DC inverter air to water heat pump monobloc Type

manual

Before operation this product,please read the instructions carefully and save this manual for future.

Thank you for choosing our quality product.
Please read this manual carefully before use and follow the instructions to operate the unit in order to prevent damages on the device or injuries to staff.
Specifications are subject to change with product improvements without prior notice. Please refer to the specification sticker on the unit for upgraded specifications.

Heat pump consisits of :

*** compressor : DC inverter compressor complete with thermal protection and crankcase heating element.**

*** electronic expansion valve**

*** water-side heat exchanger complete with water-flow-switch.**

*** air-side heat exchanger with copper pipes and aluminium fins, complete with grid protection.**

*** axial fan**

*** outdoor temperature probe for control and climatic compensation of the water set point (heat curve).**

*** structure in painted galvanised stell complete with condensation tray.**

*** electronic control panel equipped with electrical terminal boards for connective external consents.**

*** LCD controller with thermostat function, displaying and setting the operating parameters.**

Heat pumps stand out for their compactness and high performances : operation down to -20'c and COP up to 4.2 at A+7/W+35'c. They are reversible and can be used for heating and for cooling in summer. They can also be used for fan coil units.

They are composed of an outside unit, which is connected to indoor module by copper connective pipe.

The inside module comes fully equipped and includes, in particular :

- a control panel that can be programmed according to the outside temperature that communicates with the unit and, depending on the options connected, can be used to manage a direct heating circuit

- circulation pump

- auxiliary heating

- 3-way-water-valve : the motorised reversal valve with connector for sanitary hot water tank

Optional accessory :
- buffer tank : used to limit operation of the compressor in short cycles and to provide a reserve for the defrosting phase on reversible air/water heat pump.

▌Working temperature range:
- in heating mode :
  outside air : -20 ~55℃
  water : +18/+55'c
- in cooling mode :
  outside air : +15 ~42℃
  water : +7/+25'c

Maximum operating water pressure : 7bar.

When install the unit, be sure to check whether the selection of installation place, power supply specifications, usage limitation(power supply voltage and etc.) and installation spaces

Content

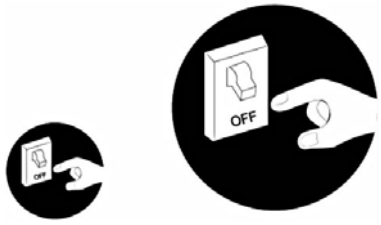
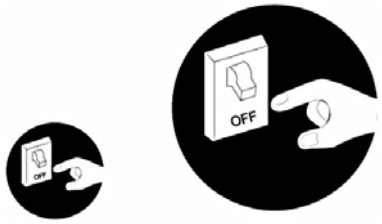
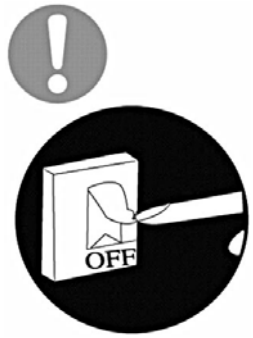
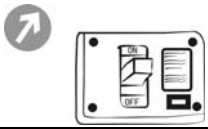
1 Safety precautions

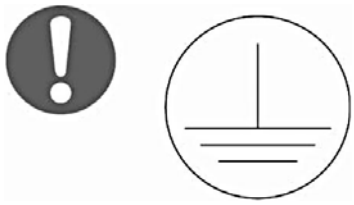
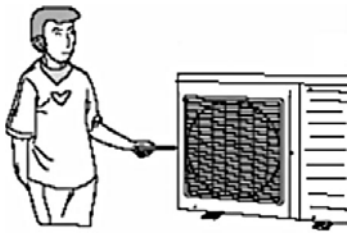
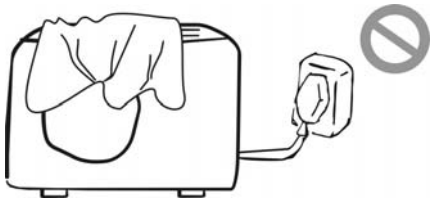
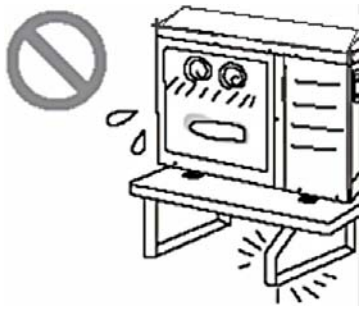
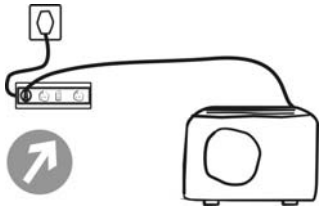
IMPORTANT

If heat pump is not running in the winter, it is necessary to keep power supply connected for Anti-freeze protection. In cold weather (≤ 0℃), if heat pump is no longer needed, do drain out all the water inside the system.

1.1 Safety precautions

- warning **- suggestion** **- prohibition**

Once abnormality like burning smell occurs, please cut off the power supply immediately and then contact with service center.  **If the abnormality still exists, the unit may be damaged and electric shock or fire may result.**	**Be sure to pull out the power plug and drain the indoor unit and water tank when unit is not in use for a long time.**  **Otherwise, the accumulated dust may cause overheating fire or freeze of water tank or coaxial heater exchanger in winter.**	**Special circuit must be adopted for power supply to prevent fire.**  **Do not use octopus multipurpose plug or mobile terminal board for wire connection.**
Before installation, please see if the voltage of local place accords with that on nameplate of unit and capacity of power supply, power cord or socket is suitable for input power of this unit. 	**Don't operate the unit with wet hand.**  **Otherwise, it may cause electric shock.**	**Never damage the electric wire or use the one which is not specified.**  **Otherwise, it may cause Overheating or fire.**
Before cleaning please cut off the power supply. Otherwise, it may cause electric shock or damage.  	**The power supply must adopt special circuit with leakage switch and enough capacity.** **It is mandatory to use a suitable circuit-breaker for the heat pump and make sure the power supply to the heater corresponds to the specifications. Otherwise the unit might be damaged.** 	**User can not change power cord socket without prior consent. Wiring working must be done by professionals. Ensure good earthing and don't change earthing mode of unit.**

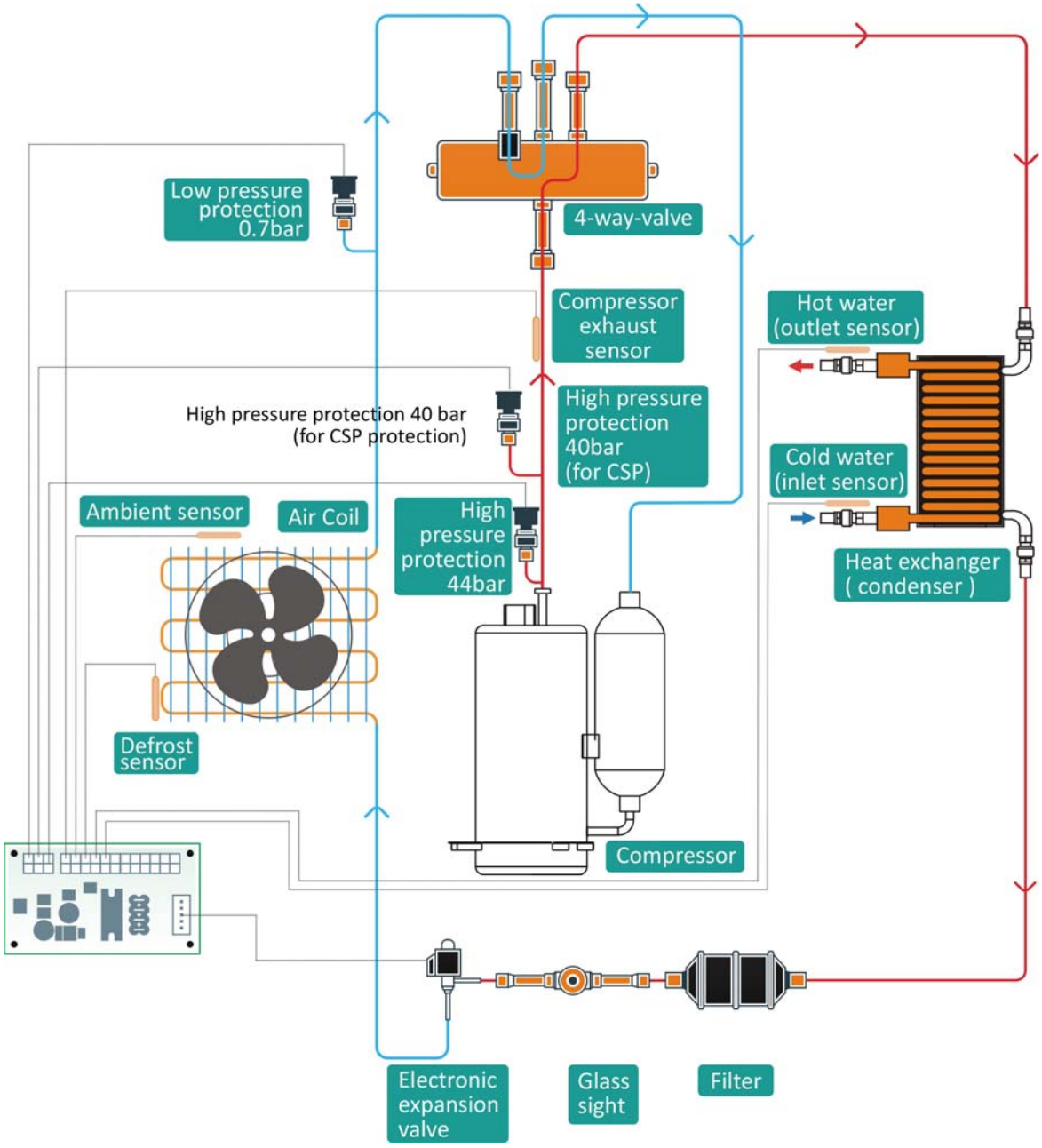
Earthing: the unit must be earthed reliably ! **The earthing wire should connect with special device of buildings.**  **If not, please ask the qualified personnel to install. Furthermore, don't connect earth wire to gas pipe, water pipe, drainage pipe or any other improper places which professional does not recognize.**	**Never insert any foreign matter into uint to avoid damage . And never insert your hands into the air outlet of unit.** 	**Don't attempt to repair the unit by yourself.**  **Improper repair may cause electric shock or fire, so you should contact the service center to repair.**
Don't step on the top of the unit or place anything on it.  **There is the danger of fall of things or people.**	**Never block the air inlet and outlet of unit.**  **It may reduce efficiency or cause stop of the unit and even fire.**	**Keep pressurized spray ,gas holder and so on away from the unit above 1m . It may cause fire or explosion.** 
Please note whether the installation stand is firm enough or not.  **If damaged, it may cause fall of the unit and injury of people.**	**Make sure to use a dedicated power line for the heat pump only. Do not add other appliances to the line.** 	**Make sure no water or other liquid drips into the electric box of the unit Otherwise the unit might be damaged.** 

2 Working principle of a Heat Pump (refrigerant circuit) :

The refrigerant system consists of 6 main compoments :
DC inverter type compressor, 4-way-valve, heat exchanger(condenser, refrigerant to water), electronic expansion valve, evaporator(air to refrigerant).

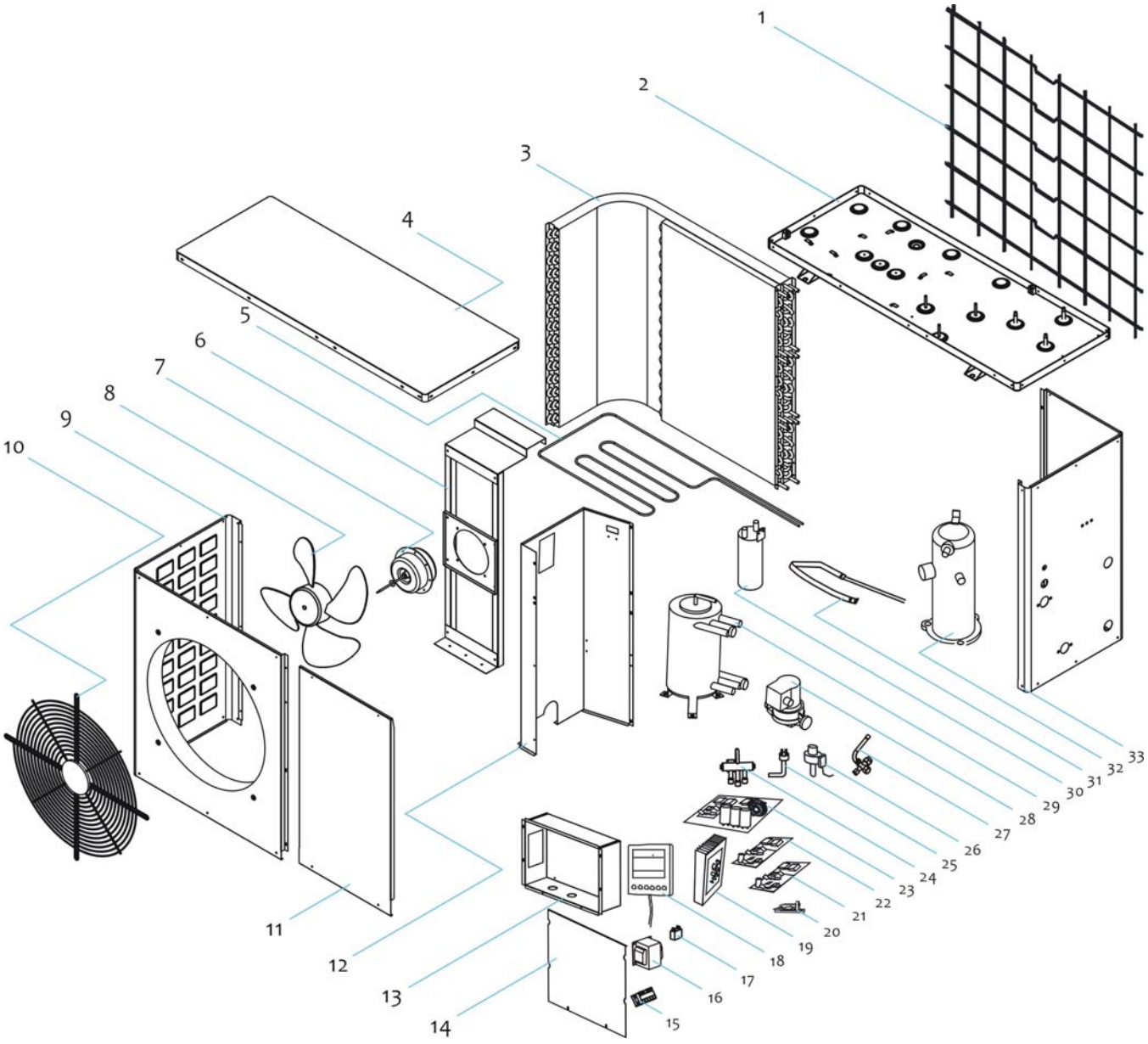
Heat pump can absorb the heating from air source. This makes the heat pump a very environmentally friendly and economically sound alternative for space heating.

*** evaporator (air coil): low temperature, low pressure refrigerant go through evaporator, to boil and turn from liquid to gas.**
*** compressor: compressor absorb refrigerant, and compress to high temperature, high pressure status.**
*** condenser: refrigerant release heat energy to heat exchanger. refrigerant temperature reduce, and it return from gas status to liquid status.**
The heat energy is absorbed by water, circulated by a circulation pump to indoor radiator or floor heating systems.
*** EEV: at last the refrigerant go through the electronic expansion valve, where its pressure is reduced, and then continues to the evaporator.**



3 Explored view

3.1 explored view

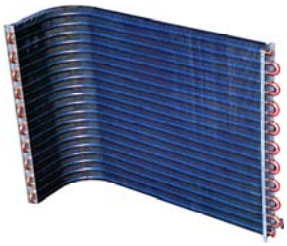


1	**Back net**		12	Separate panel		23	**Power board**
2	Bottom plate		13	**Electronic control box**		24	4-way-valve
3	**Evaporator**		14	**Cover**		25	**High/Low pressure protection**
4	Top panel		15	**Terminal**		26	Electronic expansion valve
5	Evaporator bottom heater		16	Reactance		27	**Service vale**
6	Motor bracket		17	Motor capacitor		28	**Circulation pump**
7	Motor		18	**Wire controller**		29	**Heat exchanger**
8	Fan blade		19	SPM module		30	**Receiver**
9	**Front panel**		20	**Cable clip**		31	Compressor heater
10	Front net		21	Main circuit board		32	Compressor
11	**Service panel**		22	**Transition circuit board**		33	Right panel

3.2 main components

compressor

Shell tube heat exchanger



evaporator

Pressure switch

Electronic expansion valve

4-way-valve

Fan blade

Motor

sensor

3-way-water-valve

Circulation pump

Water flow switch

Electrical heater and holder

3.3 Circuit board for single phase

Wire controller, display panel

Main circuit board

SPM module

Transition circuit board - A

Transition circuit board – B

3.4 Circuit board for three phase

Wire controller, display panel

Main circuit board

SPM module

Transition circuit board - A

Transition circuit board – B

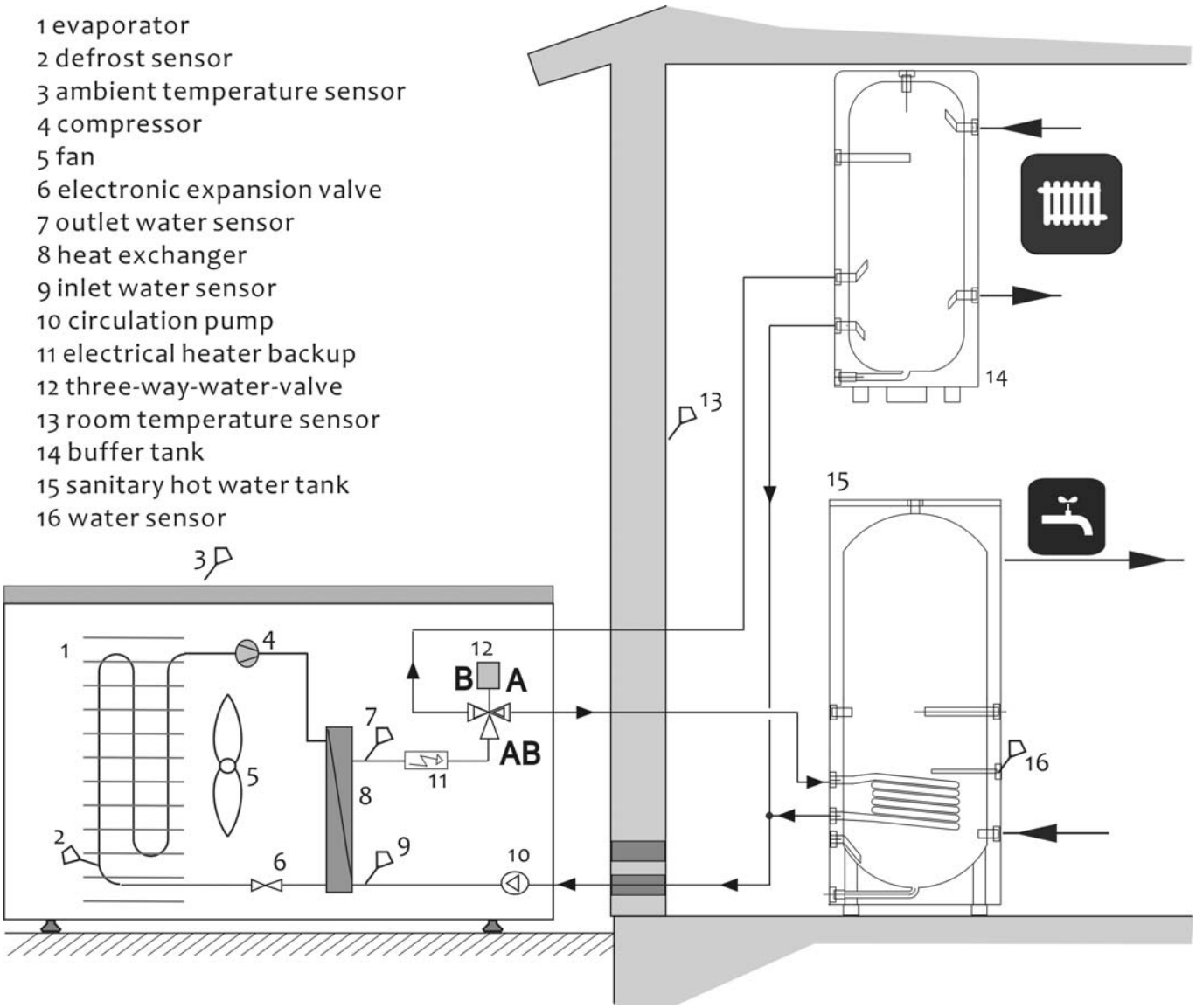
reactance

Power board

4. Applications

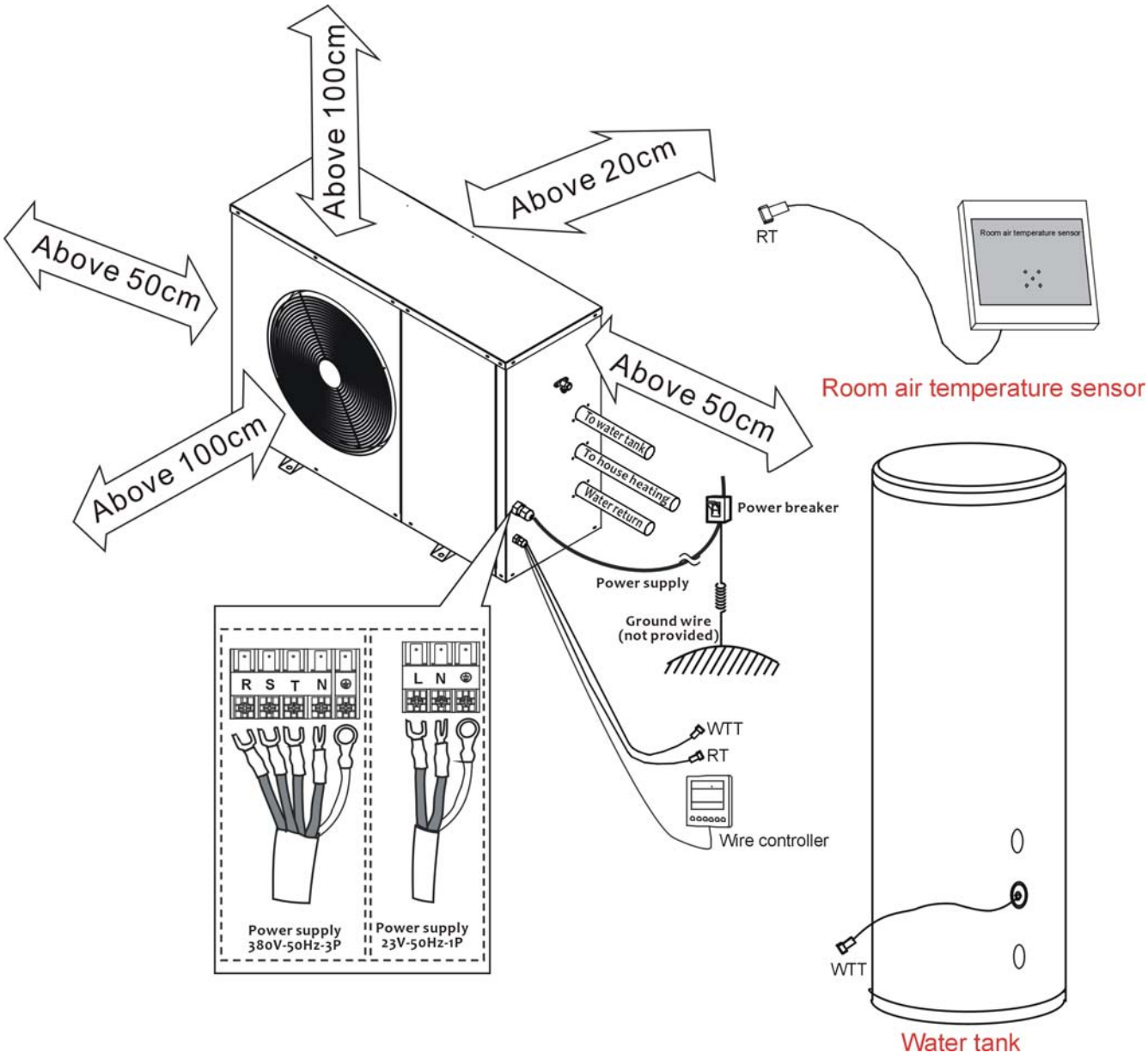
4.1 applcation 1: supply sanitary hot water, house heating

1 evaporator
2 defrost sensor
3 ambient temperature sensor
4 compressor
5 fan
6 electronic expansion valve
7 outlet water sensor
8 heat exchanger
9 inlet water sensor
10 circulation pump
11 electrical heater backup
12 three-way-water-valve
13 room temperature sensor
14 buffer tank
15 sanitary hot water tank
16 water sensor



5. Installation

5.1 installation plan



5.2 Installation Heat Pump Unit

5.1.1 Select the Installation Place of Unit

*** The unit should be installed on a solid wall and fastened securely.**

*** The unit should be installed close to the house, on a terrace, on the façade or in a garden. They are designed to operate in the rain but can also be installed under cover as long as there is sufficient ventilation. There should be no obstacles to hinder the free circulation of air to the exchanger inlet and outlet (see installation diagrams below).**

*** The emplacement of the unit should be carefully chosen and protected from prevailing winds in order for it to be compatible with environmental requirements: integration into the site, noise level.**

*** We particularly recommend:**

- **Not placing the unit close to sleeping areas**
- **Not placing it opposite a glazed wall**
- **Avoiding proximity to a terrace**

*** Moreover, we recommend positioning the unit above the average depth of snowfall in the region in which it is installed.**

*** It is necessary to provide clearance all around the appliance to carry out connection, commissioning and maintenance operations.**

*** The following procedure must be observed before connecting the pipes or electric cables.**

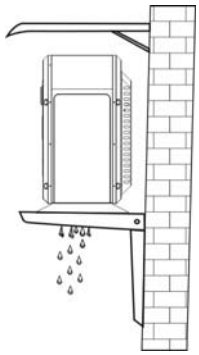
1) decide which is the best position on the wall and leave enough space to be able to carry out maintenance easily.

2) fasten the unit support to the wall using screw anchors which are particularly suited to that type of wall.

3) use a larger quantity of screw anchors than normally required for the weight they have to bear: during operation the machine vibrates and has to remain fastened in the same position for years without the screws becoming loose.

4) mount the unit on the support using the four bolts supplied.

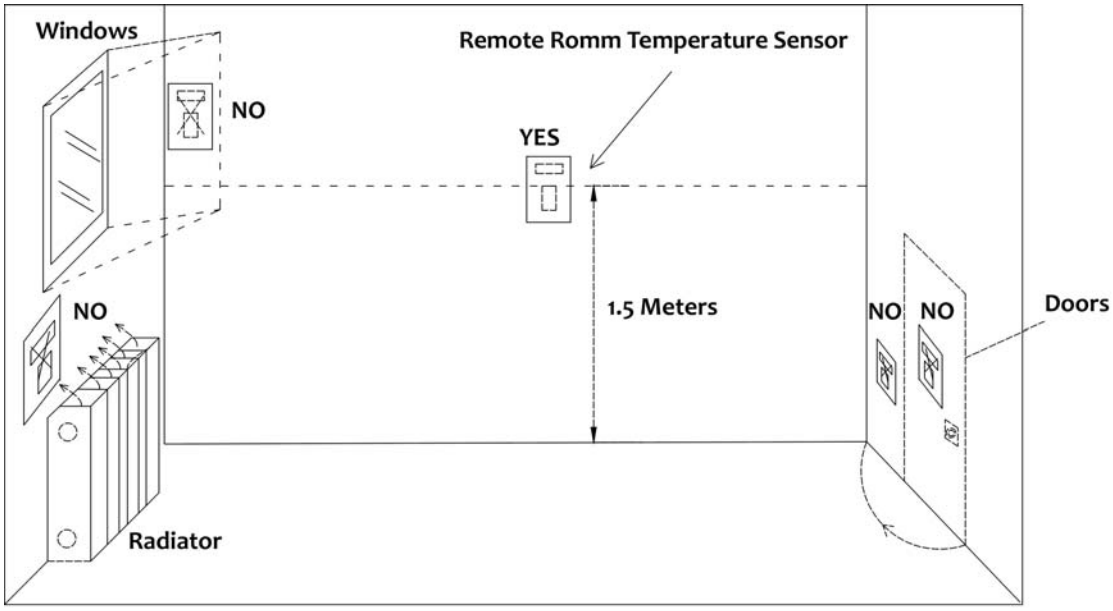
*** Please install the drain connector to the unit when necessary. In some cold areas (temperature below 0), please don't use the drain connector, otherwise it may clogged by ice.**



5.4 Room temperature sensor installation

When customer choose fan coil mode, he should install the room temperature temperature senor as following :

1. take the room temperature sensor out from the indoor unit.



2. Distance between the indoor unit and the remote room temperature senor should be less than 15 meter due to length of the connection c able of remote air temperature sensor.

3. Height from floor is approximately 1.5 meter;

4. Remote room temperature sensor can not be located where the area may be hidden when door is open;

5. Remote room temperature sensor can not be located where external thermal influence may be applied;

6. Remote room temperature sensor should be installed where space heating is mainly applied;

5.6 Electrical connection

IMPORTANT

The electrical installation of heat pumps must be done in accordance with the local and national Codes of Practice and pursuant to prevailing standards, decrees and subsequent texts. The cable will be carefully chosen according to thefollowing information: maximum amperage on the unit (thermodynamic unit). See the table below, distance of the appliance from the original power supply, upstream protection, neutral operating conditions.

Recommended cable cross-sections and circuit breakers to be installed:

Heat pump	Type	Output Electrical Absorbed	Intensity Nominal	Max Intensity	Power supply		Cable BUS
	Phase	kW	A	A	SC : mm²	DJ	SC : mm²
5kW	Single	1.7	8	12	3x2		
7kW	Single	2.4	11	17	3x2.4		
9kW	Single	3	14	21	3x4		
12kW	Three	4	7	10.5			
15kW	Three	5	8.7	13			
18kW	three	6	10.5	15.8			

Electrical back-up

Single phase :	**SC**	**3 x 6mm²**
	DJ	

SC = cable cross-section in mm²
DJ = circuit breaker

1.It is recommended to use a suitable breaker for the heat pump and make sure the power supply to the heater corresponds to thespecifications. Otherwise the unit might be damaged.
2.The power supply to the heat pump unit must be grounded.
3.Cable should be fixed tightly, to ensure it won't get lossen.

5.7 Hydraulic connection

5.7.1 Gerneral

Pipe installation must be carried out in accordance with current norms and directives. Heat pump can operate with a return temperature of up to 50°C and and outgoing temperature from the unit of 55°C.
Heat pump is not equipped with shut off valves ; these must be installed outside the heat pump to facilitate any future servicing.
Heat pump can be connected to the radiator system, floor heating system and/or fan coil units.
Install the safety valve and manometer.

Heat Pump Unit is equipped with circulation pump, water-flow-switch, 3-way-water-vave, electrical heater backup, compressor, heat exchanger.

Note : take care of water freeze when ambient temperature is low than 3'c.

Buffer tank :

The installation of buffer tank is recommended for installations.

It is intended :

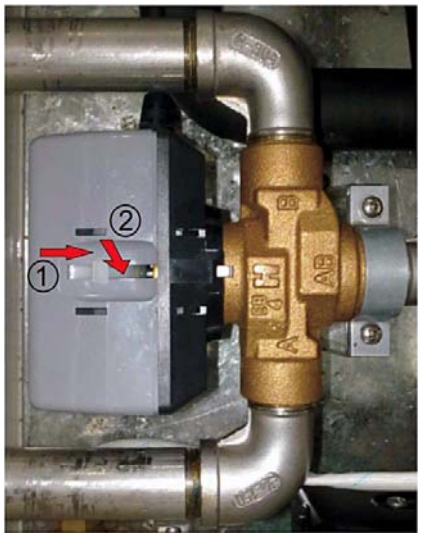
- increase the water volume in an installation in order to limit the short-cycle operation of the compressor. The greater the water volume, the lower the number of start-ups of the compressor and the longer its useful life.
- Guarantee on energy reserve for the defrosting phases.

Example of heat pump installations

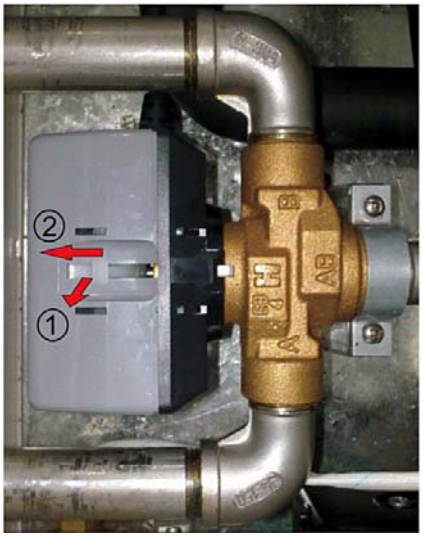
- heat pump split compact - DHW production by independent tank - Buffer tank for house heating

5.7.2 Filling and venting the heating medium system

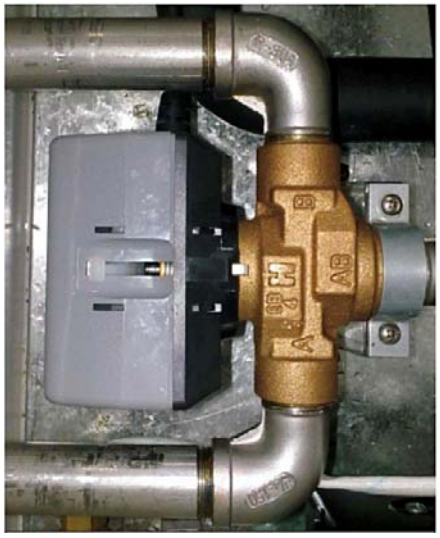
1. Check the water system for leakage.
2. Connect the filling pump and return line on the heating system's service connections as shown in figure.
3. Close the valve between the service connections.
4. Open the valves on the service connections(AV1,AV2).
5. Pushing the white manual lever down to bottom. (this has already been done when the machine leaves factory), then three way valve's water tank port is closed (the "B" port), room heat port is open (the "A" port).
6. Start the filling pump, and fill until there is fluid in the return pipe.
7. Open up Power ON from control panel to start machine, then heat medium water pump is running, the valve will return to the up position when power is restored.
8. Firmly pushing the white manual lever down to midway and in. in this position both the 'A' and 'B' ports are open.
9. The filling pump and the heating medium pump are now operational. The fluid should circulate via the container with tap water until it emerges from the return hose without being mixed with air.
10. Stop machine, heat medium water pump stop running. Depressing the white manual lever lightly and then pulling the lever out, pushing the while manual lever down to bottom position, and then "A" port open, "B" port is closed.
11. Stop the filling pump and clean the particle filter.
12. Start the filling pump, open the valve between the service connections.
13. Close the valve on the service connection's return line. Now pressurise the system (to max 3 bar)with the filling pump.
14. Close the valve (AV2) on the service connection.
15. Stop the filling pump.
16. Select the auto operating mode using the operating mode button.



Push the white gear onto the position of middle,and then use your thumb to press it inside,this time both port A and port B are in open state.

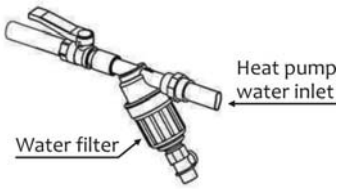


Please use screwdriver to unclench the white gear of the three way valve.



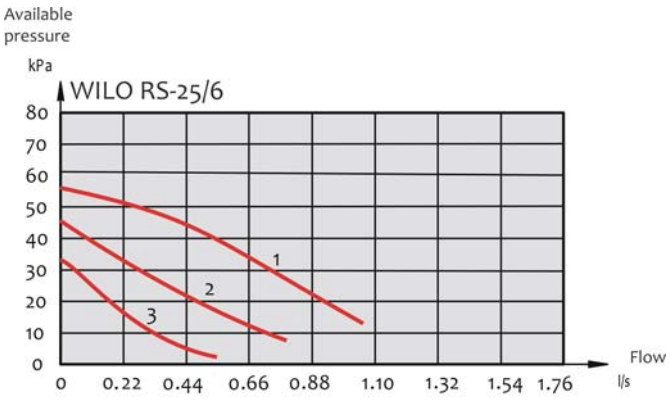
Then the white fear will move back to the original position. The three way valve will turn to port B automatically.

A mesh filter must be installed in front of the water inlet of the unit and water tank, for keeping the water quality and collecting impurity contained in the water. Take care to keep the water filter mesh towards the bottom. Check valve is recommended to be installed at both sides of the filter, so as to clean or change the filter in a easier way.

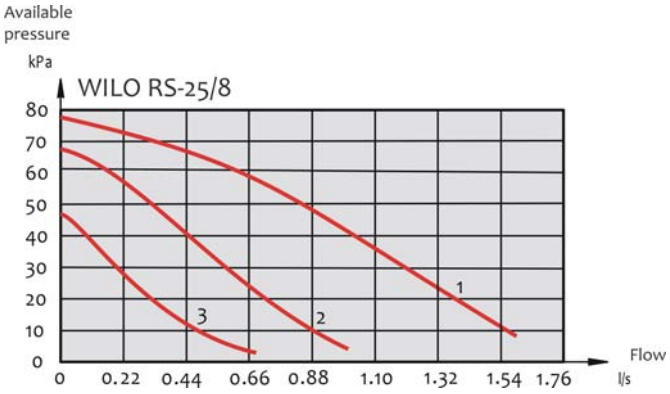


5.74 Circulation pump capacity diagram on heating medium side

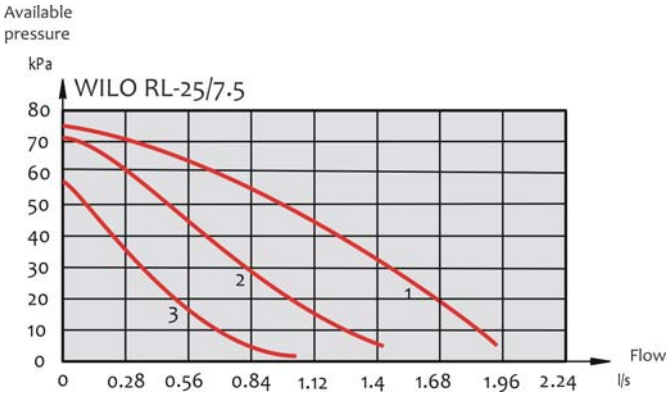
5kW, 7kW



9kW, 12kW



15kW, 18kW



Adjust water flow

WILO RS-25/6

WILO RS-25/8

WILO RL-25/7.5

6 Control panel

6.1 description of display panel

water cooling mode

clock/timer/function display

water heating mode

clock

water tank heating mode

timer on

auto mode

timer off

water tank temperature status

temperature / function display

degree celsius

room heating/cooling mode

function setting

electric heater

compressor

outer fan motor

water pump

key lock

6.2 Key Lock function

When  is on, press  button for 5 seconds to release keylock.

If the unit receives no signal for 30 seconds, it will lock the key.

6.3 Starting Operation

Press  button, and the unit receives the signal, it gives out one " beep " tone , the operation is ON and the heat pump starts operation.

If the interval shorter than 3 minutes from last shut down to the present switch-on, the compressor only restarts after 3 minutes to protect the system.

6.4 Setting target temperature of water tank heating mode

Under running, Press the button  or  for increasing or decreasing the target temperature of water tank, setting range (20 ° C - 65 ° C), default is 45 ° C .

6.5 clock Setting

Press 5 seconds  , the  flash, the right display (= the minutes) flash 

Press the button  or  for increasing or decreasing the minutes.

Press again  , the left display (= the hour) flash 

Press the button  or  for increasing or decreasing the hour.

Validate in pressing on  (or wait 10 seconds ; the display will leave this setting mode by itself).

6.6 TIMER Setting

Press  lightly,  flash, the left display (= the hour) flash 

Press button  or  for increasing or decreasing the hour.

Press again  , the right display (= the minutes) lights 

Press button  or  for increasing or decreasing the minutes.

Then, press  again,  flash, the left display (= the hour) flash  ,Press the button  or  for increasing or decreasing the hour.

Press again  , the right display (= the minutes) lights 

Press the button  or  for increasing or decreasing the minutes.

6.7 Parameter setting

Press  to enter parameter setting, then button  and  to change the value of each setting,

and press  again the enter the next Parameter setting (from P1 to P21).

Press  for 3 seconds to exit the setting. If you do not press any button, the system will save the setting automatically after 3 minutes.

Next time when you enter the Parameter setting, it will display the interface of the last setting. (Memory function).

P01 : Water tank temperature setting : range (20°C - 65°C), default is 45°C

P02 : Room heat mode: 0 is floor heating, 1 is radiator, 2 is fan coil

P03 : Room and floor temperature setting :

A : when P2 is floor heating (0), then P03 range (20°C - 45°C), default is 35°C.
Setting return water temperature is fixed.

B : when P2 is radiator (1), return water temperature will change according to ambient temperature
→ heat curve, choose gear or parameter P9.
* gear range from 1 to 5 adjustable, default is gear 3.

C : when P2 is fan coil (2), room temperature reach setting temperature (parameter 5), compressor stop.

P04 : electric heater start temperature in water tank heating mode: range (30°C to 60°C adjustable), default is 60°C .

P05 : room setting temperature in fan coil mode: range (18°C to 32°C adjustable), default is 27°C .

P06 : minimum temperature difference of compressor start in water heating mode : 3°C to 15°C adjustable, default is 5°C .

P07 : minimum temperature difference of compressor start in room heating mode: 3°C to 15°C adjustable, default is 5° C .

P08 : maximum water outlet temperature in floor heating (MAX . TEMP.) : 25°C to 70°C adjustable, default is 45° C .

P09 : gear of room heat at radiator :gear range form 30°C to 70°C adjustable, default is 30°C .

P10 : electric heater mode selection in water tank heating mode:

0 is opeate by parameter P04 ;

1 is electrical heater switch ON when water tank temperature reduce, and switch OFF when water tank temperature reach to setting temperature.

P11 : electric heater in floor heating, radiator: auto (0), off (1), default (1) .

P12: minimum temperature difference of compressor lower frequency for constant temperature :

0°C to 6°C adjustable, default is 2° C .

P13 : heat pump stop when ambient temperature drop down to -25°C : range (-25°C to -1°C adjustable), default is -25°C .

P14 : heat pump start when ambient temperature increase to -20°C : range (-20°C ~ 0°C adjustable), default is -20°C .

P14 is 1°C more than P13 on setting.

P15 : anti-freeze protection: on (1), off (0), default (0) .

P16 : Room cooling setting water temperature : range (5 °C - 35 °C adjustable), default is 10 ° C .

P17 : defrosting mode : auto defrosting (0), manual defrosting (1)

P18 : defrosting start temperature : range (-15℃ ~ +2℃ adjustable), default is -4℃.
P19 : defrosting period : range (25 ~ 70 minutes adjustable), default is 30 minutes
P20 : defrosting time : range (2 ~ 20 minutes adjustable), default is 15 minutes.
P21 : defrosting exit temperature : range (8 ~ 20℃ adjustable), default is 12 minutes.

6.8 Mode setting

Press 

to enter MODE setting : (AUTO mode is availabe on some heat pumps)

6.8.1 AUTO1 mode:

When 

switches on, heat pump is running in AUTO 1 mode,  and  is on.

6.8.2 AUTO2 mode:

When 

switches on, heat pump is running in the AUTO 2 mode,  and  is on.

6.8.3 WATER TANK HEATING mode:

When  switches on, heat pump is running in the WATER TANK HEATING mode.

When water tank temperature reach target temperature,  switches on, otherwise,  switches on.

parameter setting as following:
* parameter P1 (water tank setting temperature) : temperature range (20 ℃ - 65 ℃), default is 45 ℃
* parameter P6 (minimum temperature difference of compressor start in water heating mode) :
3℃ to 15℃ adjustable, default is 5℃ .

Heat pump stop when water tank temperature reach to 45 ℃ (parameter P1), and heat pump restart when water tank drop down to 40 ℃ (parameter P1 – parameter P6).

6.8.4 ROOM-HEATING mode:

When  switches on, heat pump is running in the ROOM - HEATING mode.

HEATING mode has 3 operations :

1) floor heating (setting return water temperature is fixed)
parameter setting as following:
* P2 (heating operation selection): 0
* P3 (setting return water temperature) : 20℃ - 45℃ adjustable, default is 35℃.
* P7 (minimum temperature difference of compressor start in room heating mode):
3℃ to 15℃ adjustable, default is 5° C .
* P8 (maximum water outlet temperature (MAX . TEMP.)): 25℃ to 65℃ adjustable, default is 45° C .

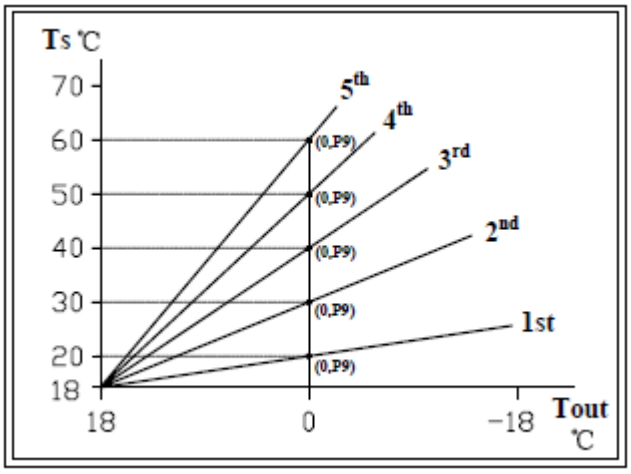
Heat pump start when return water temp. ≤ setting return temp. (parameter P3) – temp. different (parameter P7).
Heat pump stop when return water temp. > setting return temp.

Outlet water over-heat protection:

When outlet water temperature > parameter P8, compressor stop, electrical heater stop.
When outlet water temperature < P8 - 3℃, exit protection.

2) radiator (heat curve : return water temperature will change according to ambient temperature):
parameter setting as following:

* P2 (heating operation selection) : 1
* P3 (gear) : gear range from 1 to 5 adjustable, default is gear 3
  - 1st gear P9=20°C
  - 2nd gear P9=30°C
  - 3rd gear P9=40°C
  - 4th gear P9=50°C
  - 5th gear P9=60°C
* P9 (**P9 value is return water setting temperature when the ambient temperature is 0° c)**
* P7 (minimum temperature difference of compressor start in room heating mode): 3°C to 15°C adjustable, default is 5°C .
* P8 (maximum water outlet temperature (MAX . TEMP.)): 25°C to 65°C adjustable, default is 45°C .



Tout = outdoor ambient temperature Ts = setting return water temperature (max. Ts = 70° C)

P9 value is return water setting temperature when the ambient temperature is 0°C

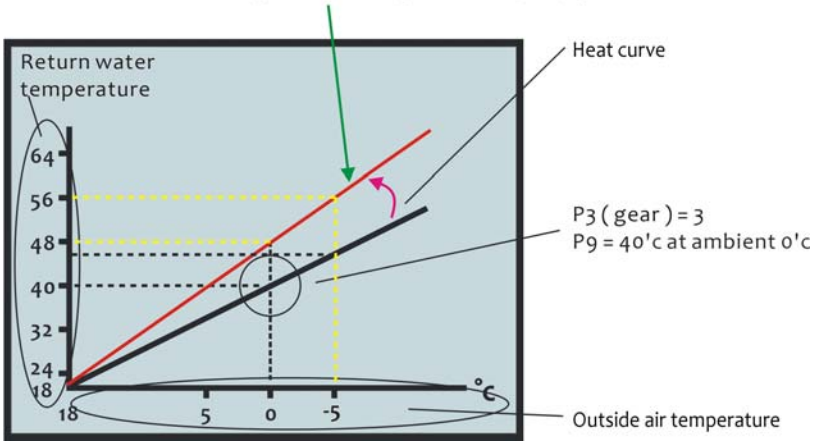
Calculation :

Ts = (P9 – 30)*(24-Tout)/24 + 30

* Ts change every 5 minutes.

For example : parameter P9 is 40'c, now change to 48'c.

P9 increase from 40'C to 48'C.
When ambient = -5'C
if P9 = 40'C, return is 46 C
if P9 = 48'C, return is 56'C (but it is too high for heat pump)



(1) start condition : when ambient temperature < 23° C, heat pump can run at radiator mode.
When ambient temperature > 25° C, heat pump stop.

(2) Heat pump start when return water temp. ≤ setting return temp. (Ts) – temp. different (parameter P7).
Heat pump stop when return water temp. > Ts + 1℃.
* Ts (return water temperature) is calculated by heat curve.

3) fan coil (heat pump ON/OFF by room temperature):
parameter setting as following:
* P2 (heating operation selection): 3
* P5 (room setting temperature) : 18℃ to 32℃ adjustable, default is 27℃ .
* P7 (minimum temperature difference of compressor start in room heating mode):
3℃ to 15℃ adjustable, default is 5° C .

Heat pump stop when room temperature > setting temperature (parameter P5) + 1 ℃ .
Heat pump start when room temperature < setting temperature (parameter P5) – 1.5℃.

6.8.5 ROOM-COOLING mode (optional):

When  switches on , heat pump is running in the ROOM - COOLING mode.

Parameter setting as following :
* parameter P16 (setting outlet temperature) : range from 5℃ to 35℃ adjustable, default is 10℃ .

constant temperature control

*** Enter condition :**

After heat pump start, outlet temperature – setting outlet temperature ≤ 2℃ (parameter 12), enter constant temperature control, or frequency select by **table 2-1**.

* Max frequency select by relative step on **table 2-1**.

According to **draw 3-1**, record ΔT=T1-Ts+2℃, ΔT has 10 areas (from 0 to 9), frequency change according to following:

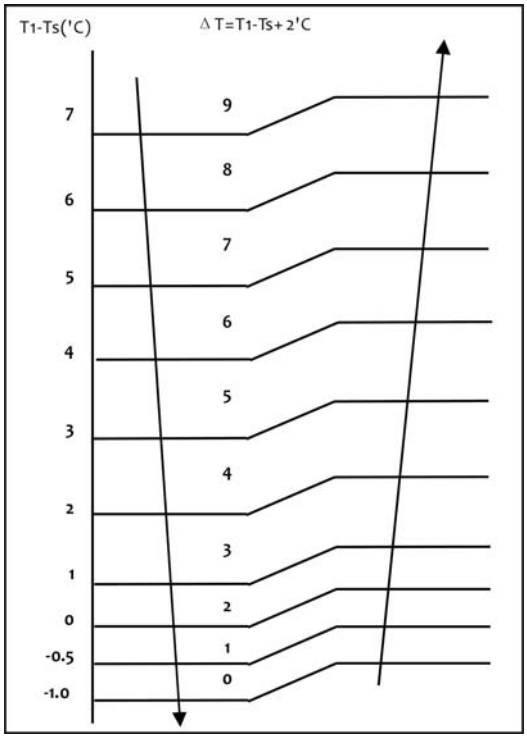
a) when ΔT change to other area
i) if ΔT increase, frequency increase to next step (**table 3-1**) ; max step is relative Hz on **table 2-1**.
If step already reach to max step, frequency would not increase any more although ΔT increase to next area.
ii) if ΔT reduce, frequency reduce to next step ;
if current frequency is F1, frequency would not reduce any more although ΔT reduce to next area.

b) when ΔT keep at the same area 3 minutes, frequency change as following :
4~8: frequency increase to next step (**table 3-1**), and increase to next step every 10 minutes.
Till running frequency reach relative Hz on **table 2-1**.
3 : frequency no change.
0~2: frequency reduce to next step (**table 3-1**), till running frequency reach F1.

* constant temperature area drawing :

T1 : return water temperature ; Ts : setting return water temperature.

Draw 3-1



*** relation table between temperature area and compressor frequency (HZ) in non-constant temperature control**

Table 2-1

Water temperature / Outdoor ambient temperature	< 19°C	19°C ~ 35°C	35°C ~ 45°C	> 45°C
ambient temperature <27°C	F6	F7	F6	F5
28°C ≤ ambient temperature ≤ 37°C	F9	F8	F7	F5
38°C ≤ ambient temperature ≤ 45°C	F8	F7	F4	F4
water temperature > 46°C	F6	F5	F4	F3

6.8.6 water tank heating + room heating / cooling:

Select water tank heating mode and room heating mode at the same time. Water tank heating is priority. When water tank temperature reaches to setting temperature, 3-way-water-valve change water flow to room heating/cooling automatically ; if water tank temperature drop down, 3-way-water-valve go back to water tank heating.

6.9 constant temperature control (available on floor heating, radiator)

6.9.1 start condition :

Parameter setting as following :

P12: minimum temperature difference of compressor lower frequency for constant temperature :

0°C to 6°C adjustable, default is 2°C .

Heat pump start, if setting return water temperature – return water temperature ≤ 2°C (parameter 12) and electrical heater stop, then enter constant temperature control ; or frequency Hz control by **table 2**.

6.9.2

Max frequency select by relative step on **table 2**.

According to **draw 3**, record ΔT=T1-Ts+2°C, ΔT has 10 areas (from 0 to 9), frequency change according to following:

a) when ΔT change to other area

i) if ΔT increase, frequency increase to next step (**table 3**) ; max step is relative Hz on **table 2**.

If step already reach to max step, frequency would not increase any more although ΔT increase to next area.

ii) if ΔT reduce, frequency reduce to next step ;

if current frequency is F1, frequency would not reduce any more although ΔT reduce to next area.

b) when ΔT keep at the same area 3 minutes, frequency change as following :

4~8: frequency increase to next step (**table 3**), and increase to next step every 10 minutes.

Till running frequency reach relative Hz on **table 2**.

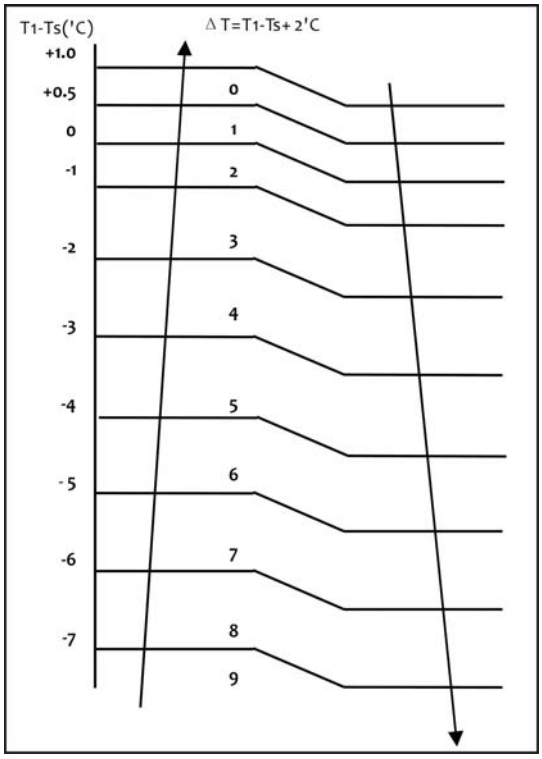
3 : frequency no change.

0~2: frequency reduce to next step (table 3), till running frequency reach F1.

6.9.3 constant temperature area drawing :

T1 : return water temperature ; Ts : setting return water temperature.

Draw 3



6.9.4 relation table between temperature area and compressor frequency (HZ) in non-constant temperature control

Table 2

Outdoor ambient temperature / Water temperature	< 0°C	0°C ~ 10°C	10°C ~ 25°C	> 26°C
Water temperature < 40°C	F10	F9	F8	F7
41°C ≤ water temperature ≤ 45°C	F9	F8	F7	F6
46°C ≤ water temperature ≤ 50°C	F8	F7	F6	F5
51°C ≤ water temperature ≤ 55°C	F7	F6	F5	F4
56°C ≤ water temperature ≤ 60°C	F6	F5	F4	F3
61°C ≤ water temperature ≤ 65°C	F5	F4	F3	F2

Relation table of F1 ~ F10 frequency (Hz)

Table 3 (factory will design Hz)

Step	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
Frequency Hz										

6.10 eletrical heater:

6.10.1 In water tank heating mode :

Parameter setting :

P04 : electric heater start temperature: temperature range from 30°C to 60°C adjustable, default is 60°C .

P10 : electric heater mode selection: 0 is opeate by parameter P04 ; 1 is electrical heater switch ON when water tank temperature reduce, and switch OFF when water tank temperature reach to setting temperature.

(1) P10 = 0

For example, P01 = 55°C , P04 = 40°C, P10 = 0 ; compressor heat water tank to 40°C, then electrical heater switch ON. Compressor and electrical heater stop when water tank temperature = 55°C.

Or water tank temperature ≤ 39°C, electrical heater switch OFF.

(2) P10 = 1

For example, P01 = 55°C , P04 = 40°C, P10 = 1 ; compressor run, and electrical heater switch ON 3 minutes later. Compressor and electrical heater stop when water tank temperature = 55°C. Then heat pump set P10 = 0.

Electrical heater only run one time, you have set P10 = 1 again for next operation.

(3) electrical heater switch ON forcibly during defrosting.

(4) CSP protection :

Refrigerant system install 2 high pressure protection (40bar, 44bar), 1 low pressure protection (0.7bar). 40bar high pressure protection is for CSP protection.

When water tank temperature > 50°C, compressor stop, circulation pump continuously run, electrical heater switch ON forcibly one time, enter CSP protection. 40bar high protection resume 3 minutes later.

Heat pump will record the highest water tank temperture, if highest water tank temperature - water temperature ≤ 3°C, or if water tank temperature < 50°C, then compressor start, and cancel CSP protection.

6.10.2 In floor heating, radiator mode :

Parameter setting :

P11 : electric heater in floor heating, radiator: auto (0), off (1), default (1) .

(1) P11 = 0, auto

When compressor run, electrical heater check return water temperature 15 minutes later.

If return water temperature do not increase 1°C every 5 minutes, electrical heater switch ON,

when return water temperature ≥ T set - 1°C, electrical heater switch OFF, compressor still run.

Aterwards electrical heater would not wait 15 minutes any more, if return water temperature < T set - 3°C ,

and return water temperature do not increase 1°C every 5 minutes, then electrical heater switch ON.

If return water temperature – Tset ≤ 2°C (parameter P13), electrical heater switch OFF.

(2) P11 = 1, off

Electrical heater switch OFF, only switch ON in some forcibly case.

(3) electrical heater switch ON forcibly during defrosting.

(4) CSP protection :

When return water temperature > 50°C, compressor stop, circulation pump continuously run, electrical heater switch ON forcibly one time, enter CSP protection. 40bar high protection resume 3 minutes later.

Heat pump will record the highest return water temperture, if highest return water temperature - water temperature ≤ 3°C, or if return water temperature < 50°C, then compressor start, and cancel CSP protection.

(5) in floor heating mode, outlet water temperature ≥45° C (parameter P8), electrical heater switch OFF forcibly.

6.11 compressor heater:

When outdoor ambient temperature < 0°C, and compressor stop, then compressor heater switch ON.

When outdoor ambient temperature > 2°C, or compressor start, then compressor heater switch OFF.

6.12 evaporator bottom heater:

When outdoor ambient temperature < 0°C, and compressor start, then evaporator bottom heater switch ON.
When outdoor ambient temperature > 2°C, or compressor stop, then evaporator bottom heater switch OFF.

6.13 reset :

Return to factory paramete setting.

Press  and  at the same time, all the parameter restore initial as long as hear the alarm to display default.

6.14 defrosting :

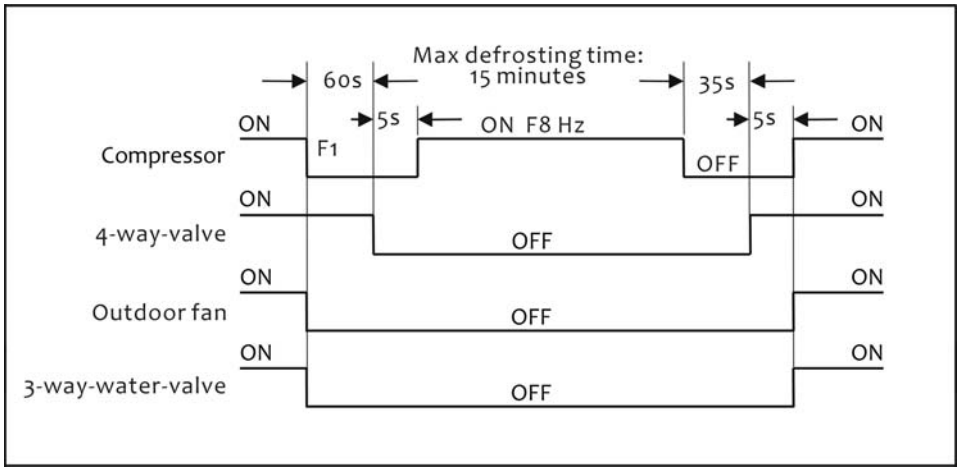
Defrosting has two mode : AUTO, manual. Choose P17 to select defrosting mode :
P17 : defrosting mode : auto defrosting (0), manual defrosting (1)

6.14.1 auto defrosting :

Parameter setting are following :
P18 : defrosting start temperature : range (-15°C ~ +2°C adjustable), default is -4°C.
P21 : defrosting exit temperature : range (8°C ~ 20°C adjustable), default is 12°C.

1st defrosting start condition (the first defrosting period is 40 minutes):
Heat pump first to run, when evaporator temperature < 3°C continuously for 40 minutes, PCB check if evaporator temperature < -4°C (parameter 18), then start defrosting.

During defrosting



Electrical heater switch ON (switch OFF if water tank temperature ≥ 65°C), circulation pump run.

Defrosting exit condition:
When evaporator temperature reach to 12°C (parameter 21), or max defrosting running time = 15 minutes, Defrosting exist.

next defrosting start condition:
the next defrosting period will be changed according to last defrosting status , the calcuation as following :

Defrosting running time (minutes)	1~2	3~4	5~6	7~8	9~10	11~12	13~15
Defrosting period (minutes)	60	55	50	45	40	35	30

6.14.2 manual defrosting :

Parameter setting are following :

P18 : defrosting start temperature : range (-15℃ ~ +2℃ adjustable), default is -4℃.

P19 : defrosting period : range (25 ~ 70 minutes adjustable), default is 30 minutes

P20 : defrosting time : range (2 ~ 20 minutes adjustable), default is 15 minutes.

P21 : defrosting exit temperature : range (8℃ ~ 20℃ adjustable), default is 12℃.

Defrosting start condition:

when evaporator temperature < 3℃ continuously for 30 minutes (parameter 19), PCB check if evaporator temperature < -4℃ (parameter 18), then start defrosting.

Defrosting exit condition:

When evaporator temperature reach to 12℃ (parameter 21), or max defrosting running time = 15 minutes (parameter 20), Defrosting exist.

6.15 Anti-freeze protection :

Parameter setting : P15 : anti-freeze protection: on (1), off (0), default (0) .

When heat pump is in standby status, PCB check if water tank temperature and ambient temperature are too low.

(1) when 2℃ < water tank temperature ≤ 4℃, and ambient temperature ≤ 0℃, then circulation pump run ;

When water tank temperature ≥ 15℃, or ambient temperature > 0℃, exit protection

(2) when water tank temperature ≤ 2℃, and ambient temperature ≤ 0℃, then heat pump run ;

When water tank temperature ≥ 15℃, or ambient temperature > 0℃, exit protection

6.16 4-way-valve :

4-way-valve switch ON on heating mode, switch OFF on cooling mode, defrosting.

6.17 3-way-water-valve :

3-way-water-valve switch ON on ROOM HEATING/COOLING mode, switch OFF on WATER TANK HEATING, cyclye-refrigerant, defrosting. When heat pump stop, 3-way-water-valve switch OFF.

6.18 circulation pump:

In WATER TANK HEATING mode, circulation pump stop when water tank temperature reach to setting temperature. Circulation pump start when water tank temperature drop down, compressor start.

In ROOM HEATING/COOLING mode, circulation pump run all time. And circulation pump stop when error occur.

In floor heating mode, when Outlet water over-heat protection, circulation pump run.

6.19 Status checking:

Press 

button for 5 seconds to enter status checking,

do1: frequency

do2: AD valve of current

do3: inlet (return) water temperature

d04: water tank temperature
d05: outlet (feed) water temperature
d06: room temperature
d07: compressor exhaust temperature
d08: outdoor ambient temperature
d09: evaporator (defrostig) temperature
d10: NO USE (ground source water inlet temperature)
d11: NO USE (ground source water outlet temperature)
d12: step of EEV (real step = d14*4)

7. Error messages :

Heat pump is equipped with regulation and safety components; when a regulation component is defective or a safety is activated, a message is posted like it's illustrated below; see the explanation of these messages in the paragraph "Error codes ". Call your installation contractor for help.

Screen and state of the heat water pump	component
E01	EEPROM read failure fromcontroller or transition circuit board
E02	water tank temperature sensor error
E03	inlet (return) water temperature sensor error
E04	outlet (feed) water temperature sensor error
E05	evaporator (defrosting) temperature sensor error
E06	Outdoor ambient temperature sensor error
E07	Compressor exhaust temperature sensor error
E08	Communication error(controller to transition circuit board)
E09	Communication error(transition circuit board to main circuit board)
E10	Compressor start failure
E11	Current overload error
E12	SPM module alarm
E13	Compressor exhaust over-heat
E14	Water flow switch error
E15	High or low pressure switch error
E16	Room temperature sensor error
E17	Ground source inlet water temperature sensor error
E18	Ground source outlet water temperature sensor error
E19	Compressor return temperature sensor error
E20	Temperature sensor after EEV error

7.1 E12 (SPM alarm)

The cause of alarm E12 (SPM alarm) could be:

1 The communications between IPM Module and outdoor main circuit board is jamming;

2 Module is jamming and can not detect current or compressor;

3 Module can not start compressor;

4 Module's rated 15VDC voltage is not steady

5 Module detect over-currunt protection.

How to do:

1. Please check if all terminals connections among circuit boards are good, whether some of the wire damaged;

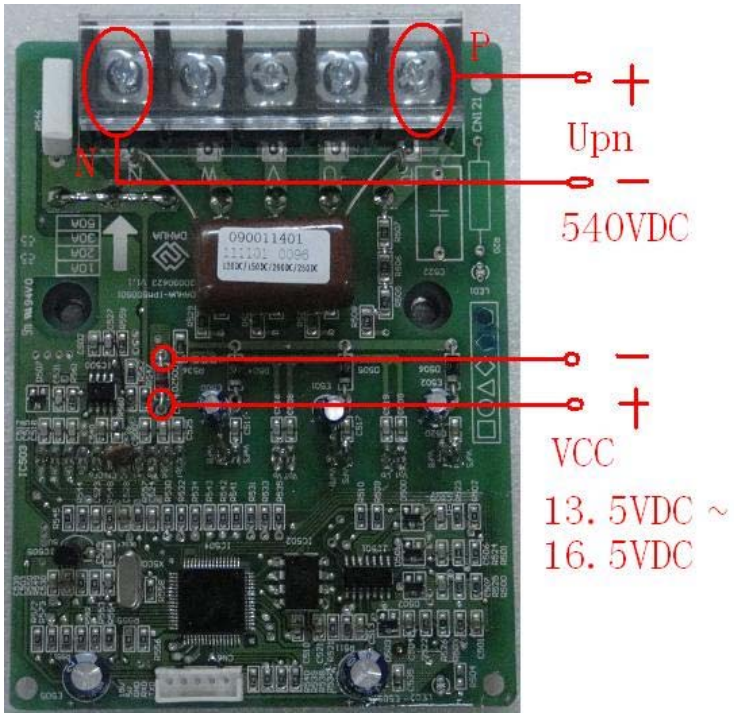
2. Please check if the compressor wire connection loose (on the top of compressor);

3. Please measure each two of the connections (on the top of compressor)'s resistance, if the resistance are always the same, means the compressor is fine. there 3 connections on the top of compressor A, B, C , you need to measure each two's resistance :AB, AC, BC;

4. please check wire connection between the outdoor circuit board and module; see the follow picture.

5. Check the DC voltage between terminal P and N if normal, the DC voltage should be:
   Single phase : 380VDC
   Three phase : 540VDC

6. check the if DC voltage between + (first wire) and -(third wire) is normal, it should be 13.5V ~16.5V



7.2 E09 (Transition board - main circuit board communicate)

The cause of alarm E9 could be:

1. The connection between transition circuit board and main circuit board is wrong;

2. The connection between transition circuit board and main circuit board is not good, such as had creepage;

3. The transition circuit board or main circuit board was damaged.

How to do

1. Check the connection wire between transition circuit board and main circuit board, their live wires, zero curves was connected correctly;

2. Check the connection wire between transition circuit board and main circuit board , the wire must be less than 20 meters, the terminals must be water- proof;

3. If the connection is fine, then the cause could be the transition circuit board or main circuit board, please check their lights.

7.3 module voltage over

The cause of alarm 'MODULE VOLTAGE OVER' could be:

1. Water flow was not enough;

2. One of the sensors got problem;

3. Ambient temperature was too high

How to do:

1. Check if the water flow was not enough;

2. Check all the sensors if they are normal.

7.4 CSP protection (it do not show any error code on display panel)

Refrigerant system install 2 high pressure protection (40bar, 44bar), 1 low pressure protection (0.7bar).
40bar high pressure protection is for CSP protection.
(1) When water temperature > 50℃, compressor stop, circulation pump continuously run, electrical heater switch ON forcibly one time, enter CSP protection. 40bar high protection resume 3 minutes later.

Heat pump will record the highest water temperture, if highest water temperature - water temperature ≤ 3℃, or if water temperature < 50℃, then compressor start, and cancel CSP protection.

(2) when water temperature < 50℃, compressor stop, circulation pump continuously run, electrical heater keep previous status ; 3 minutes later, if 40bar high protection resume, then compressor start.

(3) In water tank heating mode, heat pump check if water tank temperature match 50℃.

In room heating mode, heat pump check if return water temperature match 50℃.

7.5 E13 compressor over-heat

The reason of E13 could be:

1. Water flow was not enough;

2. Refrigerant was not enough

3. Ambient temperature was too high;

How to do:

1. Check if the water flow was not enough, so that the heat exchange efficiency was not good;

2. Check the refrigerant quantity, and make sure the system has not any leak;

7.6 E14 water flow

The reason of E14 could be:

1. Water flow is not enough;
2. The connection of water flow switch was loose or water flow switch was broken;
3. There some air inside the water system, so that the heat exchange area was not enough;
4. The thermostat switch of the electrical heater was broken;

How to do:

1. Always ensure enough water flow; otherwise the flow switch can not open;
2. Check the wire connection of water flow switch was normal or not, or replace a water flow switch;
3. Before install the system, please vent the air out from the water system, follow manual's instruction;
4. Measure the thermostat switch of electrical heater by ampere meter.

7.7 E15 low pressure

The reason of E15 could be:

1. The refrigerant was not enough ;
2. The connection of low pressure switch was loose, or the switch was broken;
3. The fan can not run

How to do:

1. Check if there any place leak refrigerant, especially on the connections valves;
2. Check if the wire connection of low pressure switch was ok, or replace a new low pressure switch;
3. Check if the fan was running, if not, please check if the fan was normal

7.8 high pressure

The reason of E15 could be:

1. The water flow was not enough;
2. The high pressure switch's connection was not good; or the switch was broken;
3. The ambient temperature was too high.

How to do:

1. Always ensure enough water flow; otherwise the flow switch can not open;
2. Check if the wire connection of high pressure switch was ok, or replace a new one;

7.9 water temperature sensor

1. The connection of water tank temperature sensor was loose;
2. The water tank temperature sensor was broken;

How to do:

1. Find the connection and make sure it is fine;
2. As per resistance table of the sensor, please measure the sensor's resistance, to judge the sensor was good or bad; replace a new one if the sensor get problem.

7.10 feed temperature sensor

1. The connection of feed water temperature sensor was loose;
2. The feed water temperature sensor was broken;

How to do:

1. Find the connection and make sure it is fine;
2. As per resistance table of the sensor, please measure the sensor's resistance, to judge the sensor was good or bad; replace a new one if the sensor get problem.

7.11 return temperature sensor

1. The connection of return water temperature sensor was loose;
2. The return water temperature sensor was broken;

How to do:

1. Find the connection and make sure it is fine;
2. As per resistance table of the sensor, please measure the sensor's resistance, to judge the sensor was good or bad; replace a new one if the sensor get problem.

7.12 evporator temperature sensor

1. The connection of pipe temperature sensor (on evaporator, for defrosting) was loose;
2. The pipe temperature sensor was broken;

How to do:

1. Find the connection and make sure it is fine;

2. As per resistance table of the sensor, please measure the sensor's resistance, to judge the sensor was good or bad; replace a new one if the sensor get problem.

7.13 outdoor ambient temperature sensor

1. The connection of outdoor ambient temperature sensor was loose;
2. The outdoor ambient temperature sensor was broken;

How to do:

1. Find the connection and make sure it is fine;
2. As per resistance table of the sensor, please measure the sensor's resistance, to judge the sensor was good or bad; replace a new one if the sensor get problem.

7.14 compressor exhaust temperature sensor

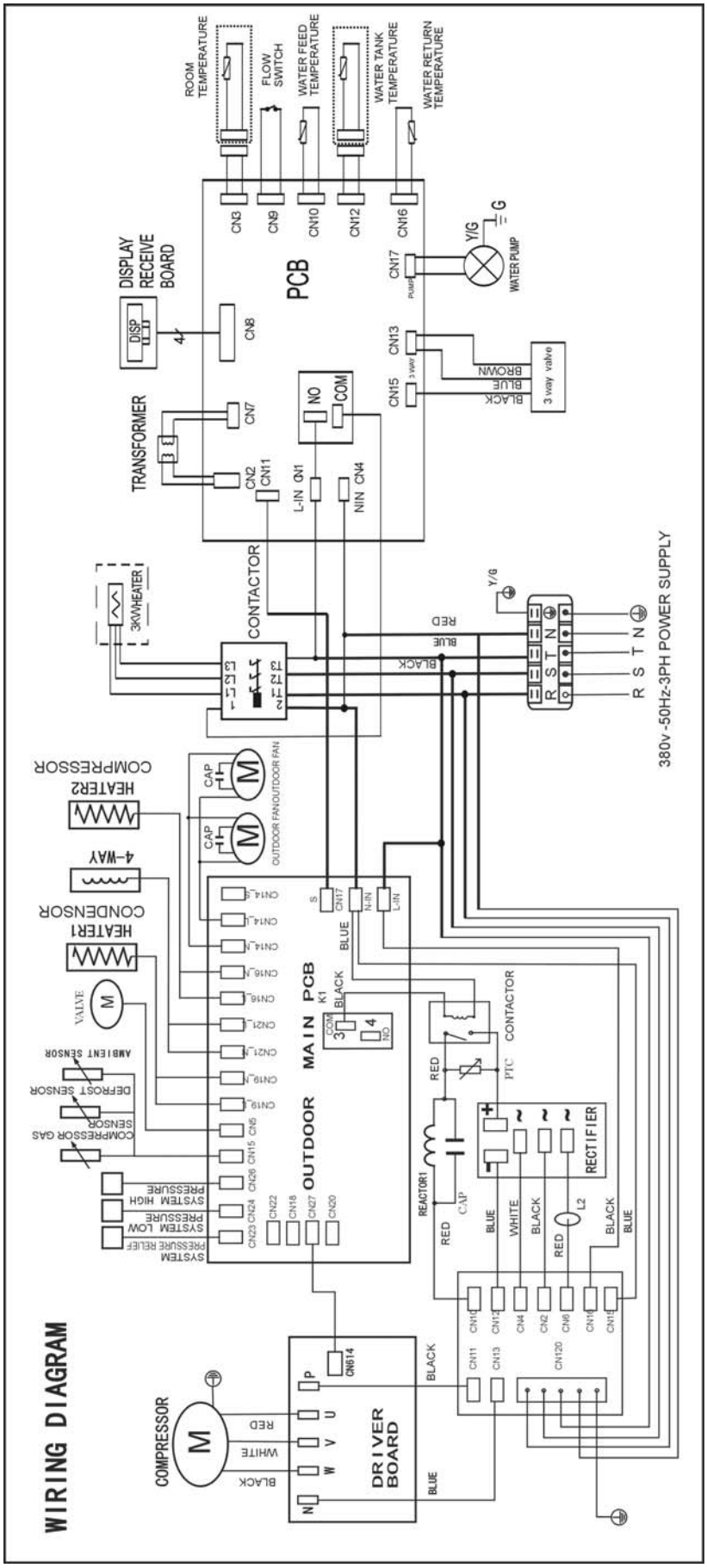
1. The connection of compressor exhaust air temperature sensor was loose;
2. The compressor exhaust air temperature sensor was broken;

How to do:

1. Find the connection and make sure it is fine;
2. As per resistance table of the sensor, please measure the sensor's resistance, to judge the sensor was good or bad; replace a new one if the sensor get problem.

8. Wiring diagram:

*** wiring diagram for 380V-50Hz-3phase**



* wiring diagram for 230-50Hz-1phase

9. temperature sensor resistance table :

9.1 compressor exhaust temperature sensor resistance t °c -- kΩ 50 k

t °c	R(KΩ)	AD	t °c	R(KΩ)	AD	t °c	R(KΩ)	AD	t °c	R(KΩ)	AD
-20	542.7	3	**20**	68.66	26	**60**	13.59	95	**100**	3.702	175
-19	511.9	3	**21**	65.62	28	**61**	13.11	97	**101**	3.595	177
-18	483	4	**22**	62.73	29	**62**	12.65	99	**102**	3.492	178
-17	455.9	4	**23**	59.98	30	**63**	12.21	101	**103**	3.392	180
-16	430.5	4	**24**	57.37	31	**64**	11.79	103	**104**	3.296	181
-15	406.7	4	**25**	54.89	32	**65**	11.38	106	**105**	3.203	183
-14	384.3	5	**26**	52.53	34	**66**	10.99	108	**106**	3.113	184
-13	363.3	5	**27**	50.28	35	**67**	10.61	110	**107**	3.025	186
-12	343.6	5	**28**	48.14	36	**68**	10.25	112	**108**	2.941	187
-11	325.1	6	**29**	46.11	38	**69**	9.902	114	**109**	2.86	188
-10	307.7	6	**30**	44.17	39	**70**	9.569	117	**110**	2.781	190
-9	291.3	6	**31**	42.33	40	**71**	9.248	119	**111**	2.704	191
-8	275.9	7	**32**	40.57	42	**72**	8.94	121	**112**	2.63	193
-7	261.4	7	**33**	38.89	43	**73**	8.643	123	**113**	2.559	194
-6	247.8	8	**34**	37.3	45	**74**	8.358	125	**114**	2.489	195
-5	234.9	8	**35**	35.78	47	**75**	8.084	127	**115**	2.422	196
-4	222.8	8	**36**	34.32	48	**76**	7.82	129	**116**	2.357	198
-3	211.4	9	**37**	32.94	50	**77**	7.566	132	**117**	2.294	199
-2	200.7	9	**38**	31.62	52	**78**	7.321	134	**118**	2.233	200
-1	190.5	10	**39**	30.36	53	**79**	7.086	136	**119**	2.174	201
0	180.9	10	**40**	29.15	55	**80**	6.859	138	**120**	2.117	202
1	171.9	11	**41**	28	57	**81**	6.641	140	**121**	2.061	203
2	163.3	12	**42**	26.9	59	**82**	6.43	142	**122**	2.007	204
3	155.2	12	**43**	25.86	60	**83**	6.228	144	**123**	1.955	206
4	147.6	13	**44**	24.85	62	**84**	6.033	146	**124**	1.905	207
5	140.4	13	**45**	23.89	64	**85**	5.844	148	**125**	1.856	208
6	133.5	14	**46**	22.89	66	**86**	5.663	150	**126**	1.808	209
7	127.1	15	**47**	22.1	68	**87**	5.488	152	**127**	1.762	210
8	121	15	**48**	21.26	70	**88**	5.32	154	**128**	1.717	211
9	115.2	16	**49**	20.46	72	**89**	5.157	156	**129**	1.674	211
10	109.8	17	**50**	19.69	74	**90**	5	157	**130**	1.632	212
11	104.6	18	**51**	18.96	76	**91**	4.849	159			256
12	99.69	19	**52**	18.26	78	**92**	4.703	161			256
13	95.05	20	**53**	17.58	80	**93**	4.562	163			256
14	90.66	20	**54**	16.94	82	**94**	4.426	165			256
15	86.49	21	**55**	16.32	84	**95**	4.294	167	**B(25/50) = 3950K ± 3%**		256
16	82.54	22	**56**	15.73	86	**96**	4.167	168	**R(90°c) = 5KΩ ± 3%**		256
17	78.79	23	**57**	15.16	88	**97**	4.045	170			256
18	75.24	24	**58**	14.62	90	**98**	3.927	172			256
19	71.86	25	**59**	14.09	93	**99**	3.812	173			256

9.2 water/ambient/evaporator temperature sensor resistance t °c – kΩ 10 k

t °c	R(KΩ)	AD	t °c	R(KΩ)	AD	t °c	R(KΩ)	AD	t °c	R(KΩ)	AD
-20	115.266	16	**20**	12.6431	99	**60**	2.35774	197	**100**	0.62973	236
-19	108.146	17	**21**	12.0561	102	**61**	2.27249	198	**101**	0.61148	237
-18	101.517	18	**22**	11.5	105	**62**	2.19073	200	**102**	0.59386	237
-17	96.3423	19	**23**	10.9731	107	**63**	2.11241	202	**103**	0.57683	237
-16	89.5865	21	**24**	10.4736	110	**64**	2.03732	203	**104**	0.56038	238
-15	84.219	22	**25**	10	113	**65**	1.96532	205	**105**	0.54448	238
-14	79.311	23	**26**	9.55074	116	**66**	1.89627	206	**106**	0.52912	239
-13	74.536	24	**27**	9.12445	119	**67**	1.83003	207	**107**	0.51426	239
-12	70.1698	26	**28**	8.71983	122	**68**	1.76647	209	**108**	0.49989	240
-11	66.0898	27	**29**	8.33566	125	**69**	1.70547	210	**109**	0.486	240
-10	62.2756	29	**30**	7.97078	128	**70**	1.64691	211	**110**	0.47256	240
-9	58.7079	30	**31**	7.62411	131	**71**	1.59068	212	**111**	0.45957	241
-8	56.3694	31	**32**	7.29464	133	**72**	1.53668	214	**112**	0.44699	241
-7	52.2438	34	**33**	6.98142	136	**73**	1.48481	215	**113**	0.43482	241
-6	49.3161	35	**34**	6.68355	139	**74**	1.43498	216	**114**	0.42304	242
-5	46.5725	37	**35**	6.40021	142	**75**	1.38703	217	**115**	0.41164	242
-4	44	39	**36**	6.13059	144	**76**	1.34105	218	**116**	0.4006	242
-3	41.5878	41	**37**	5.87359	147	**77**	1.29078	219	**117**	0.38991	243
-2	39.8239	42	**38**	5.62961	150	**78**	1.25423	220	**118**	0.37956	243
-1	37.1988	45	**39**	5.39689	152	**79**	1.2133	221	**119**	0.36954	243
0	35.2024	47	**40**	5.17519	155	**80**	1.17393	222	**120**	0.35982	244
1	33.3269	49	**41**	4.96392	157	**81**	1.13604	223	**121**	0.35042	244
2	31.5635	51	**42**	4.76253	160	**82**	1.09958	224	**122**	0.3413	244
3	29.9058	54	**43**	4.5705	162	**83**	1.06448	225	**123**	0.33246	244
4	28.3459	56	**44**	4.38736	165	**84**	1.03069	226	**124**	0.3239	245
5	26.8778	58	**45**	4.21263	167	**85**	0.99815	226	**125**	0.31559	245
6	25.4954	61	**46**	4.04589	169	**86**	0.96681	227	**126**	0.30754	245
7	24.1932	63	**47**	3.88673	172	**87**	0.93662	228	**127**	0.29974	245
8	22.5662	67	**48**	3.73476	174	**88**	0.90753	229	**128**	0.29216	246
9	21.8094	68	**49**	3.58962	176	**89**	0.8795	229	**129**	0.28482	246
10	20.7184	71	**50**	3.45097	178	**90**	0.85248	230	**130**	0.2777	246
11	19.6891	74	**51**	3.31847	180	**91**	0.82643	231	**131**	0.27078	246
12	18.7177	76	**52**	3.19183	182	**92**	0.80132	231	**132**	0.26408	246
13	17.8005	79	**53**	3.07075	184	**93**	0.77709	232	**133**	0.25757	247
14	16.9341	82	**54**	2.95896	186	**94**	0.75373	233	**134**	0.25125	247
15	16.1156	85	**55**	2.84421	188	**95**	0.73119	233	**135**	0.24512	247
16	15.3418	87	**56**	2.73823	190	**96**	0.70944	234	**136**	0.23916	247
17	14.6181	90	**57**	2.63682	192	**97**	0.68844	234	**137**	0.23338	247
18	13.918	93	**58**	2.53973	193	**98**	0.66818	235	**138**	0.22776	247
19	13.2631	96	**59**	2.44677	195	**99**	0.64862	236	**139**	0.22231	248

11 Specification

	50	70	90	120	150	180
Power Supply	230V - 1Phase - 50Hz: L, N, earth			380V - 3Phase - 50Hz: R,S,T,N,earth		

Performance							
Heating Capacity at A7/W35	kW	5	7	10	13	15	18
C.O.P.	W/W	4.1	4.1	4.1	4.1	4.1	4.1
Power input	kW	1.2	1.7	2.4	3.2	3.7	4.4
Startup current	A	1.5	1.5	1.5	2.5	2.5	2.5
Running current		5.5	7.8	11.1	5.5	6.3	7.6

Features							
Controls		Microprocessor					
Fan speeds		1 speed					
Operation noise level	dB(A)	52	55	58	60	62	62
Ambient/water/evaporator temp. sensor	kΩ	10k(25°c)					
Compressor exhaust temp. sensor	kΩ	50k(25°c)					
Refrigerant		R410a					
Refrigerant control		electronic expansion valve					

Compressor							
DC inverter compressor		Twin rotary					scroll
Coil resistance (Ambient temp. 25'c)	Ω	R-S:					
	Ω	S-T:					
	Ω	T-R:					
Safety devices	* CT (Peak current cut-off control)	yes					
	* compressor discharge temp. control	yes					
	* high refrigerant pressure protection	yes					
	* low refrigerant pressure protection	yes					
	* CSP pressure protection	yes					
crankcase heater		30W, 240V					

Fan * Fan Motor							
Fan type		propeller					
quantity … Diameter	mm	1 … ø420	1 … ø450	1 … ø490	2 … ø420	2 … ø490	2 … ø490
No. of poles … rpm 220V		4 … 670	4 … 670	6 … 670	4 … 670	6 … 670	6 … 670
nominal output	W						
run capacitor		2uF 440WAC	2uF 440WAC	5uF 440WAC	2uF 440WAC	5uF 440WAC	5uF 440WAC

evaporator								
coil		alumiminum plate fin / inner-grooved copper tube						
rows		3						
pin pitch	mm	2.2						
face area	m^2							

heat exchanger	
type	shell tube

Hydraulic module		
return water connection	inch	3/4
outlet water connection to house	inch	3/4
outlet water connection to water tank	inch	3/4
max pressure in water tank	bar	7
max pressure in spiral copper pipe	bar	4
circulation pump	speed	3

electrical heater	
type	sheath
material	stainless steel
operation	automatic
step	1
capacity	kW 3
power supply	230/50/1

Dimensions & Weight								
height	mm							
width	mm							
depth	mm							
weight	kg							