



Air Conditioners

Kinghome Monobloc Air-to-water Heat Pump

KRSCQ16HGD

Thank you for choosing commercial air conditioners. Please read this Owner's Manual carefully before operation and retain it for future reference.

To Users

Thank you for selecting Kinghome's product. Please read this instruction manual carefully before installing and using the product, so as to master and correctly use the product. In order to guide you to correctly install and use our product and achieve expected operating effect, we hereby instruct as below:

- (1) This equipment should be installed, operated or maintained by the qualified servicemen who have had specific training. During operation, all safety issues covered in the labels, User's Manual and other literature should be followed strictly. This equipment 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. Children should be supervised to ensure that they do not play with the appliance.
- (2) This product has gone through strict inspection and operational test before leaving the factory. In order to avoid damage due to improper disassembly and inspection, which may impact the normal operation of unit, please do not disassemble the unit by yourself. You can contact our designated dealer or local service center for professional support if necessary.
- (3) When the product is faulted and cannot be operated, please contact our designated dealer or local service center as soon as possible by providing the following information.
 - Contents of the product nameplate
 - Malfunction status (specify the situations before and after the error occurs).
- (4) All the illustrations and information in the instruction manual are only for reference. In order to make the product better, we will continuously conduct improvement and innovation without further notice.

Contents

Safety Notices (Please be sure to abide)	1
1. Diagram of the Operating Principle	8
2. Operating Principle of the Unit	8
3. Nomenclature	10
4. Installation Example	11
5. Installation Guideline of Monobloc Unit	12
5.1 Instruction precuations	12
5.2 Installation instructions	13
6. Available External Static Pressure of the Outlet	15
7. Ambient Temperature and Leaving Water Temperature Upper Limit	15
8. Expansion Vessel	16
8.1 Water volume and expansion vessel pressure	16
8.2 The method of calculating the charging pressure of expansion vessel	16
8.3 Selection of expansion vessel	17
9. Remote Air Temperature Sensor	
10. Thermostat (Reserved)	
11. 2-Way Valve	
12. 3-Way Valve	20
13. Other Thermal	21
14. Optional Electric Heater	22
15. Gate-controller	23
16. Charging and Discharging of Refrigerant	23
17. Electric Wiring Work	24
17.1 General wiring principle	24
17.2 Specification of power supply wire and leakage switch	24
17.3 Control board	25
17.4 Terminal board	30
18. Commissioning	
18.1 Check before startup	31
18.2 Test run	32
19. Daily Operation and Maintenance	
19.1 Notice before seasonal use	34
19.2 Maintenance of the Unit	34
20. More Information on Servicing	

Safety Notices (Please be sure to abide)

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

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

A2L	Refrigerant class as per ISO 817	
	[symbol ISO 7000-1641 (2004-01)]	operator's manual; operating instructions
	[symbol ISO 7000-1659 (2004-01)]	service indicator; read technical manual
	[symbol ISO 0790-1641 (2004-01)]	read operator's manual

Don't operate the unit with

Once abnormality likeburning smell occurs, please cut off the power supply immediately and then contact with service center.

If the abnormality still exists,

the unit may be damaged and electric shock or fire

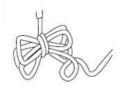
may result.

wet hand.

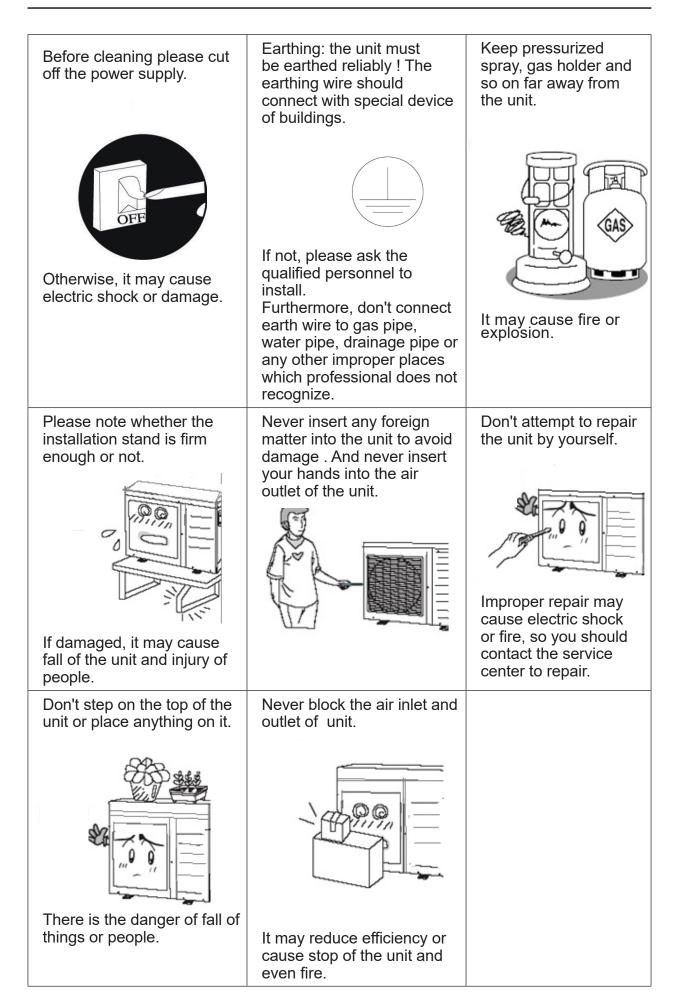


Otherwise, it may cause electric shock.

Special circuit must be adopted for power supply to prevent fire.



Do not use octopus multipurpose plug or mobile terminal board for wire connection.



(1) General requirements

Design and installation work of the unit must be performed by authorized personnel according to applicable laws and regulations and this Instruction.

After installation work, the unit cannot be energized unless there is not any problem in check.

If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

This product is a kind of comfort air conditioning, and is not allowed to be installed where there are corrosive, explosive and inflammable substances or smog; otherwise it would lead to operation failure, shortened service life, five hazard or even severe injuries. Special air conditions are required for where mentioned above.

Before installation, please see if the voltage of local place accords with that on nameplate of unit and capacity of power supply, power cord or socket is suitable for input power of this unit.

Before installation, please check if the adopted power is accordance with that listed on nameplate, and check the safety of power.

Before using, please check and confirm if wires and water pipes are connected correctly to avoid water leakage, electric shock or fire etc.

Don't operate the unit with wet hand, and don't allow children to operate the unit.

The water in unit and pipeline should be discharged if the unit is not in use, to prevent the water tank, pipe line and water pump from frost-cracking.

After receipt of the unit, check it for appearance, unit model compared with your desire and attachments.

Ensure periodical clean and maintenance of the unit after normal operation of the unit for longer life and reliable operation.

The appliance shall be installed in accordance with local wiring regulations.

To realize the function of the air conditioner unit, a special refrigerant circulates in the system. The used refrigerant is the fluoride R32, which is specially cleaned. The refrigerant is flammable and inodorous. Furthermore, it can leads to explosion under certain conditions. But the flammability of the refrigerant is very low. It can be ignited only by fire.

Compared to common refrigerants, R32 is a nonpolluting refrigerant with no harm to the ozonosphere. The influence upon the greenhouse effect is also lower. R32 has got very good thermodynamic features which lead to a really high energy efficiency. The units therefore need a less filling.

If there is any question, please contact with local dealer, authorized service center, agencies or our company directly.

(2) Special requirements

WARNING

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer. Should repair be necessary, contact your nearest authorized service centre. Any repairs carried out by unqualified personnel may be dangerous. The appliance shall be stored in a room without continuous operating ignition sources. (for example: open flames, an operating gas appliance or an operating electric heater.) Do not pierce or burn.

Appliance filled with flammable gas R32. For repairs, strictly follow manufacturer's instructions only. Be aware that refrigrants not contain odour.

If a stationary appliance is not fitted with a supply cord and a plug, or with other means for disconnection from the supply mains having a contact separation in all poles that provides full disconnection under overvoltage category III conditions, the instructions shall state that means for disconnection must be incorporated in the fixed wiring in accordance with the wiring rules.

Piping material, pipe routing, and installation shall include protection from physical damage in operation and service, and be in compliance with national and local codes and standards, such as ASHRAE 15, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52. All field joints shall be accessible for inspection prior to being covered or enclosed.

The installation of pipe-work shall be kept to a minimum.

Protection devices, piping, and fittings shall be protected as far as possible against adverse environmental effects, for example, the danger of water collecting and freezing in relief pipes or the accumulation of dirt and debris.

Steel pipes and components shall be protected against corrosion with a rustproof coating before applying any insulation.

Solenoid valves shall be correctly positioned in the piping to avoid hydraulic shock.

Solenoid valves shall not block in liquid refrigerant unless adequate relief is provided to the refrigerant system low pressure side.

Flexible pipe elements shall be protected against mechanical damage, excessive stress by torsion, or other forces. They should be checked for mechanical damage annually.

The indoor equipment and pipes shall be securely mounted and guarded such that accidental rupture of equipment cannot occur from such events as moving furniture or reconstruction activities.

The range of external static pressures at which the appliance was tested (add-on heat pumps, and appliances with supplementary heaters, only);

The appliance is intended to be permanently connected to the water mains and not connected by a hose-set.

Precautions shall be taken to avoid excessive vibration or pulsation

Keep any required ventilation openings clear of obstruction.

Maximum and minimum water operating temperatures

Item	Minimum water operating temperatures	Maximum water operating temperatures
Cooling	5°C	25°C
Heating	20°C	65°C
Water heating	40°C	80°C

The leaving water temperature varies at different environment. 65°C is the highest leaving water temperature at 10-20°C ambient temperature.

When the electric heater for the water tank prepared by the user themselves has been activated, the leaving water temperature can go up to 80°C.

Maximum and minimum water operating pressures

Item	Minimum water operating pressures	Maximum water operating pressures					
Cooling							
Heating	0.05MPa	0.25MPa					
Water heating							

Maximum and minimum entering water pressures.

	Maximum entering water pressures		
0.05MPa	0.25MPa		
	0.05MPa		

(3) Spaces for refrigerant pipes

1) For the Monobloc type unit, it shall be installed in a well-ventilated area.

2) For the split-type unit, points below shall be followed.

Compliance with national gas regulations shall be observed;

Refrigerant charging valves shall be accessible for maintenance purposes;

For appliances containing FLAMMABLE REFRIGERANTS, the minimum floor area of the room shall be mentioned in the table below. When the floor area for installation is less than 1.2m², the unit shall be installed where is well ventilated.

Minimu	Charge amount(kg)	≤1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5
nu	floor location	/	14.5	16.8	19.3	22	24.8	27.8	31	34.3	37.8	41.5	45.4	49.4	53.6
um room (m ²)	window mounted	/	5.2	6.1	7	7.9	8.9	10	11.2	12.4	13.6	15	16.3	17.8	19.3
	wall mounted	/	1.6	1.9	2.1	2.4	2.8	3.1	3.4	3.8	4.2	4.6	5	5.5	6
area	ceiling mounted	/	1.1	1.3	1.4	1.6	1.8	2.1	2.3	2.6	2.8	3.1	3.4	3.7	4

(4) Unventilated area

An unventilated area where the appliance using FLAMMABLE REFRIGERANTS is installed shall be so constructed that should any refrigerant leak, it will not stagnate so as to create a fire or explosion hazard.

The appliance shall be stored in a well-ventilated area.

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).

The appliance shall be stored so as to prevent mechanical damage from occurring.

(5) Qualification of worker

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.

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.

(6) Safety operation of flammable refrigeran

Qualification requirement for installation and maintenanc

All the work men who are engaging in the refrigeration system should bear the valid certification awarded by the authoritative organization and the qualification for dealing with the refrigeration system recognized by this industry. If it needs other technician to maintain and repair the appliance, they should be supervised by the person who bears the qualification for using the flammable refrigerant.

It can only be repaired by the method suggested by the equipment's manufacturer. **Installation notes**

The unit is not allowed to use in a room that has running fire (such as firesource, working coal gas ware, operating heater).

It is not allowed to drill hole or burn the connection pipe.

The unit must be installed in a room that is larger than the minimum room area. The minimum room area is shown on the nameplate or the table above.

A leak test is a must after installation.

Maintenance notes

Check whether the maintenance area or the room area meet the requirement.

- It's only allowed to be operated in the rooms that meet the requirement.

Check whether the maintenance area is well-ventilated.

- The continuous ventilation status should be kept during the operation process.

Check whether there is fire source or potential fire source in the maintenance area.

- The naked flame is prohibited in the maintenance area; and the "no smoking" warning board should be hanged.

nameplate.

Check whether the appliance mark is in good condition.

- Replace the vague or damaged warning mark.

Welding

If you should cut or weld the refrigerant system pipes in the process of maintaining, please follow the steps as below:

a. Shut down the unit and cut power supply

b. Eliminate the refrigerant

c. Vacuuming

d. Clean it with N₂ gas

e. Cutting or welding

f. Carry back to the service spot for welding

The refrigerant should be recycled into the specialized storage tank.

Make sure that there isn't any naked flame near the outlet of the vacuum pump and it's well-ventilated.

Filling the refrigerant

Use the refrigerant filling appliances specialized for R32. Make sure that different kinds of refrigerant won't contaminate with each other.

The refrigerant tank should be kept upright at the time of filling refrigerant.

Stick the label on the system after filling is finished (or haven't finished). Don't overfilling.

After filling is finished, please do the leakage detection before test running; another time of leak detection should be done when it's removed.

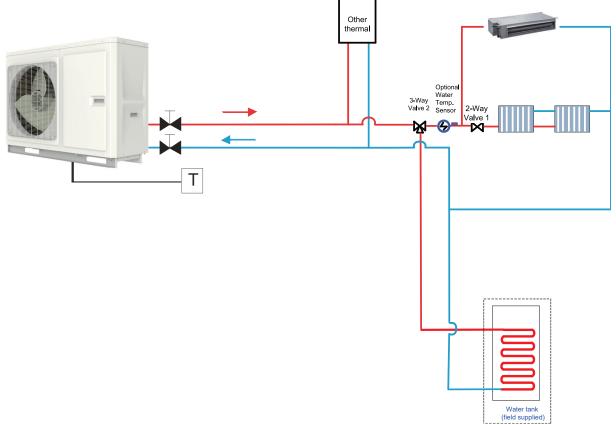
Safety instructions for transportation and storage

Please use the flammable gas detector to check before unload and open the container.

No fire source and smoking.

Do comply with the local rules and laws.

1. Diagram of the Operating Principle



Notes:

- (a) Water inside the main unit is not allowed to be connected to potable water or sanitary water.
- (b) If the water tank is required, the heat exchanger of the water tank should be double-walled and make sure the unit operate normally.

2. Operating Principle of the Unit

Operation functions as stated below are available:

- (1) Cooling;
- (2) Heating;
- (3) Water heating;
- (4) Cooling +water heating;
- (5) Heating+ water heating;
- (6) Emergency mode;
- (7) Fast hot water (reserved);
- (8) Holiday mode;
- (9) Forced operation mode;
- (10) Quiet mode;
- (11) Disinfection mode (reserved);
- (12) Floor debugging;
- (13) Air removal of the water system;
- (14) Other thermal
- (15) Weather-dependent operation:

(1) Cooling: in cooling mode, the refrigerant is condensed and evaporated in the main unit. Via the heat exchange with water in the main unit, the temperature of water decreases and it releases heat while the refrigerant absorbs heat and evaporates. With the help of the control panel, the outflow temperature can meet the user's requirement. Through the control of valve, the low-temperature water in the system is connected with indoor fan coil and underground pipe, and exchanges heat with the indoor air so that the indoor temperature decreases to the required range.

(2) Heating: in heating mode, the refrigerant is condensed and evaporated in the main unit. Via the heat exchange with water in the main unit, the water absorbs heat and its temperature increases while the refrigerant releases heat and is condensed. With the help of the control panel, the outflow temperature can meet the user's requirement. Through the control of valve, the high-temperature water in the system is connected with indoor fan coil and underground pipe, and exchanges heat with the indoor air so that the indoor temperature increases to the required range.

(3)* Water heating: in water heating mode, the refrigerant is condensed and evaporated in the main unit. Via the heat exchange with water in the main unit, the water absorbs heat and its temperature increase while the refrigerant releases heat and is condensed. With the help of the control panel, the outflow temperature can meet the user's requirement. Through the control of valve, the high-temperature water in the system is connected with the coil pipe of bearing water tank, and exchanges heat with the water in the water tank so that the temperature of water tank increases to the required range.

(4) Cooling + water heating: when cooling mode exists together with the water heating mode, the user can set the priority of these two modes based on the needs. The default priority is heat pump. That is under the default setting, if cooling mode exists together with the water heating mode, the heat pump gives priority to cooling. In that case, water heating can only realized with e-heater of the water tank. Inversely, the heat pump gives priority to water heating and switches to cooling after finishing water heating.

(5) Heating+ water heating: when heating mode exists together with the water heating mode, the user can set the priority of these two modes based on the needs. The default priority is heat pump. That is under the default setting, if heating mode exists together with the water heating mode, the heat pump gives priority to heating. In that case, water heating can only realized with e-heater of the water tank. Inversely, the heat pump gives priority to water heating and switches to heating after finishing water heating.

(6) Emergency mode: this mode is only available for heating and water heating. When the unit stops due to malfunction, enter the corresponding emergency mode; as to heating mode, after entering the emergency mode, heating can only be realized through e-heater of the unit. When the setting outflow temperature or indoor temperature is reached, the e-heater of the unit will stop running; as to water heating mode, the e-heater of the unit stops while the e-heater of water tank runs. When the setting temperature or water tank is reached, the e-heater will stop running.

(7) Fast hot water: at the fast hot water mode, the unit runs according to the water heating control of heat pump and the e-heater of water tank runs at the same time.

(8) Holiday mode: this mode is only available for heating mode. This mode is set to keep indoor temperature or leaving water temperature in a certain range, so as to prevent water system of the unit from freezing or protect certain indoor articles from freezing damage. When the unit stops due to malfunction, the two e-heaters of the unit will run.

(9) Forced operation mode: this mode is only used for refrigerant recovery and debugging for the unit.

(10) Quiet mode: Quiet mode is available in cooling, heating and water heating mode. At the quiet mode, the unit will reduce the running noise via automatic control.

(11) **Disinfection mode:** in this mode, the water heating system can be disinfected. When starting up the disinfection function and setting corresponding time to meet the requirement of disinfection mode, the function will start. After the setting temperature is reached, this mode will terminate.

(12) Floor commissioning: this function is intended to preheat the floor periodically for the initial use.

(13) Air removal of the water system: this function is intended to replenish water and remove air in the water system to make the equipment run at the stabilized water pressure.

(14) Other thermal: when the outdoor temperature is lower than the set point for starting other thermal and the unit is under the error condition and the compressor has stopped for three minutes, the other thermal will start to supply heat or hot water to the room.

(15) Weather-dependent operation: this mode is only available for space heating or space cooling. In Weatherdependent mode, the setting value (remote room air temperature or leaving water temperature) is detected and controlled automatically when the outdoor air temperature is changed.

3. Nomenclature

G	RS	С	Q	16	-	Nh	G	D
1	2	3	4	5	6	7	8	9

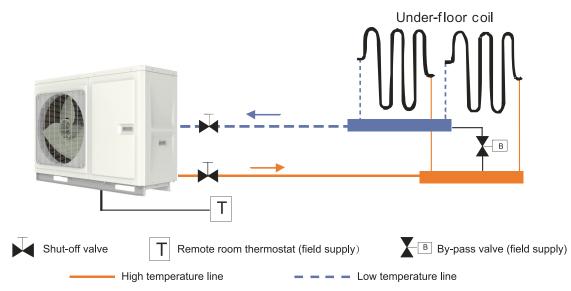
NO.	Description	Options
1	KINGHOME	K-KINGHOME Air to water heat pump
2	Heat Pump Water Heater	RS
3	Heating Mode	S= Static; C=Circulating
4	Function	Q=Multi-function; Omit=Single-function
5	Nominal Heating Capacity	16=16kW
6		
7	Refrigerant	A=R410A; H=R32
8	Design Serial Number	G3
9	Power Supply	D=208/230VAC,1Ph,60Hz

Mode	Temperature range (°C)	Water yielding temperature (°C)		
Heating	-25~35	20~65		
Cooling	-15~48	5~25		
Water Heating	-25~45	40~80		

The leaving water temperature varies at different environment. 65°C is the highest leaving water temperature at 10-20°C ambient temperature.

When the electric heater for the water tank prepared by the user themselves has been activated, the leaving water temperature can go up to 80°C.

4. Installation Example



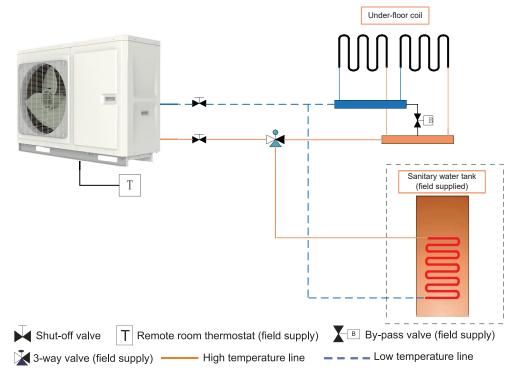
CASE 1: Connecting Under-floor Coil for Heating and Coolin

Notes

(a) Type of thermostat and specification should be complied with installation of this manual;

(b) By pass valve must be installed to secure enough water flow rate, and by pass valve should be installed at the collector.

CASE 2: Connecting Sanitary Water Tank and Under-floor Coi



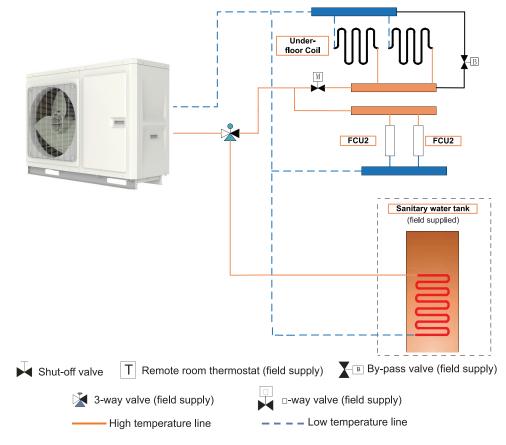
Notes

(a) In this case, three-way valve should be installed and should be complied with installation of this manual;

(b) Sanitary should be equipped with internal electric heater to to secure enough heat energy in the very cold days.

(c) Water inside the main unit is not allowed to be connected to potable water or sanitary water.

(d) If the water tank is required, the heat exchanger of the water tank should be double-walled and make sure the unit operate normally.



CASE 3 : Connecting Sanitary Water Tank, Under-floor Coil and FC

Notes

- (a) Two-way valve is very important to prevent dew condensation on the floor and Radiator while cooling mode.
- (b) Water inside the main unit is not allowed to be connected to potable water or sanitary water.

(c) If the water tank is required, the heat exchanger of the water tank should be double-walled and make sure the unit operate normally.

5. Installation Guideline of Monobloc Unit

5.1 Instruction precuations

- (1) Installation of the unit must be in accordance with national and local safety codes.
- (2) Installation quality will directly affect the normal use of the air conditioner unit. The user is prohibited from installation. Please contact your dealer after buying this machine. Professional installation workers will provide installation and test services according to installation manual.
- (3) Do not connect the unit to the electric power until all installation work is completed.
- (4) When moving the unit, it is necessary to adopt 2 pieces of long enough rope to hand the unit from 4 directions. Included angle between the rope when lifting and moving must be or less than 40° to prevent center of the unit from moving.
- (5) Adopt M12 bolts components to tighten feet and underframe when installing.
- (6) The unit should be installed on the concrete base that is 10cm high.
- (7) The unit must be lifted by using designated lifting holes. Take care to protect the unit during lift.
- (8) To avoid rusting, do not knock the metal parts.
- (9) For appliances with SUPPLEMENTARY HEATERS, the minimum CLEARANCE from the appliance to combustible surfaces is 500mm.

Inlet

>500

Outlet

>2000

5.2 Installation instructions

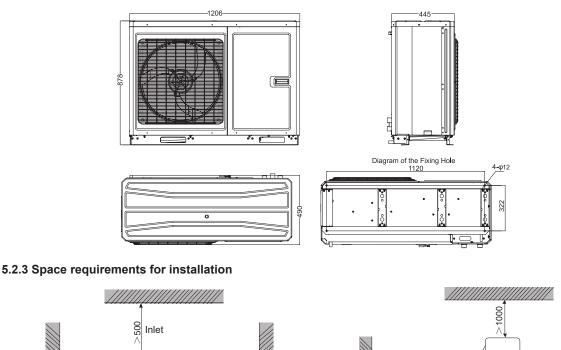
5.2.1 Selection of the installation location

- (1) Monobloc unit must be installed on a firm and solid support.
- (2) Avoid placing the monobloc unit under window or between two constructions, hence to prevent normal operating noise from entering the room.
- (3) Air flow at inlet and outlet shall not be blocked.
- (4) Install at a well-ventilated place, so that the machine can absorb and discharge sufficient air.
- (5) Do not install at a place where flammable or explosive goods exist or a place subject to severe dust, salty fog and polluted air.
- (6) This unit shall not be installed indoor and shall be installed in a well-ventilated area.
- (7) Necessary anti-shock measures shall be taken during installation to avoid faults by unusual noise and shock.

5.2.2 Outline dimensions

>500

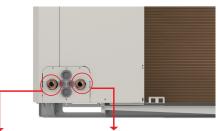
2000



Outlet Note: In conderation of space restriction, for the left-handed figure, except the outlet side, distance between the unit and the nearest barrier at other three sides are allowed to be no less than 500mm; for the right-handed figure, distance between the inlet side and the nearest barrier is allowed to be no less than 500mm.

>500

5.2.4 Inlets and outlets for wiring and piping



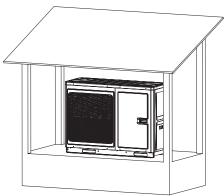
Water supply

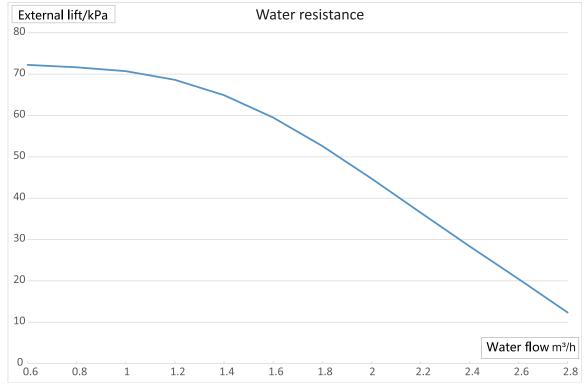
Water return

- (1) Take away the original rubber rings;
- (2) Cable field supplied shall go through the cable duct, such as cables for the 2-way valve, 3-way valve, power cable and so on.
- (3) Be careful of separating the power line and the communication line.
- (4) Water inside the main unit is not allowed to be connected to potable water or sanitary water.
- (5) If the water tank is required, the heat exchanger of the water tank should be double-walled and make sure the unit operate normally.

5.2.4 Cold Climate Requirements

- (1) For areas with frequent snowfall, please clean up the snow in time to avoid covering unit.
- (2) The unit is installed in areas expecting snow are suggested to be raised with support frames.
- (3) If possible, avoid locations that are likely to accumulate snow. If not possible, a snow guard should be installed on the unit to prevent accumulation of snow on the top of the unit.
- (4) Height of the installation foundation should be higher than the height of the annual average snallfall.
- (5) Snow and other litters shall be removed within at least one meter distance from the unit so as to keep the unit in normal operation.



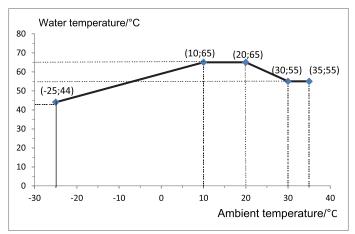


6. Available External Static Pressure of the Outlet

Notes

(a) See the curve above for the maximum external static pressure. The water pump is of variable frequency. And during operation, the water pump will adjust its output based on the actual load.

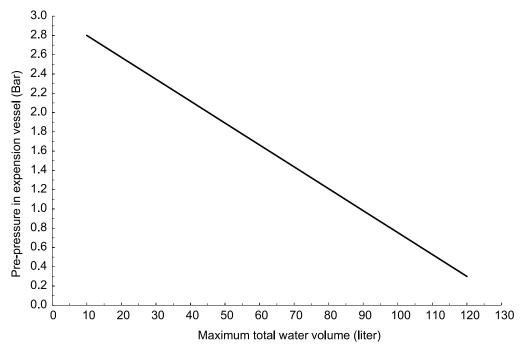
7. Ambient Temperature and Leaving Water Temperature Upper Limit



Note: the ambient temperature and water temperature should be subject to the actual operation of the unit.

8. Expansion Vessel





Notes

(a) The expansion vessel is 3 liters and 1.5bar per-pressurized for the 16kW unit;

(b) Total water volume of 66 liters is default for the 16kW unit; if total water is changed because of installation condition, the pre-pressure should be adjusted to secure proper operation. If the unit is located at the highest position, adjustment is not required;

(c) Minimum total water volume is 20 liters;

(d) To adjust pre-pressure, use nitrogen gas by the certificated installer.

8.2 The method of calculating the charging pressure of expansion vessel

The method of calculating the charging pressure of expansion vessel needed to be adjusted is as follows.

During installation, if the volume of water system has changed, please check if the pre-set pressure of the expansion vessel needs to be adjusted according to the following formula:

 $P_g = (H/10+0.3)$ Bar (H ---the difference between installing location of the unit and the highest spot of water system)

Ensure that the volume of water system is lower than the maximum volume required in the above figure. If it exceeds the range, the expansion vessel does not meet the installing requirement.

Installation height ¹	Water volume				
difference	<66L	>66L			
<12 m	Adjustment is not necessary	 Pre-set pressure needs to be adjusted according to the above formula. Check if the water volume is lower than the maximum water volume. (with help of the above figure) 			
> 12 m	 Pre-set pressure needs to be adjusted according to the above formula. Check if the water volume is lower than the maximum water volume. (with help of the above figure) 	The expansion vessel is too small and adjustment is not available.			

Notes

(a) Installation height difference: the difference between installing location of the unit and the highest spot of water system; if the unit is located at the highest point of the installation, the installation height difference is considered 0m.

(b) Example 1: The 16kW unit is installed 5m below the highest spot of water system and the total volume of the water system is 60L.

(c) Referring to the above figure, it is not necessary to adjust the pressure of the expansion vessel.

(d) Example 2: The unit is installed on the highest spot of the water system and the total water volume is 100L.

(e) As the volume of water system is higher than 66L, it is necessary to adjust the pressure of the expansion vessel be lower.

(f) The formula of calculating pressure

(g) The maximum volume of the water system is about 118L. As the actual volume of the water system is 100L,

the expansion vessel meets the installing requirement.

(h) Adjust the pre-set pressure of the expansion vessel from 1.5Bar to 0.3Bar.

8.3 Selection of expansion vessel

Formula:

$$v = \frac{c \cdot e}{1 - \frac{1 + p_1}{1 + p_2}}$$

V--- Volume of expansion vessel

C--- Total water volume

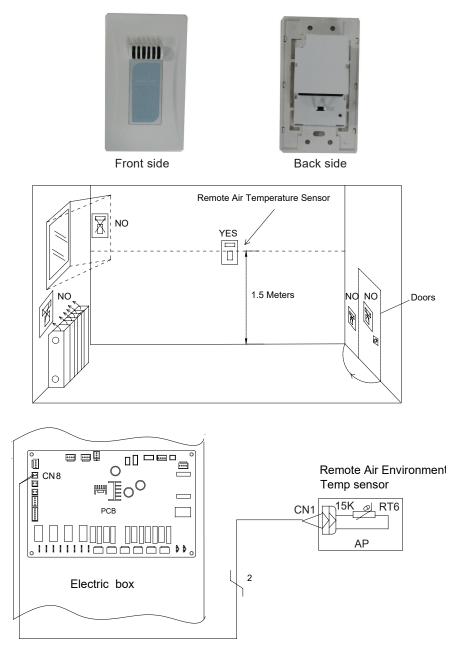
P1--- Pre-set pressure of expansion vessel

P₂-- The highest pressure during running of the system (that is the action pressure of safety valve.)

e---The expansion factor of water (the difference between the expansion factor of the original water temperature and that of highest water temperature.)

Water expansion factor in different temperatur					
Temperature (°C)	Expansion factor e				
0	0.00013				
4	0				
10	0.00027				
20	0.00177				
30	0.00435				
40	0.00782				
45	0.0099				
50	0.0121				
55	0.0145				
60	0.0171				
65	0.0198				
70	0.0227				
75	0.0258				
80	0.029				
85	0.0324				
90	0.0359				
95	0.0396				
100	0.0434				

9. Remote Air Temperature Sensor



Notes

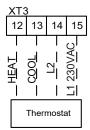
(a) Distance between the unit and the remote air temperature sensor should be less than 15m due to length of the connection cable of remote air temperature sensor;

- (b) Height from floor is approximately 1.5m;
- (c) Remote air temperature sensor cannot be located where the area may be hidden when door is open;
- (d) Remote air temperature sensor cannot be located where external thermal influence may be applied;
- (e) Remote air temperature sensor should be installed where space heating is mainly applied;

(f) After the remote air temperature sensor is installed, it should be set to "With" through the control panel so as to set the remote air temperature to the control point.

10. Thermostat (Reserved)

Installation of the thermostat is very similar to that of the remote air temperature sensor.



How to Wire Thermostat

- (1) Uncover the front cover of the unit and open the control box;
- (2) Identify the power specification of the thermostat, if it is 230V, find terminal block XT3 as NO.12~15;
- (3) If it is the heating/cooling thermostat, please connect wire as per the figure above.

- 230V power supply can be provided to the thermostat by the Versati IV heat pump.
- Setting temperature by the thermostat(heating or cooling) should be within the temperature range of the product ;
- For other constrains, please refer to previous pages about the remote air temperature sensor;
- Do not connect external electric loads. Wire 230V AC should be used only for the electric thermostat;
- Never connect external electric loads such as valves, fan coil units, etc. If connected, the mainboard of the unit can be seriously damaged;
- Installation of the thermostat is very similar to that of the remote air temperature sensor.

11. 2-Way Valve

The role of 2-way valve 1 is to control the water flow into the underfloor loop. When "Floor Config" is set to "With" for either cooling or heating operation, it will keep open. When "Floor Config" is set to "Without", it will keep closed.

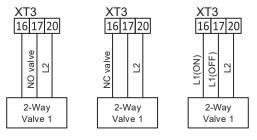
General Information

Туре	Power	Operating Mode	Supported
NO 2 wire	208/230VAC,1Ph,60HZ	Closing water flow	Yes
NO 2-wire	200/230 VAC, IPII,0002	Opening water flow	Yes
NC 2-wire		Closing water flow	Yes
NC 2-wire	208/230VAC,1Ph,60HZ	Opening water flow	Yes

- (1) Normal Open type. When electric power is NOT supplied, the valve is open. (When electric power is supplied, the valve is closed.)
- (2) Normal Closed type. When electric power is NOT supplied, the valve is closed. (When electric power is supplied, the valve is open.)
- (3) How to Wire 2-Way Valve:
- Follow steps below to wire the 2-way valve.

Step 1. Uncover the front cover of the unit and open the control box.

Step 2. Find the terminal block and connect wires as below.



- Normal Open type should be connected to wire (OFF) and wire (N) for valve closing in cooling mode.
- Normal Closed type should be connected to wire (ON) and wire (N) for valve closing in cooling mode.
- (ON) : Line signal (for Normal Open type) from PCB to 2-way valve
- (OFF) : Line signal (for Normal Closed type) from PCB to 2-way valve

12. 3-Way Valve

The 3-way value 2 is required for the sanitary water tank. Its role is flow switching between the under floor heating loop and the water tank heating loop.

General Information

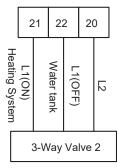
Туре	Power	Operating Mode	Supported
SPDT	208/220\/AC 1Db 60UZ	Selecting "Flow A" between "Flow A" and "Flow B"	Yes
3-wire 208/230VAC,1Ph,60HZ		Selecting "Flow B" between "Flow B" and "Flow A"	Yes

- (1) SPDT = Single Pole Double Throw. Three wires consist of Live1 (for selecting Flow B), and Neutral (for common).
- (2) Flow A means 'water flow from the unit to under floor water circuit'.
- (3) Flow B means 'water flow from the unit to sanitary water tank'.
- Follow steps below to wire the 3-way valve:

Follow below procedures Step 1 ~ Step 2.

Step 1. Uncover front cover of the unit and open the control box.

Step 2. Find terminal block and connect wires as below.



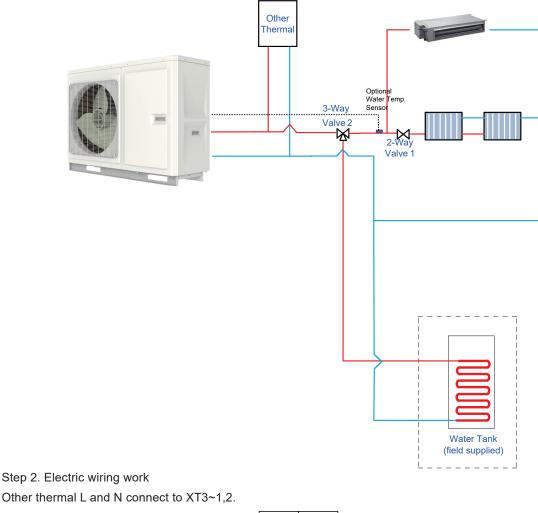
🛕 WARNING

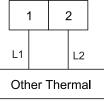
- The 3-way valve should select water tank loop when electric power is supplied to wire (OFF) and wire (N).
- The 3-way valve should select under floor loop when electric power is supplied to wire (ON) and wire (N).
- (ON): Line signal (Water tank heating) from the main board to the 3-way valve
- (OFF): Line signal (Under floor heating) from the main board to the 3-way valve

13. Other Thermal

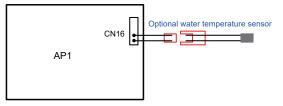
Other thermal is allowed for the equipment and controlled in such a way that the mainboard will output 230V when outdoor temperature is lower than the set point for startup of the aother thermaluxiliary heat source.

Note: Other thermal and Optional Electric Heater CANNOT be installed at the same time.





Optional water temperature sensor connecet to AP1 CN16.



Step 3. Control panel setting

Other thermal should be selected "with" if necessarily from COMMISION \rightarrow FUNCTION, then set switch on (outdoor) temperature and control logic(1/2/3).

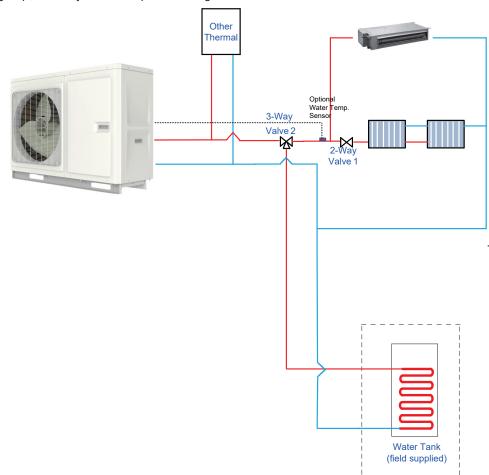


14. Optional Electric Heater

Optional electric heater is allowed for the equipment and controlled in such a way when outdoor temperature is lower than the set point for startup of the optional electric heater.

Step 1. Optional electric heater installation

Optional electric heater should be installed with monobloc unit in series.Moreover,an accessory called optional water temperature sensor(5 meter length) shall be installed at the same time.The optional electric heater could be 1group or 2 group, and only works fo space heating.



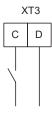
Step 2. Control panel setting

Optional electric heater should be selected "1/2" group if necessary from COMMISION \rightarrow FUNCTION, then set switch on (outdoor) temperature and control logic(1/2).



15. Gate-controller

If there is gate control function, installation guide follow as:

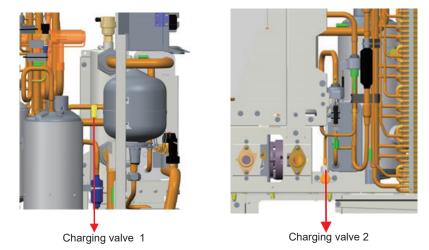


230VAC

16. Charging and Discharging of Refrigerant

The unit has been charged with refrigerant before delivery. Overcharging or undercharging will cause the compressor to run improperly or be damaged. When refrigerant is required to be charged or discharged for installation, maintenance and other reasons, please follow steps below and nominal charged volume on the nameplate.

Discharging: remove metal sheets of the outer casing, connect a hose to the charging valve and then discharge refrigerant.



Notes

(a) Discharge is allowed unless the unit has been stopped. (Cut off the power and repower it 1 minutes later)

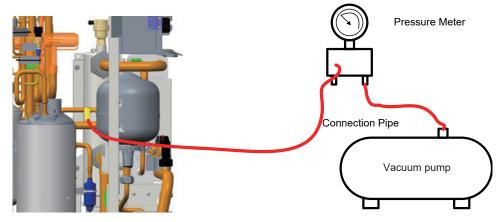
(b) Protective measures should be taken during discharging to avoid frost bites.

(c) When discharging is finished, if vacuuming cannot be done immediately, remove the hose to avoid air or foreign matters entering the unit.

(d) Vacuuming: when discharging is finished, use hoses to connect the charging valve, manometer and vacuum pump to vacuum the unit.

(e) When vacuuming is finished, pressure inside the unit should be kept lower than 80Pa for at least 30 minutes to make sure there is no leak. Either charging valve 1 or charging valve 2 can be used for vacuuming.(f) Charging: when vacuuming is finished and it is certain that there is no leak, charging can be done.

(g) Before and during operation, use an appropriate refrigerant leak detector to monitor the operation area and make sure the technicians can be well aware of any potential or actual leakage of inflammable gas. Make sure the leak detecting device is applicable to inflammable refrigerant. For example, it should be free of sparks, completely sealed and safe in nature.



17. Electric Wiring Work

17.1 General wiring principle

- (1) Wires, equipment and connectors supplied for use on the site must be in compliance with provisions of regulations and engineering requirements.
- (2) Only electricians holding qualification are allowed to perform wire connection on the site.
- (3) Before connection work is started, the power supply must be shut off.
- (4) Installer shall be responsible for any damage due to incorrect connection of the external circuit.
- (5) Caution --- MUST use copper wires.
- (6) Connection of power cable to the electric cabinet of the unit
- (7) Power cables should be laid out through cabling trough, conduit tube or cable channel.
- (8) Communication cables should be laid out through cabling trough, conduit tube or cable channel.
- (9) Power cables to be connected into the electric cabinet must be protected with rubber or plastic to prevent scratch by edge of metal plate.
- (10) Power cables close to the electric cabinet of the unit must be fixed reliably to make the power terminal in the cabinet free from an external force.
- (11) Power cable must be grounded reliably.

17.2 Specification of power supply wire and leakage switc

Power cable specifications and Leakage switch types in the following list are recommended.

		Power Supply Air	Air Break Switch	Minimum Section	Minimum Section	Minimum Section	Minimum Section
Model	Power Supply	Break Switch	Electric Heater	Area of Earth Wire	Area of Earth Wire (Electric Heater)	Area of Power Wire	Area of Power Wire (Electric Heater)
	V,Ph, HZ	A	A	mm ²	mm ²	mm ²	mm ²
KRSCQ16HGD	208/230VAC, 1Ph, 60Hz	60	35	AWG8	AWG8	2*AWG8	2*AWG8

Notes

(a) Leakage Switch is necessary for additional installation. If circuit breakers with leakage protection are in use, action response time must be less than 0.1 second, leakage circuit must be 30mA.

(b) The above selected power cable diameters are determined based on assumption of distance from the distribution cabinet to the unit less than 75m. If cables are laid out in a distance of 75m to 150m, diameter of power cable must be increased to a further grade.

(c) The power supply must be of rated voltage of the unit and special electrical line for air-conditioning.

(d) All electrical installation shall be carried out by professional technicians in accordance with the local laws and regulations.

(e) Ensure safe grounding and the grounding wire shall be connected with the special grounding equipment of the building and must be installed by professional technicians.

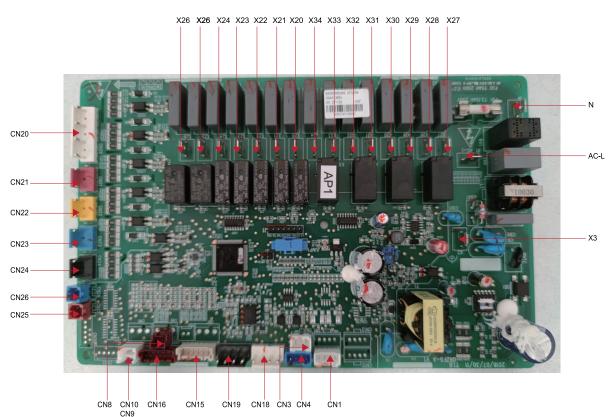
(f) The specifications of the breaker and power cable listed in the table above are determined based on the maximum power (maximum amps) of the unit.

(g) The specifications of the power cable listed in the table above are applied to the conduit-guarded multi-wire copper cable (like, YJV XLPE insulated power cable) used at 40°C and resistible to 90°C (see IEC 60364-5-52). If the working condition changes, they should be modified according to the related national standard.

(h) The specifications of the breaker listed in the table above are applied to the breaker with the working temperature at 40°C. If the working condition changes, they should be modified according to the related national standard.

17.3 Control board

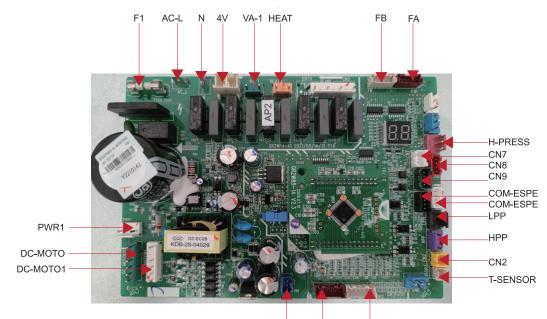
(1) Main control board 1



Silk Screen	Introduction
AC-L	Power supply
N	Power supply
X3	To the ground
X20	E-heater of water tank
X21	E-heater 1
X22	E-heater 2

Silk Screen	Introduction		
X23	Other thermal by 230VAC		
X24	Field supplied water pump		
X25	Plate heat exchanger anti-freezing		
X26	DHW signal		
X27	2-way valve 1 is normally open		
X28	2-way valve 1 is normally closed		
X29	Water pump of the water tank		
X30	Reserved		
X31	Field supplied 3-way valve 1		
X32	Reserved		
X33	Electric three-way valve 2 open		
X34	Electric three-way valve 2 closed		
CN18	Build-in water pump signal(PWM)		
CN19	Back-up water pump signal(PWM)-field supply		
CN15	20K temperature sensor (inlet water)		
CN15	20K temperature sensor (outlet water)		
CN15	20K temperature sensor (refrigerant liquid line)		
CN16	20K temperature sensor (refrigerant vapor line)		
CN16	10K temperature sensor (leaving water for the optional electric heater)		
CN16	Rreserved		
CN8	Remote room temperature sensor		
CN9	Water tank temperature sensor		
CN7	Rreserved		
CN6	Rreserved		
CN5	Rreserved		
CN20	Thermostat		
CN21	Detection to welding protection for the optional electric heater 1		
CN22	Detection to welding protection for the optional electric heater 2		
CN23	Detection to welding protection for the water tank electric heater		
CN24	Gate-control detection		
CN25	Flow switch		
CN26	Reserved		
CN3	Communication with the unit		
CN1	Anode		
CN4	Communication with control panel		

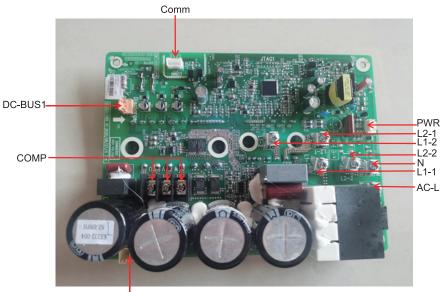
(2) Main control board 2



CN5 T-SENSOR1 T-SENSOR2

Silk Screen	Introduction		
AC-L	Power supply		
N	Power supply		
PWR1	310V Supply 310V DC power to the drive		
F1	Fuse		
4V	4-way valve		
VA-1	E-heater of chassis		
HEAT	Electric heating tape		
DC-MOTORO	1-pin: fan power supply; 3-pin: fan GND; 4-pin: +15V; 5-pin:control signal; 6-pin:feedback signal		
DC-MOTORO1	1-pin: fan power supply;3-pin: fan GND; 4-pin: +15V; 5-pin: control signal; 6-pin: feedback signal		
FA	1, 2, 3, 4 signals, 5 power supply to EXV1,pipe electronic expansion valve,1-4 pin: driving impulse output; 5 pin: +12V		
FB	1, 2, 3, 4 signals, 5 power supply to EXV2, pipe electronic expansion valve, 1-4 pin: driving impulse output; 5 pin: +12V		
T_SENSOR2	1,2: environment; 3,4:discharge; 5,6: suction		
T_SENSOR1	1,2: economizer inlet; 3,4: economizer outlet; 5,6:defrost		
H_PRESS	5V signal input of pressure sensor 1 pin: GND; 2 pin: signal input; 3 pin: +5V		
HPP	1-pin:+12V, 3-pin: signal		
LPP	1-pin: +12V, 3-pin: signal		
CN2	1-pin:+12V, 2-pin: signal		
CN7	Communication between AP1 and AP2;communication cable 2-pin: B, 3-pin: A;		
CN8	1-pin:12V, 2-pin:B, 3-pin: A, 4-pin: ground, To the control panel, communication cable;		
CN9	1-pin:+12V, 2-pin:B; 3-pin:A, 4-pin: ground		
COM_ESPE1	1-pin:+3.3V, 2-pin:TXD, 3-pin:RXD, 4-pin:ground		
COM_ESPE2	1-pin:+3.3V, 2-pin:TXD, 3-pin:RXD, 4-pin:ground		
CN5	1-pin: ground, 2-pin:+18V, 3-pin:+15V		
CN5	1-pin: ground, 2-pin:+18V, 3-pin:+15V		

(3) Drive board



DC-BUS

Silk Screen	Introduction			
AC-L	Power supply			
Ν	Power supply			
L1-1	To PFC inductor brown line			
L1-2	To PFC inductor white line			
L2-1	To PFC inductor yellow line			
L2-2	To PFC inductor blue line			
COMP	Wiring board (3-pin)(DT-66BO1W-03)(variable-frequency)			
COMM	Communication interface[1-3.3V,2-TX,3-RX,4-GND]			
DC-BUS	DC-BUS, the other end to the filter board			
PWR	Power input of the drive board [1-310V,3-GND]			
DC-BUS1	Pin for electric discharge of the high-voltage bar during test			

(4) Filter board

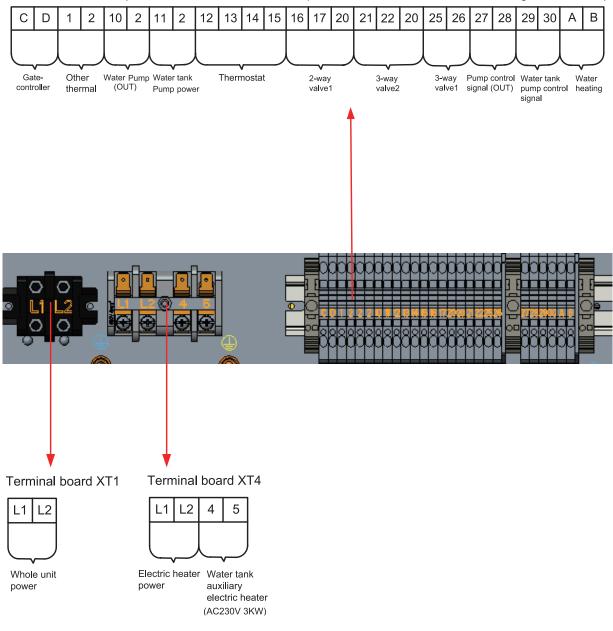


E1 E

Silk Screen	Introduction			
AC-L	Power supply			
N	Power supply			
L-OUT	Output power of the filter board (to the drive and main boards)			
N-OUT	Output power of the filter board (to the drive board)			
N-OUT1	Output power 1 of the filter board			
L-OUT1	Output power 1 of the filter board			
DC-BUS	DC-BUS, the other end to the drive board			
E	Screw hole for grounding			
E1	Grounding line, reserved			

17.4 Terminal board

Terminal board XT3 (208/230VAC, 1Ph, 60Hz, total ampere of loads below is not allowed to be greater than 1A)



18. Commissioning

18.1 Check before startup

For safety of users and unit, the unit must be started up for check before debugging. The procedures are as below:

	ollowing items shall be performed by qualified repair persons. rm together with the sales engineer, dealer, installing contractor and customers for the following items finished	d or to		
	ished.			
No.	Confirmation of Installation			
1	If the contents of Application for Installation of this Unit by Installer are real. If not, debugging will be refused.			
2	Is there written notice in which amendment items are shown in respect of unqualified installation?			
3	Are Application for Installation and Debugging list filed together?			
No.	Pre-check	\checkmark		
1	Is appearance of the unit and internal pipeline system ok during conveying, carrying or installation?			
2	Check the accessories attached with the unit for quantity, package and so on.			
3	Make sure there is drawings in terms of electricity, control, design of pipeline and so on.			
4	Check if installation of the unit is stable enough and there is enough space for operation and repair.			
5	Completely test refrigerant pressure of each unit and perform leakage detection of the unit.			
6	Is the water tank installed stably and are supports secure when the water tank is full?			
7	Are heat insulating measures for the water tank, outlet/inlet pipes and water replenishing pipe proper?			
8	Are the nilometer of water tank, water temperature indicator, controller, manometer, pressure relief valve and automatic discharge valve etc. installed and operated properly?			
9	Does power supply accord with the nameplate? Do power cords conform to applicable requirements?			
10	Is power supply and control wiring connected properly according to wiring diagram? Is earthing safe? Is each terminal stable?			
11	Are connection pipe, water pump, manometer, thermometer, valve etc. are installed properly?			
12	Is each valve in the system open or closed according to requirements?			
13	Confirm that the customers and inspection personnel of Part A are at site.			
14	Is Installation Check-up Table completed and signed by the installation contractor?			
Atten	tion: If there is any item marked with ×, please notify the contractor. Items listed above are just for reference.			
	General Evaluation: Debugging Amendment			
င္ပ	Judge the following items (if there is not any filling, qualification will be regarded.)			
nfirn	a: Power supply and electric control system b: Loading calculation			
ned li	c: Heating problems of Unit d: Noise problem			
tems	e: Pipeline problem f: Others			
Confirmed Items after pre-checking	Normal debugging work can't be performed unless all installation items are qualified. If there is any problem it must be solved firstly. The installer will be responsible for all costs for delay of debugging and re-debugging incurred by any problem which is not solved immediately.			
heck	Submit schedule of amending reports to installer.			
ing	Is the written amending report which should be signed after communication provided to installer?			
	Yes () No ()			

18.2 Test run

Test run is testing whether the unit can run normally via preoperation. If the unit cannot run normally, find and solve problems until the test run is satisfactory. All inspections must meet the requirements before performing the test run. Test run should follow the content and steps of the table below:

The follow	The following procedure should be executed by experience and qualified maintenance men.						
No.	Start up the pretest procedure						
Notice: be casualty.	fore test, er	sure that all power must be cut off, including the far- end power switch, otherwise, it may cause					
1	Ensure that	at the compressor of the unit is preheated for 8h.					
	Caution: heat the lubricating oil at least 8h in advance to prevent refrigerant from mixing with the lubricating oil, which may cause damage to the compressor when starting up the unit.						
2	Check whe firstly.	ether the phase sequence of the main power supply is correct. If not, correct the phase sequence					
Reche	ck the phase	e sequence before start-up to avoid reverse rotation of the compressor which may damage the unit.					
3		universal electric meter to measure the insulation resistance between each outdoor phase and earth between phases.					
	n: defective	earthing may cause electric shock.					
No.		Ready to start					
	Cut off all	temporary power supply, resume all the insurance and check the electricity for the last time.					
1	Check the operating	power supply and voltage of the control circuit;V must be ±10% within the range of rated power.					
No.		Start up the unit					
1	Check all the conditions needed to start up the unit: operation mode, required load etc.						
	Start up th	e unit, and observe the operation of compressor, electric expanding valve, fan motor and water					
2	pump etc.						
		unit will be damaged under abnormal running state. Do not operate the unit in states of high nd high current.					
Others:		0					
		Estimation or suggestion on the general running situation: good, modify					
		Identify the potential problem (nothing means the installation and commissioning are in					
		accordance with the requirements.)					
Items for acceptance after commissioning		a. problem of power supply and electric control system: b. problem of load calculation:					
		c. outdoor refrigerant system:					
		d. noise problem:					
		e. problem of indoor and piping system:					
		h. other problems:					
		During operation, it is needed to charge for the maintenance due to non-quality problems such as incorrect installation and maintenance.					
		Acceptance					
		Is the user trained as required? Please sign. Yes() No()					

19. Daily Operation and Maintenance

In order to avoid damage of the unit, all protecting devices in the unit had been set before delivery, so please do not adjust or remove them.

For the first startup of the unit or next startup of unit after long-period stop (above 1 day) by cutting off the power, please electrify the unit in advance to preheat the unit for more than 8 hours.

Never put sundries on the unit and accessories. Keep dry, clean and ventilated around the unit.

Remove the dust accumulated on the condenser fin timely to ensure performance of the unit and to avoid stop of the unit for protection.

In order to avoid protection or damage of the unit caused by blockage of the water system, clean the filter in water system periodically and frequently check water replenishing device.

In order to ensure anti-freezing protection, never cut off the power if ambient temperature is below zero in winter.

In order to avoid frost crack of the unit, water in the unit and pipeline system not used for a long period should be drained. In addition, open the end cap of the water tank for drainage.

When the water tank has been installed but the water tank is set to "Without", functions relative with the water tank will not work and the displayed water tank temperature will always be "-30". In this case, the water tank would suffer frostbite and even other severe influences under low temperature. Therefore, once the water tank has been installed, the water tank must be set to "With", otherwise GREE will not be responsible for this abnormal operation.

Never frequently make the unit on/off and close the manual valve of the water system during operation of the unit by users.

Ensure frequent check to the working condition of each part to see if there is oil stain at pipeline joint and charge valve to avoid leakage of refrigerant.

If malfunction of the unit is out of control of users, please timely contact with authorized service center.

Notes

The water pressure gage is installed in the returning water line in the unit. Please adjust the hydraulics system pressure according to next item:

- (1) If the pressure is less than 0.5 bar, please recharge the water immediately.
- (2) When recharging, the hydraulics system pressure should be not more than 2.5 Bar.

Malfunctions	Reasons	Troubleshooting
	Power supply has problem.	Phase sequence is reverse.
Compressor does not start up	Connection wire is loose.	Check out and re-fix.
	Malfunction of mainboard.	Find out the reasons and repair.
	Malfunction of compressor.	Replace compressor.
	Fixing bolt of fan is loose.	Re-fix fixing bolt of fan.
Heavy noise of fan	Fan blade touches shell or grill.	Find out the reasons and adjust.
	Operation of fan is unreliable.	Replace fan.
	Liquid slugging happens when liquid	Check if expansion valve is failure and temp.
Heavy noise of compressor	refrigerant enters into compressor.	sensor is loose. If that, repair it.
	Internal parts in compressor are broken.	Replace compressor.
Water nump dage not rup or	Malfunction of power supply or terminal.	Find out the reasons and repair.
Water pump does not run or	Malfunction of relay.	Replace relay.
runs abnormally	There is air in water pipe.	Evacuate.
		Discharge or add part of refrigerant.
Compressor starts or stops	Poor or excess refrigerant.	Water system is blocked or there is air in
frequently	Poor circulation of water system.	it. Check water pump, valve and pipeline.
liequentiy	Low load.	Clean water filter or evacuate.
		Adjust the load or add accumulating devices.
The unit does not heat		Repair by leakage detection and add
although compressor is	Leakage of refrigerant.	refrigerant.
running	Malfunction of compressor.	Replace compressor.
		Enhance heat insulation efficiency of the
	Poor heat insulation of water system.	system.
Poor efficiency of hot water	Poor heat exchange of evaporator.	Check if air in or out of unit is normal and
heating	Poor refrigerant of unit.	clean evaporator of the unit.
	Blockage of heat exchanger at water	Check if refrigerant of unit leaks.
	side.	Clean or replace heat exchanger.

19.1 Notice before seasonal use

- (1) Check whether air inlets and air outlets of the unit are blocked
- (2) Check whether ground connection is reliable or not
- (3) If unit starts up after not operating for a long time, it should be power on 8 hours before operation starts so as to preheat the outdoor compressor
- (4) Precautions for Freeze Protection in Winter

Under subzero climatic conditions in winter, anti-freeze fluid must be added into the water cycle and external water pipes should be properly insulated. Glycol solution is recommended as the anti-freeze fluid.

When the unit is turned off for quite a long period and has been powered off, drain the water system to prevent the unit from suffering frostbites.

When the unit is turned off during seasonal use, do not power it off so that the freeze protection can be activated.

Concentration	Freezing Temp	Concentration	Freezing Temp	Concentration	Freezing Temp
%	°C	%	°C	%	°C
4.6	-2	19.8	-10	35	-21
8.4	-4	23.6	-13	38.8	-26
12.2	-5	27.4	-15	42.6	-29
16	-7	31.2	-17	46.4	-33

Note: "Concentration" listed in the table above indicates the mass concentration.

19.2 Maintenance of the Unit

19.2.1 Error code list

(1) Complete unit code

Code Indication	Error Name	Source of Error Signal	Control Description
F4	Ambient temperature sensor error	 The plug on temperature sensor is not correctly connected to the socket on mainboard. The resistance of temperature sensor is not correct. 	It will be automatically cleared after the failure is removed.
d6	Defrosting temperature sensor error	 The plug on temperature sensor is not correctly connected to the socket on mainboard. The resistance of temperature sensor is not correct. 	It will be automatically cleared after the failure is removed.
F7	Discharge temperature sensor error	 The plug on temperature sensor is not correctly connected to the socket on mainboard. The resistance of temperature sensor is not correct. 	It will be automatically cleared after the failure is removed.
F5	Suction temperature sensor error	 The plug on temperature sensor is not correctly connected to the socket on mainboard. The resistance of temperature sensor is not correct. 	It will be automatically cleared after the failure is removed.
F2	Economizer inlet temperature sensor	 The plug on temperature sensor is not correctly connected to the socket on mainboard. The resistance of temperature sensor is not correct. 	It will be automatically cleared after the failure is removed.

Code Indication	Error Name	Source of Error Signal	Control Description
F6	Economizer outlet temperature sensor	 The plug on temperature sensor is not correctly connected to the socket on mainboard. The resistance of temperature sensor is not correct. 	It will be automatically cleared after the failure is removed.
EF	Fan error	 Mainboard of outdoor unit is damaged. The wire connecting the wiring terminals of the mainboard breaks. 	If it occurs for 6 times during one hour, it should be cleared by deenergization. If it occurs for less than 6 times, it will be automatically cleared.
E1	High pressure protection	 Comp High-pressure switch is broken or the wiring is loose. The water in the tank is not enough. The installation of tank temp sensor is not correct. The gas valve and liquid valve are not fully open. The electronic expansion valve cannot work normally. 	De-energize the unit and then, energize it again. If the malfunction is removed, the code will be cleared.
E3	Low pressure protection	 Comp Low-pressure switch is broken or the wiring is loose. The system has leaked. The fans stop running or reverse. 	It will be cleared if the malfunction is removed after the unit has been turned off.
E4	High discharge protection	 The resistance of temperature sensor is not correct. The electronic expansion valve is blocked. The system has leaked. Mainboard of outdoor unit is damaged. 	It will be cleared if the discharge temp is lower than 92°C .
E6	Communication error between the outdoor and indoor main boards	 The communication line of the unit is not connected. The communication line is not through. The communication line of the unit is not connected correctly. The two ends of communication line are not mounted with magnetic ring. The outdoor unit is not electrically powered. 	It will be cleared once communication recovers or it will be shown all the time.
E6	Communication error between the outdoor main board and the drive board	 The communication line of the unit is not connected. The communication line is not through. The communication line of the unit is not connected correctly. The two ends of communication line are not mounted with magnetic ring. The outdoor unit is not electrically powered. 	It will be cleared once communication recovers or it will be shown all the time.

Code Indication	Error Name	Source of Error Signal	Control Description	
E6	Communication error between the control panel and indoor main board	 The communication line of the unit is not connected. The communication line is not through. The communication line of the unit is not connected correctly. The two ends of communication line are not mounted with magnetic ring. The outdoor unit is not electrically powered. 	It will be cleared once communication recovers or it will be shown all the time.	
Fc	High pressure sensor error	 The sensor is damaged. The wire of the sensor is loose. The position of the sensor is wrong. 	It will be automatically cleared after the failure is removed.	
F9	Leaving water temperature sensor error for the plate type heat exchanger of the heat pump	 The plug on temperature sensor is not correctly connected to the socket on mainboard. The resistance of temperature sensor is not correct. 	It will be automatically cleared after the failure is removed.	
dH	Leaving water temperature sensor error for the auxiliary electric heat of the heat pump	 The plug on temperature sensor is not correctly connected to the socket on mainboard. The resistance of temperature sensor is not correct. 	It will be automatically cleared after the failure is removed.	
/	Entering water temperature sensor error of the plate type heat exchanger of the heat pump	 The plug on temperature sensor is not correctly connected to the socket on mainboard. The resistance of temperature sensor is not correct. 	It will be automatically cleared after the failure is removed.	
FE	Water tank temperature sensor error	 The plug on temperature sensor is not correctly connected to the socket on mainboard. The resistance of temperature sensor is not correct. 	It will be automatically cleared after the failure is removed.	
F0	Remote room temperature sensor error	 The plug on temperature sensor is not correctly connected to the socket on mainboard. The resistance of temperature sensor is not correct. 	It will be automatically cleared after the failure is removed.	
Ec	Protection for the flow switch of the heat pump	 The switch is damaged. The wire of the switch is loose. The position of the switch is wrong 	It will be cleared after the unit is turned off.	
E2	Indoor anti-frozen protection	 The resistance of temperature sensor is not correct. The electronic expansion valve cannot work normally. 	It will be cleared once malfunction is removed or it will be shown all the time; but it will be cleared immediately when switching operation mode.	

Code Indication	Error Name	Source of Error Signal	Control Description	
Ed	outlet temperature High-temp protection	 The resistance of temperature sensor is not correct. The plug on temperature sensor is not correctly connected to the socket on mainboard. Mainboard of outdoor unit is damaged. 	De-energize the unit and then, energize it again. If the malfunction is removed, the code will be cleared.	
EH	Welding protection to the auxiliary electric heater 1 of the heat pump	The AC contactor is damaged.	De-energize the unit and then, energize it again. If the malfunction is removed, the code will be cleared.	
EH	Welding protection to the auxiliary electric heater 2 of the heat pump	The AC contactor is damaged.	De-energize the unit and then, energize it again. If the malfunction is removed, the code will be cleared.	
ЕН	Welding protection to the water tank electric heater	The AC contactor is damaged.	De-energize the unit and then, energize it again. If the malfunction is removed, the code will be cleared.	
c5	Jumper cap error	Incorrect jumper is used or the jumper is not fixed securely.	De-energize, re-energize and re- inspect it. This error cannot be cleared automatically.	
E6	Communication error between the control panel panel and the outdoor unit	 The communication line of the unit is not connected. The communication line is not through. The communication line of the unit is not connected correctly. The two ends of communication line are not mounted with magnetic ring. The outdoor unit is not electrically powered. 	It will be cleared once communication recovers or it will be shown all the time.	
F3	Refrigerant vapor line temperature sensor error	 The plug on temperature sensor is not correctly connected to the socket on mainboard. The resistance of temperature sensor is not correct. 		
F1	Refrigerant liquid line temperature sensor error	 The plug on temperature sensor is not correctly connected to the socket on mainboard. The resistance of temperature sensor is not correct. 	It will be automatically cleared after the failure is removed.	
U7	4-way valve error	The jammed 4-way valve fails to reverse the operating mode.	De-energize and then re- energize it, or clear this error manually. It cannot be cleared automatically.	

(3) Drive failure code

Item		Display on Nixie Tube of the Unit	Display on Control Panel	Others
	Reset of Drive System	P0	Driver reset	
	Startup Failure of Compressor	Lc	Start failure	
	Current protection of compressor	P5	Com. over-cur.	
	Communication failure	P6	Drive-main com.	
Inverter Drive Failure	Sensor failure of heat sink	P7	T-mod. sensor	
	Overheat protection of heat sink	P8	Overtempmod.	
	AC current protection (input side)	PA	AC curr. pro.	
	Current sensor failure	Pc	Current sen.	
	Overvoltage protection	РН	DC over-vol.	
	Under-voltage protection	PL	DC under-vol.	
	Charge circuit failure	PU	Charge circuit	
	IPM protection	H5	IPM defective	
	Desynchronizing of motor	H7	Desynchronize	
	PFC abnormality	Hc	PFC defective	

20. More Information on Servicing

(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 minimised. For repair to the REFRIGERATING SYSTEM, DD.4.3 to DD.4.7 shall be completed prior to conducting work on the system.

(2) Work procedure

Work shall be undertaken under a controlled procedure so as to minimise the risk of a flammable gas or vapour being present while the work is being performed.

(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.

(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 toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i. e. non-sparking, adequately sealed or intrinsically safe.

(5) Presence of fire extinguishe

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

(6) No ignition sources

No person carrying out work in relation to a REFRIGERATING SYSTEM which involves exposing any pipe work 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 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.

(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.

(8) Checks to the refrigerating 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:

- the charge size is in accordance with the room size within which the refrigerant containing parts are installed;

- the ventilation machinery and outlets are operating adequately and are not obstructed;

- if an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant;

- marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected;

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

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

(10) Repairs to sealed components

During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked upon prior to any removal of sealed covers, etc. If it is absolutely necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.

Particular attention shall be paid to the following to ensure that by working on 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.

(11) 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.

(12) 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 aging or continual vibration from sources such as compressors or fans.

(13) Detection of flammable refrigerant

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.

The following leak detection methods are deemed acceptable for systems containing flammable refrigerants.

Electronic leak detector shall be used to detect flammable refrigerant, but the sensitivity may not be adequate, or may need re-calibration(Detection equipment shall be calibrated in a refrigerant-free area).

Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used.

Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed and the appropriate percentage of gas (25% maximum) is confirmed.

Leak detection fluids are suitable for us with most refrigerant but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

If a leak is suspected, all naked flames shall be removed / extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Oxygen free nitrogen (OFN) shall then be purged through the system both before and during the brazing process.

(14) Removal and evacuation

When breaking into the refrigerant circuit to make repairs – or for any other purpose –conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration. The following procedure shall be adhered to:

a) safely remove refrigerant following local and national regulations;

b) purge the circuit with inert gas;

c) evacuate (optional for A2L);

d) purge with inert gas (optional for A2L);

e) open the circuit by cutting or brazing.

The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times.Compressed air or oxygen shall not be used for purging refrigerant systems.For appliances containing flammable refrigerants by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum (optional for A2L). This process shall be repeated until no refrigerant is within the system (optional for A2L). When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.Ensure that the outlet for the vacuum pump is not close to any potential ignition sources and that ventilation is available.

(15) Charging procedures

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

• Ensure that contamination of different refrigerants does not occur when using charging equipment.

Hoses or lines shall be as short as possible to minimise the amount of refrigerant contained in them.

• Cylinders shall be kept in an appropriate position according to the instructions.

• Ensure that the REFRIGERATING SYSTEM is earthed prior to charging the system with refrigerant.

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

Air-to-water Heat Pump

Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. 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.

(16) 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.

a) Become familiar with the equipment and its operation.

b) Isolate system electrically.

c) Before attempting the procedure ensure that: mechanical handling equipment is available, if required, for handling refrigerant cylinders; all personal protective equipment is available and being used correctly; the recovery process is supervised at all times by a competent person; recovery equipment and cylinders conform to the appropriate standards.

d) Pump down refrigerant system, if possible.

e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.

f) Make sure that cylinder is situated on the scales before recovery takes place.

g) Start the recovery machine and operate in accordance with manufacturer's instructions.

h) Do not overfill cylinders. (No more than 80 % volume liquid charge).

i) Do not exceed the maximum working pressure of the cylinder, even temporarily.

j) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.

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

(17) Labelling

Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing FLAMMABLE REFRIGERANTS, ensure that there are labels on the equipment stating the equipment contains FLAMMABLE REFRIGERANT.

(18) Recovery

When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge are available. All cylinders to be used Ensure that the correct number of cylinders for holding the total system charge are available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of flammable refrigerants.

In addition, a set of calibrated weighing scales shall be available and in good 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 Note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.



MANUAL

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