EN

ENERGIE

AIR WATER HEAT PUMP

Installation and Instruction Manual

Revision: 1

Version 0

Date: 08/10/14

EN 60335-1;

EN 60335-2-40.

EN 14511: 2007

ENERGIE

HIGH TEMPERATURE UNITS

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. Start or operate the unit.

EVI SCROLL MODELS:

FF Evi 10 – 9, 2 kW Heating / 6, 2 kW Cooling

FF Evi 15 – 14, 5 kW Heating / 9, 5 kW Cooling

FF Evi 17 – 17 kW Heating / 12, 5 kW Cooling

Index

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 need 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 need 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 relus 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

3.1 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).

3.2 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 na 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. Features of the high temperature heat pump

1 Save our planet-earth, by green technology

Heat pump transfer heat from air to the space for heating, so that there is no burning, no waste, no dirty gas, thus maintain good environment for human and save earth from waste.

2 Serve people by high efficiency and money saving

By timer function, users can make use of the electric power at the low point of a day, thus save money for every family.

3 Good for life with safe running

To use heat pump for heating can avoid electrical shot and burning, thus keep people free from explosion or poisoning.

4 Easy operation

Heat pump is controlled and protected by micro-computer based controller; the desired water temperature is set according to real requirement. System protection program will guarantee the unit to be running at hard environment.

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. Device description

The running range of the heat pump:

Heating:

- the ambient temperature from -25°C to 43°C;
- inlet water temperature from 55°C to 15°C.

Cooling:

- the ambient temperature from 21°C to 43°C;
- Inlet water temperature from 8°C to 28°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, to produce hot water at more than 60°C. So it can work with the floor heating pipe, the fan coil or the radiator, and replace the boiler directly.

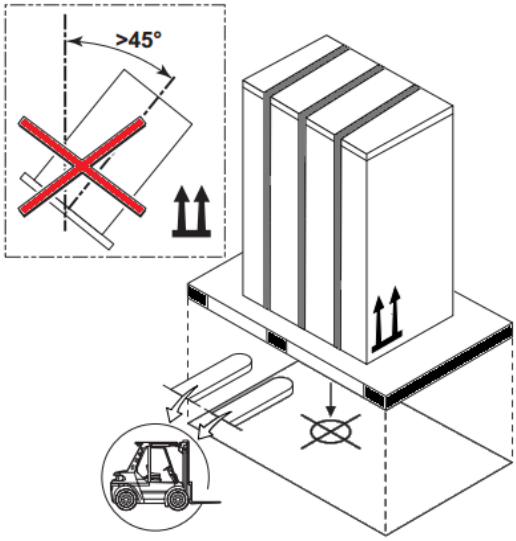
In addition, the high temperature heat pump can be used to provide hot water for sanitary use, like kitchen, shower, etc.

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.

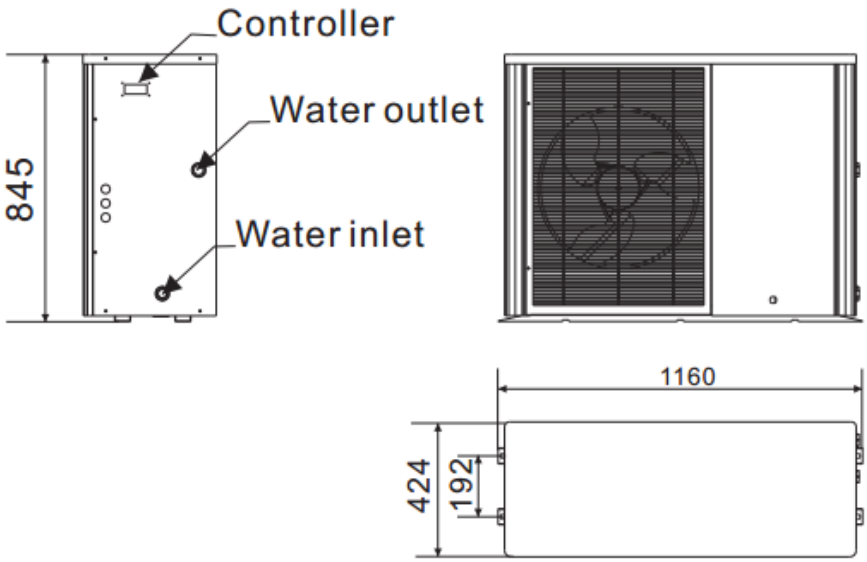
10. Reception check

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.

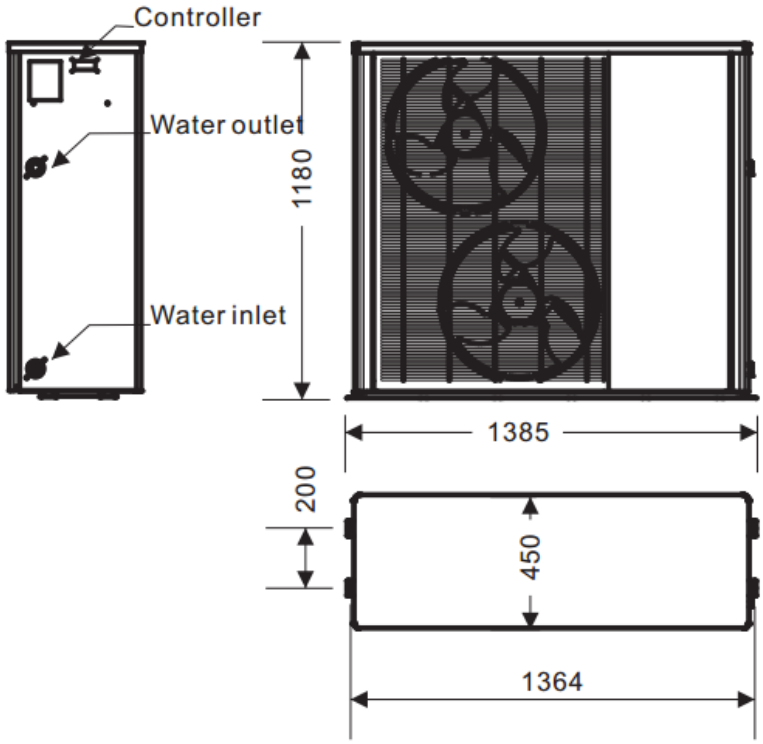
Verify that all parts ordered were received as specified and if the type, size and voltage of the unit are correct.

11. Dimension

11.1 Model: FF Evi 10

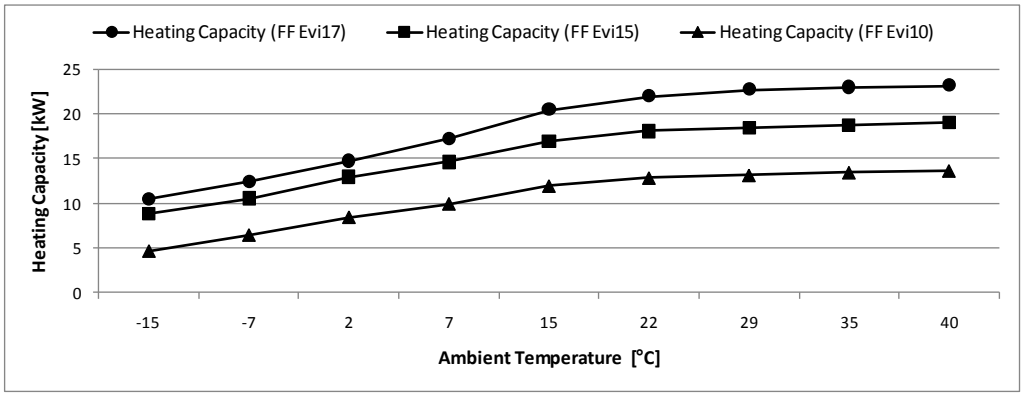


11.2 Model: FF Evi 15 and FF Evi 17

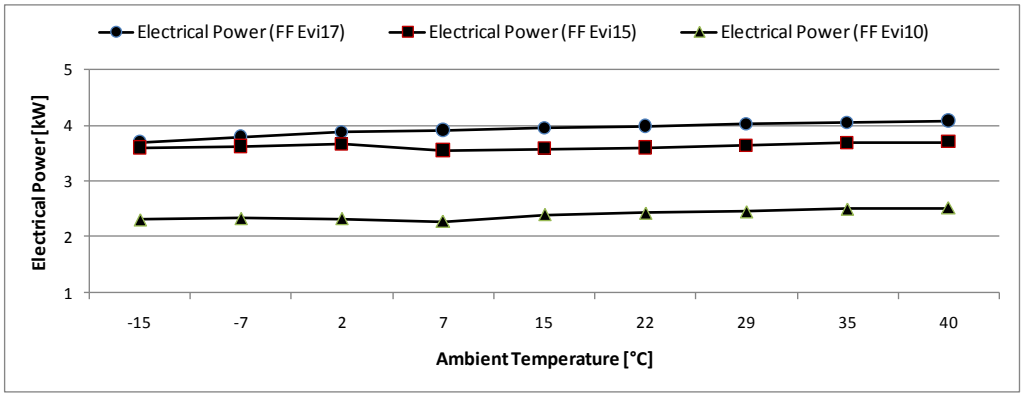


12. Performance

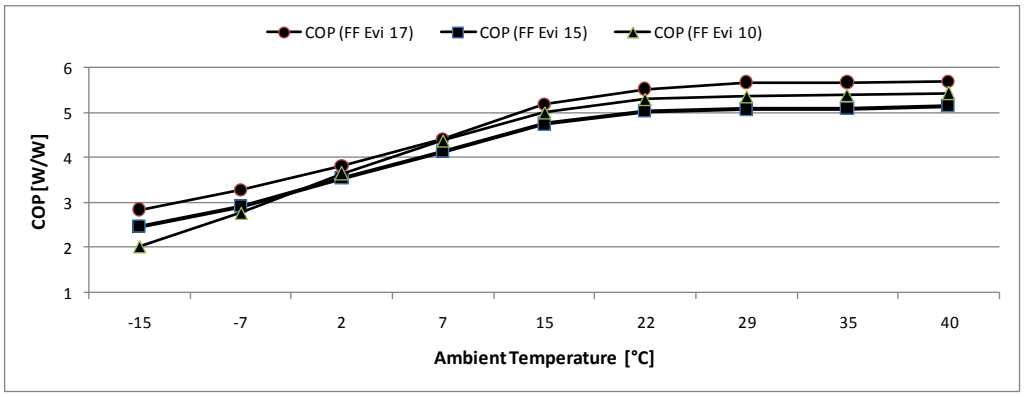
12.1 Heating Capacity (*)



12.2 Electrical Power (*)



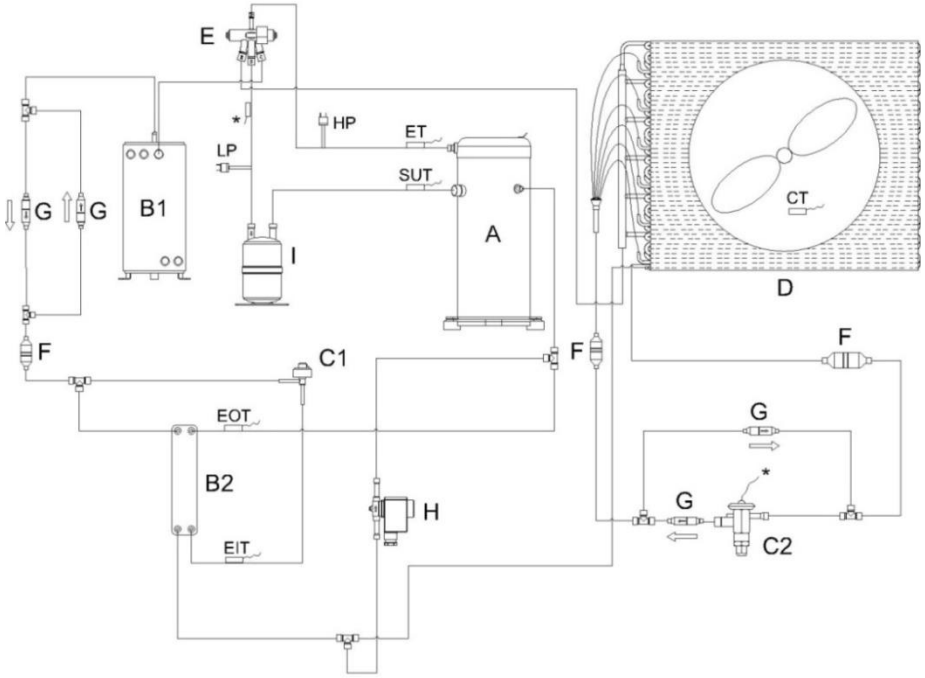
12.3 Coefficient of performance (*)



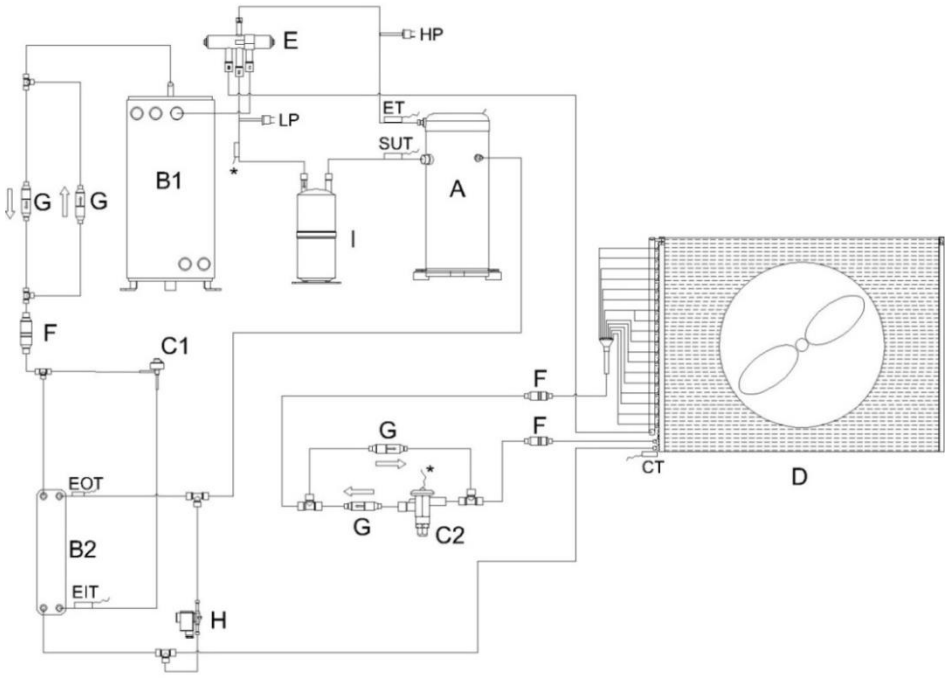
(*)Heating condition (EN14511: 2011); water temperature 30/35ºC; backup system OFF.

13. Cooling/ Heating circuit

3.3 Model FF Evi 10



3.4 Model FF Evi 15 and FF Evi 17



14. Specifications data

Heat pumps models	units	FF Evi 10	FF Evi 15	FF Evi 17
HEATING [1)]				
Heating capacity	kW	9,15	14,61	16,95
Power input	kW	2,28	3,53	3,91
COP	---	4,02	4,13	4,34
COOLING [2)]				
Cooling capacity	kW	6,2	9,5	12,0
Power input	kW	2,3	3,5	4,5
EER	---	2,7	2,71	2,78
ELECTRICAL HEATER (BACKUP)				
Electrical heater	kW	1,5	3,0	3,0
Electrical heater running current	A	6,8	13,5	4,5
Power supply	V~	220/240	220/240	380/420
HEAT PUMP SPECIFICATIONS DATA				
Power input	kW	4,0	5,8	6,7
Current input	A	20,2	30	14,4
Max current input (with backup)	A	20,2+6,8	30+13,5	14,4+4,5
Power supply	V	220/240	220/240	380/420
Frequency	Hz	50	50	50
Sound	db(A)	46	50	52
Compressor quantity	---	1	1	1
Compressor type	---	Scroll	Scroll	Scroll
Fan quantity	---	1	2	2
Refrigerant type	---	R407C	R407C	R407C
Refrigerant load	Kg	3,5	5,5	5,5
Hydraulic connections	Inches	1	1	1
Water pressure drop	kPa	17	34	34
Min. flow	m^3/h	1,5	2,6	2,8
Net weight	Kg	116	213	205

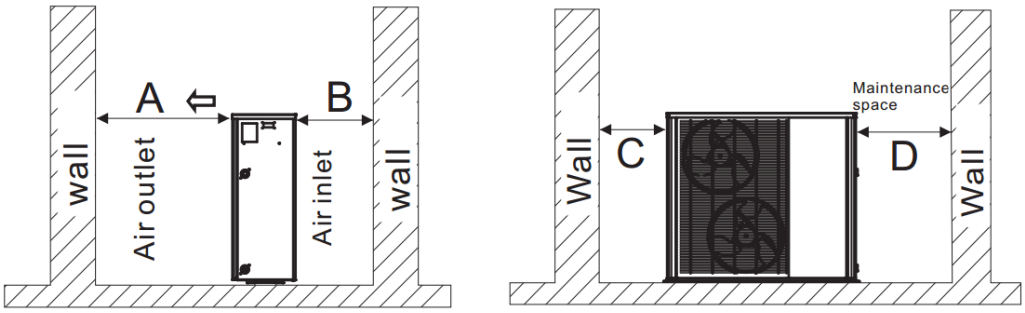
1) Heating condition (EN14511: 2011):
- outdoor temperature DB/WB 7°C/6°C;
- outlet water 35°C;
- inlet water 30°C.

2) Cooling condition (EN14511: 2011):
- outdoor temperature DB/WB 35°C/24°C;
- outlet water 7°C;
- inlet water 12°C.

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.



ATTENTION	Requirements			
	A	B	C	D
	>1500mm	>1000mm	>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:

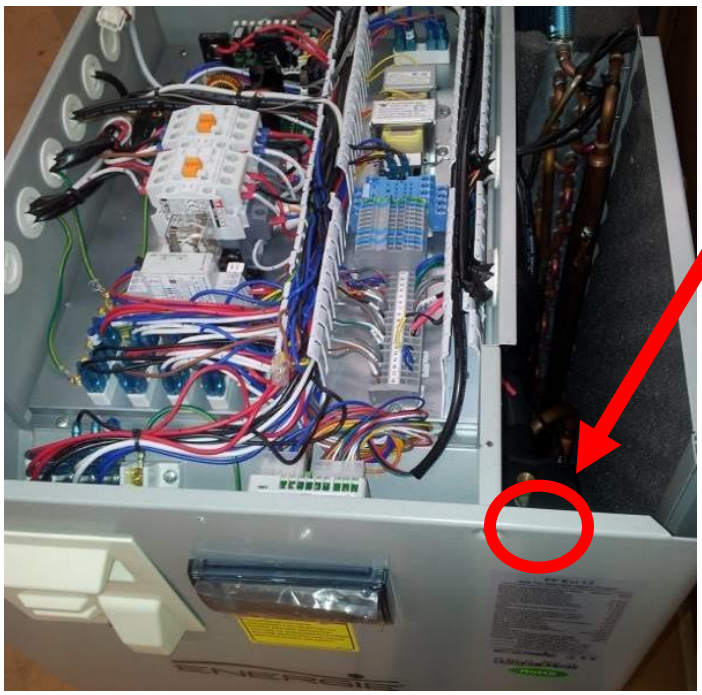
- Keep pipe work as free from bends as possible to keep back pressure in the system to a minimum. Make sure that fittings, manifolds, water pumps and valves in the system are designed for full flow as restrictions in the system from these can materially and adversely impact upon the performance of the 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.

ATTENTION

On the water circuit of the equipment, it's normal to have air accumulated after the installation. To start the equipment it's necessary to make the purge of the air on the circuit. The air tends to be on the upper point of the circuit. So the equipment has an air vent on this upper point that should be used to remove all the air on the water circuit of the equipment.



The installer should make the purge on this air vent until reach a small water trickle.

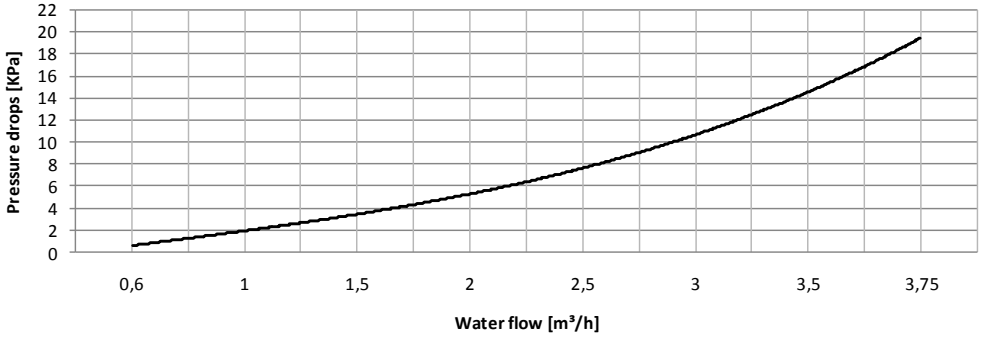
15.4 Water filter

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 BC

15.5 Pressure drops (water filter ø1”)



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.

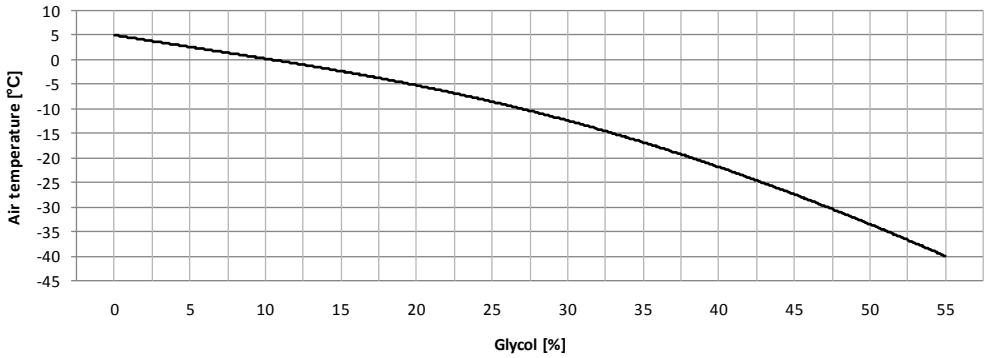
If the specific system volume is greater than 25 liters/kW heating output (e.g. through the installation of a hot water buffer storage), then the maximum permissible calcium carbonate input from the charging and backfilling water should be calculated in accordance with the VDI guideline 2035. In some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

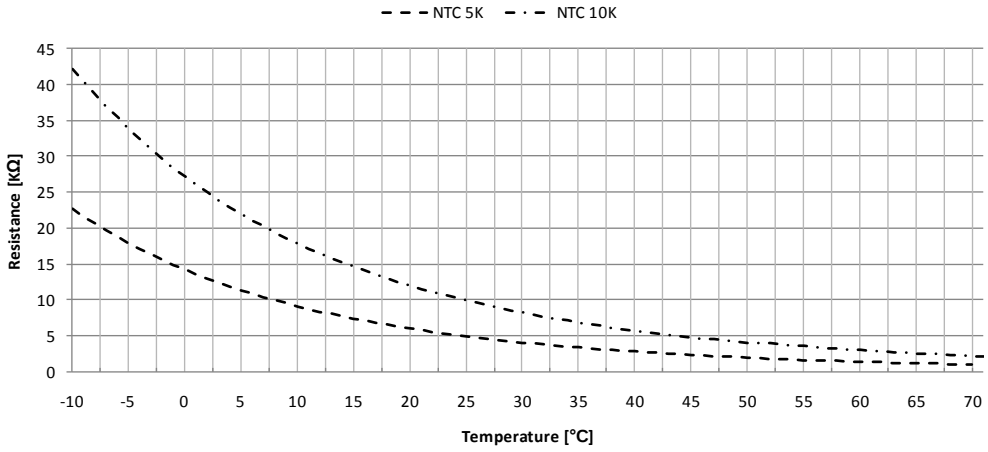
15.7 Glycol (%)

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

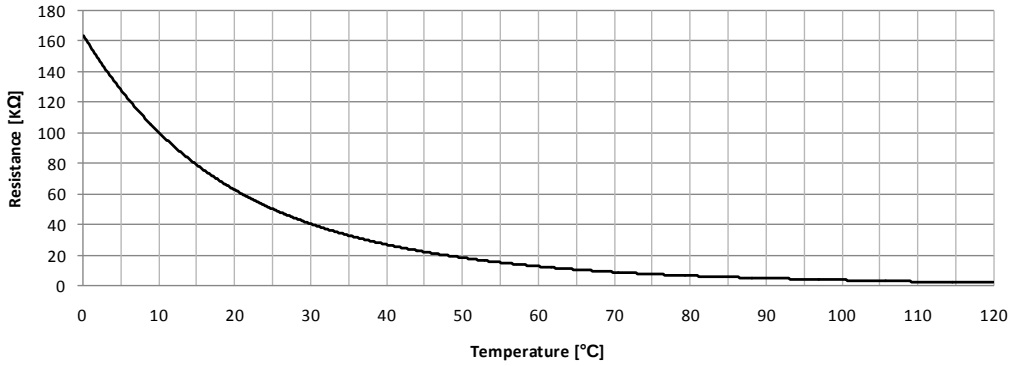


15.8 Temperature probes (temperature vs KΩ)

NTC 5KΩ and NTC 10KΩ



NTC 50KΩ



15.9 Power supply connection

- Open the front panel, and open the power supply access.
- 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.
- If the outside water pump is needed, please insert the power supply wire into the wire access also and connect to the water pump terminals.
- If an additional auxiliary heater is need to be controlled by the heat pump controller, the relay (or power) of the aux-heater must be connected to the relevant output of the controller.

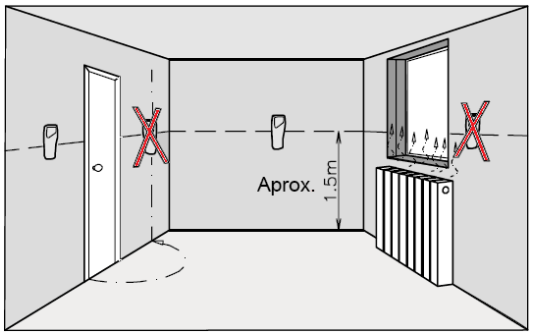
15.10 Cable and switch

- 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.

15.11 Room thermostat installation

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.

15.12 Electrical wiring

Model	Power source	Max. current	* Power source cable section
FF Evi 10	220/240V~ /50Hz	27 A	4 mm²
FF Evi 15	220/240V~ /50Hz	43,5 A	6 mm²
FF Evi 17	380/420V~ /50Hz	19 A	2,5 mm²

***** The above wire sizes are selected at the maximum current of the unit according to the European Standard EN60335-1 and considering a cable length of 10 meters.

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

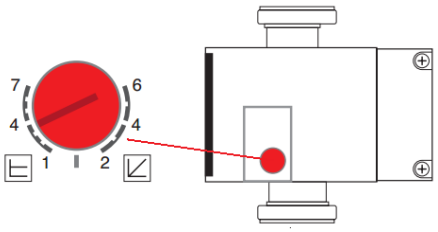
Select the main switches according to the next table:

Model	Power source	Max. current	CB	ELB (no. poles/A/mA)
FF Evi 10	220/240V~ /50Hz	27 A	32 A	2/32/30
FF Evi 15	220/240V~ /50Hz	43 A	63 A	2/63/30
FF Evi 17	380/420V~ /50Hz	19 A	25 A	4/25/30

CB – Circuit breaker; ELB – Earth leakage breaker.

15.13 Water circulator

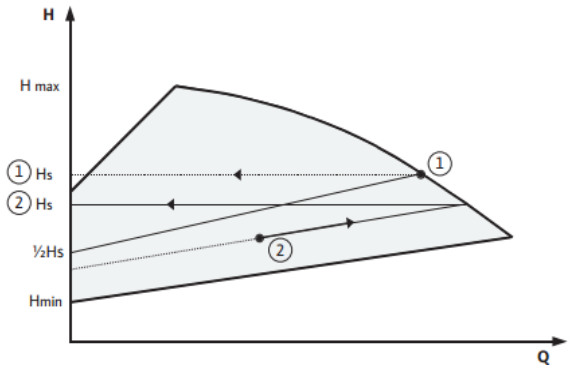
The pump is operated using the red operation knob.



Control modes:

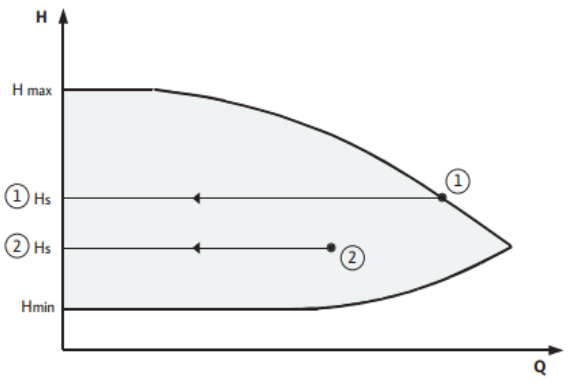
Variable differential pressure (Δp-v)

The differential pressure setpoint Hs is increase linearly over the permitted volume flow range between ½ Hs and H. The differential pressure generated by the pump is adjusted to the corresponding differential pressure setpoint. This control mode is especially useful in heating systems with radiators, since the flow noises at the thermostatic valves are reduced.



Constant differential pressure (Δp-v)

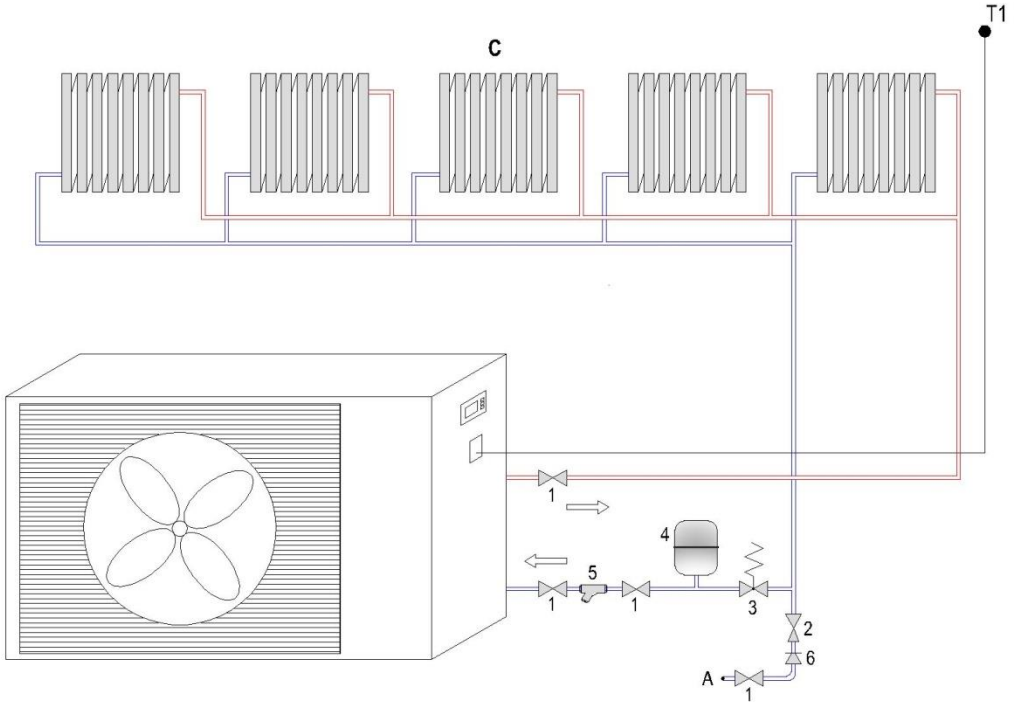
The differential pressure setpoint Hs is kept constant over the permitted volume flow range at the differential pressure setpoint up to the maximum pump curve. This control is recommended for under floor heating circuits or older heating systems with large size pipes as well as for all applications with changeable pipe system curve



16. Installation (typical application)

16.1 Normal heating or 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 or 50 degrees for fan coil, 35 to 50 degrees for radiator, or other temperature at customer request.
For cooling, the water can be cold down to 8 degrees for fan coil.

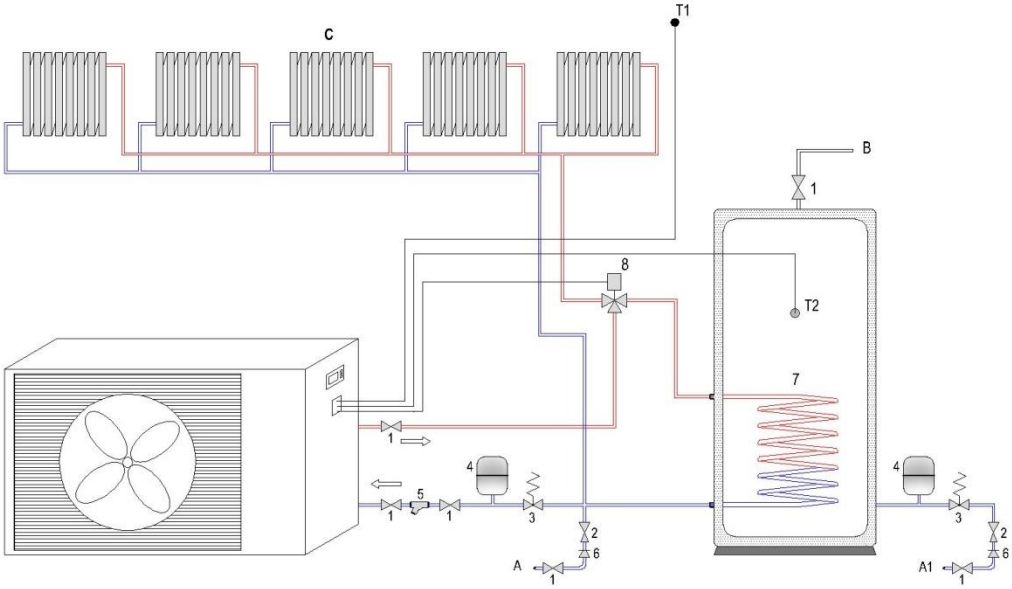


IMPORTANT:
This drawing just shows the core parts and main principle of the application, there are many parts can be installed such as water pressure meters, water temperature meter, drainage etc.

16.2 House heating and DHW

Since the high temperature heat pump can heat the water to 60 degrees, it can provide sanitary hot water for family, by use a hot water tank.

NOTE: If you want to use two different set points, example 45ºC degrees for fan coil and 60 degrees for DHW, It is necessary do some modifications, please check the chapter 17.11 Configure HP with two different set points (CH and DHW).

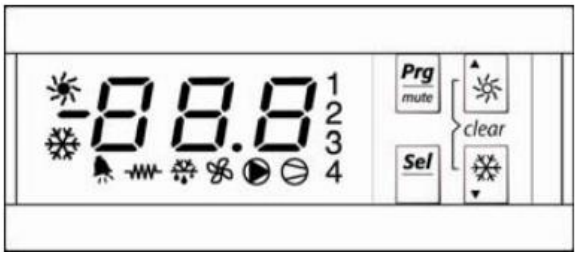


IMPORTANT:
This drawing just shows the core parts and main principle of the application, there are many parts can be installed such as water pressure meters, water temperature meter, drainage etc.

17. Controlling and operation

17.1 User interface

The front panel contains the display and keyboard, made up from 4 keys, which, pressed individually or together, allow to perform all of the controller programming operations.



17.2 Display

The display features 3 digits, with the display of the decimal point between -99.9 and 99.9. Outside of this range of measurement, the value is automatically displayed without the decimal (even if internally the unit still operates considering the decimal part). During the programming it shows the codes of the parameters and their value.

Icon	Colour	Meaning	
		Led ON	Led flashing
1, 2	Amber	Compressor 1 and/or 2 ON	Start up request
3, 4	Amber	Not used	Not used
	Amber	At least 1 compressor ON	Start up request
	Amber	Condenser pump ON	Start up request
	Amber	Condenser fan ON	---
	Amber	Defrost active	Defrost request
	Amber	Heater ON	---
	Red	Alarm ON	---
	Amber	Chiller mode	Chiller mode request
	Amber	Heat pump mode	H.P. mode request

17.3 Keypad

Button	Unit state	Pressure mode
Prg mute	Return to upper level up to exit (with saving in EPROM)	Single press
Sel	Access to parameters type “Direct”. Selection and display of type “Direct” parameter value. Confirm the parameter values/ changes.	Single press
Prg mute + Sel	Parameters programming via introduction of password	Press for 5 s
▲ + ▼	Alarms manual reset Immediate timer reset (hour counter)	Press for 5 s
▼ (DOWN)	Value decrease Select previous parameter	Single or continuous press
	Immediate access to values read by the probes	Single press
▲ (UP)	Value increase	Single of continuous press
	Immediate access to values read by the probes	Single of continuous press
	Switch from stand-by to chiller mode and vice versa	Single press
	Selection of successive parameter	Press for 5 s
Sel + ▲	Start manual defrost	Press for 5 s

17.4 Start or stop the unit

Press“ ▲ ”last 5 seconds to start or stop unit the LED display as following :

If you press“ ▲ ”, the unit will be heating mode;

If you press“ ▼ ”, the unit will be cooling mode;

NOTE: The timings of the compressor have priority over any order executed on keyboard or thermostats.

17.5 View probes values

To check the probes value must perform the following procedures:

a) Go to the controller “µC²SE” and;

b) Press " ▲ " or " ▼ " keys and you have access to the probes values.

Probe	Description
B1	Water temperature (Inlet)
B2	Water temperature (Outlet)
B3	Evaporator temperature
B4	Suction pressure in heating mode (absolute value).
	Compression pressure in cooling mode.

17.6 Access levels/ Programming

The parameters divide into 4 different levels according to their accessibility by the user via password and their function.

“Factory”: it allows the configuration of all unit parameters;

“Super User”: accessible with password (11), it allows the configuration of the Super User, User and Direct parameters;

“User”: accessible with password (22), it allows the configuration of those parameters that can be set typically by the user and Direct, therefore relative to the options.

“Direct”: accessible by pressing “ Sel ” for 5 s, it allows to read the probes and any data, which can be interrogated by anyone without compromising unit operation.

17.7 Parameters modification procedure

a. Press “ Prg/mute “ and “ Sel ” for 5 s;
b. The ▲ and ▼ symbols appear along with “00”;
c. Set the password via “ ▲ ” or “ ▼ ” and confirm with “ Sel “;
d. Select the parameters menu (S-P) via “ ▲ ” or “ ▼ “. Confirm with “ Sel ”;
e. Select the parameters category (A,b,c,d..) via “ ▲ ” or “ ▼ “. Confirm with “ Sel ”;
f. Select the parameter via “ ▲ ” or “ ▼ “. Confirm with “ Sel ”;
g. Modify the parameter value with “ ▲ ” or “ ▼ ;

h. After modification, press "Sel" to confirm or "Prg/mute" to annul the modification;

i. Press "Prg/mute" to return to the previous menu;

j. To save the modifications, press "Prg/mute" several time until going back to the main menu.

ATTENTION

The parameters modified without confirmation via the "Sel" key go back to the previous value;

If no operations are performed on the keyboard for 60 seconds, the controller exits the parameter modification menu by timeout and the changes are cancelled.

17.8 Configure/ change cooling and heating set points

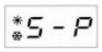
Parameter	Description
R01	Cooling setpoint
R02	R01 differential
R03	Heating setpoint
R04	R03 differential

To configure the cooling and heating set points in the Heat Pump must perform the following procedures:

1. Go to the controller "µC²SE" and following the next steps:

a) Press simultaneously the "Prg/mute" and "Sel" keys during 5 s;

b) Set the password (11) via "▲" or "▼" keys and confirm with "Sel" key;

c) With "▲" or "▼" keys select the menu parameter  and enter with "Sel" key;

d) With "▲" or "▼" keys select the parameter  and enter with "Sel". Key;

e) With "▲" or "▼" keys go to the parameter r01 **(cooling mode set point)**, enter with "Sel" key and set the new set point, save the value with "Sel" key,

f) With "▲" or "▼" keys go to the parameter r02 **(cooling mode differential)**, enter with "Sel" key and set the new set point, save the value with "Sel" key,

g) With " ▲ " or " ▼ " keys go to the parameter r03 **(heating mode set point)**, enter with " Sel " key and set the new set point, save the value with " Sel " key,

h) With " ▲ " or " ▼ " keys go to the parameter r04 **(heating mode differential)**, enter with " Sel " key and set the new set point, save the value with " Sel " key,

i) To return to the previous menu press one time " Prg/mute " key and two times to menu exit.

ATTENTION

The parameters modified without confirmation via the " Sel " key go back to the previous value;

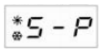
17.9 Configure/ change backup set point

Parameter	Description
A08	Backup setpoint
A09	A08 differential
A16	Backup delay

1. Go to the controller "µC²SE" and following the next steps:

a) Press simultaneously the " Prg/mute " and " Sel " keys during 5 s;

b) Set the password (66) via " ▲ " or " ▼ " keys and confirm with " Sel " key;

c) With " ▲ " or " ▼ " keys select the menu parameter  and enter with " Sel " key;

d) With " ▲ " or " ▼ " keys select the parameter  and enter with " Sel ". Key;

e) With " ▲ " or " ▼ " keys go to the parameter **A08 (Backup set point)**, enter with " Sel " key and set the new set point, save the value with " Sel " key,

f) With " ▲ " or " ▼ " keys go to the parameter **A09 (Backup differential)**, enter with " Sel " key and set the new set point, save the value with " Sel " key,

g) With " ▲ " or " ▼ " keys go to the parameter **A16 (Backup delay)**, enter with " Sel " key and set the delay time, save the value with " Sel " key,

h) To return to the previous menu press one time " Prg/mute " key and two times to menu exit.

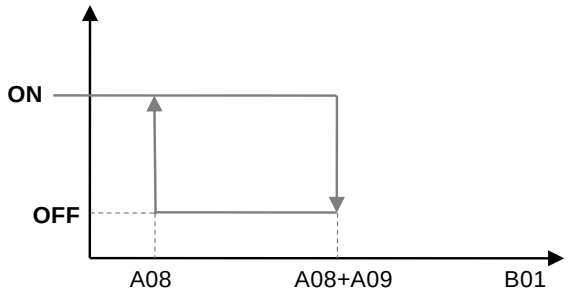
ATTENTION

The parameters modified without confirmation via the " Sel " key go back to the previous value;

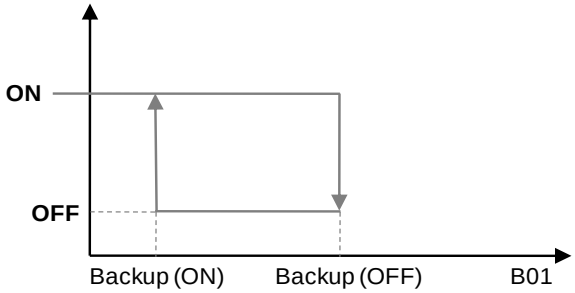
17.10 Configure/ change backup set point

The backup system has 2 operating modes:

Standard Mode:



Mode 2 (only when the second circuits are configured)



Backup (ON) = R22 – (R03 – R08);

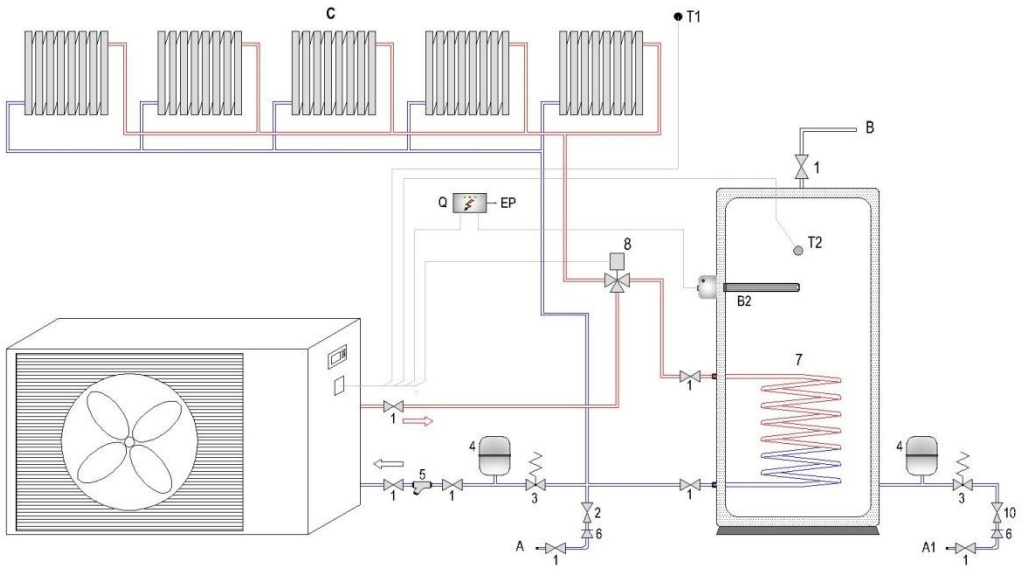
Backup (OFF) = Backup(ON) + R09;

Parameter	Description
B01	Water temperature (Inlet)
A08	Backup setpoint

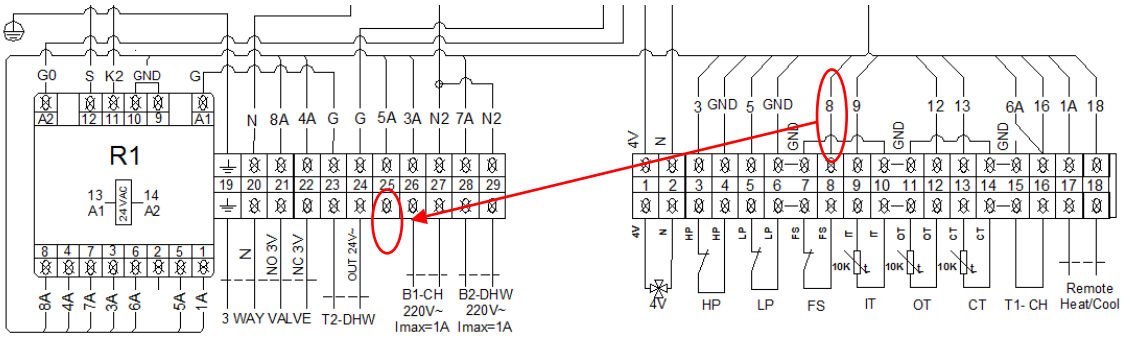
A09	A09 differential
R03	Heating Setpoint
R22	Second Setpoint (only heating mode)

17.11 Configure HP with two different set points (CH and DHW)

To configure the Heat Pump operation with two different set points, ex. 45 °C for the central heating and 55 °C for DHW, must perform the following procedures:



1. Physically enable the second set point (DHW), <u>move the wire **8** for the terminal connection **25**</u>.



2. Go to the controller "µC²SE" and following the next steps:

a) Press simultaneously the "Prg mute" and "Sel" keys during 5 s;

b) Set the password (11) via "▲" and "▼" keys and confirm with "Sel" key;

c) With "▲" and "▼" keys select the menu parameter SP and enter with "Sel" key;

d) With "▲" and "▼" keys select the parameter r- and enter with "Sel". Key;

e) With "▲" and "▼" keys go to the parameter r22, enter with "Sel" key and set the setpoint to DWH, save the value with "Sel" key,

f) Return to the previous menu with "Prg mute" key;

g) With "▲" and "▼" keys select the menu parameter -P- and enter with "Sel" key;

h) With "▲" and "▼" keys go to the parameter P08, enter with "Sel" key and change the value to 13, save the value with "Sel" key;

i) To return to the previous menu press one time "Prg mute" key and two times to menu exit.

After this update the HP are ready to work with two different set points.

Parameter	Description
R03	Heating Setpoint
R04	Differential R03 and R22
R22	Second setpoint
P08	Configure second setpoint

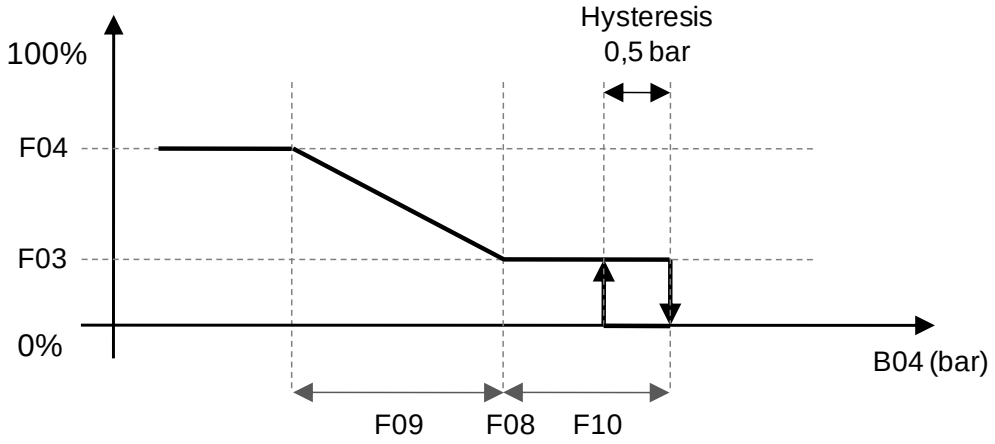
ATTENTION

- **P08 default value, P08 = 02;**
- **The parameters modified without confirmation via the " Sel " key go back to the previous value;**
- **The second circuit have priority**

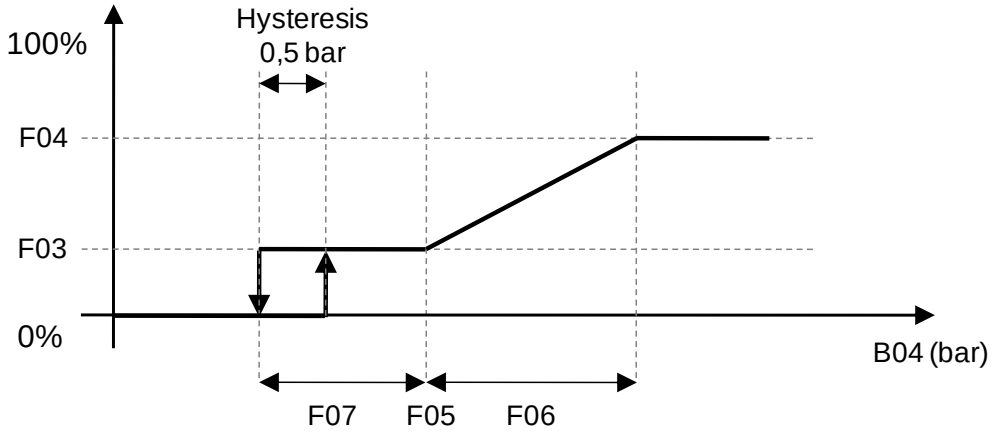
17.12 Fan speed control

With fan speed control modular MCHRTF04C0, the fan motor control curve is as the chart above and the related parameters are set as the following (R407C design):

Fan Speed in heating mode



Fan Speed in cooling mode

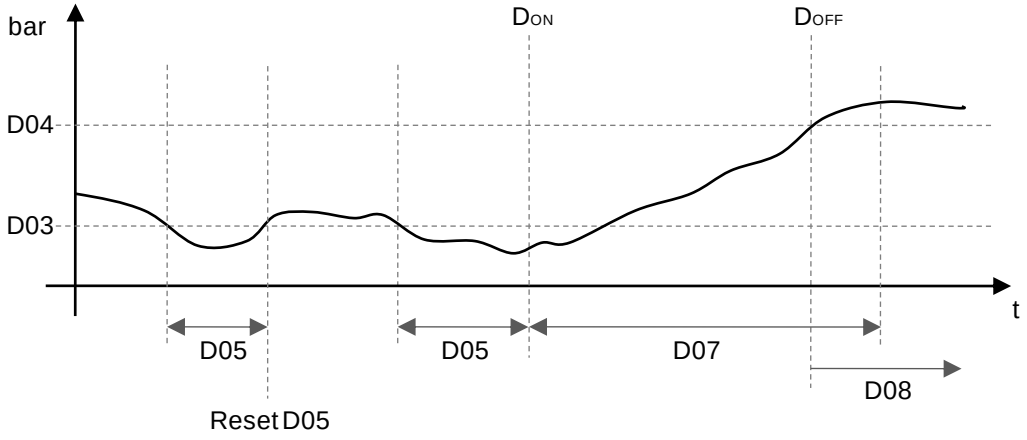


Parameter	Description
B04	Aspiration/ condensation pressure
F03	Minimum fan speed
F04	Maximum fan speed
F05	Setpoint to increasing or keep constant the fan speed
F06	Setpoint to put the fan at maximum speed. $F_{maxspeed}$ → B04 > F05+F06
F07	Setpoint to turn OFF the fan. F_{OFF} → B04 > F05-F07
F08	Setpoint to increasing or keep constant the fan speed

F09	Setpoint to put the fan at maximum speed. $F_{maxspeed} \rightarrow$ B04 < F08 – F09
F10	Setpoint to turn OFF the fan. $F_{OFF} \rightarrow$ B04 > F08 + F10

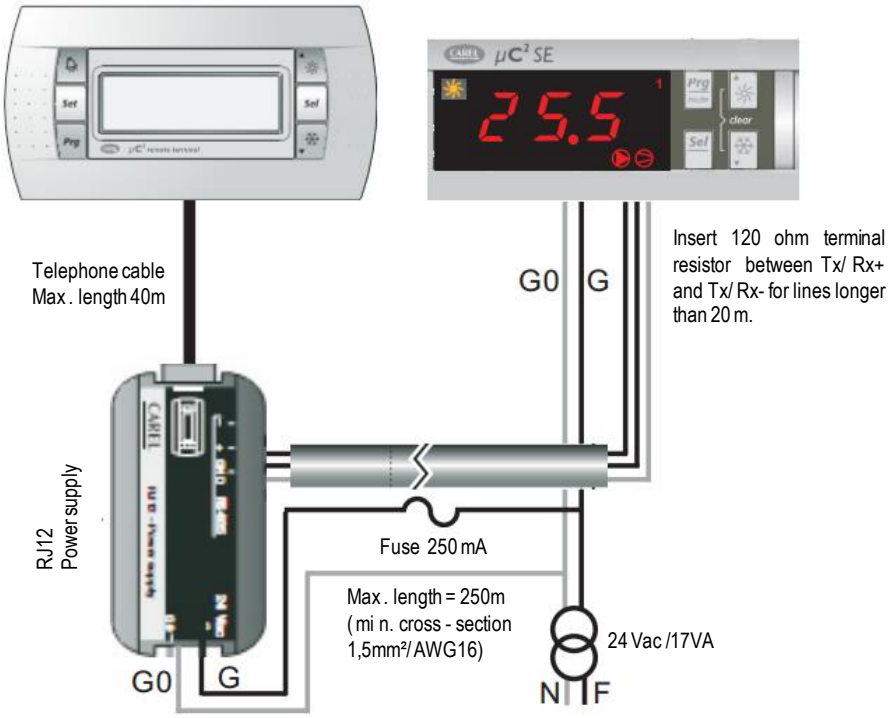
17.13 Defrost cycle

Note: During the defrost cycle the fans remain OFF and the backup system comes into operation.

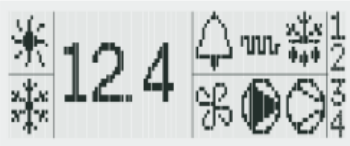


Parâmetros	Descrição
D_{ON}	Start defrost cycle
D_{OFF}	End defrost cycle
D03	Minimum pressure to start the defrost cycle
D04	Pressure to stop defrost cycle
D05	Delay to start defrost cycle
D06	Minimum time to defrost cycle (0 min)
D07	Maximum time to defrost cycle
D08	Delay between defrost cycles.

17.14 Installation of remote controller



To install the remote terminal, no configuration is required on the µC²SE, as the terminal works with any serial address set for parameter H10.Check, however, that is fitted with the serial interface the UC2SE FCSER00000. When firsts witched on the display will show the firmware version of t he UC2SE



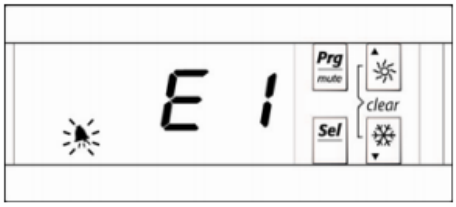
After around 4s the main screen will be displayed, with the symbols that represent the status of the µC²SE.

In the event where the RS485 connection is not performed correctly or the controller is off, the terminal will clear the display and show the message “OFFLINE”.

Pressing the “Up”+“Down”+“Sel” buttons together for more than 6 seconds displays the “INFO” screen containing information on the UC2 system and on the communication .Pressing the “Prg” button returns to the main screen.

17.15 Check alarms list

The alarms cause the LED on the display to switch on, as the below example, probe B1 alarm.



The controller can store up to 25 errors.

To access the list errors go to the controller “µC²SE” and following the next steps:

a) Press simultaneously "Prg mute" and "Sel" keys during 5 s;

b) Set the password (44) via " ▲ " and " ▼ " keys and confirm with " Sel " key;

c) With " ▲ " and " ▼ " keys scroll the list errors and to see the error press " Sel " key. If no errors the display shows “noH”.

d) To exit to the errors menu press "Prg mute" key.

17.16 Alarms list on “µC²SE”

Malfunction	Display	Reason	Resolution
Normal working			
Water inlet temp. Sensor failure	E1	The sensor is open or short circuit	Check or change the sensor
Water outlet temp. Sensor failure	E2	The sensor is open or short circuit	Check or change the sensor
Evaporator sensor failure	E3	The sensor is open or short circuit	Check or change the sensor
Ambient sensor failure	E4	The sensor is open or short circuit	Check or change the sensor
Anti freezing under cooling mode	A1	Water flow rate is not enough	Check the water flow volume, or water system is jammed or not

Flow switch failure	FL	No water/little water in water system.	Check the water flow volume, water pump is failure or not
High pressure protect	HP1	High pressure switch action	Check through each pressure switch and return circuit
Low pressure protect	LP1	Low pressure switch action	Check through each pressure switch and return circuit
Exhaust temperature/ or current protect	tC1	Exhaust temperature or current is too high	Check through exhaust temp. switch and current

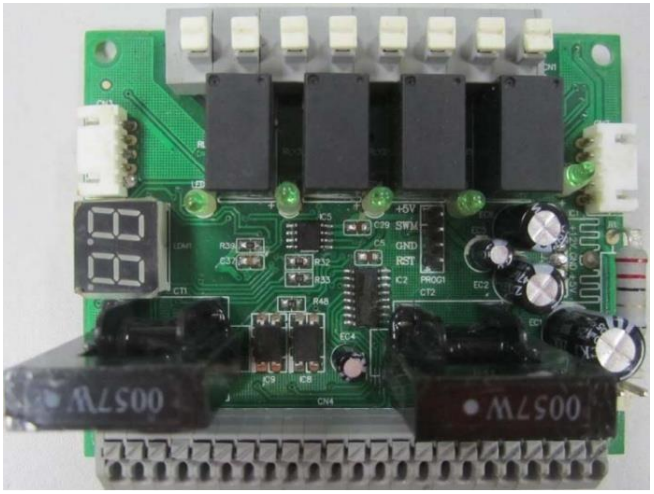
17.17 Parameters "µC²SE"

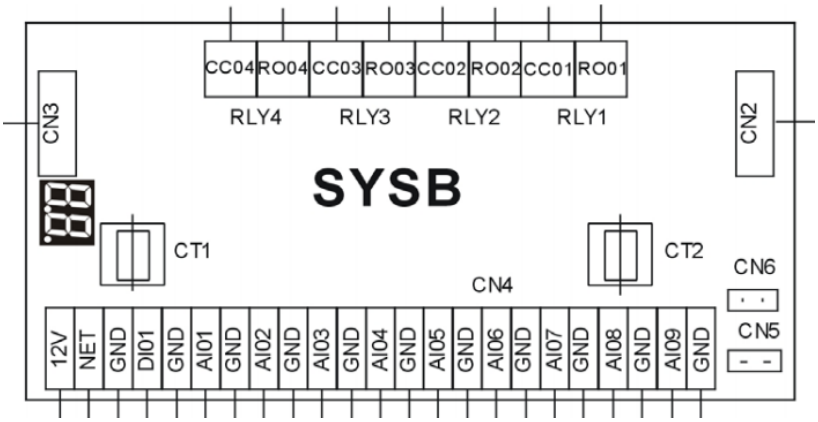
Parameter	Description	Un	Value
BACKUP SISTEM			
A08	Backup setpoint	°C	25
A09	Differential A08	°C	5
A16	Backup delay	min	60
COMPRESSOR			
C01	Minimum time to the compressor remain active after turn ON, even if a stop command occurs. Establishes the minimum activation time of the output, independently from request	s	120
C02	Compressor minimum switch-on time. Establishes the minimum switch-off time if the output, independently from request	s	180
C03	Compressor minimum switch-off time. Establishes the minimum time between two successive switch-ons of the same output.	s	300
C07	Delay to start the compressor after turn ON the water pump	s	60
C08	Delay to stop water pump after turn OFF the compressor	min	2
DEFROST			
D03	Minimum pressure to initiate the defrost cycle. The defrost cycle starts only if the pressure remains below D03 during D05 time.	bar (abs)	2,6
D04	Pressure to stop defrost cycle	bar (abs)	14
D05	Delay to start defrost cycle	s	120
D06	Minimum time to defrost cycle (0 min)	s	0
D07	Maximum time to defrost cycle	min	10
D08	Delay between defrost cycles.	min	45
D11	Backup system ON during defrost cycle	int	1
D12	Inversion time cycle (before initiating the defrost cycle). During this period the compressor is off and is inverted the position of the 4 way valve..	min	1
D13	Inversion time cycle (after defrost cycle). During this period the compressor is off and is inverted the position of the 4 way valve..	min	1
D16	Fan at maximum speed after defrost cycle	s	30

FAN			
F03	Minimum fan speed	%	20
F04	Maximum fan speed	%	100
F05	Setpoint to increasing or keep constant the fan speed	bar (abs)	13
F06	Setpoint to put the fan at maximum speed. $F_{maxspeed}$ → B04 > F05+F06	bar (abs)	2
F07	Setpoint to turn OFF the fan. F_{OFF} → B04 > F05-F07	bar (abs)	6
F08	Setpoint to increasing or keep constant the fan speed	bar (abs)	5,5
F09	Setpoint to put the fan at maximum speed. $F_{maxspeed}$ → B04 < F08 – F09	bar (abs)	1,5
F10	Setpoint to turn OFF the fan. F_{OFF} → B04 > F08 + F10	bar (abs)	2
F13	Fan OFF during the defrost cycle	int	2
CONTROL			
R01	Heating setpoint	°C	12
R02	Differential of R01	°C	3
R03	Cooling setpoint	°C	50
R04	Differential off R03	°C	5
R22	Second setpoint	°C	53

18. Controller SYSB

18.1 Protection module





Connection	Meaning
RO01 / CC01	To system 1 Electromagnetic valve
RO02 / CC02	To system 2 Electromagnetic valve
RO03 / CC03	To system 1 alarm output
RO04 / CC04	To system 2 alarm output
NET/GND/12V	To wire controller
DI01/ GND	Mode digital input
AI01/ GND	System1 anti-freeze temp. sensor
AI02/ GND	System 2 anti-freeze temp. sensor
AI03/ GND	System1 economizer inlet temp. sensor
AI04/ GND	System1 economizer outlet temp. sensor
AI05/ GND	System2 economizer inlet temp. sensor
AI06/ GND	System2 economizer outlet temp. sensor
AI07/ GND	System1 exhaust temp. sensor
AI08/ GND	System2 exhaust temp. sensor
AI09/ GND	Ambient temp. sensor
	LED display when there is some malfunction

18.2 Alarms in controller SYSB

Malfunction	Error / display	Reason	Solution
Normal operation	---	---	---
System 1 exhaust temp. sensor failure		This sensor is open or short circuit	Check or change this sensor
System 2 exhaust temp. sensor failure		This sensor is open or short circuit	Check or change this sensor
Ambient temp. sensor failure		This sensor is open or short circuit	Check or change this sensor
System 1 anti-freeze temp. sensor failure		This sensor is open or short circuit	Check or change this sensor
System 2 anti-freeze temp. sensor failure		This sensor is open or short circuit	Check or change this sensor
System 1 economizer inlet temp. sensor failure		This sensor is open or short circuit	Check or change this sensor
System 2 economizer inlet temp. sensor failure		This sensor is open or short circuit	Check or change this sensor
System 1 economizer outlet temp. sensor failure		This sensor is open or short circuit	Check or change this sensor
System 2 economizer outlet temp. sensor failure		This sensor is open or short circuit	Check or change this sensor
System 1 anti-freeze protection		The outlet water temperature below 4 degree.	Check water flow
System 2 anti-freeze protection		The outlet water temperature below 4 degree.	Check water flow
Communication error		Connection between board and display failure.	Check connection cable
System 1 over-current protection		Compressor 1 actual current > its rated current	Inlet water temperature is too high or ambient temperature is too high
System 2 over-current protection		Compressor 2 actual current > its rated current	Inlet water temperature is too high or ambient

			temperature is too high
System 1 exhaust temp. over-high protection		System 1 exhaust temp. > 110℃	System 1 exhaust temp. < 80℃
System 2 exhaust temp. over-high protection		System 2 exhaust temp. > 110℃	System 1 exhaust temp. < 80℃

19. Troubleshooting and Additional Information

Look over and clear the failure according to below information.

Failure	Possible causes for the failure	Solutions
Heat pump cannot be started	1 - Wrong power supply 2 - Power supply cable loose 3 - Circuit breaker open	1 - Shut off the power and check power supply; 2 - Check power cable and make right connection 3 - Check for the cause and replace the fuse or circuit breaker
Water pump is running with high noise or without water	1 - Lack of water in the piping 2 - Much air in the water loop 3 - Water valves closed 4 - Dirt and block on the water filter	1 - Check the water supply and charge water to the piping; 2 - Discharge the air in the water loop; 3 - Open the valves in water loop; 4 - Clean the water 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; 3 - Clean the air side heat exchanger; 4 - Clean the water filter.
High compressor exhaust	1 - Too much refrigerant; 2 - Low heat exchange rate on air side exchanger	1 - Discharge the redundant gas; 2 - Clean the air side heat exchanger.
Low pressure problem of the system	1 - Lack of gas 2 - Block on filter or capillary 3 - Lack of water flow	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 5 - Wrong setting on return water temp. 6 - Lack of water flow	1 - Check off the power supply; 2 - Replace compressor contactor; 3 - Tighten the power cable; 4 - Check the compressor exhaust temp; 5 - Reset the return water temp; 6 - Clean the water filter and discharge the air in water loop.

High noise of compressor	1 - Liquid refrigerant goes into compressor 2 - Compressor failure	1 - Bad evaporation, check the cause for bad evaporation and get rid of this; 2 - Use new compressor;
Fan do not run	1 - Failure on fan relay 2 - Fan 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; 2 - Heat exchanger broken; 3 - Compressor failure.	1 - Check system leakage and recharge refrigerant; 2 - Find out the cause and replace the heat exchanger; 3 - Replace compressor.
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.

20. Appendix 1 – Glossary

20.1 Cooling/ Heating circuit

A	Compressor	**H**	Electromagnetic 2 way valve
B1	Pipe heat exchanger	**I**	Vapour liquid separator
B2	Plate heat exchanger	**LP**	Low pressure switch
C1	Electronic expansion valve	**HP**	High pressure switch
C2	Thermostatic expansion valve	**SUT**	Suction temperature
D	Evaporator	**ET**	Exhaust temperature
E	4-way valve	**CT**	Coil Temperature
F	Filter	**EOT**	Plate Evaporator oulet temperature
G	Check valve	**EIT**	Plate Evaporator inlet temperature

20.2 Wiring diagrams

AT	Ambient temperature	**IR**	Relay electronic expand valve
CH	Crankcase heater (Compressor)	**KM1**	Contactor of compressor
COMP	Compressor	**K2**	Relay of heater
CT	Coil temperature	**K3**	Relay of water pump
EVIV	Enhanced vapor injection valve	**K5**	Signal relay for compressor start
EIT	Plate Evaporator inlet temperature	**R1**	Relay of 3 way valve (sanitary hot water)
EOT	Plate Evaporator outlet temperature	**LP**	Low pressure protection
ET	Exhaust temperature	**HP**	High pressure protection
E2V	Electromagnetic 2 way valve	**HT**	Electrical heater
OT	Outlet water temperature	**FM**	Fan motor
IT	Inlet water temperature	**FS**	Flow switch
Q	Air switch	**TC**	Transformer
4V	4 way valve	**PH**	Pan heater
PM	Phase monitor	**MTS**	Temperature switch
T1-CH	Room thermostat (voltage free contact).	**T2-DHW**	Domestic hot water thermostat (voltage free contact).
B1-CH	Central heating backup (buffer tank)	**B2-DHW**	Domestic hot water backup

20.3 Hydraulic schemes

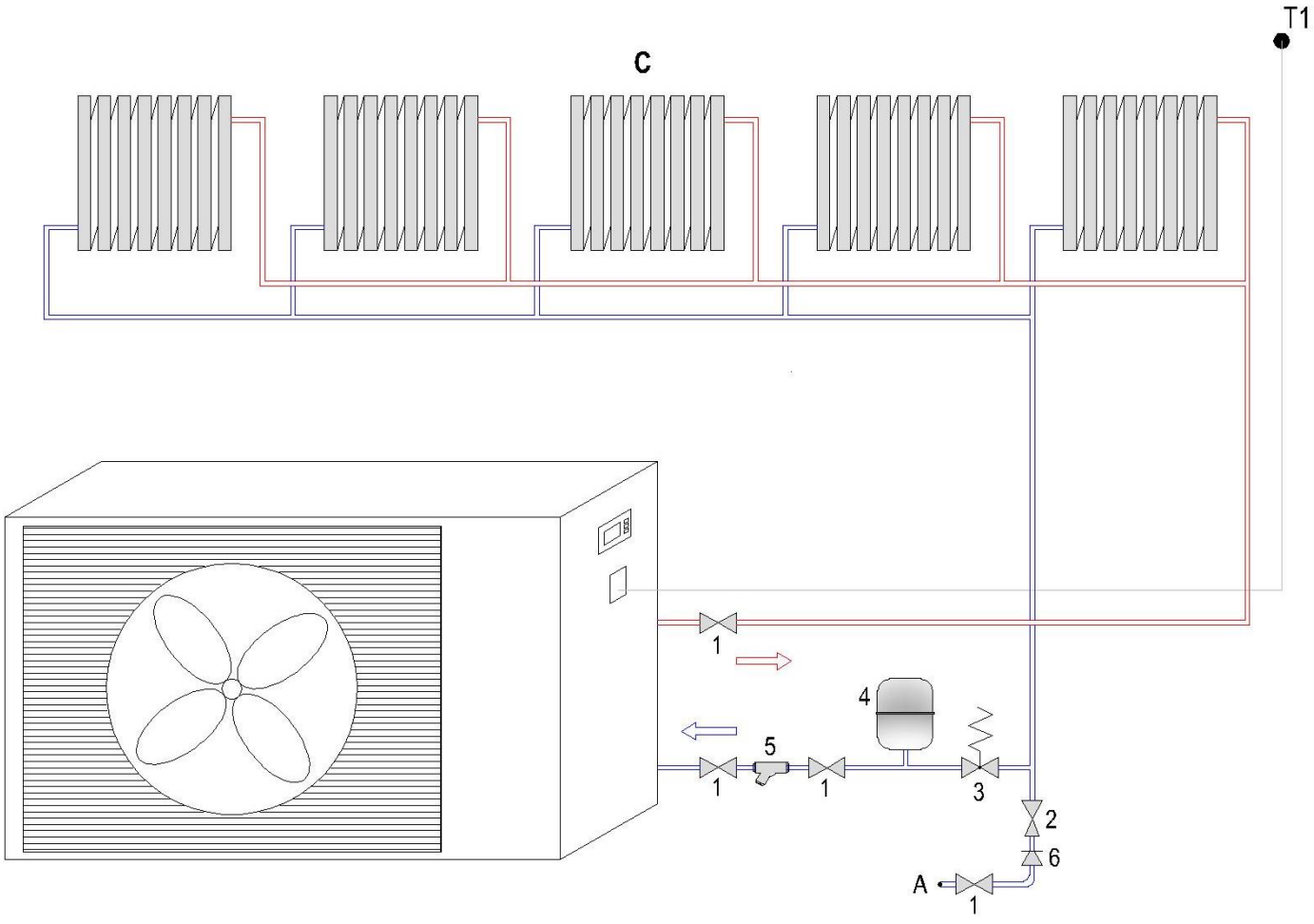
1	Shutoff valve	**A**	Water inlet (central heating)
2	Filling valve	**A1**	Cold water inlet (DHW)
3	Safety valve	**B**	Hot water outlet (DHW)
4	Expansion vessel	**C**	Central heating (radiators, floor heating or fan coils)
5	Filter	**BT**	Buffer tank
6	Valve (non-return)	**P1**	Water circulator
7	Water tank (DHW)	**T1**	Room thermostat
8	3 way valve	**T2**	DHW thermostat
9	Automatic air vent	**B1**	Electric heater kit (Backup)
10	Pressure reducing valve	**B2**	Electric heater kit (Backup)
EP	Backup external power connection	**Q**	Backup control board

21. Appendix 2 – Hydraulic schemes

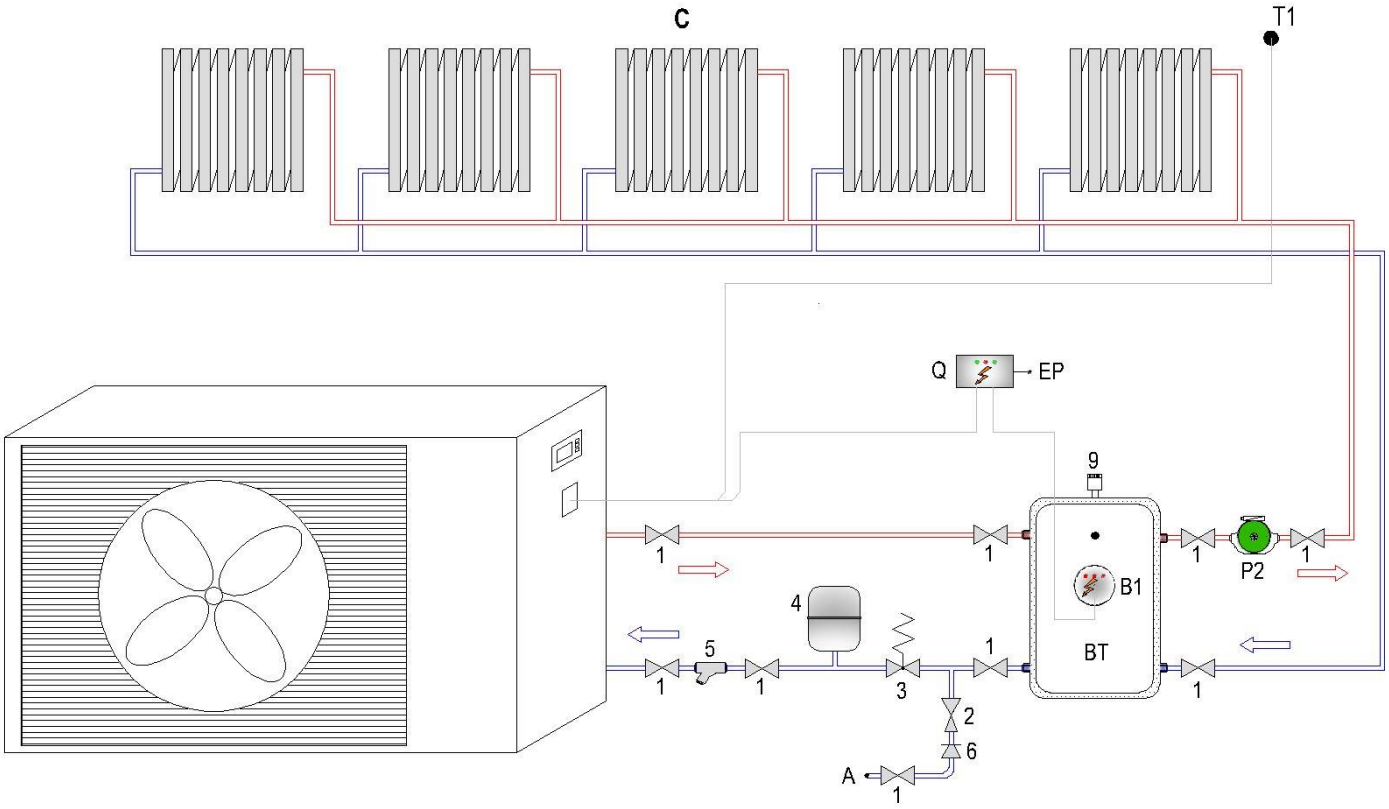
IMPORTANT:

- These hydraulic drawings just show the core parts and main principle of the application.
- Backup power supply (B1-CH e B2-DHW) must be provided by an external power supply. The HP provide only a command line (220V~/ Imax= 1A).
- Output to 3 way valve 220V~/Imax=2A

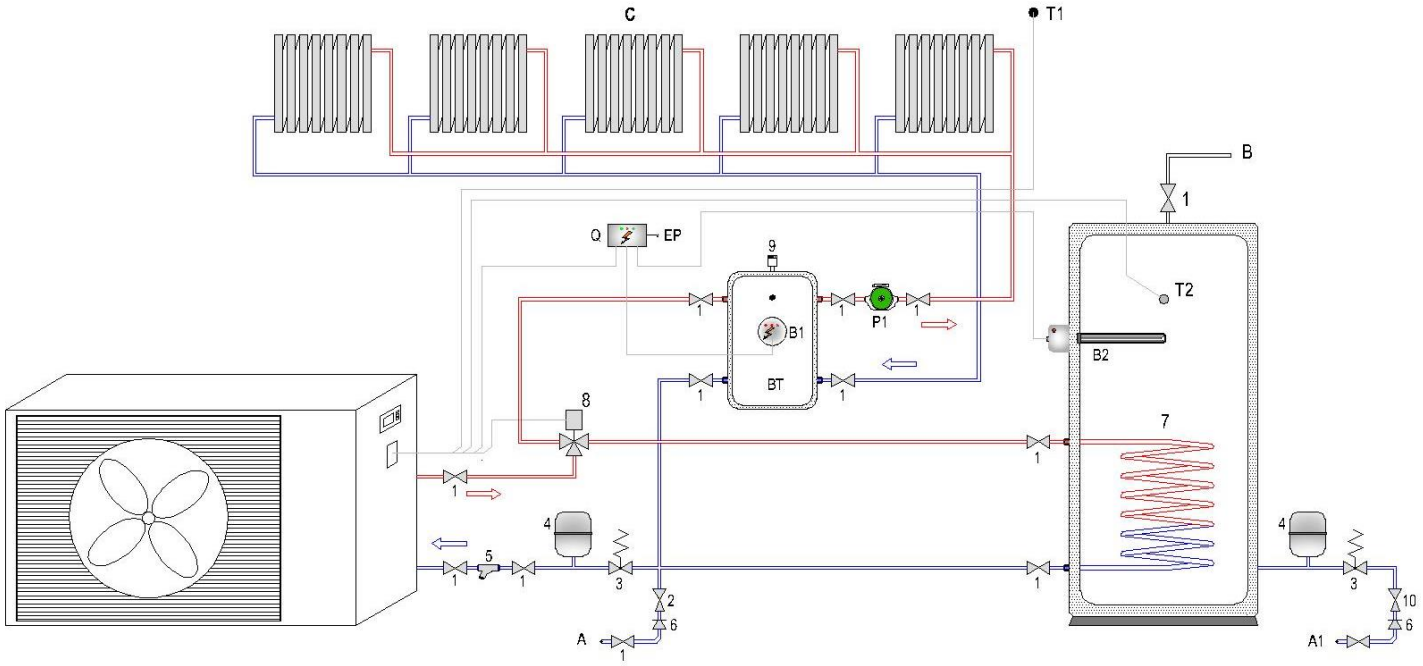
21.1 Central heating/ cooling



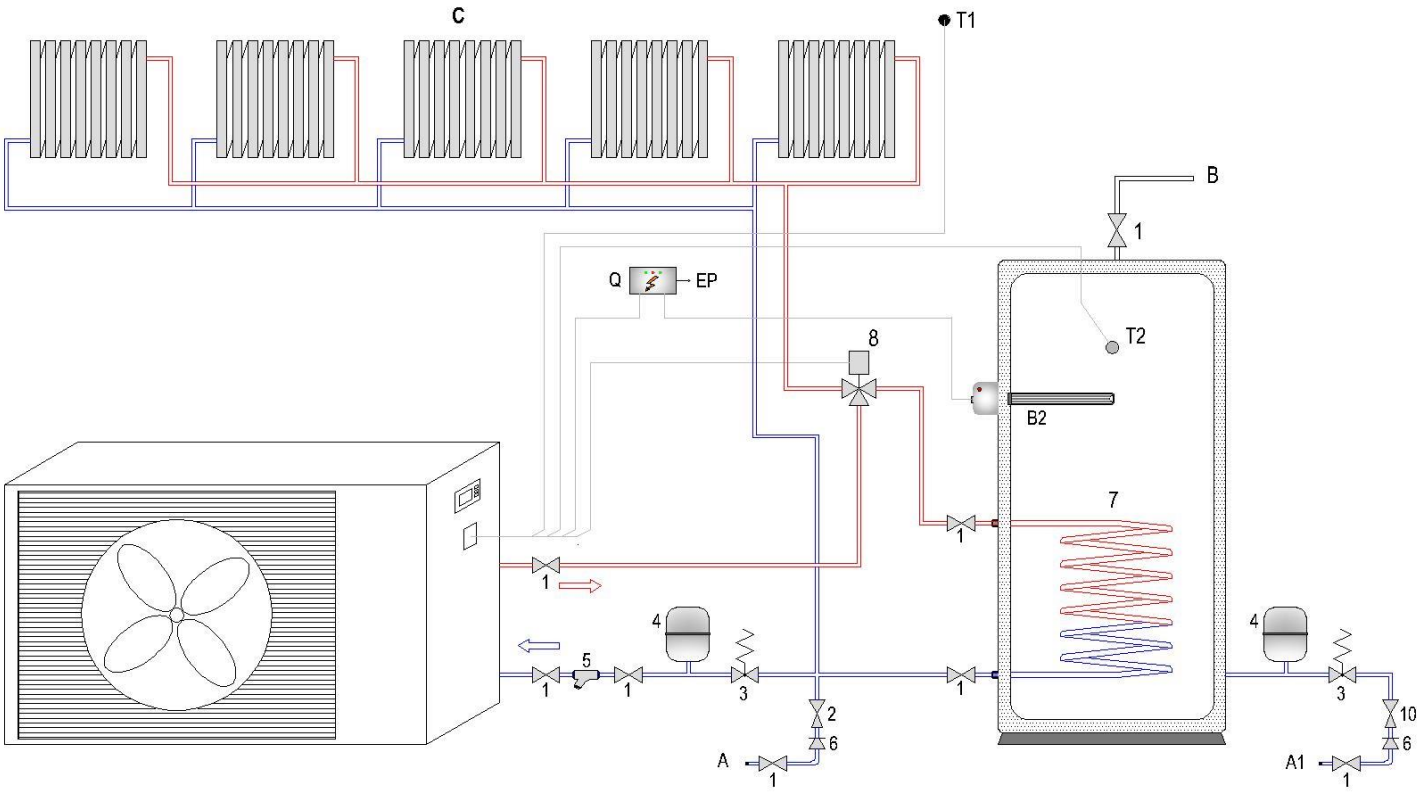
21.2 Central heating/ cooling with buffer tank



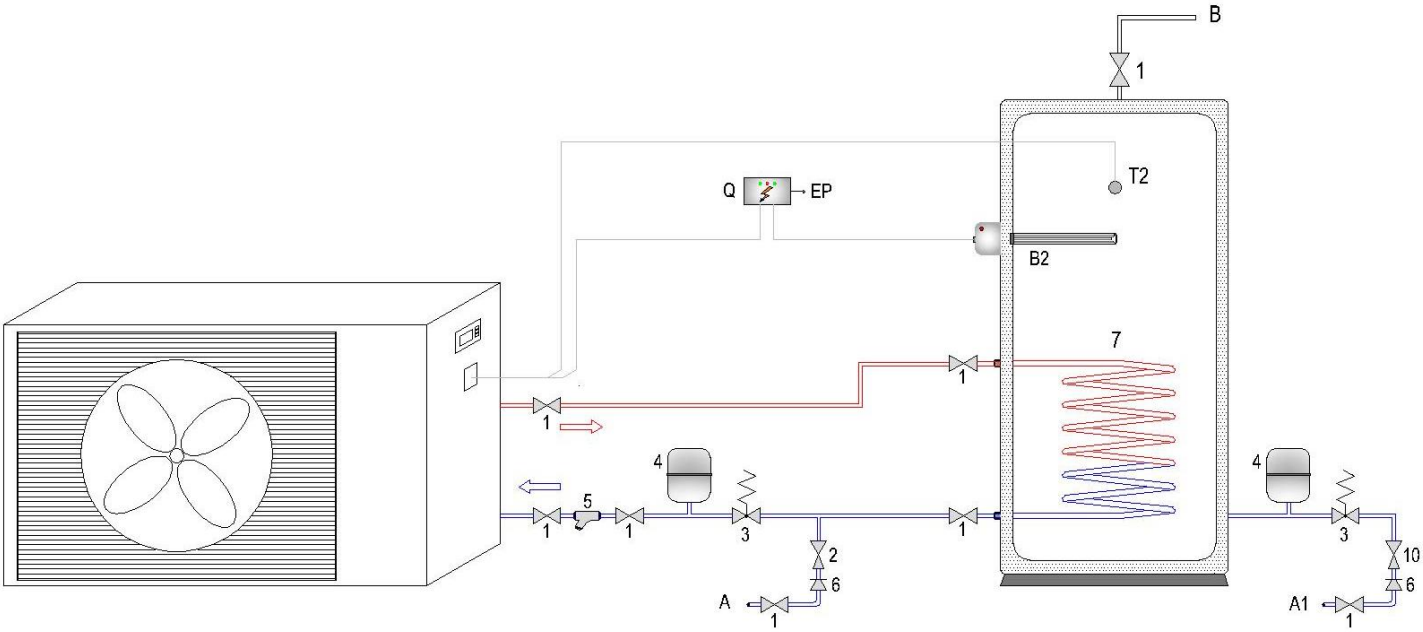
21.3 Central heating/ cooling with buffer tank and DHW



21.4 Central heating/ cooling and DHW



21.5 DHW



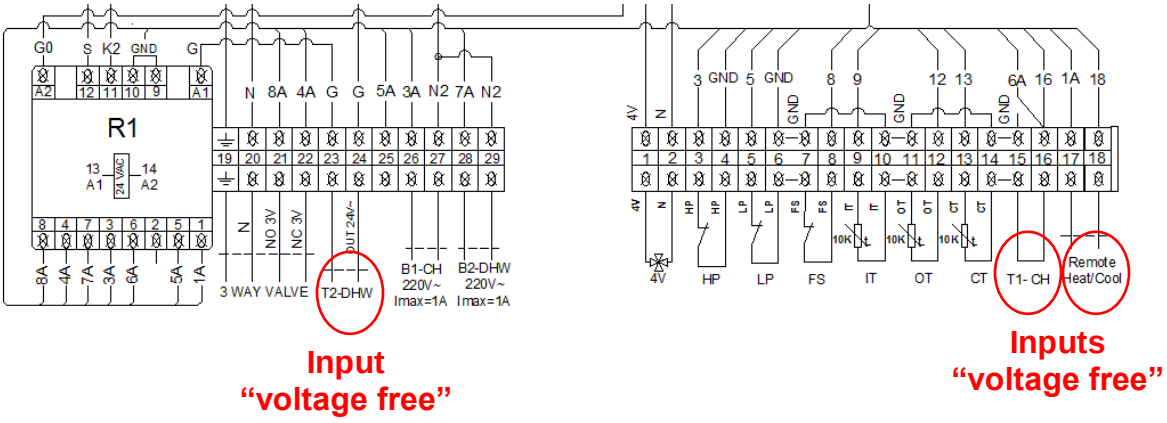
22. Appendix 3 – Wiring diagrams

WARNING – Attention, do not connect an AC (220V) power supply to the below input terminals:

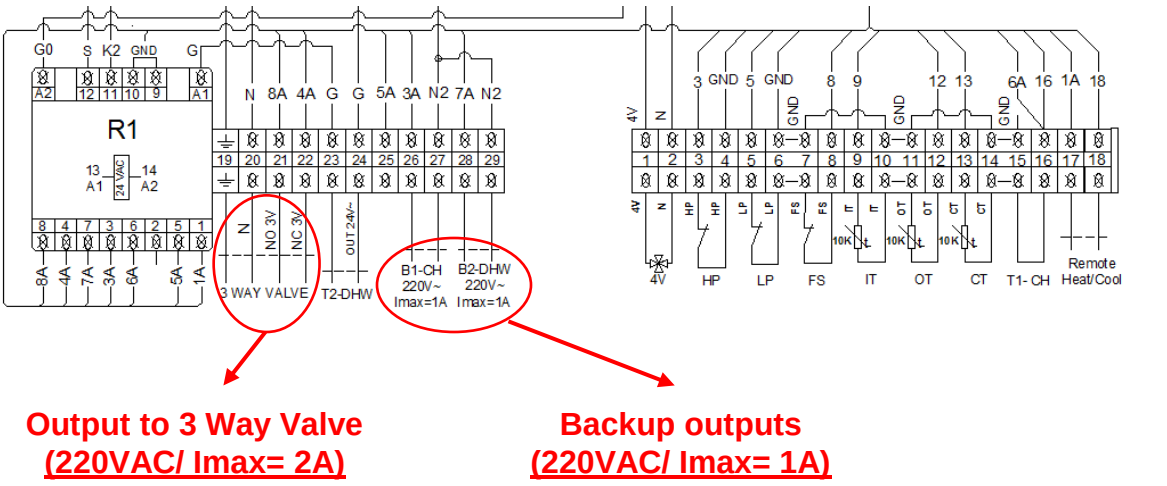
- T1-CH (room thermostat)
- T2-DHW (DHW thermostat)
- Remote Heat/ Cooll

Otherwise, there is the danger of injury and guaranty loss.

The contacts are voltage free.

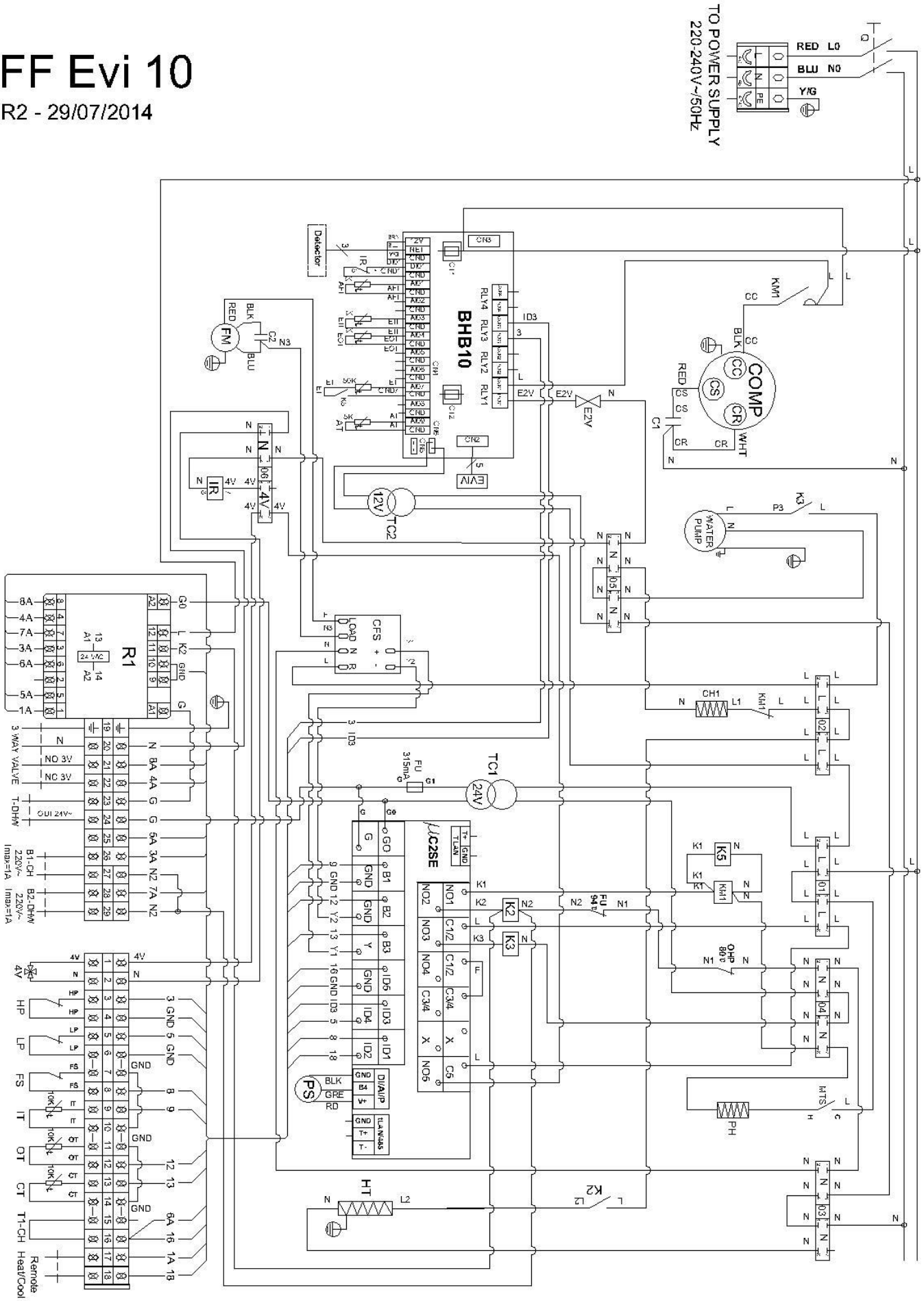


WARNING – Backup power supply must be provided by an external power supply. The Heat Pump provide only a command line (220V~/ Imax= 1A).



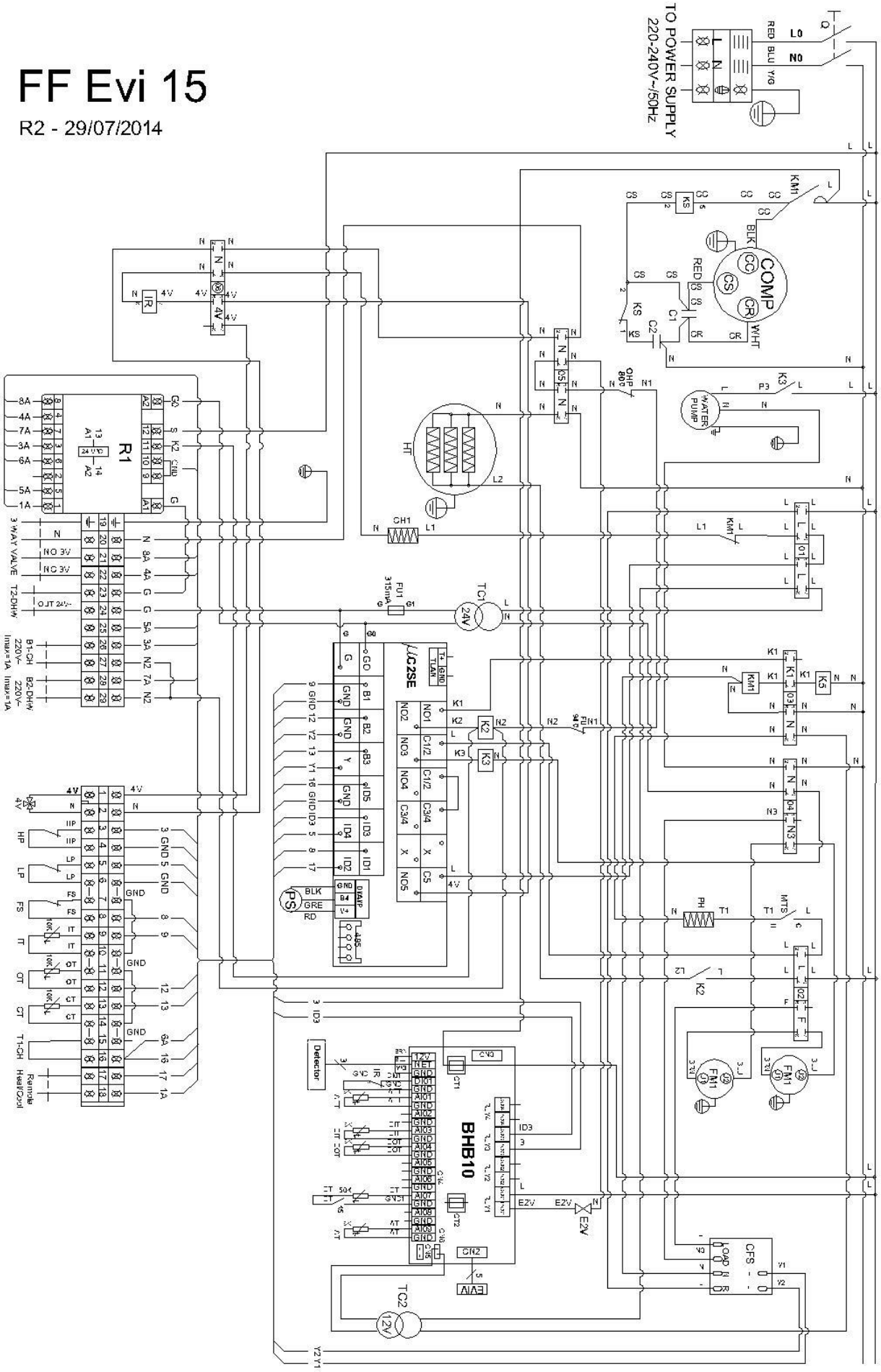
FF Evi 10

R2 - 29/07/2014



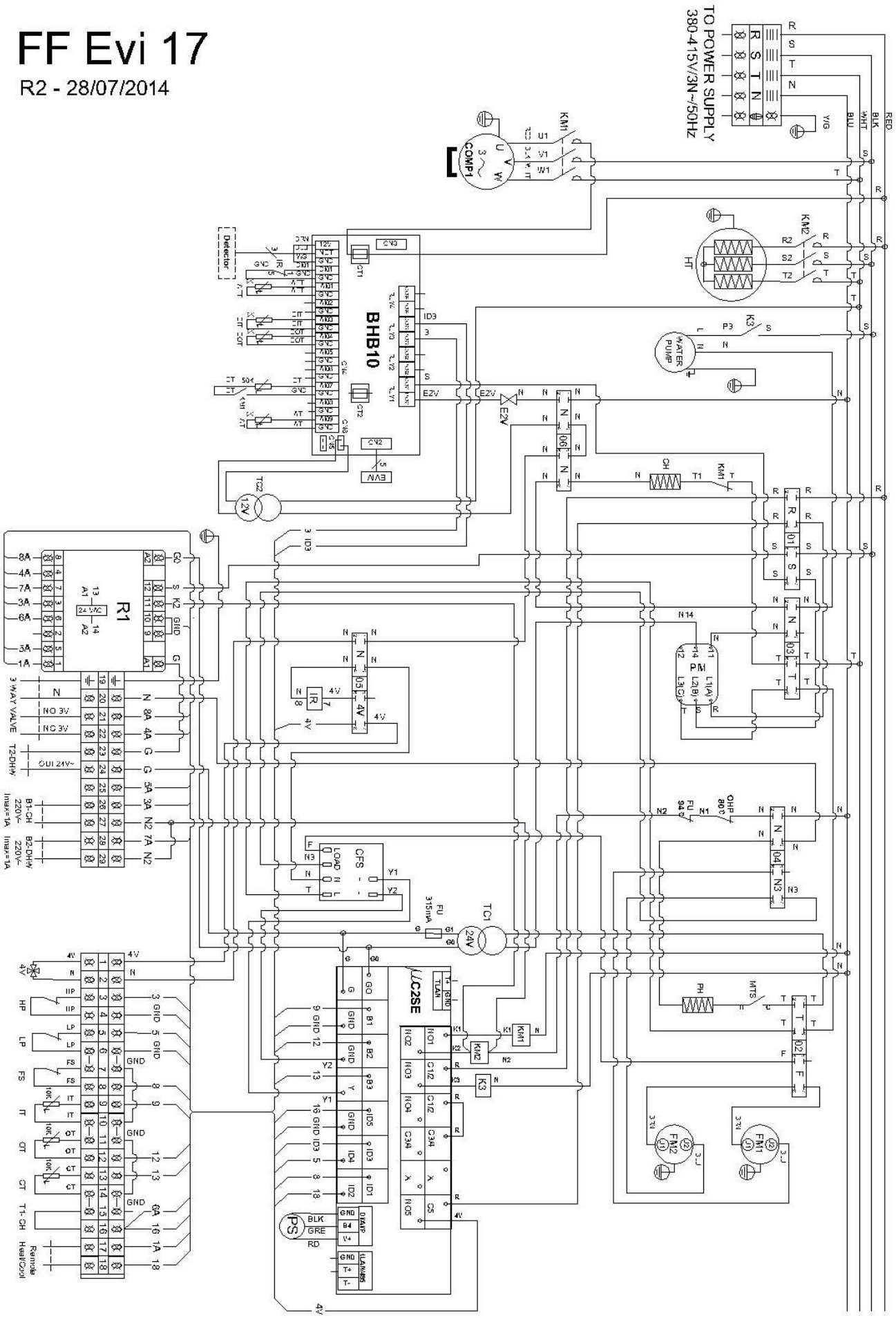
FF Evi 15

R2 - 29/07/2014



FF Evi 17

R2 - 28/07/2014



23. Appendix 4 – 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
2 Years

Water Cylinder (domestic use)
5 Years: Stainless Steel (2 + 3 years)
5 Years: Enamelled or Polywarm (2 + 3 years)
Manufacturer Warranty

Water Cylinder (industrial)
5 Years: Stainless Steel (2 + 3 years)
5 (cinco) Anos: Polywarm (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.

24. Appendix 5 – 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 call us.

ENERGIE EST

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

GPS Coordinates: N 41 27.215' , W 8 43.669'

Tel.: + 351 252 600 230

General e-mail: energie@energie.pt