ENERGIE
THERMODYNAMIC SOLAR ENERGY

ECO 200 / 200IS / 300 / 300IS / 500I

Assembly and User Manual

Thermodynamic Solar System

ROVO

INDEX

1. IMPORTANT

The Eco shall only be started if the hot water cylinder is fully filed with water.

The Eco can only function after the respective refrigerant supply has been connected.

The electrical input is: ~230 V, 50 Hz.

2. OPERATING PROCEDURES

Please read the following instructions before start installing or operating with the solar system.

- The Thermodynamic Solar System Eco shall only be used for the heating of fresh water and at the limits indicated on temperature application! Heating of other liquids, such as industrial waters or others, shall not be made with this solar system. The technical rules (DIN 1988) for the supply of fresh water must be taken into account.

- The thermodynamic solar panel shall be positioned:
  - Outside;
  - In a place with good solar capture;
  - Respect fixing/fastening rules.

- Positioning of the Hot Water Cylinder must not be done in:
  - The open air;
  - In spaces that are potentially explosive due to vapour or liquid gases.

- Do not turn on the solar system:
  - With an empty Hot Water Cylinder;
  - Without refrigerant supply (R134a).

- The ECO must always be voltage free when being worked on.
- ECO construction and assembly procedures comply with the relevant EC directives.
- VDE, EN and IEC standards must be complied with when making electrical connections to the ECO.

Installation, assembly or maintenance of Eco may only be carried out by qualified personnel!

2.1 PACKING, STORAGE & TRANSPORTATION

All Energie – Thermodynamic Solar Systems products are to be kept in the original packaging materials and should be stored or transported in the vertical position - note there is an arrow to indicate the 'UP' direction for packing's.

European Certification	Directives
EN 60335-1	73/23/CEE
EN 60335-2-21	93/68/CEE

3. DESCRIPTION

The ECO thermal solar system work is based on the Carnot principle - compression refrigeration principle - denominated as Thermodynamic Solar System.

The solar panel, the main component, is placed outside for the capture of:

- Direct and diffuse Solar Radiation;
- External air, by natural circulation;
- The effect of wind (almost always existent);
- Rain.

The differences between temperatures, stimulated by the previously described agents, guarantees that Klea (ecological refrigerant fluid) evaporates in the solar panel's interior. The absence of glass in the panel allows for increased thermal exchange by convection.

After passing through the panel, the Klea fluid is sucked in by the system's mechanical component, the compressor, which in turn raises the temperature and pressure; it is then transmitted to the water circuit via a heat exchanger.

Before the Klea fluid returns to the solar panel it is necessary for a throttling process occurs, in other words, pressure reduction that guarantees the liquid state is once again achieved, completing the overall cycle.

This operational process, in which we ally technology with the laws of nature (changing states of a liquid), demonstrates the power and the potential of the Energie thermodynamic solar system.

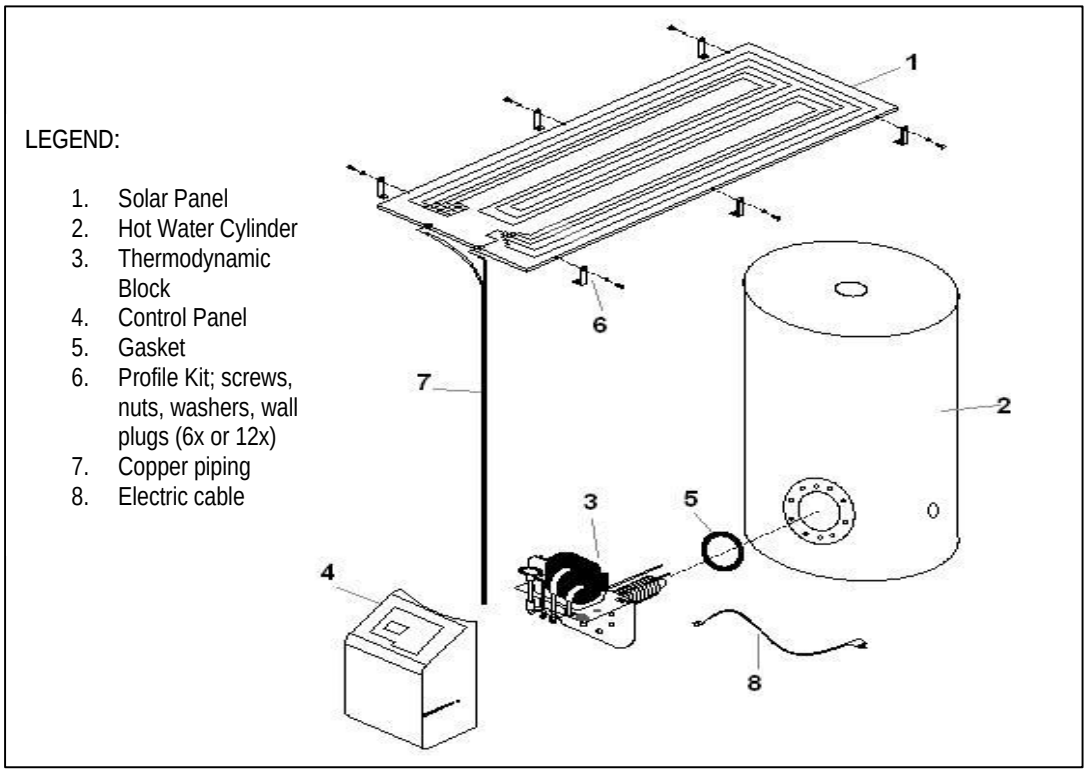


Fig.2 Overall View of the Equipment Components

4. TECHNICAL SPECIFICATIONS

The thermodynamic solar system Eco is composed by the following components:

- Thermodynamic Solar Panel (1 or 2)
- Hot Water Cylinder
- Thermodynamic block
- Control Panel
- Pressure Reduction Valve
- Safety Group
- Profile Kit; screws, nuts, washers, wall-plugs (6x or 12x)

4.1 Thermodynamic Solar Panel

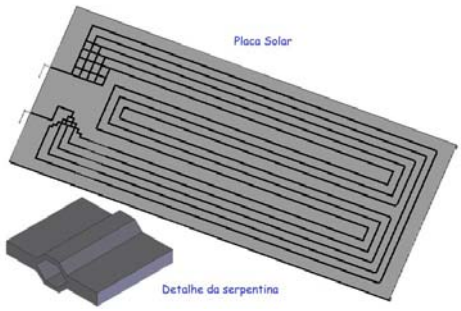


Fig 3. *Thermodynamic solar panel*

The thermodynamic solar panel is made of anodized aluminium with corrosion protection, having a black-colour appearance. Two different types of panels exist: left and right (designated at the side by appropriate connections).

The panel connections are in copper piping with an interior diameter of ¼".

Thermodynamic Solar Panel	
Width	2000 mm
Height	800 mm
Thickness	20 mm
Weight	8 kg
Gross Area / Absorver Area	1,6 m²

Tab 1. Solar panel dimensions

4.2 Hot Water Cylinder

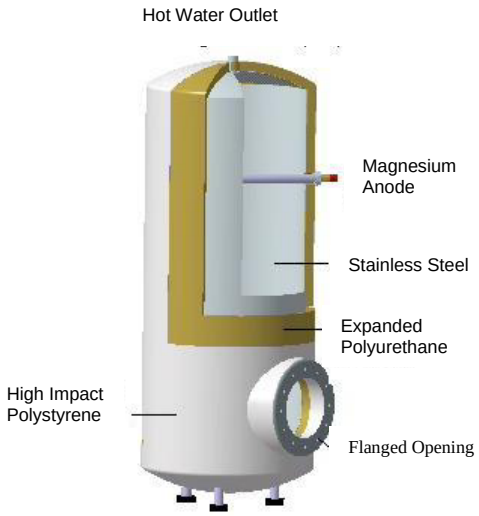


Fig 4. *Diagram of the Hot Water Cylinder*

The hot water Hot Water Cylinder sits above the ground in a vertical position. The tank is made out of stainless steel. The thermal isolation process is recreated by means of expanded polyurethane of 35 - 45 mm in thickness. Its external coating is in high-impact polystyrene.

The Hot Water Cylinder has cold water input and hot water output, SHW (Sanitary Hot Water) return and is also equipped with a magnesium anode.

There is a flanged opening at the lower part for the coupling of the Thermodynamic Block.

Hot Water Cylinder			
	200	300	500
Height (mm)	1270	1630	1650
Diameter (mm)	550	550	720
Weight (kg)	50	65	100

Tab 2. Hot water cylinder dimensions

4.3 Thermodynamic Block

Fig. 5 Thermodynamic Block

The thermodynamic block is the component which transfers the heat energy captured by the solar panel into hot water.
It is seated on a stainless steel structure, the key components being: the compressor, heat exchanger, expansion valve, thermostat, pressure-switch, electric resistance...etc.

The frontal part of the block has two pipes (Aspiration Line and Liquid Line) for connection to the panel(s).

The Thermodynamic Block is coupled to the Hot Water Cylinder using 12 M10 screws.

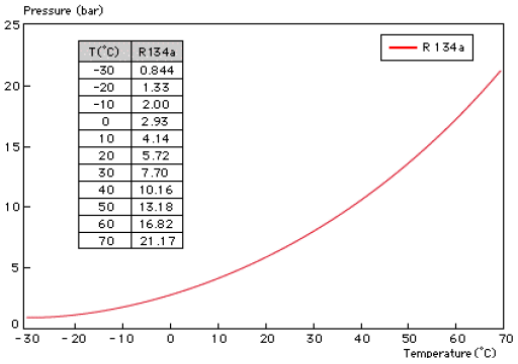
Thermodynamic Block		
Eco	200 / 300	200is/300is/500
Height	650 mm	650 mm
Width	310 mm	310 mm
Depth	300 mm	300 mm
Weight	15 kg	20 kg
Power Input	390 - 550 W	595/890
Power Out.	1690 -2900 W	2800/4550

Tab 3. Thermodynamic Block Dimensions

4.4 Fluid, R134a

R134a is an HFC refrigerant, and as such, is not harmful to the ozone layer. It has a high thermal and chemical stability, low toxicity, is non-flammable and is compatible with the majority of materials.

PRESSURE/TEMPERATURE GRAPH



4.5 Safety Group

The safety group enables the system to be protected against situations such as; anomalies in the supply of cold water, the return path of hot water, emptying of the Hot Water Cylinder and raised temperatures. It is a valve body made out of chromed brass, in accordance with European ISO 9001 standards.

The valve is calibrated to operate at 7 bar.

Fig. 6 Safety Group

1. Threaded orifice (3/4") for direct connection to the Hot Water Cylinder.
2. Threaded orifice (3/4") for the input of cold water.
3. Security valve discharge orifice, with opening (1").
4. Feed Valve.
5. Security valve discharge device command.
6. Inspection lid.

4.6 Expansion Tank

The expansion tank is a device designed to compensate for any increase in water caused by a rise in temperature.

This is the recommended procedure for the correct installation of this equipment.

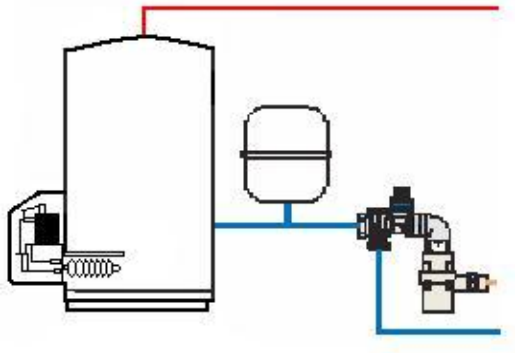


Fig. 7 *Expansion tank installation diagram*

NOTE:
Installation of the expansion tank is the responsibility of the installer. It can normally be installed into the cold water or hot water piping system.

4.7 Pressure Reducing Valve

The pressure reducing valve must always be installed upstream from the safety group and be ready to operate in situations in which the network pressure rises to above 3 bar. This valve comes equipped with a manometer.

Fig. 8 Pressure reducing valve

Characteristics:

- Body in Chromed Brass.
- Max. upstream pressure: 16 bar.
- Downstream pressure 1 – 6 bar.
- Max. operating temperature: 65° C.
- Manometer: 0 – 10 bar.
- ¾" Threaded orifice (entry and exit).

5. INSTALLATION

Assembly Sequence

- Solar Panel(s)
- Hot Water Cylinder
- Thermodynamic Block
- Refrigerating connections (Aspiration, liquid)
- Hydraulic connections
- Electrical connections
- Nitrogen supply
- Vacuum
- Installation start-up

5.1 Fixing of the Panel

It is important to take the characteristics of the installation location and the inclination angle of the panels into account. In order to get maximum benefit from incidental Solar Radiation, the panels must be at an inclination of between 10° - 85° in relation to the horizontal position, preferably orientated towards the South.

The panel comes already supplied with 6 M8 screws on the lateral tabs. The distance between the holes in the location where the panel is to be fixed must coincide with the existing holes on the panel (Fig. 13):

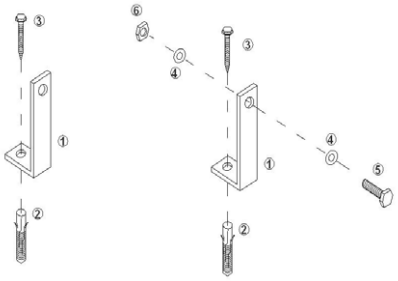


Fig. 9 Profile fixing diagram

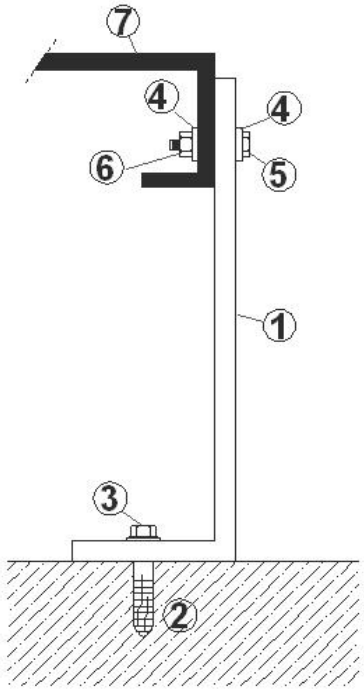


Fig. 10 Panel profile fixing process

1. Profile (aluminium)
2. Plastic wall plug
3. Self-tapping screw (M6x40)
4. Washer M6
5. Screw (M6x20)
6. Nut M6
7. Panel

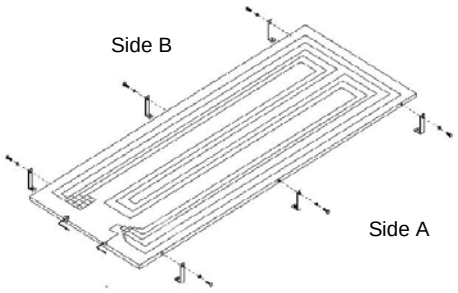


Fig. 11 Panel fixing diagram

The system comes with six sets of: profiles, screws, nuts, washers, wall-plugs.

The panel has 3 small profiles (side A) and 3 large profiles (side B) which must be fixed according stipulations in the diagram, giving the panel the desired level of inclination.

The profile must be fixed to a base (e.g. a roof) via the provided plastic wall-plugs and the self-tapping M6 screws.

Fixing of the panel to the profiles is done via the M6 screws and the respective nuts and washers.

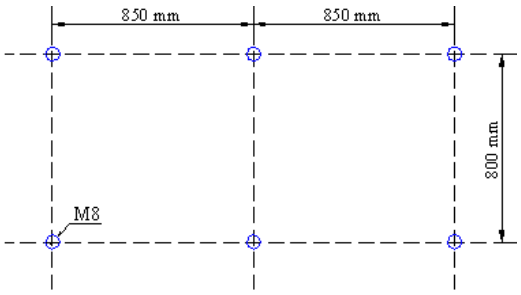


Fig. 12 Panel hole drilling diagram

The panel must always be installed with the connections facing downwards.

Refer to the 2 existing different types of panels; right panels (A) and left panels (B).

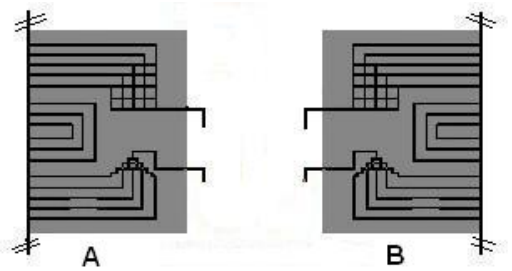


Fig. 13 *Types of panel (left and right)*

5.2 Hot Water Cylinder Installation

The Hot Water Cylinder must be installed in an accessible location, protected from bad weather conditions. The choice of location must allow for easy assembly of the Thermodynamic Block.

The Hot Water Cylinder installation point must provide:

- A point for cold water.
- A point for hot water.
- Drainage.
- Recirculation (if it exists).
- Electrical outlet, 230 V.
-

AVISO !

NOTE:

Observe that the hydraulic connections are at the back of the cylinder, it hence being necessary to consider the spacing between them and the wall.

5.3 Thermodynamic Block Installation

Before installing the Thermodynamic block, make sure that the heat exchanger is not in contact with the resistance casing and the thermostat. To check this, use a multimeter (in the continuity position), positioning a connector on the heat exchanger and the other on the block's support structure (compressor or flange) and verify that no continuity actually exists.

- The Thermodynamic Block is coupled into the existing flange (at the lower part of the Hot Water Cylinder).

- Correctly place the sealing gasket before tightening up between the flanges.

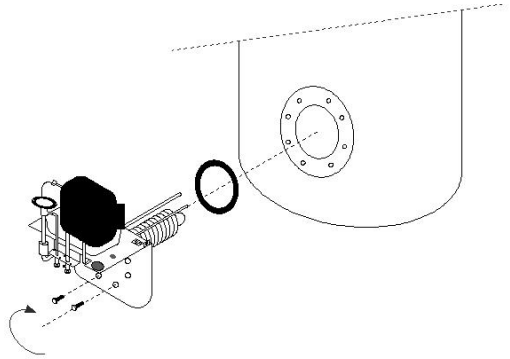


Fig. 14 Coupling of the Block to the hot water cylinder

- Put the heat exchanger into the inside of the Hot Water Cylinder, taking special care upon its placement, avoiding any damage.

- Coupling of the Thermodynamic Block must be done with the supplied screws. Tightening of the screws must be done with a crosshead screwdriver, guaranteeing air-tightness.

The Hot Water Cylinder must be properly fixed in place at the moment the Thermodynamic Block is positioned, thus avoiding any slight drop in the unit, considering that there will be a centre of gravity dislocation.

5.4 Connections

The piping to be used must be of refrigeration type seamless copper pipe (type Cu DHP, in accordance with ISO1337 standards and EN12735).

Piping Diameters		
Model	Aspiration Line	Liquid Line
Eco 200/300	3/8”	3/8”
Eco 200is / 300is / 500i	1/2"	3/8”

Tab 4. Piping diameter (aspiration and liquid)

Sanitary type copper must not be used under any circumstances.

The piping must be properly insulated with a flexible insulation sleeve made from (Armaflex type) elastomeric foam in order to prevent any possible condensation brought about by low temperatures in the liquid.

Panel Connection

Remove the protecting caps from the ends of the copper piping.
Place the end of the tube so that it is pointing downwards, cutting the pipe at the intended point, making sure to clean off any burrs (e.g. with a reamer).

Fig. 15 Cleaning off burrs (reaming)

Next, remove the covers from the panel connections, and with the aid of a cutting tool such as a penknife, remove 5 cm of the thermo-retractable sleeve.

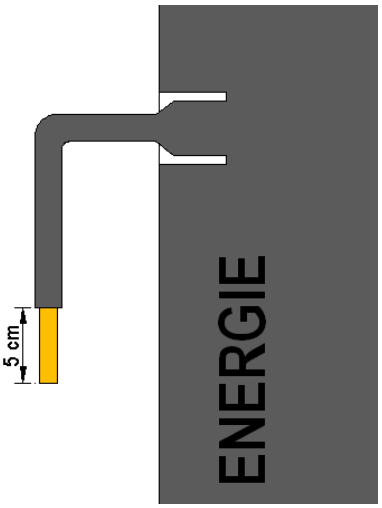


Fig. 16 Removal of thermo-retractable sleeve

A 3/8” piping expansion area must be made, with the aid of an appropriate tool, for proper connection to the panel.

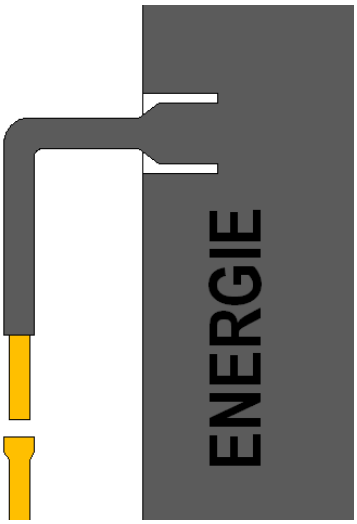


Fig. 17 Piping expansion (3/8”)

Line up the liquid and Aspiration tubes, but before commencing the welding operation, make sure to protect the thermo-retractable sleeve by using a damp cloth.

The type of solder recommended for welding the pipes is type oxyacetylene

(Oxygen/Acetylene). Other types of gases can also be used, such as propane for example.

After carrying out the panel connection welding operations, but before installing the Thermodynamic Block, make sure the apparatus has been cleaned with nitrogen, denominated as ***nitrogen sweeping.***

For installations with two or more panels, it is essential that the refrigerant fluid is homogenously distributed ***(Panel entry).*** The equipment already comes installed with a ***liquid distributor*** so that this process can be accurately put into effect.

Fig. 18 Liquid distributor

This distributor is placed between the two panels. The panel connecting pipes (1/4") must be exactly the same length, their extremities connecting directly to the panels.

The same level of pipe symmetry exactness is not required in relation to the Aspiration connections ***(Panel exit)***. This must be done by "denting" or with a "T" connection (in accordance with the following image), being properly insulated.

The entrance of piping into the building shall be finished to guarantee total resistance against rain and moisture.

Fig. 19 Aspiration Line

Thermodynamic Block Connection

After coupling of the thermodynamic block to the Hot Water Cylinder with the 12 M10 screws, the thermodynamic block is then ready for accepting the refrigerant connections.
Some of the steps to be taken are repeats of the procedures panel connections that have been already made.

Cut the pipe to the required measurement with its end facing towards the ground. Clean off any burrs.

Welding of the pipes to the thermodynamic block must respect the corresponding connections, being properly identified.

5.5 Nitrogen Load

After the connections have been made it is necessary to make sure that there are no leaks. To do this, a nitrogen ***12 bar*** connection must be fitted to a Aspiration pipe.

Cover all of the connections in soap foam, check for bubbles and whether the manometer pressure stays at a constant level.

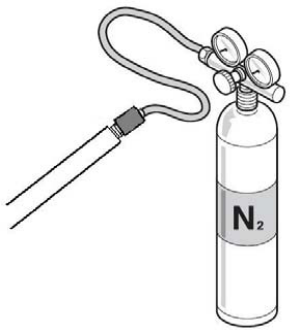
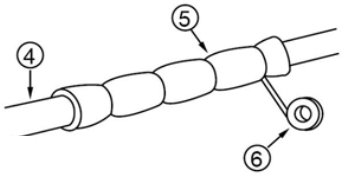


Fig. 20 Nitrogen Connection

After ensuring there are no leaks proceed to the proper welding insulation process.



4 - Pipe
5 – Pipe Insulation
6 – Insulating Tape

Fig. 21 Insulation of the Connections

5.6 Vacuum

An installation vacuum process must take place before supplying the refrigerant fluid. The purpose of the vacuum process is to remove all of the existing air and humidity in the circuit.
The duration of the vacuum process must be approximately 1 hr 30 minutes, being carried out via the two supply pipes situated on the Aspiration line (next to the compressor).

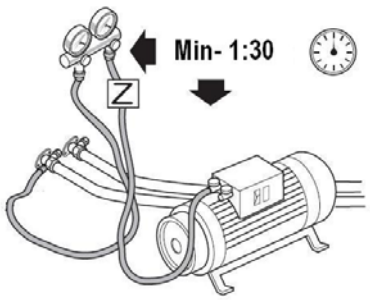


Fig. 22 Vacuum process

Once the vacuum process has terminated, close the vacuum pump valves. The vacuum manometer must have exactly the same indication levels after the pump has been stopped, thus assuring that the installation has maintained the vacuum level and is ready for the supply of refrigerant fluid.

5.7 Fluid Load (R134a)

It is necessary to make sure the compressor is turned off before the fluid load process takes place.

The introduction of fluid is done through the compression pipe.

The quantity of fluid to be introduced is based on the system and is in accordance with the following chart:

Model	Fluid Load (g)
Eco 200/300	1100*
Eco 200is / 300is / 500i	1400*

*NOTE: These figures apply for distances of up to 12 metres; otherwise consult our technical department.

After carrying out the respective fluid supply you must wait for a minimum of 15 minutes for pressures to balance. System start-up may take place after this period of time.

5.8 System Start-up

The solar system commissioning is assured providing that all installation instructions have been properly respected. Increasing water temperature from 10° C to 55° C will vary between 4 to 8 hours, depending on weather conditions and type of installation.

It is always possible to do a tune of thermal expansion valve to adapt the system to a suitable outside weather conditions by the temperatures extrapolation method.

Fill the Hot Water Cylinder with water and purge the existing air, opening a hot water tap/faucet.

Check if the valves are properly working and if the system is filled with fluid.

There aren't any failure problem when starting the system under frost conditions.

To conclude the installation process it is necessary to connect the electrical cable to the 230V plug socket, securing the control panel with two M6 screws.

To turn the apparatus on, press the general ON/OFF button (1) on the control panel. Afterwards, press the ON/OFF button on the Solar System (2). The display must give information that the system is operational (ON). Heating up of the water will now begin.

The solar system is equipped with an electrical resistance heating process in case of any eventual system breakdown. If it is necessary to use this function, press the Electrical Support (3) ON/OFF button on the command panel and the water will be heated via electrical resistance.

5.9 System Decommissioning

At the end of the product lifetime, decommissioning of the system should be undertaken by an installer or suitable qualified plumber and / or electrician (if required). All materials used in this product can be passed to your local material recycling centre for disposal - refer to local council regulations for details.

6 CONTROL PANEL

You may start up the Eco if all instructions have been accomplished. The rise up of the water temperature from 10ºC to 55ºC may vary between 2 and 10 hours depending on the model of the solar system and the outside conditions.
The command panel is an interface between the user and the equipment and you may have information about the working of the solar system.

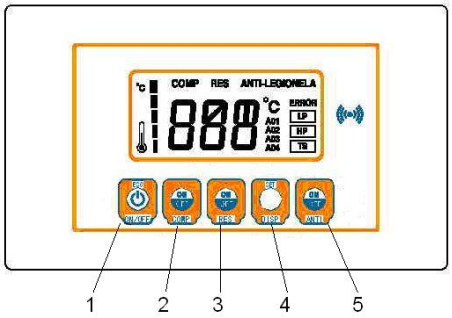
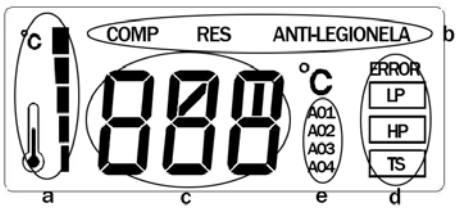


Fig. 23 Control Panel

Nº	Button	Name	Function	Display
1		ON/OFF Button	Allows the user to switch power ON or power OFF. If you press this button the display present the following information:	
2		ON/OFF Button for the Solar System	Works for turning the power ON/OFF only for the compressor. It has a one-minute delay before turning the system OFF, between that time the word ON will blink on the screen.	
3		ON/OFF Button for Electrical Backup	This shall only be turned on an emergency situation to ensure hot water to the user in case of a system malfunctioning.	
4		Programming Button (Factory Only)	This allows the modification working parameters. Do not use this unless you are a trained technician otherwise you could damage the solar system that will result in guarantee lost.	
5		Anti-Legionella Button	Activate the anti-legionella program. This will rise up the temperature of the water until 65ºC. Only turn ON this program if you do not predict to have any water consuption on the next 8 hours.	



Legend
a- Temperature
b- Output ON
c- State of the System (OFF, ON, ALM)
d- Errors
e- Factory Parameters

7 ANOMALIES / CAUSES / SOLUTIONS

ANOMALY	CAUSE	SOLUTION
The water is cold and the compressor does not function. *(Display shows no information)*	System turned off	Verify the presence of 230 V A/C at system input source. Check that the system is turned on. Make sure electrical cabling is not disconnected.
The water is cold and the compressor does not function. *(Display shows no information)*	Protection system activated Condenser is covered with lime	Check electrical protection (the Fuse). Check for Low Pressure breakdown ("LP" Error). Carry out effective cleaning.
Cold or lukewarm water, but compressor is functioning.	Excessive water consumption Alteration in electronic parameters Refrigerant fluid leakage	Wait for Thermal Charging to occur. Substitute the electronic panel. Detect and repair the leak.
The compressor periodically stops and starts	Badly connected voltage input Refrigerant fluid leakage Condenser is covered with lime	Check voltage feed (230 V). Detect and repair the leak. Carry out effective cleaning.
The display do not present any information	Lack of power Safety thermostat ON	Check if there is power supply. Check the electrical cables connection for the control panel. Check the system fuses. Rearm the safety thermostat
LP Error on display: 	Fluid missing in the solar panel circuit Outside temperatures too low	Turn ON the electrical backup if needed. Every time that a LP error occurs the system will have a 20 minutes delay, during that period the word "ON" shall blink in the screen.
The display presents the word: 	Solar system is shut down	Press the ON/OFF button for the solar system
The display presents the following information but the water is cold: 	Power supply malfunction Excess of water usage	Check the fuses. Wait for the water to warm up

Technical Support Notes:

Technical Support Notes:
- Melted Compressor fuse; start-up condenser capacity must be checked.
- Melted RES fuse; the possibility of a short-circuit must be verified (e.g. electrical resistance).
- Safety thermostat operational; electronic panel parameters must be checked.

8 MAINTENANCE PROCEDURES

Magnesium Anode

The purge of the anode must be open in order to check it state.
If the magnesium anode is letting water pass it will be necessary to change it. The time PERIOD between changing the anode is always dependent of the water quality in each location. In areas with raised concentrations of soluble solids, the anode needs to be changed with less regularity, whereas in situations with low concentration, the anode needs to be changed with greater regularity. Therefore the magnesium anode state shall be checked at least one time per year.

Pressure Reduction Valve Filter

The following must be done for periodic (maximum once every two years) cleaning of the pressure reduction filter:

1. Close the passage of water from the network.
2. Turn in an anti-clockwise direction after relieving the spring's tension.
3. Draw back the lever/handle.
4. Remove the filter and clean it.

9 TECHNICAL DATA

System	200 / 300	200IS / 300IS / 500I	UNITS
Power Data			
Thermal Power	1690 – 2900	2800 – 4550	W
Absorbed Power	390 – 550	595 – 890	W
Electric Support Power	1200	2500	W
Compressor			
Type	Hermetic / Piston		
Noise Level	39	43	dB
Thermodynamic Solar Panel			
Material	Aluminium / anodised		
Quantity	1	2	
Dimensions	2000 x 800 x 20		mm
Max. Working Pressure	12 / 1,2		bar / Mpa
Test Pressure	15 / 1,5		bar / Mpa
Max. Temperature	120		ºC
Min. Temperature	- 5		ºC
Min. Exposure Temperature	- 40		ºC
Hot Water Cylinder			
Material	Stainless Steel (304L)		
Insulation	Polyurethane		
Max. Working Pressure	6 / 0,6		bar / Mpa
Test pressure	10 / 1,0		bar / Mpa
Max. Operating Temperature	90		ºC
Protection	Magnesium Anode		
Fluid			
Type	R134a		
Quantity (1)	1100	1400	
Connections (piping)			
Type	Copper		
Liquid Line	3/8”	3/8”	inch
Aspiration Line	3/8”	1/2”	inch
Electronic Panel			
Feed	230 / 50		V/Hz
Compressor Fuse	6.3 T	15 F	A
General Fuse	6.3 F	6.3 F	A

(1) Piping distance supply of up to 12 meters.

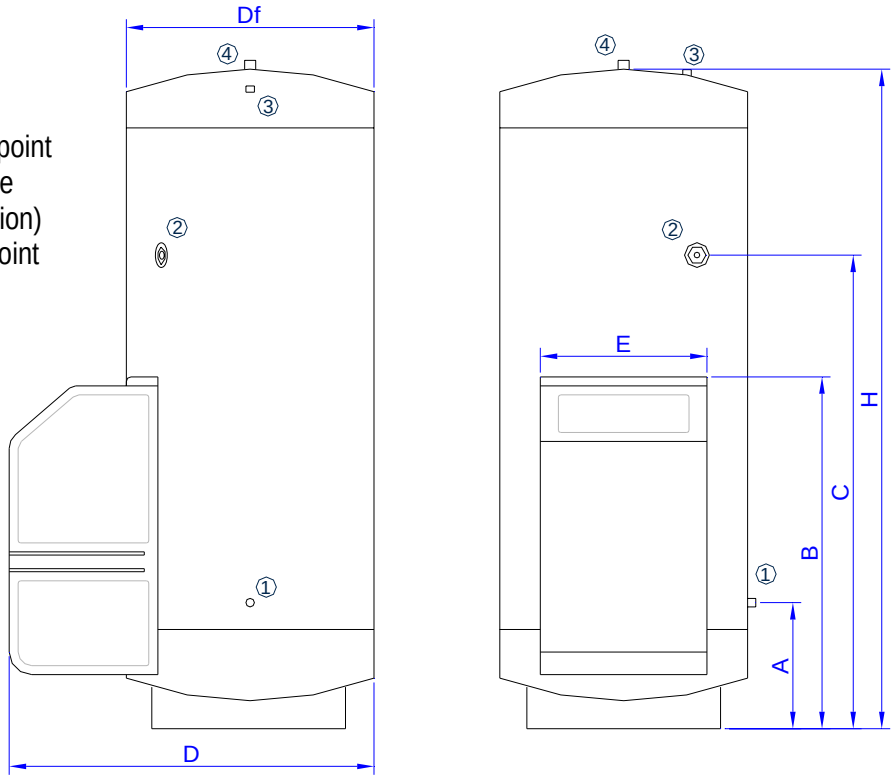
10 DIMENSIONS AND TECHNICAL SCHEMATICS

Technical Description

The hot water Hot Water Cylinder sits vertically above the ground. The tank is made out of stainless steel. The Hot Water Cylinder comes equipped with a hot water exit point, HWS return and an entry point for cold water. There is a flanged opening at the lower part of the Hot Water Cylinder for the fixing of the Thermodynamic Block. This Hot Water Cylinder comes equipped with a backup heating coil.

Casing
Thermal insulation is achieved by means of expanded polyurethane of 30 mm in thickness, (k=0, 0038W/mK).
The outer shielding is made from a (white) sheet of High Impact Polystyrene (HIPS).
Galvanic Protection
The magnesium anode (replaceable) is fitted with a purger, utilised simply to control the effective consumption of the magnesium bar.

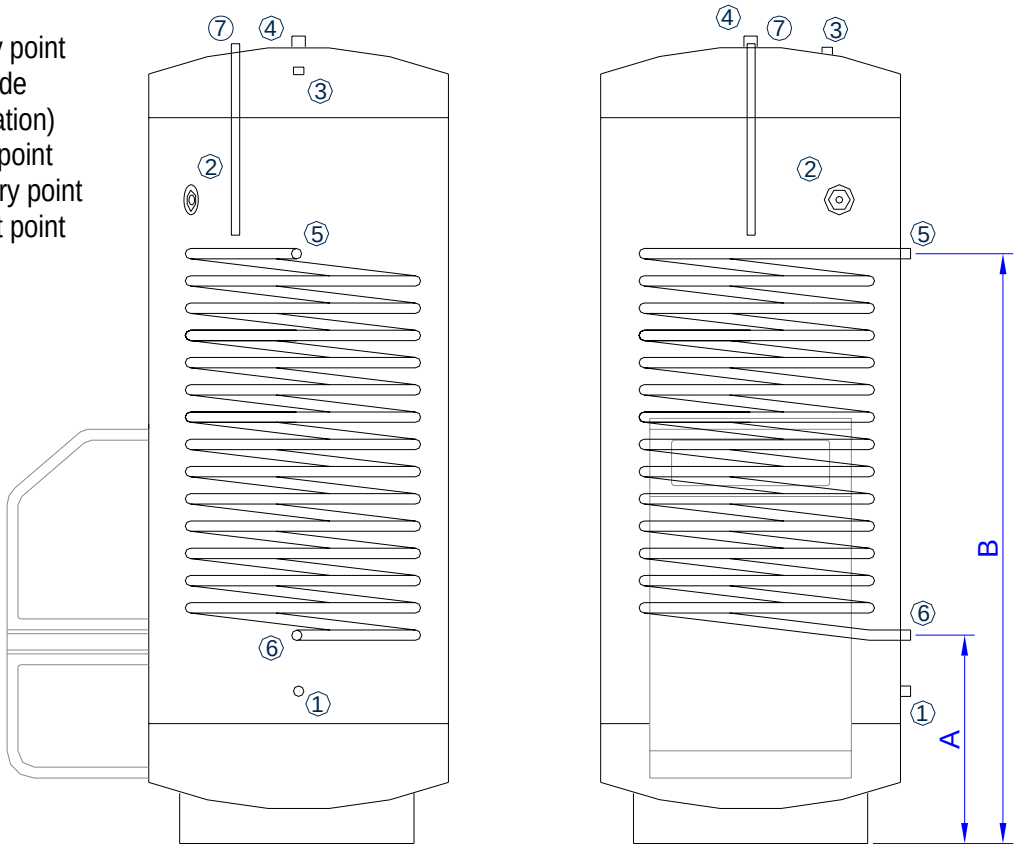
Connections:
1- Cold water entry point
2- Magnesium anode
3- Return (recirculation)
4- Hot water entry point



	Df	H	A	B	C	D	E	1	2	3	4
Model	mm							Female connection			
ECO 200	550	1270	260	730	900	800	370	3/4"	1"1/4	3/4"	3/4"
ECO 200IS	550	1270	260	730	900	800	370	3/4"	1"1/4	3/4"	3/4"
ECO 300	550	1630	260	730	1280	800	370	3/4"	1"1/4	3/4"	3/4"
ECO 300IS	550	1630	260	730	1280	800	370	3/4"	1"1/4	3/4"	3/4"
ECO 500	720	1650	260	780	1300	970	370	1"	1"1/4	1"	1"

Connections:

1- Cold water entry point
2- Magnesium anode
3- Return (recirculation)
4- Hot water entry point
5- Heating Coil entry point
6- Heating Coil exit point
7- Instrumentation



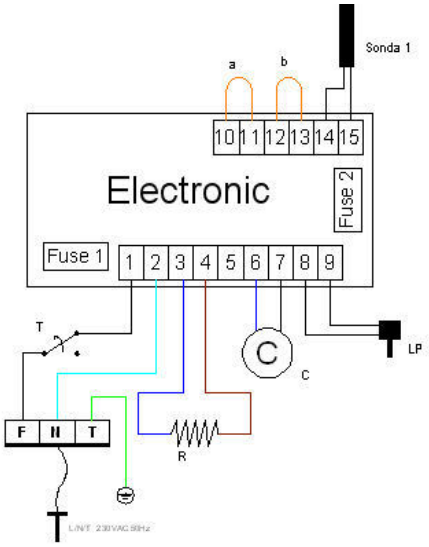
(a)- Main Circuit (Te=90ºC;Ts=80ºC); H.W.S. Circuit (Te=10ºC; Ts=60ºC)

	A	B	1	2	3	4	5	6	Heating Coil Heating Coil		
									Surface	Potential	
Model	mm		Female Connection						m_2	(a) kW	(b)
ECO 200IS	420	950	3/4"	1"1/4	3/4"	3/4"	1"	1"	0,64	18,6	9,3
ECO 300IS	420	1200	3/4"	1"1/4	3/4"	3/4"	1"	1"	1,32	38,4	19,2
ECO 500I	600	1100	1"	1"1/4	1"	1"	1"1/4	1"1/4	1,68	48,8	24,4

(b)- Main Circuit (Te=70ºC;Ts=50ºC); H.W.S. Circuit (Te=10ºC; Ts=60ºC)

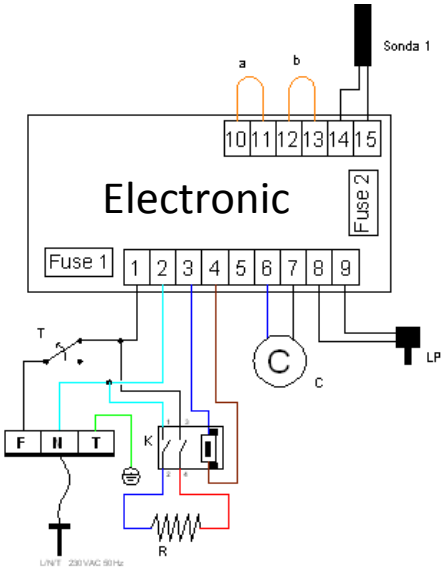
Electrical Schematic

ECO 200i / 300i



LEGEND
T - Safety Thermostat (75°)
C - Compressor
R - Resistance
LP - Low Pressostat
Sonda 1 = Temperature probe/lead
a, b = extra contacts
Fuse 1 = General Fuse
Fuse 2 = Compressor Fuse

ECO 200is / 300is / 500 i



LEGEND
T – Safety Thermostar (75ºC)
C – Compressor
R – Resistance
LP – Low Pressure Switch
Sonda1 – Temperature probe
a,b – extra contacts
Fuse 1 – Genreal Fuse
Fuse 2 – Compressor Fuse

Guarantee

This guarantee covers all defects to the confirmed materials, excluding the payment of any type of indemnity because of personal damage that may have been caused directly or indirectly to 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.

Hot Water Cylinder	Solar Panel	Thermodynamic Block
3 Years: Stainless Steel 2 Years: Enamelled Manufacturer Guaranteed	5 Years Against Corrosion	2 Years

Guarantee Exclusions

The guarantee 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 unauthorised technicians, has the appearance of modifications and/or if the series number appears to have been removed or erased.

Further exclusions from guarantee:

- Hot Water Cylinders have been operating in Water with the following indexes:
  - Active chlorine > 0.2 ppm.
  - PH < 6 (Sorensen scale at 25° C).
  - All water has a value greater than the VMA, by decree – law 74/90
- Parts are subject to natural wear and tear – levers, switches, resistances, programmers, thermostats, etc.
- Breakdown due to shock or transportation, electrical discharges, flooding, moisture, or by improper use of the apparatus.
- The guarantee lapses if it is transferred to another owner, even if within the guarantee period.
- The guarantee 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, even within the guarantee period, shall be paid 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.

NOTE: This sheet should remain with the manual, for the customer. The following sheet must be filled in together with the Control Slip and must be returned to ENERGIE LDA, otherwise the guarantee will not be valid.

Date : _____/_____/_____ Installer Stamp and Signature :