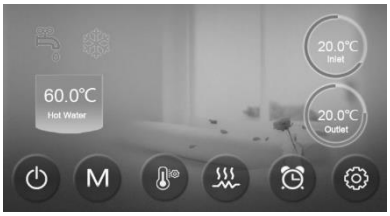
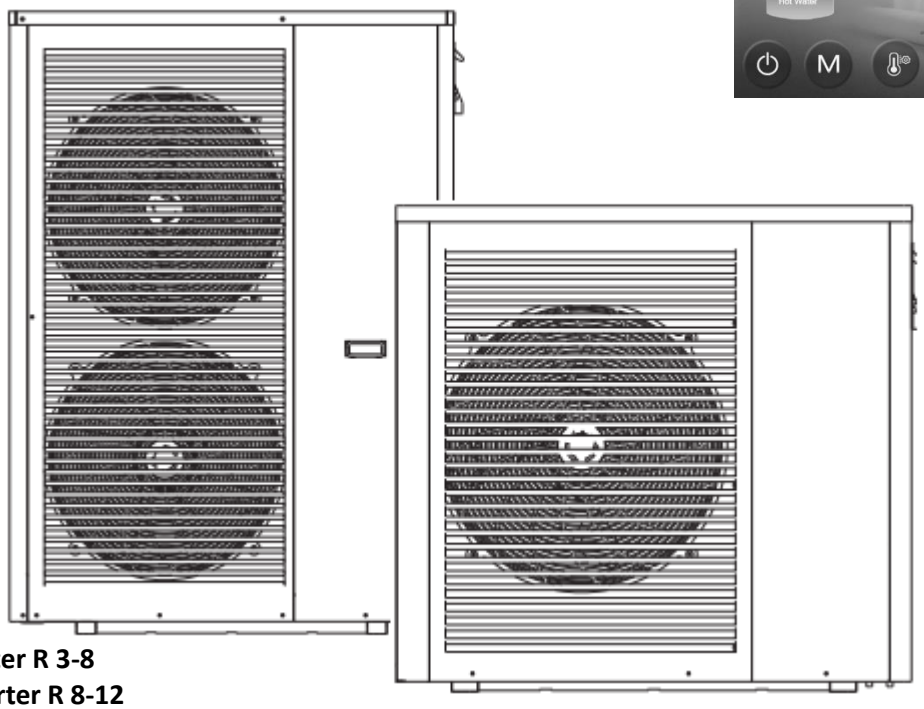
EN

ENERGIE

AIR WATER HEAT PUMP

INVERTER UNIT





Model:
Aquapura 6 – Inverter R 3-8
Aquapura 12 – Inverter R 8-12
Aquapura 16 – Inverter R 5-18
Aquapura 16 T– Inverter R 5-18

Installation and Instruction Manual

Revision: 4
Date: 22/02/21

EN 60335-1;
EN 60335-2-40.

EN: 14825
EN: 14511

ENERGIE

INVERTER UNIT

This manual is intended as an aid to qualified service personnel for proper installation, operation and maintenance of the Heat Pump.

Read this manual carefully before attempting to install or operate the Heat Pump. Failure to follow these instructions may cause a fault of the Heat Pump, resulting in electrical shock, scald injury and/or property damage.

Installer:

Before leaving the premises, review this manual to be sure the Heat Pump has been installed correctly.
Start or operate the unit and check that the parameters are within the normal operating range.

MODELS:

AQUAPURA 6 – INVERTER R 3 – 8

AQUAPURA 12 – INVERTER R 8 – 12

AQUAPURA 16 – INVERTER R 5 – 18

AQUAPURA 16T – INVERTER R 5 – 18

Índex

1. Safety Information (cautions and warnings)

To prevent the users and others from the harm of this unit, and avoid damage on the unit or other property, and use the heat pump properly, please read this manual carefully and understand the following information correctly.

The piping connection and wiring should be installed according to the local legal laws and regulations as well as the qualified professional.

 WARNING
Where children or persons with limited physical, sensory or mental capabilities are to be allowed to control this equipment ensure that this will only happen supervision or after appropriate instructions by a person responsible for their safety. Children should be supervised to ensure that they do not play with the equipment.

Mark Notes	Meaning
 WARNING	A wrong operation may lead to death or heavy injury on people.
 ATTENTION	A wrong operation may lead to harm on people or loss of material.

Icon Notes	Meaning
	Prohibition. What is prohibited will be nearby this icon
	Compulsory implement. The listed action need to be taken.
	ATTENTION (include WARNING) Please pay attention to what is indicated.

Warning

Installation	Meaning
 Professional installer is required.	The heat pump must be installed by qualified personals, to avoid improper installation which can lead to water leakage, electrical shock or fire.
 Earthing is required	Please make sure that the unit and power connection have good earthing, otherwise may cause electrical shock.

Operation	Meaning
 PROHIBITION	DO NOT put fingers or others into the fans and evaporator of the unit, otherwise harm may be occurred.
 Shut off the power	When there is something wrong or strange smell, the power supply needs to be shut off to stop the unit. Continue to run may cause electrical short or fire.

Move and repair	Meaning
 Entrust	When the heat pump needs to be moved or installed again, please entrust dealer or qualified person to carry it out. Improper installation will lead to water leakage, electrical shock, injury or fire.
 Entrust	When the heat pump needs to be repaired, please entrust dealer or qualified person to carry it out. Improper movement or repair on the unit will lead to water leakage, electrical shock, injury or fire.
 Prohibit	It is prohibited to repair the unit by the user himself, otherwise electrical shock or fire may occur.

Attention

Installation	Meaning
 Installation Place	The unit CANNOT be installed near the flammable gas. Once there is any leakage of the gas, fire can occur.
 Fix the unit	Make sure that the basement of the heat pump is strong enough, to avoid any decline or fall down of the unit.
 Need circuit breaker	Make sure that there is circuit breaker for the unit, lack of circuit breaker can lead to electrical shock or fire.

Operation	Meaning
 Check the installation basement	Please check the installation basement in a period (one month), to avoid any decline or damage on the basement, which may hurt people or damage the unit
 Switch off the power	Please switch off the power for clean or maintenance.
 Prohibition	It is prohibited use copper or iron as fuse. The right fuse must be fixed by electrician for the heat pump.
 Prohibition	It is prohibited to spray flammable gas the heat pump, as it may cause fire.
 Prohibition	Do not use any cleaning agents containing sand, soda, acid or chloride as these may damage the surface.

2. Indications

This manual came with all the equipment and contains important instructions that should be followed during installation.

3. Introduction

Dear Customer,

Thank you for the preference you gave us and congratulations on purchasing a top-quality product.

The earnestness of our company guarantees you all the necessary support from initial design, installation and support.

For the best use of this product, please read this instruction manual, where are all the indications, information and advices needed to enjoy all the advantages that this system provides you. If this specifications and rules are followed, we it's guaranteed a perfect performance of the product.

By purchasing this heat pump, you contribute to the protection of the environment.

4. General

4.1 Responsibility of the manufacturer

Our products are produced according to the requirements of various European Standards.

Always concerned with the quality and performance of our products, we strive continuously to improve them. Therefore, we reserve to the right to modify at any time the information described herein.

As manufacturers we are no longer responsible for the malfunction or even damage of the equipment when:

- The instructions for use are not respected.
- The installation instructions are not respected.
- Lack of maintenance (if required).

4.2 Responsibility of the installer

The installer is responsible for proper installation of the equipment and start with its operation. The installer should note the following notes:

- Carefully read and follow the instructions of the manuals supplied with the equipment;
- Do the installation in accordance with the standards and requirements given by the manufacturer;
- Do the initial startup of the equipment and check all control points:
- Explain to the user how to do the installation and how to use the equipment;

- Warn the user of the obligation to make the checking and maintenance of the equipment when necessary;
- Supply to the user all the documents provided with the equipment (manual and warranty datasheet).

5. Propose of the heat pump

The heat pumps are currently the most suitable equipment to improve efficiency in energy consumption. With this technology it is possible to take from the environment the highest power, using only an electrical power 3-5 times lower than the thermal energy transferred.

The thermal energy produced can be transferred to a central under floor heating system, fan coil, low temperature radiators and DHW (domestic hot water).

This equipment is very easy to install on the outside of your house, ensuring all thermal comfort, even at low outdoor temperatures.

6. Heat pump features

Inverter air source water heat pump is a kind of high efficiency, energy saving and environment friendly equipment, which is mainly used for house warming.

This series of heat pump unit owns following features:

- Advanced controlling

  The PC microcomputer based controller is available for the users to review or set the running parameters of the heat pump.

- Nice appearance

  The heat pump is designed with beautiful looking. The monobloc one has the water pump included which is very easy for installation.

- Flexible installation

  The unit has smart structure with compact body, just simple outdoor installation is needed.

- Quiet running

  High quality and efficient compressor, fan and water pump is used to ensure the low noise level with insulation.

- Good heat exchange rate

  The heat pump unit use special designed heat exchanger to enhance whole efficiency.

- Large working range

  This series of heat pump is designed to work under different working conditions as low as -15 degrees for heating.

7. Principle of operation

Ambient air is drawn in by the fan and passed over the evaporator. The evaporator cools the air, i.e. it extracts the heat it contains. In the evaporator, the heat removed is transferred to the working fluid (refrigerant).

With the aid of an electrically driven compressor, the absorbed heat is "pumped" to a higher temperature level through an increase in pressure and given off to the heating water via the condenser (heat exchanger).

In so doing, the electrical energy is used to raise the heat of the environment to a higher temperature level.

Due to the fact that the heat energy extracted from the air is transferred to the heating water, this type of appliance is referred to as an air to water heat pump.

The air to water heat pump consists of the following main components: Evaporator, fan, expansion valve, low-noise scroll compressor, condenser and the control unit.

In the case of low ambient temperatures, air humidity may accumulate on the evaporator in the form of frost, impairing the heat transfer. The evaporator is automatically defrosted by the heat pump, as required, with the possibility of vapor plumes forming at the air outlet.

8. Work conditions

The running range of the heat pump:

Heating:

- Minimum ambient temperature -25^{o}C ;
- Water temperature from 15^{o}C to 60^{o}C.

Cooling:

- Maximum ambient temperature 43^{o}C;
- Water temperature from 7^{o}C to 25^{o}C.

Compared with oil boiler, gas boiler and electrical heater, heat pump is the best solution with high efficiency, safety and environment protect.

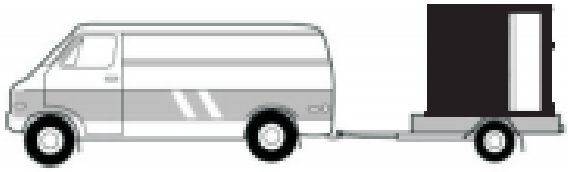
This high temperature air source heat pump use advanced heating technology and intelligent control system. So it can work with the floor heating pipe, the fan coil or the radiator, and replace the boiler directly.

In addition, the inverter heat pump can be used to provide hot water for sanitary use, like kitchen, shower, etc.

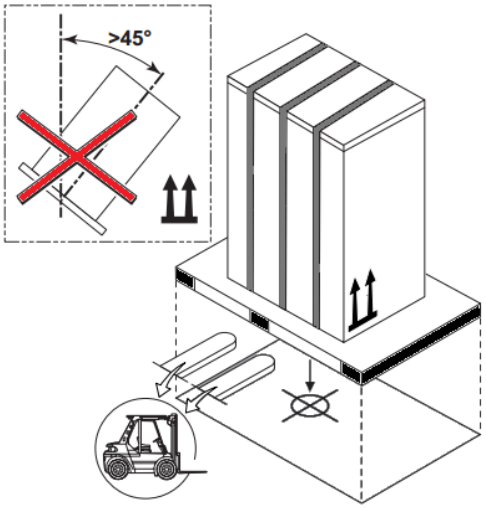
9. Transport

The Heat Pump is packed in a cardboard box without a bottom, and is secured to a wood pallet with plastic strapping.

When the heat pump is transported please keep the unit stand up, otherwise the inner parts of the device may be damaged.



The unit should be transported to the final installation site on a wooden pallet, during transport the heat pump must not be tilted more than 45 (in either direction).



The recommended tools to transport the equipment while it is still on the pallet can be: forklift or pallet.

When transporting the unit make sure that you lift it only from the bottom and always with the unit placed on the pallet. Do not move the unit without assistance.

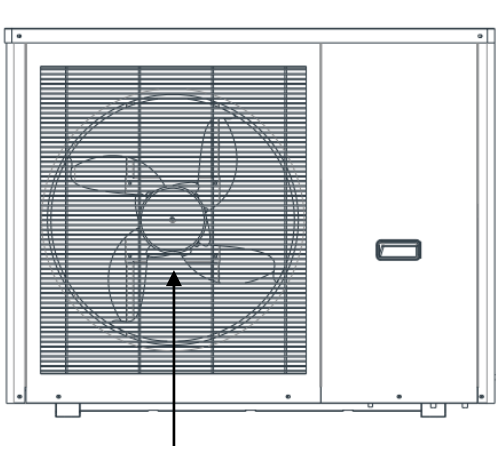
10. Reception check

The unit was tested and inspected by the manufacturer before shipment, in order to assure quality. Carefully inspect the all components of the equipment receive, to make sure that the equipment has not been damaged during transport.

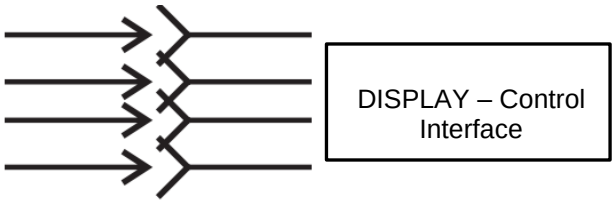
Verify that all parts ordered were received as specified and if the type, size and voltage of the unit are correct.

11. Overview

Aquapura 6 (Inverter R 3 – 8)

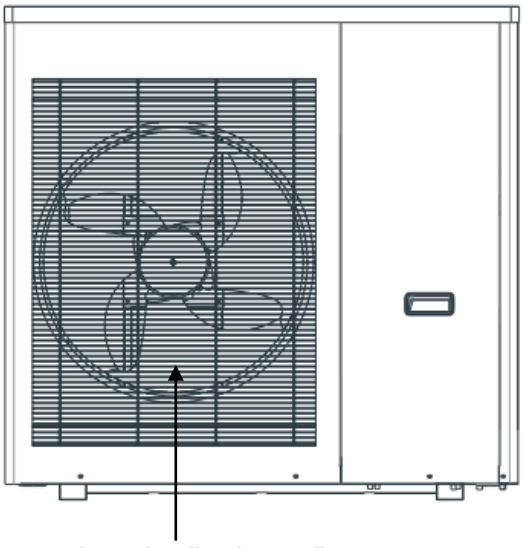


Air outlet (horizontal)

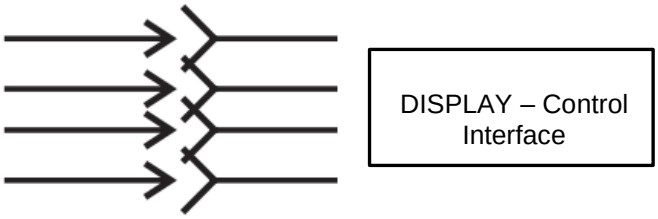


Maximum distance between display and outdoor unit 100m.

Aquapura 12 (inverter R 8 - 12)

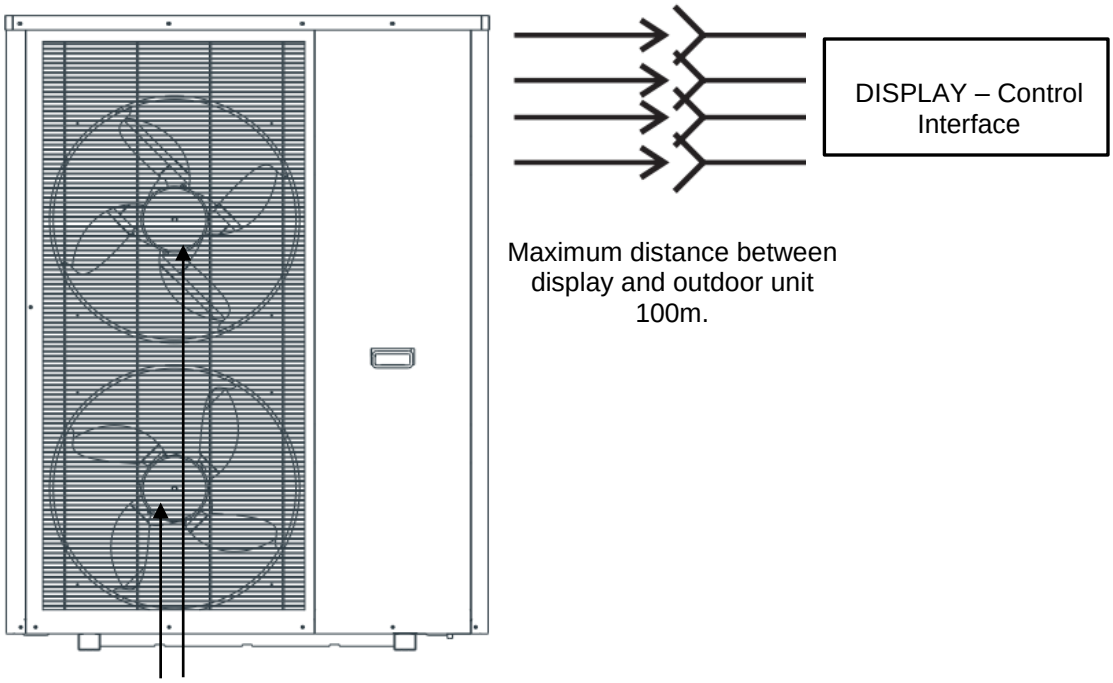


Air outlet (horizontal)



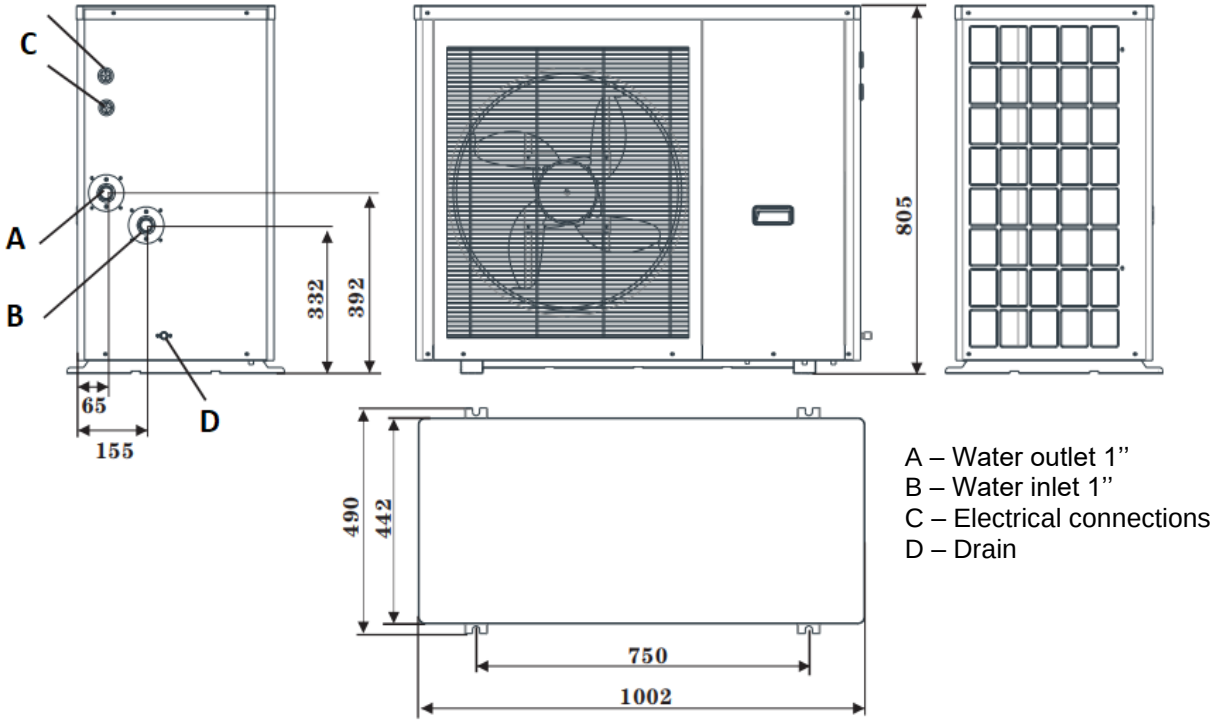
Maximum distance between display and outdoor unit 100m.

Aquapura 16 (Inverter R 5 - 18) / Aquapura 16 T (Inverter R 5-18)



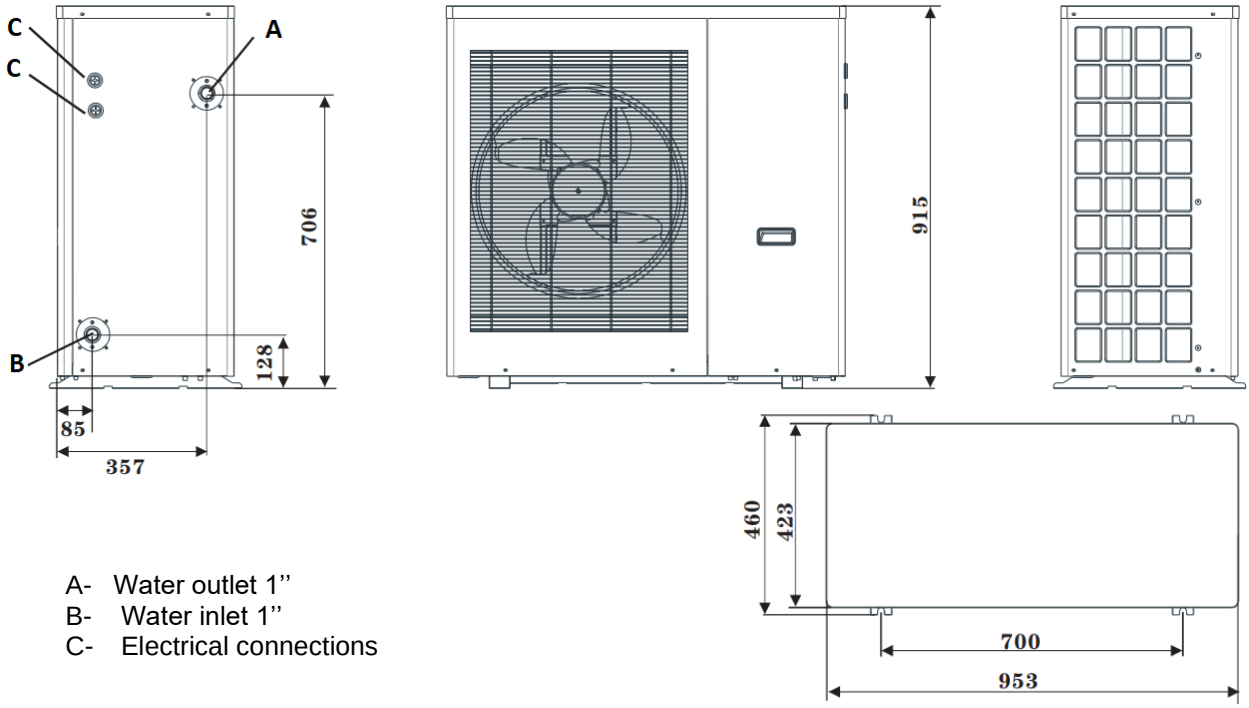
12. Dimensions

Aquapura 6 (Inverter R 3-8)



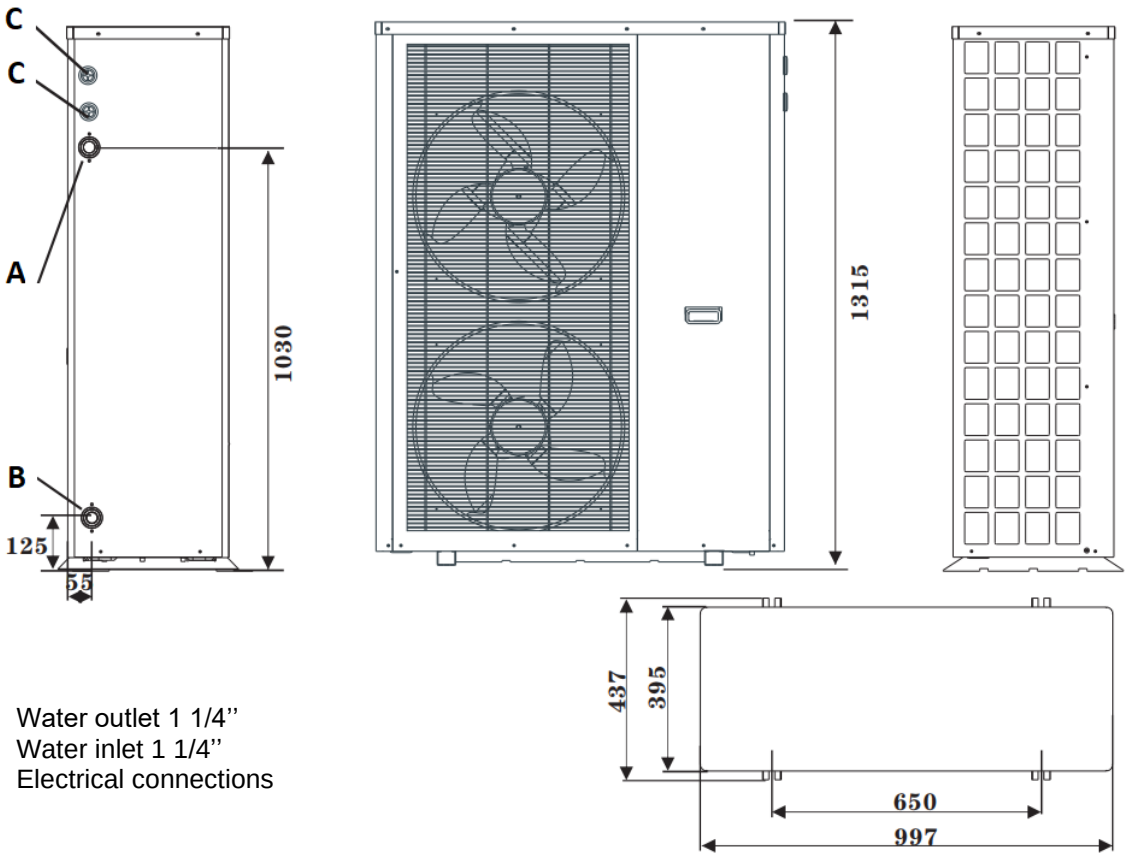
A – Water outlet 1’’
B – Water inlet 1’’
C – Electrical connections
D – Drain

Aquapura 12 (Inverter R 8-12)



A- Water outlet 1''
B- Water inlet 1''
C- Electrical connections

Aquapura 16T (Inverter R 5-18) and Aquapura 16 (Inverter R 5-18)

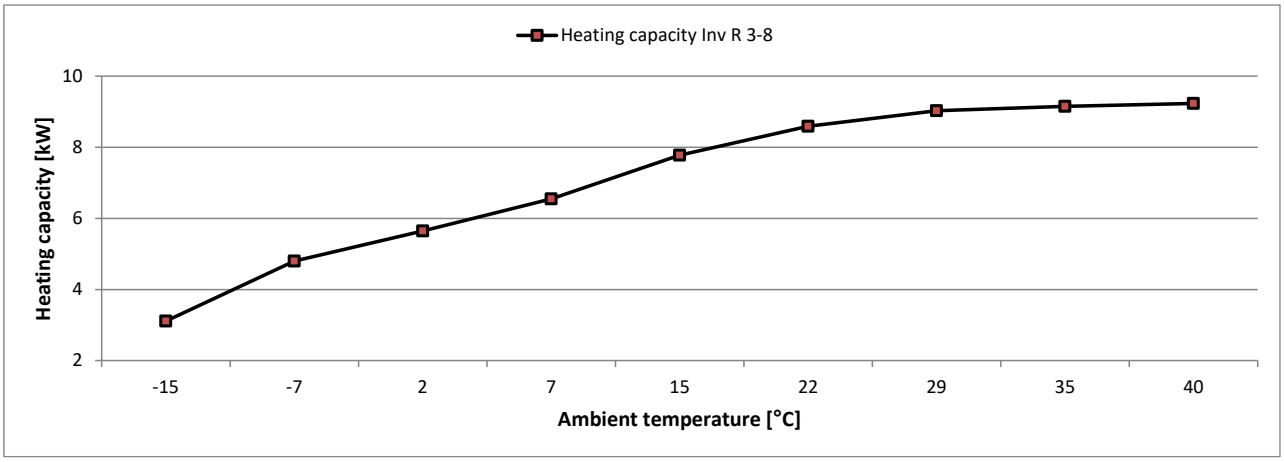


A- Water outlet 1 1/4''
B- Water inlet 1 1/4''
C- Electrical connections

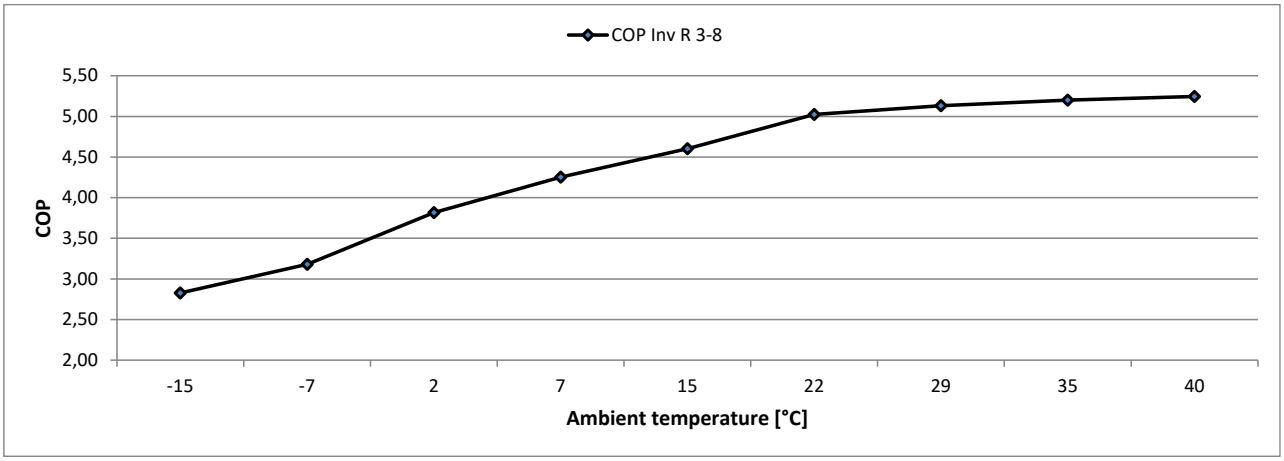
13. Performance

13.1 Aquapura 6 (inverter R 3-8)

Heating capacity



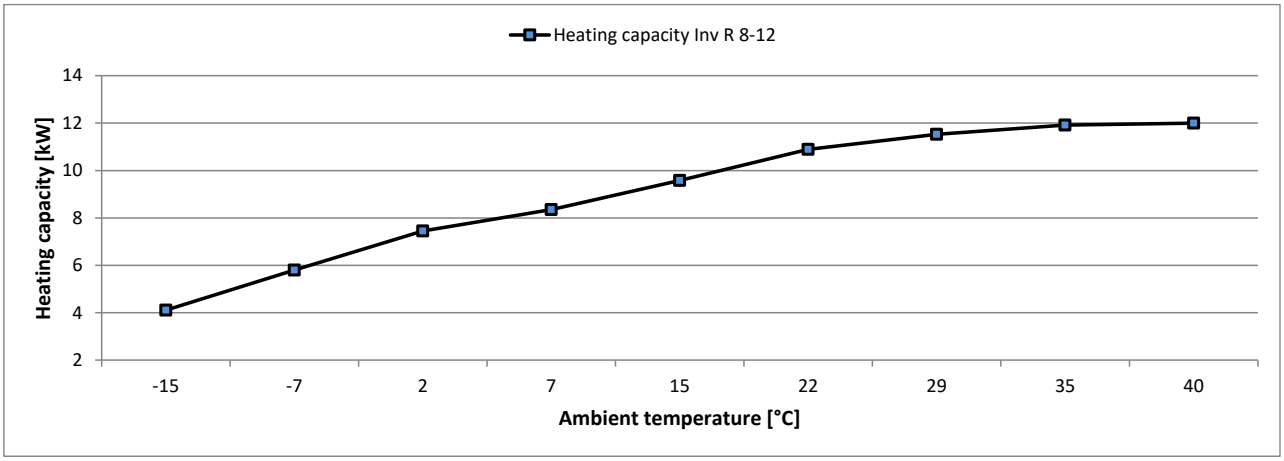
Coeficient of performance COP



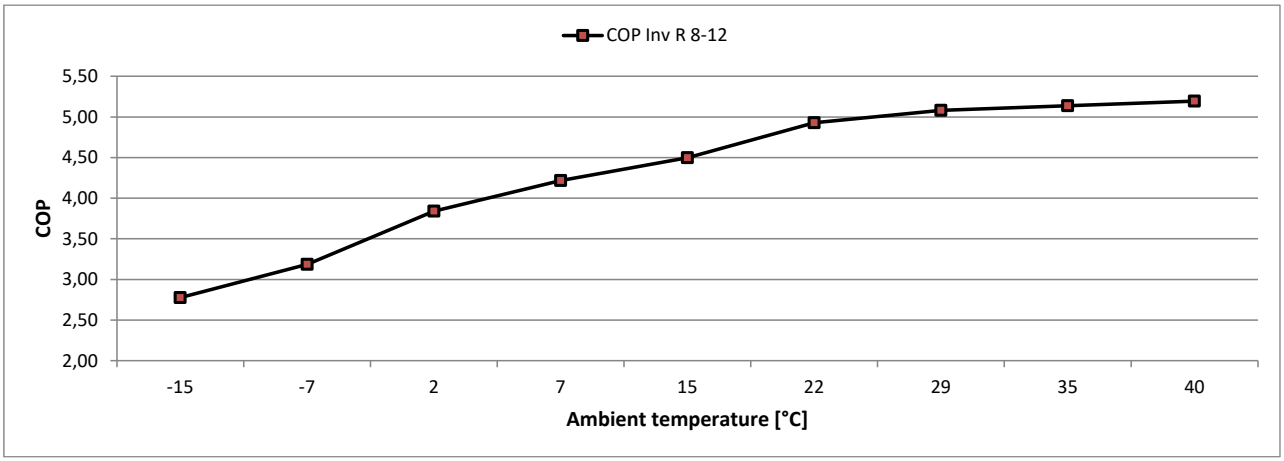
Data according EN 14511 – Water temperature 30/35ºC.

13.2 Aquapura 12 (inverter R 8-12)

Heating capacity



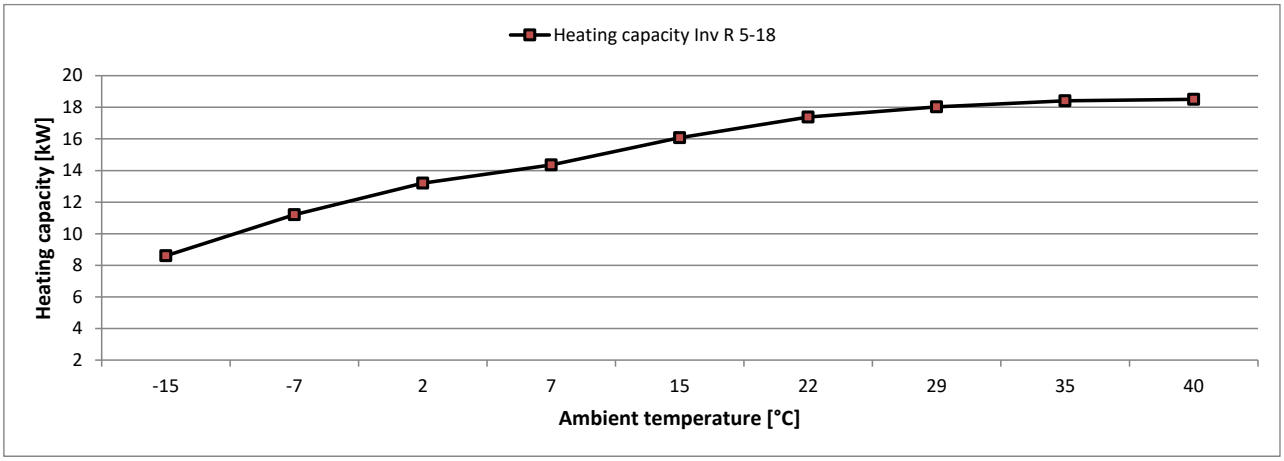
Coeficient of performance COP



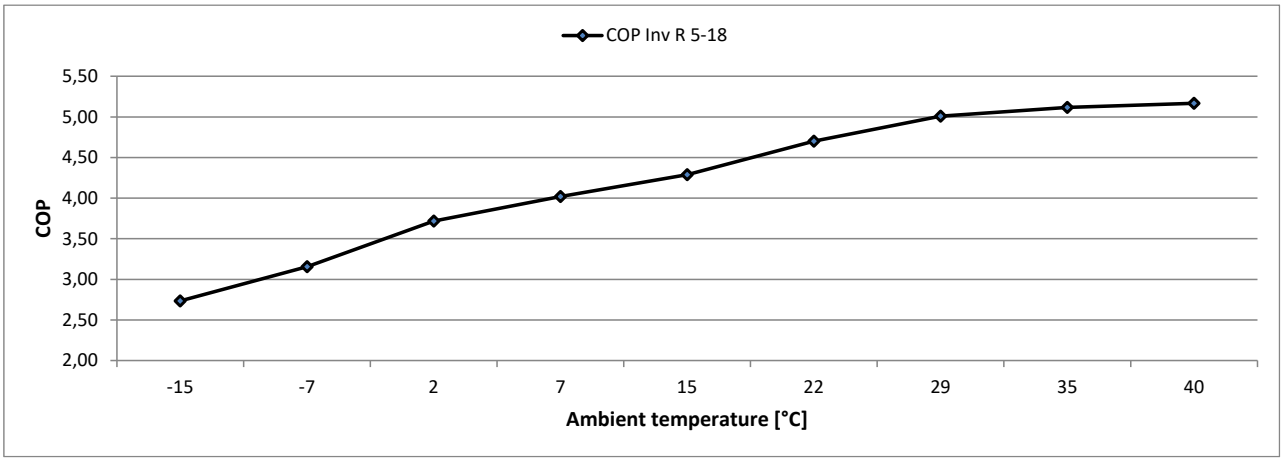
Data according EN 14511 – Water temperature 30/35ºC.

13.3 Aquapura 16 (inverter R 5-18)

Heating capacity



Coeficient of performance COP



Data according EN 14511 – Water temperature 30/35ºC.

14. Specifications data

			AQUAPURA 6 (INVERTER R 3 - 8)	AQUAPURA 12 (INVERTER R 8-12)
Main power			208-240V~/50-60Hz	208-240V~/50-60Hz
Heating capacity	Heating (Nom./Max)	kW	6,47 / 8,25	8,25 / 12,52
	Cooling (Nom./Max)	kW	5,12 / 6,10	7,01 / 11,31
Power consumption	Heating (Nominal)	kW	1,33	1,71
	Cooling (Nominal)	kW	1,40	1,94
COP (1)	Nominal	--	4,87	4,82
EER (1)	Nominal	--	3,65	3,61
Energy efficiency class 35°C	Average climate	--	A+++	A++
SCOP(2) -water 35°C / ηs		-- / %	4,76	4,73
Energy efficiency class 55°C		--	A++	A++
SCOP(2) -water 55°C / ηs		-- / %	3,91	3,86
Maximum power (power/current)		kW / A	2,9 / 13	4,6 / 21,5
Water temperature	Heating	°C	60	60
	Cooling	°C	7	7
Range of external temperature	Heating	°C	-25 a 35	-25 a 35
	Cooling	°C	10 a 43	10 a 43
Gas (R32) / CO_2 Eq.		Kg / Ton	1,3 / 0,88	1,7 / 1,15
Compressor		--	DC Inverter	DC Inverter
Number of fans/ Type		--/--	1 / DC	1 / DC
Sound power (3)		dB(A)	37~54	42~55
Hydraulic connections	Inlet/ outlet	inches	1"	1"
Water pump		---	Integrated	Integrated
Min. water flow		m^3/h	1	1,7
Pressure drop water circuit		kPa	28	32
Dimensions		(AxLxP)	805 x 1002 x 490	915 x 953 x 460
Weight		Kg	90	108

(1) COP and EER calculated according standard EN14511-2
(2) SCOP calculated according standard EN14825
(3) Calculated according standard 12102-1

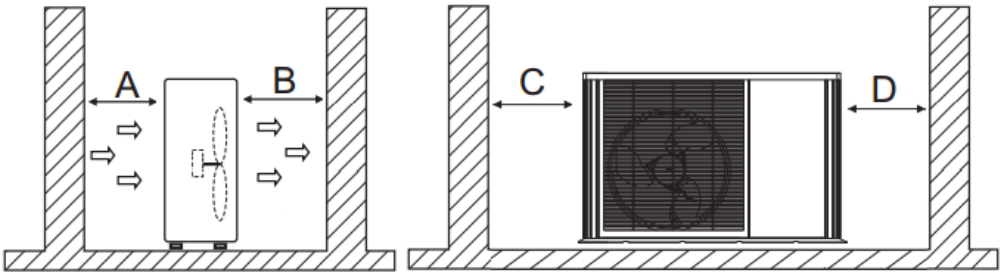
			AQUAPURA 16 (INVERTER R 5-18)	AQUAPURA 16T (INVERTER R 5-18)
Main power			208-240V~/50-60Hz	3N~/ 400V/ 50-60Hz
Heating capacity	Heating (Nom./Max)	kW	15,36 / 18,51	
	Cooling (Nom./Max)	kW	13,92 / 16,23	
Power consumption	Heating (Nominal)	kW	3,21	
	Cooling (Nominal)	kW	3,88	
COP (1)	Nominal	--	4,79	
EER (1)	Nominal	--	3,58	
Energy efficiency class 35°C	Average climate	--	A++	
SCOP(2) -water 35°C / ηs		-- / %	4,67 / 184	
Energy efficiency class 55°C		--	A++	
SCOP(2) -water 55°C / ηs		-- / %	3,72 / 146	
Maximum power (power/current)		kW / A	7,2 / 33,2	7,2 / 12
Water temperature	Heating	°C	60	
	Cooling	°C	7	
Range of external temperature	Heating	°C	-25 a 35	
	Cooling	°C	10 a 43	
Gas (R32) / CO_2 Eq.		Kg / Ton	2,0 / 1,35	
Compressor		--	DC Inverter	
Number of fans/ Type		--/--	2 / DC	
Sound power (3)		dB(A)	44~58	
Hydraulic connections	Inlet/ outlet	inches	1" 1/4	
Water pump		---	Integrated	
Min. water flow		m^3/h	2,9	
Pressure drops - water circuit		kPa	45	
Dimensions		(AxLxP)	1315 x 997 x 437	
Weight		Kg	157	

(1) COP and EER calculated according standard EN14511-2
(2) SCOP calculated according standard EN14825
(3) Calculated according standard 12102-1

15. Installation

15.1 Location of the unit

- The unit can be installed on any place outdoor which can carry heavy machine such as terrace, housetop, ground and so on.
- The location must have good ventilation.
- The place is free from heat radiation and other fire flame.
- There must be not obstacles near the air inlet and outlet of the heat pump.
- There must be water channel around the heat pump to drain the condensing water.
- A place which is free from strong air blowing.
- There must be enough space around the unit for maintenance.



	Requirements			
	A	B	C	D
	>300mm	>1500mm	>500mm	>1000mm

The heat pump must be placed upon a level and firm base that is suitable to carry the weight of the unit e.g. a 100mm concrete base. The base must provide for the unit to be sitting at least 150mm above the surrounding ground. Allow for a slight tilt of the unit (3mm across the width running from right to left as you face the fan(s)) to allow rain water run-off and any water entering the unit to drain through the holes in the bottom of the unit.

The unit must be secured to its base using suitable fixings through the unit feet. The rubber feet supplied with the unit must be used. Alternatively, there are proprietary unit fixings available that include an adjustable steel frame and legs with rubber mounting pads.

The unit must be fixed, stable and kept vertical during operation.

15.2 Condensate lines

Large amounts of condensation water, as well as melt water from defrosting cycle can be produced. Provide good drainage at the installation area and make sure water cannot run out onto paths or the like during periods that ice can form. Ideally

condensation water is led off to a drain or similar. The condensation water pipe must have a minimum diameter of 50 mm and should be discharged to the sewer drain in a frost-proof location

15.3 Water loop connection

Please pay attention to below matters when the water pipe is connected:

- Keep pipe work as free from bends as possible to keep back pressure in the system to a minimum. Make sure that fittings, manifolds, water pumps and valves in the system are designed for full flow as restrictions in the system from these can materially and adversely impact upon the performance of the unit and effectiveness of the overall heating system.
- The piping must be clear and free from dirty and blocks. Water leakage test must be carried out to ensure there is no water leaking. And then the insulation can be made.
- There must be expansion tank on the top point of the water loop, and the water level in the tank must be at least 0.5 meter higher than the top point of the water loop.
- The flow switch is installed inside of the heat pump, check to ensure that the wiring and action of the switch is normal and controlled by the controller.
- The connection between the heat pump and the construction is better to be flexible type, to avoid vibration transfer. The support to the water pipe must be separate, but not rely on the heat pump unit.
- There must be thermometer and pressure meter at the water inlet and outlet, for easy inspection during running.
- There must be drainage on the low points of the water system, and there is already drainage on the chassis of the heat pump. The water in the system must be drain out during winter. if the heat pump is not running. And there must be air vent on the high point of the water system to drive air of the water. Drainage and air vent need not to be insulated, in order to maintain.

 ATTENTION

The hydraulic connection should be installed according to the local legal laws and regulations as well as the qualified professional.

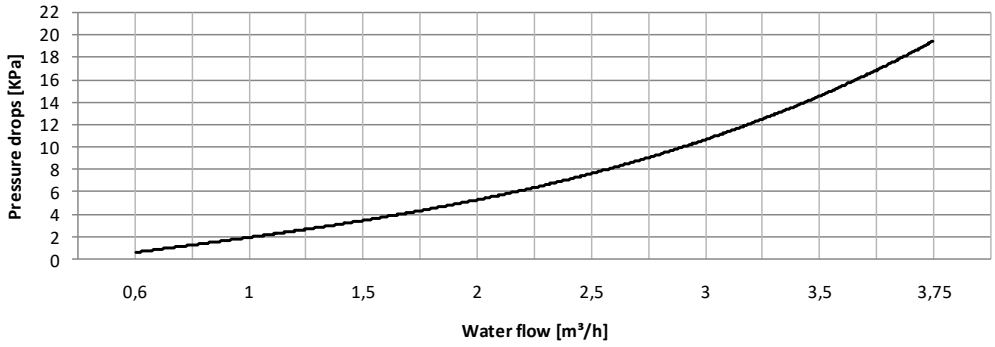
15.4 Water filter

The filter allows block any impurities present in the hydraulic circuits. Residue left in the heater pipes will damage the heat exchangers and cause the heat pumps to malfunction. It is recommended install the filter in the heater return line, especially if no buffer storage is present. It is indispensable in order to prevent serious damage to the heat exchanger.

Note 1: The filter must contain a filtering mesh with holes that do not exceed one millimeter.

Note 2; The filter should be kept cleaned and inspected periodically to maintain your condition, cleanliness and ensuring the proper functioning of Heat pump

15.5 Pressure drops (water filter)



15.6 Heating water quality

The composition and quality of the water in the system has a direct effect on the performance of the entire system and the lifetime of the heat pump.

For the initial charging and backfill of the system, usually normal tap water with a pH value of 7-8 can be used as long as the water is not highly corrosive (chloride content > 150 mg/l) or hard (>14°dH; degree of hardness IV). A drinking water analysis can be requested from the local water supply company.

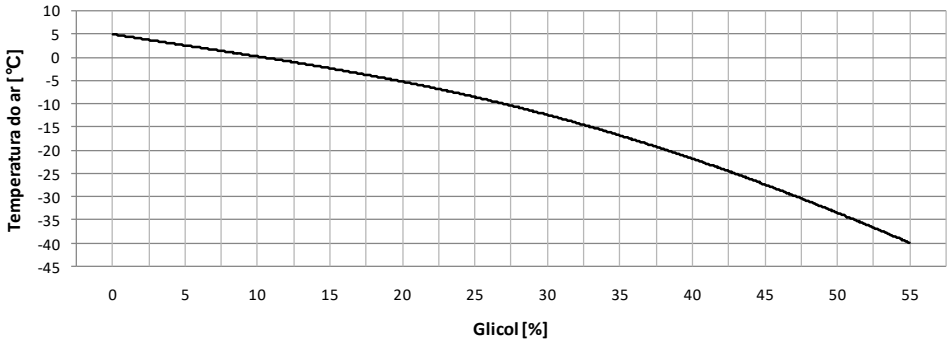
If the specific system volume is greater than 25 liters/kW heating output (e.g. through the installation of a hot water buffer storage), then the maximum permissible calcium carbonate input from the charging and backfilling water should be calculated in accordance with the VDI guideline 2035. In some cases the charging water has to be softened.

Note: The use of chemical anti-corrosion agents is not permitted.

Criteria	Max. value	Effects of non-compliance
PH - Wert	7-8	Danger of corrosion in boiler parts and heating system
Degree of hardness	< 14dH	- Increased lime deposits - Reduced lifetime of boiler
Chloride content	< 150mg/l	Corrosion of alloyed materials

15.7 Glycol (%)

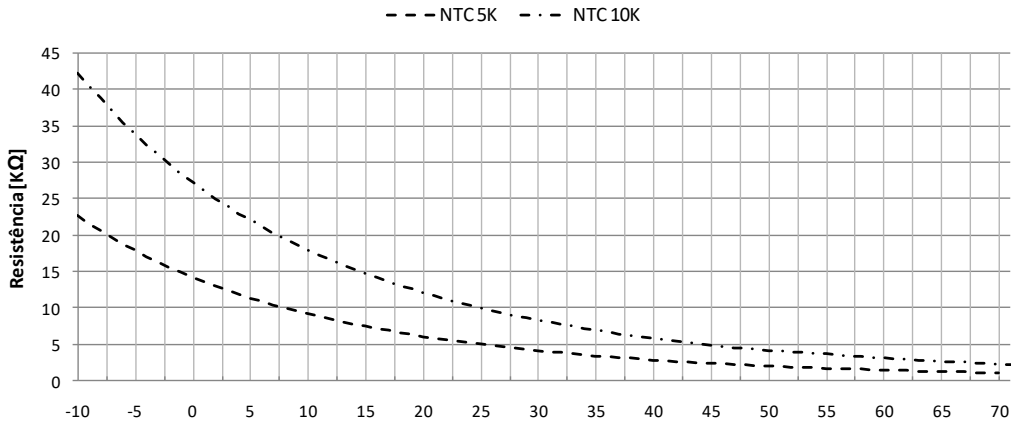
To determinate the percentage of glycol required, see below diagram, can take in consideration the air temperature.



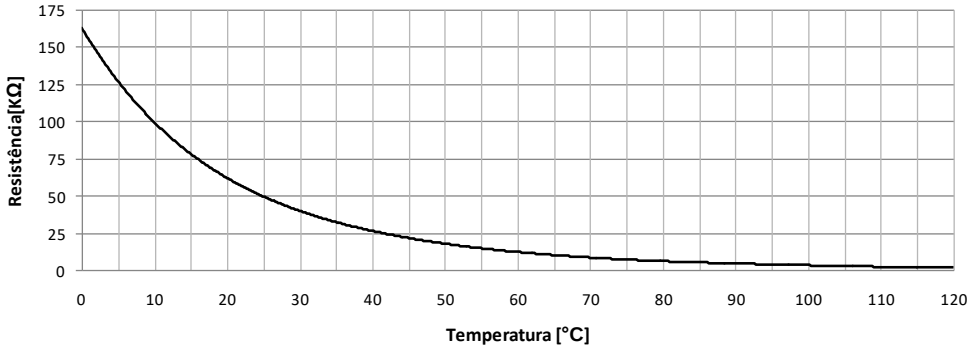
Note: if the glycol water is too much, the water flow and water pump will be influenced and the heat exchange rate will be decreased. This table is for reference, please use anti-freezing water according to the real condition of the local climate.

15.8 Temperature probes (temperature vs KΩ)

NTC 5KΩ e NTC 10KΩ

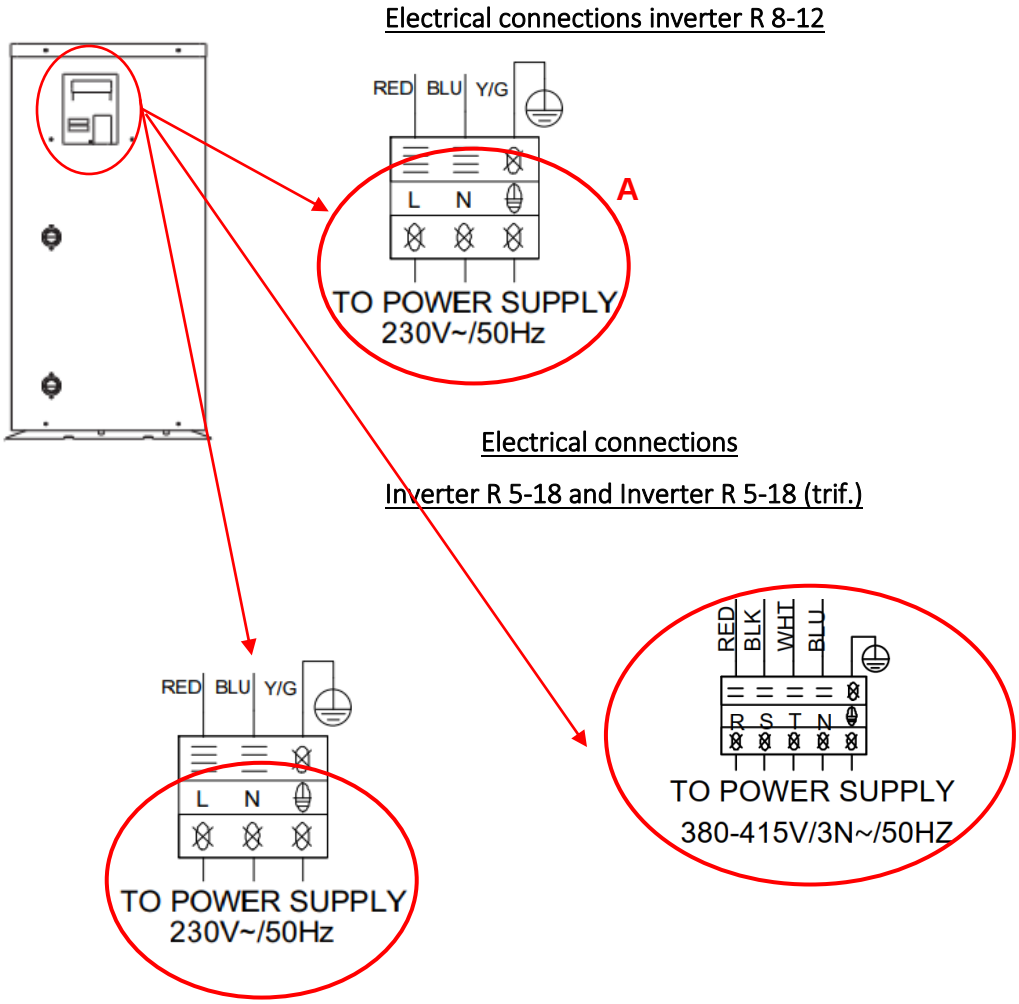


NTC 50KΩ

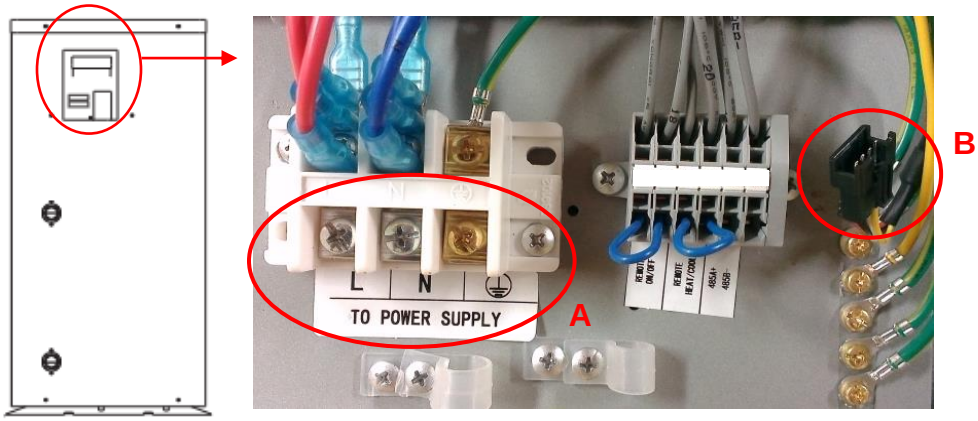


15.9 Electrical connections

WARNING: The electrical installation must be performed in accordance with local regulations and by a qualified professional.



Example:



- A - Power supply (230V ~ / 50Hz);
- B - Connection to controller display
- The power supply must go through the wire access and be connected to the power supply terminals in the controlling box. Then connect the 3-signal wire plugs of the wire controller and main controller.
- The appliance must be fitted with means for disconnection from the supply mains having a contact separation in all poles that provide full disconnection under overvoltage category III conditions, and these means must be incorporated in the fixed wiring in accordance with the wiring rules.
- An all-pole disconnection switch having a contact separation of at least 3mm in all poles should be connected in fixed wiring.
- The wiring must be completed by professional technicians in accordance with circuit diagram.
- Power supply circuit must have earth wire, the earth wire of power should be connected with external earth wire safely. And the external earth wire must be in order.
- The creepage protection device must be settled in accordance with the relevant national technical standards for electronic equipment.
- The power wire and signal wire should be neatly arranged. High voltage wire and low voltage wire must be separated and free from any interference, and they must be free from any pipe and valves of the unit.
- When all the wiring is completed, the power can only be connected after a double check. Power Specifications.

 ATTENTION: The Aquapura 16T (inverter R 5-18) has a phase sequencer.

If the display does not turn on, please change one of the phases.

15.10 Electrical wiring

Model	Power source	Max. current	* Power source cable section
Inv. R 2- 8	208-240V~/ 50-60Hz	13,0 A	2,5 mm²
Inv. R 8 - 12	208-240V~/ 50-60Hz	21,5 A	6 mm²
Inv. R 5 - 18	208-240V~/ 50-60Hz	33,2 A	6 mm²
Inv. R 5 - 18	400V~/ 50-60Hz	12,5 A	2,5 mm²

* The above wire sizes are selected at the maximum current of the unit according to the European Standard considering a cable length of 10 meters.

NOTE: Follow local codes and regulations when selecting field wires, circuit breakers and earth leakage breakers.

Select the main switches according to the next table:

Model	Power source	Max. current	CB	ELB (no. poles/A/mA)
Inv. R 2- 8	208-240V~/ 50-60Hz	13,0A	20 A	2 (F+N)/ 20/ 300
Inv.R 8-12	208-240V~/ 50-60Hz	21,5 A	32 A	2 (F+N)/ 32/ 300
Inv. R 5-18	208-240V~/ 50-60Hz	33,2 A	40 A	2 (F+N)/ 40/ 300
Inv. R 5-18	400V~/ 50-60Hz	12,5	20 A	4 (3F+N)/ 20/ 300

CB – Circuit breaker; ELB – Earth leakage breaker.

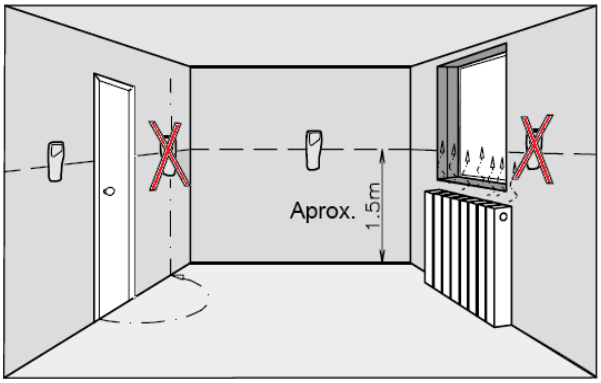
15.11 Room thermostat installation

The simplest way to improve and control the comfort level of your installation is through an ambient thermostat.

Your installation location is extremely important, following a series of requirements as we can see in the figure below.

The thermostat must be installed:

- an interior wall about 1.5m from floor level
- a place where the temperature is uniform.
- a place where have a good circulation of air around the thermostat.



The thermostat cannot be installed:

- in exterior walls.
- near the radiators, convectors, etc.
- behind or near the doors.
- near to the windows.

WARNING: The room thermostat contact must be free of tension. Connecting a tension on this contact will cause destruction of the controller.

16. GUI (graphical user interface.)

16.1 Display information

The front panel contains the display and keyboard, which, when pressed allow to perform all of the controller programming operations.

(1) Power on interface

(2) Starting up interface

Remark: the wire controller can display the temperature unit as "℉" or "℃" according to the unit model you bought.

16.2 Key functions

Key number	Key name	Key function
1	ON / OFF	Click this key to switch ON or OFF Red represents ON, while grey represents OFF
2	Screen lock	Screen unlock (password: 22)
3	Operation mode	Operation modes: • Hot water mode (DHW); • Heating mode; • Cooling mode; • Hot water (DHW) + Heating mode • Hot water (DHW) + Cooling mode
4	Temperature setting	Click this key to set the target temperature
5	Timer setting	Click this key to set the timer White represents not enabled, while green represents enabled
6	Setup key	Click this key to check the: • Unit status; • Time factory parameter; • Temperature curve; • Timer setting; • Mute setting
7	Fault icon	This Icon will flash when there is an error shown up, then the display will enter Failure record interface after tapping this icon.
8	Defrosting icon	The machine is in defrosting mode when this icon is shown
9	Electric heating	Eletric heating is On
10	Temperature	Exterior temperature
11	Operating mode	Indicative icon of the operating mode selected (heating/cooling)
12	AQS	The machine is in AQS mode when this icon is shown
13	Water temperature	Water tank temperature icon, the machine is in hot water mode when this icon is shown; otherwise,this icon is not shown

16.3 Keyboard unlock

To unlock the keyboard press the padlock symbol.

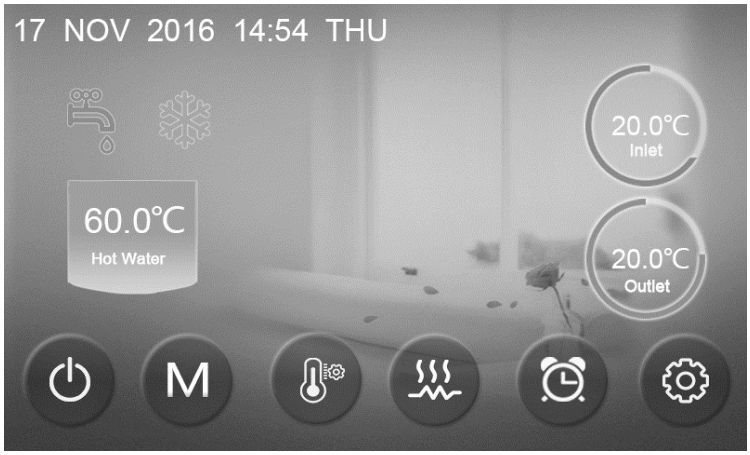
Enter password 022 and press enter.

The keyboard is automatically active.

16.4 Startup and shutdown the unit

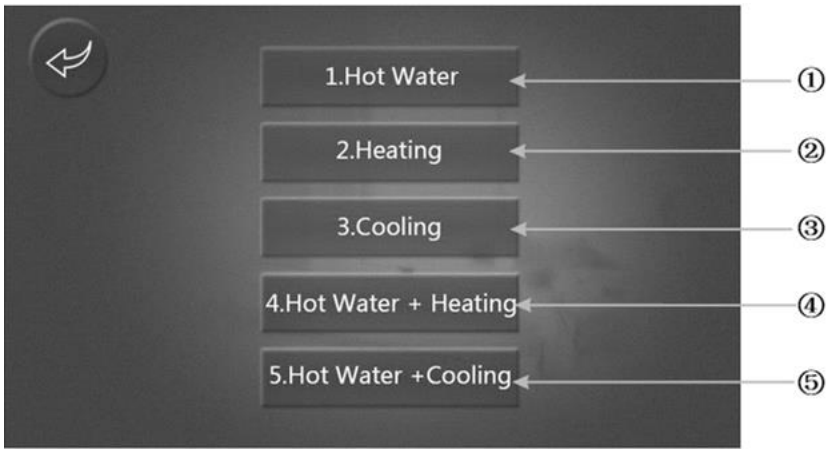
As the main interface shows:

- In shutting down interface (on/off key is in gray status), press on/off key can start up the machine;
- In starting up interface (on/off key is in red status), press on/off key can shut down the machine.



16.5 Mode switch

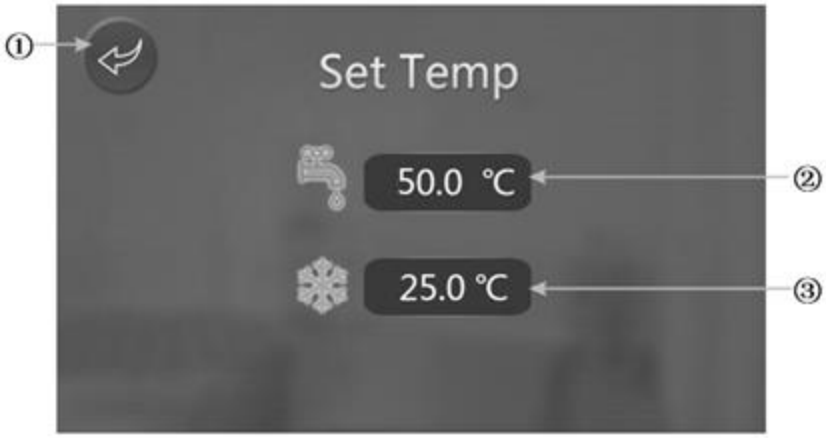
In the main interface, there are five modes can be selected after tapping the mode key.



(1) Tapping hot water mode icon ①, then the display will change to this mode interface;
(2) Tapping heating mode icon ②, then the display will enter this mode interface;
(3) Tapping cooling mode icon ③, then the display will switch to this mode interface;
(4) Tapping hot water + heating mode icon ④, then the display will go into hot water + heating mode interface;
(5) Tapping hot water + cooling mode icon ⑤, then the display will come to hot water + cooling mode interface;

16.6 Setting of target temperature

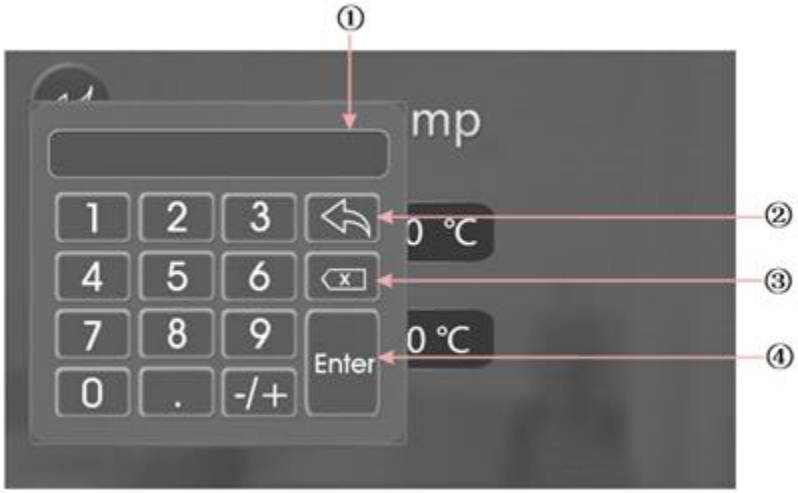
Press  to set the target temperature.



Take hot water + cooling mode for example:

Tapping ①, the wire controller back to main interface;
Tapping ②, the target temp of hot water can be set by pop-up keyboard;

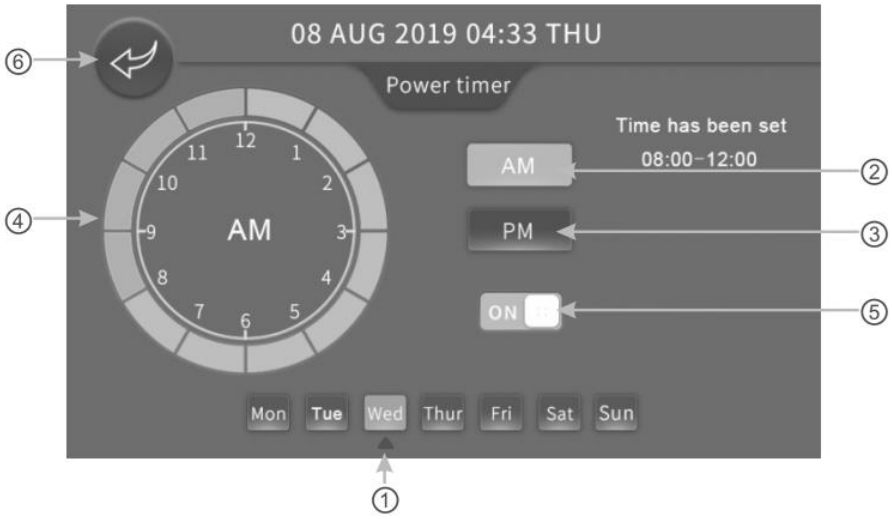
Tapping ③, the target temp of cooling mode can be set by pop-up keyboard. When the target temp is being set, pop-up keyboard is shown as following:



Key number	Key name	Key function
①	Set temp.	Means the new target temp under current setting
②	Return key	Tapping this key can back to the main interface.
③	Delete key	Tapping this key to undo the last action.
④	Enter key	Tapping this key can save you action and back to the main interface.

16.7 Timmer setting

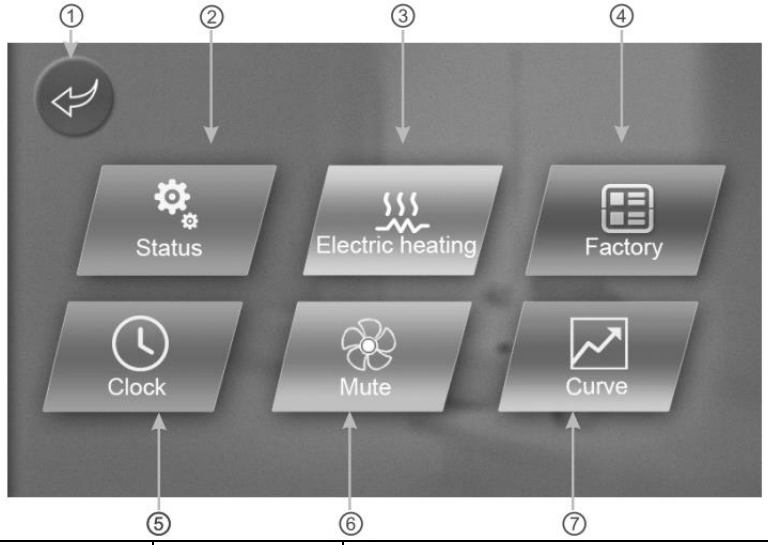
Click the timer setting key to enter the timer setting and the interface display is as follows:



Key number	Key name	Key function
1	Week day	Day of the week to be scheduled
2	Set period before 12:00	Set operating period before the first 12 noon of the day.
3	Set period after 12:00	Set operating period after the first 12 noon of the day:
4	Period	Time period
5	ON/OFF	Set chrono
6	Return key	Click this key to return to the main interface.

16.8 Setup interface

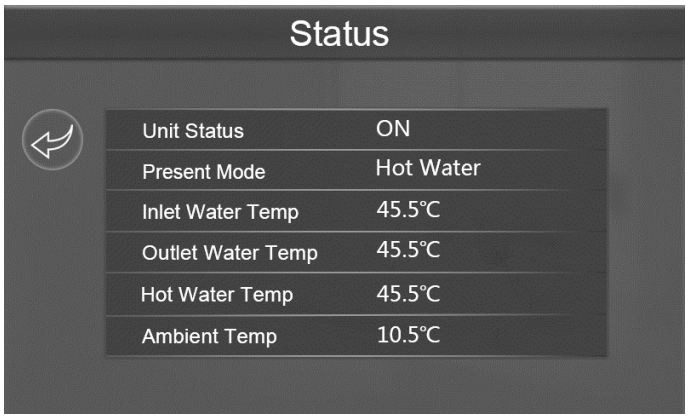
Click the setup key on the main interface and the interface display is as follows:



Key number	Key name	Key function
1	Back	Back to the main interface
2	BC status	Consult BC status (ON / OFF), set temperatures, etc.
3	Electric heating	Manually activate electric heating
4	Factory key	Enter password 022 to access the status / value of the variables read by the controller (eg pressure, temperature, etc.)
5	Time	Set time
6	Silent mode	Activate and set period in silent mode

7	Temperature curves	Evolution of inlet and outlet temperature over time

16.9 Heat Pump Status



16.10 The operation of time setting

Click the clock key on the setup interface and the interface display is as follows:

①: Click the up and down key to set the month;

②: Click the up and down key to set the day;

③: Click the up and down key to set the year;

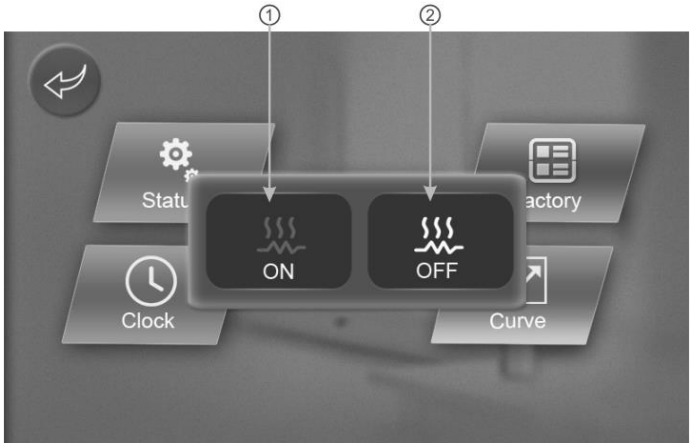
④ : Click the up and down key to set the hour;

⑤: Click the up and down key to set the minute;

⑥: Click the key to cancel the setting;

⑦: Click the key to determine the setting, and the system will be automatically calibrated if it is incorrect.

16.11 Manually Set of Electric Heating

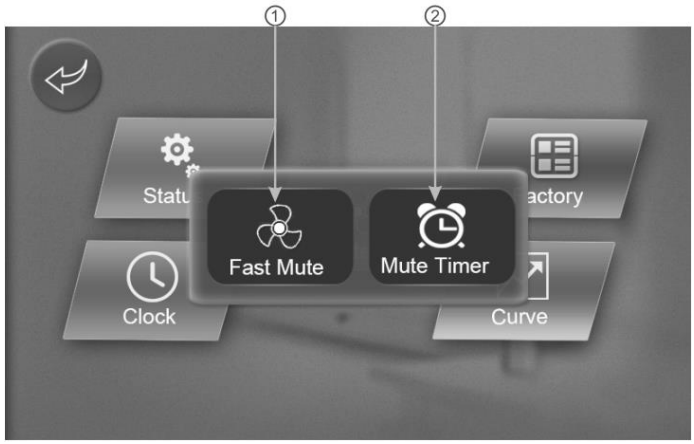


Key number	Key function
1	Electric Heating ON
2	Electric Heating OFF

In the heating mode press the key ① to turn on and the key ② to turn off the electric heating

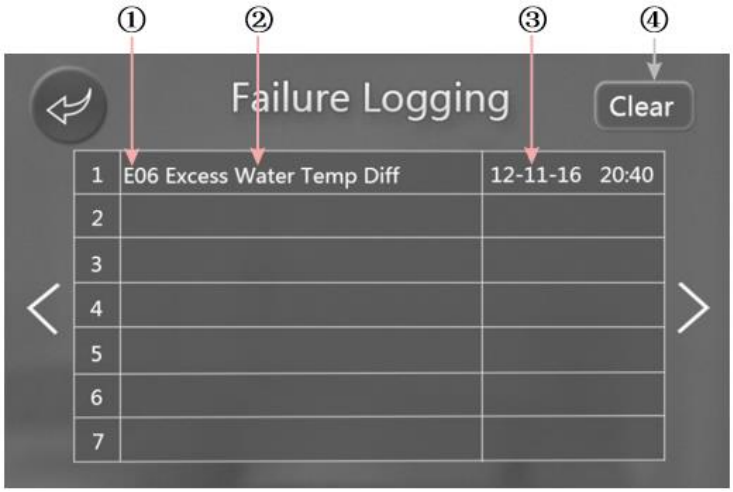
NOTE: Electrical kit is not provided with equipment.

16.12 Silent mode



Key number	Key function
1	Turn on silent mode
2	Set period in silent mode

16.13 Fault interface



Click the fault icon on the main interface and the interface display is as follows:

Note:

①: Fault code
②: Fault name
③: Occurrence time of the fault, day, month and year hour: second (s)
④: Click this key to clear all fault records (the password to clear the error list is the current day)

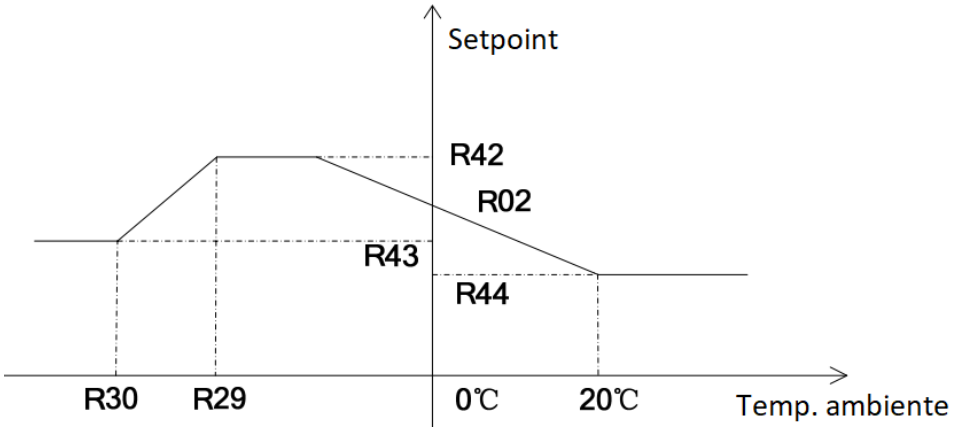
17. Compensation VS ambient temperature

Compensation in heating mode

The temperature setpoint will be automatically adjusted according to the ambient temperature.

When, R30 ≤ AT ≤ R29, or R29 ≤ AT ≤ 20, where AT = ambient temperature;

In these circumstances, the setpoint will be calculated according to the following parameters:



Parameter	Descripition	Value
R02	Heating mode setpoint	user
R29	ON compensation in low outdoor temperatures	-15
R30	OFF compensation at low outdoor temperatures	-25
R42	Setpoint max. heating mode	55
R43	Setpoint max. heating mode at low outdoor temperatures.	55
R44	Setpoint max. heating mode at high outdoor temperatures.	35

Compensation in DHW mode

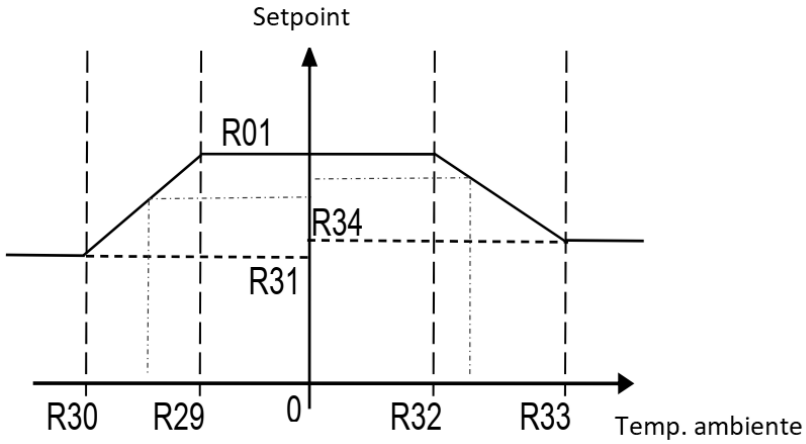
1 - When R29 ≤ AT ≤ R32 ,

• If the temperature set for DHW is higher than 60, then the target setpoint will be 60 ºC;

• If the and the temperature set for DHW is less than 60, then the target setpoint will be according to the defined setpoint:

2 - When R30 ≤ AT ≤ R29 or R32 ≤ AT ≤ R23

In these circumstances, the setpoint will be calculated according to the following parameters:



Parameter	Description	Value
R01	DHW mode setpoint	userr
R29	ON compensation in low outdoor temperatures	-15
R30	OFF compensation at low outdoor temperatures	-25

R31	Maximum compensation setpoint at low temperatures.	55
R32	ON DHW compensation for high outdoor temperatures	35
R33	OFF compensation in DHW for high outdoor temperatures	43
R34	DHW compensation setpoint for high ambient temperatures.	55

18. Error code

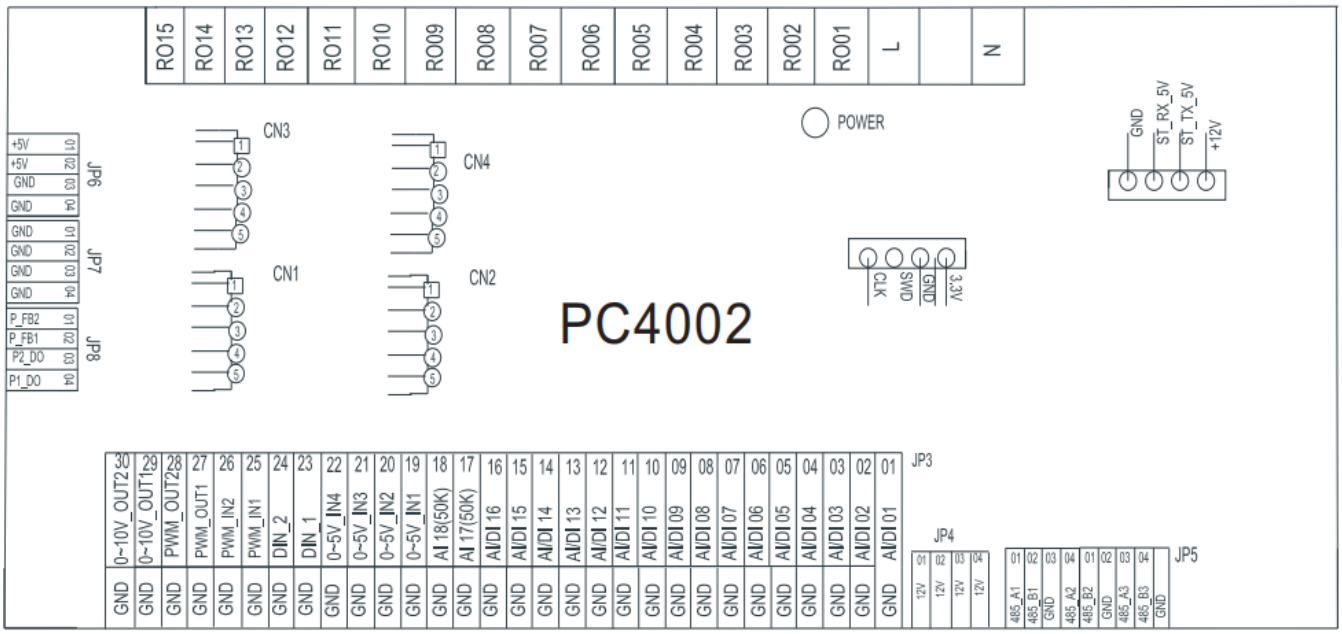
Protect/fault	Fault display	Reason	Elimination methods
Standby	Non		
Normal boot	Non		
Inlet Temp Sensor Fault	P01	The temp. Sensor is broken or short circuit	Check or change the
Outlet Temp Sensor Fault	P02	The temp. Sensor is broken or short circuit	Check or change the
Hotwater Temp Sensor Fault	P032	The temp. Sensor is broken or short circuit	Check or change the
AT Sensor Fault	P04	The temp. Sensor is broken or short circuit	Check or change the
Coil temp Sensor Fault	P153	The temp. Sensor is broken or short circuit	Check or change the
Suction temp Sensor Fault	P17	The temp. Sensor is broken or short circuit	Check or change the
Exhaust temp Sensor Fault	P181	The temp. Sensor is broken or short circuit	Check or change the
Exhaust Overtemp Fault	P182	The compressor is overload	Check whether the system of the compressor running normally
Exhaust Pressure Sensor Fault	PP1	The pressure Sensor is broken or short circuit	Check or change the pressure Sensor or pressure
Suction Pressure Sensor Fault	PP2	The pressure Sensor is broken or short circuit	Check or change the pressure Sensor or pressure
EVI Inlet Temp Sensor Fault	P001	The temp. Sensor is broken or short circuit	Check or change the
EVI Outlet Temp Sensor Fault	P002	The temp. Sensor is broken or short circuit	Check or change the
Low AT Protection	TP	The ambient temp. is low	
Flow Switch Protection	E032	No water/little water in water system	Check the pipe water flow and water pump
Electric Overheat Protection	E04	The electric-heater protection switch is broken	Check to see whether the electric heater has been running under the temperature

			over 150℃ for a long time
Compressor Overcurrent Shutdown Fault	E051	The compressor is overload	Check whether the system of the compressor running normally
Communication Fault	E08	Communicat ion failure between wire controller and mainboard	Check the wire connection between remote wire controller and main board
Communication Fault(Fan)	E081	Speed control module and main board communication fail	Check the communication connection
HP Protection	E11	The high-pressure switch is broken	Check the pressure switch and cold circuit
LP Protection	E12	The low-pressure switch is broken	Check the pressure switch and cold circuit
Anti-freezing Prot	E171	Use side water system temp. is low	Check the water temp. or change the temp. Sensor Check the pipe water flow and whether water system is jammed or not
Prim Anti-freezing Prot	E19	The ambient temp. is low	
Secondary Anti-freezing Prot	E29	The ambient temp. is low	
DC Fan Motor 1 Failure	F031	1. Motor is in locked-rotor state 2.The wire connection between DC-fan motor module and fan motor is in bad contact	Change a new fan motor Check the wire connection and make sure they are in good contact
DC Fan Motor 2 Failure	F032	1. Motor is in locked-rotor state 2.The wire connection between DC-fan motor module and fan motor is in bad contact	1. Change a new fan motor Check the wire connection and make sure they are in good contact
Fan motor speed controller failure.	E081	Communication failure between the control board and the fan speed management module. Damaged fan speed management module.	1. Check the electrical connections; 2. Check the fan speed management module.

Protection/fault	Fault display	Reason	Elimination methods
IPM Overcurrent Shutdown Fault	F00	IPM Input current is large	Check and adjust the current measurement
Compressor Activation Failure	F01	Lack of phase, step or drive hardware damage	Check the measuring voltage check requency conversion board hardware
PFC Fault	F03	The PFC circuit protection	Check the PFC switch tube short

			circuit or not
DC Bus Overload	F05	DC bus voltage>Dc bus over-voltage protection value	Check the input voltage measurement
DC Bus Underload	F06	DC bus voltage<Dc bus over-voltage protection value	Check the input voltage measurement
AC Input Underload	F07	The input voltage is low, causing the input current is low	Check the input voltage measurement
AC Input Overload	F08	The input voltage is too high, more than outage protection current RMS	Check the input voltage measurement
Input voltage Sample Fault	F09	The input voltage sampling fault	Check and adjust the current measurement
Communication Failure between DSP and PFC	F10	DSP and PFC connect fault	Check the communication connection
Communication Fault (DSP)	F11	DSP and main board communication failure	Check the communication connection
Communication Fault (Inverter Board)	F12	Frequency conversion board and main board communication failure	Check the communication connection
IPM Overheat Stop	F13	The IPM module is overheat	Check and adjust the current measurement
Weak Magnetism Alarm	F14	Compressor magnetic force is not enough	
Input voltage Lacking Phase	F15	The input voltage lost phase	Check and measure the voltage adjustment
IPM Current Sample Fault	F16	IPM sampling electricity is fault	Check and adjust the current measurement
Sensor Fault of Module/ Radiator	F17	The temp. Sensor is broken or short circuit	
IGBT Power Device Overheat Alarm	F20	The IGBT is overheat	Check and adjust the current measurement
Overload Alarm	F21	Compressor electricity is large	The compressor over-current protection
AC Input OverCurrent Alarm	F22	Compressor electricity is large	The compressor over-current protection
EEPROM Fault Alarm	F23	MCU error	Check whether the chip is damaged Replace the chip
Destroyed EEPROM Activation Ban Alarm	F24	MCU error	Check whether the chip is damaged Replace the chip
LP 15V Underload Fault	F25	The V15V is overload or undervoltage	Check the V15V input voltage in range 13.5v~16.5v or not
IGBT Power Device Overheat Fault	F26	The IGBT is overheat	Check and adjust the current measurement

19. Main board interface



Number	Sign	Meaning
01	0~10V OUT1	No use
02	0~10V OUT2	No use
03	PWM_OUT1	AC switch output
04	PWM_OUT2	AC mode switch output
05	PWM_IN1	No use
06	PWM_IN2	No use
07	DIN_2	Remote Heat/Cool
08	DIN_1	Heat/Cool On/Off
09	0~5V_IN4	No use
10	0~5V_IN3	No use
11	0~5V_IN2	No use
12	0~5V_IN1	No use
13	AI/18（50k）	System Exhaust temperature 1
14	AI/17（50K）	DHW On/Off
15	AI/DI16	Remote On/Off

16	AI/DI15	Electric heating overload input
17	AI/DI14	Water flow switch protection
18	AI/DI13	The low-preesure switch 1
19	AI/DI12	The high-preesure switch 1
20	AI/DI11	Temperature of the EVI outlet of system 1
21	AI/DI10	Temperature of the EVI inlet of system 1
22	AI/DI09	System1 Antifreeze 4 Temperature
23	AI/DI08	Water tank Temperature
24	AI/DI07	No use
25	AI/DI06	System1 Antifreeze 1 Temperature /Syetem 1 Coil temperature 2
26	AI/DI05	System 1 suction temperature
27	AI/DI04	Ambient temperature
28	AI/DI03	System 1 coil temperature
29	AI/DI02	Water output temperature
30	AI/DI01	Water intput temperature
31	+5V	5V output
32	+12V	12V output
33	CN1	Electronic expansion valve 1 in system 1
34	CN2	Centralized control port
35	CN3	Electronic expansion valve of EVI in system 1
36	CN4	No use
37	CN5	Color screen, DC fan speed regulation module, inverter board
38	CN15	DTU
39	RO15	No use
40	RO14	No use
41	RO13	No use
42	RO12	Alarm output
43	RO11	Chassis heating tape
44	RO10	Crankshaft heating tape
45	RO09	Hot water three-way valve
46	RO08	Electrical heating level 2
47	RO07	Electrical heating level 1

48	RO06	4-way valve
50	RO05	Domestic hot water pump
51	RO04	Main circulating water pump
52	RO03	Fan low speed
53	RO02	Fan high speed
54	RO01	Compressor 1

20. Troubleshooting and Additional Information

Failure	Possible causes for the failure	Solutions
BC does not work, display without information	1) Power supply failure. 2) Circuit breaker off. 3) Power cable not properly connected. 4) Swapped phases. 5) Blown controller fuse	1) Check the power supply. 2) Check if there is an anomaly and turn the circuit breaker back on. 3) Connect the power cord correctly. 4) Change one of the phases. 5) Check the fuse
Water pump is running with high noise or without water	1) Lack of water. in the hydraulic circuit, 2) Air in the installation 3) Valves closed 4) Dirty or clogged water filter	1) Check that there is no water leak. Fill the circuit 2) Purge the hydraulic circuit. 3) Open the valves 4) Clean the filter
Heat pump capacity is low, compressor do not stop	1 lack of refrigerant; 2 bad insulation on water pipe; 3 low heat exchange rate on air side exchanger; 4 lack of water flow	1 check for the gas leakage and recharge the refrigerant; 2 make good insulation on water pipe; clean the air side heat exchanger; 3 clean the water filter 4
High compressor exhaust	1 too much refrigerant 2 low heat exchange rate on air side exchanger	1 discharge the redundant gas clean 2 the air side heat exchanger
Low pressure problem of the system	1) Lack of refrigerant gas 2) Outside temperature too low. 3) Obstruction of the refrigerant circuit.	1 check the gas leakage and recharge freon; 2 replace filter or capillary; 3 clean the water filter and discharge the air in water loop.
Compressor do not run	1 power supply failure 2 compressor contactor broken 3 power cable loose 4 protection on compressor wrong setting on return 5 water temp.	1 check off the power supply; replace 2 compressor contactor; tighten the 3 power cable; 4 check the compressor exhaust temp.; 5 reset the return water temp.; 6 clean the water filter and discharge

	6 lack of water flow	the air in water loop.
High noise of compressor	1 liquid refrigerant goes into compressor Compressor 2 failure	1 bad evaporation, check the cause for bad evaporation and get rid of this; use new compressor; 2
Fan do not run	1 failure on fan relay fan 2 motor broken	1 replace the fan relay; 2 replace fan motor.
The compressor runs but heat pump has not heating or cooling capacity	1 no gas in the heat pump; heat exchanger broken; 2 compressor failure. 3	1 check system leakage and recharge 2 refrigerant; find out the cause and replace the heat exchanger; replace compressor. 3
Low outlet water temperature	1 low water flow rate; 2 low setting for the desired water temp.;	1 clean the water filter and discharge the air in water loop. 2 reset the desired water temperature.
Low water flow protection	1 lack of water in the system; 2 failure on flow switch	1 clean the water filter and discharge the air in water loop. 2 replace the flow switch.

21. Appendix 1 – Glossary

Hydraulic schemes

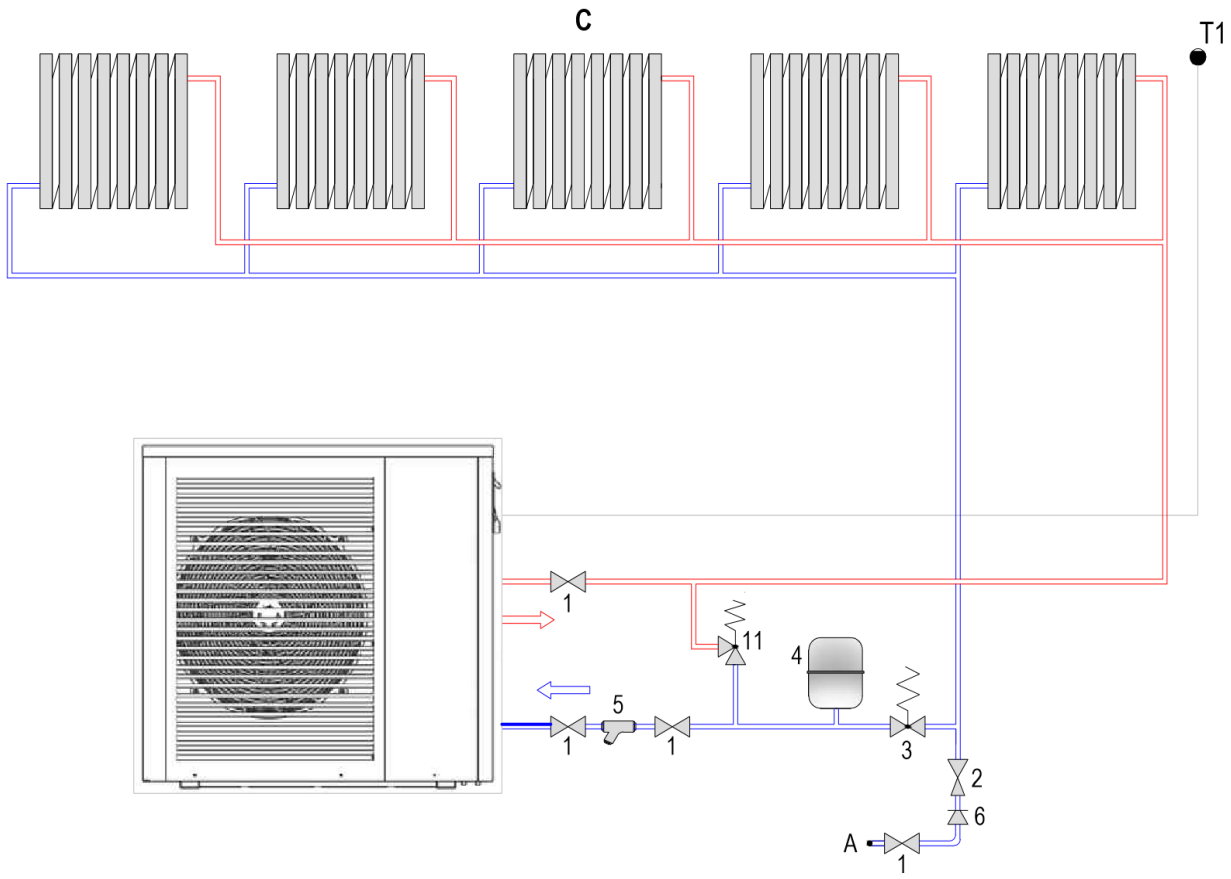
1	Shutoff valve	11	Differential bypass valve
2	Filling valve	A	Water inlet (central heating)
3	Safety valve	A1	Cold water inlet (DHW)
4	Expansion vessel	B	Central heating (radiators, floor heating or fan coils)
5	Filter	C	Hot water outlet (DHW)
6	Valve (non-return)	BT	Buffer tank
7	Water tank (DHW)	P1	Circulating pump
8	3 way valve	T1	Room thermostat
9	Automatic air vent	TT	DHW thermostat
10	Pressure reducing valve	12	Thermostatic valve

22. Appendix 2 – Hydraulic Schemes

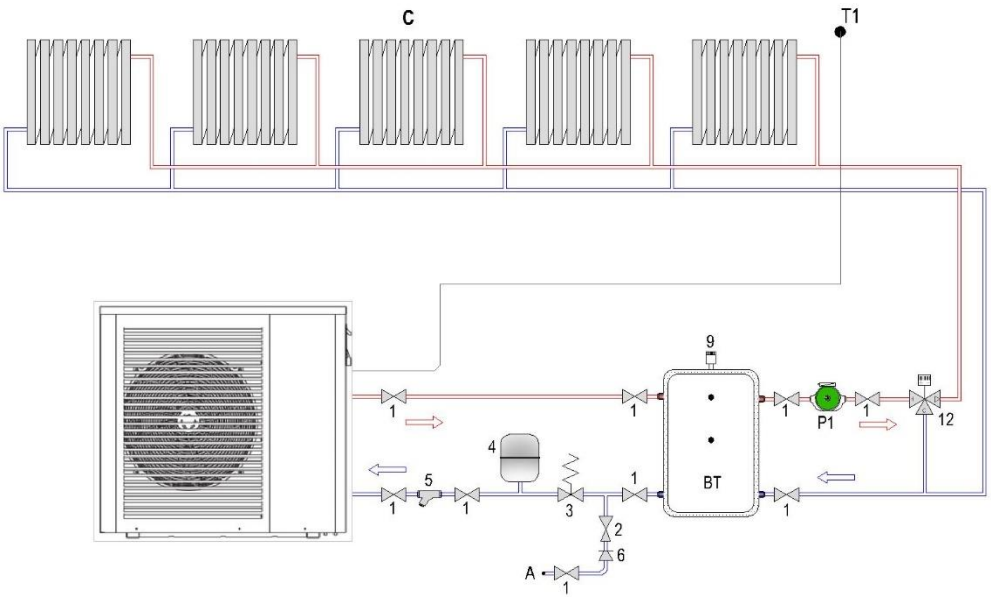
IMPORTANT: This drawing just shows the core parts and main principle of the application, there are many parts can be installed such as water pressure meters, water temperature meter, drainage etc.

22.1 Central heating/ cooling

The heat pump will heat the water, so that the water can be used for heating or cooling. Normally, for heating the water is kept at 35 degrees for floor heating, 45 degrees for fan coil, 50 degrees for radiator, or other temperature at customer request.

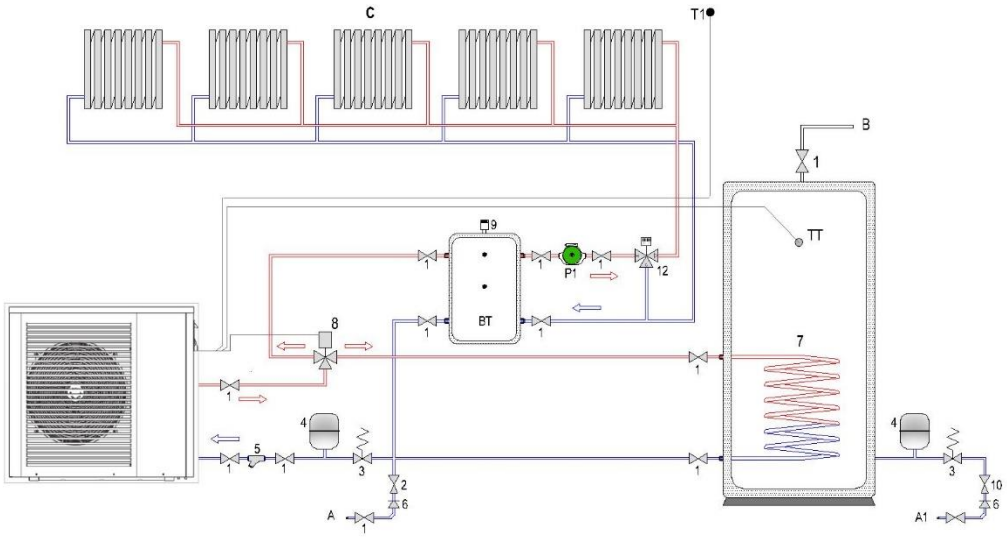


22.2 Central heating/ cooling with buffer tank



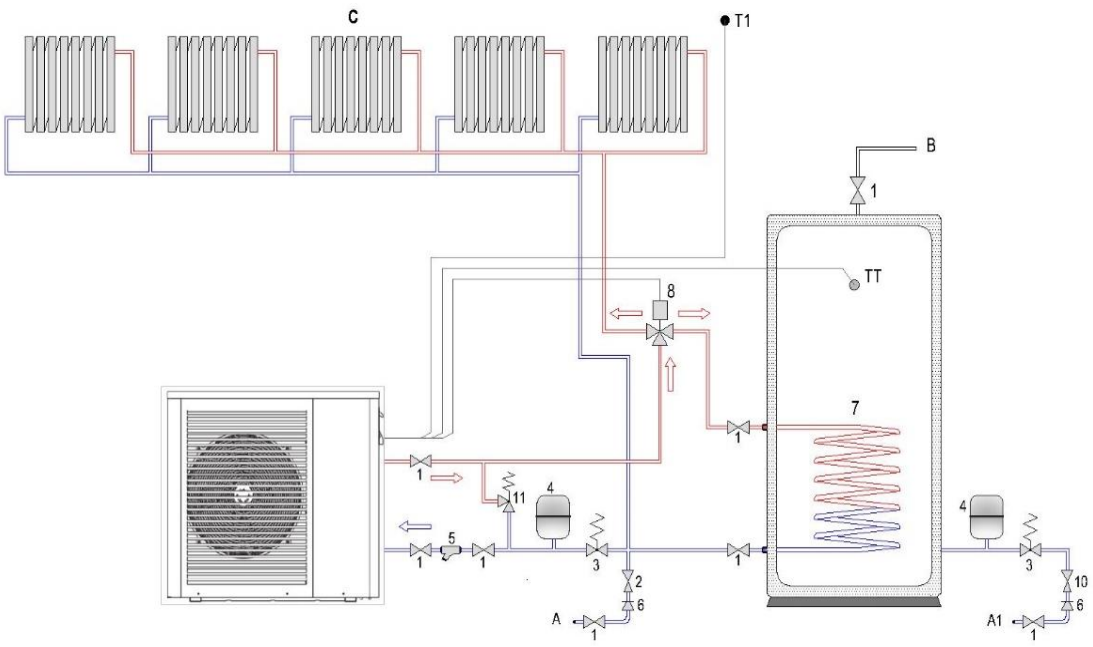
IMPORTANT: The control of the circulating pump "P1" must be carried out separately.

22.3 Central heating/ cooling with buffer tank + DHW



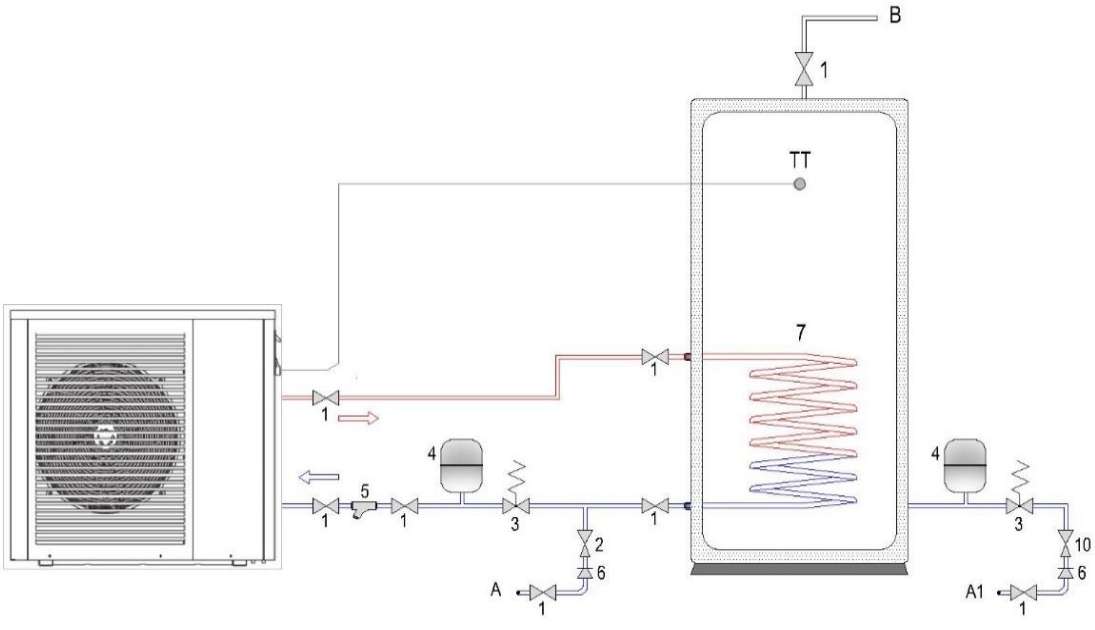
IMPORTANT: The heat pump automatically manages the three way valve. The control of the circulating pump "P1" must be carried out separately.

22.4 Central heating/ cooling + DHW



IMPORTANT: The auxiliary control unit automatically manages the heat pump and the three-way valve depending on the temperature in the DHW tank and the ambient thermostat.

22.5 DHW



23. Appendix 4 – Wiring diagrams

23.1 Digital input configuration

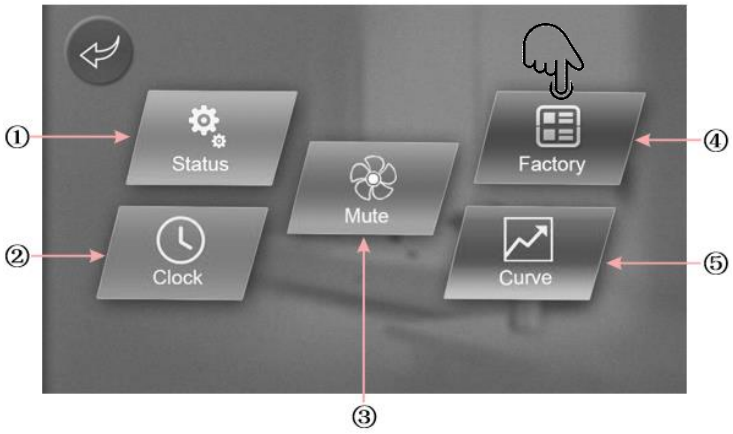
WARNING: Do not connect (220/240V~) to the terminals **Remote On/Off, Remote Heat/ Coll, DHW On/ Off e Heat/ Cool On/ Off, as this may cause irreversible damage to the controller and loss of warranty.**

All the contacts are free of voltage (dry contacts)

WARNING: The digital inputs "Remote Heat/Cool", "DHW ON/OFF" and "Heat/Cool ON/OFF" are inactive by default, giving priority to settings made through the console.

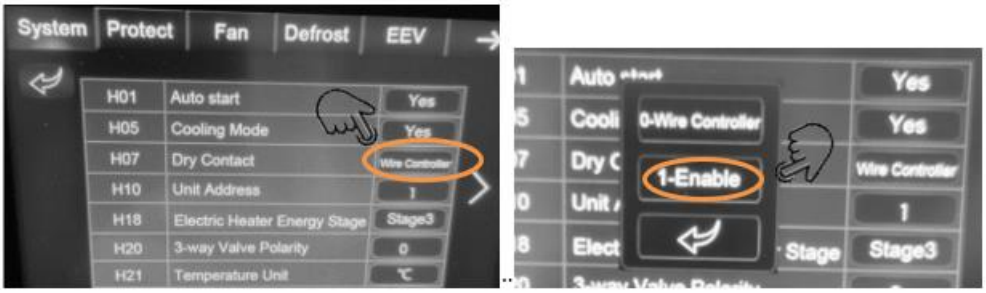
To enable digital inputs, you must do the following steps:

1. Press key to access the heat pump settings.



2. Press 4 "Factory";
3. Enter the password 066;
4. Select menu "System".

5. In parameter H07 change the setting for "1 – Enable".

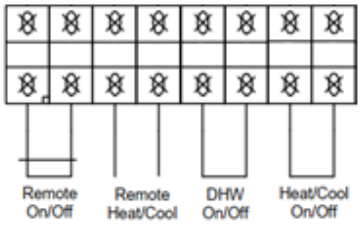


To change the configuration, click on the text “Wire controller” and a second window will automatically appear.

In the second window, click on the text “1-Enable”, the configuration of the digital inputs will be automatically assumed.

In the “1-Enable” configuration, it is not possible to change the operating modes of the heat pump via the console.

After completing the aforementioned procedures, digital roads are available for use:



Terminals description:

- REMOTE ON/OFF – Switch equipment ON or OFF remotely via digital input (dry contact / free of voltage).
  - Contact open – Heat pump OFF;
  - Contact close – Heat pump ON
- REMOTE HEAT /COOL – Select Hot/Cold operating mode via digital input (dry contact / free of voltage).
  - Contact open – Heat pump in Cooling mode;
  - Contact close – Heat pump in Heating mode.
- DHW ON/OFF– Enable DHW function (dry contact / free of voltage).
  - Contact open – DHW disable;
  - Contact close – DHW enable.
- HEAT / COOL ON/OFF – Enable or disable Heat Pump operation in Hot / Cold mode via digital input (dry contact / free of voltage).
  - Contact open – Heat pump in standby;
  - Contact close – Heat pump enable.

Usually the input HEAT/COOL ON/OFF is used to connect the ambient thermostat.

ATTENTION: Use shielded cable in the connections of the digital inputs, in this way we protect the digital inputs against noise coming from the compressor.

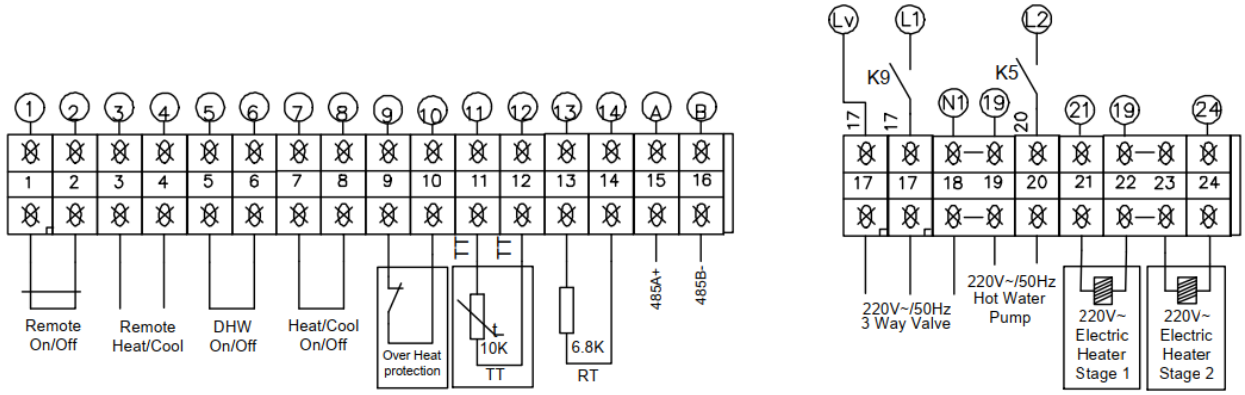
Not use this type of cable can lead to abnormal behavior in the operation of the equipment.

The shielded must not be connected to the equipment ground, but, at the “GND” terminal of the respective digital input (see electrical diagram provided)

23.2 Electrical connections inverter R 3-8

WARNING: Do not connect (220/240V~) to the terminals **Remote On/Off, Remote Heat/ Coll, DHW On/ Off e Heat/ Cool On/ Off, as this may cause irreversible damage to the controller and loss of warranty.**

All the contacts are free of voltage (dry contacts)

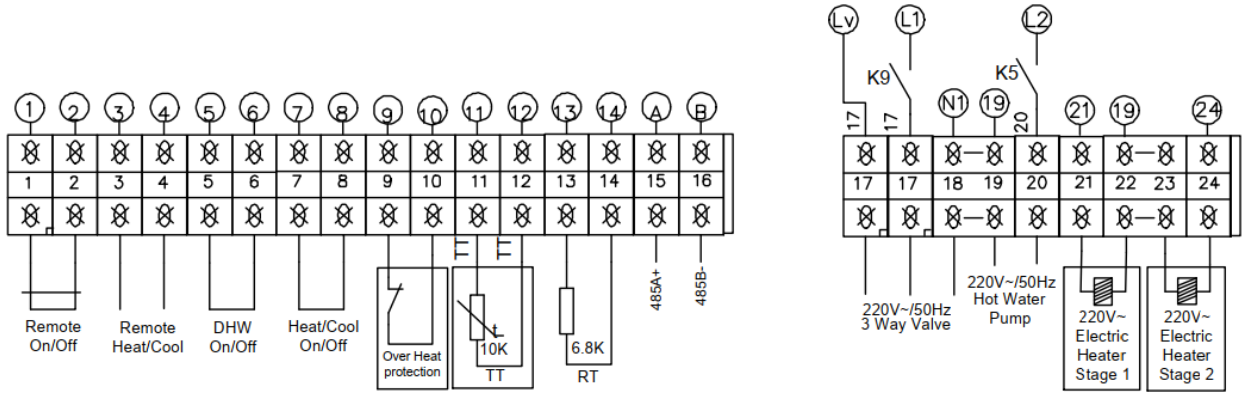


Terminal description:

- Terminal 9/10 - Safety thermostat (backup electrical heater)
- Terminal 11/12 - Input for DHW tank temperature probe (probe provided in the installation kit);
- Terminal13/14 – Input Inactive;
- Terminal 15/16 – Communication port (RS485)
- Terminal
- 17/17/18 - Output for 3-way DHW valve (DHW function active K9 is ON). Terminal 17 (LV) permanent phase.
- 19/20 - Output for DHW circulating pump (DHW function active K5 is ON)
- 21/21 and 22/23 - command for support resistance (Imax = 1amp);

23.3 Electrical connections inverter R 8-12

WARNING: Do not connect (220/240V~) to the terminals **Remote On/Off, Remote Heat/ Coll, DHW On/ Off e Heat/ Cool On/ Off, as this may cause irreversible damage to the controller and loss of warranty. All this contacts are free of voltage (dry contacts)**

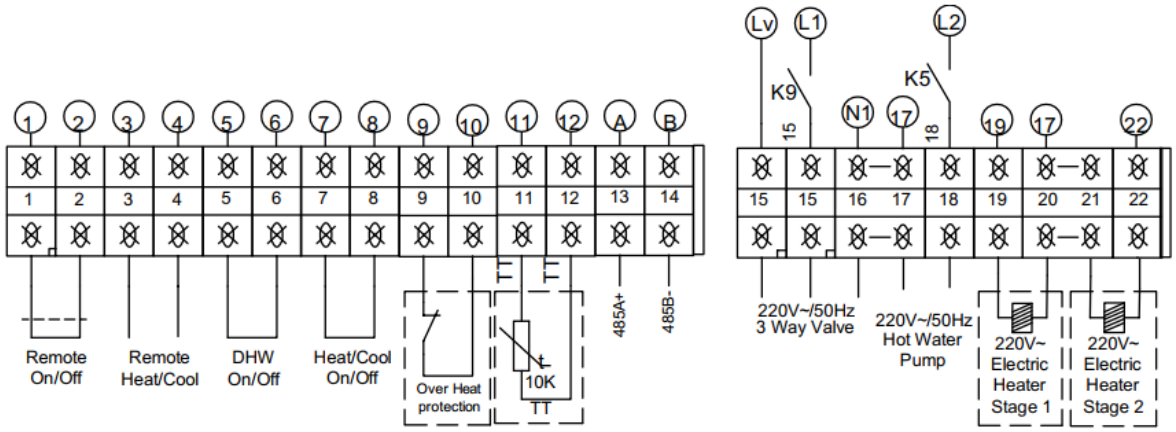


Terminal description:

- Terminal 9/10 - Safety thermostat (backup electrical heater)
- Terminal 11/12 - Input for DHW tank temperature probe (probe provided in the installation kit);
- Terminal13/14 – Input Inactive;
- Terminal 15/16 – Communication port (RS485)
- Terminal
- 17/17/18 - Output for 3-way DHW valve (DHW function active K9 is ON). Terminal 17 (LV) permanent phase.
- 19/20 - Output for DHW circulating pump (DHW function active K5 is ON)
- 21/21 and 22/23 - command for support resistance (Imax = 1amp);

23.4 Electrical connections inverter R 5-18

WARNING: Do not connect (220/240V~) to the terminals **Remote On/Off, Remote Heat/ Coll, DHW On/ Off e Heat/ Cool On/ Off, as this may cause irreversible damage to the controller and loss of warranty. All this contacts are free of voltage (dry contacts)**

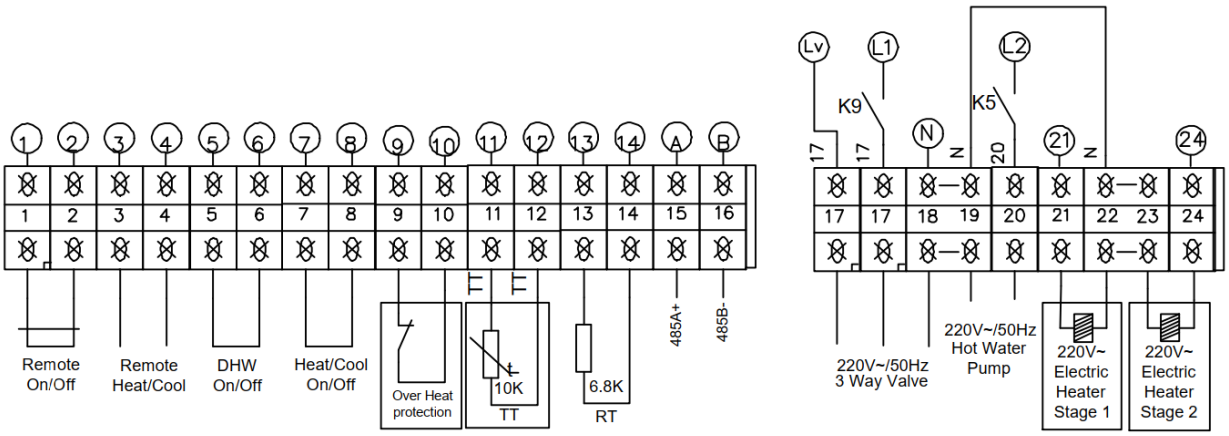


Terminal description:

- Terminal 9/10 - Safety thermostat (backup electrical heater)
- Terminal 11/12 - Input for DHW tank temperature probe (probe provided in the installation kit);
- Terminal 13/14 – RS485 communication port;
- Terminal 15/15/16 - Output for 3-way DHW valve (DHW function active K9 is ON). Terminal 15 (LV) permanent phase.
- Terminal 17/18 - Output for DHW circulating pump (DHW function active K5 is ON)
- Terminal 19/20 and 21/22 - command for support resistance (Imax = 1amp);

23.5 Electrical connections inverter R 5-18 (tree phase)

WARNING: Do not connect (220/240V~) to the terminals **Remote On/Off, Remote Heat/ Coll, DHW On/ Off e Heat/ Cool On/ Off, as this may cause irreversible damage to the controller and loss of warranty. All this contacts are free of voltage (dry contacts)**



Terminal description:

- Terminal 9/10 - Safety thermostat (backup electrical heater)
- Terminal 11/12 - Input for DHW tank temperature probe (probe provided in the installation kit);
- Terminal 13/14 – not used;
- Terminal 15/16 – RS485 Communication port;
- Terminal 17/17/18 - Output for 3-way DHW valve (DHW function active K9 is ON). Terminal 17 (LV) permanent phase.
- Terminal 19/20 - Output for DHW circulating pump (DHW function active K5 is ON)
- Terminal 21/22 and 23/24 - command for support resistance (Imax = 1amp);

1. Appendix 5 – Warranty

This warranty covers all defects to the confirmed materials, excluding the payment of any type of personal damage indemnity caused directly or indirectly by the materials.

The periods indicated below start from the purchase date of the apparatus, 6 months at the latest from the leaving date from our storage warehouses.

Heat Pump	Water Cylinder (domestic use)
2 Years	5 Years: Stainless Steel (2 + 3 years)
	5 Years: Enamelled (2 + 3 years)
	Manufacturer Warranty
	Water Cylinder (industrial)
	5 Years: Stainless Steel (2 + 3 years)
	Manufacturer Warranty

The warranty extension of 3 years is conditioned to the submission of:

- Warranty and Check Sheet at maximum 15 days after the installation.
- Documental evidence of the magnesium anode replacement.
- Pictures of the installation where it's shown safety group, expansion vessel, hydraulic and electrical connections

In case of warranty, the parts replaced are property of the manufacturer.

A repair under the warranty is not reason for an extension of its term.

Warranty Exclusions

The warranty ceases to be effective when the apparatus is no longer connected, used or assembled in accordance with manufacturer instructions, or if there has been any form of intervention by unauthorized technicians, has the appearance of modifications and/or if the series number appears to have been removed or erased. The equipment should be installed by qualified technicians according to the rules in effects and/or the rules of the trade, or the instructions of our technical services. Further exclusions from warranty:

- Hot water tanks have been operating in water with the following indexes:
    - Active chlorine > 0.2 ppm;
    - Chlorides > 50 mg/l (Inox);
    - Hardness > 200 mg/l;
    - Conductibility > 600 µS/cm (20 ºC);

- 5,5 > PH and PH > 9 (Sorensen at 20ºC);
- If one of the water parameters has a greater value than stipulated by directive 236/98 (Portugal) or equivalent standard in the costumer's country.

- Parts are subject to natural wear and tear – levers, switches, resistances, programmers, thermostats, etc.
- Breakdown due to incorrect handling, electrical discharges, flooding, humidity or by improper use of the apparatus.
- The warranty lapses if it is transferred to another owner, even if within the guarantee period.
- The warranty lapses if this certificate is incorrectly filled in, if it is violated or if it is returned after more than 15 days have passed since the purchase date of the apparatus.

 ATTENTION:

Technical assistance costs even within the warranty period shall be supported by the customer (Km and assistance time). In cases where there is no justifiable breakdown and subsequent need for technical assistance, the client will pay for lost technical assistance time.

2. Appendix 6 – Warranty Registration Card

Please complete both sides of this warranty card and return it to activate the warranty.

Installer Details

Company Name _____

Address _____

_____

Postcode _____

Telephone Nº _____

Email _____

Accreditation Installer Nº _____

Site Details

Name _____

Address _____

_____

Telephone Nº _____

Heat Pump Details

Model _____

Serial Nº _____

Date Installed _____

Date of commissioning _____

Please sing below and return to our Technical Dep. Via fax +351 252600239, email energie@energie.pt or post to the address above.

Signature:_____

Date: _____

ENERGIE est, lda

Zona Industrial de Laúndos, Lote 48

4570-311 Laúndos – Povoa de Varzim – PORTUGAL

Please complete both sides of this warranty card and return it to activate the warranty.

Commissioning report

Building type:

- Detached house ☐
- Apartment block ☐
- Industrial/commercial ☐
- Public building ☐

Heat Pump Use:

- DHW ☐
- Radiators ☐
- Under floor ☐
- Swimming pool ☐

Buffer Tank

Buffer tank Capacity: _____liters ;

Temperature spread of flow return: _____ºK

Primary flow/return Pipe size: type _____; Diameter _____mm

Immersion heater: _____kW

Hot Water Preparation

Hot water cylinder size: _____ liters; Make/type: _____

Heat Exchanger Surface Area:_____ m^2; Electric Heating:_____ kW

Actual data:

Temp. of air at the back of the unit: _____ (from controller)

Ambient air temperature: _____ (measure this in the garden)

Voltage of Supply: _____ (measure this at unit)

Current draw: _____ (measure this at unit)

Water flow temp: _____ (from controller)

Water return temp: _____ (from controller)

Please: include photo of unit, hot water cylinder, buffer tank, etc

.

If you have any question about the operation and maintenance of the unit that are not addressed in this manual, or if you feel that something in the manual is unclear, please contact us.

ENERGIE EST

Address: Zona Industrial de Laúndos, Lote 48, 4570-311 Laúndos - Póvoa de Varzim, PORTUGAL

General e-mail: energie@energie.pt