ENERGIE
THERMODYNAMIC SOLAR ENERGY

Assembly and User Manual

Thermodynamic Solar System

Thermodynamic Solar Block [6...**40**]

CENTRAL HEATING
SWIMMING POOLS HEATING
DOMESTIC HOT WATER - XL

Review: 14
Version: 0
Date: 04/12/2018

Directives
2006/95/CE

European Certification
EN 60335-1
EN 60335-2-21
EN 60335-2-40

INDEX

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1. INTRODUCTION

Esteemed Client,

Thank you and congratulations for buying an ENERGIE product, the upshot of several years of experience in the sector.

We have built products based on specific studies, top quality materials and highly advanced technologies.

Our company's serious approach ensures you all the support you'll need from the sizing stage, to installation and assistance.

For the best use of this product we would ask you to read this instructions manual carefully in which you will find all the indications, information and tips you need to enjoy all the advantages that this appliance has to offer and by following its indications and regulations in force you will be assured of optimum operation and a perfect performance.

The information contained in this document is subject to any modifications deemed necessary to enhance the product without any prior notice.

2. GENERAL

2.1. Symbology

The notes/symbols shown can be found throughout the manual. They are intended to indicate and draw attention to certain situations/indications. In this way we seek to ensure any possible problems for the installer or user and assure smooth equipment performance.

 Warning / Important Information.

 Indicates any potentially dangerous situation which may result in physical injury or material damage.

2.2. **Manufacturer's Liability**

Our products are manufactured in line with the requirements of the various European directives.
With a constant concern for the quality and performance of our products, we make a continuous effort to improve them. This is why we reserve the right to modify the information described in this document at any time.

As the manufacturers we cease to be liable for the malfunctioning or even breakdown of the equipment whenever:

- ✓ The usage instructions are not respected.
- ✓ The installation instructions are not respected.
- ✓ Lack of maintenance (where required).

2.3. **Installer's Liability**

The installer is liable for proper equipment installation and for putting into operation.
The installer must bear in mind the following notes:

- ✓ Read and closely follow the instructions of the manuals supplied with the appliance.
- ✓ Carry out installation in accordance with standards in force and required by the manufacturer.
- ✓ Carry out the initial start-up of the equipment and verify all the checkpoints.
- ✓ Explain the installation to the user as well as how he/she should use the equipment.
- ✓ Notify the user of its obligation, where required, as regards equipment maintenance and inspection operations.
- ✓ Obligation to provide the user with all the documentation supplied with the equipment (manuals and warranty certificate).

2.4. Safety Information

With a view to protecting the physical integrity of the operator as well as of the equipment, it is vital that all the safety information noted in this manual should be taken into account.
This appliance is not envisaged for use by people (including children) whose physical, sensorial or mental capabilities are reduced or by people without any experience or knowledge, unless they have been given supervision or instructions about use of the appliance by someone responsible for its safety.
Children must be supervised to ensure that they do not play with the appliance.

3. INDICATIONS

This manual accompanies all the *"Thermodynamic Solar Block 6-40"* equipment and contains important instructions which must be followed during installation.

3.1. Unit inspection

The unit was tested and inspected for quality assurance before its dispatch. Carefully inspect the equipment components (Solar Block, Solar Panels etc.) as soon as you receive it in order to check that all the equipment is intact.
Confirm whether all the parts requested have been received in accordance with that which has been specified and whether the type, size and voltage of the unit are correct.

3.2. Lodging a complaint

If damage is identified in the inspection carried out at the time of reception of the unit, describe the damage in the transport reception document. Any transport complaint must be submitted at the act of delivery.

If you are in any doubt, get in touch with ENERGIE to obtain information about how to lodge a complaint with the haulage company.

Should damage occur during transport, do not install the unit. Keep all packaging for inspection of the hauler.

3.3. Packaging

The Thermodynamic Block is packed in a bottomless cardboard box and is secured to a treated pinewood pallet using plastic tape.
The thermodynamic solar panels are packed in cardboard boxes unless otherwise provided for.

The dimensions of the boxes, pallets and respective weights for the Thermodynamic blocks are shown in table 1.

Model	Box (H*L*P mm)	Pallet (H*L*P mm)	Weight (Kg)
Solar Block 6	950x585x650	140x605x670	103
Solar Block 12			115
Solar Block 16			120
Solar Block 28	950x685x735	140x705x755	190
Solar Block 40			192

Table 1: Dimensions of the boxes, pallets and respective weights

3.4. Transporting the unit

The tools recommended for transporting the unit whilst it is still in the pallet may be: forklift truck or pallet rack. Where possible, the latter must move/transport the unit to the final destination (point of installation).

pallets truck

lift truck

When transporting the unit, make sure that you only lift it by its lower part and always with the unit placed on the pallet. Do not try to move the unit without help.

It is vital to follow all the warnings and recommendations stated on the packaging boxes.

3.5. Preparation of the installation site

3.5.1. Solar Panels

The nature of the site and the inclination angle where the panels are installed are important factors to bear in mind in installation.

To capture the maximum incident solar radiation, the panels must have an inclination of between 10º - 90º with regard to the horizontal and be oriented Southwards. In addition to the factors mentioned above the panels must be at ventilated places and preferably not be exposed to any kind of shade.

It is incumbent upon the installer to comply with all the requirements demanded by ENERGIE and adapt the method for securing the panels in line with the site.

If the panels are subject to adverse atmospheric conditions, in the main strong gusts of wind, it is the responsibility of the installer to strengthen the panel affixation structure.

3.5.2. Thermodynamic Block

The Block installation site must be carefully designed. And before carrying out any procedure you must bear in mind:

- ✓ Easy access and sufficient space to move the equipment as far as the installation site.
- ✓ Load capacity of the ground (verify the weight of the equipment).
- ✓ Leave point for the hydraulic and electrical connections.
- ✓ The base of the site where the equipment will be placed must be perfectly even.
- ✓ Consider minimum distances with regard to walls, ceilings or any other type of obstacles which may make access difficult, both at the installation as well as in any maintenance operation.

3.5.3. Unit storage

If the unit is not installed immediately, keep it in a safe place protected from the weather in such a way that it does not suffer any kind of damage which may hinder its correct operation. Poor installation of the unit may give rise to the cancellation of the manufacturer's warranty.

4. THERMODYNAMIC SOLAR BLOCK

4.1. Operation

ENERGIE [6…40] solar blocks are items of equipment intended for climatisation: atmosphere, swimming pools, industrial applications etc.

The thermodynamic panel is placed on the exterior and it ensures the capturing of energy as regards:

- ✓ Direct and diffuse radiation
- ✓ Outside air by natural convection.
- ✓ Wind effect (almost always to be found).
- ✓ Rainwater

The temperature difference brought about by the previous factors ensures that the fluid will change to vapour state inside the panel.
The compressor aspirates the refrigerant fluid (vapour) of the panel, raising the pressure and temperature thereof, which is transmitted to the water circuit by way of a heat exchanger.
The Exchanger is located inside the cabinet Solar Block (*), providing heat to the water which is inside.
When the refrigerant fluid reaches the expansion valve it is at its liquid phase and the load loss owing to strangulation reduces the pressure and the fluid is re-prepared for entry into the panels.

* In the LVHW and Swiming Pool Heating Systems the plate heat-exchanger is installed in the exterior (or supplied as optional)

4.2. Technical Specifications

The *ENERGIE* Central Heating systems are presented on the market in a range of:

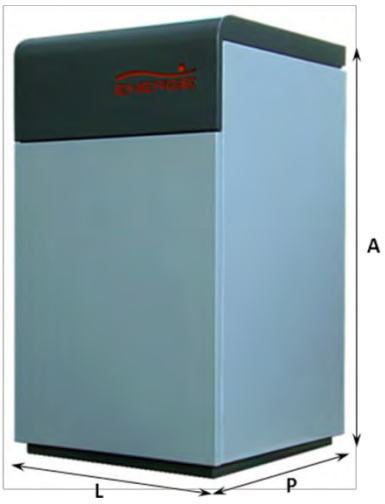
- 5 models of swimming pool heating and central heating ("Solar block" 6…40)
- 6 capacities of heather water ("ECO -industrial use"- ECO1000-ECO6000)

	unit	BS 6	BS12	BS 16	BS 28	BS40
		ECO 1000	ECO 1500 ECO 2000	ECO 2000 ECO 3000	ECO 4000	ECO 6000
Number of panels		6	12	16	28	40
Total weight of panels	Kg	48	96	128	224	320
Exposed capture surface	m2	9,6	19,2	26,6	44,8	64
Number of exchangers (ECO)		1	1	2	2	2
Number of water heaters (ECO)		1	1	1	2	2
Triphase power	400Vac, 50Hz	*	*	*	*	*
Monophase power	240Vac, 50Hz	*	*	*	X	X
Max. Power consumed(1~/3~)**	Kw	3,0/2,9	5,0/4,9	6,7/7,0	X/11,9	X/18,3
Power consumed(1~/3~)**	Kw	2,4/2,3	3,6/3,5	4,9/5,0	X/8,7	X/13,0
Thermal power supplied(1~/3~)**	Kw	7,0/7,0	11,6/11,6	15,9/17,2	X/29,5	X/45,2
Noise(dB)	dbA	41	44	48	50	57
Refrigerant fluid		R-407C	R-407C	R-407C	R-407C	R-407C
Minimum fluid fload	Kg	1,6	2	2,8	3,5	5,5
**A7/W50-55; without solar radiation*						

4.3. Components

The Thermodynamic Block is made up of two components:

a) Thermodynamic Solar Block



- Box made of Steel plate with Polyester painting.
- Scroll type hermetic compressor
- Heat Exchanger
- Expansion Valve (Electronic)
- Oil Separator
- Liquid Tank
- Filter
- Liquid Level Glass
- Switch (LP and HP)
- Digital thermostat
- Safety thermostat (mechanical)
- Electrical equipment
- Hydraulic connection.
- Cold connections.

Model	A (mm)	L (mm)	P (mm)
Solar Block 6 … 16	940	555	550
Solar Block 28 … 40	940	655	640

Table: Dimensions of the thermodynamic Solar Blocks

b) Thermodynamic solar panels

The solar panel is a plate made of twin-channel pressed aluminium with post-pressing anodic oxidation. The panel has the dimensions 2000 mm x 800 mm x 5 mm and it has a fluid flow entry and exit in a copper-aluminium tube with an interior diameter of ¼''

5. INSTALLATION

5.1. Installation Tools required

To ensure correct assembly of the equipment, the installing technician must be endowed with the following tools:

- ✓ Manometers (low and high pressure).
- ✓ Vacuum Pump.
- ✓ Refrigerant gas loading station or scales.
- ✓ Pipe cutter.
- ✓ Adjustable spanner.
- ✓ Screwdriver.
- ✓ Measuring tape.
- ✓ Tube bender.
- ✓ Tube expander.
- ✓ Refrigerant gas cylinder.
- ✓ Rotoblock wrench.
- ✓ Set of hydrant keys or ratchet.
- ✓ Blowpipe (welding).
- ✓ Copper rods with 40% of Silver.
- ✓ Descaler.

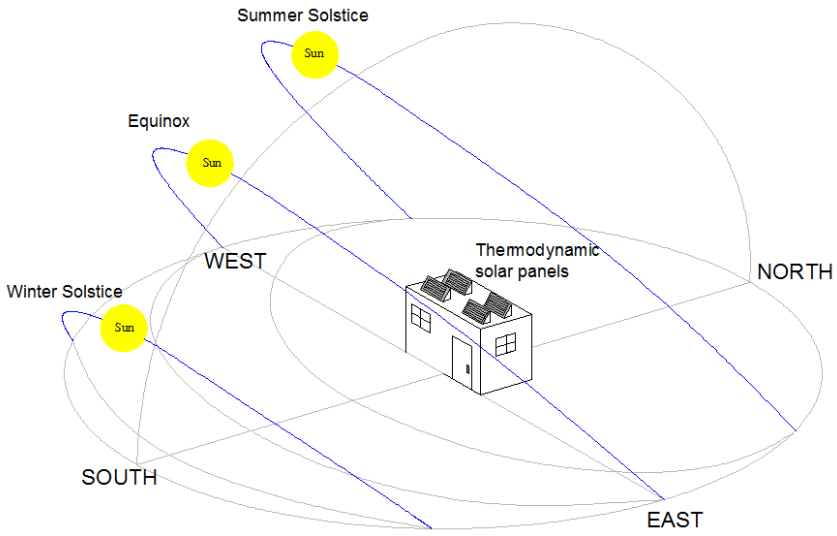
To verify the operationality of the equipment the installing technician must have at its disposal:

- ✓ Multimeter.
- ✓ Appliance for measuring temperature.

5.2. Thermodynamic Solar Panel

5.2.1. Panel orientation

ENERGIE panels must preferably be oriented in a southerly direction, but they may also have an orientation towards Northeast and Northwest.

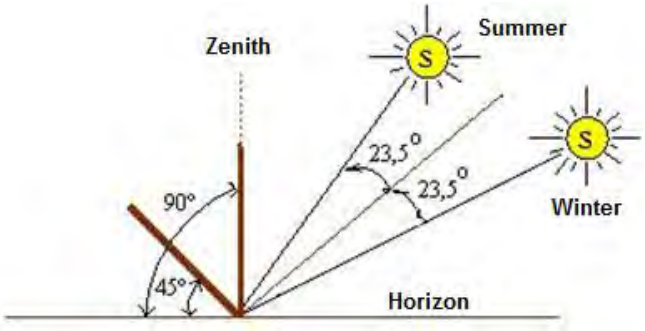


5.2.2. Inclination

The inclination angle of the sun rays with regard to the horizontal varies in accordance with the seasons of the year.
In Winter, at the Zenith, the solar rays form an angle of 20º to 40º with regard to the horizon. In Summer the angle is between 60º and 80º.

To get the most out of the solar rays on the panel, it's best to choose an inclination between 45º and 90º.

However, you may install the panels with another inclination in certain situations.



5.2.3. Distance

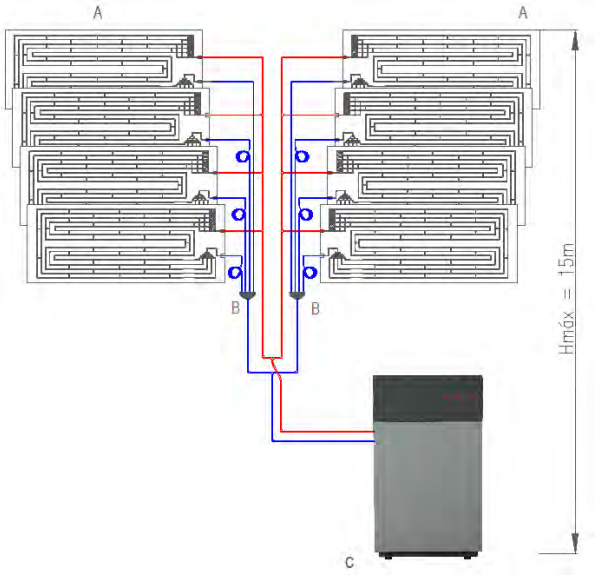
The maximum distance between the panels and the Thermodynamic Block depends on certain factors such as the equipment model, the no. of curves, the piping diameter etc.
However, we would recommend that the distance should not exceed the following values:

- ✓ SB 6 … SB 16 → 20 metres
- ✓ SB 28 … SB 40 → 30 metres.

For Installations with a distance greater than those indicated must contact the Technical Dept.

5.2.4. Unevenness

Under normal circumstances the total maximum gradient must always be less than 15 mts. However, there are situations where it is not possible to respect these distances, in these cases you must consult our technical department.
The aspiration piping must rise above the level of the panels, in the same way as the distribution shaft in order to avoid the rapid siphon effect of the liquid at the time of the stoppage of the compressor.



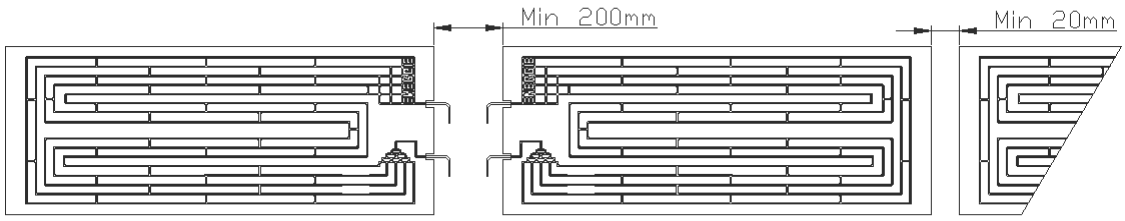
Key:	
A	Solar Panels
B	Distributor
C	Solar Block

5.2.5. Standard Gap of the Panels

The position of the panels and the choice of the sides of the connections must be carried out so as to limit the length of the piping and simplify the connections.

The panel gap is determined so as to facilitate its placement and the implementation of the connections between piping, though due consideration must be given to:

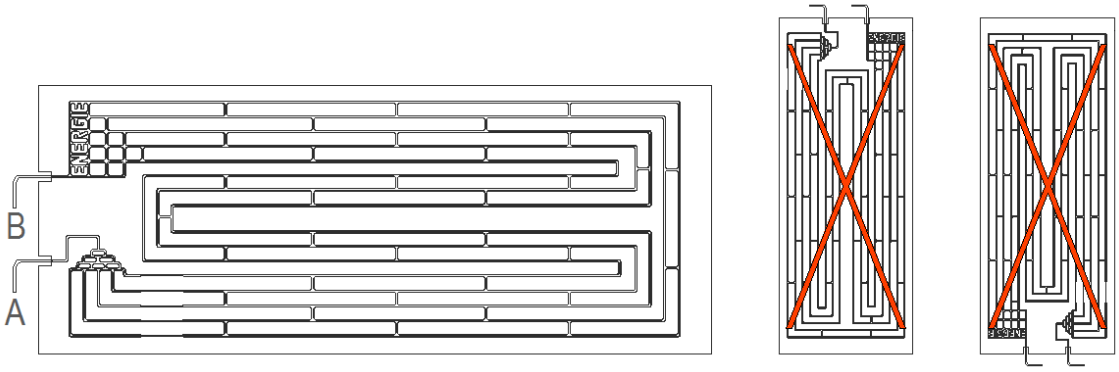
- ✓ Minimum space between the panels on the connections' side: 200mm (ideal space: 500mm).
- ✓ Space between the panels on the side opposite the connections: they should preferably not be completely stuck together (preferably> 20mm)



5.2.6. Direction of the Panels

The direction of the panels is defined by the outlets of the tubes pointing downwards and by the view of the front part of the panel. They must always be placed with the largest length horizontally and the connections pointing downwards. In this context two panel models are manufactured:

- Left-hand panel

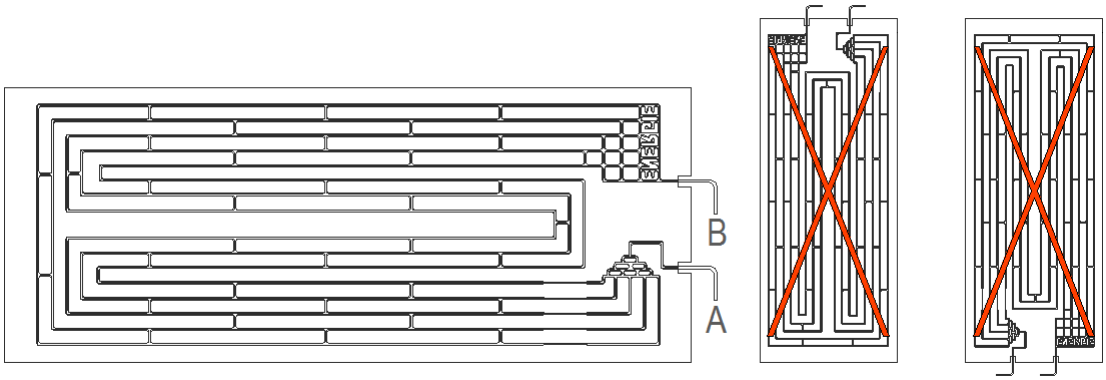


A – Liquid Line (Inlet)
B – Vapour Line (Outlet)

Left: A left-hand panel is installed on the right (front view). To this end, it has connections on the left side.

The Solar panel must not be installed on the vertical in accordance with the representation indicated above with a red cross.

- Right-hand Panel



A - Liquid Line (Inlet)
B - Vapour Line (Outlet)

Right: A right-hand panel is installed on the left-hand side (front view). To this end, it has connections on right-hand side.

The Solar panel must not be installed on the vertical in accordance with the representation indicated above with a red cross.

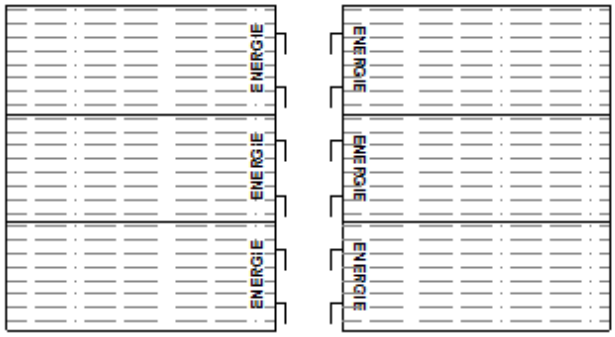
5.2.7. Relative position of the panels

The relative Position of the panels depends on the system to be installed, the availability of the installation area, the architectonic integration etc.

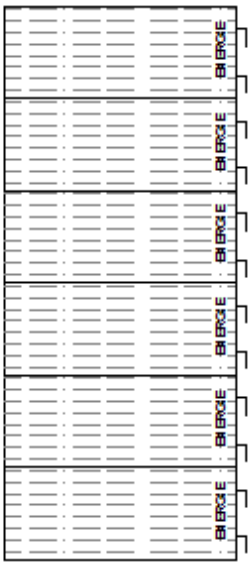
In the diagrams below some of the possible positioning layouts of the panels are represented. However, you may consult in the annex complementary information about the position of the panels in the installation.

Solar Block 6

a)

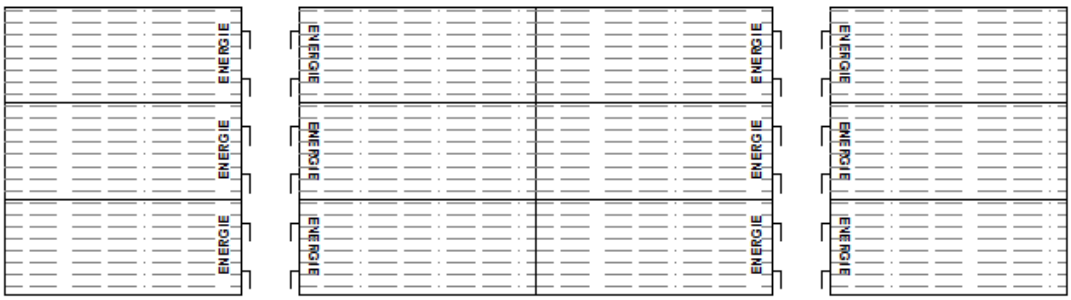


b)

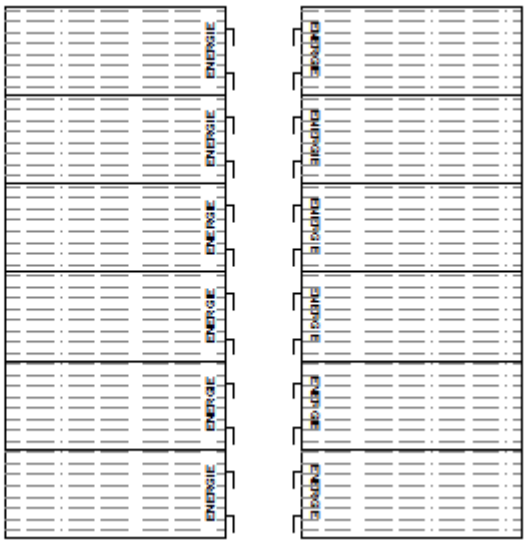


Solar Block 12

a)



b)

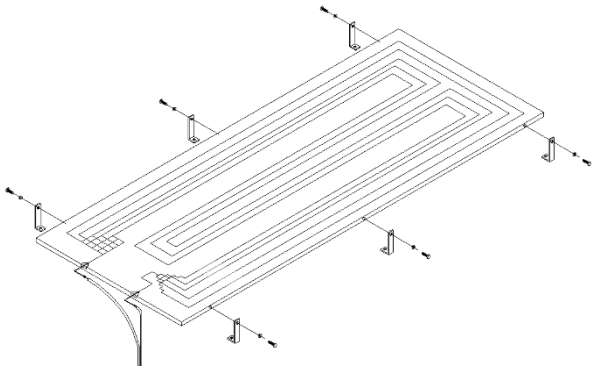


In the event of some other positioning of the panels, you must contact our Technical Department.

5.2.8. Fixation

The affixation of panels depends on the installation site and the method and type of affixation is the installer's decision. However, you must bear various factors in mind (described above such as, for example, distance, orientation…).

For a correct affixation of the panels, as regards the physical part of the affixation supports they must have a sturdy structure in line with the circumstances of the site. Each panel must be secured at 6 points (as a minimum). The image below illustrates an example of the affixation used:



The affixation of the panels is ensured by aluminium supports*. The support is bent in "L" form with two M8 through holes. The support base is secured to the roof (where applicable) using an M6 screw and a plastic plug or a female thread (depending on the situation).

The other support rib is secured to the panel by way of galvanised M6 screws to prevent corrosion situations.

* The aluminium supports are not supplied with the SB

The Panels must have a minimum gap of 50cm (from the previous and/or subsequent panel)

5.2.9. Liquid Distributor and Collector, placement and connection

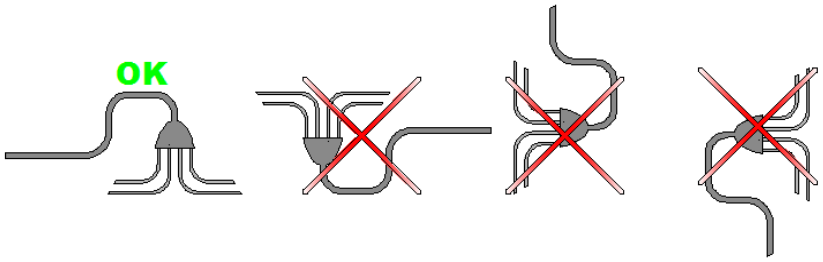
To ensure that the fluid reach the panels in homogeneous fashion, a *liquid distributor* must be installed. This same distributor includes as many distribution tubes as there are panels in the installation.

The distributor is placed between the panels. The connection tubes to the panels must have strictly the same length and their ends connect directly to the panels.

The distributor and the collector may be placed before the installation of the panels for the sake of convenience (obstruction, passage of distribution tubes behind the panels).

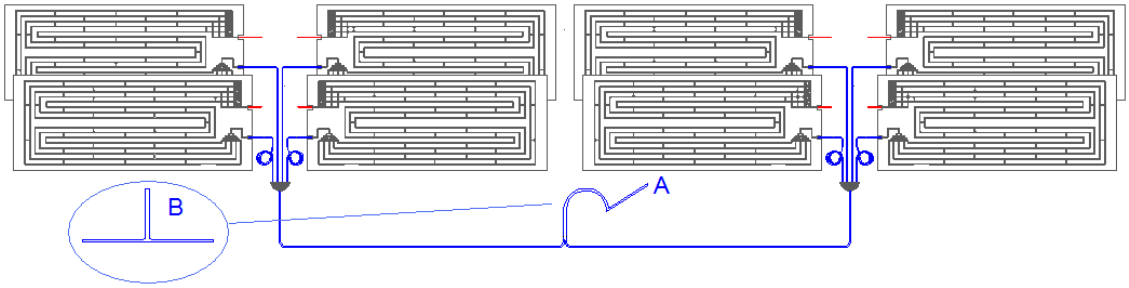
Only remove the tube protection cover at the time of connection to the power and aspiration shafts with a view to avoiding the penetration of impurities.

Install the distributor (s) vertically, face downwards (*never horizontally!*), thereby ensuring that the fluid reaches the panels in homogeneous fashion.



If a shaft is too long for the length required, it must be rolled up and never cut.
If it is wished to shorten or elongate, this operation must be carried out on all the shafts with the same diameter.

All ø ¼" shafts must be welded to the lower connections of the panels (liquid inlet). The shafts of the main distributor must be welded to the secondary distributors.



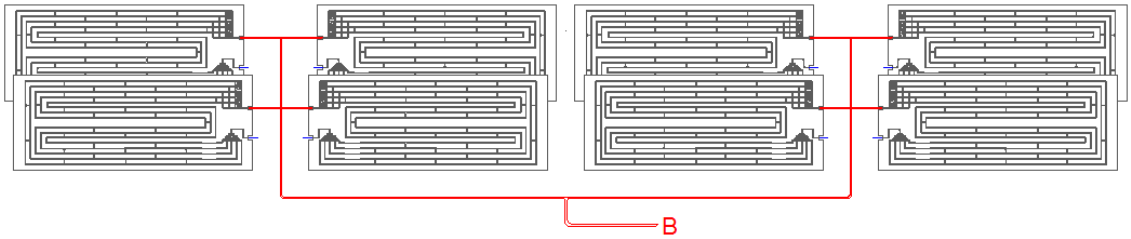
- ✓ A – Main Liquid Line
- ✓ B – Main Liquid Line viewed from above.

It is vital that the power shafts (Ø 1/4'') should have the same length and the same is true of the main distributor shafts.

sadsad

Depending on the Thermodynamic Block model and the position of the panels, one or more aspiration collectors must be carried out.

The aspiration which allows the collection of the refrigerant fluid in its gaseous state must regroup all the panel aspiration outlets (ø 3/8'') as far as the collector. This is shown in the figure below.



- ✓ B – Main Aspiration Line.

All the shafts must be welded to the upper panel outlets.
It is important for the connections at the collectors to be as simple as possible, respecting the instructions in the event of any unevenness.

It is essential for the copper tubes used to be refrigerant type CUDHP according to the ISO1337 and/or according to EN12735, both on the aspiration line and on the liquid line (power).

It is also recommended for all the piping to have good quality thermal insulation in order to avoid any possible condensation.

The piping diameters vary with the system model as can be seen in the table below.

Model	Aspiration Line	Liquid Line
Solar Block 6	3/4"	1/2"
Solar Block 12	7/8"	1/2"
Solar Block 16	7/8"	3/4"
Solar Block 28	1" 3/8	7/8"
Solar Block 40	1" 3/8	7/8"

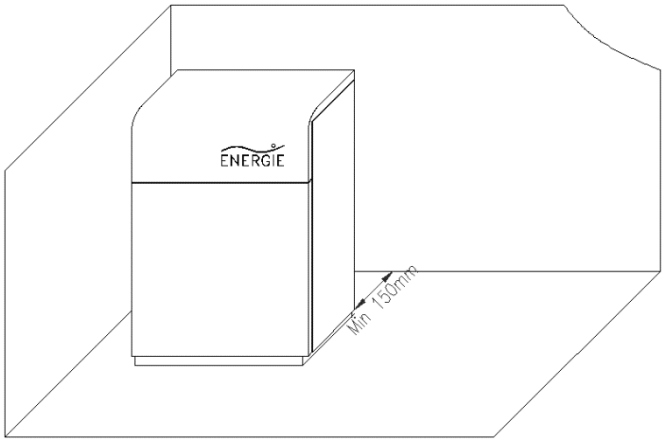
5.3. Thermodynamic Block

5.3.1. Installation site

The choice of site where the Thermodynamic Block is placed is very important and must be carried out bearing mind a certain number of criteria such as:

- ✓ Accessibility
- ✓ Proximity of the Boiler, with the latter serving as a support system or even in the event of the replacement thereof.
- ✓ Avoid the possibility of vibration transmission.
- ✓ Place anti-vibration supports between the appliance and the ground.
- ✓ Position of the piping from the panels.
- ✓ Protected from bad weather such as garages, cellars, attics etc.
- ✓ Allow any possible assistance intervention.

As regards the rear panel of the equipment and the installation site the installer must respect a minimum distance of 150mm to allow easy access to the hydraulic and refrigerant connections.



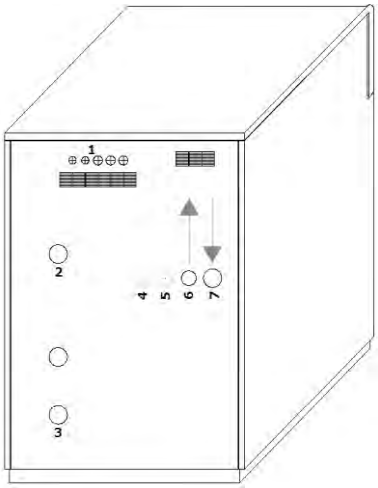
The installation of the Block near bedrooms should be avoided owing to the possible transmission of vibrations and noise.

If the block is placed in the attic special care must be taken as regards the vibrations produced under the *wooden* construction. Also provide for the placement of a tray under the appliance in accordance with legislation to collect any water in the event of an installation rupture.

Never grab nor handle the Thermodynamic Block by the refrigerant or hydraulic connections.

5.3.2. Connections at the Solar Block

The back of the Thermodynamic Block has the various connections in accordance with the designation set out below.



Key:	
1	Electrical connections
2	Water outlet
3	Water inlet
4	Exchanger outlet (Gas)
5	Exchanger inlet (Gas)
6	Outlet for Panels
7	Panels Return

The Thermodynamic Block connections to the panels are duly sealed to avoid the penetration of impurities and humidity in the refrigerant circuit.

5.3.3. Implementation of piping connections (Welds)

Once the Panels are installed and the Block has been finally placed at the site, now the following types of piping must be placed:

- ✓ Liquid (Outward to panels).
- ✓ Aspiration (Return from panels).

Before making the aforementioned connections, it is best to carry out the connections of the panel tubes to the:

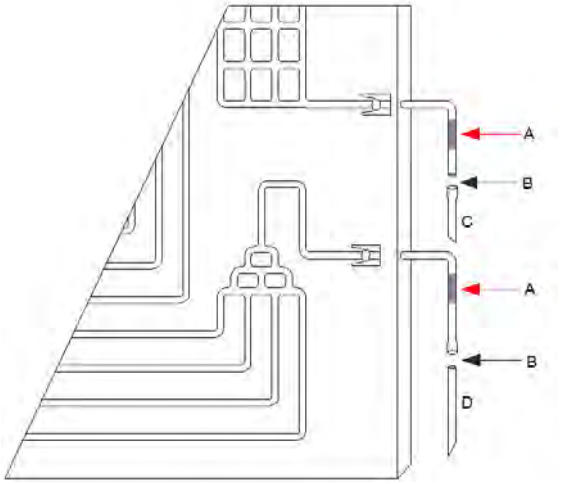
- ✓ Liquid distributor (s).
- ✓ Aspiration collector (s)

The implementation of the connections is one of the most delicate points of the whole installation and it is extremely important that the welds are carried out in line with all the basic criteria of a quality welding process.

The recommended welding type for implementing the piping connection is oxy-acetylene welding (oxygen/acetylene). Other types of gas may also be used such as propane, for example.

The most delicate welds and which require the greatest care are carried out at the panels. It is necessary to place a damp fabric strip which must envelop the "Thermoretractable Joint" so that it is duly protected from high temperatures caused by the blowlamp flame as shown in the figure below.

Key:	
A	Thermoretractable Joint
B	Connection and Weld
C	Aspiration Line (panel outlet)
D	Liquid Line (panel inlet)



The copper is heated until it goes dark red at which point welding must begin. Bring the slightly inclined welding rod closer without exposing it to the flame. As a general rule, the quantity to be applied is the same as one and a half times the tube diameter. As soon as the alloy expands, stop heating and let it cool.
As soon as the weld is in a solid state, you must cool the whole area around the weld immediately with a damp cloth.

Welds alongside the Thermodynamic Block must also be carried out with due care so as not to burn any component of the block.

After completing all the operations, the system is ready for submission to the leak test and the whole refrigerant fluid loading process.

5.3.4. Leak test

A nitrogen load at a pressure of 10 bar (Max) would be ideal to ensure that there are no leaks on the welds carried out. Once the installation is loaded, cover all the welds in soapy water and check that there are no nitrogen leaks. The panels must remain 2 to 3 days with the nitrogen load so as to ensure that there is no leak. Once this operation has been completed, remove all the nitrogen from the installation.

5.3.5. Vacuum

This operation is carried out using two load pipes, one of which is located on the Low Pressure line (next to the compressor) and the other on the High Pressure line (next to the liquid tank).
Before loading the refrigerant fluid, it is vital to carry out a vacuum at the installation. The purpose of the vacuum is to remove all the air and humidity to be found on the circuit. The vacuum time depends on the following factors:

- ✓ Volume in m^3/h of the vacuum pump.
- ✓ Volume of the system piping.

On average, the minimum vacuum time to be carried out at an installation, depending on the system installed, is shown in the table below.

Solar Block	6	12	16	28	40
Minimum vacuum time (hours)	5	8	9	11	12

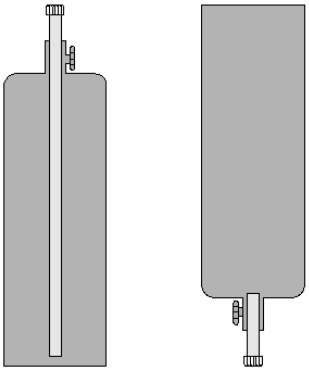
Once the vacuum process has been completed, the taps of the vacuum pump are closed. The vacuum manometer must always have the same display after stopping the pump, thereby ensuring that the installation maintains the vacuum is ready for the loading of the refrigerant fluid.

5.3.6. Refrigerant R-407C Loading

The R-407C is a zeotropic mix (fluid comprising more than one component) made up of R32 (23%), R125 (25%) and R134a (52%). It is chemically stable, is endowed with good thermodynamic properties and is a refrigerant with a low environmental impact and very low toxicity.

As it is a zeotropic fluid, it is necessary to take care as regards the loading of the installation. If we load an installation with a zeotropic refrigerant in vapour state, we run the risk that one of the components of the fluid will vaporize before the others and hence the installation will have a greater proportion of this component.
This is why the installation must be loaded with the refrigerant in liquid state. The majority of R407c recipients have a siphon, though it is worth checking. To load in liquid form you must proceed in the manner shown in the figure below.

Refrigerant Gas Loading from Canister with Siphon



Refrigerant Gas Loading from Canister without a Siphon

The amount of fluid to be inserted in each system essentially depends on two factors, the type of Thermodynamic Block and the distance between the Block and the panels. However, on average, unless there should be some anomaly, the following minimum loads must be carried out:

Solar Block	6	12	16	28	40
Minimum load (kg)	1,6	2,0	2,5	3,0	5,5

To ensure the start of the operation of the thermodynamic system a Pre-Load must be carried out (minimum load) of fluid with the pre-load being carried out by the "HIGH" compression pipe (with the compressor turned off). When the pressure is equalised at the manometers, the system is ready for compressor start up.
The fine-tuning (remaining load) of the system must be carried out via the "LOW" aspiration pipe very slowly (with the compressor in operation). To this end the loading must be carried out slowly by the Aspiration Line until we attain a difference of 20 ºC between the atmospheric Temperature and the aspiration Temperature (for low pressure manometers with readings in VAPOUR!!).

Or there should be as close an approximation as possible to the following aspiration pressure values for the respective exterior temperature (atmospheric temp. at the panels).

Exterior Temperature	Aspiration Pressure
(ºC)	(bar)
0	1,2
5	1,6
10	2,2
15	2,9
20	3,6
25	4,5
30	5,5

*For water return temperatures of between 25 – 30ºC

You may not achieve exactly the desired pressure as this depends on some factors such as:

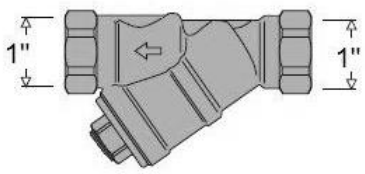
- ✓ Direct solar radiation on the panels;
- ✓ Ventilation;
- ✓ Relative humidity of the air;
- ✓ Variation in distances and unevenness of the installation piping;

5.4 Central Heating

The installation of the Hydraulic system must be carried out by a competent professional, always respecting the indications supplied by ENERGIE.

The Thermodynamic Block is not fitted with a Water circulator. It is up to the installer to size and install the pump. The water circulator must be sized bearing in mind the load losses of the installation and the flow required for smooth equipment operation.

Upon the initial installation and before establishing any hydraulic connection of the heating circuit to the Thermodynamic Block, the whole hydraulic installation must be cleaned to remove any dirtiness, remains of material and similar impurities.
After carrying out the cleaning of the circuit, connect it to the Thermodynamic Block, placing, without fail, a filter at the return water inlet as an accumulation of residues in the condenser may bring about a system malfunction. The figure below illustrates the type of filter to be used.



When the circuit is properly connected, fill the hydraulic circuit and as this operation is being undertaken, you must purge all the circuits, ensuring that you eliminate all the air pockets from the installation.

As a precaution you must carry out a leak test. The test must be carried out with pressure 1.5 times the working pressure.

As mentioned above when the installer is sizing the water circulator, he must bear in mind – besides the hydraulic circuit load losses – the recommended flow for smooth system operation (consult table below).

Solar Block	6	12	16	28	40
Minimum flow at the condenser (m^3/h)	0,7	1,0	1,5	3,0	5,0

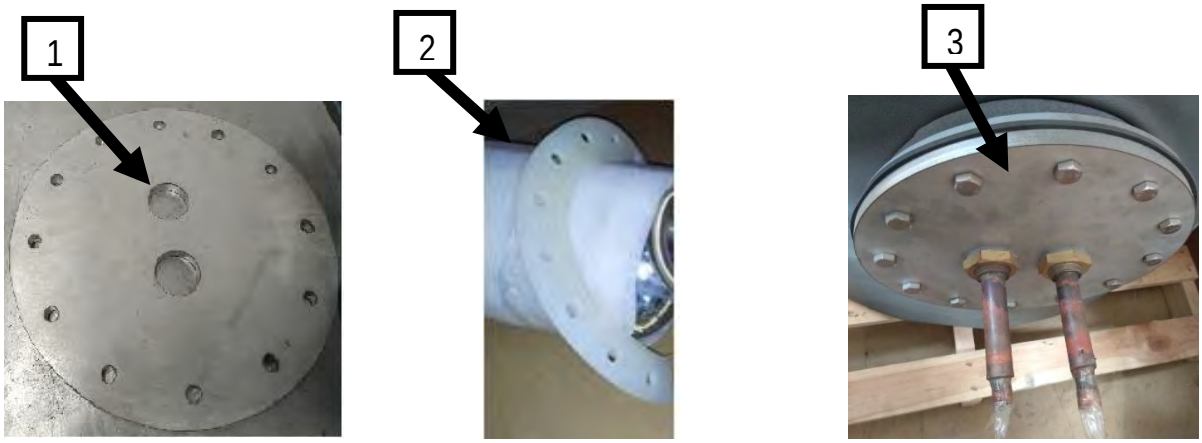
When installing the Thermodynamic Block along with another heating device we must bear in mind and place the Thermodynamic Block in parallel with the existing equipment.

Firstly, preferably choose heat emitters with a large exchange surface (radiant flooring, radiators, convectors, ventilo-convectors) as they allow distribution at a low temperature and better performances to be obtained.

It is compulsory to apply an anticorrosive additive (stabilising liquid) on the hydraulic circuit to prevent clogging, electrolysis phenomena and noise on the circuit.

5.4.- XL Heat exchanger

5.4.1. Domestic Hot Water



The heat exchanger for domestic hot water should be installed by following the next steps:

- Point the flange (1) to the cylinder (3)
- Have extremely carefull with the rubber sealing (2)
- Point the bolts to the holes on the cylinder (3) and thigh them
- Fullfill the tank to help to cool down the components on the next step
- Put a wet cloth on the copper pipes, near the tank to protect the components during the weld process
- Weld the tubes and make sure that you know the correct place to weld the tubes: outlet of the solar block to the inlet of the heat exchanger; inlet of the solar block to the outlet of the heat exchanger

Capacity	Solar Block	Outlet/Inlet Diameter From Block to Exchanger	Exchanger Diameter (Inlet/Outlet)
1000 L	6	1/2"	7/8”
1500 L	12	1/2"	
2000 L	12 | 16	1/2" | 5/8”	
3000 L	16 | 28	5/8” | 7/8”	
4000 L	28	7/8”	
6000 L	40	7/8”	

The maximum distance between the sun block and the tank must not exceed 5m.
The S1 and S4 probes should be placed in the tank. In the case of S1, it should be placed at the bottom, and S4 probe placed on top.

5.4.2. Technical Specifications

The water heating systems for industrial use are endowed with the following characteristics:

Model	Capacity (Lts)	Number of panels	Stainless		Absorved Power (Min)	Thermal Power (Max)
			Height (mm)	Diameter (mm)		
ECO 1000	1000	6	2010	930	960W	7500W
ECO 1500	1500	12	2100	1140	1230W	16580W
ECO 2000	2000	12/16	2160	1300	1440W	16580/24210W
ECO 3000	3000	16/28	2300	1500	2010W	24210/38220W
ECO 4000	4000	28	2x2160	2x1300	4140W	38220W
ECO 6000	6000	40	2x2300	2x1500	7630W	54600W

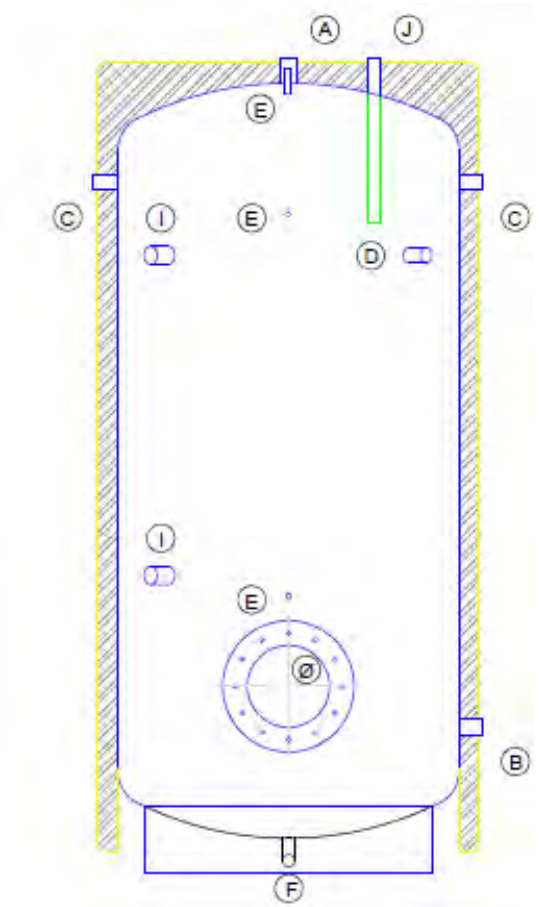
As has already been mentioned, all the assembly steps and sequences are identical to those described for Central Heating with the exception of the connection of the block to the condenser (Helical Coil Heat Exchanger). The condenser is not coupled to the block but rather inside the tank.

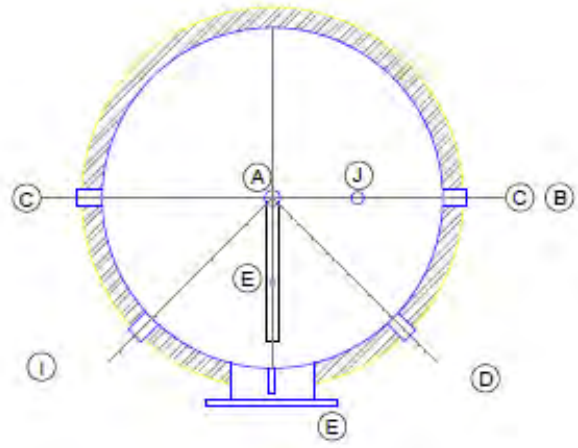
The dimensions of the water tanks may undergo alterations. These may have a maximum deviation of up to 20% of the measurements represented in the table above. As a consequence, the capacity of the water tank accompanies this variation.

The connection of the copper piping (gas outward and return) to the helical coil heat exchanger must be carried out with the inside of the water tank full of water.
The clamping connection of the heat exchanger to the flange must be protected by a damp cloth (Sealing nylon)

5.4.3. **Polywarm water cylinder ECO 1000 … 6000**

Key:	
A	Hot Water outlet
B	Cold Water Inlet
C	Heat exchanger connection (Extra)
D	Magnesium Anode
E	Instrumentation
F	Sewer
I	Eletrical resistance connection
J	Recirculation
*	Optional

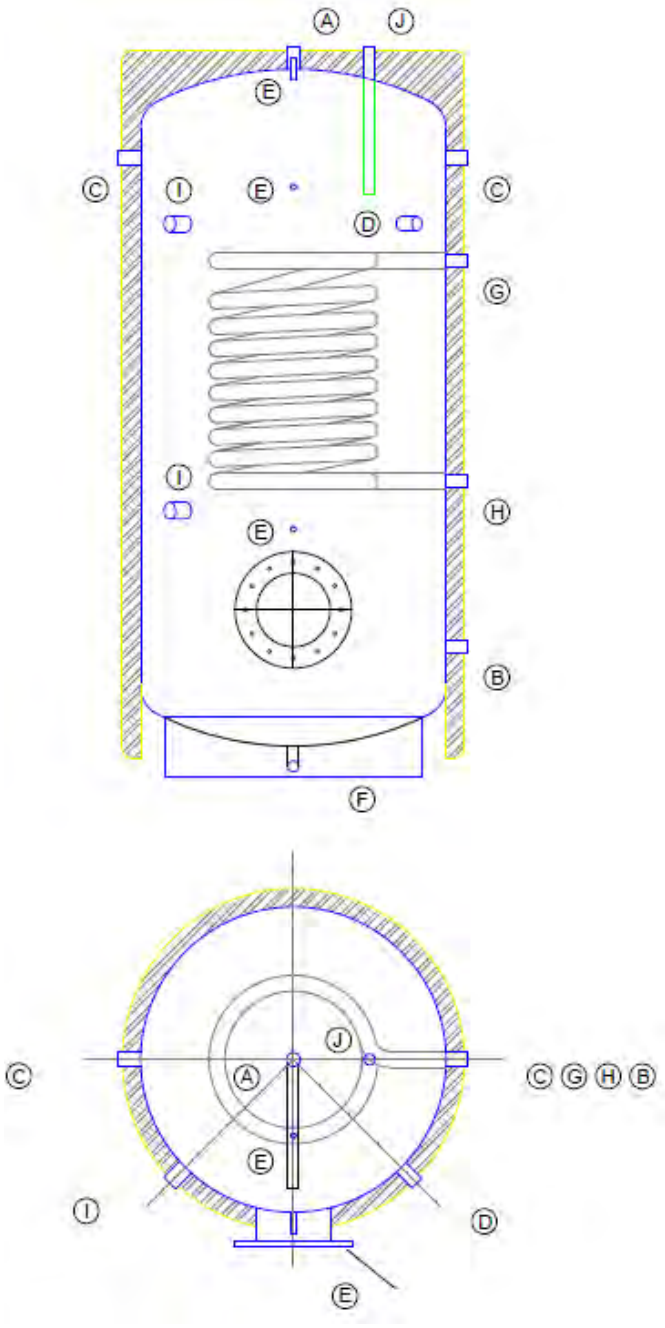




Model	Rated Capacity	Weight	Dimensões		Connections(female)										Øfree diam. of the
			Height	Diameter	A	B	C	D	E	F	G	H	I	J	
	Lts	Kg	mm		Incches										mm
ECO 1000	1000	150	2010	930	1 1/4	1 1/4	1 1/4	1 1/4	1/2	1	1 1/4	1 1/4	1 1/2	1	190
ECO 1500	1500	200	2100	1140	1 1/2	1 1/2	1 1/2	1 1/4	1/2	1	1 1/4	1 1/4	1 1/2	1 1/4	190
ECO 2000	2000	275	2160	1300	2	2	2	1 1/4	1/2	1	1 1/4	1 1/4	1 1/2	1 1/4	190
ECO 3000	3000	350	2300	1500	2	2	2	1 1/4	1/2	1	1 1/4	1 1/4	1 1/2	1 1/4	190
ECO 4000	4000	2X275	2X2160	2X1300	2	2	2	1 1/4	1/2	1	1 1/4	1 1/4	1 1/2	1 1/4	190
ECO 6000	6000	2X300	2X2300	2X1500	2	2	2	1 1/4	1/2	1	1 1/4	1 1/4	1 1/2	1 1/4	190

5.4.4. Stainless Steel Water Cylinder ECO 10**00** ... 6000

Key:	
A	Hot Water outlet
B	Cold Water Inlet
C	Heat exchanger connection (Extra)
D	Magnesium Anode
E	Instrumentation
F	Sewer
I	Eletrical resistance connection
J	Recirculation
*	Optional

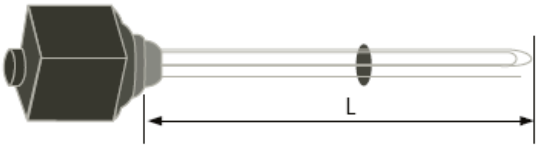


Model	Rated Capacity	Weight	Dimensões		Connections(female)										Coil			Direct diam. of the flange
			Height	Diameter	A	B	C	D	E	F	G	H	I	J	Surface	Potencia (KW)		
	Lts	Kg	mm		Incches										m2	a)	b)	mm
ECO 1000	1000	150	2010	930	1 1/4	1 1/4	1 1/4	1 1/4	1/2	1	1 1/4	1 1/4	1 1/2	1	3,48	101,2	50,6	190
ECO 1500	1500	200	2100	1140	1 1/2	1 1/2	1 1/2	1 1/4	1/2	1	1 1/4	1 1/4	1 1/2	1 1/4	4,05	117,3	58,9	190
ECO 2000	2000	275	2160	1300	2	2	2	1 1/4	1/2	1	1 1/4	1 1/4	1 1/2	1 1/4	4,86	141,3	70,6	190
ECO 3000	3000	350	2300	1500	2	2	2	1 1/4	1/2	1	1 1/4	1 1/4	1 1/2	1 1/4	6,48	188,4	94,2	190
ECO 4000	4000	2X275	2X2160	2X1300	2	2	2	1 1/4	1/2	1	1 1/4	1 1/4	1 1/2	1 1/4	2X4,86	2x141,3	2x70,6	190
ECO 6000	6000	2X300	2X2300	2X1500	2	2	2	1 1/4	1/2	1	1 1/4	1 1/4	1 1/2	1 1/4	2X6,48	2x188,4	2x94,2	190

5.4.5. Support System (Electric heater kit)

Heating resistance by tube type immersion developed especially to be used for water heating, presenting the following characteristics:

- ✓ Shield made of stainless steel or Copper pipe.
- ✓ Magnesium oxide insulation.
- ✓ Adjustable thermostat (0 … 77 °C).
- ✓ Safety thermostat (90 … 99 °C).
- ✓ Contactor (only at the triphase electric heater kit).
- ✓ Luminous Pilot.



Power KW	Power supply	Screw	L
3,3 kW	1 ⏚ 240 Vac /50 Hz	6/4"	330 mm
6 kW	3 ⏚ 400 Vac /50 Hz	6/4"	520 mm
7,5 kW	3 ⏚ 400 Vac /50 Hz	6/4"	580 mm
9 kW	3 ⏚ 400 Vac /50 Hz	6/4"	610 mm

5.6. Swimming Pool

5.6.1. General characteristics

Solar block	Outlet/Inlet from the Block to Exchanger
6	1/2"
12	1/2"
12 | 16	1/2" | 5/8"
16 | 28	5/8" | 7/8"
28	7/8"
40	7/8"

Exchanger model	HTA-5	HTA-10	HTA-12
Refrigerant connections Ø inlet. | Ø outlet (inches)	5/8" | 1/2"	3/4" | 1/2"	3/4" | 1/2"
Thermal power (kW)	17	33	46
Water flow (m^3/h)	7,5	15	20
Hidraulic connections (pol.)	1 1/2"	2"	2"
Diameter (mm)	250	315	315

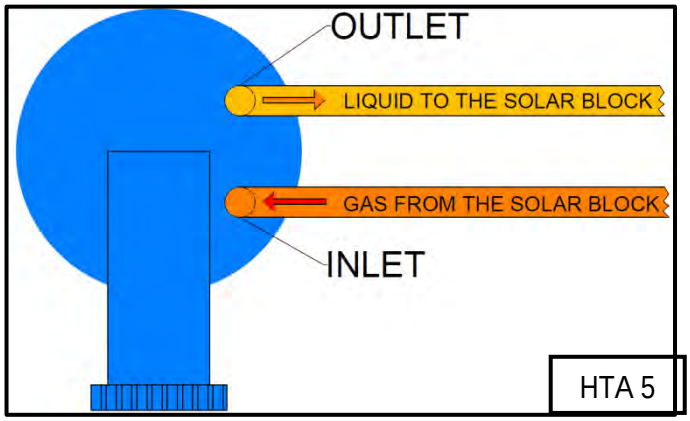
Altura (mm)	460	545	590

	Refrigerant circuit	Hidraulic circuit
Maximum pressure	5,2 MPa	0,5 MPa (origin) / 0,6 – 1,2MPa (optional)
Temperature (min/ max)	-50 ºC / 150 ºC	0 ºC / 45 ºC
Fluid	R407c, R134a, R410a	Água natural, água do mar, água + glicol
Recommendations	Keep the water clean; Use a filter and clean regulary When the air temperature is below 0 ° C, drain all water to avoid freezing.	

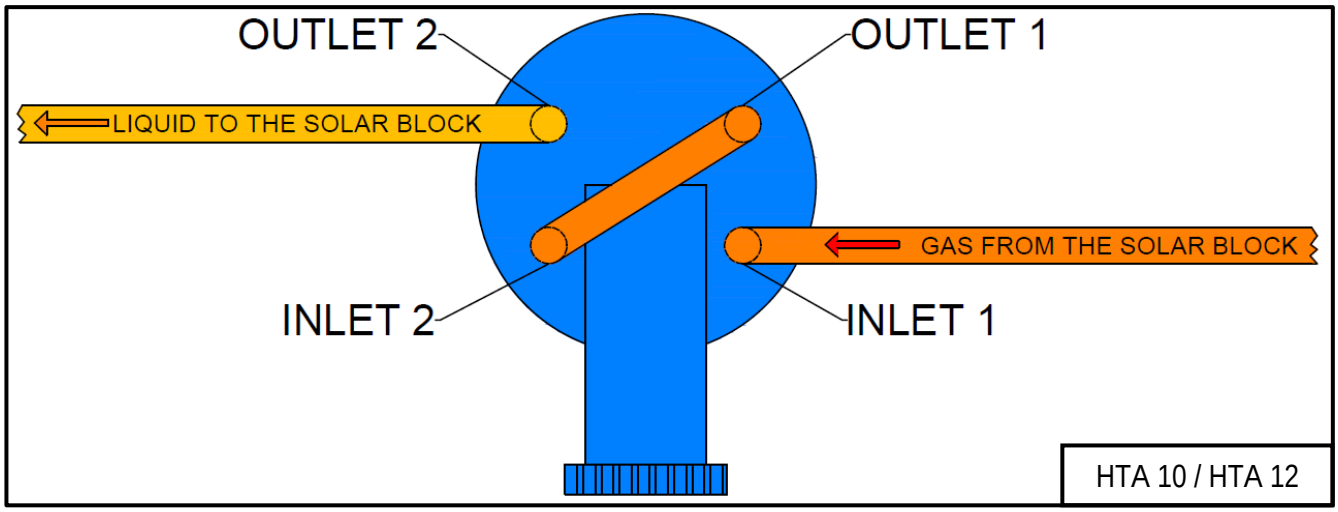
5.6.2. Refrigerant conections

Make sure that the electric connections between the solar block and the pump of the swimming pool are correctly done.
The heat exchanger for the swimming pool systems should be installed by following the next steps:

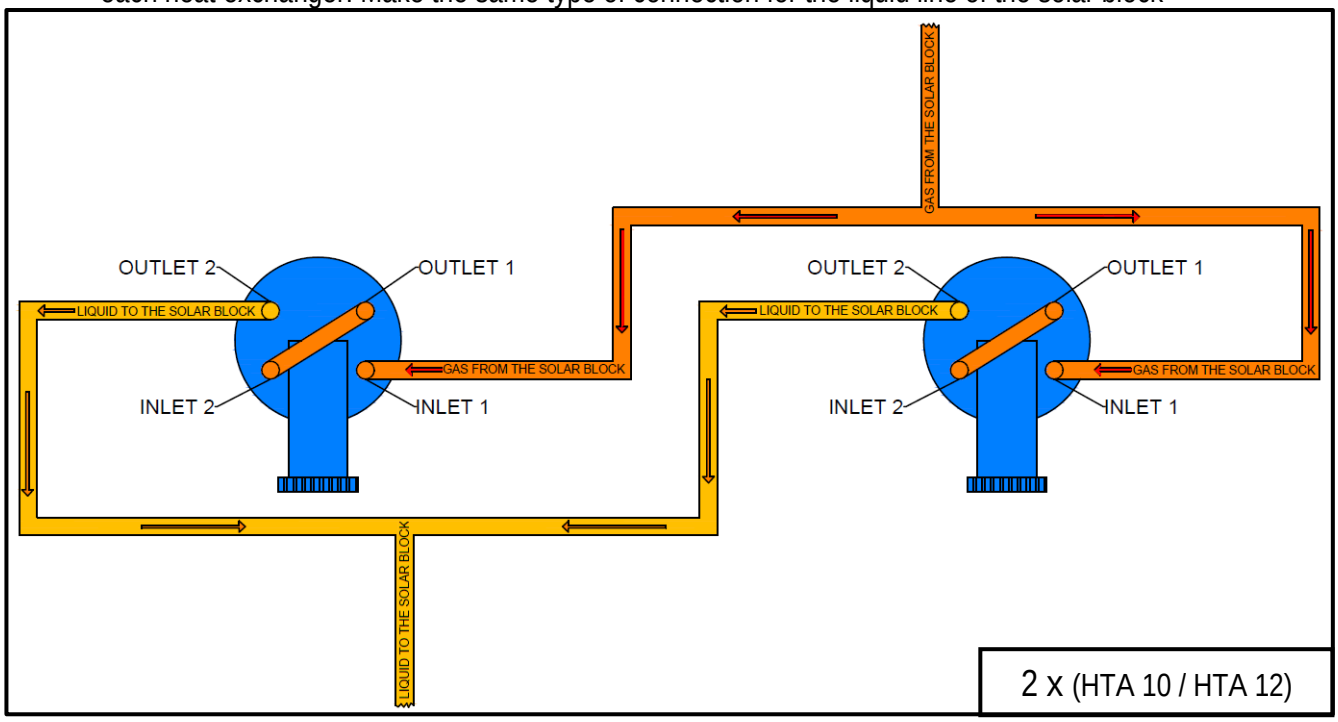
a) Fulfill all the hydraulic circuit
b) Always put a wet cloth on the copper pipes, near the heat exchanger to protect the components during the weld process
c) Weld the tubes on the correct place: outlet of the solar block to the inlet of the heat exchanger; inlet of the solar block to the outlet of the heat exchanger



d) For the case of heat exchanger with 2 coils, weld the gas tube from the solar block to the Inlet 1 of the heat exchanger, weld a tube from the Outlet 1 to the Inlet 2, and finnaly weld the liquid line of the solar block to the Outlet 2



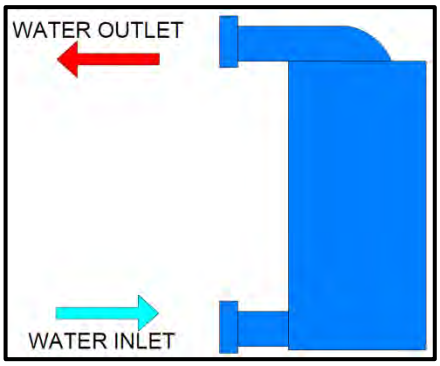
e) For the case of 2 heat exchangers, make the same type of connections (point d)) on each heat exchanger and make a derivation from the gas line that come from the solar block for the two Inlet 1 of each heat exchanger. Make the same type of connection for the liquid line of the solar block



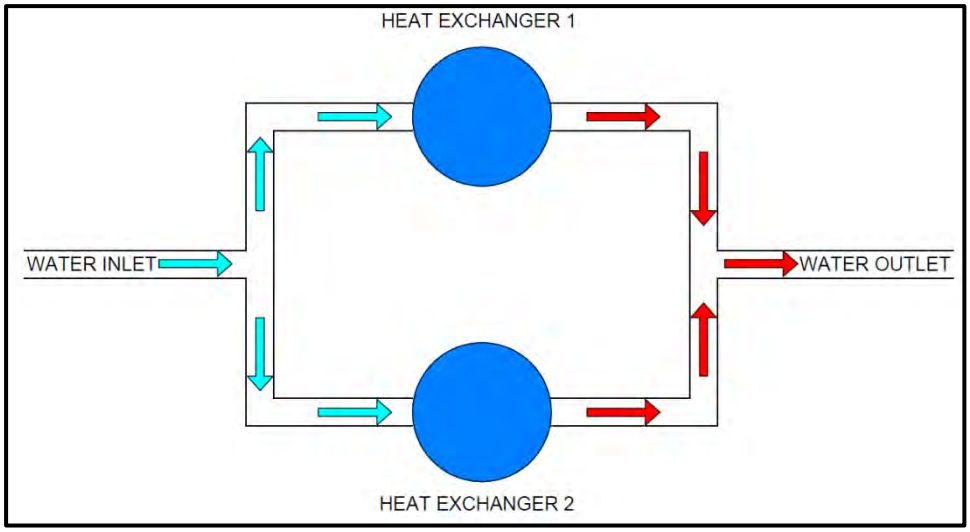
5.6.3. Hydraulic connections

On the water inlet and outlet connect you can use: Male/female thread, Quick fitting.

1 x Heat Exchanger



2 x Heat Exchanger



5.7. Electrical connections

The electrical system must be installed by a professional who has preferably been qualified by ENERGIE.

Furthermore, it must be ensured that there is enough electrical current for the system in question which will have to meet the manufacturing characteristics as shown in the table below:

Solar Block	6	12	16	28	40
Single Phase 220/240V-1~-50Hz	•	•	•	---	---
Triphase 380/420V-3~-50Hz	•	•	•	•	•

The electrical system powering the Block must be carried out directly from the general local distribution board, thereby avoiding the electrical powering of other points and/or equipment whose consumption may cause voltage drops with serious repercussions for equipment operation.
The electrical cable section must comply with the values shown in the table below. The maximum admissible losses for a cable of no more than 5 metres have already been considered in the calculations.

Solar Block	6	12	16	28	40
Single Phase (section mm^2)	2,5	4	6	---	---
Triphase (section mm^2)	2,5	2,5	2,5	4	6

The powering of the water circulator (s) will be ensured by a 3 x 1,5 mm^2 cable (as a minimum).

The circuit must also be protected from any possible current overloads and short circuits, foreseeing the installation of a magnetothermal switch with the following currents:

Solar Block	6	12	16	28	40
Single Phase (Current A)	20	30	40	---	---
Triphase (Current A)	10	16	16	25	40

The Thermodynamic Block connection terminals to the electric board, room thermostat, outdoor thermostat etc. are located on the inner part.
The connections must be made in accordance with the electric diagram (consult Annex A)

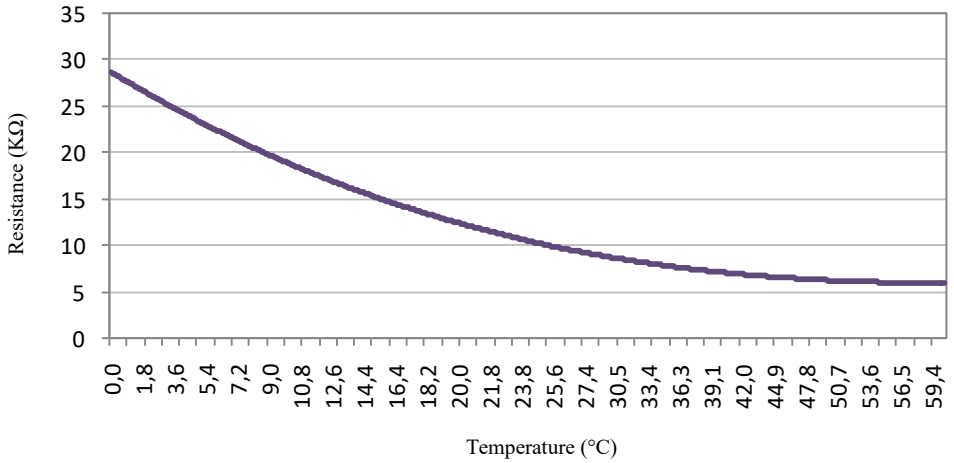
Do not power the electrical compressor before carrying out all the refrigerant connections, ensuring that the circuit is loaded and that the hydraulic circuit is duly filled with water.

The Triphase model has a phase sequencer to ensure the correct connection of the phases. If the phases have been misplaced, you must correct the connection. If the rotary field of the compressor has the wrong rotation direction it may suffer irreversible damage.

Under no circumstances should the equipment be put in operation without being duly connected to the earth circuit of the electrical installation.

5.8. Temperature Probe

The temperature probes installed in the controller of the Thermodynamic Block are NTC type (10KΩ ≈25ºC).



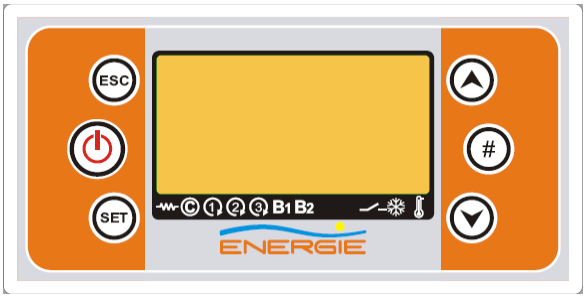
The installation of another temperature probe type will compromise the equipment operation, because the temperature values read by the controller will not be true.

6. CONTROL PANEL

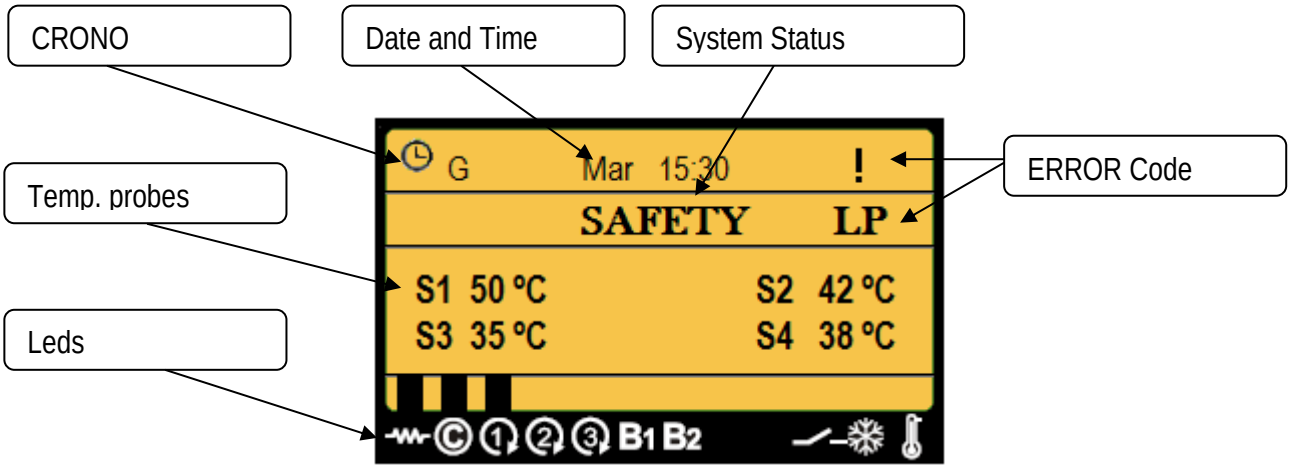
The control panel of the ENERGIE system takes the form of a console whereby several operating settings can be configured such as:

- ✓ Water outward and return temperature.
- ✓ Temperature differentials.

- ✓ Timers
- ✓ Typical ground plans of installations.
- ✓ Etc. (consult attached Electronic device manual)



The electronic device has the following configuration as the background image of the display and it is possible to view different settings simultaneously:



7. ERROR MESSAGES

Before seeking Technical assistance, follow the steps of this table to check whether it is needed.

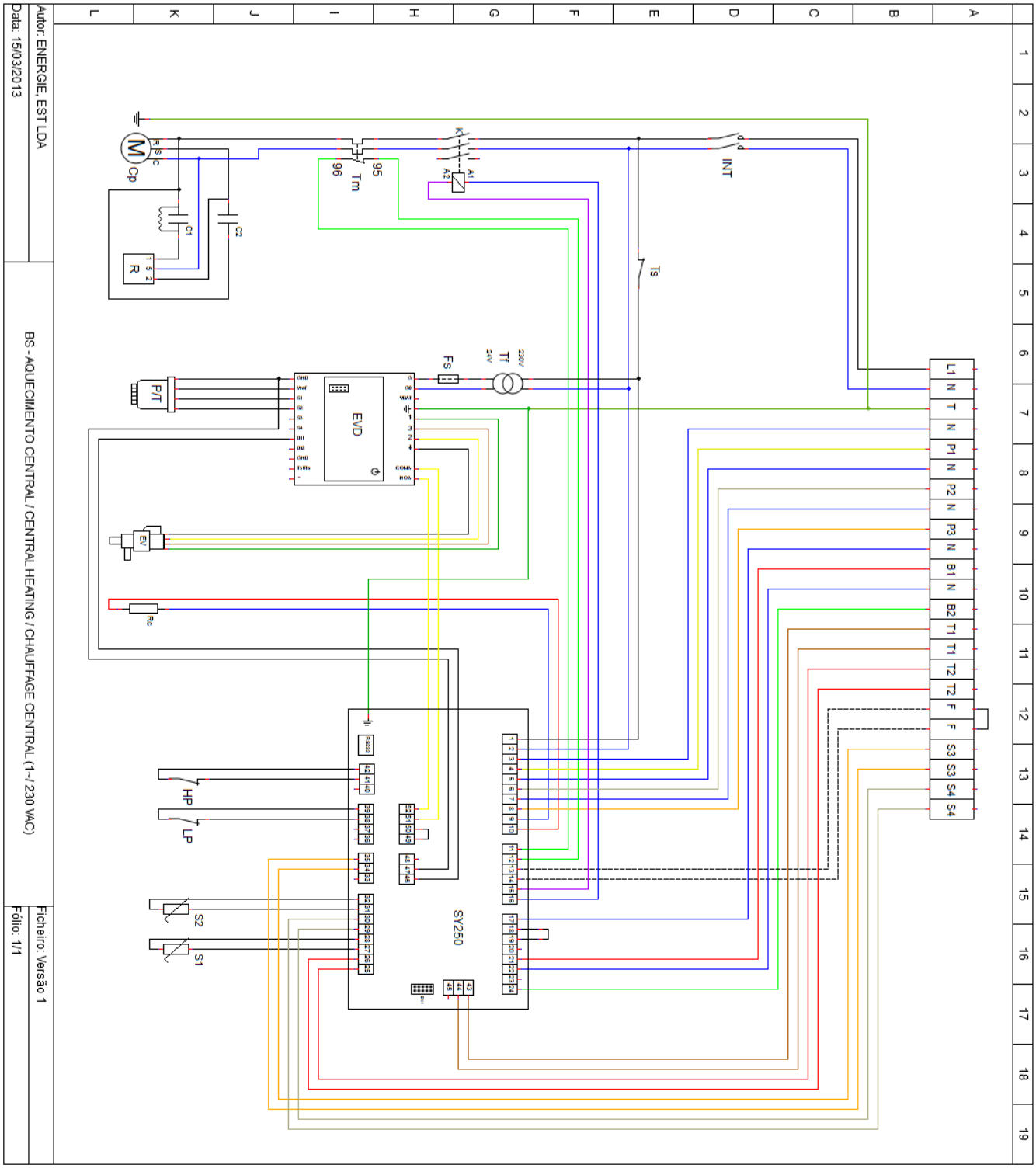
ERROR (Code)	Description	Cause/Solution
Er01 – FLOW	Flowmeter doesn't work.	✓ Lack of flow on the circuit. Water circulator disconnected or filter obstructed. Check electrical connections of the circulator or clean filter. ✓ Poorly drained circuit. Excess air at the hydraulic installation. ✓ Water flow too low. Increase water circulation pump speed or replace for a larger one. ✓ Hydraulic circuit is empty (no water).
Er02 – TN	Safety Thermostat	✓ Thermal relay action resulting from exaggerated electrical consumption of the compressor or mains voltage anomalies.
Er03 – LP	Low Pressure, system doesn't work or disconnects cyclically	✓ Lack of fluid or leak on circuit. Check the circuit pressure with gauge. ✓ Low outsider temperature. ✓ Obstruction of refrigerant circuit (e.g. Humidity). ✓ Low pressure switch damaged.
Er04 – HP	High pressure, system doesn't work	✓ Fluid overcharge. Check circuit pressure with manometers. ✓ High pressure switch damaged. ✓ Poor heat exchange. Increase flow.
Er05 – TS1 Er05 – TS2 Er06 – TS3 Er07 – TS4	Temperature alarm	✓ Excess of temperature. Lack of water in the circuit, circulator pump disconnected or stuck or damaged Flowmeter.
Er08 – RTC	Clock	✓ Internal clock of the controller is damaged. Replace the controller. ✓ The controller battery is discharged or weak. Replace the battery (type of battery CR2032)
TL	Probe Failure (S1, S2, S3 or S4)	✓ Check whether the probe is measuring correctly, verifying its internal resistance. ✓ Verify connections.
Er11 - EVD	Alarm Relay Open on Carel EVD	✓ Check the power supply on the EVD (fuse-Fs). ✓ Pressure/Temperature sensor connected wrongly or damaged. Check connections or replace sensor (POS) ✓ Low Superheating (LowSH). ✓ Very low evaporation temperature (LOP). ✓ Very high evaporation temperature (MOP). ✓ Low aspiration temperature. ✓ Low aspiration pressure.

The works at the Thermodynamic Block must only be carried out by authorised, specialised professionals.

8. ANNEXES A (WIRING DIAGRAMS)

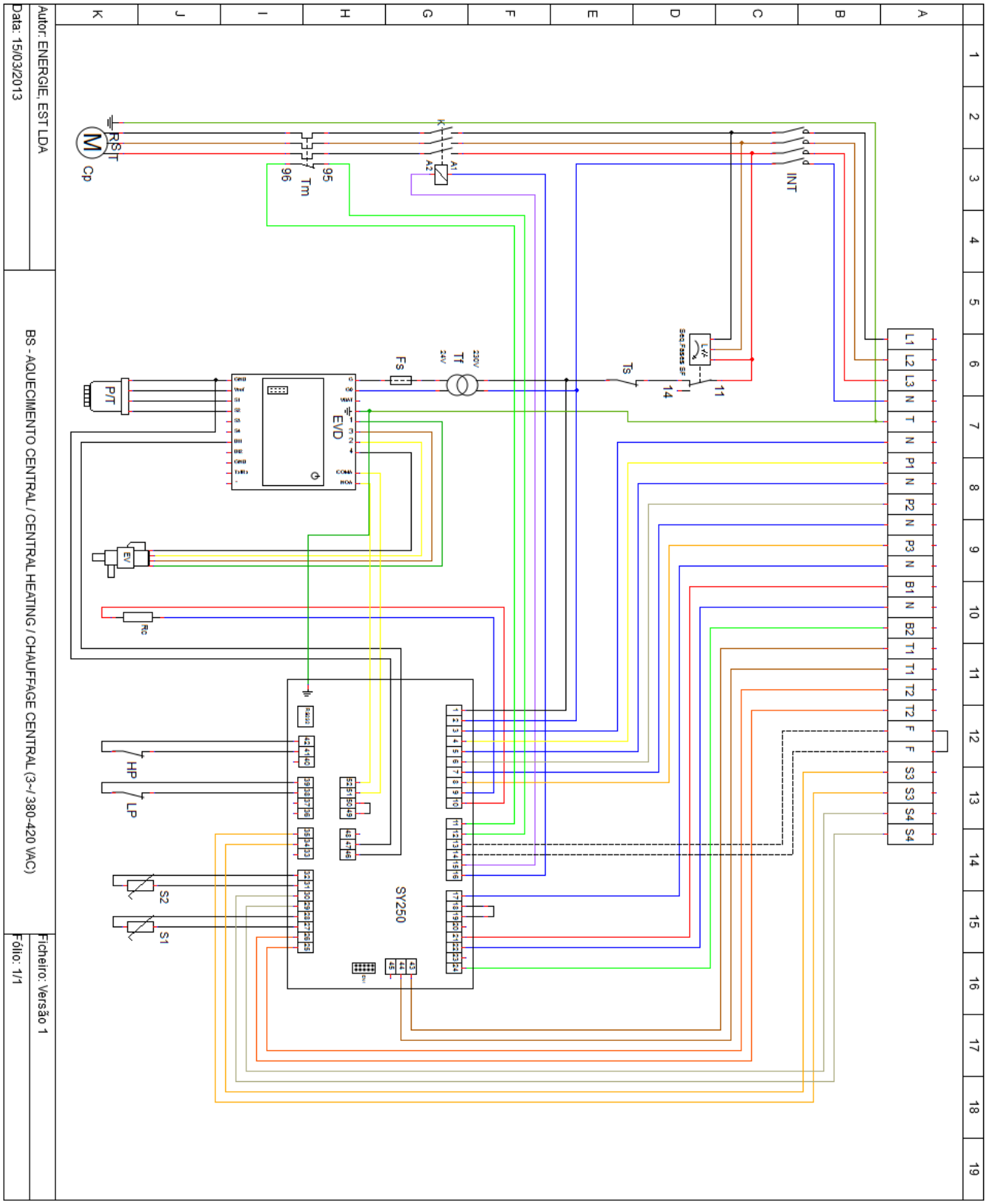
8.1. Solar Block –Central Heating 230 Vac/ 1~ / 50Hz

Maximum Current value supported by the end contacts is 2 Amps.



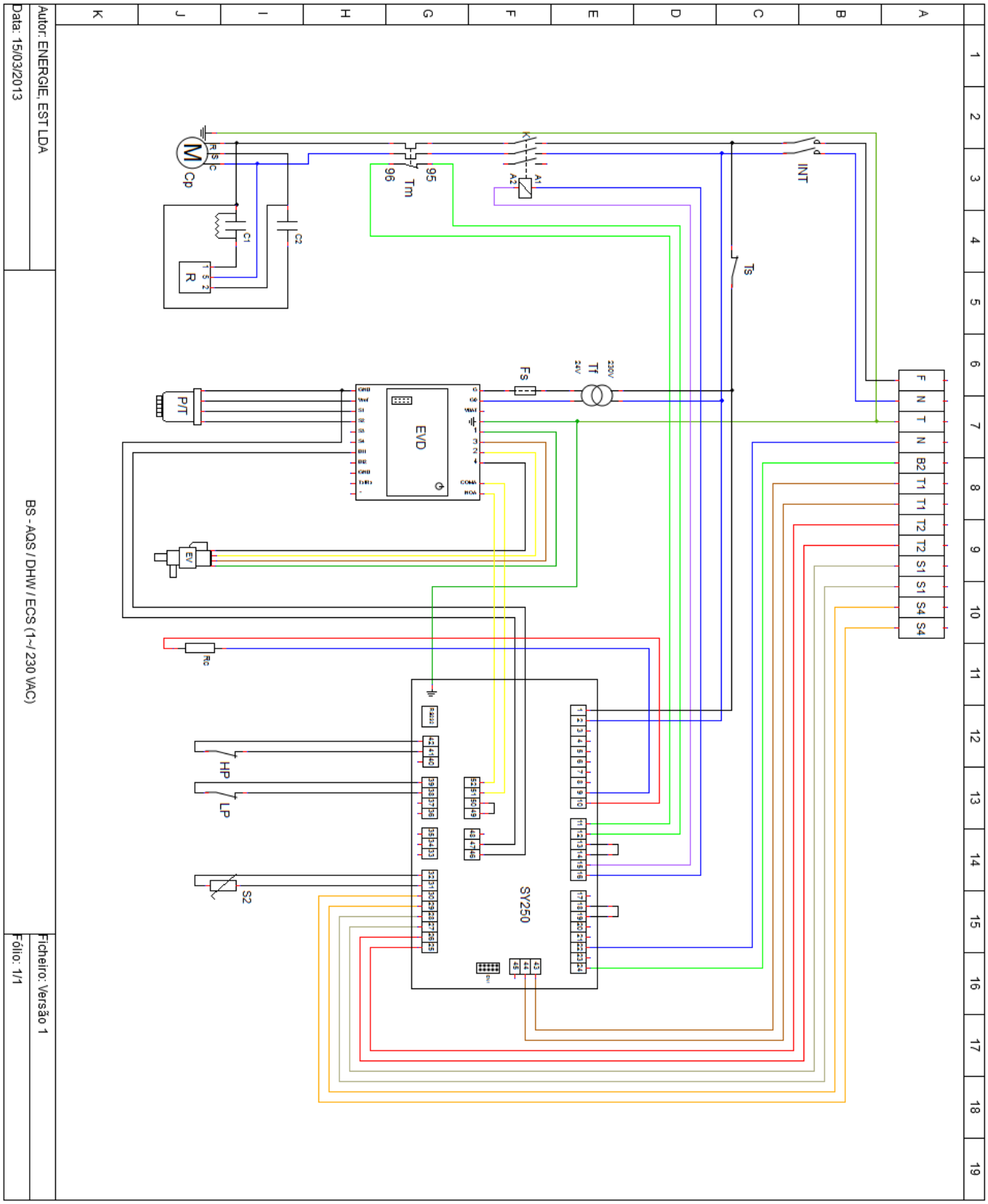
8.2. Solar Block – Central Heating 400Vac/ 3~/ 50Hz

Maximum Current value supported by the end contacts is 2 Amps.



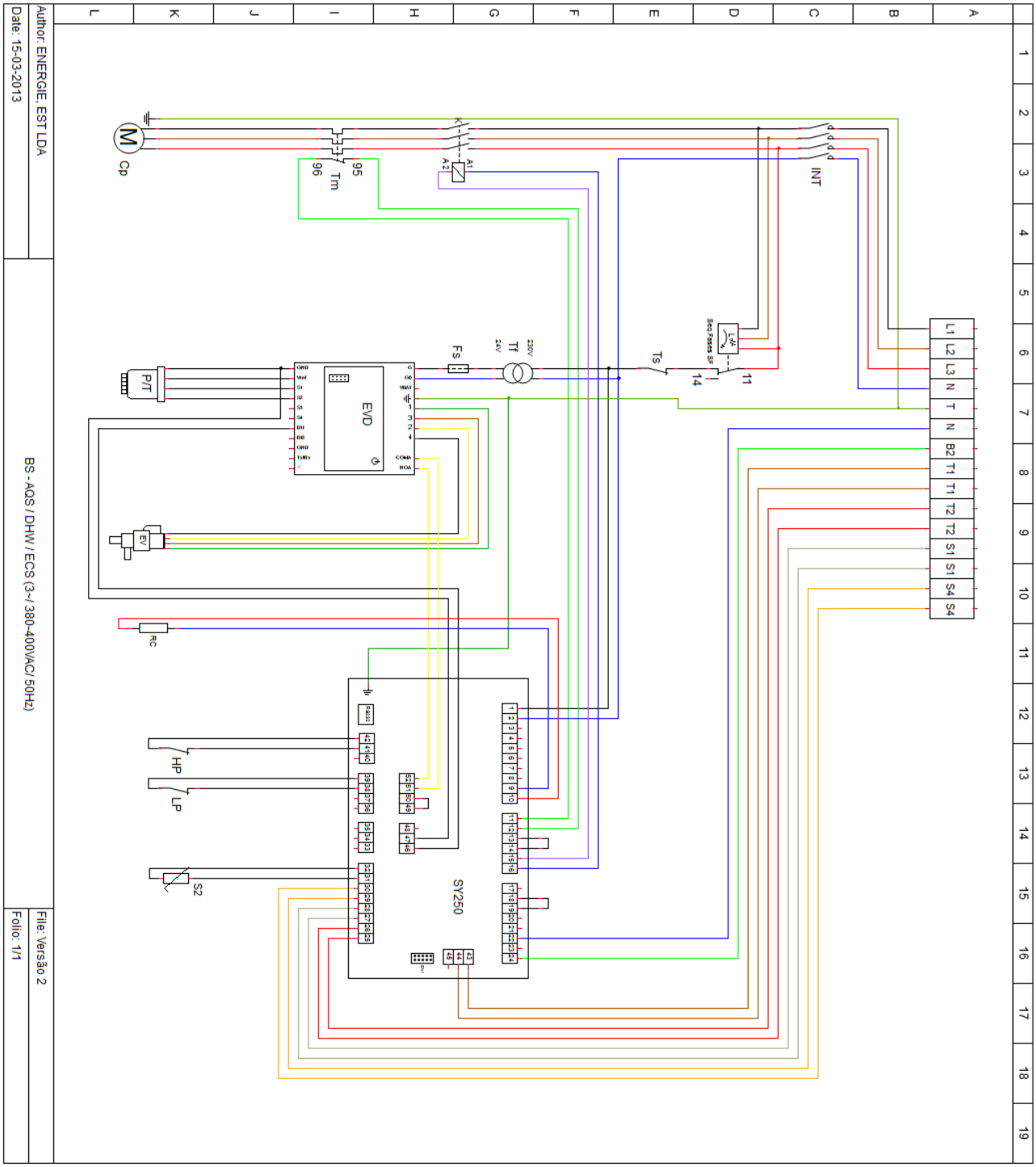
8.3. Solar Block – Domestic Hot Water 230Vac/ 1~/ 50Hz

Maximum Current value supported by the end contacts is 2 Amps.



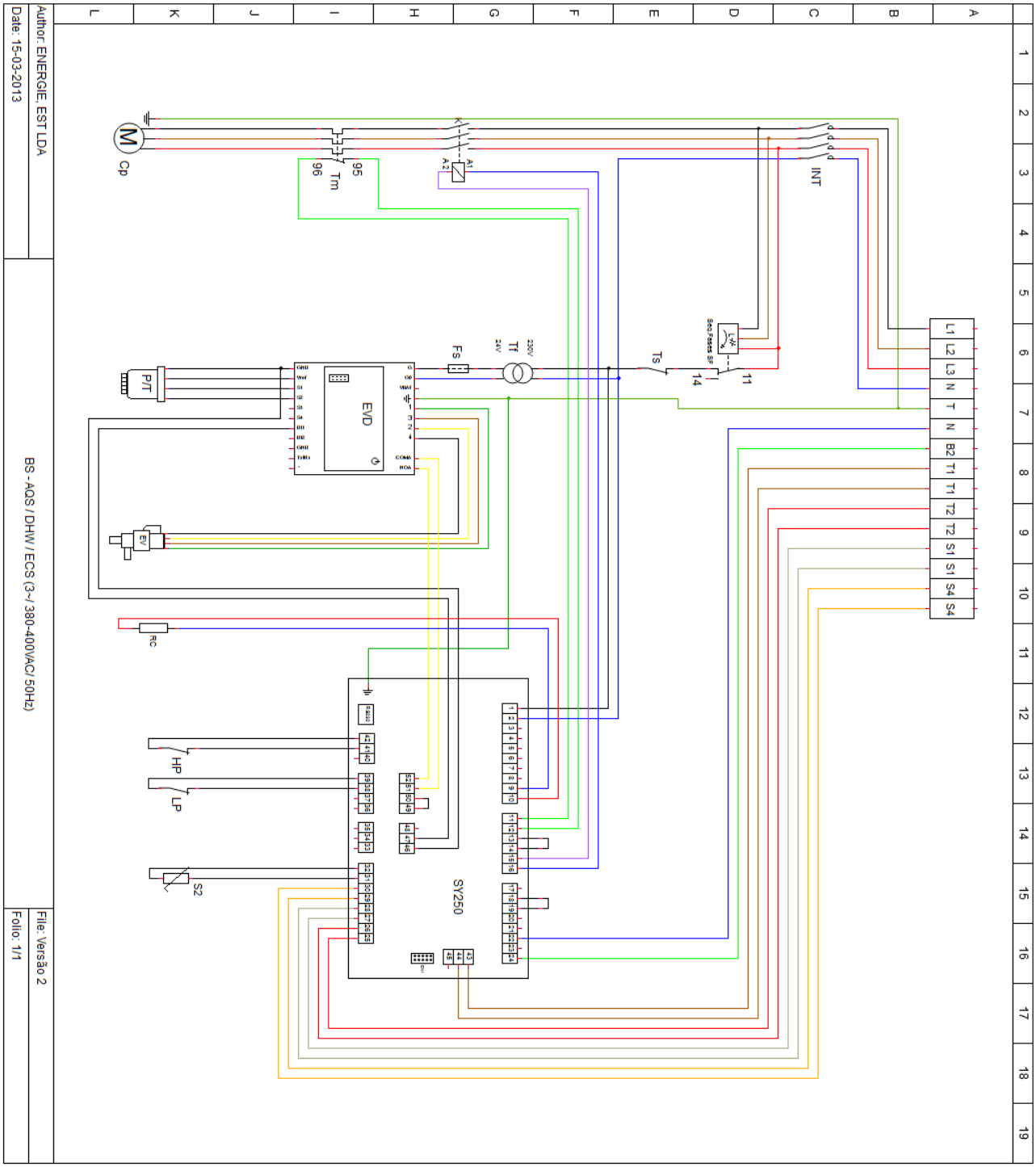
8.4. Solar Block – Domestic Hot Water 400Vac/ 3~/ 50Hz

Maximum Current value supported by the end contacts is 2 Amps.



8.5. Solar Block – Swimming Pool – 230Vac/ 1~/ 50Hz

Maximum Current value supported by the end contacts is 2 Amps.



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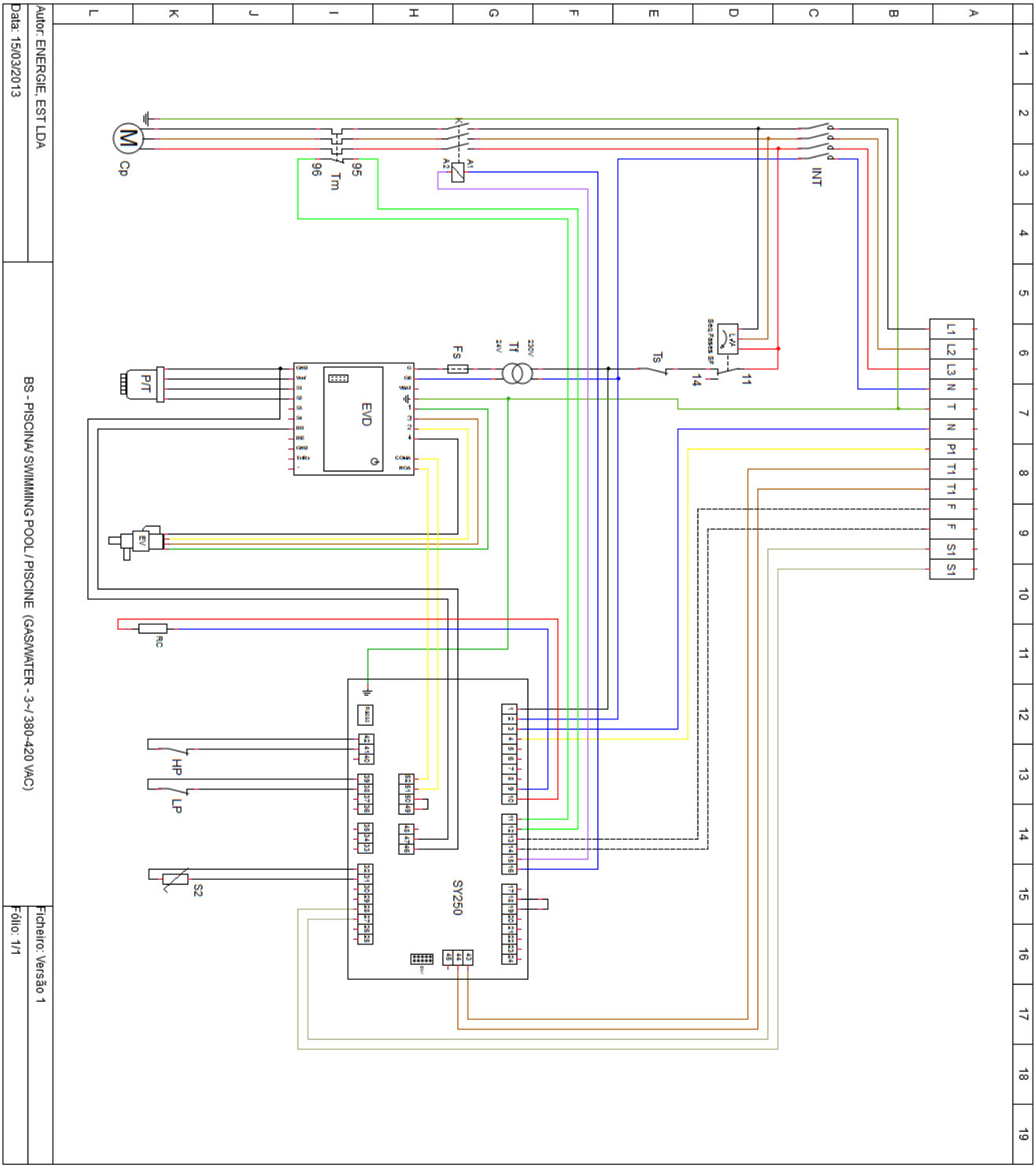
8.6. Solar Block – Swimming Pool – 400Vac/ 3~/ 50Hz

Maximum Current value supported by the end contacts is 2 Amps.

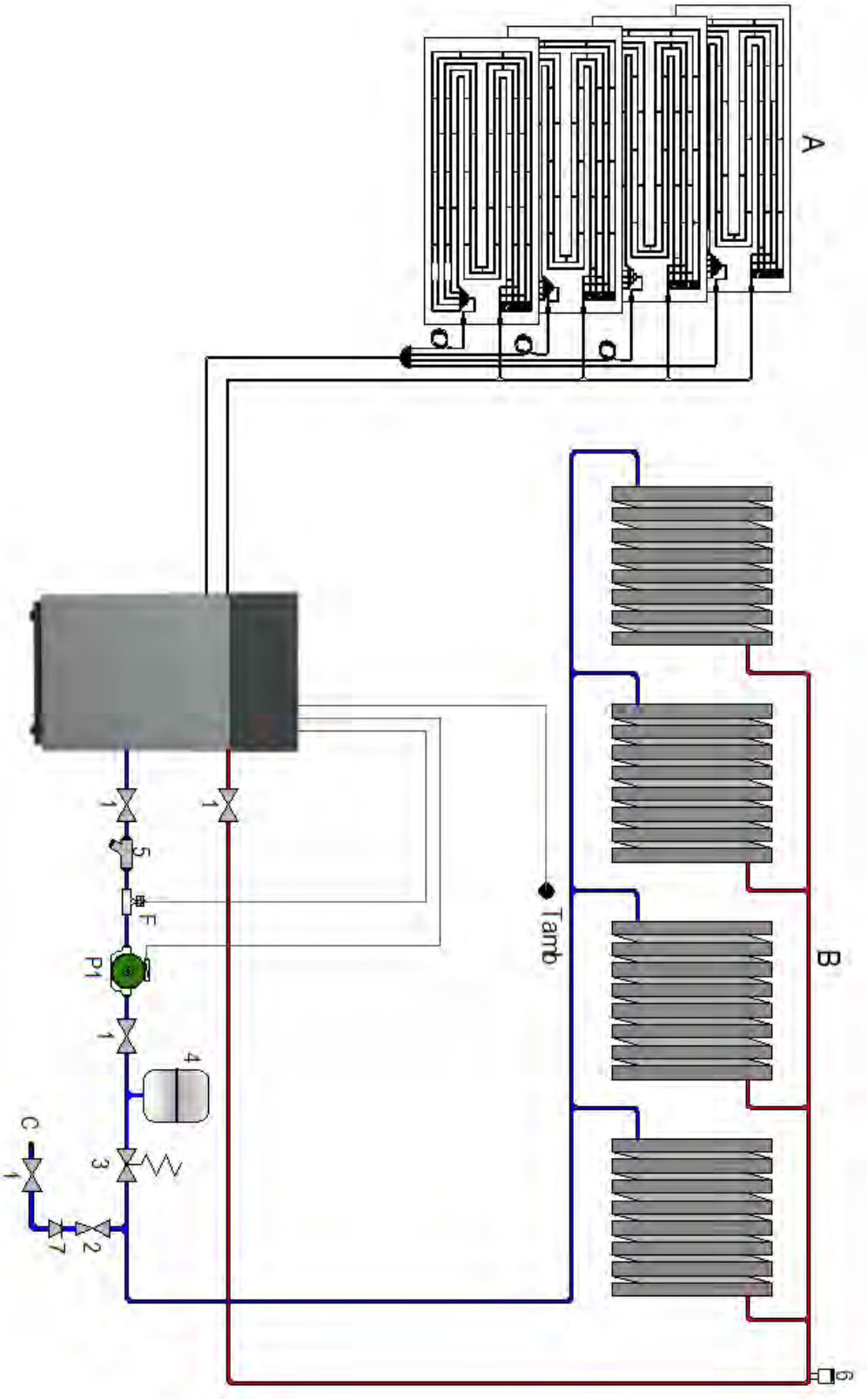


8.7. Glossary

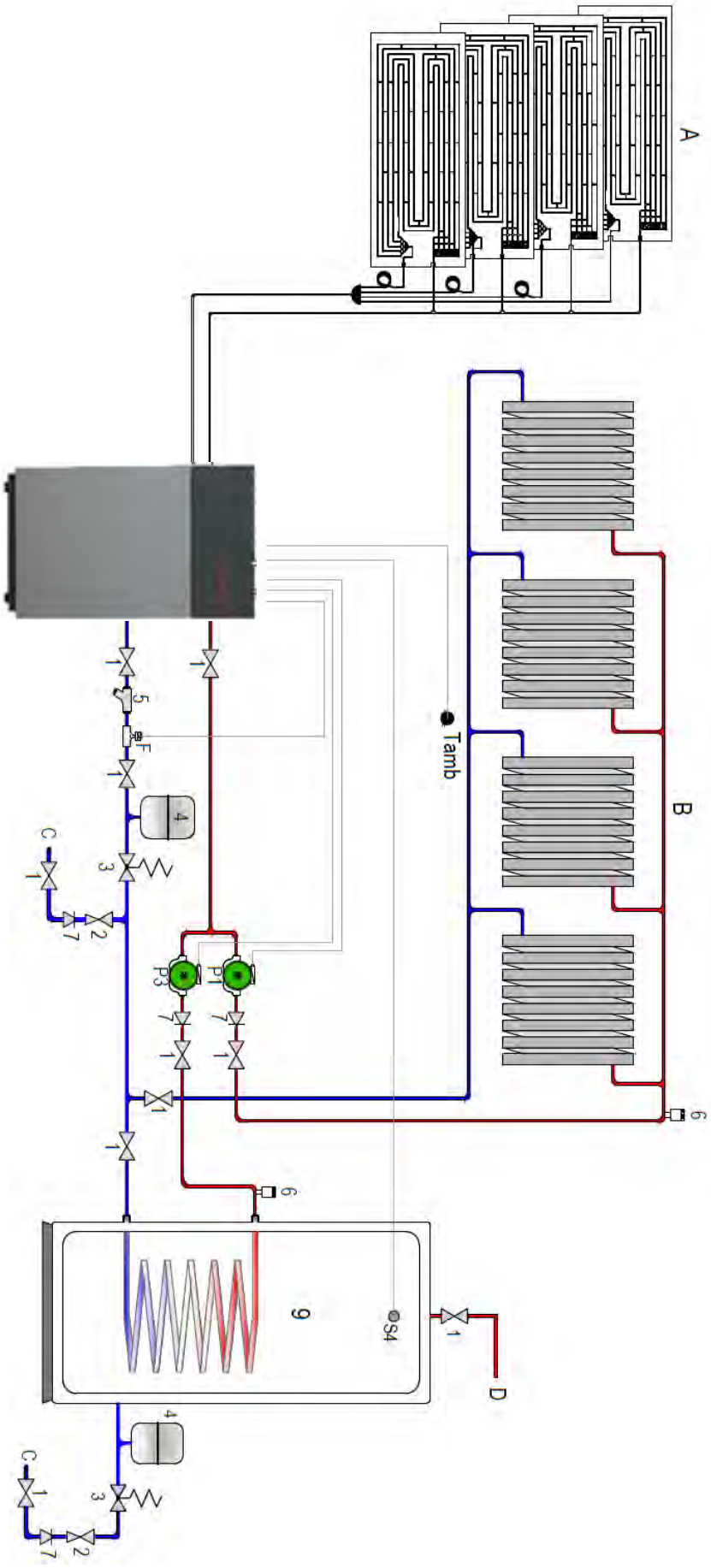
Electrical diagrams			
	Português	English	Français
INT	Interruptor de Corte Geral;	Switch ON/OFF	Commutateur ON / OFF
Ts	Termóstato de Segurança;	Security Thermostat	Thermostat de sécurité
K	Contactor Compressor;	Compressor Contactor	Contacteur de compresseur
L	Sequenciador de Fases;	Phase Failure Relay	Relais de défaillance de phase
Tm	Térmico Compressor;	Compressor Relay	Relais du compresseur
Cp	Compressor;	Compressor	Compresseur
C1	Condensador de Arranque;	Start Capacitor	Condensateur de démarrage
C2	Condensador de Marcha;	Run Capacitor	Condensateur de marche
R	Relé;	Relay	Relais
Tf	Transformador 230Vac - 24Vac;	Transformer 230Vac - 24Vac	Transformateur 230Vac - 24Vac
P/T	Transdutor de Pressão/Temper.	Pressure/Temperature Sensor	Sonde de Pression/Température
EVD	Controlador V. de Expansão;	Controller EVX	Contrôleur EVX
EV	Válvula de expansão;	Expansion Valve	Détendeur
Rc	Resistência de Cárter;	Crankcase Heater	Résistance de carter
SY250	Controlador;	Controller	Contrôleur
HP	Pressóstato de Alta;	High Pressure Switch	Pressostat haute pression
LP	Pressóstato de Baixa;	Low Pressure Switch	Pressostat basse pression
S1	Sonda de Temperatura;	Temperature probe	La sonde de température
S2	Sonda de Temperatura;	Temperature probe	La sonde de température
S3	Sonda de Temperatura;	Temperature probe	La sonde de température
S4	Sonda de Temperatura;	Temperature probe	La sonde de température
F	Fluxostato;	Flow Switch	Détecteur de débit
T1	Termóstato Ambiente;	Room Thermostat	Thermostat ambiance
T2	Termóstato Exterior;	Ambient Thermostat	Thermostat exterieur
B1	Backup 1;	Back up 1 (Booster Heater)	Chauffage d'appoint 1
B2	Backup 2;	Back up 2 (Booster Heater)	Chauffage d'appoint 2
P1	Bomba circuladora 1	Circulation Pump 1	Circulateur d'eau 1
P2	Bomba circuladora 2	Circulation Pump 2	Circulateur d'eau 2
P3	Bomba circuladora 3;	Circulation Pump 3	Circulateur d'eau 3
L1	Fase 1;	Phase 1	Phase 1
L2	Fase 2;	Phase 2	Phase 2
L3	Fase 3	Phase 3	Phase 3
N	Neutro	Neutral	Neutre
T	Terra	Earth	Terre

9. ANNEXES B - INSTALLATIONS

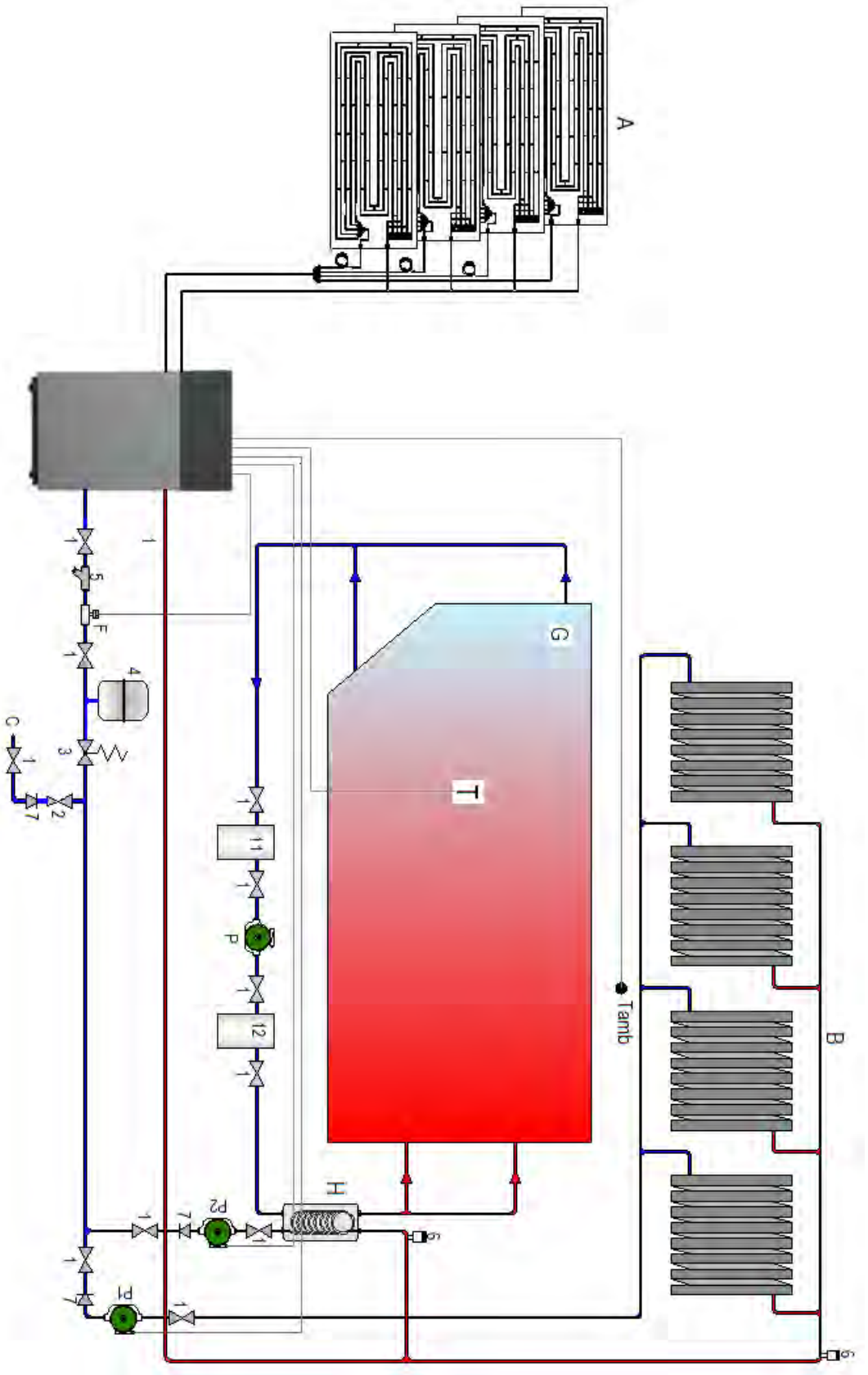
9.1. Ground plan 1



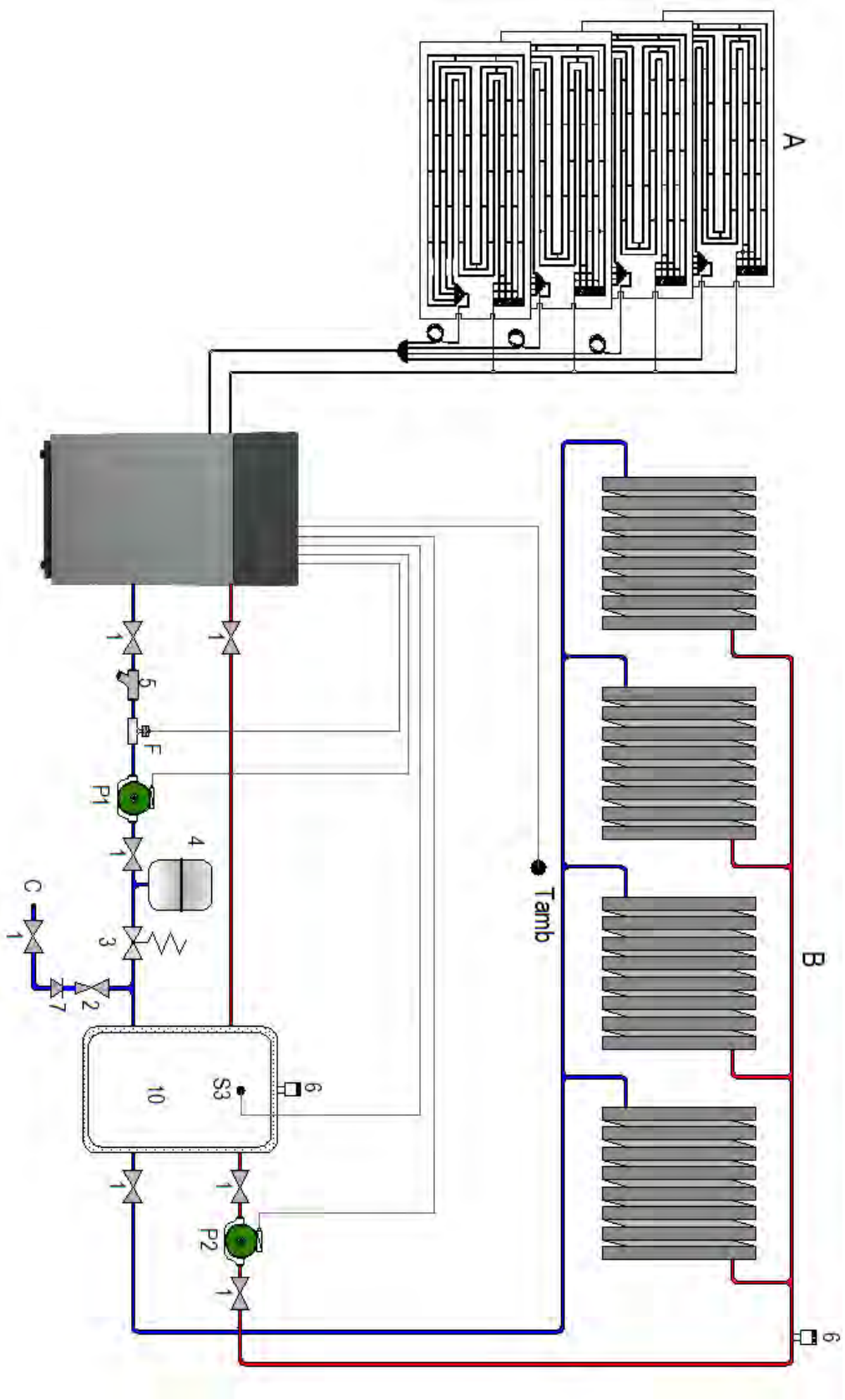
9.2. Ground plan 2



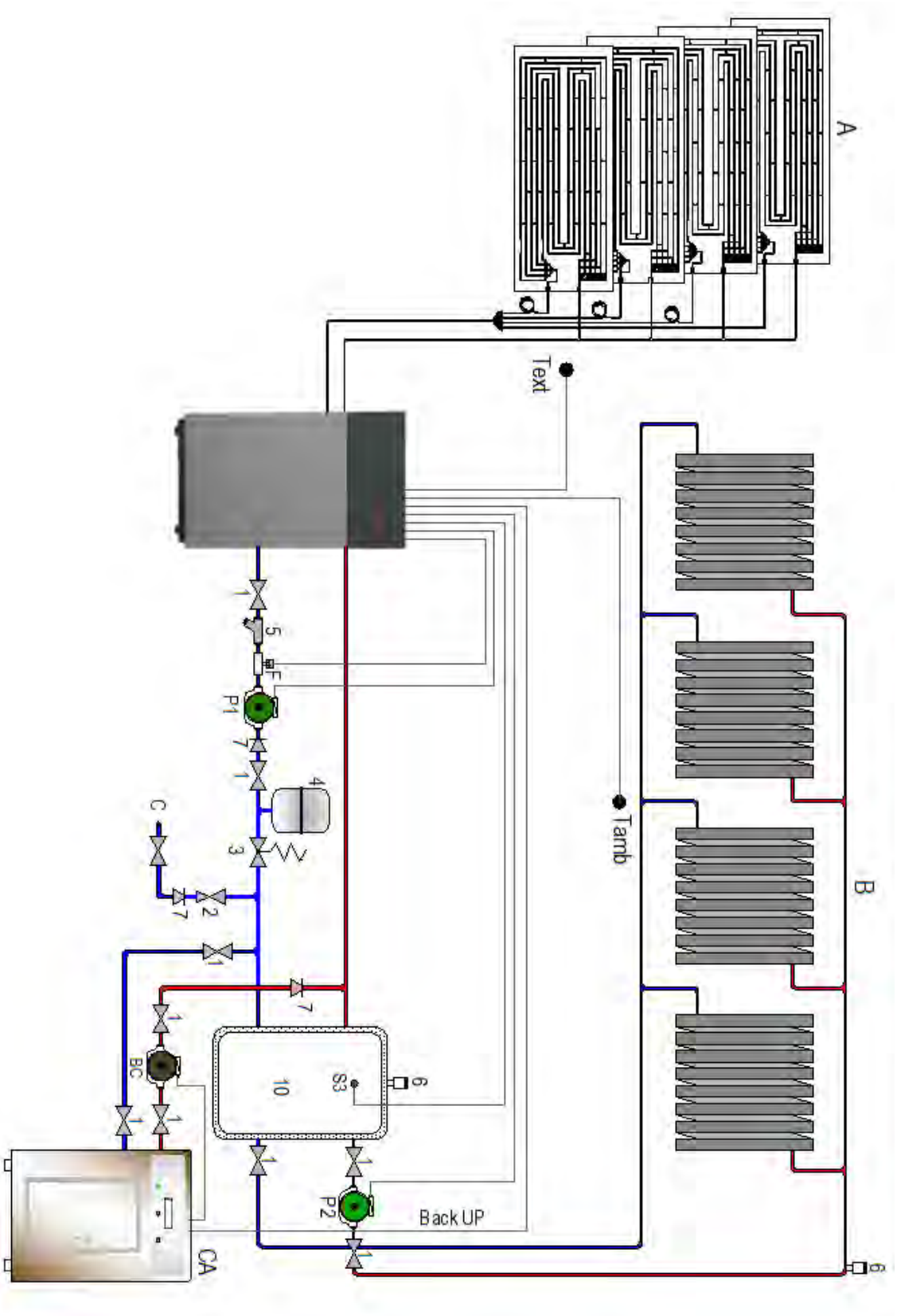
9.3. Ground plan 2b



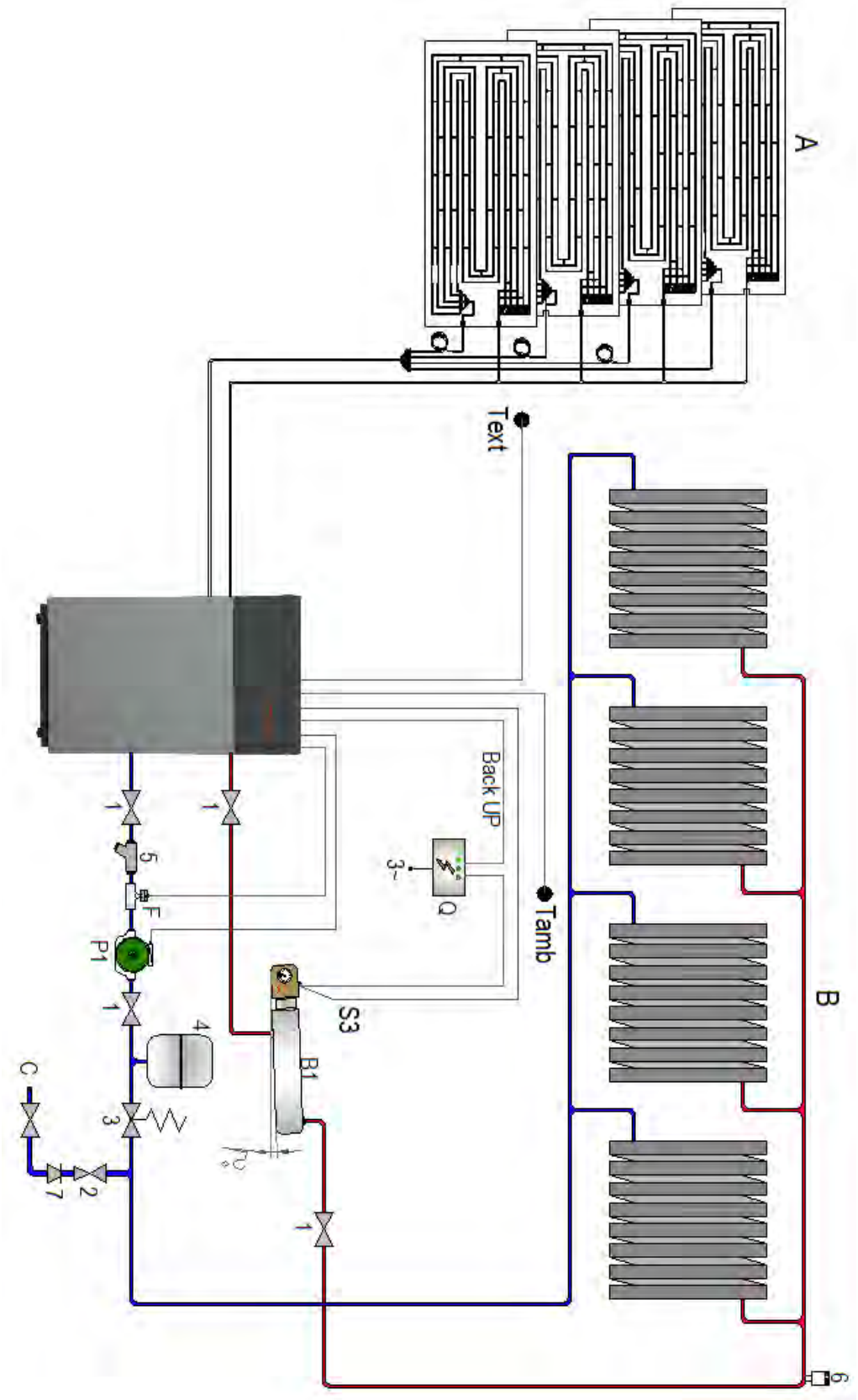
9.4. Ground plan 3



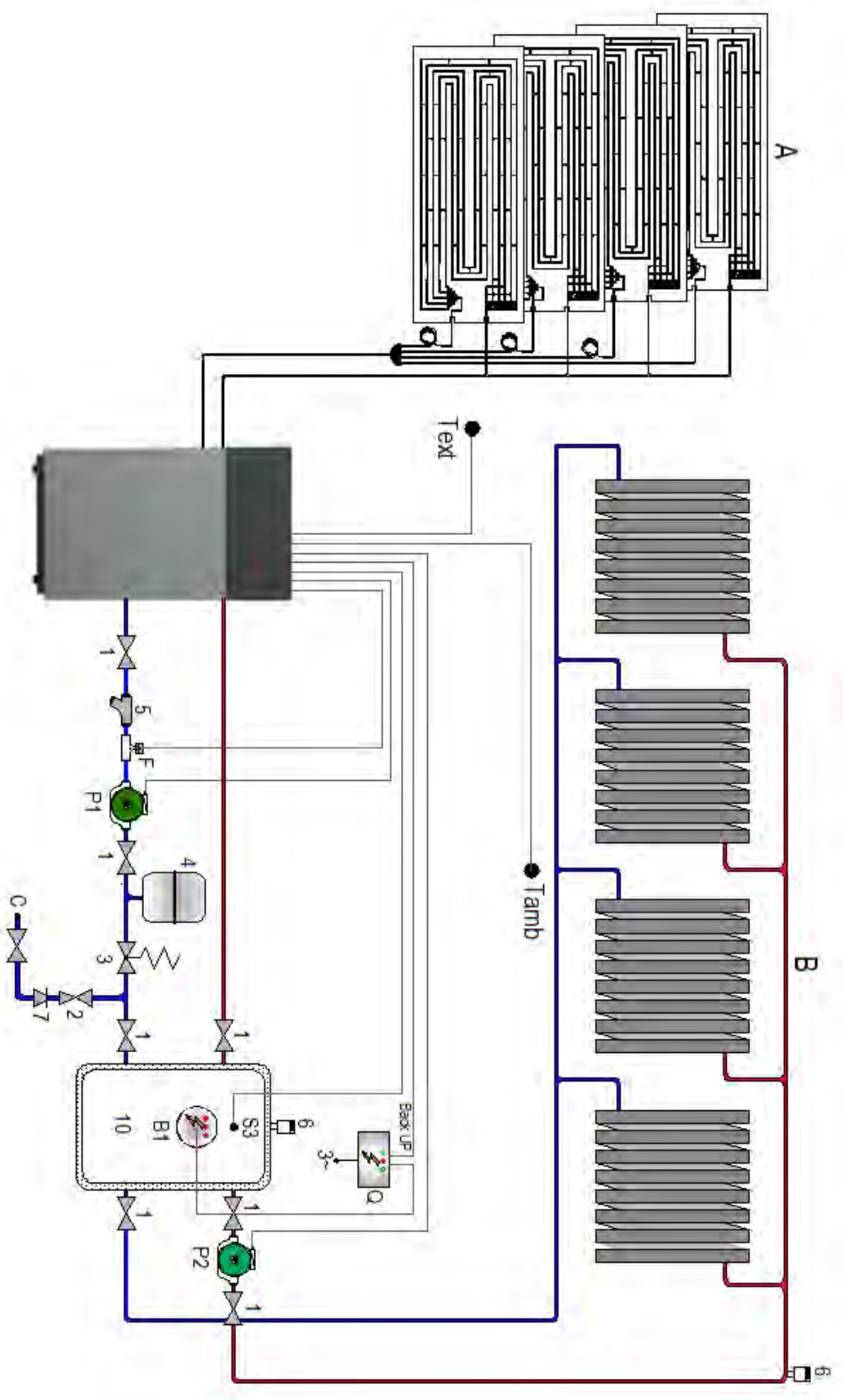
9.5. Ground plan 4



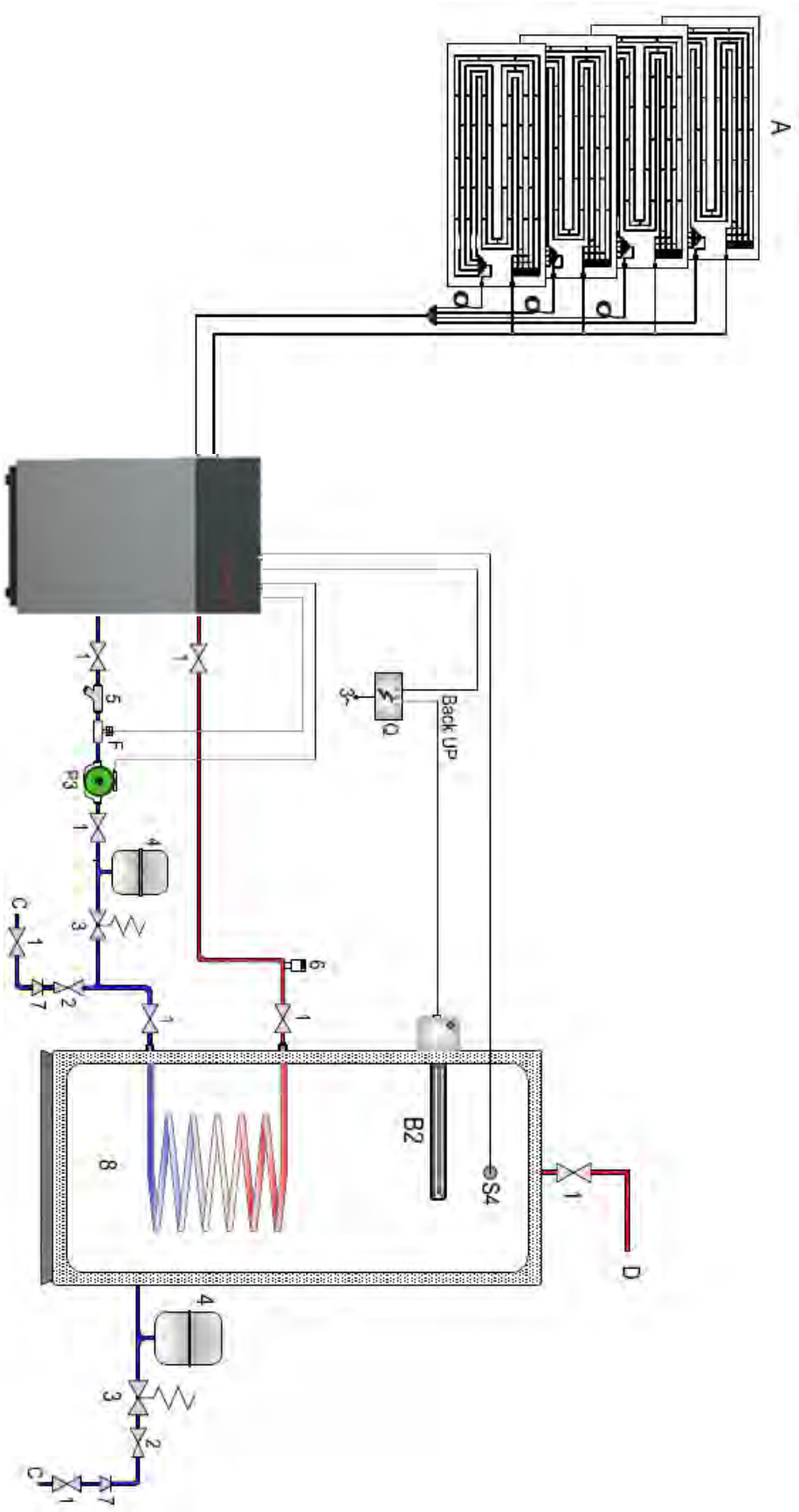
9.6. Ground plan 5



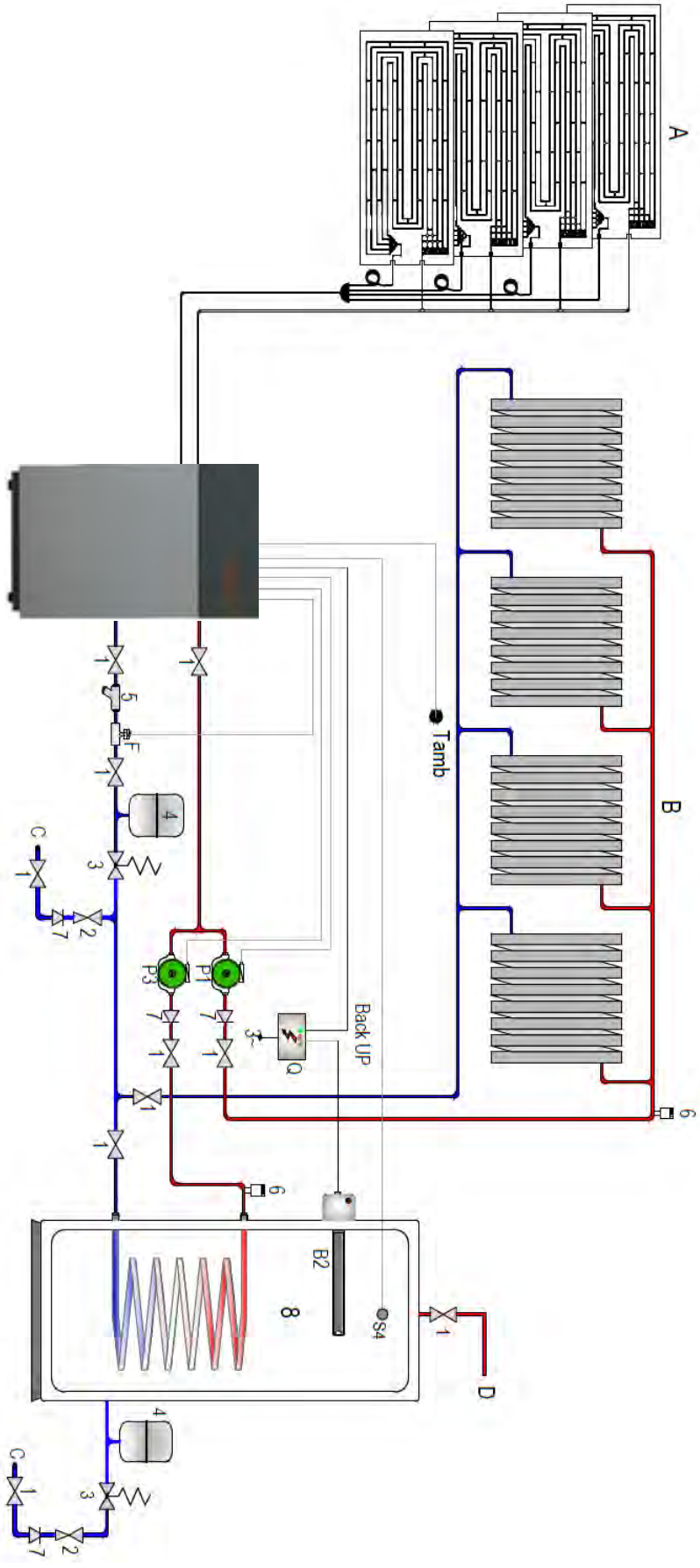
9.7. Ground plan 6



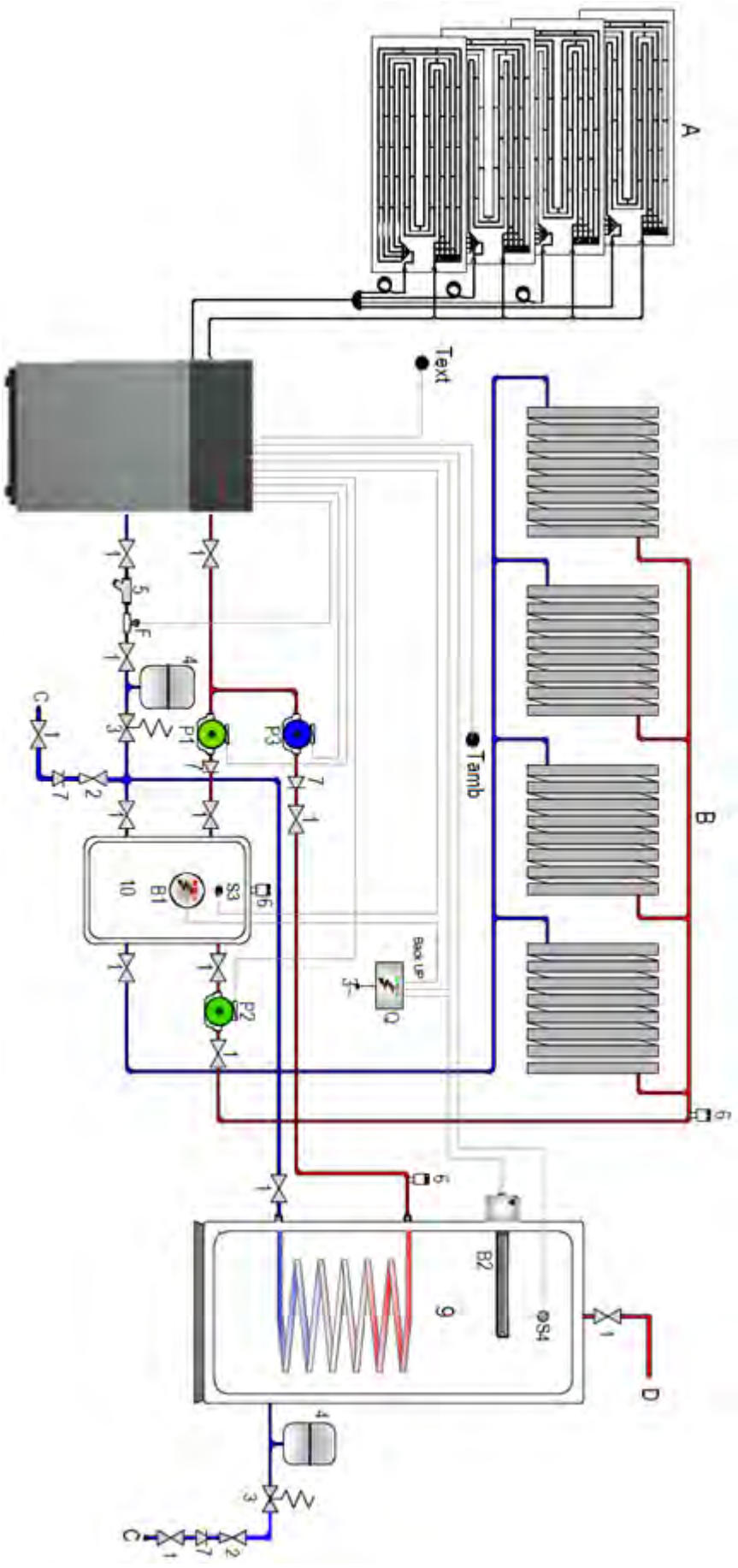
9.8. Ground plan 7



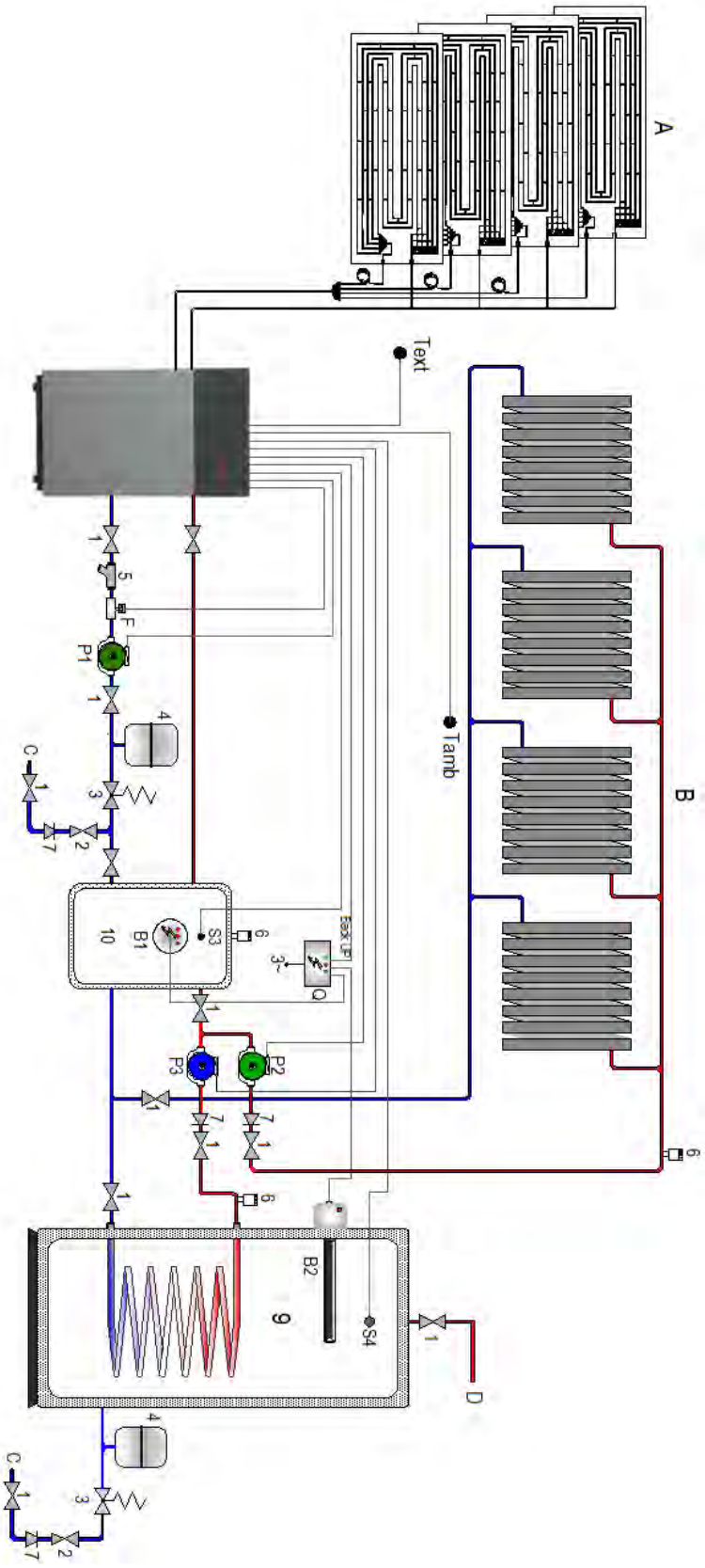
9.9. Ground plan 8



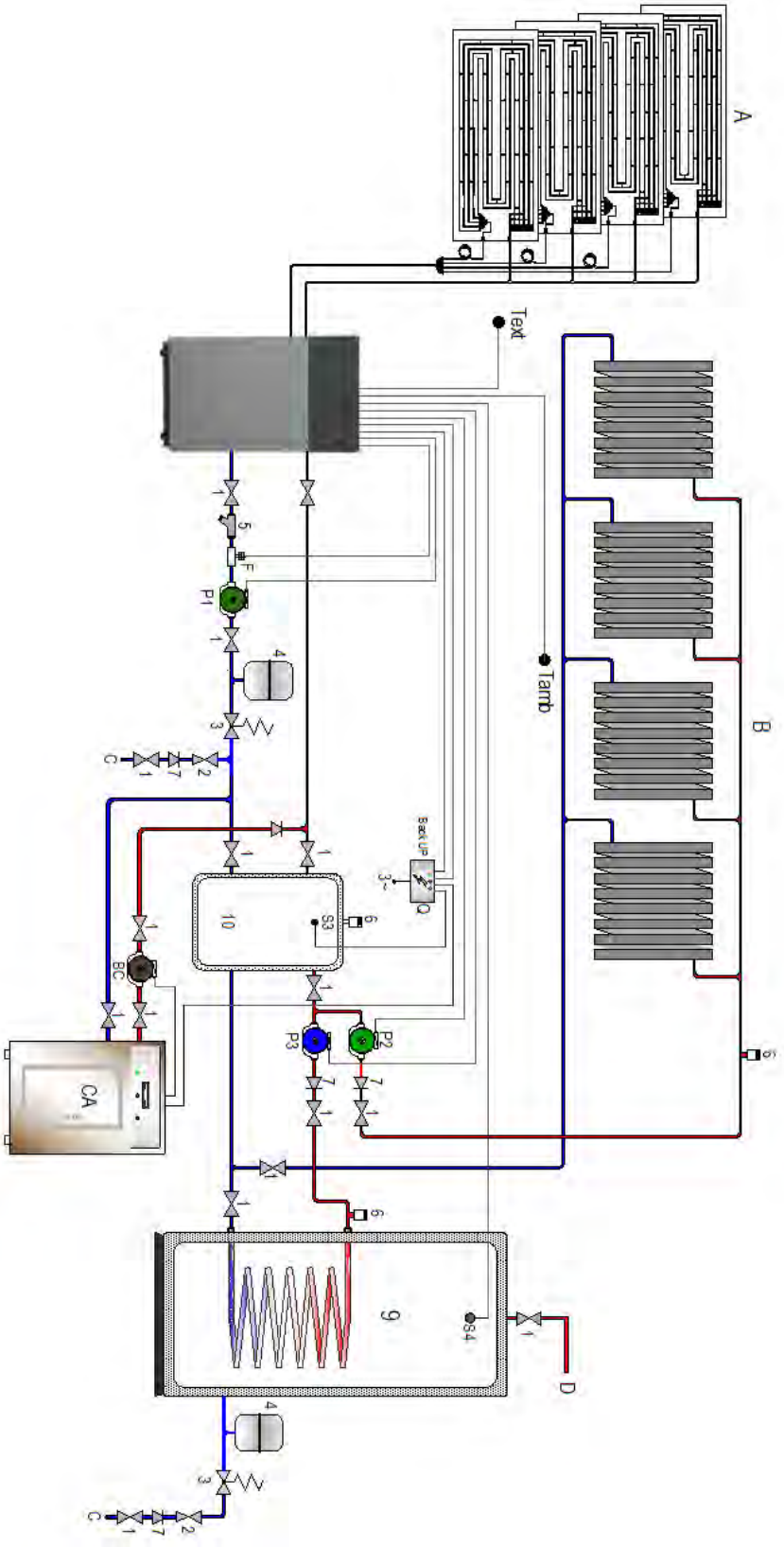
9.10. Ground plan 9



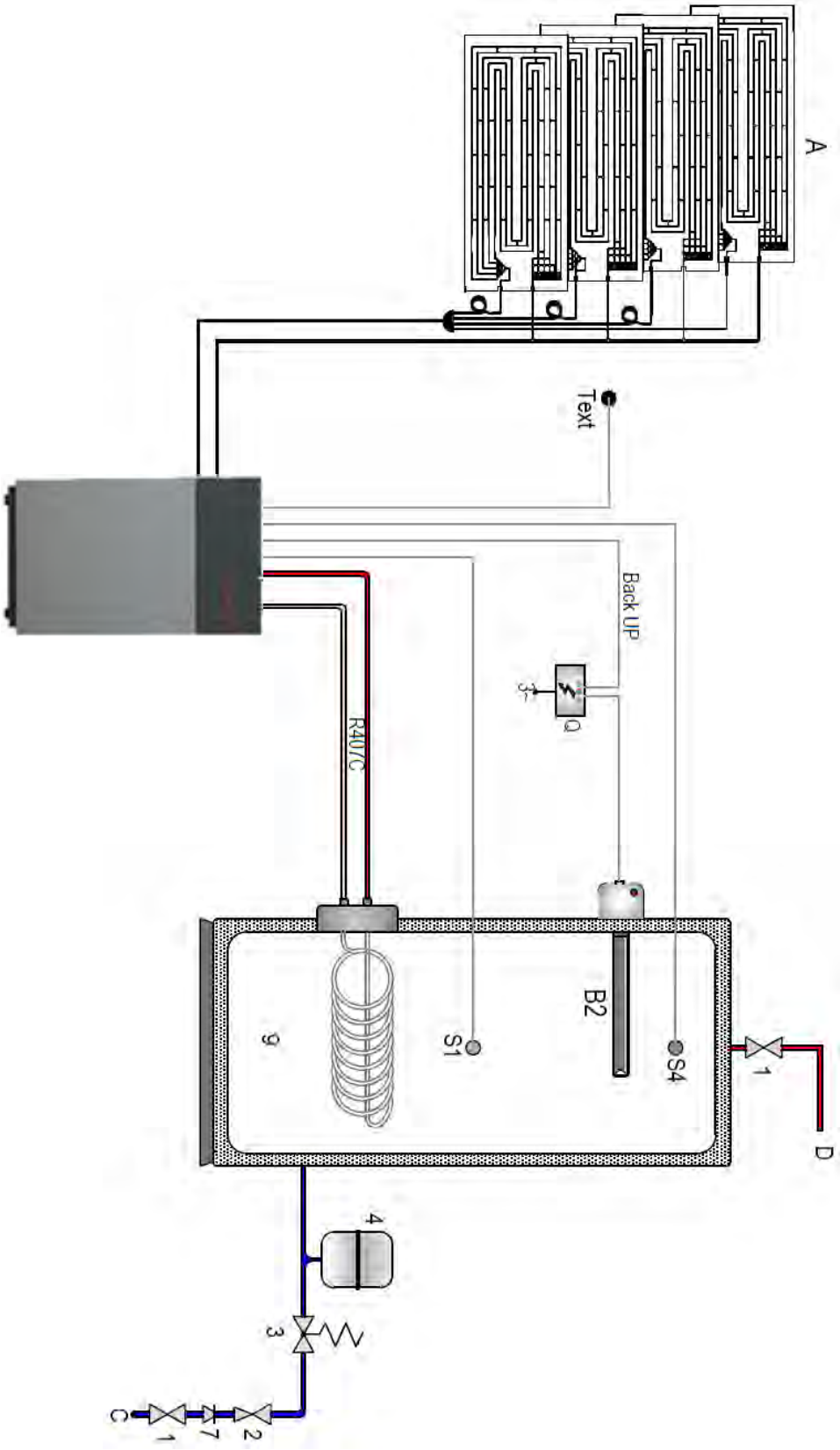
9.11. Ground plan 10



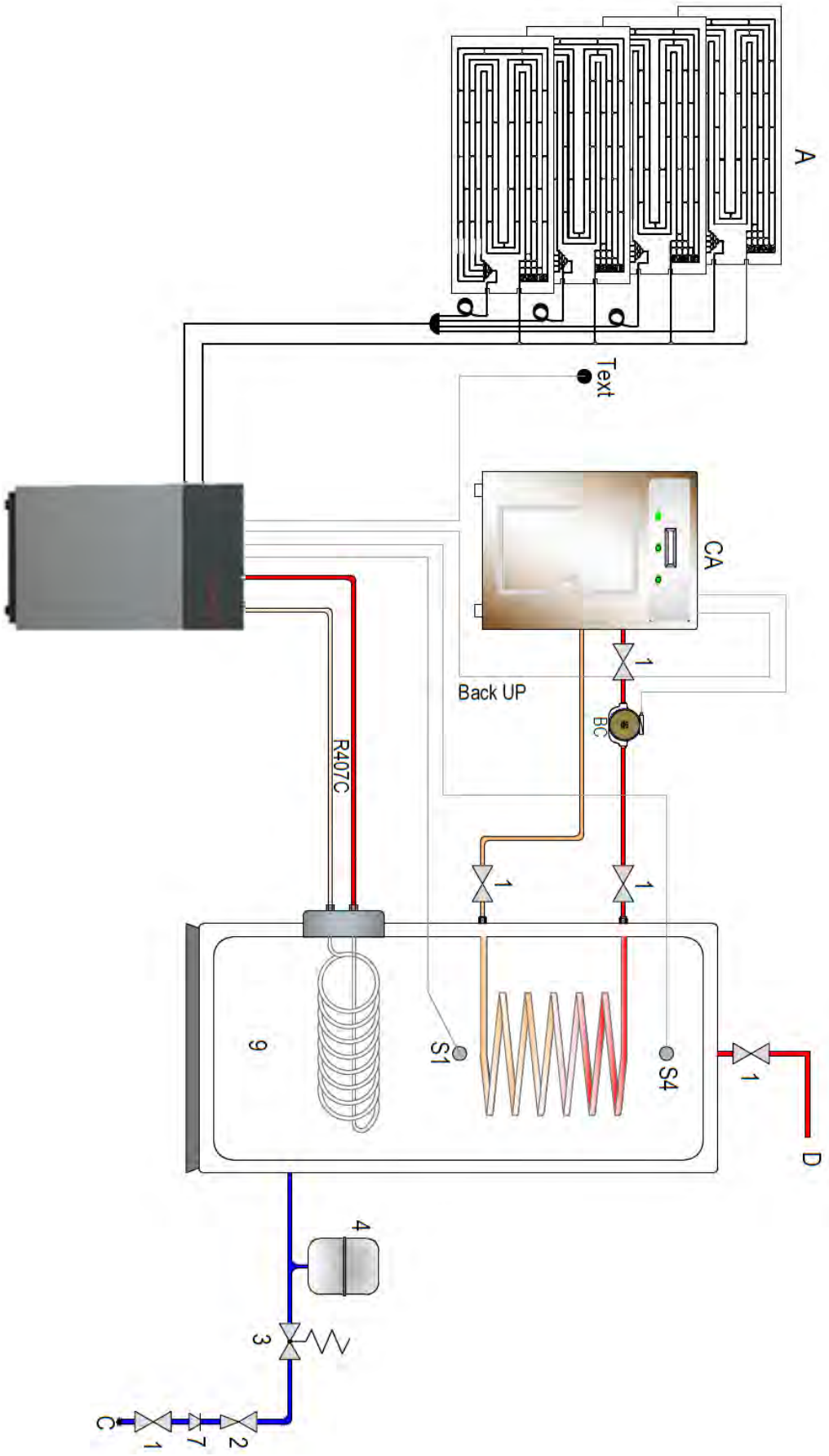
9.12. Ground plan 10a



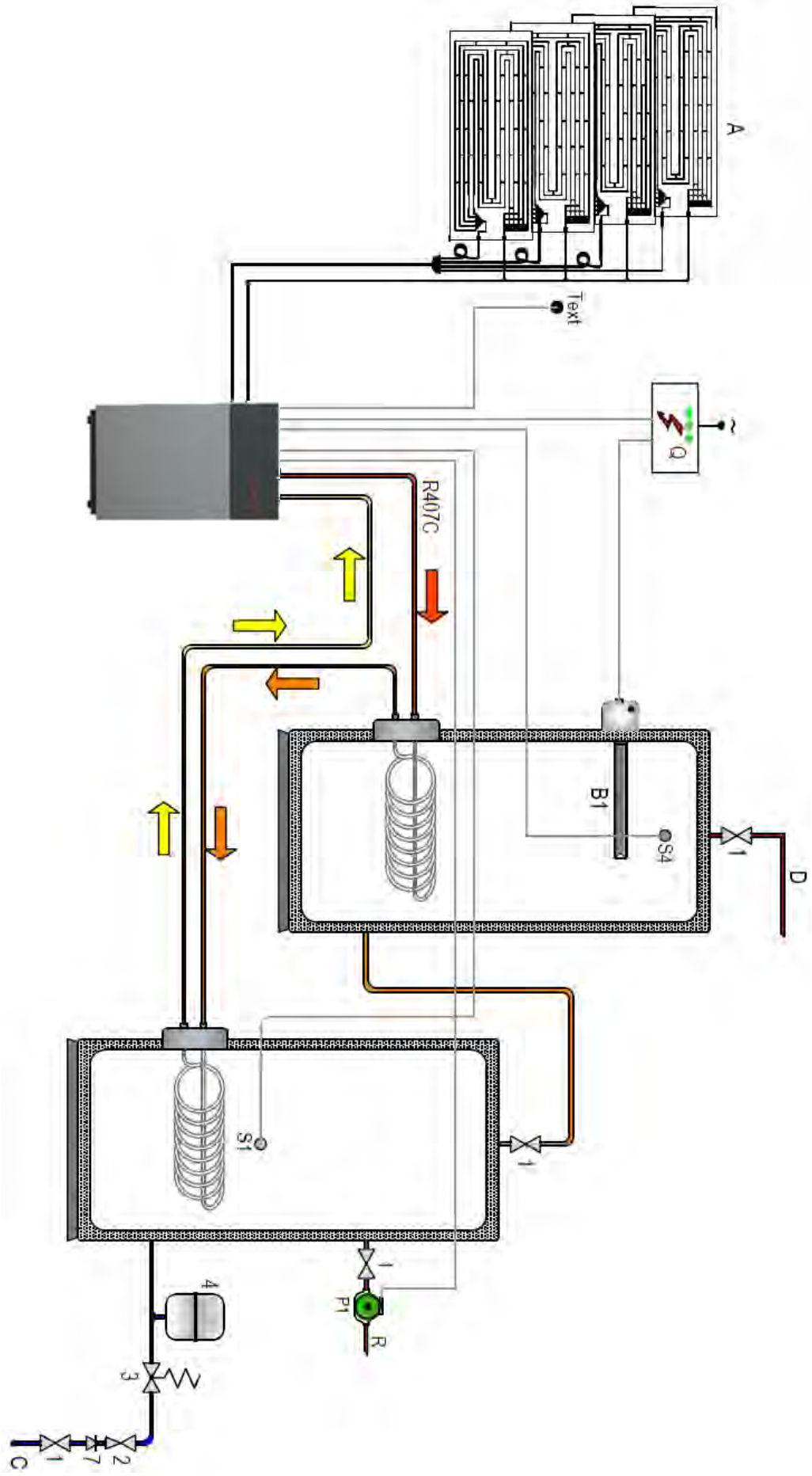
9.13. Ground plan 11



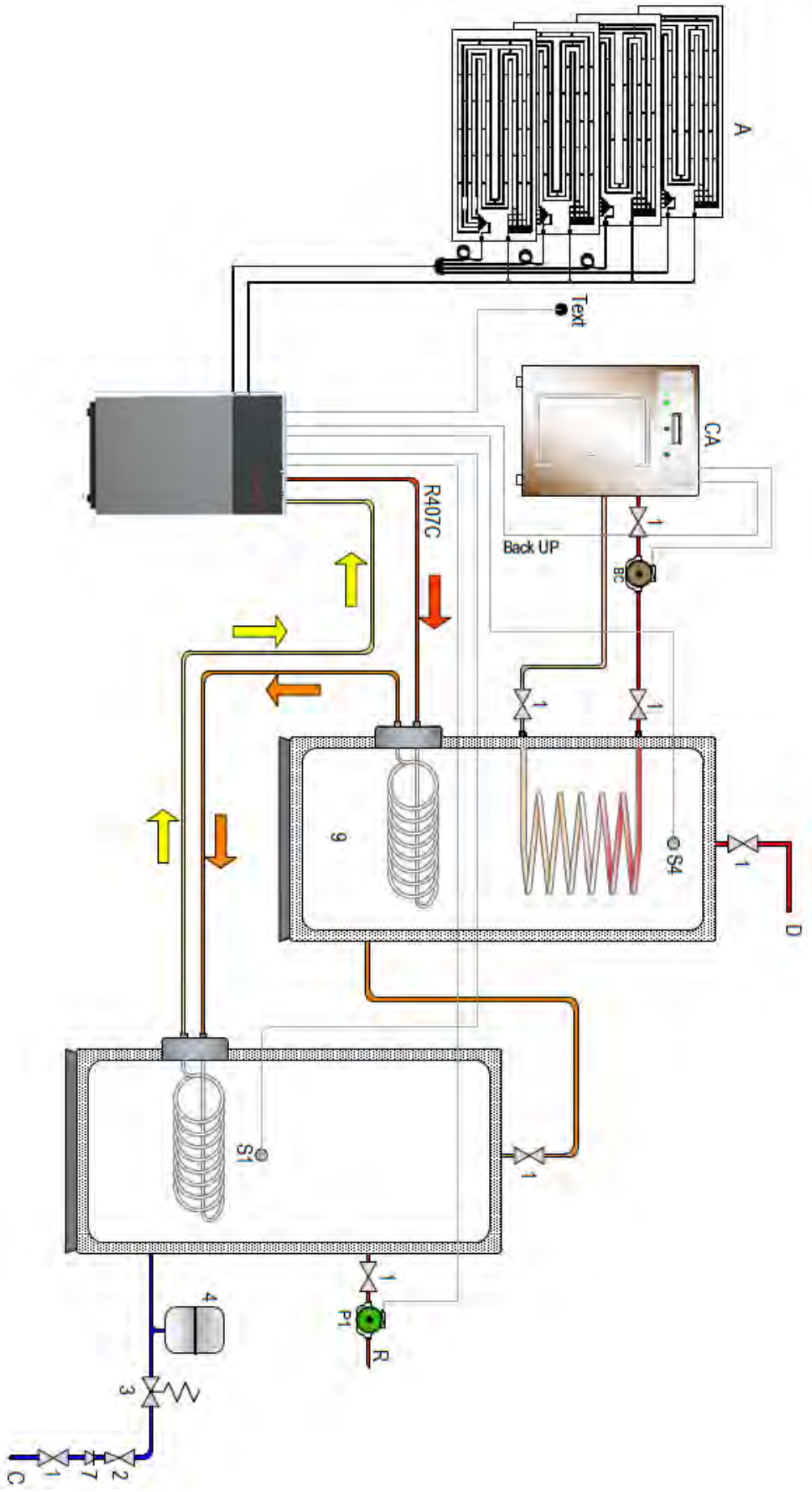
9.14. Ground plan 11a



9.15. Ground plan 11b



9.16. Ground plan 11c



9.17. Glossary

Esquemas Hidraulicos.			
	Português	Inglês	Francês
1	Válvula de Corte	Shutoff Valve	Vannes d'arrêt
2	Redutora de Pressão	Pressure Reducing Valve	Réducteur de pression
3	Válvula de Segurança	Safety valve	Vanne de sécurité
4	Vaso de Expansão	Expansion Vessel	Vase d'expansion
5	Filtro	Filter	Filtre
6	Purgador	Automatic air vent	Purguer d'air automatic
7	Válvula de Retenção (Anti-retorno)	Valve (non-return)	Vanne anti-retour
8	Termoacumulador (Câmara Dupla)	Water Tank (DHW)	Ballon ECS
9	Termoacumulador	Water Tank	Ballon
10	Depósito de Inércia	Buffer tank	Ballon tampon
11	Pré-Filtro	Filter	Pré-Filtre
12	Filtro	Filter	Filtre
A	Painéis Solares Termodinâmicos	Thermodynamic Solar Panels	Panneaux Solaires Thermodynamiques
B	Aquecimento Central	Central Heating	Chauffage Central
C	Entrada de Água Fria	Cold water inlet	L'entrée d'eau froide
D	Saída de Água Quente	Hot Water Outlet	Sortie d'eau chaude
F	Fluxostato	Flow Switch	Détecteur de débit
P1	Bomba Circuladora 1	Water circulator 1	Circulateur d'eau 1
P2	Bomba Circuladora 2	Water circulator 2	Circulateur d'eau 2
P3	Bomba Circuladora 3	Water circulator 3	Circulateur d'eau 3
S1	Sonda de Temperatura S1	Temperature probe S1	La sonde de température S1
S3	Sonda de Temperatura S3	Temperature probe S3	La sonde de température S2
S4	Sonda de Temperatura S4	Temperature probe S4	La sonde de température S3
Tamb	Termóstato Ambiente	Room Thermostat	Thermostat ambiance
Text	Termóstato Exterior	Ambient Thermostat	Thermostat exterieur
T	Termóstato	Thermostat	Thermostat
BC	Bomba Circuladora Caldeira	Water circulator (Boiler)	Pompe de circulation (chaudière)
CA	Caldeira (Apoio)	Boiler (Backup)	Chaudière
B1	Kit de Resistência (Apoio)	Electric Heater Kit (Backup)	Kit de résistance
B2	Kit de Resistência (Apoio)	Electric Heater Kit (Backup)	Kit de résistance
Q	Quadro de Comandos	Control Board	Panneau de commande
G	Piscina	Swimming Pool	Piscine
H	Permutador em Titânio	Titanium Heat Exchanger	Échangeur de Chaleur en Titane
R	Recirculação	Recirculation	Recirculation

10. 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.

Water Cylinder (domestic and industrial use) 5 Years: Stainless Steel (2 + 3 years)* 5 Years: Enamelled (2 + 3 years)* Manufacturer Warranty	Thermodynamic solar panel 10 Years Against Production Defects and corrosion	Electrical components and Moving parts: • Thermodynamic Block • Solar Block • Solarbox • Split • Monobloc (except cylinder) • Combi Block • Agrotherm • DHW 2 Years

*The warranty extension of 3 years, against corrosion of the internal tank (Enamelled / Stainless Steel), 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
  - Condutibility > 600 μS/cm (20 ºC)
  - PH < 5,5 or 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.

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