EN

SERVICE MANUAL

01 | 23-05-2023

SINCLAIR WATER HEATER

SWH-35ERA2
SWH-200DE

S-THERM

sinclair
HEAT PUMPS

„ORIGINAL INSTRUCTIONS“

IMPORTANT NOTE:

Read this manual carefully before installing or operating your new heat pump.
Make sure to save this manual for future reference.

EN For downloading manual for this product, please enter the model name at this link:

CZ Pro stažení manuálu k tomuto produktu zadejte modelové označení do následujícího odkazu:

SK Pre stiahnutie manuálu k tomuto produktu zadajte modelové označenie do nasledujúceho odkazu:

DE Um das Handbuch für dieses Produkt herunterzuladen, geben Sie bitte den Modellnamen für diesen Link ein:

HR Za preuzimanje priručnika za ovaj proizvod unesite naziv modela na ovu vezu:

HU Termék kézikönyvének letöltéséhez írja be a modell megnevezését az alábbi linkre:

SL Za prenos navodil za uporabo tega izdelka, vnesite ime modela na tej povezavi:

RU Чтобы загрузить руководство для этого продукта, введите обозначение модели по следующей ссылке:

IT Per scaricare il manuale di questo prodotto, inserisci il nome del modello a questo link:

ES Para descargar el manual de este producto, ingrese la designación del modelo en el siguiente enlace:

Contents

PRODUCT

1 MODELS LIST

Product type	Model	Heating capacity	Outline diagram
Outdoor unit	SWH-35ERA2	3500+1500 (electric heater)	
Water tank	SWH-200DE		

2 NOMENCLATURE

2.1 Nomenclature of outdoor unit

SWH	-	S		3.5	Pd	G		/	Na	A1	-	K
1		2	3	4	5	6	7		8	9		10

NO.	Description	Options
1	Unit code	SWH
2	Heating style	C – Circulating; S – Static;
3	Function character	Q – Multifunctional; Single function – Omit
4	Heating capacity	3.5kW
5	Compressor style	Pd – DC Inverter; Fixed Frequency – Omit
6	Water tank mode	E – 100L; F – 150L; G – 200L; H – 250L; No Water Tank – Omit
7	Climate code	T1 – Omit; T2 – Cold Climate; T3 – Warm Climate
8	Refrigerant	R22 – Omit; N – R407c; Na – R410A; Nb – R134a; Ne – R417A
9	Design serial number	A, B, C, …or A1,B1,C1…
10	Power code	K – 220-240V-1Ph～50Hz; D – 220-240V-1Ph～60Hz; …

2.2 Nomenclature of water tank

SWH	T		D	200	L	C	JW			/	A	-	K
1	2	3	4	5	6	7	8	9	10		11		12

NO.	Description	Options
1	Water tank code	SWH–Water tank
2	Water tank material	Stainless steel – Omit; T –Enameled steel
3	Water tank type	Normal heat pump water tank – Omit; V – Heat pump water tank for VRF unit
4	Function code	No electric heating function – Omit; D – With electric heating function
5	Water tank capacity	Capacity of water tank; Unit:（L）
6	Structure type	B – Wall-mounted type; L – Floor standing type
7	Endure pressure form	C – Endure pressure water tank; Not endure pressure water tank – Omit
8	Form of heat exchange tube	No heat exchange tube – Omit; J – Built-in coil tube static heating type (J indicates single coil tube; J2 indicates double coil tubes); JW – Outer coil tube static heating type; D – The floor heating coil tube (D indicates single coil tube; D2 indicates double coil tube)
9	Appearance structure type	Round – Omit; F – Quadrate; Y – Atactic; T – Strip
10	Inner tank number	1 – Omit; 2, 3,…
11	Design serial number	A, B, C1, C2, …
12	Power code	K – 220-240V-1Ph~50Hz; D – 220-240V-1Ph~60Hz; …

3 FUNCTION

No.	Name	Function
1	Compressor	Increases pressure for the refrigerant and provides driving force for circular flow of the refrigerant as a main driving component.
2	Four-way valve	Reverses flow direction of the refrigerant when the system switches between the normal heat up mode and defrosting mode.
3	Water tank	Provides heat exchange channel for refrigerant and water and stores hot water for daily use.
4	Electronic expansion valve	Speeds up high-pressure and high-temperature refrigerant and reduces pressure and adjusts the circulation amount of coolant.
5	Finned tube exchanger	Provides heat exchange channel for refrigerant and air.
6	Fan motor	Enhances heat exchange on the air side of the finned tube exchange and provides a low-temperature heat source continuously.
7	Filter	Filters impurities in refrigerant to protect components with small diameter.

4 PRODUCT PARAMETERS

4.1 Product Parameters of Outdoor Unit

Model			SWH-35ERA2
Rated Heating Capacity(*)		W	3500(1800~3700)
Rated Input Power(*)		W	833(360~910)
COP(*)		W/W	4.10
Load Profile		-	L
COP_{DHW}(**)		W/W	3.08
Energy Efficiency Class(**)		-	A^+
Water Heating Energy Efficiency(**)		-	130%
Annual electricity consumption (average climate conditions)		kWh	795
Maximum Input Power		W	2000+1500W (Electric Heater)
Outlet Water Temperature		°C	Default: 55°C, 35°C~55°C
Power Supply		-	220V-240V ~ 50Hz
Insulation Level		-	I
Protection of Ingression		-	IPX4
Refrigerant	Name		R410A
	Charge	kg	1.40
Outline Dimensions	W × D × H	mm	842×320×591
Package Dimensions	W × D × H	mm	948×363×660
Gross/Net Weight		kg	44.5/38.5
Sound Power Level(***)		dB(A)	63
Operating Range		°C	-25~45°C

NOTES:

① (*) Value obtained with the following conditions: Outdoor temperature: 20°C DB/15°C WB; Water tank temperature (start/end): 15(dry bulb temperature) /55(wet bulb temperature).

② (**) Value obtained with an air temperature of 7°C and a water inlet at 10°C, as per EN16147-2017, (EU) No 814/2013.

③ (***) Value obtained as per EN 12102-2008.

④ Under “RAPID” function, electric heater helps to heating water.

⑤ Please always see the nameplate for the exact data as this table is subject to change.

4.2 Parameters of the Water Tank

Model		SWH-200DE
Capacity	L	185
Power Supply for Electric Heater	-	220V-240V ~ 50Hz
Input Power for Electric Heater	W	1500
Outline Dimensions(W × D × H) (*)	mm	462 × 462 × 2000
Package Dimensions(W × D × H) (*)	mm	2108 × 583 × 565
Water Tank Gross/Net Weight(*)	kg	83/72.5
Outer Size of Connection Pipe	mm	Φ6, Φ9.52

NOTES:

① (*)Due to different production bases, the water tank height and working medium port type have some differences. Please refer to the actual product.

② Type selection of water tank shall also be made based on local climatic conditions and opinions from professionals.

③ For units with water tank equipped with an electrical heater, that is, the water tank model of which starts with SWH, both the heat pump and electrical heater are started for heat up under low ambient temperature or “RAPID” function.

④ If the specification parameters change with product improvement, refer to the parameter specified on the nameplate.

4.3 Performance Data of Hot water Mode

environment temperature (°C)	MODE	inlet water temperature (°C)	outlet water temperature (°C)	capability (kW)	COP (W/W)
45	HOT WATER	29	55	2.90	7.80
20		15	55	3.50	4.10
7		10	55	1.80	3.80
0		10	55	1.90	2.30
-7		10	55	2.40	2.20
-15		10	55	1.90	1.80
-20		10	55	1.40	1.50

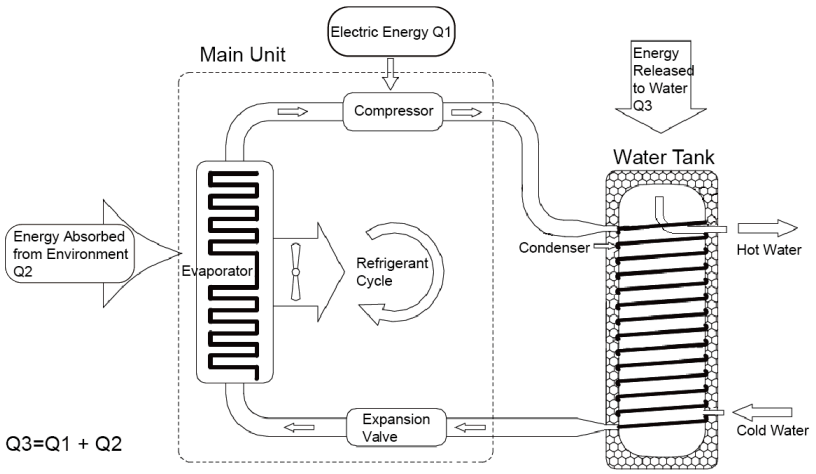
5 Working Principle

5.1 Brief Introduction to Working Principle

As the refrigerant has different phase-transition temperature under varied pressure, it enables the heat pump to transfer heat of low-temperature heat source to the high-temperature heat source. The air source water heater unit utilizes the heat pump to obtain heat from the ambient low-grade energy (air source) via thermodynamic cycle by consuming partial electrical energy, and then delivers heat to the water tank for heating up water.

5.2 Working Diagram

5.2.1 Working Diagram



The air source heat pump water heater is designed based on the heat pump principles. It consumes a part of electric energy as a supplement, and by using the thermodynamic cycle, absorbs heat from the low-grade energy (air source), and transfers the heat to a condenser through a compressor, and releases it to the water inside the water tank. In this way, the water is heated up.

The working principles of an air source heat pump water heater are the same as those of a heat pump air conditioner. A heat pump air conditioner absorbs heat from the natural environment and transfers it to the indoor air; however, the air source heat pump water heater uses the absorbed heat to heat up domestic water. The air source heat pump water heater is a novel, efficient, energy-saving, and environment-friendly heater product.

6 Optional Accessories

The Sinclair air source water heater unit supports the following accessories:

Item
Self-limiting temperature tracing belt
Pressure stabilizing valve

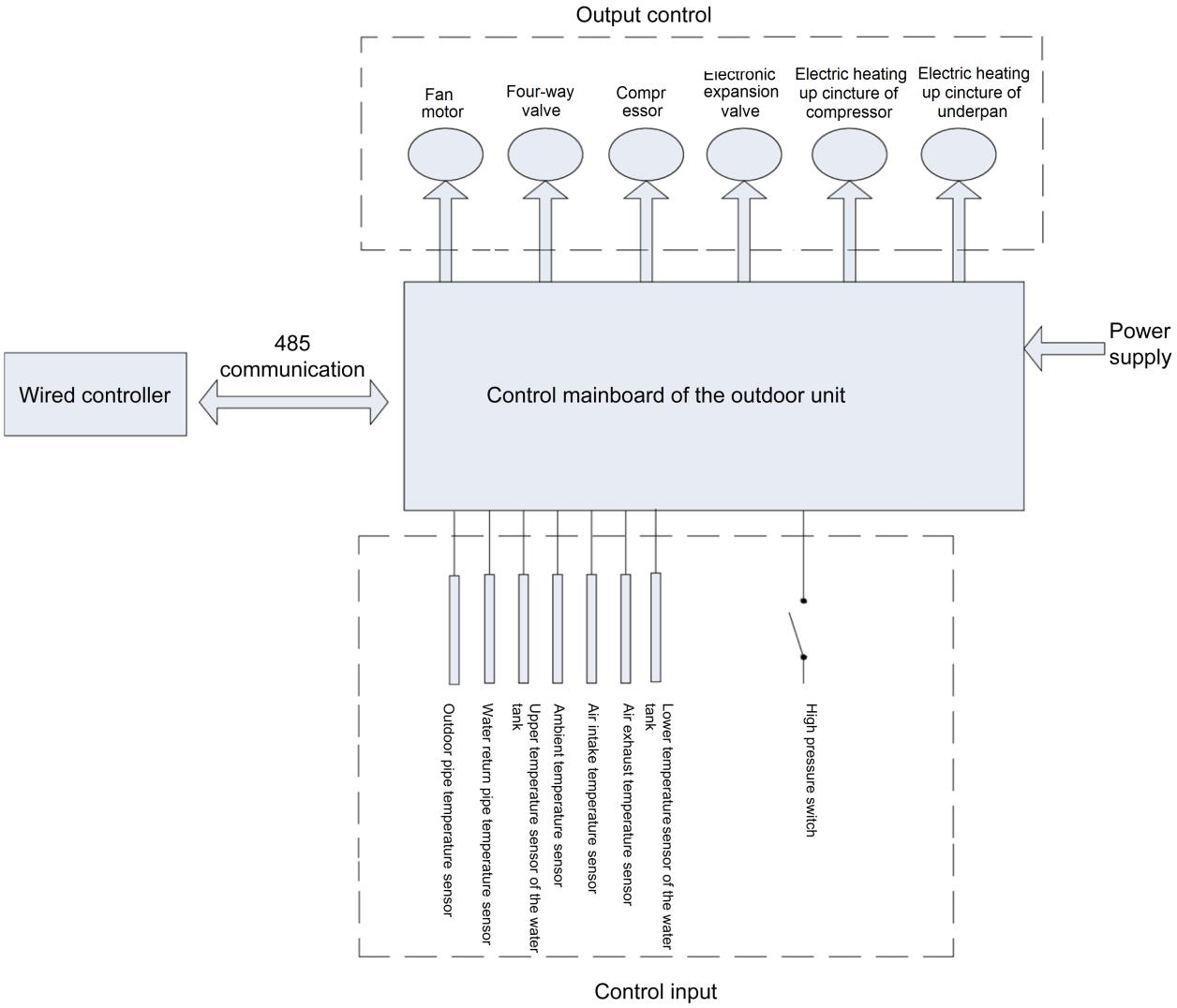
NOTE:

If any of the preceding accessories is required, contact with the local sales company.

CONTROL

1 Unit Control

1.1 Overall Control Logic



(1) High pressure switch

When the discharge pressure of compressor exceeds the preset value, an error will be displayed and the unit will stop or not start.

(2) Temperature sensor error detection and handling

Once the temperature sensor for the ambient temperature, gas discharge, gas suction, tube temperature, or water tank is open-circuited or short-circuited, the corresponding error code will be displayed and all loads will be cut off. After the error is cleared, the unit automatically runs again.

1.2 Key Control Logics

(1) Control on compressor

After power is connected, start the system by the manual operator and detect the outdoor ambient temperature sensor. If the outdoor ambient temperature is not lower than -25°C and when no error is detected and start up conditions of the compressor are met, the system starts by following the hot water sequence.

(2) Control on fan motor

When start up conditions of the compressor is met, the system starts by following the hot water sequence. The electronic expansion valve resets and is initialized, and the external fan motor starts. After 10s, the compressor starts. Then speed of the fan will determine by the ambient temperature and the rotate speed of compressor.

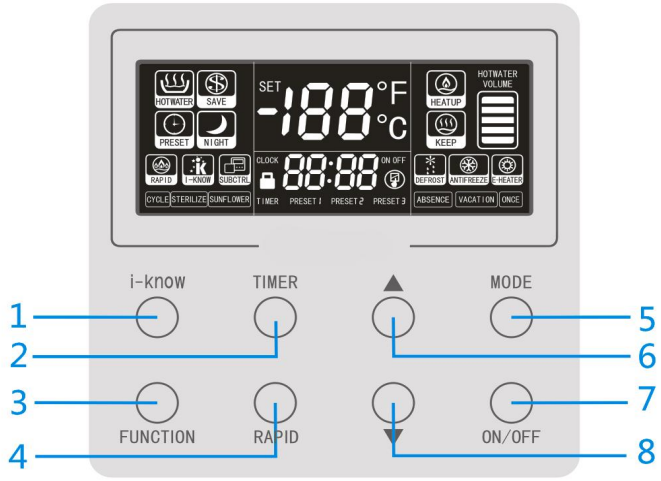
(3) Control on defrosting

When the compressor is initially powered on and started, it determines the defrosting condition after running for the preset duration. If the defrosting condition is met, the system defrosts before running in “HOT WATER” mode (including freeze-proofing operation of compressor). After defrosting is over, the compressor starts for heat up. When the cumulative operation time exceeds or equals to the preset time for defrosting, defrosting will be performed if the temperature difference between the outdoor exchanger pipe and environment temperature sensor meets the defrosting condition.

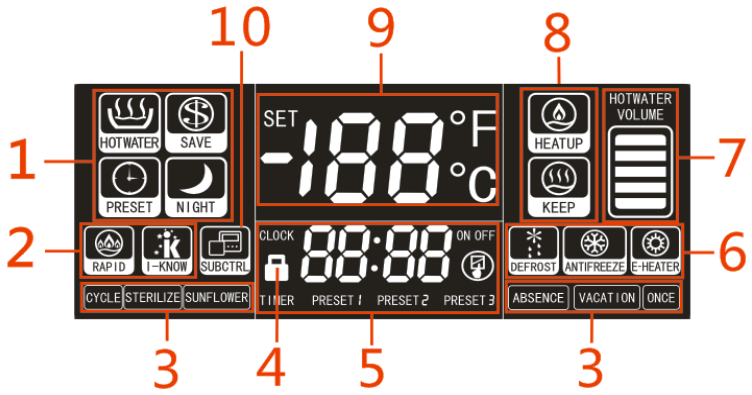
(4) Control on freeze-proofing function

In the Off state, if water temperature in the water tank detected by the system based on the ambient temperature is too low, the unit starts the freeze-proofing function immediately.

2 Wired Controller



1	i-know button	2	Timer button	3	Function button	4	Rapid button
5	Mode button	6	Increase button	7	On/Off button	8	Decrease button



1	Display of Common Operation Modes: HOTWATER, SAVE, PRESET and NIGHT mode.	6	Display of defrost, antifreeze running, and e-heater running (or display of the Special E-HEATER Mode).
2	Display of RAPID and i-know function.	7	Display of hot water volume (this function is unavailable to models with single temperature sensor).
3	Display of CYCLE, STERILIZE, SUNFLOWER, ABSENCE, VACATION, and ONCE function (the STERILIZE function may not work for models without an electrical heater).	8	Display of operating/standby.
4	Display of Keypad Lock function.	9	Display of actual water temperature, temperature set point, error codes, and running parameters.
5	Display of system time, preset time, timer setting and running parameters.	10	Display of the sub-controller. (This function is reserved.)

3 Query Parameters

This function is provided for the debugging personnel to query running status of the unit. After pressing and holding “MODE”+ “▲” button for 5 second, the parameter display area blinks. 00 is displayed by default. The “▲” and “▼” buttons can be pressed to switch the query item.

Query codes are described in the following table.

Query Code	Query Parameter
00	00 by default
01	Communication protocol version
02	Temperature of the temperature sensor for water outlet pipe
03	Temperature of the upper temperature sensor of the water tank (detected by the mainboard of the outdoor unit)
04	Temperature of the outdoor ambient temperature sensor
05	Reserved
06	Temperature of the air suction temperature sensor
08	Temperature of the air discharge temperature sensor
13	Temperature of tube temperature sensor for outdoor heat exchanger
16	Temperature of the lower temperature sensor of the water tank (detected by the mainboard)
17	Display of single or dual temperature sensor (01 indicates single temperature sensor and 02 indicates dual temperature sensor)
18	Temperature of the middle temperature sensor of the water tank (part of units have the temperature sensor)
19	Temperature of the upper temperature sensor of the water tank(detected by the mainboard of the water tank,part of units have the temperature sensor)

4 Operation Instructions

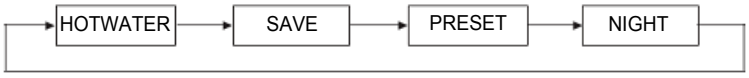
4.1 On/Off Setting

The unit will be started or stopped by pressing the “On/Off ” button.

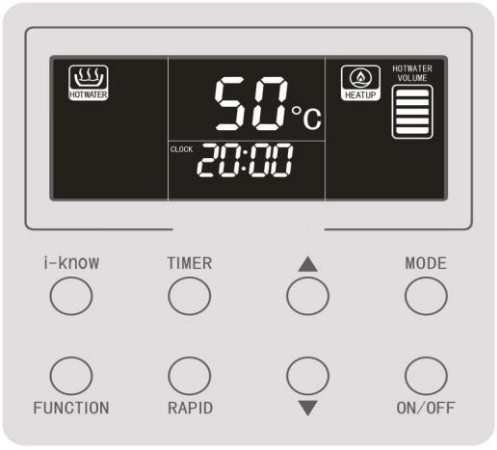
NOTE: After energization and under normal communication, the LCD will display the water temperature, time, and hot water volume (for models with dual temperature sensor) under both On and Off states of the unit. It means the Off state if the LCD does not display the running mode, as shown in the following figure.

4.2 Common Modes Setting

In the On state of the unit, press the **MODE** button to switch the operation modes in the following sequence:



The HOTWATER mode is shown in the following figure.

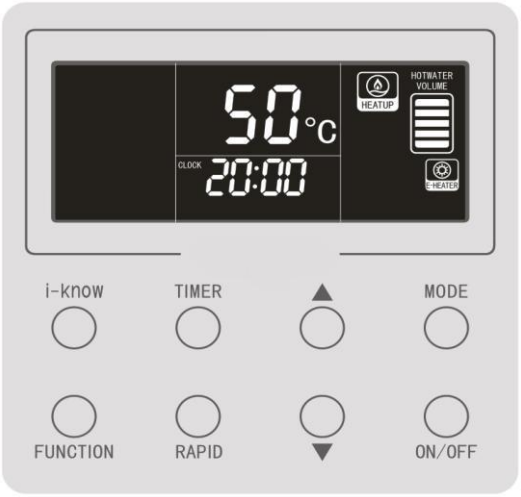


4.3 Special Modes Setting

If the heat pump of a water heater equipped with an electrical heater is faulty, users can press and hold **MODE+RAPID** for 5s in any mode under the state to enter the **E-HEATER** mode.

NOTE: The E-HEATER mode can be used only when the heat pump is faulty. In this case, contact the aftersales service immediately.

The E-HEATER mode is shown in the following figure.



In the E-HEATER mode, users can press the **MODE** button to switch to the HOTWATER mode. Note that the E-HEATER mode will be cancelled automatically and the HOTWATER mode will be started upon restart of the water heater in the case of blackout.

4.4 Water Temperature Setting

In the On state, press "▲" to increase or press "▼" to decrease the temperature set point. The water temperature will increase or decrease continuously by 1°C when the button is pressed and held.

The minimum temperature set point for all models is 35°C. The maximum temperature set point can be set to 55°C, 58°C, or 70°C. For details, see the Integrated Unit User Manual.

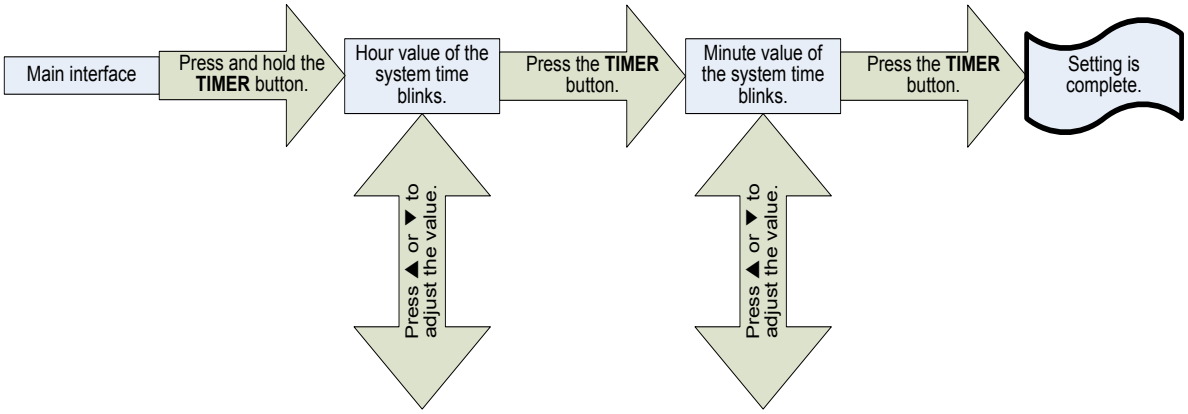
4.5 Time Setting

4.5.1 System Time Setting

In the main interface, press and hold the **TIMER** button for five second. The system time setting interface is displayed. The clock icon is on and the hour value blinks. Press "▲" **or** "▼" to adjust the hour value and press the **TIMER** button to confirm setting. Then the minute value flickers. Press "▲" **or** "▼" to adjust the minute value and press the **TIMER** button to confirm setting. After system time setting is saved, the main interface is displayed. In the setting process, if no button is pressed within 15s, the main interface will be displayed and setting will not be saved.

The system time ranges from 00:00 to 23:59. Each time you press "▲" or "▼", the time increases or decreases by 1 hour or 1 minute. When the button is pressed and held, the time increases or decreases continuously by 1°C or 1 minute.

The setting process is shown in the following figure.

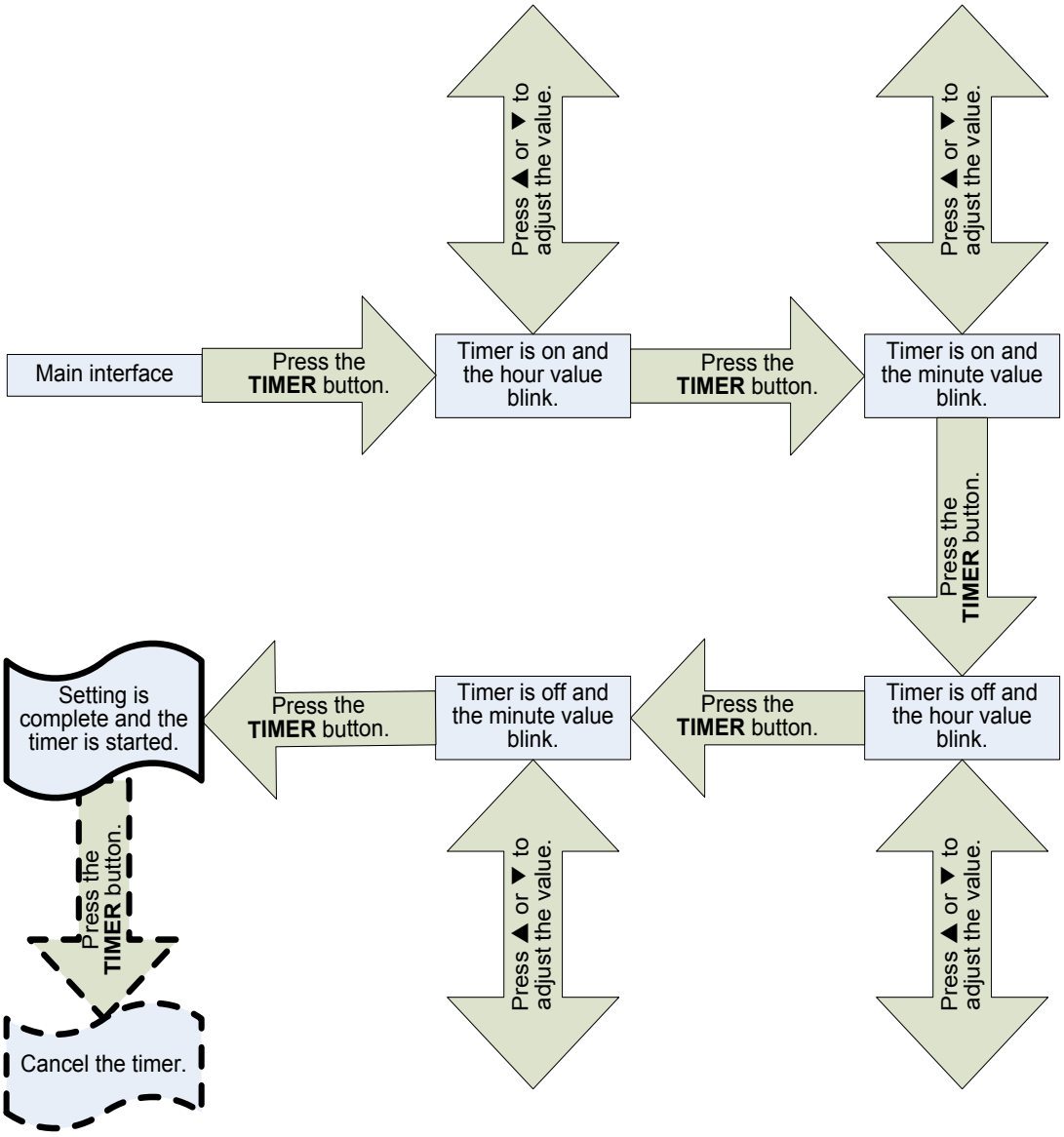


4.5.2 Timer Setting

Timer setting: Under the HOTWATER or SAVE mode or under the Off state, press the **TIMER** button to enter the timer setting interface. The TIMER and ON icons are on and the hour value blinks. Press ▲ **or** ▼ to adjust the hour value and press the **TIMER** button to confirm setting. Then the minute value flickers. Press ▲ **or** ▼ to adjust the minute value and press the **TIMER** button to confirm setting. Then the OFF icon is on and ON icon is off. The hour value blinks. Press ▲ **or** ▼ to adjust the hour value and press the **TIMER** button to confirm setting. Then the minute value flickers. Press ▲ **or** ▼ to adjust the minute value and press the **TIMER** button to confirm setting. After the scheduled on/off time setting is saved, the main interface is displayed. In the setting process, if no button is pressed within 15s, the main interface will be displayed and setting will not be saved.

Timer cancelling: After the scheduled on/off time is set, press the **TIMER** button to cancel it.

NOTE: The scheduled on time and off time cannot be the same; otherwise, the LCD switches to the interface for resetting the timer.



4.5.3 Preset Time Setting

In the PRESET mode, hot water is prepared in advance by the preset time.

In the main interface of the PRESET mode, press the **TIMER** button to enter the selection interface. PRESET 1 blinks while PRESET 2 and PRESET 3 are not displayed. Press ▲ **or** ▼ and the LCD blinks circularly in the flowing sequence: PRESET 1 – PRESET 2 – PRESET 3 – PRESET 1.

Preset time setting: Press the **TIMER** button to select PRESET 1. Then the PRESET 1 icon is on and the hour value blinks. Press ▲ **or** ▼ to adjust the hour value and press the **TIMER** button to confirm setting. Then the minute value flickers. Press ▲ **or** ▼ to adjust the minute value and press the **TIMER** button to confirm setting. After time setting for PRESET 1 is saved, the main interface is displayed.

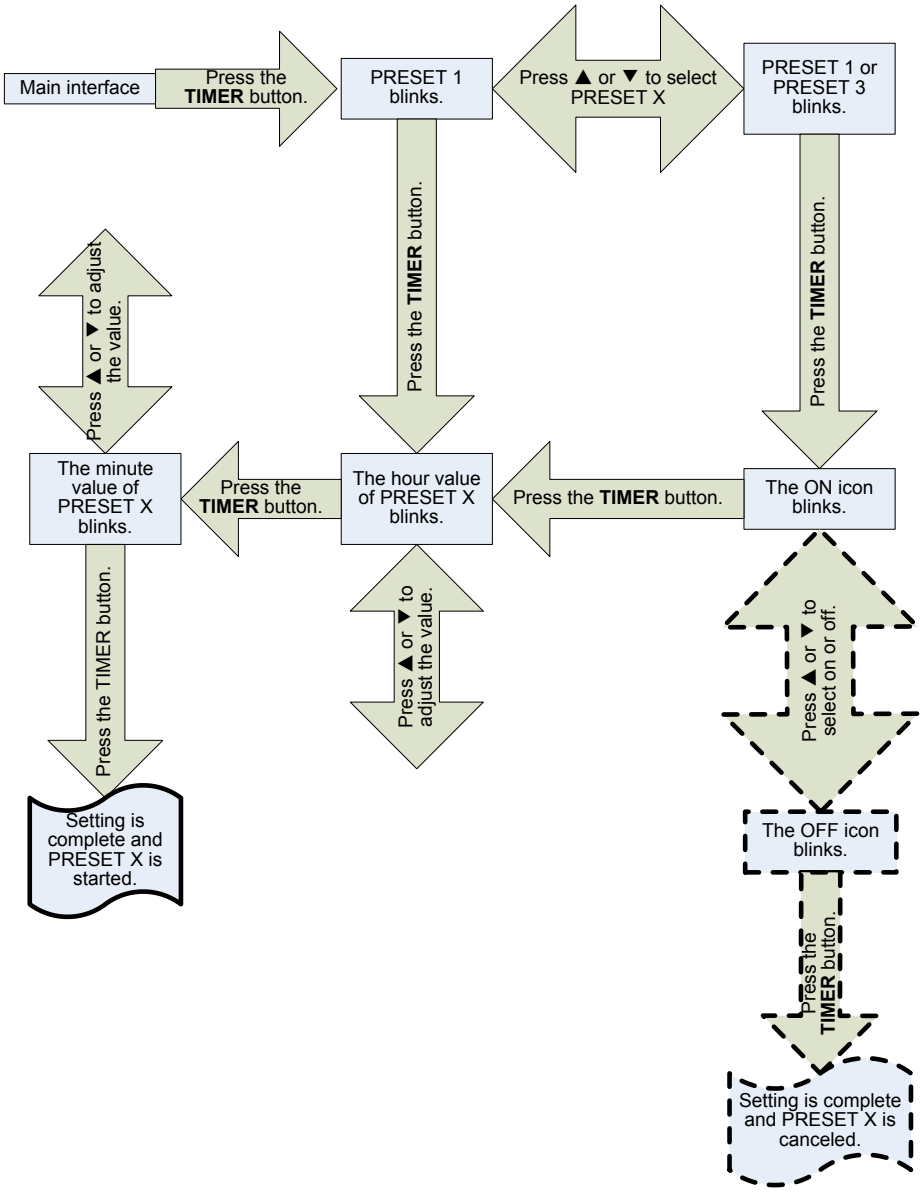
PRESET 2 or PRESET 3 setting: Press the **TIMER** button to select PRESET 2 and then the ON icon blinks. Press ▲ **or** ▼ to switch the ON and OFF icons. When the ON icon blinks, press the **TIMER** button. Then the PRESET 2 icon is on and the ON icon is off. The hour value blinks. Press ▲ **or** ▼ to adjust the hour value and press the **TIMER** button to confirm setting. Then the minute value flickers. Press ▲ **or** ▼ to adjust the minute value and press the **TIMER** button to confirm setting. After time setting for PRESET 2 is saved, the main interface is displayed. The method for setting PRESET 3 is the same as that for PRESET 2. (After setting is saved, the ON and OFF icons are not displayed in the main interface as these icons are available in the setting process.)

In the time presetting process, if no button is pressed within 15s, the preset interface will switch to the main interface automatically and setting will not be saved.

If the time preset for PRESET 1, PRESET 2, and PRESET 3 is the same, it is regarded as one timer.

The preset time can be memorized. If the preset time does not need to be reset, users only need to select on or off.

Preset time cancelling: After time is preset for PRESET 2 or PRESET 3, users can press the **TIMER** button to display the selection interface. The icon of PRESET 2 blinks. Press ▲ **or** ▼ and the LCD blinks circularly in the flowing sequence: PRESET 2 – PRESET 3 – PRESET 1 – PRESET 2. Select PRESET 2 and press the **TIMER** button. Select to cancel PRESET 2. Then the PRESET 2 icon is on and the ON icon blinks. Press ▲ **or** ▼ to select OFF. Press the **TIMER** button to confirm cancelling and return to the main interface. The method for cancelling preset time for PRESET 3 is the same as that for PRESET 2. Preset time for PRESET 1 cannot be cancelled. If users select PRESET 1, the time setting interface will be displayed.



The PRESET mode runs circularly. The water heater starts to heat up water based on the preset time and ambient temperature and stops one hour after the preset time.

4.6 Function Setting

4.6.1 i-know

In the On state, press the i-know button to select the i-know function. To cancel this function, press the i-know button again.

4.6.2 RAPID

In the On state, press the RAPID button to select the RAPID function. The electrical heater is started for heat up. To cancel this function, press the RAPID button again. Then electrical heater is stopped.

Under the E-HEATER mode, users can press the RAPID button to switch to the HOTWATER mode. To return to the E-HEATER mode, press the RAPID button again.

4.6.3 CYCLE, SUNFLOWER, ABSENCE, and ONCE

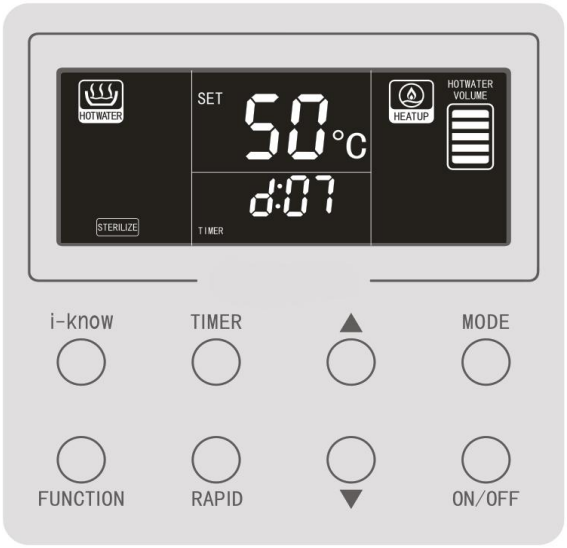
In the On state, press the FUNCTION button to enter the interface for selecting among the CYCLE, SUNFLOWER, ABSENCE, and ONCE functions. When a function is selected, the corresponding icon

blinks. Then users can press ▲ or ▼ to start or cancel this function. If no operation is performed within 5s, it will be regarded that this function is not required. If this function is started, the function icon is displayed without blinking. If this function is cancelled, the function icon will not be displayed. If no function is selected in setting interface for 5s, the interface switches back to the original status.

4.6.4 STERILIZE

The STERILIZE function is available under four common modes. However, after this function is set, the unit runs as under the HOTWATER mode. The water heater controls startup and shutdown of the unit based on the difference between the actual water temperature and that required for sterilization.

In the On state and in a common mode, press the FUNCTION button to enter the function selection interface. When the STERILIZE function is selected, the corresponding icon blinks. At the same time, the preset circular sterilization duration is displayed as d:XX, as shown in the following figure.



During this period, the following operations can be performed:

(1) Press ▲ **or** ▼ to start or cancel the STERILIZE function. If this function is started, the STERILIZE icon is displayed without blinking. Sterilization will be performed circularly by the preset d and h value; If this function is canceled, the STERILIZE icon is not displayed. If no operation is performed within 5s, it will be regarded that this function is not required. After this function is started and when sterilization is being performed, the function icon blinks.

(2) Press the **TIMER** button to enter the sterilization parameter setting interface. Press ▲ **or** ▼ to select the d value and then press the **TIMER** button to confirm the value. When the confirmed d value is not 0, the h value setting interface is displayed. Press ▲ **or** ▼ to select the h value and then press the **TIMER** button to confirm the value. When the STERILIZE icon is displayed, the STERILIZE function is started. If the STERILIZE icon blinks, the preset h value (time point for sterilization) is achieved and sterilization is being performed.

Sterilization Parameter	Meaning	Range
d value	Day interval for circular sterilization	0-10 days; 0 indicates sterilization for once only and the sterilization function will be canceled after being performed.
h value	Time point for circular sterilization	00:00-23:00

Circular sterilization:

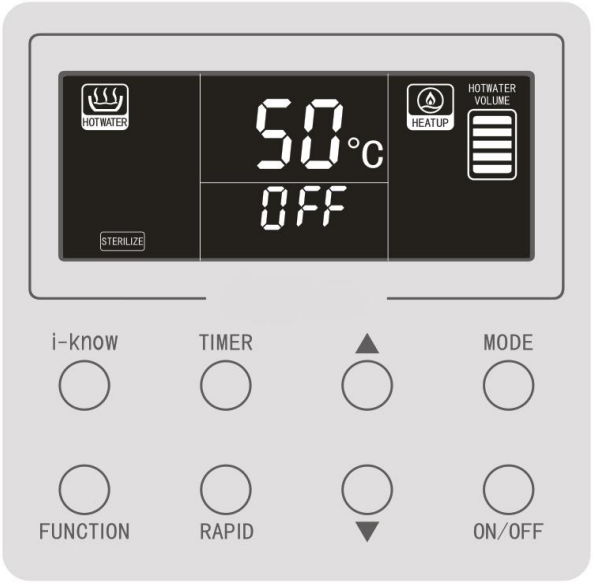
Sterilization is performed circularly by the d value. Once the circular sterilization conditions are met, sterilization is performed regardless of on/off status of the controller and beyond limit of common modes and functions except VACATION. However, users can stop sterilization under process by pressing the **ON/OFF** button to shut it down. (But it can only stop sterilization for this time without affecting circular sterilization; the preset circular sterilization function still works.)

OFF reminder for sterilization failure:

If the OFF icon is displayed at the clock position after the STERILIZATION function is started, sterilization fails and the water temperature required for sterilization cannot be reached. The OFF reminder can be canceled when any button is pressed.

The OFF reminder only indicates that sterilization fails for this time without affecting circular sterilization.

The OFF reminder is shown in the following figure.



NOTES:

① When time goes from 23:59 to 00:00, the system enters a new day, which is the basis for increasing the number of days.

② Every time after the STERILIZE function is started or sterilization parameters are adjusted in the sterilize function setting interface, sterilization will be performed for once immediately and the day interval for sterilization will be recalculated accumulatively. Even when sterilization is being performed, operations such as sterilize function resetting and day interval adjusting for sterilization will also cause recalculation of the day interval.

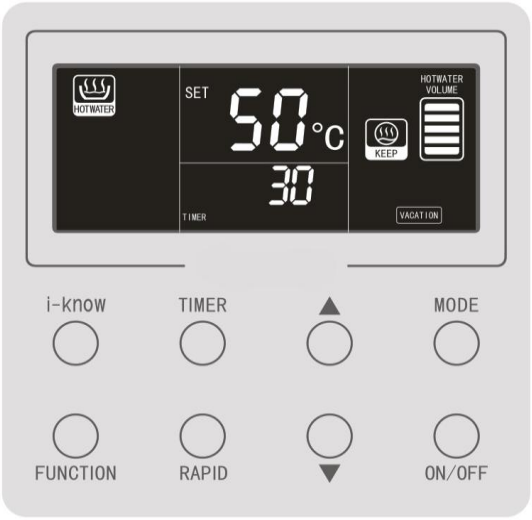
③ After the circular sterilization function is set, the water heater can still precisely calculate the day interval for sterilization accumulatively and the circular sterilization function can still work in the case of short-term power failure. If the time point for sterilization is within the power failure duration, sterilization will be made up once power is provided again. In addition, the day interval for sterilization will be recalculated accumulatively based on this sterilization and next sterilization will be calculated accordingly.

④ Ensure that there is no long-term power failure; otherwise, the clock of the water heater will malfunction and the STERILIZE function will not work properly.

⑤ Under the E-HEATER mode, the STERILIZE function is unavailable.

4.6.5 VACATION

In the On state, press the **FUNCTION** button to enter the function selection interface. When the VACATION function is selected, the corresponding icon blinks. At the same time, the preset number of vacation days is displayed at the clock position, as shown in the following figure.



During this period, the following operations can be performed:

(1) Press ▲ **or** ▼ to start or cancel the VACATION function. After this function is started, the VACATION icon will be displayed without blinking and the water heater runs based on the preset number of vacation days; If this function is canceled, the VACATION icon will not be displayed. If no operation is performed within 5s, it will be regarded that this function is not required.

(2) Press the **TIMER** button to set the number of vacation days. Press ▲ **or** ▼ to select the number of vacation days from 3 to 120 days and press the **TIMER** button to confirm setting. Then press ▲ **or** ▼ to start or cancel the VACATION function.

When the VACATION function is started under the On state, the water heater calculates the number of vacation days accumulatively. And the STERILIZE function will be started to sterilize the water tank one day before the vacation is over. In addition, hot water is prepared by advance in the HOTWATER before the vacation is over.

NOTES:

① When time goes from 23:59 to 00:00, the system enters a new day, which is the basis for increasing the number of days.

② Every time after the VACATION function is started or the number of vacation days is adjusted in the vacation function setting interface, the number of vacation days will be recalculated accumulatively. Even when the VACATION function is being performed, operations such as vacation function resetting and vacation day adjusting will also cause recalculation of the number of vacation days.

③ After the VACATION function is set, the water heater can still precisely calculate the number of vacation days accumulatively in the case of short-term power failure. But ensure that there is no

long-term power failure; otherwise, the clock of the water heater will malfunction and the VACATION function will not work properly.

4.7 Special Function

4.7.1 Keypad Lock

In normal status of the unit, press and hold ▲+▼ for 5s. The LOCK icon is displayed on the controller and all buttons become unavailable. The LOCK icon blinks when any button is pressed. To cancel the Keypad lock function, press and hold ▲+▼ for 5s again. Then the LOCK icon disappears.

If the unit is faulty, the lock function becomes invalid and all buttons are available again. The Keypad lock function will resume after the error is rectified. In addition, the lock status before power failure is memorized.

4.7.2 Temperature unit setting (℃/℉)

In the Off state of the wired controller, press and hold MODE+▲ on the main interface for 5s to enter the query interface. Then the query code 00 is displayed, press and hold MODE+▲ for 5s to display the configurable parameter codes and values. Press ▲ or ▼ to select P5 and press the MODE button. Then item value 00 or 01 blinks under the parameter code P5. Press ▲ or ▼ to select the item value and press the MODE button to confirm setting (00: ℃ and 01: ℉). After that, press the FUNCTION button to return to the main interface. If no operation is performed with 15s, it will switch back to the main interface automatically.

NOTE: Other parameters cannot be modified; otherwise, operation exception will be caused.

4.8 Errors Display

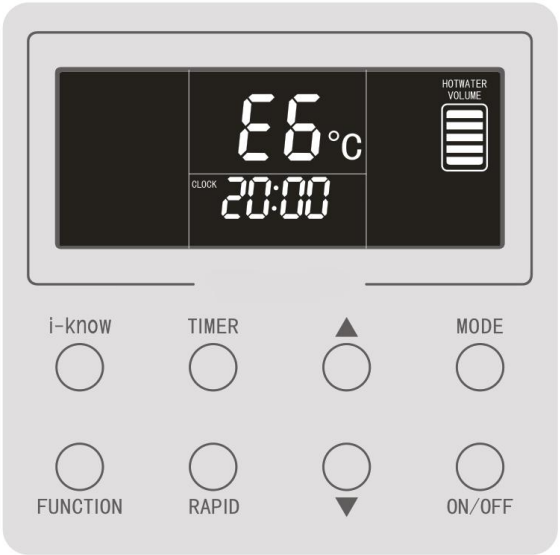
When some errors occur during operation, the error codes will be displayed on the controller.

Meanwhile, the unit is in the Off state and the controller supports only the on/off and query functions.

If multiple errors occur to the water heater simultaneously, the corresponding error codes will be displayed circularly.

If the controller displays a error, shut down the water heater and contact qualified personnel for maintenance. The following figure shows a communication error.

For details on error codes, see the table attached at the end of this manual.



INSTALLATION

1 Engineering Installation Flowchart

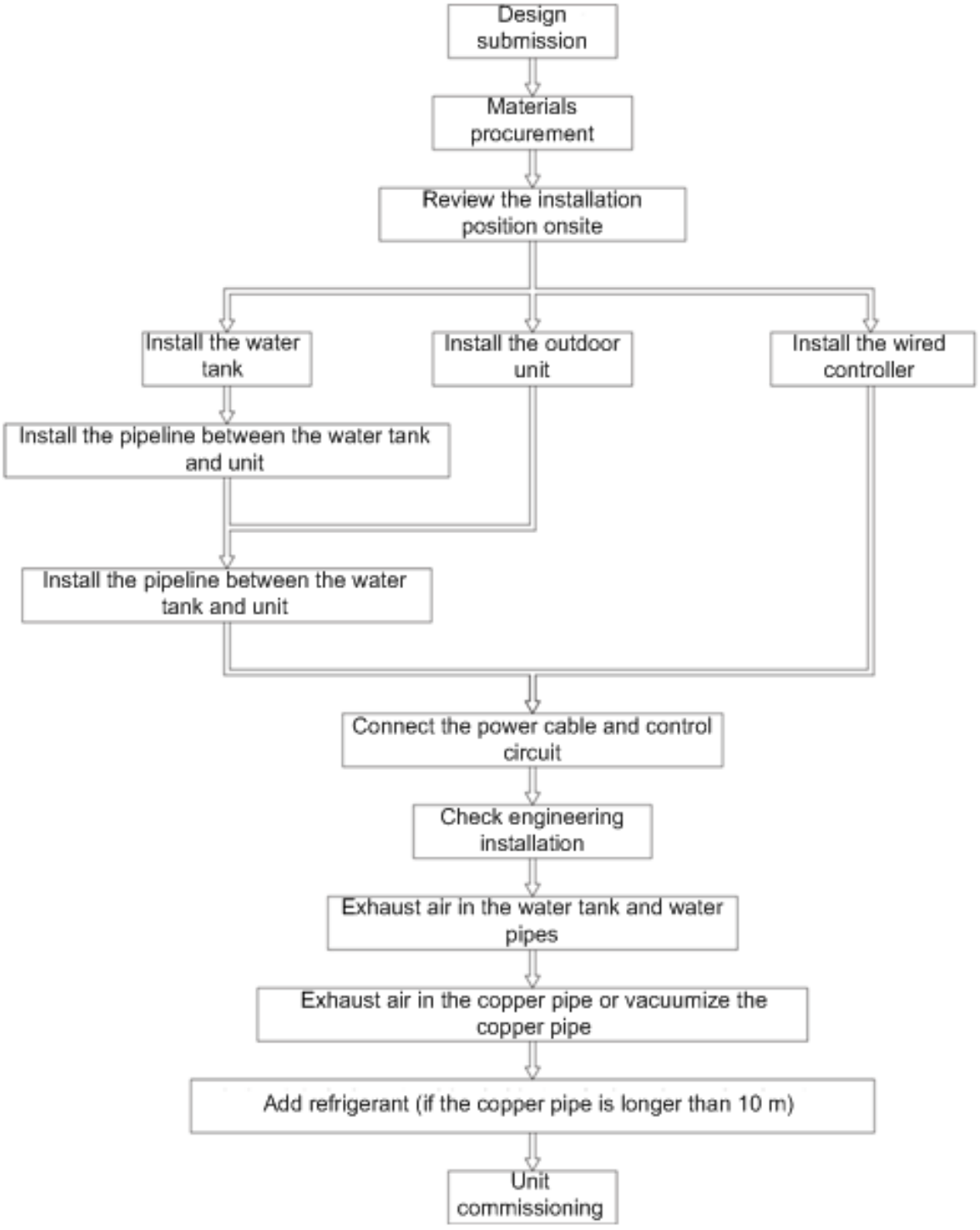


Figure 1-1 Flowchart for installing a split-type coil unit

2 Preparations

2.1 Precautions for Engineering Installation

2.1.1 Safety Requirement

Caution!

All installation personnel must receive safety education and be assessed before construction is started. Once a delinquent behavior occurs, the relevant personnel must be liable for it.

Caution!

Personal and property safety must be put first during the entire construction process. Related national regulations on safety must be strictly followed to ensure personal and property safety.

2.1.2 Importance of Engineering Installation

The installation process of a Sinclair air source water heater involves installation of various parts, such as that of the unit and water tank, water pipe or copper pipe between the unit and water tank, pipes between the water tank and indoor cool/hot water pipes, wired controller, power cord, and control circuit. Each installation phase must be treated with much care to ensure normal operation of the unit. Otherwise, user requirements cannot be met and more seriously, water leakage may be caused and the indoor decoration will be destroyed.

The following table lists problems that are inclined to occur during installation and their adverse effect.

No.	Installation Problem	Adverse Effect
1	Dirt or impurity enters the refrigerant pipe of the coil unit.	The refrigerant pipe is blocked. The air conditioning performance declines and the compressor suffers abrasion. Under a serious case, the unit may fail to work and the compressor may get burned.
2	Vacuum degree of the refrigerant pipe system of the coil unit is insufficient.	The heating effect declines. Protection is frequently started and the unit cannot normally run. Under a serious case, key components such as the compressor may get damaged.
3	Moisture or water enters the refrigerant system of the coil unit.	The compressor may be copperized, which may cause efficiency decrease and abnormal noise. Ice may be generated in the system and the unit fails to work.
4	The safety valve is not connected with a drainage hose or the connection is insecure.	Water leakage occurs and indoor decoration is destroyed.
5	PPR pipes are not properly welded.	The pipe is blocked. Hot water is unavailable as protection is started for the unit. Alternatively, the water flow rate is too low for daily use.
6	No filter is installed for the cool water inlet pipe.	
7	The outdoor unit is installed at a position with poor ventilation.	When the ambient temperature is high, high-voltage protection may be started and the unit stops.
8	The outdoor unit is not securely fixed.	The unit is noisy during operation.
9	The outdoor unit is not connected with a drainage pipe.	Condensate water is discharged at random. Complaints may be generated.
10	The water tank is not securely fixed or is installed on an external wall.	The water tank may topple over or drop down, which may have severe results.
11	The pipe is not provided with thermal insulation or thermal insulation is poor.	The water temperature fails to meet user requirements due to heat loss.

No.	Installation Problem	Adverse Effect
12	City water is unavailable or the water pressure is too low or too high while no remedial measures are taken.	The unit fails to work and complaints are generated due to unavailability of hot water.
13	The communication control cable is not properly protected.	The communication cable is short-circuited or disconnected and the unit fails to start due to communication failure.

2.1.3 Collaboration During Installation

The installation process requires collaboration with aspects such as building, structure, electric, water supply and drainage, fire control, and decoration. Layout of the piping shall not affect the automatic spray header for fire extinguishing and should be well designed to go with the electrical device, lighting, and indoor decoration.

2.1.3.1 Collaboration with Civil Engineering

(1) Holes, casing pipes, and installation positions for drainage standpipe must be reserved. Cable pipes must be laid in advanced.

(2) Installation positions for the outdoor unit and water tank must be reserved and foundation must be prepared. The installation position for the outdoor unit must meet requirements on weight bearing, ventilation, and maintenance.

(3) If no holes are reserved, holes can be drilled when required. Hole drilling on the spandrel girder or load bearing wall is prohibited.

2.1.3.2 Collaboration with Decoration Engineering

(1) Indoor pipes for cool water, hot water, and water return must be laid in advance. Interfaces for cool water, hot water, water return, and water drainage must be reserved.

(2) Indoor hot water pipes must be provided with thermal insulation.

2.1.3.3 Collaboration with Electrical

(1) Circuits for the hot water unit must be reserved with proper power type and power use capacity.

(2) The power cord and air circuit breaker meets requirements of the air conditioning unit as well as national safety regulations.

(3) The regional power supply should comply with national standards in terms of voltage fluctuation and interference noise. Any incompliance found must be rectified through joint efforts.

2.2 Design Drawing Review

The installation personnel shall carefully read the design scheme and drawing provided by the design personnel. The design intent should be completely understood and construction items should be checked onsite. If any question exists, rational opinions should be put forward in a timely manner.

Items to be checked during drawing review:

No.	Item	Check Result
1	It is recommended that the distance between the coil unit and water tank is within 10 meters. If the distance is with 3 meters, the connection pipe delivered with the unit can be used.	
2	The unit is provided with a condensate water drainage pipe.	
3	The unit installation position meets space requirements for heat exchange and maintenance.	
4	The unit goes well with the water tank, the volume of which shall meet user requirements.	
5	The specification, type, and control method of the power cord meet design requirements of the unit.	
6	Preparation, total length, and control method of the control cable meet design requirements of the unit.	

Caution:

The construction personnel shall strictly follow the design drawing. During construction, if any design requirement cannot be met and needs to be changed, the design requirement can be changed upon approval of the design personnel and a written document should be formulated accordingly.

2.3 Installation Material Selection

2.3.1 Precautions

(1) If the brand and specifications of installation materials are specified by the user, user requirements must be met. If not specified, the installation materials purchased shall follow national regulations and meet quality requirements.

(2) The certificate of quality or inspection report must be provided for materials and devices used for installation.

(3) A fire-proof inspection certificate must be provided for products with fire-proof requirement and these products must comply with national regulations and mandatory standards.

(4) When environmental-friendly materials are required by the user, all materials shall meet national environment-protection requirements and relevant certificates must be provided.

2.3.2 Requirements on Installation Material Selection

2.3.2.1 Copper Pipe Selection

(1) Material: Dephophorization seamlessly drawn copper pipe for air conditioner.

(2) Appearance: Both inner and outer surface of the copper pipe should be free from pinhole, crack, peeling, bubble, inclusion, copper powder, carbon accumulation layer, green rust, dirt, severe oxidation film, and obvious defects such as scratch, pit and spot.

(3) Inspection report: The certificate of quality and quality inspection report must be provided.

(4) The tensile strength shall not be less than 240 kgf/mm².

(5) Specifications:

Outside Diameter of Copper Pipe (mm)	Refrigerant Type	Minimum Wall Thickness (mm)
6.35	R134a	0.5
	R410A	0.8
9.52	R134a	0.71
	R410A	0.8
12.7	R134a	0.8
	R410A	0.8

2.3.2.2 Water Pipe Selection

(1) Selection of PPR water pipe

Generally, PPR pipes are adopted as hot water pipes for their various advantages such as light weight, corrosion resistance, scaling-free, long service life, easy installation, heat preservation and energy-saving and good heat resistance. PPR pipes are connected by hot melting. Common series and specification are listed in the following table.

Nominal Outside Diameter Dn	Average Outside Diameter		Pipe Series				
			S5	S4	S3.2	S2.5	S2
	Maximum	Minimum	Nominal Wall Thickness				
20	20.0	20.3	-	2.3	2.8	3.4	4.1
25	25.0	25.3	2.3	2.8	3.5	4.2	5.1

NOTE: Generally, S4 series pipes are adopted for cool water and S2.5 series pipes are adopted for hot water.

(2) Selection of condensate water pipe

1) Rigid PVC pipes are recommended for water drainage as they are easy to purchase and install.
2) The certificate of quality and quality inspection report must be provided.
3) Specifications and wall thickness:

Rigid PVC pipe (PVC-U pipe): dn 32 mm × 2 mm, dn 40 mm × 2 mm, dn 50 mm × 2 mm, where dn indicates external diameter.

2.3.2.3 Selection of Thermal Insulation Materials

(1) The quality inspection report and certificate of quality must be provided for thermal insulation materials and products. Technical specifications and performance of these materials and products must comply with related technical standards and design regulations.

(2) Flexible closed foam rubber and plastic materials are recommended for thermal insulation.

(3) Fire-retardant grade of the thermal insulation materials must be B1 (nonflammable) or A (noncombustible).

(4) The heat resisting capacity of the thermal insulation materials shall not be lower than 120°C.

(5) Wall thickness of the copper pipe thermal insulation materials shall not be less than 15 mm.

(6) Wall thickness of the PPR pipe thermal insulation materials shall not be less than 10 mm.

2.3.2.4 Selection of Communication Cable

Twisted pairs or shielded twisted pairs that are already configured for the unit must be adopted as the communication cable and control cable. For standard configuration, length of the communication cable between the unit and wired controller is 8 m. The maximum length is 20 m.

2.3.2.5 Selection of Power Cord

A copper conductor must be adopted as the power cord, which shall comply with related conductor standards and meet the unit's requirement on current-carrying capacity. For details on cable diameter, refer to section 7 of this chapter.

3 Installation of the Unit

3.1 Installation of the Outdoor Unit

3.1.1 Overall Dimensions and Size of Installation Holes

Requirements on outdoor unit installation for the water heater are the same as those for the air conditioner. The outdoor unit can be installed on the external wall, roof, balcony or ground. The air outlet should be set against the wind. Figure 3-1 shows dimensions of the outdoor unit. (unit: mm)

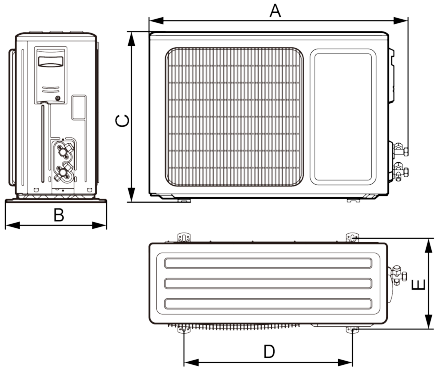


Figure 3-1 Dimensions of the outdoor unit

Model	A	B	C	D	E
SWH-35ERA2	842	320	591	540	286

3.1.2 Selection of Installation Position

The outdoor unit must be installed at a location where:

(1) The noise and air flow generated by the air outlet do not affect neighbors, animals, and plants.

(2) Good ventilation of the outdoor unit can be ensured, and there are no obstructions nearby that hinders the air intake or output of the unit

(3) The installation position is able to withstand the weight and vibration of the outdoor unit, and the installation can be safely performed.

(4) The place is dry and not exposed to direct sunlight or strong winds.

(5) The installation dimension diagram of the outdoor unit can be complied with, and it is convenient to maintain and check the unit.

(6) The outdoor unit is out of the reach of children.

(7) It does not hinder public aisle or affect city appearance.

3.1.3 Requirements on Installation Space

The distance between the outdoor unit and wall or any other obstacle must be proper, as shown in Figure 3-2.

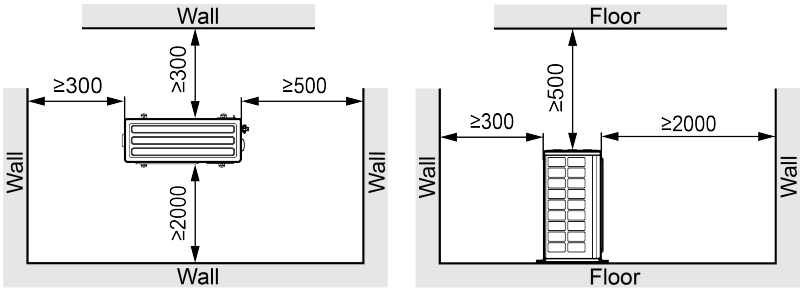


Figure 3-2 Space requirements for installation (Unit: mm)

(1) If a canopy is to be installed for the water heater outdoor unit, note that the heat dissipation and absorption should not be affected.

(2) The outdoor unit must be installed in the host places a solid foundation, and ensure that the outdoor unit is installed upright, and fastened with foundation bolts. If the vibration is strong, add rubber gaskets to prevent vibration.

(3) Condensate drain of the outdoor unit: buckle snap the drainage joint of the outdoor unit into the drainage hole located in the middle of the chassis, and ensure reliable and tight fitting. Then, connect the drainage pipe to the drainage mouth, and guide the drainage pipe to a proper place for drain.

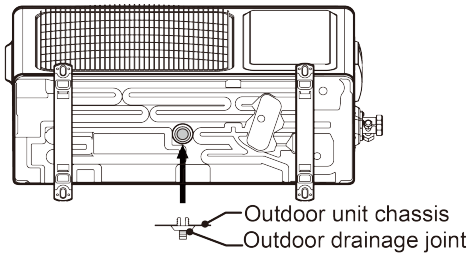


Figure 3-3 Drainage pipe connection

3.1.4 Requirements on Foundation Installation

The concrete foundation of the outdoor unit must be strong enough. Ensure that the drainage is smooth and that the ground drainage or floor drainage is not affected. The vertical installation mode must be adopted and the outdoor unit must be fixed using foundation bolt. Requirements on the concrete foundation are as follows:

(1) The concrete foundation must be flat and have enough rigidity and strength to undertake the unit's weight during operation. The height of the foundation is 200 mm to 300 mm, which is determined based on the size of the unit.

(2) The proportion of the cement, sand, and stone for the concrete is 1:2:4. Place 10 reinforced steel bars (φ10 mm) with a space of 30 mm.

(3) Use the mortar to flatten the surface of the foundation.

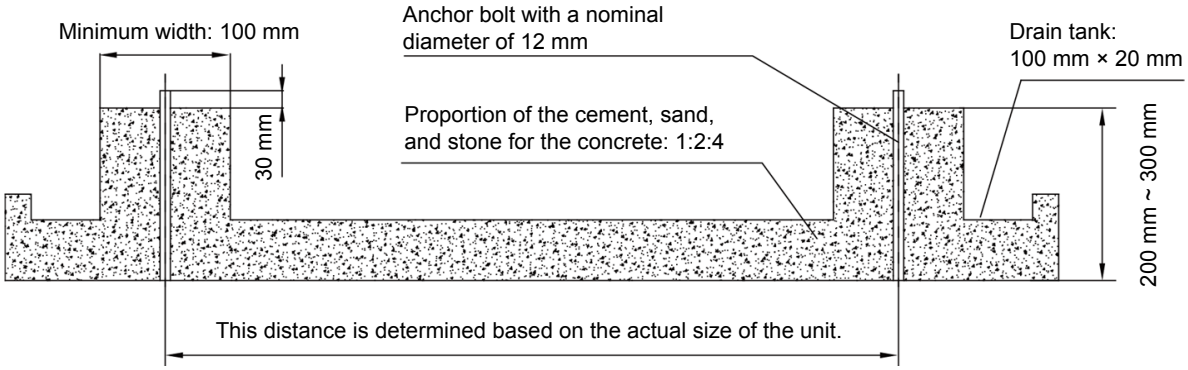
(4) When the foundation is built on a concrete floor, crushed stones are not required. But the foundation surface must be roughened.

(5) Clear the oil stains, crushed stones, dirt, and water in the reserved bolt hole of the foundation and install a temporary cover before installing bolts.

(6) Build a drainage ditch around the foundation to discharge the condensate water.

(7) If the outdoor unit is installed on the roof, check the intensity of the building and take waterproof measures.

(8) If a u-steel foundation is adopted, the structure must be designed with sufficient rigidity and strength.



If the wall-mounting mode is adopted, install the outdoor unit of water heat on the load bearing wall. First, drill holes based on the bolt size for support and bracket installation, then install expansion bolts into the holes before installing the supports and brackets. Last, install the outdoor unit onto the supports and brackets and fix it with bolts.

3.1.5 Requirements on Vibration Reduction

The outdoor unit of water heater must be fixed securely. If the outdoor unit vibrates obviously, apply a damping rubber pad between the bottom corner of outdoor unit and the foundation or support board.

3.1.6 Connection of the Outdoor Unit and Water Tank

Connect the outdoor unit to the water tank using the refrigerant pipe configured upon delivery. For details, see Section 5 Refrigerant Pipe Design in this chapter.

NOTE: Because there many factories make the produce, the height and type of Refrigerant in and Refrigerant out of the water has delicate difference, for details, refer to the actual product delivered.

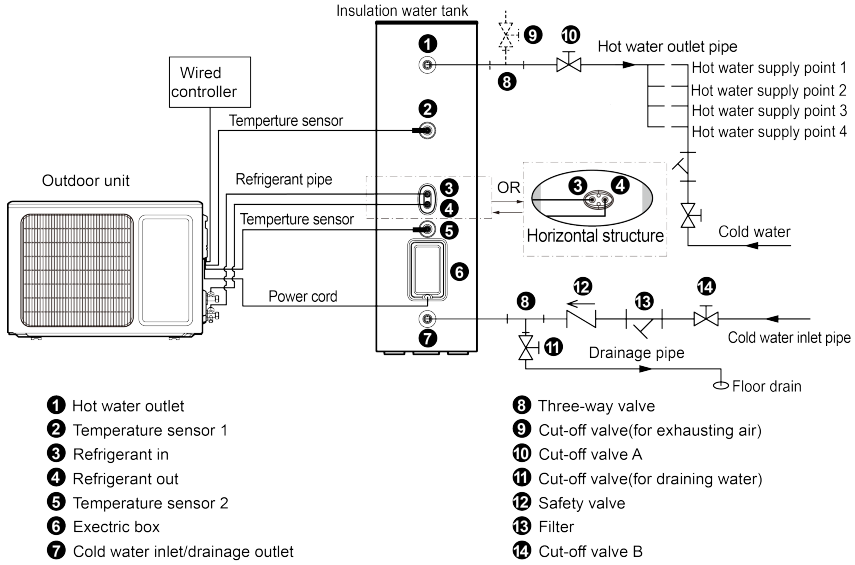
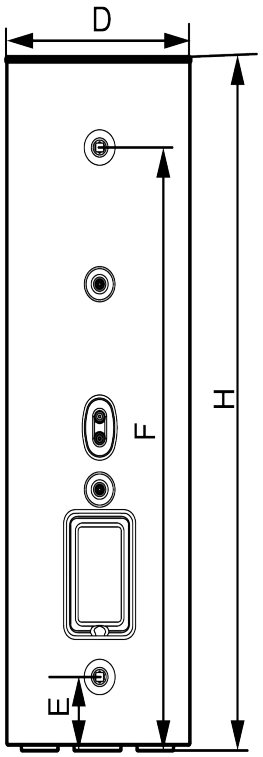


Figure 3-4 Installation diagram

3.2 Installation of Water Tank

3.2.1 Overall Dimensions and Size of Installation Holes

External Dimensions and Installation & Maintenance Space of SWH-200DE



Parameter	
D	462
H	2000
F	1797
E	166
Cool water inlet (internal thread)	G1/2
Hot water outlet (internal thread)	G1/2
Working medium inlet (internal thread)	Φ9.52
Working medium outlet (internal thread)	Φ6

3.2.2 Requirements on Installation Position and Space

(1) The water tank suggest be installed indoors. When be installed outdoors, it need a shed or mantle to prevent rain. In addition, the water tank and safety valve shall not be installed inside the room or balcony which is without discharge floor drain.

(2) Try to install it in an environment where the temperature is higher than 0°C. The hot water outlet should not be too far away from the locations for use. Lay out the pipes in a centralized manner, and take thermal insulation measures on hot water piping to reduce heat loss.

(3) The water tank must be placed upright with all feet touching the ground. It must be installed on a solid foundation. During water tank installation, consider the weight bearing capability of the foundation. The following figure shows the installation diagram.

NOTE: The water tank must also be fastened to the wall using a tank mounting hoop or plate to prevent fall-off the water tank due to exceptions.

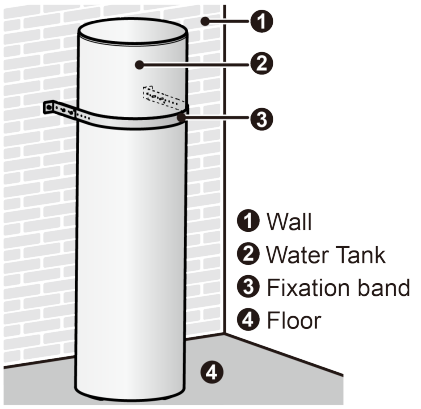


Figure 3-5 Fixing Installation schematic diagram of the water Tank

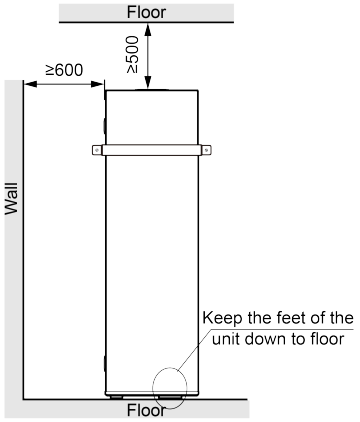


Figure 3-6 Space requirements for Installation of the water tank (Unit: mm)

(4) There should be water pipes, hot water interfaces, and floor drains to facilitate water replenishment for the water tank, hot water supply, and drainage.

4 Refrigerant Pipe Design

4.1 Precautions on Pipe Design

The refrigerant pipe must meet the following requirements:

Material requirement: Dephophorization seamlessly drawn copper pipe for air conditioner

Appearance: Both inner and outer surfaces of the copper pipe should be free from pinhole, crack, peeling, bubble, inclusion, copper powder, carbon accumulation layer, green rust, dirt, severe oxidation film, and obvious defects such as scratch, pit and spot.

Inspection report: The certificate of quality and quality inspection report must be provided.

Specification: For standard configuration, one TP2M Φ9.52 (or Φ12) and one TP2M Φ6 are configured for the unit. Length of both pipes is 3 m. If the pipe needs to be extended, this specification needs to be followed.

The Sinclairair source water heater system poses high requirements on cleanliness and dryness. Therefore, special attention must be paid when connecting the refrigerant pipe to the indoor and outdoor units. If any impurity, moisture, or dust is left in the pipe due to improper operation, many problems may occur to the system and the system may fail to work.

4.2 Pipe Installation Diagram

4.2.1 Installing the Refrigerant Pipe

(1) If the water tank and the outdoor unit need to be connected by punching through a wall, a hole of Φ 55 mm must be drilled in the wall and the hole should be inclined toward the exterior wall, as shown in Figure 4-1. Protective sleeves need to be put on both sides of the hole.

(2) Bind up the connecting pipes, power cord, water temperature sensing package, and communication lines (if necessary) of the wired controller with thermal insulation bands, and then lead them through the hole.

(3) Remove the refrigerant pipe joint from the water tank and the sealing nuts from the small and large valves of the outdoor unit, and add refrigerant oil on the joint and valve cones.

(4) Remove the sealing caps of the connecting pipe. Align the center of the bell mouth with the pipe joint and valve cone, and screw up the conical nut with your hand and then with a wrench, as shown in Figure 4-2.

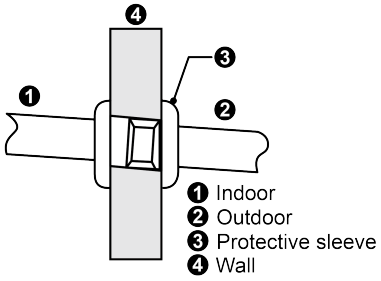


Figure 4-1 Refrigerant connecting pipe through the wall

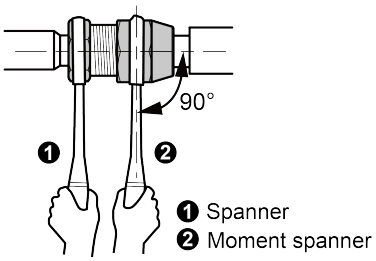


Figure 4-2 Fastening the connecting pipe

4.2.2 Exhausting Air in the Refrigerant Pipe and Refrigerant Charge

Table 4-1 Refrigerant Charge

Length of Connection Pipe	Refrigerant Charge Volume
Not greater than 10 m	/
10 to 20 m	+22g/m

NOTE: The unit capability and energy efficiency decreases when length of the connecting pipe increases. Therefore, take thermal insulation measures on the connecting pipe when it needs to be extended.

Exhausting Air in the Refrigerant Pipe must use vacuum pump.

(1) Connect the filling hose to the fluoride injection mouth of the air valve. Ensure that the valve cores of the air valve and fluid valve are tightly closed.
(2) Connect the joint of the filling hose to the vacuum pump.
(3) Fully open the low pressure valve of the pressure gauge.
(4) Start the vacuum pump to vacuumize the air for 20 minutes or more, and ensure that the pressure gauge pointer points to -1.0 bar. Close the low pressure valve, and stop the vacuum pump. Wait 2 minutes. If the number indicated by the pressure gauge pointer does not rise, the vacuumization and piping are successful. If the number indicated by the pressure gauge pointer rises, it indicates that air is entering the system. In this case, check the piping for leaks, and vaccumize the air again.
(5) Remove the filling pose from the air valve.
(6) Fully open valve cores of the gas valve and fluid valve.
(7) Tighten the valve caps of the air valve and fluid valve, and the fluoride injection mouth nut.
(8) Tighten the valve caps, and then use a leak detector or soapy water to check whether the pipes for connecting the outdoor unit and the water tank leak.

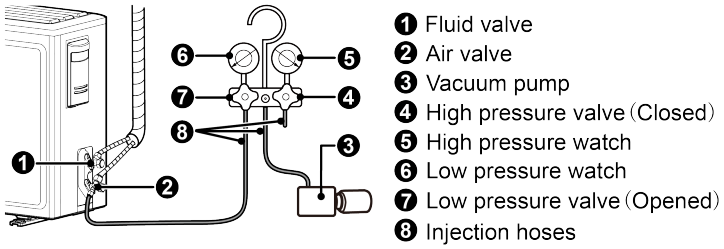


Figure 4-3 Vacuum pump connection diagram

NOTES：Refrigerant perfusion refer to section 8.

5 Pipes Installation and Insulation

5.1 Pipes Installation for the Cooling System

5.1.1 Processing to Refrigerant Pipes

A 3-meter refrigerant pipe is configured for the unit for standard configuration. If the required refrigerant pipe is longer than 3 m, it needs to be processed in the steps specified below.

5.1.1.1 Cut-off and Burring

Warning!

Do not use undedicated cutting devices such as a hacksaw.

(1) Use a special-purpose pipe cutter to cut copper pipes.

(2) Cut the pipes gently to ensure that the copper pipe does not deform.

(3) After cutting the pipes, use a slicker to grater bur the pipes with the pipe opening inclining downward so that the copper scales do not fall into the pipe.

(4) Cover the copper pipe with a sealing cap or adhesive tape to prevent dirt and sundries.

(5) Allowable deviation: Skewness of the cross section cannot exceed 1% of the copper pipe caliber.

5.1.1.2 Pipe Cleaning

(1) Cleaning with a piece of silk cloth (applying to straight pipes)

1) Cleaning with a piece of silk cloth: Wrap a thin steel wire with a piece of clean silk cloth. Crumple the cloth into a lump with diameter larger than the pipe caliber.
2) Apply several drops of chlorylene to the cloth. Push the cloth in from one end of the pipe and pull out from the other end.
3) Every time the cloth is pulled out, remove the dust and sundries with chlorylene.
4) Wash repeatedly until the pipe is clean.

(2) Cleaning with nitrogen (applying to coils)

Blow off all dust and sundries in the pipe with nitrogen.

Warning!

After cleaning, cover the both ends of the pipe with a sealing cap or adhesive tape.

5.1.1.3 Pipe Bending

Precautions:

① During bending, there must be no corrugation or deformation inside the pipe.

② The welding point of the pipe should not be at the bending part. The distance between the nozzle welding joint and the bending part should be less than 100 mm.

(1) Requirements

The radius of the bending pipe must exceed 3.5D. The ratio of the short diameter after bending to the original diameter must exceed 2/3.

(2) Processing methods:

1) Manual bending: applies to thin copper pipes (Φ6.35 mm to Φ12.7 mm)
2) Mechanical bending: applicable range (Φ6.35 mm to Φ44.45mm)

5.1.1.4 Pipe Expanding

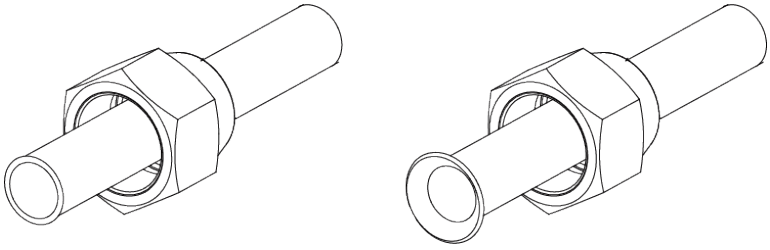
Pipe expanding is used to provide a welding point for pipe connection. Requirements on pipe expanding are as follows:

(1) Before pipe expanding, apply appropriate amount of lubricant on the surface of the pipe. (The lubricant must meet the refrigerant system's requirements.)
(2) Pipe expanding length must be in accordance with the insertion depth of the caliber.
(3) To avoid leakage due to straight lines at the expanding point, turn round the copper pipe and then make corrections.
(4) Apply appropriate force during pipe expanding to avoid crack.

5.1.1.5 Flaring

Another mode of pipe connection is flare opening connection, which requires pipe flaring before connection.

(1) Install the flaring nut to the copper pipe.
(2) Put the copper pipe into the root of the pipe expander.



1) Before pipe flaring, apply appropriate amount of lubricant on the surface of the opening to ensure smooth pass of flaring nuts and avoid pipe distortion.
2) The concentricity must be ensured after pipe flaring. The sealing face must be intact without any burr, crack, or wrinkle.
3) Small burrs at the pipe opening can be cleared using a grater.

5.1.2 Installation of Refrigerant Pipes

5.1.2.1 Installation Sequence

The sequence for installing the refrigerant pipe is as follows:

Preparing and installing the support, hanger, and bracket – Piping according to the drawing – Cleaning the pipe – Processing the pipe – Adding an thermal insulation sleeve – Connecting the pipe – Fixing the pipe – Blowing contaminants in the pipe system – Performing an air-tightness test – Performing thermal insulation

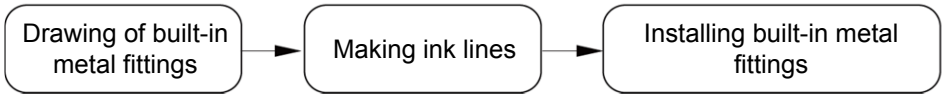
5.1.2.2 Construction of Supports, Hangers, and Brackets

(1) Construction of supports, hangers, and brackets for pipes: These parts must be fixed securely in reasonable type and style without any tilt. The surface is clean without any dirt. The parts embedded into the wall or floor cannot be painted or coated and must be free from grease stains.

(2) Construction of fixing bolts for devices: Ensure sufficient rigidity for the devices. Take anticorrosive measures for exposed part of built-in fittings. If the foundation must be waterproof, takes waterproof measures.

(3) Construction of steel casings: Equip a steel casing for all pipes which are led through the wall or floor. Pipe welding joints cannot be placed inside the sleeve. The steel casing must be parallel with the bottom of the wall or floor but be 20 mm or greater above the bottom. The diameter of the steel casing must be determined based on the thickness of the thermal insulation layer and the inclination degree of the condensate water pipe. Fill the gap between the pipe and the sleeve with flexible and non-flammable materials. The sleeve cannot be used as a support point of the pipe.

(4) Operation sequence



If possible, make ink lines on the ground and project them to the top of the building.

(5) Installing built-in metal fittings

Select built-in metal fittings in accordance with local regulations.

(6) Installing expansion bolts

Use expansion bolts when built-in metal fittings are unavailable due to design change.

(7) Installing expansion bolts

- If the foot pedal is 2 m or more from the ground, there must be three points of support. The foot pedal must be tightened securely with the ladder.
- Do not perform operations on the top of the ladder.

5.1.2.3 Shaping and Fixing of Pipes

When installing refrigerant pipes, ensure that the directions are correct with minimum length and elbows. Alignment and thermal insulation after installation cannot affect the pipe location and elevation. There shall not be flat bending or corrugation on the pipe after piping.

Use angle steel support, bracket, round steel hanger, U-type pipe clip, or flat steel to fix pipes outside the thermal insulation layer. It is better that the thermal insulation materials be not compressed to ensure good thermal insulation.

The style and workmanship of supports, hangers, and brackets must follow the standard T616 HVAC Systems Design Handbook.

The minimum distance between supports, hangers, and brackets is listed in the table below:

Outside Diameter of the Pipe (mm)	Φ≤16	40>Φ≥19.05	Φ≥40
Distance between Horizontal Pipes (mm)	1000	1500	2000
Distance between Vertical Pipes (mm)	1500	2000	2500

The pipe led through a wall or beam must be fixed by a support, hanger, or bracket on both ends at the position 300 mm away from the hole.

5.1.2.4 Pipe Connection

The refrigerant pipes and indoor units are connected by using the flare opening. Therefore, the quality of flaring connection must be ensured. The flaring depth of the bell mouth cannot be smaller than the caliber. The flaring direction must face towards the direction of medium flow. Use two torque wrenches to fasten the connection.

5.1.3 Air-tightness Test

Precautions:

(1) The measuring range of the test pressure gauge must be above 4.5 MPa for R410A system and above 3.5 MPa for R134a system.

(2) Record the value displayed on the pressure gauge, ambient temperature, and test time.

(3) Pressure correction: The pressure changes by 0.01 MPa when the temperature changes by 1°C.

(4) The pressure meets the requirement if it does not change.

(5) If the pressure must be kept for a long time, decrease the pressure to 0.5 MPa or lower. High pressure for a long time may cause leakage at the welding point or safety hazard.

(6) Before completing the air-tightness test to the refrigerant pipe, do not conduct thermal insulation or wrapping at the points where the refrigerant pipe is connected to the outdoor unit of water heater and water tank.

5.1.3.1 Importance of the Air-tightness Test

Air-tightness of the water heater system mainly refers to the tightness of the refrigerant pipes, which ensures secure and reliable running of the water heater.

Refrigerant leakage may affect functions of the water heater or even damage the compressor and make the system to break down. Therefore, an air-tightness test must be performed.

5.1.3.2 Procedure for Performing the Air-tightness Test

Cut-off valves of the gas and liquid pipes of outdoor unit of the water heater are turned off at delivery.

Before test, apply a small amount of required lubricant on the block nut and pipe terminals and use two wrenches to fix the block nut.

The outdoor unit pipes cannot be connected when the air-tightness test is being performed.

Use dry nitrogen as media for the air-tightness test. Increase the pressure slowly by following the steps below:

Step 1: Increase the pressure to 0.5 MPa. Stop for 5 minutes and then perform air-tightness check. Major leakage may be detected.

Step 2: Increase the pressure to 1.5 MPa. Stop for 5 minutes and then perform air-tightness check. Minor leakage may be detected.

Step 3: Increase the pressure to the test pressure (4.15 MPa for R410A system and 3.15 MPa for R134a system). Keep the test pressure for 1 hour and check whether it decreases. If the pressure does not decrease, it meets the requirement.

5.1.4 Vacuumization and Desiccation

5.1.4.1 Requirements on Vacuum Pump

The vacuum pump for different refrigerant systems cannot be the same.

The ultimate vacuum degree of the vacuum pump should reach -0.1 MPa.

The air discharge capacity of the vacuum pump must be greater than 4 L/S.

The precision of the vacuum pump must be greater than 0.02 mmHg.

The system vacuum pump must be equipped with a check valve.

5.1.4.2 Procedure and Precautions for Vacuumization and Desiccation

(1) Connect the perfusion hose with the nozzle for perfusing refrigerant. (The gas valve and liquid valve must be turned off.)

(2) Connect the perfusion hose with the vacuum pump, as shown in Figure 5-1.

(3) Totally open the low-pressure valve on the pressure gauge.

(4) Start the vacuum pump. After vacuumizing for at least 20 minutes, turn off the low-pressure valve and stop the vacuum pump when the pressure gauge indicates -1.0bar. Keep it for 2 minutes. If the pressure value does not increase, it means that vacuumization and pressure maintaining succeeds. If the value increases, it means that air gets into the system. Check whether leakage exists and vacuumize again.

(5) Remove the perfusion hose from the gas valve.

(6) Totally open the valve pin from the gas valve and liquid valve.

(7) Screw the fluoride injection mouth nut and tighten the valve caps for the liquid valve and gas valve.

(8) Tighten the valve cap and use suds or leakage detector to check whether there is gas leakage at the connection point of the outdoor unit and water tank.

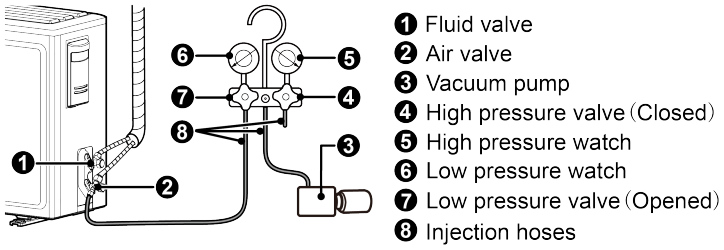


Figure 5-1 Vacuum pump connection

5.2 Installation of Water Pipes

(1) Preparing of water pipes

Hot water tank hot water pipes must be selected out of the tube, it is recommended to use a nominal outside diameter of dn20, S2.5 series PPR pipe. Such as the use of other similar insulated pipe, can refer to more than the outside diameter and wall thickness to choose, do not recommend the use of plastic pipe and other fast heat pipe.

(2) Installing water outlet and inlet pipes for the water tank

The safety valve, filter, and cut-off valve must be installed for the water inlet pipe, and the installation order must be consistent with that shown in the unit installation diagram. At least a cut-off valve must be installed for the water outlet pipe.

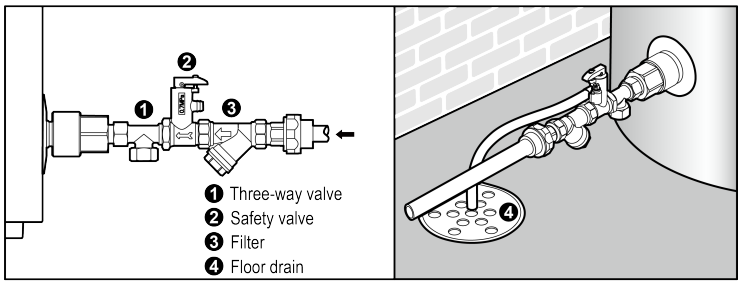
In order to facilitate water tank emptying or cleaning, you are advised to add a tee joint and a cut-off

valve at the water outlet of the water tank. They must be installed if the water tank is far away (the hot water pipe is longer than 20 m) from the location for water use or all locations for water use are lower than the cold water inlet of the water tank.

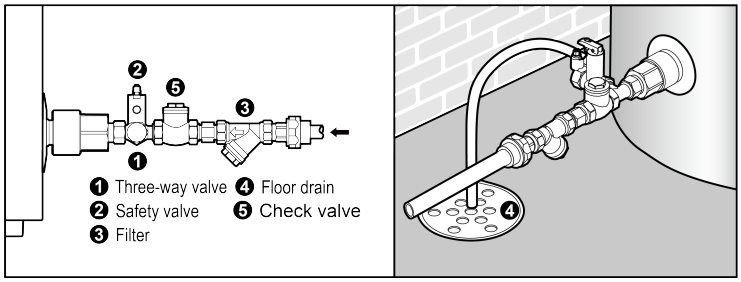
(3) Installing the safety valve

Use a PPR pip to connect the safety valve delivered with the unit to the water inlet of the water tank (note: the direction indicated by "→" should point to the water tank). The other end of the safety valve is connected to the tap water for water replenishment. To ensure safe use, please strictly follow the installation order shown in Figure 5-2. Safety valve must install diversion tube and be reliably fixed to prevent falling off; lead the drainage hose to floor drain downward naturally and properly without bending or any twine. After that, the surplus hose must be cut to avoid water in drainage hose getting frozen due to blocking of drainage or low temperature.

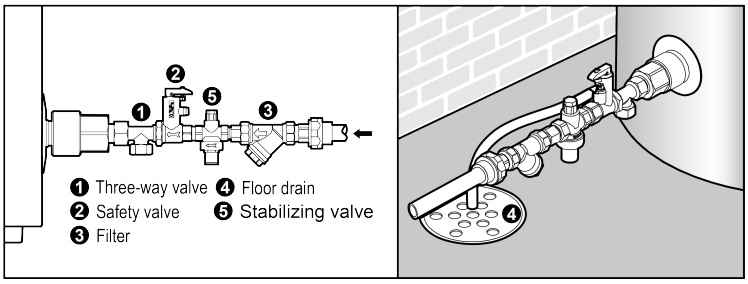
To avoid any inconveniences or property losses due to water leakage or safety valve discharging water which is resulted from improper connection of water pipe, water tank and safety valve shall not be installed inside the room or balcony which is without discharge floor drain.



(a) Installation method 1(inlet cold water pressure is between 0.1MPa and 0.5MPa)



(b) Installation method 2(inlet cold water pressure is less than 0.1MPa)



(c) Installation method 3(inlet cold water pressure is greater than 0.5MPa)

Figure 5-2 Safety valve installation diagram of cold water inlet pipe

(4) Installing the drainage pipe

As shown in Figure 3-4, remove the plug of the three-way valve. Then, use a drainage pipe to connect the three-way valve to the floor drain, and ensure that the drainage pipe and the joint of the floor drain are lower than the bottom of the water tank. Otherwise, the water cannot be drained. In addition, the cut-off valve must be installed in the position at which the user can conveniently operate it.

(5) Installing antifreezing tracing belt

If the water tank shall inevitably be installed in places with temperature below 0°C, to avoid the pipeline getting frozen due to bad insulation of water system pipeline, antifreezing tracing belt for pipeline shall be installed in water inlet pipe of water tank, our pipeline antifreezing tracing belt and its accessories is recommended, detailed list is as follows:

Name	Quantity
Self-limiting temperature tracing belt	1
Frame	1
Aluminum-foil paper	1
Pipeline antifreezing tracing belt installation statement sheet	1

⚠Caution：

① To ensure water safety, the PPR pipe length at the water inlet and outlet is determined as per the formula: $L \geq 70 \times R^2$, wherein L indicate the pipe length, and R indicates the inner diameter of the pipe (unit: cm). The pipe should be insulated properly. No metal pipe is allowed.

② To ensure safety and reliability, special accessory equipped with this unit must be adopted (PPR water pipe joint, safety valve and filter etc.). Don't use the accessory of any third party and replace the accessory by yourself, any losses thereof for normal operation and usage of heat pump water heater result from personal injury and improper installation,Sinclair shall not be liable.

5.3 Thermal Insulation Measures

5.3.1 Thermal Insulation for the Refrigerant Pipes

5.3.1.1 Thermal Insulation Materials

Use closed-cell foam thermal insulation materials with flame retardant grade of B1.

The heat conductivity is not greater than 0.035 W/(m·k) when the average temperature is 0°C.

5.3.1.2 Thickness of the Thermal Insulation Layer

Outside Diameter of the Pipe (mm)	≤12.7	≥15.88
Thickness of the Thermal Insulation Layer (mm)	≥15	≥20

Use sunblock, anti-weathering, and non-cracking thermal insulation materials for outdoor pipes.

5.3.1.3 Procedure of Insulation

(1) Select thermal insulation materials based on design requirements.

(2) Wear the thermal insulation sleeve before connecting refrigerant pipes. Users cannot cut the thermal insulation material apart and then wrap up with ties after connecting the pipes by welding.

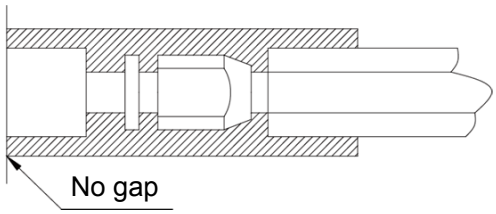
(3) Specifications of the thermal insulation sleeve must match with that of the refrigerant pipes.

(4) Reserve a distance of about 200 mm near the welding point to protect the thermal insulation sleeve during welding. After performing the air-tightness test, perform thermal insulation to the welding point separately to ensure continuity of the thermal insulation sleeve.

(5) The thermal insulation layer cannot crack during construction. Bond the thermal insulation material joints with special glue and then wrap them with electrical adhesive tape. The width of the adhesive tape must be 50 mm or greater to ensure secure connection.

(6) Use glue to bond the thermal insulation material at the water outlet to the unit to prevent dewing.

(7) Wrap joints of indoor/outdoor units with thermal insulation materials. There must be no gap between the joint and the wall of the indoor/outdoor unit, as shown in the following figure.



5.3.2 Thermal Insulation for Water Pipes

5.3.2.1 Thermal Insulation Materials

Use closed-cell foam thermal insulation materials with flame retardant grade of B1.

The heat conductivity is not greater than 0.035W/(m·k) when the average temperature is 0°C.

5.3.2.2 Thickness of the Thermal Insulation Layer

Thickness of the thermal insulation layer for the water pipes must be greater than 10 mm.

Bond the thermal insulation material joints with special glue and then wrap them with electrical adhesive tape. The width of the adhesive tape must be 5 cm or greater to ensure secure connection.

6 Electric Installation

6.1 Precautions on Safety

(1) This air source water heater is class Ⅰ appliance. Ensure that wire layout is performed by professional personnel according to national wiring rules.

(2) Ensure that a switch for all-pole disconnection is available for the fixed lines and is directly connected to wiring terminals of the power supply. Ensure that contactor opening distance on all poles meets the disconnection requirements under overvoltage category III conditions.

(3) Ensure that reliable grounding measures are taken. A dedicated grounding apparatus should be used.

(4) Use the power supply with specifications provided in the nameplate, and use circuits dedicated for air conditioners.

(5) Copper-conductor cables must be adopted for power cords, and the operating temperature should not greater than the stipulated value. The diameter of the cables should be large enough. For details, refer to Table 6-1. If the length of the power cord is greater than 15 meters, choose a cord with a larger cross-sectional area to prevent problems caused overloading. Do not pull the power cord during the installation.

(6) Use independent fixed socket for the supply. The structure of the socket must match the power plug of the water heater and be in line with relevant national standards. The socket should be placed in the safe position that is out of the reach of water and does not cause electric shock hazards. It must not be placed in the bathroom, kitchen, balcony, and other wet places.

(7) Do not use the socket converter, extension cords, or wiring boards to adapt to the size of the plug of the water heater, and do not use another plug to for the socket. The water heater should use independent wires, and do not share a line with other appliances.

(8) If the installation conditions on site change, consider using cables whose reduced capacity can still meet site requirements, based on the specifications of the power cords and air circuit

breakers provided by the vendor.

(9) If the power flexible wire is damaged, it must be replaced by professional personnel of the vendor, maintenance center of the vendor, or relevant other department to avoid dangers.

6.2 Installation of Power Cord

6.2.1 Procedure for Installing the Power Cord

(1) Connect the power cord to the connecting terminal of the outdoor unit and fix it securely.

(2) Connect the other end of the power cord to the fixed circuit and fixed it securely. During connection, pay attention to the live, neutral, and ground lines.

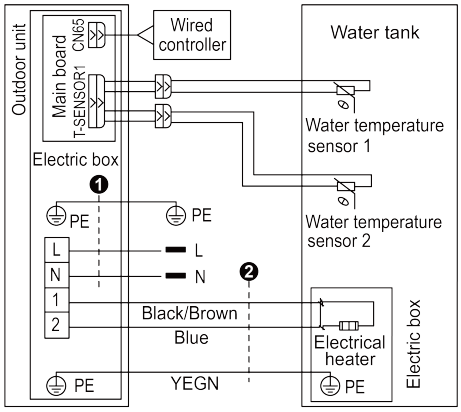
6.2.2 Selection of Power Cord Diameter and Circuit Breaker

Table 6-1 Power configuration table

Model	Power Supply	Minimum Cross-sectional Area (mm^2)			Circuit Breaker Capacity (A)
		Firing Line	Zero Line	Ground Line	
SWH-35ERA2	220V-240V ~ 50Hz	1.5	1.5	1.5	16

6.2.3 External Connection Diagram of the Unit

The external connection diagram for SWH-35ERA2 equipped with SWH-200DE water tank is shown in the following figure.



❶ Power cord 3×1.5mm²(H07RN-F) ❷ Power cord 3×1.5mm²(H07RN-F)

Figure 6-1 External Wiring

6.3 Circuit Diagram

The circuit diagram of SWH-35ERA2 unit is shown in the following figure.

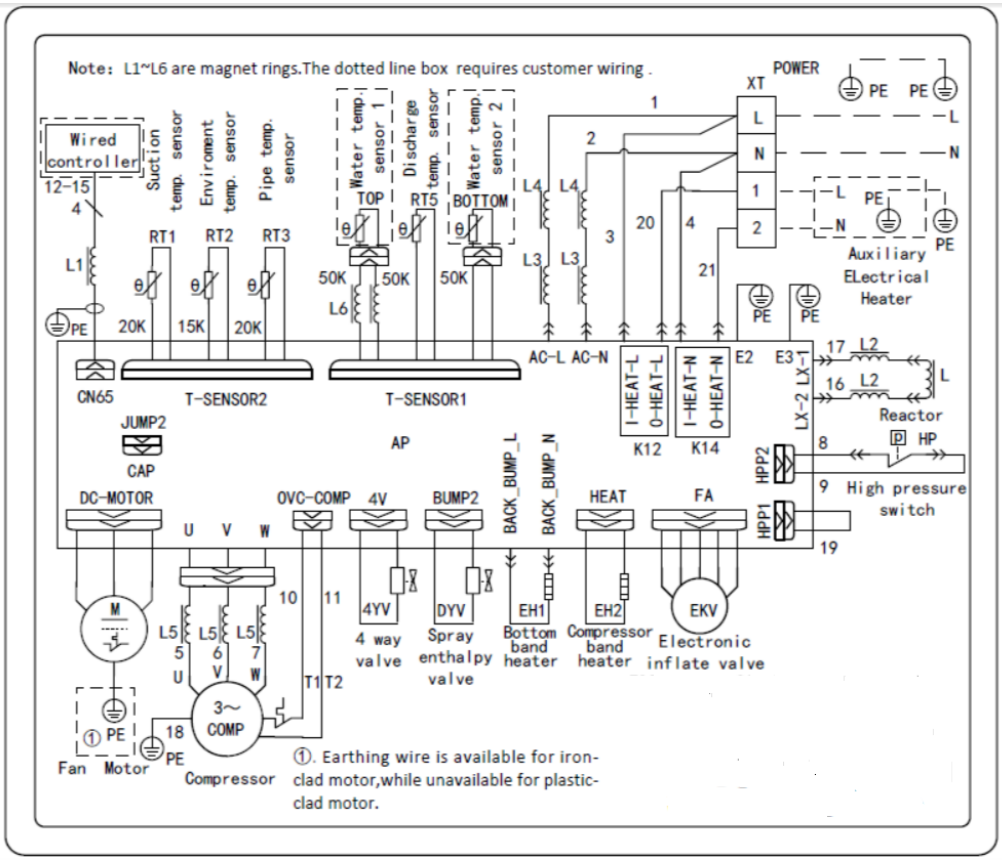


Figure 6-2 Circuit Diagram

7 Installation of Communication System

7.1 Communication Cable Terminal Connection

Lead out the communication cable from the mainboard of the outdoor unit and insert it into the slot of the wired controller, as shown in the following figure.

7.2 Communication Cable Connection

7.2.1 Communication Cable Connection for Vertical Model

The water tank does not need to communicate with the outdoor unit. Therefore, connect the communication cable led out from the outdoor unit to the wired controller.

7.2.2 Communication Cable Connection for Wall-mounted Model

The water tank needs to communicate with the outdoor unit. Therefore, connect the communication cable led out from the water tank to the communication cable interface of the outdoor unit.

7.3 Installation and Disassembly of Wired Controller

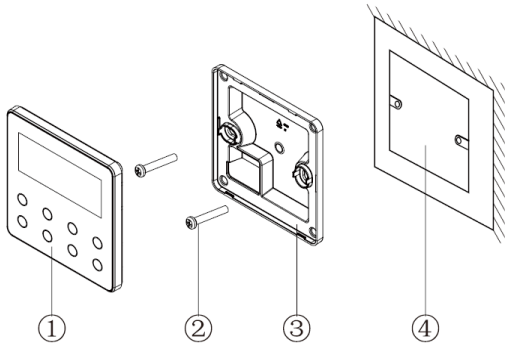
7.3.1 Requirements for Wired Controller Installation Locations

(1) Do not install the wired controller in a wet place or a place exposed to direct sunlight.

(2) Do not install the unit or wired controller of the air source water heater in a place susceptible to electromagnetic interference.

(3) Ensure that the communication line is connected to the correct interface. Otherwise, communication will be failure.

7.3.2 Wired Controller Installation



No.	1	2	3	4
Name	Front panel of wired controller	Screw	Soleplate of controller	Socket's base box installed in the wall

Figure 7-1 Accessories of Wired Controller

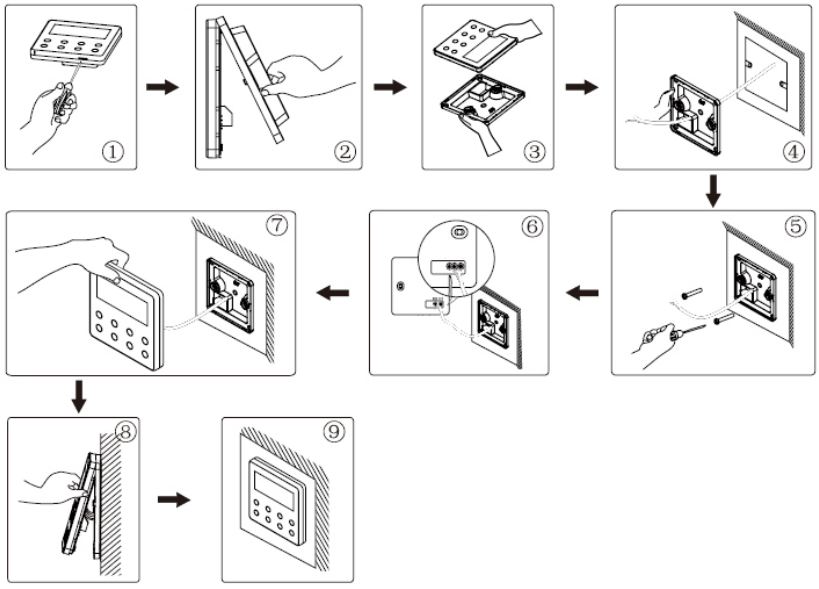


Figure 7-2 Installation Diagram of Wired Controller

Figure 7-1 is the installation diagram of wired controller. Cut off power supply of heavy-current wire embedded in mounting hole in the wall before installation. The installation method is as below:

Pry the removal port with straight screwdriver to separate the front panel and soleplate of wired controller;

Pull out the communication cable (4-core twisted pair wire) in the base box and then make the communication cable go through the hole of soleplate of wired controller;

Joint the controller's soleplate and base box with screws;

Insert the communication cable (4-core twisted pair wire) into controller's slot;

Buckle the front panel and soleplate of controller together.

⚠ Caution

During the following connections, pay special attentions to prevent malfunction due to electromagnetic interference:

(1) The communications line of the wired controller and the line of the temperature sensor should be separated from the power cord, and the distance between them should be greater than 20 cm. Otherwise, the unit may not be able to communicate properly.

(2) If the unit is installed in a place susceptible to electromagnetic interference, the communications line of the wired controller and the line of the temperature sensor must be used, shielded twisted pair.

7.3.3 Rainproof Box Installation

If the wired controller is to be installed in outdoors or dank places, please install a rainproof box for wired controller. Pay attention to cut off the power supply of heavy current wire embedded in the installation hole of wall. The whole installation procedure shall be done without electricity. The installation method is as follows:

Separate the panel of wired control and bottom plate with a flat screwdriver;

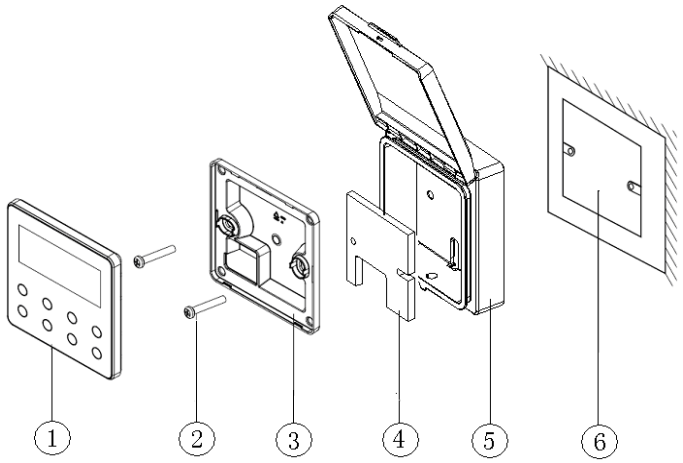
Pull out the communication wire (4-core twisted pair wire) inside the installation box and make this wire go through the wire-crossing hole of rainproof box and wired controller bottom plate;

Secure the bottom plate of wired controller, rubber cushion, and rainproof box at the installation box with screws; if there is no installation box in the wall, please drill hole on the wall and install plastic expansion pipe. Secure the bottom plate of wired controller, rubber cushion and rainproof box at the plastic expansion pipe with tapping screws(plastic expansion pipe and tapping screw are provided by our company);

Insert the communication cable(4-core twisted pair wire) into the groove of wired controller;

Align the panel of wired controller with the bottom plate and then fasten them together.

NOTE: When disassembling the wired controller, please use the flat screwdriver carefully (As shown in Figure 7-4).



No.	Name	No.	Name
1	Panel of wired controller	4	Rubber cushion(rainproof box)
2	Screw	5	Rainproof box
3	Bottom plate of wired controller	6	Installation box inside the wall

Figure 7-3 Rainproof Box Accessories of Wired Controller

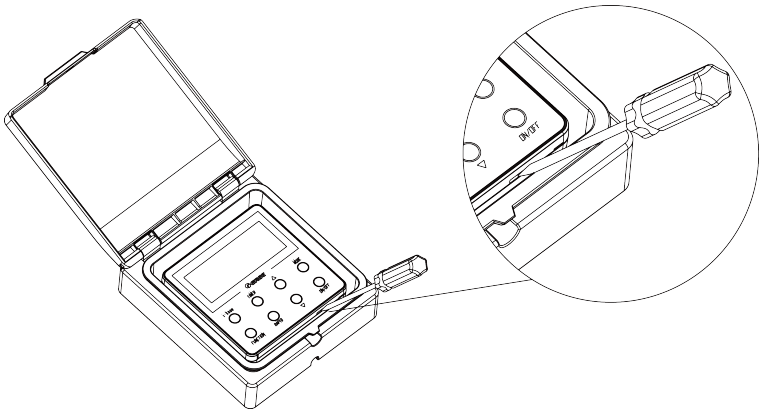


Figure 7-4 Disassembly Diagram of Rainproof Box of Wired Controller

8 Refrigerants Perfusion

8.1 Precautions on Refrigerant Leakage

The engineering design and installation personnel for the water heater must comply with local laws and regulations on refrigerant leakage. If no safety requirement on refrigerant leakage is posed by local regulations, design and operation of the water heater must meet the requirements specified below. The household air source water heater with static heat up adopts refrigerant R410A and R134a. Although the refrigerant is non-flammable and not toxic, the space must be large enough for possible leakage. The refrigerant concentration must strictly follow the safety requirement; otherwise, suffocate will be caused. The water heater unit consists of the outdoor unit installed outdoor and the water tank which can be installed in the balcony, kitchen, or bathroom. Therefore, special attention must be paid to avoid refrigerant leakage at the water tank side.

The method of calculating the maximum perfusion quantity and the maximum concentration of the refrigerant is subject to the size of space where the water tank is installed. Unit of refrigerant concentration is kg/m³.

Method of calculating the maximum concentration of the refrigerant (the water tank is installed

indoor):

(1) Calculate the refrigerant perfusion quantity of the water heater.

Total perfusion quantity of the system (kg) = Perfusion quantity of outdoor unit before delivery (kg) + Perfusion quantity added onsite (kg)

(2) Calculate the minimum volume of space for installing the water tank (m^3).

Volume of space for installing the water tank (m^3) = Length x Width x Height

NOTE: The length, width, and height is the valid length of the indoor space.

(3) Calculate the maximum concentration of the refrigerant system.

Total refrigerant quantity of the system ≤ Maximum allowable concentration (kg/m^3) x Volume of space for installing the water tank

NOTE: If there is no local standard on the maximum allowable refrigerant concentration, the maximum allowable concentration is 0.3kg /m^3.

(4) If the concentration exceeds the maximum allowable value, the refrigerant system must be re-designed into multiple small-volume refrigerant system or consult the local sales company of Sinclair.

If the water tank is installed outdoor, the refrigerant concentration in the case of refrigerant leakage will not exceed the allowable value. However, if a large amount of refrigerant leaks within a short duration, keep away from the leakage source and unplug the unit. In addition, contact the local sales company of Sinclair to handle this case onsite.

8.2 Method for Calculating Incremental Refrigerant for Extended Pipe

Length of the pipe configured for the water heater for standard configuration is 3 m. If the pipe meets the installation requirement, there is no need to add refrigerant. If the pipe needs to be extended, add refrigerant according to the following table:

Extended Pipe Length	Quantity of Incremental Refrigerant	
≤ 10 m	/	
10 m-20 m	R134a system	+20 g/m (20 g per 1 m extended)
	R410A system	+22 g/m (22g per 1 m extended)

8.3 Refrigerant Replenishing Method

Refrigerants can be replenished for the source water heater only in specific MODE.

First, connect the hose in the middle of the pressure gauge to the refrigerant bottle, and connect (but do not tighten) one end of the blue hose of the low pressure gauge to the fluoride injection mouth of the air valve on the unit. Then, open the valve of the refrigerant bottle. Open the valve next to the low pressure gauge for 5 seconds and close it, and immediately tighten the hose interface on the fluoride injection mouth.

In “HOT WATER” MODE, press and hold “MODE”+“▲” for 5 seconds to enter the query status. When the temperature display area displays “00”, press and hold “MODE”+“▲” for 5 seconds. Then, “00” changes to “P0”. Pressing the “▲” or “▼” button to switch to “P3”. Then, press the “MODE” button for settings. Pressing the “▲” or “▼” button again to change “00” in the time display area to “01”. Press “MODE” to confirm and complete the settings. After the settings are complete, when the low pressure gauge pointer declines, you can loosen the valve next to the low pressure gauge for refrigerant

replenishment (Figure 8-1 shows the diagram for refrigerant replenishment).

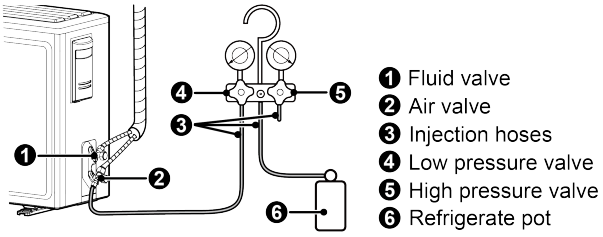


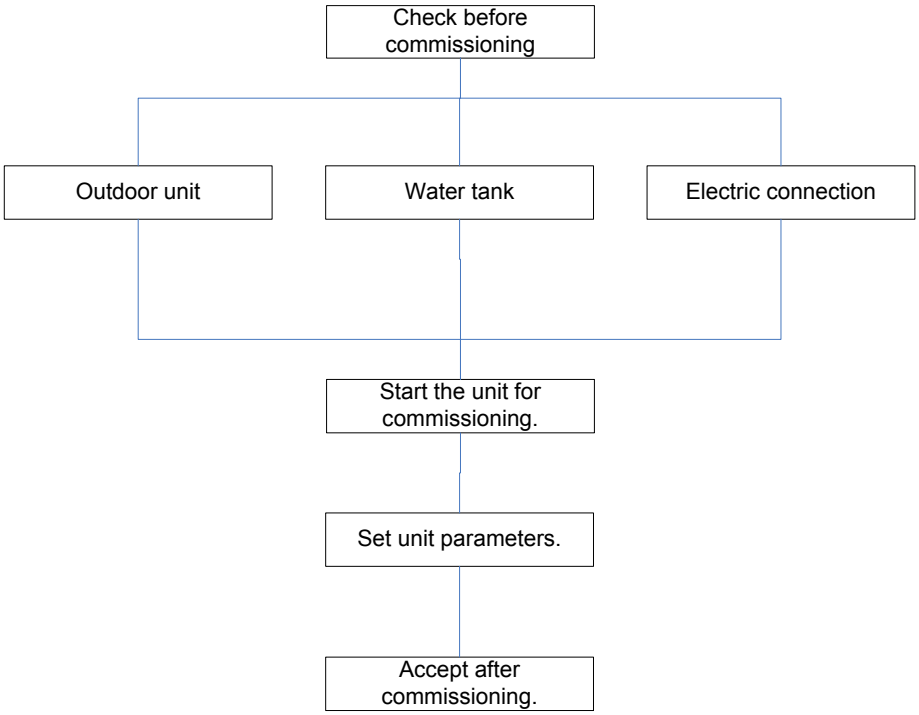
Figure 8-1 Refrigerant replenishment diagram

9 Check for Acceptance After Installation

No.	Check Item	Check Result
1	The distance between the coil unit and water tank is smaller than 10 m.	
2	The outdoor unit is installed at a position with good ventilation.	
3	Vibration-damping facilities are provided for the foundation of the outdoor.	
4	A condensate water drainage pipe is installed for the outdoor unit.	
5	The water tank is securely and stably installed.	
6	The safety device is connected with a drainage hose to the floor drain or any other position as specified.	
7	Pressure of the inlet water is between 0.1 MPa and 0.5 MPa.	
8	A filter is equipped for the cool water inlet pipe.	
9	No water leakage or block occurs to the cool water and hot water pipes.	
10	No refrigerant leakage occurs to the refrigerant pipe.	
11	Copper pipes are properly laid and insulated.	
12	Specifications and model of the power cord meet the unit’s requirement.	
13	Preparation and total length of the control cable meet the unit’s requirement.	

COMMISSIONING and TRIAL RUN

1 Commissioning Flowchart



2 Precautions on Safety

Before commissioning, ensure that the power supply model, possible usage range (pipe distance, indoor and outdoor high and low voltage difference, and power supply voltage), and installation space meet user requirements.

After verifying that no exception exists upon commissioning, introduce the operation and maintenance method to the customer according to the user manual. In addition, deliver the precautions and user manual to the customer for careful storage.

3 Preparations

3.1 Tool Preparation for Commissioning

Hex key
Adjustable wrench
Phillips screwdriver
Straight screwdriver
Vacuum pump
Electronic scale
High-pressure and low-pressure gauges for the related refrigerant system

3.2 Document Preparation for Commissioning

Running Parameters for Commissioning of Household Air Source Heat Pump Water Heaters

Project name:				Unit model:	
Commissioning performed by:				Water tank model:	
Rated capacity of the outdoor unit (kW)		Capacity of the water tank		Date	
Maximum drop between the outdoor unit and water tank (m)		Length of system pipe			
Commissioning status: ☐ Heat up					
Status Parameter		Unit	Before Startup	60 minutes	
Status parameters of the outdoor unit	Outdoor ambient temperature	°C			
	Power supply voltage	V			
	Air intake temperature	°C			
	Air exhaust temperature	°C			
Parameters of the water tank	Temperature of the temperature sensor for water outlet pipe	°C			
	Temperature of the water temperature sensor	°C			
Summary					

Checklist for Commissioning of Household Air Source Heat Pump Water Heaters		
No.	Check Item	Pass
Outdoor unit	The heat exchange space for unit installation meets the related requirement.	
	A drainage ditch or outlet is available near the installation position to facilitate water drainage.	
	The drop between the outdoor unit and water tank meets the unit's design requirement.	
	1. The foundation or support is solid and secure to ensure stable operation of the unit.	
	2. The unit must be installed in a horizontal manner without any tilt.	
	Total pipe length meets the requirement.	
	Cable diameter of the outdoor unit meet the unit's design requirement.	
	The circuit breaker and leakage circuit breaker meet the unit's design requirement.	
Water tank	1. The position for installing the water tank must have sufficient load-bearing capacity. The water tank suggest be installed indoors. When be installed outdoors, it need a shed or mantle to prevent rain.	
	2. The drain outlet for water tank is near the drainage ditch or drainage hole.	
	3. The safety valve and drainage pipe are installed securely.	
	4. The safety valve and drainage pipe are placed in the drainage pipe for drainage.	
	Insulation pipes such as PPR pipes are adopted as the inlet/outlet pipe for cool water and hot water. The length (L) of each section of insulation pipes is larger than or equal to $70\times R^2$ (R indicates the internal radius of pipe).	
	Water leaks in the hot water tap.	
Wired controller	1. The communication cable of the wired controller is 50 mm or more away from the strong electricity cable.	
	2. The wired controller is not installed in a place with high temperature and high humidity, such as the kitchen and bathroom.	
	It is recommended that the wired controller is installed indoor. If it is installed outdoor, an opaque rain-proof box must be provided to protect it against sunlight and rain.	

3.3 Check before Commissioning

3.3.1 Selection of Installation Position

3.3.1.1 Installation Position of the Outdoor Unit

(1) The outdoor unit is installed in a spacious room with good ventilation. The air inlet and outlet are not blocked.

(2) A drainage ditch or outlet is available near the installation position to facilitate water drainage.

(3) The foundation or support is solid and secure to ensure stable operation of the unit.

(4) The unit must be installed in a horizontal manner without any tilt.

3.3.1.2 Installation Position of the Water Tank

(1) The position for installing the water tank must have sufficient load-bearing capacity.

(2) The water tank suggest be installed indoors. When be installed outdoors, it need a shed or mantle to prevent rain.

(3) The drain outlet for water tank is near the drainage ditch or drainage hole.

3.3.1.3 Installation Position of the Wired Controller

(1) The wired controller is not installed in a place with high temperature and high humidity, such as the kitchen and bathroom.

(2) It is recommended that the wired controller is installed indoor. If it is installed outdoor, an opaque rain-proof box must be provided to protect it against sunlight and rain.

(3) The communication cable of the wired controller is 50 mm or more away from the strong electricity cable.

3.3.2 Matching of Power Supply and Circuit Breaker

Model	Power Supply	Minimum Cross-sectional Area (mm^2)			Air Circuit Breaker Capacity (A)
		Firing Line	Zero Line	Ground Line	
SWH-35ERA2	220 V-240 V ~ 50Hz	1.5	1.5	1.5	16

NOTES:

① The power cord of the unit must be a copper-core cable. The work temperature must meet the related requirement.

② If the power cord is more than 15 m. Its cross-sectional area must be expanded accordingly to avoid overload.

③ As a category-I appliance, the unit must be reliably grounded.

④ The power cord specification refers to the specification adopted when the BV single-core cables (2-4 pieces) are led through a plastic pipe and the work temperature is 40°C. The circuit breaker is D-type and it is used under temperature of 40°C.

⑤ If the installation conditions on site change, consider using cables whose reduced capacity can still meet site requirements, based on the specifications of the power cords and air circuit breakers provided by the vendor.

4 Commissioning and Trial Run

4.1 Precautions for Commissioning

Before commissioning, ensure that the power supply model, possible usage range (pipe distance, indoor and outdoor high and low voltage difference, and power supply voltage), and installation space meet user requirements.

After verifying that no exception exists upon commissioning, introduce the operation and maintenance method to the customer according to the user manual. In addition, deliver the precautions and user manual to the customer for careful storage.

4.2 Brief Introduction to Commissioning

As engineering design, installation, and system control require high precision, commissioning must be performed after installation. The unit can be delivered if no exception is detected during commissioning.

4.3 Engineering Commissioning

4.3.1 Air Exhaust for Initial Run

(1) After the water tank is fully injected with water, exhaust air in the pipe. (In initial installation, this operation shall be implemented by the installation and commissioning personnel. During normal operation, users also need to exhaust air in the pipe before water makeup startup after water in the water tank is discharged. Operations must be in accordance with the manual or label on the water tank.)

(2) Inject water fully and check leakage. Turn on the water inlet/outlet cut-off valve of the water tank and the hot water tap or shower head on the user's side. If water flows out continuously at the tap or shower head, the water tank is full of water. Then turn off the tap or shower head. Check whether leakage exist in the water pipeline, especially at joints. When no leakage is found, power on the unit.

(3) Unit power-on: After the unit is powered up, the wired controller buzzes for once. Check whether an error code is displayed on the wired controller. It is normal if no error code is displayed. As the wired controller has the memory function for blackout, it may be in the off or standby mode when it is powered on for the first time. Note: The unit must be powered on by strictly following the air exhaust steps.

(4) Unit running: After air is exhausted, check the water pipeline system. Ensure that the tap or shower head on the user's side is turned off and other cut-off valves are turned on before starting the unit. When the wire controller displays the heating icon, check to make sure the unit is running normally.

Judgment criteria include that the fan runs properly and the unit runs stably without obvious shake and noise. After the unit runs properly for at least 30 minutes and no exception is found, it can be delivered to the user.

Attention:

All operations should be performed in accordance with the corresponding product manual.

4.3.2 Precautions for Operation in Winter

(1) Before starting the unit which has not been used for a long period or in quite low temperature in winter, energize the unit for at least 8 hours.

(2) Do not disconnect the power supply when the outdoor temperature is quite low in winter; otherwise, the automatic antifreeze protection will fail to work.

(3) If the unit will not be used for a long period, power off the unit and drain the water in the water tank and pipe through the drain valve.

Drain the water by following the steps below:

1) Cut off the power supply and close the cut-off valve at the water outlet of the tap faucet.
2) Open the cut-off valve at the hot water drain outlet and valve in user water use site.
3) Open the cut-off valve on the joint (3-way) pipe.
4) Close the drainage cut-off valve after draining water on the water tank to complete drainage operation.

If the unit needs to be used after water drainage, fill the water tank fully with water before starting the unit. For details, see the description on air exhaust for the water pipeline during unit commissioning.

4.4 Commissioning Completed

Running Parameters for Commissioning of Household Air Source Water Heaters

<table>
<tr><td>Project name:</td><td colspan="3"></td><td>Unit model:</td><td></td></tr>
<tr><td>Commissioning performed by:</td><td colspan="3"></td><td>Water tank model:</td><td></td></tr>
<tr><td>Rated capacity of the outdoor unit (kW)</td><td></td><td>Capacity of the water tank</td><td></td><td colspan="2">Date</td></tr>
<tr><td>Maximum drop between the outdoor unit and water tank (m)</td><td></td><td colspan="2">Length of system pipe</td><td colspan="2"></td></tr>
<tr><td colspan="6">Commissioning status: □ Heat up</td></tr>
<tr><td colspan="2">Status Parameter</td><td>Unit</td><td>Before Startup</td><td colspan="2">30 minutes</td></tr>
<tr><td rowspan="4">Status parameters of the outdoor unit</td><td>Outdoor ambient temperature</td><td>°C</td><td></td><td colspan="2"></td></tr>
<tr><td>Power supply voltage</td><td>V</td><td></td><td colspan="2"></td></tr>
<tr><td>Air intake temperature</td><td>°C</td><td></td><td colspan="2"></td></tr>
<tr><td>Air exhaust temperature</td><td>°C</td><td></td><td colspan="2"></td></tr>
<tr><td rowspan="2">Parameters of the water tank</td><td>Temperature of the temperature sensor for water outlet pipe</td><td>°C</td><td></td><td colspan="2"></td></tr>
<tr><td>Temperature of the water temperature sensor</td><td>°C</td><td></td><td colspan="2"></td></tr>
<tr><td>Summary</td><td colspan="5"></td></tr>
</table>

4.5 Reference Value for Judging Running Parameters of the Unit (Commissioning Inspection)

After the ON/OFF button is pressed for a while, the wired controller displays the heat up icon. The fan and compressor run properly and the unit runs stably without obvious shake and noise. During heat up, the water temperature displayed on the wired controller increase gradually. After the unit runs properly for at least 30 minutes, it can be delivered to the user.

5 Check Before Acceptance

Checklist for Commissioning of Household Air Source Heat Pump Water Heaters		
No.	Check Item	Pass
Outdoor unit	The heat exchange space for unit installation meets the related requirement.	
	A drainage ditch or outlet is available near the installation position to facilitate water drainage.	
	The drop between the outdoor unit and water tank meets the unit's design requirement.	
	1. The foundation or support is solid and secure to ensure stable operation of the unit.	
	2. The unit must be installed in a horizontal manner without any tilt.	
	Total pipe length meets the related requirement.	
	The copper pipe thickness meets the unit's design requirement.	
	Cable diameter of the outdoor unit meets the unit's design requirement.	
	The circuit breaker and leakage circuit breaker meet the unit's design requirement.	
	Foundation of the outdoor unit is solid. Vibration reduction and water drainage meets the related requirement.	
Water tank	1. The position for installing the water tank must have sufficient load-bearing capacity.	
	2. The drain outlet for water tank is near the drainage ditch or drainage hole.	
	3. The safety valve and drainage pipe are installed securely.	
	4. The safety valve and drainage pipe are placed in the drainage pipe for water drainage.	
	Insulation pipes such as PPR pipes are adopted as the inlet/outlet pipe for cool water and hot water. Length (L) of each section of insulation pipes is larger than or equal to $70\times R^2$ (R indicates the internal radius of pipe).	
	Water leakage occurs to the hot water tap.	
Wired controller	1. The communication cable of the wired controller is 50 mm or more away from the strong electricity cable.	
	2. The wired controller is not installed in a place with high temperature and high humidity, such as the kitchen and bathroom.	
	It is recommended that the wired controller is installed indoor. If it is installed outdoor, an opaque rain-proof box must be provided to protect it against sunlight and rain.	

Running Parameters for Commissioning of Household Air Source Heat Pump Water Heaters

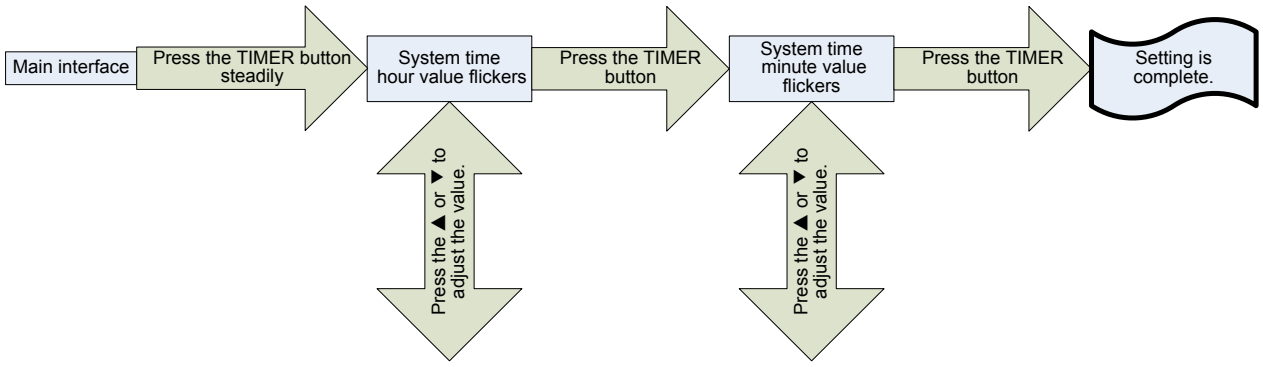
Project name:				Unit model:	
Commissioning performed by:				Water tank model:	
Rated capacity of the outdoor unit (kW)		Capacity of the water tank		Date	
Maximum drop between the outdoor unit and water tank (m)		Length of system pipe			
Commissioning status: □ Heat up					
Status Parameter		Unit	Before Startup	60 minutes	
Status parameters of the outdoor unit	Outdoor ambient temperature	°C			
	Power supply voltage	V			
	Air intake temperature	°C			
	Air exhaust temperature	°C			
Parameters of the water tank	Temperature of the temperature sensor for water outlet pipe	°C			
	Temperature of the water temperature sensor	°C			
Summary					

6 Unit Function Setting

On the main interface, press the TIMER button for 5 second. The system time setting interface is displayed. The time icon is on and the hour value flickers. Press ▲ or ▼ to adjust the hour value and press the TIMER button to confirm setting. Then the minute value flicks. Press ▲ or ▼ to adjust the minute value and press the TIMER button to confirm setting. After system time setting is saved, the main interface is displayed. During the setting process, if no button is pressed within 15 second, the main interface will be displayed and setting will not be saved.

The system time ranges from 00:00 to 23:59. Upon each press of ▲ or ▼ button, the time increases or decreases by 1 hour or 1 minute. When the button is pressed steadily, the time increases or decreases continuously by 1 hour or 1 minute.

The setting process is shown in the following figure.



NOTES: The other functions setting refer to wired controller instructions of the unit.

MAINTENANCE

1 Error Code

Symptom	Error Description
The water heater stops operation and the wired controller displays E1.	System high pressure protection.
The water heater stops operation and the wired controller displays E3	Refrigerant-lacking protection
The water heater stops operation and the wired controller displays C5	Malfunction of jumper cap
The water heater stops operation and the wired controller displays E4.	Discharge high temperature protection.
The water heater stops operation and the wired controller displays E5	Overload protection of compressor
The water heater stops operation and the wired controller displays E6.	Communication malfunction.
The water heater stops operation and the wired controller displays F3.	Malfunction of outdoor ambient temperature sensor
The water heater stops operation and the wired controller displays F4.	Malfunction of discharge temperature sensor.
The water heater stops operation and the wired controller displays F6.	Malfunction of tube temperature sensor for outdoor heat exchanger.
The water heater stops operation and the wired controller displays Fd.	Malfunction of suction temperature sensor.
The water heater stops operation and the wired controller displays FE.	Malfunction of upper temperature sensor of water tank.
The water heater stops operation and the wired controller displays FL.	Malfunction of lower temperature sensor of water tank.
The water heater stops operation and the wired controller displays L6.	Unit’s capacity is insufficient.
The water heater stops operation and the wired controller displays PL	Low voltage protection for drive DC bus bar of inverter compressor or voltage dropping malfunction
The water heater stops operation and the wired controller displays PH	High voltage protection for drive DC bus bar of inverter compressor
The water heater stops operation and the wired controller displays PA	Drive DC current protection of inverter compressor (input side)
The water heater stops operation and the wired controller displays H5	Drive IPM module protection of inverter compressor
The water heater stops operation and the wired controller displays HC	Drive PFC protection of inverter compressor
The water heater stops operation and the wired controller displays Lc	Failure startup of inverter compressor
The water heater stops operation and the wired controller displays Ld	Phase-lacking protection of inverter compressor
The water heater stops operation and the wired controller displays P0	Drive module reset of inverter compressor
The water heater stops operation and the wired controller displays P5	Overcurrent protection of inverter compressor

Symptom	Error Description
The water heater stops operation and the wired controller displays LF	Power protection of inverter compressor
The water heater stops operation and the wired controller displays Pc	Detection circuit malfunction of driven circuit of inverter compressor
The water heater stops operation and the wired controller displays H7	Desynchronizing protection of inverter compressor
The water heater stops operation and the wired controller displays P6	Drive communication malfunction between main control and inverter compressor
The water heater stops operation and the wired controller displays P8	High temperature protection of drive module of inverter compressor
The water heater stops operation and the wired controller displays P7	Malfunction of temperature sensor of drive module of inverter compressor
The water heater stops operation and the wired controller displays ee	Malfunction of drive storage chip of inverter compressor
The water heater stops operation and the wired controller displays PU	Malfunction of drive charging loop of inverter compressor
The water heater stops operation and the wired controller displays PP	Abnormal protection of drive DC input voltage of inverter compressor
The water heater stops operation and the wired controller displays PF	Malfunction of temperature sensor of drive electric box of inverter compressor
The water heater stops operation and the wired controller displays P9	Zero-crossing protection of drive AC input of inverter compressor
The water heater stops operation and the wired controller displays AL	Low voltage protection of drive DC bus bar of inverter outdoor unit or voltage dropping malfunction
The water heater stops operation and the wired controller displays AH	High voltage protection of drive DC bus bar of inverter outdoor unit
The water heater stops operation and the wired controller displays AA	AC current protection of inverter outdoor fan (input side)
The water heater stops operation and the wired controller displays A1	Drive IPM module protection of inverter outdoor fan
The water heater stops operation and the wired controller displays AF	Drive PFC protection of inverter outdoor fan
The water heater stops operation and the wired controller displays AC	Failure startup of inverter outdoor fan
The water heater stops operation and the wired controller displays Ad	Phase-lacking protection of inverter outdoor fan
The water heater stops operation and the wired controller displays A0	Drive module reset of inverter outdoor fan
The water heater stops operation and the wired controller displays A0	Overcurrent protection of inverter outdoor fan
The water heater stops operation and the wired controller displays UP	Power protection of inverter fan
The water heater stops operation and the wired controller displays AE	Detection circuit malfunction of driven current of inverter outdoor fan
The water heater stops operation and the wired controller displays AJ	Desynchronizing protection of inverter outdoor fan
The water heater stops operation and the wired controller displays A6	Driven communication malfunction between main control and inverter outdoor fan

Symptom	Error Description
The water heater stops operation and the wired controller displays A8	High temperature protection of driven module of inverter outdoor fan
The water heater stops operation and the wired controller displays A9	Malfunction of temperature sensor of driven module of inverter outdoor fan
The water heater stops operation and the wired controller displays An	Malfunction of drive storage chip of inverter outdoor fan
The water heater stops operation and the wired controller displays AU	Drive charting loop malfunction of inverter outdoor fan
The water heater stops operation and the wired controller displays AP	Abnormal protection of driven AC input of inverter outdoor fan
The water heater stops operation and the wired controller displays Ar	Malfunction of temperature sensor of drive electric box of inverter fan
The water heater stops operation and the wired controller displays U9	Zero-crossing protection of drive AC input of inverter fan
The water heater stops operation and the wired controller displays EE	Malfunction of storage chip of main control

2 Troubleshooting

2.1 E1 High Pressure Protection

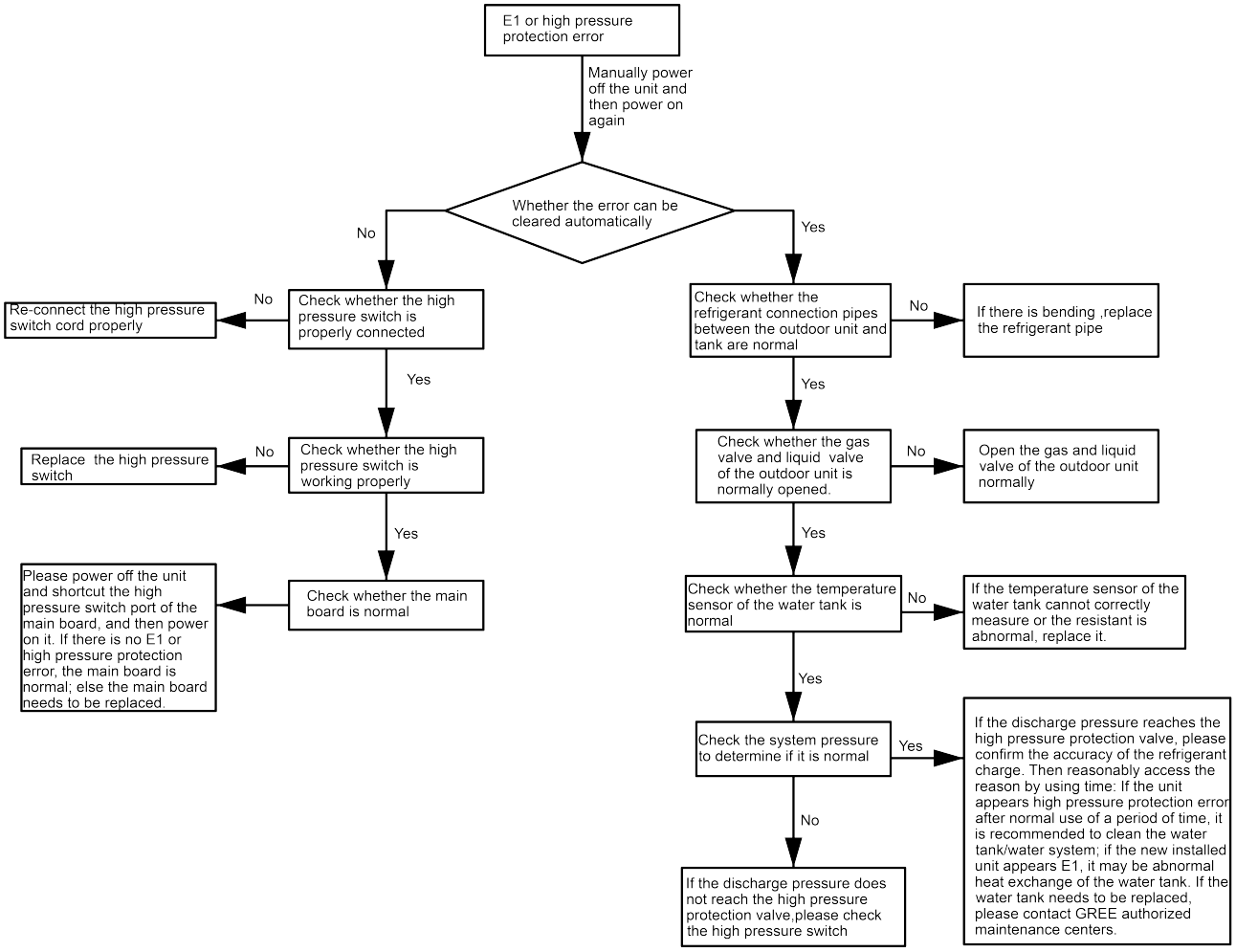
Error code: 

Applicable model: HOTWATER; SAVE; PRESET; NIGHT

Error judgment condition and method: E1 is displayed on the wired controller. The troubleshooting method is shown in the flowchart below.

Possible cause: 1) Poor connection of the water tank temperature sensor; 2) Loose pressure switch cable; 3) Pressure switch error; 4) Main board error; 5) Main board error;6)the gas valve and liquid valve of outdoor unit is not normally opened;6)Abnormal heat exchange of the water tank.

Troubleshooting:



2.2 E3 Refrigerant-lacking Protection

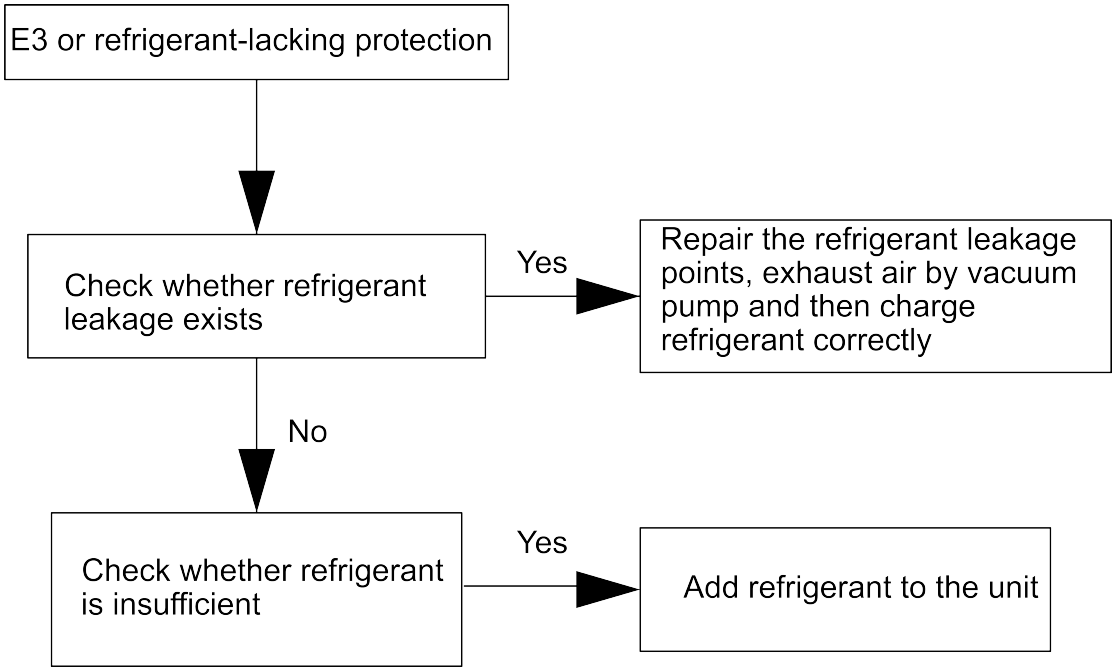
Error code: 

Applicable model: HOTWATER; SAVE; PRESET; NIGHT

Error judgment condition and method: E3 is displayed on the wired controller. The troubleshooting method is shown in the flowchart below.

Possible cause: (1) Refrigerant leakage of the unit; (3) Insufficient refrigerant of the unit

Troubleshooting:



2.3 E4 High Discharge Temperature Protection

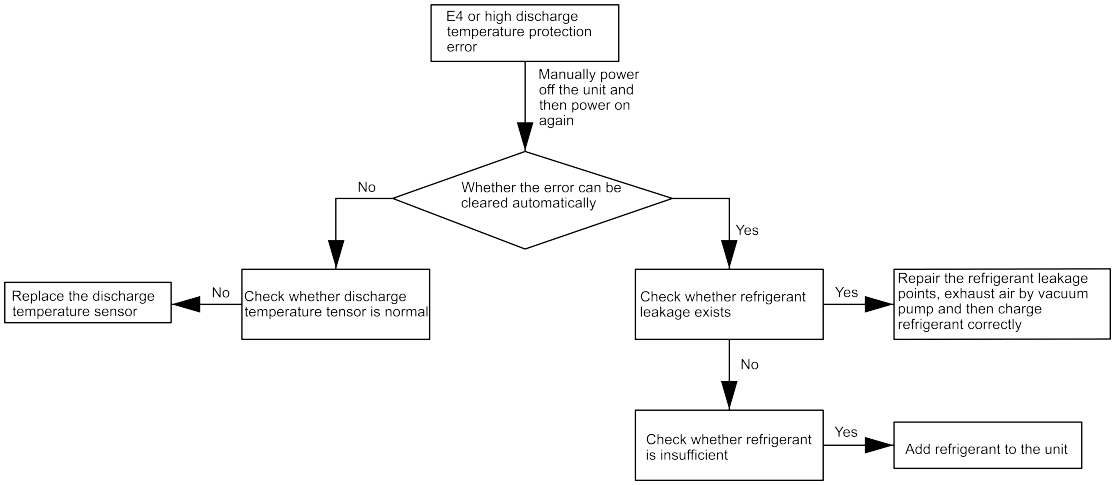
Error code: 

Applicable model: HOTWATER; SAVE; PRESET; NIGHT

Error judgment condition and method: E4 is displayed on the wired controller. The troubleshooting method is shown in the flowchart below.

Possible cause: (1) Discharge Temperature Sensor Error; (2) Refrigerant leakage of the unit; (3) Insufficient refrigerant of the unit

Troubleshooting:



2.4 E6 Communication Error

Error code: 

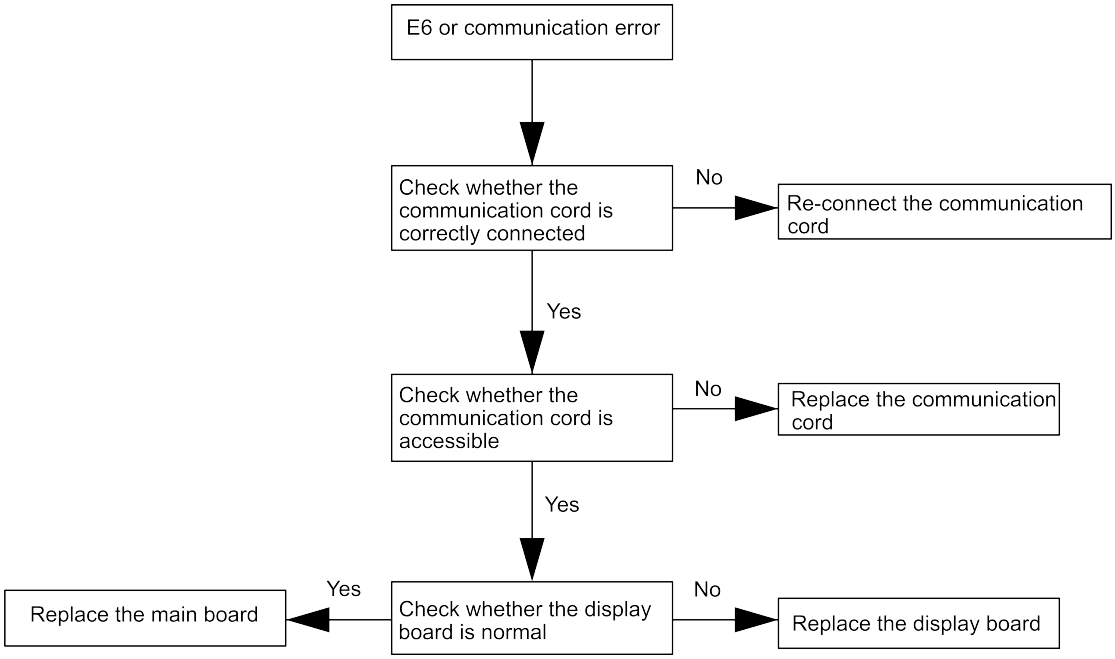
Applicable model: all models

Error judgment condition and method: E6 is displayed on the wired controller. The troubleshooting method is shown in the flowchart below.

Possible cause:

(1) Incorrect connection of the communication cord; (2) Display board error; (3) Main board error

Troubleshooting:



2.5 F3, F4, F6, Fd, FE, FL Temperature sensor Error

Fault error: F3, F4, F6, Fd, FE, or FL (one or more of these codes may be displayed), for example,

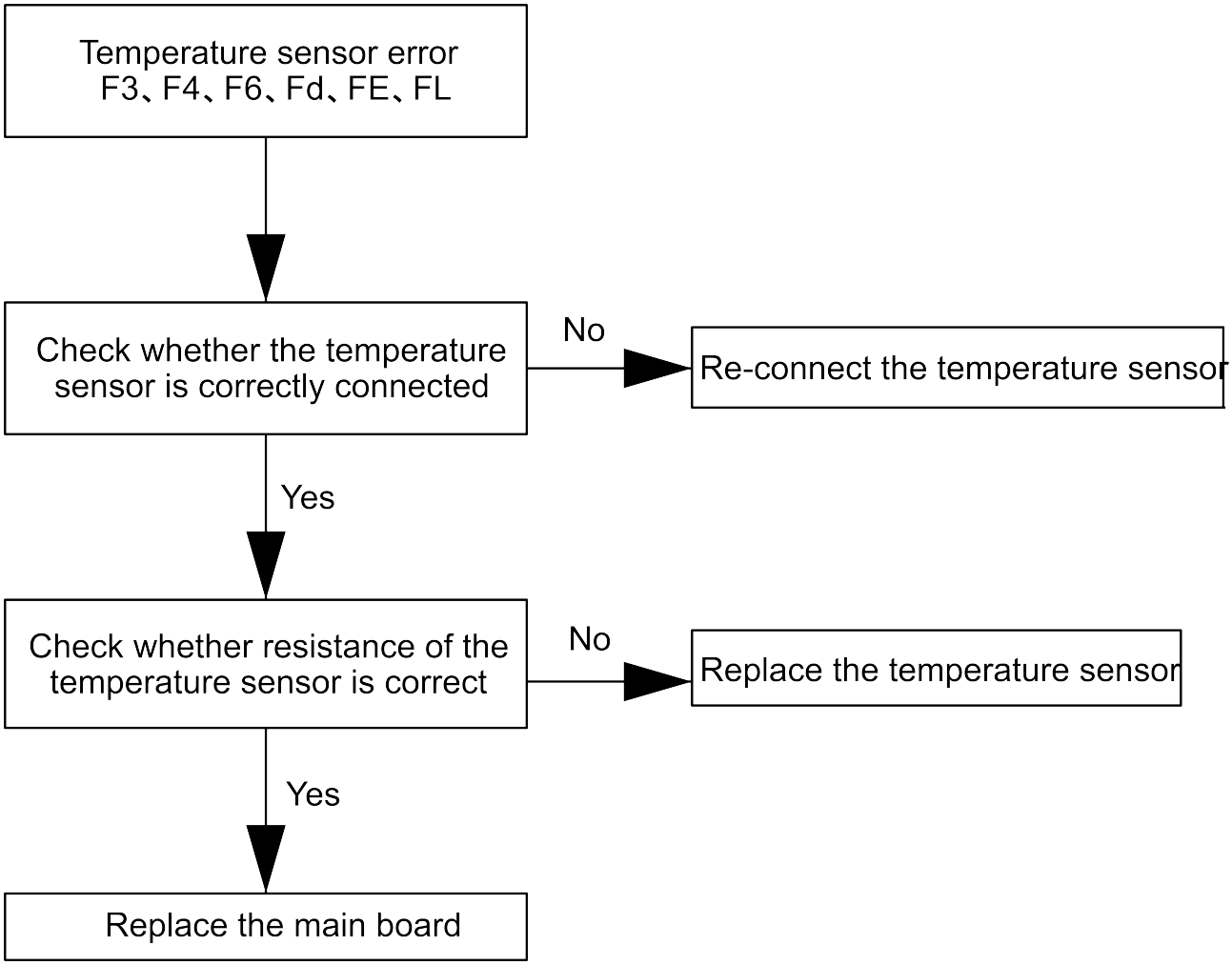
Applicable model: all models

Error judgment condition and method: F3, F4, F6, Fd, FE, or FL is displayed on the wired controller (F3: Outdoor ambient temperature sensor error; F4: Discharge temperature sensor error; F6: Tube temperature sensor error (for outdoor heat exchanger); Fd: Suction temperature sensor error; FE: Upper temperature sensor error of the water tank; FL: Lower temperature sensor error of the water tank). The troubleshooting method is shown in the flowchart below.

Possible cause:

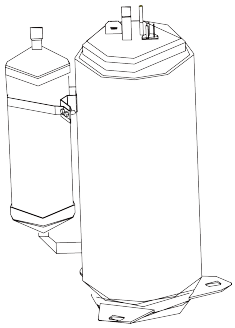
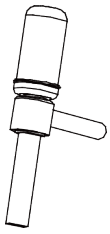
(1) Incorrect connection of temperature sensor; (2) Temperature sensor error; (3) Mainboard error

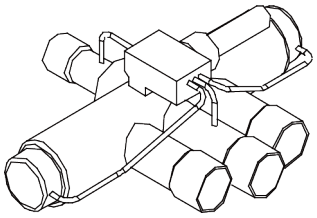
Troubleshooting:



3 Repair of Key Components

3.1 Introduction to Key Components

 Compressor	Driven by the electric energy, the compressor compresses refrigerant to high-temperature and high-pressure gas and enables the gas to flow circularly in the refrigerant. Volume of the low-pressure refrigerant decreases via compression. After the pressure and temperature increases gradually, it becomes high-pressure and high-temperature refrigerant, which is the driving force of the entire system.
 Electronic expansion valve	The electronic expansion valve performs throttling and pressure reduction to high-pressure liquid refrigerant to ensure the pressure difference between the condenser and evaporator. In addition, it adjusts the flow rate of refrigerant entering the evaporator based on heat load change of the evaporator so as to ensure stable operation of the refrigeration equipment.

 Four-way valve	The four-way valve changes flow direction of refrigerant during defrosting of the circular water heater. In the defrosting mode, the compressed refrigerant enters the evaporator for heat exchange and defrosting after its flow direction is changed by the four-way valve. Then it flows into the tube heat changer through the expansion valve. After that, it is sucked by the compressor to enter the next cycle.

3.2 Disassembly of Key Components

3.2.1 Disassembly of Key Components of the Outdoor Unit

(1) Disassembly of Compressor

Disassembly of Compressor	
Procedure	Description
1. Remove the power cord of the compressor.	● Unscrew the power cord using a screwdriver.
	● Remove the power cord.
	Note: When removing the power cord, make marks for cable color and the corresponding terminal to avoid incorrect connection when the cable is connected again.
2. Unscrew the compressor.	● Unscrew the compressor using a screwdriver. Remove the pad first if the compressor is equipped with a pad.
3. Remove the gas suction and gas discharge pipes.	● Heat up the gas suction and gas discharge pipes with the fired heater before removing them.
	● Nitrogen must be charged for protection during welding. Nitrogen pressure: 0.5±0.1 bar (gauge pressure)
	Note: Surrounding materials must be protected against being burnt by high temperature during heat up.
4. Remove the compressor.	● Remove the fixed bolts at bottom corners of the compressor using the spanner.
	● Remove the compressor from the supporting structure.
	Note: The compressor must be handled horizontally or vertically without inversion.
5. Place the repaired or new compressor on the supporting structure.	● Place the repaired or new compressor on the supporting structure in the same direction as that before removal.
	● Screw on the fixed bolts at bottom corners of the compressor using the spanner.
	Note: The compressor must be handled horizontally or vertically without inversion.
6. Install fixed bolts for the compressor.	● Screw on the fixed bolts at bottom corners of the compressor using the spanner.
7. Connect the air intake and air exhaust pipes.	● Connect the air intake and air exhaust pipes to the system by welding after heating them with the fired heater.
	● Nitrogen must be charged for protection during welding. Nitrogen pressure: 0.5±0.1 bar (gauge pressure)
	Note: Surrounding materials must be protected against being burnt by high temperature during heat up.
8. Install the power cord of the compressor.	● Install the power cord to the fixed bolt in the sequence as that for disassembly.
	● Screw on the fixed bolts of the power cord using a screwdriver.
9. Vacuumize and keep pressure for the system to ensure tightness.	
10. Re-perfuse refrigerant.	● Connect the perfusion nozzle (arrowed) on the air return pipe of the compressor to the refrigerant.
	● Perfuse refrigerant to the system.
	Note: Refrigerant must be perfused based on the unit standard as the refrigerant volume has great effect on cooling performance of the unit.
NOTE: Before disassembling the compressor, ensure that there is no refrigerant in the pipeline system and power is cut off.	

(2) Disassembly of Four-Way Valve

Disassembly of Four-Way Valve	
Procedure	Description
1. Disconnect the four-way valve by welding.	● Record direction of the four-way valve before disconnecting it as the direction for two systems of a dual-system unit may differ.
	● Remove the coil and mark the direction.
	● Wrap the four-way valve with a wet cloth to protect the sliding block in the valve against being burnt during welding and prevent water from entering the pipe.
	● Nitrogen must be charged for protection during welding. Nitrogen pressure: 0.5±0.1bar (gauge pressure)
2. Remove the four-way valve.	● Remove the four-way valve with care to avoid touching other parts, components, or pipes.
3. Place the four-way valve to the original position.	● Place the four-way valve to the original position with care to avoid touching other parts, components, or pipes.
4. Connect the four-way valve to by welding.	● Model of the new four-way valve must be the same as the original one.
	● Pipe connection must be the same as the original connection.
	● Nitrogen must be charged for protection during welding. Nitrogen pressure: 0.5±0.1 bar (gauge pressure)
NOTE: Before replacing the four-way valve, cut off power supply for the unit and recycle refrigerant properly.	

(3) Disassembly of Electronic Expansion Valve

Disassembly of Electronic Expansion Valve	
Procedure	Description
1. Remove the coil of the electronic expansion valve.	● Generally, the concave on the valve meshes with the convex on the coil. Before removing the electronic expansion valve, turn the coil clockwise or counterclockwise for a small angle until that the convex is between two adjacent concaves. Disconnect the convex from the concave and then remove the coil upwards.
2. Disconnect the electronic expansion valve by welding.	● Avoid burning other pipes during welding.
	● Remove the electronic expansion valve with care to avoid touching other parts, components, or pipes
	● Nitrogen must be charged for protection during welding. Nitrogen pressure: 0.5±0.1bar (gauge pressure)
3. Connect the electronic expansion valve by welding	● Model of the new electronic expansion valve must be the same as the original one.
	● Wrap the expansion valve with a wet cloth to protect the sliding block in the valve against being burnt during welding and prevent water from entering the pipe.
	● Nitrogen must be charged for protection during welding. Nitrogen pressure: 0.5±0.1bar (gauge pressure)
	● Install the coil after the connection pipe is welded. Ensure that the convex on the coil meshes with the concave on the valve.
4. After replacing the electronic expansion valve, power off the unit and power it on again.	● If the coil plug of the electronic expansion valve is re-connected after being disconnected from the mainboard, the unit must be powered on again after being powering off.
NOTE: Before replacing the electronic expansion valve, cut off power supply for the unit and recycle refrigerant properly.	

3.2.2 Disassembly of Key Components of the Water Tank

(1) Procedure for replacing the water tank temperature sensor

1) Screw off threading coil of the temperature sensor.

2) Remove the temperature sensor cover.

3) Take out the temperature sensor.

4) Install a new temperature sensor and assemble related parts in sequence. After the temperature sensor cord is properly placed, start the unit for trial run.

(2) Procedure for replacing the magnesium stick

To improve durability of the water tank, a magnesium stick is installed inside the water tank. Generally, the magnesium stick has a lifespan of two to three years. However, if the quality of water used by the water heater is poor, the Mg-Stick lifespan will be shortened. For magnesium stick replacement, perform the following steps:

1) Before removing the magnesium stick, drain the water tank by following drainage operations.
2) Open the cap on the mounting mouth for the magnesium stick in the water tank.
3) Use a hex key to unscrew the magnesium stick component, and then steadily removed the magnesium stick to prevent it from falling into the inner container of the water tank.
4) Install a new magnesium stick component into the mounting mouth of the magnesium stick, and then tighten it using a hex key.
5) Close the cap, and replenish water by following water replenishment operations.

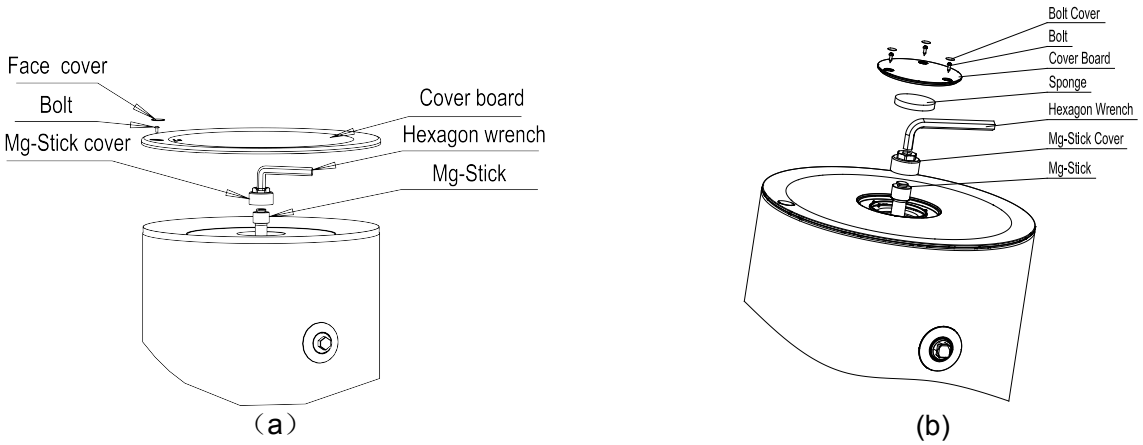
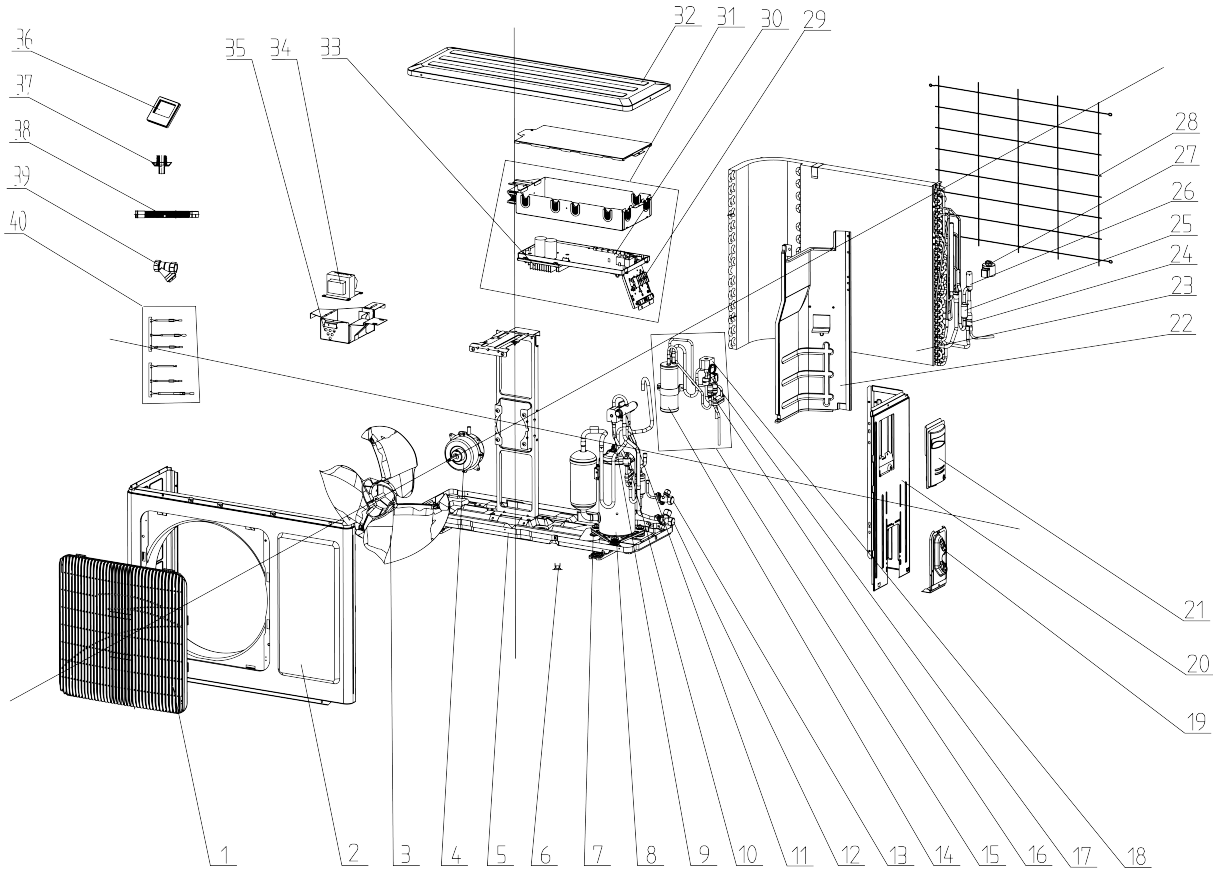


Figure 3-1 Magnesium stick replacement

4 Exploded View and Parts List

4.1 Exploded View and Parts List of the Outdoor Unit

◆ Model: SWH-35ERA2 Exploded Views and spare parts list: SWH-35ERA2



NO.	Name of Part	SWH-35ERA2	
		Part Code	Quantity
1	Front Grill	22413049	1
2	Front Panel	0153501605	1
3	Axial Flow Fan	10333427	1
4	Fan Motor	1501308511	1
5	Chassis Sub-assy	017000000027P	1
6	Compressor Overload Protector(External)	00183031	1
7	Compressor Gasket	76710302	3
8	Compressor and Fittings	0010389001	1
9	Magnet Coil	4300040045	1
10	Pressure Protect Switch	46020006	1
11	4-Way Valve	430004022	1
12	Valve	07100038	1
13	Valve	0710000301	1
14	Liquid Accumulator	07223045	1
15	Flash Evaporator	07422800002	1
16	Strainer	0721160101	2
17	Electromagnetic Valve	43003091	1
18	Magnet Coil	43040004	1
19	Valve Support	01713424	1
20	Right Side Plate	01305087P	1
21	Big Handle	26233431	1
22	Clapboard Sub-Assy	01233175	1
23	Condenser Assy	011002000171	1
24	Strainer	0721160101	1
25	Strainer	07213032	1
26	Electronic Expansion Valve	43042800063	1

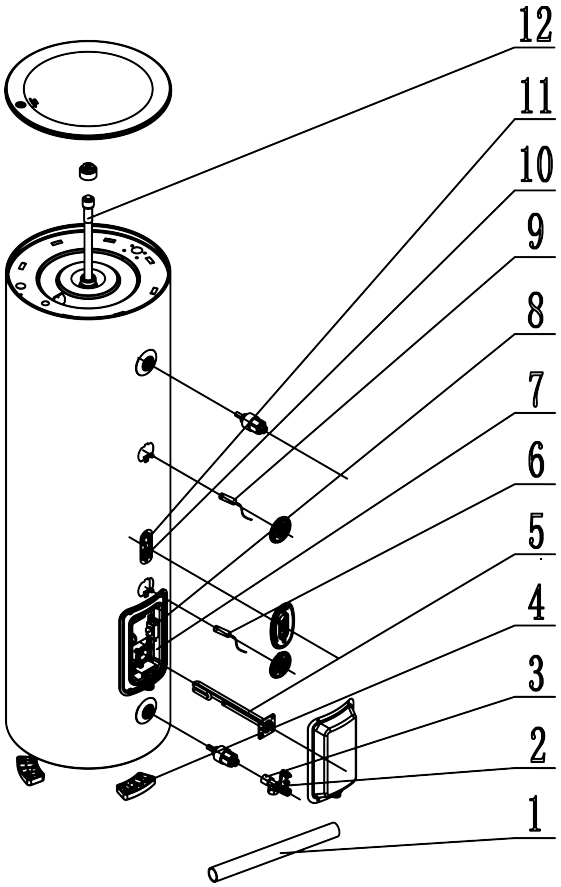
NO.	Name of Part	SWH-35ERA2	
		Part Code	Quantity
27	Electric Expand Valve Fitting	4300034401	1
28	Rear Grill	01475014	1
29	Terminal Board	42000100000303	1
30	Main Board	30224000105	1
31	Electric Box Assy	01392800232	1
32	Top Cover Plate	0125310703P	1
33	Radiator	49010252	1
34	Reactor	43130185	1
35	Reactor Sub-assy	02603199	1
36	Display Board	30296000028	1
37	Drainage Connecter	06123401	1
38	Drain Pipe	05230022	1
39	Filter	07412802	1
40	Front Grill	39008000149	1

Above data is subject to change without notice, please reference the SP in global service website.

4.2 Exploded View and Parts List of the Water Tank

◆ Model: SWH-200DE

Exploded Views and spare parts list:



Components List

NO.	Name of Part	SWH-200DE	
		Part Code	Quantity
1	Drainage Pipe(Rubber)	05332800002	1
2	Safety Valve	07382801	1
3	Water Pipe Connector	035033000012	1
4	Water Tank Bottom Feet	26902848	3
5	Electric Heater	32112800004	1
6	Temperature Sensor	39000106003101	1
7	Electric Box Assy	100002060368	1
8	Thermostat	45048003	1
9	Temperature Sensor	390001060031	1
10	Pipe Connector	06652828	1
11	Pipe Connector	06652830	1
12	Magnesium Bar Sub-Assy	01500450042702	1

UNIT MAINTENANCE

1 Water Input and Drainage of Water Tank

(1) Operation process for water input on the water tank

1) Cut off the power supply and open the cut-off valve at the water inlet of the tap faucet.
2) Open the cut-off valve at the hot water drain outlet and valve in user water use site.
3) Close the valve in user water use site when water is flowing out from user water use site.
4) Complete water input operation and reenergize the unit.

(2) Operation process for drainage on the water tank

1) Cut off the power supply and close the cut-off valve at the water outlet of the tap faucet.
2) Open the cut-off valve at the hot water drain outlet and valve in user water use site.
3) Open the cut-off valve on the joint (3-way) pipe.
4) Close the drainage cut-off valve after draining water on the water tank to complete drainage operation.

2 Regular Cleaning for the Water Tank

To ensure the quality of hot water you use, follow the following steps to regularly clean the water tank:

（1）Cut off the power supply of the unit.

（2）Close the cut-off valve on the water inlet pipe of the water tank.

（3）Open the cut-off valve at the hot water drain outlet and valve in user water use site.

（4）Open the cut-off valve in joint (3-way) connector, and wait for drainage of water inside water tank.

（5）Close the cut-off valve in joint (3-way) connector, open the cut-off valve at the water inlet of the water tank, close the cut-off valve at the water inlet when water flows from user water use site, then reopen the cut-off valve in joint (3-way) connector, repeat the drainage operation, close the cut-off valve in joint (3-way) connector when water discharged is clean.

(6) Conduct water input for the water tank according to water input operation.

(7) Water tank cleaning completed and energize it.

Note: Under normal conditions, the water tank can be cleaned once a year. If the water quality is poor, you need to shorten cleaning frequency.

3 Safety Valve Maintenance

In the heating process, when the inner container of water tank is in overpressure, a small amount of water may be discharged through the safety valve, which is a normal phenomenon. However, if a large amount of water is discharged through the safety valve or even pipe vibration occurs and abnormal noise is caused,contact Sinclaireauthorized maintenance centers. The possible causes of this problem are as follows: The safety valve is damaged; the water replenishment pressure is higher than the maximum working pressure (0.7MPa) of the water tank, which occurs generally when pressure reduction is not performed on the tap water. In normal conditions, the tap water pressure is around 0.3MPa. If a booster pump is used to replenish water, the water replenishment pressure may exceed 0.5MPa. In this

case, a stabilizing valve needs to be added to the tap water replenishment pipe to reduce water replenishment pressure.

Open the safety valve's handle to check whether it is blocked on a regular (about once a month) basis. If it is blocked, contact the authorized maintenance center for check or replacement. Perform sewage disposal by following the guide on a regular (about once a year) basis.

4 Maintenance of the Unit

(1) Regularly check whether the air inlet and outlet of the outdoor unit are blocked. If blocked, immediately clean them.

(2) Regularly check whether piping between the outdoor unit and the water tank, piping on the water use side, pipe fittings, and valves are damaged or blocked. Check whether any joint leaks, and whether the filter is blocked.

5 Attachment: Mapping Table of the Temperature Sensor Resistance and Temperature

The following tables list the mapping relationship between resistance of different temperature sensors and temperature. The resistance for different temperature can be queried during maintenance.

NOTE: Due to variance in measuring method and temperature sensing, the sensor resistance may deviate at ±5°C.

Table 5-1 Mapping between the temperature and resistance of 15 kΩ (outdoor ambient temperature sensor)

Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)
-20	144	41	7.653	101	0.98
-19	138.1	42	7.352	102	0.952
-18	128.6	43	7.065	103	0.925
-17	121.6	44	6.791	104	0.898
-16	115	45	6.529	105	0.873
-15	108.7	46	6.278	106	0.848
-14	102.9	47	6.038	107	0.825
-13	97.4	48	5.809	108	0.802
-12	92.22	49	5.589	109	0.779
-11	87.35	50	5.379	110	0.758
-10	82.75	51	5.179	111	0.737
-9	78.43	52	4.986	112	0.717
-8	74.35	53	4.802	113	0.697
-7	70.5	54	4.625	114	0.678
-6	66.88	55	4.456	115	0.66
-5	63.46	56	4.294	116	0.642
-4	60.23	57	4.139	117	0.625
-3	57.18	58	3.99	118	0.608
-2	54.31	59	3.848	119	0.592
-1	51.59	60	3.711	120	0.577
0	49.02	61	3.579	121	0.561
1	46.8	62	3.454	122	0.547
2	44.31	63	3.333	123	0.532
3	42.14	64	3.217	124	0.519
4	40.09	65	3.105	125	0.505
5	38.15	66	2.998	126	0.492
6	36.32	67	2.898	127	0.48
7	34.58	68	2.797	128	0.467

Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)
8	32.94	69	2.702	129	0.456
9	31.38	70	2.611	130	0.444
10	29.9	71	2.523	131	0.433
11	28.51	72	2.439	132	0.422
12	27.18	73	2.358	133	0.412
13	25.92	74	2.28	134	0.401
14	24.73	75	2.205	135	0.391
15	23.6	76	2.133	136	0.382
16	22.53	77	2.064	137	0.372
17	21.51	78	1.997	138	0.363
18	20.54	79	1.933	139	0.355
19	19.63	80	1.871	140	0.346
20	18.75	81	1.811	141	0.338
21	17.93	82	1.754	142	0.33
22	17.14	83	1.699	143	0.322
23	16.39	84	1.645	144	0.314
24	15.68	85	1.594	145	0.307
25	15	86	1.544	146	0.299
26	14.36	87	1.497	147	0.292
27	13.74	88	1.451	148	0.286
28	13.16	89	1.408	149	0.279
29	12.6	90	1.363	150	0.273
30	12.07	91	1.322	151	0.266
31	11.57	92	1.282	152	0.261
32	11.09	93	1.244	153	0.254
33	10.63	94	1.207	154	0.248
34	10.2	95	1.171	155	0.243
35	9.779	96	1.136	156	0.237
36	9.382	97	1.103	157	0.232
37	9.003	98	1.071	158	0.227
38	8.642	99	1.039	159	0.222
39	5.997	100	1.009	160	0.217
-20	144	41	7.653	101	0.98
-19	138.1	42	7.352	102	0.952
-18	128.6	43	7.065	103	0.925
-17	121.6	44	6.791	104	0.898
-16	115	45	6.529	105	0.873
-15	108.7	46	6.278	106	0.848
-14	102.9	47	6.038	107	0.825
-13	97.4	48	5.809	108	0.802
-12	92.22	49	5.589	109	0.779
-11	87.35	50	5.379	110	0.758
-10	82.75	51	5.179	111	0.737
-9	78.43	52	4.986	112	0.717
-8	74.35	53	4.802	113	0.697
-7	70.5	54	4.625	114	0.678
-6	66.88	55	4.456	115	0.66
-5	63.46	56	4.294	116	0.642
-4	60.23	57	4.139	117	0.625
-3	57.18	58	3.99	118	0.608
-2	54.31	59	3.848	119	0.592
-1	51.59	60	3.711	120	0.577

Table 5-2 Mapping between the temperature and resistance of 20 kΩ (tube sensor and gas suction temperature sensor)

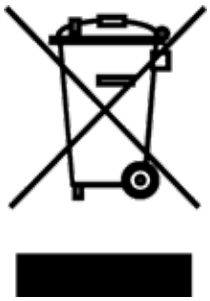
Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)
-30	361.8	10	39.87	50	7.173
-29	339.8	11	38.01	51	6.905
-28	319.2	12	36.24	52	6.648
-27	300	13	34.57	53	6.403
-26	282.2	14	32.98	54	6.167
-25	265.5	15	31.47	55	5.942
-24	249.9	16	30.04	56	5.726
-23	235.3	17	28.68	57	5.519
-22	221.6	18	27.39	58	5.32
-21	208.9	19	26.17	59	5.13
-20	196.9	20	25.01	60	4.948
-19	181.4	21	23.9	61	4.773
-18	171.4	22	22.85	62	4.605
-17	162.1	23	21.85	63	4.443
-16	153.3	24	20.9	64	4.289
-15	145	25	20	65	4.14
-14	137.2	26	19.14	66	3.998
-13	129.9	27	18.32	67	3.861
-12	123	28	17.55	68	3.729
-11	116.5	29	16.8	69	3.603
-10	110.3	30	16.1	70	3.481
-9	104.6	31	15.43	71	3.364
-8	99.13	32	14.79	72	3.252
-7	94	33	14.18	73	3.144
-6	89.17	34	13.59	74	3.04
-5	84.61	35	13.04	75	2.94
-4	80.31	36	12.51	76	2.844
-3	76.24	37	12	77	2.752
-2	72.41	38	11.52	78	2.663
-1	68.79	39	11.06	79	2.577
0	65.37	40	10.62	80	2.495
1	62.13	41	10.2	81	2.415
2	59.08	42	9.803	82	2.339
3	56.19	43	9.42	83	2.265
4	53.46	44	9.054	84	2.194
5	50.87	45	8.705	85	2.125
6	48.42	46	8.37	86	2.059
7	46.11	47	8.051	87	1.996
8	43.92	48	7.745	88	1.934
9	41.84	49	7.453	89	1.875

Table 5-3 Mapping between the temperature and resistance of 50 kΩ (upper and lower temperature sensors in the water tank and gas discharge temperature sensor)

Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)
-30	911.56	30	39.61	90	4.4693
-29	853.66	31	37.958	91	4.3345
-28	799.98	32	36.384	92	4.2044
-27	750.18	33	34.883	93	4.0789
-26	703.92	34	33.453	94	3.9579
-25	660.93	35	32.088	95	3.841
-24	620.94	36	30.787	96	3.7283
-23	583.72	37	29.544	97	3.6194
-22	549.04	38	28.359	98	3.5143
-21	516.71	39	27.227	99	3.4128
-20	486.55	40	26.147	100	3.3147
-19	458.4	41	25.114	101	3.22
-18	432.1	42	24.128	102	3.1285
-17	407.51	43	23.186	103	3.0401
-16	384.51	44	22.286	104	2.9547
-15	362.99	45	21.425	105	2.8721
-14	342.83	46	20.601	106	2.7922
-13	323.94	47	19.814	107	2.715
-12	306.23	48	19.061	108	2.6404
-11	289.61	49	18.34	109	2.5682
-10	274.02	50	17.651	110	2.4983
-9	259.37	51	16.99	111	2.4308
-8	245.61	52	16.358	112	2.3654
-7	232.67	53	15.753	113	2.3021
-6	220.5	54	15.173	114	2.2409
-5	209.05	55	14.618	115	2.1816
-4	195.97	56	14.085	116	2.1242
-3	188.12	57	13.575	117	2.0686
-2	178.65	58	13.086	118	2.0148
-1	169.68	59	12.617	119	1.9626
0	161.02	60	12.368	120	1.9123
1	153	61	11.736	121	1.8652
2	145.42	62	11.322	122	1.8158
3	135.96	63	10.925	123	1.7698
4	131.5	64	10.544	124	1.7253
5	126.17	65	10.178	125	1.6821
6	119.08	66	9.8269	126	1.6402
7	113.37	67	9.4896	127	1.5996
8	107.96	68	9.1655	128	1.5602
9	102.85	69	8.9542	129	1.522
10	98.006	70	8.5551	130	1.485
11	93.42	71	5.9676	131	1.449
12	89.075	72	7.9913	132	1.4141

Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)
13	84.956	73	7.7257	133	1.3803
14	81.052	74	7.4702	134	1.3474
15	77.349	75	7.2245	135	1.3155
16	73.896	76	6.9882	136	1.2846
17	70.503	77	6.7608	137	1.2545
18	67.338	78	6.542	138	1.2233
19	64.333	79	6.3315	139	1.1969
20	61.478	80	6.1288	140	1.1694
21	58.766	81	5.9336	141	1.1476
22	56.189	82	5.7457	142	1.1166
23	53.738	83	5.5647	143	1.0913
24	51.408	84	5.3903	144	1.0667
25	49.191	85	5.2223	145	1.0429
26	47.082	86	5.0605	146	1.0197
27	45.074	87	4.9044	147	0.9971
28	43.163	88	4.7541	148	0.9752
29	41.313	89	4.6091	149	0.9538

NOTE CONCERNING PROTECTION OF ENVIRONMENT



This product must not be disposed of via normal household waste after its service life, but must be taken to a collection station for the recycling of electrical and electronic devices. The symbol on the product, the operating instructions or the packaging indicate such disposal procedures. The materials are recyclable in accordance with their respective symbols. By means of re-use, material recycling or any other form of recycling old appliances you are making an important contribution to the protection of our environment. Please ask your local council where your nearest disposal station is located.

INFORMATION CONCERNING USED REFRIGERANT MEDIUM

This unit is containing fluorinated gases included in the Kyoto protocol.
The maintenance and the liquidation must be carried out by qualified personnel.

Type of refrigerant: R410a
The composition of the cooling medium R410a: (50% HFC-32, 50% HFC-125)
The quantity of the refrigerant: Please see the unit label.
The value GWP: 2088 (1 kg R410a = 2,088 t CO_2 eq)
GWP = Global Warming Potential

In case of quality problem or other please contact your local supplier or authorized service center.
Emergency number: 112

PRODUCER

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United Kingdom
www.sinclair-world.com

This product was manufactured in China (Made in China).

REPRESENTATIVE

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CE


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HEAT PUMPS