AIR TO WATER R32 MONOBLOCK HEAT PUMP

MASTER

INSTALLATION AND USER MANUAL

VERSION: 1.0
UPDATE: 27.05.2024

Contents

1. GENERAL INFORMATION

1.1. Proper use of the appliance

Before you make use of this appliance make sure you have read and fully understood the instructions included in this manual.

The installation and use of the appliance must be performed according to the instructions indicated in this manual in combination with the current national safety regulations.

The appliance is designed for use in pumped hot water central heating systems. Any other use is considered improper and is prohibited. THERMOSTAHL ROMANIA declines any responsibility for damages or injuries caused by improper use; in this case the risk is completely at the user's responsibility.

To ensure an efficient and flawless function of the appliance, it is strongly recommended that you have performed an annual service by a qualified technician.

1.2. Safety warnings

For safety reasons, it is important to apply the following:

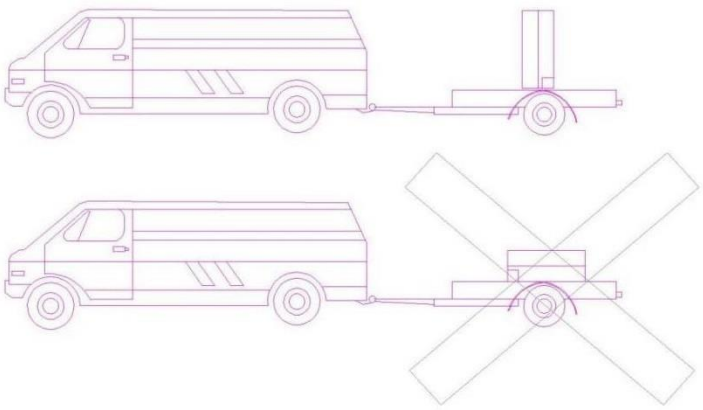
- This heat pump is suitable for use in both heating and cooling installations and can be combined with fan coils, underfloor heating/cooling, low-temperature radiators, and domestic hot water tanks (optional). It must be connected to a heating/cooling installation and/or a domestic hot water distribution 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.
- **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.
- Do not make modifications to parts of the appliance, unless you have contacted the company and an authorized service contractor.
- Only original accessories and spare parts must be used to ensure correct and safe function.
- 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 50V 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.

1.3. 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.



1.4. 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 anti-freeze 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 anti-freeze 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.

1.5. Data label

The data label of the appliance is placed on the heat pump side cover, on the external part. Make sure that it is properly placed and readable.

On the label it is indicated the serial number and the manufacturing year of the appliance.

1.6. Document information

This document is an integral and indispensable part of the product and must be retained in good condition by the user. Keep it in a safe place for future reference.

If the appliance is sold or transferred to another person, this manual has to always follow the appliance and handed to the new user or installer.

2. TECHNICAL FEATURES AND DIMENSIONS

2.1. Technical features

The unit is a monoblock (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.

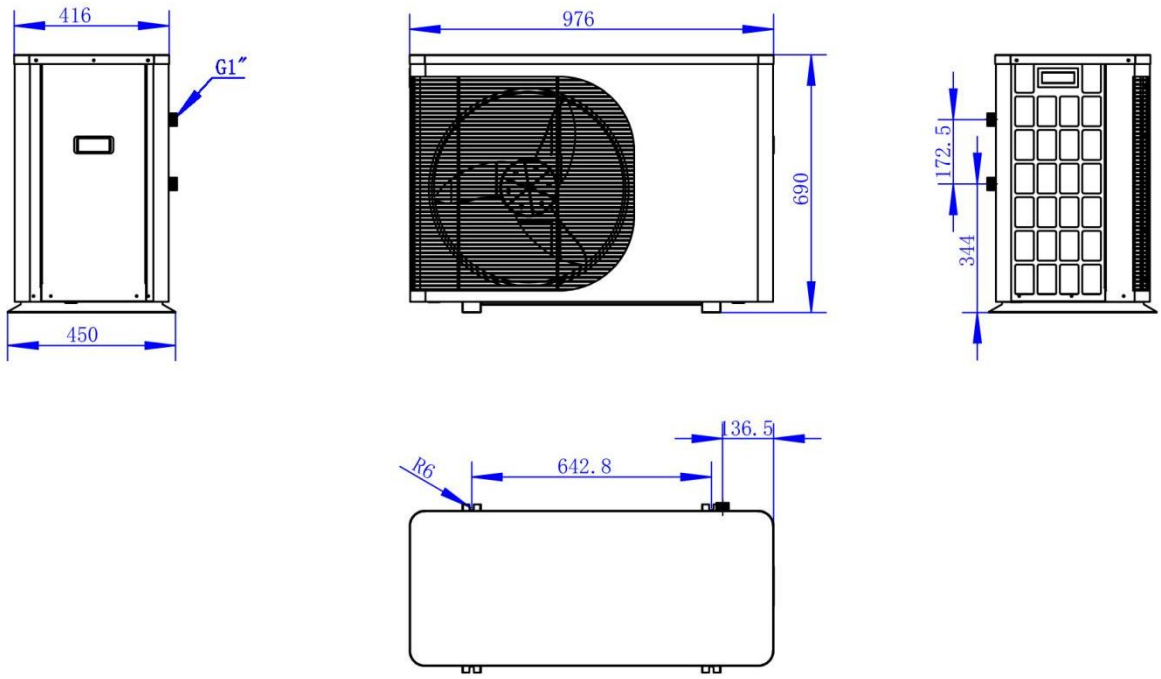
The unit can both heat hot water effectively at high outdoor temperatures and give a high output to the heating system at low outdoor temperatures. If the outdoor temperature drops to a level lower than 0°C (factory setting), the auxiliary heater switches on to ensure the heat pump unit works normally. 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/18KW//26KW. The materials and components are chosen to provide a long service life and to fully withstand harsh outdoor conditions.

The unit has two different installation options:

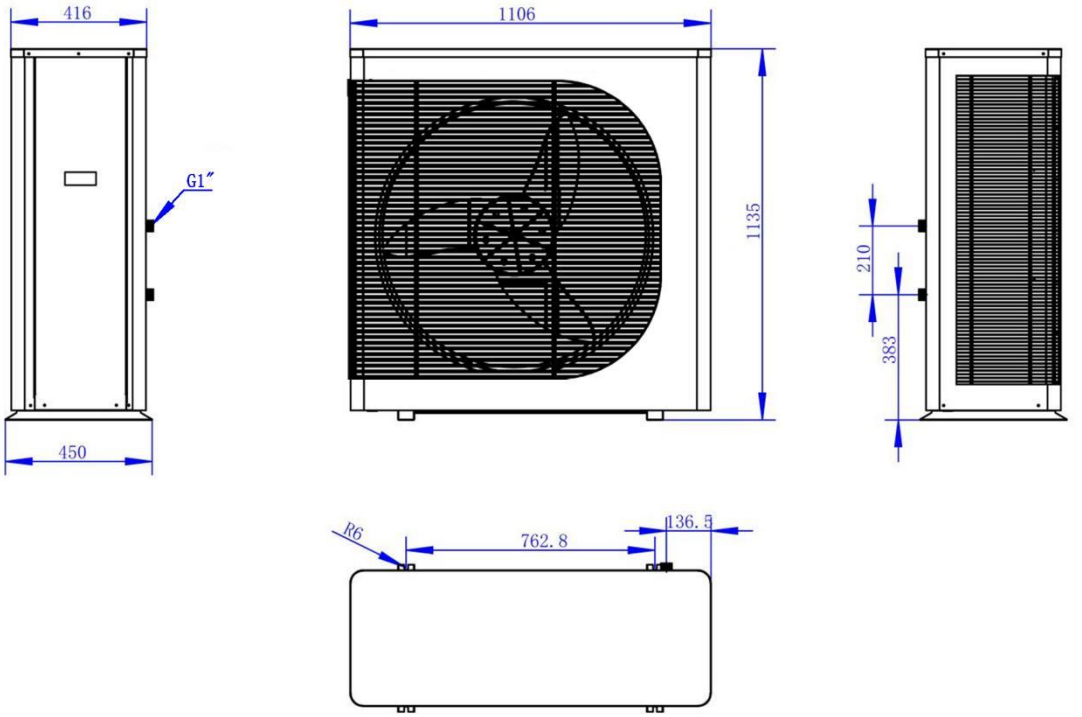
- Space heating/cooling + DHW (Domestic hot water)
- Space heating/cooling only

2.2. Dimensions

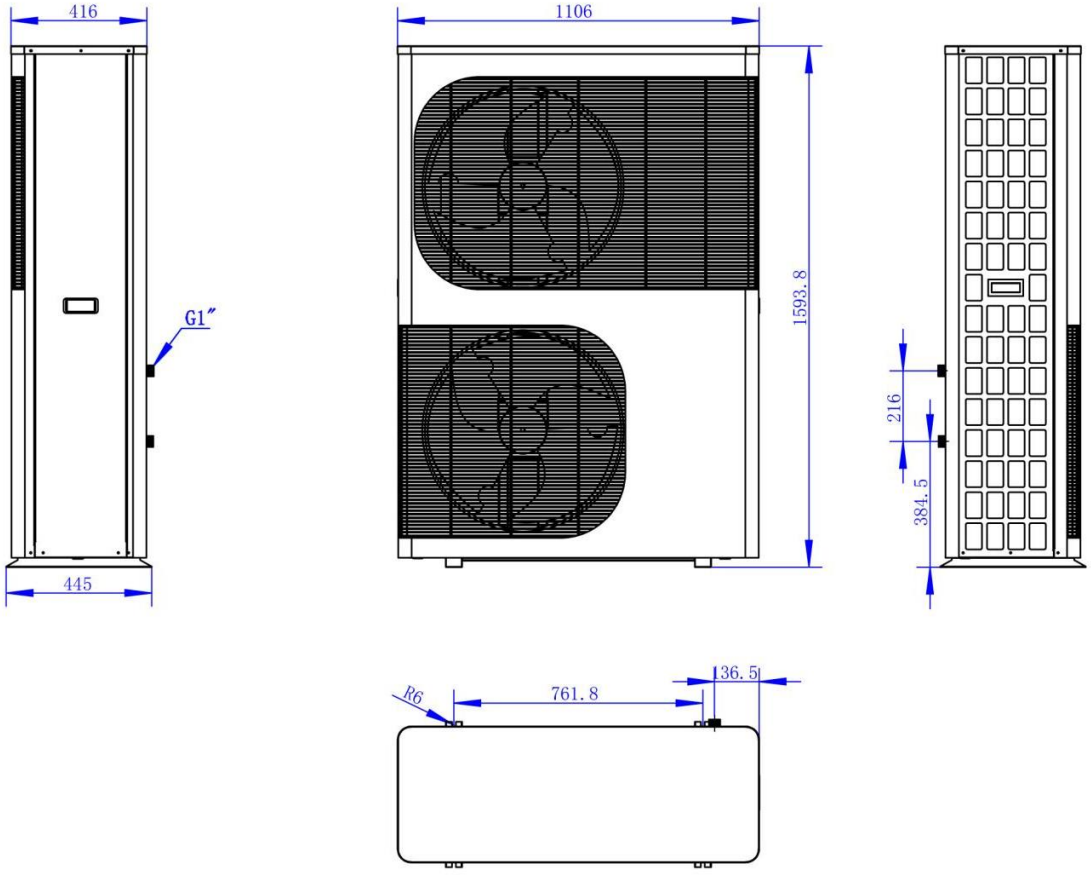


MASTER 90/120/120-TRI

TECHNICAL FEATURES AND DIMENSIONS



Master 160/160-TRI



Master 180/180-TRI/260-TRI

2.3. Technical data

Type			Master 60	Master 90	Master 120	Master 160	Master 180	Master 120-TRI	Master 160-TRI	Master 180-TRI	Master 260-TRI
Heating Capacity Range		*kW*	1,5-7	2-10	3-13	4-18	4-20	3-13	4-18	4-20	5-28
Heating A7℃, W30/35℃	Heating Capacity	*kW*	6,2	9,2	12,1	16,1	18,1	12,1	16,1	18,1	26,1
	Power Input	*kW*	1,34	1,96	2,63	3,58	4,00	2,62	3,58	3,98	5,79
	Current	*A*	5,82	8,52	11,44	15,56	17,39	4,42	6,04	6,72	9,77
	COP	*W/W*	4,63	4,69	4,60	4,50	4,53	4,62	4,50	4,55	4,51
Heating A7℃, W47/55℃	Heating Capacity	*kW*	6,2	9,1	11,0	16,1	17,1	11,1	16,0	17,1	25,3
	Power Input	*kW*	2,20	3,14	4,05	5,37	5,90	4,05	5,33	5,90	7,93
	COP	*W/W*	2,82	2,90	2,72	3,00	2,90	2,74	3,00	2,90	3,18
Cooling A35℃, W23/18℃	Cooling Capacity	*kW*	6,0	9,1	11,0	15,1	17,2	11,0	15,1	17,2	23,9
	Power Input	*kW*	1,57	2,36	2,88	3,96	4,51	2,86	3,96	4,50	6,26
	EER	*W/W*	3,82	3,85	3,82	3,81	3,81	3,85	3,81	3,82	3,82
Cooling A35℃, W12/7℃	Cooling Capacity	*kW*	6,2	8,5	10,7	14,5	16,3	10,7	14,5	16,3	22,2
	Power Input	*kW*	2,10	2,85	3,63	4,78	5,78	3,58	4,78	5,75	7,49
	EER	*W/W*	2,95	2,98	2,95	3,03	2,81	2,99	3,03	2,83	2,97
Rated water flow		*m^3/h*	1,1	1,6	2,1	2,8	3,1	2,1	2,8	3,1	4,5
Rated voltage /Frequency		*V/Hz*	220~240/50					380~415/50			
Maximum input power		*kW*	2,2	3,5	4,7	6,0	6,6	4,7	6,5	6,5	10,0
Maximum input current		*A*	12	15	20	26	28	8	11	11	17
Refrigerant		/	R32								
Air flow		*m^3/h*	3.500	4.000	4.500	6.500	8.000	4.500	6.500	8.000	9.000
Waterproof grade		/	IPX4								
Noise pressure (at 1m/5m)		*dB*	51/37	53/39	54/40	56/42	56/42	54/40	56/42	56/42	58/44
Max water outlet temperature		*°C*	60								
Diameter of water connection		*inch*	1"	1"	1"	1"	1"	1"	1"	1"	1"
Drainage valve		*mm*	½"	½"	½"	½"	½"	½"	½"	½"	½"
Internal pressure drop at rating water flow		*kPa*	22	40	50	50	50	50	50	50	50
Min/Max heating water pressure (Safety valve 3 bar)		*bar*	0,5/3,0								
Fuse (PCB)		*A*	15								
Min/Max outdoor air (heating mode)		*°C*	-20/45								
Min/Max outdoor air (cooling mode)		*°C*	15/45								
Net Weight (empty)		*kg*	65	75	85	100	135	75	100	135	180

3. MOUNTING

3.1. Transportation and delivery

The heat pump is delivered on wood pallet and carton box. The loading and unloading of the heat pump must be performed with a forklift or a crane.

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.

Remove the packaging with attention. **Keep the packaging material away from children since it can be dangerous.** After having unpacked everything, make sure that the appliance is intact and undamaged. In case of doubt do not use the appliance and inform the supplier.

In the documentation folder you will find:

- Technical manual
- Warranty leaflet

The controller 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.

3.2. General requirements

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

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

Plan the layout of the equipment according to the customer site and try to have the shortest and the most straight water pipe, as well as enough space for operation and maintenance.

Consider the local wind direction and choose a reasonable installation direction to avoid the wind direction being opposite.

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 closed heating systems, make sure the pipeline has an air relief valve (an automatic air relief valve is included in the heat pump).

3.3. Mounting of the heat pump

The heat pump should be firmly fixed to a base, preferably a concrete base, minimum height 100-200mm from the ground. It is suggested that the right end is 5-10mm higher than the left end, as shown in the figure.

The standing 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

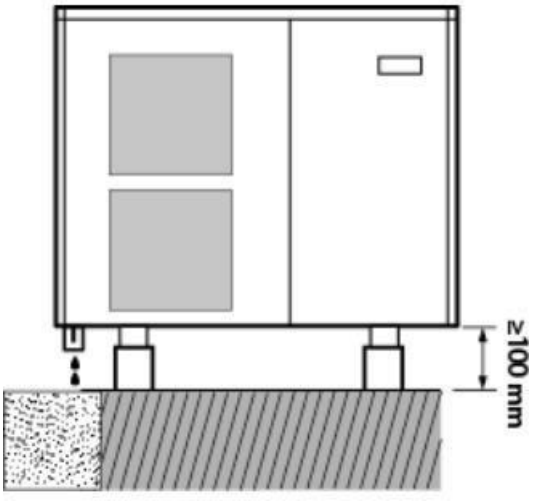


Fig 1. Minimum distance from floor

In case of installing the device on wall mounts, it is 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. Make sure that the protruding distance of the bolt does not exceed 10mm inside the metallic support of the device (leg).

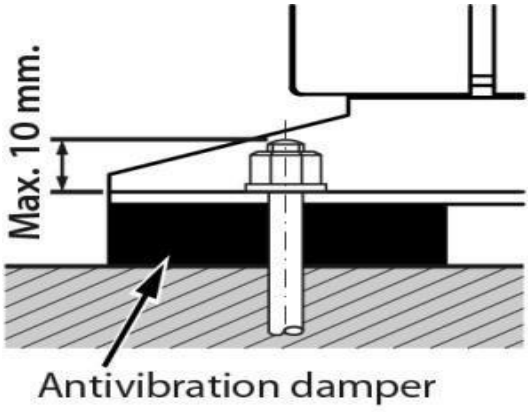


Fig 2. Antivibration dampers

3.4. Positioning requirements

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.

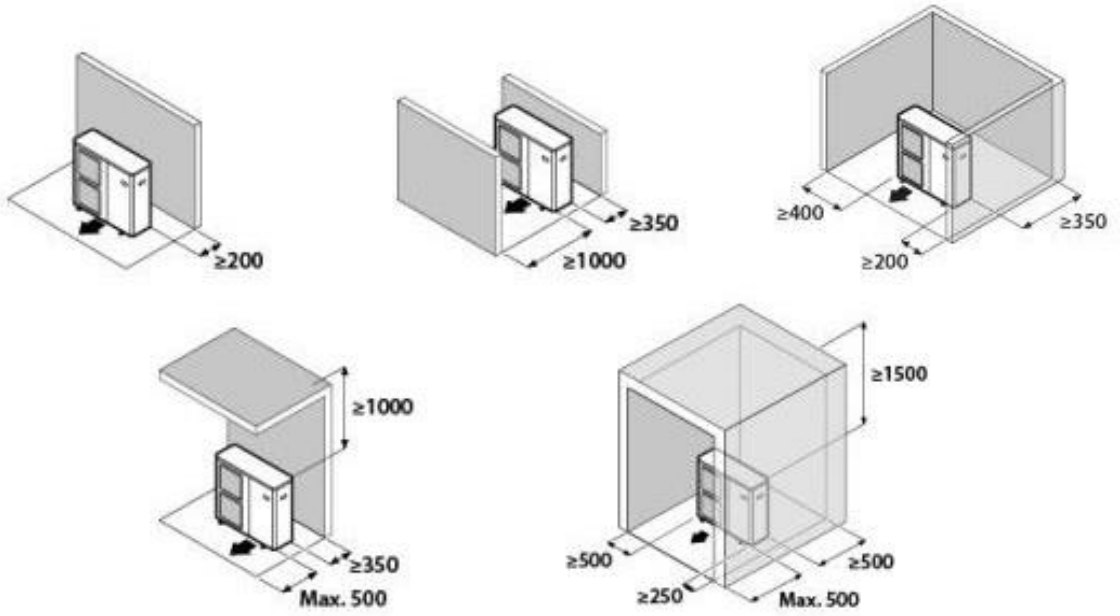


Fig 3. Minimum distances for the installation of the unit [mm]

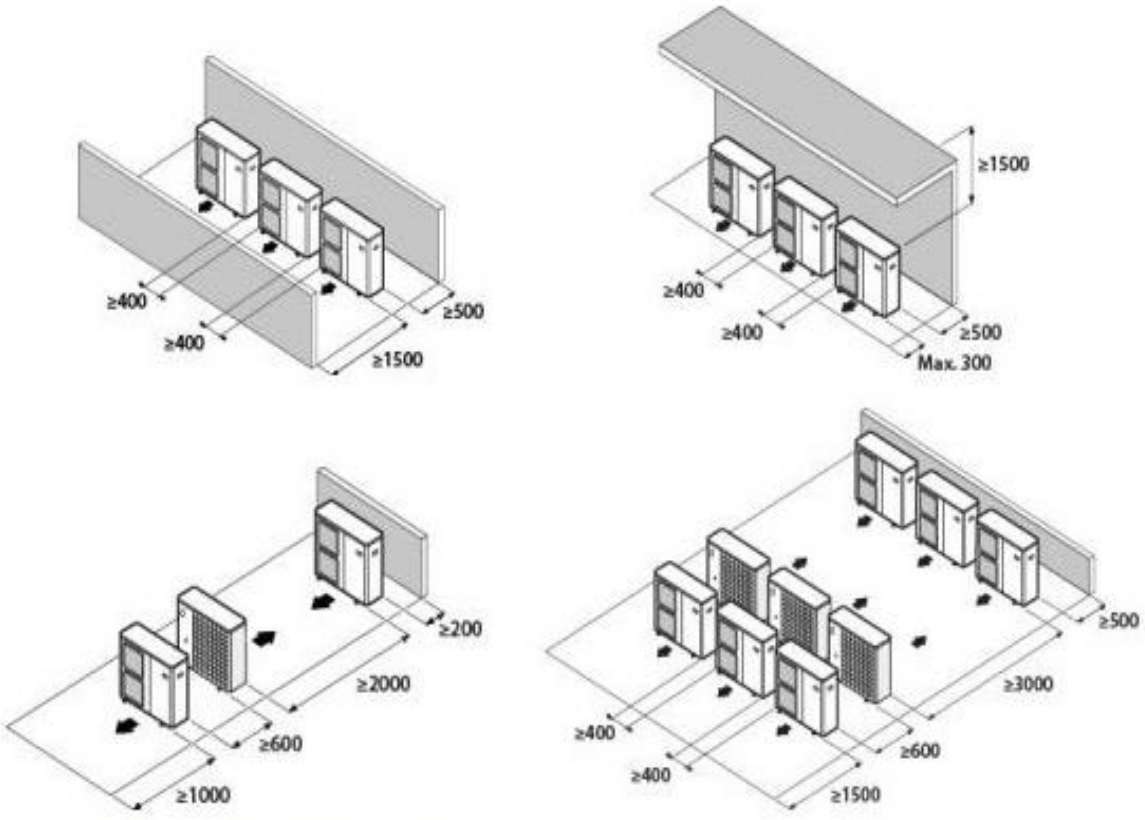


Fig 4. Minimum distances for the installation of multiple units in the same location [mm]

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 strings, as indicated in the following figure.

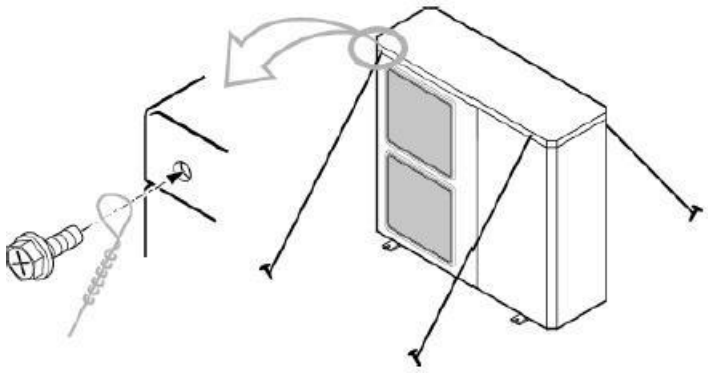


Fig 5. Anchoring the heat pump with strings

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.

3.5. 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.

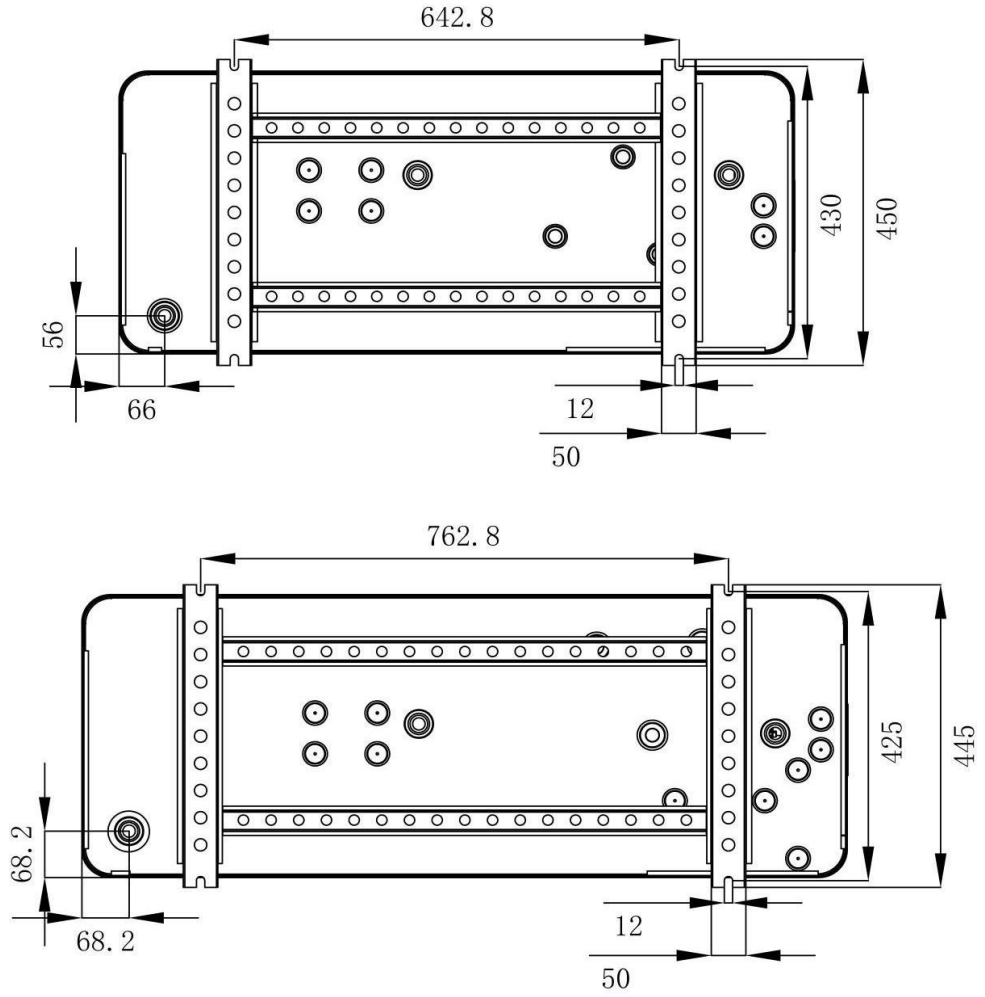


Fig 6. Drainage connection

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 drainage 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 heat pump will not be frozen. This can be ensured with a drain pan with an electrical heater (optional).**

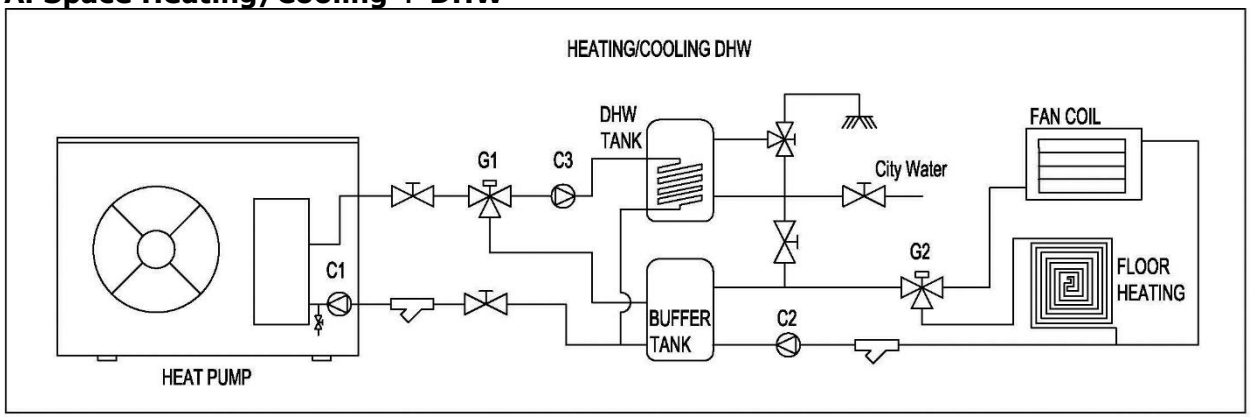
4. INSTALLATION

4.1. Installation design

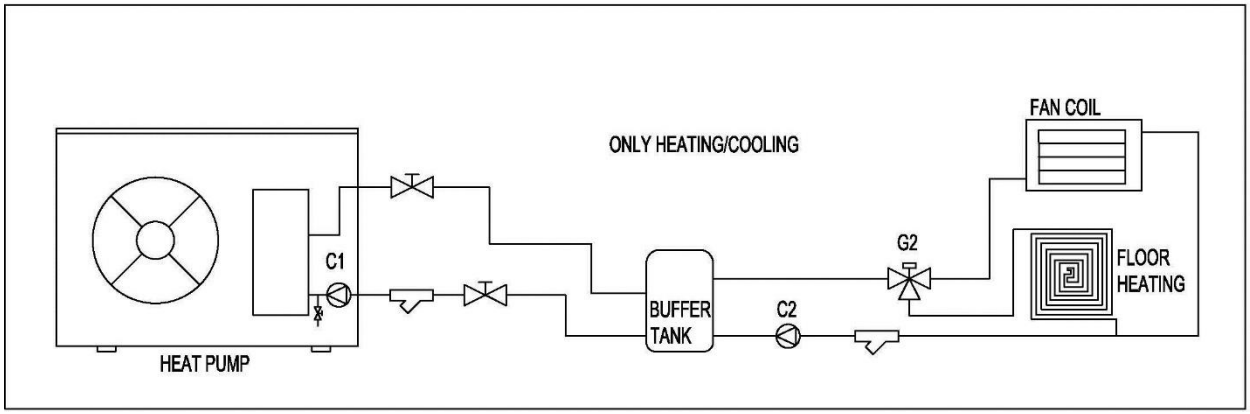
The unit can be installed in several different ways, according to the following diagrams.

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 must be at least 10 liters per kW of output.**

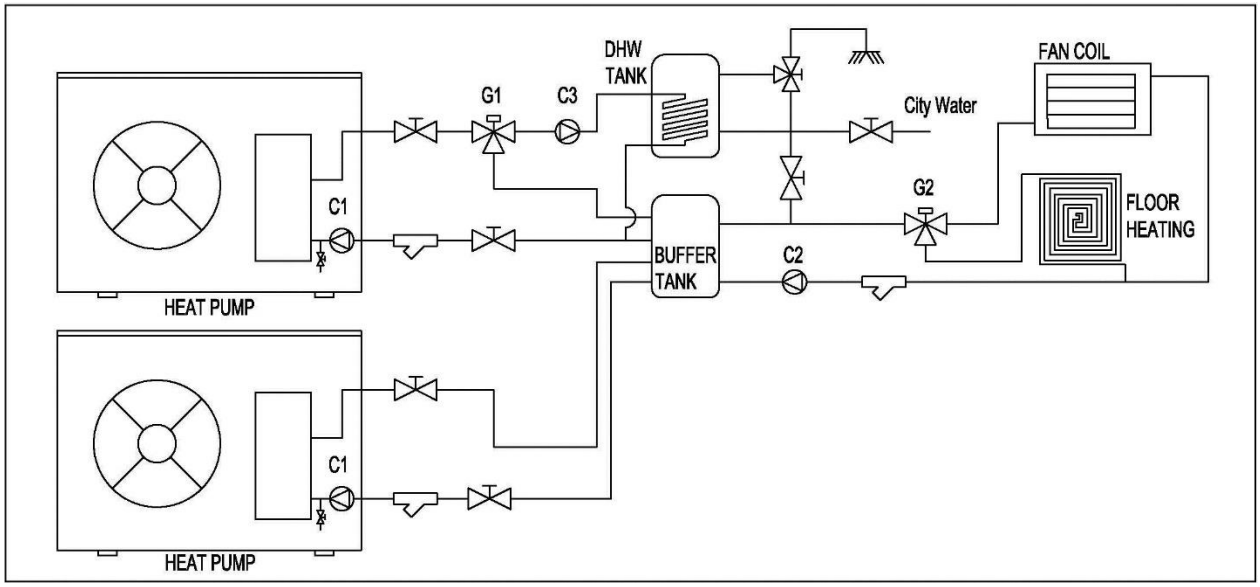
A. Space Heating/Cooling + DHW



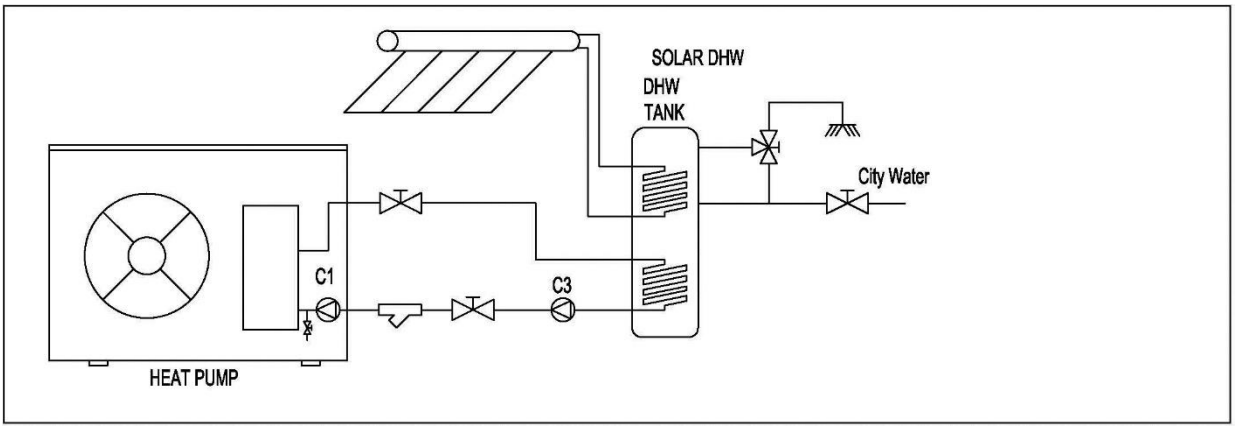
B. Space Heating/Cooling mode only



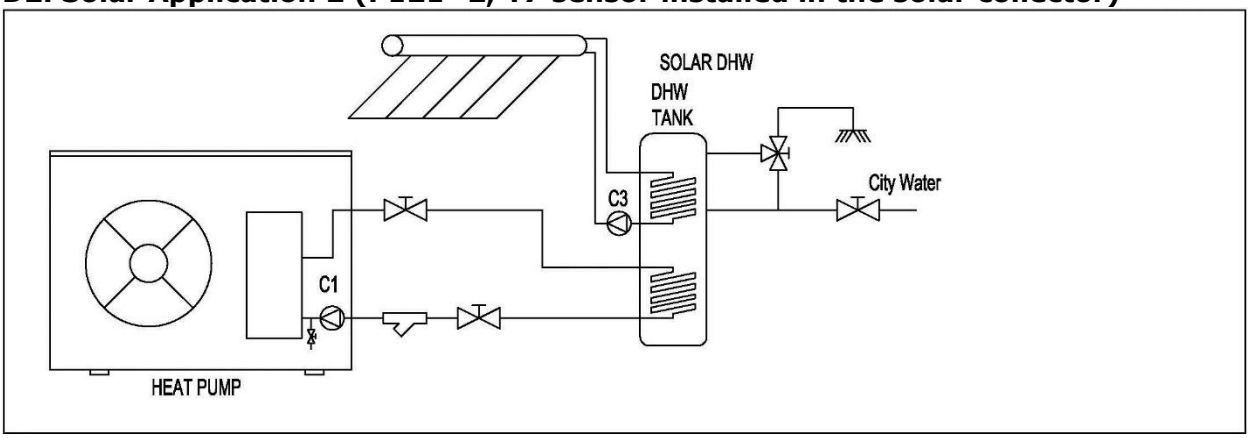
C. Cascade of two heat pumps for Space Heating/Cooling + DHW



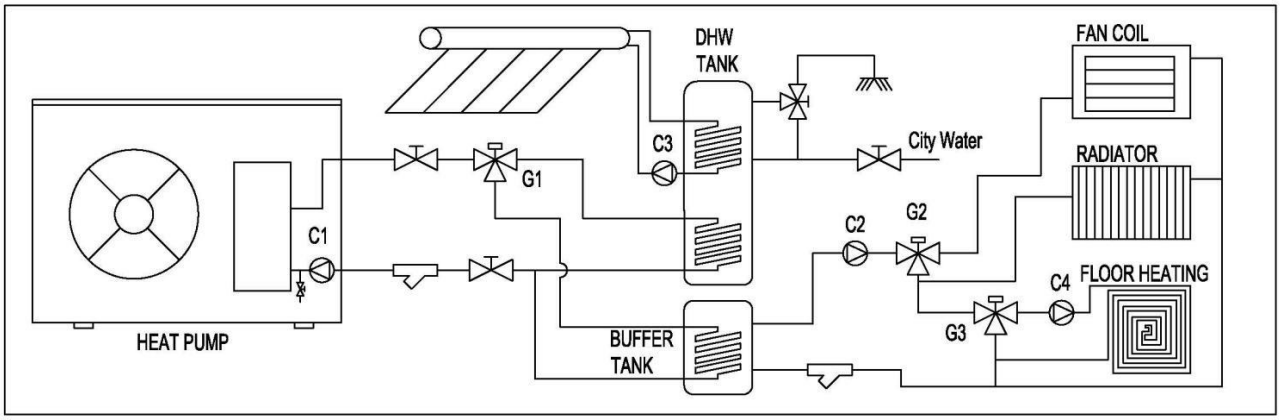
D1. Solar Application 1 (P121=0, T7 sensor installed in the DHW tank)



D2. Solar Application 2 (P121=2, T7 sensor installed in the solar collector)



D3. Solar Application 3 (P121=2, T7 sensor installed in the solar collector)



The working flow is calculated depending on the temperature difference outlet-inlet (5K), which is approximately 4 times higher than a conventiona gas boiler. This results in bigger pipe diameters. An indicative table is given below:

Heat Pump Power [kW]	Pipe Diameter			
	DN	Inches	Copper / Inox [mm]	PPR [mm]
6	25	1″	28	40x5,5
9	25	1″	28	40x5,5
12	32	1 ¼″	35	50x6,9
16	40	1 ½″	42	63x8,7
18	40	1 ½″	42	63x8,7
26	50	2″	54	75x10,3

Table 1. Recommended pipe diameters

The G1, G2, 3-way valves **must be motorized deviation valves (no mixing).** Special attention must be given to the circuit activated when the electric status is ON or OFF. The recommended action time of the motor is 15-20 seconds.

The G3 valve must be a motorized mixing valve, the ON/OFF running period can be set by the parameter P046.

The DHW tank must be special for heat pumps (with a bigger heat exchanger length). Recommended heat exchanger surface is 0,25 m^2/kW.

The heating buffer tank is very important for the correct function of the heat pump. A minimum volume is recommended according to the power of the heat pump.

Heat Pump Power [kW]	Buffer tank volume [lit]
6	50
9	50
12	50
16	80-100
18	100-150
26	100-150

Table 2. Recommended buffer tank volume

The circulation pump for the heating circuit C2 must be correctly chosen according to the heat pump power and water flow rate, according to the following table. If the installation has more than one circuits/distributors, it is recommended that the sum of all the pumps flow rate is equal to the indication below.

Note 1: The recommended pump flow is the working point on the pumping curve (not the maximum).

Note 2: If the installation includes floor heating distributor, it is recommended that it does not include circulation pump, but an external pump should be installed with rate flow according to the indications. Also, the temperature regulation mixing valve should be installed externally.

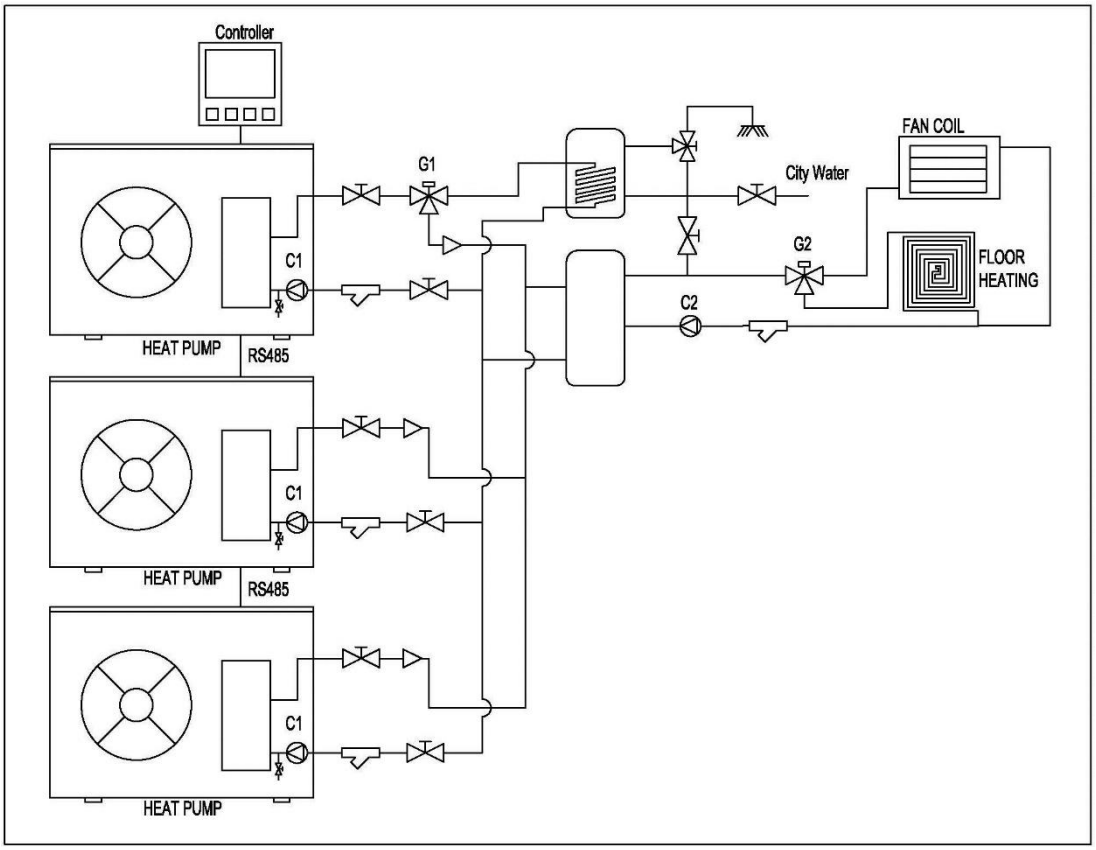
Heat Pump Power [kW]	Circulation Pump rate flow [m^3/h]
6	1,3
9	1,8
12	2,6
16	3,2
18	3,8
26	5,4

Table 3. Recommended circulation pump rate flow

4.2. Cascade control

The heat pump can realize cascade control of 2 units. A total of 8 units can be installed in cascade **with the optional cascade controller.**

The 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 buffer tank is too large, the lower water tank temperature sensor (T16) needs to be added in order to improve the control accuracy.



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

SW6	SW7	SW8	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

Table 4. Cascade control settings

Below is the connection diagram on the PCB board.

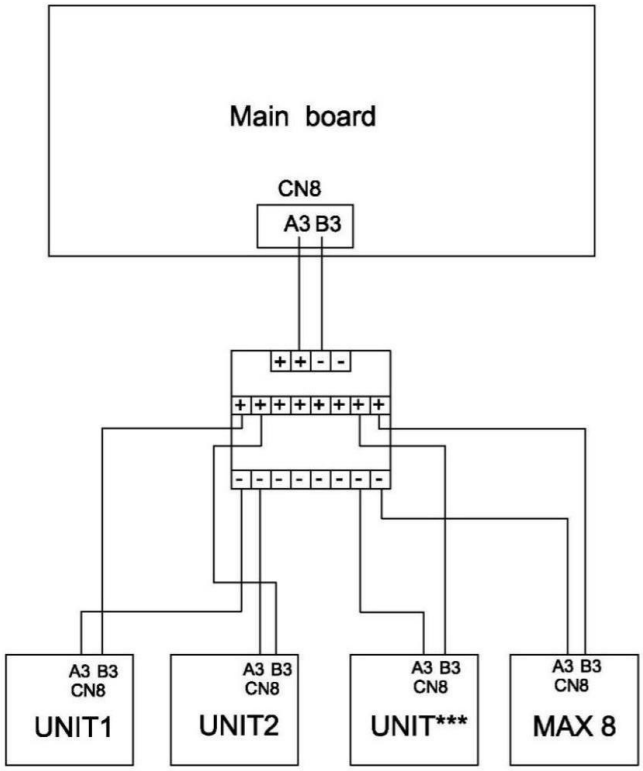


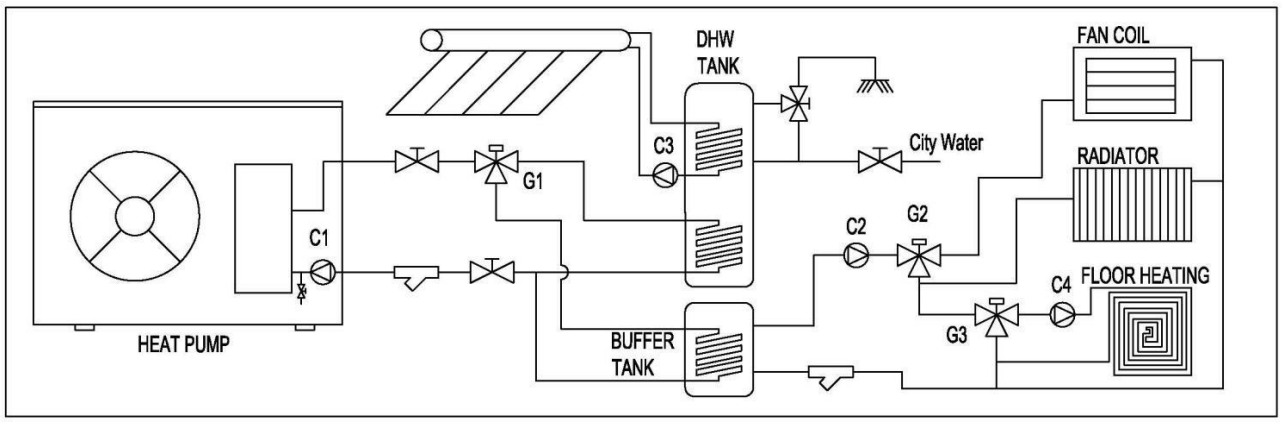
Fig 7. Cascade connection diagram

4.3. Double zone control

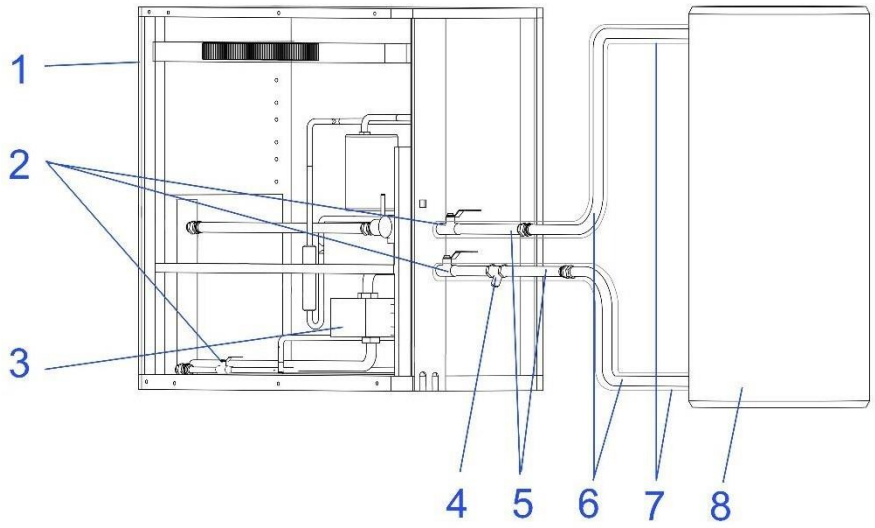
The heat pump has a double zone control, which can individually control a radiator and a floor heating circuit. This function can be enabled by the parameter P016.

On the controller, you can set the individual temperature for each zone. The radiator circuit temperature is set by the parameter P002, while the floor heating circuit temperature is set by the parameter P041.

The G3 valve must be a motorized mixing valve, the ON/OFF running period can be set by the parameter P046.



4.4. Hydraulic connections



Legend
1. Heat pump
2. Shut-off valve
3. Water pump
4. Filter
5. Flexible damping pipe
6. Connection pipes
7. Pipe insulation
8. Buffer tank

Fig 8. Schematic diagram of water pipe connections to the buffer tank

The pipe 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.

The hydraulic installation must include a filling valve, air vent valves and the necessary hydraulic components for correctly filling it. We recommend that an external expansion tank is installed, with sufficient volume according to the total water volume in installation.

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.

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.**

4.5. Electrical connections

4.5.1. General requirements

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.

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

THERMOSTAHL ROMANIA SRL declines any liability for damage caused to people, animals and goods, due to defects caused by faulty electrical connections or lack of connecting the boiler to an efficient grounding system.

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).

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

External thermostat connection must be simple electrical switch (ON/OFF). Voltage feed in these terminals can destroy the controller!

4.5.2. Connection of the main power supply

The heat pump is prepared for connection to ~230V/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.**

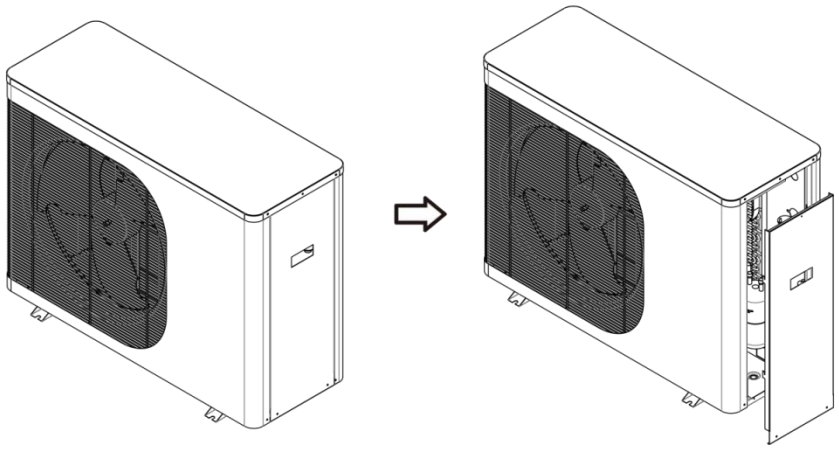
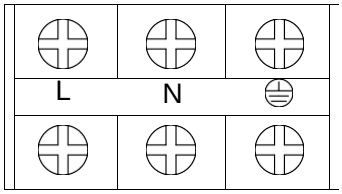
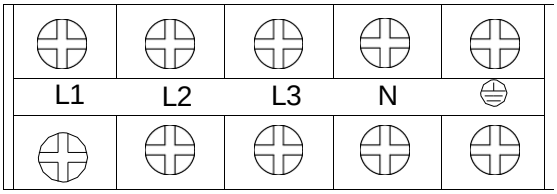


Fig 9. Removing the side panel



Single phase model



Three phase model

It is recommended that a UPS shall be connected to the PCB as shown below. When there is power supply cut, the UPS can ensure that the water will circulate in the pipes of the heat pump. Thus, the freezing of the heat pump can be avoided in cold winter.

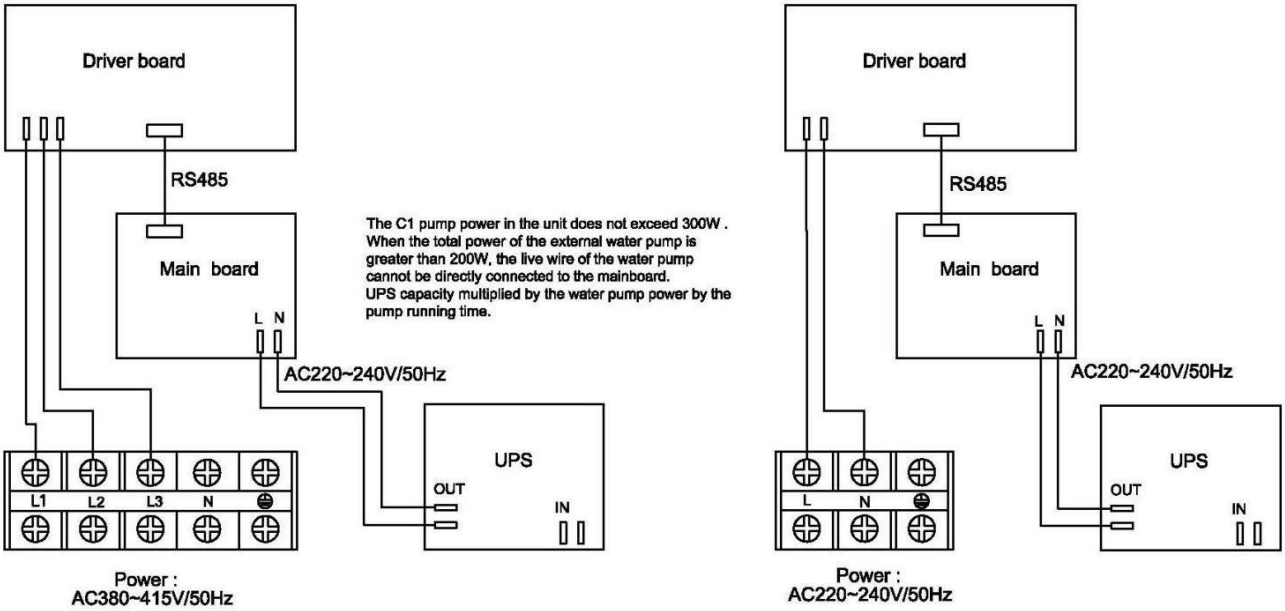


Fig 10. UPS connection

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

Power supply	**Heat pump type**	**Heat pump**		
		Max current *A*	**Wire section** *mm²*	**Fuse capacity** *A*
220~240V/ 1 phase	6kW	12	3x2,5	16
	9KW	17	3x2,5	25
	12kW	22	3x4	32
	16/18kW	32	3x6	40
380~415V/ 3 phase	6KW	7	5x1,5	16
	9KW	7	5x1,5	16
	12kW	9,5	5x1,5	16
	16/18kW	13	5x2,5	16
	26kW	17	5x4	25

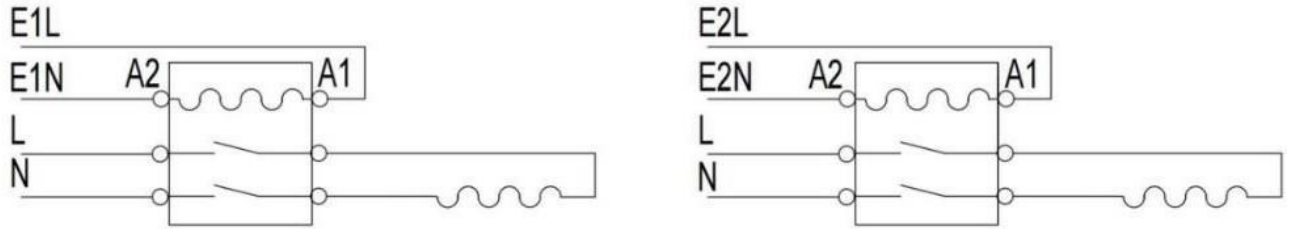
Table 5. Main electrical supply suggestions

For the correct selection of the type and dimensions of the main supply cable, you must take into account the electrical consumption of the optional accessories connected on the heat pump (auxiliary electrical heaters, circulating pumps). They values indicated in the above table show the maximum consumption for combination of heat pump and the auxiliary electrical heater E1 and E2 (see "Wiring Diagram").

4.5.3. Auxiliary electrical heater connections

The heat pump can control two auxiliary electrical heaters: E1 for the DHW tank and E2 for the heating circuit/buffer tank.

This connection is only free contact, no current. **To connect the heater, an external contactor must be installed, as shown below.**



E1: DHW auxiliary electrical heater E2: Heating auxiliary electrical heater

Fig 11. Auxiliary electrical heater connection

Power Supply	Electric heater current [A]		
	3kW	6kW	9kW
220~240V/1 phase	13	26	39
380~415V/3 phase	4	9	13

Wire section	Limit current	Recommended current	Fuse capacity
mm^2	A	A	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

Table 6. Auxiliary electrical heater connection suggestions

4.5.4. Second heat source connection

The second heat source is connected to the E2 terminal. In this case, you need to change the parameter P065.

When parameter P065=0, E2 port is electrical heater, when parameter P065=1, E2 port is second heat source control port.

4.5.5. Baseplate electric heater or drain water pipe electric heater

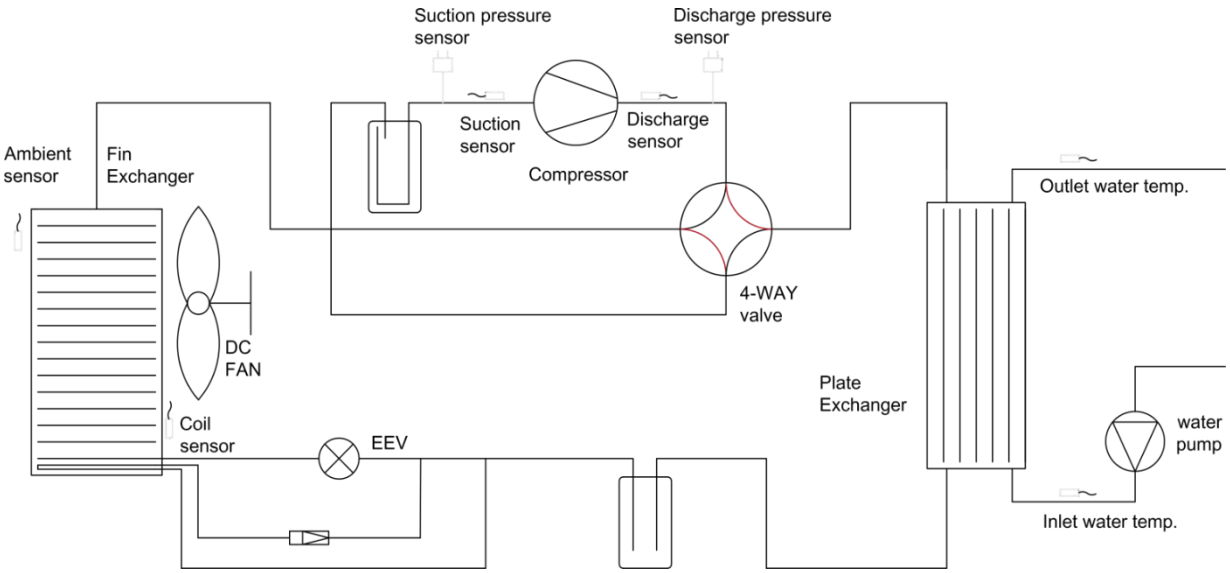
The electrical heater can be connected on the Heater-L/N port on the terminal strip.
It starts once defrost starts and stops after defrosting has been stopped for 10 minutes.

When P069=0, the electric heater keeps working to keep hot the baseplate.

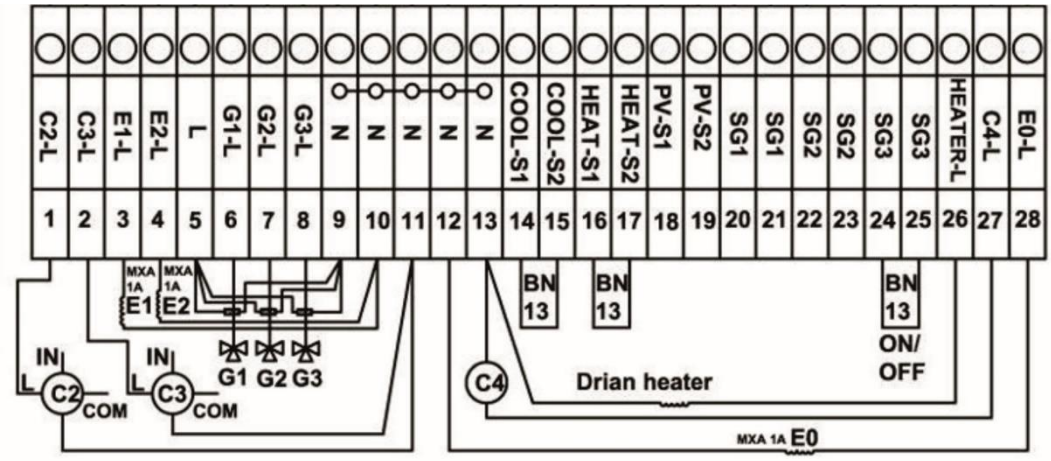
When P069=1, the electric heater works only during defrosting for drain water pipe and stops after the defrost has been deactivated for 10 minutes.

4.6. Wiring Diagram

4.6.1. Functional diagram



4.6.2. Terminal connections



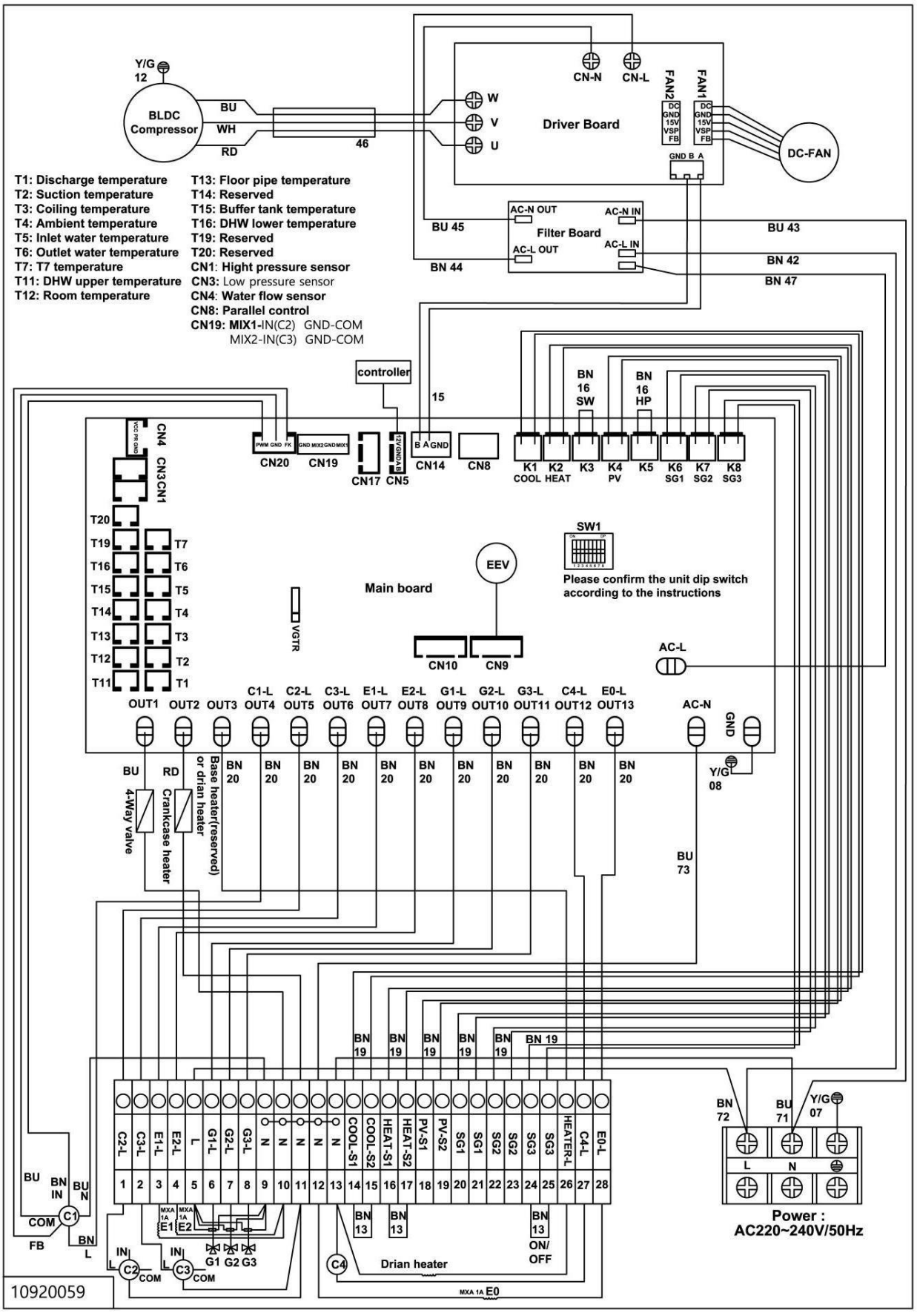
Legend

C2-L	Water pump C2 (heating circuit)	E0-L	Pipe electric heater
C3-L	Water pump C3 (DHW)	HEATER-L	Baseplate heater (defrost)
C4-L	Water pump C4 (mixing circuit)	E1-L	Electric heater E1 (DHW)
G1-L	3-way valve G1 (diverting)	E2-L	Electric heater E2 (Buffer / second source)
G2-L	3-way valve G2 (diverting)	HEAT-S1,S2	Heating room thermostat
G3-L	3-way valve G3 (mixing)	COOL-S1,S2	Cooling room thermostat
PV-S1, PV-S2	PV inverter	SG1, SG2, SG3	Smart Grid
L	Permanent phase for 3-way valves	N	Common Null

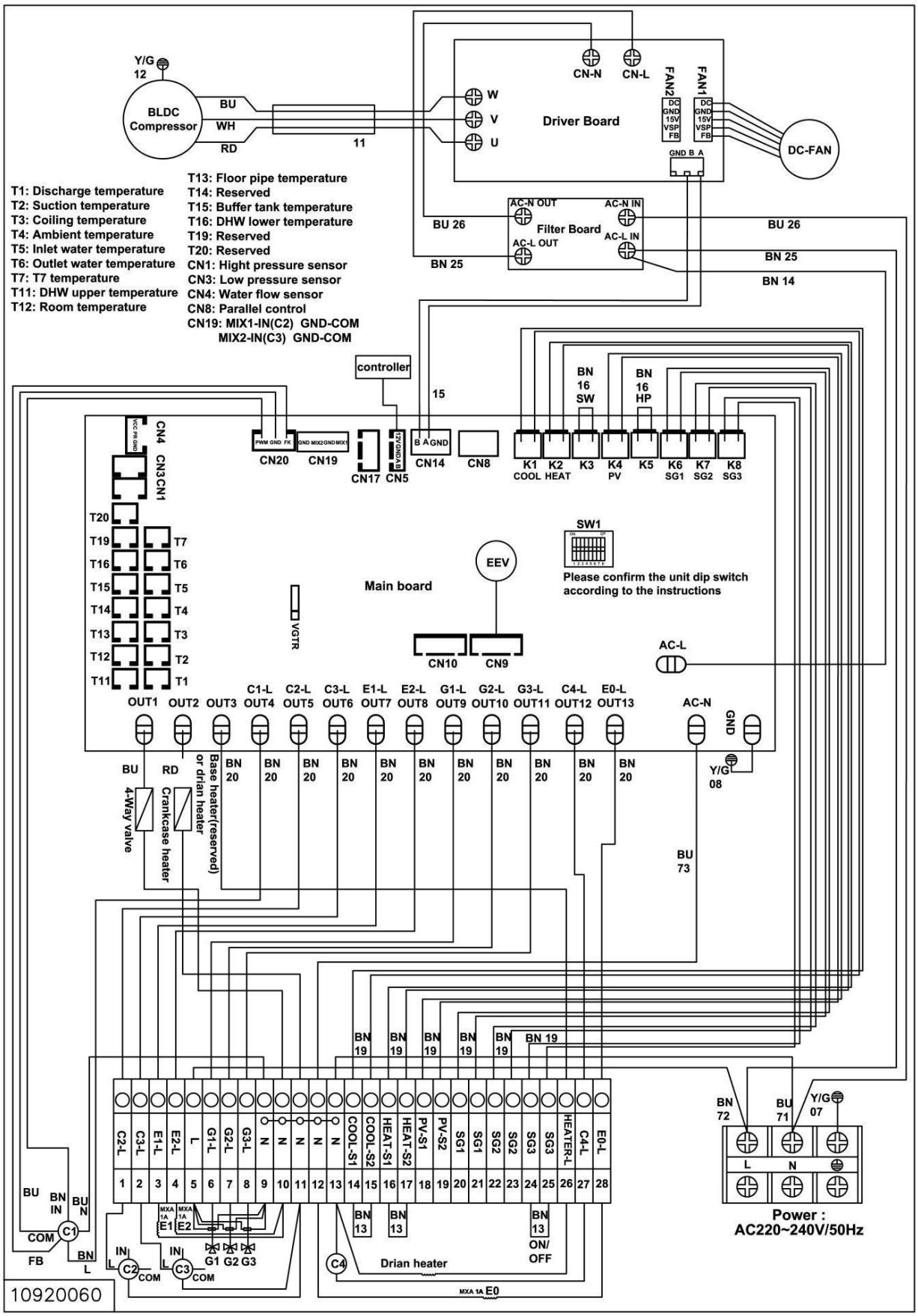
Sensors

T4	Ambient temperature (mounted on the back panel)	T13	Mixing circuit temperature
T7	Solar system temperature	T15	Buffer tank temperature
T11	DHW upper temperature	T16	DHW lower temperature
T12	Room temperature		

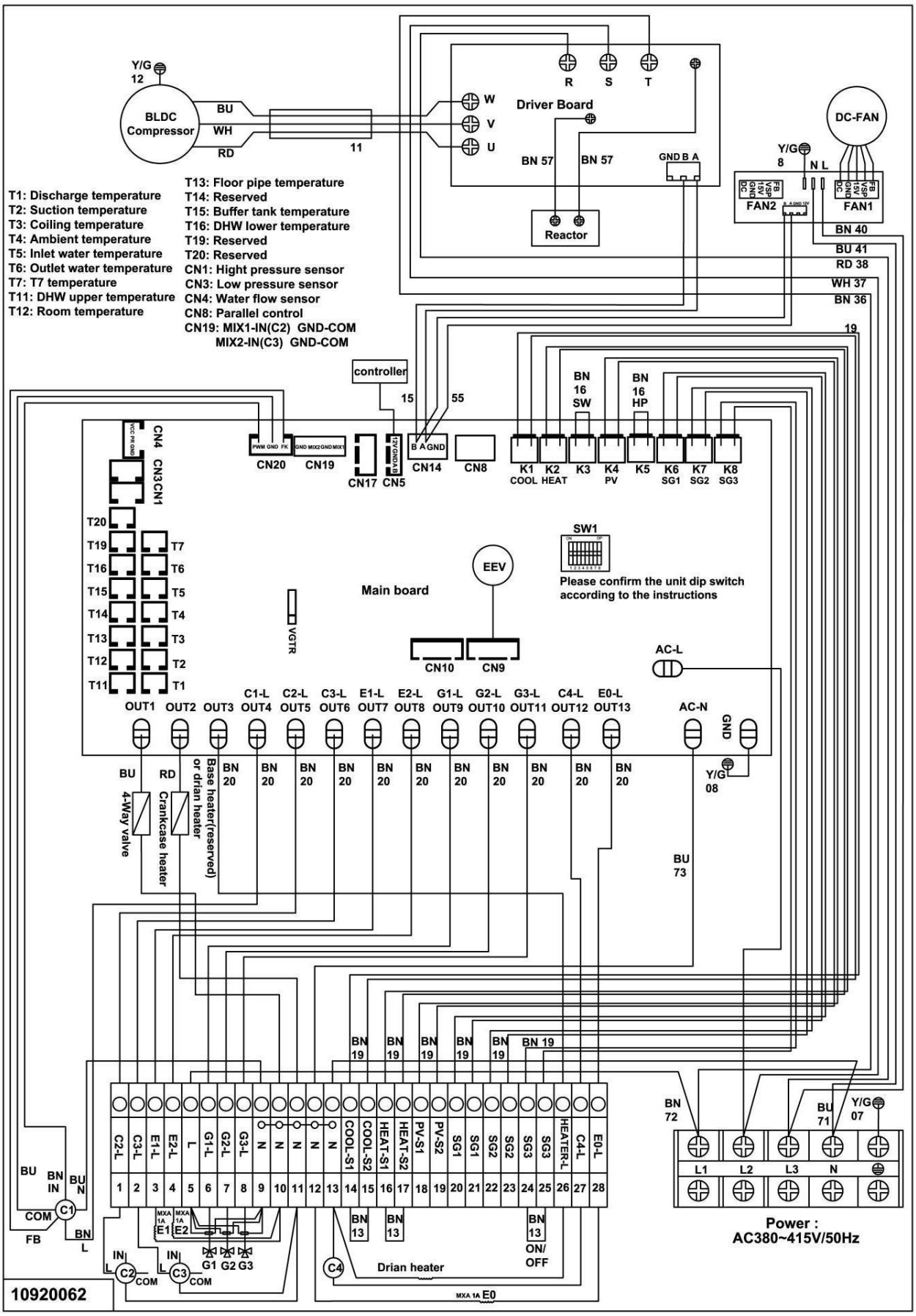
4.6.3. Master 60/90



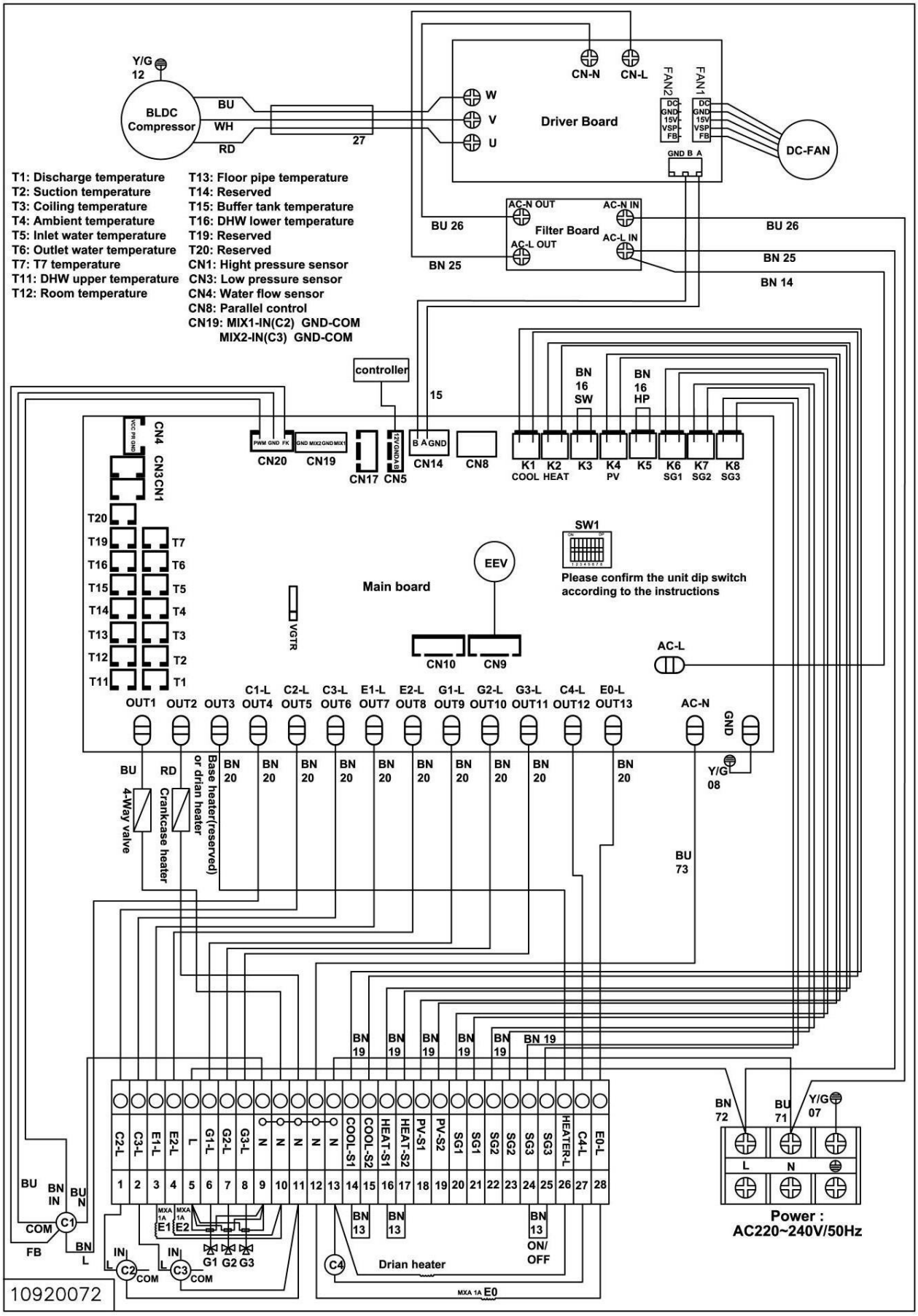
4.6.4. Master 120



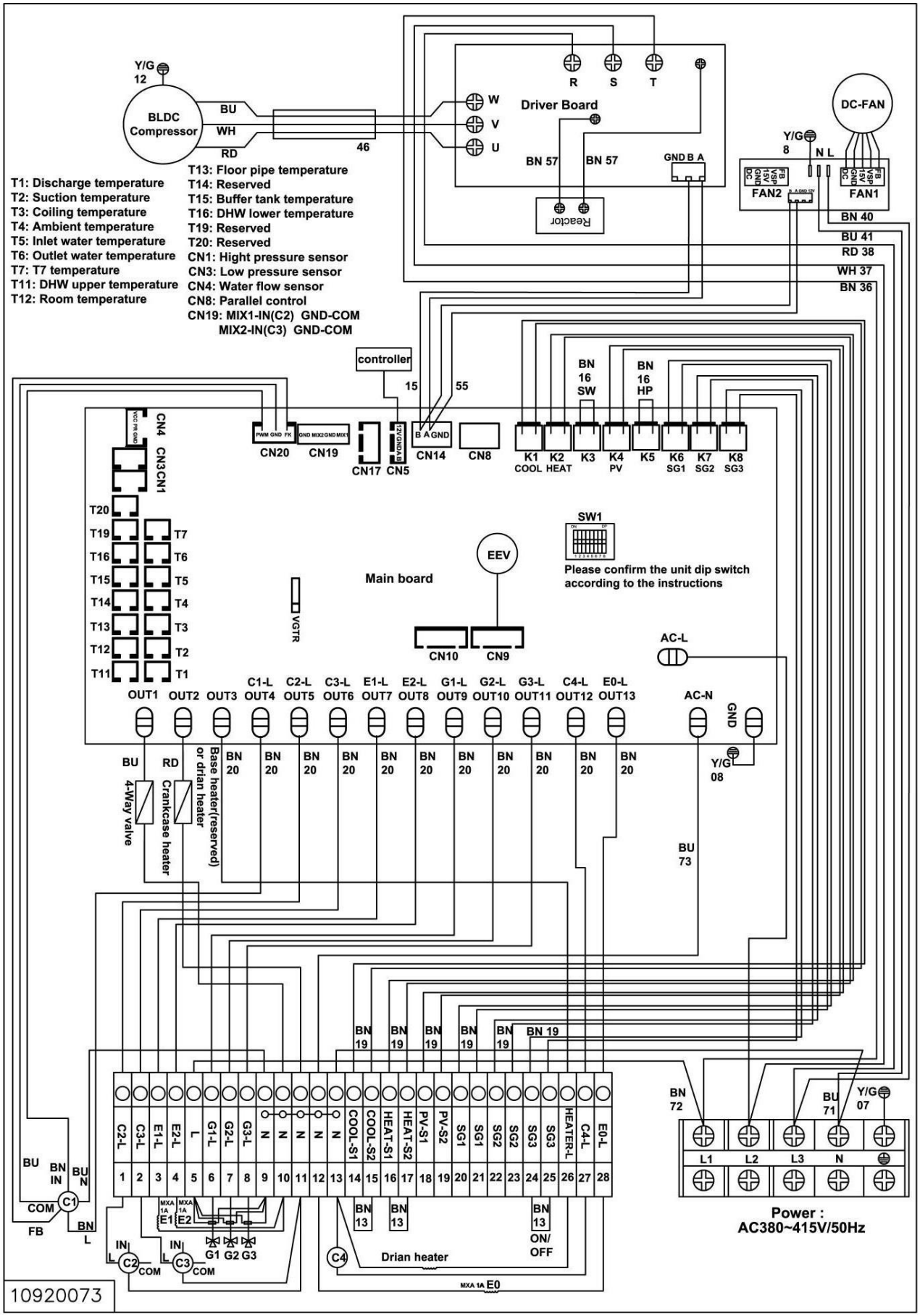
4.6.5. Master 120-TRI



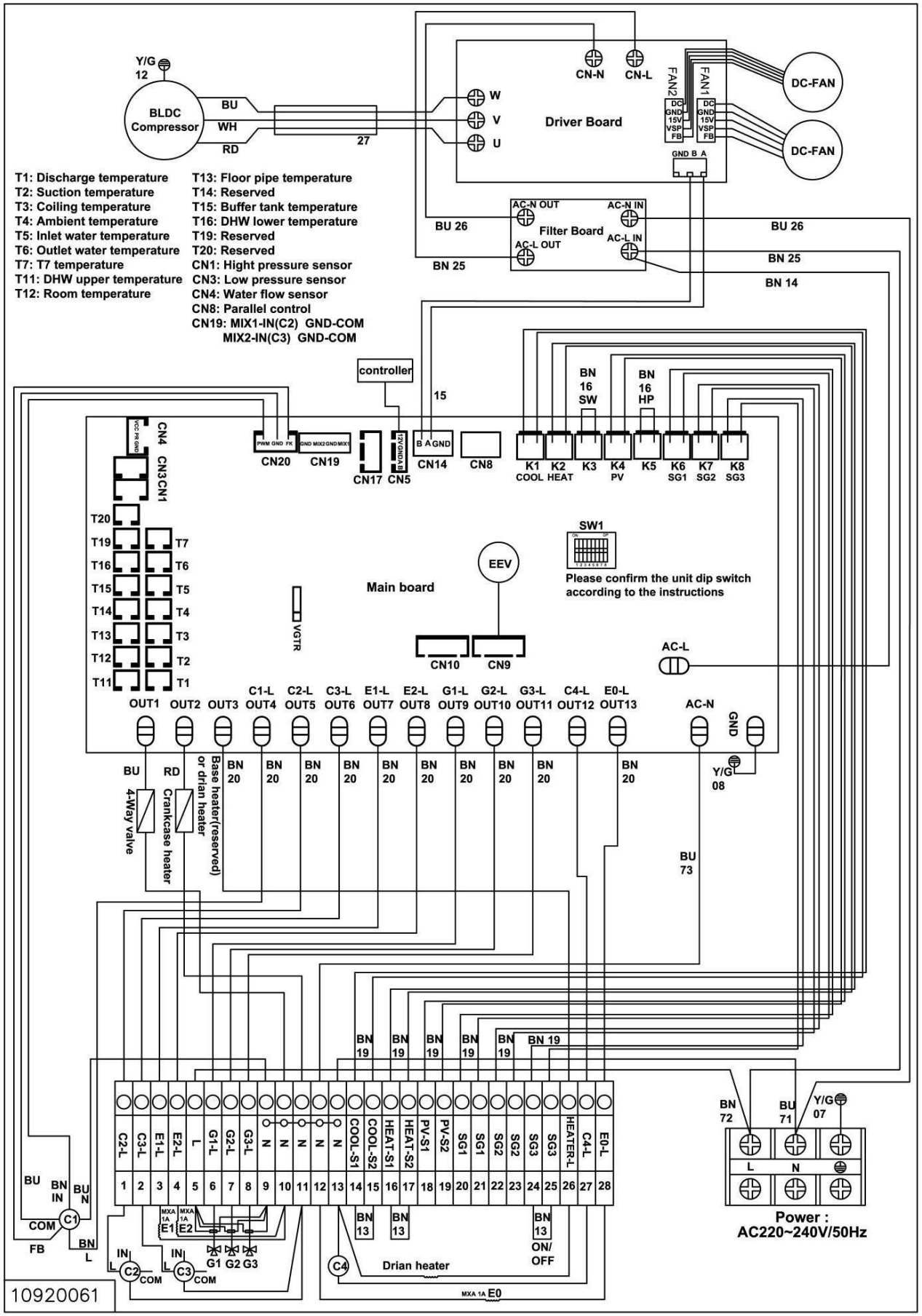
4.6.6. Master 160



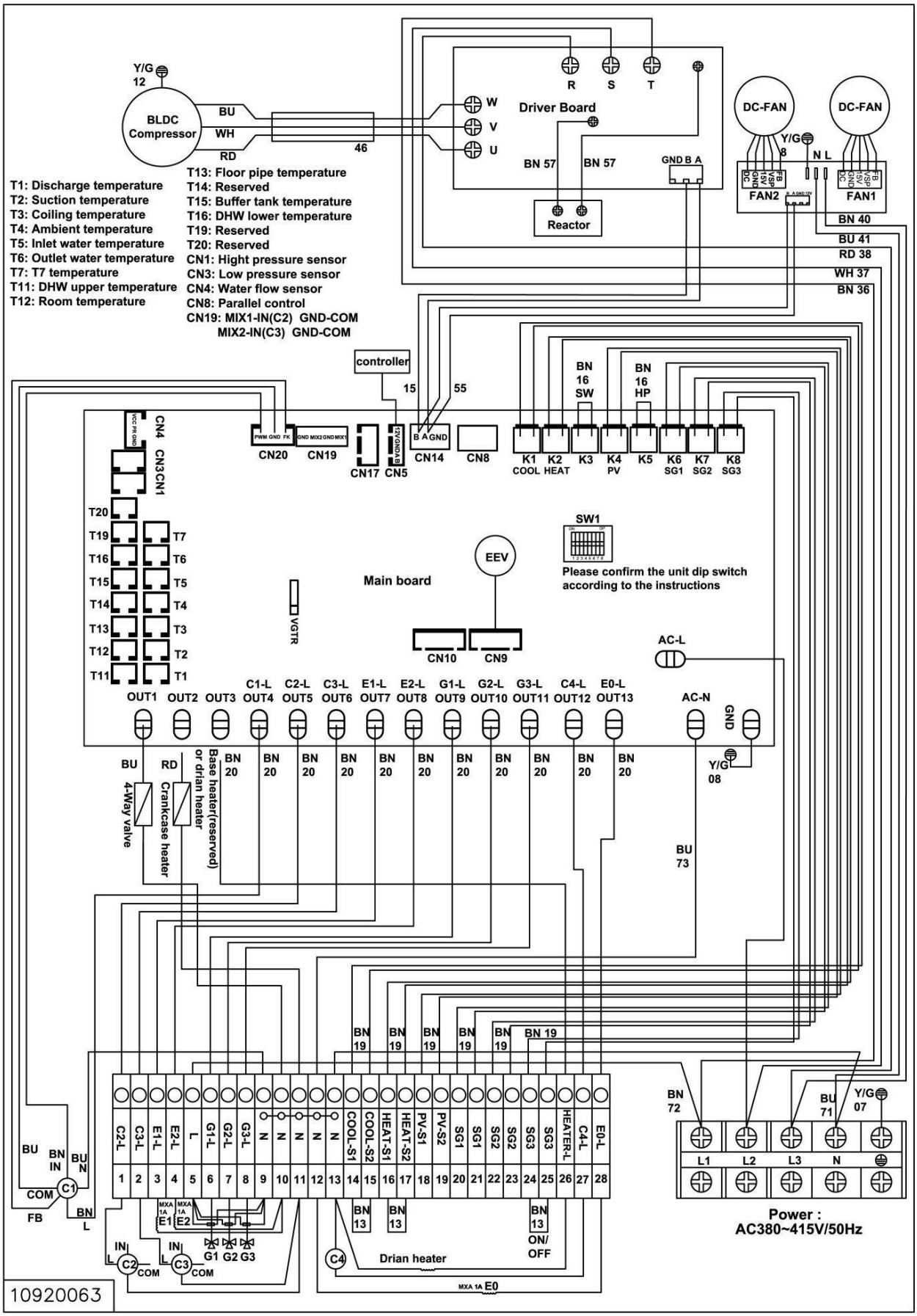
4.6.7. Master 160-TRI



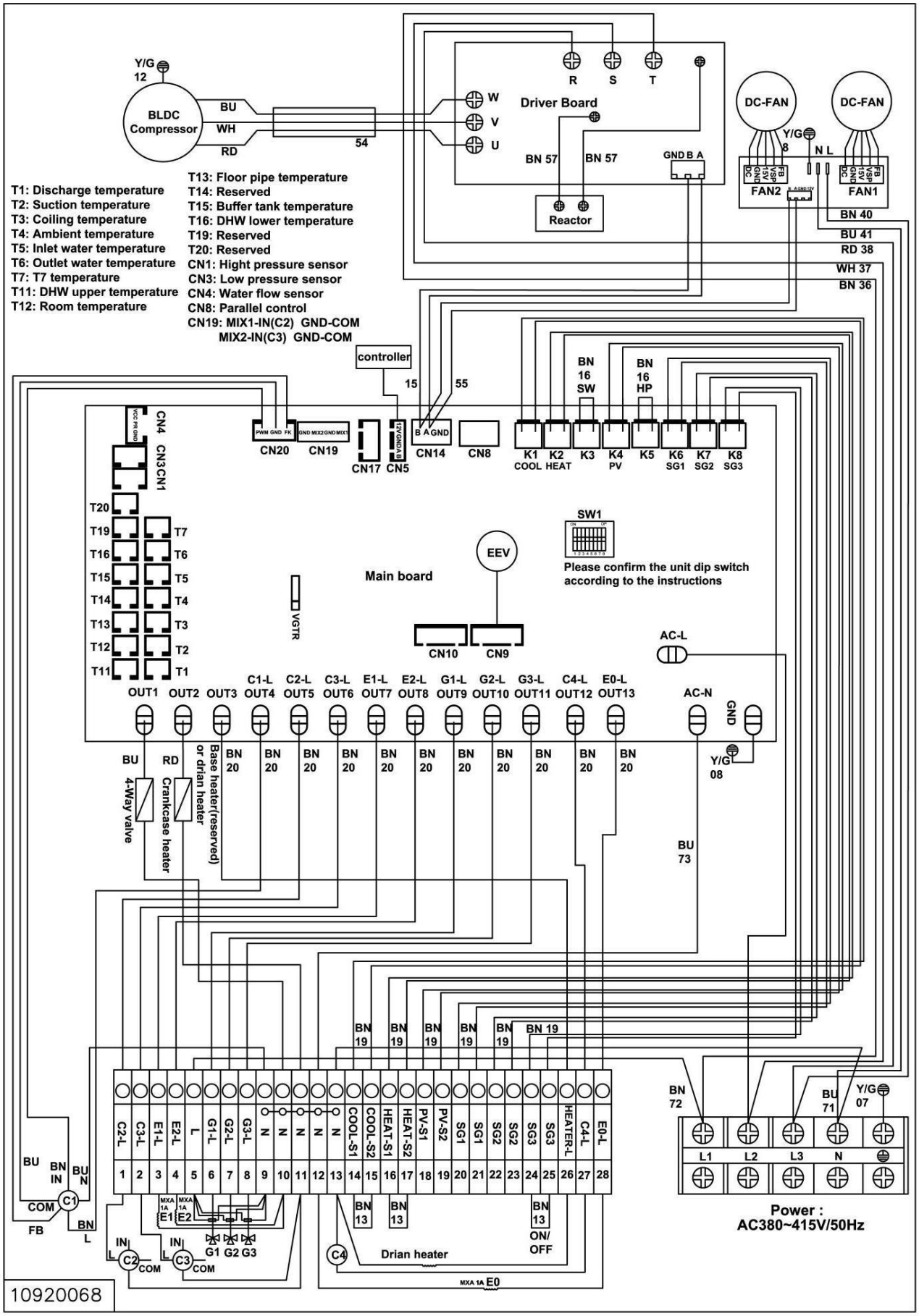
4.6.8. Master 180



4.6.9. Master 180-TRI



4.6.10. Master 260-TRI



5. CONTROLLER

5.1. General description

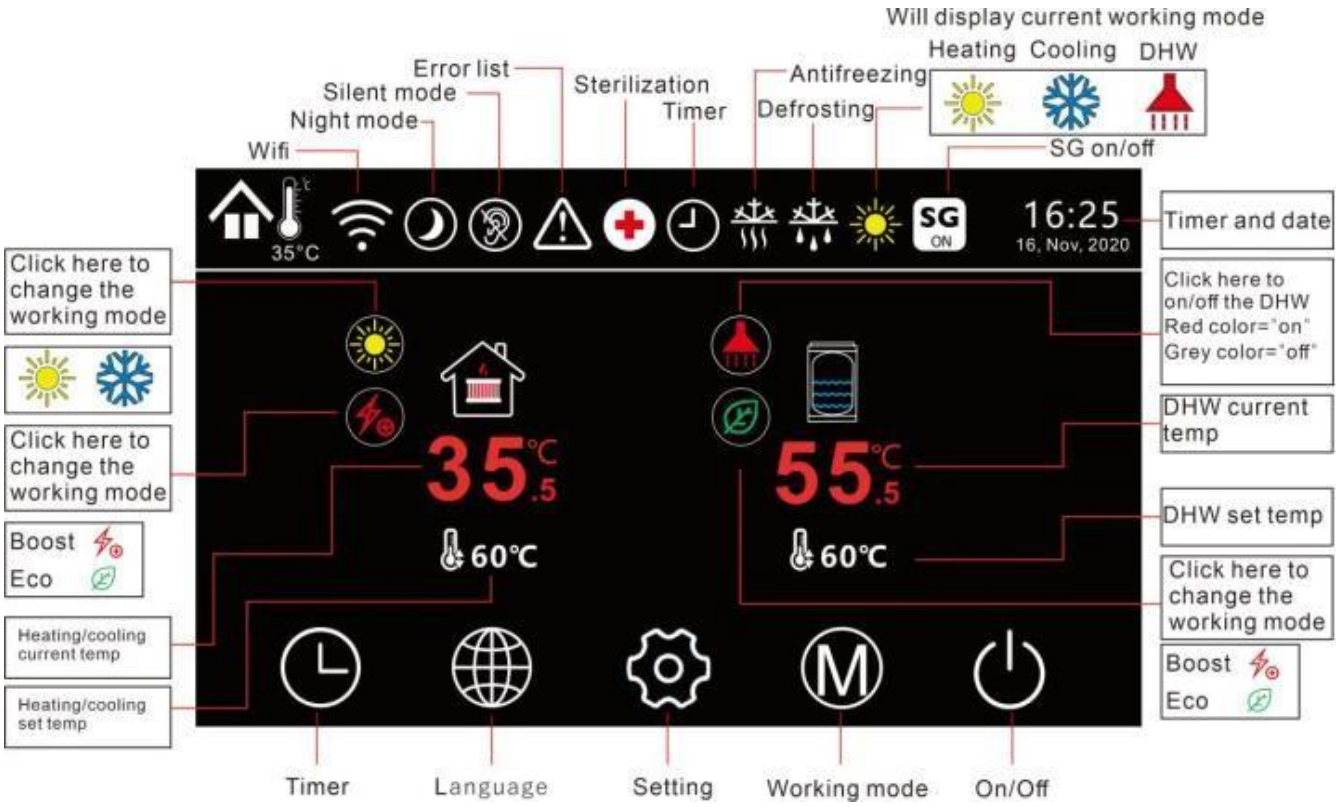
The unit is equipped with an external electronic controller that handles all functions necessary for heat pump operations. Defrosting, stop at max/min temperature, connection of the compressor heater as well as enabling the aux electrical heater, monitoring of motor protection and pressure sensors are 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 up to 60°C.

The controller is connected with the heat pump by RS485-1 cable with 4 wires, (wire polariy must be respected) max 100m.

5.2. User interface



5.2.1. Turn ON/OFF

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

5.2.2. Language selection

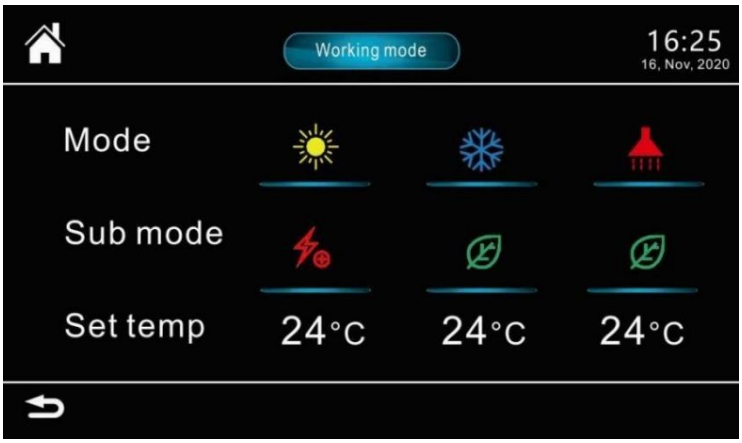
Click language button 🌐 in order to select language.

5.2.3. Time and date setting

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

5.2.4. Operating mode

Click mode button Ⓜ to 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 mode is cooling or heating plus DHW, DHW will be priority. When selected mode is DHW, only DHW operation will be activated, no cooling or heating.

Each mode has two sub modes.

1. Boost
2. Eco

When selected boost mode, heat pump will be work together with auxiliary electric heater. When selected Eco mode, heat pump will work only by itself. Only if an error appears, the auxiliary electric heater will be activated.

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 is finished, it will exit automatically. When P017=1, sterilization will be activated immediately. To deactivate this function, please modify the parameter P017=2.

Heating Mode

Temperature setting range is 10-60°C, the factory setting is 45°C.

Cooling Mode

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

Hot Water Mode

Temperature setting range is 10-60°C, the factory setting is 50°C.

Defrost Cycle

Auto Defrost mode (normal defrosting). The heat pump is fitted with intelligent defrost controls. A number of parameters are taken into account before defrost begins and ends. The defrost time and frequency will vary depending upon the conditions the heat pump is working in, and the set parameters.

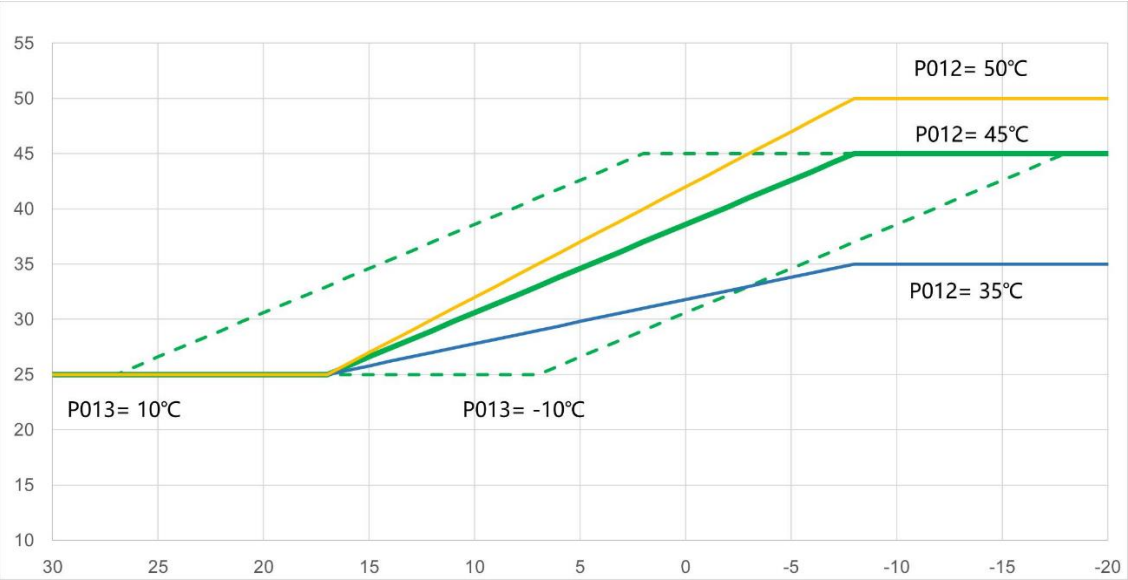
5.2.5. External temperature control

External temperature control is a mode for setting the heat pump output temperature automatically according to the ambient temperature based on a heat curve.

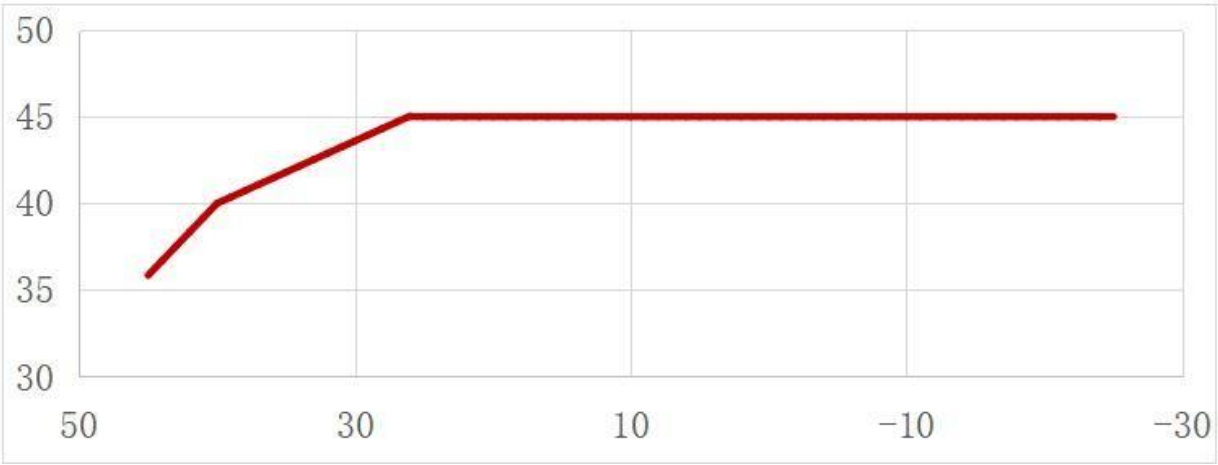
The activation of heating auto temperature control is done by parameter P010. If the value is set to 0, it is deactivated, if it is set to 1, it is activated.

The heat curve shifting is decided by parameter P013, positive value means move up, negative value means move down (-10°C...+10°C).

The heat curve highest temperature limit is decided by parameter P012, from 30...50, default value is 45.



The activation of DHW auto temperature control is done by parameter P011. If the value is set to 0, it is deactivated, if it is set to 1, it is activated. The DHW auto temperature sets, according to the outdoor ambient temperature (C04) calculation per below curve.



5.2.6. Time programmer

To enter the time programmer, click the Timer button . Here you can set operating time range for the heat pump and the C3 pump.

5.2.7. Parameters modification

To enter the parameters menu, click the Setup button. Here you can can modify the user parameters. The parameters P048-P151, are protected by password and are intended only for the service technician.

5.3. Anti-freeze function

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.

DHW anti-freeze:

Entry condition: DHW water tank temperature (C07)≤[P067]; If the 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: If the parameter P[121]=0, the C3 pump will also be activated in the anti-freezing.

First level anti-freeze:

Entry conditions: Inlet water temperature (C05)≤[P067] or outlet water temperature (C06)≤[P067]; If the above conditions are met, the controller enters the first-level anti-freeze and it starts the water pump C1.

Exit conditions: Inlet water temperature (C05) or outlet water temperature (C06)≥10°C.

Second level anti-freeze:

Entry conditions: When first-level anti-freezing operation has exceeded 30min, inlet water temperature (C05) or outlet water temperature (C06)≤10°C, the controller enters the second-level anti-freeze. The unit starts in heating mode and it starts the E2 electric heater.

Exit conditions: The inlet water temperature (C05) or outlet water temperature (C06)≥20°C.

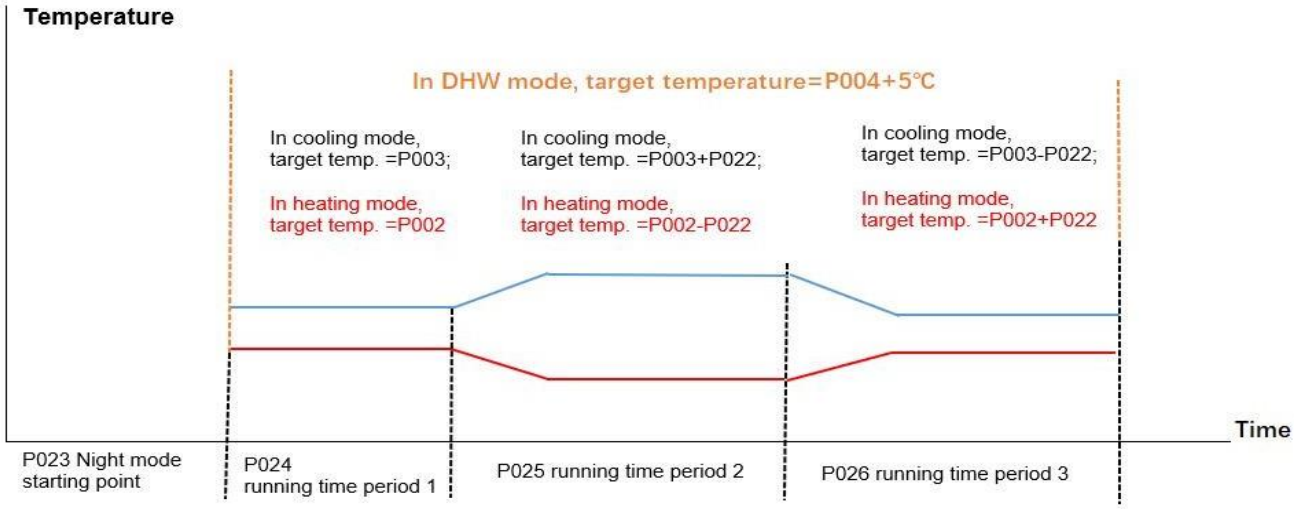
Note: When entering anti-freezing, the controller displays the anti-freezing symbol.

5.4. Night mode

By clicking the night mode symbol , you can enable the night mode. The night mode starting time is set by the parameter P023. Running time period is set by the parameters P024/P025/P026.

With night mode:

- Hot water mode will run with the current setting temperature+5° C
- Heating mode will run with the current setting temperature for time period P024, current setting temperature+P022 for time period P025, current setting temperature-P022 for time period P026. Cooling mode will run with current setting temperature+2°C.
- Cooling mode will run with current setting temperature for time period P024, current setting temperature+P022 for time period P025, current setting temperature-P022 for time period P026.



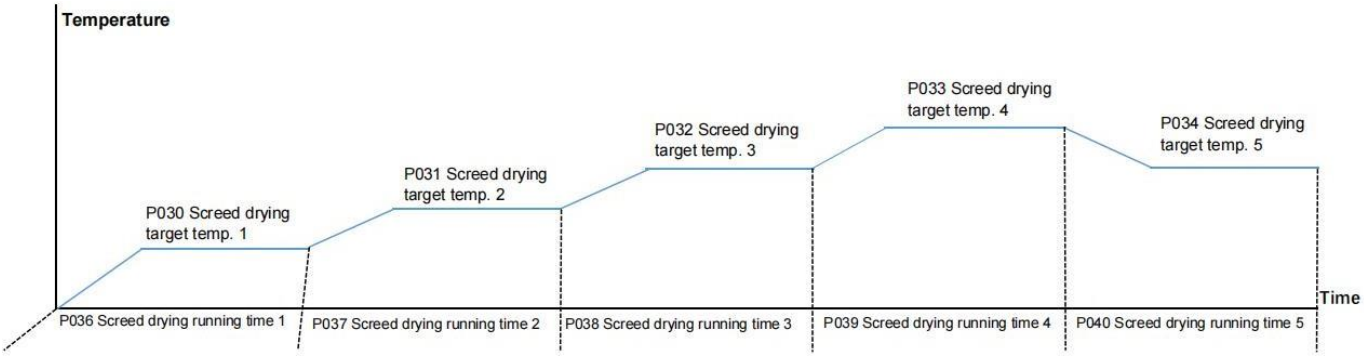
5.5. Silent mode

By clicking the silent mode symbol , you can enable the silent mode.

In silent mode, the 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 the heat pump will be allowed to run with maximum fan speed.), thus noise will be reduced.

5.6. Screeding drying

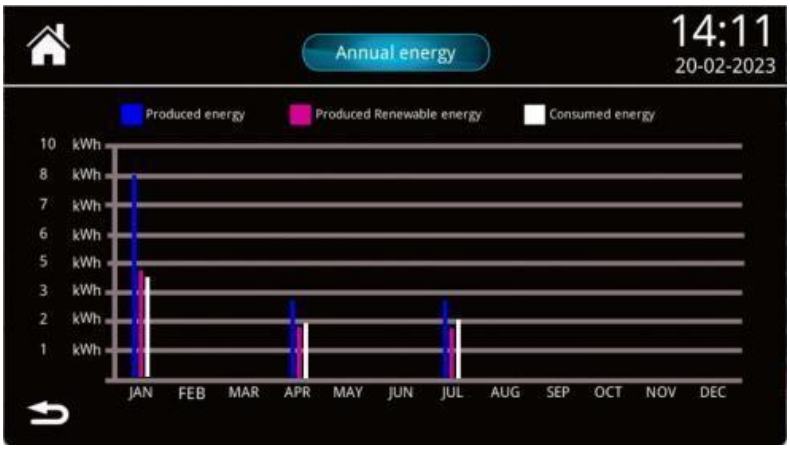
Heat pump has an automatic program for drying out the screed of an underfloor heating system during the construction of a house. Screeding drying function will be enabled with parameter P029. After screeding drying has finished, P029 value will return to 0.



5.7. Smart Grid interface

The heat pump can receive signals about the power source and switch energy usage. When the electricity price is high, the heat pump runs as energy-saving as possible, when the price is low, it will use as much electricity as possible.

The controller interface offers information about energy production in daily, monthly and annual terms, and the corresponding energy consumption for the same periods.



5.8. Electric parts working mode

5.8.1. 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, compressor on/off interval is based on the defrost parameters.

If the external temperature is lower than 10°C, the compressor heater will heat the compressor for 3-10 minutes before the first start up.

5.8.2. 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.

5.8.3. Pipe electric heater E0

The electric heater E0 must be installed on the outlet water pipe. The working logic of the electric heater E0 is:

In DHW mode, it is the same working logic as E1.
In heating mode, it is the same working logic as E2.

5.8.4. DHW auxiliary electric heater E1

The electric heater E1 is effective in the DHW mode. Electric heater E1 control is described below.

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 it is turned off at the end of defrosting.

In DHW mode, if there is any problem 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.

5.8.5. Multifunctional port E2

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

[P065]=0, the port controls the auxiliary electric heating;
[P065]=1, the port controls the second heat source.

Auxiliary 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:

1. Outdoor ambient temperature (C04)≥[P064]+2°C;
2. Outlet water temperature (C05)≥heating set temperature [P002];

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

Second Heat Source function

If the outdoor ambient temperature (C04)<[P066], the heat pump will be turned off and the second heat source will be turned on.

If the outdoor ambient temperature (C04)≥[P066]+2°C, the heat pump will be turned on and the second heat source will be turned off.

5.8.6. Motorized 3-way valve G1 (diverting valve)

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

5.8.7. Motorized 3-way valve G2 (diverting valve)

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

5.8.8. Motorized 3-way valve G3 (mixing valve)

If the two zone control installation diagram is selected, in heating mode, the motorized 3-way valve is ON/OFF for zone selection between high and low temperature.

5.8.9. Water pump C1

It is installed inside the unit.

5.8.10. Water pump C2

When P120=0, the water pump C2 is installed between the unit and the buffer tank, working as heating auxiliary pump.

When P120=1, the water pump C2 is installed between the buffer tank and terminal, working as indoor circulating pump.

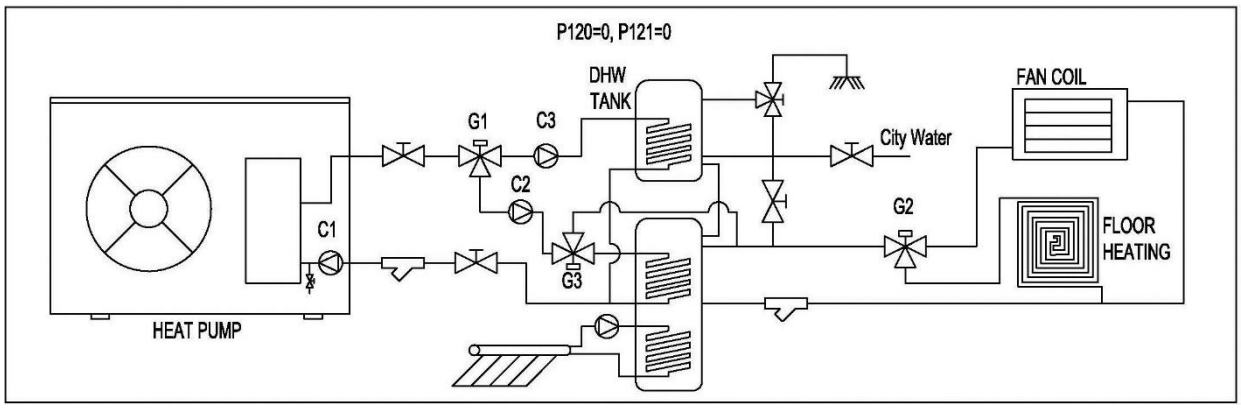
5.8.11. Water pump C3

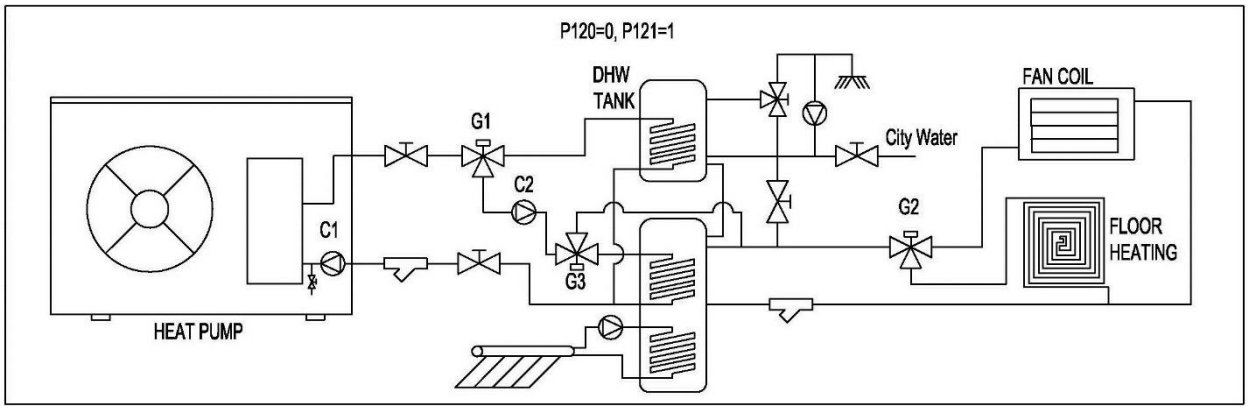
When P121=0, the water pump C3 is installed between the unit and the DHW water tank, working as DHW auxiliary pump.

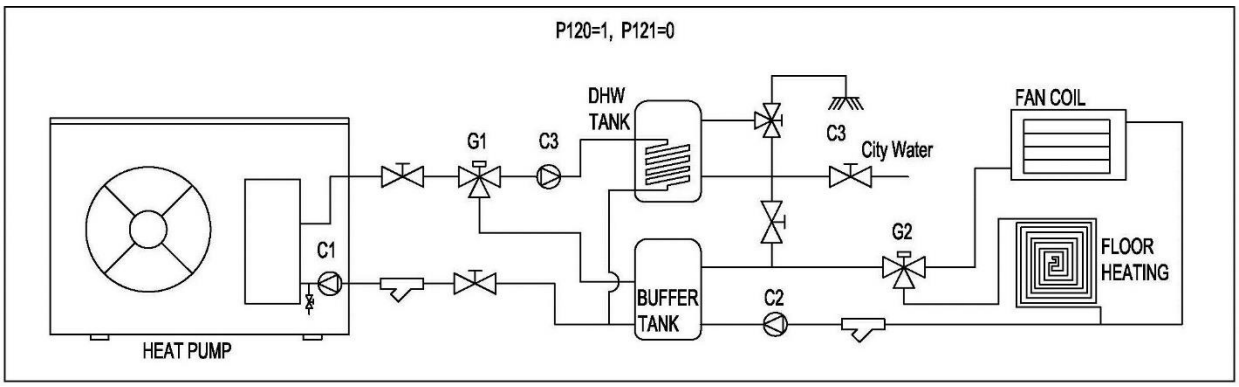
When P121=1, the water pump C3 is installed between the DHW water tank and terminal, working as DHW recirculation pump.

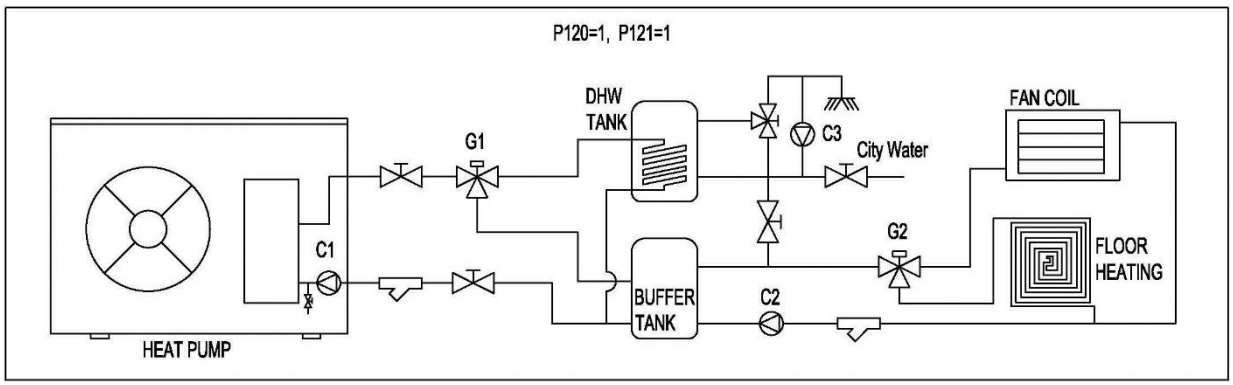
5.8.12. Water pump C4

If the two zone control installation diagram is selected, in heating mode, the water pump C4 is activated for the low temperature zone.


P120=0, P121=0
DHW
TANK
FAN COIL
G1
C3
City Water
C2
G2
C1
FLOOR
HEATING
G3
HEAT PUMP


P120=0, P121=1
DHW
TANK
FAN COIL
G1
City Water
C2
G2
C1
FLOOR
HEATING
G3
HEAT PUMP


P120=1, P121=0
DHW
TANK
FAN COIL
G1
C3
C3
City Water
G2
C1
FLOOR
HEATING
BUFFER
TANK
C2
HEAT PUMP


P120=1, P121=1
DHW
TANK
FAN COIL
G1
C3
City Water
G2
C1
FLOOR
HEATING
BUFFER
TANK
C2
HEAT PUMP

5.8.13. Baseplate electric heater or defrost heater

The electrical heater can be connected on the Heater-L/N port on the terminal strip.
It starts once defrost starts and stops after defrosting has been stopped for 10 minutes.

When P069=0, the electric heater keeps working to keep hot the baseplate.

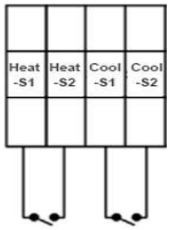
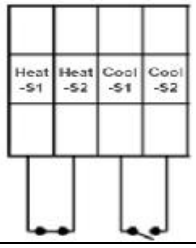
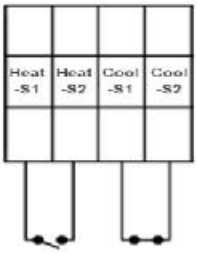
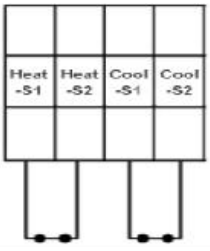
When P069=1, the electric heater works only during defrosting for drain water pipe and stops after the defrost has been deactivated for 10 minutes.

5.8.14. Heating or cooling room thermostat

The heat pump is equipped with 2 inputs for the installation of a room thermostat. 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.

5.8.15. PV ready

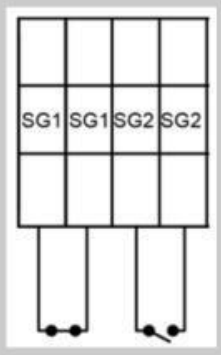
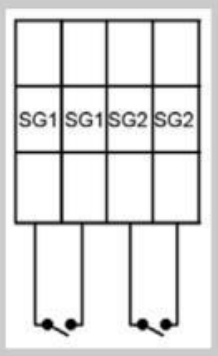
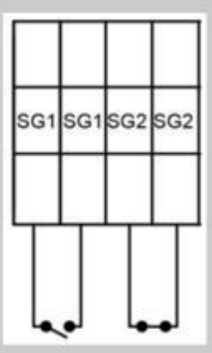
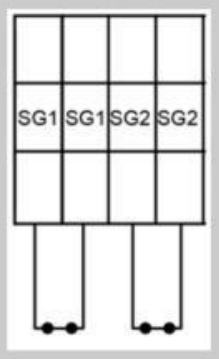
The heat pump has the ability to collaborate with photovoltatic system. The parameter P144 can enable PV ready function or not. When P144 is set to 0, PV function is disabled, when set to 1, PV function is enabled.

When there is signal received from PV inverter, the heat pump will heat according to P145 set max. temperature, or P146 DHW set max. temperature.

In Cooling mode, the unit will run per P003 cooling target temperature. When in mixed modes, DHW will be in priority.

5.8.16. SG ready

The 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

5.8.17. Remote on/off switch

The heat pump can be controlled for start or stop remotely by the SG3 port on terminal strip. When SG3 port is connected, the heat pump will start, when SG3 port is disconnected, the heat pump will stop.

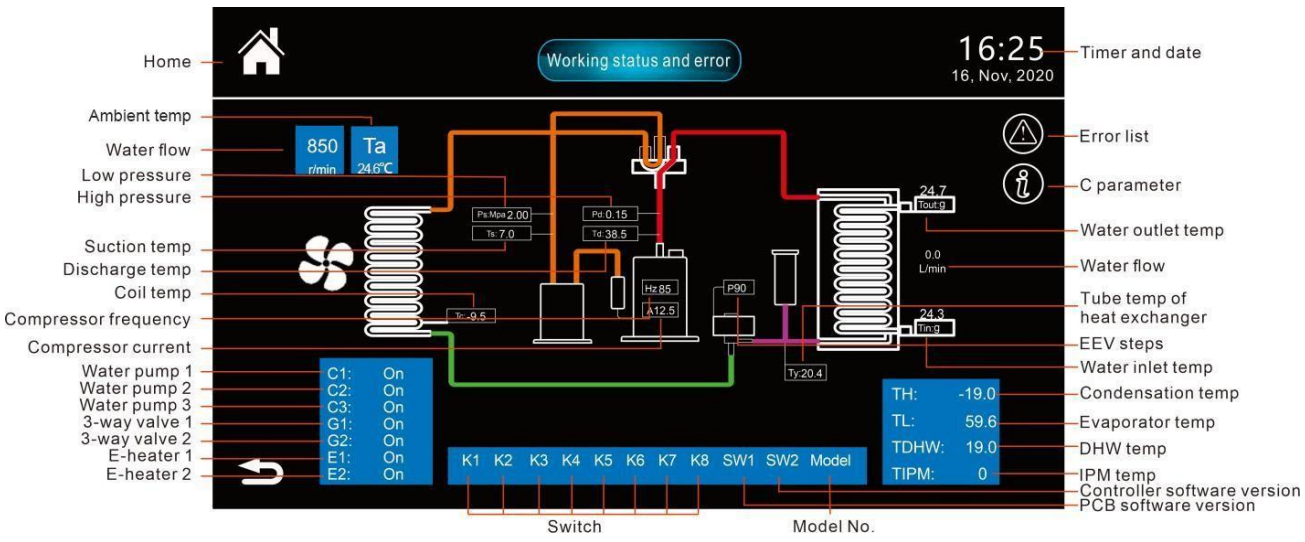
5.9. User parameters

No	Name	Range	Master 60	Master 90	Master 120	Master 160-180	Master 180T	Master 260T
P000	ON/OFF	0-OFF 1-ON	0	0	0	0	0	0
P001	Working mode	0~4 0-DHW 1-Heating 2-Cooling 3-DHW+ Heating 4-DHW+Cooling	1	1	1	1	1	1
P002	Heating target temp	10~60℃	45	45	45	45	45	45
P003	Cooling target temp	6~30℃	12	12	12	12	12	12
P004	DHW target temp	10~60℃ (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	Heating 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	Heating AU control	0-OFF 1-ON	0	0	0	0	0	0
P011	DHW AU control	0-OFF 1-ON	0	0	0	0	0	0
P012	Heating AU curve max temp value	35~60℃	45	45	45	45	45	45
P013	Heating AU curve offset value	-10~20℃	0	0	0	0	0	0
P014	Reserved							
P015	Mode selection	0-boost heating 1-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	5~99 min	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)	22	22	22	22	22	22
P024	Night mode running time period 1	0-12 hour	1	1	1	1	1	1
P025	Night mode running time period 2	0-12 hour	5	5	5	5	5	5
P026	Night mode running time period 3	0-12 hour	3	3	3	3	3	3
P027	Reserved							
P028	Reserved							

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	0~15 days	20	20	20	20	20	20
P037	Screed drying running time 2	0~15 days	20	20	20	20	20	20
P038	Screed drying running time 3	0~15 days	20	20	20	20	20	20
P039	Screed drying running time 4	0~15 days	20	20	20	20	20	20
P040	Screed drying running time 5	0~15 days	20	20	20	20	20	20
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	0
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	5-10 min	10	10	10	10	10	10
P047	Reserved							

5.10. Working status checking

Click mode button, and select button „Working status and error”. Here you can check the performance data and working status.



5.11. Alarms

Click Error list button ⚠ in the main menu or in "working status and error" page to check the list of errors.

Code	Description	Observations
E01	Ambient temp sensor error	Outdoor 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 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 big 2. Throttling part error 3. Pressure sensor error
E14	Low pressure protection	1. Refrigerant volume too small 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	Reserved	
E22	Water temp differential too big	Check water pump and water pipe filter
E23	DHW anti-freeze twice	The anti-freeze function in DHW mode has been activated twice in 60 minutes
E24	Heating anti-freeze twice	The anti-freeze function in heating 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℃, 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 big 2. Throttling part error 3. Coil temp sensor error
E51	Heat pump locked by high pressure error	
E52	Heat pump locked by low pressure error	

E53	Heat pump locked by water flow error	
E54	Heat pump locked by large temp. Difference between inlet and outlet water	
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. Here you can see the values of the various sensors.

Code	Description	Range of values
C00	Water flow	0~100 L/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	-40~145℃
C07	DHW upper tank temperature	-40~145℃
C08	T7 (solar)	-40~145℃
C09	Room temp	-40~145℃
C10	Buffer tank temperature	-40~145℃
C11	EVI Inlet temp	-40~145℃
C12	Floor pipe temperature	-40~145℃
C13	DHW tank lower temperature	-40~145℃
C14	Compressor running times	Minutes
C15	Condenser temperature	-40~145℃
C16	Evaporator temperature	-40~145℃
C17	Suction air superheat	-40~145℃
C18	EVI superheat	-40~145℃
C19	IPM temperature	-40~145℃
C20	EEV steps	0-500
C21	EVI EEV steps	0-500
C22	High pressure	MPa
C23	Low pressure	MPa
C24	Compressor running frequency	0-120 HZ
C25	Compressor input current	0-50 A
C26	DC fan 1	0-1500 RPM
C27	DC fan 2	0-1500 RPM
C28	AC power voltage	0-500 V
C29	DC power voltage	0-800 V
C30	Compressor power	W

5.12. WiFi operation

The heat pump has integrated a WiFi function, to allow the user remote control and data recording. To connect the heat pump with the application, follow the instructions below:

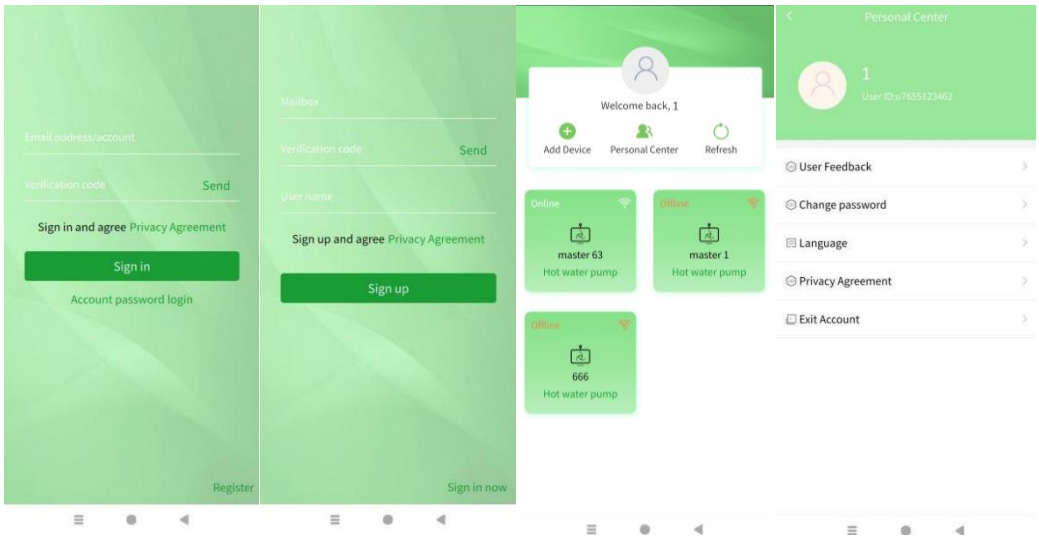
1. APP download

Please go to APP store or Google market and search for the application "Green Comfort", download and install the APP, then start it.

2. Register

If you are new user, you will need to register:

- Register
- Input your mobile phone number/Email
- Check the agreement
- Get verification code, enter the verification code
- Set the password
- Complete

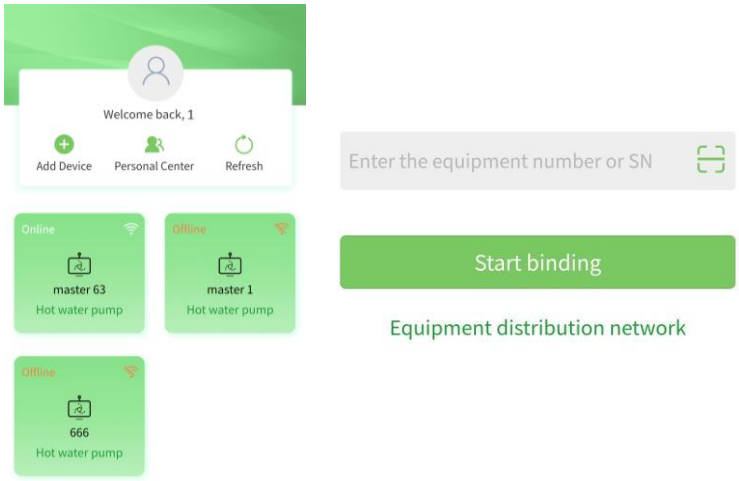


3. Add device

Step 1: Activate the pairing mode on your heat pump controller according to the following:

- Click  to enter following page.
- Click  and in the grey column  to search for the WiFi network. Introduce the password, then click  to connect with the WiFi network.

Step 2: Click "+" button. Scan the QR code of the device (on the Wifi interface of the controller), then click "Start binding" to finish association.



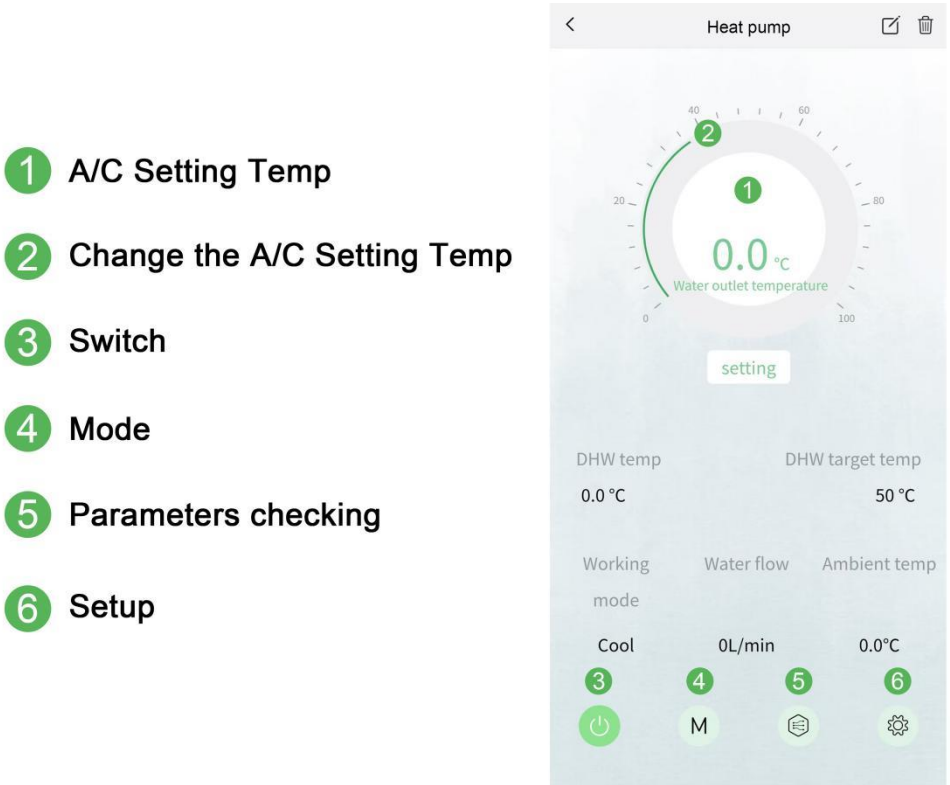
ATTENTION: The application only supports 2.4GHz WiFi networks.

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.

4. Controlling

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



6. HEAT PUMP START-UP

6.1. Filling and venting

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

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.

Switching on the heat pump with no water inside could result in serious damages!

6.2. Initial checks

Before you start the heat pump, make the following checks:

Mechanical checks

- Check the cabinet and internal pipe system for possible damage during transportation.
- Check that the heating water circuit is filled and well vented. Check the pipe system for leaks.
- Check the fan, make sure it can move freely.

Electric system checks

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

Pipe checks

- Check all the valves, and water flow directions. Make sure all valves are open.
- Check for any possible leaks inside or outside of unit.
- Check the insulation of all the pipes.

6.3. Start-up of the heat pump

After the system inspection is finished, startup can begin.

- Connect the power supply, switch on the controller.
- The circulation pumps starts immediately. After 40 seconds, the fan motor starts. After another 5 seconds, compressor starts.
- 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.
- Check heating water inlet/outlet temperature difference after the system is stable.
- Check the compressor exhaust and suction temperature.
- Adjust the parameters according to different weather conditions and user requirements.

If the external temperature is lower than 10°C, the compressor heater will heat the compressor for 3-10 minutes before the first start up.

7. SERVICE AND MAINTENANCE

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 (every 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 air relief valves are working properly so that you have no air into the system causing reduced circulation.
- Check that the 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 sure 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, 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 day time (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 programme 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. 14°C to 16°C) during the evening. This is controlled by your central heating controller or room thermosat.

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