

Split EVI Heat pump

AW10/F AW13/F



Operation Installation & Maintenance Manual

VR3103 201210



The piping connection should be installed according to the local legal laws and regulations as well as the profession standard.

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Pre-installation

1、 Movement and storage

The unit must be moved upside (not be tilted more than 30° in either direction as diagram A) and store at dry area.

2、 Choice of installation place

The unit must be installed on the strong ground, preferable on the concrete foundation. Rubber cushion could be added to reduce vibration and noise.

In order to avoid the noise made by outdoor unit. It should be far away from living rooms and others which could not bear noise.

Large amount of condensation water as well as melt water from defrosting can be produced in outdoor unit. Provide good drainage at the installation area and make sure water can not run out onto paths or the like during periods that ice can form.

If the unit will operate in temperature under 0°C ,outdoor unit must be raised at least 300 mm from the ground. This is necessary to avoid ice build-up on the unit chassis and also to permit correct unit operation in locations where the snow level may reach this height .

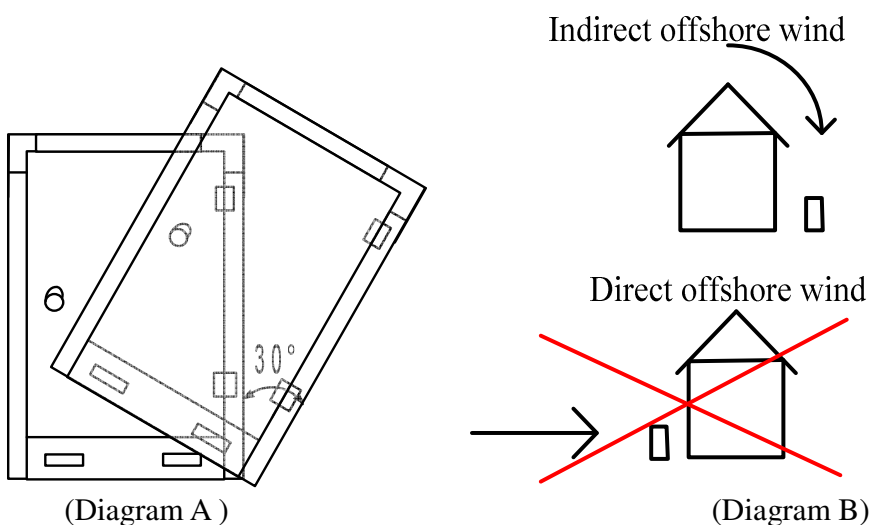
The unit must be installed level in both axes (less than 2mm tolerance per meter)

Outdoor unit must not be placed so that recirculation of outdoor air can occur, must not be placed in a windy location where it is exposed to direct strong winds as diagram B. This can cause lower output and impaired efficiency.

Baffles may be necessary to deflect strong winds and to prevent snow from blowing directly into the unit .They must not restrict air flow into the unit.

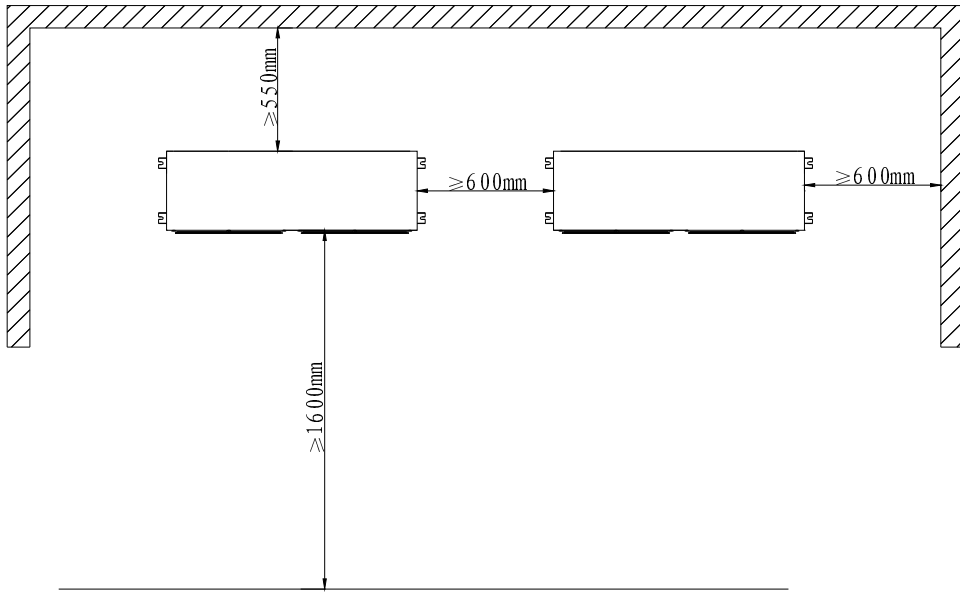
Keep suitable distance between the unit and the building to ensure the normal running and enough maintenance space.

The unit must be installed in a location that it is not accessible to the public and protected again access by non-authorized people.

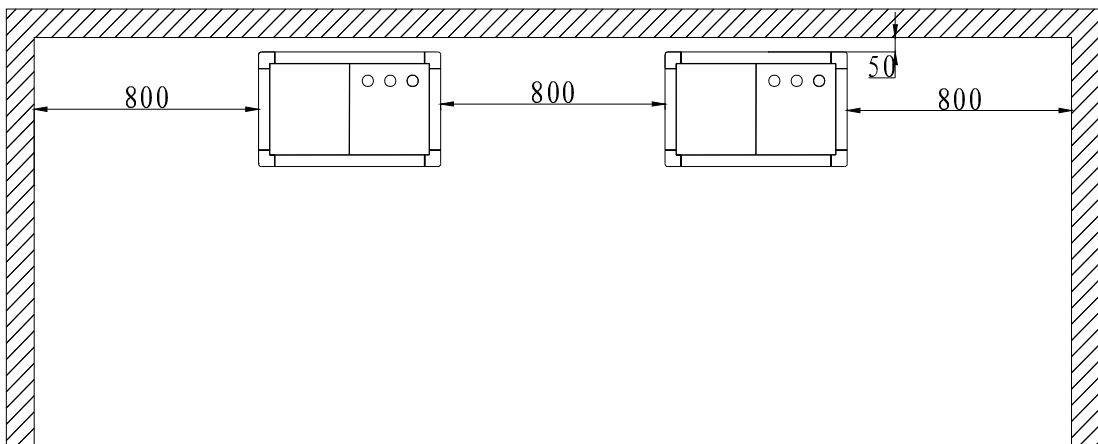


Positioning

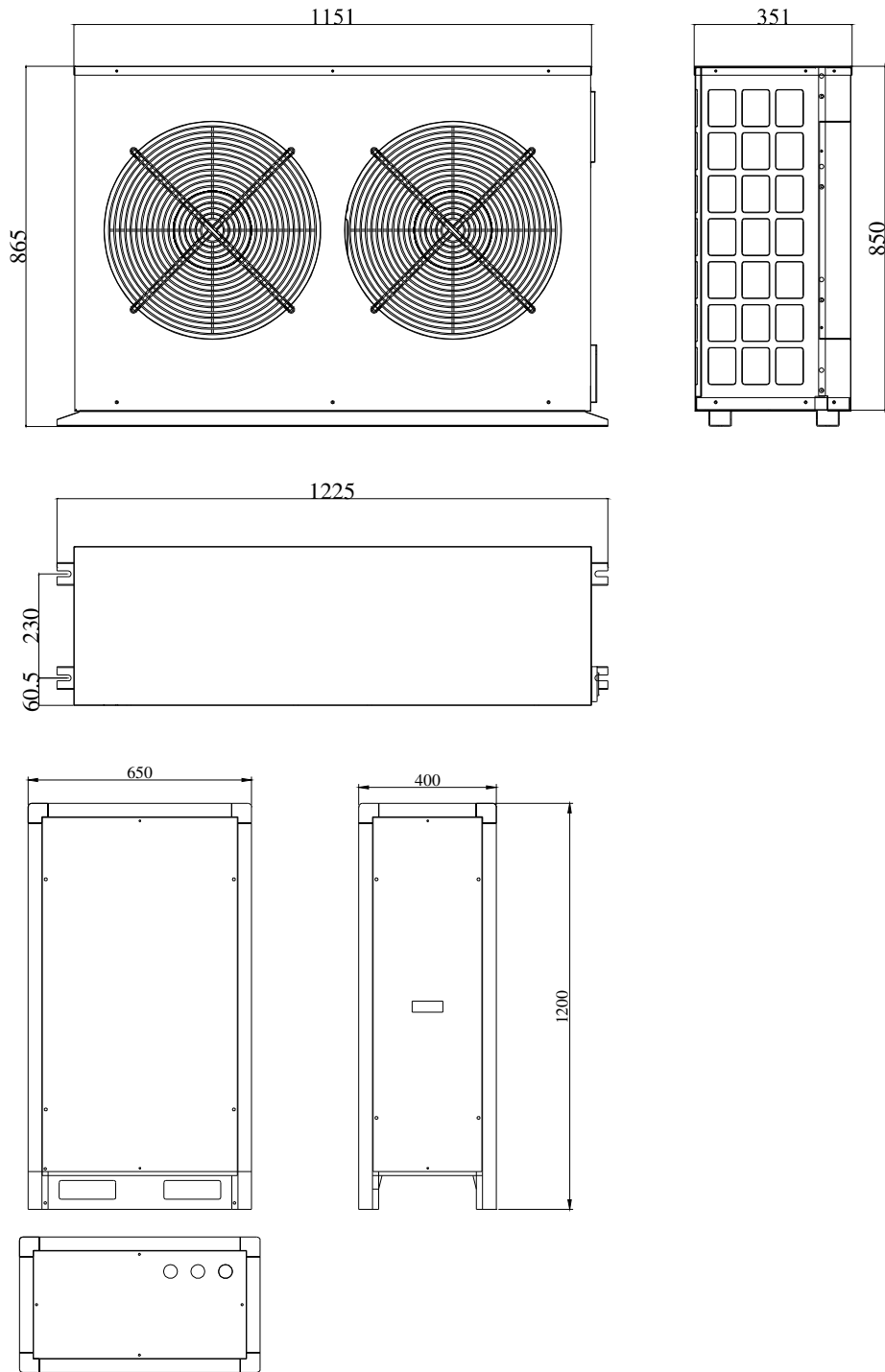
Outdoor unit



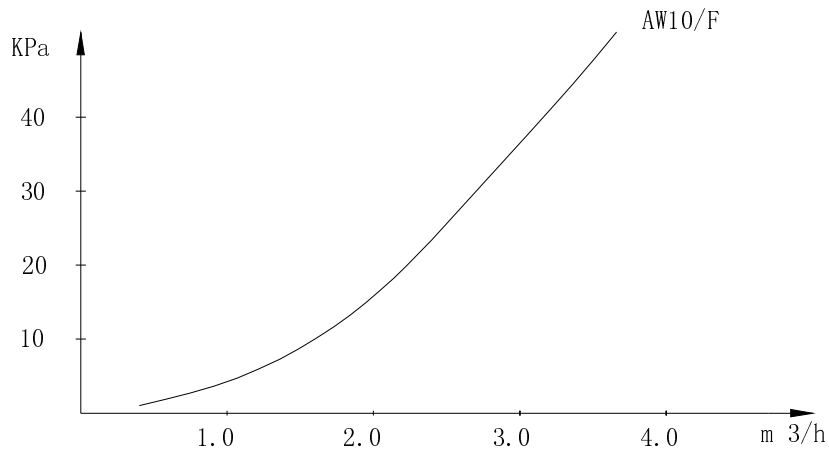
Indoor unit



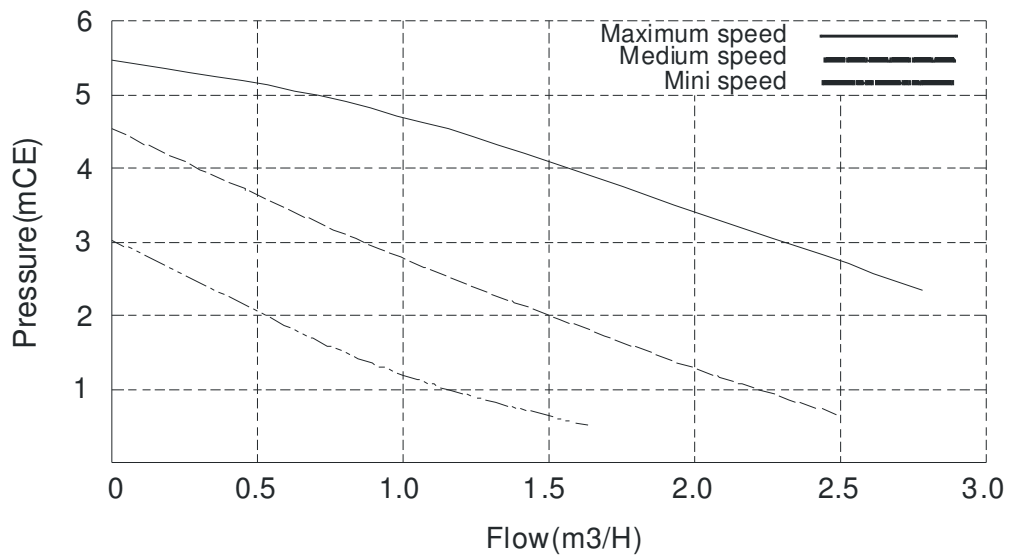
Dimensions



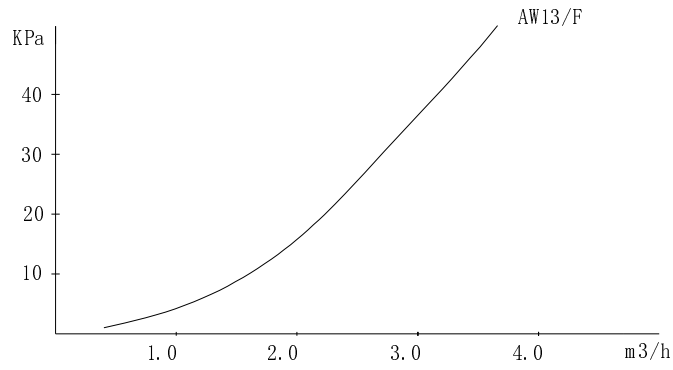
Water Pressure Plots



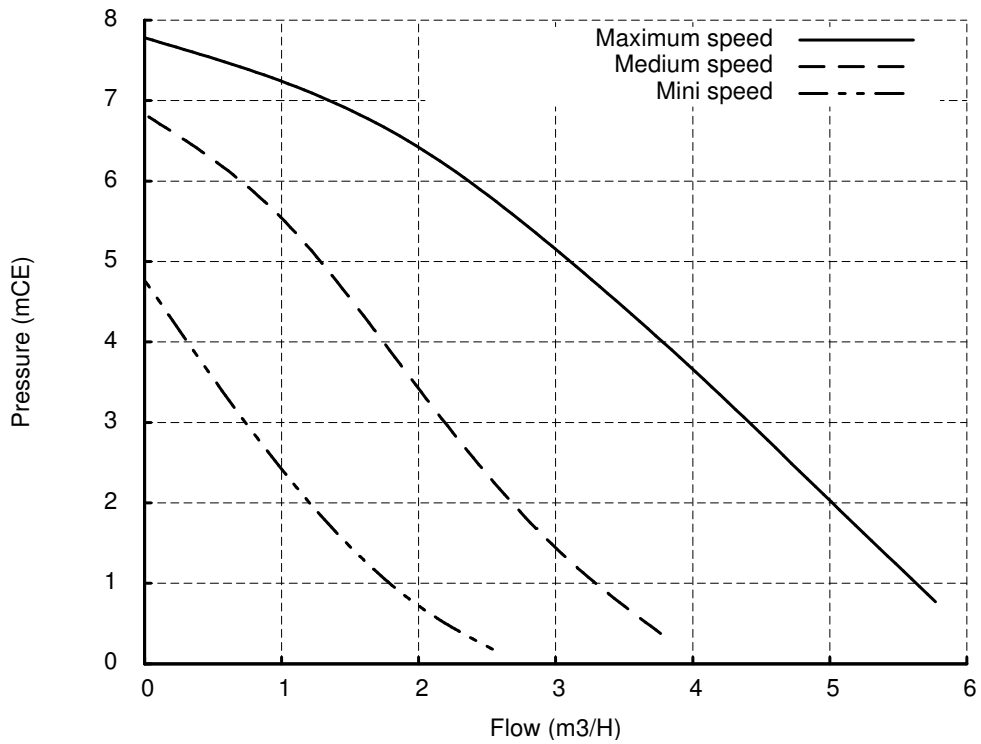
Optional water pump curve (AW10/F)



Water pressure Plots

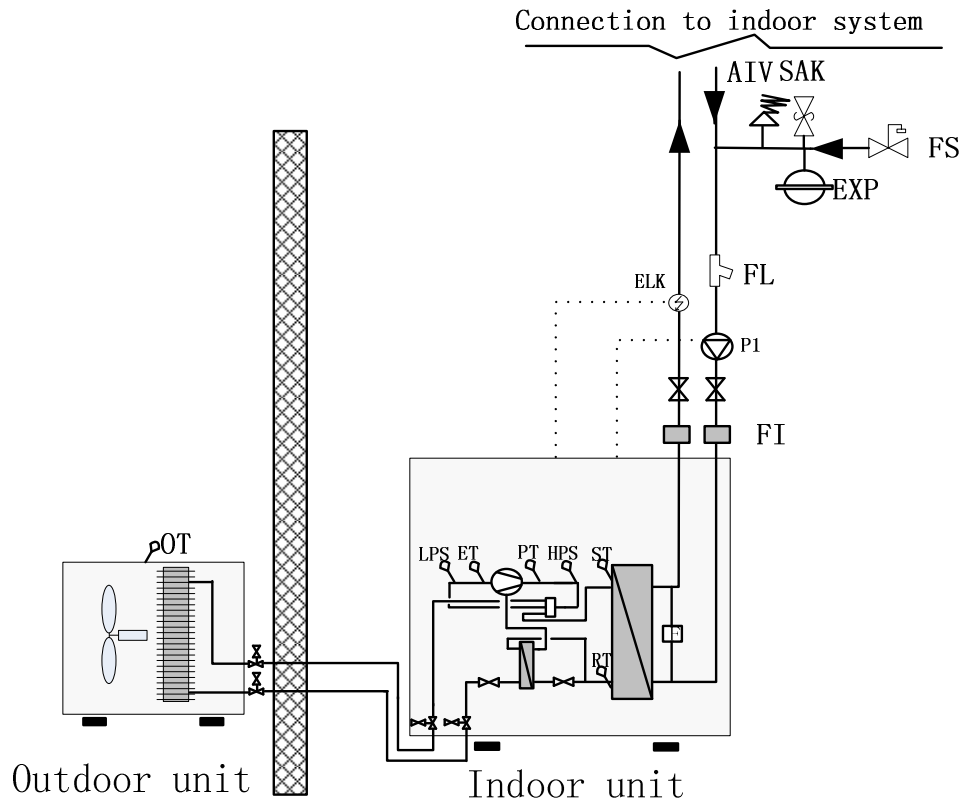


Internal water pump curve



Pipe connections

Heating and Cooling (Without internal hot water pump ,three way valve and electric heater)



Name	Description	Included ?	Name	Description	Included ?
P1	Circulation pump	External	RT	Inlet water temperature sensor	Internal
ELK	Electric heater	External	ST	Outlet water temperature sensor	Internal
FI	Soft joint	External	OT	Outdoor temperature sensor	Internal
FS	Automatic water supplement valve	External	LPS	Electronic low pressure transmitter	Internal
SAK	Safety valve	External	HPS	Electronic high pressure transmitter	Internal
FL	Filter	External	ET	Suction gas temperature sensor	Internal
F	Differential pressure flow switch	Internal	PT	Exhaust gas temperature sensor	Internal
EXP	Diaphragm expansion vessel	External	AIV	Air vent valve	External

Pipe connections

Principle of operation:

1. Heating Mode Working Principle:

1.) a. When SF04=0:

When the RT drops below $ST02-ST04$, the compressor will start to heat until $RT \geq ST02+ST04$. Then compressor will stop. The Compressor will start again when $RT \leq ST02-ST04$.

b. When SF04=1:

ST02 is replaced by "Set temperature at heating" $=ST05+ST06 *(ST05-OT)$. Refer to page 33 "Heating compensation curve setting" and page 34 "Three curves of different ST05 setting"

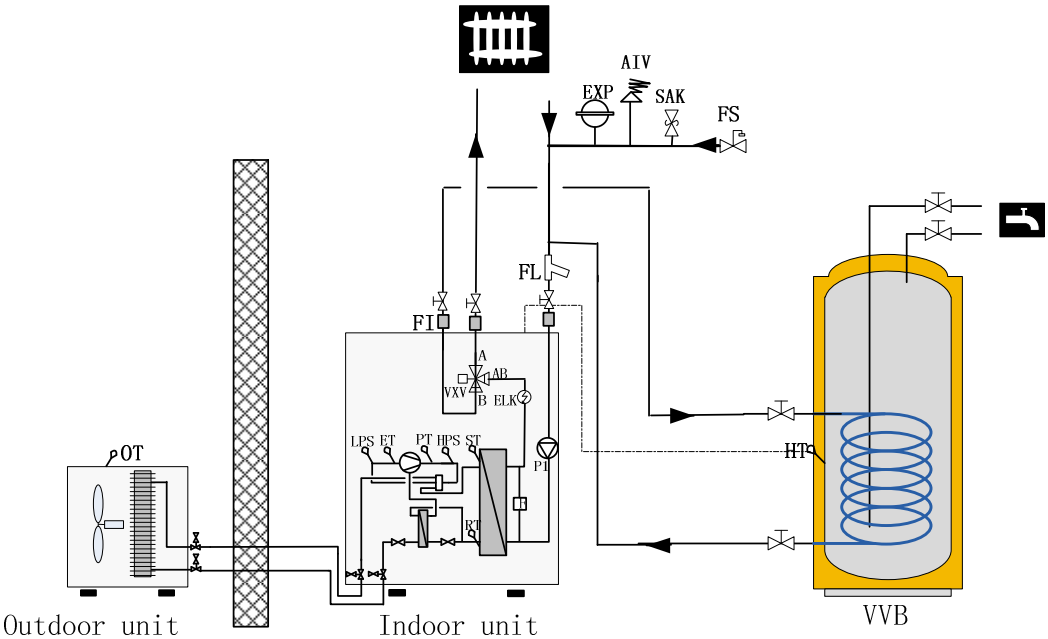
2.) When the outdoor temperature meets the conditions of $OT \leq ST07$ and $RT \leq ST02 - ST04$, electric heater ELK will be activated to heat. It will stop heating when $OT \geq ST07+2$ or $RT \geq ST02$

3.) Cooling Mode Working Principle:

When the $RT \geq ST01+ST03$, the compressor will start to cool until $RT \leq ST01-ST03$. Then compressor will stop. The Compressor will start again when $RT \geq ST01+ST03$.

Pipe connections

Heating with hot water (with internal water pump, three way valve and electric heater)



Name	Description	Included ?	Name	Description	Included ?
PI	Circulation pump	Internal	RT	Inlet water temperature sensor	Internal
ELK	Electric heater	Internal	ST	Outlet water temperature sensor	Internal
VXV	3 way Valve	Internal	OT	Outdoor temperature sensor	Internal
VVB	Hot water tank	External	HT	Hot water temperature sensor	Internal
FI	Soft joint	External	ET	Suction gas temperature sensor	Internal
EXP	Diaphragm expansion vessel	External	LPS	Electronic low pressure transmitter	Internal
SAK	Safety valve	External	HPS	Electronic high pressure transmitter	Internal
FL	Filter	External	PT	Exhaust gas temperature sensor	Internal
F	Differential pressure flow switch	Internal	FS	Automatic water supplement valve	External
AIV	Air vent valve	External			

Pipe connections

Principle of operation:

(1) Heating working principle:

On heating mode, Three way valve (VXV) will open AB-A.

1.) a. When SF04=0:

When RT drop to below $ST02-ST04$, compressor will start to heat until $RT > ST02+ST04$. Then compressor will stop. Compressor will start again when $RT < ST02-ST04$.

b. When SF04=1:

ST02 is replaced by "Set temperature at heating" = $ST05+ST06 *(ST05-OT)$. Refer to page 33 "Heating compensation curve setting" and page 34 "Three curves of different ST05 setting"

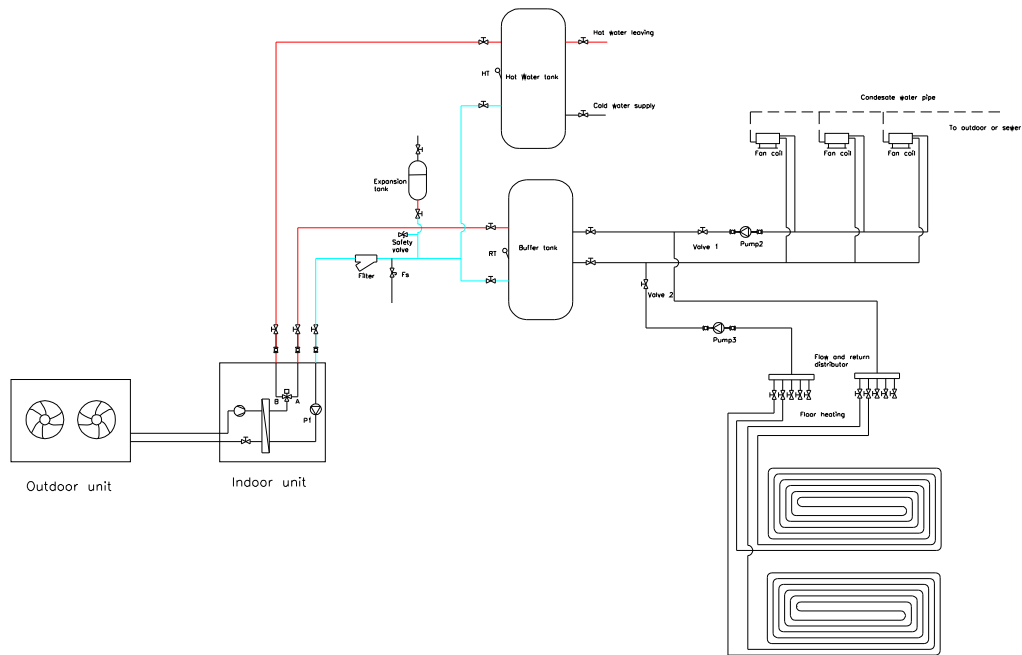
b. When outdoor temp. $OT \leq ST07$ and $RT \leq ST02-ST04$, electric heater (ELK) will be activated as energy stage to heat and will exit working when $OT \geq ST07+2$ or $RT \geq ST02$

(2) Hot water production working principle:

On hot water mode, Three way valve (VXV) will open AB-B.

When domestic hot water requirement calls, the three way revert valve (VXV) will have the priority to revert to the hot water tank (VVB). After the domestic hot water reach its set temperature ST09, the three way revert valve (VXV) return to heating circuit position. After $HT < ST09 - ST10$, three way revert valve (VXV) will revert to hot water circuit again.

Heating ,Cooling with hot water (with internal water pump, three way valve and electric heater)



Name	Description	Included ?	Name	Description	Included ?
P1	Circulation pump	Internal	RT	Inlet water temperature sensor	Internal
FS	Automatic water supplement	Internal	HT	Hot water temperature sensor	Internal

Pipe connections

Principle of operation:

1. Heating Mode Working Principle:

1.) a. When SF04=0:

When the RT drops below ST02-ST04, the compressor will start to heat until $RT \geq ST02+ST04$. Then compressor will stop. The Compressor will start again when $RT \leq ST02-ST04$.

b. When SF04=1:

ST02 is replaced by "Set temperature at heating" = $ST05+ST06 *(ST05-OT)$. Refer to page 33 "Heating compensation curve setting" and page 34 "Three curves of different ST05 setting"

2.) When the outdoor temperature meets the conditions of $OT \leq ST07$ and $RT \leq ST02 - ST04$, electric heater ELK will be activated to heat. It will stop heating when $OT \geq ST07+2$ or $RT \geq ST02$

2. Cooling Mode Working Principle:

When the $RT \geq ST01+ST03$, the compressor will start to cool until $RT \leq ST01-ST03$. Then compressor will stop. The Compressor will start again when $RT \geq ST01+ST03$.

3. Hot water production working principle:

On hot water mode, Three way valve (VXV) will open AB-B.

When domestic hot water requirement calls, the three way revert valve (VXV) will have the priority to revert to the hot water tank (VVB). After the domestic hot water reach its set temperature ST09, the three way revert valve (VXV) return to heating circuit position. After $HT < ST09 - ST10$, three way revert valve (VXV) will revert to hot water circuit again.

Pipe connections

Pipe connections

Pipe installation must be carried out in accordance with current norms and directives.

The water inlet and outlet should not be reversed, refer to the label on the unit.

The water pipes must not transmit radial or axial force to the heat exchangers nor any vibration.

The water supply must be analyzed and appropriate filtering, treatment, control devices, shutoff and bleed valves and circuit built in, to prevent corrosion, fouling and deterioration of the pump fittings.

The water circuit should be designed to have the least number of elbows and horizontal pipe runs at different levels. Below are the main points to be checked:

Use an expansion device to maintain pressure in the system and install a safety valve as well as an expansion tank.

Install drain connections at all low points to allow the whole circuit to be drained.

Use flexible connections to reduce vibration transmission.

Insulate all pipework, after testing for leaks, both to reduce thermal leaks and to prevent condensation.

When charging the water circuit, use air vents to evacuate any residual air pockets.

Since the heat pump is not fitted with shutoff valves, these must be fitted outside of the heat pump to facilitate future service.

The heat pump must be vented at the highest point and particle filter must be installed ahead of the water inlet.

If total system water volume is less than 12L/KW, buffer tank should be added to reduce compressor ON/OFF cycling and prolong compressor servicing life.

When buffer tank is adopted, indoor system will absorb energy from buffer tank first. To save energy, indoor pump P1 could be switched on only when compressor is on, just set EV01 to "1".

When EV01 changes into "1", RT sensor should be taken out from the unit and put into buffer tank's sensor pocket.

When the unit reaches its set temperature, compressor stops working, P1 will also stop accordingly, there is no water circulation between the heat pump and buffer tank, so that RT sensor in the unit (originally placed at lower submerged sensor pocket of plate heat exchanger) will keep on its stopped temperature not the real indoor side flow temperature. Change the RT sensor into the buffer tank will avoid this problem.

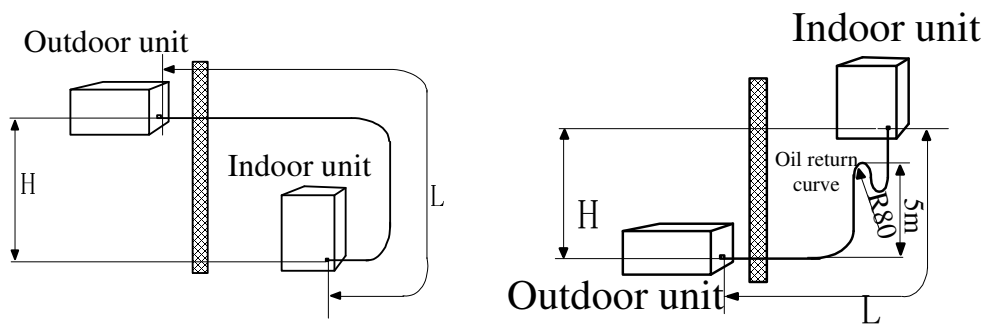
Pipe connections

Connecting refrigerant pipe (not supplied)

Install the refrigerant pipes between the outdoor unit and indoor unit.

Installation must be carried out in accordance with current norms and directives.

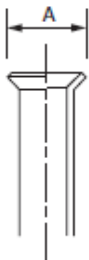
- If indoor unit is higher than outdoor unit more than 5m, an oil return curve must be made in each 5m .
- Max. height difference between indoor and outdoor unit (H) :10m
- Max. pipe length (L) : 15m



	Gas pipe	Liquid pipe
Pipe size	φ9.52mm (3/8")	φ15.88mm (5/8")
Connection	Flare (3/8")	Flare (5/8")
Minimum copper coil thickness	1.0mm	0.8mm
Max pressure	4.5MPa	

Flare connections

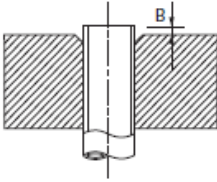
Expansion:



Outer diameter, copper pipe (mm)	A (mm)
Ø9.52	13.2
Ø15.88	19.7

Pipe connections

Ejection:

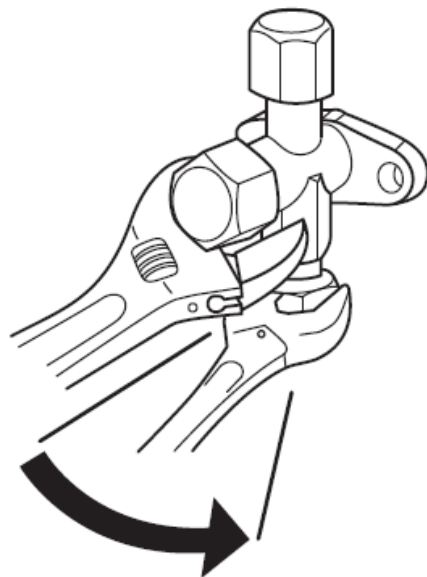


Outer diameter, copper pipe (mm)	B, with an R410A tool (mm)	B, with a conventional tool (mm)
Ø9.52	0~0.5	0.7~1.3
Ø15.88		

- Service valves on indoor/outdoor pipe connector should close when connecting the pipes. The indoor/outdoor pipe connector refer to Chapter “components”
- Ensure that water and dirt does not enter the pipes.
- Bend the pipes with as large a radius as possible (at east R100~R150).Do not bend a pipe repeatedly. Use a bending tool.
- Connect the flare connector and tighten to the following torque.

Pipe diameter	Torque
3/8” (φ9.52mm)	35-40 (N·m)
5/8” (φ15.88mm)	60-65 (N·m)

- Aim the flare connection of copper coil at the center of screw connection of heat pump , screw the flare nut as tightly as possible manually.
- Tighten the flare nut to required torque with a torque wrench



Pipe connections

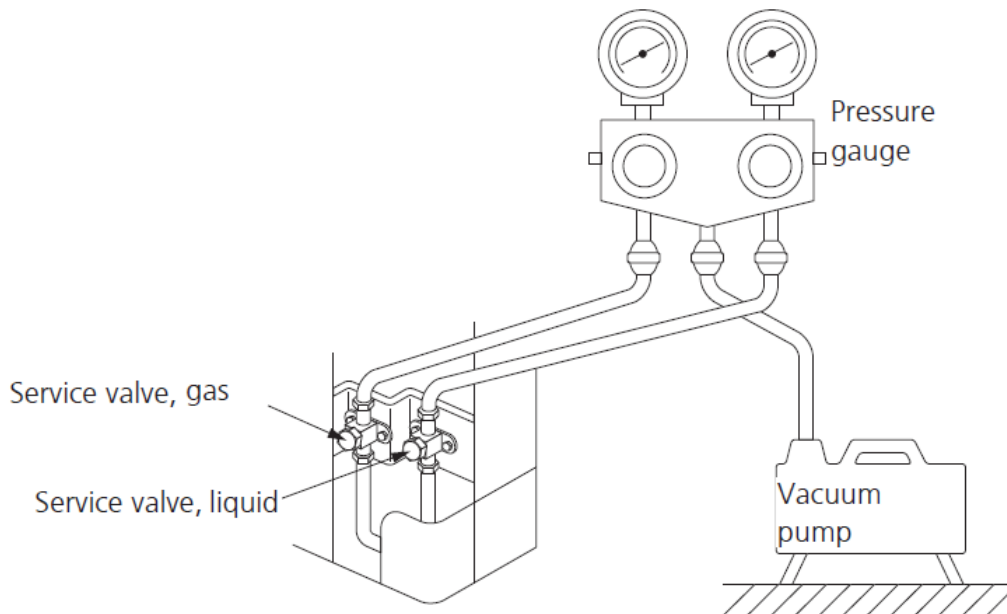
Pressure test and leak test

The pipe connection between indoor and outdoor unit must be pressure tested and leak tested after installation.

Only nitrogen could be used when pressurizing and flushing the system.

Use a vacuum pump to evacuate all air. Vacuum for at least one hour and end pressure after evacuation must be 1mbar absolute pressure.

If the system has remaining moisture or a leak, the vacuum pressure will rise after completed evacuation.



Filling refrigerant:

After finishing pipe connections, pressure test, leak test and vacuuming, the service valves can be opened.

The gas inside the indoor unit is enough for 5m pipe. If connection pipe is longer than 5m, need to re-fill some R410A refrigerant. Filling weight is 50g per extra meter.

Pipe connections

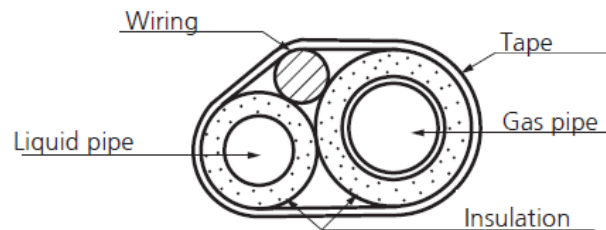
Insulating refrigerant pipes

Insulate refrigerant pipes for heat insulation and to prevent condensate.

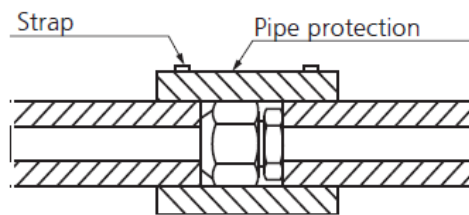
Use insulation that can withstand at least 120°C.

The insulation should be at least 13 mm thick.

Principle:



Connections:



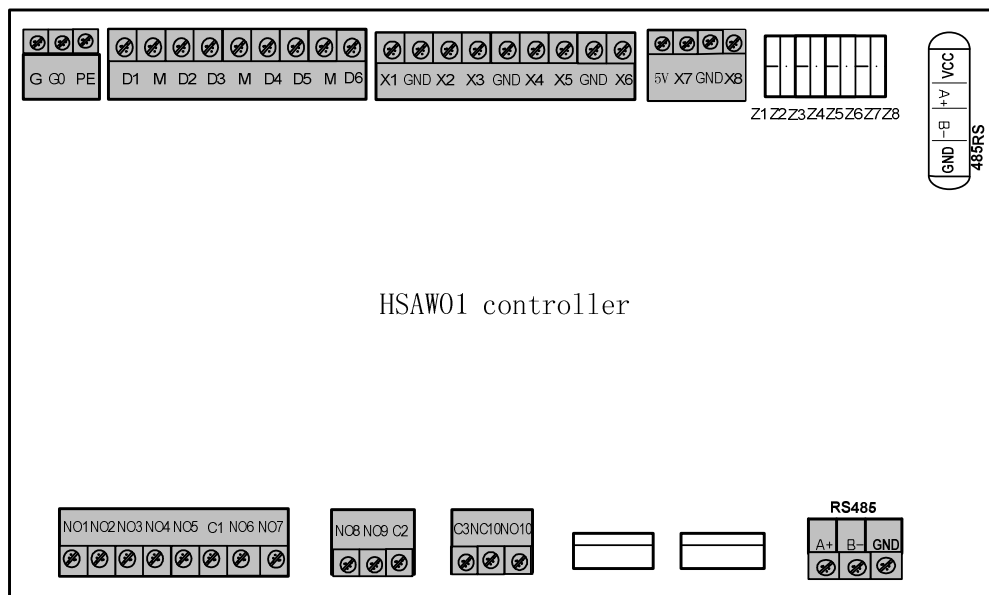
NOTE!

The pipe work must be flushed before the heat pump is connected, so that any contaminants do not damage the components parts.

The water pressure in the heat exchanger can not exceed 0.5Mpa

Electrical connection

Power supply Digital input NTC 10K sensor HPS,LPS 0-5VDC



Digital output Universal output Digital output EVI Throttle
 electronic electronic
 expansion expansion
 valve valve

	<i>Terminal Assignments</i>		<i>Terminal Assignments</i>
G	Power supply AC/DC 24 V	NO01	Compressor
G0	Power supply ground	NO02	Hot water electric heater
PE	Safety ground	NO03	water pump
		NO04	4-way valve
X1	Inlet water temperature (RT)	NO05	High speed fan
X2	Outlet water temperature (ST)	C1	Supply 1 (AC 24 V ...230 V)
X3	Outdoor ambient temperature (OT)	NO06	Low speed fan
X4	Hot water temperature (HT)	NO07	Crankcase heater
X5	Exhaust temperature (PT)	NC08	Heating electric heater
X6	Suction gas temperature (ET)	NO09	De-icing electric heater
X7	Low pressure (LPS)	C2	Supply 1 (AC 24 V ...230 V)
X8	High pressure (HPS)	C3	Supply 1 (AC 24 V ...230 V)
GND	Common reference point for analog input	NO10	Normal open
		NC10	Normal close
D1	Water flow switch		
D2	Low pressure switch		
D3	high pressure switch		
D4	Air conditioner switch		
D5	Hot water switch		
D6	Phase sequence protection		
M	Common reference point for digital input		

Electrical connection

NOTE! Electrical installation and service must be carried out under the supervision of a qualified electrician. Electrical installation and wiring must be carried out in accordance with the stipulations in force.

The equipment must be installed via an isolator switch with a minimum breaking gap of 3 mm. The heat pump is not re-connectable 1-phase and 3-phase. The power supply must conform to the specification on the unit nameplate. The supply voltage must be within the range specified in the electric data table. For connection, refer to the electric wiring diagram on the inside panel of the unit.

When the building is equipped with an earth-fault breaker the heat pump should be equipped with a separate one.

IMPORTANT: During the unit installation first make the water connections and then electrical connections. If unit is removed first disconnect electrical cables, then water connections.

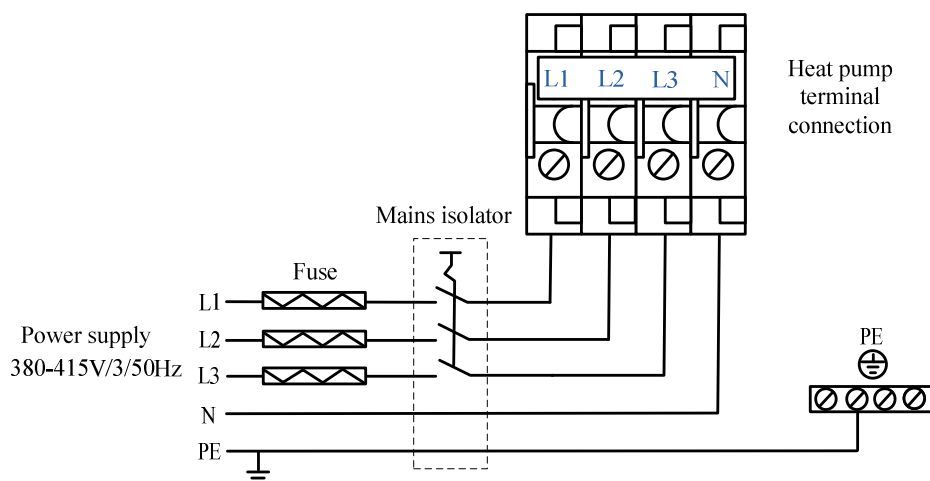
WARNING: Disconnect the main power supply switch before servicing the system or handling any internal parts of the unit.

In case of any malfunctioning turn the unit off, disconnect the mains power supply and contact a qualified service engineer.

Power connection

Before connect the power supply, please confirm the unit adopting power. 380-415V/3/50Hz (3 phase).

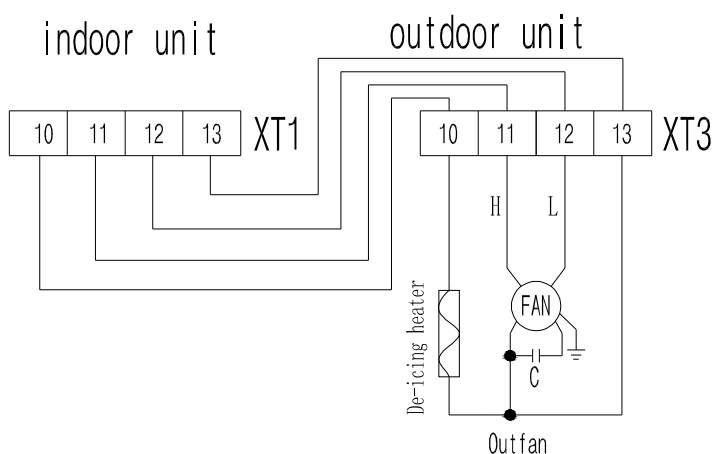
Fuse protection must be adopted according to the max value stated in the nameplate attached to the unit outside cabinet.



Electrical connection

Connecting indoor and outdoor unit

Use cable (not less than 1.5m²) (not supplied) to connect indoor and outdoor unit via control board terminal connection .



Note:

- ◆ Outdoor unit must be earthed before the wiring before the unit is connected.
- ◆ The wiring must be attached so that the terminal block is not under stress

Connect Outdoor ambient temperature sensor OT (6m) (X3)

One section of OT probe (X3) is inside the outdoor unit control box. Other section of OT probe is inside the indoor unit control box. Connect two section of OT probe with its connector.

Important: Temperature sensor must be separated (min 20 cm) from high voltage power cables to avoid interference which will cause measured temperature fluctuating and heat pump can not work normally.

If the temperature sensor cable runs close to power cables, shielded cable should be used .If a conduit is used, it should be sealed to avoid condensation in the outdoor temperature sensor probe.

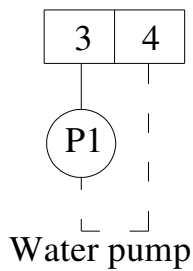
Hot water temperature sensor

The supplied temp. sensor HT is connected to terminal positions X4 and GND on the main board, the other terminal must be put into buffer tank temp sensor probe inlet pocket.

Electrical connection

A/C water pump:

If A/C water pump is not installed in the factory, there is a terminal port (3-4) for connecting it. If water pump current is over 2A, an A/C contactor must be used to activate the water pump.

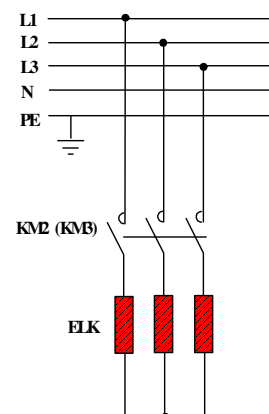
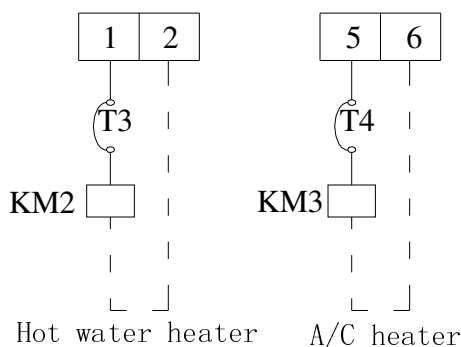


Electric heater :

Hot water electric heater could be installed in a hot water tank and could be connected to terminal port (1-2).

If A/C electric heater is not installed in the factory, there is a terminal port (5-6) for connecting it.

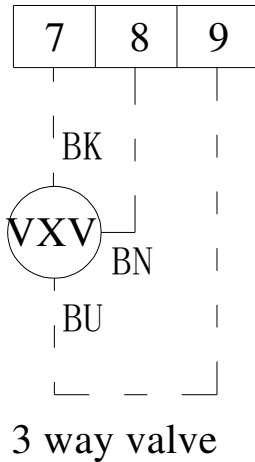
A/C contactors must be used to activate the electric heaters .



Electrical connection

Three way valve:

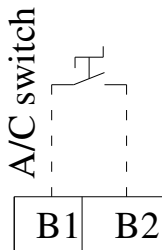
If 3 way valve is not installed in the factory, there is a terminal port (7-8-9) for connecting it .



A/C switch:

If SF14=0, unit ON/OFF is controlled by A/C switch

When A/C switch B1-B2 is bridged, unit heating /cooling function is activated. An external signal like a timer or thermostat, etc could be connected to B1-B2 and to activate or deactivate unit heating /cooling function. This external signal must be voltage free.



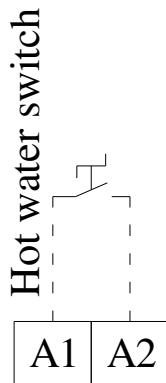
If user want to switch on/off unit by remote control, set SF14=1 (factory default setting)

Electrical connection

Hot water switch:

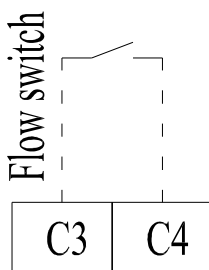
Unit hot water mode can not be set on controller and also can not be switched ON/OFF by remote control.

When hot water switch A1-A2 is bridged, unit hot water function is activated. An external signal like a timer or thermostat, etc could be connected to A1-A2 to activate or deactivate unit hot water function. This external signal must be voltage free.



13. Water flow switch:

If water flow switch is not installed in the factory, there is a terminal port C3-C4 for connecting it. Water flow switch is used to check if the water flow is sufficient in the system. If water flow switch works normally, the compressor can be started; otherwise, the compressor is prohibited to start.



Commissioning and adjusting

1.Preparations

Before commissioning, check that the heating circuit is filled and well vented. Check the pipe system for leaks.

Filling and venting the heating medium system

The heating medium system is filled with water to the required pressure 0.3Mpa. Vent the system using the venting nipple .

compressor heater

The equipment is equipped with a compressor heater that heats the compressor before start-up when outdoor temperature is low. The compressor heater must have been connected for 6-8 hours before the FIRST start.

Phase sequence control

When starting for the first time or after work on incoming electricity supply, phase sequence control must be carried out.

The phase sequence protector refer to “COMPONENTS “

- “Normal” green light on means that phase connection is correct
- “PR” red light on means that phase connection is reversal.
- “PL” red light on means that phase is short.
- “O UVR-VOLT” red light on means that power supply voltage is too high/low.

Start-up and inspection

- 1.Turn the isolator switch on.
- 2.Check that all incoming phases are powered.
- 3.The compressor heater must have been operational for at least 6 – 8 hours before the compressor start can be initiated. This is done by switching on the control voltage and press A/C switch and hot water switch to OFF.
- 4.check that water flow switch in installed ,A/C switch or hot water switch is bridged.
- 5.Once the connection is made, the compressor starts after approx. 60 seconds.
- 6.Adjust the charge flow to make water inlet/outlet temperature difference about 5 °C
Just press PLUS button to check ST,RT.. The temperature difference between ST/RT could be adjusted to about 5°C using the circulation pump and control valve.

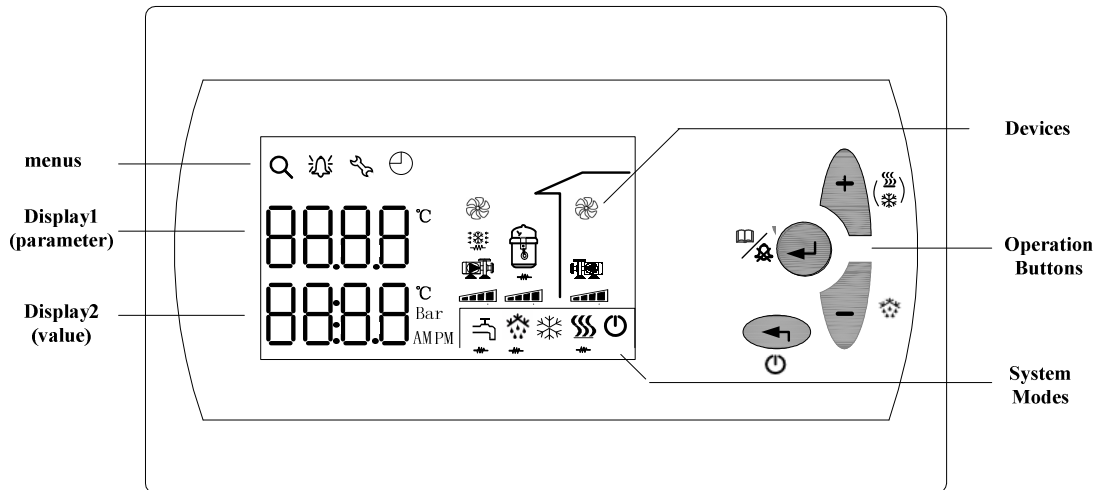
Commissioning and adjusting

Readjusting, heating medium side

Air is initially released from the hot water and venting may be necessary. If bubbling sounds can be heard from the heat pump, the circulation pump and radiators the entire system will require further venting. When the system is stable (correct pressure and all air eliminated) the automatic heating control system can be set as required.

Control

Controller display (display window & button area)



Operating buttons:

button	description	application
	<Esc> & <Power On/Off>	Press this button when unit is running, <OK> will appear ,and then press again, unit will be switched off. Press this button when unit is off , unit will be switched on. At menu/parameter setting mode, press this button to return to previous menu or cancel inputted data
	<Enter>	Press this button more than 2s when unit is off ,unit will enter menu mode. At menu/parameter setting mode, press this button to enter the selected sub-menu or confirm inputted data Press this button to reset warning and alarm
	<Plus>	Press this button more than 2s when unit is off, unit mode selection function will be activated At menu mode, press this button to scroll forward or increase data.
	<Minus>	At menu mode, press this button to scroll backward or decrease data. Press this button 2s and then release to activate manual defrost mode. If all necessary parameter data of defrost has been set up and unit is running on heating or hot water mode, it will begin to defrost manually.

Display area:

- At normal working mode, display 1 shows temperature code, display 2 shows this code temperature value。
- At menus mode, display 1 shows menu code, display 2 shows this code value。

Control

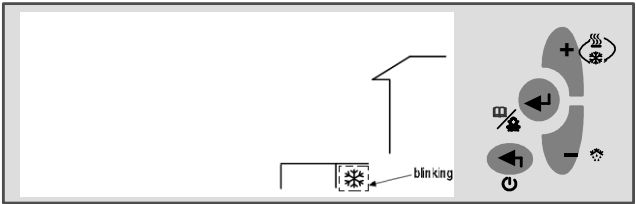
Menu area:

Icon	Description	Function
🔍	Query/view	check input/output temperature/pressure
		Check program version number
🔔	Alarm	view the latest 20 alarms .
🔧	Parameters	set parameter data
🕒	Clock	Adjust time

Icon explanation:

Icon	description	Icon	description
🔌	Power on/off	❄️	Anti freeze
❄️	Cooling	☀️	Defrost
🔥	Heating	📊	Energy state of compressor and other components
⚡	Electric heater for crankcase,heating, de-icing and hot water respectively display under symbol of compressor,heating mode,defrost mode,hot water mode)		
🏠	House (The components with icon inside the house is called indoor device)		

2. Selection of System Modes

Display	Procedures
	<p>In stop mode, press the <Plus> button for 2 seconds, and release it to activate the selection of system mode. The current system mode will start flashing.</p> <p>Press <Plus> or <Minus> to select the desired system mode, and then press<Enter > to confirm.</p>

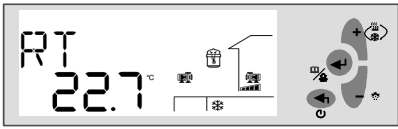
If the current system is heating only (when SF01=2), the selection of system modes is disable.

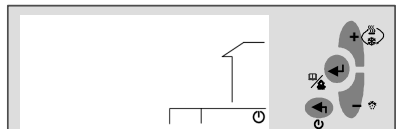

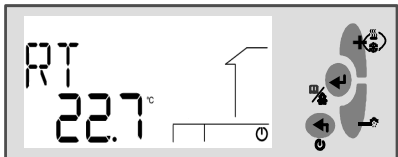
If the current system is heating & cooling (when SF01=1), the full sequence of selecting the system modes will be as follows.

Activity	Sequence
Press <Plus>	❄️ → 🔥 → ❄️

Control

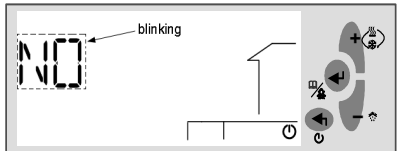



3. Viewing temperature/pressure

Display	Procedures
	In normal working mode, press <plus> or <minus> to read the temperature.

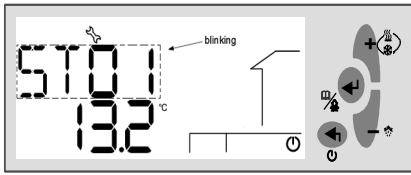
Display	Procedures
	In stop mode, press the <Enter> button for 2 seconds and release it to enter the Menu mode. By default, the Query  icon is blinking, waiting for further instructions.
	Press the <Enter> button to enter the query mode. Press <plus> or <minus> to read the temperature.

Code	Description
RT	Inlet water temperature
ST	Outlet water temperature
OT	Outdoor ambient temperature
HT	Hot water temperature
PT	Exhaust gas temperature
ET	Suction gas temperature
LPS	Low pressure
HPS	High pressure

4. Changing Set points (for users)

Display	Procedures
In stop mode, press <Enter> for 2 seconds and release it to activate the Menu mode.	
	When the  icon is blinking, press <Plus> or <Minus> to navigate to the  menu, and then press <Enter> to proceed.
<p>Contents under the  Parameter Menu vary with the privilege right of the user.</p> <ul style="list-style-type: none"> • For users, select “NO,” and press <Enter> to proceed. • For service men and factory users, select “EU” or “ID”, and press <Enter> to input the 4-digit password . 	

Control



For users, some parameters in the “ST” group will by default be displayed.

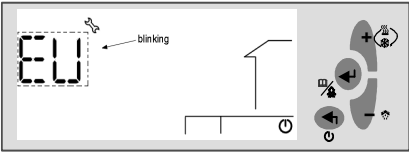
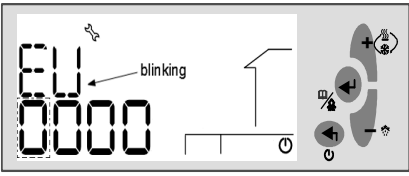
Or, continuously press <Esc> to exit out of the current level and back to the desired menu level.

User setting parameters:

User settings		Default	Unit	Res
ST01	Setting temperature at cooling mode	12	°C	0.1
ST02	Setting temperature at heating mode	40	°C	0.1
ST09	Hot water temperature	50	°C	0.1
ST10	Hot water temperature difference	3	°C	0.1

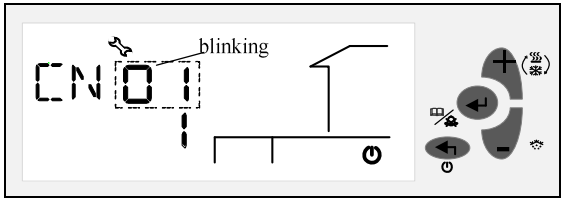
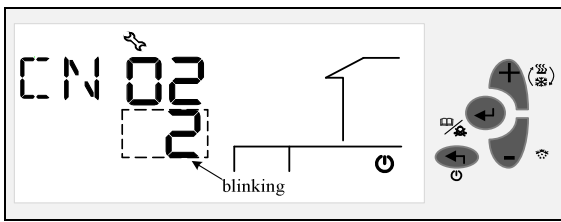
Control

5. Accessing the Parameter Menu

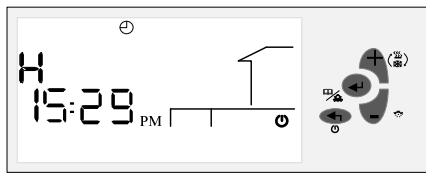

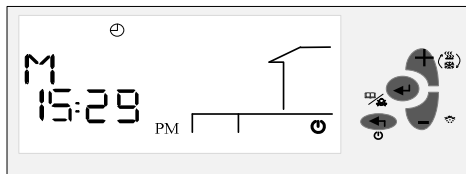
<i>Display</i>	<i>Procedures</i>
	In Stop mode, press <Enter> for 2 seconds and release it to activate the Menu mode.
	When the 🔍 icon is blinking, press <Plus> or <Minus> to navigate to the 🛠️ menu, and then press <Enter> to proceed.
	<p>Contents under the 🛠️ menu may vary with the privilege right of the user.</p> <ul style="list-style-type: none"> • For users, select “NO” and press <Enter > to proceed. • For service men and factory users, select “EU” or “ID” and press <Enter>. Input the 4-digit password when the following screen is displayed
	Press <Enter> to confirm and continue to input the password.
	Password is required for the service man (EU) and factory users(ID).
	<p>To input password, follow the instructions below:</p> <ul style="list-style-type: none"> • When the digit is blinking, press <Plus>/<Minus> to select the value. Then, press <Enter> to confirm, and proceed to the next digit. • Or, press <Esc> at any time to cancel the input and return to the previous blinking digit. • Repeat steps above to input other three numbers. • After inputting the password, press <Enter> to confirm, and proceed to setting parameter values.

Control

6. Adjusting Parameter Values

Display	Procedures
After inputting password and enter into the parameter setting mode.	
	Press <Plus> or <Minus> to select the parameter code, and press <Enter> to confirm.
	The default value of the parameter will start flashing, allowing you to make a change. Press <Plus> or <Minus> to increase or decrease the value, and press <Enter> to confirm.
Continuously press <Esc> to exit out of the current level and back to the desired menu level.	

7. Adjusting clock time

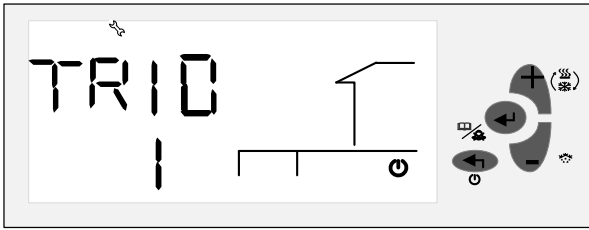

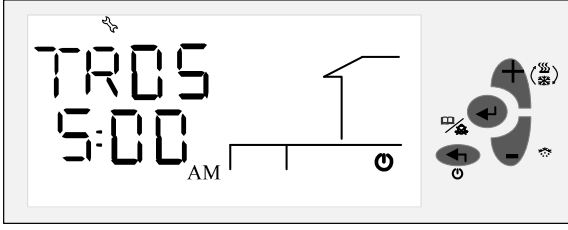
Display	Procedures
Press <enter> at stop mode and enter into the parameter setting mode.	
	Press <Plus> or <Minus> to select  , and press <Enter> to confirm. Hour code H will start flashing, press <enter> to confirm, hour data flashes, Press <Plus> or <Minus> to increase or decrease the value, and press <Enter> to confirm.
	Navigate to Minute code M, press <enter> to confirm when code "M" flashes, enter to confirm, Press <Plus> or <Minus> to increase or decrease the value, and press <Enter> to confirm.
Continuously press <Esc> to exit out of the current level and back to the desired menu level.	

Control

8. Adjusting timer on/off.

Unit heating/cooling could be switched on/off at the pre-set time by a timer .

To activate Timer ON/OFF function, TR10 need to be set to 1. (factory default setting is 0)

Display	Procedures
After enter into the parameter setting mode.	
	<p>Press <Plus> or <Minus> to select , and press <Enter> to confirm.</p> <p>Navigate to TR10,enter to confirm, “0” flash, press <Plus> key to change to “1”,enter to confirm.</p>
	<p>Navigate to TR05, press <enter> to confirm</p> <p>Press <Plus> or <Minus> to increase or decrease the value, and press <Enter> to confirm.</p>
<p>And so on to change TR06,TR07,TR08 to desired datas</p> <p>Continuously press <Esc> to exit out of the current level and back to the desired menu level.</p>	

Timer setting parameters:

Timer settings		Default	Mix.	Max.	Unit	Res
TR05	A/C timer ON	5:00			min	1
TR06	A/C timer OFF	5:00			min	1
TR07	A/C timer ON	17:00			min	1
TR08	A/C timer OFF	17:00			min	1
TR10	A/C timer function	0	0	1		
	(0:invalid,1:valid)					

Control

Turn ON/OFF hot water production:

Hot water ON/OFF only could be controlled by A1-A2 switch.
 A1-A2 is bridged, unit hot water production will be activated.
 Disconnect A1-A2, hot water production will be OFF.

Turn on heating/cooling with A/C switch:

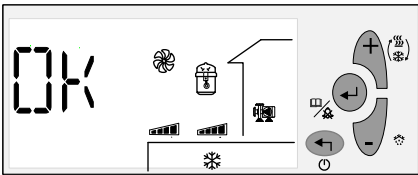
If setting SF14=0, unit heating/cooling ON/OFF is controlled by A/C switch. Remote control can not switch on/off unit but can view temperature/pressure data and reset alarms.

If B1-B2 is bridged, unit heating/cooling function will be activated.
 Disconnect B1-B2, heating/cooling will be OFF.



Turn on heating/cooling with remote control:

If SF14=1, unit heating and cooling ON/OFF is controlled by remote control
 If the power is cut off when unit is on stop mode, it will be stop mode when power reverts.

Press <Esc> and then release, unit will be turned on and work on pre-set mode.

<i>Display</i>	<i>step</i>
	<p>Turn OFF heating/cooling: Press <Esc> and then release when unit is working on heating or cooling mode, LCD will display "OK",</p>

Press <Enter> All components will stop working after relay . Finally it will display as below

	<p>Stop mode, icon  will display</p>
---	---

Control

Heating compensation curve setting

The control temperature for heating mode has two methods: fixed and changeable temperature. The fixed temperature is a fixed value and directly set by the user from the set area. The changeable temperature is determined by values of ST05, ST06 and the actual outdoor temperature measured by the OT sensor probe.

This function is selected by SF04:

when SF04=0, it is fixed temperature;

when SF04=1, it is changeable temperature.

When SF04=0, the set temperature at heating is ST02;

When SF04=1, the set temperature at heating will be controlled by ambient temperature (OT), ST05 and ST06 according to the following formula:

Set temperature at heating = $ST05 + ST06 * (ST05 - OT)$.

- ST05 is indoor temperature that the user feel comfortable
- ST06 is the heating compensation coefficient curve factor you select for the heat pump to work with. Increasing ST06 will increase compensation temperature and RT will increase relatively.
- OT is the outside temperature.

The calculated temperature can be used for the control reference, but the maximum data will not exceed ST14

For example:

Set the heating compensation coefficient $ST06 = 0.7$,

When outdoor temperature is 0°C , the control temperature is

$ST05 + ST06 * (ST05 - OT) = 20 + 0.7 * (20 - 0) = 34^{\circ}\text{C}$;

When outdoor temperature is -10°C , the control temperature is

$ST05 + ST06 * (ST05 - OT) = 20 + 0.7 * (20 - (-10)) = 41^{\circ}\text{C}$;

When outdoor temperature is -20°C , the control temperature is

$ST05 + ST06 * (ST05 - OT) = 20 + 0.7 * (20 - (-20)) = 48^{\circ}\text{C}$;

With the drop of the outdoor temperature, the control temperature become higher and higher to meet the large heating requirement.

With the increase of the outdoor temperature, the control temperature become lower and lower, so that the heat pump works under low pressure to keep low energy consumption.

Changing ST05 or ST06 could change the heating curve .

Cold weather conditions

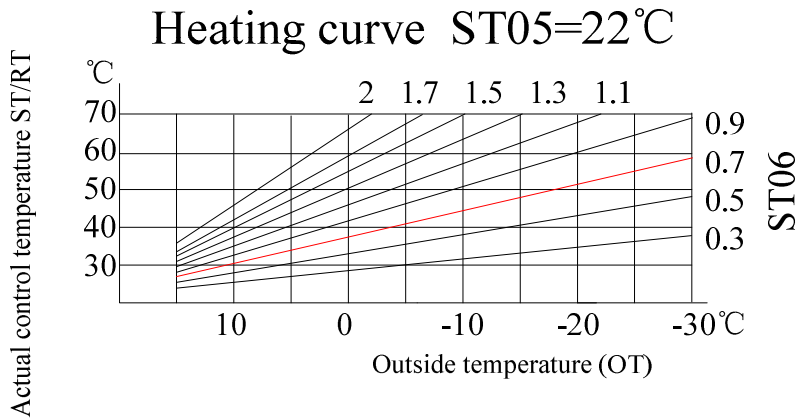
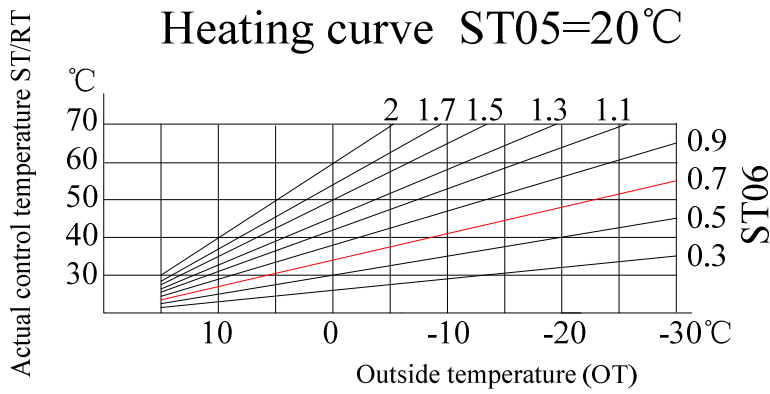
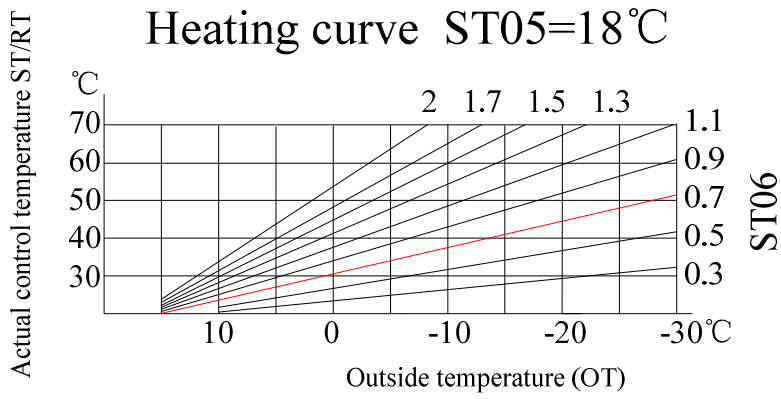
- When the room temperature is too low, You could increase ST06 .
- When the room temperature is too high, you could decrease ST06.

Warm weather conditions

- If the room temperature is too low, You could increase ST05 .
- If the room temperature is too high, you could decrease ST05.

Control

Three curves of different ST05 setting:



Control

De – icing heater

De – icing heater is assembled at the tray. It will be switched on when compressor is on and $OT \leq DF15$ (factory default setting $DF15 = 3^\circ\text{C}$)

De-icing heater is switched off when compressor is off or $OT > DF15 + 2^\circ\text{C}$..

Hot water electric heater setting

Hot water electric heater in the water tank could be switched on in periodic time (ST26) to a pre-set hot water temperature (ST27) to prevent legionella .Factory default setting of $ST26 = 0$, $ST27 = 65^\circ\text{C}$. To activate this function, ST26 setting need to be changed to desired time.

Anti-freeze function

On stop mode or standby state, when $OT \leq 2^\circ\text{C}$ (SF06), in every 30 min interval (AR11), water pump will be switched on and run 3 min. then :

- 1.) If $RT > 10^\circ\text{C}$ (SF08), switch off water pump
- 2.) If $RT \leq 10^\circ\text{C}$ (SF08), switch on A/C electric heater (if installed) and display AL26 alarm.
Till $RT \geq 13^\circ\text{C}$ (SF08+SF09) , A/C electric heater and water pump will be switched off.

High outlet water temperature protection

On heating or hot water mode, if $ST \geq 58^\circ\text{C}$ (AR03), compressor and fan motor will be switched off. Inlet water temp. RT2 at this moment is recorded. AL05 alarm code display. Till $RT \leq RT2 - ST04$, then it will turn to normal working .


Alarms

Alarm Management


Alarms are divided into two groups: auto reset alarms and manual reset alarms.

For an auto reset alarm, users are not required to acknowledge and reset it. The corresponding device will be automatically restarted once the alarm status disappears.

Once a manual reset alarm is detected, the system will be stopped. Users need to acknowledge and reset it, and also manually restart the corresponding device after the fault status is cleared.

When an alarm is detected, the corresponding device icon (if any) and the  icon will continuously flash. An alarm code will be displayed on the screen.

If more than one alarm is detected, the alarm codes will be displayed orderly on the LCD screen until the alarm status disappears, or until they are manually acknowledged or reset (only for manual reset alarms).

The latest 20 normal alarms and manual reset alarms generated in total are separately kept under the auto reset alarm (AR) and manual reset alarm (MR) categories in the  menu.

Auto-reset alarms

Code	Description
AL01	Low pressure protection (low pressure switch D2)
AL02	High pressure protection (high pressure switch D3)
AL03	Outlet water temp. is lower than 6°C (AR01)
AL05	Outlet water temp. is over 58°C (AR03)
AL11	RT sensor trouble (X1) RT> 135°C or <-35°C
AL12	ST sensor trouble (X2) ST> 135°C or <-35°C
AL13	OT sensor trouble (X3) OT> 135°C or <-35°C
AL14	HT sensor trouble (X4) HT> 135°C or <-35°C
AL15	PT sensor trouble (X5) PT> 135°C or <-35°C
AL16	ET sensor trouble (X6) ET> 135°C or <-35°C
AL17	Insufficient water flow protection
AL26	Anti freeze protection
AL35	Low pressure protection ,low pressure transmitter LPS<1.5bar (AR13)
AL36	High pressure protection ,high pressure transmitter HPS>42bar(AR15)
AL37	LPS pressure transmitter trouble (X7), LPS>34.5bar (SF31)
AL38	HPS pressure transmitter trouble (X8),HPS>45bar (SF32)

Alarms

Manual reset alarms

Code	Description
AL00	Communication trouble between remote control and main-board,
AL18	Low pressure alarm is over 4 times (AR06) in 24h (low pressure switch AL01)
AL19	High pressure alarm is over 6 times (AR07) in 24h (high pressure switch AL02)
AL20	Evaporation gas temp.ET is lower than -2°C (AR08) on cooling .
AL21	Exhaust gas temp. is over 115°C (AR10)
AL23	Phase sequence is wrong
AL32	Low pressure alarm is over 4 times (AR17) in 24h (low pressure transmitter AL35)
AL33	High pressure alarm is over 6 times (AR18) in 24h (high pressure transmitter AL36)
AL34	Evaporation pressure LPS is lower than 6.5bar (AR12) on cooling .
AL99	Unit running time > limited running time ST25. If ST25=0, no running time limitation.

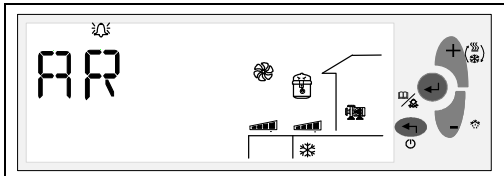
Alarms


- Viewing Alarm Logs

Display

Procedures

Press down <Enter> for 2 seconds, and release it to activate the Menu mode.



Press <Plus> or <Minus> to navigate to the  menu, and then press <Enter> to confirm.

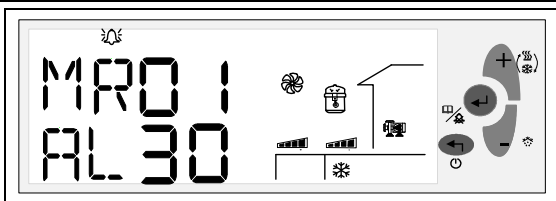
By default, auto reset alarm “AR” will be displayed on the LCD, flashing.

To view auto reset alarms generated, press <Enter> to continue when “AR” is displayed.

To view manual reset alarms, press<Minus> or <Plus> to navigate to the “MR” group, and then press <Enter> to continue.

By default, the first manual reset alarm “MR01” will be displayed as follows. Press <Enter> to view the first manual reset alarm code.

Or, press<Minus> or <Plus> to view other numbered alarms, and press<Enter> to view the specific code.



If no alarm is generated, the word “NoNE” will be displayed.

Continuously press <Exit> to exit out of the current level, and back to the normal running mode.


MR01 and AR01 are respectively the latest information of manual reset alarm and auto reset alarm.

Acknowledging and Resetting Manual Reset Alarms

Any alarm detected by the system, either an auto reset alarm or a manual reset alarm, will be displayed on the LCD. However, only manual reset alarms require user’s acknowledgement and reset.

To do this, follow the steps below:

Press <Enter> to acknowledge the alarm.

If the alarm status is cleared, the corresponding device icon and alarm icon  that are flashing will accordingly disappear.

Restart the system, as appropriate.

Safety

All installation parts must be maintained by personnel in charge, in order to avoid material deterioration and injuries to people. Faults and leaks must be repaired immediately. Each time repairs have been carried out to the unit, the operation of the safety devices must be re-checked.

If a leak occurs, remove the complete charge using a recovery unit and store the refrigerant in mobile container. (careful in case the refrigerant decomposes due to high temperature increases, as the decomposition products are dangerous.)

If a leak occurs, evacuate all refrigerant, repair the leak detected and recharge the circuit with the filling weight and the type on the unit nameplate.

Ensure to use correct refrigerant type before recharging. Charging any refrigerant other than the original type will impair machine operation and can even lead to a destruction of the compressors.

Do not use oxygen to purge lines or to pressurize a unit for any purpose. Oxygen gas reacts violently with oil, grease, and other common substances.

Never exceed the specified maximum operating pressures. Do not use air for leak testing, use only refrigerant or dry nitrogen.

Do not unweld or flamecut the refrigerant lines or any refrigerant circuit components until all refrigerant (liquid and vapour) has been removed from unit. Traces of vapour should be displaced with dry air nitrogen. Refrigerant in contact with an open flame produces toxic gases.

The necessary protection equipment must be available, and appropriate fire extinguishers for the system and the refrigerant type used must be within easy reach.

Do not siphon refrigerant.

Avoid spilling liquid refrigerant on skin or splashing it into the eyes. Use safety goggles. Wash any spills from the skin with soap and water. If liquid refrigerant enters the eyes, immediately and abundantly flush the eyes with water and consult a doctor.

Never apply an open flame or live stream to a refrigerant container. Dangerous overpressure can result.

Maintenance

Some exterior maintenance is necessary.

Make regular checks throughout the year that the inlet grille is not clogged by leaves, snow or anything else. In addition, you should ensure during the colder times of the year that too much frost or ice does not form under the unit. Strong wind combined with extensive snowfall can cause the inlet and exhaust air grilles to become clogged. Make sure that there is no snow on the grilles.

The unit and its components must be periodically inspected to check for loose, damaged or broken parts. If these faults are found and not eliminated, the unit could cause physical injury and damage to goods and property.

Regularly carry out leak checks and immediately repair any leak found. If there is a leak in the plate heat exchanger, this part must be replaced.

If there is not enough refrigerant in the system, this is indicated by low pressure which can be read from remote control. If the undercharge is significant, the suction pressure drops. The compressor suction superheat is also high. The machine must be recharged after the leak has been repaired. Find the leak and completely drain the system with a refrigerant recovery unit. Carry out the repair, leak test and then recharge the system. After the leak has been repaired, the circuit must be tested, without exceeding the maximum low-side operating pressure shown on the unit name plate.

The refrigerant must always be recharged in the liquid phase into the liquid line.

The refrigerant cylinder must always contain at least 10% of its initial charge.

For the refrigerant quantity per circuit, refer to the data on the unit name plate.

Refrigerant circuit checks

Verify the air heat exchanger cleanliness status and clean it at least once a year, or more often if the equipment environment is especially demanding. this ensures that the unit performances can be guaranteed.

Check the operation of the high-pressure and low pressure switches. Replace them if there is a fault.

Check the fouling of the filter drier (by checking the temperature difference in the copper piping). Replace it if necessary.

Full-load operating test Verify the following values:

- 1.compressor high-pressure side discharge pressure
- 2.compressor low-pressure side suction pressure
- 3.temperature difference between the heat exchanger water inlet and outlet temperature.
actual liquid sub-cooling ,overheating at the expansion device on heat pumps
- 4.Verify correct defrost of the air heat exchanger.

Maintenance

Verify the alarm status

Electrical maintenance

Check the tightening of the electric connections, contactors, disconnect switch and transformer.

Check the status of the contactors, fuses and capacitors,

Check the status of the electrical cables and their insulation.

Carry out an operating test of the electric evaporator heaters, compressor crankcase heater, piping and expansion device.

Check the phase/earth insulation of the compressors, fans and pumps.

Check the compressor, fan and pump winding status.

Mechanical checks

Check the tightening of the fan motor, fan wheel, compressor and control box fixing bolts.

Check that no water has penetrated into the control box.

Evaporator coil

We recommend, that finned coils are inspected regularly to check the degree of fouling. This depends on the environment where the unit is installed, and will be worse in urban and industrial installations and near trees that shed their leaves.

For coil cleaning proceed as follows:

Remove fibers and dust collected on the evaporator face with a soft brush (or vacuum cleaner).

Clean the coil with the appropriate cleaning agents

Water circuit checks

Clean the water filter.

Purge the circuit with air.

Verify the correct operation of the water flow switch.

Check the status of the thermal piping insulation.

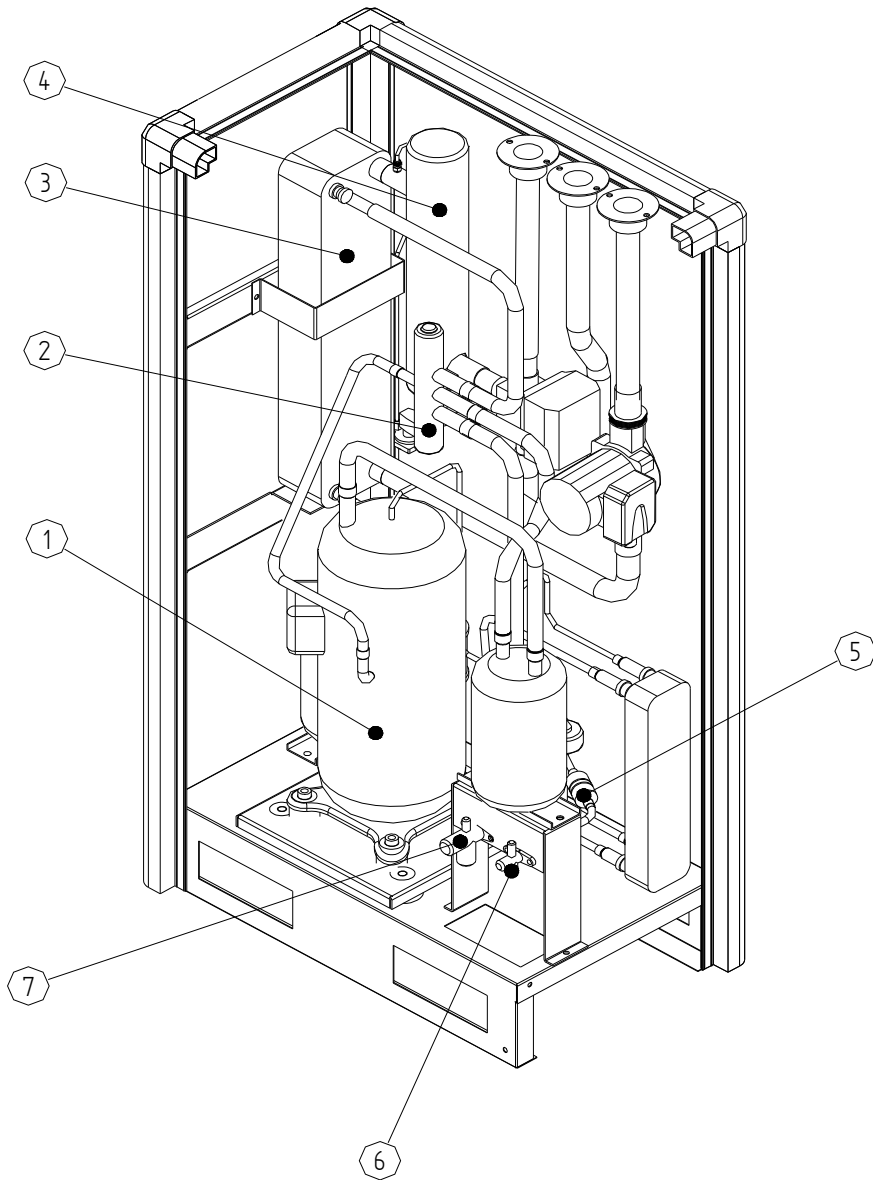
Check the water flow by checking the water inlet and outlet temperature difference.

Check the concentration of the anti-freeze protection solution (ethylene glycol or polyethylene glycol).

Check the status of the heat transfer fluid or the water quality.

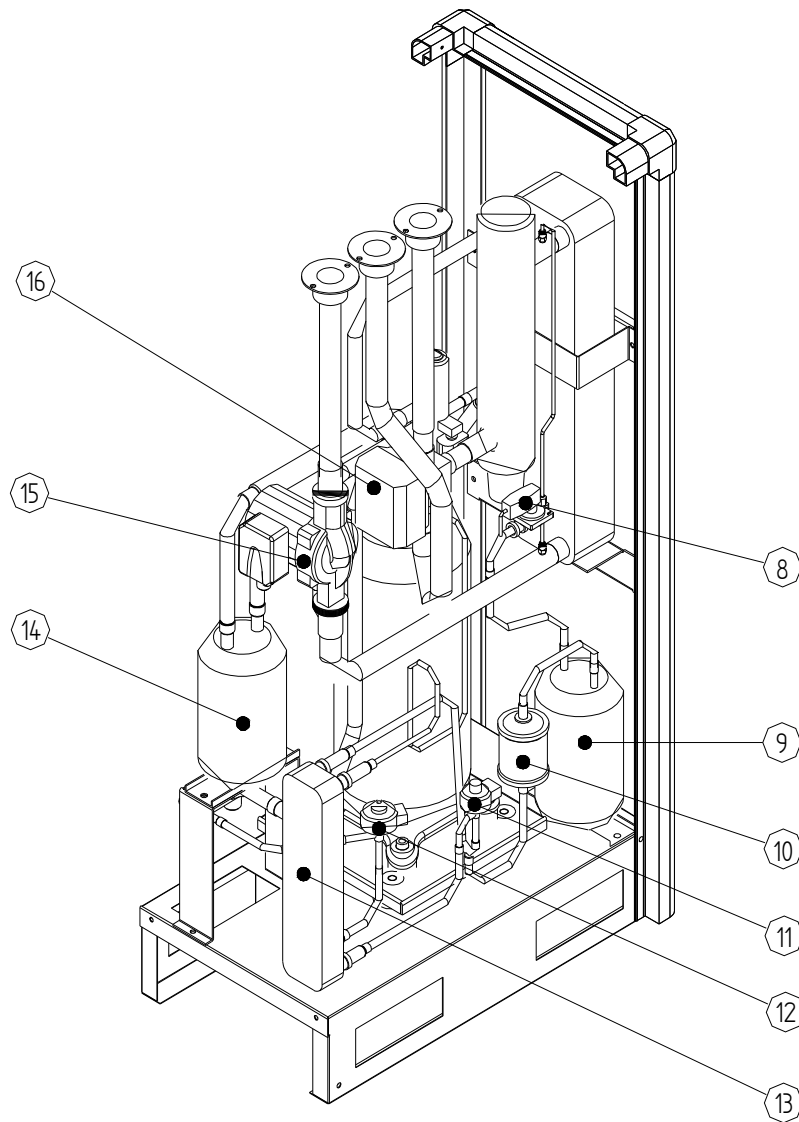
Check the expansion tank for signs of excessive corrosion or gas pressure loss and replace it, if necessary.

Components



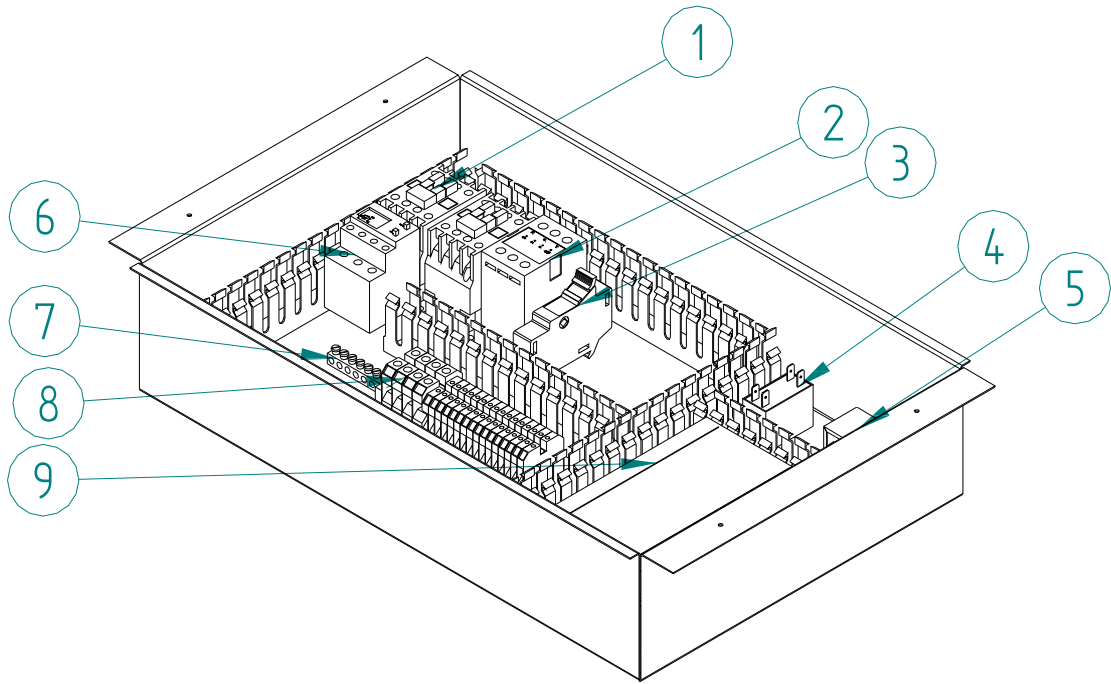
- 1.Compressor
- 2.Four way valve
- 3.Plate heat exchanger
- 4.Electric heater
- 5.Filter
- 6.liquid pipe connector /service valve
- 7.Gas pipe connector /service valve

Components



- 8. Differential pressure flow switch
- 9. Accumulator
- 10. Dry filter
- 11. EVI electronic expansion valve
- 12. Throttle electronic expansion valve
- 13. Additional plate heat exchanger
- 14. Gas-liquid separator
- 15. Water pump
- 16. Three way valve

Components



1. A/C contactor
2. Phase sequence protector
3. Controller circuit breaker
4. Capacitor
5. Transformer
6. Thermal relay
7. Grounding connection terminal
8. Power supply connection terminal
9. Controller

Technical Parameter

AIR TO WATER HEAT PUMP		AW10/F		AW13/F	
Heat output/Power consumption at 7/35°C	kW	11.0/2.8	COP 3.93	14.0/3.6	COP 3.89
Heat output/Power consumption at 7/45°C*	kW	11.8/3.5	COP 3.37	15.1/4.5	COP 3.36
Heat output/Power consumption at 7/55°C*	kW	11.4/4.5	COP 2.53	14.8/5.8	COP 2.55
Heat output/Power consumption at 2/35°C	kW	10.7/3.1	COP 3.45	12.0/3.5	COP 3.43
Heat output/Power consumption at 2/45°C*	kW	10.4/3.5	COP 2.97	13.5/4.6	COP 2.93
Heat output/Power consumption at -7/35°C*	kW	8.3/3.0	COP 2.77	10.6/3.9	COP 2.72
Heat output/Power consumption at -7/45°C*	kW	8.2/3.7	COP 2.22	10.5/4.7	COP 2.23
Heat output/Power consumption at -10/35°C*	kW	7.5/3.1	COP 2.42	9.5/3.9	COP 2.44
Heat output/Power consumption at -10/45°C*	kW	7.4/3.8	COP 1.95	9.4/4.8	COP 1.96
Heat output/Power consumption at -15/35°C*	kW	6.8/3.1	COP 2.19	8.6/3.9	COP 2.21
Heat output/Power consumption at -15/45°C*	kW	6.7/3.8	COP 1.76	8.5/4.8	COP 1.77
Cool output/Power consumption at 35/7°C	KW	9.8/3.32	COP 2.95	12.0/4.35	COP 2.76
Starting current	A	46		55	
Power		380-415V/3PH/50Hz			
Compressor		HITACHI scroll			
Condenser		Brazen plate heat exchanger			
Nominal flow heating medium	l/s	0.52		0.67	
Internal pressure drop at nominal flow	kPa	24		24	
Air flow	m ³ /h	3000		5000	
Nominal output fan	W	220		300	
Max outgoing heating medium temperature	°C	55°C			
Indoor unit dimensions(HxWxD)	mm	1200x650x400			
outdoor unit dimensions(HxWxD)	mm	880x1150x350			
Pipe connector		DN32			
Indoor unit Weight	kg	150		150	
outdoor unit Weight	kg	70		70	

The above data is tested by EN14511. 7/35°C means that :outdoor air temp.7°C, outlet water temp. 35°C

* : EVI is operating.