

DC INVERTER SERIES AIR TO WATER

INSTALLATION AND OPERATING INSTRUCTIONS

MODEL: KS50-DC / KS70-DC / KS90-DC / KS120-DC / KS150-DC



**PLEASE READ THIS OPERATION MANUAL
BEFORE USING THE HEAT PUMP**

Introduction

This inverter are using outside air as a heat source.

In addition to the inverter itself, it's wise to have an additional heat source ready if the outside temperature should drop heavily and by that a help to keep the comfort-temperature on the circulating water inside the house.

We have chosen to create an Air to Water inverter as a so-called split version. This means that it has one part outside and one part inside.

Other Inverter manufacturers has often both parts outside. We see that this solution has some major disadvantages. First of all must the water pipes be heavily insulated to avoid freezing in case of a power down. Secondly will this solution also cause great heat loss.

Warm during a cold winter and cool in the summer heat! Our DC Inverter can take care of both tasks by a simple but yet advanced remote control system in your living room.

Please read completely this manual.

If necessary, ask explanations of the unclear points to your fitter

We wish you long seasons of bath at your comfort temperature.

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1 - Warning

This manual is an integral part of the machine and must always be reachable in your technical room.

**This Heat pump is meant exclusively for heating or cooling.
Any other non-conform and random use will be considered as dangerous and unsuitable.**

The assembly, the electric connection and the start up must be carried out by specialized and professional staff.

It is essential to maintain the temperature in the DC INVERTER lower than the value recommended by the DC INVERTER's manufacturer.

You'll have to inform your retailer of any breakdown or error message; have the maintenance works done by specialized staff.

In a concern of constant improvement, our products can be modified without notice; the pictures or the characteristics described in this manual are not contractual.

2 - Safety Instructions

Do not go up on the Heat pump or do not try and move it once installed. Never cover (risk of overheating). Keep out of reach of children, and do not to let them play around; inform them of the dangers of this machine.

Never introduce a stick or your fingers into the protective grille of the ventilation; the last one turns very quickly. Never clean the machine with the water jet.

Never disconnect the machine when it's working; for any intervention even of cleaning, stop the machine, by pressing first on the key OFF; in the event of an emergency, cut off the current on the table. Do not draw on the electric wire (risk of electric shock)

Warning: (Only For KS120-DC Single Phase)

When the heat pump runs at maximum frequency, the maximum current could be close to 50A, that the heat pump shall be installed in accordance with local wiring regulations, otherwise will cause danger.

3 - Principle of working

The Heat pump uses the free heat contained in the outside air to transmit it to the water.

The ventilator located in the heat pump has the air circulated on the radiator with gilds. When the Heat pump heats the water, the air blown is fresher than the outside air.

In the contrary, when the heat pump cools the water, the air blown is heater that the outside air.

You can regulate the temperature to which you want to heat the water.

4 - Checking before and after starting

Before starting:

Your machine is tested and regulated in factory; however it is advised to carry out the following controls before starting:

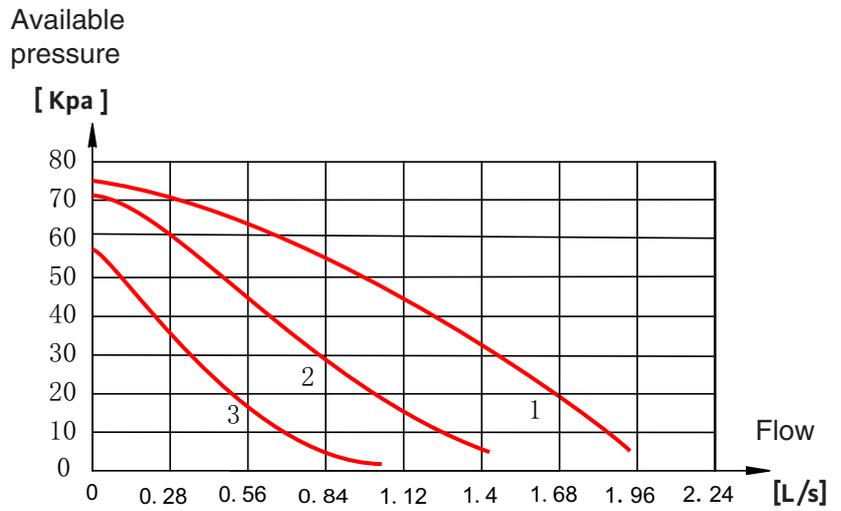
- Electric connections correctly carried out
- Installation carried out according to our recommendations
- Correct connection of arrival and exit water pipes according to the written indications
- No foreign things on the machine or fixed on the gilds of the radiator

After starting:

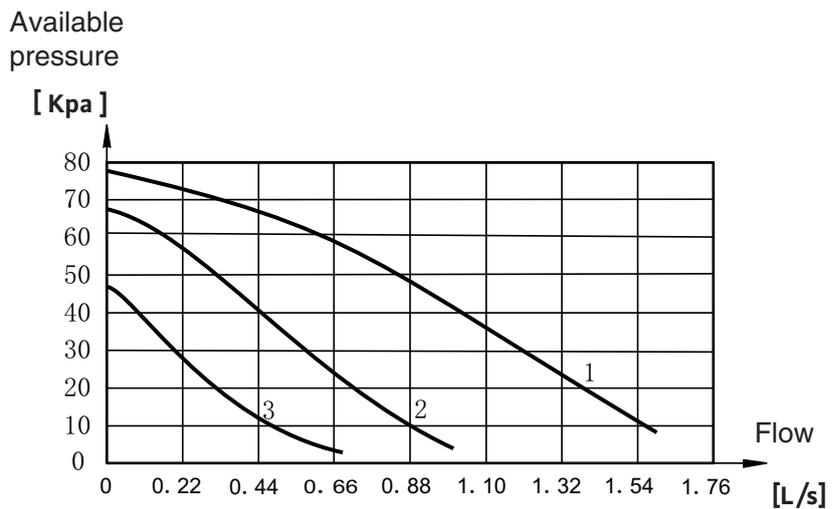
Ensure that operation is regular; if high vibrations occur, stop the Heat pump and call your fitter.

5 - Pump capacity diagrams

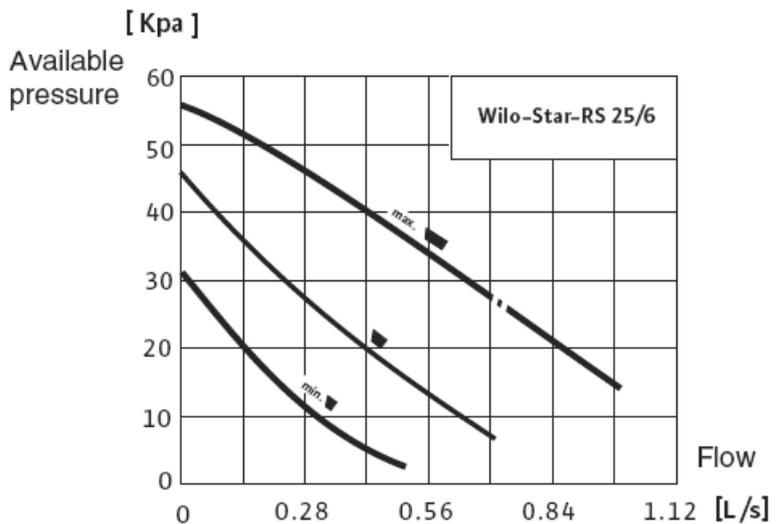
**WILO RL-25/7.5
(KS150-DC)**



**Wilo-Star-RS 25/8
(KS90-DC, KS120-DC)**



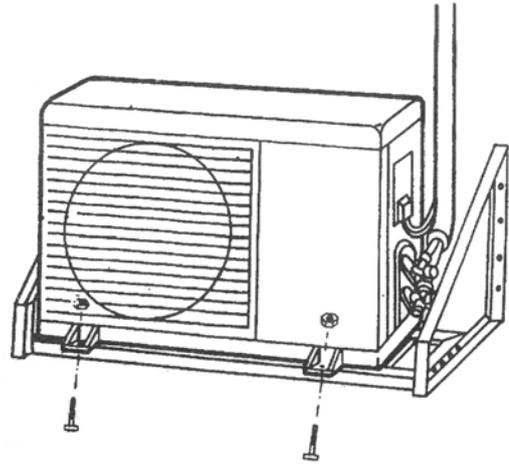
**Wilo-Star-RS 25/6
(KS50-DC, KS70-DC)**



6 - Installation Outdoor Unit

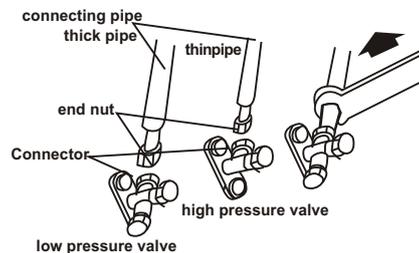
Select the Installation Place of Outdoor Unit

- The outdoor unit should be installed on a solid wall and fastened securely.
- 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 outdoor 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 outdoor unit on the support using the four bolts supplied.

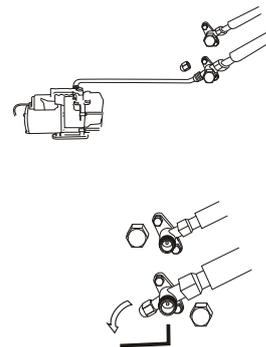


Piping Connecton

1. Open the cover of the outdoor unit.
2. Connect the pipe to the indoor unit and outdoor unit.
 - Wipe the quick connectors with clean cloth to prohibit dust and impurity entering the pipes.
 - Align the centre of the pipe and fully screw in the angular nuts with Finger.



3. Use Vacuum pump to remove the air from indoor unit and connection pipe.
4. Connect the electric cable as per circuit diagram, and bundle it with the connecting pipe.
5. Take off the nuts in the mouths of high valve and low valve, turn the valves core anticlockwise with hexagon panner till the valves are opened completely. Recover and tighten the nuts.
6. Check leakage: check if there is leakage at each connection of the pipes or nuts. If yes, remedial neasure must be taken, leakage is not permitted in any case.



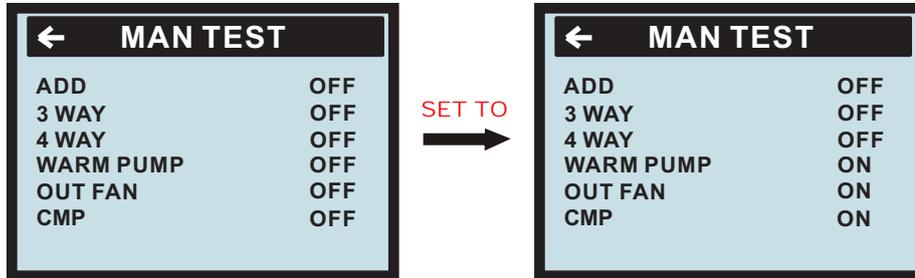
Attention :

- When connecting the pipe, a suitable pitching spanner must be used. If other spanner is used, it may damage the joint due to inappropriate force.
- On connecting the pipe, one should ensure that the insulating material of the pipe be closely fitted to the nuts at the joint.
- On connecting to the external unit, the pipe should be wrapped with sponge padding to prevent rain water from flowing in.
- When bending the pipe, the radius cannot be too small and be about 150-160 mm.

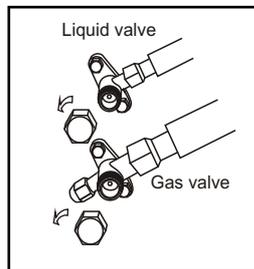
7 - The step and diagram of Collect refrigerant

- If the machine needs to be disconnected and moved to another place or refrigerant charging, please recycle the gas back into the compressor according to the following steps before doing the disconnecting:

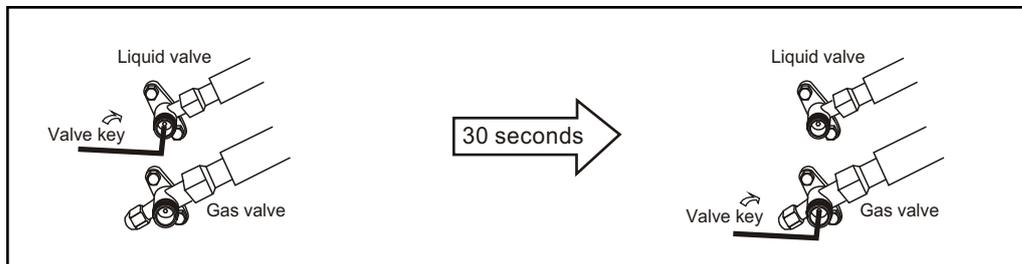
1. Turn to the menu: OPERATION---MAN TEST



2. Remove the cap of two valves with the spanner.

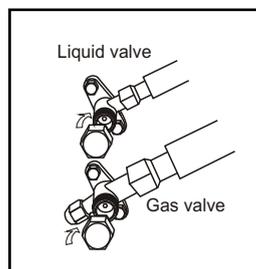


3. Tighten the core of the liquid valve (the smaller one) with valve key at first. After about 20 seconds, tighten the core of the gas (the bigger one) with valve key.



4. Exit the "MAN TEXT" at once or turn the "WARM PUMP", "OUT FAN", "CMP" to OFF, at that time the HEATPUMP was stopped.

5. Tighten the cap of two valves.



6. loose the nut of the connect pipe to the outdoor unit valve with 2 spanner, disconnect the connect pipe and the two valves.



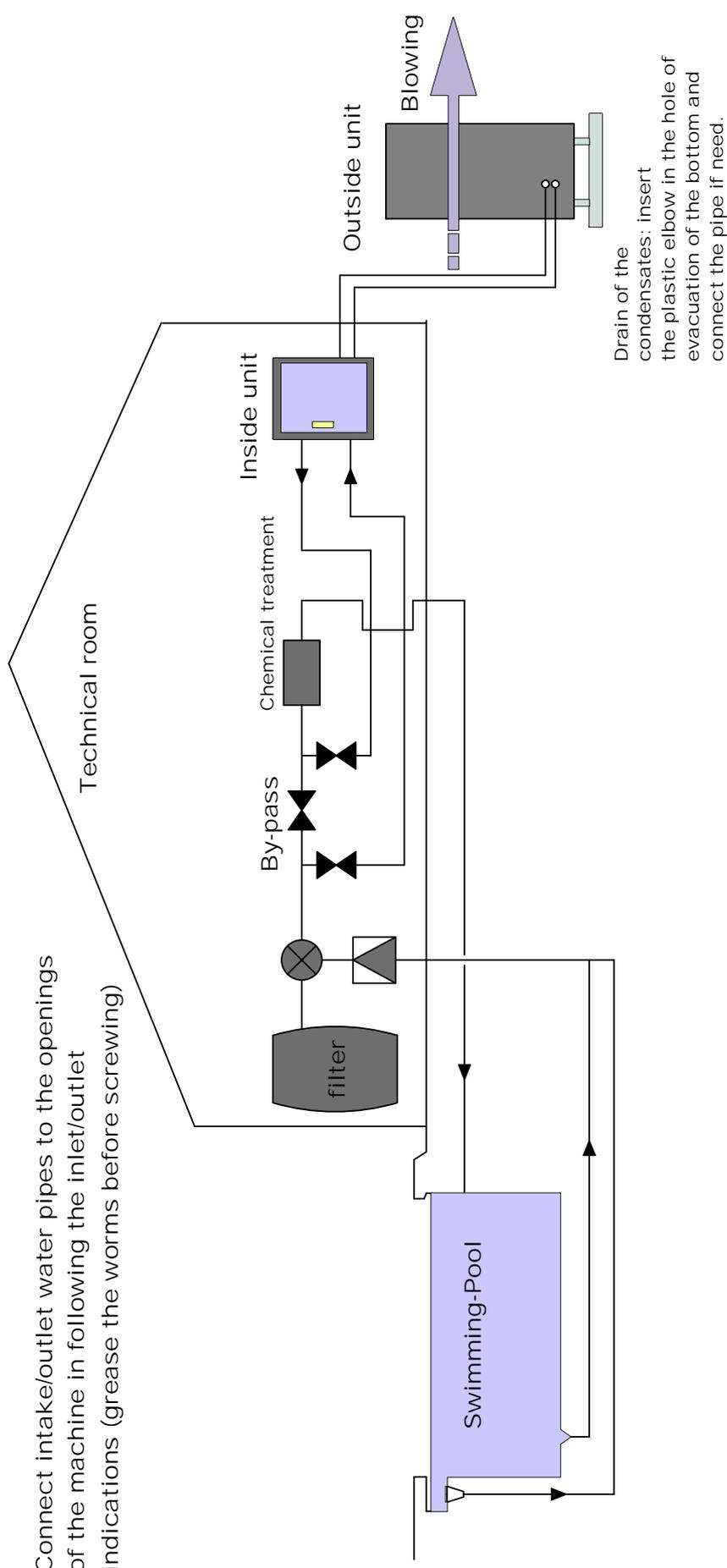
Using For Swimming-Pool

Hydraulic connections:
To respect imperatively

Connection is carried out with a by-pass located on the circuit of filtration, upstream appliances of the chemical treatment of water.

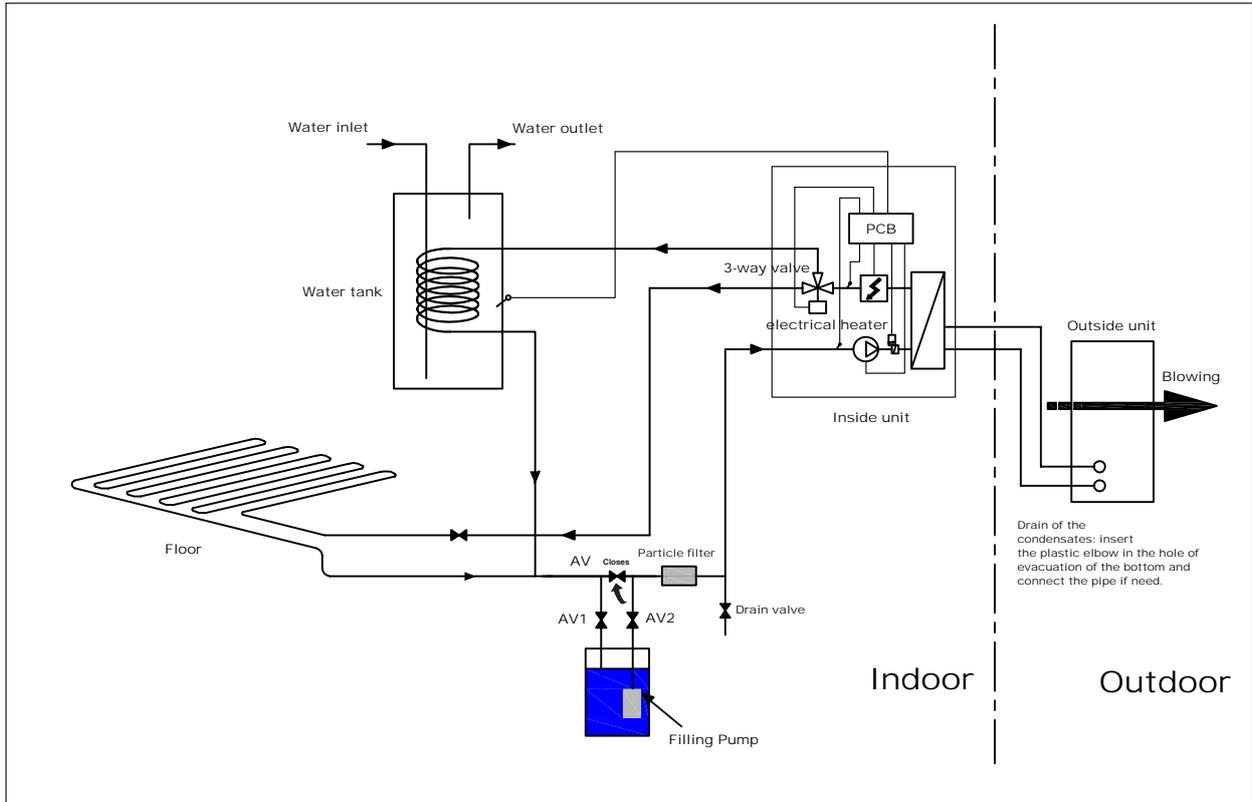
If the machine is used for swimming pools, titanium heat exchanger should be chosen. Factory can be required to choose the titanium heat exchanger as the heat exchanger according to the customer before production.

Connect intake/outlet water pipes to the openings of the machine in following the inlet/outlet indications (grease the worms before screwing)

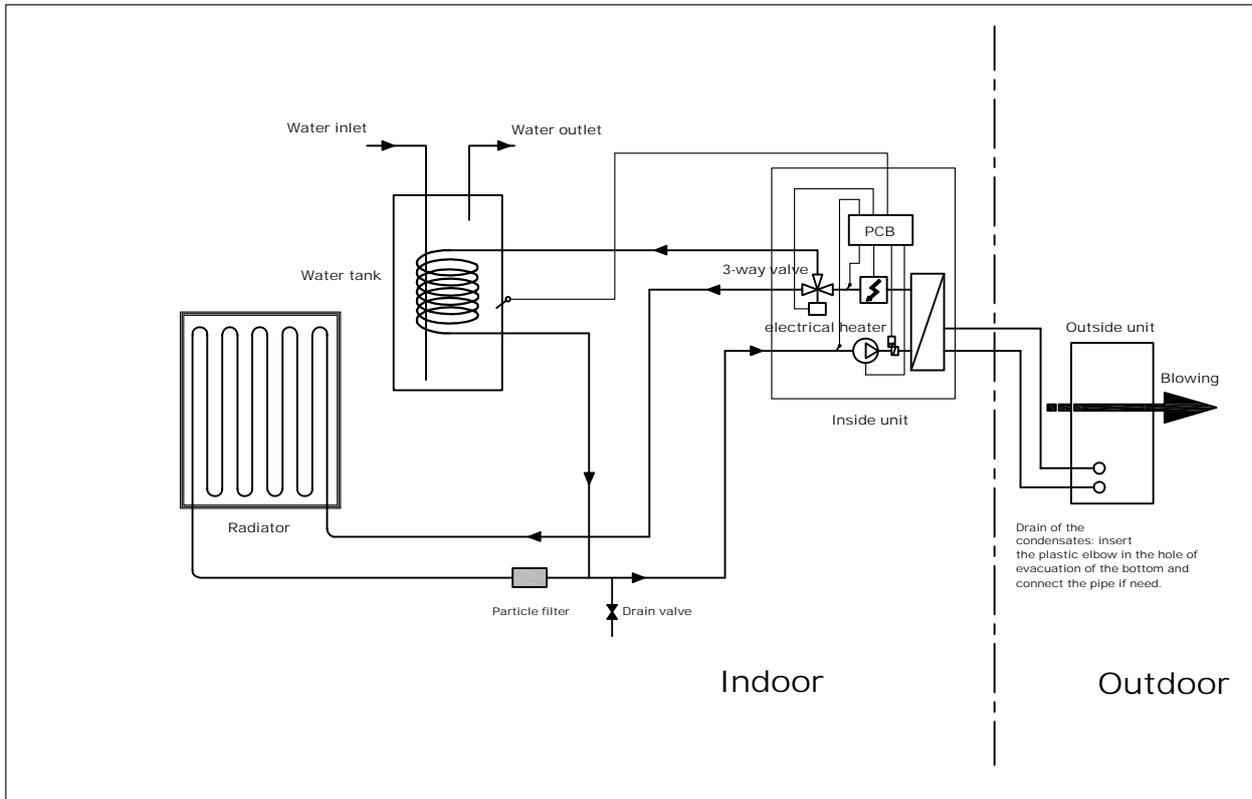


8 - Diagram for installation and connection

Using For Floor heating and Water tank heating

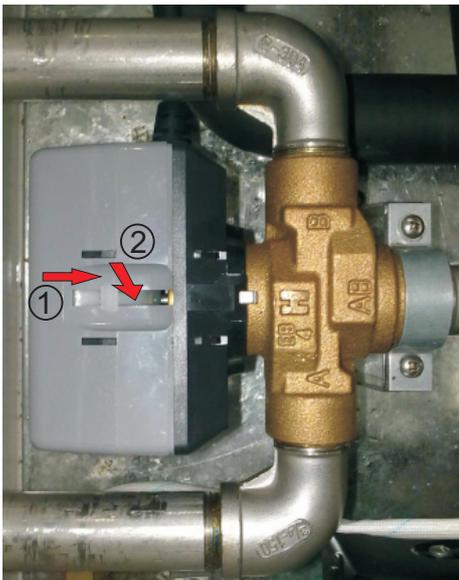


Using For Radiator and Water tank heating

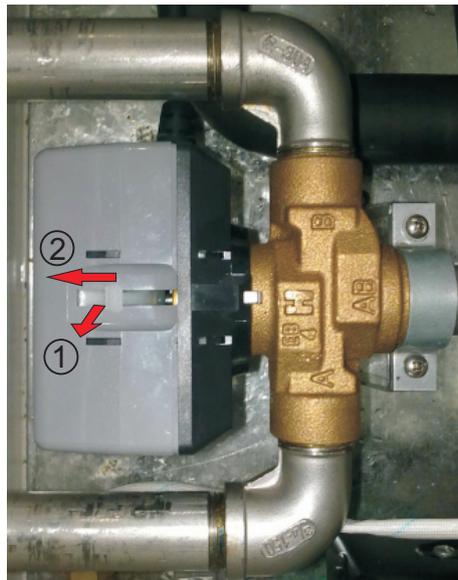


9 - Filling and venting the water circuit system

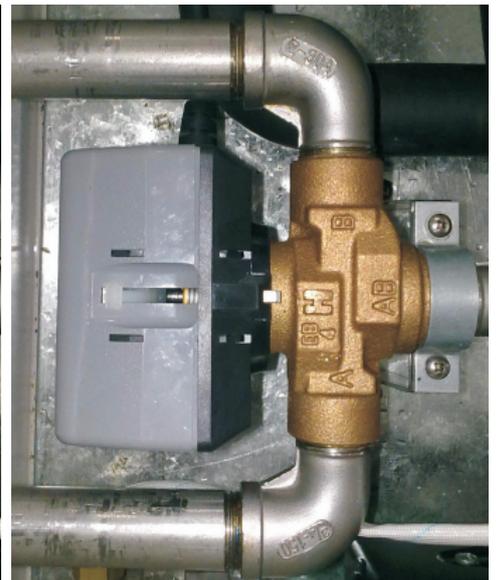
1. Check the heating medium system for leakage;
2. Please follow the fig.1 (on page 10) to connect the pipeline, the water filling pump and the service connections; the capacity of external filling pump must be at least 3 m³/h;
3. Before galvanize to heat pump, Three Way Valve was in "A" state (the state when heat pump leave factory). First of all please close the drain valve and AV valve between the service connections, open AV1/AV2 valves, then start the external water filling pump to evacuate the air inside floor or radiator system. The evacuation time is decided by your load, to evacuate until has not more air coming out.
4. To galvanize the heat pump, Three Way valves gear will turns automatically, at the time "B" port is in open state; please push the white gear of Three Way Valve to the position of middle then press it inside; at the time, both port A and port B are in open state, then evacuate the air in whole water system, it needs a longer time to finish evacuation until has not more air come out from return water pipe.
5. After finish the air evacuation, please use screwdriver to unclench the white gear of Three Way Valve , then it will turn back to port B automatically;
6. Shut the external water filling pump, and close AV1 and AV2 valves, then open AV valve;
7. Recommendation: it would better to install an evacuation valve on the highest place of water system, and it is necessary to have long term water complementarity equipment.



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.



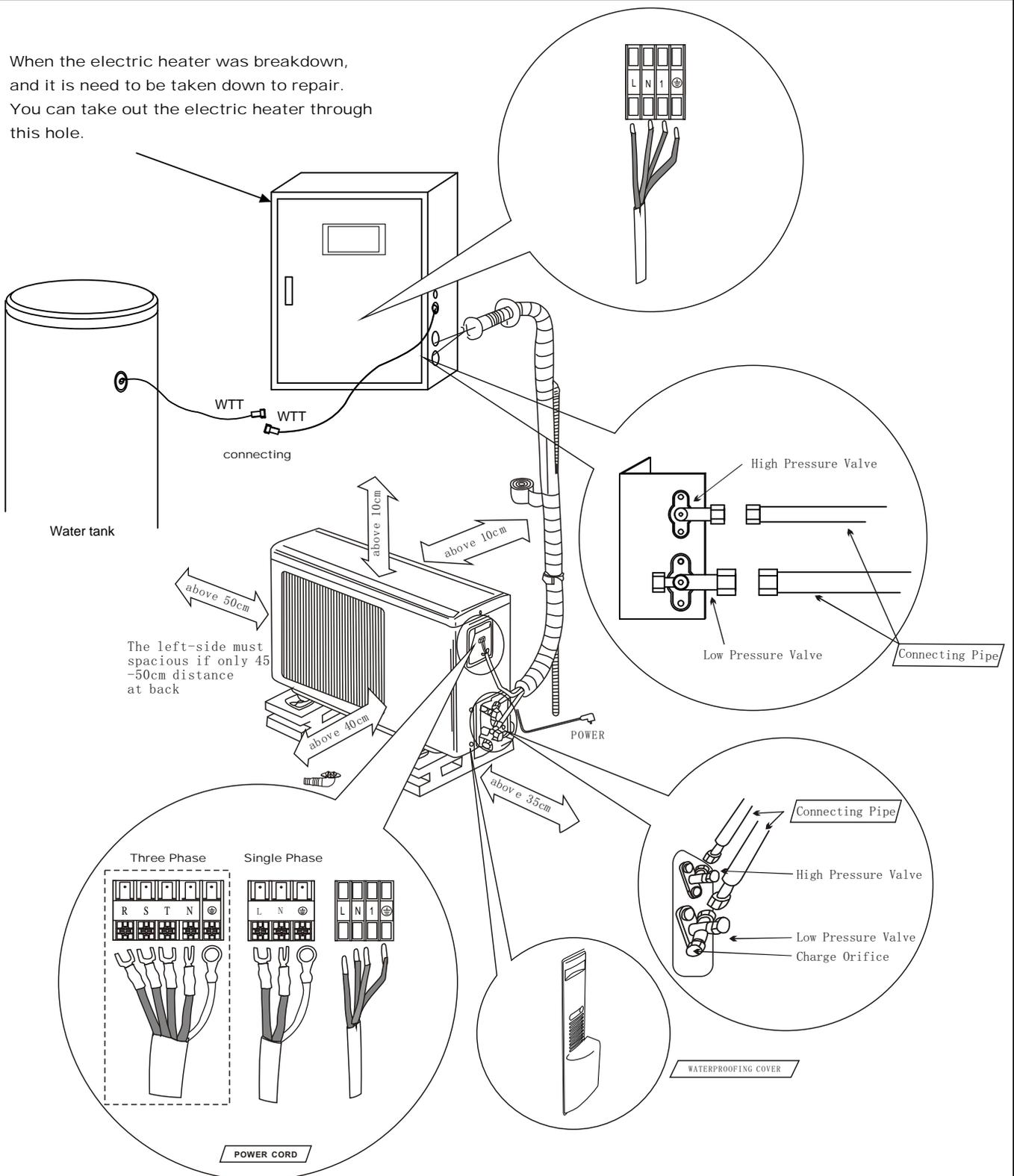
Please use screwdriver to unclench the white gear of the three way valve.



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

10 - Installation Master Plan

When the electric heater was breakdown, and it is need to be taken down to repair. You can take out the electric heater through this hole.



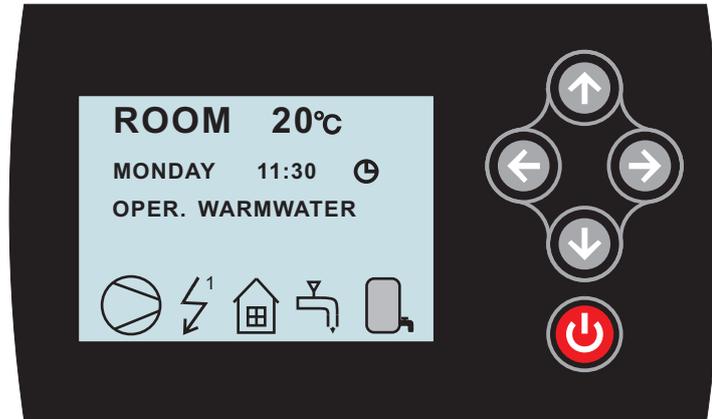
Notice!

Even when heat pump no needs to connect water tank, it must be connected with water tank sensor on the terminal, and put the sensor as the place as Room heating flows sensor, to ensure heat pump works normally.

11 - Description of the order and display panel

Control Panel

The control panel of DC inverter series features a graphic display, five control buttons.



Functions

The control computer is operated with the help of a user friendly menu system that is displayed on the control panel. There is a main menu and several sub-menus accessible from the main menu. The menus are described in detail further down.

To be able to select the desired menu and increase or reduce preset values, you will use the five buttons.

- One button pointing upwards marked with a up arrow
- One button pointing downwards marked with a down arrow
- One button pointing to the right marked with a right arrow
- One button pointing to the left marked with a left arrow
- One button pointing to the ON/OFF

Operating Instructions

General Information

Menu Navigation

The right-hand button on the control panel is used to open the desired menu.

The left-hand button is used to return to the previous menu.

The up and down buttons are used to navigate between the parameters of a menu.

A cursor (arrow) on the left-hand side of the display indicates which menu can be opened.

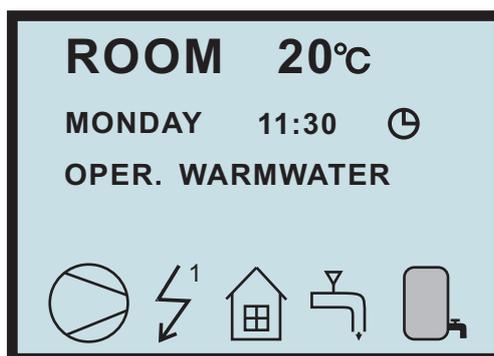
The up and down buttons are also used if you wish to increase or reduce a preset value.

[When display at the interface, press button Right and Left at the same time for 5 seconds to lock the display. All buttons are not available after lock is active, until press button Right and Left at the same time for 5 seconds to open the lock](#)

Display of current operating mode

During normal operation, the following information will be displayed:

- Desired (preset) room temperature
- Date / time / timer
- Whether there is a heating demand or not. If there is, there will also be symbols telling which heat source is working, heat pump or auxiliary heater or both (see "Symbols").
- Which operating mode has been selected.



Symbols

For you to know at a glance the actual operating mode of the heat pump, each of the following symbols will be shown in the lower part of the display depending on which part of the unit is working:



1. The heat pump is running.



2. The auxiliary heater is activated.



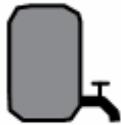
3. There is a room heating demand.



4. Warm water is being produced.



5. Indicates the status of warm water production. If the symbol is empty, warm water temperature is under the setting temperature. It does not mean that there is no water in the water tank. The tank is always full.



6. If the symbol is full, warm water temperature reached to the setting temperature.

NOTICE

During heat pump running, if the water tank symbol twinkles once in every second, it means water tank temperature is too low and it is in antifreezing protection. At the time warm water heating will forcibly start until water temperature get to 20 °C, then go back to previous running mode.

GSP: if display GSP message, means compressor stop for pressure protection. This message will be automatically disappear.

Menus

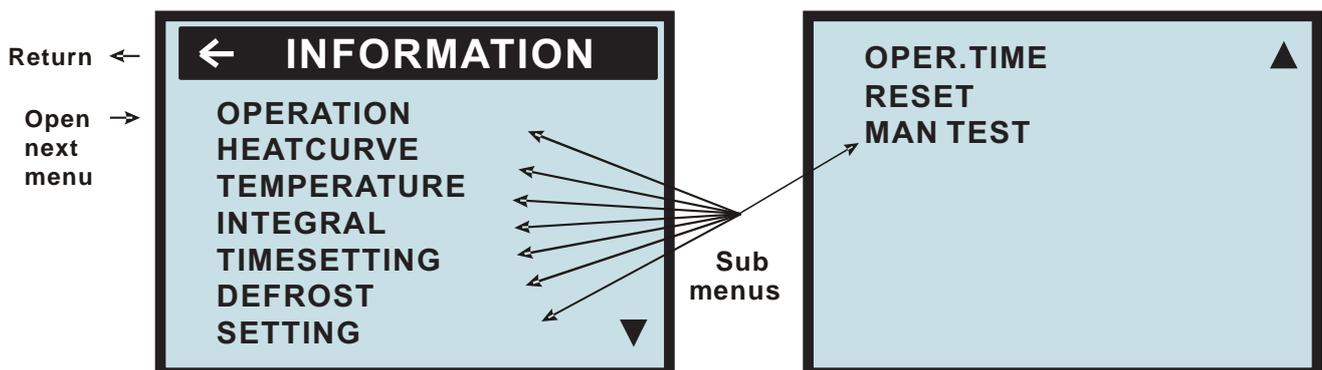
Main Menu INFORMATION

To open the main menu INFORMATION, press the right-hand button once.

To select the desired sub-menu, use the up or down button.

Open the menu by pressing the right-hand button once.

To return to the main menu, press the left-hand button once.



OPERATION

Running mode: Water tank heating, Room heating, Room heating 1, Room heating 2, Auto

HEATCRVE

The setting of this submenu will affect the room temperature; CURVE is program that adjusts feed water temperature according outdoor ambient temperature, factory setting is ambient temperature 0°C as feed water temperature 40°C, that is CURVE =40; the value of CURVE is adjustable from 22°C to 56°C. How to change the slope—two points decide one beeline, point one is (0,40), the other point could be (18,24), the point (18,24) is not changing when changing the slope, because factory setting is that heat pump stops when outdoor ambient temperature is 18°C, so the feed water temperature should be 24°C.

TEMPERATURE

Temperature items setting.

INTEGRAL

Integral is a program to set the startup time and distance between compressor and electrical heater, to set stop conditions of compressor and electrical heater. This program is depends on the "feed water temperature degeneratiaon" and Time.

COMPRESSOR A -60 (0)

ADD1 500 (-60)

TIMESSETTING

To set Time, year, month, date, and week; electrical heater timing, water tank heating timing, whole unit timing.

DEFROST

To set the defrosting manually or automatic defrosting setting

SETTING

To set Emergency mode 1, Emergency mode 2, night mode, day mode, start conditions of electrical heater.

OPER.TIME

To calculate how much time have been running by compressor, electrical heater.

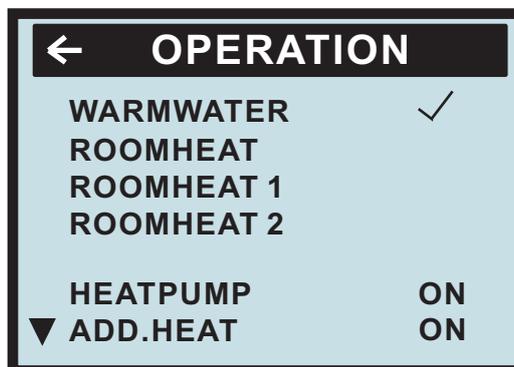
RESET

Return to factory settings: press button Right to go back all factory settings.

MAN TEST

Engineer testing

Sub-Menu OPERATION



WARMWATER :

Water tank heating(warmwater) mode: when enter this mode(under this mode has a program call

'compressor restart determined by water temperature degeneration'), heat pump only heat the water tank. The unit stops running as soon as water tank's temperature gets to setting temperature, then compressor restart determined by water tank temperature degeneration(CMPDIFTEMP)

ROOMHEAT :

Room heating mode: when enter this mode, heat pump only heat the room. In this mode heat pump runs according to the relationship between Time and Feed water temperature, under a constant ambient temperature, operator can change the feed water temperature through slope of the CURVE.

ROOMHEAT1 :

Room heating mode 1: when enter this mode, heat pump only heat the room. In this mode heat pump runs according to Time and Feed water temperature, operator can set the feed water temperature directly (adjustable from 20 to 65°C, factory setting is 45°C)

ROOMHEAT2 :

Room heating mode 2: when enter this mode, heat pump only heat the room. In this mode heat pump runs according to room air temperature, operator can set the room air temperature directly (adjustable from 16 to 31°C, factory setting is 27°C)

WARMWATER+ROOMHEAT (ROOMHEAT1 or ROOMHEAT2) :

Auto mode: select (✓) water tank heating and room heating at the same time, enter Auto mode. After enter this mode, water tank heating has the priority (compressor restart when in water tank heating must follow program 'CMPDI TEMP'). When water tank get to setting temperature, three -way valve will change its direction to room heating automatically. If the water tank temperature decrease, three-way valve's direction will go back to water tank heating.

HEATPUMP (ON or OFF)

ON : select ON, compressor is running normally.

OFF : select OFF, only switch off compressor , the others are running normally.

ADD.HEAT (ON or OFF)

ON : select ON, electrical heater is running normally.

OFF : select OFF, only switch off electrical heater , the others are running normally.

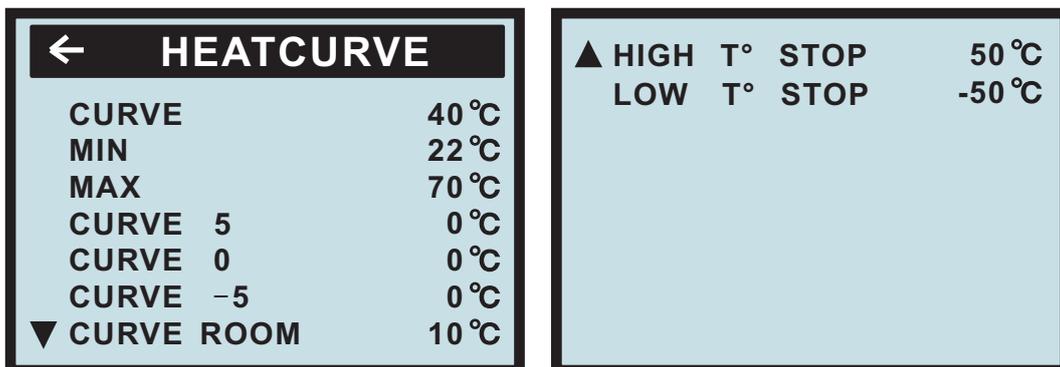
If you wish to change operating mode:

- a. Open the main menu INFORMATION by pressing the right-hand button once. You will find the cursor at the sub-menu named OPERATION.
- b. Open the OPERATION menu by pressing the right-hand button once. You will find the cursor at the previously selected operating mode.
- c. Select the desired mode by pressing either the "up" or "down" button.

Return to the main menu by pressing the left-hand button twice.

Sub-Menu HEAT CURVE

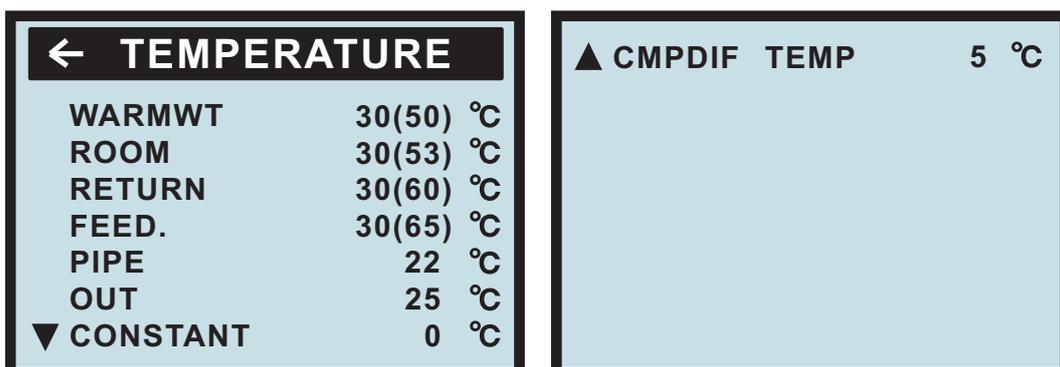
This menu is used for making adjustments that affect the room temperature. For more information, please refer to "Adjustments to be made regularly" on page 25.



Menu Text	Description	Adjustable by
CURVE	The value entered shows the temperature of the water to be distributed to the radiators (feed water temperature) when the outside air temperature is 0°C.	used(see "Adjustment of CURVE value" on p26.)
MIN	Adjustment of value for lowest feed water temperature allowed.	used(see "Adjustment of MIN & MAX value" on p30.)
MAX	Adjustment of value for highest feed water temperature allowed.	used(see "Adjustment of MIN & MAX value" on p30.)
CURVE 5	Adjustment of room temperature when the outside air temperature is +5°C.	used(see "Adjustment of CURVE value" on p26.)
CURVE 0	Adjustment of room temperature when the outside air temperature is 0°C.	used(see "Adjustment of CURVE value" on p26.)
CURVE - 5	Adjustment of room temperature when the outside air temperature is -5°C.	used(see "Adjustment of CURVE value" on P26.)
CURVE ROOM	The translation of heat curve origin: change Room value also can change Curve valve, in this way, the Curve's slope is not change; if change the Curve directly, its slope will change; to change every Room value, the translation of Curve is 1°C.	used(see "Adjustment of CURVE value" on p26.)
HIGH T STOP	When outdoor ambient temperature is higher than this setting, the hot water to room or water tank will be stopped	this setting is adjustable from 0 to 50°C, factory setting is 50°C.
LOW T STOP	When outdoor ambient temperature is lower than this setting, the hot water to room or water tank will be stopped;	this setting is adjustable from 0 to -50 °C, factory setting is -50°C.

Sub-Menu TEMPERATURE

This menu shows the different temperatures of the heating system. All temperature changes registered over the last 60 minutes are stored in the control system and can be viewed in the shape of graphs.



WARMWT: water tank temperature, the first value is water tank real temperature, the second value in ' () ' is water tank setting temperature; the setting temperature is adjustable from 20 °C to 65°C, factory setting is 45°C.(compressor restart must follow the program 'CMPDIF TEMP')

ROOM: room air temperature, the first value is room real air temperature, the second value in ' () ' is room air setting temperature; the setting temperature is adjustable from 16 to 31 °C, factory setting is 27°C.

RETURN: Display real return water temperature.

FEED:

1.the first value is real feed water temperature, the second value in ' () ' is feed water setting temperature in ROOMHEAT MODE, it is adjusted by slope of Curve according to outdoor ambient temperature. Factory setting is that feed water temperature is 40°C when outdoor ambient temperature is 0°C, that is to say Curve is 40, the value of Curve is adjust from 22°C to 56°C. This setting is only available for Room heating, not for water tank heating.

2. under ROOMHEAT 1 mode, FEED setting can be adjust directly from 20 to 65°C, factory setting is 45°C; this setting is only available for room heating, not for water tank heating.

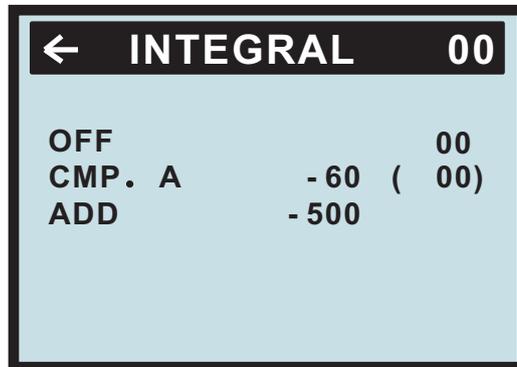
PIPE: Display outdoor unit evaporator temperature (for defrosting)

OUT: Display outdoor ambient temperature.

CMPDIF TEMP: compressor restart determined by water temperature degeneratiaon of water tank. This setting is only for water tank heating, it is adjustable from 3 to 15 °C, and factory setting is 5°C.

When at item WARMWT or ROOM or RETURN or FEED, or PIPE, press button Right 5 seconds will display the information as follow kind of chart, to check how the temperature is going in one hour.

Sub-Menu INTEGRAL



Integral (DM) is a program to set the startup time and distance between compressor and electrical heater according to heat demand and heat output, to set stop conditions of compressor and electrical heater. This program is depends on the "feed water temperature degeneratiaon" and Time. To enter this menu operator can change the factory setting:

Menu Text	Description	Adjustable by
OFF	When the value (testing) reaches the value setting by user, the system will be closed.	USER
CMP.A	When the value (testing) reaches the value setting by user, the compressor will be start-up. And the value (testing) under the value (setting), the compressor will be closed.	USER
ADD	When the value (testing) reaches the value setting by user, the ADD will be start-up.	USER

Instruction of Integral (DM)

Degree Minute = The corresponding value of temperature difference between the Feed water and the Desired water X Running time (through integral to change; every minute for a cumulative)

Temperature difference between the feed water and the desired water (°C)	The corresponding value
-31 ~ -40	-40
-21 ~ -30	-30
-11 ~ -20	-20
-1 ~ -10	-10
1 ~ 10	10
11 ~ 20	20
21 ~ 30	30
31 ~ 40	40

For example:

(Under desired temperature)

Feed water temperature decrease 1°C (under desired temperature) in 1 minutes,

Degree Minute=-10 X 1= -10;

Feed water temperature continue decrease 2°C(under desired temperature) in another 1 minutes,

Degree Minute=-10 X 1 + (-10) = -20;

Feed water temperature continue decrease 3°C(under desired temperature) in another 1 minutes,

Degree Minute=-10 X 1 + (-20) = -30;

Feed water temperature continue decrease 4°C(under desired temperature) in another 1 minutes,

Degree Minute=-10 X 1 + (-30) = -40;

.....

Before the Degree Minute reach - 60 (adjustable) ,the compressor is off, but when the Degree Minute reach - 60 (adjustable) ,the compressor automatic start, and the flow temperature will begin increase.

(Higher than desired temperature) when the actual water supply temperature reach / higher than the desired temperature, the DM will be changed.

For example : the DM was cumulated to -160 in this time.

1 minutes later when the Feed water temperature higher than desired temperature for 1°C.

10X1=10 , Degree Minute= -150;

Another 1 minutes later when the Feed water temperature higher than desired temperature for 2°C. 10X1=10, Degree Minute= -140;

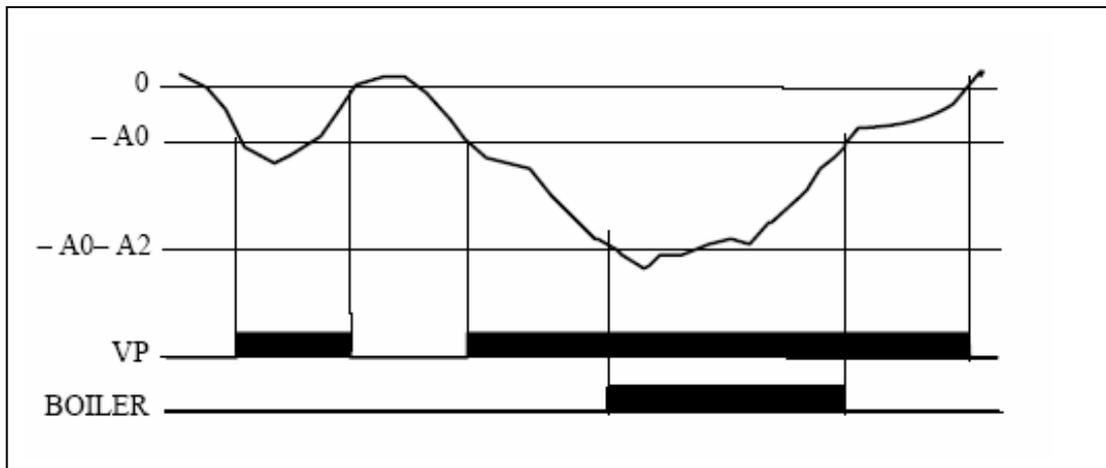
Another 1 minutes later when the Feed water temperature higher than desired temperature for 3°C. 10X1=10, Degree Minute= -130;

Another 1 minutes later when the Feed water temperature higher than desired temperature for 4°C. 10X1=10, Degree Minute= -120;

.....

Compressor off when Degree Minute reach 0 (adjustable) .

The relationship between compressor (on and off) and DM, the relationship between heater (on and off) and DM.



The above chart is describing that running of compressor and electrical heater depend on Integral
The compressor's DM is -60 start, 0 is off, A0=-60 startup.

Electrical heater's DM is -500 start, when the feed water temperature reach the setting value the electrical heater is off, A0+A2=-60-440=-500 start up.

Start process (water tank and room heating)

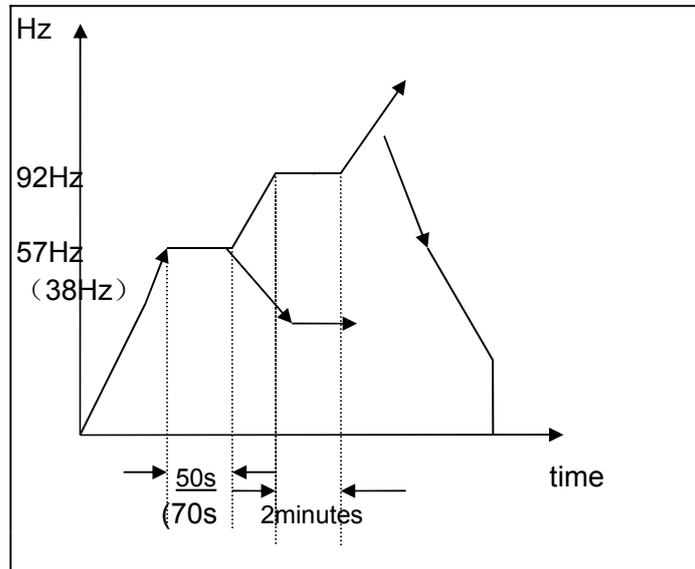
- 1) The compressor will keep running for a while at frequency points 57Hz, 92Hz when its state from sleeping to starting;
- 2) Compressor keep running for 50 seconds at frequency 57Hz, keep running for 2 minutes at 92Hz
- 3) When the start objective frequency ≤ 57 Hz , the frequency is going up to 57 Hz as speed 0.5Hz/s, then keep running 50 seconds at 57Hz, and then it is going down to objective frequency as speed 0.5Hz/s
- 4) When the start objective frequency < 92 Hz, it does not need to run at point 92Hz; when the start objective frequency ≥ 92 Hz, it does need to run at point 92Hz two minutes. If during the time of running at point 92Hz, the frequency is going down cause by some reasons such as protection or frequency limited(the time is not enough for 2 minutes), then when frequency is going up more than 92Hz, it does not need to run at point 92Hz for 2 minutes.
- 5) When outdoor ambient temperature > 28 degree, if the setting heating mode starts, it will does not need to run at point 57Hz, but run at point 38Hz, the running time will be 70 seconds, and then the frequency is going down to objective frequency as speed 0.5Hz/s; if during the time of running at point 38Hz, the outdoor ambient temperature ≤ 26 degree, and then it can go up continuously to point 57Hz, and then it is going down to objective frequency as speed 0.5Hz/s.

The speed of frequency going up

- ① when frequency < 57 Hz, the speed of frequency going up is 0.5Hz/S;
- ② when frequency ≥ 57 Hz, the speed of frequency going up is 0.5Hz/S

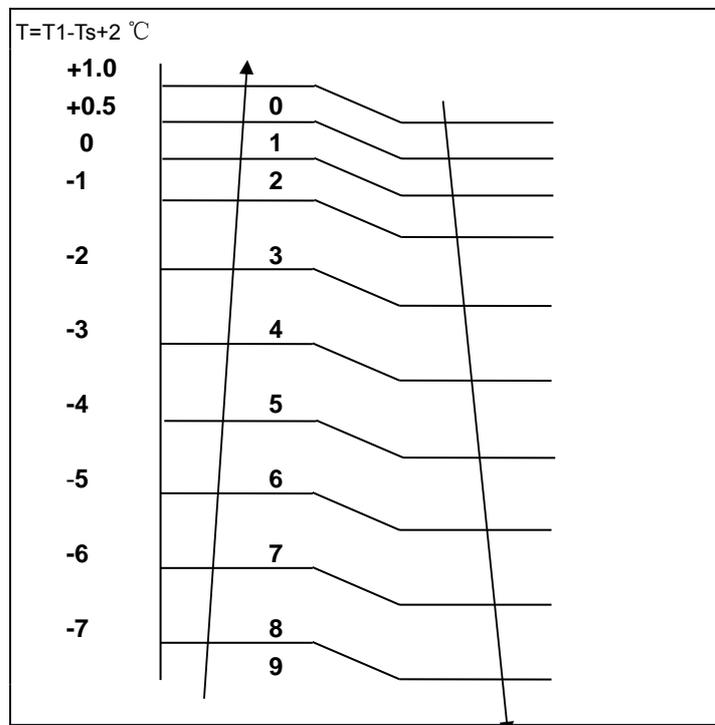
The speed of frequency going down

- ① when frequency > 57 Hz, the speed of frequency going down is 0.5Hz/S;
- ② when frequency ≤ 57 Hz, the speed of frequency going down is 0.5Hz/S;



The constant temperature function is only available in Room heating, but not in water tank heating. Constant temperature function has three kinds: return water, Integral (DM) and Constant room temperature

1. The constant area diagram of return water temperature: T_1 , room return water temperature, T_s , room air setting temperature or feed water temperature.



After compressor start running, when 'setting return water temperature – actual return water temperature \leq constant temperature setting, and the electrical heater does not start, then enter constant temperature control

The temperature and its frequency during constant temperature program. Recorded by the above chart $\Delta T = T_1 - T_s + 2^\circ\text{C}$, ΔT has 10 areas, from 0 to 9, the rule of constant temperature program's frequency is follow:

- a) when ΔT is changing
 - i) When ΔT is increasing, the frequency increase 1 to run
 - ii) When ΔT is decreasing, the frequency decrease 1 to run
- b) when ΔT stay at a area as 3 minutes, the rules as follow:
 - 4 ~ 8: the present frequency increase 1(keep 10 min to increase 1) , until get the maximum frequency.
 - 3: frequency is unchanged
 - 0~2: The present frequency decrease 1 to run, until the frequency is get to F1

2. Constant temperature of Integral:

The constant area is from 00 to -500 (DM)

It is running as integral changing.

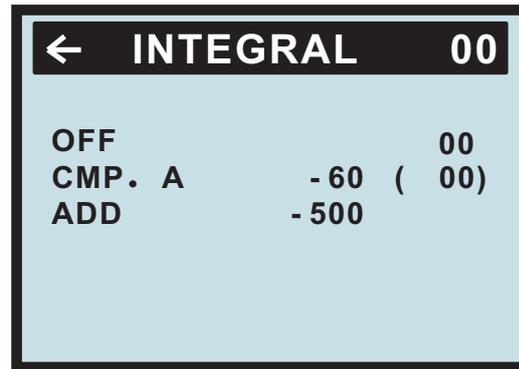
1: When integral is coming to negative side, the frequency is increase 1 to run; the frequency will unchangeable until get to maximum integral;

2: When integral is coming to positive side, the frequency is decrease 1 to run; the frequency will unchangeable until get to minimum integral.

3: Room air constant temperature

a) When ΔT is increasing, the frequency increase 1 to run; ΔT will unchangeable until frequency is get to maximum.

b) When ΔT is decreasing, the frequency is decrease 1 to run. If the present frequency is F1, the frequency is unchangeable even if ΔT decrease.

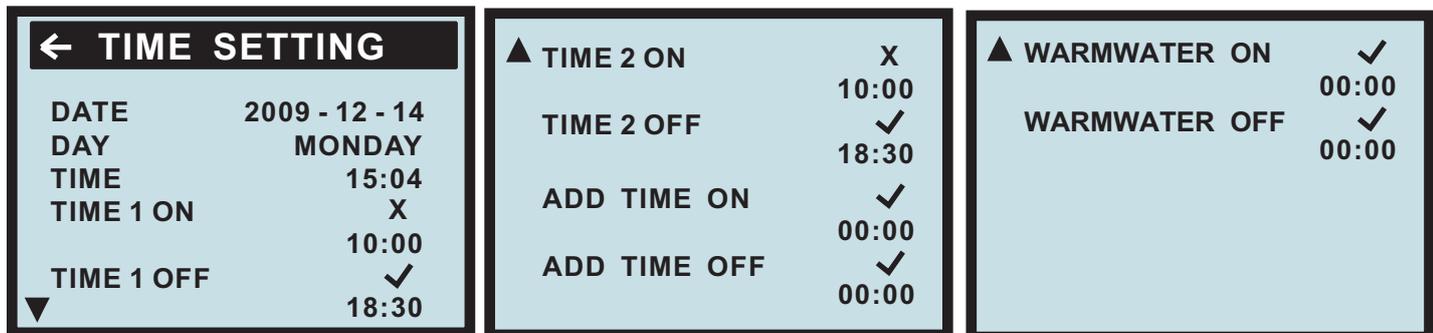


Sub-Menu TIMESETTING

How to enter the Sub-Menu TIMESETTING:

You need to choose the " TIMESETTING" on the main menu (INFORMATION).

Press the right button. Then " TIMESETTING" menu can be seen.



TIMESETTING: use button Up and down to select each item.

DATE

To display year, month, date.

DAY

TO display day of week.

TIME

To display time, or adjust time.

Double timer function:

TIMER1 ON : ✓ 9: 00 TIMER1 OFF ✓ 12: 00

TIMER2ON : ✓ 14: 00 TIMER2 OFF ✓ 18: 00

TIME ON

When choose mark "✓", the Auto start function is active, choose "x" for cancel this function. If this function is active, every day during the timing, the heat pump will work normally.

TIME OFF

When choose mark "✓", the Auto stop function is active, choose "x" for cancel this function. If this function is active, every day during the timing, the heat pump will stop normally.

ADD TIME ON

When choose mark "✓", the Auto start function of electrical heater is active, choose "x"for cancel this function. If this function is active, every day during the timing, the electrical heater will work normally.

ADD TIME OFF

When choose mark "✓", the Auto stop function of electrical heater is active, choose "x"for cancel this function. If this function is active, every day during the timing, the electrical heater will stop normally.

WARMWATER ON

When choose mark "✓", the Auto start function of water tank is active, choose "x"for cancel this function. If this function is active, every day during the timing, the water tank heating will work normally.

WARMWATER OFF

When choose mark "✓", the Auto stop function of water tank is active, choose "x"for cancel this function. If this function is active, every day during the timing, the water tank heating will stop normally.

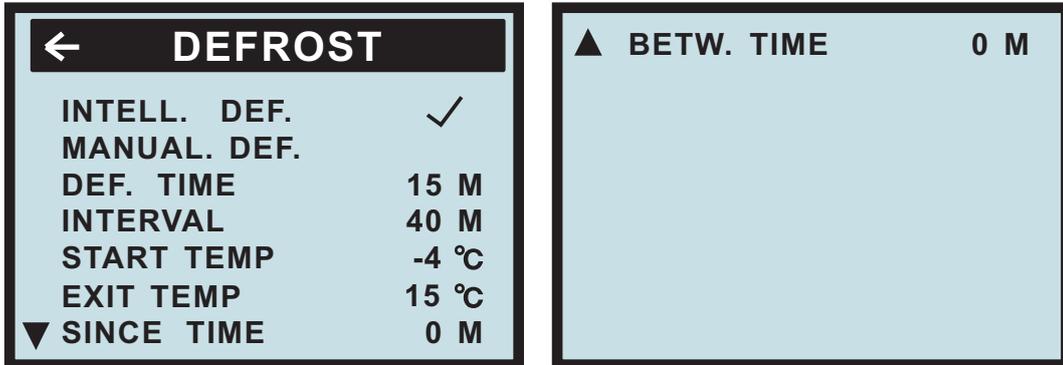
Sub-Menu DEFROST

How to enter the Sub-Menu DEFROST:

You need to choose the "DEFROST" on the main menu (INFORMATION).

Press the right button. Then " DEFROST" menu can be seen.

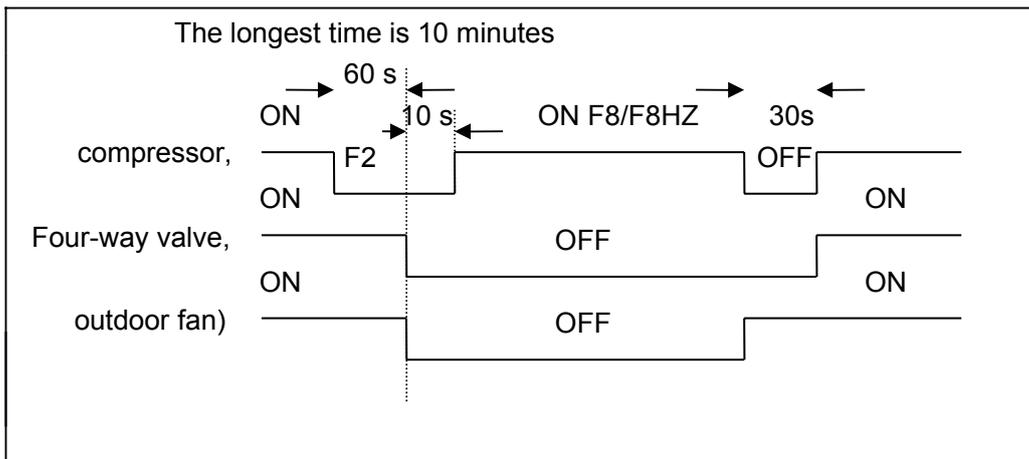
You can choose " Intell Defrost" or " Manual Defrost"



INTELL.DEF:

Intelligent defrost program: after you choose this function, defrost program is intelligent and automatical; when outdoor unit's heat changer (evaporator)'s pipe temperature is less than 3 °C continuously for 40 minutes, and the temperature is less than setting temperature, will start the defrosting.

After defrosting:



In Intelligent defrost mode, operator can adjust the setting of defrosting according to different ambient temperature and humidity.

Select START TEMP, then press button Right for a long time, to enter the defrosting setting:

Outdoor ambient temperature	Defrost start temperature (pipe at evaporator)	Outdoor ambient temperature	Defrost start temperature (pipe at evaporator)	Outdoor ambient temperature	Defrost start temperature (pipe at evaporator)
2	-3	-7	-11	-16	-20
1	-3	-8	-12	-17	-21
0	-4	-9	-13	-18	-22
-1	-5	-10	-14	-19	-23
-2	-6	-11	-15	-20	-24
-3	-7	-12	-16	-21	-25
-4	-8	-13	-17	-22	-26
-5	-9	-14	-18	-23	-27
-6	-10	-15	-19	-24	-28

When choose Intelligent defrost mode, the Defrost start temperature will be the same as above form when the ambient temperature is lower than 2 degree, all the value of the form is factory setting and they are adjustable from 0 to -30 degree. Press button Right 5 seconds to enter the form, operator can select any defrost start temperature and revise it. For example, after change the defrost start temperature to be -12 degree under ambient temperature is -3 degree, all the defrost temperature which more than -12 degree will change automatically to -12 degree under the kinds of ambient temperature which less than -3 degree.

Outdoor ambient temperature	Defrost start temperature (pipe at evaporator)	Outdoor ambient temperature	Defrost start temperature (pipe at evaporator)	Outdoor ambient temperature	Defrost start temperature (pipe at evaporator)
-3	Change to -12	-6	Change to -12	-9	Remain-13
-4	Change to -12	-7	Change to -12	-10	Remain-14
-5	Change to -12	-8	Remain-12	-11	Remain-15

After confirmation, the factory setting will change to above and be as new default.

MANUAL.DEF:

Manually defrost (adjustable defrost program): This function is semi-automatic. For example, operator can change the value of INTERVAL(the distance between two defrosting) to be 40 min, and the START TEMP(the start temperature of defrosting) to be -4degree, when the defrosting time request and temperature request were meet at the same time, heat pump go to defrost.

Defrost finish: when outdoor evaporator pipe temperature (EXIT TEMP)'s setting is 15 degree or EXIT TIME (defrosting timing), the defrosting will finish as soon as get one of them.

DEF.TIME:

Duration of defrosting, adjustable from 2 to 20min(factory setting is 15min) defrosting duration

INTERVAL:

Interval of defrosting , adjustable from 25 to 70min(factory setting is 40min)

START TEMP:

Start temperature of defrosting(pipe temperature of outdoor evaporator), adjustable from 2 to -30 degree (factory setting is -4 degree)

EXIT TEMP:

Exit temperature of defrosting(pipe temperature of outdoor evaporator), adjustable from 0 to 20degree (factory setting is 15degree)

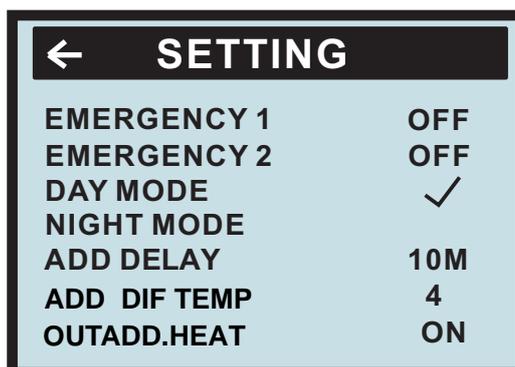
SINCE TIME:

Start and exit time of defrosting, to indicate whole time of defrosting.

BETW.TIME:

To record the interval between the ending of first defrosting and the beginning of second defrosting.

Sub-Menu SETTING



EMERGENCY1 (ON or OFF)

Emergency mode 1 (emergency 1) : (ON or OFF), factory setting is OFF (after select emergency mode, the unit will continuously execute the same objective (room heating only, water tank heating only, or auto)

When select ON, compressor will be switch off, only electrical heater, water pump or other temperature protection are available. When in water tank heating, the electrical heater will instead of compressor; when in room heating mode, the electrical heater will runs depends on Integral; when in room heating mode 1, the electrical heater will runs depends on Integral; when in room heating mode 2, the electrical heater automatically starts, unless operator off the electrical heater.

EMERGENCY2(ON or OFF)

Emergency mode 2 (emergency 2) : (ON or OFF), factory setting is OFF: (after select emergency mode, the unit will continuously execute the same objective (room heating only, water tank heating only, or auto)

When select this mode, compressor will stop determined by outdoor ambient temperature, the temperature setting is from 0 to -50 degree adjustable, factory setting is -25 degree, only electrical heater, water pump or other temperature protection are available. When in water tank heating, the electrical heater will instead of compressor; when in room heating mode, the electrical heater will runs depends on Integral; when in room heating mode 1, the electrical heater will runs depends on Integral; when in room heating mode 2, the electrical heater automatically starts, unless operator off the electrical heater.

DAY MODE

Day mode : when select this mode , the time from 9 : 00 to 17 : 00, the actual feed water temperature will less than setting temperature 3 degree, because people go out for work or something, no as much heat demand as usual.

NIGHT MODE

Night mode: when select this mode, the time from 17:00 to 9:00, the actual feed water temperature will more than setting temperature 3 degree, because at night heat demand will increase as soon as temperature goes down in the evening.

ADD DELAY 10M

Time delay of electrical heater starting: from 3 to 30 minutes adjustable, factory setting is 10 minutes. For example, since compressor has been running 15 minutes, when 10 minutes (factory setting) later the return water temperature remain or decrease, the electrical heater will start automatically.

ADDIF TEMP

Additional electrical heater restart determined by water temperature degeneration: it is adjustable from 1 to 10 degree (factory setting is 4 degree); the electrical heater will stop when the water get to setting temperature, then restarts as soon as the water temperature decrease 4 degree (factory setting)

OUTADD.HEAT ON (OFF)

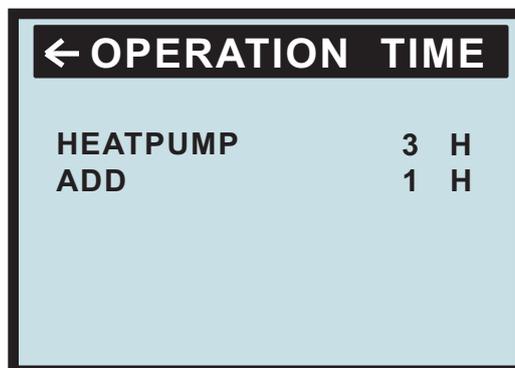
To control outdoor unit electrical heater (bottom electrical heater, evaporator heater), factory setting is ON, the heater will start when ambient temperature is less than 0 °C, and stop when ambient temperature is more than 2 °C

When the outdoor electrical heater is select OFF, the outdoor heater can not start automatically.

Display : OUT ADD . HEAT OFF

Sub-Menu OPERATING TIME

Menu OPERATING TIME



← OPERATION TIME	
HEATPUMP	3 H
ADD	1 H

Menu Text	Description	Adjustable by
HEATPUMP	Total operating hours of heat pump since installation. Operating time will not be reset to zero.	
ADD	Total operating hours of auxiliary heater (2kW/3kW/4kW) since installation. Operating time will	

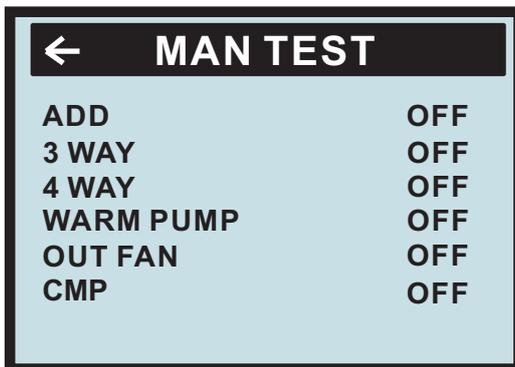
Sub-Menu RESET

Reset to factory setting value.

Sub-Menu MAN TEST

How to enter the Sub-Menu MAN TEST:

You need to choose the " MAN TEST" on the main menu (INFORMATION) And press the right button for 3 second .



Man test for installation

On sub-menu OPERATION---MAN TEST

ADD	ON or OFF	ADD (electrical heater)
3 WAY	ON or OFF	3-WAY VALVE
4 WAY	ON or OFF	4-WAY VALVE
WARM PUMP	ON or OFF	WATER PUMP
OUT FAN	ON or OFF	OUTDOOR FAN
CMP	ON or OFF	COMPRESSOR

P.S : the compressor only runs 5 minutes for testing, at that time its frequency is 45Hz.

This menu is for installation engineer, user operation is prohibitive. The testing function will dissolve as soon as the menu is off the interface.

Adjustments to be made regularly

Most settings will be made by the installation contractor in connection with installation. Adjustments to be made regularly by the user are the following:

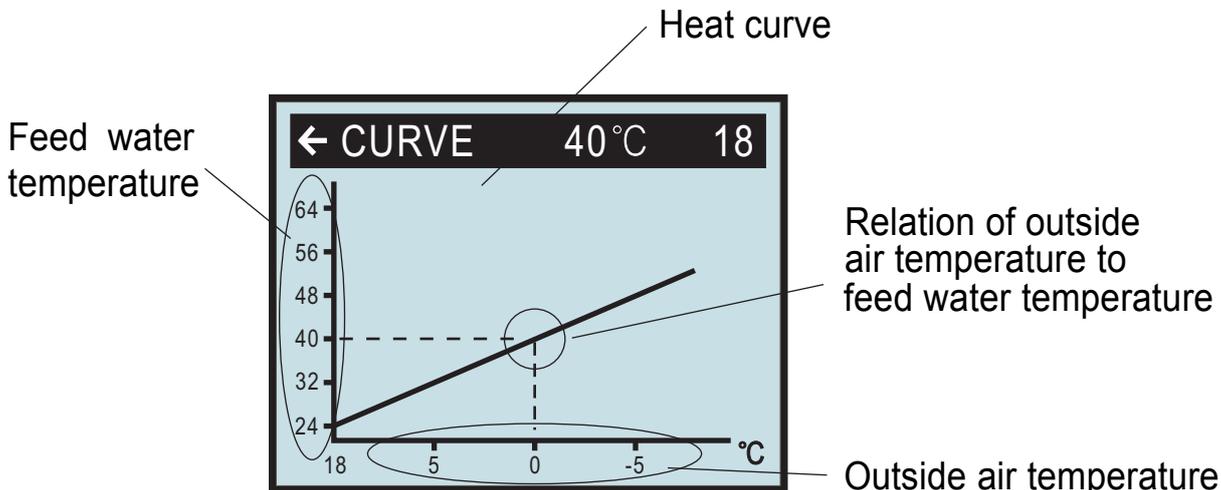
- Selection of operating mode
- Adjustment of desired room temperature by changing the ROOM value.
- Adjustment of heat curve
- Adjustment of maximum and minimum values for feed line temperature

Heat Generation - General

The indoor temperature should be adjusted by changing the heat curve of the installation. The control computer determines the correct temperature of the water to be distributed to the heating system based on the heat curve. The heat curve will be adjusted in connection with installation. It must be adapted later on, however, to obtain a pleasant indoor temperature under any weather condition. A correct heat curve reduces maintenance and saves energy.

The heat curve determines the feed line temperature depending on the outside air temperature. The lower the outside air temperature, the higher the feed line temperature. In other words, the temperature of the water feed to the radiators will increase exponentially as the outside air temperature falls.

If you select CURVE in the sub-menu named HEAT CURVE, a diagram will be displayed. It represents the relation of outside air temperature to feed line temperature. This relation is referred to as heat curve.



Adjustment of the CURVE value

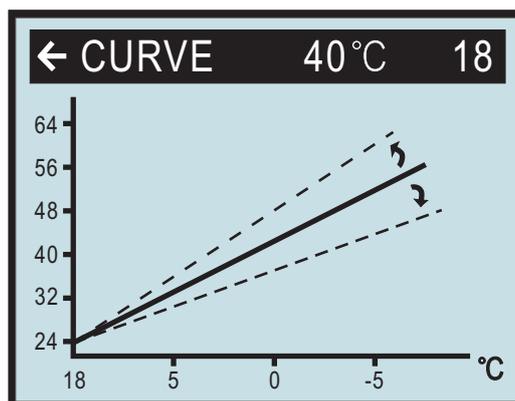
The heat curve will be adjusted by the CURVE value. This value indicates the feed line temperature to the radiators at 0°C outside temperature. At outside air temperatures lower than 0°C, the water sent to the radiators will be warmer than 40°C.

At outside temperatures higher than 0°C, the water will be colder than 40°C. When you increase the CURVE value, the heat curve will become steeper and when you reduce it, it will become flatter.

This is the most energy and cost efficient way to set the indoor temperature and should therefore be used for long term temperature settings. If you wish to make a temporary change of temperature, you can simply change the ROOM value (see "Adjustment of the ROOM value" on page).

CURVE is program that adjusts feed water temperature according outdoor ambient temperature, factory setting is ambient temperature 0°C as feed water temperature 40°C, that is CURVE =40; the value of CURVE is adjustable from 22°C to 56°C.

How to change the slope—two points decide one beeline, point one is (0,40), the other point could be (18,24), the point (18,24) is not changing when changing the slope, because factory setting is that heat pump stops when outdoor ambient temperature is 18°C, so the feed water temperature should be 24°C.



If you wish to change the CURVE value:

1. Open the main menu INFORMATION by pressing the right-hand button once. You will find the cursor at the sub-menu named OPERATION
2. Press the "down" button to move the cursor to the sub-menu called HEAT CURVE.
3. Press the right-hand button once to open the menu. You will find the cursor at the parameter CURVE
4. Open the selected parameter by pressing the right-hand button once.
5. Increase or reduce the preset value using the "up" or "down" button. You will see from the diagram how the gradient of CURVE changes.

Press the left-hand button three times to return to the main menu.

Adjustment of ROOM value (CURVE ROOM)

As mentioned above, you can also adjust heat curve and indoor temperature by changing the ROOM value. If you use ROOM value to adjust the heat curve, the gradient does not change, i.e. it doesn't become steeper or flatter. Instead, the whole curve is moved by 1°C for every degree by which the ROOM value is changed.

The relation feed line temperature to outside air temperature will not be affected. The feed water temperature will be increased or reduced by the same number of degrees all along the heat curve. See the following diagram.

Adjustment of the ROOM value should only be used for temporary changes of the indoor temperature.

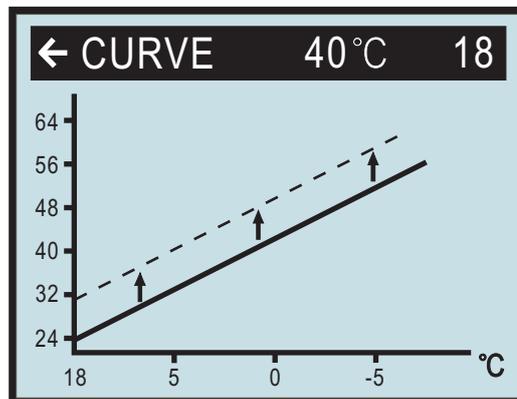
For long term settings, the CURVE value should be adjusted as this is the most energy and cost efficient way to set the indoor temperature.

For adjusting the heat curve, please refer to the chapter "Adjustment of the CURVE value" on page .

You need to choose the "ROOM CURVE" on the Sub-menu (HEATCURVE), then press the right button.

Use UP and DOWN button to adjust the " ROOM CURVE".

Factory setting of ROOM value is 20°C.



Changing the ROOM CURVE

If you wish to change the ROOM CURVE:

1. Press the "up" or "down" button once to open the ROOM CURVE for adjustment.
2. Increase or reduce the preset value using the "up" or "down" button so that the desired room temperature is reached. Wait for 10 seconds or press the left-hand button once to return to the main menu.

When enter 'Room heat' mode, user could control compressor and electrical heater through regulate heat curve or DM (degree minute).

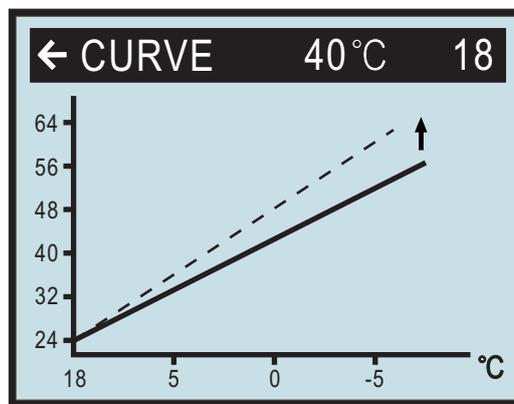
under a certain ambient temperature ,the time start of compressor is determined by degree minute(DM).

Now we are giving two situations to explain.

1. 'start quickly' is determined by FEED(heat curve)

Suppose now the feed water temperature is 25°C; regulate the heat curve to let the setting of water temperature to be a higher value such as 55°C,that is FEED25(55). At that time, DM (degree minute) decrease -30 per minute, when the DM reach -60, compressor will start right away.

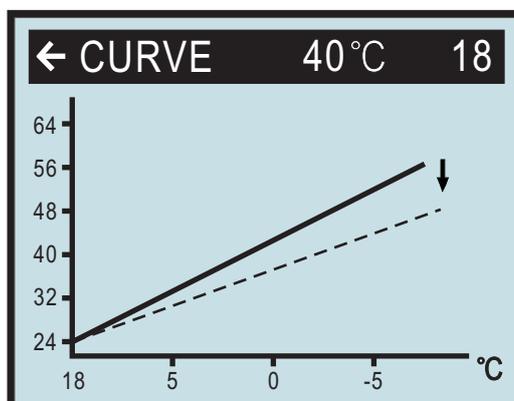
(**Notice:** if the water temperature setting is lower than feed water temperature DM would turn to positive number, and then compressor does not start. Of course, you also can regulate the DM to be near the value for compressor start, such as -20).



turn it up

2. 'start slowly' is determined by FEED(heat curve)

Suppose now the feed water temperature is 25°C,if regulate the heat curve to let the setting of water temperature to be a lower value such as 30°C, that is FEED25(30); at that time, the DM would decrease - 10 per minute, the time to reach -60 is becoming longer, only after some time, then compressor can start. You also can regulate the DM to be more far away from the value for compressor start, such as (-100).



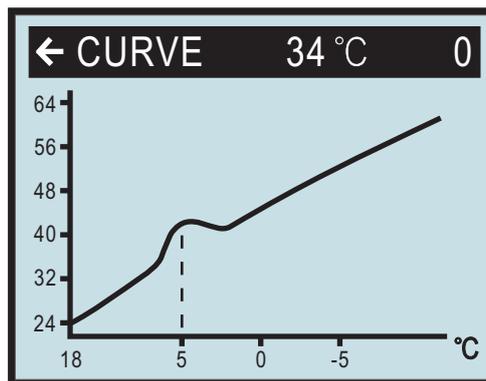
curve is a little flat

When enter room heat mode, it needs customer to regulate the heat curve or DM (degree minute) according to own request.

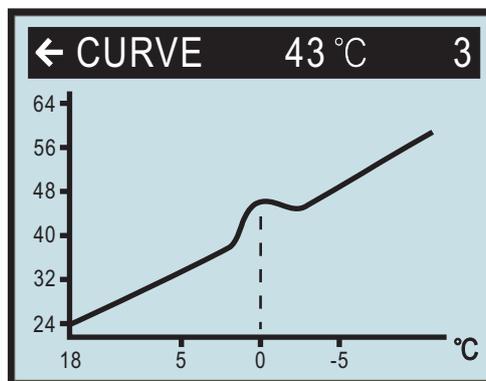
Adjustment of Part of the Heat Curve

At outdoor temperatures between -5°C and $+5^{\circ}\text{C}$ part of the heat curve may need adjusting if the indoor temperature does not stay at the preset ROOM value. For this reason, the control system includes a function adjusting the curve at three outside temperatures: -5°C , 0°C , $+5^{\circ}\text{C}$. This function will allow you to increase or reduce the feed line temperature, without affecting the heat curve, at three specific outdoor temperatures. If, for example, the outside temperature is -5°C , the feed line temperature will change gradually in the outdoor temperature range of 0°C to -10°C , maximum adjustment being reached at -5°C . The diagram below shows an adjusted CURVE -5. The point of maximum adjustment is clearly visible.

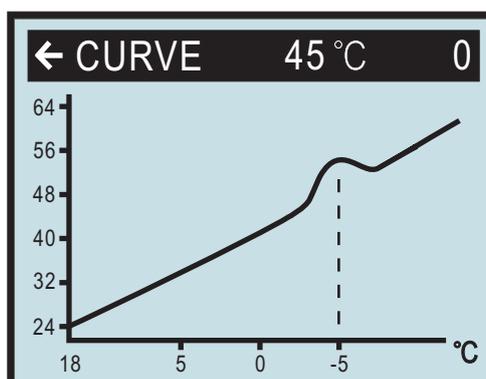
As we have seen, you can choose to adjust the heat curve at three specified outside air temperatures: -5°C , 0°C and $+5^{\circ}\text{C}$. The feed line temperature can be changed by plus/minus 3 degrees.



When outdoor ambient temperature is 5°C , this setting is available to change the feed water temperature, it is adjustable by operator: heat curve is not change (the slope is no change), but the point near 5°C (from 0°C to 10°C), curve can be change step by step; the variable is the biggest at 5°C , it is $\pm 3^{\circ}\text{C}$



When outdoor ambient temperature is 0°C , this setting is available to change the feed water temperature, it is adjustable by operator: heat curve is not change (the slope is not change), but the point near 0°C (from -5°C to $+5^{\circ}\text{C}$), curve can be change step by step; the variable is the biggest at 0°C , it is $\pm 3^{\circ}\text{C}$.



When outdoor ambient temperature is -5°C , this setting is available to change the feed water temperature, it is adjustable by operator: heat curve is not change (the slope is not change), but the point near -5°C (from 0°C to -10°C), curve can be change step by step; the variable is the biggest at 0°C , it is $\pm 3^{\circ}\text{C}$.

If you wish to change a specific part of the heat curve:

1. Open the main menu INFORMATION by pressing the right-hand button once. You will find the cursor at the sub- menu OPERATION.
2. Press the "down" button to move the cursor to the sub-menu HEAT CURVE.
3. Open the selected menu by pressing the right-hand button once. You will find the cursor at the parameter CURVE.
4. Using the "up" or "down" button, select either CURVE 5, CURVE 0 or CURVE -5.
5. Open the selected curve by pressing the right-hand button once.
6. Raise or lower the value, using respectively the "up" or "down" button. To return to the main menu, press the left- hand button three times.

Adjustment of the HIGH T STOP and LOW T STOP

The HIGH T STOP and LOW T STOP function stops all production av radiator heat when the outside air temperature is equal to higher or lower than the value entered for HIGH T STOP or LOW T STOP. When the function is activated, the circulation pump will be turned off. The factory setting of the HIGH T STOP is 50°C.(0 -50 °C adjustable) The factory setting of the LOW T STOP is -50°C.(-50 -0 °C adjustable)

If you wish to change the HIGH T STOP OR LOW T STOP value:

- 1 Open the main menu INFORMATION by pressing the right- or left-hand button once.
You will find the cursor at the sub-menu OPERATION
- 2 Press the "down" button to move the cursor to the sub-menu HEAT CURVE
- 3 Open the selected menu by pressing the right-hand button once.
- 4 You will find the cursor at the parameter CURVE.
- 5 Press the "down" button to move the cursor to HIGH T STOP or LOW T STOP.
- 6 Open the selected parameter by pressing the right-hand button once. The cursor moves to HIGH T STOP or LOW T STOP.
- 7 Raise or lower the value, using respectively the "up" or "down" button.
- 8 Press the left-hand button three times to return to the main menu.

Adjustment of the MIN and MAX value

The MIN and MAX value is the lowest respectively highest value that is allowed for the supply line temperature. Adjusting the minimum and maximum supply line temperature is particularly important if your home has floor heating. If your house has floor heating and parquet floor, the supply line temperature should not be higher than 45°C. Else the floor might get damaged. If you have floor coils and stone tiles, the MIN value should be 22-25°C in summer when no heating is required to obtain a comfortable floor temperature.

If there is a basement to your house, the MIN value should be adjusted to a suitable temperature in summer too, to avoid a humid and chilly basement. In such cases, the value for HEAT STOP needs being adjusted upwards. If you wish to change the MIN or MAX value:

MIN

MIN is the minimum setting of feed water temperature; it is adjustable by operator from 10 to 30 °C, factory setting is 22°C; if the room's floor use ceramic tile, then the setting of MIN can not less than 22°C (this value can get a comfortable floor temperature); the heat pump will restart as soon as actual feed water temperature less than MIN setting.

MAX

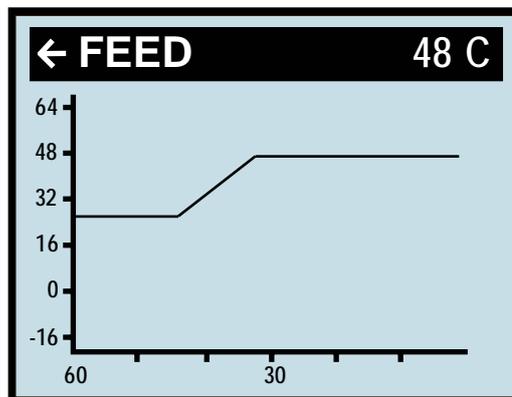
MAX is the maximum setting of feed water temperature, it is adjustable by operator from 30 to 70°C, and factory setting is 70°C; if heat pump is using for floor heating, this setting is very important, because at the time the feed water temperature can not higher than 70°C, otherwise could be dangerous; the heat pump will stop as soon as actual feed water temperature more than MAX setting.

1. Open the main menu INFORMATION by pressing the right- or left-hand button once. You will find the cursor at the sub-menu OPERATION
 2. Press the "down" button to move the cursor to the sub-menu HEAT CURVE
 3. Open the selected menu by pressing the right-hand button once. You will find the cursor at the parameter CURVE.
 4. Press the "down" button to move the cursor to MIN.
 5. Open the selected parameter by pressing the right-hand button once. The cursor is at MIN
 6. Raise or lower the value, using the "up" and "down" button respectively.
 7. Press the left-hand button three times to return to the main menu.
- Repeat the procedure to change the MAX value, replacing MIN by MAX at step 4.

Graph of recent changes in TEMPERATURE

All temperatures registered during the last hour can be viewed in the sub-menu TEMPERATURE in the shape of a graph. This will enable you to monitor changes in the different system temperatures.

When at item WARMWT or ROOM or RETURN or FEED, or PIPE, press button Right 5 seconds will display the information as follow kind of chart, to check how the temperature is going in one hour.



There is a graph available for all temperatures, where you can only view the set point value. The integral value that is displayed represents the heating system's energy balance.

If you wish to check the TEMPERATURE graphs:

- 1 Open the main menu INFORMATION by pressing the right- or left-hand button once. You will find the cursor at the sub-menu OPERATION.
- 2 Press the "down" button to move the cursor to the sub-menu TEMPERATURE.
- 3 Open the menu by pressing the right-hand button once.
- 4 You will find the cursor at the parameter OUT.
- 5 Press the "down" or "up" button to move the cursor to the desired temperature.
- 6 Open the selected value by pressing the right-hand button 5 seconds. A graph will be shown in the display.
- 7 Move the cursor along the time axis using the "up" (plus) or the "down" (minus) button. The exact temperature at the selected point of time appears at the top of the display.
- 8 Press the left-hand button three times to return to the main menu.

12 - Regular operations of maintenance

Washing the sand filter of your filtration installation :

Stop the Heat pump

Wintering :

Stop and put the heat pump out of tension;

Stop and put the filtration pump out of tension;

Close the 2 isolating valves nearest of the indoor unit;

Entirely unscrew the 3 connections on the indoor unit and have each pipe slip to make leave the openings coming out from the indoor unit ; the Indoor unit gets empty, wait for the complete emptying. (THE EXCHANGER MIGHT BURST IF IT HAS NOT EMPTIED COMPLETEY)

Put back each pipe to its place and screw again the connections to entirely close again (to avoid little animal's entry) Remark : supplement the draining of your filtration installation or call your fitter (all your installation must be protected against the freezing)

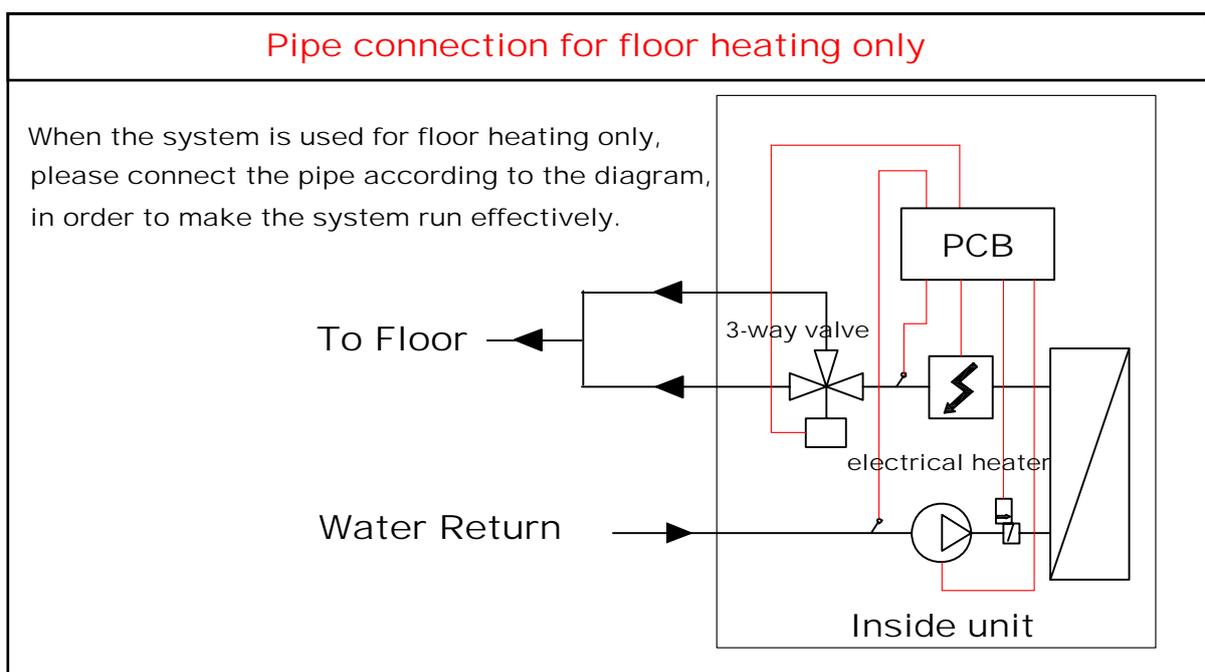
Maintenance :

Make sure that nothing comes to block the grids radiator, if it's necessary clean it with a soft brush (no water jet under pressure)

Make sure that the grids are right, rectilinear, if it's necessary rectify them with a fine comb

Make sure that the flue of the condensates is not blocked

13 - Pipe connection for floor heating only



14 – Error codes

This table explains the error codes caused by a defective regulating component or by a security operation. You have to call your retailer.

DISPLAY EEPROM	EEPROM reading error from display
DISPLAY-INDOOR COMMUNICATE	The communications mistake between display and indoor circuit board
INDOOR EEPROM	EEPROM reading error from indoor circuit board
INDOOR-OUTDOOR COMMUNICATE	The communications mistake between outdoor circuit board and indoor circuit board
OUTDOOR-DRIVE IC COMMUNICATE	The communications mistake between outdoor circuit board and outdoor drive
OUTDOOR TEMP.	Outdoor ambient temperature sensor error
MODULE VOLTAGE OVER	Outdoor module voltage over-low error
IPM MODULE	IPM module error
CMP TOP OVER	Compressor top temperature over
CMP TEMP.	Compressor exhausts temperature sensor error
RETURN TEMP.	Return water temperature sensor error
WARM WATER TEMP.	Water tank temperature sensor error
FEEDLINE TEMP.	Feed water temperature sensor error
PIPE TEMP.	Pipe temperature sensor error(defrosting)
WATER FLOW TROUBLE	Water flow error
HIGH PRESS	Pressure over high
LOW PRESS	Pressure over low
ROOM TEMP.	Room air temperature sensor error
WARMWATERTEMP.TOOLOW	thewatertanktemperatureistoolow

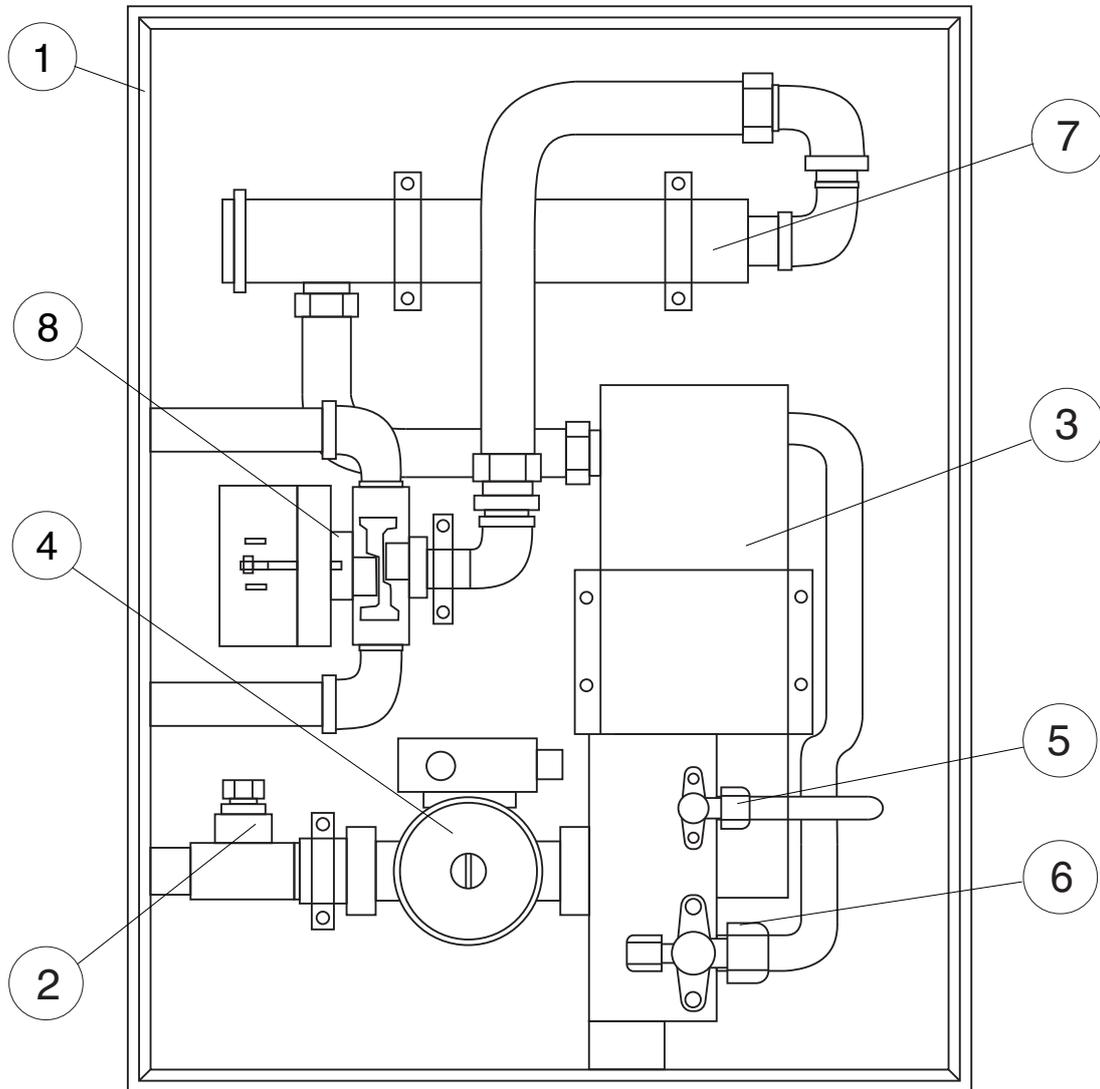
15 – Pipe connection

Copper tube size

Modle Size	KS50-DC	KS70-DC	KS90-DC	KS120-DC	KS150-DC
Gas tube	1/2"	5/8"	5/8"	3/4"	3/4"
Liquid tube	1/4"	3/8"	3/8"	1/2"	1/2"

16-List of components :

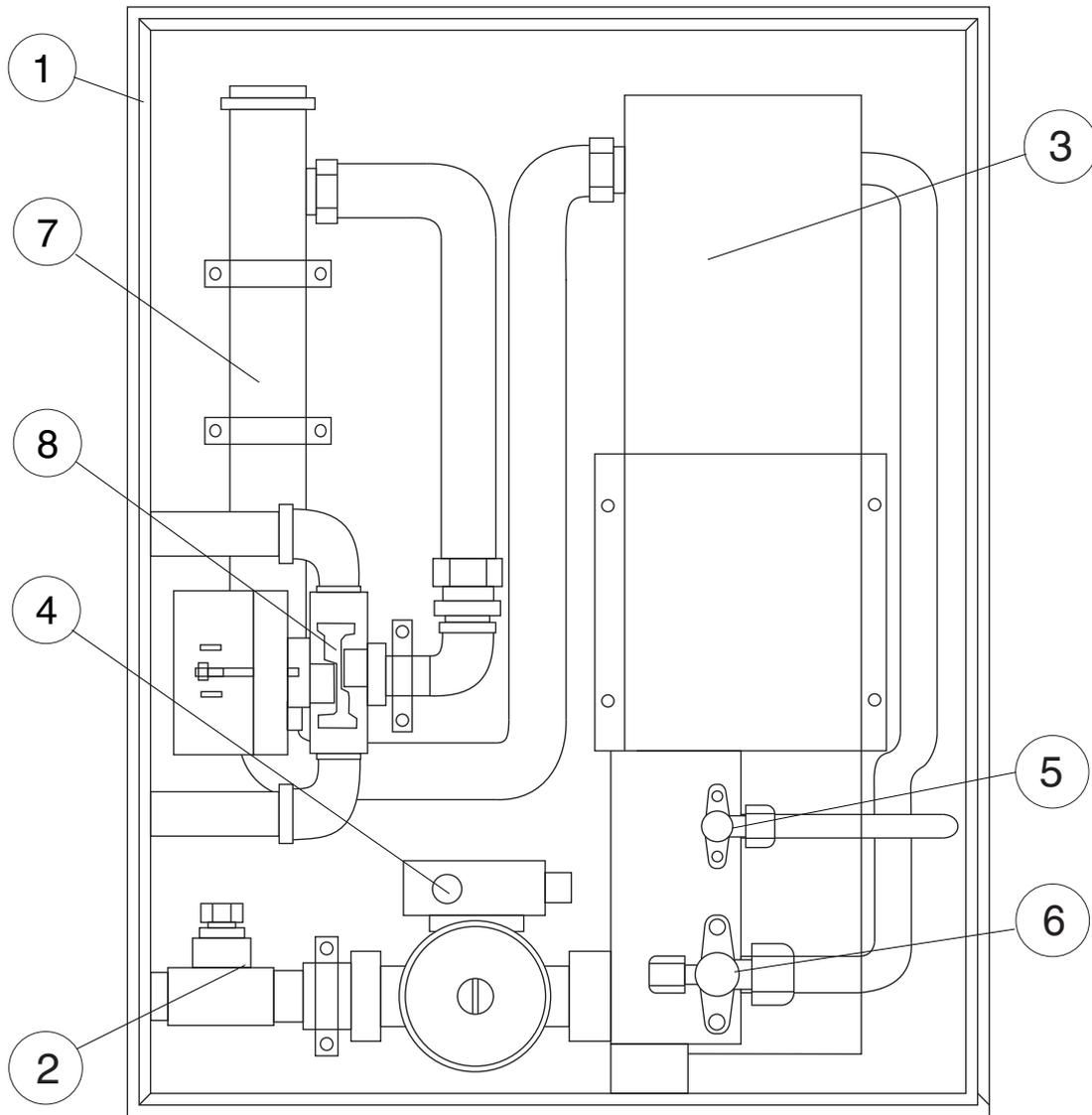
Indoor Unit



KS50-DC / KS70-DC / KS90-DC / KS120-DC

NO.	NAME	Q'TY
1	Box	1
2	water flow switch	1
3	stainless steel plate heat exchanger	1
4	water pump	1
5	liquid valve	1
6	gas valve	1
7	electrical heater	1
8	three way valve	1

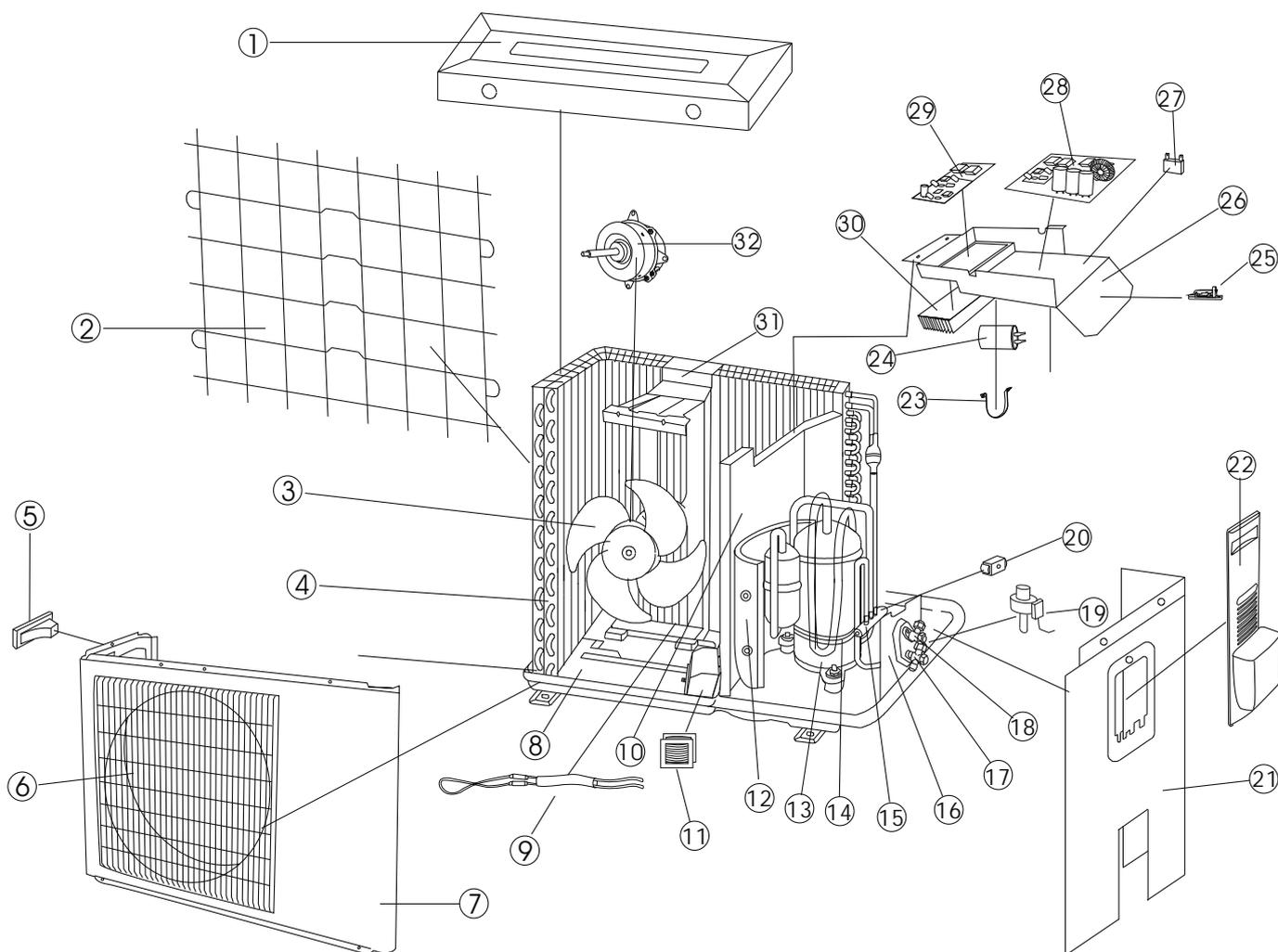
Indoor Unit



KS150-DC

NO.	NAME	Q'TY
1	Box	1
2	water flow switch	1
3	stainless steel plate heat exchanger	1
4	water pump	1
5	liquid valve	1
6	gas valve	1
7	electrical heater	1
8	three way valve	1

Outdoor Unit



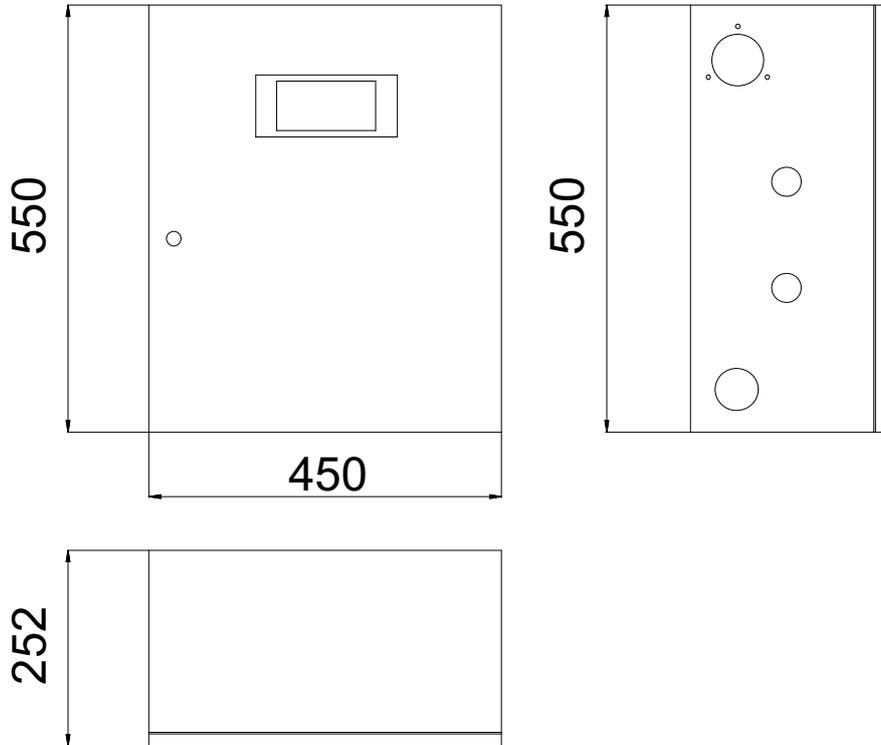
NO.	NAME	Q'TY
1	Top panel	1
2	Back grill	1
3	Outdoor fan	1
4	Condenser	1
5	Handle	1
6	Front grill	1
7	Front panel	1
8	Bottom plate	1
9 *	Condenser heater	1
10	Partition board	1
11	Reactor	1
12	Compressor jacket	1
13	Compressor	1
14*	Crankcase heater	1
15	Reversing valve	1
16	Valve plate	1

NO.	NAME	Q'TY
17	Gas valve	1
18	Liquid valve	1
19	Electronic Expansion Valve	1
20	Rev valve coil	1
21	Side panel	1
22	Access plate	1
23	Capacitor clips	1
24	Compressor capacitor	1
25	Wire clip	1
26	Electric box	1
27	Fan motor capacitor	1
28	Outdoor PCB	1
29	Module	1
30	Radiator	1
31	Motor bracket	1
32	Outdoor motor	1

17-Dimensions :

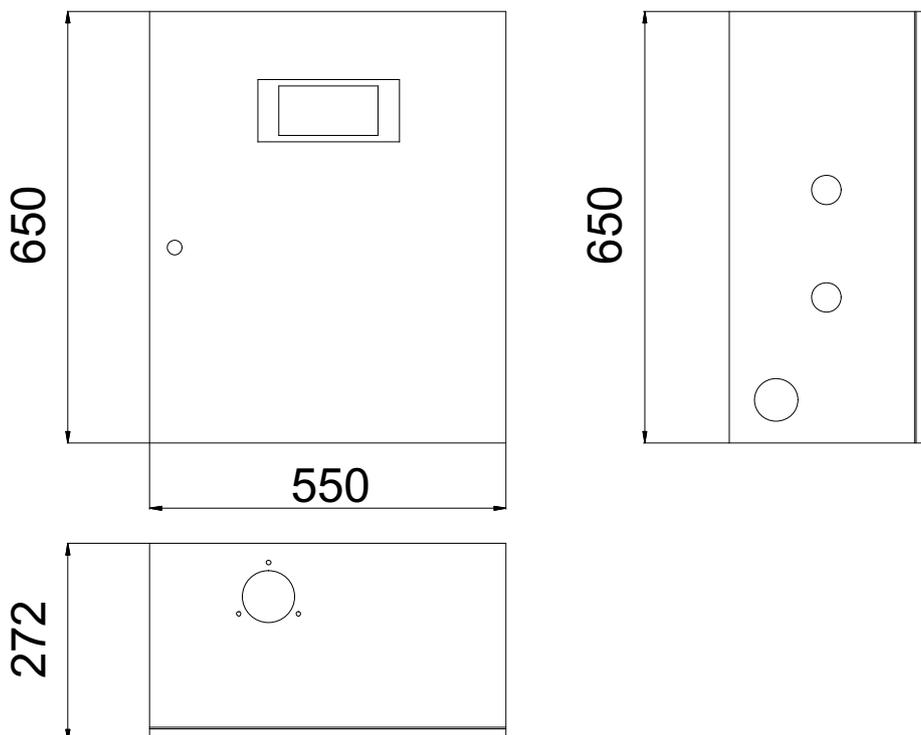
INDOOR UNIT

(KS50-DC/KS70-DC/KS90-DC/KS120-DC)



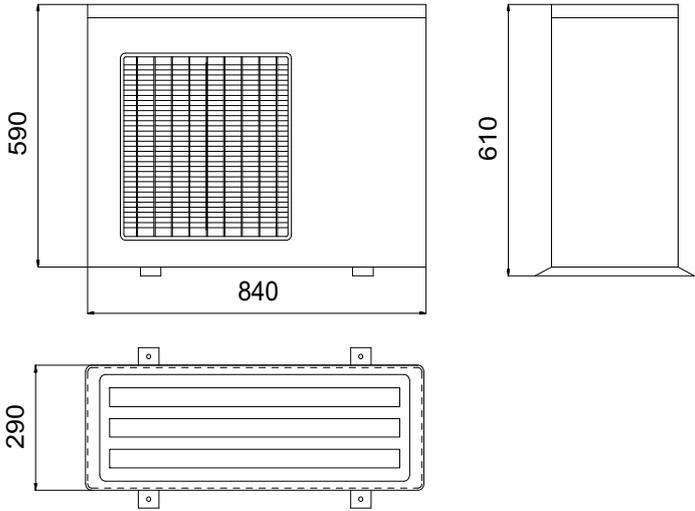
INDOOR UNIT

(KS150-DC)

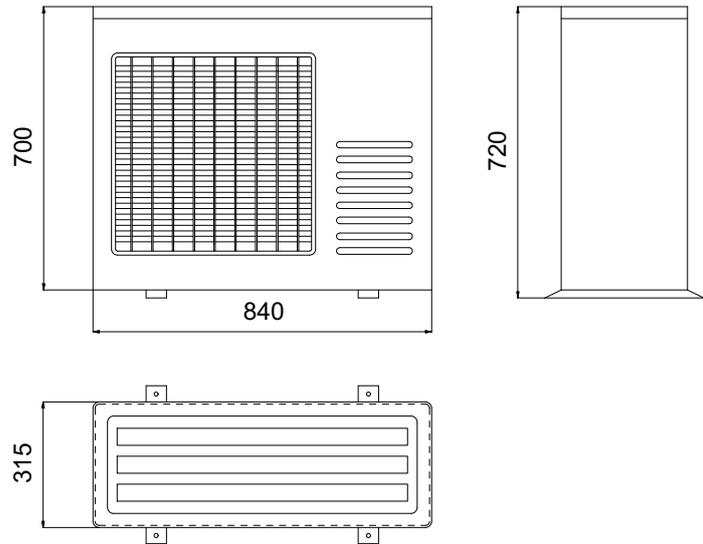


OUTDOOR UNIT

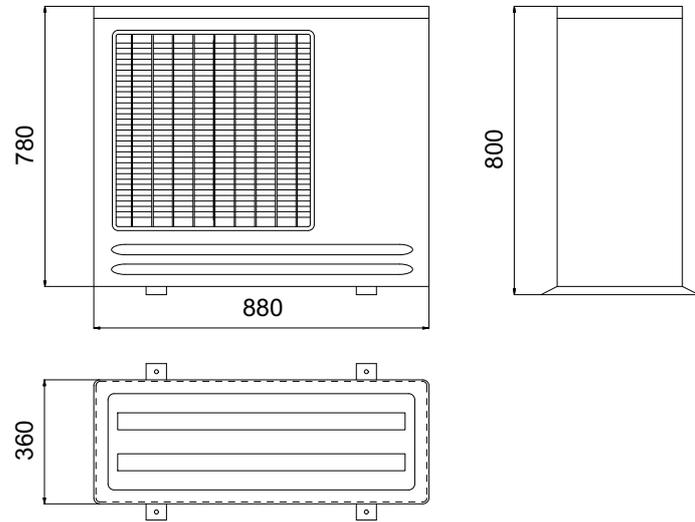
(KS50-DC)



(KS70-DC)

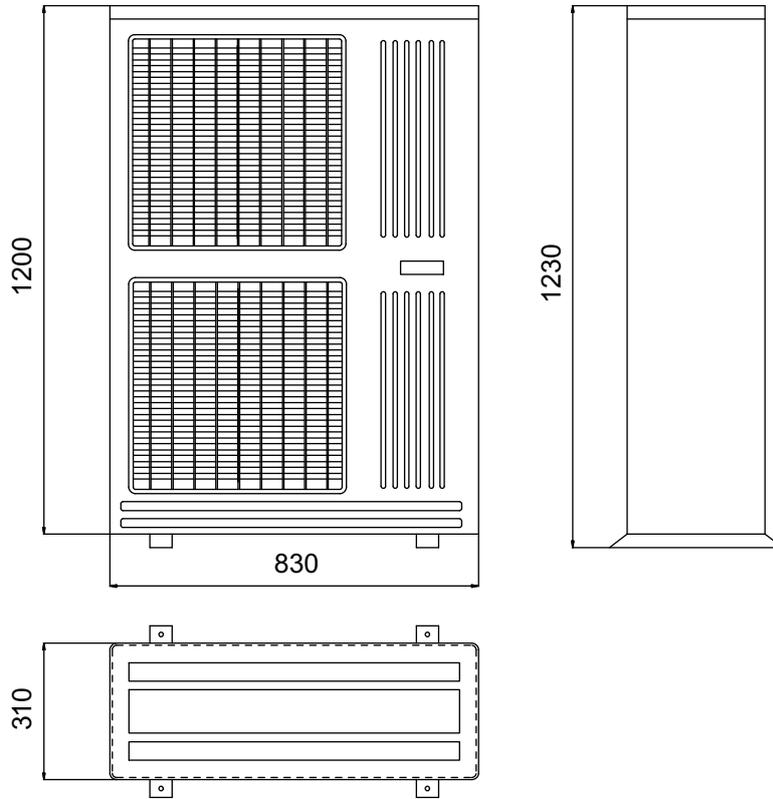


(KS90-DC)



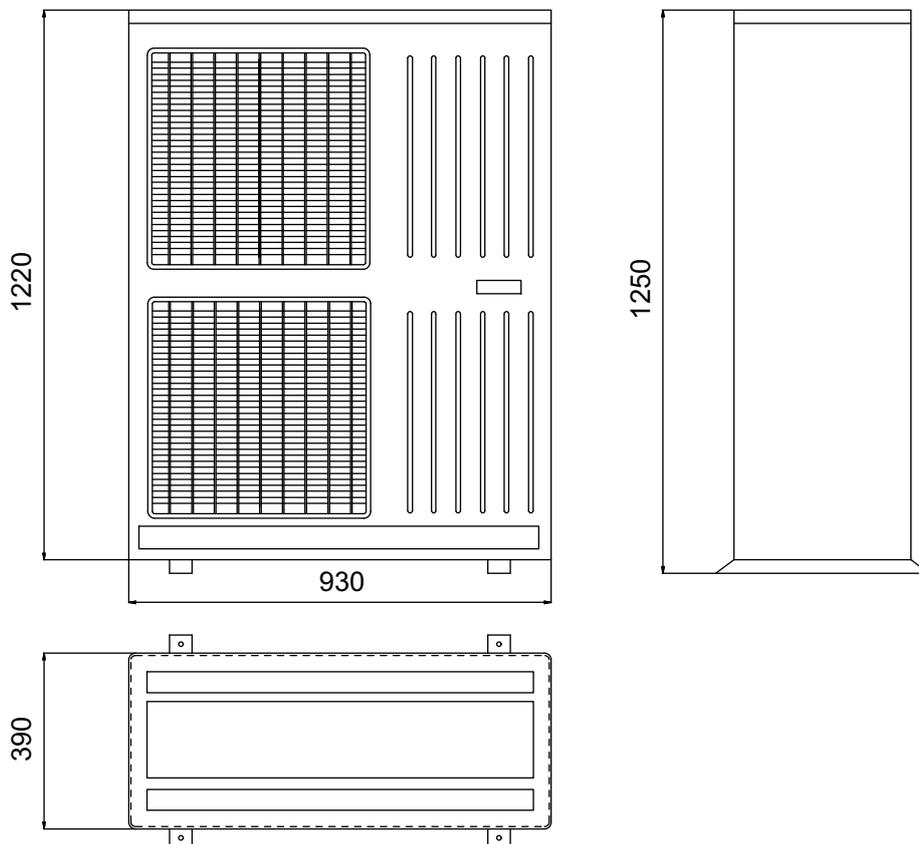
OUTDOOR UNIT

KS120-DC



OUTDOOR UNIT

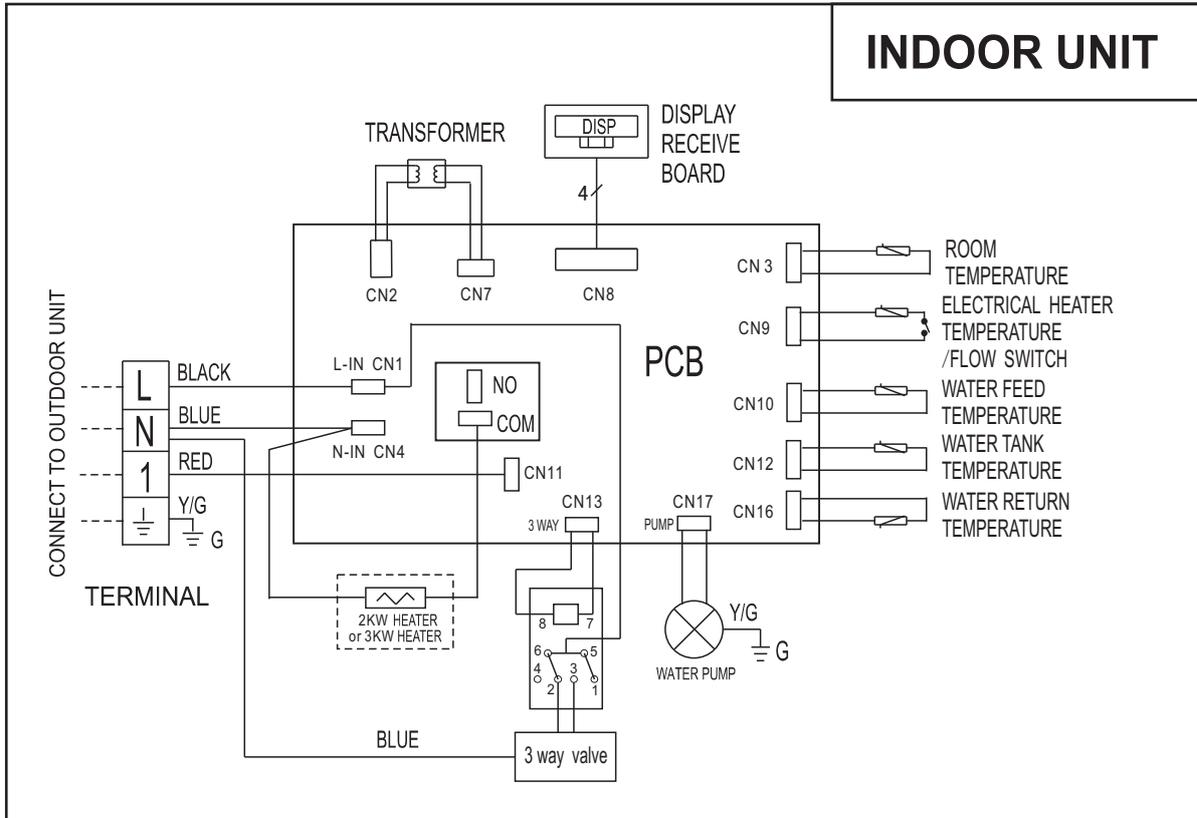
KS150-DC



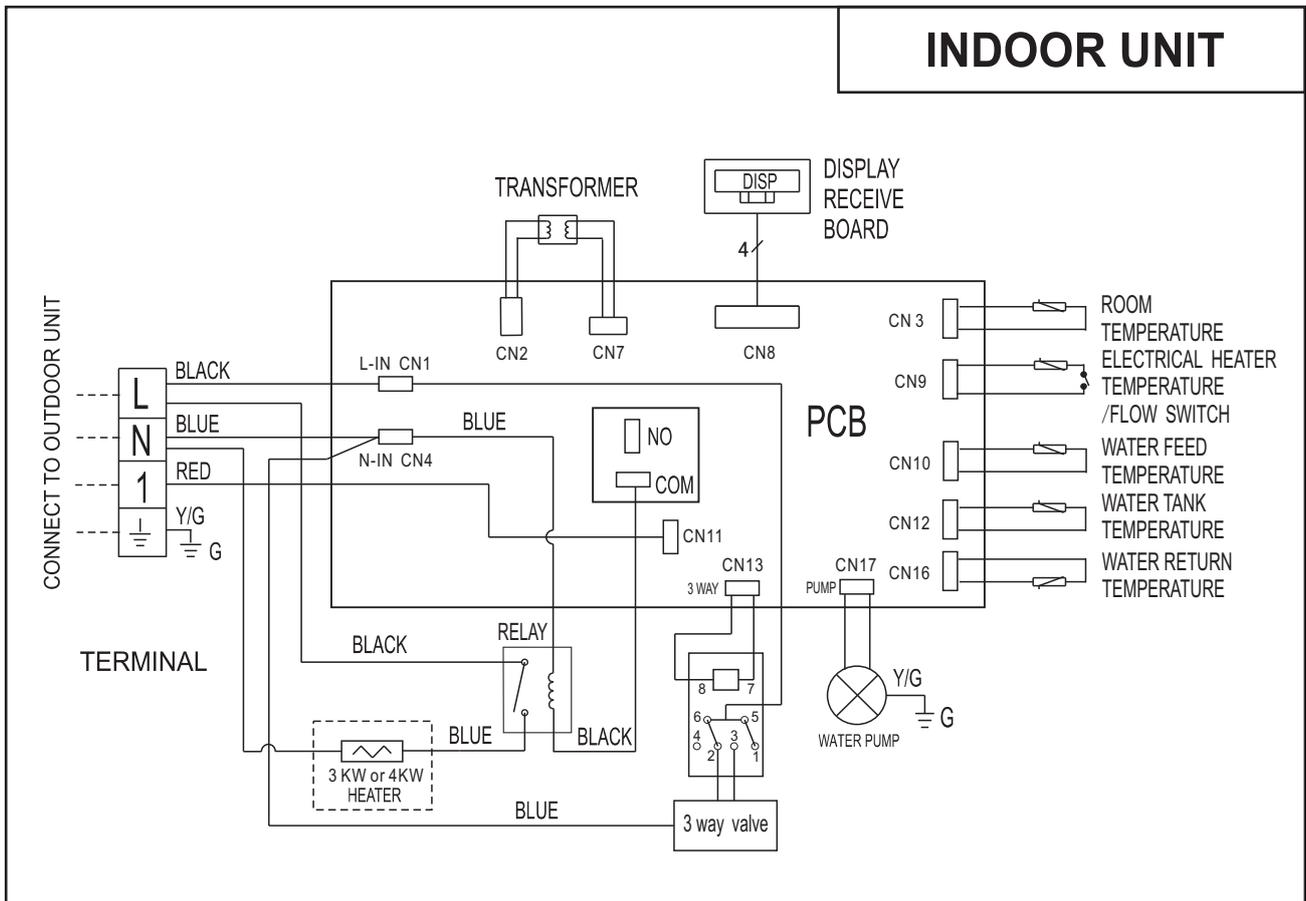
18-wiring diagrams :

INDOOR UNIT

(KS50-DC/KS70-DC)

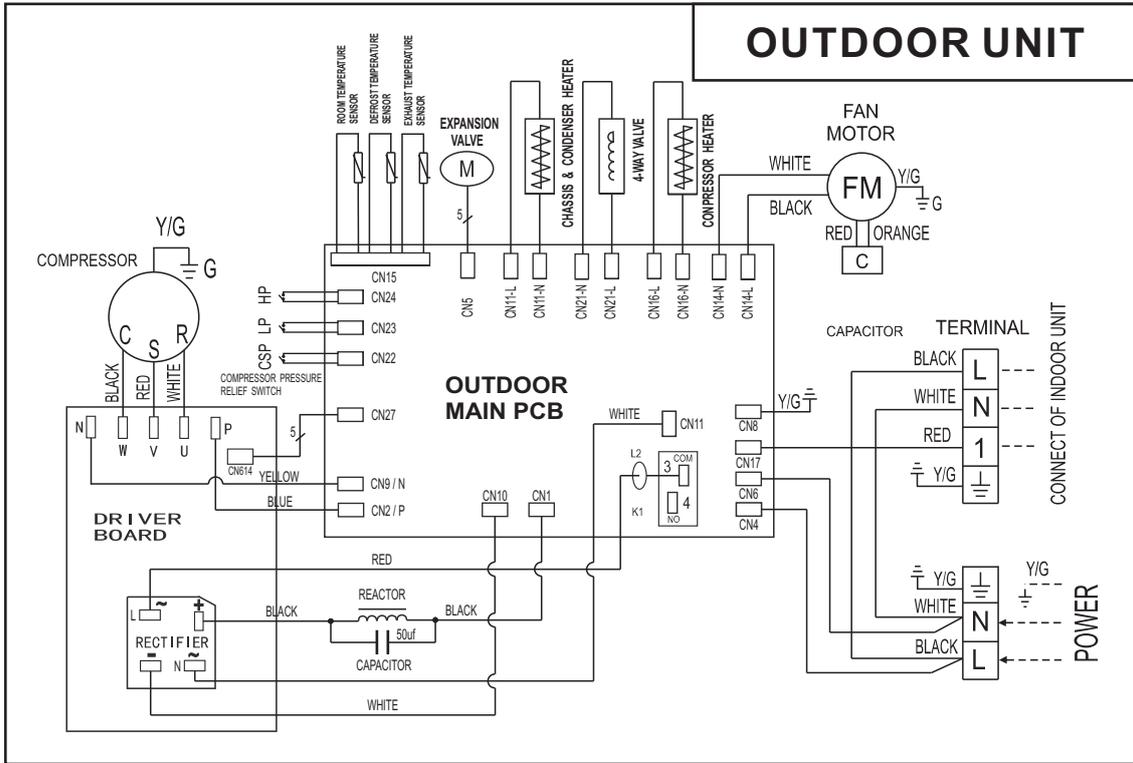


(KS90-DC/KS120-DC/KS150-DC)

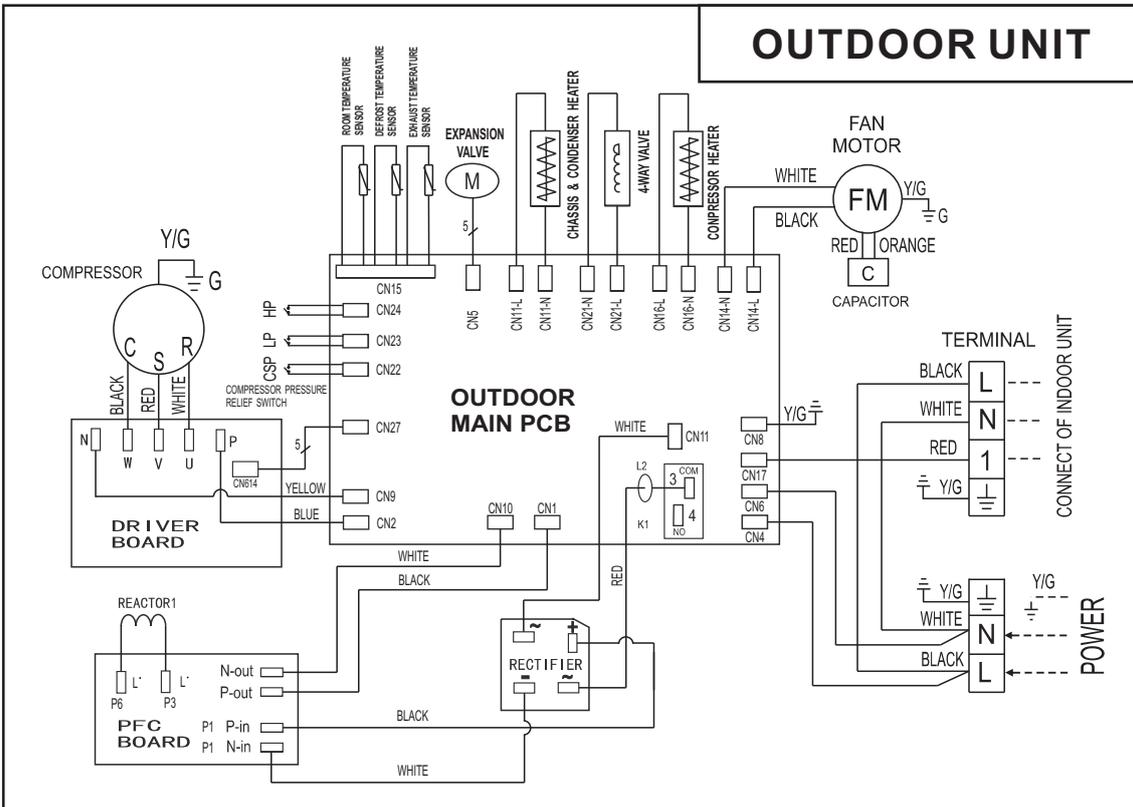


OUTDOOR UNIT

(KS50-DC) single phase

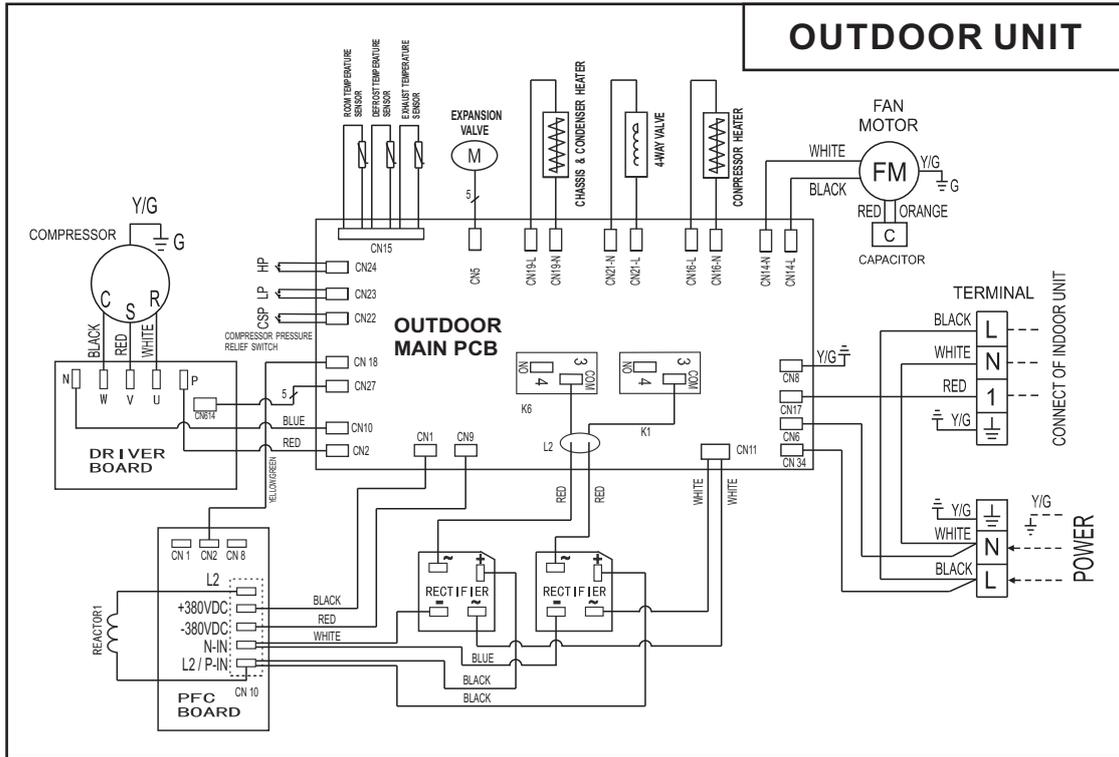


(KS70-DC/KS90-DC) single phase

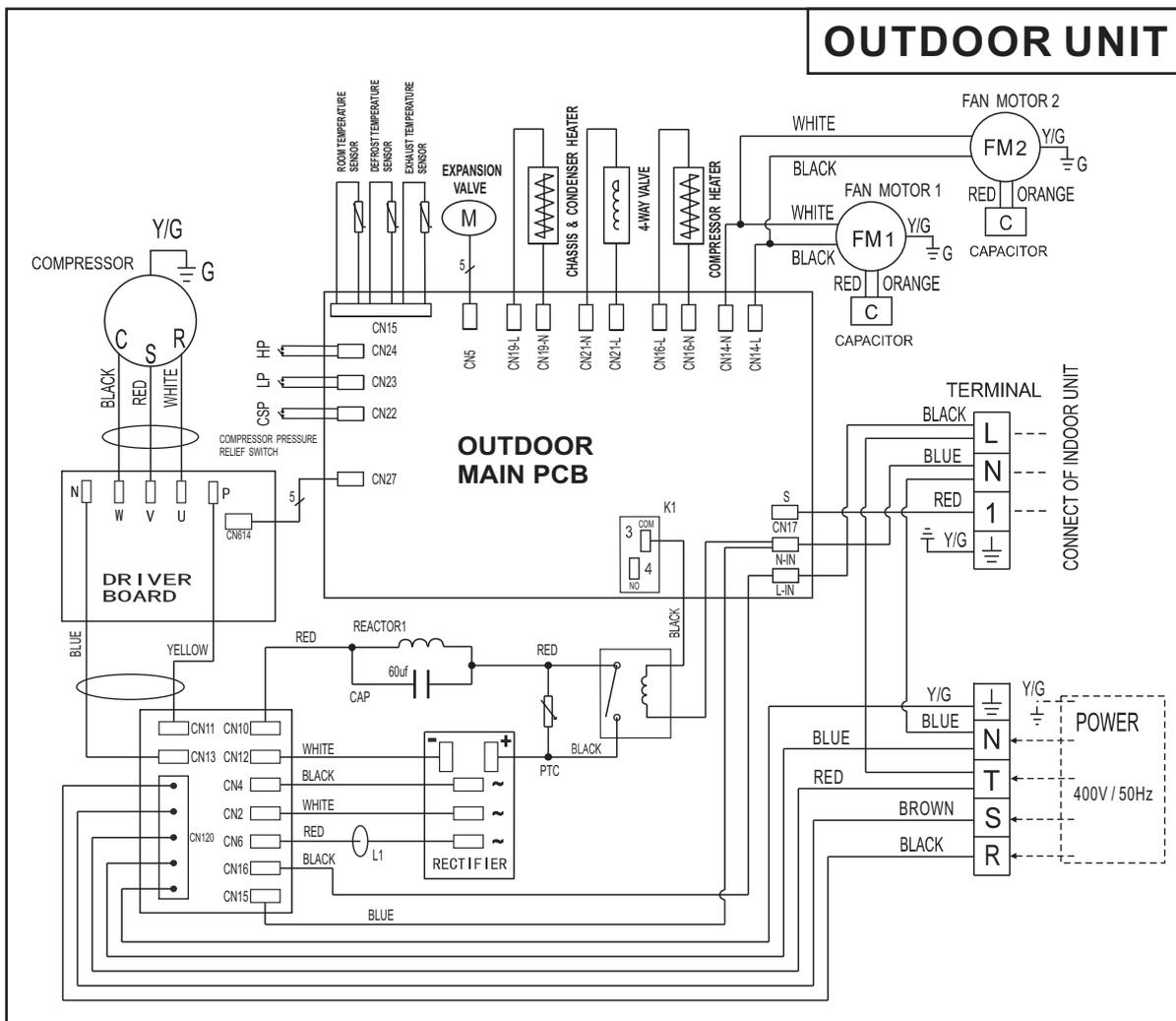


OUTDOOR UNIT

(KS120-DC) single phase



(KS120-DC / KS150-DC) three phase



19-Technical characteristics

<i>Item</i> \ <i>Model</i>	KS50-DC	KS70-DC	KS90-DC	KS120-DC	KS120-DC	KS150-DC
<i>Heating Capacity</i>	2700~6200W	3800~8500W	5000~9800W	6200~13850W	7000~13400W	8000~16800W
<i>Heating Power Input</i>	600~2080W	800~2400W	1260~3450W	1670~4720W	1650~4850W	2650~5800W
<i>C O P</i>	4.25	4.20	4.10	4.08	4.08	4.05
<i>Current (Heating)</i>	3.0A~10.0A	3.8A~11.5A	5.4A~15A	8A~24A	2.5A~7.2A	3.7A~10.0A
<i>Voltage</i>	220-240V~	220-240V~	220-240V~	220-240V~	380-415V~	380-415V~
<i>Frequency</i>	50Hz	50Hz	50Hz	50Hz	50Hz	50Hz
<i>Phase</i>	single	single	single	single	trinal	trinal
<i>Electrical heater power</i>	3000W	3000W	3000W	4000W	4000W	4000W
<i>Electrical heater current</i>	8.8A	13.6A	13.0A	18A	18A	18A
<i>Max. Input power</i>	2250W	2500W	3680W	5400W	5100W	6050W
<i>Max Discharge Pressure</i>	3.9MPa	3.9MPa	3.95MPa	4.0MPa	3.95MPa	3.95MPa
<i>Max Suction Pressure</i>	0.95MPa	0.95MPa	0.95MPa	0.95MPa	0.95MPa	0.95MPa
<i>Refrigerant</i>	R410a/0.82kg	R410a/1.10kg	R410a/1.50kg	R410a/2.4kg	R410a/2.4kg	R410a/2.5kg
<i>Water pump flux</i>	1 m ³ /h	1.25 m ³ /h	1.6 m ³ /h	2.2 m ³ /h	2.2 m ³ /h	2.55 m ³ /h
<i>Water Proof Class</i>	IPX4	IPX4	IPX4	IPX4	IPX4	IPX4
<i>Ambient condition</i>	-20 ~ 43 ° C	-20 ~ 43 ° C	-20 ~ 43 ° C	-20 ~ 43 ° C	-20 ~ 43 ° C	-20 ~ 43 ° C
<i>Net Weight (indoor)</i>	18kg	19kg	32kg	37kg	34kg	41kg
<i>Net Weight (outdoor)</i>	35kg	38kg	56kg	65kg	62kg	105kg