



Monobloc heat pump water heater with domestic hot water storage tank for internal installation

GREEN 220 - 220 S - 220 DS



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Code				Serie
MUI01110D6120				DHW heat pump with storage tank

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The GREEN manual contains all the necessary information for the better use of the equipment under safety conditions for the operator.

1. PURPOSES AND CONTENT OF THIS MANUALS

This manual provides essential information for the selection, installation, use and maintenance GREEN units. The indications contained in it are written for the operator who uses the machine: even if he has no specific knowledge, in these pages the operator will find the indications that will allow him to use it effectively.

This manual describes the machine at the time of its marketing; must therefore be considered adequate in relation to any subsequent technological improvements that the company continues to make to its products in terms of potential, ergonomics, safety and functionality.

The company, therefore, is not constrained to update the manuals for previous versions of machines.

It's recommended that the user must follow the instructions contained in this manual, especially those concerning the safety and routine maintenance.

1.1 HOW TO KEEP THE MANUAL




The manual has to be always kept with the unit it refers to. It has to be stored in a safe place, away from the dust and moisture. It has to be accessible to all users who shall consult it any time they are in doubt on how to operate the equipment.

The company reserves the right to modify its products and related manuals without necessarily updating previous versions of the reference material. It assumes no responsibility for any inaccuracies in the manual, if due to printing or transcription.

Any updates sent to the customer must be kept as an annex to this manual.

However, the company remains available to provide more detailed information about this manual on request, and also to provide information regarding the use and maintenance of its machines.

1.2 GRAPHIC SYMBOLS USED IN THE MANUAL

	Indicates operations that can be dangerous for people and/or for the correct operation of the machine.
	Indicates prohibited operations.
	Indicates important information that the operator has to follow in order to guarantee the correct operation of the equipment in complete safety.

2. NORMATIVE REFERENCES

The CALIDO1 units produced as a whole and their individual components are designed in accordance with the following directives and harmonised standards:

- Community Directives: 2014/30/UE, 2014/35/UE, 2011/65/UE, 2012/19/UE.
- Norms: EN 60335-2-21; EN 60335-2-40; EN 55014-1; EN 55014-1 ; EN 61000-3-2; EN 61000-3-3.

And the following directives, regulations and standards about eco-friendly design, energy labeling and promotion of the use of energy from renewable sources:



- Community directives 2019/125/UE, 2009/28/CE;
- UE Regulations n. 1907/2006, 812/2013 e 814/2013;
- Standard UNI EN 16147:2017.

3. PERMITTED USED

- The company excludes any contractual and no-contractual liability for damage caused to persons, animals or things, by incorrect installation, adjustment and maintenance, improper use or a partial or superficial reading of the informations contained in this manual.
- These units are designed for domestic water heating. A different application, not expressly authorised by the manufacturer, is to be considered improper and therefore not allowed.
- The location, plumbing and electrical installation must be determined by the system designer and must take into account both purely technical requirements and any applicable local legislation and specific authorisations.
- The execution of all work must be performed by qualified and experienced personnel, competent in the existing rules in different countries





4. GENERAL SAFETY GUIDELINES

Before starting to operate on GREEN units each operator must be perfectly familiar with the operation of the machine and its controls and must have read and understood all the information contained in this manual.

	It's strictly forbidden to remove and/or tamper with any safety device. Do not remove the grilles located on the fan outlet or the plastic cover.
	Children and unassisted disabled persons are not allowed to use the appliance.
	Do not touch the appliance when barefoot or with wet or damp parts of the body.
	Do not pull, detach or twist the electrical cables coming from the unit, even if it is disconnected from the mains supply.
	Do not stand with your feet on the device, sit down and/or lean on any type of object.
	Do not spray or pour water directly on the device.
	Packaging material (cardboard, staples, plastic bags, etc.) must not be dispersed, abandoned or left within reach of children as it can be a potential source of danger.
	Any ordinary or extraordinary maintenance operations must be carried out with the machine stationary, without power supply.
	The plastic cover can be removed only by qualified operators.
	Do not place your hands or insert screwdrivers, spanners or other tools on moving parts.
	The person in charge of the machine and the maintenance technician must receive appropriate training and instruction to carry out their duties in a safe situation.
It is compulsory for operators to know the personal protective equipment and accident prevention rules provided for by national and international laws and standards.	



4.1 WORKERS' HEALTH AND SAFETY

The European Community has adopted a number of directives on workplace's health and safety, which include: 89/391/CEE, 89/686/CEE, 2009/104/CE, 86/188/CEE and 77/576/CEE, which each employer is obliged to respect and enforce. It is recalled that:

	Do not tamper with or replace parts of the equipment without the specific consent of the manufacturer. These interventions absolve the manufacturer of any civil or criminal liability.
	Using components, expendable materials or spare parts that do not correspond to those recommended by the manufacturer and/or listed in this manual may be dangerous for the operators and/or damage the machine.
	The operator's workplace has to be kept clean, tidy and free from objects that may prevent free movements. Appropriate lighting of the work place shall be provided so as to allow the operator to carry out the required operations safely. Poor or too strong lighting can cause risks.
	Ensure that work places are always adequately ventilated and that aspirators are working in good condition and in compliance with the requirements of the laws in force.

4.2 PERSONAL SAFETY EQUIPMENTS

When operating and maintaining the **GREEN 220 - 220 S - 220 2S** units, use the following personal protective equipments:

	Clothing: Anyone carrying out the maintenance or working with the installation must wear clothing that complies with the essential safety requirements in force. They must also wear safety shoes with non-slip soles, especially in environments with slippery floors.
	Gloves: Protective gloves must be used during cleaning and maintenance operations.

	Mask and goggles: A respiratory protection mask and protective goggles must be used during cleaning operation.
	

4.3 SAFETY SYMBOLS

The unit includes the following safety signs which must be followed by personnel:

	General hazards.
	Electric shock hazard.
	Presence of moving organs.
	Presence of surfaces that may cause injuries.

4.4 REFRIGERANT SAFETY DATA SHEET

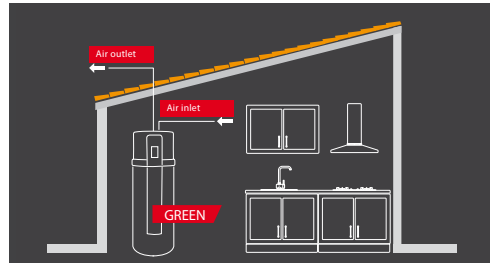
Name:	R134a (100% ,1,1,2-Tetrafluoroethane).
HAZARDS INDICATIONS	
Main hazards:	Asphyxia.
Specific hazards:	The rapid evaporation may cause freezing. It can cause cardiac arrhythmia.
FIRST AID MEASURES	
General information:	Do not give anything to an unconscious person.
Inhalation:	Transport in the open air. Use oxygen or artificial respiration if necessary. Do not administer adrenaline or similar substances.
Eye contact:	Rinse carefully with plenty of water for at least 15 minutes and consult a doctor.
Contact with skin:	Wash immediately with plenty of water. Immediately remove contaminated clothing.
FIRE PREVENTION	
Extinguishing media:	Whatever.
Specific hazards:	Increased pressure.
Specific methods:	Use water spray to cool containers.
Special protective equipments:	Use breathing apparatus in confined spaces.
ACCIDENTAL RELEASE MEASURES	
Personal precautions:	Evacuate personnel to safety areas. Ventilate appropriately. Use personal protective equipment.
Environmental precautions:	Evaporate.
Cleaning methods:	Evaporate.
HANDLING AND STORAGE	
Handling measures/technical precautions:	Ensure sufficient air exchange and/or suction in workplaces.
Advice for safe use:	Do not breath in vapores or aerosol. Do not pressure test with air/HFC-134a mixtures. Can form a combustible mixture with air at pressures above atmospheric pressure when the volume ratio exceeds 60%.
Storage:	Close carefully and store in a cool, dry and well ventilated area. Keep in original containers. Incompatible products: explosive, flammable materials, organic peroxide.
EXPOSURE CONTROLS/PERSONAL PROTECTION	
Control parameters:	AEL (8-h and 12-h TWA) = 1000 ml/m3.
Respiratory protection:	Use self-contained breathing apparatus for rescue and maintenance work in tanks. Vapours are heavier than air and can cause choking by reducing the oxygen available for breathing.
Eye protection:	Full protective goggles.
Hand protection:	Rubber gloves.
Hygienic measures:	No smoking.
PHYSICAL AND CHEMICAL PROPERTIES	
Appearance:	Colourless liquefied gas.
Odour:	Similar to ether.
Boiling point:	-26.5°C at atmospheric pressure.
Lighting point:	Does not ignite.
Density:	1.21 kg/l at 25°C.
Solubility in water (wt %):	0.15.
STABILITY AND REACTIVITY	
Stability:	No reactivity when used with appropriate instructions.
Materials to avoid:	Alkali metals, alkaline earth metals, powdered metals, granulated metal salts.
Dangerous decomposition products:	Halogen acids, carbon dioxide (CO ₂), carbon monoxide, fluorocarbons, carbonyl halides.
Dangerous reactions:	The product is not flammable in contact with air under ambient conditions of temperature and pressure. Under pressure with air or oxygen, the mixture may become flammable. Some mixtures of HCFC or HFC and chlorine may become flammable or reactive under certain conditions.
TOXICOLOGICAL INFORMATION	
Acute toxicity:	LD/LC50/inhalation/4 hours/on rat = 1107000 mg/m3.
Local effects:	Concentrations substantially above the TLV (1000 ppm) may cause narcotic effects. Inhalation of decomposed products at high concentrations may cause respiratory failure (pulmonary edema).
Long term toxicity:	Has not shown carcinogenic, teratogenic or mutagenic effects in animal experiments. May cause cardiac arrhythmia. Threshold limit for cardiac sensitivity: 312975 mg/m3. Threshold limit for anaesthetic effects: 834600 mg/m3.
ECOLOGICAL INFORMATION	
Global warming potential GWP (R744=1):	1430
Potential depletion Ozone ODP (R11=1):	0
Disposal considerations:	Usable with reconditioning.

5. GENERAL CHARACTERISTICS

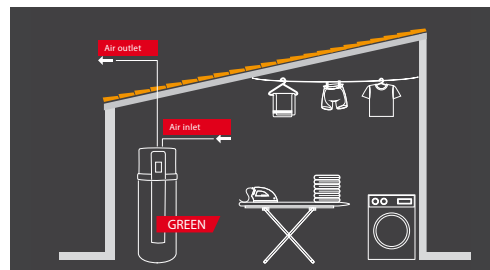
The heat pump for hot sanitary water is one of the most economical systems to heat the water for family domestic use or for small business. Using renewable energy from the air, the unit is highly efficient with low running costs. Its efficiency can be up to 3~4 times more than conventional gas boilers or electrical heaters.

5.1 FLEXIBILITY AND BENEFITS OF GREEN INSTALLATION

Waste energy recovery: the unit can be installed near the kitchen, in the boiler room or the garage, basically in every room which has a large number of waste-heat so that it has the higher energy efficiency even with very low outside temperatures during the winter.



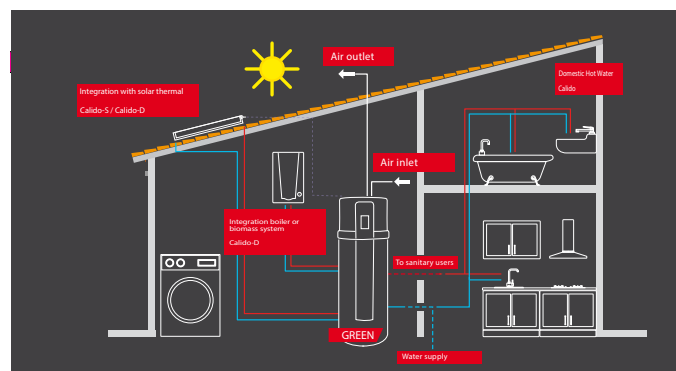
Hot water and dehumidification: the unit can be placed in the laundry room. When producing hot water, it lowers the ambient temperature and dehumidifies the room.



Storage room cooling: the unit can be placed in the storage room as the low temperature helps to keep the food fresh.

Hot water and fresh air ventilation: the unit can be located in the garage, gym, basement etc. when producing hot water, it cools the room and supplied fresh air.

Compatible with different energy sources: The unit can work with a second heat source as solar panels, external heat pumps, boilers or other different energy sources (remark: the extra heat source is not provided with).



Ecological and economical heating: the unit is one of the most efficient and economical alternatives to both fossil fuel boilers and heating systems. By making use of the renewable source in the air, it consumes much less energy.

Multiple functions: the special design of the air inlet and outlet makes the unit suitable for various ways of connections. With different ways of installation, the unit can work as just a heat pump but also as a fresh air blower, a dehumidifier, or an energy recovery device.

5.2 COMPACT DESIGN

The unit is designed in particular to provide domestic hot water for domestic use or small businesses. Its highly compact structure and elegant design are designed to facilitate indoor installation only. The tank is white (RAL 9003), while the visible plastics are light grey in a bush-hammered finish (RAL 7035). The control is white.

5.3 AVAILABLE MODELS

To adapt to different installation requirements, GREEN unit is available in 3 versions:

GREEN 220 - 220 S - 220 2S: standard that provides the heat pump and the electric heater as heating sources;

- **GREEN 200 S:** with auxiliary coil for use in combination with solar panels;
- **GREEN 200 2 S:** with double auxiliary coil in order to have at the same time three energy sources.

5.4 AVAILABLE ACCESSORIES

The optionals are available only for GREEN S and GREEN 2S models and they are necessary to manage solar integration or hot sanitary water recirculation:

- **ONE-FL:** flow switch 1" F;
- **ONE-SAS:** temperature probe with 5 m cable.

6. TECHNICAL CHARACTERISTICS


- Steel tank with double layer vitrification.
- Steel tank with double layer vitrification.
- Condenser wrapped externally to the boiler, free from fouling and gas-water contamination.
- High thickness polyurethane foam (PU) thermal insulation (42 mm).
- Grey RAL 9006 plastic outer cover.
- Acoustically isolated top part plastic cover.
- High efficiency compressor with R134a refrigerant.
- Safety devices for high and low gas pressure.
- Electrical heater available in the unit as a back-up (with integrated thermo cut out with protection set at 90°C), assuring constant hot water even in extreme cold winters.
- ON-OFF contact for starting the unit from an external switch.
- Weekly disinfection cycle.
- Possibility of manage hot sanitary water re-circulation or solar water integration which allows the unit to start up on demand; The start up could for example be used during the production of a photovoltaic system maximising self-consumption and energy efficiency (presence of a dedicated temperature probe, flow switch input and control for an external pump).



Acoustically isolated plastic cover

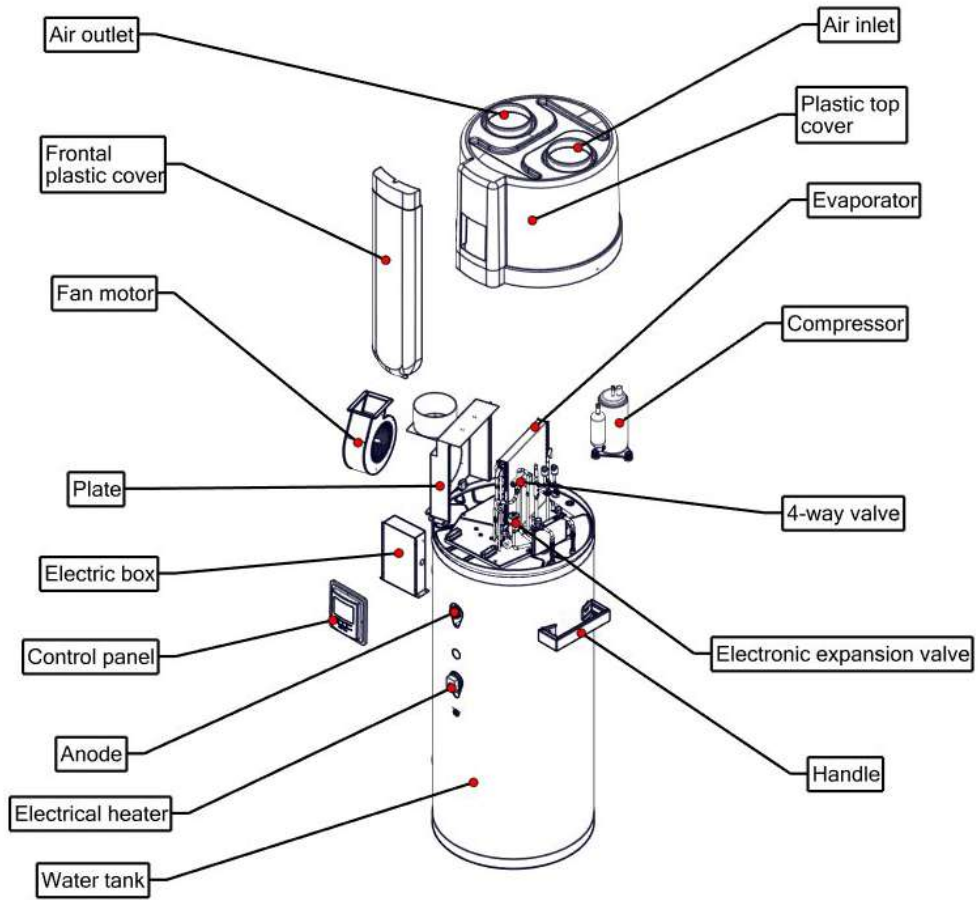
7. ITEMS CONTAINED INSIDE THE PACKAGING

Before starting the installation, ensure that all parts are included in the packaging.

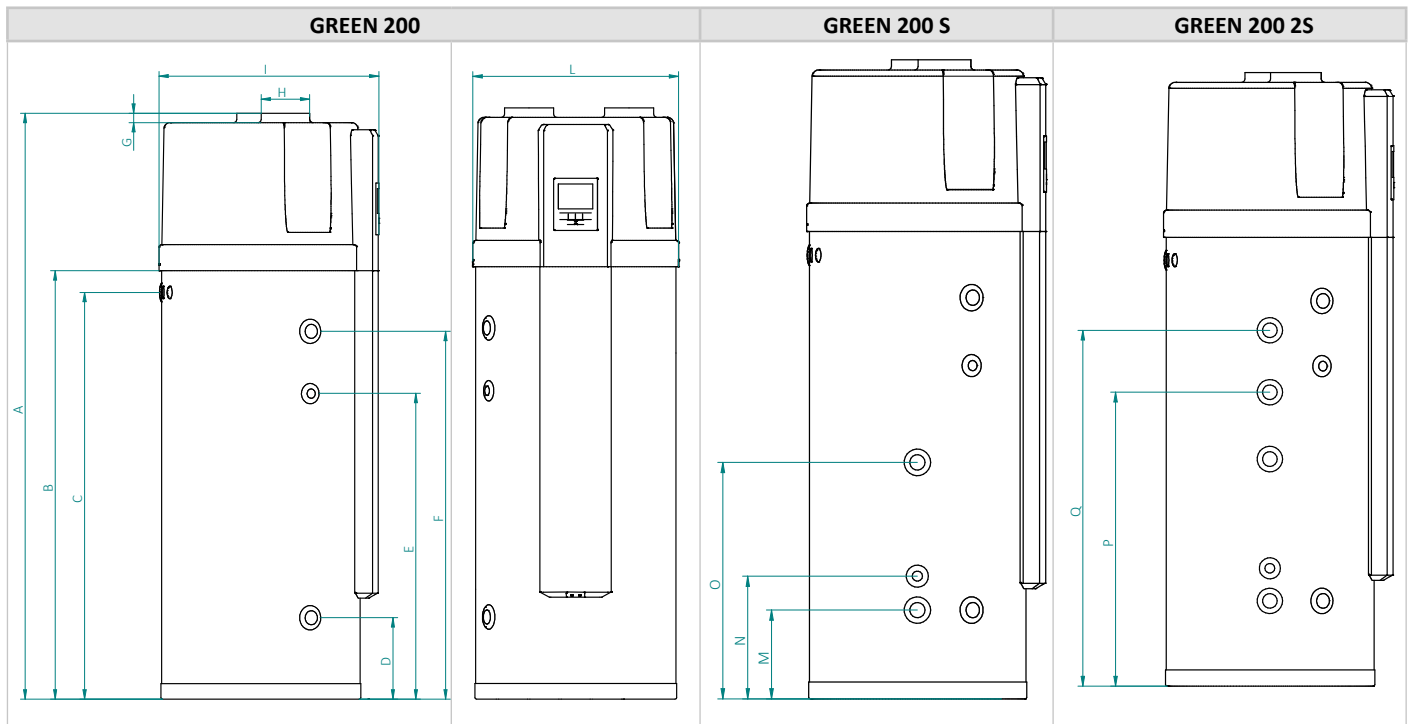
Unit packaging		
Item	Image	Quantity
Domestic hot water heat pumps		1
User-intaller manual		1

8. OVERVIEW OF THE UNIT

8.1 PARTS AND DESCRIPTIONS

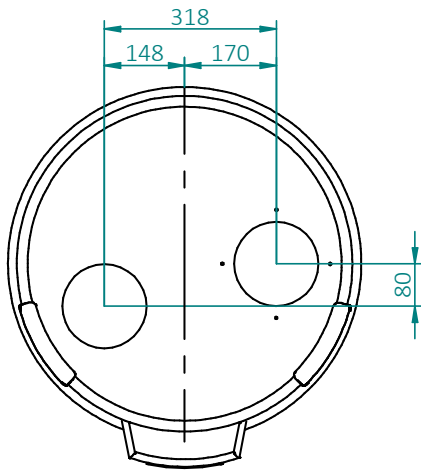


8.2 DIMENSIONS

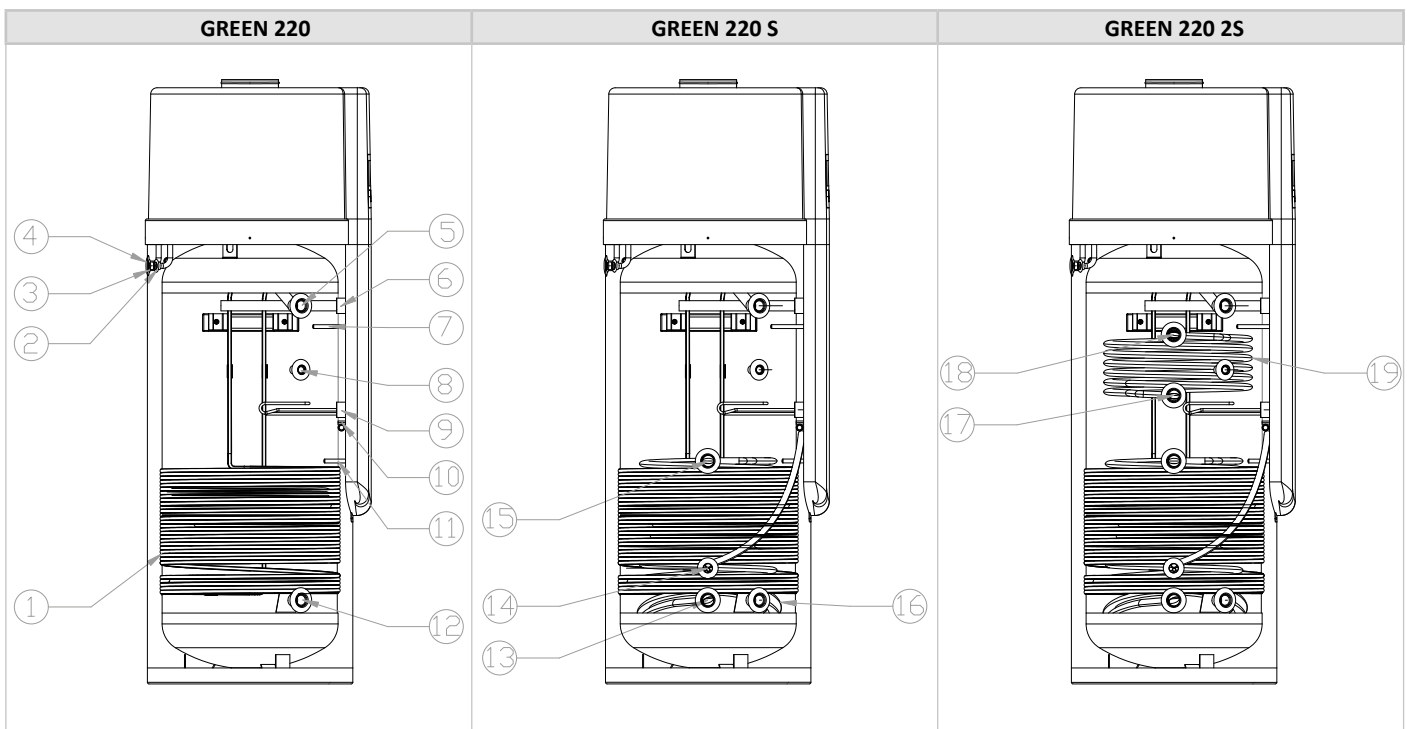


Dimensions [mm]	GREEN 220	GREEN 220 S	GREEN 220 2S
A	1638	1638	1638
B	1124	1124	1124
C	1062	1062	1062
D		262	
E	747	747	747
F	932	932	932
G		30	
H		φ 160	
I		706	
L		φ 655	
M	-	258	258
N	-	-	-
O	-	692	692
P		-	787
Q		-	927

AIR CONNECTION QUOTAS



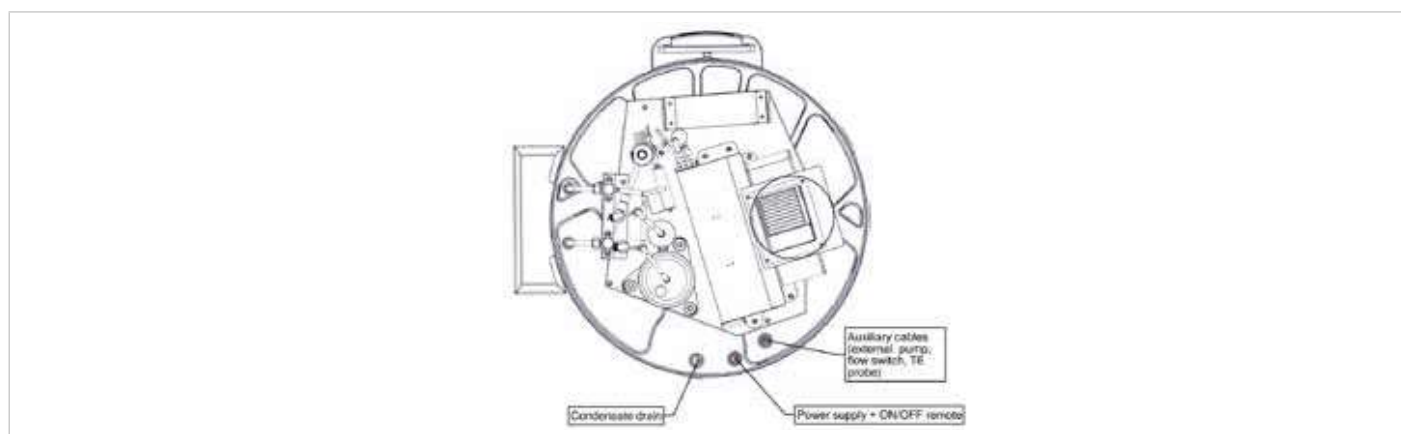
Wheelbase air connections: 318 mm



POS.	DESCRIPTIONS	DIMENSIONS
		GREEN 220 SERIES
1	Aluminium heat exchanger	3/8"
2	Hole for auxiliary cables	φ 17 mm

POS.	DESCRIPTIONS	DIMENSIONS
		GREEN 220 SERIES
3	Hole for power supply	φ 17 mm
4	Condensate drain	φ 22 mm x 0,3 m
5	Hot water outlet	G 1" female
6	Anti-corrosion magnesium anode	1" ¼ female
7	Upper tank temperature (T3) + thermostat T85°C	φ 12 mm x L 120 mm
8	Connection for recirculated water	G ½" female
9	1200 W auxiliary electric heater with integrated thermostat	1" ¼ female
10	Grounding	M6
11	Lower tank temperature (T2)	φ 12 mm x L 90 mm
12	Cold water inlet	G 1" female
13	Solar water outlet	G 1" female
14	Auxiliary tank temperature	/
15	Solar water inlet	G 1" female
16	Solar exchanger coil	1,2 m ²
17	Auxiliary heat source outlet	G 1" female
18	Auxiliary heat source inlet	G 1" female
19	Auxiliary heat source coil	0,5 m ²

8.3 CABLE GLANDS



8.4 HOW TO REPLACE THE MAGNESIUM ANODE

The Magnesium anode is an anti-corrosion element. It is assembled in the water tank to avoid the creation of oxide patinas inside the tank in order to protect it, and the other components. It can help to extend the life-span of the tank.

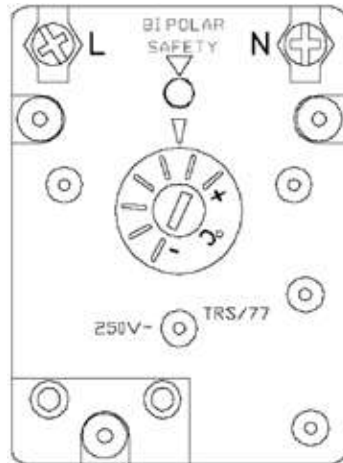


Check the magnesium anode every 6 months and change it if it has the diameter less than 22 mm, clean it if it is intact but encrusted by limestone.

- Turn the power of the unit 'OFF' and pull out the plug.
- Drain all the water out of the tank.
- Remove the old magnesium anode from the tank.
- Replace it with the new magnesium anode.
- Recharge the water.

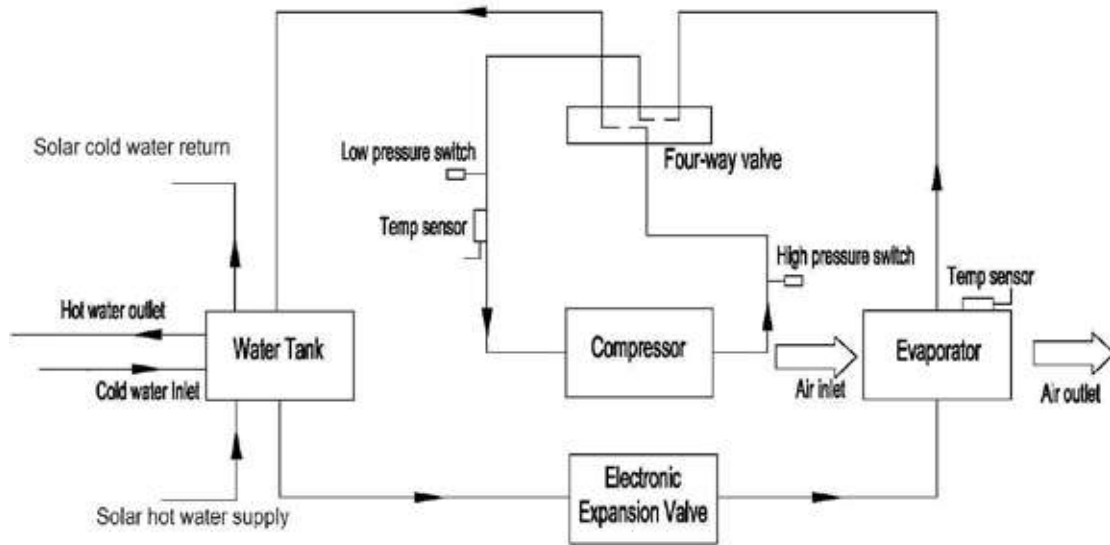


8.5 REGULATION THERMOSTAT OF THE ELECTRIC HEATING

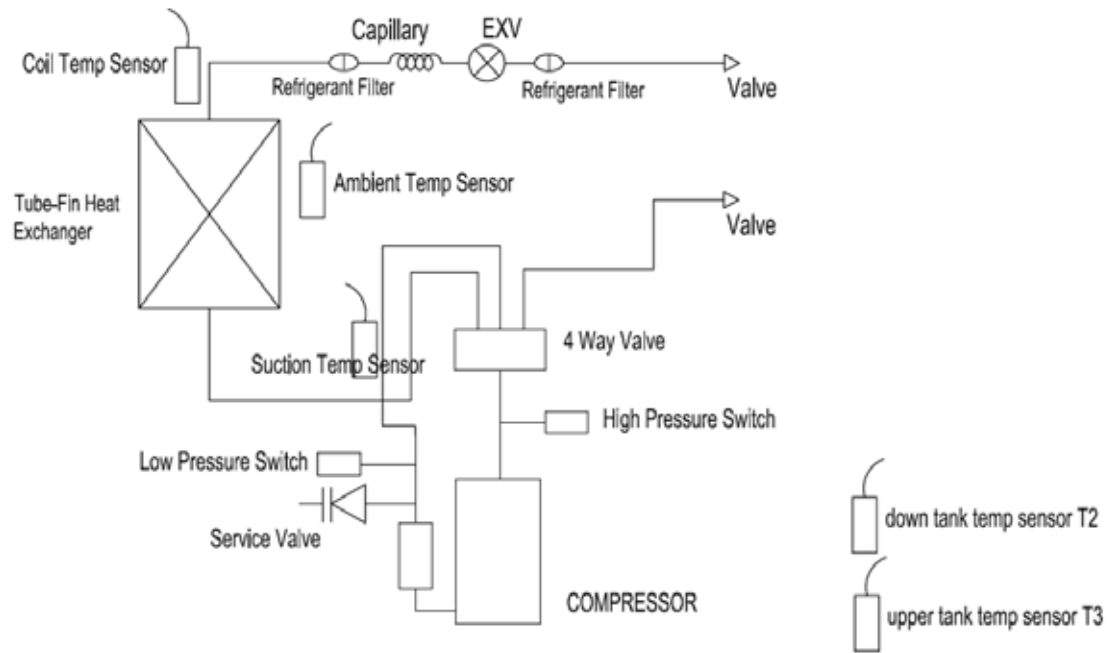


The auxiliary electric heater is equipped with a thermostat for regulation; the access to this component takes place by removing the plastic frontal cover. Such control allows a variation of temperature between 15 and 75°C; each notch corresponds to a temperature variation of 10°C. The factory setting is set to its maximum value, 75°C, a modification of this value is not recommended as it would produce malfunctions on the legionella cycle control (For this purpose it is required to read carefully the paragraph 11.4.5).

8.6 HYDRAULIC AND GAS CIRCUIT DIAGRAM



8.7 GAS CIRCUIT DIAGRAM



9. INSTALLATION



WARNING: All the operations described below must be carried out only by **QUALIFIED PERSONNEL**. Before any operation on the unit, make sure that the power supply is disconnected.

9.1 GENERALITY

When installing or servicing the cooling circuit, it is necessary to strictly follow the rules listed in this manual, to conform to all the specifications of the labels on the unit, and to take any possible precautions. Failure to follow these rules can lead to dangerous situations.



After receiving the unit, immediately check its integrity. The unit left the factory in perfect condition; any eventual damage has to be questioned to the carrier and recorded on the Delivery Note before signing it.

The company has to be informed, within 8 days, of the extent of the damage. The Customer should prepare a written statement of any severe damage.



Please note that all the installation diagrams shown in this chapter are only a guide. The correct installation plant must be evaluated case by case by the installer.


9.2 SAFETY INSTRUCTIONS

To prevent injury to the user, other people, or property damage, the following instructions must be followed. Incorrect operation due to ignoring of instructions may cause damages or injuries.





Install the unit only when it complies with local regulations, laws and standards. Check the main voltage and frequency. This unit is only suitable for earthed sockets, connection voltage 220 - 240 V ~ / 50Hz. The following safety precautions should always be taken into account:

- be sure to read the following warning before installing the unit;
- be sure to observe the cautions specified here as they include important items related to safety;
- after reading these instructions, be sure to keep it in a handy place for future reference.

9.2.1 Warning

	<p>The unit must be securely fixed to avoid noise and vibrations: when insufficiently secured, the unit could fall causing injury. The supporting surface must be flat to support the weight of the unit and suitable for installing the unit without increasing noise or vibration.</p>
	<p>When installing the unit in a small room, please take measures (like sufficient ventilation) to prevent the asphyxia caused by the leakage of refrigerant.</p>
	<p>Be sure to use the provided or specified parts for the installation work: the use of defective parts could cause an injury due to possible fire, electric shocks, the unit falling etc.</p>
	<p>Do not tear off the labels on the unit: the labels are for the purpose of warning or reminding, keeping them can ensure your safe operations.</p>
	<p>Indoor installation is mandatory: it is not permitted to install the appliance in an open place or in a place easily accessible by rain and in general accessible from any source of water.</p>
	<p>The installation place without direct sunlight and other heat supplies is recommended: if no way to avoid these, please install a covering.</p>
<p>Make sure that there's no obstacles around the unit.</p>	

9.2.2 Caution

	<p>Do not install the unit in a place where there is a possibility of flammable gas leaks: if there is a gas leak and gas accumulates in the area surrounding the unit, it could cause an explosion.</p>
	<p>Do not clean the unit when the power is 'ON': the power supply must always be 'OFF' when cleaning or servicing the unit. Failure to do so may result in injury due to high fan speed or electrical shock.</p>
	<p>Do not install the unit in a place where there is a possibility of flammable gas leaks: if there is a gas leak and gas accumulates in the area surrounding the unit, it could cause an explosion.</p>
	<p>Do not clean the unit when the power is 'ON': the power supply must always be 'OFF' when cleaning or servicing the unit. Failure to do so may result in injury due to high fan speed or electrical shock.</p>
	<p>In case the unit is used without an exhaust air duct, check that the installation room has a volume of not less than 20m³, with adequate ventilation. Please note that the temperature of the expelled air is 5÷10°C lower than the inlet air, therefore if not channelled it can cause a significant drop of the temperature of the installation room.</p>
<p>Do not continue to run the unit when there is something wrong or there is a strange smell: the power supply must be cut off immediately to stop the unit, otherwise malfunction may cause an electric shock or fire.</p>	
	<p>Inside the unit, there are some moving parts. Be especially careful when working near them, even if the unit is off.</p>
	<p>Do not insert fingers or other materials into the fan and evaporator.</p>
	<p>The temperatures of heads and exhaust piping of the compressor are usually high. Therefore be careful when working near condensing coils.</p>
	<p>The aluminium fins are very sharp and cause serious injuries.</p>

9.3 HANDLING OF THE UNIT

As a general rule, the unit must be stored and/or transported in its container in upright position and without water in the tank. During the transport (if done with care) and the storage, it is recommended to not exceed an inclination angle of 30 degrees max. Ambient storage temperatures of -20 to +70 degrees Celsius are permissible.

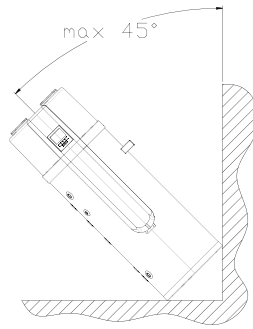
9.3.1 Handling of the unit with forklift

When using the forklift for handling, the unit must remain mounted on the pallet. The lifting rate should be reduced to a minimum. Due to the height weight of its upper part, the unit must be secured against tipping over. To avoid damages, the unit must be placed on a flat surface.

9.3.2 Manual handling of the unit

For the manual handling, a wooden pallet can be used; ropes or straps can be used for transport, taking care not to tip the unit. The maximum permissible tilt angle is 45 degrees, although it is always advisable to keep the unit upright.

If transport at an angle of inclination cannot be avoided (at a maximum angle of 45° and for a limited period of time), the unit should be operated one hour after it has been moved to its final upright position.



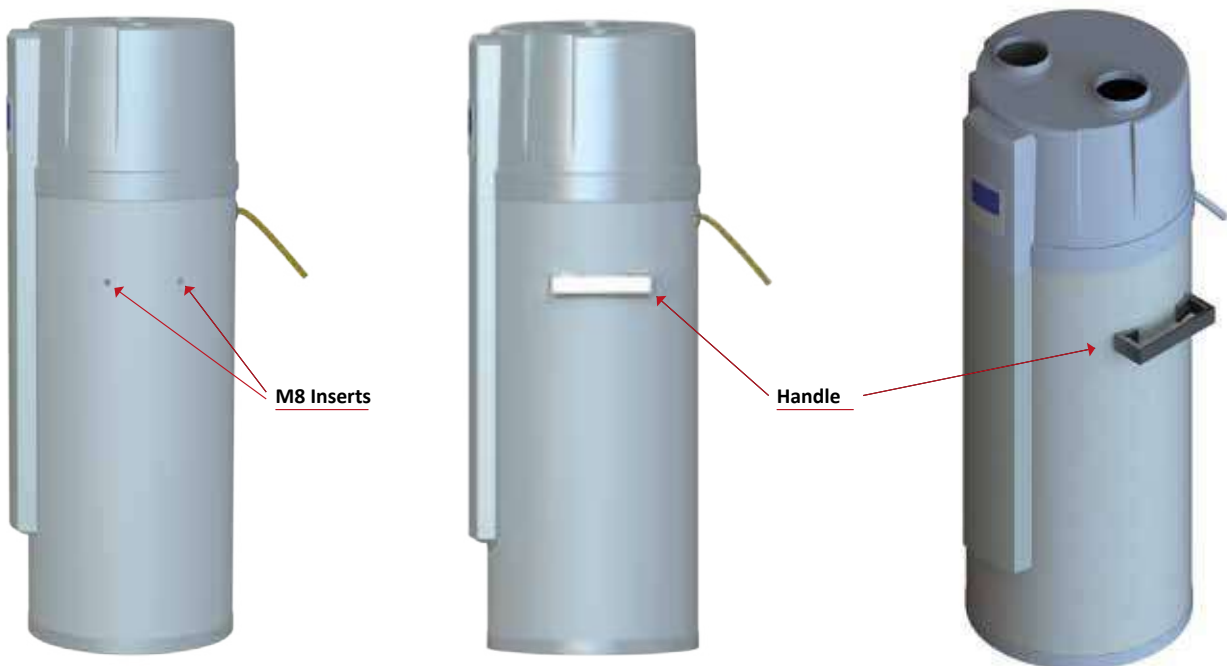
ATTENTION: Due to the high centre of gravity, and the relatively low overturning moment, the unit must be secured against tipping over.



ATTENTION: the cover of the unit cannot withstand stress, so it cannot be used for the transport.

ATTENTION: The unit can be inclined only on the opposite side of the handle (see above drawing), namely only on the left-hand side of the control panel.

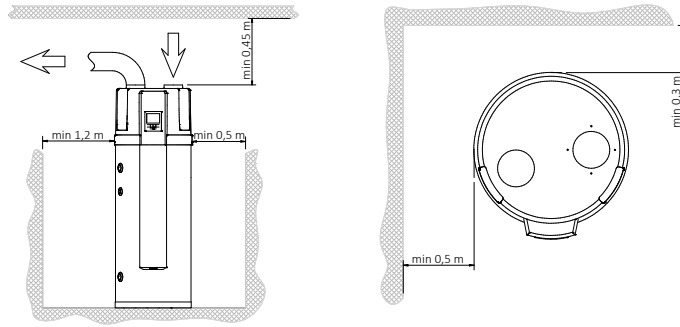
The unit is equipped with a handle to make easy the transport. The handle is supplied separately: If necessary, it must be attached with two M8 screws to the two threaded inserts provided.



9.4 REQUIRED SERVICE SPACE

Below you will find the minimum space required to ensure service and maintenance activities on the units.

In addition, recirculation of the exhaust air must be avoided; failure to do so would result in a drop in performance or the activation of safety controls. For these reasons, the following distances must be observed.



If the air intake and/or air outlet ducts are connected, part of the air flow on the capacity of the heat pump will be lost.

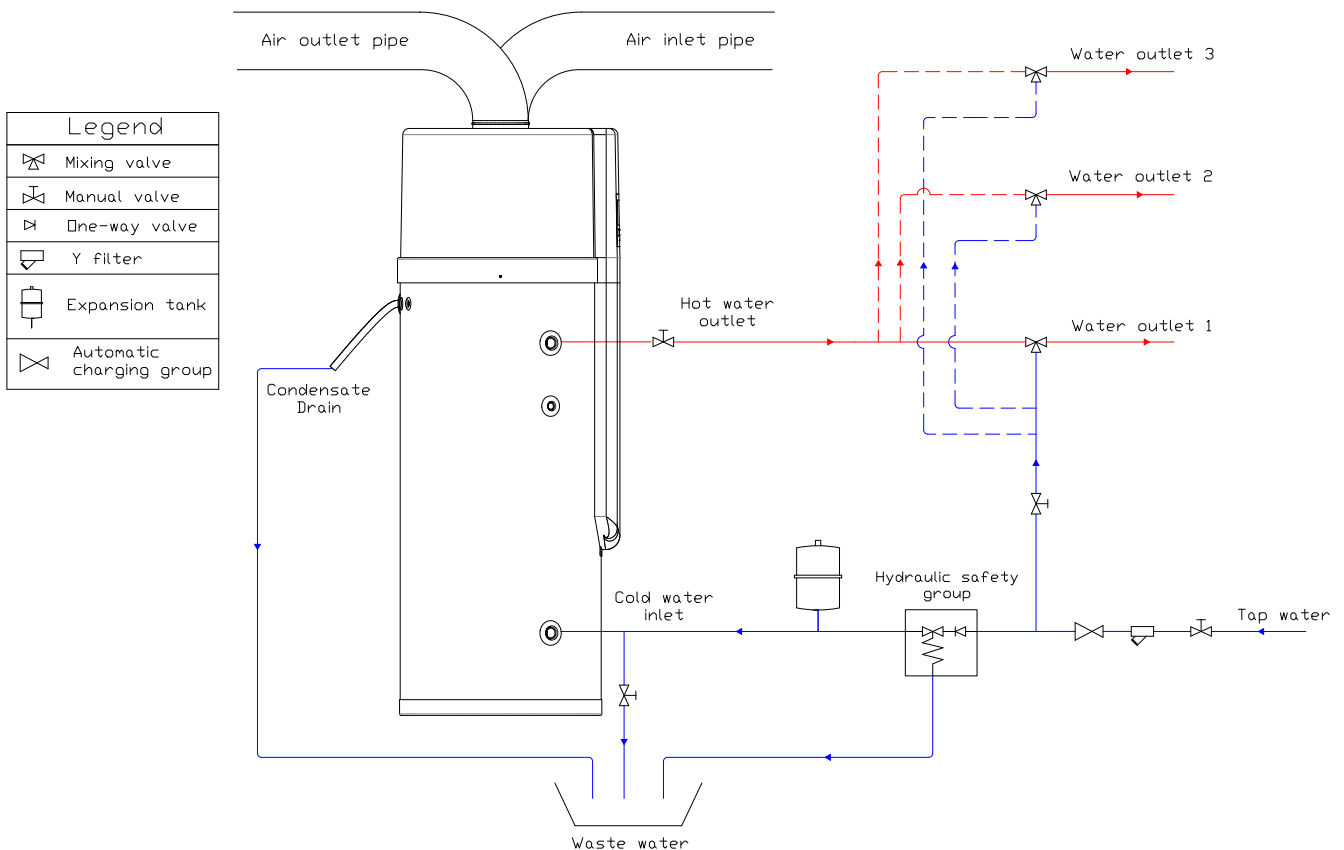
If the unit connects with air ducts it should be: DN 160 mm for rigid pipes or internal diameter 160 mm for flexible pipes. Total length of the ducts should not be longer than 4 m or the maximum static pressure should not exceed than 60 Pa. If the air ducted are bended, the pressure loss will be larger. So if there are two bending pipes, the total length of the ducts should not be longer than 2 m.


Please note that the performance of the unit are reduced in the case the air inlet is connected to a duct which takes air from outside, because of the low winter temperatures and high summer temperatures. The optimal working ambient temperature is 20°C.

In the table on this side, the maximum total lengths to be observed for the air duct depending on the geometry (original 160mm) and if the diameter is to be extended to 180 mm.

Max length of air piping (in+out)		d= 180 mm	d=160 mm
Without curves		8 m	4,3 m
90° curves no.	1	6,9 m	3,2 m
	2	5,9 m	2,2 m
	3	4,9 m	/
	4	4 m	/

9.5 INSTALLATION SCHEME




	An hydraulic safety group complying with EN 1487 standards must be installed in the water inlet. If not, it could cause damage to the unit, or even hurt people. The safety group must be provided with stop valve, manual drain valve, inspectionable non-return valve and safety valve set to 7 bar. Refer to the installation diagram to find out where to install the safety group. The safety group must be protected against frost.
	The discharge pipe of the safety group must be installed with a continuous downward inclination and in an environment protected from frost. The water must be free to drip from the safety group discharge pipe and the end of this pipe must be left open to atmospheric pressure.
	The safety group must be inspected regularly to remove lime deposits and to ensure that it is not blocked. Beware of burns, due to the high temperature of the water.
	The expansion tank with capacity suitably sized to absorb volume variations (depending from the extension of sanitary distribution piping) must be installed in the inlet line. In each case, its capacity must not be lower than 12 liters for 200 series and 18 liters for 300 series.
	The tank water can be drained through the external manual gate valve installed on the inlet pipe (not provided).
	After all the pipes installed, open the cold water inlet and the hot water outlet to fill the tank. When there is water normally flowing out from water outlet taps, the tank is full. Turn off all valves and check all pipes. If any leakage, please repair. If the inlet water pressure is less than 1.5 bar, a pressure pump should be installed at the water inlet. For ensure the long safety using age of tank at the condition of water supply hydraulic higher than 5.5 bar, a reducing valve should be mounted at the water inlet pipe.
	A filter is advisable in the air inlet. If the unit is connected with ducts, filter in there must be put forward to the air inlet of duct.
For draining the evaporator condensate water, install the unit on a horizontal plane with a maximum angle of inclination of 2 degrees towards the drain hole on the opposite side of the control panel. If this is not the case, make sure that the condensate drainage pipe is located at the lowest point and siphon it if necessary.	

9.6 HYDRAULIC CONNECTIONS

Hydraulic connections must be made in accordance with national and local regulations. The pipes can be made of multilayer pipe, polyethylene or stainless steel and must withstand at least 100°C and 10 bar. The pipes must be carefully sized according to the desired water flow rate and the pressure drop of the hydraulic circuit. All hydraulic connections must be insulated using closed-cell material of adequate thickness. The units should be connected to the piping using flexible couplings. It is recommended to install the following components in the hydraulic circuit:

- Y-shaped metallic filter (to be mounted on the inlet pipe) with a mesh not larger than 1mm.
- Automatic charging group (3 bar advised) when water supply pressure is higher than 5,5 bar.
- Hydraulic safety group (7 bar).
- Manual gate valves to separate the unit from the hydraulic circuit.
- Manual gate valve on the inlet pipe to discharge the unit if necessary.
- Thermometers for wells to monitor the system's temperature.
- Expansion tanks, safety valves and air vents where indicated in the following installation diagrams.

	Perform the connections making sure that weight of the pipes do not overload the unit.
	Check the water hardness, which should not be below 12°F. With particularly hard water, it's recommended the use of a water softener so that the residual hardness is no more than 20°F and no less than 15°F.
	WARNING: When is possible, connect the pipes to the hydraulic connections always using the system key against key.
	WARNING: Unit water inlet pipe have to be in correspondence with the blue connection, otherwise the unit malfunction could occur.
	WARNING: It is compulsory to install on the WATER INLET connection a metallic filter with a mesh not larger than 1 mm. Should the filter not be installed, the warranty will no longer be valid. The filter have to be kept clean, so make sure that it is clean after the unit has been installed, and then check it periodically.
	WARNING: if an external pump is installed and connected to the system (for recirculation of domestic hot water or solar water) It is recommended to also install and connect a flow switch before the pump. Otherwise, any damage to the pump will not be reported and system malfunction could occur.
	Perform the drainage/piping work according to the installation instruction. If there is a defect in the drainage/piping work, water could leak from the unit and household goods could get wet and be damaged.
Hot water needs to be mixed with cold water before it is distributed to users, to hot water (over 50°C) in the unit can cause injury. The use of anti-burn valves is recommended.	

	The diagrams are to be considered only for indication purpose. It is always required the study of the specific installation context and the approval of the system by a qualified heating engineer designer.
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9.6.1 Water connections

Please pay attention to the following points when connecting the water circuit pipes:

1. Try to reduce pressure losses in the water circuit.
2. Check that there are no impurities in the pipes and that they are smooth inside, check them carefully for leaks, and then fit them with

insulation.

3. Install the hydraulic safety group in the water inlet.
4. Install also an expansion tank suitable sized to absorb volume variations.
5. The nominal diameter of the pipe must be chosen on the basis of the available water pressure and the expected pressure drop within the pipe system.
6. Water pipes can be flexible. To avoid corrosion damage, ensure that the materials used in the pipe system are compatible.
7. During the installation of the pipes in situ, any contamination of the pipe system must be avoided.

9.6.2 Water loading

If the unit is used for the first time or used again after emptying the tank, please make sure that the tank is full of water before turning on the power.

- Flush the system carefully.
- Open the cold water inlet and hot water outlet.
- Start the water loading. When water flows out of the hot water outlet normally, the tank is full.
- Close the hot water outlet valve: the water load is finished.



ATTENTION: Operation without water in water tank, may cause damages the auxiliary electric heater.

9.6.3 Water draining

If the unit needs cleaning, moving etc, the tank should be emptied.

- Close the cold water inlet.
- Open the hot water outlet and open the manual valve of the drainage pipe.
- Start the water emptying.
- After emptying, close the manual valve.

9.6.4 Installation of an external recirculation pump and flow switch

If necessary to recirculate solar water or hot sanitary water, an external pump and flow switch must be connected and installed hydraulically and electrically. The max available output for the pump is 5 A resistive. Also the optional probe T6 must be connected to the electrical box and correctly positioned on the hydraulic plant (see the diagrams here below). The Parameter no. 14 must be configured by the installer (1= hot sanitary water circulation, 2= solar water circulation).

The circulation of hot sanitary water is useful to avoid water becomes cold in the sanitary circuit if not used for several time. In this way the hot water will be always ready when requested.

The circulation of solar water is possible only if solar panel are installed and only for CALIDO1-S or CALIDO1-D units. In this way solar energy is used as secondary heat source to save energy.

In case of solar integration water, the following is required on the relevant circuit:

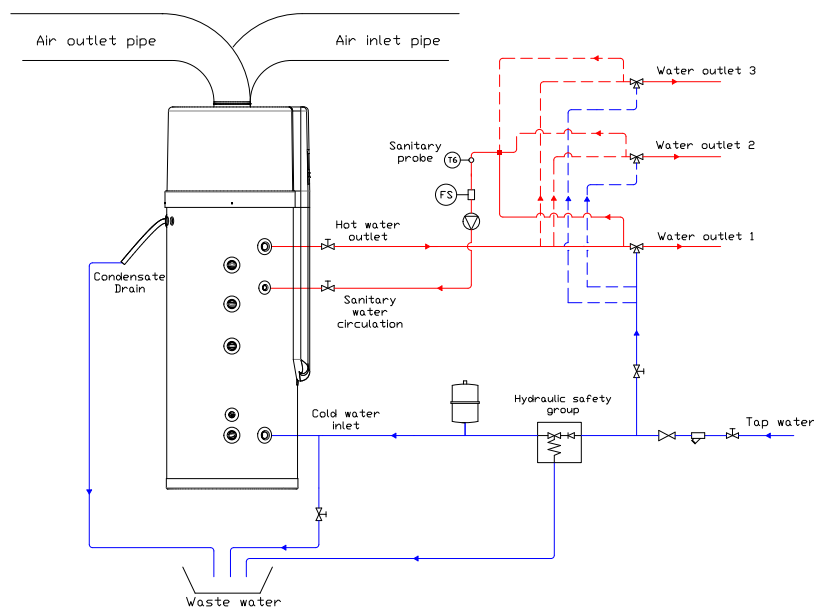
- an expansion tank suitable sized to absorb volume variations, installed before the solar system.
- a pressure safety valve (3 bar) installed after the solar panel.
- an air vent valve with manual gate installed near the safety valve.

The outlet of the safety valve must be directed to a special tank for collecting glycol water, and not to normal waste water.

In case of recirculation of solar integration water, a thermal discharge safety valve (85°C) is highly recommended on the hot water outlet, with the probe positioned in a ½" thermowell installed in the recirculation water connection.

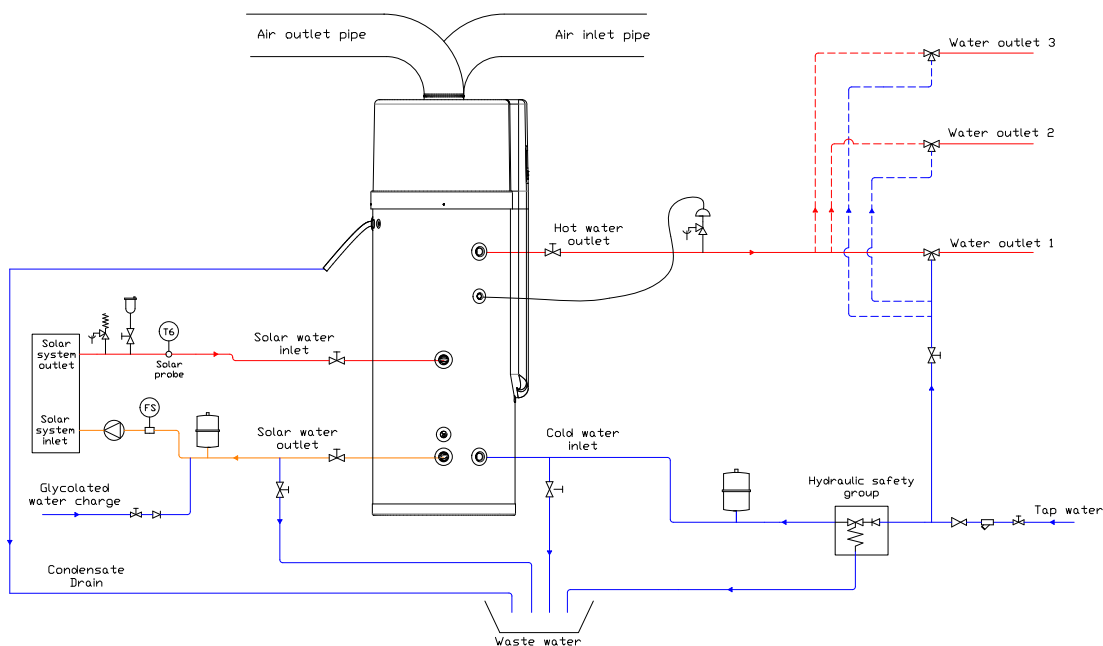
The CALIDO1 300 litres is equipped with an auxiliary well for the use of a possible external temperature probe for solar management with a separate controller. In this case, it is advisable to pass the temperature probe through the auxiliary well (see Section 8.3) and through the channel provided behind the front plastic cover, which is connected to the auxiliary well. In this way the cable, entering from the rear of the unit, will not be visible, thus preserving the machine's appearance. To remove the front plastic cover, simply unscrew the two lower fixing screws and remove the cover from the upper cover. To remove the upper cover, it is necessary to unscrew the three screws fixing the cover to the tank (one at the rear and two at the sides).

Legend	
	Temperature probe
	Flow switch
	Mixing valve
	Manual valve
	One-way valve
	Y filter
	Expansion tank
	Automatic charging group
	Water circulation pump



Installation scheme in case of hot sanitary water circulation:

Legend	
	Temperature probe
	Flow switch
	Mixing valve
	Manual valve
	One-way valve
	Y filter
	Expansion tank
	Safety valve (3 bar)
	Vent valve
	Thermal discharge safety valve (85°C)
	Automatic charging group
	Water circulation pump

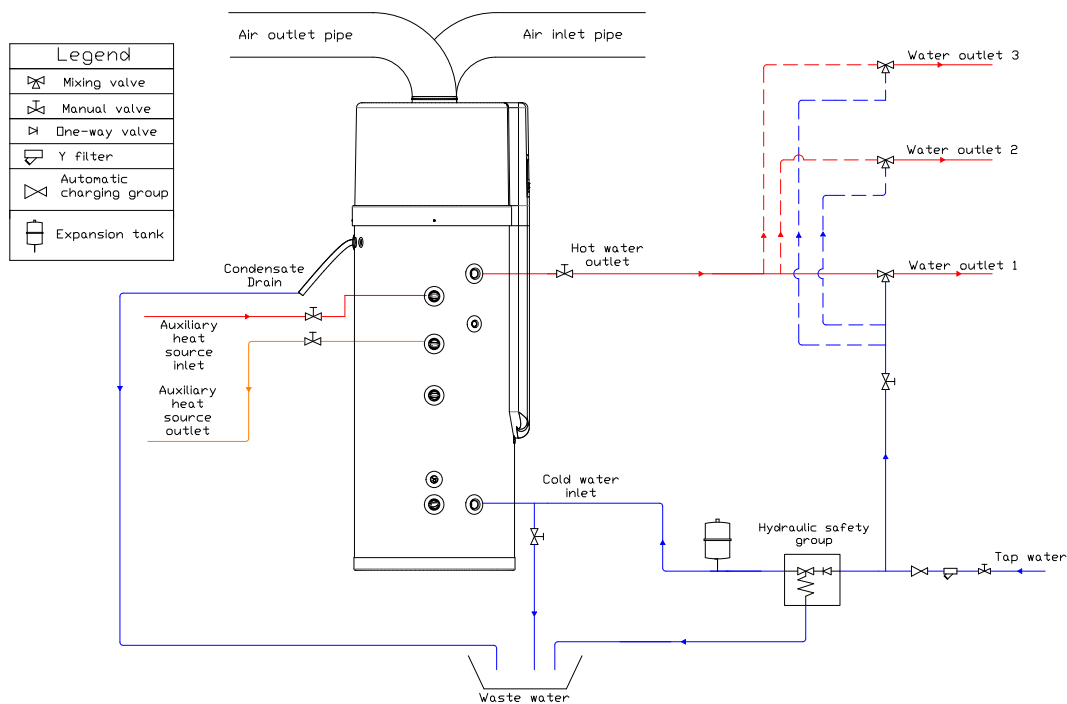


Installation scheme in case of solar water circulation

Note: The solar integration coil is only available on GREEN 200-S and GREEN 200 2S models

9.6.5 Connection of an auxiliary heat source

Only for GREEN 200 units, it's possible to connect a third energy source (for example an external boiler). In this case, the installer must disconnect the electric heater and its thermostat (see the wiring diagram in Section 17.2) and use the heater's power supply to give a consent through an external relay (not supplied) to the external heat source or to directly power a dedicated external pump. The maximum output available for OUT2 is 20 A resistive. Alternatively, the installer can provide an external selector switch (electrically connected between the electric heater and the PCB) to choose whether to use the electric heater or the third energy source (see wiring diagram in Section 17.3).



Installation diagram in case of auxiliary heat source
 Note: auxiliary heat exchange coil is present only in GREEN 200 2S unit.

9.7 ELECTRICAL CONNECTIONS

Check out that the power supply meets the unit's electric nominal data (tension, phases, frequency) reported on the technical label of the unit. The appliance is supplied complete with power cable and Schuko plug, it is forbidden to tamper with the cable or plug; if necessary, contact the service centre. It is advisable to check the electrical system to ensure it complies with current standards. Check that the system is suitable for the maximum power absorbed by the water heater (refer to the data on the plate) both in terms of cable cross-section and conformity to the regulations in force.

	<p>ATTENTION: The power supply must comply with the above limits, otherwise the warranty will expire immediately. Before any operation on the unit, make sure that the power supply is disconnected.</p>
	<p>ATTENTION: The supply voltage must not change by more than $\pm 10\%$ of the nominal value. If this tolerance is not respected, please contact our technical department.</p>
	<p>ATTENTION: If an external circulation pump is connected to the system, the flow switch must ALWAYS be connected as shown in the circuit diagram. Never jumper the flow switch connections in the terminal box.</p>
	<p>The appliance must always be properly grounding. If the power supply is not grounded, the unit may not be connected.</p>
	<p>Never use an extension cable to connect the unit to electric power supply. If there is no properly earthed socket available, have one installed by a qualified electrician.</p>
	<p>If the supply cable is damaged, it must be replaced by the manufacturer or its service agent or a similarly qualified person in order to avoid a hazard. Improper movement or repair on the unit could lead to water leakage, electrical shock, injury or fire.</p>
<p>The installation height of the power socket should be higher than the unit at the point of hydraulic connection of the unit, so in case of splashing water the unit is still safe.</p>	

To access the electrical box:

1. remove the plastic cover from the top.
2. remove the metallic cover of the electrical box unscrewing the 4 screws.
3. The unit already has a power cable connected to the electrical box. If it is necessary to disconnect it and connect a longer cable, or if it is necessary to connect a remote ON/OFF signal, or an external flow switch and pump for the circulation of domestic hot water or solar integration water, please refer to the electrical diagram.

The specification of the power supply cable 3 * 1.5mm². PCB protection fuse specification is T 3.15A 250V.

There must be a switch when connecting the unit to the power system. The current of the switch is 10A.

An earth leakage circuit breaker must be installed on the power supply line and the unit must be effectively earthed. The specification of the earth leakage circuit breaker is 30mA, 0.1 sec.

10. START UP

Before start-up, carry out the following checks:

- Check out the availability of the diagrams and manual of installed machine.
- Check out the availability of the electrical and hydraulic diagram of the plant in which the unit is installed.
- Check out that all water connections are properly installed and all indications on unit labels are observed.
- Check the inlet water pressure, make sure that the pressure is sufficient (above 1,5 bar).
- Check that the shut-off valves of the hydraulic circuit are open.
- Verify that the hydraulic circuit has been charged under pressure and air vented.
- Check if any water flows out from the hot water outlet, make sure that the tank is full of water before turning on the power.
- Ensure that provisions has been made to drain condensation.
- Check the electrical connection.
- Check that the electrical connections have been made in accordance with the regulations in force, including grounding.
- Check that the electrical voltage is within the tolerance ($\pm 10\%$) of the rating plate value.
- Check that there are no gas leaks.
- Before switching on the unit, check that all the chosing panel are in place and secured with thew appropriate screws.
- Check the unit, make sure everything is ok before supplying power to it, then check the led on the control panel when the unit is working.
- Use the control panel to start the unit.
- Listen to the unit carefully when supplying power to it. Turn off the power supply when an abnormal noise is heard.
- Measure the water temperature to check for changes in water temperature.
- Once the operating parameters have been set by the installer, the user cannot change them. Please contact a qualified technician if is necessary.

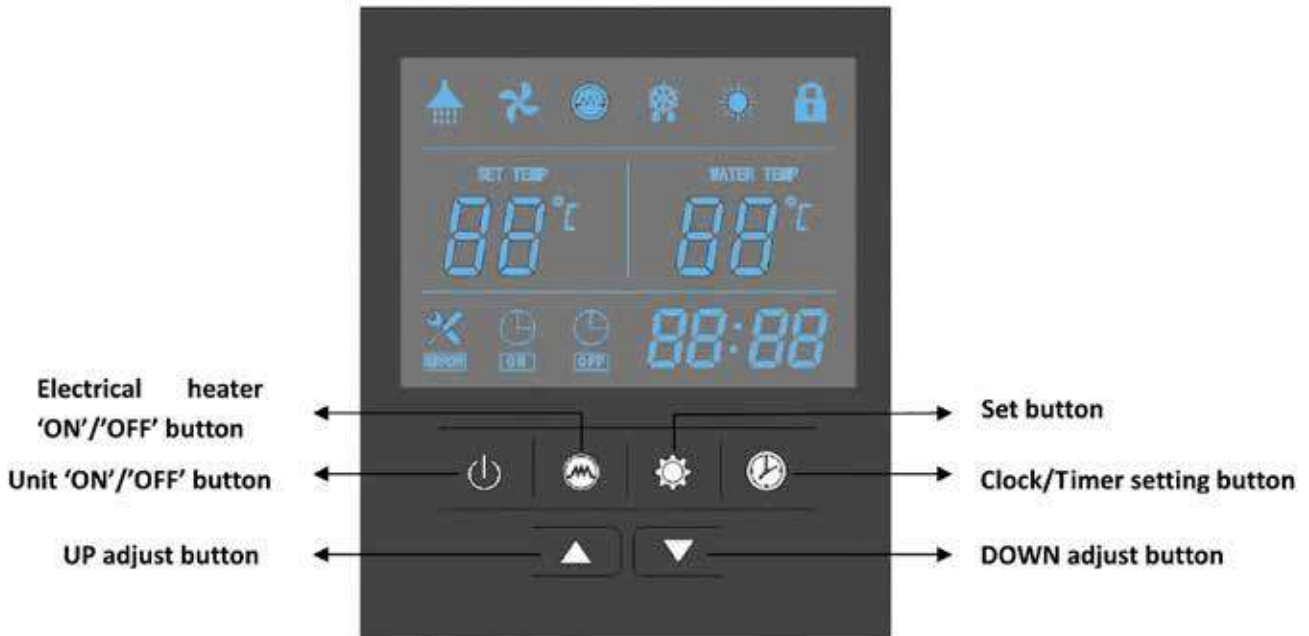


ATTENTION: Do not switch off the unit (for temporary shutdown) by switching off the main switch, this operation should only be used to disconnect the unit from the mains supply for long shutdowns or for maintenance/repair operations.

ATTENTION: Do not modify the internal wiring of the unit otherwise the warranty will terminate immediately.

11. USE OF THE UNIT

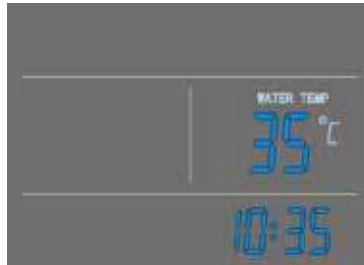
11.1 USER INTERFACE



11.2 OPERATION

1. Power 'ON'

When power is supplied to the unit, all icons are shown on the display for 3 seconds. After checking that everything is ok, the unit enters into the standby mode. The water temperature and time are displayed on the screen.



2. Button

Pressing this button for 2" when the unit is in standby mode, the unit switches on and operates in the selected mode. The operating mode, temperature set point and water temperature, time and any timer are shown on the display.











By pressing this button for 2" again when the unit is running, the unit is turned 'OFF' and enters into the standby mode.

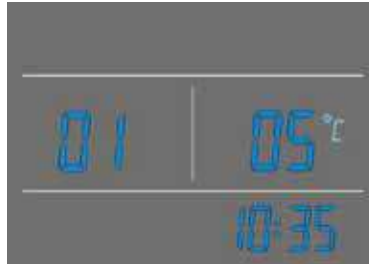
3. Buttons and

- These are the multi-function. They are used for temperature setting, parameters control and setting and clock setting and adjustment of the timer.

- During operation mode, press the buttons ▲ and ▼ to adjust the setting temperature directly.
- By pressing these buttons when the unit is on clock setting status, the hour(s) and the minute(s) of the clock time can be adjusted.
- By pressing these buttons when the unit is on timer setting status, the hour(s) and the minute(s) of the timer 'ON'/'OFF' can be adjusted.
- Check and adjust the set parameters:

- 1) When the unit is 'ON' or 'OFF' (not on clock and timer setting status), briefly press the  button to access the user parameter control. Select the parameter by pressing ▲ or ▼. Press  to exit.
- 2) When the unit is 'OFF' (not on clock and timer setting status), press  and  buttons at the same time for 2" and insert the password confirming each field with  button to enter in the adjustment of installer parameters. Select the parameter and press the ▲ or ▼ buttons and briefly press the  button to access to the parameter value. Press the ▲ or ▼ buttons to adjust the value and confirm with  button. Press  to exit.

For example: parameter 01, the relative value is 5°C:






Once the parameters have been set by the installer, the user cannot change them. Please contact a qualified after-sales service person to change the installer parameter settings.

- By pressing ▲ and ▼ buttons at the same time for 5 seconds, all the buttons are locked.
- By pressing at the same time and for 5 seconds again the ▲ and ▼ buttons, all the buttons are unlocked.






4. Buttons and

Clock setting:


- Press  button to entry the clock setting interface: hour icon "88:88" flashes;
- Press the ▲ and ▼ buttons to set the hour and press  to confirm: minute icon "88:88" flashes;
- Press the ▲ and ▼ buttons to set the minutes and press  to confirm and exit.

The set time is shown on the display.

Timer setting:

- Press the  button for 5" to enter the timer setting interface: timer 'ON' hour icon "88:88" flashes;
- Press the ▲ and ▼ buttons to adjust the time and press  to confirm: timer 'ON' minute icon "88:88" flashes;
- Press the ▲ and ▼ buttons to adjust the minutes and press  to confirm: timer 'OFF' hour icon "88:88" flashes;
- Press the ▲ and ▼ buttons to adjust the hour and press  to confirm: timer 'OFF' hour icon "88:88" flashes;
- Press the ▲ and ▼ buttons to adjust the minutes and press  to confirm.

Timer 'ON' and 'OFF' icons are shown on the display next to the current time.

Press  button to clear the timer settings when programming the timer 'ON' and timer 'OFF' time, thus returning to the current time display. Timer settings repeat cyclically and are still valid even after a power failure.

5. Button

Press this button to turn 'ON' or turn 'OFF' the. The auxiliary resistor will operate according to its own control logic. When the unit is 'ON', press this button for 5" to enable or disable the fan ventilation function.

6. Error codes

During standby or running status, if there is a malfunction, the unit will stop automatically and show the error code on the right screen of the controller.




11.3 LCD ICONS

1. Hot water available

The icon indicates that the domestic hot water temperature has reached the set temperature. Hot water is available for use. The heat pump is in standby mode.

2. Ventilation

The icon indicates that the function is active.

By pressing the  button for several seconds the ventilation function can be enabled or disabled.

If this function is enabled the fan will continue working to ventilate the air, when the water temperature reaches the set point and unit is standby. If this function is disabled the fan will stop, when the water temperature reaches the set point and unit is standby.

3. Electric heating

The icons indicates that the electric heating function is enabled. The auxiliary heater will operate according to its own control logic. During the disinfection cycle, the icon flashes.

4. Defrosting

The icon indicates that the defrosting function is active. This is an automatic function, the system will enter or exit defrosting according to its own internal control logic. Defrosting parameters cannot be changed on site. And the unit does not support manual defrost control.

5. Heating

The icon indicates that the current operation mode is heating.

6. Key lock

The icon indicates that the key lock function is enabled. The keys will not function as long as this function is active.

7. Left Temperature display

The display shows the setting water temperature.

When checking or adjusting the parameters, this section will display the relating parameter number.

In case any malfunction occurs, this section will display the related error code.

8. Right temperature display

The right area of the display shows the upper tank temperature.

While checking or setting parameters, this area displays the value of the relevant parameter.

9. Time display

The display shows the time of the clock or timer.

10. Timer "ON"

The icon indicates that the timer function is 'ON'.

11. Timer "OFF"

The icon indicates that the 'OFF' timer function is active.

12. Error

The icon indicates the presence of a malfunction.

11.4 MAIN LOGICS

11.4.1 Water temperature difference for compressor starting

Parameter 1 "offset temperature TS6" is used to control the start or stop of the compressor.

When the lower temperature of tank T2 is below the temperature set TS1-TS6, the compressor runs to heat the water to temperature set TS1. The display always shows the upper temperature of tank T3.

11.4.2 External pump

T2: lower tank temperature

T3: upper tank temperature

Check to be done to use the external pump:

- Parameter 14 is configured;
- The optional probe T6 has been electrically and hydraulically connected;
- The external flow switch (optional) has been electrically and hydraulically connected;
- an external pump (not supplied) has been electrically and hydraulically connected.

When used for sanitary hot water circulation, the pump will start when the below conditions are satisfied at the same time:

1. the unit is 'ON';
2. $T3 \geq \text{parameter 15} + \text{parameter 16}$;
3. $T6 \leq \text{parameter 15} - 5^{\circ}\text{C}$

The pump stops when one of the following conditions is met:

1. the unit is 'OFF';
2. $T3 \leq \text{parameter 15} - 2^{\circ}\text{C}$;
3. $T6 \geq \text{parameter 15}$

When used for solar water circulation, the pump will start when the below conditions are satisfied at the same time:

1. the unit is 'ON';
2. $T6 \geq T2 + \text{parameter 17}$
3. $T2 \leq 78^{\circ}\text{C}$

The pump will stop when one of the below conditions is satisfied:

1. the unit is 'OFF';
2. $T6 \leq T2 + \text{parameter 18}$
3. $T2 \geq 83^{\circ}\text{C}$

Pump anti-block function: when the pump stops for 12 hours, it will be forced to run for 2 min.

11.4.3 Flow switch

When the pump has been running for 30 sec, if the flow switch contact is detected as open for 5 sec, the pump stops. The pump restarts after 3 min. If the malfunction occurs 3 times in 30 min, the pump cannot restart until the unit is disconnected and restarted. The relevant error code will be shown on the display. Only the pump stops but not the whole unit.

11.4.4 Thermal protections

First step protection: when the tank water goes up to 85°C , the unit will stop and the relating error code will be shown on the controller. This is an auto-reset protection. When tank water temperature goes down, the unit can start again.

Second step protection: when the tank water keeps going up and reaches 90°C , the manual reset cut-off will be active, the electrical heater stops, unless you manual reset the protector.

To manual reset the protector, remove the frontal plastic cover and press the reset red button on the thermostat.

11.4.5 Disinfection weekly cycle

The unit is programmed to activate a weekly anti-Legionella cycle for a period of 30 minutes that brings the tank water to 70°C .

This system reduces the risk of bacteria causing various diseases, commonly known as "legionella". We ask you to read this paragraph carefully and ask your installer/planner for explanations in order to be properly informed about the risks of spreading this disease. We strongly recommend that you read the "Guidelines for the prevention and control of legionellosis" - Approved by the State-Regions Conference in the session of 7 May 2015 - Italy and subsequent amendments, which should also be taken as a reference when designing the system.

The operation of the disinfection cycle is as follows:

The electrical resistance is automatically activated every week at the set time (parameter 13), regardless of whether the machine is switched on or in stand-by mode (i.e. unit switched off but connected to the power supply).







When the upper tank temperature $T3 \geq TS3$ (parameter 4), the heating element is deactivated. When $T3 \leq TS3 - 2^{\circ}\text{C}$, the resistor is activated. The temperature T3 is maintained in the range $TS3 - 2^{\circ}\text{C}$ and $TS3$ for the set disinfection time (parameter 5), then the unit exits the disinfection cycle.

When parameter 5 (t2) is set to 0, the disinfection function is disabled.

The logic only start counting t2 when T3 has reached TS3.

Is possible set the frequency between disinfection cycles (parameter 21).

If the unit is switched off but powered (and even if the ON/OFF contact is open), disinfection takes place with the same logic as if the unit was switched on.

	If the unit is disconnected from the power supply, the disinfection cycle will not occur. If the unit has been without power for an extended period of time, DO NOT use the water contained in the unit. It is recommended that the tank be emptied and all water contained in the system piping carrying the DHW be drained. It is recommended to let the water flow not only to renew all the water in the pipes but also for a sufficient time to flush the pipes. This necessary "flushing" time is inversely proportional to the temperature of the water flowing through the pipes.
	The disinfection cycle occurs only inside the water tank. Therefore, it's recommended to perform a recirculation of the water system especially for disinfecting all the contained water. If cannot be possible, according to the preceding warning, it is recommended to let the water system to flow for a enough for cleaning the pipes and renewing the water.
	If the parameter 5 (t2) is set to be 0, the disinfection function is disabled. Such operation is strictly unrecommended; the manufacturer declines any responsibility for the data caused by a lack or incorrect unit disinfection. If you desire to disable the disinfection cycle, you should ask the maintainer about the consequences that may arise from this operation.
	It is strictly forbidden to change the default value of parameter 4. The parameters 4 and 5 control the anti-legionella cycle (temperature vs time). We recommend to respect the above guidelines, if you want to change them. Please remember that to keep the temperature of the tank water between 55-60°C in order to inhibit the bacterial proliferation (see Annex 13 of the guidelines mentioned above).
	The parameter 21 acts on the frequency of disinfection cycles. It must be properly set according to the storage temperature of the tank and the frequencies of DHW utilization. Higher frequency of the disinfection cycle, results in a lower possibilities of bacteria contact. The stagnant water allows Legionella bacteria to grow. For this reason it is necessary to properly valuate the frequency of the disinfection cycle according to its own uses. The plant designer must keep in mind the legionella risk and should adopt all the measures for prevention and control of water.
	The user is RESPONSIBLE to periodically check the correct operation of the anti-legionella cycle and to verify that during the disinfection, the setting temperature parameter is put to be 4 and is reached for the duration indicated by the parameter 5.

11.4.6 Auxiliary electric resistance

Electric resistance on or off, condition 1:

(when the unit is switched on, and the electrical resistance has not been switched on manually using the relevant button)

- ON: when tank temperature set TS1 (parameter 0) is greater than the operating limit expressed in Section 16, the lower temperature of tank T2 reaches this limit and the upper temperature of tank T3 \leq TS1-3°C;
OFF: when the upper tank temperature T3 reaches temperature set TS1+1°C.
- ON: when the ambient temperature \leq -10°C or $>$ 44°C;
OFF: when the ambient temperature \geq -8°C or $<$ 42°C.
- ON: when high or low gas pressure protection is triggered three times in 30 minutes;
OFF: when the gas pressure protection has triggered for the third time, the corresponding error code is displayed, and this protection cannot be reset until the unit is disconnected and restarted. The resistance continues to operate to reach the set temperature, then it is switched off.
- ON: when the unit enters defrost (only if parameter 20 is set to 1=on) or disinfection;
OFF: when the unit exits defrost or disinfection.



The resistor integration function described in point 1 of condition 1 can be deactivated via parameter 32 (see paragraph 11.5).

Electric resistance on or off, condition 2:

(when the unit is switched on and the electric resistance has been switched on manually using the relevant button)

- ON: the running time of the compressor exceeds the delay time of the heater (parameter 3), and the upper tank temperature T3 \leq TS2-3°C;
OFF: upper tank temperature T3 \geq TS2+1°C.

Electric resistance on or off, condition 3:

(when the unit is switched off but powered, namely in standby mode)

- ON: If the electric resistance has been switched on manually using the corresponding key, it will operate until the upper tank temperature T3 reaches set TS2;
OFF: the electric resistance was switched off manually using the button or the upper temperature of tank T3 has reached set TS2.
- ON: Upper tank temperature T3 \leq 5°C (tank frost protection);
OFF: upper tank temperature T3 \geq 10°C or the unit is switched on.



When the heater is switched on manually using the heater key, TS2 (heater off temperature) appears on the display and can be changed directly instead of TS1 (tank temperature set).

11.4.7 ON/OFF contact

When ON/OFF contact is closed and the control is ON, the unit can work and the running mode is decided by the setting of the controller.

When ON/OFF contact is closed, but the control is OFF (but powered), the unit can't work.

When ON/OFF contact is open but the control is ON, the unit can't work (with the exception of external pump).

If the control is ON, and the state of the ON/OFF contact changed from open to closed, the unit will work by the previous settings of the controller (auto-restart).

If the unit was previously in stand-by, in case the ON/OFF status is changed from opened to closed, the unit remains in stand-by.

A signal/warning in case of remote OFF signal (opened contact) is displayed. In such a way the customer can understand why the unit is not working.

11.4.8 Contact for integration with photovoltaic system

The ON/OFF contact can be configured so that a photovoltaic system, during periods of maximum productivity, can be used to obtain the maximum amount of hot water from the unit (set parameter 35=1). When the contact is closed (activation by the photovoltaic system), the temperature setpoint of tank TS1 is raised to the highest possible value compatible with the operating limits indicated in Section 16.

11.5 CHECKING PARAMETER SETTINGS




Parameter nr.	Visibility U=user I=installer	Description	Range	Default	Note
0	I/U	Tank temperature set (TS1)	10 ~ 65°C	55°C	Adjustable (it can be also modified by the user in normal operation)
1	I	Temperature offset TS6	2 ~ 15°C	5°C	Adjustable
2	I	Temperature off electric resistance (TS2)	10 ~ 75°C	65°C	Adjustable
3	I	Electrical resistance delay	0 ~ 90	6	t * 5 min, Adjustable
4	I	Weekly disinfection temperature TS3 (relative to upper tank temperature T3)	60 ~ 70°C	70°C	Adjustable
5	I	High temperature disinfection time t2	30 ~ 90 min	30 min	Adjustable
13	I	Start disinfection time	0~23	23	Adjustable
14	I	Pump use	0/1/2	0	Adjustable (0=disabled, 1=hot water recirculation, 2=solar water recirculation)
15	I	Water circulation temperature setting	15 ~ 50°C	35°C	Adjustable
16	I	Offset for sanitary hot water circulation	1 ~ 15°C	2°C	Adjustable
17	I	Solar pump restart temperature difference	5 ~ 20°C	5°C	Adjustable
18	I	Offset solar water circulation	1 ~ 4°C	2°C	Adjustable
19	I	Low outside temperature heater activation	0/1	1	Adjustable 0=off, 1=on
20	I	Resistor activation during defrosting	0/1	1	Adjustable 0=off, 1=on
21	I	Frequency of disinfection cycles	1 ~ 30 days	7 days	Adjustable
32	I	Activation of heat pump integration resistor	0/1	1	Adjustable 0=off, 1=on
33	I	Electrical resistance activation hysteresis	1 ~ 10°C	3°C	Adjustable
35	I	Contact configuration ON/OFF	0/1	0	0=on/off 1=photovoltaic
A	U	Lower tank temperature T2	0 ~ 99°C		Current value detected. Error code P1 will be displayed in the event of a malfunction.
B	U	Upper tank temperature T2	0 ~ 99°C		Current value detected. Error code P2 will be displayed in the event of a malfunction.
C	U	Coil temperature	-15 ~ 99°C		Current value detected. Error code P3 will be displayed in the event of a malfunction.
D	U	Intake gas temperature	-15 ~ 99°C		Current value detected. Error code P4 will be displayed in the event of a malfunction.
E	U	Ambient temperature	-15 ~ 99°C		Current value detected. Error code P5 will be displayed in the event of a malfunction.
F	U	Domestic hot water/water temperature only	0 ~ 125°C		Current value detected. Error code P6 will be displayed in the event of a malfunction, no error if parameter 14=0
G	U	EXV opening step	10 ~ 47 step		N*10 step
H	U	Effective water set for heat pump	10 ~ 65°C		Should the machine operation go outside the region indicated in Section 16 due to high water and air temperatures, the actual water set is automatically lowered from the TS1 set by the user.

11.6 UNIT MALFUNCTION AND ERROR CODES

When an error occurs or the protection mode is set automatically, the circuit board and the wired controller will both display the error message.

Protection/ Malfunction	Error code	LED indicator	Possible reasons	Corrective actions
Standby		Off		
Normal operation		On		
Lower tank temperature sensor fault	P1	☆ ● (1 flashes 1 off)	1) Sensor not connected 2) Short-circuited sensor	1) Check the sensor connection 2) Replace the sensor
Upper tank temperature sensor fault	P2	☆☆ ● (2 flashes 1 off)	1) Sensor not connected 2) Short-circuited sensor	1) Check the sensor connection 2) Replace the sensor
Evaporator coil temperature sensor fault	P3	☆☆☆ ● (3 flashes 1 off)	1) Sensor not connected 2) Short-circuited sensor	1) Check the sensor connection 2) Replace the sensor
Intake gas temperature sensor fault	P4	☆☆☆☆ ● (4 lampeggi 1 off)	1) Sensor not connected 2) Short-circuited sensor	1) Check the sensor connection 2) Replace the sensor
Ambient temperature sensor failure	P5	☆☆☆☆☆ ● (5 flashes 1 off)	1) Sensor not connected 2) Short-circuited sensor	1) Check the sensor connection 2) Replace the sensor
Domestic hot water/solar water circulation temperature sensor failure	P6	Off	1) Sensor not connected 2) Short-circuited sensor	1) Check the sensor connection 2) Replace the sensor
Remote signal status ON/OFF	P7	Off	When the remote signal is on, P7 is not displayed on the controller, when the signal is off, P7 is displayed. This is not an error code, but only the status of the remote on/off signal.	
High T6 temperature warning	P8	Off	1) High T6 temperature. 2) T6 sensor not working properly	1) P8 appears at 125°C and disappears at 120°C 2) Check and replace the sensor if necessary
High pressure protection (Pressure switch HP)	E1	☆☆☆☆☆ ● (6 flashes 1 off)	1) Air inlet temperature too high 2) Low water in the tank 3) EXV blocked 4) Too much refrigerant 5) HP pressure switch faulty 6) Excessive liquid in the cooling system	1) Check if the air inlet temperature is above the operating limit 2) Check that the tank is full of water 3) Replace the EXV 4) Discharge some refrigerant 5) Replace the pressure switch 6) Discharge and recharge the refrigerant
Low pressure protection (Pressure switch LP)	E2	☆☆☆☆☆☆ ● (7 flashes 1 off)	1) Inlet air temperature too low 2) EXV blocked 3) Not enough refrigerant 4) LP pressure switch faulty 5) Fan not working	1) Check if the air inlet temperature is below the operating limit 2) Replace the EXV 3) Charge some refrigerant 4) Replace the flow switch 5) Check that the fan is working together with the compressor. Otherwise the fan may be faulty
High temperature protection (Thermostat T85°C)	E3	☆☆☆☆☆☆☆ ● (8 flashes 1 off)	1) High tank water temperature 2) Thermostat is faulty	1) If the fan temperature exceeds 85°C, the pressure switch opens the contact and the resistor switches off for protection. After the water returns to normal temperature values, the protection resets itself. 2) Replace the thermostat
Flow switch	E5	☆☆☆☆☆☆☆☆ ● (9 flashes off)	Water flow rate not detected: 1) Pump not powered 2) Pump malfunction 3) Dirty water filter 4) Flow switch malfunctioning	1) Check the power supply of the pump 2) Check the electrical connections of the pump and the direction of rotation of the motor. Replace the pump if necessary 3) Clean the filter 4) Check the connections and the correct operation of the flow switch
Defrost	Indicates defrosting	(continuous flashes)		
Communication error	E8	On		

12. MAINTENANCE AND PERIODICAL CONTROLS

	<p>ATTENTION: All operations described in this chapter MUST ALWAYS BE CARRIED OUT BY QUALIFIED PERSONNEL. Before carrying out any work on the unit or accessing internal parts, make sure that the power supply is disconnected. The compressor head and discharge piping are usually at quite high temperatures. Be particularly careful when working in their proximity. The aluminium fins of the coil are particularly sharp and can cause serious injuries. Be particularly careful when working near the battery. After maintenance operation, close the panels, securing them with the fixing screws where necessary.</p> <p>ATTENTION: The unit must be installed to ensure sufficient clearance for maintenance and repairs. The warranty does not cover the costs of platforms or handling equipment required of any maintenance work.</p>
	<p>It is forbidden to load the refrigeration circuits with a refrigerant different from the one indicated on the identification plate. The use of a different refrigerant can cause serious damage to the compressor.</p> <p>The use of different oils from those specified in this manual is prohibited. The use of a different oil may cause serious damage to the compressor.</p>
	<p>If the water outlet temperature is already sufficient, it is recommended not to raise the temperature set further in order to reduce consumption, prevent limescale build-up and save energy.</p>

It is good practice to carry out periodic checks to ensure that the unit is working properly:

OPERATION	1 month	4 months	6 months
Check the water supply line and the air vent regularly to avoid water leaks or air in the pipes. Check that the tank is always full of water.	x		
Check the correct operation of the control and safety devices.	x		
Check that there is no oil leakage from the compressor..	x		
Check that there are no water leaks in the hydraulic circuit.	x		
Check that the external flow switch is working properly (if installed).	x		
Clean the metal filters in the hydraulic circuit. to maintain good water quality. Water leaks or dirty water can damage the unit.	x		
Clean the finned coil with compressed air (it is recommended to keep the unit in a dry and clean place, and with a good air exchange).	x		
Check the correct operation of the electrical resistance for the anti-legionella cycle (*). It is advisable to carry out a diagnostic of all the hydraulic system with sampling of the system water at the most critical points.		x	
Check that the electrical terminals both inside the electrical panel and in the compressor terminals are properly secured.		x	
Make sure that the electrical components are in good condition. If a component is damaged or emits a strange smell, it should be replaced as soon as possible.		x	
Tightening hydraulic connections.		x	
Keep the unit clean with a soft, damp cloth.		x	
It is recommended to clean the tank and the resistance regularly to maintain efficient performance.		x	
Pulire regolarmente l'eventuale griglia di copertura del condotto aria esterna per mantenere una resa efficiente. Regularly clean the outside air duct cover grille, to maintain efficient performance.		x	
Correct voltage.			x
Correct absorption.			x
Check each part of the unit and the pressure of the refrigerant circuit. Replace any damaged parts, and recharge the refrigerant if necessary.			x
Checking working pressure, overheating and undercooling.			x
Check the efficiency of the circulation pump.			x
If the heat pump is to be out of service for a long period, drain all the water from the unit and seal it to keep it in good condition. Drain the water from the lowest point of the tank to prevent water freezing in winter. Water drainage and complete inspection of the heat pump are required before subsequent commissioning.			x
Check and possibly replace magnesium anode.			every year

(*): Check the correct operation of the electric resistance: The adjustment wheel of the thermostat mounted on the resistor must be turned fully anticlockwise. To check that the resistance is activated, press the button and check that the tank temperature rises.

12.1 ENVIRONMENTAL PROTECTION

The law regulating the use of ozone-depleting substances stipulates the prohibition of disposing of refrigerant gases in the environment. Refrigerant gases must be recovered and returned, at the end of their service life, to the appropriate collection centres. The refrigerant R134a is mentioned as one of the substances subject to a special control regime provided for by law, and must therefore be subject to the above obligations. **Particular care is therefore recommended during maintenance operations in order to reduce refrigerant leaks as much as possible.**



This unit contains R134a refrigerant in the quantity specified in the technical characteristics label. Do not release R134a into the atmosphere: R134a is an ecological fluorinated gas with global warming potential (GWP) = 1300. It should only be handled and disposed of by qualified and trained persons.

13. TROUBLESHOOTING

This section provides useful information for diagnosing and correcting certain malfunctions that may occur. Before starting the troubleshooting, visually inspect the unit and system and check for obvious problems such as loose hydraulic connections or incorrect or loose electrical connections.

Before contacting your local dealer, read this chapter carefully, it will save time and money.



While checking the unit's electrical panel, always make sure that the unit's main switch is set to 'off'.

The guidelines below might help to solve your problem. If you cannot solve the problem, consult your installer/local dealer.

- No image on the controller (black display). Check if the main power is still connected.
- One of the error code appears, consult your local dealer.
- The programmed timer works but the programmed actions are performed at the wrong time (e.g. 1 hour before or after). Check that the time and date are set correctly, adjust if necessary.

14. DECOMMISSIONING

Once the unit is arrived at the end of its life cycle and needs to be removed or replaced, the following operations are recommended:

- the refrigerant must be recovered by qualified personnel and sent to collection centres;
- lubricating oil from compressors should also be recovered and sent to collection centres;
- electronic components such as regulators, driver boards and inverters should be dismantled and sent to collection centres;
- the structure and the various components, if unusable, must be dismantled and sorted according to their nature; in particular the copper and aluminium present in discrete quantities in the machine.

These operations facilitate the recovery and recycling of substances, reducing environmental impact.

The user is responsible for the correct disposal of the product in accordance with the national regulations in force in the country of destination. For further information please contact the installer or the competent local authorities.



An incorrect decommissioning of the machine can cause serious environmental damage and endanger the safety of people. It is therefore advisable to contact authorised and technically trained persons who have attended training courses recognised by the relevant authorities.

It is required to follow the same precautions described in the previous paragraphs.

Pay special attention during the disposal operation of the refrigerant gas.

The illegal disposal of the product by the end user leads to the application of the penalties in accordance with the law in the country where the disposal takes place.



The crossed bin symbol applied on the appliance indicates that the product, at the end of its useful life, must be collected separately from other wastes.

15. TECHNICAL CHARACTERISTICS

TECHNICAL DATA		GREEN 200	GREEN 200 S	GREEN 200 2S
Power supply	V/Ph/Hz	220-240/1Ph+N+PE/50		
Water tank real capacity	L	228	220	217
Heating capacity	W	2060* (+1200**)		
Power input	W	700* (+1200**)		
Nominal current	A	2.21* (+5.2**)		
COPDHW***	W/W	2.64	2.64	2.64
COPDHW****	W/W	2.81	2.81	2.81
Maximum absorption	W	765 (+1200**)		
Maximum current	A	3.2* (+5.2**)		
Heating time with cold tank (*)	h:min	7:48	7:48	7:48
Maximum outlet water temperature (without using resistance)	°C	65		
Maximum water temperature	°C	75**		
Minimum starting water temperature	°C	10		
Ambient working temperature	°C	-10 ~ +43		
Maximum refrigerant discharge pressure	bar	25		
Maximum refrigerant suction pressure	bar	10		
Refrigerant type		R134a		
Refrigerant charge	g	920		
Compressor	Type	Rotary		
	Oil	ESTER OIL VG74, 400 mL		
Fan motor	Type	Asynchronous motor		
	W	80		
	RPM	1250		
Nominal flow rate	m ³ /h	450		
Flow rate at 60 Pa	m ³ /h	350		
Ducting diameter	mm	160		
Maximum permissible tank pressure	bar	10		
Material of internal tank surface		S235JR with double-layer vitrification		
Tank transmittance (kboll) *****	W/K	1,73	1,73	1,73
Auxiliary electric resistance	Kw	1.2		
Electronic expansion valve		yes		
Magnesium anode		yes		
Heat pump exchanger material (condenser)		Aluminium alloy		
Solar exchange coil surface	m ²	/	1,2	1,2
Auxiliary exchange coil surface	m ²	/	/	0,5
Solar exchange coil flow rate (1)	m ³ /h	/	1,2	1,2
Auxiliary exchange coil flow rate (1)	m ³ /h	/	/	0,5
Maximum exchange coil pressure	bar	/	6	6
Exchange coil material		Pickled S235JR		
Cold water inlet	inch	G 1"female		
Hot water inlet	inch	G 1"female		
Solar integration input/output	inch	/	G 1"female	G 1"female
Auxiliary integration input/output	inch	/	/	G 1"female
Condensate water outlet		0,3 mt. φ22 mm plastic flexible pipe		
Condensate drainage	inch	To be installed externally		
IP protection class		IPX1		
Net dimensions	mm	φ654x1638	φ654x1638	φ654x1638
Packaging dimensions	mm	700x700x1760	700x700x1760	700x700x1760
Net weight	Kg	98.0	113.0	121.0
Weight with full water tank	Kg	326.0	333.0	338.0
Gross weight	Kg	112.0	127.0	135.0
Sound power (2)	dB (A)	58.2		
Sound pressure (3)	dB (A)	42.8		

NOTES:

* Heating capacity and power input detected in the following conditions:

ambient temperature 20°C, water temperature from 15°C to 55°C (these data are obtained by internal laboratory tests based on the uniform reintegration of the tank temperature).

** Related to the auxiliary resistance. During the disinfection cycle, the temperature is raised to 70°C by the auxiliary resistance.

*** Energy efficiency of water heating based on ERP (EN 16147), profile L (200L) and XL (300L), Ambient temperature 7°C / 6°C, water temperature from 10°C to 55°C (SCOP_{DHW})

**** Energy efficiency of water heating based on ERP (EN 16147), profile L (200L) and XL (300L), Ambient temperature 14°C / 12°C, water temperature from 10°C to 55°C

**** Referred to tank with air temperature at 20°C and storage with water at 65°C.

(1) Technical label values referred to integration with boiler in accordance with DIN 4708 norms (primary 80/60°C, secondary 10/45°C)

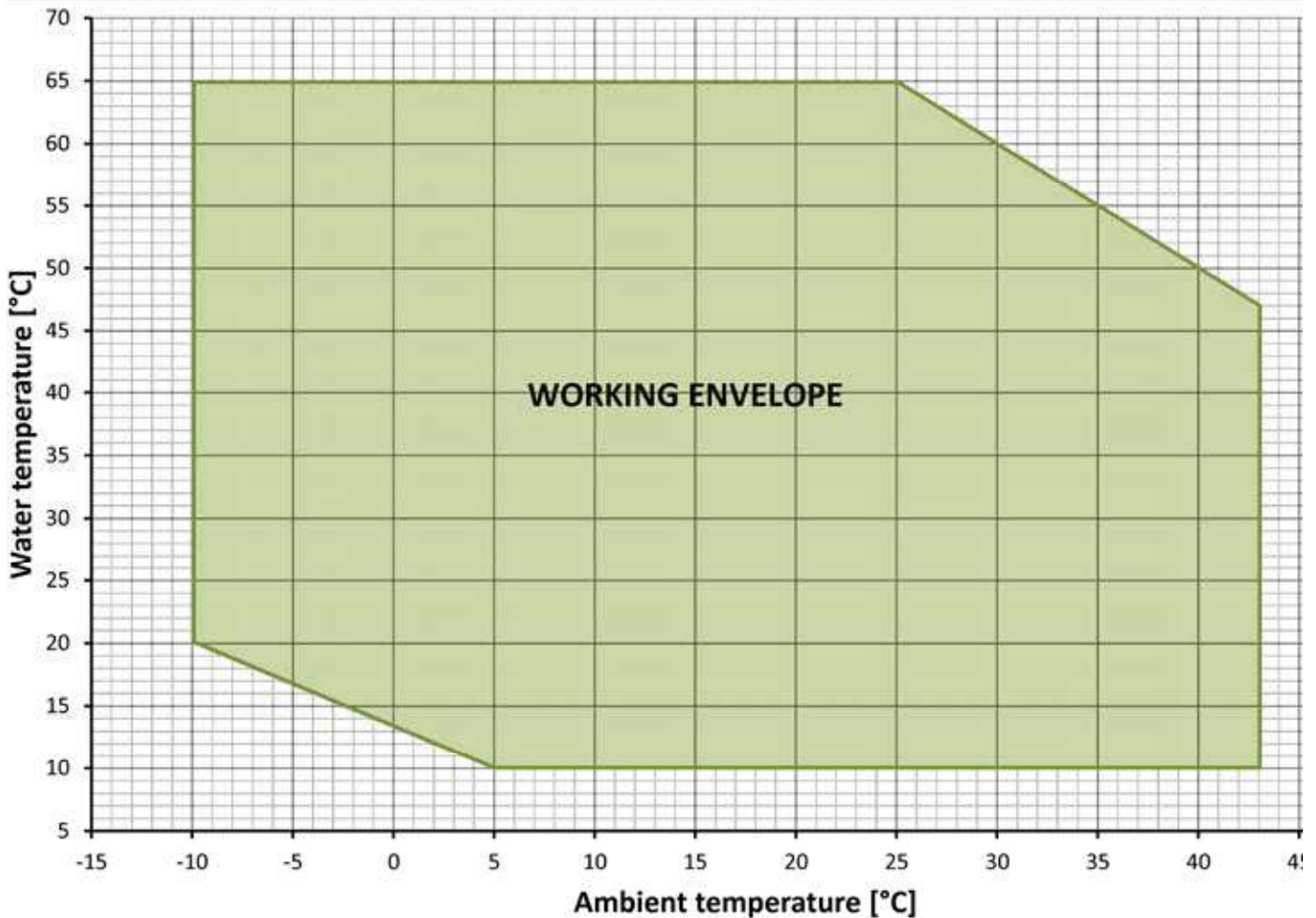
(2) Measured according to EN 12102 standard in the conditions of EN 16147.

(3) Calculated according to ISO 3744:2010 algorithm at a distance of 1 m from the unit.

16. HEAT PUMP OPERATING LIMITS

It is recommended that the unit is operated within the following operating limits to avoid possible intervention of the protective devices.

In any case, for high temperatures (water temperature between 47 and 65°C, air temperature between 25 and 43°C), if the user sets a temperature set outside the operating region, the heat pump automatically adapts its set to the limits shown in the diagram below.



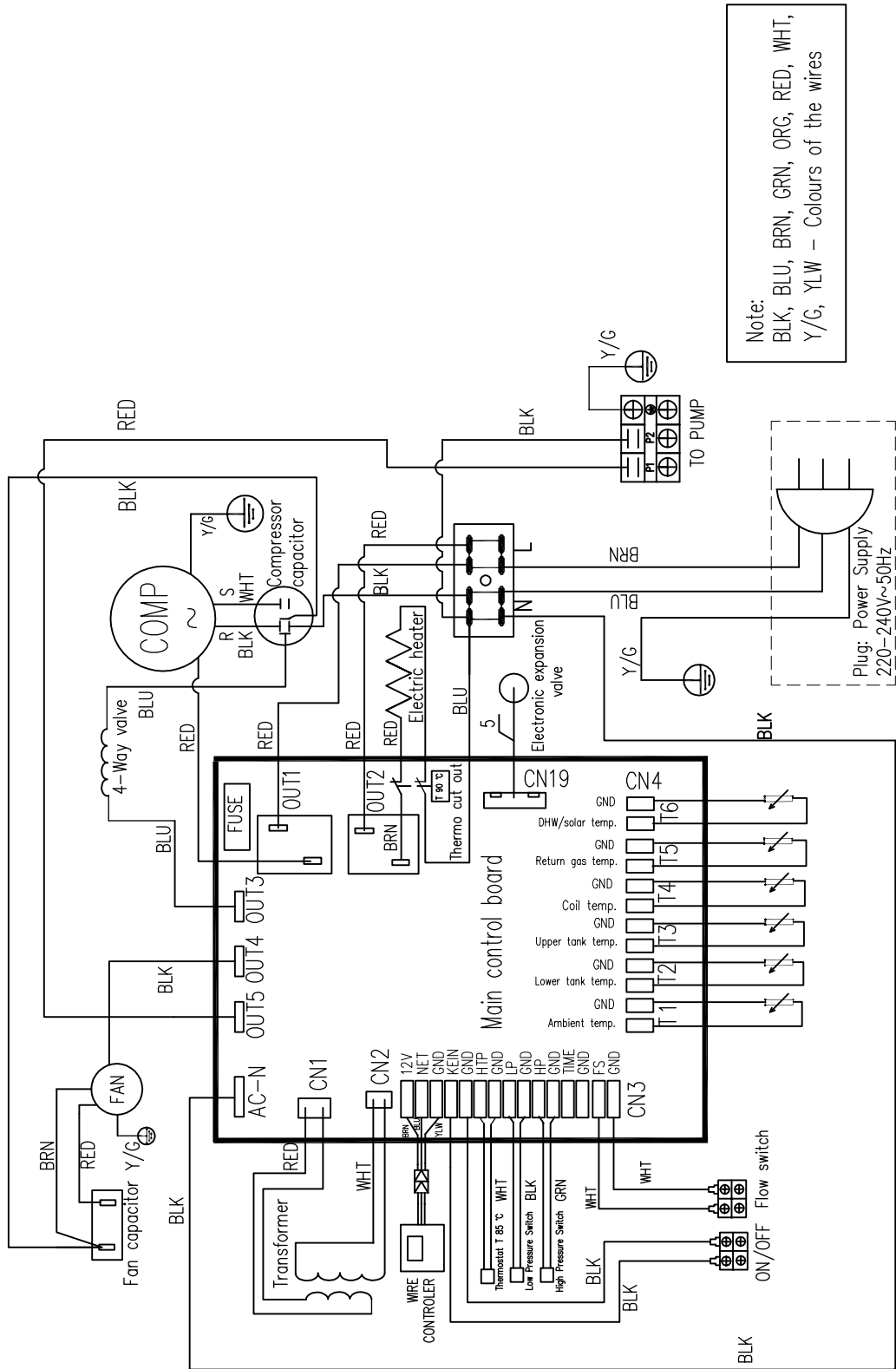
The fixed sets of the pressure switches are shown below:

- AP pressure switch: OFF=22 bar, ON=16bar
- BP pressure switch: OFF=0,2 bar, ON=1 bar

17. WIRING DIAGRAM

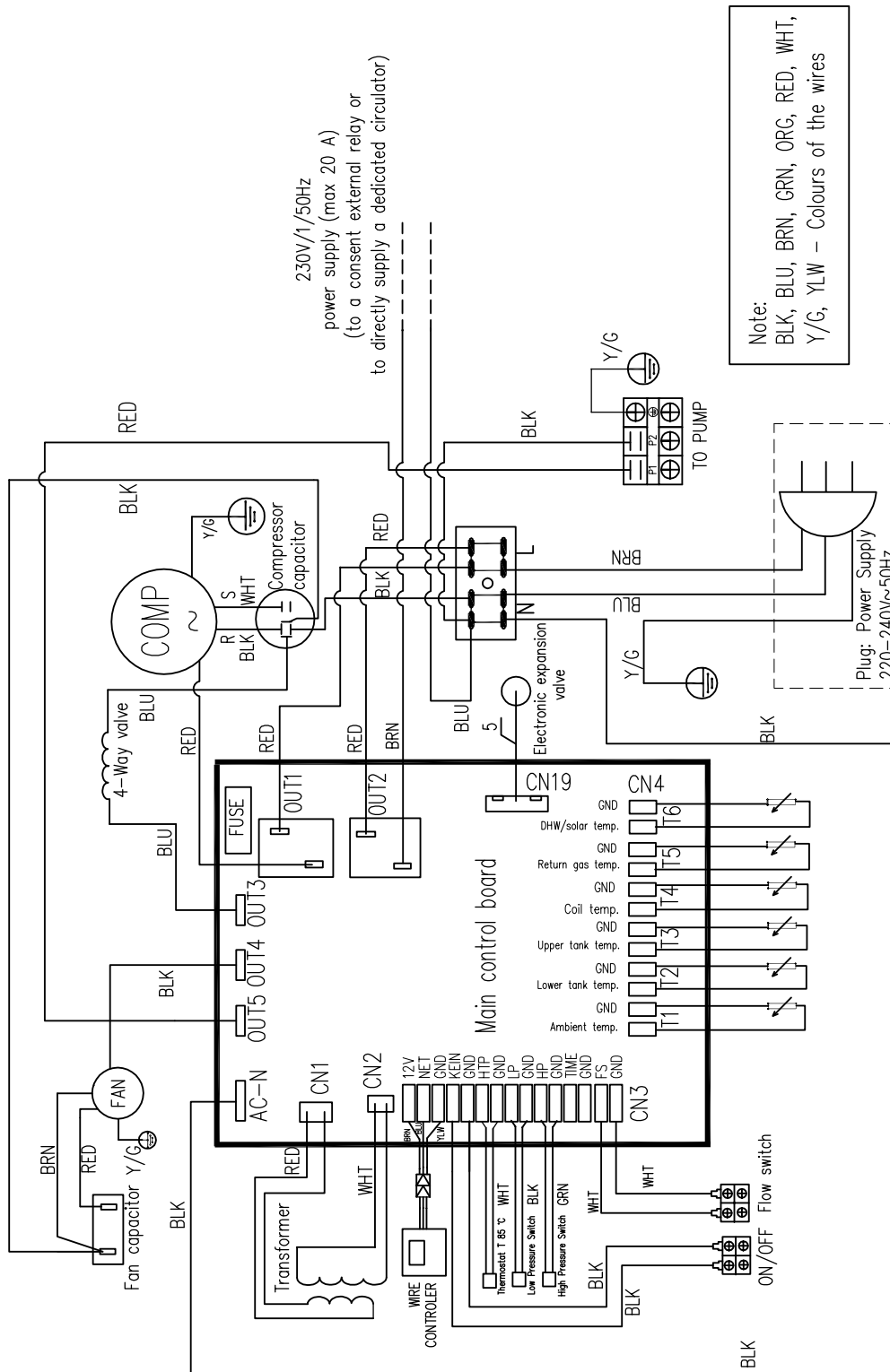
Please refer to the wiring diagram inside the electrical box cover.

17.1 STANDARD CONNECTION

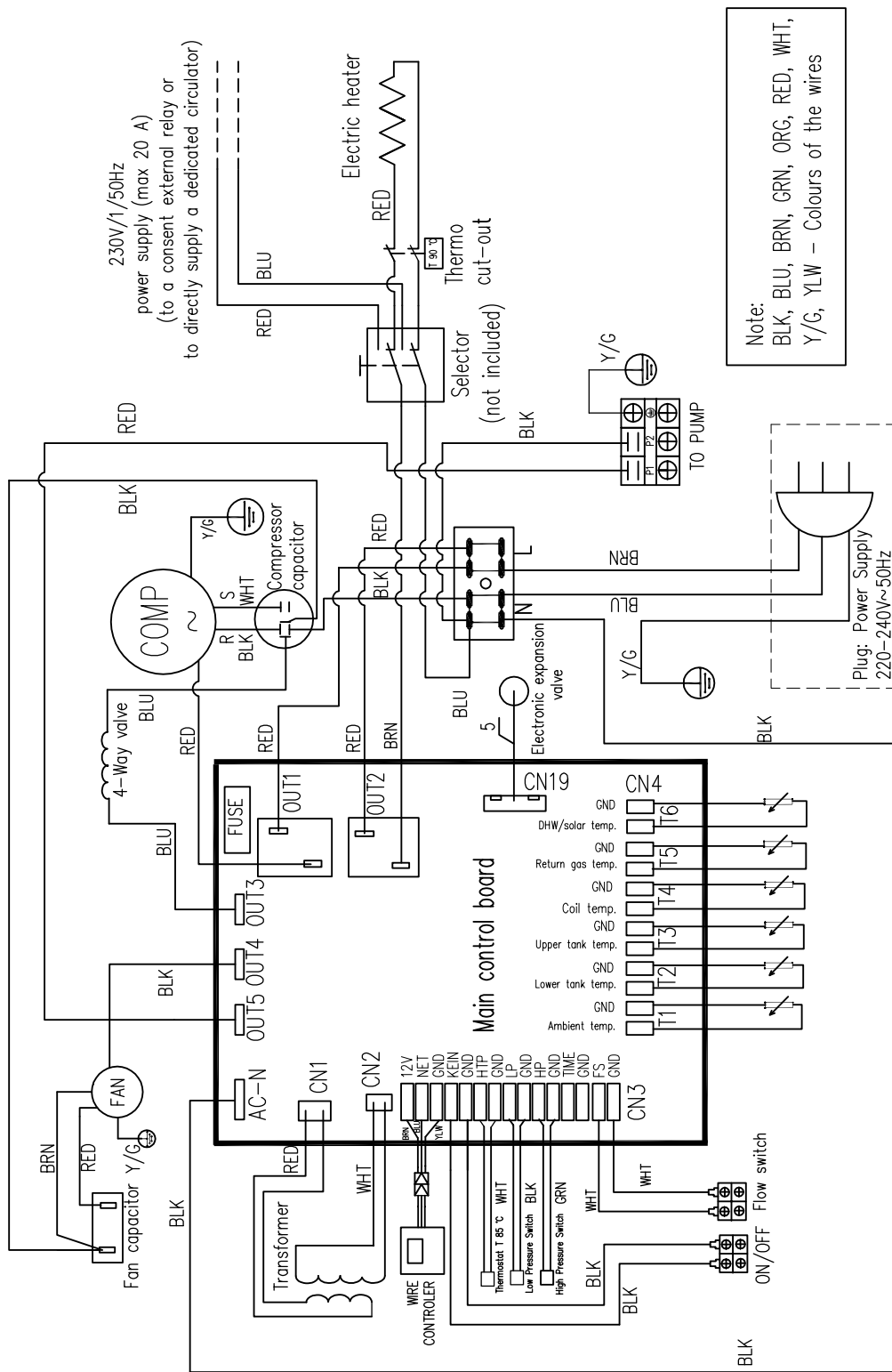


Note:
 BLK, BLU, BRN, GRN, ORG, RED, WHT,
 Y/G, YLW – Colours of the wires

17.2 CONNECTION OF AN AUXILIARY POWER SOURCE



17.3 CONNECTION OF AN AUXILIARY ENERGY SOURCE VIA AN EXTERNAL SELECTOR SWITCH



18. PRODUCT SHEET EU REGULATION 812/2013

Models		GREEN 200 / GREEN 200 S / GREEN 200 2S
Declared load profile		L
Energy efficiency class of water heating		A
Energy efficiency of water heating	Indoor air +20°C	129%
	Warmer climatic conditions (+14°C)	119%
	Average climatic conditions (+7°C)	111%
	Colder climatic conditions (+2°C)	104%
Annual energy consumption in terms of final energy	Indoor air +20°C	796 kWh
	Warmer climatic conditions (+14°C)	862 kWh
	Average climatic conditions (+7°C)	921 kWh
	Colder climatic conditions (+2°C)	983 kWh
Thermostat temperature settings		55°C
Indoor sound power level LWA		58 dB(A)
Installation and maintenance precautions		For information on installation and maintenance, please refer to the dedicated chapters in the user-installer manual

19. TECHNICAL PARAMETERS EU REGULATION 814/2013

Models		GREEN 200 / GREEN 200 S / GREEN 200 2S
Daily electricity consumption Qelec	Indoor air +20°C	3,847 kWh
	Warmer climatic conditions (+14°C)	4,148 kWh
	Average climatic conditions (+7°C)	4,415 kWh
	Colder climatic conditions (+2°C)	4,699 kWh
Declared load profile		L
Indoor sound power level		58 dB(A)
Mixed water at 40°C V40		291 l
Energy efficiency of water heating	Indoor air +20°C	129%
	Warmer climatic conditions (+14°C)	119%
	Average climatic conditions (+7°C)	111%
	Colder climatic conditions (+2°C)	104%



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