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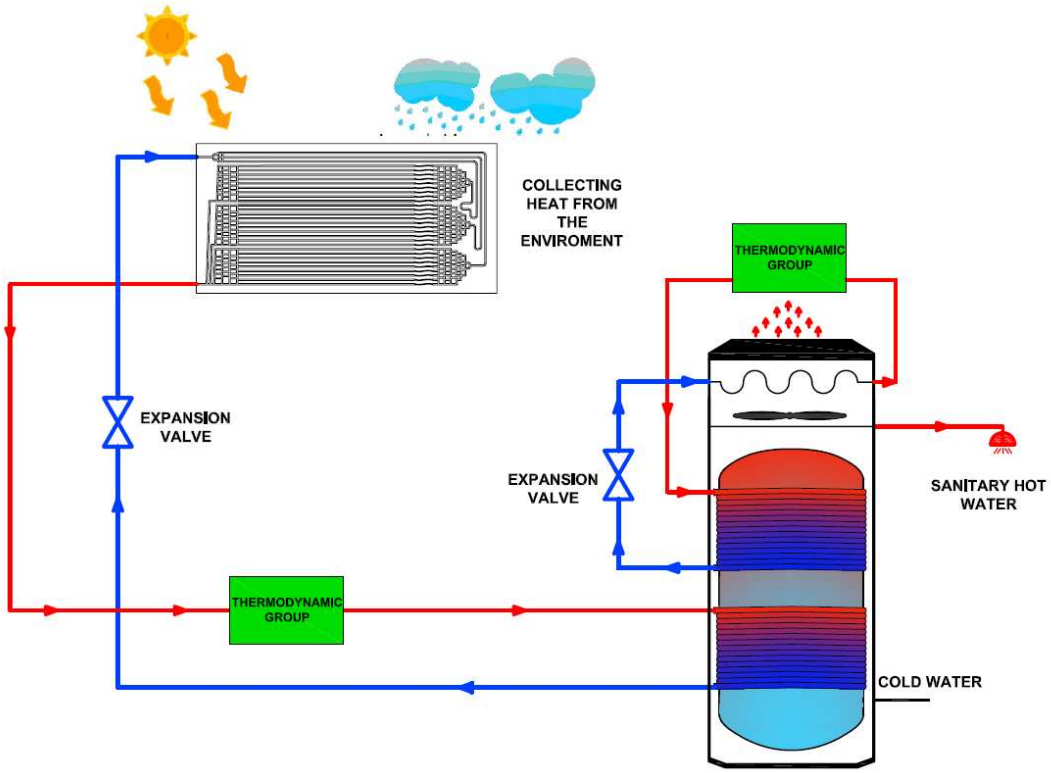
1 GENERAL SAFETY WARNINGS

- To avoid any injury to the user as well as material damages, the following instructions shall be followed. Incorrect operation due to ignoring these instructions may cause damages.
- The installation is the responsibility of the purchaser. Read the information supplied with the equipment carefully before installing and using it. The manufacturer declines any responsibility as regards damages deriving from an incorrect installation and a failure to follow the instructions detailed here.
- Ask a professional installer to install this equipment as incorrect installation may cause gas and water leaks, electrical discharges etc.
- Install the equipment in the following places which may bring about the malfunctioning thereof (even if it is unavoidable, consult the supplier): areas with corrosive gases, factories where the electrical voltage tries out strong fluctuations, places with strong electromagnetic waves, places with inflammable materials or gases, other special environments.
- The electrical connection has to be carried out in accordance with that specified in the respective point.
- It is vital to install in appropriate fashion the safety valve which is supplied with the equipment and check that it is working properly.
- In the event that the system pressure exceeds the pressure of 4 bar, a pressure reducing valve must be used.
- Sufficient space shall be set aside for installation and maintenance.
- The equipment shall always remain in a vertical position during transport, transfer and installation.
- The support surface shall be flat, bear the weight of the unit and be ready for the installation of the unit without increasing the noise or the vibrations.
- The installation site shall allow the connections of pipes and wiring.
- Maintenance repairs and tasks shall be carried out by a professional technical service. An incorrect maintenance task or repair may bring about gas and water leaks, electrical discharges etc.

2 OPERATIONG PRINCIPLE

Thermboil is a thermodynamic solar system. Thermodynamic solar system is the name given to the combination of heat pump technologies with the solar thermal energy technologies. It consists of solar collectors called thermodynamic panels, formed by a metallic panel which are directly exposed to the sun and which act as a heat pump circuit evaporator, collecting heat from the Sun and the environment. The system TB500E+I has a second heat pump circuit with a forced evaporator. In this way, there are two different mechanics to heat water which act in parallel taking benefits both for solar energy from outside and for ambiental energy.

In the illustration, the simplified scheme for the thermodynamic systems can be observed for obtaining sanitary hot water.



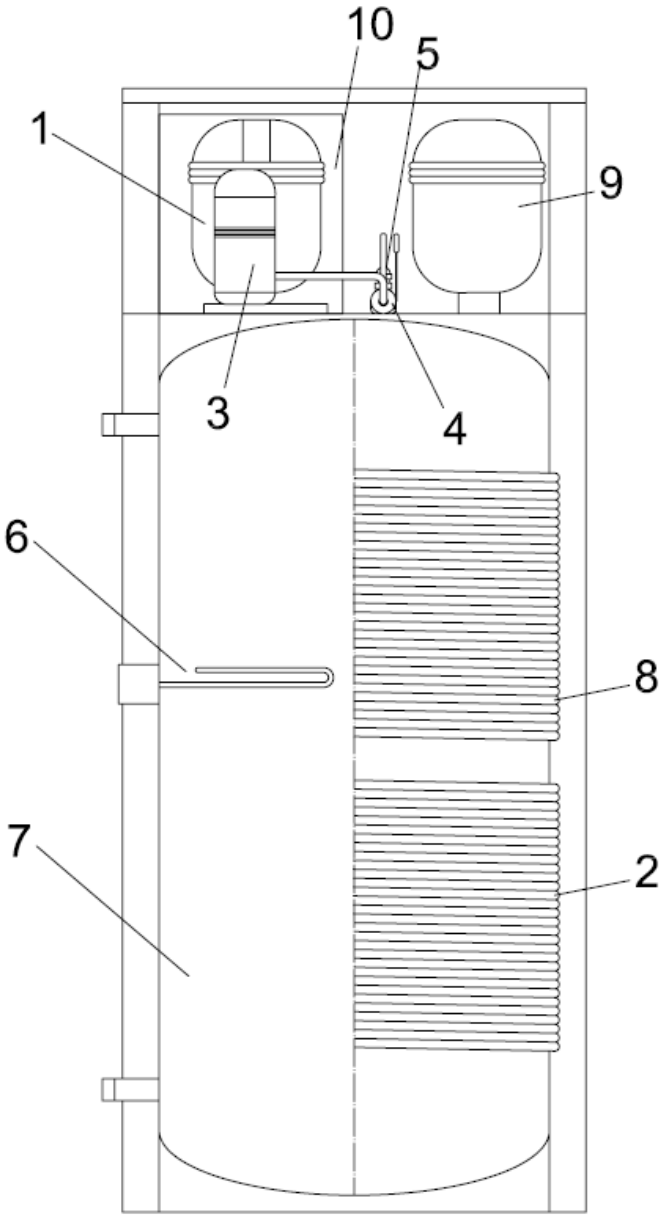
3 TECHNICAL FEATURES

TECHNICAL FEATURES- THERMBOIL Series E +I	
Model	**TB500E+I**
Mean thermal capacity (only thermodynamic)* (W)	4000
Mean power consumed (thermodynamic) (W)	1000
Maximum power consumed (W)	2500
Voltage / frequency	230 V / I ph / 50 Hz
Ambient temperature range (ºC)	5-45
COP range	3-7
Refrigerant fluid	R134a
Accumulator volume (L)	500
ACS temperature range with thermodynamics (ºC)**	45-80
Dimensions (height x width x depth) (mm)	2000x708x630
Maximum working pressure (bar)	6
Cold water input connections (") /Hot water output connections (")	3/4 - 3/4
Insulation type (kg/m3)	PUR 40
Thermodynamic panel weight (kg)	6.2
Packaging dimensions (height x width x depth)	2310x740x740
Protection class	IP 20
Approx. weight of equipment when empty (kg)	180
Dimensions of the thermodynamic panel	1700 x 800 x 25 mm
Thermodynamic panel input/ output connections SAE(")	1/4 - 3/8
Thermboil input/ output connections SAE(")	3/8 – 1/4
Power of the double fan (W)	45

*Thermodynamic system heats water up to 60ºC

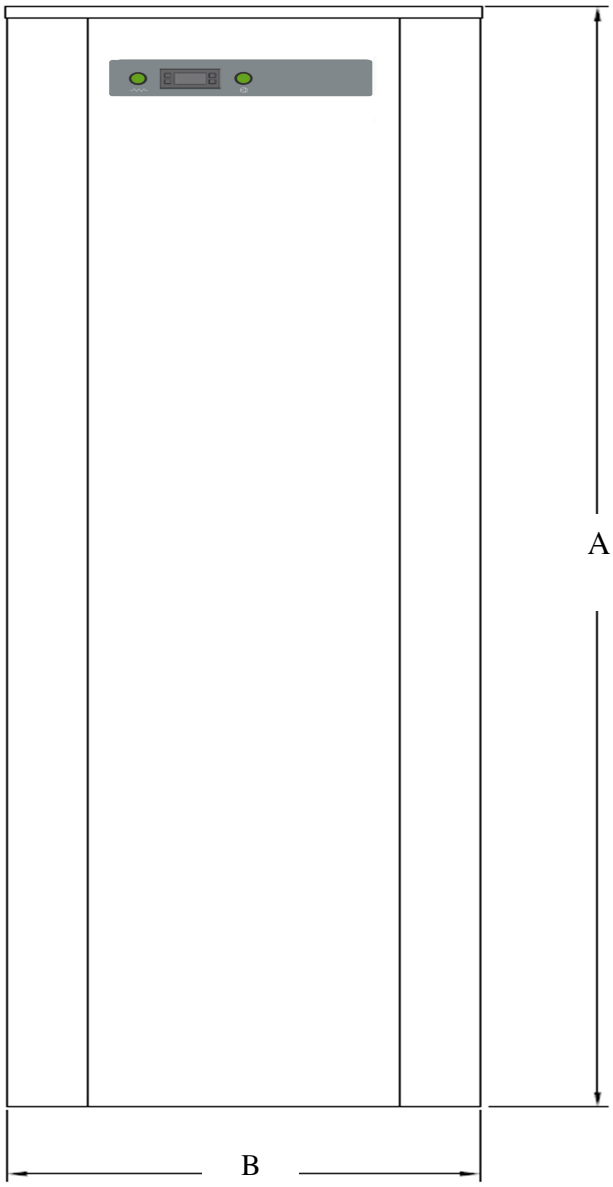
** Electrical resistance heats water up to 80ºC

Fig. 1 DESCRIPTION SCHEMATIC THERMBOIL TBE+I
(transversal section)



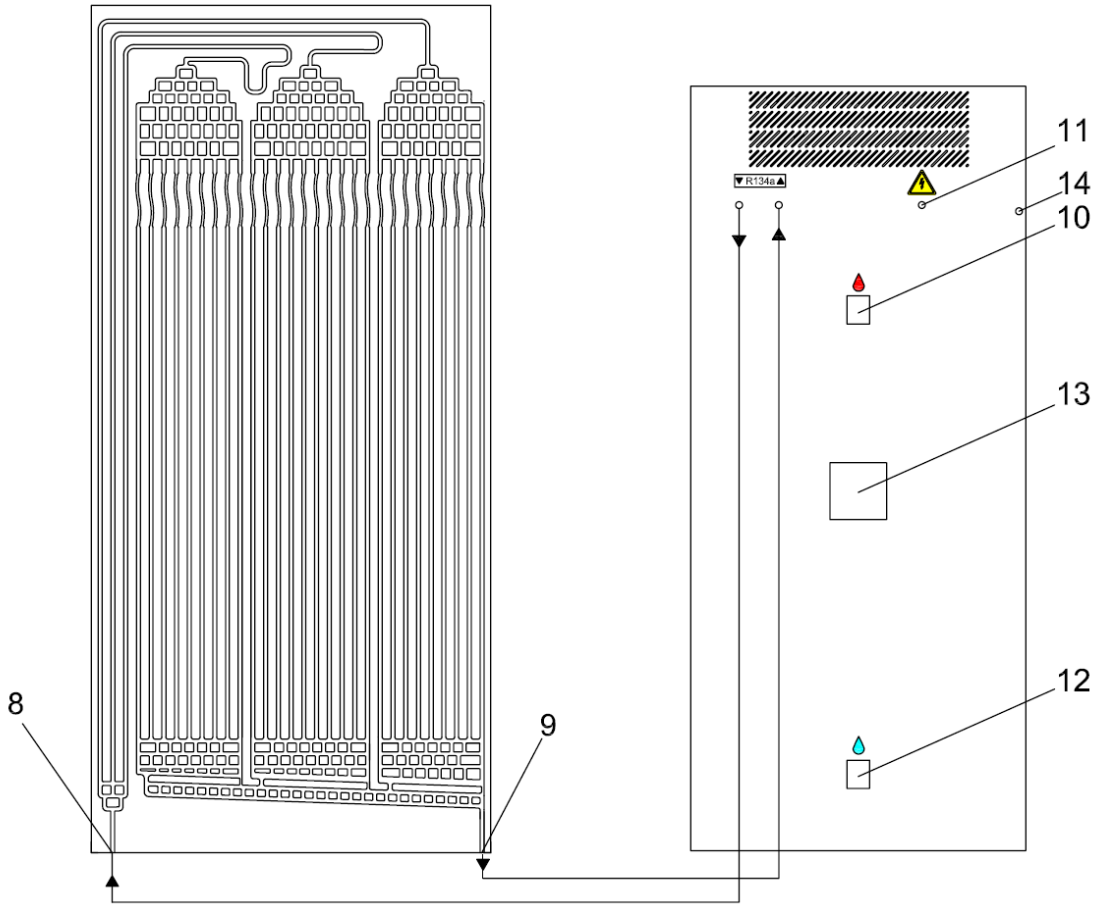
1. Compressor
2. Condenser 1
3. Drum
4. Dehydrator
5. Expansion valve
6. Resistance
7. Tank
8. Condenser 2
9. Compressor 2
10. Finned coil

Fig. 2 DIMENSIONAL SCHEME
(Front part)



Model/ dimensions	TB500E+I
A (fig. 2) (cm)	200
B (fig. 2) (cm)	70,8
C (fig. 3) (cm)	172.1

Fig. 3 DIMENSIONAL CONNECTIONS SCHEMATIC
(rear part)

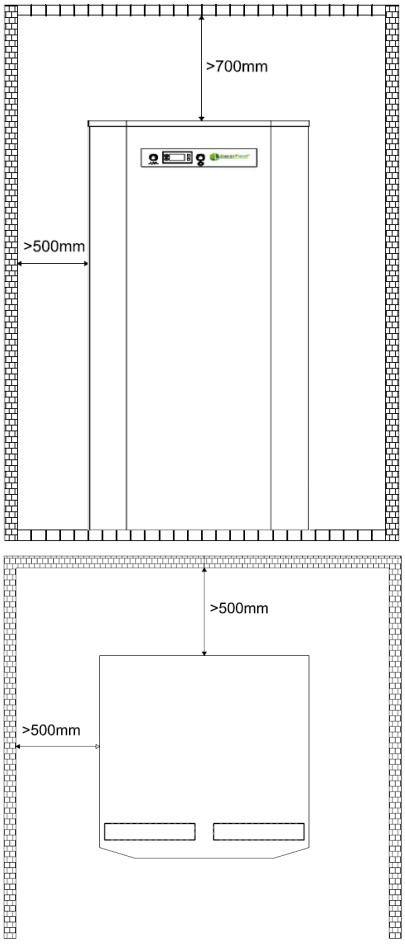


8. Liquid inlet (impulsion)
9. Gas outlet (aspiration)
10. Hot water outlet
11. Electrical connection
12. System water inlet
13. Resistance
14. Wastepipe

4 INSTALLATION

The installation is carried out in accordance with the steps detailed below:

Fig.4 Dimensions



Sitting location

Before proceeding with the discharging of the unit, we must check that the place where the Thermboil will be placed has:

- Sufficient space for the electrical and hydraulic connections.
- It must be checked that said places where both the panel and the Thermboil are going to be placed have bearing capacity.
- This apparatus is designed for its assembly in vertical position and should not be installed in any other position.
- The installation place shall not be an environment exterior with corrosive gases, factories where the electrical voltage experiences major fluctuations, places with sources of electromagnetic waves, with inflammable materials or gases or other special environments.

Handling when moved

The equipment must be transported and moved in vertical position and should never be turned over.
During the unloading and movement of the unit to its sitting place, these instructions shall be followed strictly with a view to ensuring the safety of the unit and people. Otherwise we run the risk that injuries or material damages may occur.
Before starting to handle the unit, we must check its weight (rating plate of the unit and in the section “General technical data” of this manual).
During its handling it shall not be submitted to sudden movements or blows, with a view to avoiding damages to the functional part.

Order of assembly

1. Installation of the thermodynamic solar panel
2. Refrigerant connections
3. Hydraulic connections
4. Electrical connections
5. Welds
6. Precision test during the installation with nitrogen, maximum of 10 bar.
7. Emptiness test during installation
8. Filling of the refrigerant circuit
9. Filling the accumulator
10. Turning the system on

4.1 INSTALLATION OF THE THERMODYNAMIC SOLAR PANEL

- Anchor the evaporator panel in a vertical position (recommendable) with the inlet pipes situated on the lower part as shown in figure 4. The precaution must be taken of not perforating nor strangling the piping when bending it should this prove necessary.

- Between the thermodynamic unit and the panels there should not be a distance of over 8 m and it is recommended that there should be the least possible distance between the thermodynamic block and the panels with a view to improving system performance. For better distance, see with Energy Panel

- For the anchorage of the panels 6 L supports measuring 105x55x5 mm are supplied which have two M8 holes (8 mm in diameter).

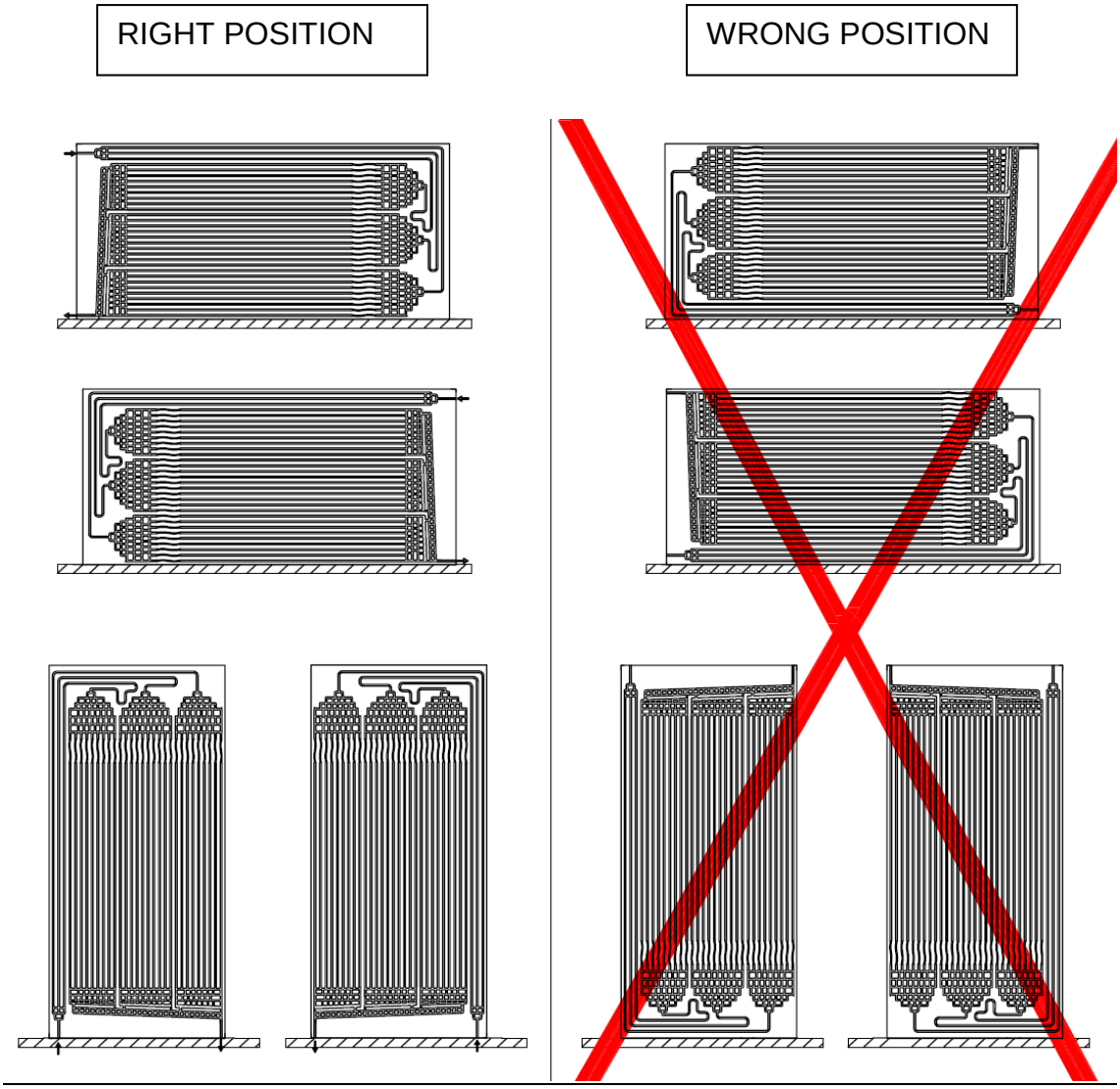
- The evaporator panels shall be preferably oriented to the SOUTH, SOUTHWEST or SOUTHEAST as other orientations slightly reduce their performance. The ideal inclination horizontally is more or less equal to the latitude of the place, so that they collect the greatest solar radiation; however, they may be positioned at a wide range of angles which stretch from 10 to 90.

- For greater yield, the panels must be in contact with the wind to favour heat exchange between the coolant and the atmosphere. For this reason, it is recommended that as far as possible the panels should be situated in a direction parallel to the prevailing wind in the area, allowing the air to pass freely between them.

- Connection of the panel: The liquid outlets to the panel 1 and 2, (fig 3. “8” and “11”) are connected to the liquid inlet of each panel (see fig. 5), and the gas outlet from the panel (see fig. 5) is connected to the gas inlets of the Thermboil (fig.3 “9” and “10”).

Fig. 5 Thermodynamic panel

Fig. 6 Correct and incorrect placing of the panel



4.2 REFRIGERANT CONNECTIONS

The piping which has to be used to join the thermodynamic panel to the Thermboil equipment shall be made of refrigeration quality copper (dehydrated copper pipe).

In interior spaces, this piping must be properly insulated with flexible anticondensation insulation. In the event that the water condensations do not entail any problem, this piping will not need to be insulated.

Contact between the liquid and aspiration line shall be avoided to prevent energy losses in the system.

Before welding the piping, it shall be checked that the system is free of humidity and particles.

The gas piping shall be designed with as few bends as possible to minimise the load loss and it shall be supported properly with a view not to transmit stresses or vibrations.

Before insulating the piping and loading the installation, carry out a preliminary control to ensure that there are no leaks in the installation.

4.3 HYDRAULIC CONNECTIONS

The Thermboil equipment is endowed with mains water inlet situated on the rear lower part. The hot water outlet is located on the rear upper part. This shall be connected to the hot water piping of the house. Anti-electrolysis sleeves must be worn to avoid contact between the equipment water outlet and inlet intakes of the equipment and the piping of the home in the event that they are metallic.

Mains water shall enter in accordance with figure 7. The safety valve supplied with the equipment must be installed, checking that it works properly.

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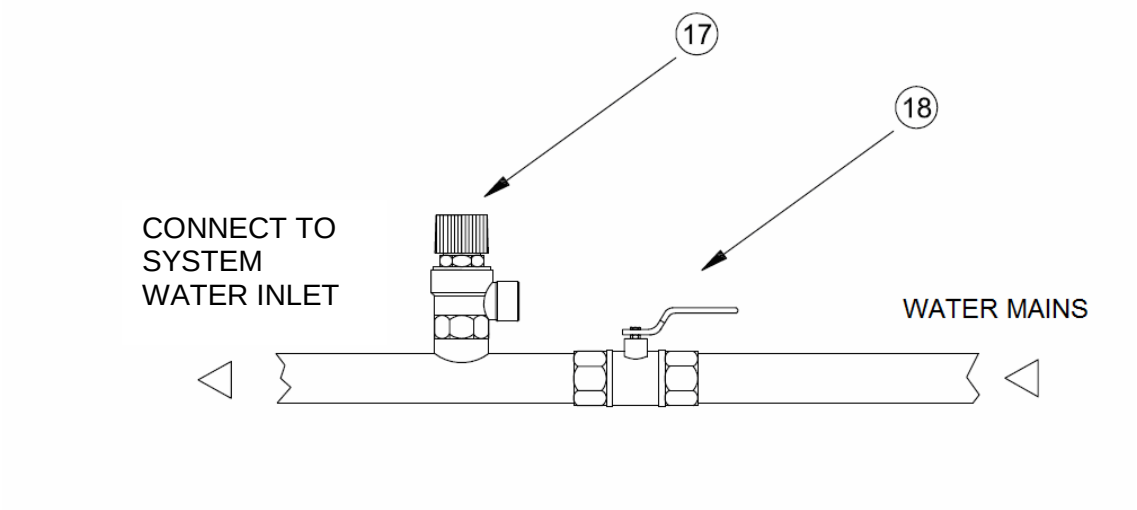
This equipment is not prepared to bear over 0.6 MPa (6 bar) of regulatory pressure. A safety valve rated at 6 bars is supplied with this equipment for the safety thereof and its placement is vitally important. It is recommended to incorporate in the installation an expansion vessel for sanitary hot water.

Should the pressure of the house water exceed 4 bars, a pressure reducing valve shall be installed before the safety valve.

Fig.7 SCHEMA NETWORK CONNECTION



17. Safety valve
18. Cutoff valve

4.4 ELECTRICAL CONNECTIONS

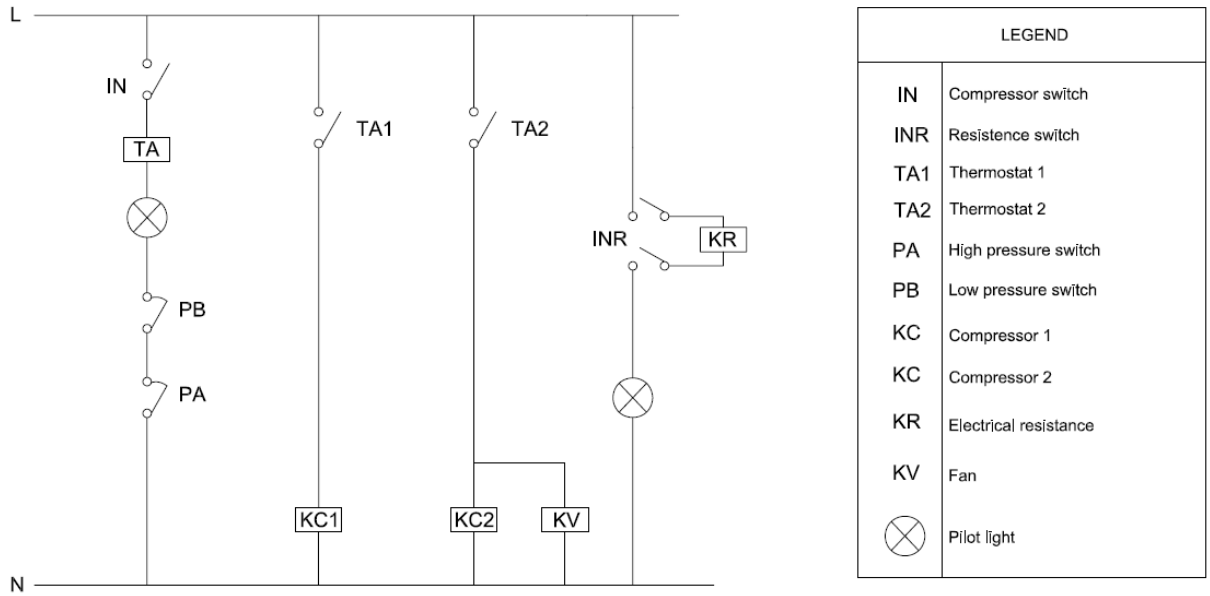
The equipment shall be connected to the electrical system when all the refrigerant connections have been made and the accumulator is full of water.

The power supply is monophase: 230V / 50Hz and earthing connection.

The power supply line must be protected by a 16A magnetic-thermal device.

The electrical scheme of the equipment has been shown in the following figure:

Fig. 8 WIRING DIAGRAM



4.5 FILLING THE ACCUMULATOR

To fill the accumulator, the cold water power key of the equipment shall be opened.

Once open, a hot water tap of the installation shall be opened, thereby allowing the emptying of all the air contained in the tank.
Once full, turn off the tap.

Check for any possible water leaks in the installation.

4.6 WELDS

The welds shall be carried out by qualified staff and in accordance with the regulatory standards in force. Any damage caused by an incorrect welding procedure is not considered in the guarantee and shall be assumed by the installer responsible.

The type of welding recommended for the carrying out of the joints in gas piping is oxyacetylene welding (propane may also be used).

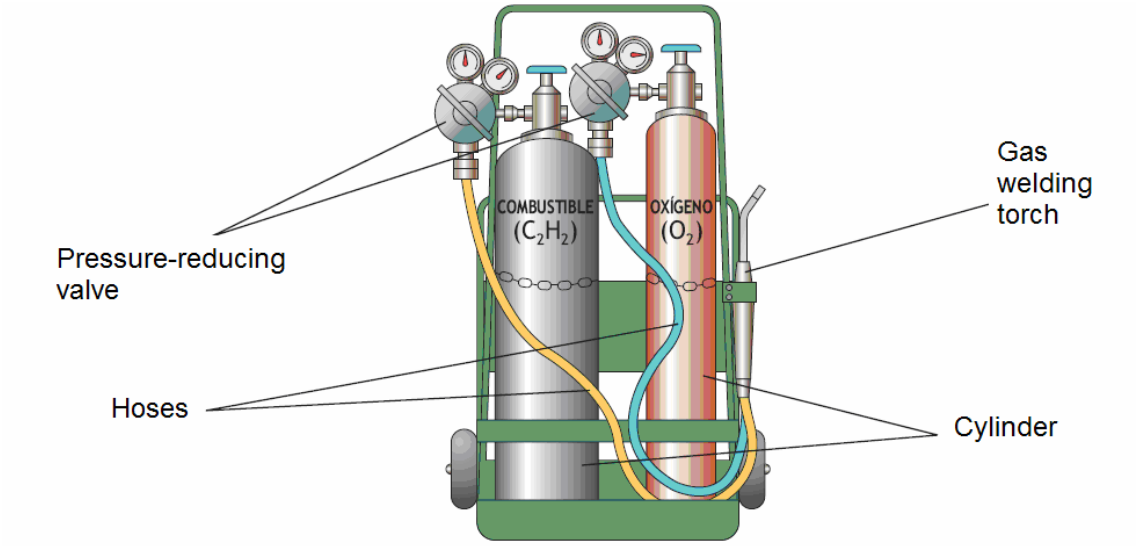
For the welding 40% silver rods shall be deployed.

The panels have a thermo retractile case at the connection pipes. Where necessary, a section thereof shall be cut to prevent it from being burned during the welding. Also it is possible to use a humid cloth for the protection during the weld

Once the refrigerant installation has been welded, the water tightness thereof shall be checked.

In addition to the two mobile bottles which contain the fuel and the oxidizing agent, the main elements which are involved in the oxyacetylene welding process are the pressure reducers, the blowpipe and the hoses. (see fig.9)

Fig. 9 Main elements of a Mobile gas welding installation



4.7 FILLING OF THE REFRIGERANT CIRCUIT

In case of existing pre-installations, check the cleanliness of the pipelines and effect a sweep with nitrogen if necessary.

The equipment contains a precharge of refrigerant fluid (R134a), prepared to flood of refrigerant an installation up to 8m in length.

Before opening the keys of service it is necessary to empty the circuit and the panel, to eliminate the air. For it use emptying equipment across any valve core. Once emptied, open the keys of service to fill the circuit.

Check the water tightness of the circuit at the welds, for example using soapy water.

Should there be any leaks in the installation, contact the technical service as an intervention by qualified staff will be necessary.

4.8 TURNING THE SYSTEM ON

Thermboil may be set in motion once the steps described previously have been set in motion. The equipment shall attain the anticipated temperature (60ºC) in a variable time period (2-10 hours) which shall depend on the environmental and mains water inlet temperature conditions.

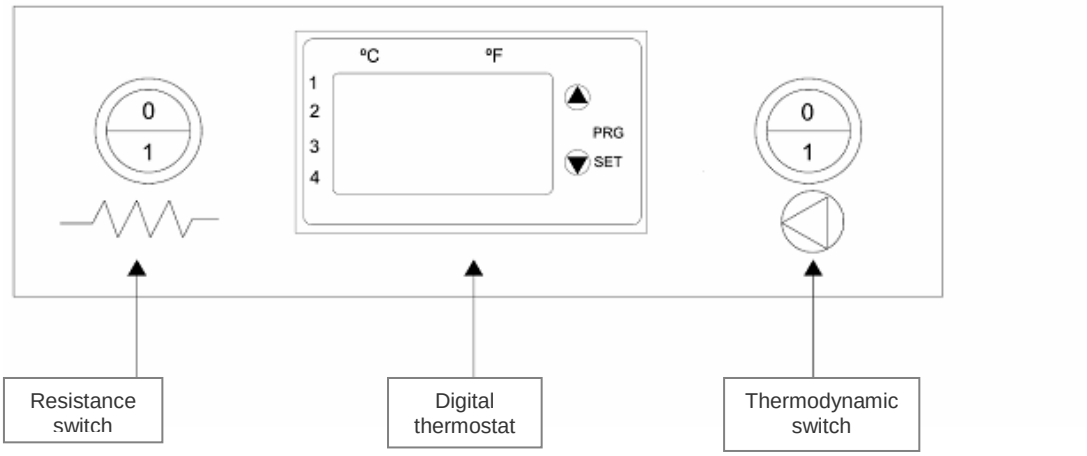
Once the installation has been completed, it shall be checked that the accumulator is full of water and the installation free of air.

To turn the Thermboil on, the latter shall be connected to the electrical system

WARNING: In order to avoid damages to the electrical resistance, it shall be checked that the tank is full of water before turning on the apparatus.

Once said indications have been checked, connect the thermodynamic equipment (right switch) which shall remain on.
The electrical resistance switch (left) shall remain off.
The thermodynamic equipment, once connected, shall operate automatically thanks to the digital controller which shall start up when the temperature falls below the prefixed value.

Fig. 10 Control panel scheme



5 USAGE RULES

5.1 TEMPERATURE ADJUSTMENT

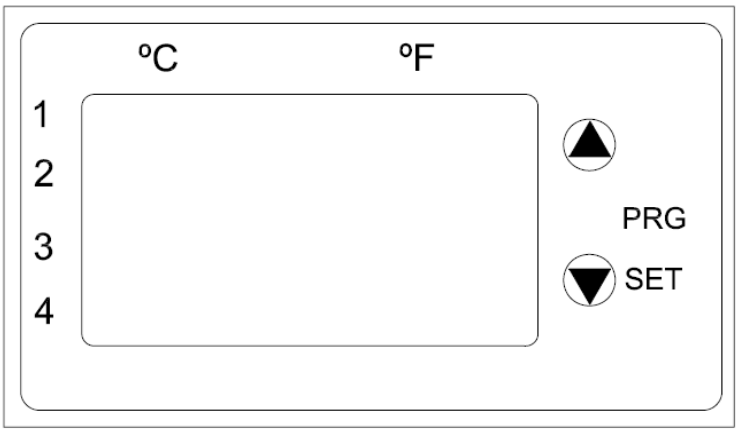
This thermostat is preset at 55ºC, the user cannot modify the temperature.

The digital thermostat of the equipment marks the temperature of the water at any time. This thermostat is preset at 55ºC.

To display preset temperature of the compressor, press the key 

To display preset temperature of the electrical resistance, press the key 

Fig.11 Digital thermostat scheme



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5.2 ELECTRICAL RESISTANCE

The equipment has electrical resistance of 2000 W which is connected manually (by way of the left switch) when greater power to heat up the water is foreseen (demand for hot water greater than that foreseen, extremely low external temperatures, legionellosis prevention).

To connect the resistance, both the thermodynamic switch and the resistance switch, must be in position 1 (see fig. 10).

6 MAINTENANCE, REPAIR AND CLEANING

WARNING. Follow the general warnings and safety rules listed at the start of the text carefully, paying due attention to everything which is indicated.
All maintenance operations and interventions shall be carried out by specialized staffs (who have the requirements requested by the prevailing standards in this regard).

Before requesting the intervention of the Technical Service owing to a possible malfunction, check that the operating failure does not depend on other causes such as, for example, a temporary lack of water or electrical energy.

- The sitting of the unit shall be dry, clean and well-ventilated.
- It is usually not necessary to clean the solar thermodynamic panels in view of their self-cleaning power when it rains. When they are very dirty (dust, leaves or bird excrements), it can be cleaned with water and non-abrasive detergent. This operation should not be carried out when sunlight is strong.
- A mandatory annual revision must be carried out by authorized installers checking:
  - The proper operation of the installation, the regulator and the safety devices.
  - The state of the installation components exposed to the inclement weather (affixations, panel…).
  - The state of the electrical resistance, changing this where applicable.
- In addition to the mandatory annual revision, a visual inspection of the installation is recommended every 6 months and in any case whenever any anomaly occurs in installation operation.
- It is vital to empty the apparatus if it has to remain out-of-use for a prolonged time period. Where necessary, empty the apparatus as indicated below:
  - disconnect the apparatus from the electrical system;
  - turn off the central tap of the domestic installation;
  - turn on the hot water tap (sink or bath);

Periodic maintenance

To obtain the optimum performance of the apparatus, it is recommended to replace the resistance every two years.

Overpressure device

- Avoid placing below the thermo accumulator any object and/or apparatus which may be damaged by a possible water loss.
- In the event of a prolonged period of inactivity of the apparatus it is necessary to:
  - disconnect the apparatus from the electrical power supply.
  - turn off the hydraulic circuit taps.
- If the hot water coming out of the taps is at a temperature of over 50ºC, this may cause serious burns immediately. Children, the handicapped and the elderly are more easily exposed to the risk of burns.

The user is forbidden from carrying out the ordinary and extraordinary maintenance of the apparatus.
If the electrical power cable is replaced, call specialized staff.

The overpressure device shall be put into operation on a regular basis to check it is not blocked and eliminate any lime scale.

7 TROUBLESHOOTING

Problems	*Causes*	*Solutions*
The screen doesn't show any information	Lack of power	Check the power supply
		Check that the power switch is on
	Pressure switch is on	Check the R134a load
		Check that the pressure switches function properly
	Screen error	Check that the screen functions properly
The system starts and stops, the screen switches off	Refrigeration circuit leak	Check the water tightness of the connections
	Incorrect gas load	Check the R134a load
	Very low water temperature	Connect the resistance until the system activates
	Obstruction in the filter drier	Replace the filter drier and clean the thermodynamic panel's circuit(Models E/E+I/ E+I HT)
	Pressure switch is on	Check that the pressure switches function properly
	Non condensable gases in the refrigeration circuit	Empty the refrigeration circuit
E1 error appears on screen	Temperature probe	Check the temperature probe connection
		Check the continuity of the probe using a multimeter
AE error appears on screen	Pressure switch is open	Very low water temperature. Connect the resistance until the system activates.
		Check the R134a load
The water is cold and the compressor is working	Water leak	Check the water tightness of the hydraulic circuit
	Incorrect gas load	Check the R134a load
	Adjustment of the water temperature	Check the temperature adjustment on screen

Problems	***Causes***	***Solutions***
The compressor is working short cycles	Gas leak	Check for leaks in the refrigerating circuit
	Non condensable gases in the refrigerating circuit	Empty the refrigerating circuit
The compressor is working short cycles	Power supply tension	Check the power supply tension
	Water leak	Check the water tightness of the hydraulic circuit joints
Water escaping from the tank	The stainless steel pipe is not tightened	Check the stainless steel pipe is properly connection to the system
	Condensates	Check the proper evacuation of the water through the condensate pipe. (Models I/E+I/FX/E+I HT) or check the condensate pan

8 PREVENTION OF ISSUES

Cause of the issue	***Consequences***
Forgetting to install the security valve	Pierced accumulator and leaks in the hydraulic connections
Opening the valve allowing gas to circulate without having checked the water tightness	The system will stop working alter a couple of hours
Starting the machine without having filled with water	Risk of deteriorating the refrigeration circuit
Excessive tube distance between the thermodynamic unit and the panels	Overheating of the compressor decreasing its lifespan
Upside-down positioning of the panel	The system will have constant low pressure and the compressor will lose oil
Installing the system on a wall without the right support	The system risks falling and damages
Bad fixation of the panels on the roof	Risk of the panels breaking or falling from the roof, especially during strong winds
Absence of dielectric junction	Risk of corrosion in the hot and cold water connections as well as damaging the accumulator
Not holding the hot water pipe during connection causing twisting of the pipe	Partial or total obstruction of the hot water exit from the system
Anchoring of the outlet connections and absence of anti-vibratory muffs	Gradual loss of refrigerant fluid, malfunctioning followed by shutting down of the system