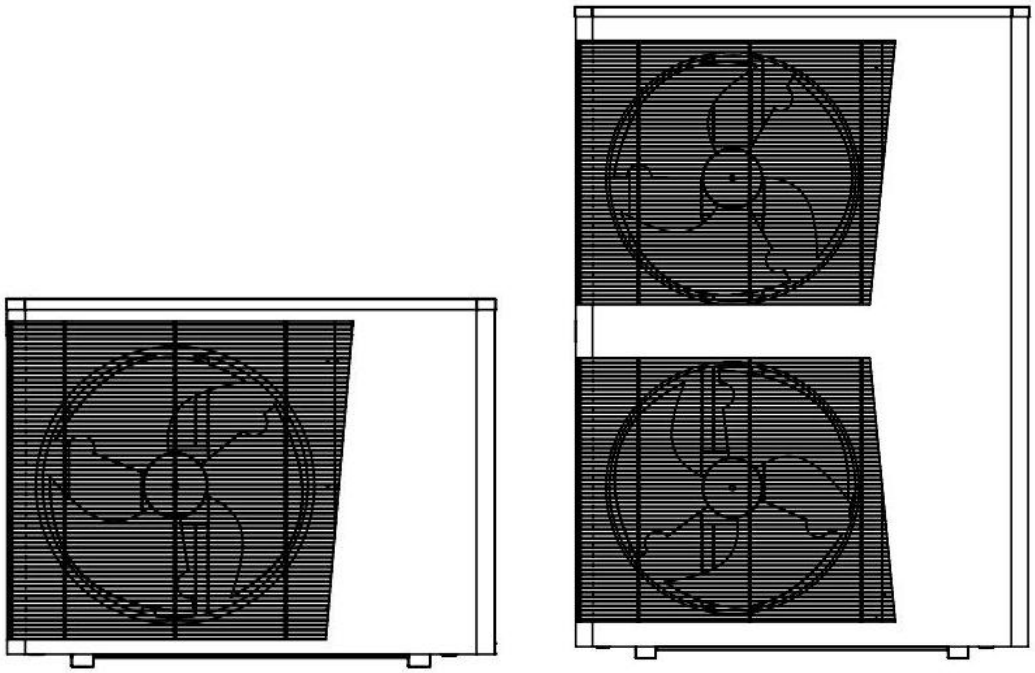
GP tech

Models : Master plus 60 / 90 / 120/ 120-TRI/ 160 / 160-TRI /160S / 160S-TRI



DC INVERTER MULTIFUNCTIONAL AIR TO WATER HEAT PUMP

USER & INSTALLATION MANUAL

Contents list


IMPORTANT NOTE:
Thank you very much for purchasing our product. Before using your unit,please read this manual carefully and keep it for future reference.

1 GENERAL

Thank you for choosing a **Master plus series** heat pump. This is a heat pump capable of providing the ideal level of comfort for your home, always with a suitable hydraulic installation.

The unit is an air source heat pump for space heating/cooling and sanitary water heater for houses, apartment blocks and small industrial premises. Outdoor air is used as a heat source creating free energy to heat your home.

This manual forms an essential part of the product and it must be given to the user. Read the warnings and recommendations in the manual carefully, as they contain important information on the safety, use and maintenance of the installation.

This heat pump must be installed by qualified personnel only, in accordance with the legislation in force and following the manufacturer's instructions.

The start-up of this heat pump and any maintenance operations must be carried only by qualified personnel only.

Incorrect installation of this heat pump could result in damage to people, animals or property, and the manufacturer will not be held liable in such cases.

2 SAFETY WARNINGS

2.1 Usage and installation warnings

The heat pump must be installed by personnel authorized by the Ministry of Industry, in compliance with the applicable laws and regulations. The precautions detailed here cover very important issues. Please be sure to follow them carefully.

Read carefully this instruction manual and keep it in a safe, easily accessible place. The manufacturer will not be liable for any damages caused by failure to follow these instructions.

This heat pump is suitable for use in both heating and cooling installations and can be combined with fan coils, underfloor heating/cooling, low-temperature radiators, and domestic hot water tanks (optional). It must be connected to a heating/cooling installation and/or a domestic hot water distribution network and compatible with its performance and power.

This appliance must only be used for the purpose for which it has been expressly designed. Any other use is considered unsuitable and therefore hazardous. The manufacturer shall not be considered liable under any circumstances for damage caused by unsuitable, erroneous or irrational use.

Remove all the packaging and check the contents are complete. In case of doubt, do not use the heat pump. Contact your supplier. Keep the packaging elements out of reach of

children, as they can be dangerous.

Improper installation or placement of equipment or accessories may cause electrocution, short circuit, leakage, fire, or other damage to the equipment. Use only accessories or optional equipment designed specifically to work with the products presented in this manual. Do not modify, replace or disconnect any safety or control device without first consulting the manufacturer.

When it is decided not to use any more the heat pump, disable the parts that could represent a potential hazard.

2.2 Personal safety warnings

Always wear appropriate personal protective equipment (gloves, safety goggles, etc.) when performing installation and/or maintenance on the unit.

Do not touch any switch with wet fingers. Touching a switch with wet fingers may cause electric shock. Before accessing the electrical components of the heat pump, disconnect the main power supply completely.

Disconnect all electricity sources before dismantling the cover panel from the electric panel or before making any connections or accessing electrical parts.

To avoid electrocutions, be sure to turn off the power for 1 minute (or more) before servicing the electrical parts. Even after 1 minute, always measure the voltage at the terminals of the main circuit capacitors and other electrical parts before touching them and make sure that the voltage is equal to or less than 50 V dc.

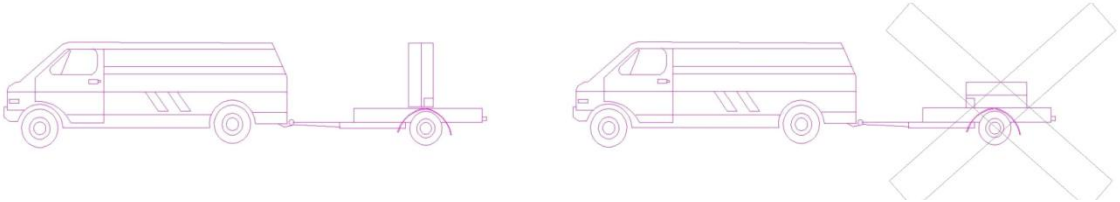
When the cover panels are disassembled, the energized parts can be easily accessed. Never leave the unit unattended during installation or during maintenance work when the cover panel is removed.

Do not touch the refrigerant pipes, water piping, or internal parts during and immediately after operation. Pipes and internal parts may be excessively hot or cold, depending on the use of the unit.

The hands may be burned by cold or heat in case of improperly touching pipes or internal parts. To avoid injury, wait until the pipes and internal parts return to their normal temperature. Alternatively, if access is required, be sure to wear appropriate safety gloves.

2.3 Transport, storage and handling warnings

The heat pump must be transported, handled and stored vertically. Tipping the machine may cause the compressor or other components damage.



Do not twist, loosen or pull the external electric cables of the heat pump. Do not insert any sharp objects through the fan grille or into the fan itself.

Do not wash the interior of the heat pump with water as this may result in electric shock or fire. For any cleaning and /or maintenance operations, disconnect the main power supply.

2.4 Freeze protection warnings

The heat pump is a machine that is installed in the exterior of the house, so that it will be exposed to the extreme climatic conditions of cold in the periods of frost. Due to this, it is of paramount importance that this type of machine is protected against such frost. The freezing of the water inside the heat pump causes the heat pump to breakdown, with the subsequent interruption of its operation and major economic expenses involving its repair.

It is **mandatory** to use a safety system in the installation to prevent the freezing of the water in the machine. We propose the use of glycol in the water circuit of the heat pump, or some antifreeze valve system to empty the installation in conditions of low temperatures. Carefully read the “Freeze Protection” section in this manual for more detailed information on these systems. We will not cover damages caused by the lack of any of these antifreeze safety systems.

The electronic controller of the heat pump has a function for protection against the freezing of the water in its interior in periods of frost. For this function to remain active and on alert, the heat pump must be connected to the mains and have a power supply, even if it is switched off or not in use.

A water filter should be installed in the installation, in order to avoid obstructions in the water circuit of the heat pump. It must be installed in the return circuit of the heat pump and MUST be installed before filling and circulating the water through the installation. The water filter should be checked and cleaned, if necessary, at least once a year. IN new installations, however, it is advisable to check it within the first few months of its commissioning

3 SYSTEM DESCRIPTION

The unit is a monobloc (single unit) air/water heat pump, specially designed for the colder climate. There is no need for bore holes and usually the system can be installed within 1 day.

The unit can both heat hot water effectively at high outdoor temperatures and give a high output to the heating system at low outdoor temperatures. If the outdoor temperature drops to a level lower than minus 0°C (factory setting), the auxiliary heater switches on to ensure the heat pump unit works normally. The unit is also capable of cooling in the summer. The heat pump controller is an intelligent wired system.

The unit is rated as 6KW/9KW/12KW/16KW. The Material/components are chosen to provide a long service life and to fully withstand harsh outdoor conditions.

The unit has two different installation options:

1). Space heating/cooling + DHW (Domestic hot water)
2). Space heating/cooling only

4 INSTALLATION

4.1 General points for installation engineer

4.1-1 Preparation before installation

Make sure the site is large enough to hold all the equipment and has enough operation space.

Measure the hoisting path to ensure that the path to the installation site is unobstructed and prevent the equipment from reaching the site during Installation.

Confirm that the power meter capacity and the wire capacity are sufficient and the phase (three-phase, two-phase) meets the requirements.

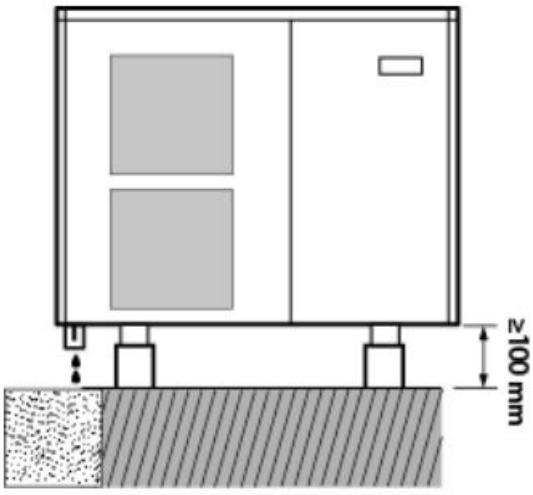
Plan the layout of the equipment according to the customer's site. And strive to have the shortest and the straightest water pipe and enough space for operation and maintenance.

For the heat pump with side outlet wind, consider the local wind direction and choose a reasonable installation direction to avoid the wind direction being opposite.

Current regulations require the heating installation to be inspected before it is commissioned. The inspection must be carried out by a suitably qualified person and should be documented. If the heat pump is replaced, the installation must be inspected again. In the event of installation with unvented (closed) heating systems, make sure the pipeline has an exhaust valve (an automatic air exhaust valve is included in the heat pump). If necessary, installation engineer may add additional air exhaust valves to the pipeline

4.1-2 Sitting the heat pump

The heat pump should be firmly fixed to a base, preferably a concrete base, It is the most suitable that the right end is 5-10mm higher than the left end. As shown below:



The receiving surface of the device must:

- **Allow a solid fixation (Preferably concrete).**
- **Fully support its weight.**
- **Have a permeable area below the**

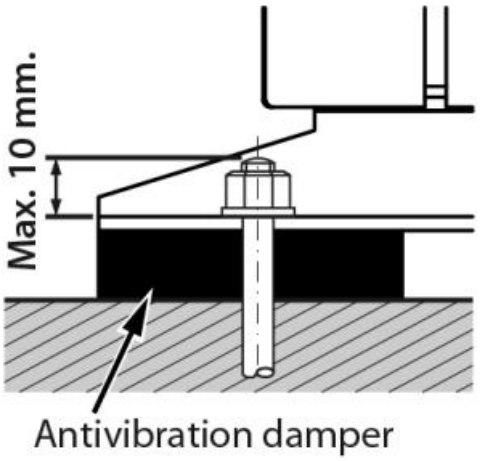
condensate drainage hole (earth, gravel bed, sand, etc.).

- **Do not transmit any vibration to the home, recommending the installation of the anti-vibration dampers supplied with the heat pump.**

In case of installing the device on wall mounts, it will be especially important to isolate the machine from the transmission of vibrations and noise inside the house, it may be necessary to install more suitable anti-vibration dampers for the wall mount in addition to those supplied with the heat pump. Nevertheless, the installation on the ground is the most advisable.

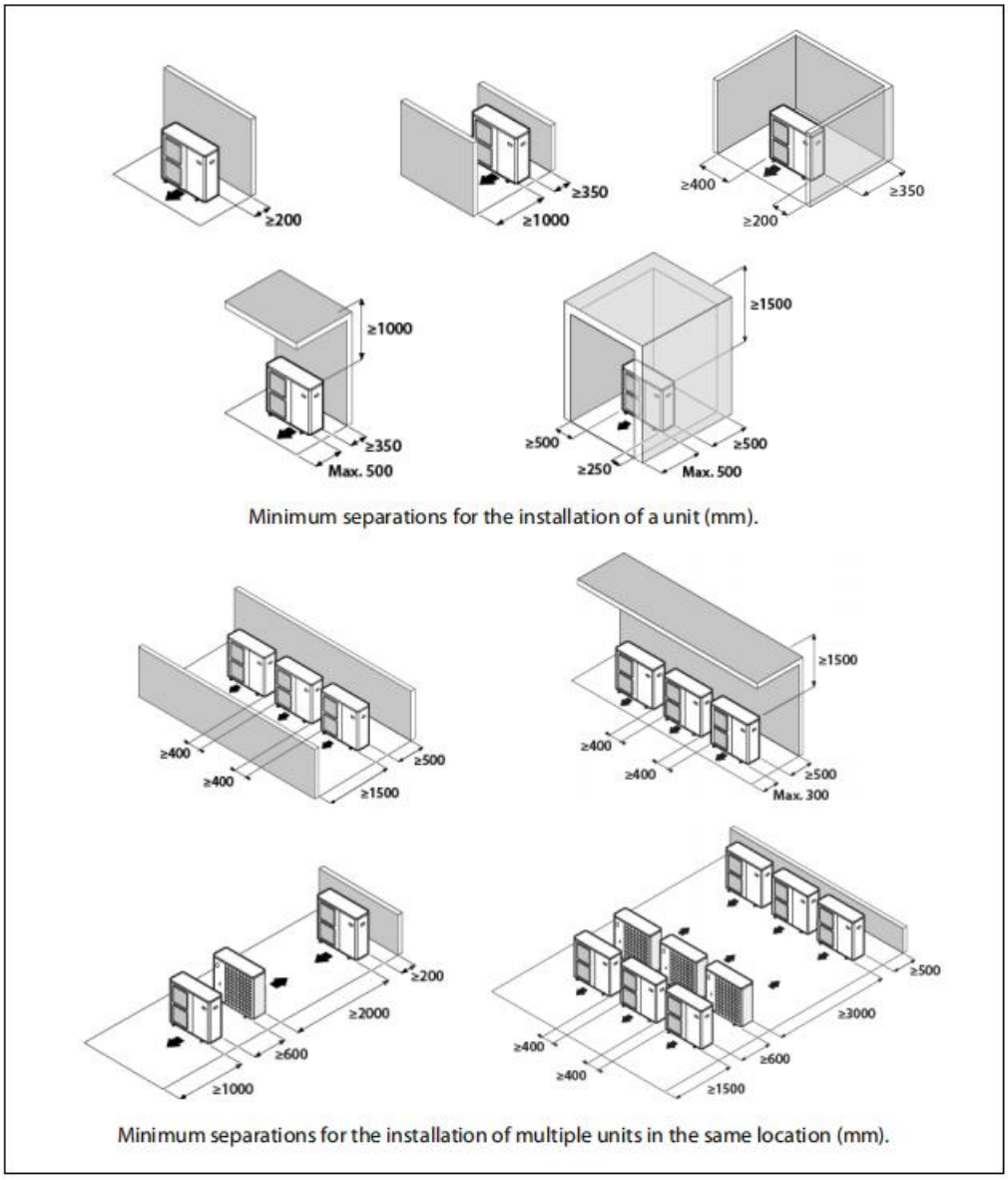
Straighten the heat pump well to ensure that the condensate water cannot exit through any paths other than the intended drain hole.

Fasten it firmly using 4 sets of M12 bolts suitable for the base material, with nuts and washers (available on the market). Make sure that the protruding distance of the bolt does not exceed 10mm inside the metallic support of the device(leg).



4.1-3 Location requirements between machine and building

The heat pump must be installed exclusively outside the home and, where possible, in a completely clear area. If a protection is needed around the appliance, it should have wide openings on the 4 sides and the installation separations indicated in the following figure must be respected. No obstacle should prevent the circulation of air through the evaporator and the fan outlet.

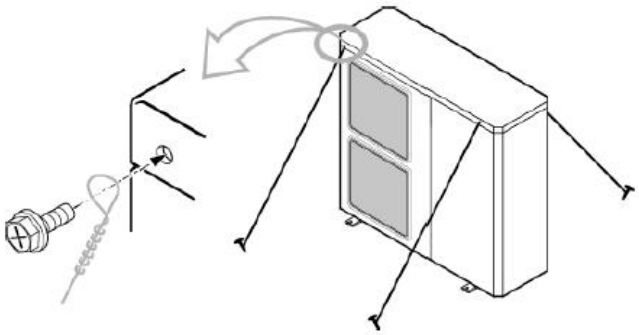


Consult with the user before choosing the location of the device. It should not be placed next to sensitive walls, such as on the wall next to a bedroom. Make sure that the location of the heat pump is not disruptive to neighbors (sound level, air currents generated, low temperature of the air blown with risk of freezing plants in the path, etc.).

Choose a location that preferably has sunlight and is protected from strong and cold winds. If the heat pump is exposed to gusts of wind that make it possible to overturn it, it should be supported by suitable guys, as indicated in the figure.

The device must be sufficiently accessible for subsequent installation and maintenance work. Make sure that the passage of the hydraulic and electrical connections to the interior of the house is possible and comfortable. The spacing measures indicated in the figure above are those strictly necessary to ensure correct operation of the device; however, sometimes, it will be essential to provide more space for maintenance work.

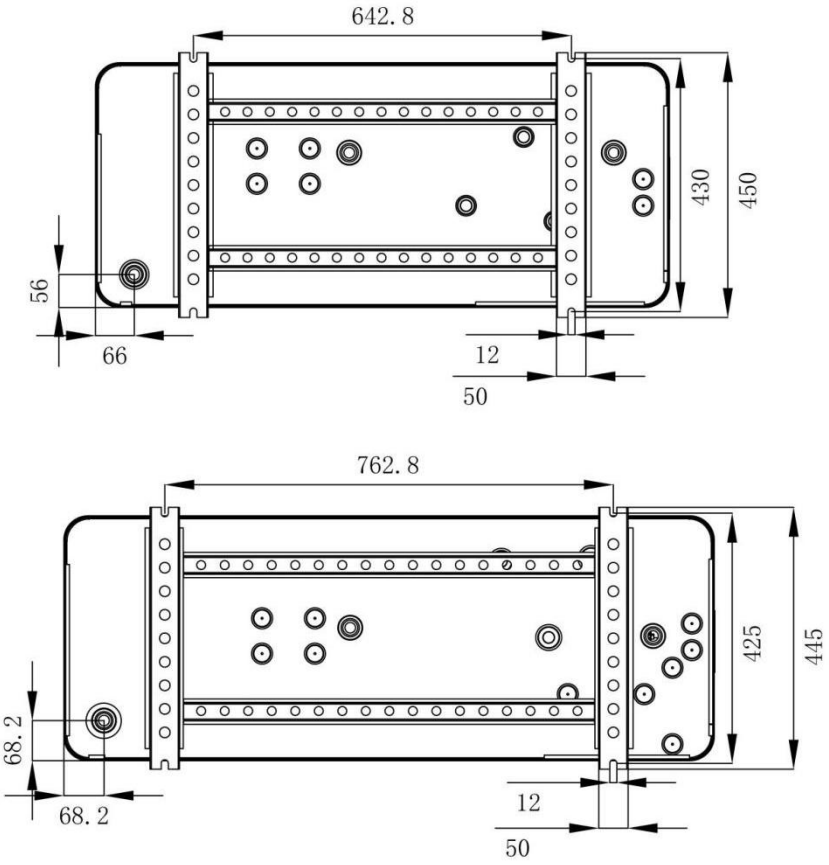
The heat pump is a device specially designed for outdoor installation. Nevertheless, avoid installing it in a place where it may be exposed to significant water stains or spills (e.g., under a faulty gutter, near gas outlets, etc.). Move the appliance away from heat sources and flammable products.



In areas where abundant and copious snowfalls occur, special care must be taken to protect the heat pump from possible obstructions due to accumulation of snow around it. The obstruction of the air inlet and/or outlet of the machine due to the accumulation of snow may cause malfunction of the unit and possible breakdowns. The heat pump must be raised at least 100 millimeters above the maximum expected snow level. In turn, the roof should be protected from accumulation of snow, by means of a roof projecting from the building or a similar structure.

4.1-4 Condensate drainage

In normal operation, the heat pump can evacuate large amounts of water, for which the heat pump provides a hole in the bottom of the appliance. Be sure not to obstruct this hole during the installation process of the appliance.



Preferably install the device in a well-drained place. To do this, it is advisable to provide a bed of gravel, sand or similar materials below said hole. If the drain hole of the heat pump is covered by a mounting base or by the floor, lift the unit to leave a free space of at least 100mm below it.

If it is installed on a terrace or facade, the condensate outlet must be led to a drain to avoid inconvenience and/or damage caused by the dripping of condensate water. If the installation is carried out in a region where the temperature can be below 0°C for a long period of time, please ensure that the circulating medium of the machine will not be frozen.

4.1-5 Accessories supplied

The following accessories are supplied in the interior of the heat pump. Before proceeding with the installation of the machine, make sure that you receive them and that they are in good condition.

Documentation:
On the top of the machine, you can find the documentation bag, where all the manuals and documents necessary for the use and installation of the heat pump are included.

Controller:
It is supplied inside the machine and can be found by removing the right-side panel. Before connecting the power supply to the machine, the controller should be installed inside the house.

4.1-6 Controller

The unit is equipped with an external electronic controller that handles all functions necessary for heat pump operations. Defrosting, stop at max/min temperature, connection of the compressor heater as well as enabling the aux electrical heater, monitoring of motor protection and pressure sensors are all controlled.

The number of starts and the operating time after this power-on can also be read.

The controller is set during installation and can be used during a service.

Under normal operating conditions the homeowner does not need to have access to the controller. The unit has an integrated electronic outlet water temperature sensor that limits the outlet temperature.

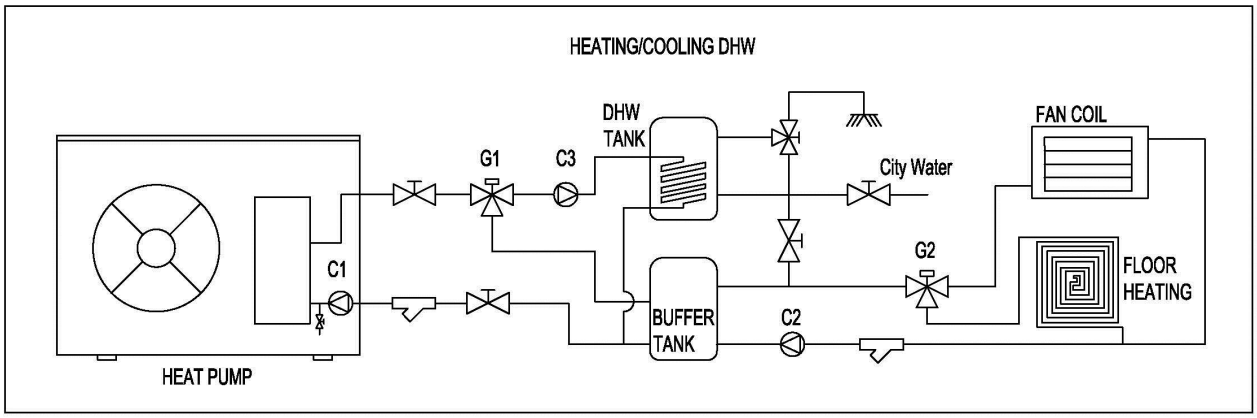
4.2 Installation design

The unit can be installed in several different ways.

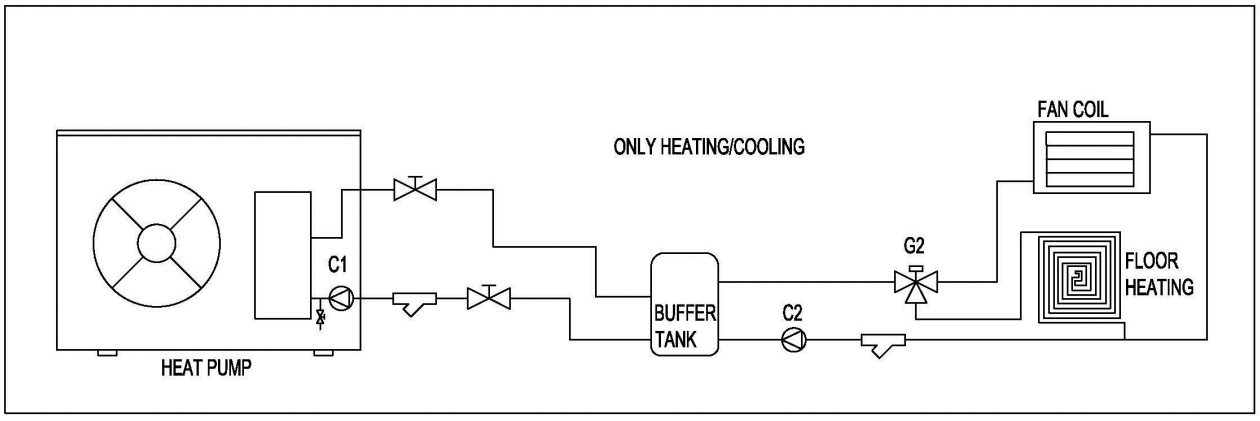
The safety equipment must be installed in accordance with current regulations for all installation options.

When connecting with the unit, the total water volume in the heat pump pipe system and buffer tank suggest be 10 liters per KW of output.

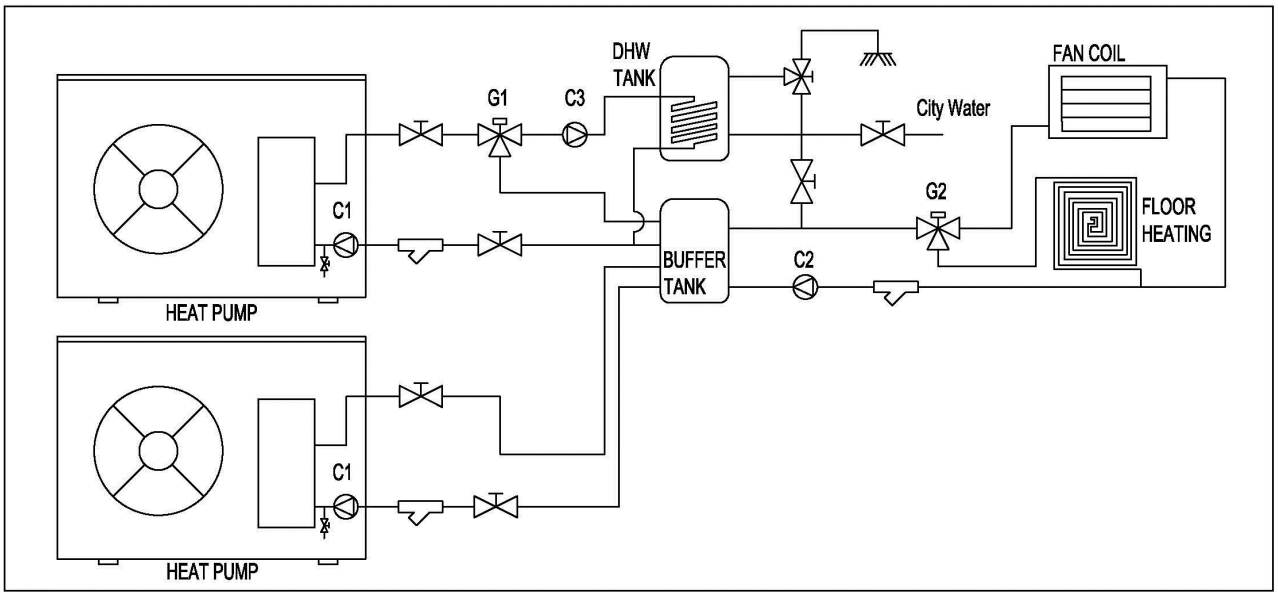
A) 6/9/12/16 Space Heating/Cooling + DHW



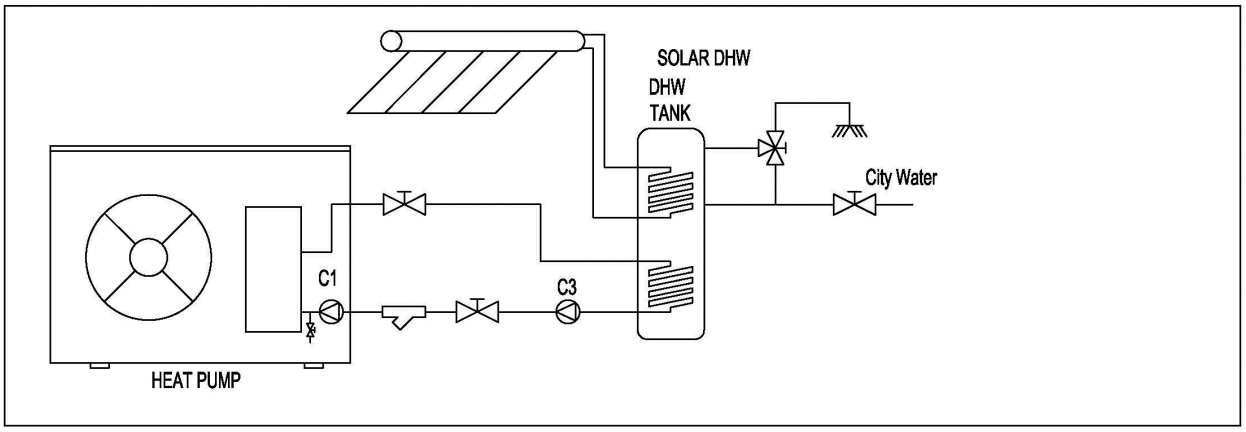
B) 6/9/12/16 Space Heating/Cooling Mode Only



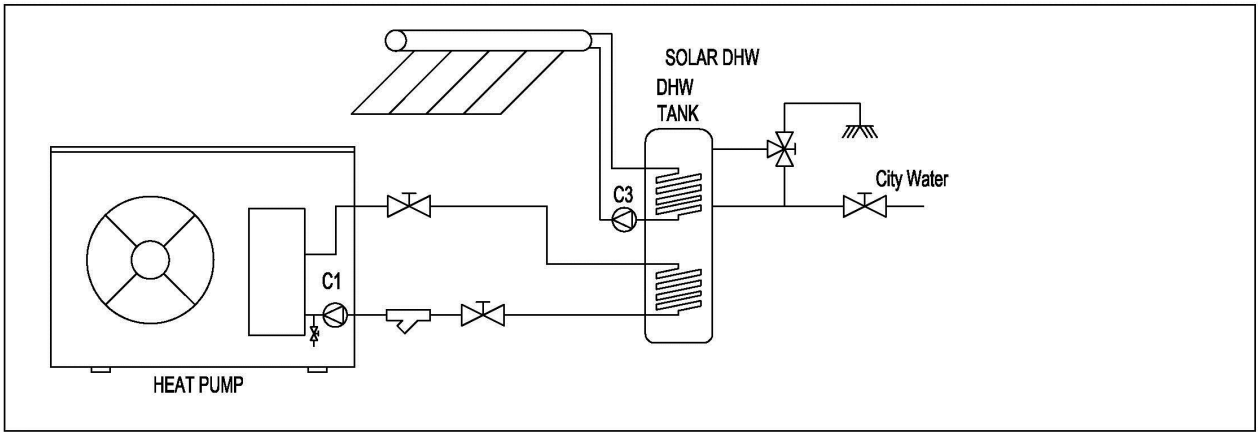
C) 2x6/9/12/16 Installation. Space Heating/Cooling + DHW



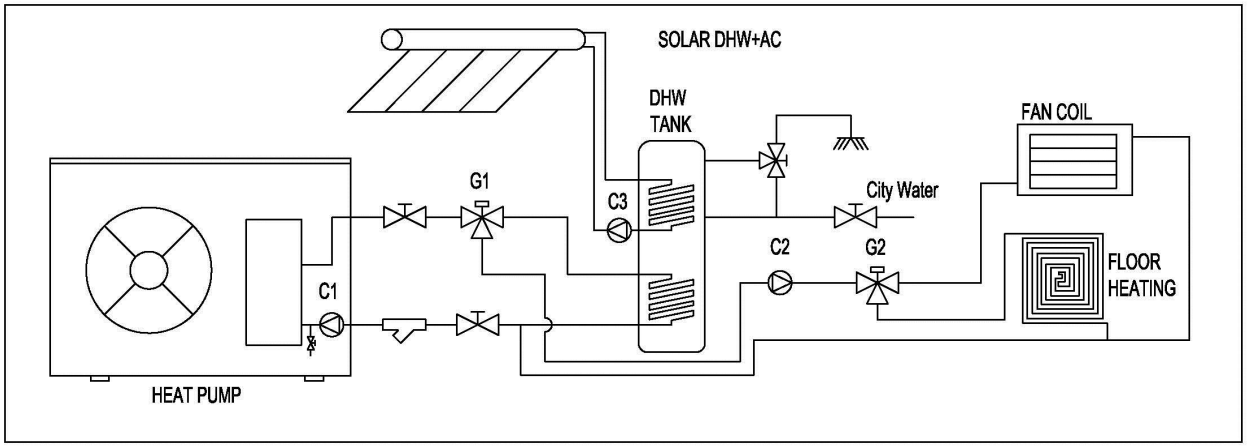
Solar Application 1 （P121=0,T7 in the tank or solar pipe）



Solar Application 2 （P121=2,T7 in the tank or solar pipe）

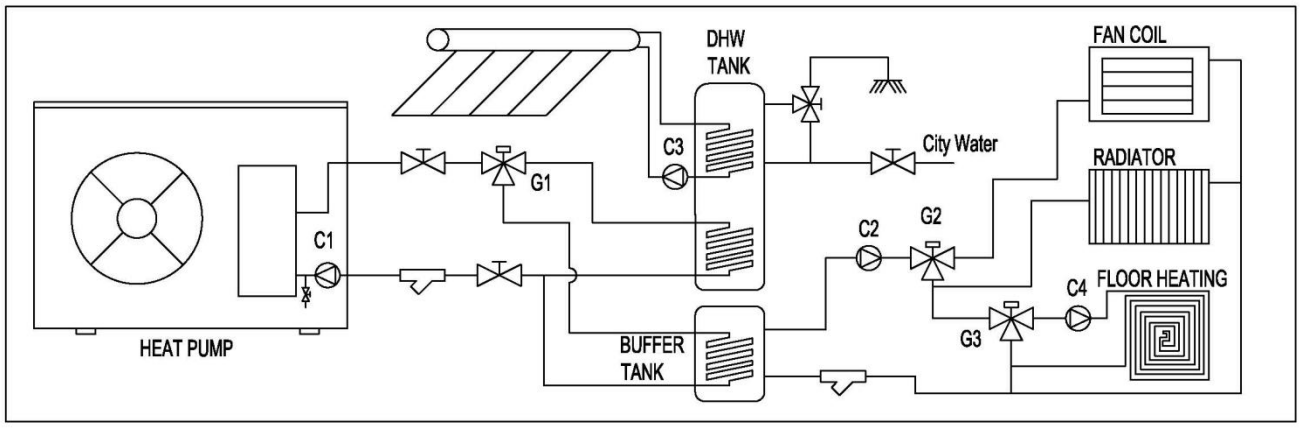


Solar Application 3 （P121=2,T7 in the tank or solar pipe）



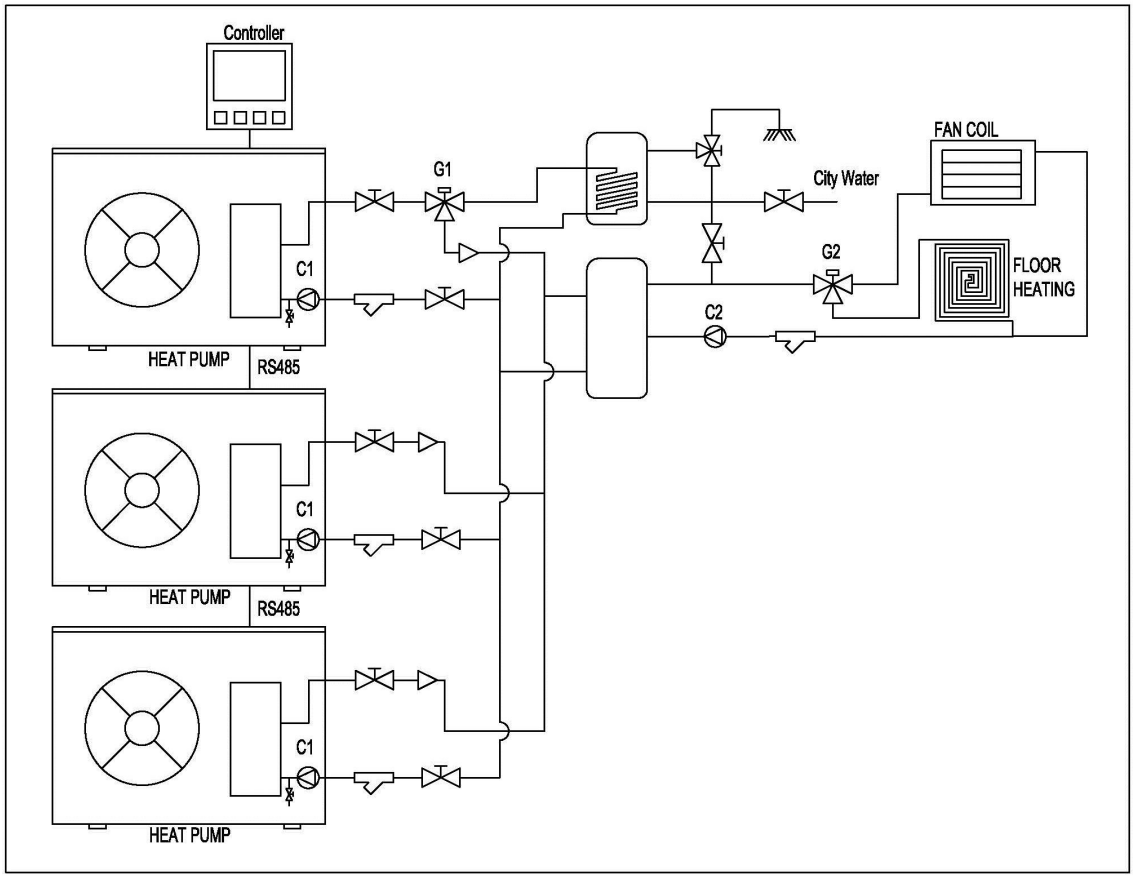
Double zone Control

Heat pump has double zone control, which can control radiator and floor heating at the same time. This function can be enabled by P016. Below is the application for your reference. On the controller, you can set target temperature of floor heating and radiator. Or Water temperature of radiator can be set by parameter P002 and Water temperature of floor heating can be set by parameter P041. G3 valve is mixing valve, there is parameter P046 can be set for the ON/OFF period.



Cascade Control

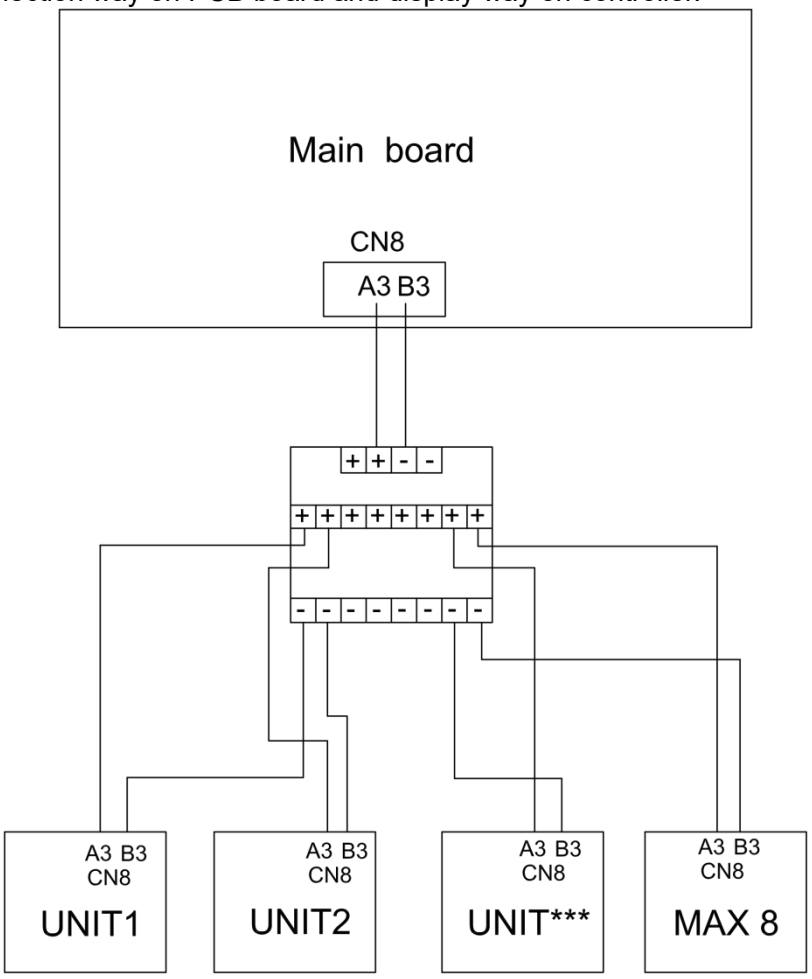
Heat pump can realize cascade control up to 8 units. There is 7 inch color touch screen controller optional for the display. The group control system can control and view the operation of the entire system only by connecting the master to the wire controller. And functions of Master unit or Slave units can be selected by parameter P070. If the balance tank is too large, the lower water tank temperature sensor (T16) needs to be added in order to improve the control accuracy. T16 is set in the lower part of the balance tank.

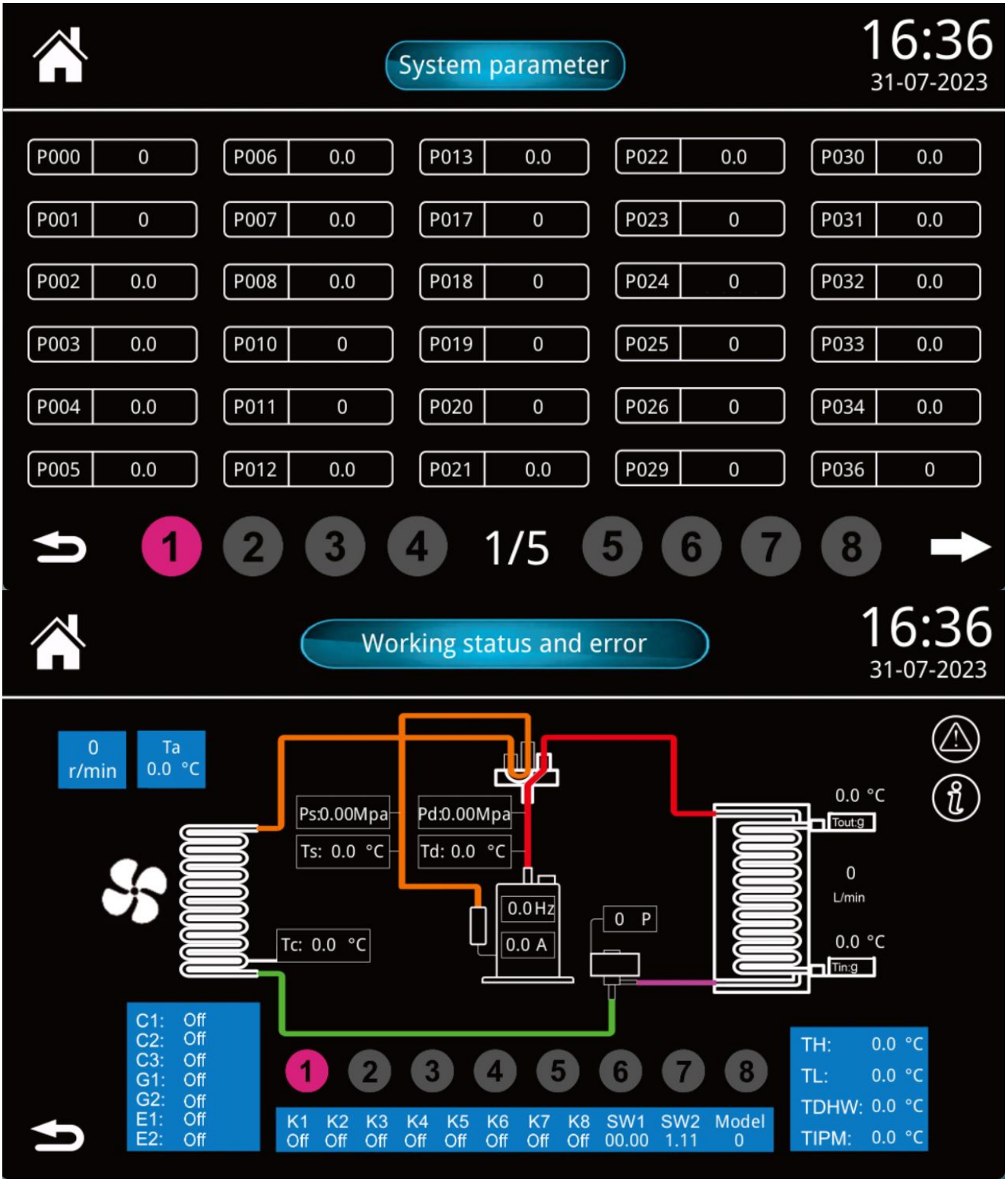


Master unit or Slave unit can be defined by the dial switch SW1 6,7,8 on PCB board as per below rule.

6	7	8	Define
OFF	OFF	OFF	Master unit
ON	OFF	OFF	Slave unit 1
OFF	ON	OFF	Slave unit 2
ON	ON	OFF	Slave unit 3
OFF	OFF	ON	Slave unit 4
ON	OFF	ON	Slave unit 5
OFF	ON	ON	Slave unit 6
ON	ON	ON	Slave unit 7

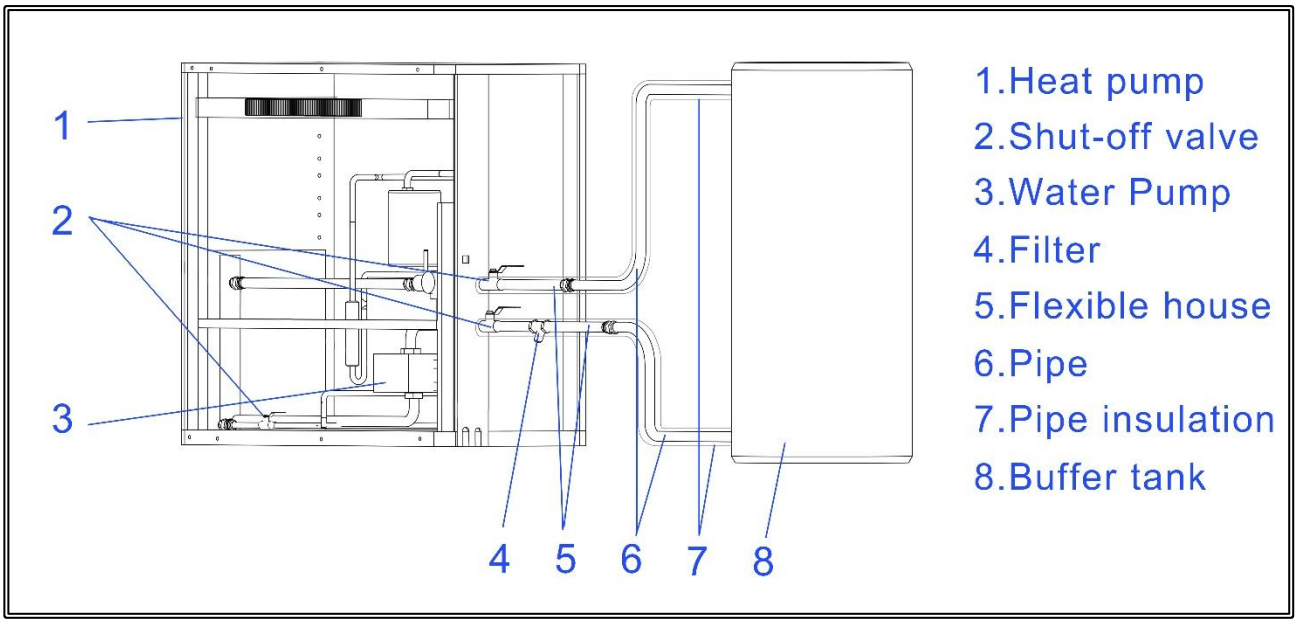
Below is the connection way on PCB board and display way on controller.




System parameter
16:36
31-07-2023
P000 0
P001 0
P002 0.0
P003 0.0
P004 0.0
P005 0.0
P006 0.0
P007 0.0
P008 0.0
P010 0
P011 0
P012 0.0
P013 0.0
P017 0
P018 0
P019 0
P020 0
P021 0.0
P022 0.0
P023 0
P024 0
P025 0
P026 0
P029 0
P030 0.0
P031 0.0
P032 0.0
P033 0.0
P034 0.0
P036 0
1/5
Working status and error
16:36
31-07-2023
0 r/min
Ta 0.0 °C
Ps:0.00Mpa
Pd:0.00Mpa
Ts: 0.0 °C
Td: 0.0 °C
Tc: 0.0 °C
0.0Hz
0.0 A
0 P
0.0 °C
Tout:g
0 L/min
0.0 °C
Tin:g
C1: Off
C2: Off
C3: Off
G1: Off
G2: Off
E1: Off
E2: Off
K1 K2 K3 K4 K5 K6 K7 K8 SW1 SW2 Model
Off Off Off Off Off Off Off Off 00.00 1.11 0
TH: 0.0 °C
TL: 0.0 °C
TDHW: 0.0 °C
TIPM: 0.0 °C

4.3 Pipe Connection

Schematic diagram of water pipe connection between heat pump and buffer tank.



For the pipe size is:1 inch, and pipe joint specification. is DN25, material can be copper or stainless steel.

For 26kw, pipe size is:1.5 inch, and pipe joint specification. is DN40, material can be copper or stainless steel.

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

The heating/cooling water inlet and outlet direction must be connected according to the marked areas on the heat pump.

A water filter must be installed in the water circuit of the heat pump, in order to avoid obstructions or narrowing caused by dirt in the installation. The filter MUST be installed before filling the installation with water and in the return branch of the machine, to avoid the entry of dirty water into the heat exchanger (condenser). The type of filter installed must be adapted to the particular characteristics of each installation (type and material of the water pipes, type of water used, water volume of the installation, etc.).
The water filter should be checked and cleaned, if necessary, at least once a year. In new installation, however, it is advisable to check it within the first few months of its commissioning.
A flexible damping pipe must be installed between the heat pump and the buffer tank to balance the height difference between the machine and the pipe and reduce the transmission of vibration.

We recommend inserting cut-off valves between the installation piping and the heat pump to simplify maintenance tasks.
Leave a free space around the heat pump for carrying out any maintenance and repair

operations.

Air vent valves and suitable devices should be fitted for the correct removal of air from the circuit during the filling stage.

All water circuit piping MUST be insulated to prevent condensation during operation in cooling mode and reduction of the cooling and heating capacity, as well as to prevent freezing of outside pipes during winter. The minimum insulation thickness of the pipes should be 19mm(0.039W/mK), preferably comprising a closed cell insulation or a vapor barrier. In outdoor areas exposed to the sun, the insulation must be protected from the effects of degradation.

The water circulation pump must at all times be operational (even if unit is not running) to prevent any possible damage due to freezing. Even when in standby mode, the circulation pump is controlled directly from the unit, which takes the outdoor temperature and temperature in pipe into consideration to decide whether to circulate water within the system.

Important: Even though the unit has anti-freeze protection, if the circulation pump fails or there is a problem with the power supply, there is still a risk of damage due to freezing. **During the installation Anti-freeze (Ethylene Glycol) is strongly recommended. If the air temp is ever lower than 0°C, it must use enough glycol.**

4.4 Electrical Connection

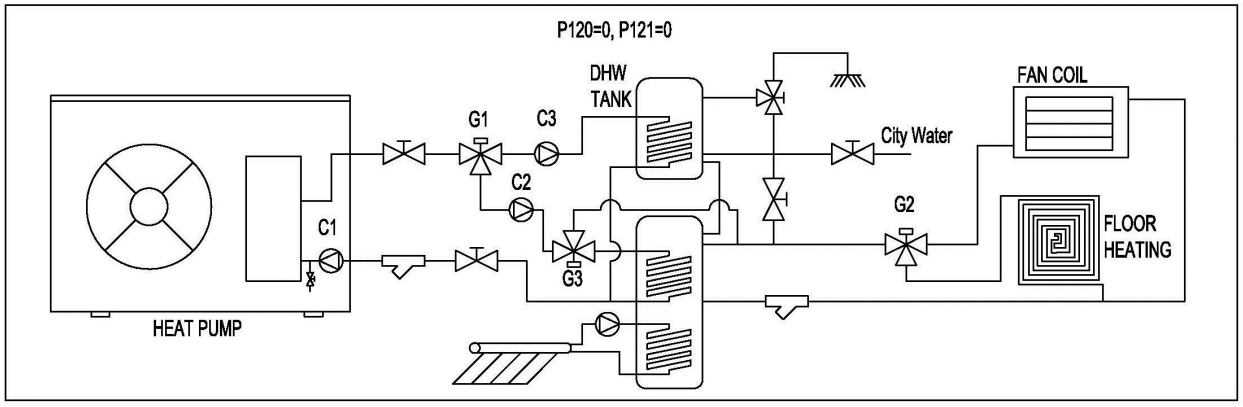
The electrical installation of the heat pump and its electrical accessories should be carried out by qualified personnel, subject to the current installation regulations on the matter. The electrical installation must be connected so that the heat pump can be fully isolated and disconnected for the safe execution of any maintenance operations.

Th machine has 2 holes with cable grommets in its back side to introduce all connection cables inside the machine. The cables exposed to the weather conditions of the exterior should be protected by means of protective raceways or pipes. Alternatively, they should be of a suitable category for use outdoors (H07RN-F type or higher). It is also advisable to keep the high -voltage cables (general supply, diverted valves, electrical heaters, circulation pumps, etc.) at a minimum distance of 25 mm low-voltage cables (controller board cable, temperature sensors, room sensor, etc.) and drive them through independent pipes.

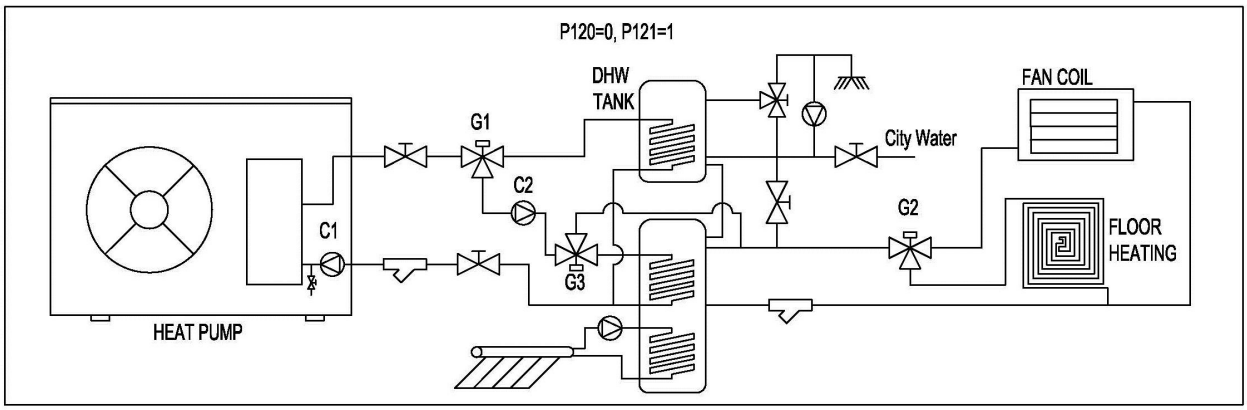
IMPORTANT: Before carrying out any work on the electrical installation of the heat pump, always ensure it is disconnected from the mains.

4.4.1 System Diagram

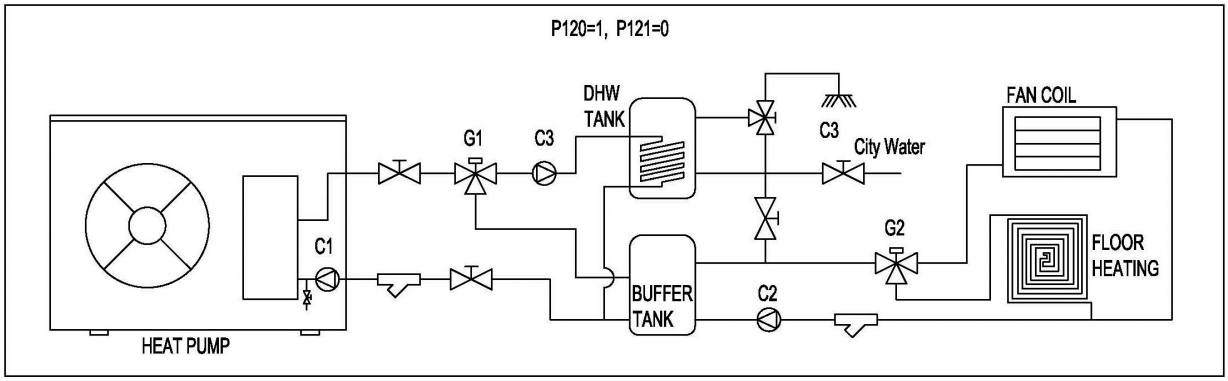
A) P120=0，P121=0



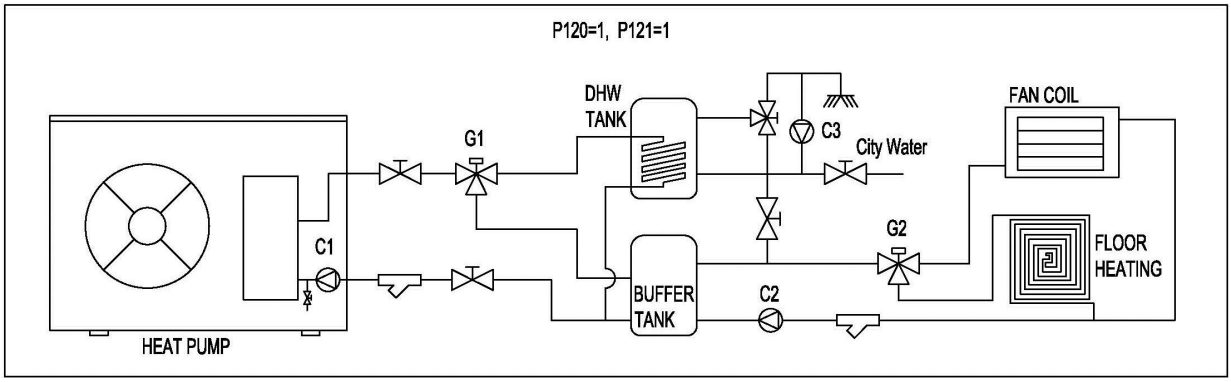
B）P120=0，P121=1



C) P120=1，P121=0

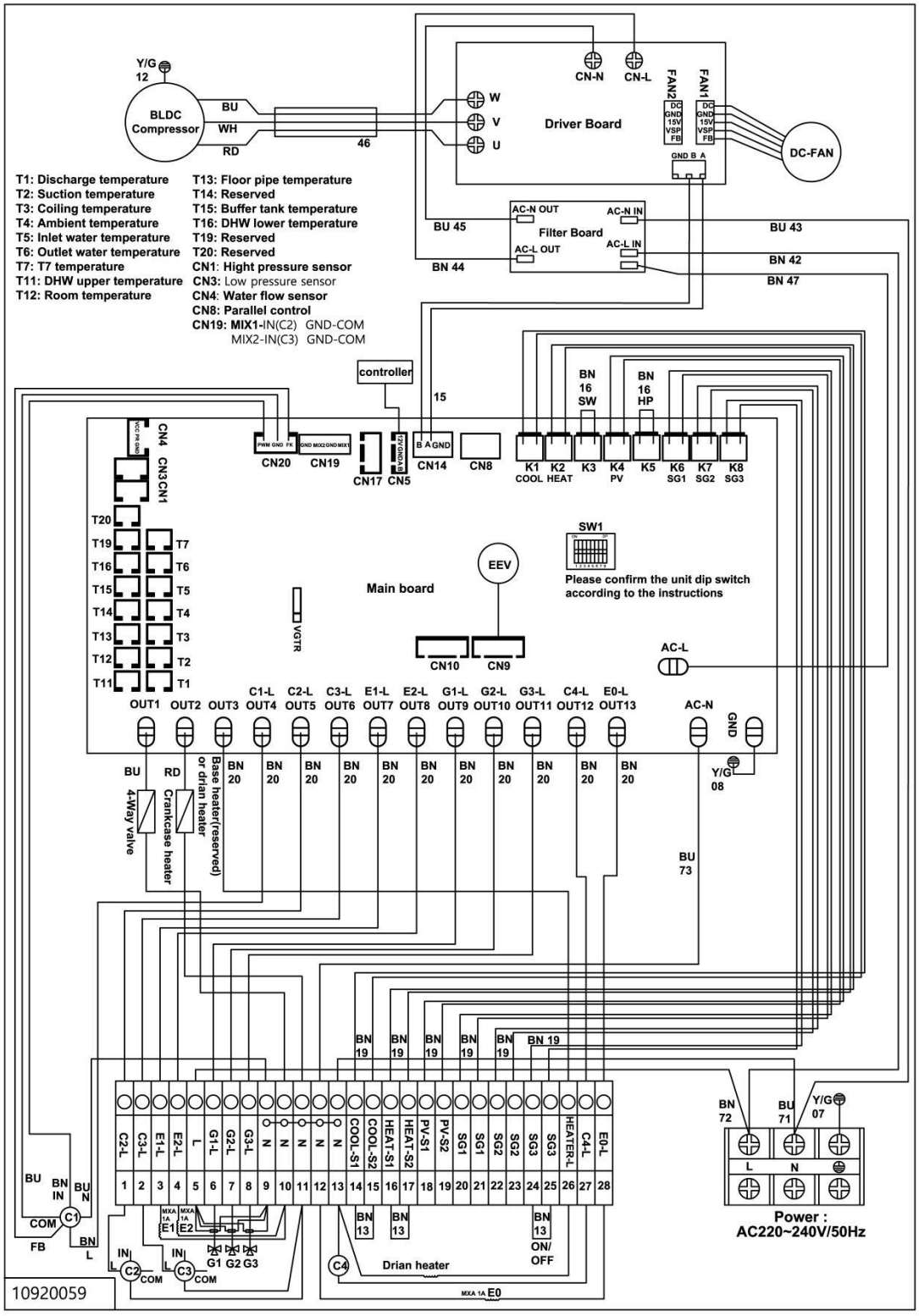


D) P120=1，P121=1

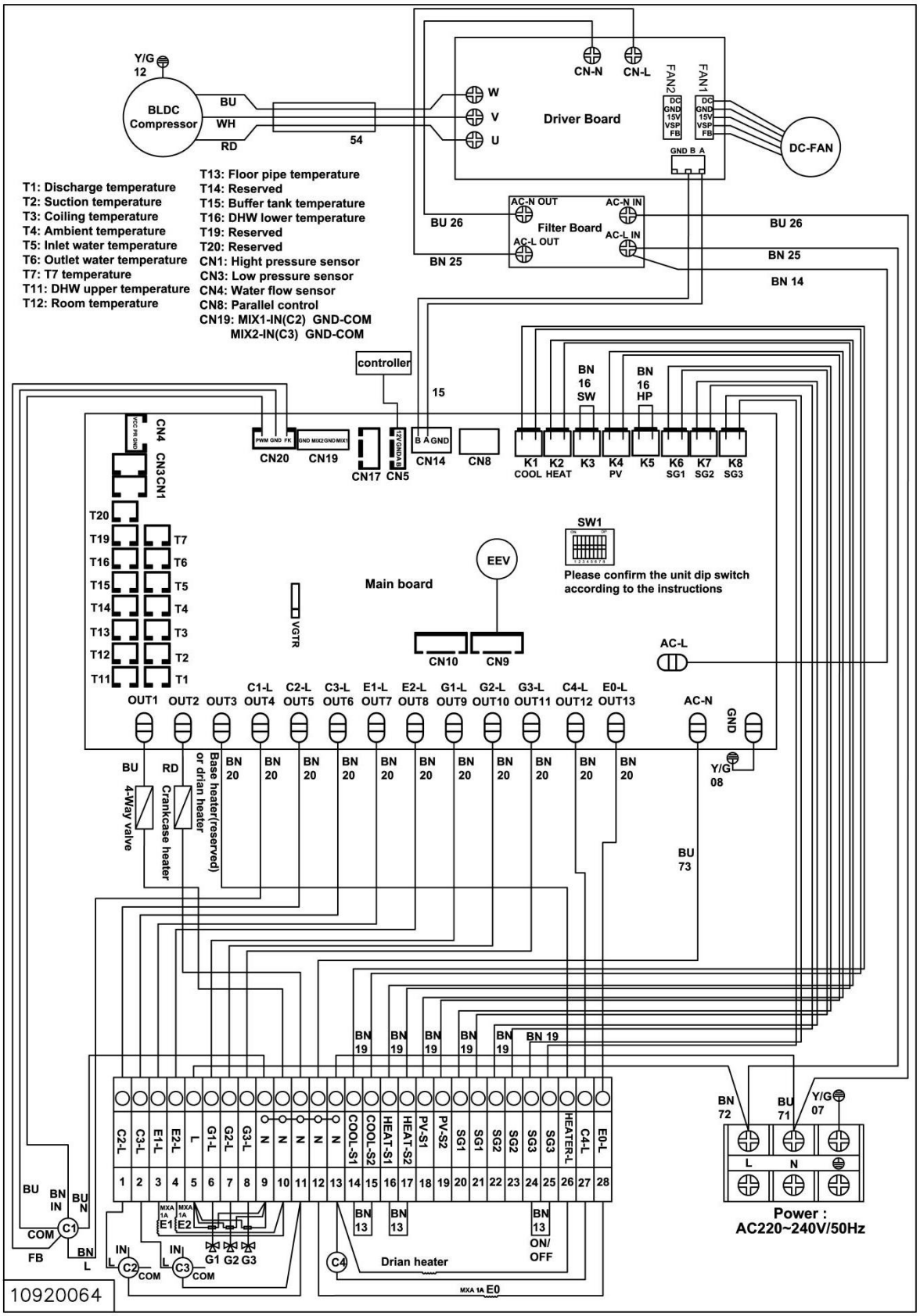


4.4.2 Wiring Diagram

Master plus 60/90



Master plus 120



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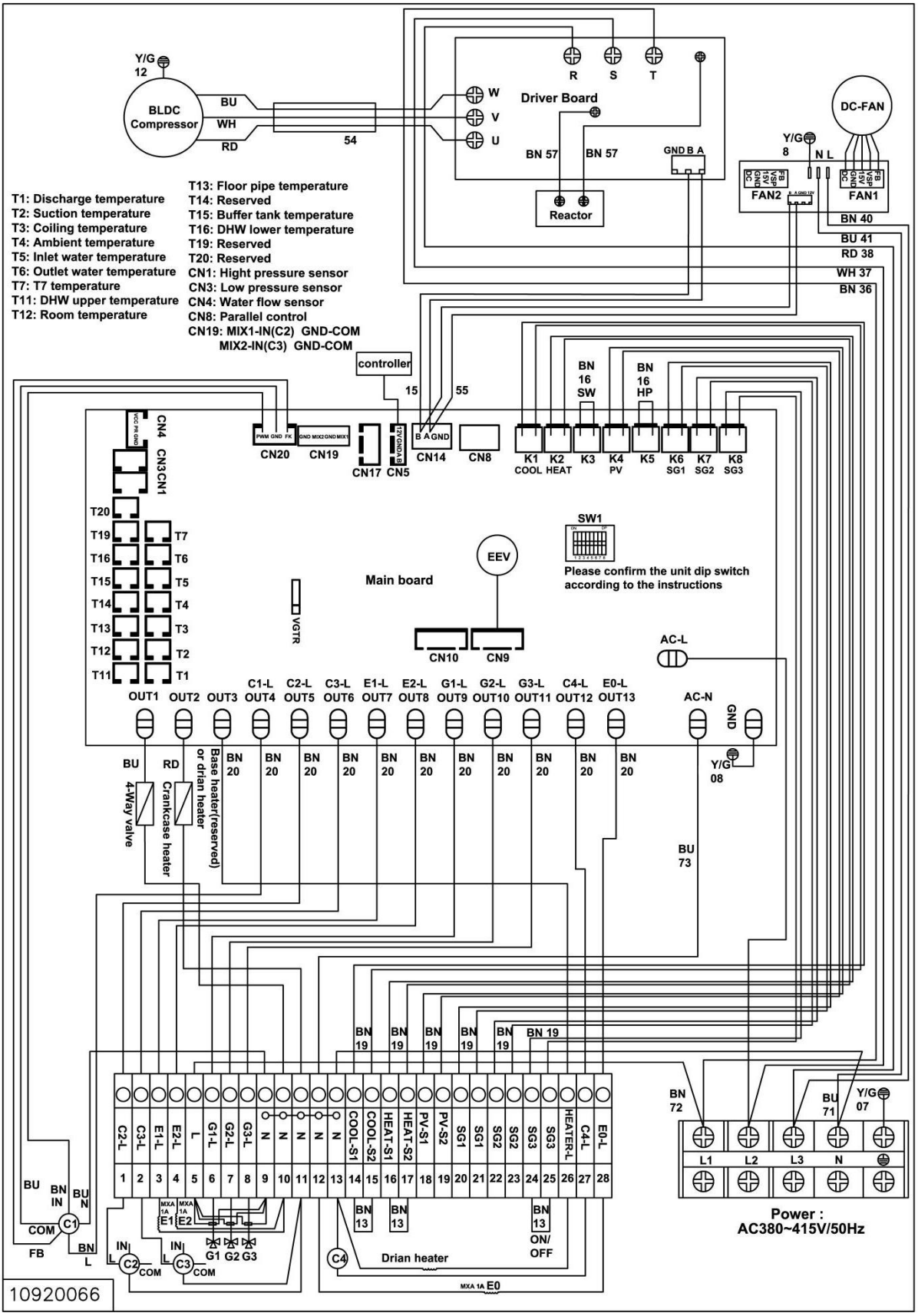

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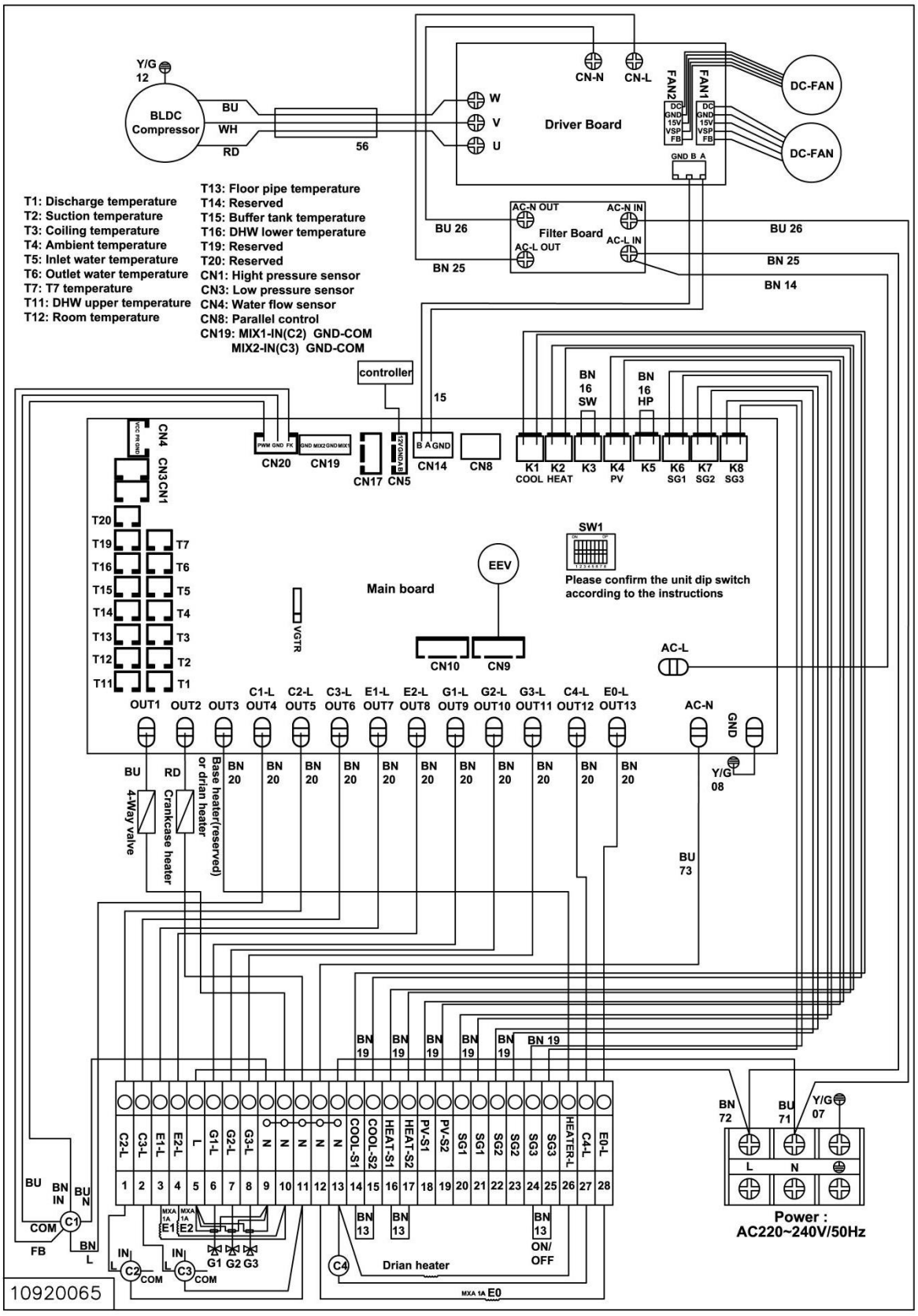

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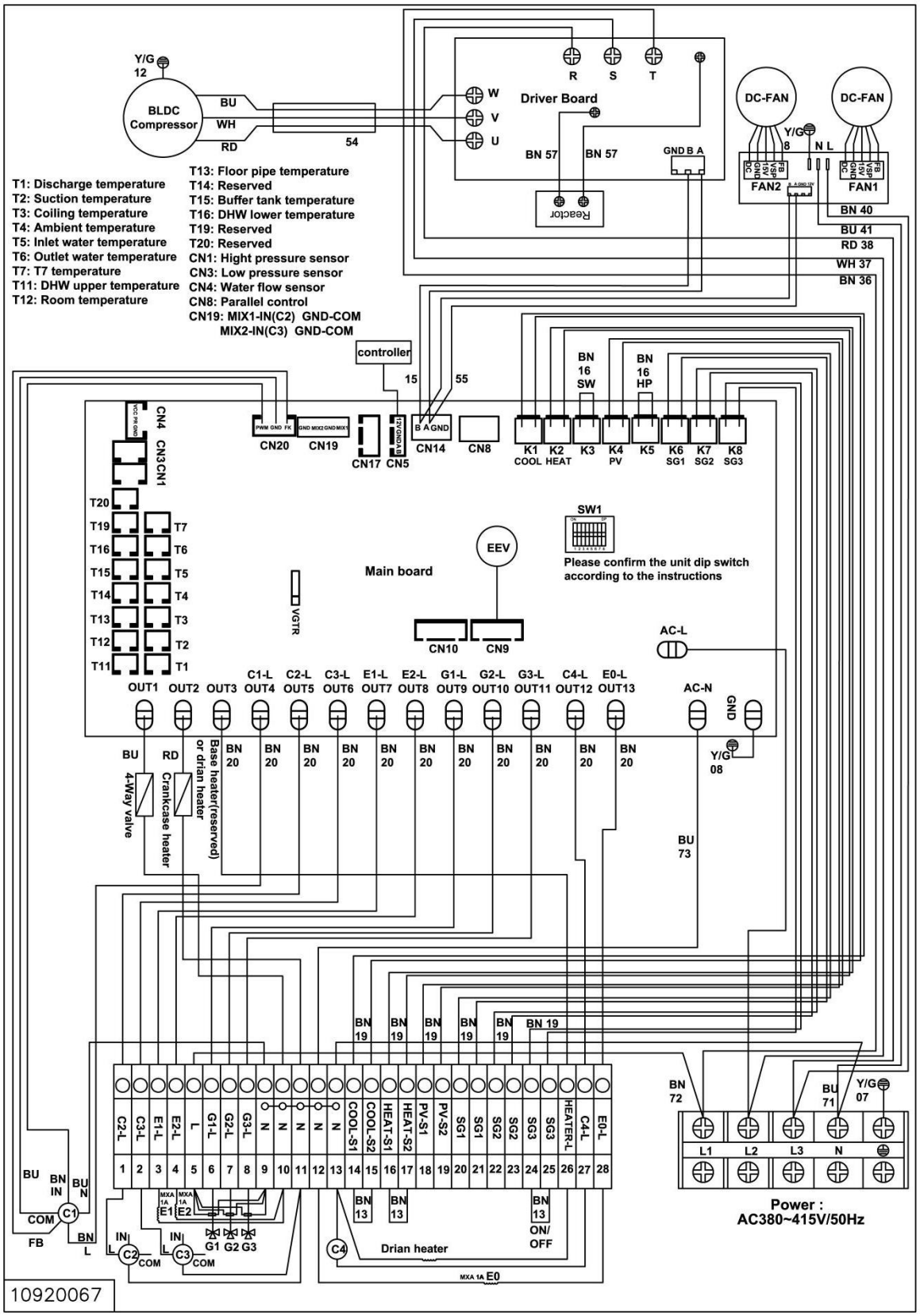

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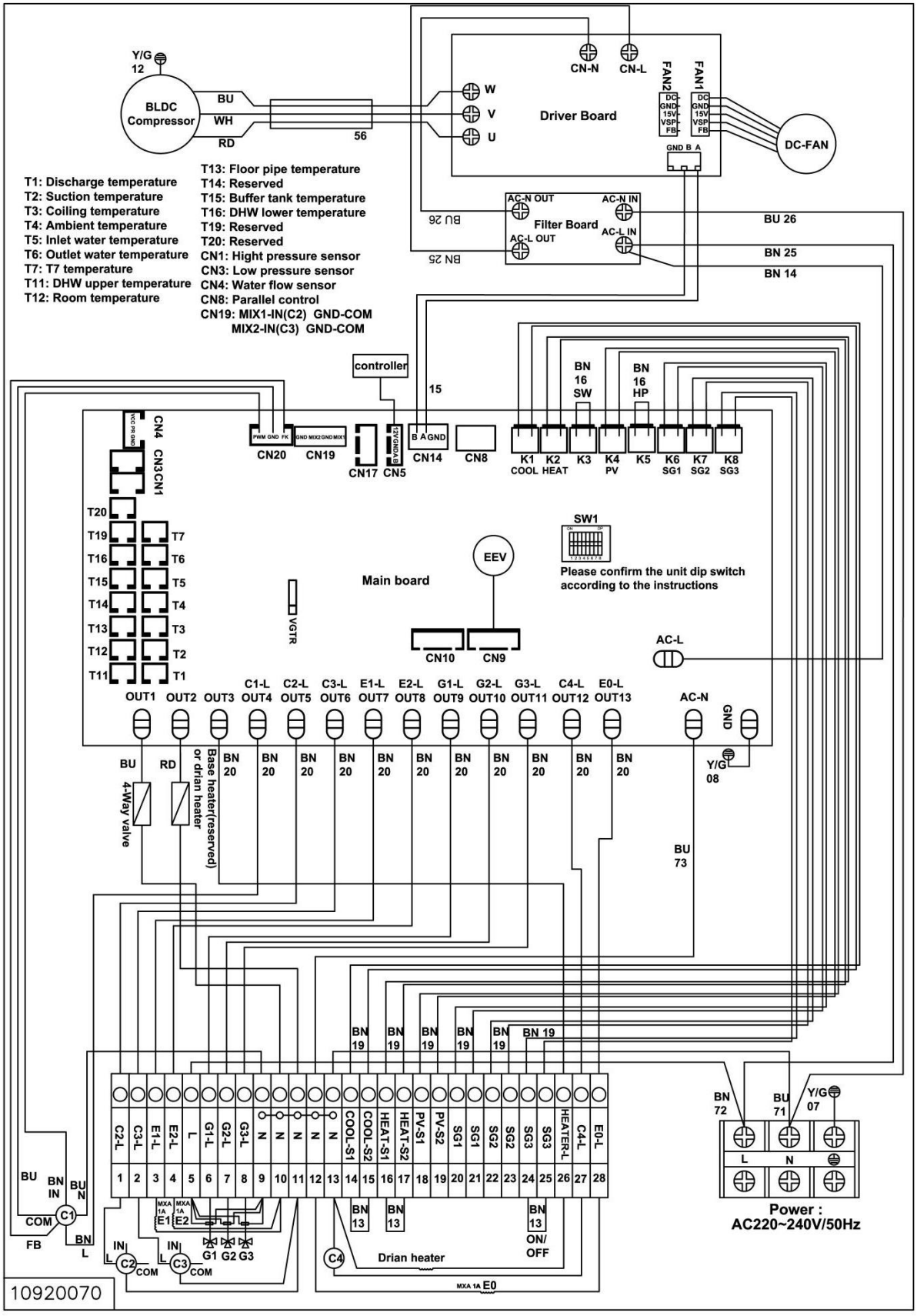

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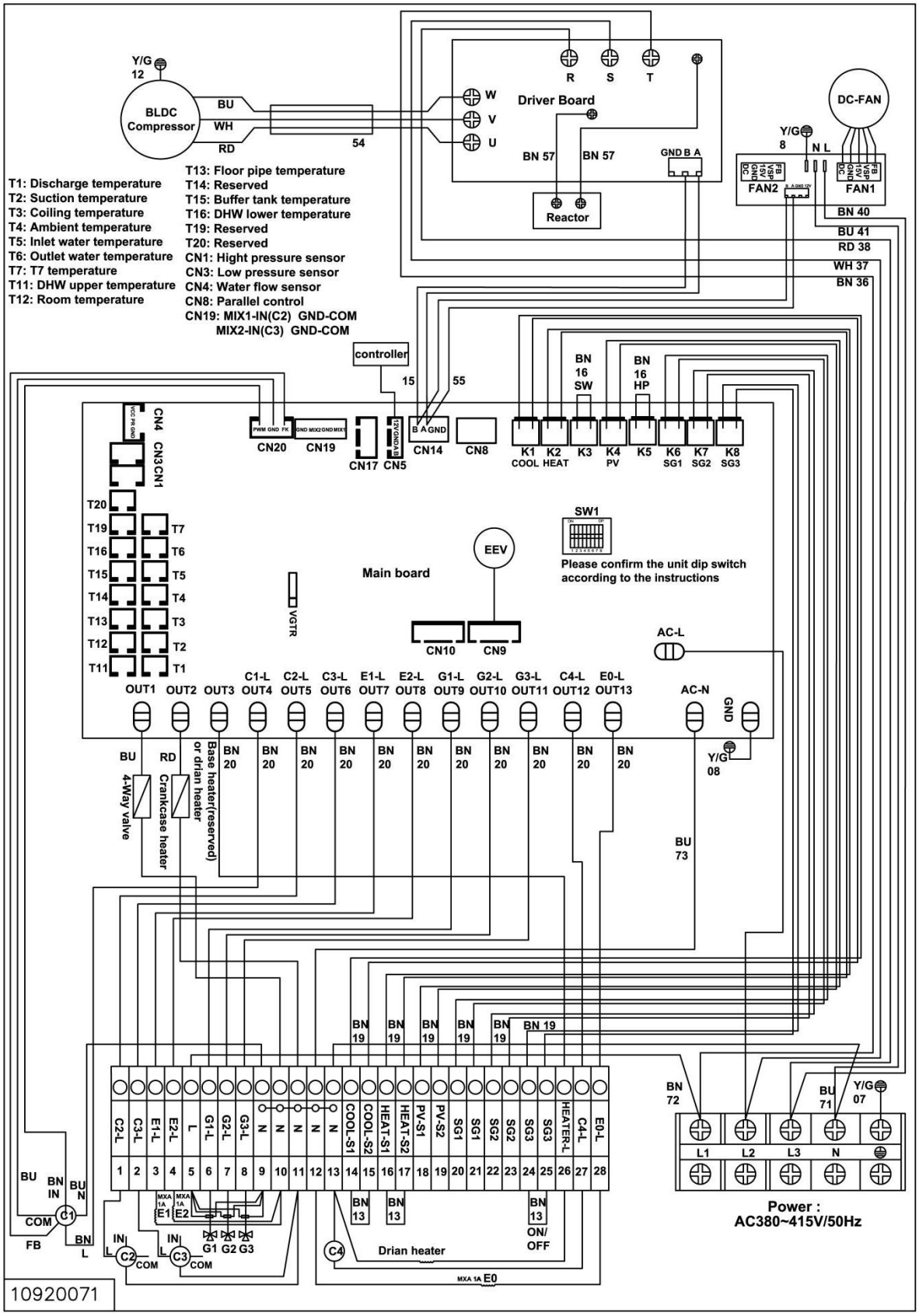
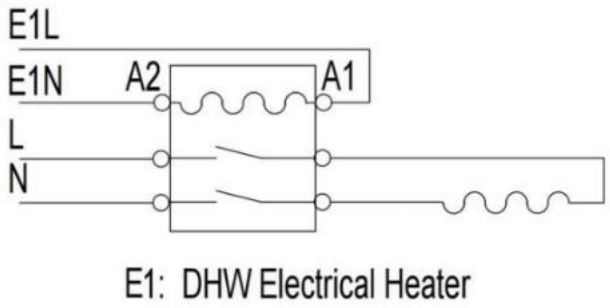
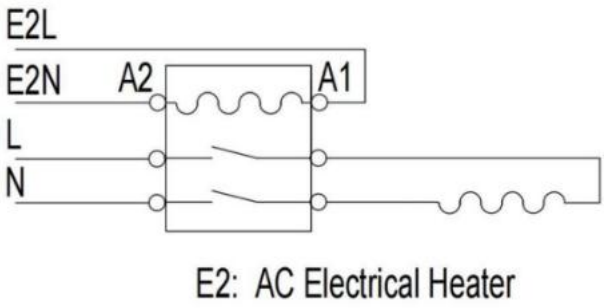


4.4.3 Auxiliary electrical heater connection



E1: DHW Electrical Heater



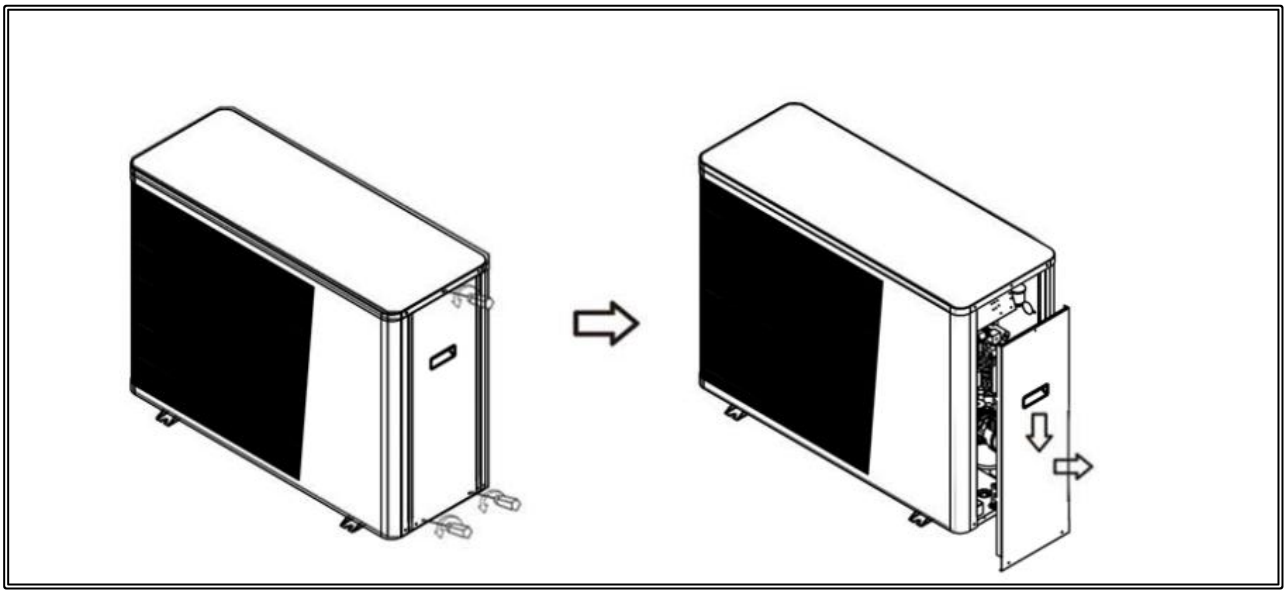
E2: AC Electrical Heater

Note: A relay with max 1A must be installed before connecting electrical heater, and main board of heat pump only control the relay, will not control the electrical heater directly.

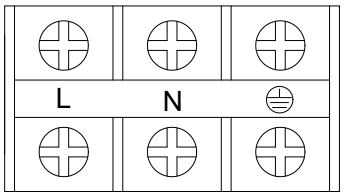
4.4.4 Installation Drawing

Connection the main power supply

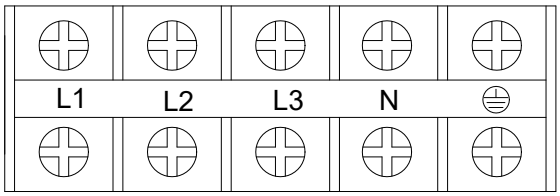
The heat pump is prepared for connection to 230V~ 50Hz or 380V~415V/3/50HZ in the terminals indicated in the figure (see “wiring Diagram”). Inside the machine, open the right-side door, and access to the electronic boards area to find the power supply terminals. **Make sure to make the earth connection.**



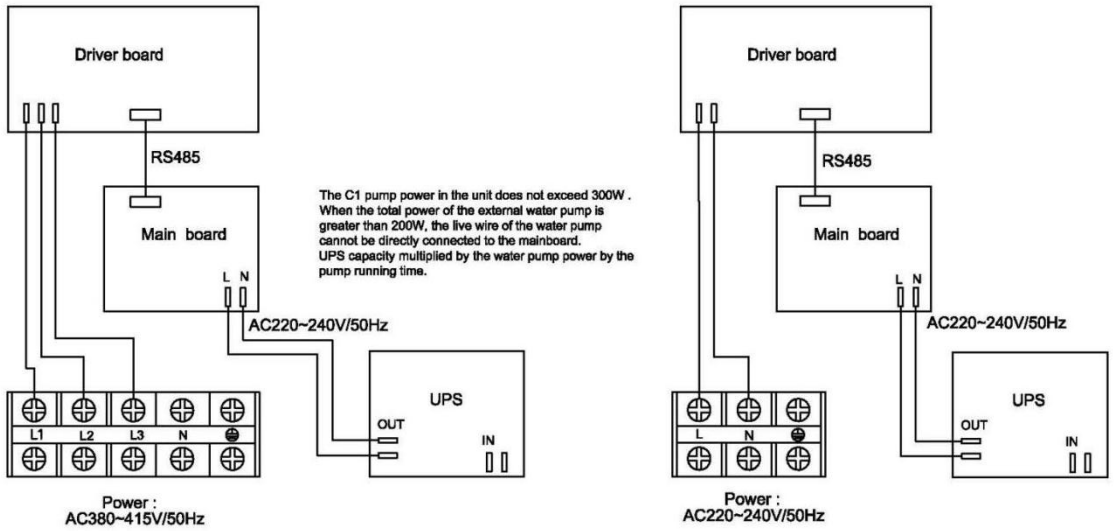
Single phase model



Three phase model



There is UPS can be connected to PCB as below shown. When there is power supply cut, UPS can make built in water pump work, then circulate the water in the pipes of heat pump. Thus can avoid heat pump freezing in cold winter.



The dimension and type of the main supply cables must at all times comply with the rules and regulation in force. Nevertheless, the following table details some recommended features and dimensions, as a guide:

Power supply	Units	Heat pump		
		Max. (A)	(mm^2)	Fuse (A)
220~240V/ 1 phase	6kW	12	2.5	16
	9KW	17	2.5	25
	12kW	22	4	32
	16kW	32	6	40
380~415V/ 3 phase	6KW	7	1.5	16
	9KW	7	1.5	16
	12kW	9.5	1.5	16
	16kW	13	2.5	16

power Supply	E-heater Current (A)		
	3kW	6kW	9kW
220~240V/1 phase	13	26	39
380~415V/3 phase	4	9	13

Wire Diameter mm^2	Limit Current A	Recommended Current A	Fuse Capacity A
1.5	16	11	16
2.5	25	18	25
4	32	22	32
6	40	28	40
10	60	42	60
16	80	56	80
25	100	70	100

HP: Heat pump E1: DHW auxiliary electrical heater E2: heating auxiliary electrical heater

For the correct selection of the type and dimensions of machine's main supply cable, it has taken in account the electrical consumption of the optional accessories connected on the heat pump (auxiliary electrical heaters, circulating pumps). They are columns included in the above table indicating the maximum consumption for combinations of heat pump and the auxiliary electrical heater E1 and E2 (see "Wiring Diagram").

The electrical connection of the heat pump must be protected by an earth leakage circuit breaker (a high-speed switch of 30 mA (<0.1s)).

IMPORTANT: Before carrying out any work on the electrical installation of the Heat pump, always ensure it is disconnected from the mains.

4.4.5 DHW anti-freeze

Entry condition: DHW water tank temperature (C07)≤ [P067],
If above condition is met, the unit starts in DHW mode and E1 electric heater starts.
Exit condition: DHW water tank temperature (C07)≥20°C;
Note: When entering anti-freezing, the controller displays the anti-freezing symbol
When P [121] of C3 water pump =0, participate in anti-freezing together.

4.4.6 AC anti-freeze

First-level antifreeze
Entry Conditions:
Inlet water temperature (C05)≤ [P067] or outlet water temperature (C06)≤ [P067];
If the above conditions are met, enter first-level antifreeze and start water pump C1.
Exit conditions: inlet water temperature (C05) or outlet water temperature (C06)≥10°C;
Second-level antifreeze
Entry Conditions:

When first-level anti-freezing operation for 30min, inlet water temperature (C05) or outlet water temperature (C06)≤10° C, enter second-level antifreeze. The unit starts in heating mode and E2 electric heater starts.
Exit conditions:
The inlet water temperature (C05) or outlet water temperature (C06)≥20° C.
Note: When entering anti-freezing, the controller displays the anti-freezing symbol.

4.5 Commissioning

4.5.1 Preparations

1) Compressor Heater

As mentioned above, we suggest if the temperature is lower than 10°C, the compressor heater will heat the compressor for 3-10 hours before the first start up.

2) Filling and Venting

The hydraulic installation must include a filling valve, air vent valves and the necessary hydraulic components for correctly filling it.

To fill the heat pump, open the filling valve until the pressure gauge located on the back of the machine shows a pressure of 1~1.5 bars. The heat pump has an auto air vent on the top of the heat exchanger's (condenser) flow tube. Open it during the filling process and wait for the water to begin flowing out.

The air should also be bled from the rest of the installation using the air vent valves provided.

Filling should be performed slowly, thus helping the evacuation of air from the water circuit. Close the filling valve after filling.

To comfortably access the heat pump air vent valve, open the top cover and side panel of the heat pump.

IMPORTANT: Switching on the heat pump with no water inside could result in serious damages.

4.5.2 Inspection before Start up

1) Mechanical Inspection:

a. Check the cabinet and inside pipe system for possible damage during transportation.

b. Check that the heating water circuit is filled and well vented. Check the pipe system for leaks.
c. Check the Fan making sure it can move freely

2) Electric System Inspection:

a. Check the power supply (voltage/frequency) matches the rating label and specification.
b. Check all the electrical connections for loose or damaged wires due to

transportation.

3) Pipe Inspection:

a. Check all the valves, and water flow directions.
b. Check for any possible leaks inside or outside of unit.
c. Check the insulation of all the pipes.

4.5.3 Start up and Commissioning

- a. After the system inspection is finished, startup can begin.
- **b.** Connect the power supply; switch on the isolator to turn on the heat pump.
- **c.** The circulation pumps starts immediately. After 40 seconds, the fan motor starts. After another 5 seconds, compressor starts.
- **d.** Air is initially released from the hot water and venting may be necessary. If bubbling sounds can be heard from the heat pump, the circulation pump or radiators the entire system will require further venting. When the system is stable (correct pressure and all air eliminated) the automatic heating control system can be set as required.
- **e.** Check heating water inlet/outlet temperature difference after the system is stable.
- **f.** Check the compressor exhaust and suction temperature.
- **g.** Adjust the parameters according to different weather conditions and user requirements.

4.6 Specific information regarding appliances with R290 refrigerant gas

Specific information regarding appliances with R290 refrigerant gas.
• Thoroughly read all of the warnings.
• When defrosting and cleaning the appliance, do not use any tools other than those recommended by the manufacturing company.
• The appliance must be placed in an area without any continuously sources of ignition (for example: open flames, gas or electrical appliances in operation).
• Do not puncture and do not burn.
• This appliance contains Y g (see rating label back of unit) of R290 refrigerant gas.
• R290 is a refrigerant gas that complies with the European directives on the environment. Do not puncture any part of the refrigerant circuit. Be aware the refrigerants may not contain an odour.
• If the appliance is installed, operated or stored in a nonventilated area, the room must be designed to prevent to the accumulation of refrigerant leaks resulting in a risk of fire or explosion due to ignition of the refrigerant caused by electric heaters, stoves, or other sources of ignition.
• The appliance must be stored in such a way as to prevent mechanical failure.
• Individuals who operate or work on the refrigerant circuit must have the appropriate certification issued by an accredited organization that ensures competence in handling refrigerants according to a specific evaluation recognized by associations in the industry.
• Repairs must be performed based on the recommendation from the manufacturing company.
Maintenance and repairs that require the assistance of other qualified personnel must be

performed under the supervision of an individual specified in the use of flammable refrigerants.

Appliances shall be installed, operated and stored in a room with a floor area larger than $4m^2$. The appliance shall be stored in a well-ventilated area where the room size corresponds to the room area as specified for operation.

Instructions for repairing appliances containing R290

1 General Instructions

This instruction manual is intended for use by individuals possessing adequate backgrounds of electrical, electronic, refrigerant and mechanical experience.

1.1 Check to the area
Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimized. For repair to the refrigerating system, the following precautions shall be complied with prior to conducting work on the system.

1.2 Work procedure
Work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapor being present while the work is being performed.

1.3 General work area
All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided. The area around the workspace shall be sectioned off. Ensure that the conditions within the area have been made safe by control of flammable material.

1.4 Checking for presence of refrigerant
The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with flammable refrigerants, i.e., nonspeaking, adequately sealed or intrinsically safe.

1.5 Presence of fire extinguisher
If any hot work is to be conducted on the refrigeration equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO 2 fire extinguisher adjacent to the charging area.

1.6 No ignition sources
No person carrying out work in relation to a refrigeration system which involves exposing any pipe work that contains or has contained flammable refrigerant shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which flammable refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.

1.7 Ventilated area
Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the

work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it extremally into the atmosphere.

1.8 Checks to the refrigeration equipment
Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer's maintenance and service guidelines shall be followed. If in doubt consult the manufacturer's technical department for assistance. The following checks shall be applied to installations using flammable refrigerants: the charge size is in accordance with the room size within which the refrigerant containing parts are installed.

• the ventilation machinery and outlets are operating adequately and are not obstructed.
• if an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant.
• marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected.
• refrigeration pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

1.9 Checks to electrical devices
Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised. initial safety checks shall include:
• that capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking.
• that there no live electrical components and wiring are exposed while charging, recovering or purging the system.
• that there is continuity of earth bonding.

2 Repairs to sealed components

2.1 During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked upon prior to any removal of sealed covers, etc. If it is absolutely necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.

2.2 Particular attention shall be paid to the following to ensure that by working on electrical components, the casing is not altered in such a way that the level of protection is affected. This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc. Ensure that apparatus is mounted securely. Ensure that seals or sealing materials have not degraded such that they no longer serve the purpose of preventing the ingress of flammable atmospheres. Replacement parts shall be in accordance with the manufacturer's specifications.
NOTE The use of silicon sealant may inhibit the effectiveness of some types of leak detection equipment. Intrinsically safe components do not have to be isolated prior to working on them.

3 Repair to intrinsically safe components

Do not apply any permanent inductive or capacitance loads to the circuit without ensuring that this will not exceed the permissible voltage and current permitted tor the equipment in use. Intrinsically safe components are the only types that can be worked on while live in the presence of a flammable atmosphere. The test apparatus shall be at the correct rating. Replace components only with parts specified by the manufacturer. Other parts may result in the ignition of refrigerant in the atmosphere from a leak.

4 Cabling

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continua! vibration from sources such as compressor fans.

5 Detection of flammable refrigerants

Under no circumstances shall potentially sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame} shall not be used.

6 Leak detection methods

The following leak detection methods are deemed acceptable for systems containing flammable refrigerants. Electronic leak detectors shall be used to detect flammable refrigerants, but the sensitivity may not be adequate, or may need recalibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed and the appropriate percentage of gas (25 % maximum} is confirmed. Leak detection fluids are suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipework. If a leak is suspected, all open flames shall be removed/extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves} in a part of the system remote from the leak. Oxygen free nitrogen (OFN) shall then be purged through the system both before and during the brazing process.

7 Removal and evacuation

When breaking into the refrigerant circuit to make repairs - or for any other purpose conventional procedures shall be used. However, it is important that best practice is followed since flammability is a consideration. The following procedure shall be adhered to: remove refrigerant; purge the circuit with inert gas; evacuate; purge again with inert gas; open the circuit by cutting or brazing. The refrigerant charge shall be recovered into the correct recovery cylinders. The system shall be “flushed” with OFN to render the unit safe. This process may need to be repeated several times. Compressed air or oxygen shall not be used for this task. Flushing shall be achieved by breaking the vacuum in the system with OFN and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system. When the final OFN charge is

used, the system shall be vented down to atmospheric pressure to enable work to take place. This operation is absolutely vital if brazing operations on the pipework are to take place. Ensure that the outlet tor the vacuum pump is not close to any ignition sources and here is ventilation available.

8 Charging procedures

In addition to conventional charging procedures, the following requirements shall be followed. Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them. Cylinders shall be kept upright. Ensure that the refrigeration system is earthed prior to charging the system with refrigerant. Label the system when charging is complete (if not already). Extreme care shall be taken not to overfill the refrigeration system. Prior to recharging the system, it shall be pressure tested with OFN. The system shall be leak tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

9 Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of reclaimed refrigerant. It is essential that electrical power is available before the task is commenced.
a) Become familiar with the equipment and its operation.
b) Isolate system electrically.
c) Before attempting the procedure ensure that: mechanical handling equipment is available, if required, for handling refrigerant cylinders;
d) All personal protective equipment is available and being used correctly; the recovery process is supervised at all times by a competent person;
e) recovery equipment and cylinders conform to the appropriate standards.
f) Pump down refrigerant system, if possible.
g) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
h) Make sure that cylinder is situated on the scales before recovery takes place.
i) Start the recovery machine and operate in accordance with manufacturer’s instructions.
j) Do not overfill cylinders. (No more than 80 % volume liquid charge).
k) Do not exceed the maximum working pressure of the cylinder, even temporarily.
l) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
m) Recovered refrigerant shall not be charged into another refrigeration system unless it has been cleaned and checked.

10 Labeling

Equipment shall be labeled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. Ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

11 Recovery

When removing refrigerant from a system, either for servicing or

decommissioning, it is recommended good practice that all refrigerants are removed safely. When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge are available. All cylinders to be used are designated for the recovered refrigerant and labeled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs. The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of flammable refrigerants. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that il is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.

The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant Waste Transfer Note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric healing to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

5 CONTROLLER

5.1 Electric Parts Control Program working theory

a) Compressor

- After the compressor is shut down, it has a minimum interval of 3 minutes before the next start up
- The initial "power-up" does not require the protection of three minutes.
- During defrost, compress on/off interval is based on the defrost parameters.

b) Start up / Shut down Cycle

- When the heat pump switches on, the water circulation pump will start 40 seconds before compressor and the fan will start 5 seconds before compressor.
- When the heat pump switches off, the water circulation pump shuts down 60 seconds after the compressor. The fan switches off 15 seconds after the compressor
- During defrost, the water circulation pump does not stop running.

c) 2nd Heat Source Starting

When parameter P065= 0, E2 is AC heating control port, when parameter P065=1, E2 is 2nd heat source control port.

d) Pipe Electric Heater E0

The pipe electric heater must be installed in the pipe. And working logic will be:
In DHW mode, will be same as E1.
In A/C heating mode, will be same as E2

e) DHW Auxiliary Electric Heater E1

The electric heater E1 is effective in the DHW mode.

Electric heater E1 control:

Start condition 1:

1) The actual temperature of the DHW water tank【C07】≥【P062】;

2) DHW water tank temperature (C07) <DHW target temperature [P004].

The electric heater E1 will be turned on when above conditions are all met at the same time.

Stop condition 1:

1) DHW water tank temperature (C07) ≥ DHW target temperature [P004].

2) DHW water tank temperature (C07)<【P062】-2°C;

If any of the above conditions are met, the electric heater E1 will be turned off.

Note: In DHW mode, the electric heater E1 is turned on at the beginning of defrosting, and

the electric heater E1 is turned off at the end of defrosting.

In DHW mode, if there is problem got on the heat pump (except failure of DHW sensor), the electric heater E1 will be turned on and operate normally according to the DHW set temperature.

f) Multifunctional Port E2

The electric heater E2 has two functions, which are determined by the parameter [P065]:

【P065】=0, A/C electric heating;

【P065】=1, the second heat source.

A/C electric heating function Start conditions:

1) Outdoor ambient temperature (C04)<【P064】;
2) Compressor running timer ≥ 180min;
3) Outlet water temperature (C05) ≤ heating set temperature [P002].

Stop conditions:

Outdoor ambient temperature (C04)≥【P064】+2°C;

Outlet water temperature (C05) ≥ A/C heating set temperature [P002].

If any of the above conditions is met, the electric heater E2 will be turned off.

Second Heat Source function:

Outdoor ambient temperature (C04)<【P066】, the heat pump will be turned off and the second heat source will be turned on.

Outdoor ambient temperature (C04)≥【P066】+2, the heat pump will be turned on and the second heat source will be turned off.

g) Motorized 3-way Valve G1

In DHW mode, the motorized 3-way valve is power on. In any other mode, it is power off.

h) Motorized 3-way Valve G2

In A/C heating mode, the motorized 3-way valve is power on. In A/C cooling mode, the motorized 3-way valve is power off.

i) Motorized 3-way Valve G3

In two zone control, in heating mode, the motorized 3-way valve is ON/OFF, for lower water temperature control.

j) Water Pump C1

It is installed inside the unit.

k) Water Pump C2

When P120=0, It is installed between the unit and the buffer water tank, working as AC auxiliary pump.
When P120=1, It is installed between then buffer water tank and terminal, working as indoor circulating pump.

l) Water Pump C3

When P121=0, It is installed between the unit and the DHW water tank, working as DHW auxiliary pump.
When P121=1, It is installed between the DHW water tank and terminal, working as DHW circulation pump.
When P121=2, It is installed between the DHW water tank and solar collector, working as solar water pump.

m) Water Pump C4

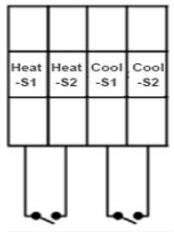
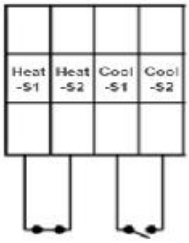
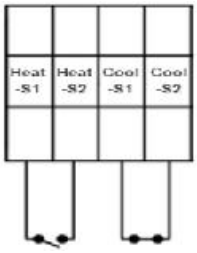
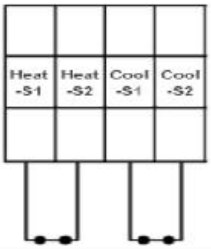
In two zone control, in heating mode, the water pump C4, for lower water temperature control.

n) Baseplate electric heater or Drain water pipe electric heater

When P069=0, The electric heater keeps working hot for baseplate.
When P069=1, The electric heater works during defrosting for drain water pipe.

o) Heating or Cooling thermostat

For cooling and heating thermostat, it would be necessary to add our current working mode. Our current heat pump incorporates 2 inputs prepared for the installation of a room thermostat, what will allow the operation of the heat pump to be controlled depending on the room temperature inside the home. One connection is intended to manage the Heating mode (Heat-S1/S2) and the other to manage the Cooling mode (Cool-S1/S2)
The operation with the room thermostat will not affect the DHW service, keeping it enabled regardless of the status of the thermostat.
In these inputs different types of thermostats can be installed and the operation modes will be the following:

Inputs Operation mode	Operation mode
	Thermostat OFF mode: The heating and cooling modes will not be activated.
	Heating mode: The heat pump activates the Heating mode.
	Cooling mode: The heat pump activates the Cooling mode.
	Manual mode: The working mode is set by the controller.

p) PV ready

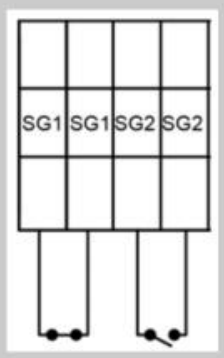
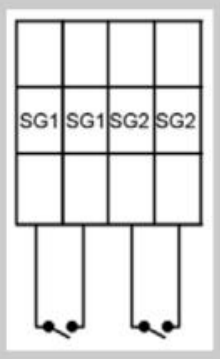
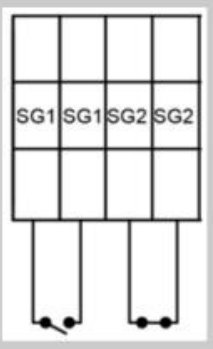
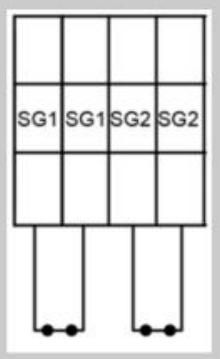
There are sites where heat-pump need working with Photovoltaic system.

Parameter P141 can enable PV ready function or not. When set 0, PV function is invalid, when set 1, PV function is enabled.

When there is signal received from PV inverter, heat pump will heat per P145 AC set max. temp, or P146 DHW set max.temp. In Cooling mode, the unit will run per P003 cooling target temp. When in mixed modes, DHW will be in priority.

q) SG Ready

SG ready function can be enabled by parameter P136, and the temperature can be sent by parameters from P137 to P143.

MODE	Switch-off command.	Standard operation	Switch-on recommendation	Switch-on command
SG1	Close ON	Open OFF	Open OFF	Close ON
SG2	Open OFF	Open OFF	Close ON	Close ON
CONNECTION				
DISPLAY	SG OFF	Nothing	SG ON	SG ON

r) Remote on/off switch

Heat pump can be controlled for start or stop remotely by SG3 port on terminal strip.

When SG3 closed, heat pump will start, when SG3 disconnected, heat pump will stop.

s) Electrical heater at the bottom of heat pump or for drainage pipe

Electrical heater can be connected by Heater-L/N port on terminal strip.

It starts once defrost starts and stops after defrosting stops for 10 minutes

5.2 Operating Mode Principle

1) Space Cooling Mode

Temperature setting range is 6-30°C, the factory setting is 12°C;

2) Space Heating Mode

Temperature setting range is 10-75°C, the factory setting is 45°C;

3) Hot Water Mode

Temperature setting range is 10-75°C, the factory setting is 50°C;

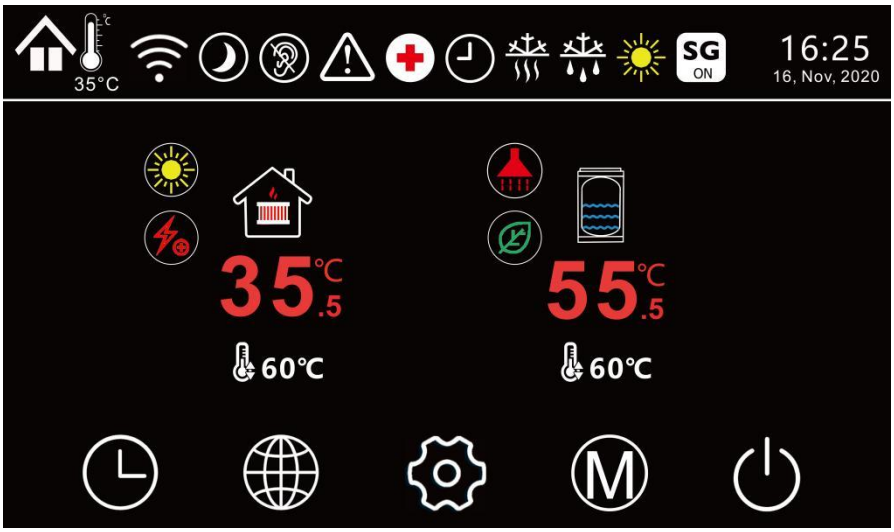
4) Defrost Cycle

Auto Defrost mode (normal defrosting)

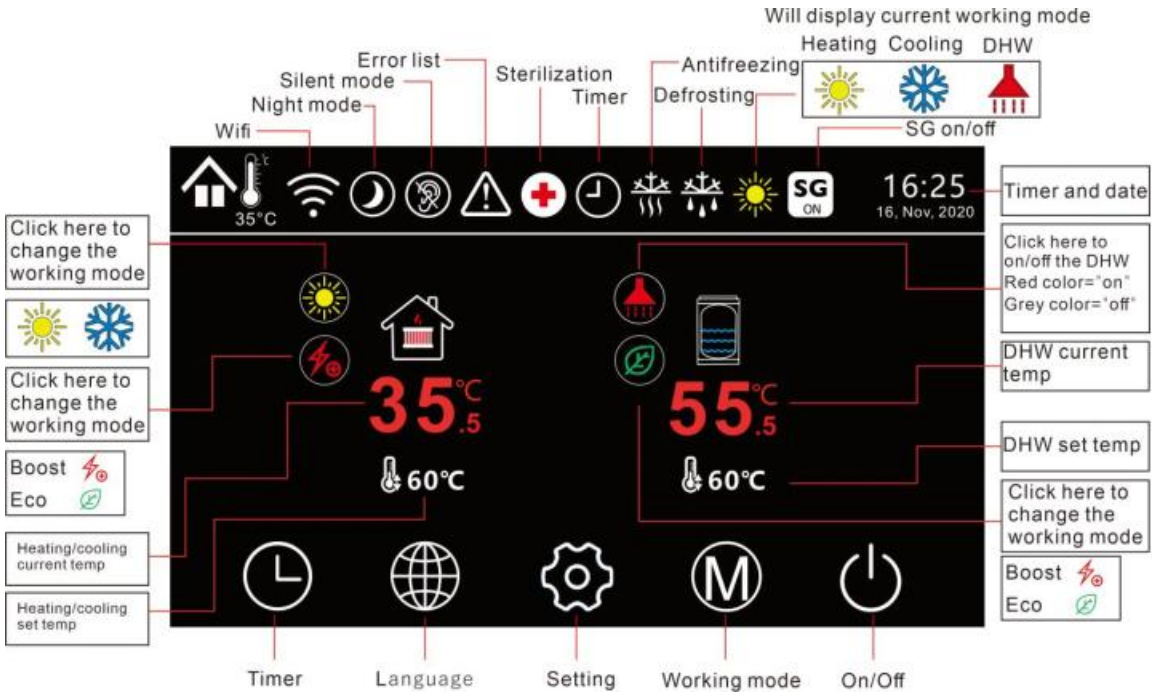
All heat pumps are fitted with intelligent defrost controls. A number of parameters are taken into account before defrost begins and ends. The parameters should be set as per factory settings or otherwise set out by an engineer. The defrost time will vary depending upon the conditions the heat pump is working in. The length between defrosts will either extend or contract depending upon the parameters set.

5.3 Wired controller

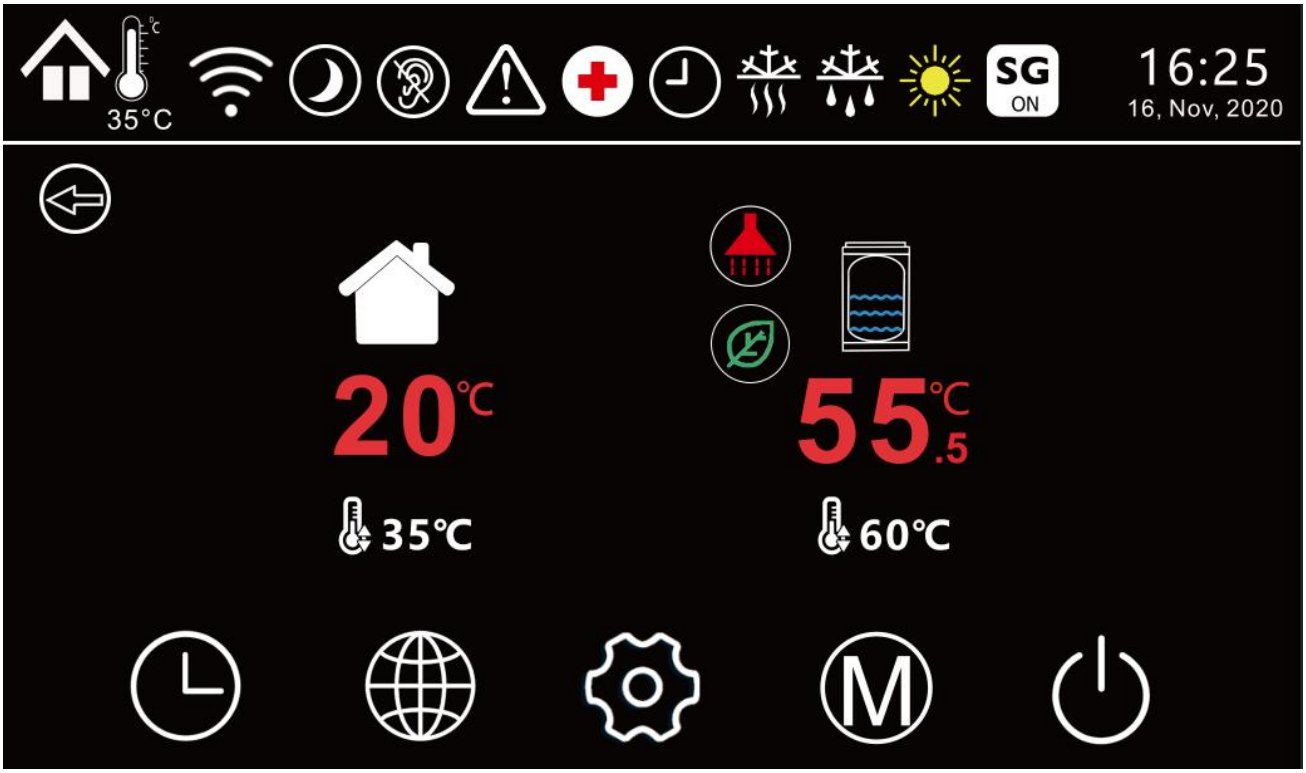
5.3.1 Main interface



5.3.2 Buttons definition and action



Note: Room temperature sensor is optional. You can set room temperature on main interface as below.



5.3.2-1 Turn on / off

Press ON/OFF button ⏻ for 3 seconds, can switch the heat pump ON or OFF.

5.3.2-2 Multi-language

Click language button , can select language.

5.3.2-3 Time and date setting

Click time and date button 16:25 16, Nov, 2020, can set time and date.

5.3.2-4 Change operating mode

Click mode button Ⓜ, can select operating modes.

The heat pump will be able to manage up to 5 different modes.

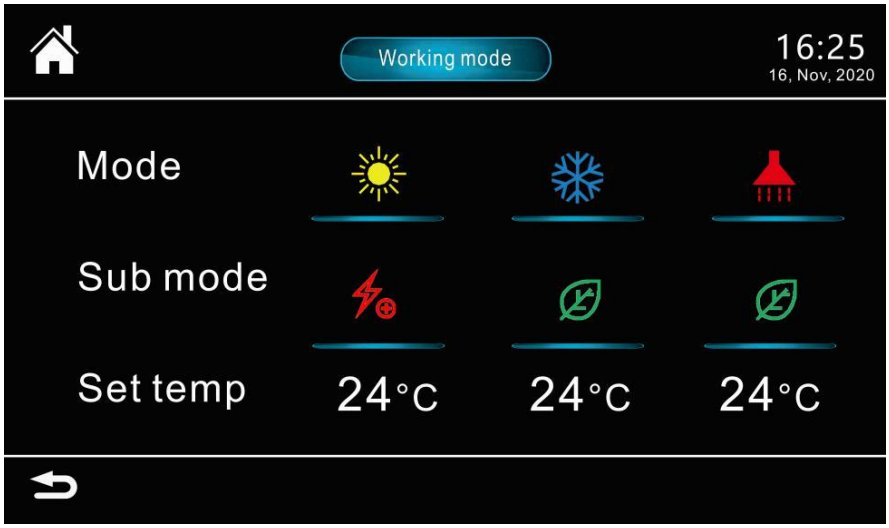
(1) Cooling only.

(2) Heating only.

(3) DHW only.

(4) Cooling + DHW.

(5) Heating + DHW.



When selected cooling or heating plus DHW, DHW will be priority.

When selected DHW mode, only DHW operation, no cooling and heating.

Each mode has two sub modes.

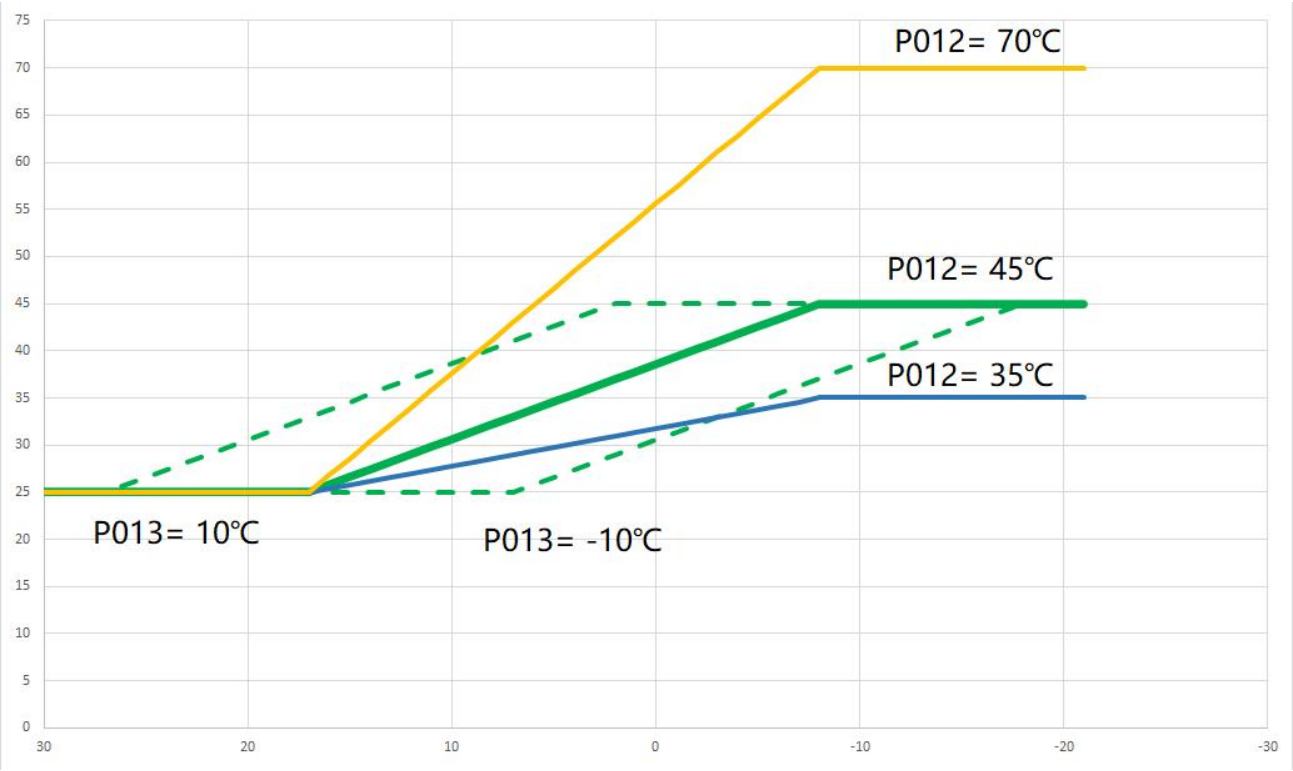
(1) Boost.
(2) Eco.

When selected boost mode, heat pump will be worked together with E-heater.

When selected Eco mode, heat pump will work itself. Only error got, E-heater will be enabled.

Healthy sterilization is an independent automatic operation mode. When P017=0 as default, sterilization will be operated per setting of parameters from P018 to P021. Once sterilization finished, it will exist automatically. When P017=1, sterilization can be entered immediately. If necessary, modify the parameters individually. If unnecessary, please modify the parameter P017=2.

Auto temp. is a mode for setting temperature per ambient temperature by heat pump automatically per below Auto heat curve.

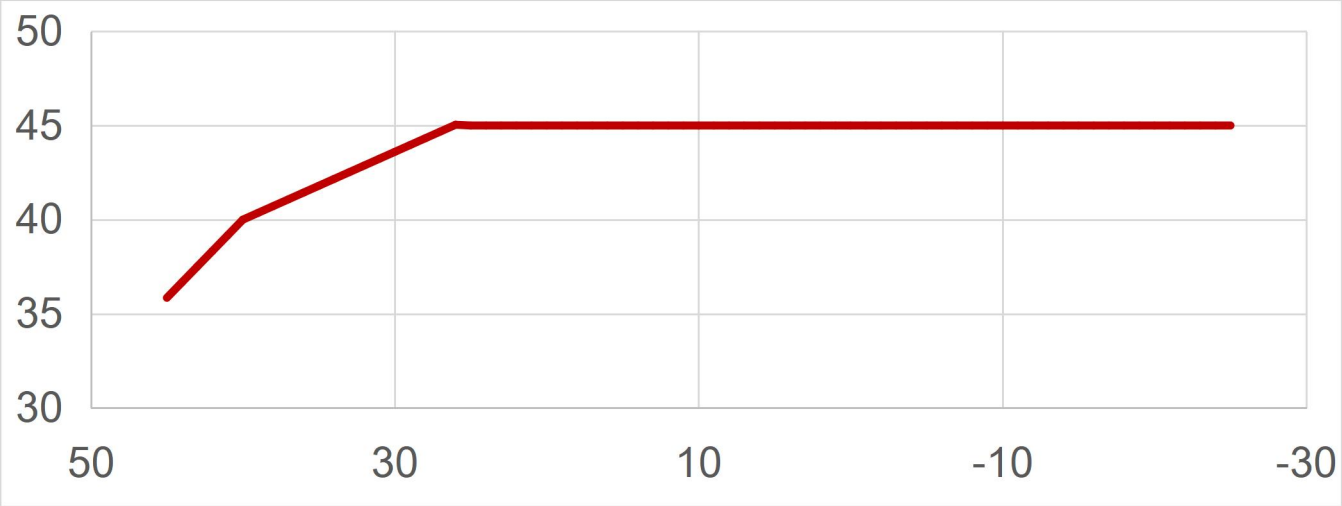


A. Heating auto temp. mode valid or not is up to parameter P010. If the data is set 0, means invalid, 1 means valid.

B. Heating auto heat curve shifting is decided by parameter P013, positive value means move up, negative value means move down. (-10°C ~10°C).

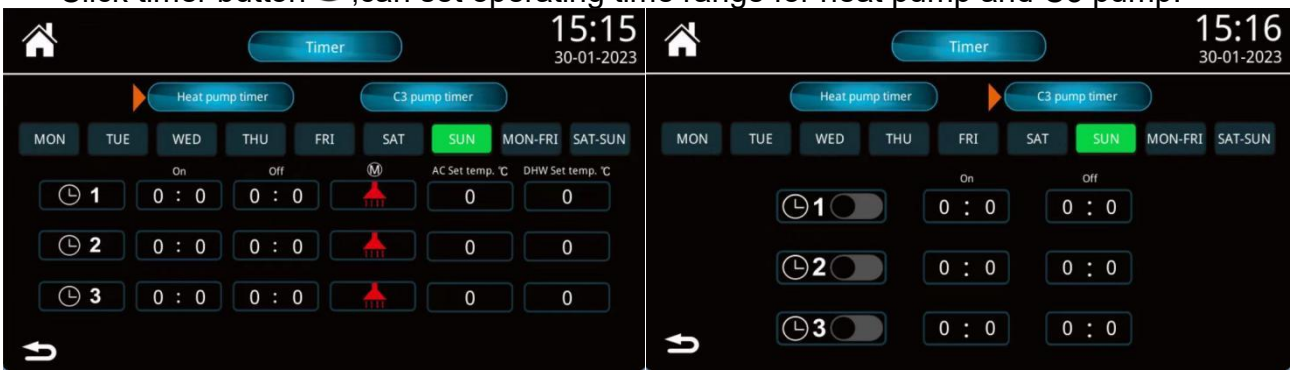
C. Auto heat curve highest temp is decided by parameter P012, from 35~70（Different refrigerant values vary，R290 maximum 70°C, R32 maximum 60°C），default 45. When the parameter is 45, the AU highest target temp is 45°C.

D. DHW auto temp. mode valid or not is up to parameter P011. If the data is set 0, means invalid, 1 means valid.
DHW auto temperature sets, according to the outdoor ambient temperature (C04) calculation per below curve.



5.3.2-5 Timing

Click timer button,can set operating time range for heat pump and C3 pump.



5.3.2-6 Parameters modification

Click Setup button, and select button <system parameter>. can modify parameters. For parameters P048~P151, need inputting password “12580” for modification.

Note: Parameters are not suggested to be modified to avoid taking failure to heat pump. If necessary, please contact professional technician to operate the modification. Please refer to below parameter list for parameters set.

No	Name	Range	Master plus 60	Master plus 90	Master plus 120	Master plus 120-TRI	Master plus 160	Master plus 160-TRI
P000	ON/OFF	0- OFF 1-ON	0	0	0	0	0	0
P001	Working mode	0~4 0-DHW 1-A/C Heating 2-2-A/C cooling 3-DHW+A/C Heating 4-DHW+A/C Cooling	1	1	1	1	1	1
P002	Heating target temp	10~75℃	45	45	45	45	45	45
P003	Cooling target temp	6~30℃	12	12	12	12	12	12
P004	DHW target temp	10~75℃ (Value≥P35，Only electric heater operation)	50	50	50	50	50	50
P005	Room target temp	18~35℃	21	21	21	21	21	21
P006	A/C temperature difference	1~15℃	5	5	5	5	5	5
P007	DHW temperature difference	1~15℃	5	5	5	5	5	5
P008	DHW temperature difference for upper and bottom tank temperature	0~15℃	0	0	0	0	0	0
P009	Buffer tank temperature control	0-OFF 1-ON	0	0	0	0	0	0
P010	A/C AU validation	0-OFF 1-ON	0	0	0	0	0	0
P011	DHW AU validation	0-OFF 1-ON	0	0	0	0	0	0
P012	A/C heating AU curve max temp value (weather compensation curve AU)	35~70℃	45	45	45	45	45	45
P013	A/C heating AU curve offset value (weather compensation curve AU)	-10~20℃	0	0	0	0	0	0
P014	Reserved							
P015	Mode selection	0-AC boost heating 1-AC boost cooling 2-DHW boost 3- Night mode 4-Silent mode	0	0	0	0	0	0
P016	Double zone control	0-OFF 1-ON	0	0	0	0	0	0
P017	Sterilization mode select	0-Auto 1-Manual 2-OFF	0	0	0	0	0	0
P018	Sterilization Interval days	1~99 days	7	7	7	7	7	7
P019	Sterilization start time	0~23（time）	23	23	23	23	23	23
P020	Sterilization running time	5~99min	10	10	10	10	10	10
P021	Sterilization temperature	50~75℃	70	70	70	70	70	70
P022	Temperature difference in night mode	0-5℃	1	1	1	1	1	1
P023	Night mode starting point	0~23（time）24 Go into night mode immediately	22	22	22	22	22	22
P024	Night mode running time period 1	0-12hour	1	1	1	1	1	1
P025	Night mode running time period 2	0-12hour	5	5	5	5	5	5
P026	Night mode running time period 3	0-12hour	3	3	3	3	3	3
P027	Inlet or outlet water temp. Control selection	0: outlet water temp. 1: inlet water temp.	0	0	0	0	0	0

	in heating mode							
P028	Inlet or outlet water temp. Control selection in cooling mode	0: outlet water temp. 1: inlet water temp.	0	0	0	0	0	0
P029	Screed drying	0-OFF 1-Calcium sulfate cement 2-Cement and sand	0	0	0	0	0	0
P030	Screed drying targe temp.1	10~60℃	18	18	18	18	18	18
P031	Screed drying targe temp.2	10~60℃	25	25	25	25	25	25
P032	Screed drying targe temp.3	10~60℃	28	28	28	28	28	28
P033	Screed drying targe temp.4	10~60℃	33	33	33	33	33	33
P034	Screed drying targe temp.5	10~60℃	30	30	30	30	30	30
P035	Reserved							
P036	Screed drying running time 1	0~15days	10	10	10	10	10	10
P037	Screed drying running time 2	0~15days	5	5	5	5	5	5
P038	Screed drying running time 3	0~15days	10	10	10	10	10	10
P039	Screed drying running time 4	0~15days	5	5	5	5	5	5
P040	Screed drying running time 5	0~15days	0	0	0	0	0	0
P041	Floor heating target temperature	10-45℃	35	35	35	35	35	35
P042	E2 electric heater reversed	0-normal / 1-reversed	0	0	0	0	0	E2 electric heater reversed
P043	The control signal of G1 valve is reversed	0-normal / 1-reversed	0	0	0	0	0	0
P044	The control signal of G2 valve is reversed	0-normal / 1-reversed	0	0	0	0	0	0
P045	The control signal of G3 valve is reversed	0-normal / 1-reversed	0	0	0	0	0	0
P046	G3 mix water valve running periods	5-10min	10	10	10	10	10	10
P047	Reserved							
P048	Timed defrosting cycle	0-168hr	3.5	3.5	3.5	3.5	3.5	3.5
P049	Timed defrosting temperature	-35~10℃	-4	-4	-4	-4	-4	-4
P050	Defrost selection	0-Auto 1-Manual defrost (Default to 0 when defrosting is complete)	0	0	0	0	0	0
P051	Defrost interval multiple times control	0~4 0- no defrost 1~4 defrost interval time multiple rate	1	1	1	1	1	1
P052	First Defrost interval	15~99min	35	35	35	35	35	35
P053	Coil temperature to active defrost	-8~5℃	0	0	0	0	0	0
P054	Coil temperature to stop defrost	5~30℃	20	20	20	20	20	20
P055	The max defrost time	2~20min	15	15	15	15	15	15
P056	Defrost ambient temperature	0℃~20℃	15	15	15	15	15	15
P057	Defrost ambient temperature and coil temperature difference ΔT1	0℃~20℃	8	8	8	8	8	8
P058	Defrost ambient temperature and coil temperature difference	0℃~20℃	12	12	12	12	12	12

	ΔT2							
P059	Buffer tank	0-without 1-exist-	1	1	1	1	1	1
P060	Room thermostat (reserved)	0- OFF 1- ON	0	0	0	0	0	0
P061	T7 selection	0- OFF 1- ON	0	0	0	0	0	0
P062	In DHW mode, highest water temperature for compressor running	30~75℃	75	75	75	75	75	75
P063	Ambient temp to active DHW electrical heater	-30~20℃	-7	-7	-7	-7	-7	-7
P064	Ambient temp to active A/C electrical heater	-30~20℃	-7	-7	-7	-7	-7	-7
P065	E2 function definition	0-Auxiliary electrical heater 1-second heating source	0	0	0	0	0	0
P066	Start temp. for E2 as second heating source	-25~20℃	-25	-25	-25	-25	-25	-25
P067	Anti-freezing start water temp.	0-8℃	5	5	5	5	5	5
P068	E0 ON/OFF（E2 is second heating source）	0-OFF, 1-ON	0	0	0	0	0	0
P069	Base heater work mode	0-continue 1-defrost period	0	0	0	0	0	0
P070	Working mode selection limit	0~6 0-DHW 1-Heating 2-Cooling 3-Heating+DHW 4-Cooling+DHW 5-Heating+Cooling 6-Heating+Cooling+DHW	6	6	6	6	6	6
P071	Factory default	0-No 1-Yes	0	0	0	0	0	0
P072	Choose compressor model (reserved)	0~999	258	258	258	258	258	258
P073	Compressor running frequency set mode	0-Auto 1-Manual	0	0	0	0	0	0
P074	Compressor running frequency in manual mode	10~100Hz	50	50	50	50	50	50
P075	Compressor oil return frequency	10~100 Hz	45	45	45	45	45	45
P076	Defrost running frequency	30~90Hz	60	60	60	60	60	60
P077	DHW maximum frequency	1~100 (Max frequency X 1~100%)	80	80	80	80	80	80
P078	Compressor frequency limiting current	1~50A	10	14	18	4.2	27	6.2
P079	Compressor frequency reduction current	1~50A	11	15.5	20	4.8	29.5	6.8
P080	Compressor shutdown current	1~50A	12	17	22	5.3	32	7.3
P081	Maximum compressor running frequency	50~120Hz	90	90	90	90	90	90
P082	Minimum compressor running frequency	0~90Hz	30	30	30	30	30	30
P083	Minimum compressor running frequency coefficient	0-1	0.6	0.6	0.6	0.6	0.6	0.6
P084	Reserved							
P085	Pressure controller type	0-Pressure sensor 1-Pressure switch	0	0	0	0	0	0
P086	High pressure protection recovery pressure difference	0.2~1.5MPa	0.5	0.5	0.5	0.5	0.5	0.5
P087	High pressure protection setting valve	2.5~5.0Mpa	3.2	3.2	3.2	3.2	3.2	3.2
P088	High pressure value to limit compressor frequency rising	2.0~4.5Mpa	3	3	3	3	3	3

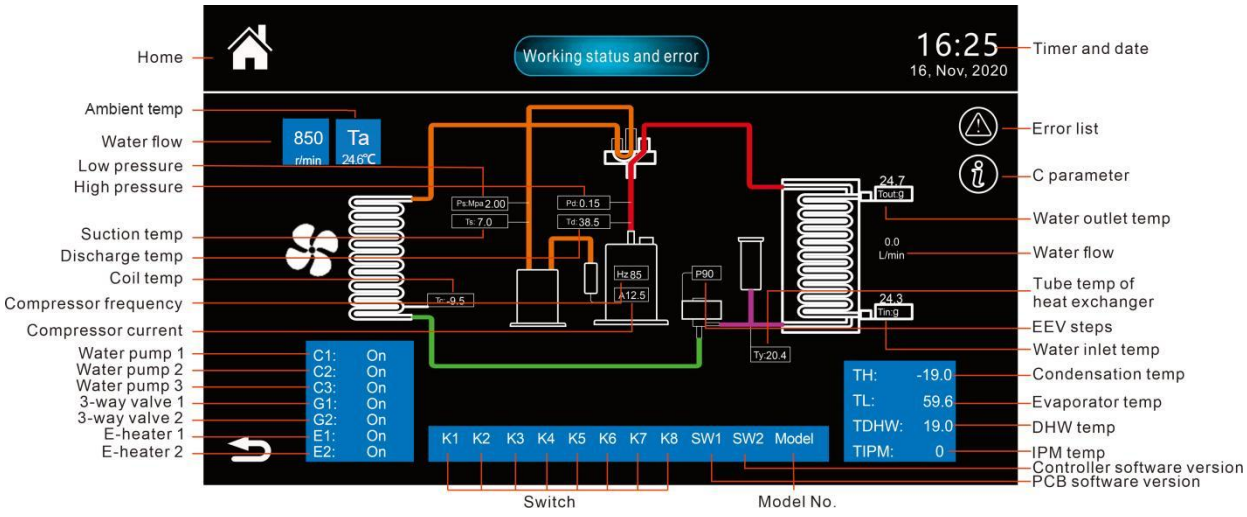
P089	High pressure value to cancel compressor frequency limit	2.0~4.5Mpa	2.8	2.8	2.8	2.8	2.8	2.8
P090	Low pressure protection recovery Pressure difference	0.01~1.0Mpa	0.06	0.06	0.06	0.06	0.06	0.06
P091	Low pressure protection setting valve	0.01~1.0Mpa	0.02	0.02	0.02	0.02	0.02	0.02
P092	Reserved							
P093	Reserved							
P094	EEV control mode in cooling mode	0-no 1-Checking table 2-manual 3-suction superheat 4-Discharge superheat	4	4	4	4	4	4
P095	EEV control mode in heating mode	0-no 1-Checking table 2-manual 3- suction superheat 4-Discharge superheat	4	4	4	4	4	4
P096	EEV open step in manual mode	40~480	200	200	200	200	200	200
P097	Discharge superheat percentage coefficient (Heating)	40~480	20	20	20	20	20	20
P098	Discharge superheat integration coefficient (Heating)	0~99 (display value multiply 0.1)	4	4	4	4	4	4
P099	Suction superheat percentage coefficient (Heating)	0~99 (display value multiply 0.1)	20	20	20	20	20	20
P100	Suction superheat integration coefficient (Heating)	0~99 (display value multiply 0.1)	4	4	4	4	4	4
P101	Target suction superheat 1（Heating）	-5℃-5℃	2.5	2.5	2.5	2.5	2.5	2.5
P102	Target suction superheat 2（Heating）	-5℃-5℃	2.5	2.5	2.5	2.5	2.5	2.5
P103	Target suction superheat 3（Heating）	-5℃-5℃	1.5	1.5	1.5	1.5	1.5	1.5
P104	Target suction superheat 4（Heating）	-5℃-5℃	5	5	5	5	5	5
P105	Target suction superheat（cooling）	-5℃-5℃	3	3	3	3	3	3
P106	EEV minimum open step	0-480	100	100	100	100	100	100
P107	Reserved							
P108	EVI superheat percentage coefficient	0~99 (display value multiply 0.1)	50	50	50	50	50	50
P109	EVI superheat integration coefficient	0~99 (display value multiply 0.1)	1	1	1	1	1	1
P110	EVI EEV control mode	0- no 1-manual 2-reserved 3-auto	3	3	3	3	3	3
P111	EVI EEV open step in manual mode	40~480	200	200	200	200	200	200
P112	EVI Target superheat (heating)	-5~10℃	0	0	0	0	0	0
P113	EVI Target superheat (cooling)	-5~10℃	0	0	0	0	0	0
P114	Reserved							
P115	Flow switch selection	0-Water flow switch 1-Water flow sensor	1	1	1	1	1	1
P116	Minimum water flow	3~80L/min, Step 1	7	10	14	14	18	18
P117	C1 water pump working mode	0-No stop 1-Stop when reach temp 2-Running 1minute every 15minutes	0	0	0	0	0	0

P118	Water pump anti-freeze interval	5~50min	30	30	30	30	30	30
P119	C1 water pump speed adjustment temp. difference	3~8℃	5	5	5	5	5	5
P120	Function definition for C2 water pump	0-Auxiliary pump 1-Indoor circulating pump	0	0	0	0	0	0
P121	C3 water pump selection	0-DHW auxiliary pump, T7 is solar water tank temp. sensor 1-DHW circulation pump, T7 is indoor circulation pipe temp. sensor 2-Solar water pump, T7 is temperature sensor for solar collector	0	0	0	0	0	0
P122	DHW circulation pump mode（C3 pump P121=1）	0- No 1- Timer 2- Temperature 3- Timer + Temperature	3	3	3	3	3	3
P123	C3 water pump start temp. difference	4~20℃	5	5	5	5	5	5
P124	PWM water pump minimum running speed	20~80	80	80	80	80	80	80
P125	Room temp. heating temp. difference	0.5~5℃（0.5 class）	0.5	0.5	0.5	0.5	0.5	0.5
P126	Room temp. cooling temp. difference	0.5~5℃（0.5 class）	0.5	0.5	0.5	0.5	0.5	0.5
P127	Solar water pump on temp. difference	5~20℃	5	5	5	5	5	5
P128	Solar water pump off temp. difference	1~4℃	2	2	2	2	2	2
P129	Fan size	1-420 2-508 3-580	2	3	3	3	3	3
P130	Fan motor type	0-AC 1- First DC 2-Second DC 3-Two DC	1	1	1	1	3	3
P131	DC motor speed control	0-Auto 1-Manual	0	0	0	0	0	0
P132	DC motor fixed speed	0-1500rpm (display value multiply 10)	700	700	700	700	700	700
P133	Maximum fan speed	0~1500rpm	700	700	700	700	700	700
P134	Fan speed adjustment temp. difference (heating)	2~15℃	6	6	6	6	6	6
P135	Fan speed adjustment temp. difference (cooling)	3~18℃	8	8	8	8	8	8
P136	SG Ready activation	0-OFF 1-ON	0	0	0	0	0	0
P137	SG Heating Switch-on recommendation target temp.	0-OFF 10ºC – 70ºC	0	0	0	0	0	0
P138	SG Heating Switch-on command target temp.	0-OFF, 10ºC – 70ºC	0	0	0	0	0	0
P139	SG Cooling Switch-on recommendation target temp.	0-OFF, 30ºC – 10ºC	0	0	0	0	0	0
P140	SG Cooling Switch-on command target temp.	0-OFF, 30ºC – 10ºC	0	0	0	0	0	0
P141	SG DHW Switch-on recommendation target temp.	PV function enable	0	0	0	0	0	0
P142	SG DHW Switch-on command target temp.	0-OFF, 10ºC – 70ºC	0	0	0	0	0	0
P143	SG Heating device for DHW and heating modes.	0-Heat pump + E1/E2 1-Only E1/E2 2-Only Heat pump	0	0	0	0	0	0
P144	PV function enable	0~1, 0-OFF, 1-ON,	0	0	0	0	0	0

P145	PV A/C heating set temperature	10~75ºC	70	70	70	70	70	70
P146	PV DHW heating set temperature	10~75ºC	70	70	70	70	70	70
P147	UPS defrost	0-OFF, 1-ON	0	0	0	0	0	0
P148	UPS modes C1 water pump run time	1~60	5	5	5	5	5	5
P149	UPS modes C1 water pump stop time	1~60	20	20	20	20	20	20
P150	Multi-device operation criteria (frequency percentage)	30~100	70	70	70	70	70	70
P151	Number of Multiple devices	1~8	1	1	1	1	1	1
P152 P155	Reserved							
P156	Heating capacity curve set-ambient lower point	-10~10	-10	-10	-10	-10	-10	-10
P157	Cooling capacity curve set-ambient lower point	5-25	10	10	10	10	10	10
P158	Heating capacity curve set-frequency lower point	30-60	50	50	50	50	50	50
P159	Cooling capacity curve set-frequency lower point	30-60	60	60	60	60	60	60

5.3.2-7 Working status checking

Click mode button, and select button <working status and error >, can check the performance data and working status.



5.3.2-8 System protection and error list checking

Click Error list button  in the main menu or in “working status and error” page to check the historical error.

Code	Meaning	Remark
E01	Outdoor air temp sensor error	Outdoor air temp sensor open circuit or short circuit
E02	Coil temp sensor error	Coil temperature sensor open circuit or short circuit
E03	Suction temp sensor error	Suction temp sensor open circuit or short circuit
E04	EVI inlet temp sensor error	EVI inlet temp sensor open circuit or short circuit
E05	EVI outlet temp sensor error	EVI outlet temp sensor open circuit or short circuit
E06	Discharge temp sensor error	Discharge temp sensor open circuit or short circuit
E07	DHW upper temp sensor error	DHW temp sensor open circuit or short circuit
E08	Outlet temp sensor error	Outlet temp sensor open circuit or short circuit
E09	Inlet temp sensor error	Inlet temp sensor open circuit or short circuit
E10	DHW lower temp sensor error	Sensor open circuit or short circuit
E11	High pressure sensor error	1.sensor fault 2. open circuit or short circuit 3. PCB fault
E12	Low pressure sensor error	1.sensor fault 2. open circuit or short circuit 3. PCB fault
E13	High pressure protection	1.refrigerant volume too much 2.throttling part error 3. pressure sensor error
E14	Low pressure protection	1.refrigerant volume too little 2. throttling part error 3 pressure sensor error
E15	Water flow error	1.Water flow volume too small 2. Water flow switch error
E16	Communication error	Main board and controller communication error
E17	Discharge temp too high protection	1.refrigerant volume too little 2. throttling part error
E18-19	Reserved	
E20	IPM abnormal protect	See Appendix C for detailed code
E21	Compressor power to high	Check whether the heat exchanger has bad heat exchange
E22	Water temp differential too big	Check water pump and water pipe filter
E23	DHW anti-freeze twice	The antifreeze function in DHW mode has been activated twice in 60 minutes
E24	AC anti-freeze twice	The antifreeze function in A/C mode has been activated twice in 90 minutes
E25	Compressor overcurrent protection	
E26	T7 temp sensor error	T7 temp sensor open circuit or short circuit
E27	Ambient temperature exceeds upper limit	ambient temperature > 45℃
E28	Inlet water temp. too high (Cooling)	cooling: inlet water temp > 40℃, please stop Use with caution or turn off.
E29	Room temp sensor error	temp sensor open circuit or short circuit
E30-31	Reserved	
E32	Outlet water temp. too high (heating)	Outlet temp > 75℃. Check water pump and water pipe filter
E33-35	Reserved	
E36	DC fan board communication failure	Check communication wire
E37-39	Reserved	

E40	Outlet water temp. too low (cooling)	Outlet temp < 5℃. Check water pump and water pipe filter
E41-43	Reserved	
E44	1# DC motor error	Check motor wire or Motor fault
E45	2# DC motor error	Check motor wire or Motor fault
E46-49	Reserved	
E50	Coil high temp protection	1-refrigerant volume too much 2-throttling part error 3-Coil temp sensor error
E51	Heat pump locked by high pressure error	E11 occurred four times while startup or E11 occurred twice in 30minutes while running
E52	Heat pump locked by low pressure error	E12 occurred twice in 30 minutes
E53	Heat pump locked by water flow error	E15 occurred twice in 30 minutes
E54	Heat pump locked by large temp. Difference between inlet and outlet water	E22 occurred twice in 60 minutes
E55-57	Reserved	
E58	Ambient temperature exceeds lower limit	ambient temperature < 【P065】
E59-98	Reserved	
E99	Inverter model communication failure	Main board and inverter board Communication error

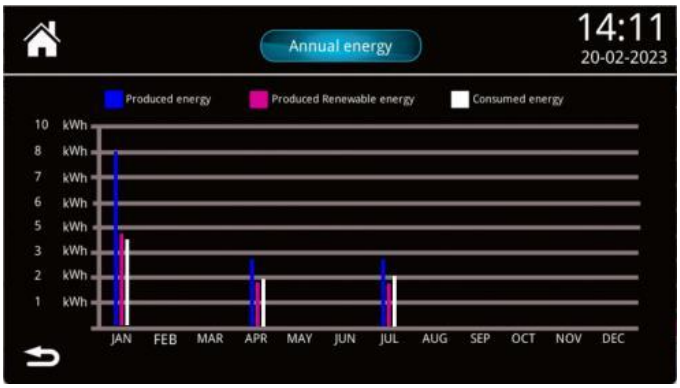
Click button  in “working status and error” page to check the parameter C.

Code	Name	Value/Meaning
C00	Water flow	0~100L/min
C01	Discharge temp	-40~145℃
C02	Suction temp	-40~145℃
C03	Coil temp	-40~145℃
C04	Ambient temp	-40~145℃
C05	Water inlet temperature	-40~145℃
C06	Water outlet temperature	
C07	DHW upper tank temperature	-40~145℃
C08	T7	-40~145℃
C09	Room temp	-40~145℃
C10	Buffer tank temperature	-40~145℃
C11	EVI Inlet temp	Reserved
C12	Floor pipe temperature	-40~145℃
C13	DHW tank lower temperature	-40~145℃
C14	Compressor running times	Minute
C15	Condenser temperature	-40~145℃
C16	Evaporator temperature	-40~145℃
C17	Suction superheat	-40~145℃
C18	EVI superheat	-40~145℃
C19	EEV steps	0-500
C20	EVI EEV steps	0-500

C21	IPM temperature	-40~145C
C22	High pressure	MPa
C23	Low pressure	MPa
C24	Compressor running frequency	0-120HZ
C25	Compressor input current	0-50A
C26	DC fan 1	0-1500RPM
C27	DC fan 2	0-1500RPM
C28	AC power voltage	0-500V
C29	DC power voltage	0-800V
C30	Compressor power	W

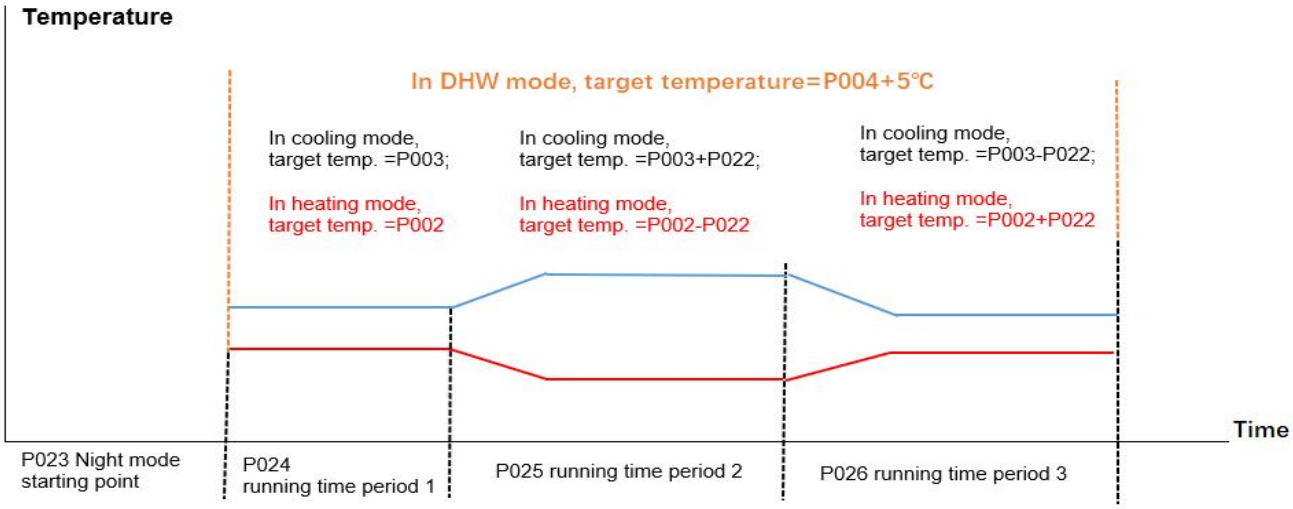
5.3.2-9 Grid-ready interface

Renewable energy production in daily, monthly and annual terms, and the corresponding energy consumption for the same periods has been shown on controller.



5.4 Night mode

(1) Click night mode symbol , can enable the night mode. The night mode starting time is decided by data P023. Running time period is decided by data P024/P025/P026.
(2) With night mode:
a. hot water mode will run with the current setting temp +5° C,
b. room heating run with current setting temp. at time period P024, current setting temp.+P022 at time period P025, current setting temp.-P022 at time period P026. Room cooling run with current setting +2°C.
c. room cooling run with current setting temp. at time period P024, current setting temp.+P022 at time period P025, current setting temp.-P022 at time period P026.

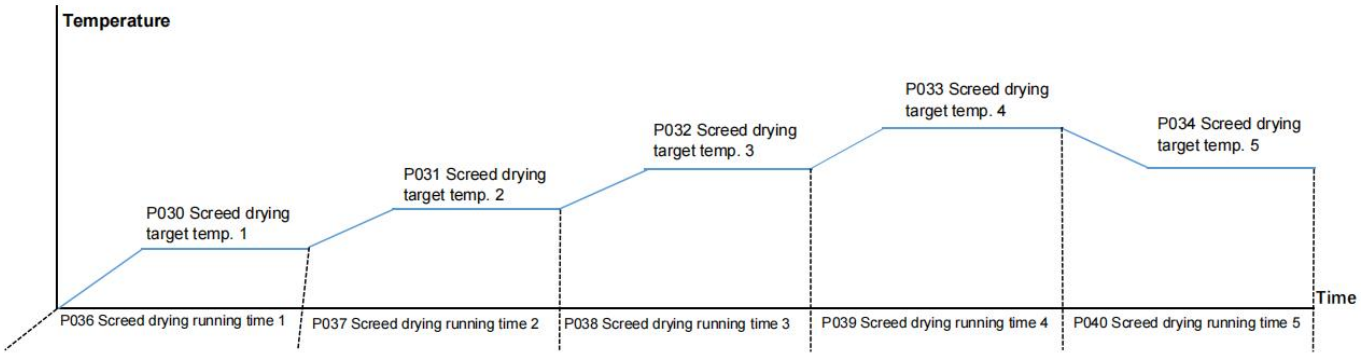


5.5 Silent mode

Click silent mode symbol , can enable the silent mode.
In silent mode, heat pump will run with maximum compressor operating frequency x 70%, and with maximum speed of the DC fan x 70%, (except cooling mode. In cooling mode, heat pump will be allowed to run with maximum fan stopped.), thus noise will be reduced.

5.6 Screeding drying

Heat pump has an automatic program for drying out the screed of an underfloor heating system during the construction of a house. Screeding drying function will be enabled by P029. After screeding drying finished, P029 returned to 0.



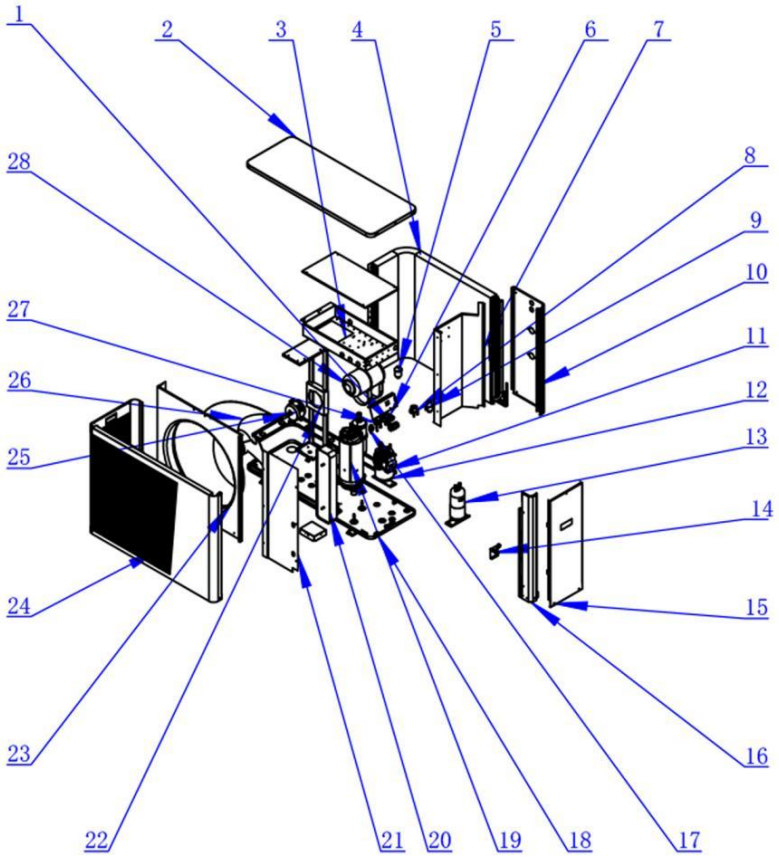
5.7 Communication with controller

Controller is connected with heat pump RS485-1 by 4 wires, (must in order) max 100m.

6 TECHNICAL SPECIFICATION

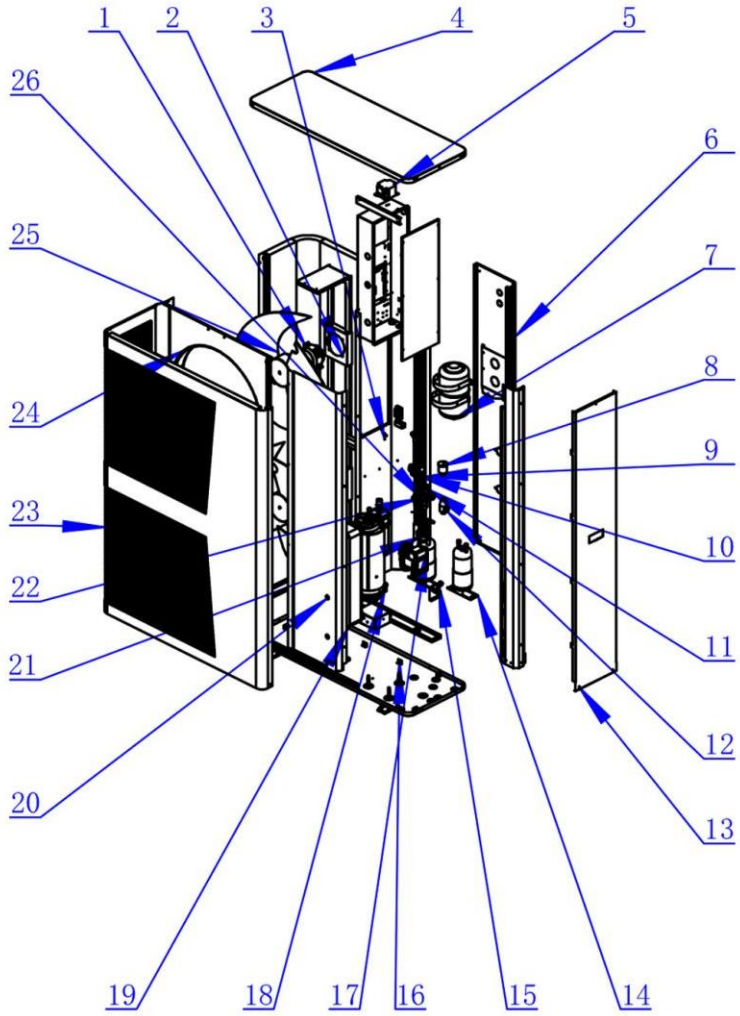
6.1 Internal View

Master plus 60/90/120/120-TRI/160S/160S-TRI



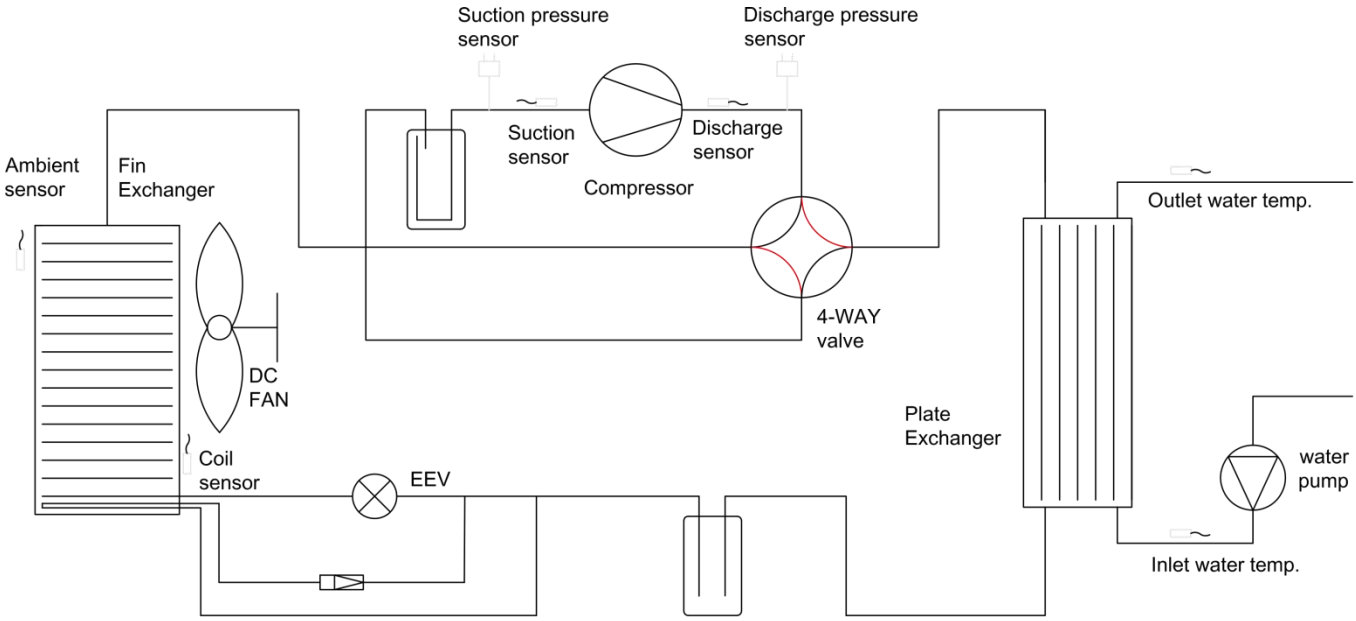
1	Water flow meter	15	Right side panel
2	Top cover	16	Pillar
3	Electrical control box	17	High pressure sensor
4	Evaporator	18	Bottom base
5	Auto air valve	19	Compressor
6	Four way valve	20	Plate heat exchanger
7	Middle plate	21	Front panel
8	Electrical expansion valve	22	Fan motor support
9	Safety valve	23	Front panel
10	Back panel	24	Front grille
11	Water pump	25	Fan motor
12	Gas-liquid seperator	26	Fan blade
13	Accumulator	27	Low pressure sensor
14	Stop valve	28	Expansion vessel

Master plus 160/160-TRI



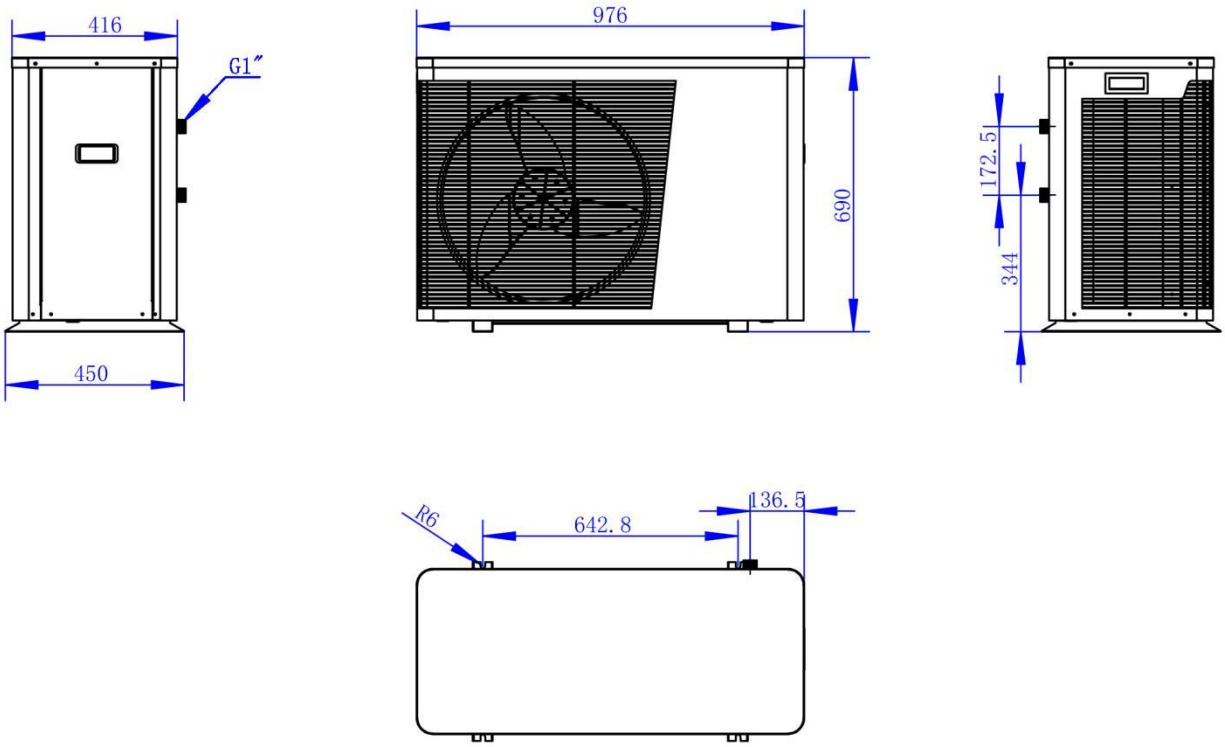
1	Fan motor	14	Accumulator
2	Fan motor support	15	Gas-liquid seperator
3	Middle plate	16	Bottom base
4	Top cover	17	Plate heat exchanger
5	Electric reactor available for three phase model	18	Compressor
6	Back panel	19	Water pump
7	Expansion vessel	20	Front panel
8	Auto air valve	21	Front panel
9	Electrical expansion valve	22	Front grille
10	High pressure sensor	23	Fan blade
11	Water flow meter	24	Evaporator
12	Safety valve	25	Low pressure sensor
13	Back side panel	26	Four way valve

6.2 System Drawing

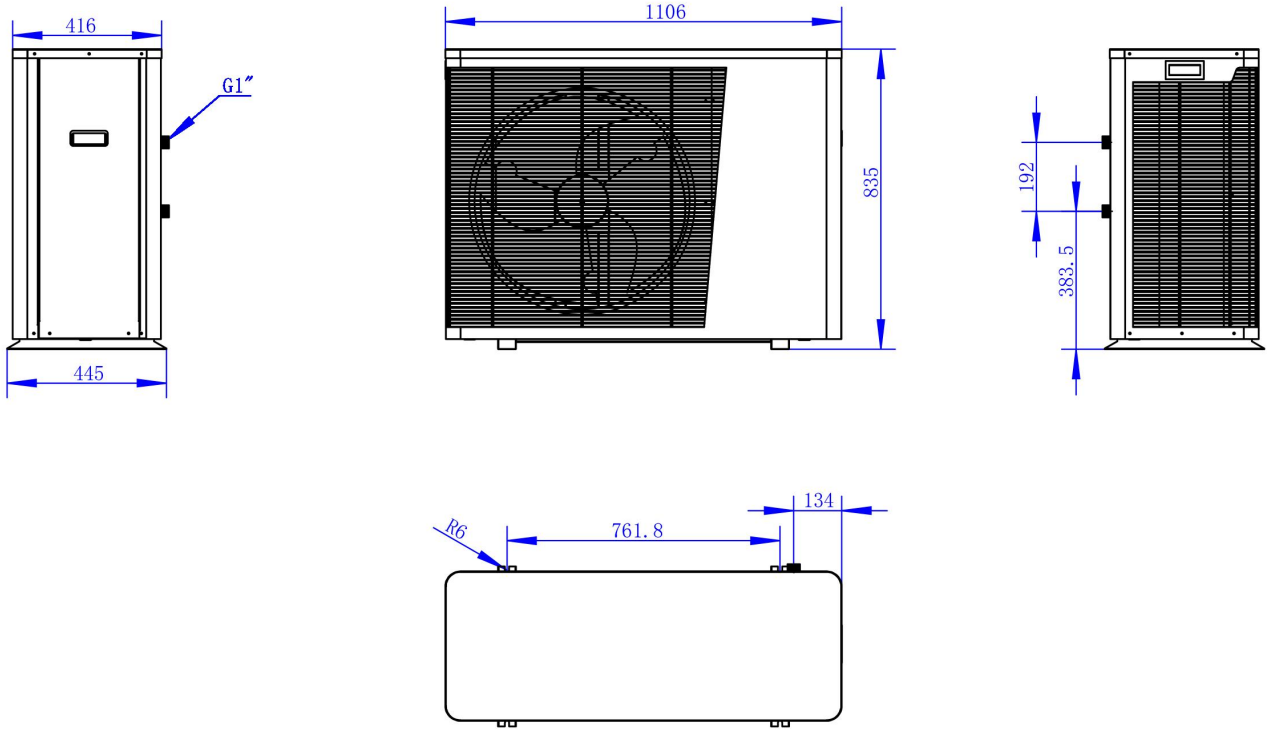


6.3 Dimensions(mm)

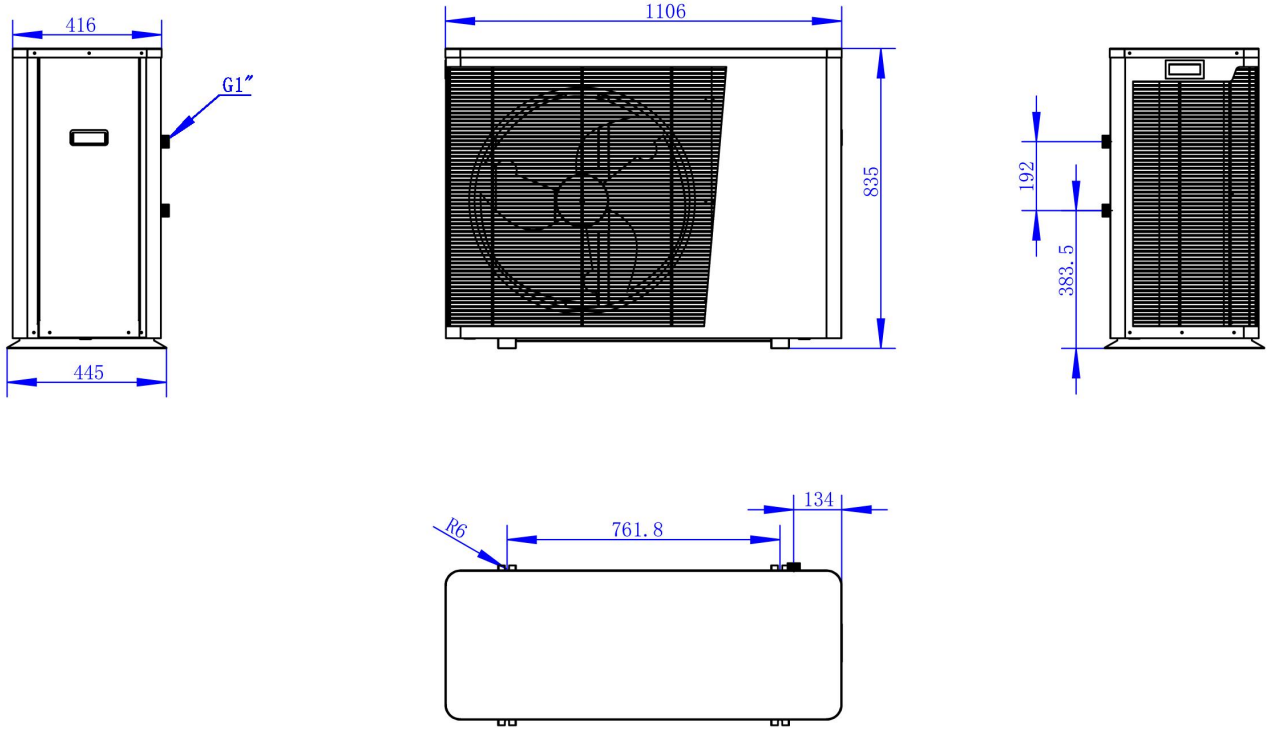
Master plus 60



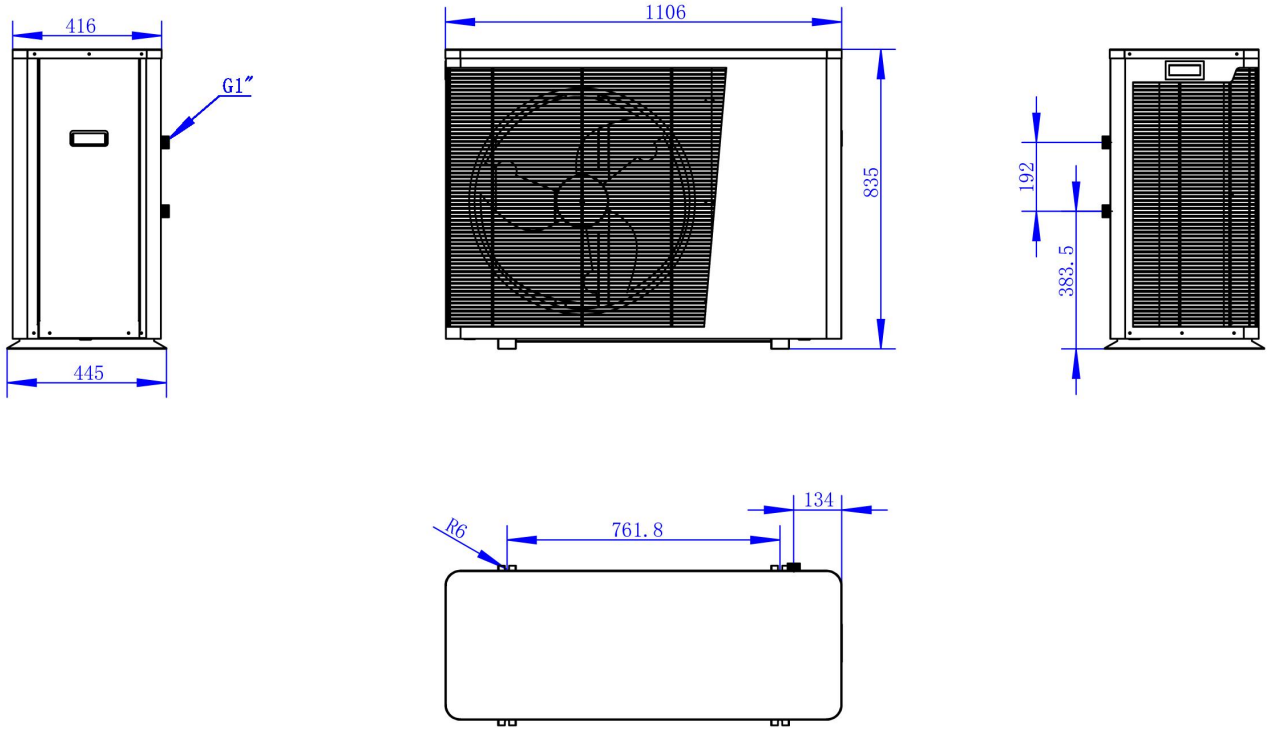
Master plus 90



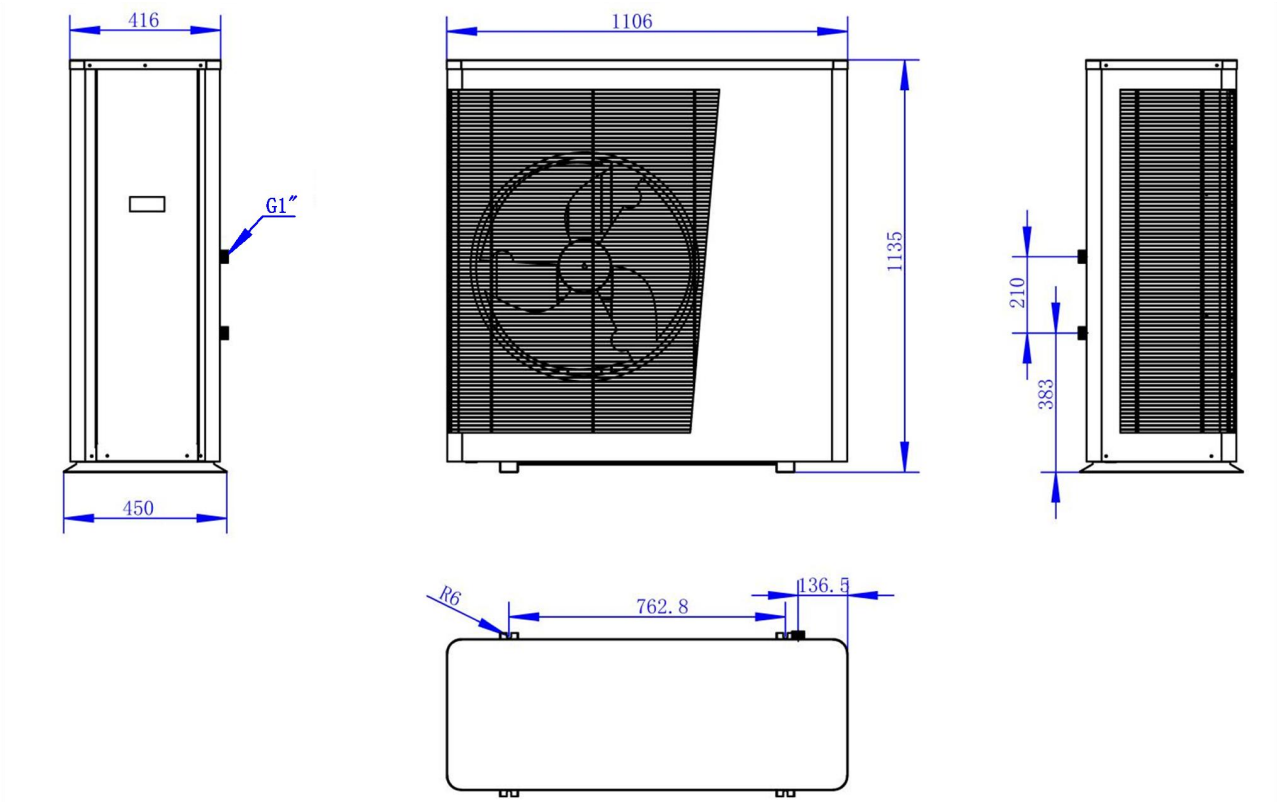
Master plus 120/120-TRI (Danfoss heat exchanger)



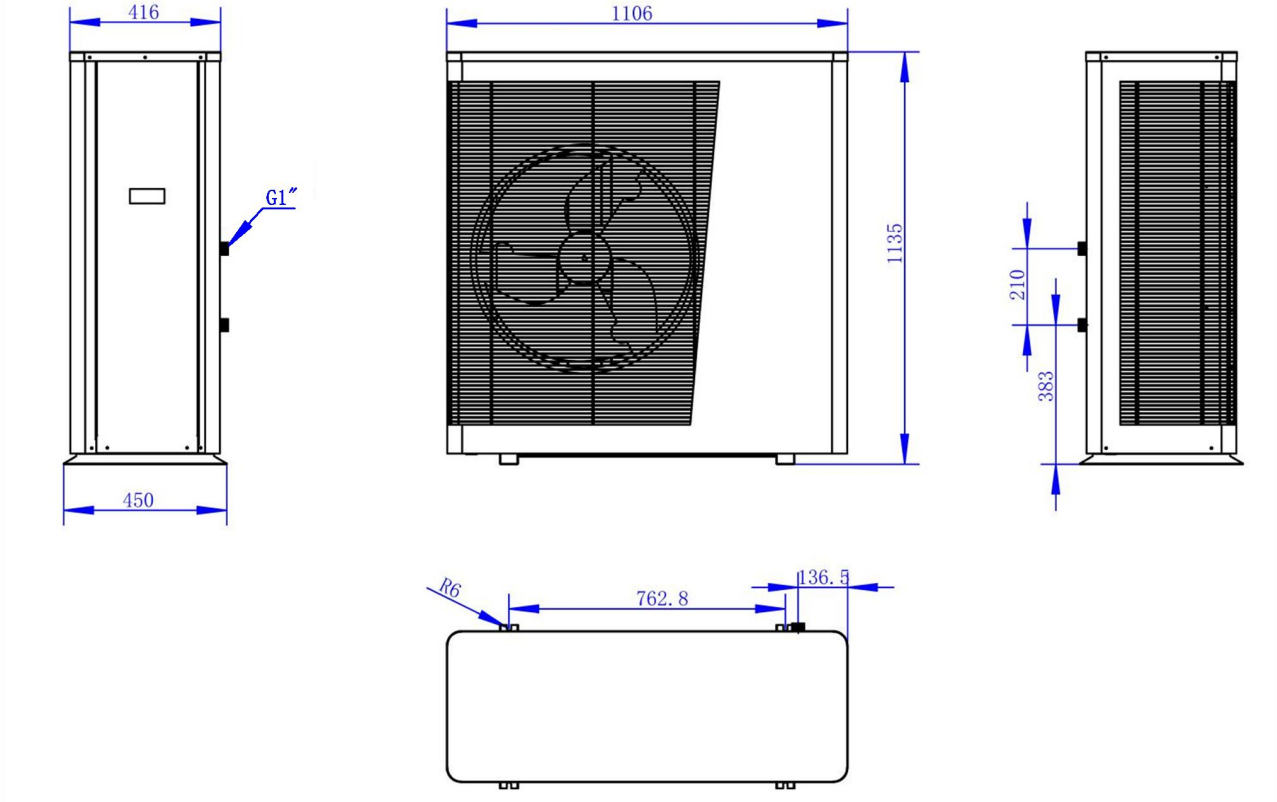
Master plus 120/120-TRI (SWEP heat exchanger)



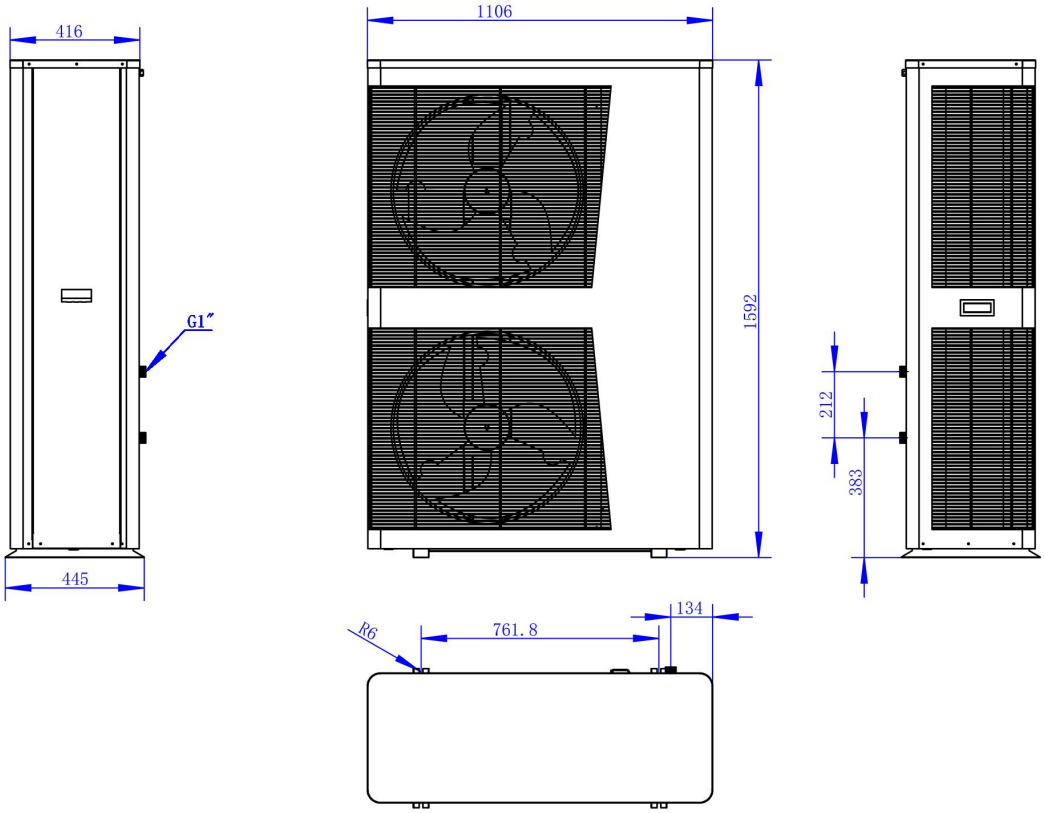
Master plus 160S/160S-TRI (Danfoss heat exchanger)



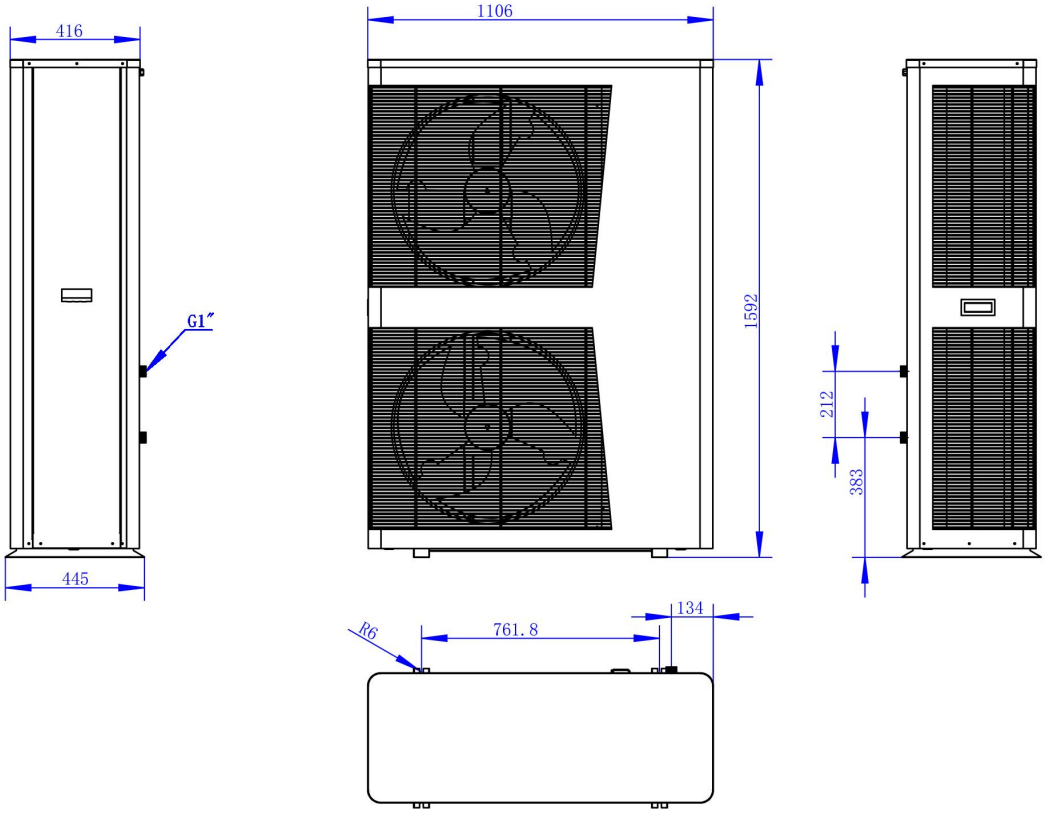
Master plus 160S/160S-TRI (SWEP heat exchanger)



Master plus 160/160-TRI (Danfoss heat exchanger)



Master plus 160/160-TRI (SWEP heat exchanger)



7 MAINTENANCE

7.1 Maintenance and Cleaning for User

It is good practice to inspect your heat pump regularly. Maintenance should be carried out at least annually to maintain a good lifespan of your heat pump.

- Regularly clean the Y type filters every 6 months to ensure that the system is clean and to avoid blockage to the system.

- Units should be kept clean (no leaves or dirt) and no obstructions should be placed in front of or behind the unit. Good ventilation and regular cleaning (3-6 months) of the evaporator will help maintain efficiency.

- Ensure the unit has power in the winter whether the unit is used or not.
- Check the power unit and electrical system.

- Check the water system, safety valves and exhaust devices are working properly so as not to pump air into the system causing reduced circulation.

- Check water pump is functioning properly. Make sure the water pipeline and pipe fittings are not leaking.

- Clear evaporator of any debris.

- Check the various components of the unit work properly. Inspect the pipe joints and valves branch have inflated oil, to ensure no leakage of the refrigerant unit.

- Chemically flush the plate heat exchanger after every 3 years.

- Check refrigerant gas content if necessary.

- Check delta (water in/out) making it meets the guidelines of delta 3 to 7.

8 HOW TO GET THE MOST OUT OF YOUR HEAT PUMP

It is important to understand that you should operate heat pumps differently to conventional heating systems such as gas boilers. Below are some points you should be aware of:

- Since heat pumps produce water at a lower temperature (than gas boilers), it is important to remember the heat up time of your property is slower.
- The lower temperature the heat pump produces, the more efficient it is.
- The higher the ambient temperature (outside temperature), the more efficient the heat pump is.
- The heat pump has a simple job, and that is to maintain the water tanks at the set temperature.
- It's a good idea to let your heat pump maintain your water tank temperatures 24 hours a day during the winter. This will enable your central heating controller to call for heat in the home at any time. During the summer you can set the timer on the heat pump controller for your hot water requirements.

With the above in mind, you could decide between the following:

▸ **Option 1.** You could decide to operate your heat pump during the daytime (when temperatures are higher). At the same time you could set the water temperature lower. This will basically charge your home during the day so in the evening the home is warm and the heat pump simply maintains the heat. This is not controlled by the heat pump controller, it is controlled by your central heating controller.

▸ **Option 2**. You could operate your central heating controller in a similar way to a conventional boiler. You must set the program at least 1 hour before you need your property to be warm. The downside to this is that you may need to set the water that the heat pump produces to a higher temperature.

▸ **Option 3.** You could decide to operate your home with background heat. This means you are always (24 hours a day) putting a trickle heat in your home.

In all cases it is recommended to maintain a minimum temperature in your home (e.g., 14c to16C) during the evening. This is controlled by your central heating controller.

There is no right and wrong way to operate your heat pump. We cannot tell you which is the most efficient way to operate it since every home is different. What we can say is that you should look for the best way to heat your home that suits your lifestyle. Nowadays with low-cost energy monitors, you can easily find the most cost-effective way to heat your home. We hope you enjoy your Heat Pump.

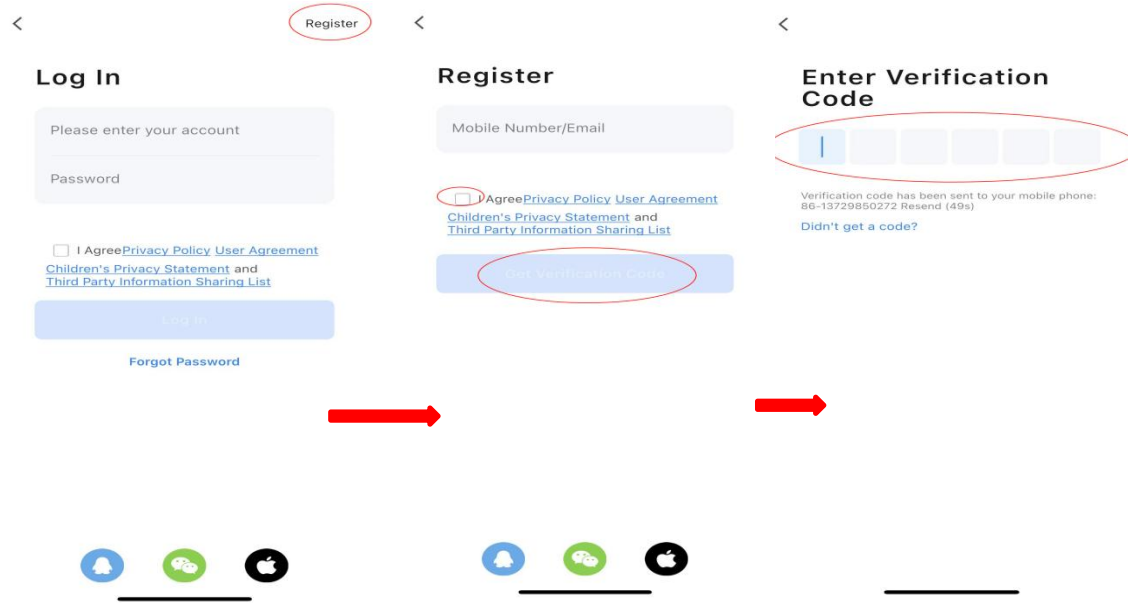
Appendix I: WIFI operation

1. APP download

Please go to APP store or Google market and search “**Smart Life**”, download and install the APP, then start it.

2. Register

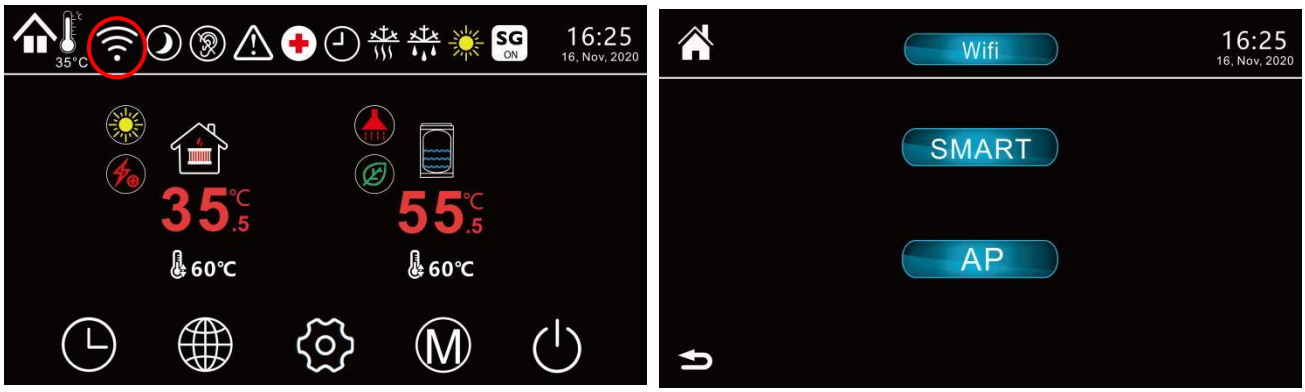
If you are new user, you will need registering: Register→Input your mobile phone number/Email→Check the agreement→Get verification code→Enter the verification code→Set the password→Complete.



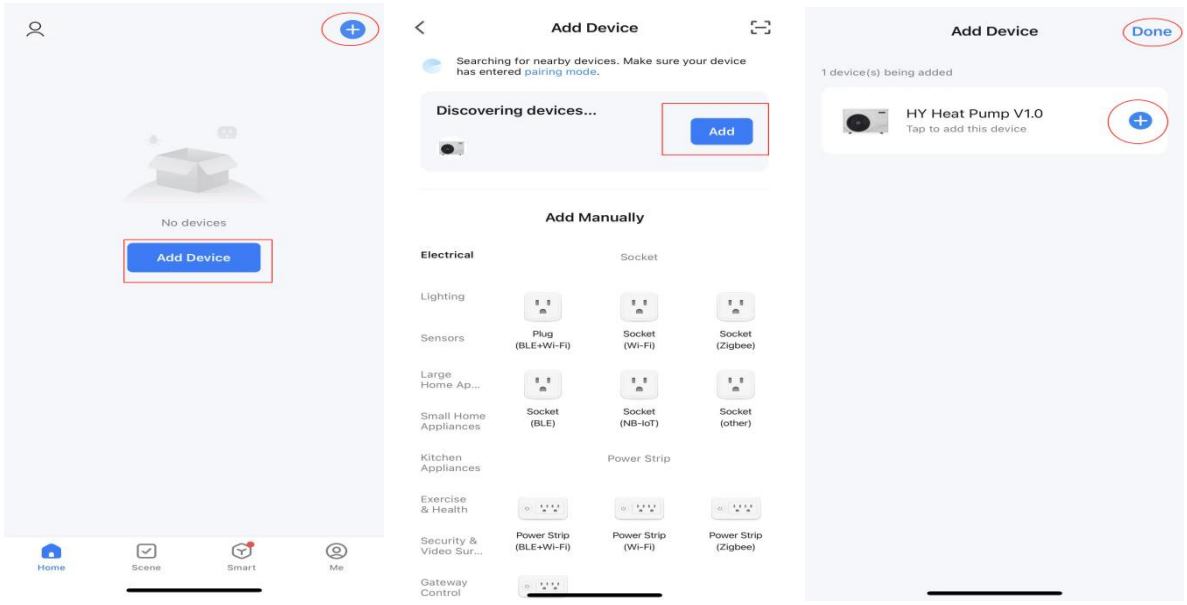
3. Add device

Step 1: Activate the pairing mode on your heat pump controller according to the following: click to enter following page. Click «Smart» to activate WiFi. The symbol will flash quickly.

Note: The blinking will stop when the APP is connected to WiFi.



Step 2: Now activate the pairing. Choose the WiFi network to use, enter its password and click «Next».



ATTENTION: The «Smart Life» application only supports 2.4GHz WiFi networks. If your WiFi network uses the 5GHz frequency, go to the interface of your home WiFi network to create a second 2.4GHz WiFi network (available for most Internet Boxes, routers and WiFi access point).

Step 3: If the pairing was successful, you can rename your heat pump per below pictures.

4. Controlling

Interface as below shown. You can now control your heat pump from your smartphone.

1. A/C Setting Temp
2. Change the A/C Setting Temp
3. Switch
4. Mode
5. Parameters checking
6. Setup

1) Choice of operating modes

You can choose between DHW, Heat, Cool, Heat + DHW, Cool + DHW modes.