

Heat Pump Water Heater IOM Manual
Installation Operation & Maintenance

This manual is intended as an aid to qualified service personnel for proper installation, operation and maintenance of the heat pump water heater.

Read this manual carefully before attempting to install or operate the heat pump water heater. failure to follow these instructions may cause a Fault of the heat pump, resulting in electrical shock, scald injury and/or property damage.

Installer:

Before leaving the premises, review this manual to be sure the water heater has been installed correctly. Start or operate the unit for one complete cycle and make sure the water temperature is acceptable to the consumer.

1 Safety Instructions

- Do not use this unit if it has been dropped or damaged in any way.
- This unit should not be installed in any area where flammable liquids or vapors may be present. Do not store or use gasoline or other combustible materials or liquids near or adjacent to this water heater.
- Check the rating plate on the unit before installation to make certain the voltage shown is the same as the electricity supply to the water heater.
- The unit must be connected only to a properly grounded electrical supply. Do not fail to properly ground the unit.
- This unit should only be serviced by qualified service personnel.
- Always shut off electric power before making unit connections or removing any panels and be extremely careful to avoid injury.
- Components may have sharp edges or protrusions which can cut you.
- Tubing and compressor contain high pressure refrigerant and they should not be exposed to high temperature or be punctured.
- Water temperature over 52°C (125° f) can cause severe burns or death from scalding. Feel the water before bathing or showering. Children, disabled, and elderly are at highest risk of being scalded.
- Tampering with the thermostat, heater, elements or electrical connections is dangerous and may result in serious injury. Only properly trained, qualified service personnel should service these components. Do not attempt to modify or change this water heater in any way.

2 Pre-installation and code requirements

Important Note

- The Heat Pump Water Heater should never be stored or installed on its side. Upright transportation is recommended. If it becomes necessary to transport the water heater on its side, the manufacturer recommends that the unit be in the upright position for a minimum of two hours prior to operation. Failure to follow these instructions may result in damage to the water heater.
- After removing the unit from the crate/carton, immediately remove the panels and inspect for any damage that might have occurred during shipment. Report concealed damage immediately to the transportation company and request inspection.

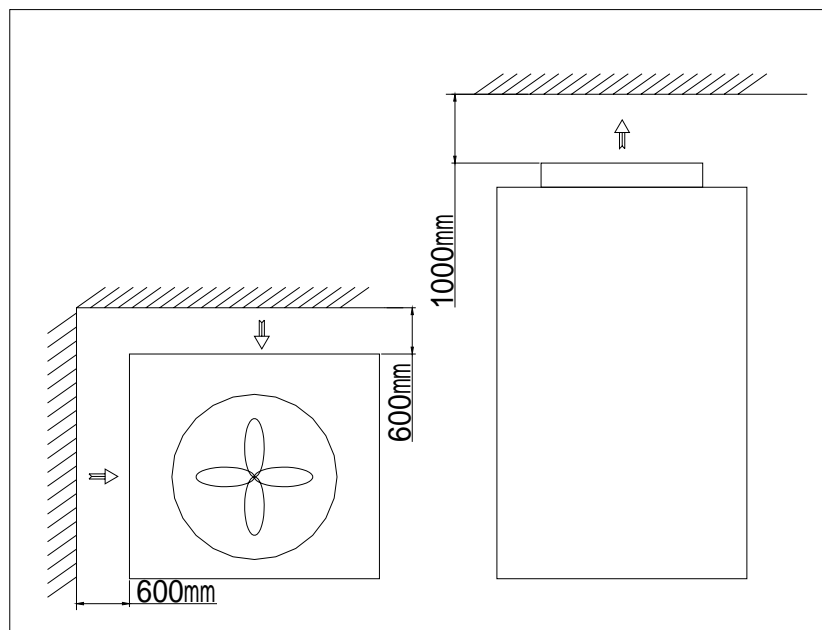
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- The electric power source must be the same voltage and phase as shown on the rating plate. Line and low voltage wiring must be done in accordance with local codes or the national electric code.
- Make a survey of the final location of the unit before setting it in place. The unit should be centrally located with respect to the distribution system. Install the unit within a heated area if possible. Exposure to inclement weather conditions may cause lower efficiency performance.

3 Installation

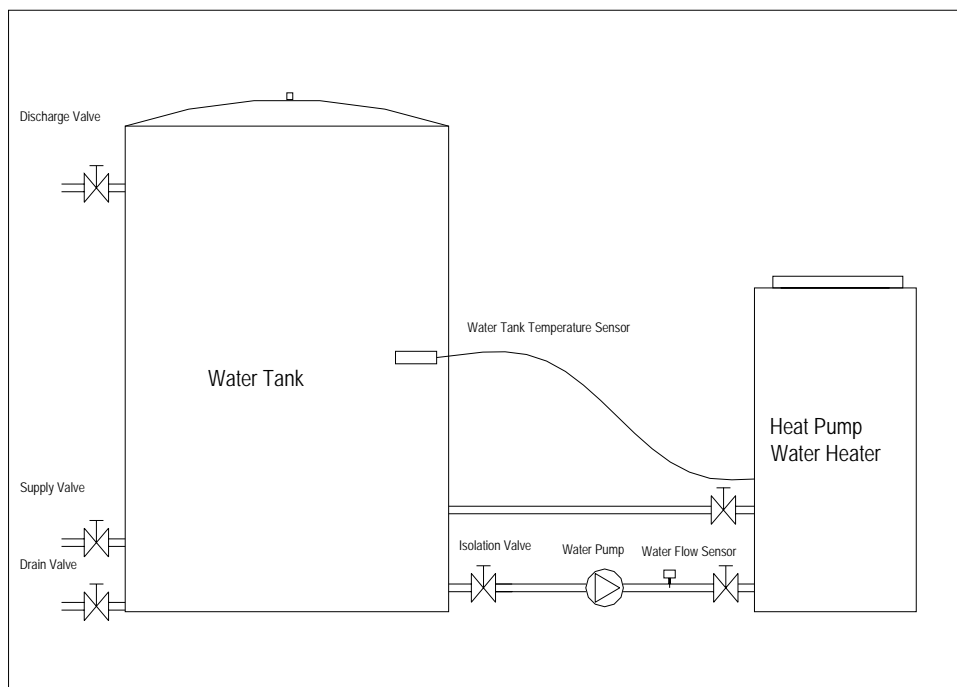
Mounting the unit

- The unit should be mounted level on a vibration absorbing pad slightly larger than the base to provide isolation between the unit and floor.
- Do not install the unit in any area where a polluted source, flammable liquids or vapors may be present or where dirt and defoliation will accumulate.
- The unit should be installed in a place with sufficient space and good ventilation. A minimum of 24" clearance in front and sides of the unit should be provided to allow sufficient room to make water and electrical connections. If the unit is located in a confined space such as a closet, provisions must be made for unit servicing.
- Water tank should be installed in a place with an ambient air temperature over 0°C.



Piping the Unit

- Both source and load connections must be at least as large as the unit connection on the unit. Never use flexible hoses that are smaller (inside diameter) than that of the water connection on the unit. Make sure hoses and pipes are suitable for system water pressure and sized for proper flow rate.
- The supply and the discharge pipes should be insulated to prevent heat loss.
- The pressure of tap water should be smaller than 1Mpa.
- After the piping is complete, test the piping to make certain that it is free of leaks.



Caution: Improper water flow in the system due to piping, valving or improper pump operating could cause unit damage.

4 Start up

Check the following before powering the unit:

- High voltage supply matches the nameplate rating.
- Field wire size, breakers and fuses are the correct size.
- Low voltage control circuit is correct.
- Water piping is complete and correct.
- Isolation valves are open.

- Loop pumps are correctly wired.
- Access panels are in place and secured.
- Water flow switch is installed. If not, terminal 1 and 2 on the control board should be loop wired.

Compressor Time Delay: Be aware there is a 3 minute time delay before the compressor will start once the unit is turned on or whenever it restarts.

5 Unit operation

Important note : Never operate a water heater when the tank is empty or partially filled. This can result in serious damage to the tank and will destroy the heating elements.

1. When all piping and electrical connections have been completed, turn on the water supply to the unit and allow it to fill completely.

To ensure the unit is completely filled, open all hot water faucets to allow air to escape from the piping. Then close the faucets.

2. Turn on the power supply to the water heater. The display screen on the control panel shows the temperature of the water in the tank.

3. Press the "On/Off" button on the control panel. The compressor will energize if three minutes elapses since last time the unit is shut down and the water temperature in the tank (read by the tank water temperature sensor) is below the set water temperature.

4. The heat pump continues to operate until the water temperature reaches t_1 when the compressor de-energizes.

Important: The unit will emit sounds similar to a refrigerator or dehumidifier when the heat pump is running. Certain noises will be heard. These noises are common and may result from:

- a) Operations of compressor and fans
- b) Normal expansion/contraction of metal parts during heat-up and cool-down.
- c) Sediment build-up on the tank bottom on the heating elements

5. When the water temperature drops below the set water temperature, the compressor will start to work and the unit will run automatically.

When there is no hot water demand, the heat pump will run continually to keep the water temperature constant.

6. The fan motor will energize/de-energize once the compressor energizes/de-energizes.

7. The water pump will start 30 seconds before the compressor starts and cease 60 seconds after the compressor ceases.

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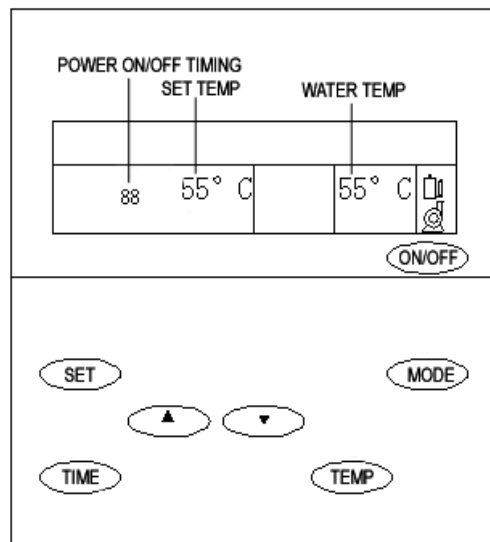
8. The unit will enter the defrost state if the compressor has worked for 20 minutes uninterruptedly and the evaporator coil temperature (read by the evaporator coil temperature sensor) is below -2°C .

When the unit enters defrost state, the 4-way reversing valve solenoid de-energizes, directing the hot gas to evaporator coil to defrost.

The fan motor will de-energize but the compressor and the water pump will continue to work in the defrost state.

9. The unit will be restored from defrost state to heating mode if the coil temperature is above 15°C or the unit has been in defrost state for over 8 minutes.

6 Panel Regulation



- On/off Button
Press On/Off button to switch on/off the unit.
- Set Button
Press Set Button for five seconds and then Up/Down Buttons to set parameters.
Press Set Button for ten seconds to check evaporator coil temperature or purged air temperature.
- Timer Button
Press Timer Button for five seconds and then Up/Down Button to set time.
- Up Button
Press Up Button to set temperatures upwards.

- Down Button
Press Down Button to set temperatures downwards.

Function

1. Heating :
Tr—Return Water Temperature , Trd— Return/outlet Water Temperature Difference , Ts— Set Water Temperature)
When $Tr \leq Ts - Trd$, the compressor is started.
When $Tr \geq Ts + 1^{\circ}\text{C}$, the compressor is shut down.
Remarks: The start or shutdown of the compressor is subject to unit time delay protection.
2. Fan Motor Control :
The fan motor will begin to work after the compressor is started; the fan motor will cease after the compressor is shut down.
Remarks: Exceptional in defrost mode
3. Compressor Time Delay Protection :
A minimum three minutes of time delay is required for the compressor to be restarted.
4. Temperature Sensor Fault Protection :
 - a) Return Water Temperature Sensor Fault : Close all outputs
 - b) Evaporative Coil Temperature Sensor Fault : Close all outputs
 - c) Purged Air Temperature Sensor Fault: Close all outputs
 - d) Ambient Air Temperature Sensor Fault: Close all outputs
- 5 . Water Flow Switch Protection :
If the water flow switch is observed to be disconnected for ten second continuously, insufficient water flow protection will be activated and all outputs will be closed.
Remarks: Water flow switch will only be checked thirty seconds after the unit is started.
- 6 . Pump Control :
The pump will begin to work thirty seconds after the compressor is started, and stop sixty seconds after the compressor is shut down.
- 7 . Defrost Control :
Defrost-in Conditions : (only when both conditions are satisfied)
 - a) Compressor continuous running time \geq Defrost-in time delay
 - b) Evaporator Coil Temperature \leq Defrost-in temperatureWhen the unit enters defrost mode, the 4-way reversing valve will de-energize, directing the hot gas to the evaporator coil. The fan motor will stop but the

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compressor and pump will continue working.

Defrost-out Conditions : (when either condition is satisfied)

- a) Evaporator coil temperature \geq Set defrost-out temperature
- b) Defrosting time \geq Set defrost-out time

When the unit revert to heating from defrost mode, the 4-way reversing valve will energize and the fan motor will begin to work.

8 . Anti-freeze Protection :

During unit-off state, the unit will be switched on to heat the water automatically if the water is observed to be below 3 °C for a continuous sixty seconds. After the water temperature is above 15°C, the unit will be shut down.

9. Temperature Checkup Function

Code	Parameter
0	Evaporator Coil Temperature
1	Ambient Air Temperature

7 Unit protection

No	Input Port	Fault	Code	Protection
1	CN3	Water Temperature Sensor Fault	E1	Close all outputs
2	CN4	Ambient Air Temperature Sensor Fault	E2	Close all outputs
3	CN6	Purged Air Temperature Sensor Fault	E3	Close all outputs
4	SHUI	Insufficient Water Flow	E4	Close all outputs
5	63H1	High/Low Pressure	E5	Close all outputs
6				
7	CN5	Evaporator Coil Temperature Sensor Fault	E7	Close all outputs

High / Low Pressure Switches

The high-pressure switch senses the refrigerant pressure in the sealed refrigeration system and shuts the heater down in the event unsafe operating pressures are reached.

The low-pressure switch senses the refrigerant pressure in the sealed refrigeration system to protect against certain conditions that could be detrimental to compressor life. The switch shuts the unit down in the event of loss of refrigerant, fan motor failure, and airflow blockage.

8 Parameter setting

	Parameter	Range	Default
	Set Water Temperature	25°C —60°C	55°C
P0	Return/Outlet Water Temperature Difference	1°C —10°C	5°C
P1	Temperature Sensor Precision	0°C —10°C	0°C
P2	Defrost-in Time Delay	20min – 90min	20min
P3	Defrost-in Temperature	-15°C —5°C	-2°C
P4	Defrost-out Time	3min – 15min	8min
P5	Defrost-out Temp	5°C —25°C	15°C

9 Maintenance

Proper maintenance is important to insure the most efficient operation and longest life for your equipment. The following points are to serve as a general guide. Always consult with your maintenance contractor with regard to the specific requirements of your own installation.

Paint Finish

The paint finish may be polished if desired. Spray paint is available in case of accidental scratching or chipping.

The following should be checked only by a competent contractor.

Contactors Points

Check contactor points twice a year to be sure they are not burned or pitted as a result of low voltage, lightning strikes, or other electrical difficulties.

Water System

The water circulating pump should be checked and cleaned, to ensure that it is operating normally. Clogged coils lead to high head pressures, insufficient water flow protection or inefficient operation. If coil is limed, a cleaning treatment may be necessary. Water coils should be checked yearly for liming or clogging.

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Improper Unit Functioning

If unit is not performing properly, several readings of temperature, pressure and electrical characteristics need to be taken. The normal required troubleshooting information is listed below.

Cleaning

The evaporator should be cleaned at least twice a year or whenever it is visibly dirty. A dirty evaporator coil will result in decreased efficiency.

The outer surfaces of the water heater may be cleaned with a sponge and warm soapy water. Do not use bleach, abrasive cleaners, or solvents which will damage the unit's finish.

Draining and Flushing

Close the cold water inlet valve and open a nearby hot water faucet.

Connect a hose to the drain valve and terminate it at an adequate drain.

Open the drain valve and allow the tank to drain, periodically opening and closing the cold water inlet valve to flush sediment from the tank.

When clear water is observed coming from the drain hose, close the drain valve and disconnect the hose.

Open the cold water inlet valve to refill the tank with water.

Close the hot water faucet when water begins flowing from it.

Restore the power to unit.

Refer to start up procedures in this manual.

Important: If the water heater is going to shut down for an extended period, the drain valve should be left open.

Warning: Water draining from the water heater will be hot and can result in an injury by scalding. Do not allow anyone to come in contact with draining water!!!

10 Troubleshooting Guide

SYMPTON	POSSIBLE REASONS	REMEDY
NOISY OPERATION	CHATTERING CONTACTOR NOISE	CHECK CONTACTOR POINTS
UNIT DOES NOT TURN ON AFTER WIRING IS COMPLETE	WIRING MAY BE INCORRECT	VERIFY WIRING WITH WIRE DAGRAM
	DEFECTIVE CONTROL PANEL	REPLACE CONTROL PANEL
COMPRESSOR WILL NOT TURN ON	WIRING MAY BE INCORRECT	VERIFY WIRING WITH WIRE DAGRAM

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	LOOSE ELECTRICAL CONNECTIONS	CHECK ALL CONNECTIONS AT CONTACTOR AND COMPRESSOR TERMINAL BOX
	Terminals 1 & 2 NOT LOOP WIRED	WIRE THEM IF NO WATER FLOW SWITCH IS INSTALLED
EVAPORATOR FROSTING OR ICING	DEFECTIVE COIL TEMPERATURE SENSOR	REPLACE SENSOR
	LOSS OF REFRIGERANT CHARGE	REPAIR LEAK AND RECHARGE
	DEFECTIVE THERMOEXPANSION VALVE	REPLACE VAVLE
NO HOT WATER	INSUFFICIENT POWER TO UNIT	VERIFY POWER SUPPLY
	DEFECTIVE WATER TANK TEMPERATURE SENSOR	REPLACE SENSOR
	DEFECTIVE CONTROL PANEL	REPLACE CONTROL BOARD
INSUFFICIENT HOT WATER	DEFECTIVE TEMPERATURE SENSORS	REPLACE SENSORS
	TEMPERATURE SETTING TOO LOW	INCREASE SETTING
	UNIT UNDERSIZED FOR APPLICATION	INSTALL ADEQUATELY SIZED WATER HEATER
	PIPING IS INCORRECT	REFER TO "PIPING INSTALLATION"
	LONG RUNS OF EXPOSED PIPING OR HOT WATER PIPING IS UNINSULATED	INSULATE PIPING
	SENDIMENT OR LIME IN TANK	FLUSH TANK
	LEAKING FAUCETS	REPAIR FAUCETS
	LOSS OF REFRIGERANT CHARGE	RECHAREGE REFRIGERANT
	DIRTY AIR FILTER	CLEAN AIR FILTER

11 Part List

Part No.	Description	Part No.	Description
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1	Compressor	12	Thermal Overload Relay
2	Vapor/Liquid Separator	13	Solder Tube Union
3	Liquid Receiver	14	4-way Reversing Valve
4	Coaxial Copper Condenser	15	Low Pressure Switch
5	Evaporator Coil Temperature Sensor	16	High Pressure Switch
6	Fan	17	Thermal Protector
7	Fan Motor	18	Oil Pressure Gauge
8	Control Board	19	Fin Coil Evaporator
9	Phase-sequence Relay	20	Thermal Expansion Valve
10	Capacitor	21	R417a Refrigerant
11	AC Contactor		

12 Electrical Specification

Model		LSQ015CR	LSQ02CR	LSQ03(C)R
Power Supply		220V/1HP/50HZ		
Power Cord	Phase Wire	2.5	2.5	4
	Cross Section (mm ²)			
	Number	1	1	1
Power Cord	Neutral Wire	2.5	2.5	4
	Cross Section (mm ²)			
	Number	1	1	1
Power Cord	Earth Wire	2.5	2.5	4
	Cross Section (mm ²)			
	Number	1	1	1
Recommended Pump Specification	Water Flow (L/S)	0.3	0.4	0.55
	Pump Head (m)	5	5	8
	Power Input (W)	>65	>90	>200