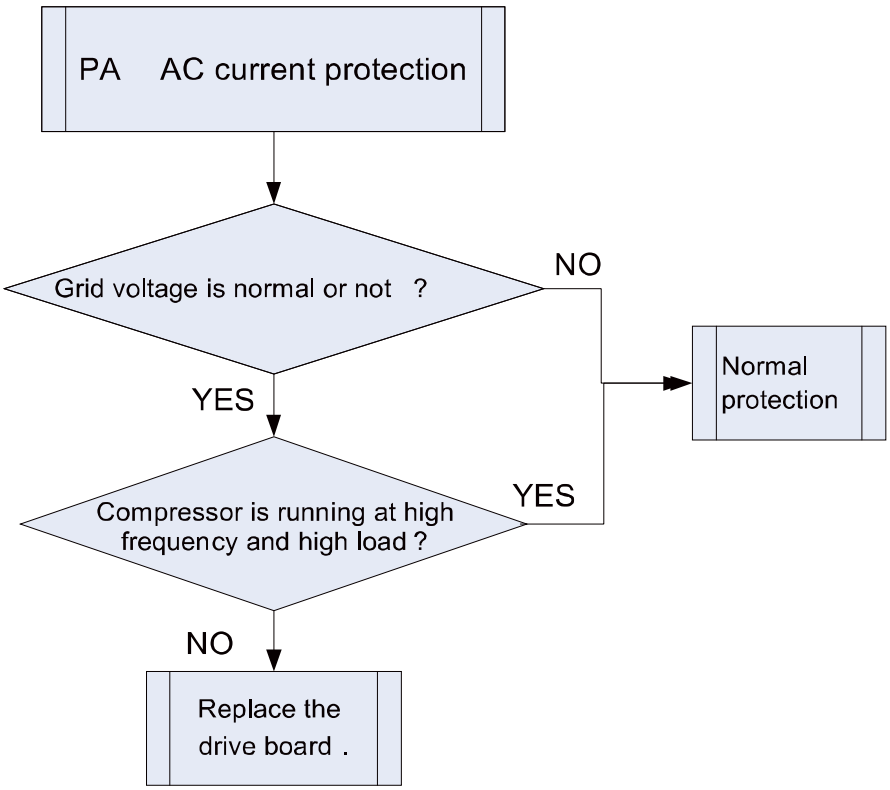
(1) System is heavy-loaded and compressor current is too large;

(2) Grid voltage is abnormal;

(3) PFC module is damaged;

(4) Drive board PFC current sampling circuit element is damaged or drive chip PFC current sampling AD terminal is abnormal.

Troubleshooting：



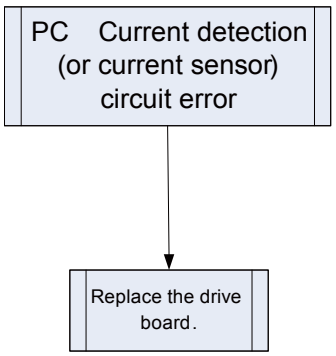
6.19 “Pc” Driver Current Error

Possible reason:

(1) Current detection (or current sensor) sampling circuit element is abnormal;

(2) Drive chip compressor current sampling AD terminal is badly welded or short-circuited.

Troubleshooting：



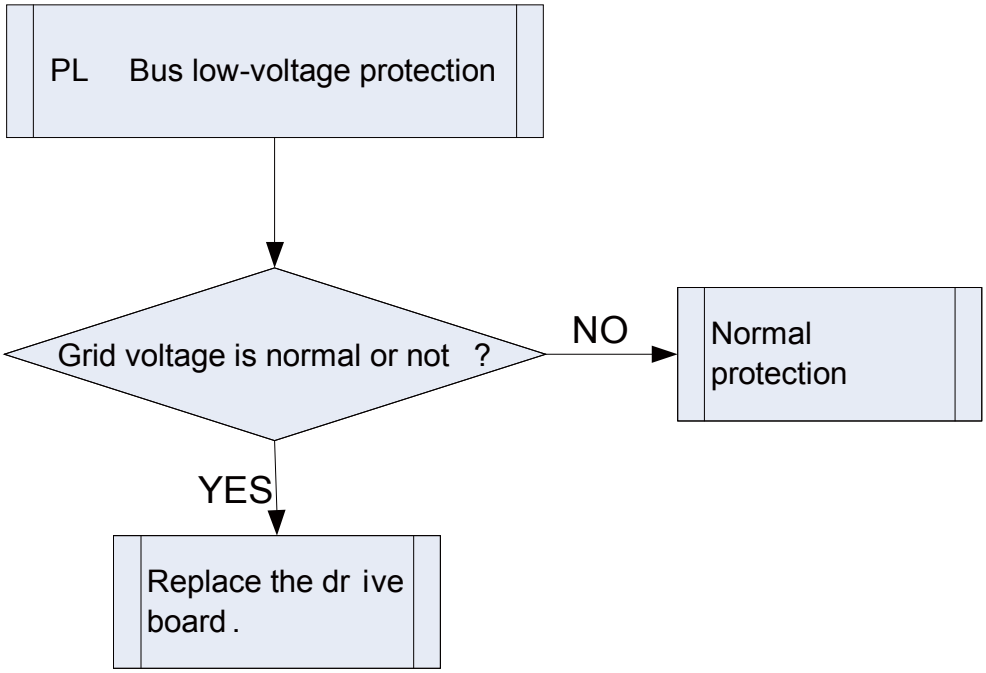
6.20 “PL” Bus Low-Voltage Protection

Possible reason:

(1) Voltage of power grid is abnormal;

(2) Drive board busbar voltage sampling circuit element is damaged or drive board busbar voltage sampling AD terminal is abnormal.

Troubleshooting：



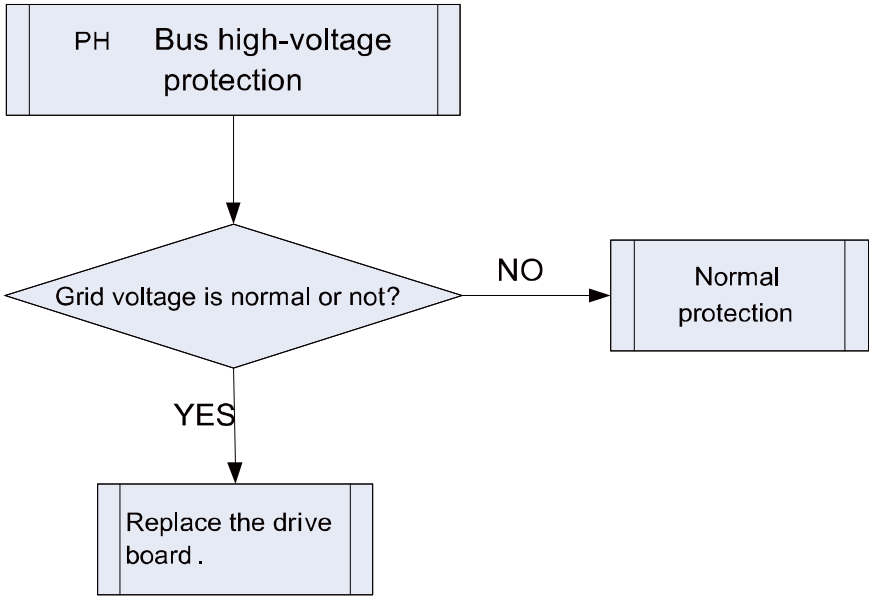
6.21 “PH” Bus High-Voltage Protection

Possible reason:

(1) Voltage of power grid is abnormal;

(2) Drive board busbar voltage sampling circuit element is damaged or drive board busbar voltage sampling AD terminal is abnormal.

Troubleshooting：



6.22 “PU” Charge Loop Error

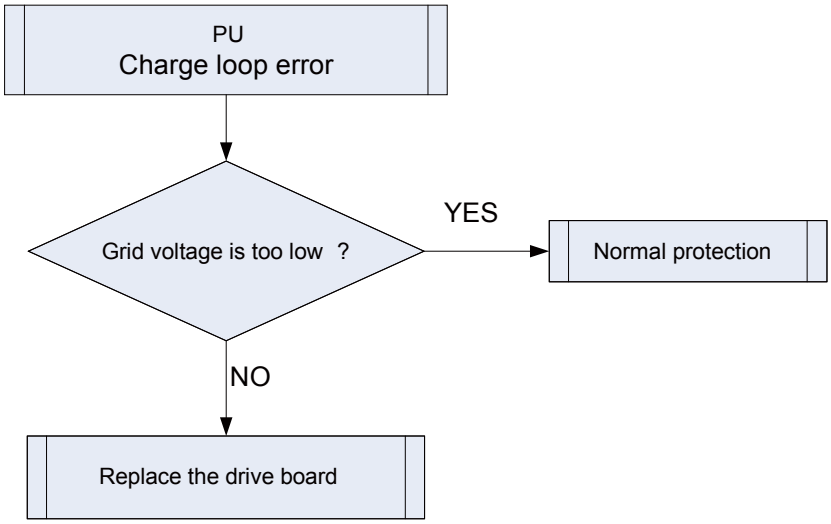
Possible reason:

(1) Voltage of power grid is abnormal. Voltage is too low;

(2) Drive board charge loop element is abnormal;

(3) Drive board busbar voltage sampling circuit element is damaged or drive chip busbar voltage sampling AD terminal is abnormal.

Troubleshooting：



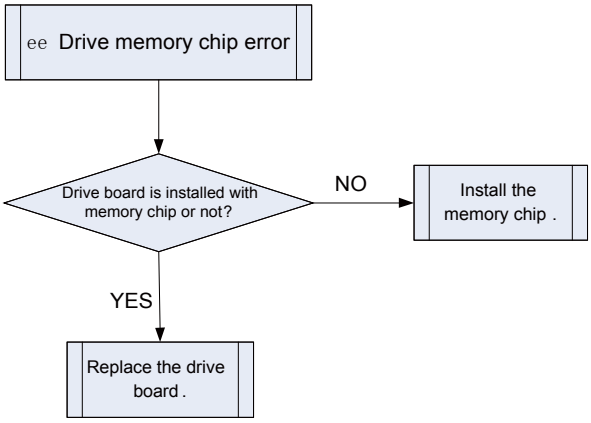
6.23 “ee” Drive Memory Chip Error

Possible reason:

(1) The drive board that needs memory chip is not installed with the memory chip;

(2) The lead or connector of memory chip is badly welded or short-circuited.

Troubleshooting：



7.Removal of Parts

7.1 Key Parts

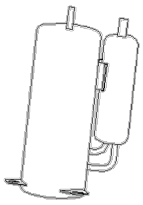
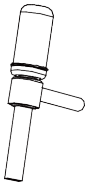
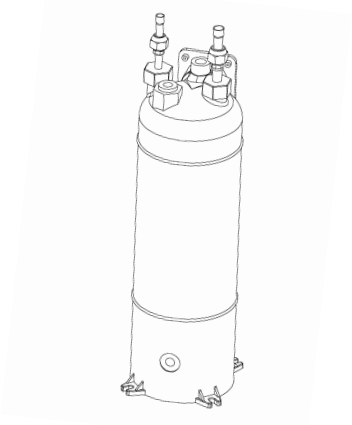
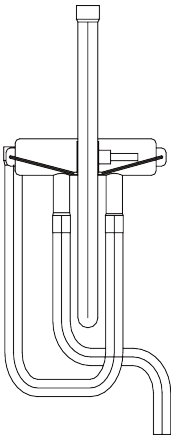
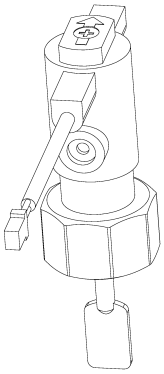
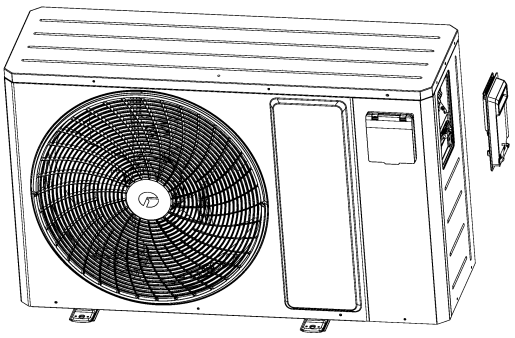
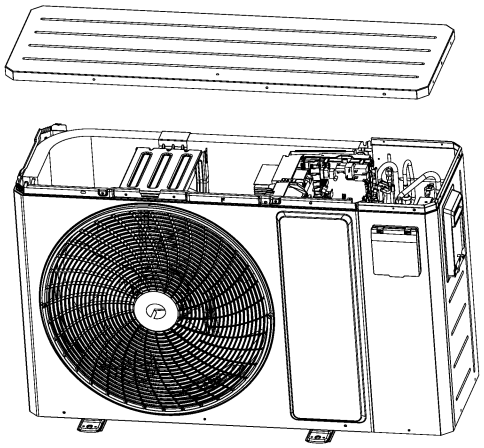
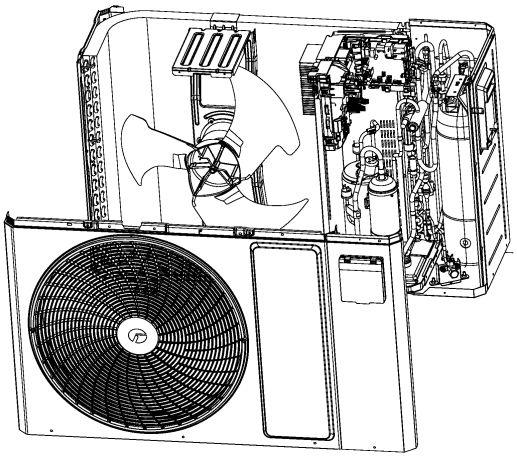
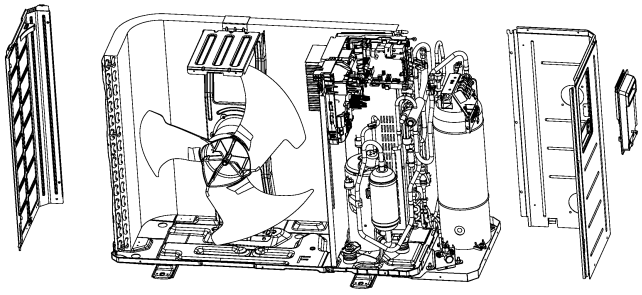
Photo	Name	Function
	compressor	Driven by the electric energy, the compressor compresses refrigerant to high-temperature and high-pressure gas and enables the gas to flow circularly in the refrigerant.
	Electronic expansion valve	Volume of the low-pressure refrigerant decreases via compression. After the pressure and temperature increases gradually, it becomes high-pressure and high-temperature refrigerant, which is the driving force of the entire system.
	Titanium tube heat exchanger	It's used for the heat exchange between the refrigerant and the water to heat or cool the water.
	4-way valve	The electronic expansion valve performs throttling and pressure reduction to high-pressure liquid refrigerant to ensure the pressure difference between the condenser and evaporator.

Photo	Name	Function
	Water flow switch	It's used for detecting the water flow and check whether the flow volume is satisfying the requirements for the normal operation of unit.

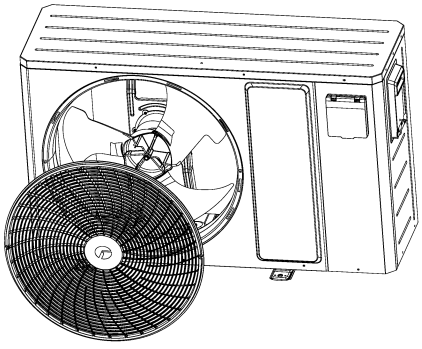
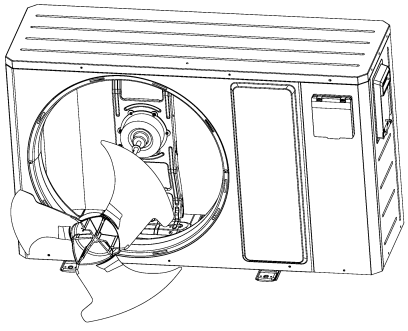
7.2 Removal of Key Parts

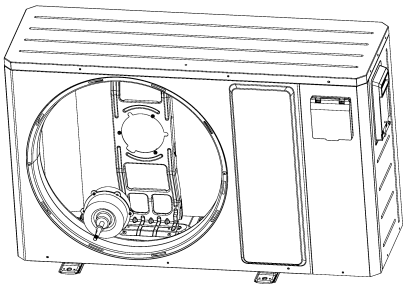
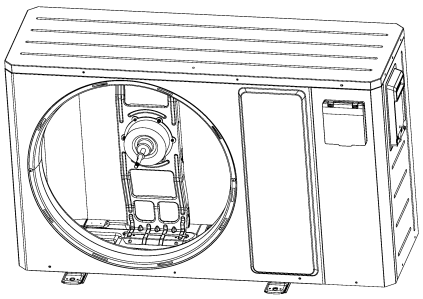
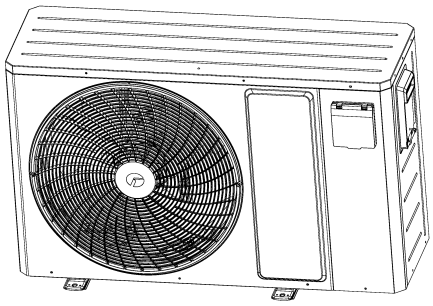
7.2.1 Removal operation for panel

Removal operation for panel		
Remark: Before removing the panel, please make sure that the unit is disconnected with the power, Completely open the bypass valve at the water pipeline, close the cut-off valve at the waterway, twist off the joints of inlet pipe and outlet pipe connected with the heat pump unit and then drain out the water inside the titanium tube heat exchanger.		
Process	Photo	Operation Instruction
1. Remove Handle		Twist off the screws used for fixing the handle and then press the handle downwards to remove it.
2. Remove top cover		● Loose the screws fixing the top cover with screwdriver; ● Hold the top cover upwards and then put it on the floor flatly.

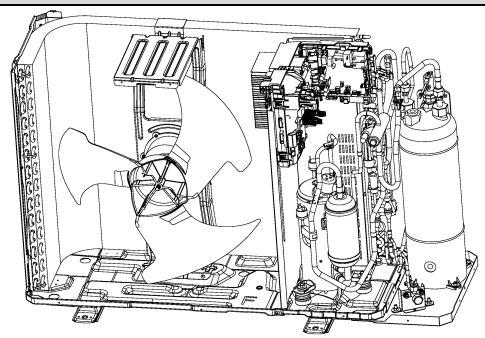
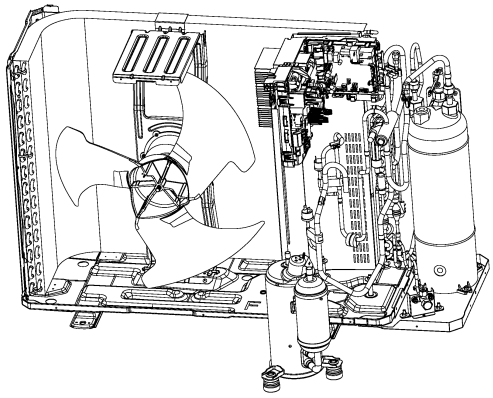
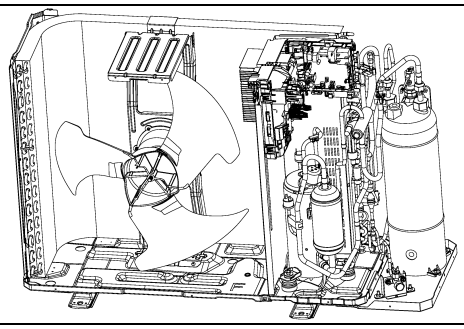
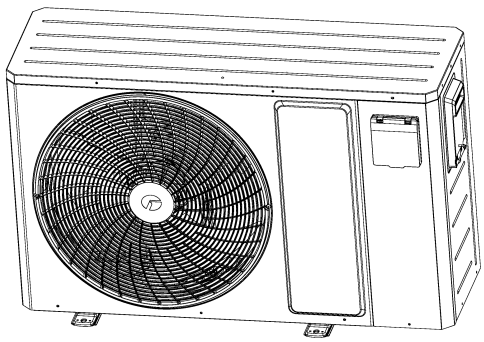
Removal operation for panel		
Remark: Before removing the panel, please make sure that the unit is disconnected with the power, Completely open the bypass valve at the water pipeline, close the cut-off valve at the waterway, twist off the joints of inlet pipe and outlet pipe connected with the heat pump unit and then drain out the water inside the titanium tube heat exchanger.		
Process	Photo	Operation Instruction
3. Remove front side plate sub-assy		● Loose the screw fixing the front side plate with screwdriver; ● Pull out the connection wire of wired controller connected with the front panel; ● Hold the front side plate upwards and then put it on the floor flatly.
4. Remove left side plate and right side plate		● Loose screws fixing left side plate and right side plate with screwdriver; ● remove the right side plate.

7.2.2 Removal operation for blade

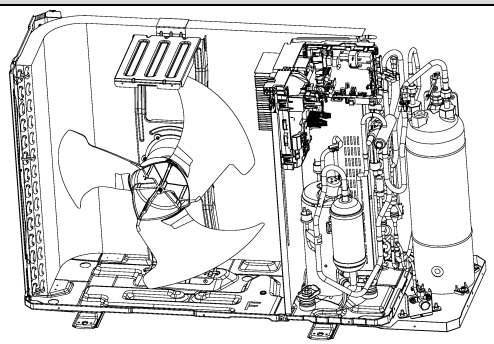
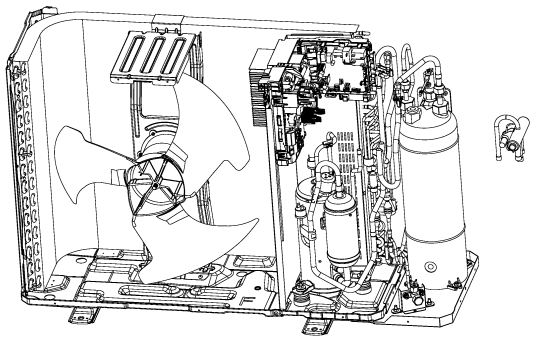
Removal operation for blade		
Remark: Before removing the motor, please make sure that the unit is disconnected with the power.		
Process	Photo	Operation Instruction
1.Remove grille		● Loose screws fixing the panel with screwdriver; ● Press the grille with both hands and rotate it in an clockwise direction to loose the clasp and then take out the grille.
2.Remove blade		● Loosen nuts fixing the blade with wrench; ● Then remove the blade and put it on the floor flatly.

Removal operation for blade		
Remark: Before removing the motor, please make sure that the unit is disconnected with the power.		
Process	Photo	Operation Instruction
3.Remove motor		● Loose screws fixing the motor with screwdriver; ● then remove the power cord of motor; ● Take out the damaged motor.
4.Install motor		● Replace the motor, tighten screws with screwdriver and then connect the power cord of motor.
5.Assemble unit		● Assemble the unit in the the converse sequence.

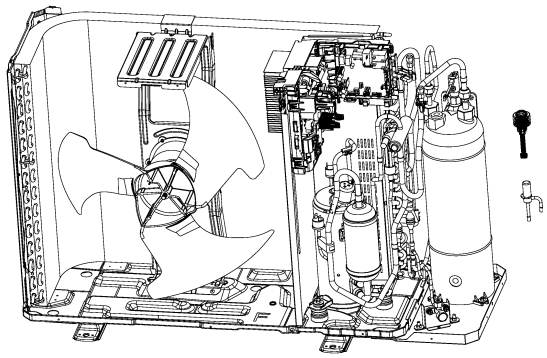
7.2.3 Removal operation for compressor

<table>
<tr><td colspan="3">Removal operation for compressor</td></tr>
<tr><td colspan="3">Remark: Before removing the compressor, please make sure that there’s no refrigerant inside the pipeline and the power is disconnected.Completely open the bypass valve at the water pipeline, close the cut-off valve at the waterway, twist off the joints of inlet pipe and outlet pipe connected with the heat pump unit and then drain out the water inside the titanium tube heat exchanger.</td></tr>
<tr><td>Process</td><td>Photo</td><td>Operation Instruction</td></tr>
<tr><td>1. Remove wiring cover of compressor</td><td rowspan="2">  </td><td>● Remove the panel, the top cover and the side plate;
● Loose screws fixing the compressor with screwdriver;
● Then pull out the power cord
NOTE: When removing the power cord, make marks for different color power cords and corresponding wiring terminals for wrong terminal.</td></tr>
<tr><td>2. Disconnect compressor and connected pipeline,Loose nuts fixing the foot of compressor</td><td rowspan="2">  </td><td>● Weld suction pipe and discharge pipe of compressor
● then pull out the connection pipe from the compressor
NOTE: During welding process, do not let the flame burn out other parts.
● Twist off the nuts for compressor with wrench.</td></tr>
<tr><td>3. Fix the new compressor at the chassis</td><td>● After replacing the compressor, fix the nuts at the bottom of compressor.</td></tr>
<tr><td>4. Connect suction pipe and discharge pipe of compressor and pipeline of system again</td><td>  </td><td>● Weld the connection pipe of compressor, connect the pipeline and compressor.
NOTE: During welding process, do not let flame burn out other parts.</td></tr>
<tr><td>5. Connect the power cord of compressor well</td><td rowspan="2">  </td><td>● Loose screws fixing the power cord with screwdriver;
● connect the power cord well again.
NOTE: When connecting the power cord, make marks for different color power cords and corresponding wiring terminals.</td></tr>
<tr><td>6. Check and reinstall</td><td>●Check whether the pipeline is connected well;
●Check whether all parts and connection wires are connected well;
●If there’s no problem after checking, install front and right side plate.</td></tr>
</table>

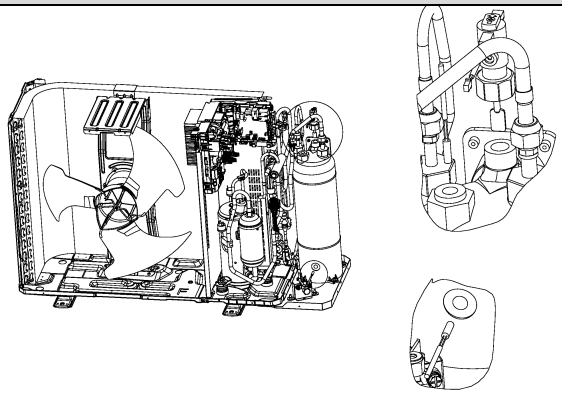
7.2.4 Removal operation for 4-way valve

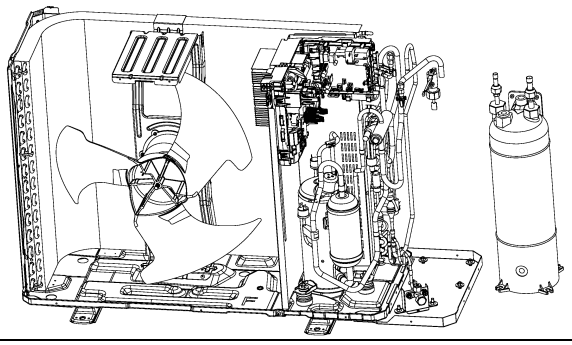
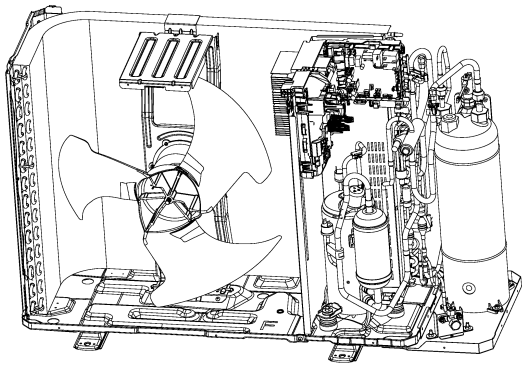
<table>
<tr><td colspan="3">Removal operation for 4-way valve</td></tr>
<tr><td colspan="3">Remark: Before removing the 4-way valve, please make sure that there’s no refrigerant inside the pipeline of system and then power is disconnected, Completely open the bypass valve at the water pipeline, close the cut-off valve at the waterway, twist off the joints of inlet pipe and outlet pipe connected with the heat pump unit and then drain out the water inside the titanium tube heat exchanger.</td></tr>
<tr><td>Process</td><td>Photo</td><td>Operation Instruction</td></tr>
<tr><td>1.Disconnect the coil of 4-way valve from the 4-way valve</td><td>  </td><td>● Remove the panel, the top cover and the side plate;
●Remove the coil of 4-way valve at first.</td></tr>
<tr><td>2.Disconnect the 4-way valve and connection pipeline</td><td rowspan="2">  </td><td>● Weld those 4 connection spots on 4-way valve, and then pull out the connection pipe.
NOTE: During welding process, do not let the flae burn out other parts.</td></tr>
<tr><td>3.Replace 4-way valve</td><td>● Replace 4-way valve
NOTE: During welding process, do not let the flame burn out other parts.</td></tr>
</table>

7.2.5 Removal operation for electronic expansion valve

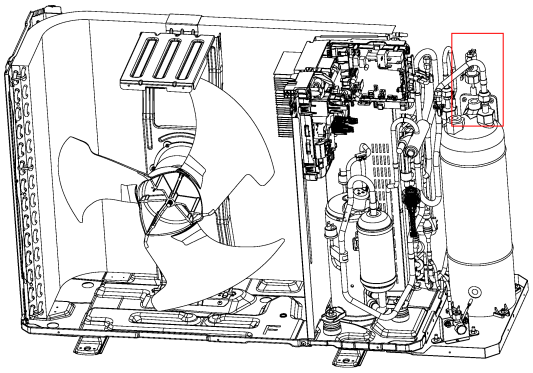
Removal operation for electronic expansion valve		
Remark: Before removing the electronic expansion valve, please make sure that there's no refrigerant in the pipeline of system and the power is disconnected,Completely open the bypass valve at the water pipeline, close the cut-off valve at the waterway, twist off the joints of inlet pipe and outlet pipe connected with the heat pump unit and then drain out the water inside the titanium tube heat exchanger.		
Process	Photo	Operation Instruction
1.Disconnect the electronic expansion valve from the pipeline		● Remove the panel, the top cover and then side plate; ●Remove the coil of electric expansion valve at first; ● Weld the connection pipe for expansion valve, and then pull out the connection pipe. **NOTE**:During welding process, do not let flame burn out other parts.
2.Take out the electronic expansion valve and replace it		●Take out the electronic expansion valve and replace it.
3.Replace electronic expansion valve		● Weld the connection pipe of electronic expansion valve; ● Install the coil of electronic expansion valve. **NOTE**:During welding process, do not let the flame burn out other parts.

7.2.6 Removal operation for the titanium heat exchanger

Removal operation for the titanium heat exchanger		
Remark: Before removing the titanium heat exchanger, please make sure that there's no refrigerant inside the pipeline of system and disconnect the power, Completely open the bypass valve at the water pipeline, close the cut-off valve at the waterway, twist off the joints of inlet pipe and outlet pipe connected with the heat pump unit and then drain out the water inside the titanium tube heat exchanger.		
Process	Photo	Operation Instruction
1. Remove the connection wire		● Remove the panel, the top cover and then side plate; ● Remove the water flow switch from the heat exchanger; ● Remove the water inlet and water outlet temperature sensors from the heat exchanger.

<table>
<tr><td colspan="3">Removal operation for the titanium heat exchanger</td></tr>
<tr><td colspan="3">Remark: Before removing the titanium heat exchanger, please make sure that there's no refrigerant inside the pipeline of system and disconnect the power, Completely open the bypass valve at the water pipeline, close the cut-off valve at the waterway, twist off the joints of inlet pipe and outlet pipe connected with the heat pump unit and then drain out the water inside the titanium tube heat exchanger.</td></tr>
<tr><td>Process</td><td>Photo</td><td>Operation Instruction</td></tr>
<tr><td>2. Remove the connection pipe and the ground bolt</td><td>  </td><td>● Loosen the refrigerant inlet and outlet pipe at the upper part of the heat exchanger with a wrench;
● Loose fixing bolts with a socket spanner.</td></tr>
<tr><td>3. Replace titanium heat exchanger</td><td rowspan="2">  </td><td>● Replace titanium heat exchanger;
● Fixing the ground bolt;
● Connect the joint to the pipeline of corresponding copper pipe with a wrench.</td></tr>
<tr><td>4. Fixing the wires</td><td>● Reinstall water inlet temperature sensor and water outlet temperature sensor correctly;
● Reinstall the water flow switch to ensure that the direction is same as the water flow direction.</td></tr>
</table>

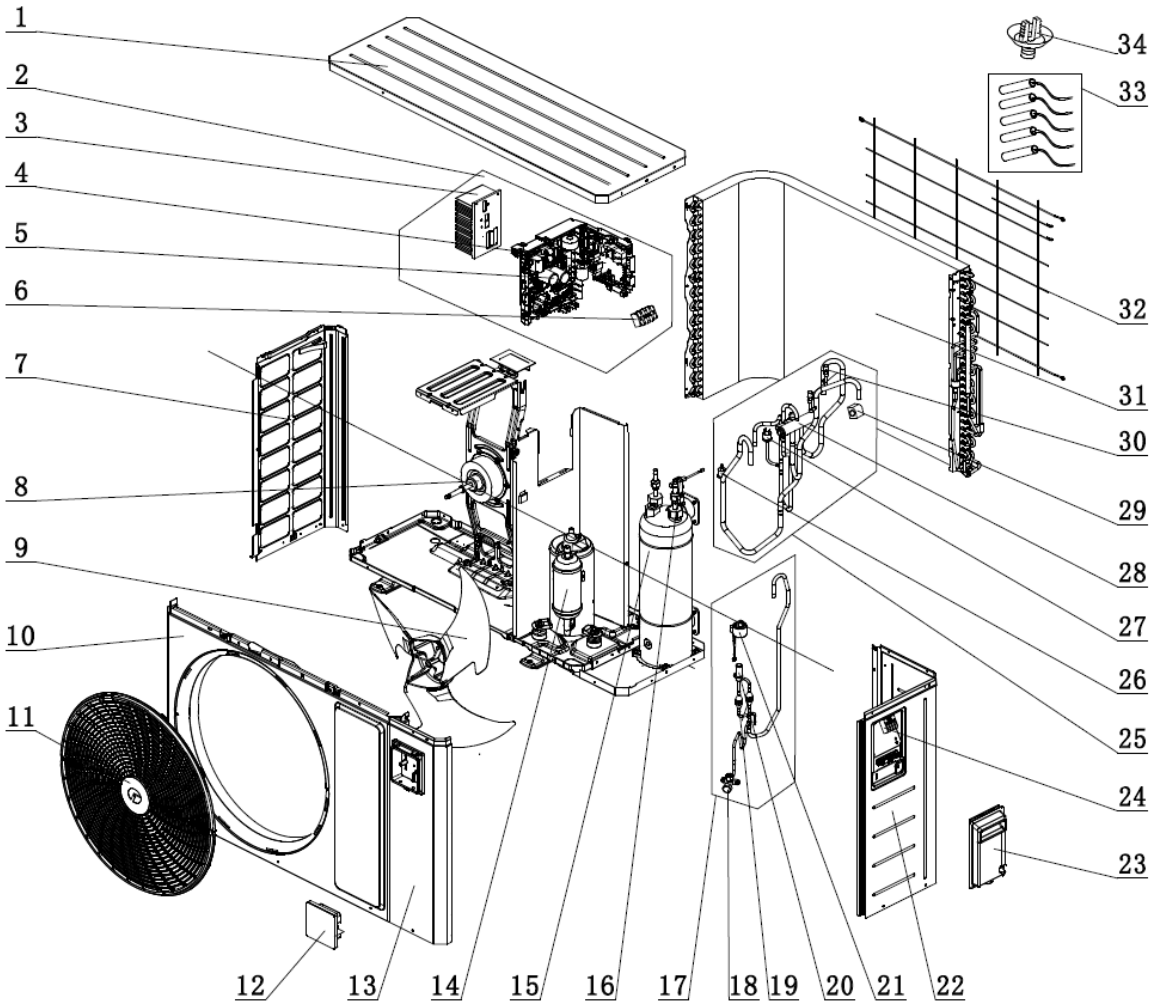
7.2.7 Removal operation for water flow switch

<table>
<tr><td colspan="3">Removal operation for water flow switch</td></tr>
<tr><td colspan="3">Remark: Before removing the water flow switch, please make sure disconnect the power, Completely open the bypass valve at the water pipeline, close the cut-off valve at the waterway, twist off the joints of inlet pipe and outlet pipe connected with the heat pump unit and then drain out the water inside the titanium tube heat exchanger.</td></tr>
<tr><td>Process</td><td>Photo</td><td>Operation Instruction</td></tr>
<tr><td>Remove or replace water flow switch</td><td>  </td><td>● Remove the top cover and the panel;
● Remove the wires of water flow switch from the main board;
● Twist off the water flow switch with a wrench;
● Replace the water flow switch. Please note that the arrow of water flow switch should be the same as the water flow direction;
● Connect the wires at the corresponding terminal of the main board.</td></tr>
</table>

8.Exploded View of Unit and Parts' List

8.1 Exploed View and Parts' List

Exploded view



NO	Name of Part	GRS-CP11Pd/NhA-K GRS-CP11Pd/NhA-S Product Code： ER02000180、ER02000190		GRS-CP18Pd/NhA-K GRS-CP18Pd/NhA-S Product Code： ER02000170、ER02000200	
		Part Code	Quantity	Part Code	Quantity
1	Top cover	012049060208P	1	012049060207P	1
2	Electric Box Assy	100002079068	1	100002078976	1
3	Radiator	43003406011803	1	43003406011606	1
4	Main Board	300027063117	1	300027063461	1
5	Main Board	300027063159	1	300027063192	1
6	Terminal Board	42000100000303	1	4201800059302	1
7	Left Side Plate	012055060392P01	1	012055060393P02	1
8	Brushless DC Motor	150104060102	1	1501506409	1
9	Axial Flow Fan	10333014	1	10335262	1
10	Cabinet or Front Panel	01202206001102P	1	01207306161102P	1
11	Front Grill	200057060010	1	200057060011	1
12	Display Board (Wire controller)	300001061415	1	300001061415	1
13	Cabinet or Front Panel	012022060030P	1	012073063856P	1
14	Compressor and Fittings	009001060617	1	009001060755	1
15	Heat Exchanger	010023000001	1	010023000002	1
16	Water flow Switch (Steam current Switch)	430019060011	1	430019060011	1
17	Electric Expansion Valve Sub-Assy	030026061443	1	030026061388	1
18	Cut-off valve	07130208	1	07130208	1
19	Strainer	0721304401	2	0721304401	2
20	Electronic Expansion Valve	072009000017	1	072009000018	1
21	Electric Expand Valve Fitting	07200206002231	1	07200206002318	1
22	Right Side Plate	012056060623P	1	012056060632P	1
23	Handle	200149060018	1	200149060018	1
24	Terminal Board	42200006005405	1	42200006005405	1
25	4-Way Valve Assy	030152061282	1	030152061265	1
26	Low Pressure Switch	460200046	1	460200046	1
27	Pressure Protect Switch	460200061	1	460200061	1
28	4-Way Valve	430004032	1	430004032	1
29	4 Way Valve Coil	43000400123	1	43000400123	1
30	Nozzle for Adding Freon	0612001202	2	0612001202	2
31	Condenser Assy	011002062357	1	011002062376	1
32	Rear Grill	016001060086	1	016001060088	1
33	Sensor Sub-assy 1	390002060399	1	390002060421	1
34	Drainage Joint	26113009	1	26113009	1

APPENDICES

1.Resistance/Temperature Lists of Temperature Sensors

1.1 Voltage list of 15 kΩ temperature sensors

Temperature (°C)	Resistance (kΩ)	Voltage (V)	Temperature (°C)	Resistance (kΩ)	Voltage (V)
-20	144	0.311	71	2.523	2.825
-19	138.1	0.323	72	2.439	2.838
-18	128.6	0.345	73	2.358	2.852
-17	121.6	0.362	74	2.28	2.865
-16	115	0.381	75	2.205	2.877
-15	108.7	0.4	76	2.133	2.889
-14	102.9	0.42	77	2.064	2.901
-13	97.4	0.44	78	1.997	2.912
-12	92.22	0.462	79	1.933	2.923
-11	87.35	0.484	80	1.871	2.934
-10	82.75	0.506	81	1.811	2.945
-9	78.43	0.53	82	1.754	2.955
-8	74.35	0.554	83	1.699	2.964
-7	70.5	0.579	84	1.645	2.974
-6	66.88	0.605	85	1.594	2.983
-5	63.46	0.631	86	1.544	2.992
-4	60.23	0.658	87	1.497	3.001
-3	57.18	0.686	88	1.451	3.009
-2	54.31	0.714	89	1.408	3.017
-1	51.59	0.743	90	1.363	3.025
0	49.02	0.773	91	1.322	3.033
1	46.8	0.801	92	1.282	3.04
2	44.31	0.835	93	1.244	3.047
3	42.14	0.866	94	1.207	3.054
4	40.09	0.899	95	1.171	3.061
5	38.15	0.931	96	1.136	3.068
6	36.32	0.965	97	1.103	3.074
7	34.58	0.998	98	1.071	3.08
8	32.94	1.033	99	1.039	3.086
9	31.38	1.067	100	1.009	3.092
10	29.9	1.102	101	0.98	3.098
11	28.51	1.138	102	0.952	3.103
12	27.18	1.174	103	0.925	3.108
13	25.92	1.21	104	0.898	3.114
14	24.73	1.246	105	0.873	3.119
15	23.6	1.282	106	0.848	3.123
16	22.53	1.319	107	0.825	3.128
17	21.51	1.356	108	0.802	3.133
18	20.54	1.393	109	0.779	3.137
19	19.63	1.429	110	0.758	3.141
20	18.75	1.467	111	0.737	3.145
21	17.93	1.503	112	0.717	3.15
22	17.14	1.54	113	0.697	3.153
23	16.39	1.577	114	0.678	3.157
24	15.68	1.613	115	0.66	3.161
25	15	1.65	116	0.642	3.165
26	14.36	1.686	117	0.625	3.168
27	13.74	1.722	118	0.608	3.171
28	13.16	1.758	119	0.592	3.175
29	12.6	1.793	120	0.577	3.178
30	12.07	1.829	121	0.561	3.181
31	11.57	1.863	122	0.547	3.184
32	11.09	1.897	123	0.532	3.187
33	10.63	1.931	124	0.519	3.19
34	10.2	1.964	125	0.505	3.192
35	9.779	1.998	126	0.492	3.195
36	9.382	2.03	127	0.48	3.198
37	9.003	2.062	128	0.467	3.2

Temperature (°C)	Resistance (kΩ)	Voltage (V)	Temperature (°C)	Resistance (kΩ)	Voltage (V)
38	8.642	2.094	129	0.456	3.203
39	5.997	2.125	130	0.444	3.205
41	7.653	2.185	131	0.433	3.207
42	7.352	2.215	132	0.422	3.21
43	7.065	2.243	133	0.412	3.212
44	6.791	2.272	134	0.401	3.214
45	6.529	2.299	135	0.391	3.216
46	6.278	2.326	136	0.382	3.218
47	6.038	2.353	137	0.372	3.22
48	5.809	2.379	138	0.363	3.222
49	5.589	2.404	139	0.355	3.224
50	5.379	2.429	140	0.346	3.226
51	5.179	2.453	141	0.338	3.227
52	4.986	2.477	142	0.33	3.229
53	4.802	2.5	143	0.322	3.231
54	4.625	2.522	144	0.314	3.232
55	4.456	2.544	145	0.307	3.234
56	4.294	2.566	146	0.299	3.235
57	4.139	2.586	147	0.292	3.237
58	3.99	2.607	148	0.286	3.238
59	3.848	2.626	149	0.279	3.24
60	3.711	2.646	150	0.273	3.241
61	3.579	2.664	151	0.266	3.242
62	3.454	2.682	152	0.261	3.244
63	3.333	2.7	153	0.254	3.245
64	3.217	2.717	154	0.248	3.246
65	3.105	2.734	155	0.243	3.247
66	2.998	2.75	156	0.237	3.249
67	2.898	2.766	157	0.232	3.25
68	2.797	2.781	158	0.227	3.251
69	2.702	2.796	159	0.222	3.252
70	2.611	2.811	160	0.217	3.253

1.2 Voltage list of 20 kΩ pipeline temperature sensors

Temperature (°C)	Resistance (kΩ)	Voltage (V)	Temperature (°C)	Resistance (kΩ)	Voltage (V)
-30	361.8	0.173	66	3.998	2.75
-29	339.8	0.183	67	3.861	2.766
-28	319.2	0.195	68	3.729	2.781
-27	300	0.206	69	3.603	2.796
-26	282.2	0.218	70	3.481	2.811
-25	265.5	0.231	71	3.364	2.825
-24	249.9	0.245	72	3.252	2.838
-23	235.3	0.259	73	3.144	2.852
-22	221.6	0.273	74	3.04	2.865
-21	208.9	0.288	75	2.94	2.877
-20	196.9	0.304	76	2.844	2.889
-19	181.4	0.328	77	2.752	2.901
-18	171.4	0.345	78	2.663	2.912
-17	162.1	0.362	79	2.577	2.923
-16	153.3	0.381	80	2.495	2.934
-15	145	0.4	81	2.415	2.944
-14	137.2	0.42	82	2.339	2.954
-13	129.9	0.44	83	2.265	2.964
-12	123	0.462	84	2.194	2.974
-11	116.5	0.484	85	2.125	2.983
-10	110.3	0.507	86	2.059	2.992
-9	104.6	0.53	87	1.996	3.001
-8	99.13	0.554	88	1.934	3.009
-7	94	0.579	89	1.875	3.017
-6	89.17	0.605	90	1.818	3.025
-5	84.61	0.631	91	1.763	3.033
-4	80.31	0.658	92	1.71	3.04
-3	76.24	0.686	93	1.658	3.047

Temperature (°C)	Resistance (kΩ)	Voltage (V)	Temperature (°C)	Resistance (kΩ)	Voltage (V)
-2	72.41	0.714	94	1.609	3.054
-1	68.79	0.743	95	1.561	3.061
0	65.37	0.773	96	1.515	3.068
1	62.13	0.804	97	1.47	3.074
2	59.08	0.835	98	1.427	3.08
3	56.19	0.866	99	1.386	3.086
4	53.46	0.898	100	1.346	3.092
5	50.87	0.931	101	1.307	3.098
6	48.42	0.965	102	1.269	3.103
7	46.11	0.998	103	1.233	3.108
8	43.92	1.033	104	1.198	3.114
9	41.84	1.067	105	1.164	3.119
10	39.87	1.102	106	1.131	3.123
11	38.01	1.138	107	1.099	3.128
12	36.24	1.174	108	1.069	3.133
13	34.57	1.209	109	1.039	3.137
14	32.98	1.246	110	1.01	3.141
15	31.47	1.282	111	0.9825	3.145
16	30.04	1.319	112	0.9556	3.15
17	28.68	1.356	113	0.9295	3.153
18	27.39	1.393	114	0.9043	3.157
19	26.17	1.429	115	0.8799	3.161
20	25.01	1.466	116	0.8562	3.165
21	23.9	1.503	117	0.8333	3.168
22	22.85	1.54	118	0.8111	3.171
23	21.85	1.577	119	0.7895	3.175
24	20.9	1.614	120	0.7687	3.178
25	20	1.65	121	0.7485	3.181
26	19.14	1.686	122	0.7289	3.184
27	18.32	1.722	123	0.7099	3.187
28	17.55	1.758	124	0.6915	3.19
29	16.8	1.793	125	0.6736	3.192
30	16.1	1.828	126	0.6563	3.195
31	15.43	1.863	127	0.6395	3.198
32	14.79	1.897	128	0.6232	3.2
33	14.18	1.931	129	0.6074	3.203
34	13.59	1.965	130	0.5921	3.205
35	13.04	1.998	131	0.5772	3.207
36	12.51	2.03	132	0.5627	3.21
37	12	2.063	133	0.5487	3.212
38	11.52	2.094	134	0.5351	3.214
39	11.06	2.125	135	0.5219	3.216
40	10.62	2.155	136	0.509	3.218
41	10.2	2.185	137	0.4966	3.22
42	9.803	2.215	138	0.4845	3.222
43	9.42	2.243	139	0.4727	3.224
44	9.054	2.272	140	0.4613	3.226
45	8.705	2.299	141	0.4502	3.227
46	8.37	2.326	142	0.4394	3.229
47	8.051	2.353	143	0.4289	3.231
48	7.745	2.379	144	0.4187	3.232
49	7.453	2.404	145	0.4088	3.234
50	7.173	2.429	146	0.3992	3.235
51	6.905	2.453	147	0.3899	3.237
52	6.648	2.477	148	0.3808	3.238
53	6.403	2.5	149	0.3719	3.24
54	6.167	2.522	150	0.3633	3.241
55	5.942	2.544	151	0.3549	3.242
56	5.726	2.565	152	0.3468	3.244
57	5.519	2.586	153	0.3389	3.245
58	5.32	2.607	154	0.3312	3.246
59	5.13	2.626	155	0.3237	3.247
60	4.948	2.646	156	0.3164	3.249

Temperature (°C)	Resistance (kΩ)	Voltage (V)	Temperature (°C)	Resistance (kΩ)	Voltage (V)
61	4.773	2.664	157	0.3093	3.25
62	4.605	2.682	158	0.3024	3.251
63	4.443	2.7	159	0.2956	3.252
64	4.289	2.717	160	0.2891	3.253
65	4.14	2.734	-	-	-

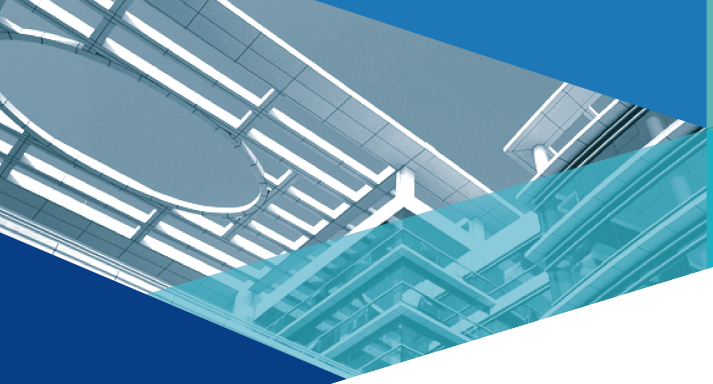
1.3 Voltage list of 50 kΩ discharge temperature sensors

Temperature (°C)	Resistance (kΩ)	Voltage (V)	Temperature (°C)	Resistance (kΩ)	Voltage (V)
-30	911.56	0.036	61	11.736	1.518
-29	853.66	0.038	62	11.322	1.548
-28	799.98	0.041	63	10.925	1.577
-27	750.18	0.043	64	10.544	1.606
-26	703.92	0.046	65	10.178	1.635
-25	660.93	0.049	66	9.8269	1.664
-24	620.94	0.052	67	9.4896	1.693
-23	583.72	0.056	68	9.1655	1.722
-22	549.04	0.059	69	8.9542	1.741
-21	516.71	0.063	70	8.5551	1.778
-20	486.55	0.066	71	5.9676	1.806
-19	458.4	0.07	72	7.9913	1.834
-18	432.1	0.075	73	7.7257	1.862
-17	407.51	0.079	74	7.4702	1.889
-16	384.51	0.084	75	7.2245	1.916
-15	362.99	0.088	76	6.9882	1.943
-14	342.83	0.094	77	6.7608	1.969
-13	323.94	0.099	78	6.542	1.995
-12	306.23	0.104	79	6.3315	2.021
-11	289.61	0.11	80	6.1288	2.046
-10	274.02	0.116	81	5.9336	2.071
-9	259.37	0.123	82	5.7457	2.096
-8	245.61	0.129	83	5.5647	2.12
-7	232.67	0.136	84	5.3903	2.144
-6	220.5	0.143	85	5.2223	2.168
-5	209.05	0.151	86	5.0605	2.191
-4	195.97	0.158	87	4.9044	2.214
-3	188.12	0.167	88	4.7541	2.237
-2	178.65	0.175	89	4.6091	2.259
-1	169.68	0.184	90	4.4693	2.281
0	161.02	0.193	91	4.3345	2.302
1	153	0.202	92	4.2044	2.323
2	145.42	0.212	93	4.0789	2.344
3	135.96	0.223	94	3.9579	2.364
4	131.5	0.233	95	3.841	2.384
5	126.17	0.242	96	3.7283	2.404
6	119.08	0.256	97	3.6194	2.423
7	113.37	0.267	98	3.5143	2.442
8	107.96	0.28	99	3.4128	2.46
9	102.85	0.292	100	3.3147	2.478
10	98.006	0.306	101	3.22	2.496
11	93.42	0.319	102	3.1285	2.514
12	89.075	0.333	103	3.0401	2.531
13	84.956	0.348	104	2.9547	2.547
14	81.052	0.362	105	2.8721	2.564
15	77.349	0.378	106	2.7922	2.58
16	73.896	0.393	107	2.715	2.595
17	70.503	0.41	108	2.6404	2.611
18	67.338	0.427	109	2.5682	2.626
19	64.333	0.444	110	2.4983	2.64
20	61.478	0.462	111	2.4308	2.655
21	58.766	0.48	112	2.3654	2.669
22	56.189	0.499	113	2.3021	2.682
23	53.738	0.518	114	2.2409	2.696

Temperature (°C)	Resistance (kΩ)	Voltage (V)	Temperature (°C)	Resistance (kΩ)	Voltage (V)
24	51.408	0.537	115	2.1816	2.709
25	49.191	0.558	116	2.1242	2.722
26	47.082	0.578	117	2.0686	2.734
27	45.074	0.599	118	2.0148	2.747
28	43.163	0.621	119	1.9626	2.759
29	41.313	0.643	120	1.9123	2.77
30	39.61	0.665	121	1.8652	2.781
31	37.958	0.688	122	1.8158	2.793
32	36.384	0.711	123	1.7698	2.804
33	34.883	0.735	124	1.7253	2.814
34	33.453	0.759	125	1.6821	2.825
35	32.088	0.784	126	1.6402	2.835
36	30.787	0.809	127	1.5996	2.845
37	29.544	0.835	128	1.5602	2.855
38	28.359	0.86	129	1.522	2.864
39	27.227	0.886	130	1.485	2.873
40	26.147	0.913	131	1.449	2.882
41	25.114	0.94	132	1.4141	2.891
42	24.128	0.967	133	1.3803	2.9
43	23.186	0.994	134	1.3474	2.908
44	22.286	1.022	135	1.3155	2.916
45	21.425	1.05	136	1.2846	2.924
46	20.601	1.078	137	1.2545	2.932
47	19.814	1.107	138	1.2233	2.94
48	19.061	1.136	139	1.1969	2.947
49	18.34	1.164	140	1.1694	2.955
50	17.651	1.193	141	1.1476	2.96
51	16.99	1.223	142	1.1166	2.969
52	16.358	1.252	143	1.0913	2.975
53	15.753	1.281	144	1.0667	2.982
54	15.173	1.311	145	1.0429	2.988
55	14.618	1.34	146	1.0197	2.995
56	14.085	1.37	147	0.9971	3.001
57	13.575	1.4	148	0.9752	3.007
58	13.086	1.429	149	0.9538	3.013
59	12.617	1.459	150	0.9331	3.018
60	12.368	1.475	-	-	-

2.Temperature/Pressure List of Refrigerant

R32								
Pressure	Temperature		Pressure	Temperature		Pressure	Temperature	
Kpa	℃		Kpa	℃		Kpa	℃	
100	-51.909		1250	14.153		2400	38.688	
150	-43.635		1300	15.52		2450	39.529	
200	-37.323		1350	16.847		2500	40.358	
250	-32.15		1400	18.138		2550	41.173	
300	-27.731		1450	19.395		2600	41.977	
350	-23.85		1500	20.619		2650	42.769	
400	-20.378		1550	21.813		2700	43.55	
450	-17.225		1600	22.978		2750	44.32	
500	-14.331		1650	24.116		2800	45.079	
550	-11.65		1700	25.229		2850	45.828	
600	-9.1503		1750	26.317		2900	46.567	
650	-6.8046		1800	27.382		2950	47.296	
700	-4.5925		1850	28.425		3000	48.015	
750	-2.4975		1900	29.447		3050	48.726	
800	-0.50613		1950	30.448		3100	49.428	
850	1.393		2000	31.431		3150	50.121	
900	3.2092		2050	32.395		3200	50.806	
950	4.9506		2100	33.341		3250	51.482	
1000	6.624		2150	34.271		3300	52.15	
1050	8.2352		2200	35.184		3350	52.811	
1100	9.7896		2250	36.082		3400	53.464	
1150	11.291		2300	36.965		3450	54.11	
1200	12.745		2350	37.834		3500	54.748	



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