



Owner's Manual

Original Instructions

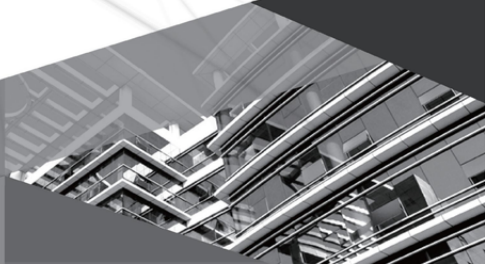
Air Source Heat Pump Water Heater

Models:

KHW50R32

KHW70R32

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



To Users

Thank you for selecting Kinghome 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 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. Children should be supervised to ensure that they do not play with the appliance.
- (2) The recommended altitude of the installation and usage area of the unit should be below 2000m.
- (3) In order to ensure reliability of product, the product may consume some power under stand-by status for maintaining normal communication of system and preheating refrigerant and lubricant. If the product is not to be used for long, cut off the power supply and make sure to drain all the water from the tank and pipes.
- (4) If the product is not to be used for long, cut off the power supply; please energize and preheat the unit in advance before reusing it.
- (5) Please properly select the model according to actual using environment; otherwise it may impact the using convenience.
- (6) If the product needs to be installed, moved or maintained, please contact our designated dealer or local service center for professional support. Users should not disassemble or maintain the unit by themselves, otherwise it may cause relative damage, and our company will bear no responsibilities.
- (7) 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. If there is adjustment in the product, please subject to actual product.
- (8) 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.

- (9) The appliance is intended to be permanently connected to the water mains and not connected by a hose-set.
- (10) The water supplied to the unit must meet local tap water quality standards. The unit is not recommended to connect directly to drinking water sources; otherwise, measures must be taken to protect the drinking water source from adverse effects caused by backflow from the unit.

Exception Clauses

Manufacturer will bear no responsibilities when personal injury or property loss is caused by the following reasons:

- (1) Damage the product due to improper use or misuse of the product;
- (2) After verification, the defect of product is directly caused by corrosive gas;
- (3) After verification, defects are due to improper operation during transportation of product;
- (4) Alter, change, operate, repair, maintain or use the product with other equipment without abiding by the instruction manual of manufacturer;
- (5) After verification, the problem or dispute is caused by the quality specification or performance of parts and components that produced by other manufacturers;
- (6) The damage is caused by natural calamities, bad using environment or force majeure.

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IMPORTANT SAFETY INSTRUCTIONS

⚠ DANGER

Water temperature over 125°F can cause severe burns or even death from scalds. Children, disabled and elderly are at highest risk of being scalded. Feel water before bathing or showering.



Tab. 1-1 Time/Temperature Relationship in Scalds

Temperature	Time To Produce a Serious Burn
120°F (49°C)	More than 5 minutes
125°F (52°C)	1½ to 2 minutes
130°F (54°C)	About 30 seconds
135°F (57°C)	About 10 seconds
140°F (60°C)	Less than 5 seconds
145°F (63°C)	Less than 3 seconds
150°F (65°C)	About 1½ seconds

⚠ WARNING

When using electrical appliances, basic safety precautions to reduce the risk of fire, electric shock, or injury to persons should be followed, including:

- (1) READ ALL INSTRUCTIONS BEFORE USING THIS WATER HEATER.
- (2) Be sure to comply with national gas regulations.
- (3) Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
- (4) 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.)
- (5) Do not pierce or burn.
- (6) Be aware that refrigerants not contain an odour.
- (7) The appliance is intended only for indoor use (excluding laundry rooms) .
- (8) This water heater must be grounded. Connect only to properly grounded outlet. For details, please refer to the “Electrical Wiring” section.
- (9) Install or locate this water heater only in accordance with the provided installation instructions.
- (10) Use this water heater only for its intended use as described in this manual.
- (11) Do not use an extension cord set with this water heater. If no receptacle is

available adjacent to the water heater, contact a qualified electrician to have one properly installed.

- (12) As with any appliance, close supervision is necessary when used by children.
- (13) Do not operate this water heater if it has a damaged cord or plug, if it is not working properly, or if it has been damaged or dropped.
- (14) This water heater should be serviced only by qualified service personnel. Contact nearest authorized service facility for examination, repair, or adjustment.
- (15) Do not use multi-outlet adaptors (i.e. power strips) with this water heater.
- (16) Servicing shall be performed only as recommended by the manufacturer; ducts connected to an appliance shall not contain a POTENTIAL IGNITION SOURCE.

FOR INSTALLATIONS IN THE STATE OF CALIFORNIA

California Law requires that all new and replacement water heaters, and all existing residential water heaters, must be braced, anchored, or strapped to resist falling or horizontal displacement due to earthquake motion. At a minimum, any water heater shall be secured in accordance with the California Plumbing Code, or modifications made thereto by a city, county, or city and county pursuant to Section 17958.5. Generic instructions for California titled "Guidelines for Earthquake Bracing Residential Water Heaters" can be obtained by:

- Writing the California, Department of General Services, Division of State Architect, 1102 Q Street, Suite 5100, Sacramento, CA 95814
- Calling (916) 445-8100
- Following web address:

https://www.dgs.ca.gov/-/media/Divisions/DSA/Publications/gas_shutoff/waterheaterbracing

SAVE THESE INSTRUCTIONS

1 Safety Notices (Please be Sure to Abide)



DANGER

An immediately hazardous situation that will result in death or serious injury.



WARNING

A potentially hazardous situation that could result in death or serious injury and/or damage to property.

⚠ CAUTION

A potentially hazardous situation that may result in minor or moderate injury.

NOTICE

Attention is drawn to the need to observe a specified procedure or maintain a specific condition.

⚠ DANGER

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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.

- (1) 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).
- (2) Do not place any flammable items near the unit.
- (3) The appliance shall be stored in a well-ventilated area where the room size corresponds to the room area as specified for operation.
- (4) This unit must not be installed or used in corrosive, flammable, or explosive environments, or in locations with strong magnetic fields, unstable voltage, or other special conditions. Otherwise, it may cause equipment malfunction, reduced service life, or even serious safety incidents such as fire, explosion, or personal injury.
- (5) 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.

- (6) 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.
- (7) Any person who is involved with working on or breaking into a refrigerant circuit should hold a current valid certificate from an industry-accredited assessment authority, which authorizes their competence to handle refrigerants safely in accordance with an industry recognized assessment specification.
- (8) Please adopt safety protection measures before touching the refrigerant pipe, otherwise your hands may be hurt.
- (9) Shut off the power supply before installation, maintenance, or servicing. Improper operation may cause unit damage, electric shock, or fire.
- (10) Do not put a finger or other objects into the air inlet or air return grill.

WARNING

- (1) It is forbidden to stand or place articles on the unit.
- (2) Please cut off the power supply immediately in case of abnormal conditions (such as burning smell).
- (3) During installation, use the specialized accessories and components, otherwise water leakage, electric shock or fire hazard may occur.
- (4) Be sure to adopt independent power circuit.
- (5) 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.
- (6) It is forbidden to change the power cord, socket or grounding mode without authorization.
- (7) 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.
- (8) Do not operate the unit with wet hands. Do not make the unit wet, otherwise malfunction or electric shock will occur. ensure that the unit will not be cleaned by water rinsing under any circumstance.
- (9) If any part of the unit gets wet, immediately stop using it and contact a

qualified installer or service agent for replacement. Do not attempt to repair it yourself. Replacement is mandatory!

- (10) 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.
- (11) 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. Do not stop the unit's operation by directly cutting off the power supply, unless in an emergency.

CAUTION

- (1) Hydrogen gas builds up in a hot water system when it is not used for a long period (two weeks or more). Hydrogen gas is extremely flammable. If the hot water system has not been used for two weeks or more, open a hot water faucet for several minutes at the kitchen sink before using any electrical appliances connected to the hot water system. Do not smoke or have an open flame or other ignition source near the faucet while it is open.
- (2) 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.
- (3) The unit should be stored with protective measures against mechanical damage caused by accident.
- (4) Precautions shall be taken to avoid excessive vibration or pulsation.
- (5) Steel pipes and components shall be protected against corrosion with a rustproof coating before applying any insulation.
- (6) Flexible pipe elements shall be protected against mechanical damage excessive stress by torsion ,or other forces ,and that they should be checked for mechanical damage annually.
- (7) Keep ventilation openings clear of obstruction.
- (8) 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.



This marking indicates that this product should not be disposed with other household wastes throughout the U.S. 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.

NOTICE

- (1) Please arrange the drain pipe according to the instruction manual.
- (2) Adopt proper measures to protect the unit from small animals because they may damage the electric components and cause malfunction of the unit.
- (3) 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.
- (4) Only use soft dry cloth or slightly wet cloth with neutral detergent to clean the casing of the unit. Do not use organic solvent to clean the unit.

2 Product Introduction

2.1 Introduction of Components

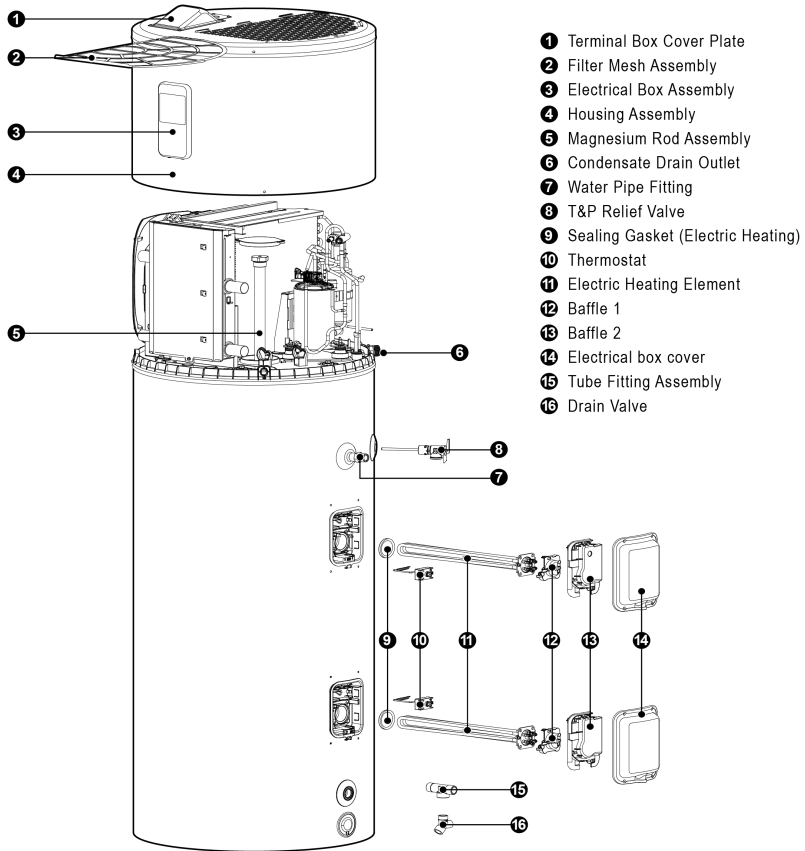


Fig. 2.1-1 Unit components

2.1.1 Accessories

For the standard accessories of the product, please refer to the actual. In the installation diagram, engineering consumables such as valves and pipes that are not equipped must be purchased separately according to actual requirements (e.g. thermostatic mixer tap, waterway filter, non-return valve check valve, pressure regulation valve, cut-off valve, male threaded coupler, tee-junction, water pipe, mounting frame, self-temperature limitation heating belt, air pipes, etc.).

2.2 Product Parameters

2.2.1 General

Model		KHW50R32	KHW70R32
First Hour Rating(FHR) ⁽¹⁾	gal	80	100
Uniform Energy Factor(UEF) ⁽¹⁾	—	4.0	4.0
Heating capacity ⁽²⁾	W	2400	2400
Power input ⁽²⁾	W	570	570
COP ⁽²⁾	—	4.20	4.20
Refrigerant	Name	R32	
	Charge	oz	19.4
		kg	0.55
GWP	—	675	
Heat pump operating range	°F (°C)	35.6~113 (2~45)	
Maximum and minimum set water temperatures(The heat pump can heat water up to 60°C)	°F (°C)	95~149 (35~65)	
Sound pressure level ⁽³⁾	dB(A)	49	49
Nominal volume of the tank	gal	50	70
Rated volume of the tank	gal	54	68
Dimensions(W×D×H)	in (mm)	26-1/8X25-1/2X66-15/16 (664X648X1700)	26-1/8X25-1/2X76-1/8 (664X648X1934)
Ship dimensions(W×D×H)	in (mm)	29-1/4×29-1/4×74-3/16 (743×743×1885)	29-1/4×29-1/4×83-1/4 (743×743×2115)
Unit Wt.	LBS	240	265
Approx. Ship Wt.	LBS	289	315
Tank maximum working pressure	psi	150	
Compressor	—	DC Inverter,	
Fan	—	DC Inverter,	

2.2.2 Electrical specifications

Model		KHW50R32	KHW70R32
Power supply	—	208V/240V ~ 60Hz	
Fan Motor Horsepower	HP	0.042	
Volts AC		208V	240V
Rated Input Current of Compressor	A	5.95	4.85
Max. Rating of Overcurrent Protective Device	A	30	30
Min. Circuit Ampacity	A	30	30
Upper Electric Heater	W	3380	4500
Lower Electric Heater	W	3380	4500
Maximum Allowable Ratings	W	5728	

2.2.3 Connections specifications

Model		KHW50R32	KHW70R32
Connections for the domestic water circuit	—	3/4"	
Air inlet part diameter	in (cm)	8 (20)	
Air outlet part diameter	in (cm)	10 (25)	

NOTICE

⁽¹⁾ FHR and UEF parameters test in accordance with 10 CFR Part 430 (up to date as of 12/21/2023). The technical parameters test in factory default standard water heating mode.

⁽²⁾ Heating capacity and COP parameters test in accordance with Outdoor temperature: 20°CDB/15°CWB; Water tank temperature (start/end): 15°C/55°C. The technical parameters test in ECO mode.

⁽³⁾ The sound pressure level test in semi-anechoic style chamber.

The temperature of the water in the heater is regulated by the water heater wired controller. To comply with safety regulations the temperature was set at 120°F

(49°C) before the water heater was shipped from the factory. This temperature setting corresponds to the default standard mode. Hotter water increases the potential for Hot Water SCALDS.

Refer to the operating Instructions of wired controller for detailed instructions on how to adjust water temperature settings and change operating modes.

Please always see the nameplate for the exact data as this table is subject to change.

2.3 Product Performance Curves

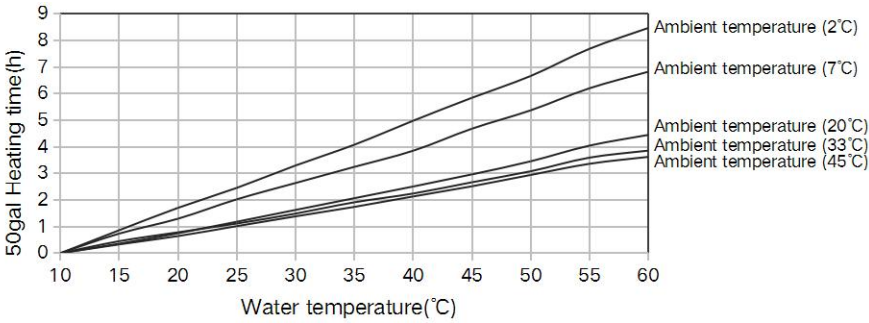


Fig. 2.3-1 KHW50R32 heating time to different hot water target temperatures for different ambient temperatures

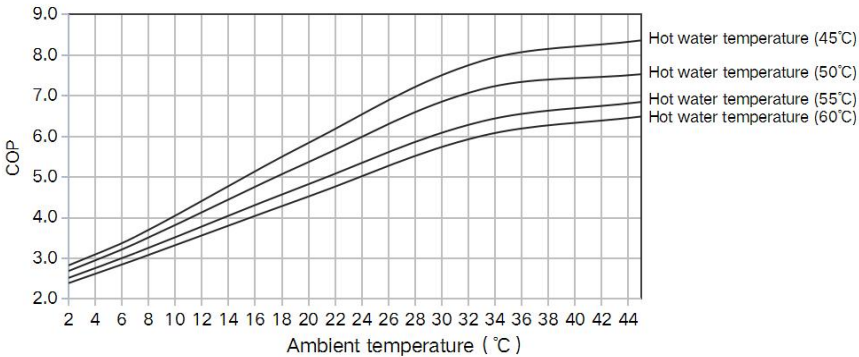


Fig.2.3-2 KHW50R32 COP at different ambient temperatures when heating to different hot water target temperatures

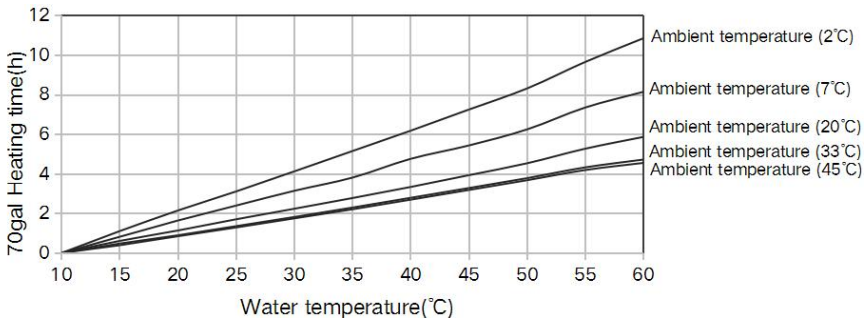


Fig. 2.3-3 KHW70R32 heating time to different hot water target temperatures for different ambient temperatures

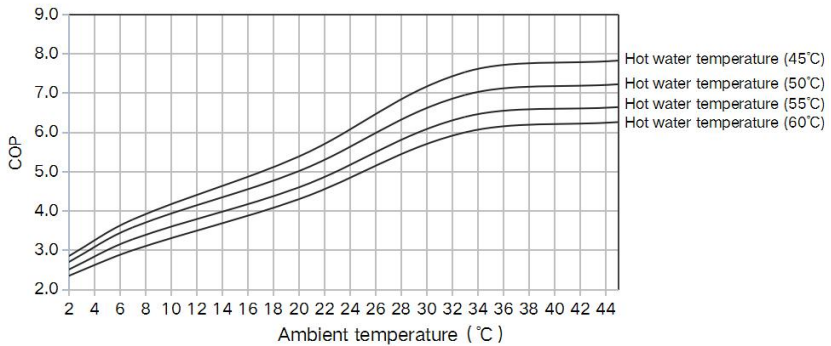


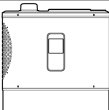
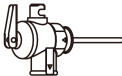
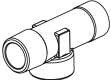
Fig.2.3-4 KHW70R32 COP at different ambient temperatures when heating to different hot water target temperatures

NOTES:

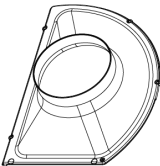
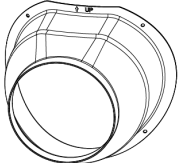
- ① The above curve data are fitted based on the test parameters of Gree Laboratory(The test conditions are: initial water temperature: 10°C, power supply: 240V ~ 60Hz; in a new unit with clean heat exchangers; in ECO mode). So there will be about 5% tolerance and the curves are for reference only.
- ② When the electrical heater and heat pump are together started to heating, the heating time will be decreased. On the other hand, COP will decrease and power consumption will increase.

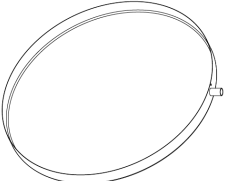
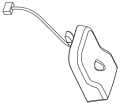
3 Before Installation

3.1 Accessories

	Main Unit The Main unit including the heat pump & storage tank.
	T&P Relief Valve Pressure Temperature Relief Valve (May be pre-fitted)
	Owner's manual In-depth installation & maintenance detail on the product
	Owner's manual (Controller) In-depth control descriptions detail on the product
	Water Pipe Fitting Water outlet pipe fitting of water storage tank
	Tube Fitting Assembly Water inlet tube fitting assembly of water storage tank
	Drain Valve Water inlet drain valve of water storage tank

3.2 Optional Accessories

Schematic diagram of part	Instruction	Accessory model
	Inlet Duct Adapter Allows for ducting to be connected on the top inlet	CF1230
	Outlet Duct Adapter Allows for ducting to be connected to the unit	CF1231

	Drain pan Collect the water leaked from the water tank	CF1232 CF1260(Only drain pan)
	Shutoff Valve Automatic shut off of water supply to unit	
	Water tank leakage detection assembly Automatic detection of tank leakage	

3.3 Transporting

The following should be adhered to when transporting the unit:

- (1) Transport the product to the installation site using a fork-lift truck or pallet truck.
- (2) Don't incline the unit more than 25° from vertical when moving, and keep it vertical when installing.
- (3) Avoid scratching or damaging the unit by using protective coverings where applicable.
- (4) As this unit is heavy it needs to be carried by two or more persons, to avoid injury and/or damage.

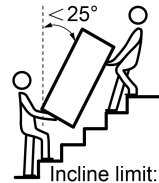


Fig. 3.3-1 Diagram of transporting the unit

4 Installation

4.1 Installation Safety Precautions

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



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- (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) Installation must be performed in accordance with the requirement of NEC and CEC by authorized personnel only.
- (3) 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.
- (4) The unit adopts environment-friendly, colorless, odorless and flammable R32 refrigerant.
- (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) The unit shall be stored to prevent mechanical damage caused by accidents.
- (9) The unit shall be stored in a room without continuous fire source (such as open fire, ignited gas appliance, and open electric heater).
- (10) 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.

- (11) 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.
- (12) 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.
- (13) According to the relevant laws, regulations and electrical standards, 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 1/8".
- (14) 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.
- (15) 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.
- (16) 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.
- (17) Communication cables should be laid out through cabling through, conduit tube or cable channel.
- (18) The water heater should not be located in an area where leakage of the tank or connections will result in damage to the area adjacent to it or to lower floors of the structure. Where such areas cannot be avoided, it is recommended that a suitable drain pan, adequately drained, be installed under the water heater.
- (19) Check with your local and state authorities for any local or state codes that apply to your area. In the absence of local and state codes, follow National Fire Protection Association (NFPA-70) and the current editions of the National Electric Code (NEC) and the International Plumbing Code (IPC). The instructions in this manual comply with national codes, but the installer is responsible for complying with local codes.
- (20) This water heater must be installed in accordance with these instructions, local codes, utility codes, utility company requirements or, in the absence of local codes, the latest edition of the National Electrical Code. It is available from some local libraries or can be purchased from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269 as booklet ANSI/NFPA

70.Canadian installations should refer to CSA22.1, a copy can be purchased from the Canadian Standards Association, 5050 Spectrum Way, mississauga, ONT L4W 5N6.

- (21) Installer shall ensure that nameplate and the following warning labels shall be visible and not covered after installation.
- 1) **WARNING** - Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer. Should a repair be necessary, contact your nearest authorized service dealer. Any repairs carried out by unqualified personnel may be dangerous. 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.) Do not pierce or burn. Appliance filled with flammable gas R32. For repairs, strictly follow manufacturer's instructions only. Be aware that refrigerants does not contain odour. Read specialist's manual.
 - 2) **WARNING** - Risk of fire. Dispose of properly in accordance with federal or local regulations. Flammable refrigerant Used.
 - 3) **WARNING** - Risk of fire. Flammable refrigerant used. To be repaired only by trained Service personnel. Do not puncture refrigerant tubing.

4.2 Unit Installation Diagram

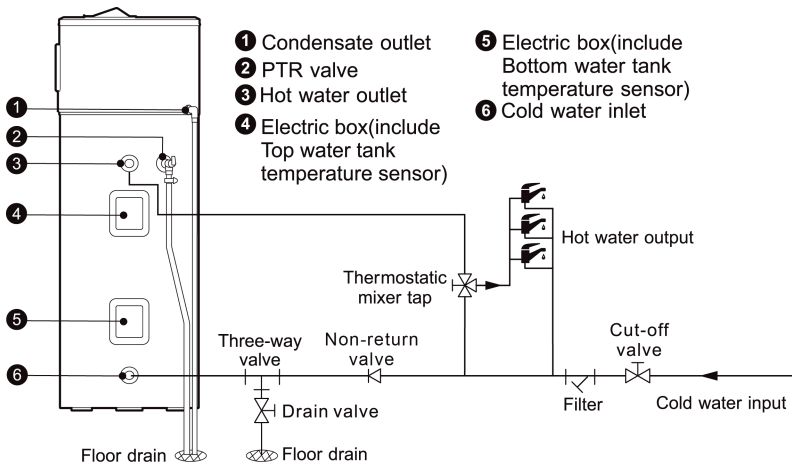


Fig. 4.2-1 Unit installation diagram

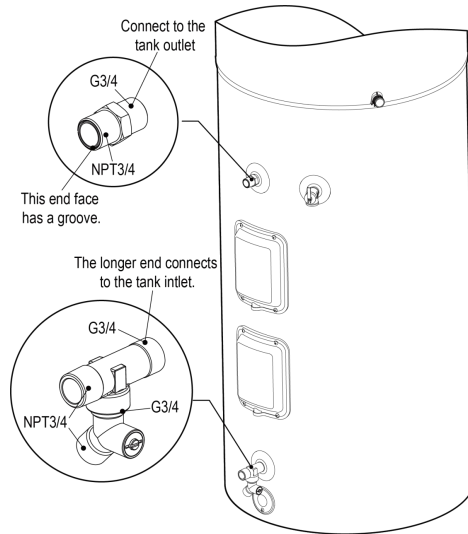


Fig. 4.2-2 Diagram of inlet and outlet connector

NOTICE

- Installation in a confined space will lead to higher power consumption if adequate ventilation is not provided.
- The non-return valve is not equipped , it must be purchased separately according to actual requirements.

CAUTION

- Systems must be plumbed as per the above figure.
- The T&P Relief Valve outlet is a 3/4"female (internal thread) connection.
- All hot water plumbing must be insulated for safety & heat retention.
- Even if the water heater thermostat is set to a relatively low temperature, hot water can scald. Install Thermostatic Mixing Valves at point-of-use to reduce the risk of scalding.
- A Thermostatic Mixing Valve (conforming to ASSE 1017) ,shall be installed on the hot water supply line, mixes hot water from the water heater with cold water to more precisely regulate the temperature of hot water supplied to fixtures. The Thermostatic Mixing Valve is not equipped. it must be purchased separately according to actual requirements.
- If the water supply pressure exceeds the rated pressure, a reduction valve should be installed in the water inlet line. Most codes allow a maximum incoming water pressure of 80 psi. We recommend that the minimum operating pressure should not exceed 50 psi, and the maximum operating pressure should not exceed 60 psi.
- Connect the Thermal Expansion Tank (available at your local plumbing supplier) to the cold water supply line near the water heater. The expansion tank contains a bladder and an air charge. To work properly, the Thermal Expansion Tank must be sized according to the water heater's tank capacity and pressurized to match the home's incoming water pressure. Refer to the installation instructions provided with the Thermal Expansion Tank for installation details.

⚠ CAUTION

- To limit your home's water pressure: Locate your home's Pressure Reducing Valve (PRV) on the main incoming (cold) water supply line and adjust the water pressure control to between 50 and 60 psi. If your home does not have a Pressure Reducing Valve, install a PRV on the home's main water supply line and set it to between 50 and 60 psi. Pressure Reducing Valves are available at your local plumbing supplier.
- Water pipes are allowed to be routed only after the unit has been installed properly. Note that don't let dust or other foreign matters enter the pipe system.
- When all pipes have been in place, take a leak test and then insulate all pipes. Special attention shall be drawn to the valves and joints. The insulation material shall be at least 1 (15mm) thick.
- Pipes must be heat-resistant and durable.

4.3 Structural Dimension

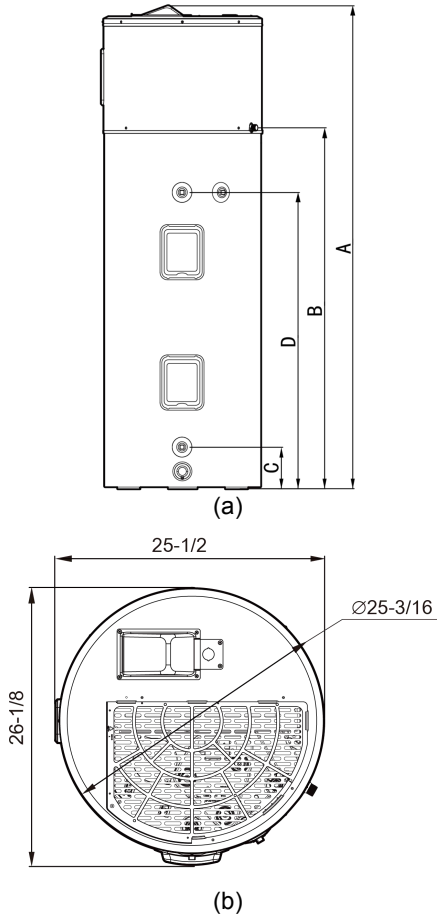


Fig. 4.3-1 Structural Dimensions

Model Parameter	KHW50R32	KHW70R32
A	66-15/16	76-1/8
B	47-11/16	56-13/16
C	6-1/2	6-1/2
D	37-15/16	46-5/8

4.4 Installation Requirements

- (1) Ensure that the sound and airflow of the unit will not affect people, animals, or plants, etc.
- (2) Ensure that the unit has good ventilation. If a canopy is installed to protect the unit, it should be noted that heat dissipation and heat absorption shouldn't be affected.
- (3) The unit should be installed in a place with a solid foundation and make sure that the unit is installed upright. The impact of strong wind, typhoon and earthquake or other natural disasters should be fully considered, and the installation should be reinforced.
- (4) Ensure the reliable connection of the drain pipe of the unit and lead the drain pipe to a proper place for drainage.
- (5) This unit is equipped with a 3/4" NPT female primary condensate connection. Use MIP fittings for connections
- (6) DO NOT reduce drain line size less than connection size provided on condensate drain.
- (7) All drain lines must be pitched downward away from the unit a minimum of 1/8" per foot of line to ensure proper drainage.
- (8) Drain lines must include a P-trap if connected to a sewer pipe.
- (9) DO NOT allow condensate to drain into the water heater drain pan.
- (10) The drain line should be insulated where necessary to prevent sweating and damage due to condensate forming on the outside surface of the line.
- (11) When making condensation connections to the primary connection, Do not overtighten! These connections should be hand tightened only. Overtightening could crack or damage the condensate drain pan.

- (12) The unit must be installed in a place with rain and sun shading devices where it can be sheltered from rain.
- (13) The unit and water system piping and valves should be installed as far as possible in the ambient temperature above 0°C, and preferably installed near the main hot water point.
- (14) In order to avoid inconvenience or property damage to user due to water leakage caused by improper connection of water pipe or normal water release of safety valve, it is forbidden to install the unit in a place without good drainage.
- (15) The unit shall be located upright. Level the unit on the ground using a spirit level to prevent abnormal condensate drainage. The installation ground must be flat and spacious, and the foundation shall be solid enough to bear four times of the weight of the unit after the unit being filled with water. It is strictly forbidden to hang the unit or hang it on an external wall. When installing the unit, it's necessary to use fixing belt to protect the unit. If the unit is installed in areas with strong winds, typhoons, or earthquakes, in addition to using fixing belt for installation, additional reinforcement measures must be taken to prevent the unit from tipping over under external forces, thus causing unnecessary unit damage or personal injury. The fixing belt of the unit only serves as an auxiliary fixation and cannot bear the weight of water tank.

4.4.1 Installation Requirements of Water System Piping

- (1) DO not apply heat to the HOT or COLD water connections. If sweat connections are used, sweat tubing to adapter before fitting adapter to the water connections on heater. Any heat applied to the water supply fittings will permanently damage the dip tube and/or heat traps.
- (2) Each valve must be installed properly and the installation sequence must be consistent with the installation diagram of the unit.
- (3) The pipelines shall be laid centrally. Hot water outlet of the unit shall not be far from the place where the hot water is taken. There should be floor drain near the unit.
- (4) If the tap water contains impurities, a water filter must be installed.

- (5) The connecting parts of the water pipe must be sealed with tape or sealant to prevent water leakage.
- (6) All water system pipelines, valves and pipe joints, etc. must be insulated. It is recommended that the thickness of the insulation pipe is not less than 1/2" (15mm).
- (7) When the installation environment temperature is below 0°C, the pipeline must be equipped with self-limiting temperature heater.
- (8) A new combination Temperature & Pressure Relief Valve (T&P Relief Valve), complying with the Standard for Relief Valves for Hot Water Supply Systems, ANSI Z21.22/CSA 4.4, is factory installed and must remain in the opening provided and marked for the purpose on the water heater. No valve of any type should be installed between the relief valve and the tank. The pressure will gradually rise during the heating process of the water tank, and a small amount of water shall be discharged through the T&P Relief Valve to relieve the pressure. If it is not installed or installed incorrectly, expansion, deformation or any other damage may occur to the unit, and even personal injury will be caused. The T&P Relief Valve must be connected to the drain hose and the connection must be reliable to prevent falling off; the drain hose shall be introduced into the floor drain naturally, and there cannot be bulges, entanglement, folding, etc. After connecting to the floor drain, the spare hose must be cut off so as not to cause poor drainage and the water in the hose will not be frozen in low temperature environment. The type of the T&P Relief Valve is an external pressure relief valve. The discharge pipe connected to the T&P Relief Valve must be installed in a continuously downward direction and in a frost-free environment. And it is forbidden to block the exhaust hole of floor drain.
- (9) Connect the outlet of the T&P Relief Valve to a suitable open drain so that the discharge water cannot contact live electrical parts or persons and to eliminate potential water damage. Piping used should be of a type approved for hot water distribution. The discharge line must be no smaller than the outlet of the valve and must pitch downward from the valve to allow complete drainage (by gravity) of the T&P Relief Valve and discharge line. The end of the discharge line should not be threaded or concealed and should be

protected from freezing. No valve of any type, restriction or reducer coupling should be installed in the discharge line.

- (10) DO NOT connect other plumbing to the T&P Relief Valve plumbing; it must go directly to a suitable open drain. DO NOT connect the T&P Relief Valve plumbing to the condensate plumbing.
- (11) The water quality for the water heater should comply with the local sanitation standard for the domestic drinking water and refer to the following water quality requirements.

Table 4.4-1 Water Quality Requirements

pH (77°F)	6.8~8.0	Turbidity (scattering turbidity unit)/NTU	<1
Chloride/(mg/L)	<50	Iron/(mg/L)	<0.3
Sulfate/(mg/L)	<50	Silica (SiO ₂)/(mg/L)	<30
Total hardness (calculated in CaCO ₃)/(mg/L)	<70	Nitrate (calculated in N)/(mg/L)	<10
Conductivity (77°F)/(μs/cm)	<300	Ammonia nitrogen (calculated in N)/(mg/L)	<1.0
Total alkalinity (calculated in CaCO ₃)/(mg/L)	<50	Sulfide/(mg/L)	Shall not to be detected

4.5 Installation Space

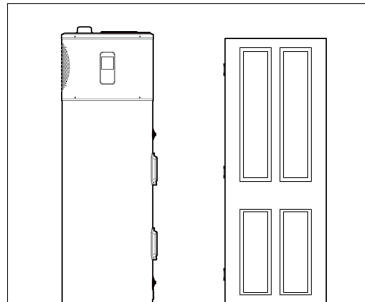
NOTICE

- This water heater will operate in rooms less than 700 ft³ down to 450 ft³ but at reduced energy efficiency and reduced performance output.
- When unit is operated in a small enclosure, a door or wall with a minimum of 2.3 ft² of louvers is recommended to provide proper air changes for unit function.
- The minimum clearance between this product and combustible surfaces is 5 feet.

4.5.1 Not Ducted Installation Space

Room size: Larger than 700 ft³(e.g. 7'x 10'x 10').

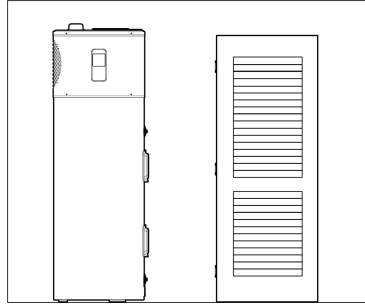
Requirements: No additional ventilation needed.



(a)

Room size: Smaller than 700 ft³(e.g. 7'x 10'x 10').

Requirements: Full louvered door or two louvers top and bottom.

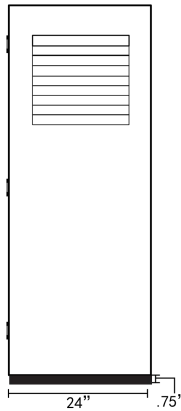


(b)

Room size: Small closet.

Requirements:

- (1) Air gap under door equal to 18 in² (0.75" clearance).

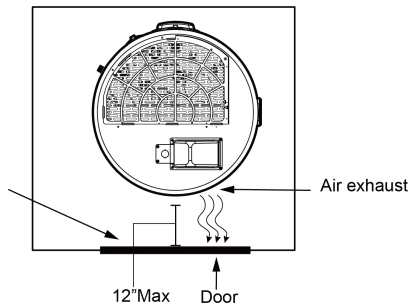


(c)

- (2) Louver must be located the same height on door as the air exhaust on heater.

- (3) Heater air exhaust must be positioned toward louver within one foot of door.

The clear height above the heater's air inlet shall be more than 11.8 inch.



(d)

Fig. 4.5-1 Not Ducted Installation

4.5.2 Ducted Installation Space

NOTICE

- Install the ductwork according to the installation instructions in Attachment I .

Room size: Any size room.

Requirements: Air gap under door equal to 18 in²(0.75" clearance).

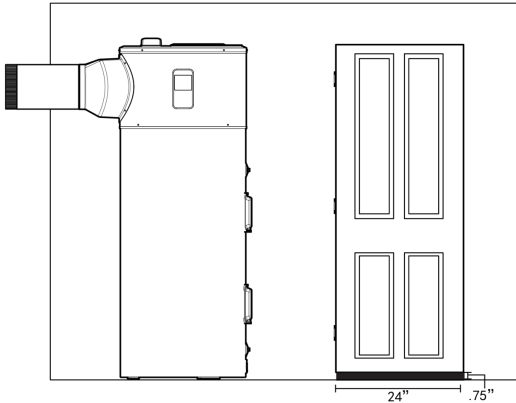


Fig. 4.5-2 Ducted with inlet or outlet duct

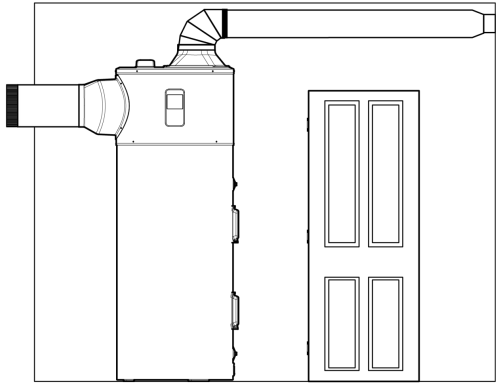


Fig. 4.5-3 Ducted with inlet and outlet duct

4.6 Electrical Installation

WARNING

- DO NOT turn on the electrical supply or operate this water heater unless it is completely full of water.
- Please be sure it is installed by professional personnel according to the relevant standards of the region or country where it is installed. All wiring must be in accordance with the National Electrical Code, ANSI/NFPA No.70, latest edition, and all applicable state and local codes.
- 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 ground-fault circuit interrupter (GFCI) and circuit breaker that have sufficient capacity and can be completely disconnected from the power supply. The ground-fault circuit interrupter (GFCI) 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. The ground-fault circuit interrupter (GFCI) and circuit breaker must be in accordance with the National Electrical Code, ANSI/NFPA No.70, latest edition, and all applicable state and local codes.
- The unit must be grounded reliably! The grounding wire should connect with special device of buildings. The ground connection must be completed before making line voltage connections. Failure to do so can result in electrical shock, severe personal injury or death.
- 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.

4.6.1 Electrical Wiring

4.6.1.1 Circuit Sizing And Wire Size Guide

Maximum Wattage	Recommended Over Current Protection (Fuse or Circuit Breaker Amperage Rating)	Copper Wire Size AWG Based on NE.C Table 310-16 (75°C)
	240V	240V
5800	30	8

4.6.1.2 Wiring Diagram

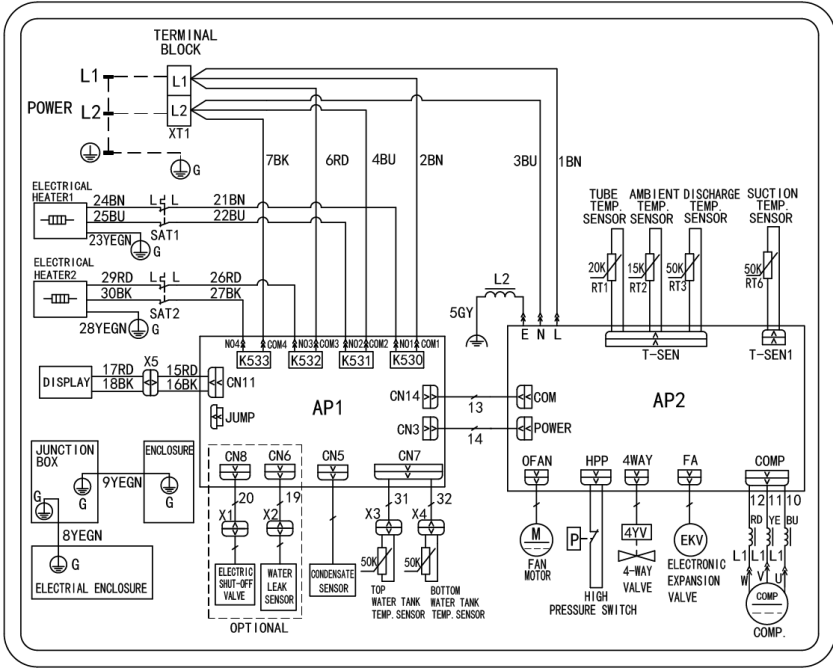


Fig.4.6-1 Wiring Diagram

4.6.2 Electrical Wiring & Connection Requirements

- (1) After completing wiring connection, the power cord and communication wires must be tightly pressed with a fixed wire clamp. The fixed wire clamp should be pressed on the outer sheath of the connection wire.
- (2) When arranging wiring connection for the external unit, the communication cord of wired controller shall be separated from the power cord. The minimum distance between the parallel wires shall be greater than 20cm. Otherwise, the communication of the unit might be abnormal. The strong and weak wires shall be covered separately with wire sleeves.

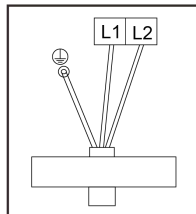


Fig.4.6-2 External wiring and fixing figure

5 Commissioning Operation

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.
- Refrigeration technicians, 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.
- Hydrogen gas builds up in a hot water system when it is not used for a long period (two weeks or more). Hydrogen gas is extremely flammable. If the hot water system has not been used for two weeks or more, open a hot water faucet for several minutes at the kitchen sink before using any electrical appliances connected to the hot water system. Do not smoke or have an open flame or other ignition source near the faucet while it is open.

5.1 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.

Table 5.1-1 Unit Installation Checklist

Items to be checked	What may happen if the installation is improper
Whether the unit is installed reliably.	The operation of the unit produces noise or vibration, and even causes danger such as falling.
Whether there are obstacles at the air outlet and air inlet of the unit.	The unit operates abnormally.
Whether the T&P Relief Valve of water tank is installed.	The operation pressure of water tank is high and there may be safety hazard.
Whether a reduction valve is installed when the inlet pressure of water tank is too high.	The operation pressure of water tank is high. The safety valve continuously discharges water and produces abnormal noise.
Whether all parts of the water pipeline have been properly insulated.	The performance of the unit may be affected and the pipeline may be damaged by freezing.
Whether the power supply voltage is consistent with the product nameplate, and whether the wire type meets the regulations.	The unit has malfunction or the parts are burned out.

5.2 Trial Operation

NOTICE

- The water tank of the unit must be filled with water before the unit can be powered on.
- Disconnect all power to the water heater if it has been subjected to over heating, fire, flood, physical damage.
- DO NOT turn on water heater if cold water supply shut-off valve is closed.

- If there is any difficulty in understanding or following the Operating Instructions or the Care and Cleaning section, it is recommended that a qualified person or serviceman perform the work.

The whole unit can be debugged only after the unit has passed the installation inspection. The debugging steps are as follows:

- (1) Water recharge of the unit: refer to the installation tips label on the water tank of the unit to perform water recharge. Ensure that there is no water leakage in the pipelines, joints, etc.
- (2) Energization of the whole unit: After the unit is energized, observe whether the display of wired controller is normal. If there is no fault, it is normal.
- (3) System time calibration of wired controller: set the time according to the manual of the wired controller.
- (4) Operation of the whole unit: turn on the unit with the wired controller. When the wired controller displays heating icon, check whether the unit is operating normally. Normal judgement criterion: the fan is running normally, the whole unit is running stably without obvious vibration and abnormal noise. The unit can be delivered to the user after running for at least 20 minutes without abnormality.

6 Maintenance

In the process of produce maintenance, please contact our designated dealer or local service center when maintaining or replacing related components.

6.1 Water Recharge, Drainage and Cleaning

The water recharge and drainage of the unit shall be followed up throughout the whole process to avoid water leakage accidents caused by wrong operation. Before the process of water recharge, drainage or cleaning, please turn off the power supply. Perform the following operations refer to the 4.2-1 Unit installation diagram.

- (1) Water recharge
 - 4) Open the cold water inlet valve.
 - 5) Fill the unit with water by opening the hot water outlet valve and a hot water tap.
 - 6) Once water flows from the hot water tap, ensure all air in the system is bled then close the hot water tap.

- (2) Water drainage
 - 1) Close the cold water inlet valve & open a hot water tap.
 - 2) Open the drainage pipe valve; drain out all the water in the inner tank.
 - 3) Close the drainage pipe valve, re-fill the inner tank with water, and turn the power back on.
- (3) Cleaning of water tank of the unit

Repeat the water drainage and recharge operations until the water discharged from the water tank of the unit is clear. Please clean the water tank periodically (every half year) to get good-quality water.

6.2 Maintenance of Anode Rod

NOTICE

- Arrange for an authorised person to inspect the Mg-stick (anode) and replace it if required.

(Frequency: Every Year - Replace if required)

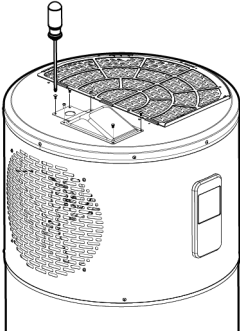
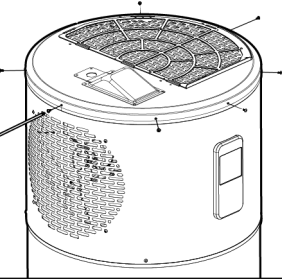
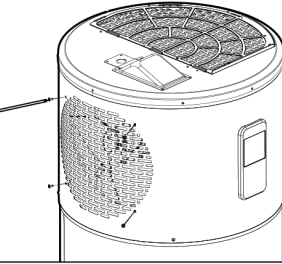
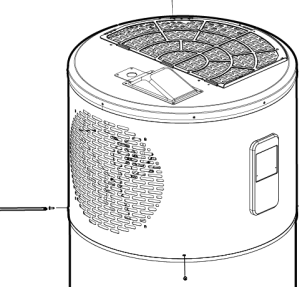
The Mg-stick (anode) protects the inner tank of water tank. When the Mg-stick become degraded the level of protection is diminished. It is recommended that Mg-stick is periodically checked for its level of degradation and gets replaced if required.

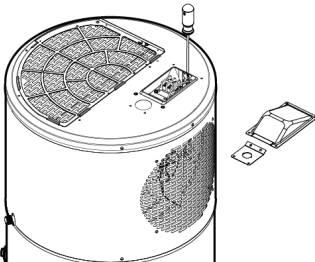
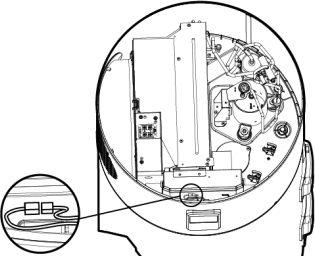
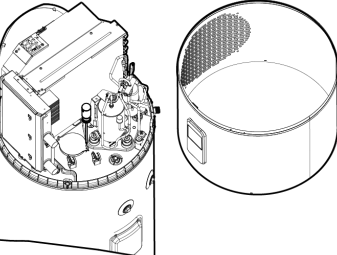
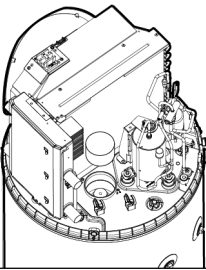
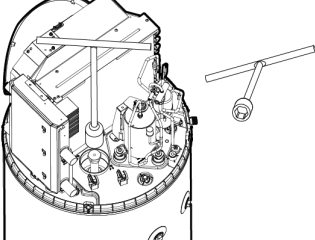
Most water heating industry professionals recommend inspecting the Mg-stick yearly. The coating of water tank is designed for normal quality water. When using more corrosive water, the Mg-stick is checked more frequently. When in doubt consult a local water heating professional.

To check the protective anode:

- (1) Cut off the power supply.
- (2) Close the cold water inlet valve & open a hot water tap.
- (3) Open the drainage pipe valve, and wait for discharging the water.
- (4) Remove the power wire.
- (5) Remove the top cover and external cover.
- (6) Remove the Mg-stick cover, and unscrew the Mg-stick, and extract it directly.
- (7) Check the Mg-stick, if Mg-stick is in an unsuitable condition, replace with a new one.
- (8) Restitute the unit and debug anew.

When removing the magnesium rod, please follow the steps below.

Magnet rod removal steps		
Step	Schematic Diagram	Operation instructions
1		Remove the 6 screws of the junction box cover.
2		Remove the 7 screws on the top cover of the unit.
3		Remove the 4 screws at the air outlet.
4		Remove the 4 screws at the bottom of the outer cover.

Magnet rod removal steps		
Step	Schematic Diagram	Operation instructions
5		Remove the two parts of the junction box cover. Then, remove the wiring screw.
6		Remove the cover, Disconnect the connector at the display board .
7		Pull up the outer cover and remove it. Remove the two screws at the magnesium rod cover.
8		Remove the sponge at the magnesium rod opening, and the magnesium rod can be seen.
9		The magnesium rod can be removed and replaced using a socket tool.

6.3 Maintenance of T&P Relief Valve

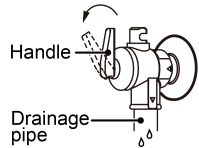
NOTICE

- Hot water will be released. Before operating the T&P Relief Valve manually, check that it will discharge in a safe place. If water does not flow freely from the end of the discharge pipe, turn the power to the water heater OFF. Call a qualified person to determine the cause.
- Before manually operating the relief valve, make certain no one will be exposed to the danger of coming in contact with the hot water released by the valve. The water may be hot enough to create a scald hazard. The water should be released into a suitable drain to prevent injury or property damage.
- If the temperature and pressure relief valve on the water heater discharges periodically, this may be due to thermal expansion in a closed water system. Contact the water supplier or your plumbing contractor on how to correct this. **DO NOT** plug the relief valve outlet.

(Frequency: Every Half Year - Replace if required)

It is recommended to operate the T&P Relief Valve periodically to ensure water flows freely. If water doesn't flow freely, the T&P Relief Valve will need to be replaced.

- (1) Locate the T&P Relief Valve on the right hand side of the unit.
- (2) Carefully release the valve using the lever & release some water from the tank.



NOTE: Water expelled may be extremely hot.

- (3) If water flows freely the PTR appears to still be in a suitable working condition.
- (4) If water does not flow freely it would appear the T&P Relief Valve is due for replacement.
- (5) If the T&P Relief Valve needs replacing, please apply for further assistance.

6.4 Air Filter Maintenance

It is recommended to clean the filter on top of the heat pump every half year. Clean by washing with mild detergent and water. Dry and replace. First, remove the fixed screws, then take out the filter by sliding it sideways. See Figure below.

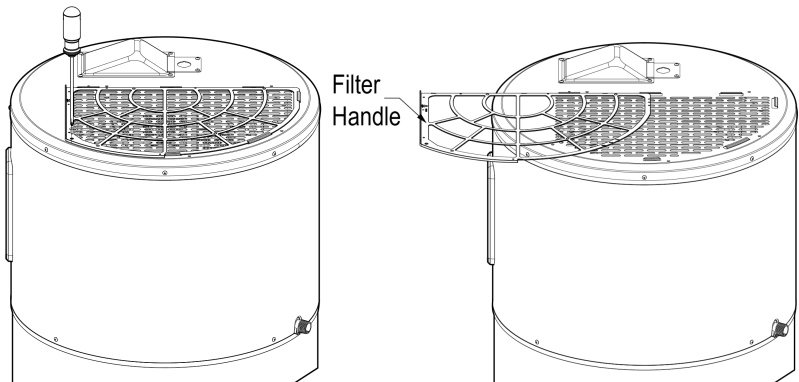


Fig.6.4-1 Air Filter

6.5 Maintenance in Winter

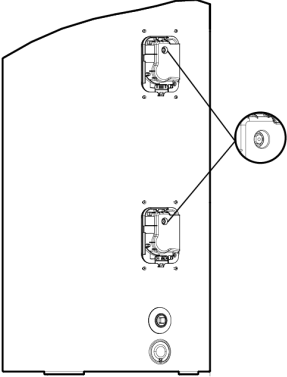
When using this product in winter, please ensure that the unit is always energized. If the unit won't be used, make sure to drain the water in the water tank and pipeline of the unit to avoid freezing and cracking of the system.

6.6 Thermostat Reset Operation

When the thermostat of electrical heater is disconnected, the reset button will be popped up. You need to remove the electrical box cover, and press the reset button and reset the thermostat.

When perform the thermostat reset operation, please follow the steps below.

Thermostat reset operation steps		
Step	Schematic Diagram	Operation instructions
1		Remove the screws of the electrical box, 4 screws each for the upper and lower electrical boxes, then remove the electrical box.

Thermostat reset operation steps		
Step	Schematic Diagram	Operation instructions
2		After disassembly, a round hole can be seen at the electrical box baffle.
3		The red contact point here is the reset switch. Press down here, and once you feel the feedback, the reset is complete.

7 Common Phenomena

Phenomenon	Cause
The displayed water temperature decreases significantly but hot water is still available.	The temperature sensor that shows the water temperature is located in the middle-upper part of the tank and only senses the local hot water temperature at this location. In the process of using water, when the displayed water temperature decreases, the part of the water tank higher than the position of this sensor can still release hot water with temperature higher than the current displayed water temperature, about 1/5 to 1/3 of the water tank.
The displayed water volume decreases significantly but hot water is still available.	The unit estimates the hot water volume through the temperature of the two temperature sensors in the middle-upper part and middle-lower part of the water tank. It is a rough judgment, and the water volume display bar is for reference only. In the process of using water, when the water quantity display bar changes from one bar to empty, there is a certain amount of hot water available in the tank, about 1/5 to 1/3 of the water tank.

Phenomenon	Cause
The displayed water temperature decreases significantly but the unit doesn't operate.	Please check whether the timer or preset function is enabled. With this function, the unit only operates within the set time range. If the function is enabled, please calibrate whether the system time and function opening time are accurate, or cancel this function; Please check whether the "Sunflower" energy-saving heating function is enabled. This function only produces hot water in the period with high ambient temperature every day to achieve energy saving purposes. If it cannot meet your needs and habits, please cancel this function; Please check whether the "Holiday" functions are enabled; The above functions can be cancelled by setting the wired controller or restoring the factory settings.
The unit is often turned on for heating.	In actual use, the hot water is in the middle-upper part of the water tank and the cold water is in the middle-lower part of the water tank. The unit will automatically judge to start heating according to the water temperature. The times that the unit starts heating will not lead to a significant difference in energy consumption, and the hot water is stored in the water tank.
The volume of hot water decreases in winter.	The hot water stored in the water tank will not actually reduce, but because of the low temperature of tap water in winter, more hot water in the tank needs to be consumed when bathing. It is recommended to appropriately increase the set water temperature or go bathing in turns with suitable intervals.
Water heating time is long.	The unit is a storage type water heater equipped with a large water tank volume, and it takes a certain time to heat a whole tank of water. Water heating time in winter is longer than that in summer, it is recommended to heat water in advance or keep the unit on all day for use.
The unit is frosting.	The ambient temperature is low and frosting is a normal operation process. The unit will defrost regularly to ensure reliable operation.
Condensate flows out from the unit.	It is a normal phenomenon when the unit is running.
A small amount of water is discharged from the T&P Relief Valve.	During heating operation, the water tank will discharge a small amount of water through the T&P Relief Valve to relieve the pressure. This is a normal phenomenon.
After-sales Service	
The list of common fault codes can be found in the manual of the wired controller. If the product you purchased has a quality problem or a fault is displayed on the wired controller or other conditions shall be solved, please contact our designated dealer or local service center in time.	

8 Detailed Installation Instructions for Unit Fixing Belt

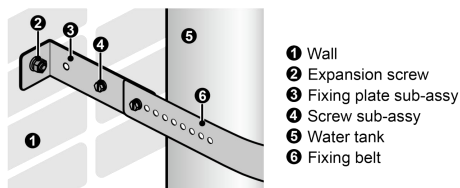


Fig. 8-1 Introduction to Related Parts of Fixing Belt

Table 8-1 Detailed Operation of Installing Fixing Belt

Step 1: Confirm the installation location of the fixing belt. The installation height H of the expansion screw can be appropriately increased or decreased according to actual needs, but it must be ensured that the fixing belt cannot press against the gaskets at each pipe port of the water tank of the unit during installation. Step 2: Install expansion screws. Install the expansion screws on the wall.	Step 3: Install the fixing belt. Install one end of the fixing belt on one of the fixing plate subassembly. Step 4: Install the fixing plate subassembly. Install the two sets of fixing plate subassembly on the expansion screws respectively.	Step 5: Fix the unit. Move the unit to the fixing plate subassembly, select the appropriate connection holes on the fixing belt according to the actual installation situation, and use the screw subassembly to complete the fixing.

9 Detailed Maintenance Instructions for Refrigeration System

9.1 Information on Servicing

Aptitude requirement for maintenance man (repairs should be done only be specialists).

- (1) 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.

- (2) 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.

That pipe-work including 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, ASHRAE 15.2, 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.

9.1.1 Qualification of Workers

Qualification of the working personnel for maintenance, service and repair operations should according to UL60335-2-40、CAN/C-SA-C22.2 No.60335-2-40:22 Annex HH. Every working procedure that affects safety means shall only be carried out by competent persons according to Annex HH. Special training additional to usual refrigerating equipment repair procedures is required when equipment with FLAMMABLE REFRIGERANTS is affected.

9.1.2 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, the following precautions shall be complied with prior to conducting work on the system.

9.1.3 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.

9.1.4 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.

9.1.5 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. nonsparking adequately sealed or intrinsically safe.

9.1.6 Presence of fire extinguisher

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.

9.1.7 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.

9.1.8 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.

9.1.9 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:

- (1) the actual refrigerant charge 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) refrigerating 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.

9.1.10 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) that 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.

9.2 Repairs to sealed components

Sealed electrical components shall be replaced.

9.3 Repair to intrinsically safe components

Intrinsically safe components must be replaced.

9.4 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 aging or continual vibration from sources such

as compressors or fans.

9.5 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.

The following leak detection methods are deemed acceptable for all refrigerant systems.

Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, 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 also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

NOTE: Examples of leak detection fluids are

- ① bubble method,
- ② fluorescent method agents.

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. Removal of refrigerant shall be according to clause Removal and evacuation.

9.6 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:

- (1) safely remove refrigerant following local and national regulations;
- (2) evacuate;

- (3) purge the circuit with inert gas (optional for A2L);
- (4) evacuate (optional for A2L);
- (5) continuously flush or purge with inert gas when using flame to open circuit;
- (6) and open the circuit.

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, refrigerants purging shall be achieved 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.

The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.

9.7 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 minimise the amount of refrigerant contained in them.
- (2) Cylinders shall be kept in an appropriate position according to the instructions.
- (3) Ensure that the refrigerating 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 refrigerating system.

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.

9.8 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 recovered 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 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 refrigerating system unless it has been cleaned and checked.

9.9 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.

9.10 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 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 the flammable refrigerant. If in doubt, the manufacturer should be consulted. 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.

The recovered refrigerant shall be processed according to local legislation 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 compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely.

10 Troubleshooting

Error code	Error name	Possible causes	Solution
E1	System high pressure protection	The temperature sensor of water tank of the unit is not inserted in place; The unit is not filled with water; The wire of pressure switch is loose; The charged refrigerant is too excessive; The pressure switch is faulted; The main board is faulted; The heat exchange of water tank of the unit is abnormal; There is too much dirt in the water tank of the unit and the water tank needs to be cleaned.	It will recover by re-energization after troubleshooting.
E4	High discharge temperature protection	The resistance of exhaust temperature sensor is abnormal; Refrigerant of the unit leaks or the refrigerant is insufficient.	
E6	Communication error	The communication wire is loose or damaged; The display board is faulted; The mainboard is faulted.	It will recover automatically after troubleshooting.
F3	Outdoor ambient temperature sensor error	The temperature sensor is damaged; The mainboard is faulted.	
F4	Discharge temperature sensor error		
F6	Tube temperature sensor error		
Fd	Suction temperature sensor error		
FE	Top water tank temperature sensor error		
FL	Bottom water tank temperature sensor error		
E8	Condensate water full protection	The condensate drain outlet or drain pipe is blocked, or other reasons cause poor condensate drainage.	
EA	Water Tank leakage protection	The water level in the drip pan below the water tank is too high. Please check if the water tank is	

Error code	Error name	Possible causes	Solution
		leaking.	
U7	Abnormal reversing of 4-way valve	The temperature sensors of the water tank are normal; Reversing of 4-way valve is abnormal; Refrigerant of the unit leaks or the refrigerant is insufficient.	It will recover by re-energization after troubleshooting.
C5	Jumper cap error	The jumper cap is wrong; The jumper is poorly connected.	

Attachment I : Optional Accessories Installation Instructions

1 Installation Requirements for Duct System

This product can be equipped with two ventilation pipelines for indoor and outdoor ventilation. One pipeline is used to deliver outdoor fresh air into the room, and the other pipeline is used to discharge the air of the unit to the outside. When the airflow flows through the pipeline, the pipeline will create a certain resistance to the airflow. The greater the resistance is, the smaller the ventilation volume. Besides, the wind resistance of pipeline will increase if the length of pipeline is too long, the diameter is too small, and there are too many bends, thus reducing the ventilation volume. Therefore, please follow the following recommended principles for installation and design:

- (1) Minimize the use of elbow in pipeline. The length of elbow in each pipeline shall be controlled within 16.4 foot. The bending part of elbow should be designed as an arc to avoid 90° right angle bending.
- (2) The inner wall of pipeline is smooth, free from dust and wrinkles.
- (3) The difference in temperature between the air flowing through the pipe and the air in the installation room can cause condensation to form on the outside surface of the pipe. Insulation layers must be set on the outlet air duct, inlet (return) air duct and pipe joints to prevent heat leakage and condensation. The recommended thickness for insulation layer should not be less than 0.6 inch. Glue the adhesive nails on the air duct, then attach the insulation cotton with a layer of tin foil paper, fix it with the adhesive nail cover, and finally seal

the connection joint tightly with tin foil tape; other materials with good insulation effect can also be used for insulation.

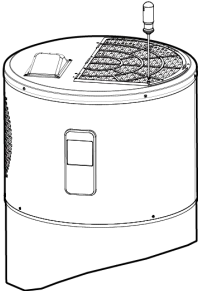
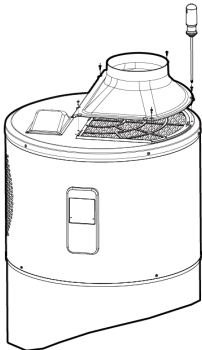
- (4) The outlet and return air ducts should have iron brackets fixed on the prefabricated floor panels. Seal the air duct joints tightly with glue to prevent air leakage.
- (5) In order to prevent leak air from being extracted by recirculation, maintain a clearance(≥ 8.7 inch) between the ends of the air pipes.
- (6) The design and construction of air duct shall comply with relevant national and local engineering specifications.
- (7) The recommended distance between the edge of the return air duct and the wall is 5.9 inch or more, and a filter screen needs to be added for the return air outlet.
- (8) The filter screen needs to be cleaned or replaced regularly. During design and installation, leave maintenance space at a side of air duct.
- (9) After installing the air duct or engineering filter screen, hands shall not touch the internal components.
- (10) The design and construction of air duct shall consider sound attenuation and vibration reduction. In addition, the noise source must avoid the crowds. Do not design the air vent above the user's head (in places such as office and rest area). If the users require the indoor noise to be as low as possible, just consider to connect duct silencers in series in the duct. There are many types of silencers, and please ask for professional guidance during selection. After installing a suitable silencer, the noise at the air outlet can be reduced.
- (11) Ducting approved for HVAC applications is required. Ducting must be adequately supported along both vertical and horizontal lengths.
- (12) UL Certified terminations must be used for ducting to the outside. These terminations have been evaluated to ensure there is sufficient protection from rain water entry and resistance to air flow is minimized.
- (13) Indoor registers approved for HVAC applications is required.
- (14) Rigid ducting must be isolated from floor joists or other structural members to minimize the transmission of noise and vibration. A short section (12 inch

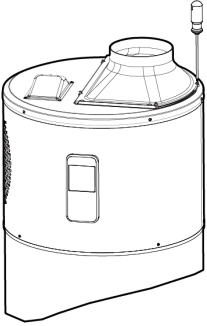
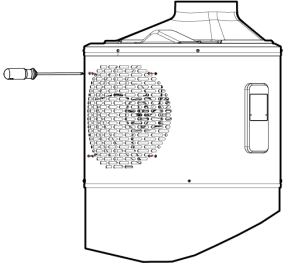
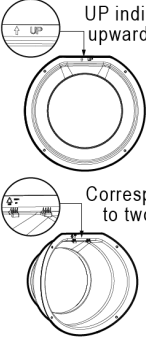
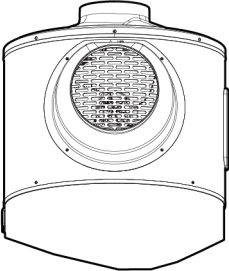
minimum) of flexible duct must be used between the water heater and rigid ducting as an isolation method.

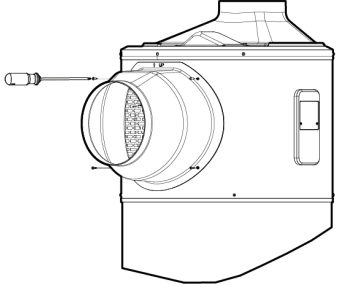
- (15) Additional duct adapter kits are needed. The adapter kits are not pre-installed. The inlet ducting connections on the water heater accept 8 inch diameter ducting, while the outlet ones accept 10 inch diameter ducting.
- (16) When the unit is installed with a discharge duct, an exhaust fan must be added at the end of the discharge duct to ensure sufficient airflow circulation during unit operation.

After the unit is installed with the ductwork, the engineering parameter “E26” need to be adjusted to “01” on the wired controller to ensure that the air volume compensation function is activated. Please refer to the wired controller manual for detailed instructions.

2 Air Inlet/Outlet Fitting Installation Steps

Air Inlet/Out Fitting Installation Steps		
Step	Schematic Diagram	Operation instructions
1		Remove the screws of the filter screen.
2		Installation process does not require removing the filter screen.

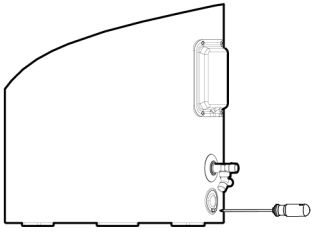
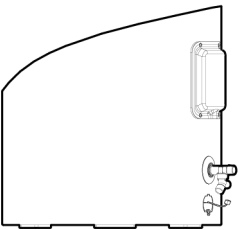
Air Inlet/Out Fitting Installation Steps		
Step	Schematic Diagram	Operation instructions
3		Fix the intake grille filter on the top cover at the same time.
4		Remove the four screws at the air outlet.
5	 UP indicates upward here Corresponding to two clips	First, align the two upper clips with the holes at the top of the air outlet and insert them.
		

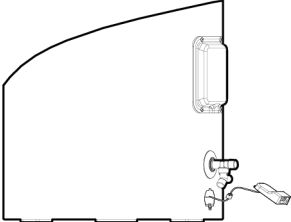
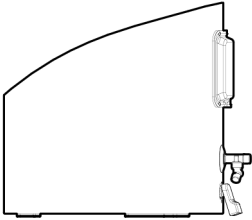
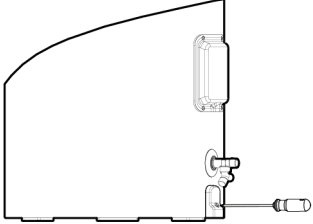
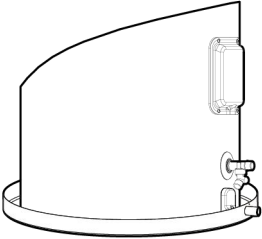
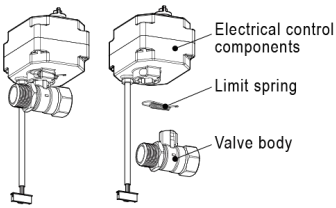
Air Inlet/Out Fitting Installation Steps		
Step	Schematic Diagram	Operation instructions
6		Reinstall the 4 screws back to the air outlet, and securely install the air outlet component.

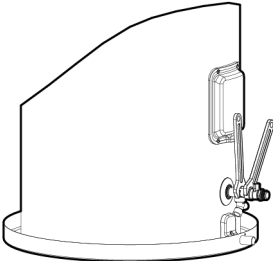
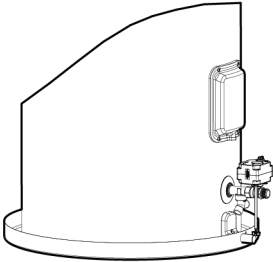
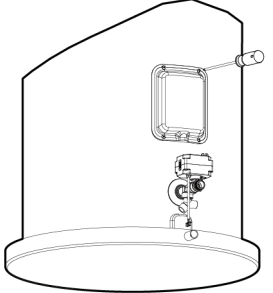
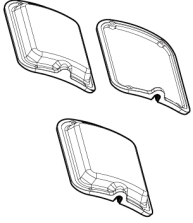
3 Water Tank Leak Detection Device Installation Steps

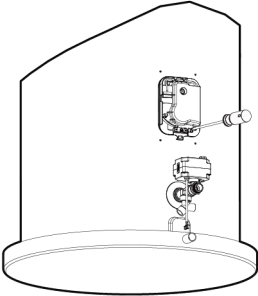
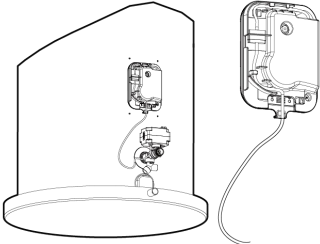
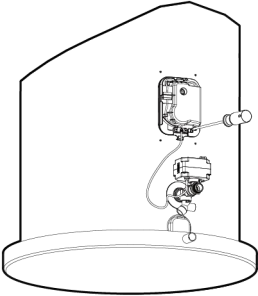
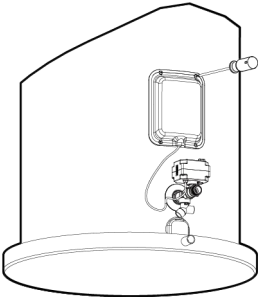
The shut off valve is not pre-installed. Install the shut off valve as close as possible to the unit, following the instructions below. Check for water leaks after installation.

After installation, the function status value parameter “F06” need to be adjusted to “02” on the wired controller to ensure that the tank leakage detection function is activated. Please refer to the wired controller manual for detailed instructions.

Water Tank Leak Detection Device Installation Steps		
Step	Schematic Diagram	Operation instructions
1		Remove the screws of the decorative cover at the bottom of the unit Take off the decorative cover.
2		Pull out the internal wiring harness temporarily.

Water Tank Leak Detection Device Installation Steps		
Step	Schematic Diagram	Operation instructions
3		Connect the wiring harness of the leak detection device to the wiring harness just pulled out from the unit.
4		After wiring, neatly arrange the wire harness into the mounting hole, taking care to avoid the screw positions. When installing, first tilt the upper end and snap the clip into the housing hole.
5		Install the leak detection device Back to the original position and secure it with screws.
6		The leak detection function needs to be used with a drip pan. Please make sure the unit is placed on the drip pan to ensure the function works properly.
7		The electric ball valve is generally divided into three parts: electrical control components, limit spring, and valve body. During installation, pull out the limit spring first, then install the valve body.

Water Tank Leak Detection Device Installation Steps		
Step	Schematic Diagram	Operation instructions
8		Use one wrench to fix the three-way valve, and another wrench to tighten the valve body. To ensure convenient installation later, make sure the final orientation of the valve body connection part with the electrical control component is upward.
9		Reinstall the electrical control components and reinsert the limit spring to its original position, thus completing the installation of the electric ball valve.
10		Remove the four screws from the lower electrical box cover of the unit
11		The rubber gasket initially equipped in the electrical box has no wire-through holes; replace this rubber gasket with one that has wire-through holes.

Water Tank Leak Detection Device Installation Steps		
Step	Schematic Diagram	Operation instructions
12		Remove 2 screws of the wire clamp, temporarily remove the wire clamp.
13		Connect the solenoid ball valve wiring harness securely to the wiring harness inside the electrical box, organize the wiring harness, and fix it in the electrical box clip.
14		Reinstall the wire clamp into the electrical box and secure the electric ball valve wiring harness. Ensure the screws are firmly installed.
15		Reinstall the electrical box cover in place and secure it with 4 screws.

Attachment II : Error Information Table

Appendix table 2-1 Common error information

Error code	Error name	Error code	Error name
E1	System high-pressure protection	F4	Discharge temperature sensor error
E3	System less refrigerant protection/ low-pressure protection	Fd	Suction temperature sensor error
E4	High discharge temperature protection	F6	Tube temperature sensor error
E6	Communication error	FL	Bottom water tank temperature sensor error
F3	Ambient temperature sensor error	FE	Top water tank temperature sensor error
U7	Abnormal reversing of 4-way valve or insufficient refrigerant	L6	Insufficient capacity, anti-high ambient temperature operation or operation protection for long period
C5	Jumper cap error	EF	Blockage protection for air inlet or air outlet
E8	Condensate water full protection	EA	Water Tank leakage protection

Appendix table 2-2 Drive error information

Error code	Error name	Error code	Error name
EE	EPROM storage chip error	AA	Inverter outdoor fan AC protection (input side)
ee	Inverter compressor driver storage chip error	AC	Inverter outdoor fan startup failure
H5	Inverter compressor driver IPM module protection	Ad	Inverter outdoor fan less phase protection
HC	Inverter compressor driver PFC protection	AE	Inverter outdoor fan driver current detecting circuit error
H7	Inverter compressor out-of-step protection	Ar	Inverter outdoor fan driver electric box temperature sensor error
Lc	Inverter compressor startup failure	AL	Inverter outdoor fan driver DC bus low-voltage protection or voltage drop error
Ld	Inverter compressor default phase protection	AJ	Inverter outdoor fan out-of-step protection
LF	Inverter compressor power protection	AH	Inverter outdoor fan driver DC bus high-voltage protection
PA	Inverter compressor driver AC protection (input side)	AP	Inverter outdoor fan driver AC input voltage error protection
Pc	Inverter compressor driver current detecting circuit error	AU	Inverter outdoor fan driver charging loop error
PF	Inverter compressor driver electric box temperature sensor error	A0	Inverter outdoor fan driver module reset

Air Source Heat Pump Water Heater

Error code	Error name	Error code	Error name
PH	High voltage protection for drive DC bus of inverter compressor	A1	Drive IPM module protection for inverter outdoor fan
PL	Inverter compressor driver DC bus low voltage protection or voltage drop error	A6	Master controller and inverter outdoor fan driver communication error
PP	Inverter compressor driver AC input voltage error protection	A8	Inverter outdoor fan driver module high-temperature protection
PU	Inverter compressor driver charging loop error	A9	Inverter outdoor fan driver module temperature sensor error
P0	Inverter compressor driver module reset	U9	Inverter outdoor fan driver AC input zero-sequence overcurrent protection
P5	Inverter compressor overcurrent protection	An	Inverter outdoor fan driver storage chip error
P6	Master controller and inverter compressor driver communication error	AF	Inverter outdoor fan driver PFC protection
P7	Inverter compressor driver module temperature sensor error	UL	Inverter outdoor fan overcurrent protection
P8	Inverter compressor driver module high-temperature protection	UP	Power protection for inverter fan
P9	Inverter compressor driver AC input zero-sequence overcurrent protection	—	—

