

Thermoelectric Generator

ECO ENERGY SYSTEM
ZEUS150



USER MANUAL ZEUS150 CD

Power Supply: Diesel



IMPORTANT

You can obtain the 3 (three) year warranty extension by registering the product for free on support.mobiltech.it
More information can be found in chapter 5 of this manual.

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1. Introduction

Thank you for purchasing a Mobil Tech product. With the Zeus150 thermoelectric generator you have a system capable of charging the batteries of your vehicle, regardless of the availability of external electricity or weather conditions.

Installation and commissioning must be performed by specialized personnel only, using a dedicated Installation Manual. This User Manual describes all the steps to be taken only for normal system operation.

1.1 Usage rules

Zeus150 can be installed on campers, caravans and trucks and it's able, when the vehicle is parked, to charge the vehicle's batteries in a silent and ecological way, using only the fuel present in the vehicle's tank.

Use other than intended is not allowed.

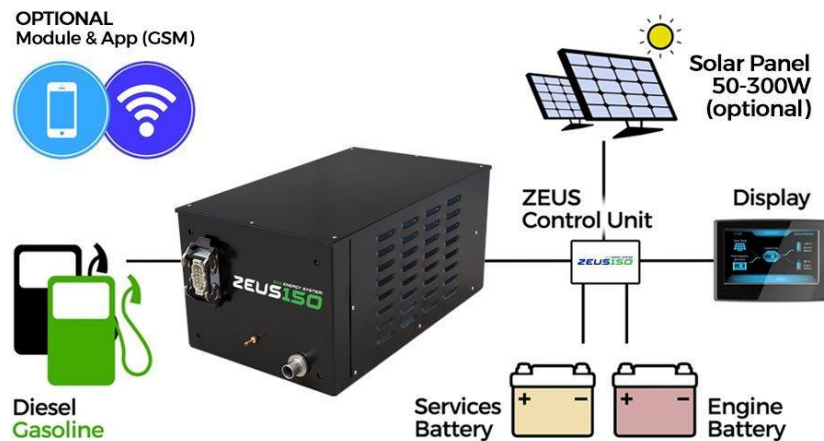
During installation and normal operation, the following instructions must be observed:

- Installation must be performed by qualified personnel only
- Usage is allowed in open places only
- Use only the prescribed fuel
- It is not allowed to make any change to the system, deleting or inserting other types of components

- The use of components other than the original ones is not allowed
- The product does not require user maintenance. Maintenance operations must be performed by qualified personnel only
- In case of doubt, contact the manufacturer or a qualified installer

1.2 Basic operating principles and general indications

The basic operating principle of the system is shown below:



Zeus150 generator is able, using the vehicle's fuel, to charge and maintain charged both the engine and service batteries, in a silent and ecological way.

Zeus150 is able to supply 150Wh of typical power; it's able to manage also an optional photovoltaic panel, in order to obtain an integrated battery management system.

ATTENTION

NEVER disconnect for any reason the primary battery when the generator is working. The operation is very harmful because the cooling of the device will be lost, causing possible breakages due to overheating. Any incorrect operation is recorded in the device memory.

General notes regarding generator usage:

- The system has an integrated atmospheric pressure sensor, in order to adapt the combustion to air rarefaction variations, due to altitude and to climatic conditions; it is tested up to 3.000mt above sea level
- Basic operations have been designed in order to set the system in automatic mode or manual mode, for complete and efficient batteries management
- The system provides the management of optional photovoltaic panels
- The system offers manual operations and two programmable timers
- The system manages the recharge of the primary service battery at 12V (mod. Z150CD12) or 24V (mod. Z150CD24) and the secondary 12V/24V one (engine).

The charging logic gives priority to the primary battery but meanwhile the secondary is monitored and recharged in case of need

- The primary battery is recharged using the parameters related to the temperature of the containment compartment. It is possible to force a priority charging of the secondary battery
- If the display is not touched for 3 minutes, it switches off automatically while keeping the set functions unaltered. To turn it on again simply touch the screen
- If manual mode, after 30 minutes of inactivity the system automatically goes into stand-by mode to reduce electrical consumption. When switched on again, it may take a few seconds to restore communication with all components
- The generator switches off automatically 3 minutes after the ignition of the vehicle engine. Within the first 3 minutes there is the possibility to force the generator working status confirming the popup message on the display
- Use only batteries of type PB / AGM / GEL and LiFeP04, selecting the correct charging algorithm from the control unit.
- Recommended capacity: from 70 to 400Ah. Do not use old batteries in any circumstances, as they could cause the Zeus150 generator not to work correctly
- In any moment is possible to check the status and characteristics of the batteries
- It is always possible to check the operating status of the system and all its components
- Do not wash the generator using a pressure washer
- The generator is not designed to work submerged in water or other liquids; in the event of flooding, the warranty becomes void and it is necessary to go to an authorized installer.
- The generator manufacturer is not responsible for battery status or incorrect selection of the type of batteries to be recharged

1.3 Fuel quality

Zeus150 generator works without problems with the diesel fuel normally available on the market used for the vehicle's engine. Addition max. of biodiesel available on the market according to DIN EN 590. In the winter months diesel fuel is adapted at low temperatures from 0°C to -20°C. In this way problems can arise only in the case of extremely low external temperatures - as well as in the vehicle engine - see the instructions of the vehicle manufacturer. In special cases and at external temperatures above 0°C the Zeus150 generator can also work with heating oil sec. DIN 51603 (from an additional tank).

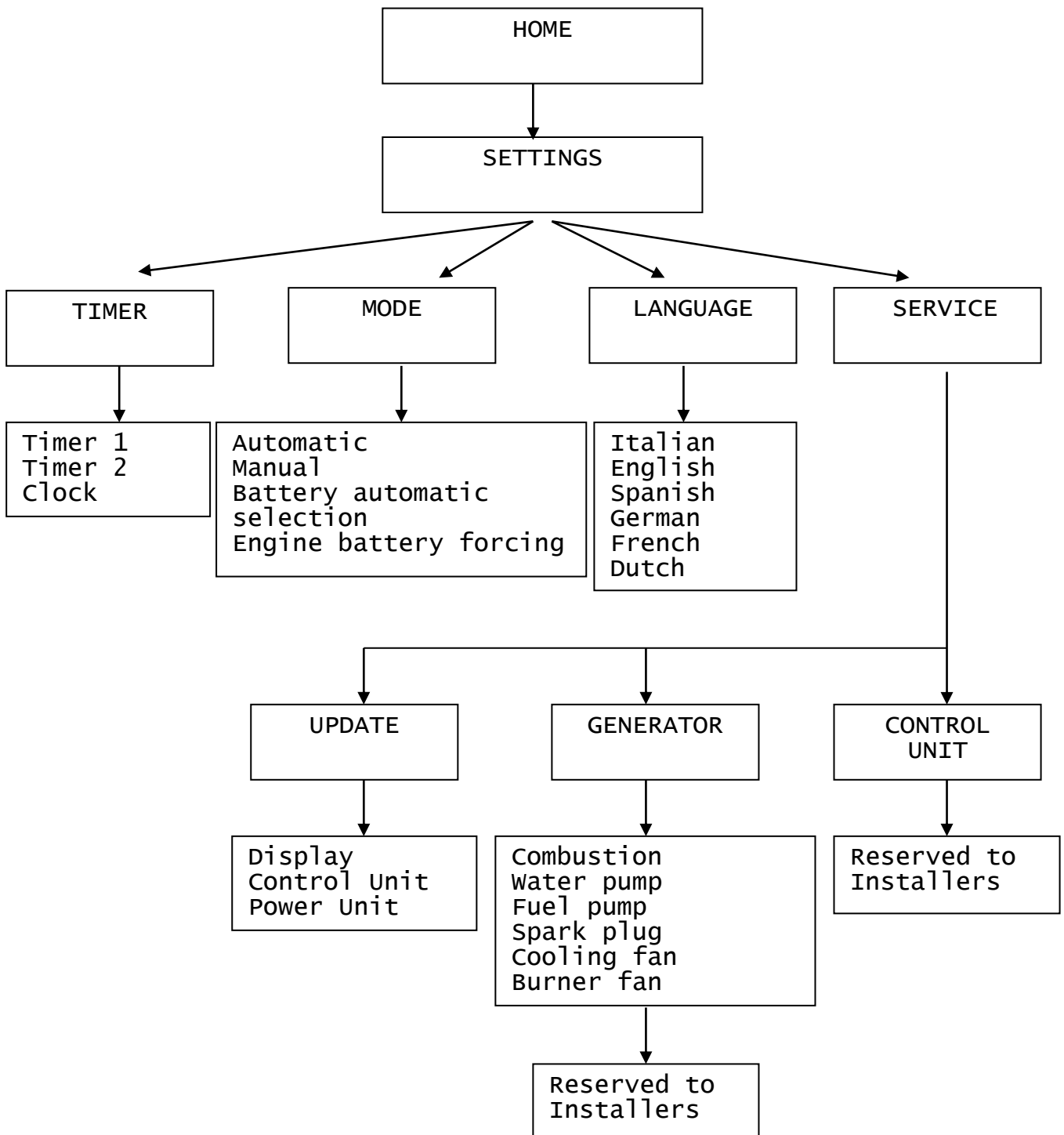
If the Zeus150 generator is powered from a separate tank, follow these steps:

- external temperatures higher than 0°C: use diesel oil sec. DIN EN 590 or heating oil sec. DIN 51603;
- external temperatures from 0°C to -20°C: use winter diesel sec. DIN EN 590;
- outside temperatures from -20°C to -40°C, use arctic gas oil or polar gas oil.

The addition of used oil is not allowed. After using winter diesel or diesel fuel for low temperatures, fill the fuel lines and the standard diesel fuel pump by running the generator for 15 minutes. The Zeus150 generators are not approved to work with bio-diesel according to DIN EN 14214.

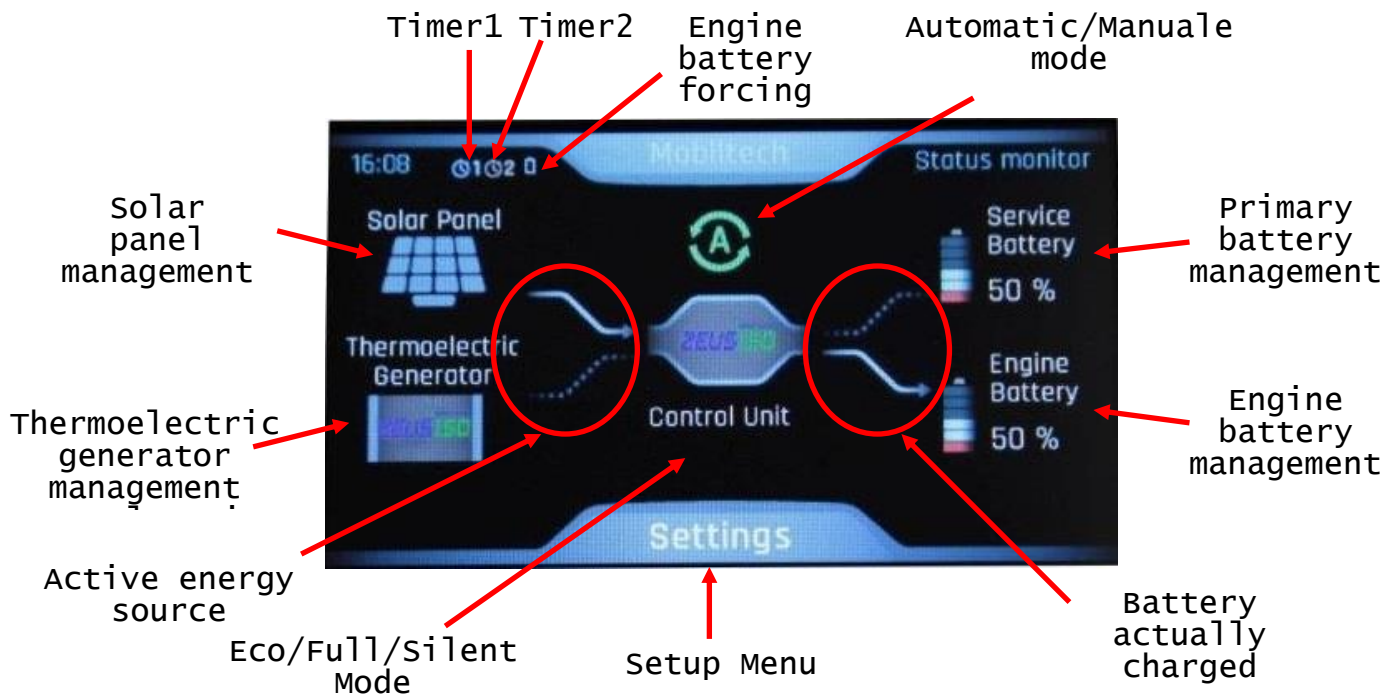
2 System control

The system is completely manageable through the functions of the control panel, divided into several menus. In the figure below the menu structure is shown



2.1 Main Menu - Home

The Home Menu is shown in the following picture.



This menu shows the status of the system in terms of energy management. It clearly indicates which energy source is charging which type of battery. It shows the actual mode of operation (manual or automatic) the charge level of the batteries, the status of the timers, the activation or not of the "High-Mountain" function and the possible forced recharging for the engine battery.




General notes:

- The Mode can have three settings:

- **Silent**: optimizes the operation keeping the background noise low
- **Eco**: optimizes the production of electricity, consumption and noise
- **Full**: for maximum electricity production

Note: Full-Eco and Eco-Silent steps may take a few minutes, due to the need to dissipate excess heat compared to the mode chosen. It is therefore recommended to select the desired mode within the first 5 minutes after switching on.

- The operating mode icon can have the following forms:

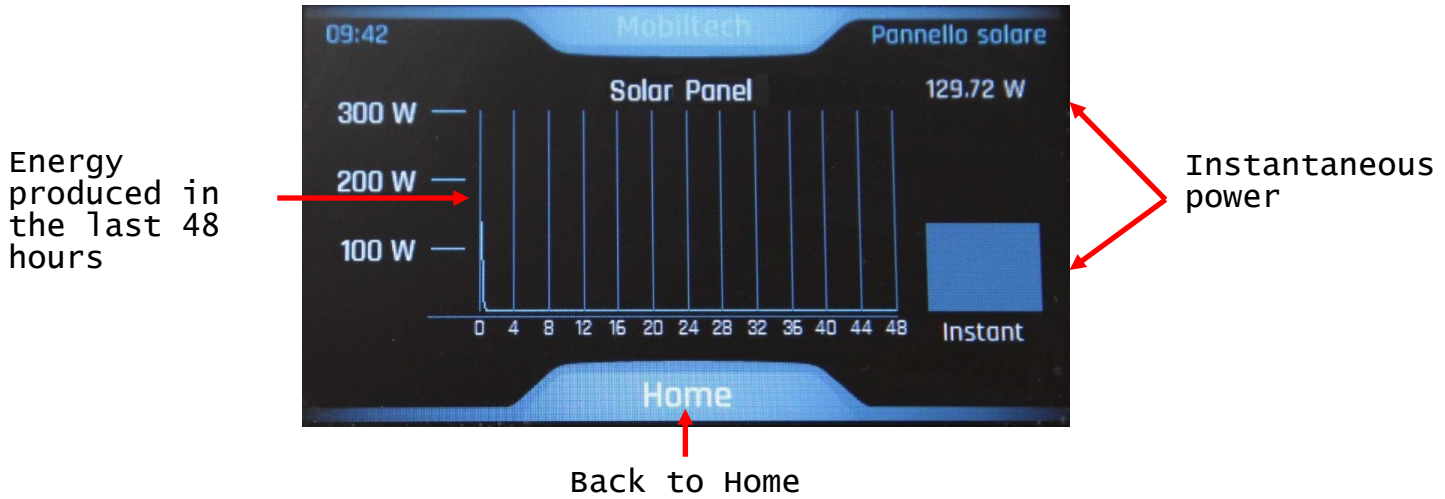
-  Automatic mode; the icon flashes when the generator is working
-  Manual mode; generator active
-  Manual mode; generator not active

- The solar panel icon will be on only if the solar panel is charging
- The blue arrows with a continuous line indicate which of the energy sources is in operation and which of the batteries is being charged
- For both batteries the percentage of remaining charge is displayed
- Timer icons are displayed only if the related timers have been set. Available only in automatic mode, the icons can have the following colors:
 - Blue: timer set and active
 - White: timer set but not active

2.1.1 Solar panel management



Pressing the solar panel icon, the screen display the Menu related to the energy supplied by the solar panel

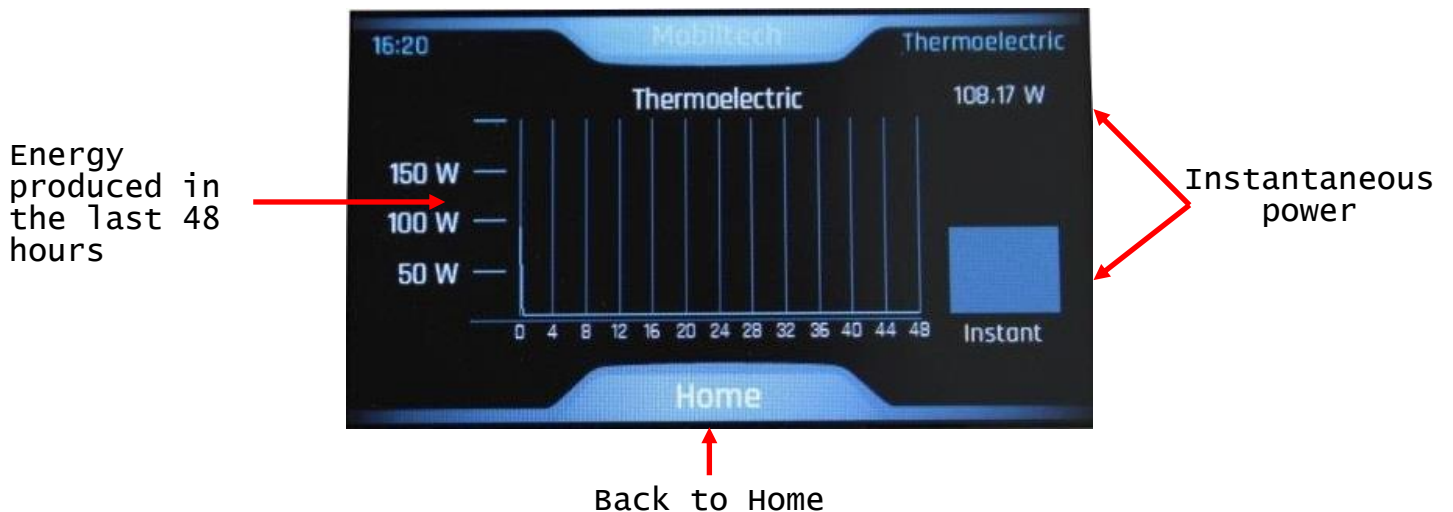


The graph shows the trend of the energy delivered by the solar panel over the last 48 hours. Touching the graph area, a zoom is performed in order to view the progress of the energy generation more accurately. On the right side is shown the energy produced instantly, both graphically and numerically.

2.1.2 Thermoelectric generator management



Pressing the generator icon, the screen display the Menu related to the energy supplied by the thermoelectric generator

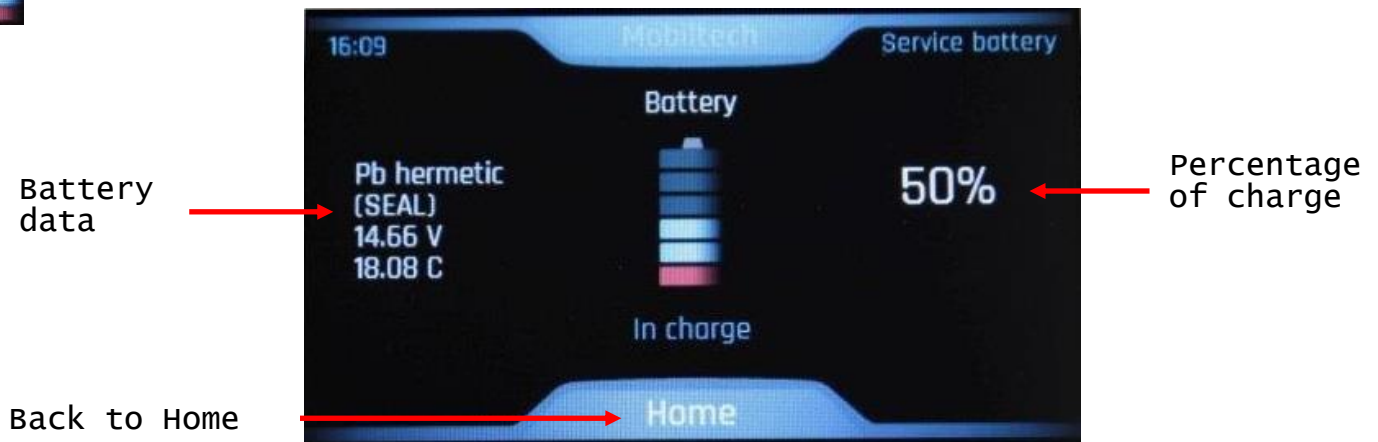


The graph shows the trend of the energy delivered by the thermoelectric generator over the last 48 hours. Touching the graph area, a zoom is performed in order to view the progress of the energy generation more accurately. On the right side is shown the energy produced instantly, both graphically and numerically.

2.1.3 Service battery



Pressing the service battery icon, the service battery menu is shown



The battery data is displayed on the left:

- Type
- Actual voltage
- Battery compartment temperature

The percentage of service battery charge is displayed on the right side of the screen

2.1.4 Engine battery



Pressing the battery icon, the engine battery menu is shown



The battery data is displayed on the left:

- Type
- Actual voltage

The percentage of engine battery charge is displayed on the right side of the screen

Note: the percentage of battery charge is not exactly the actual percentage, as it depends on several factors; the charging or discharging phase, the battery typical discharge curve and the efficiency of the battery itself. Furthermore, the data displayed is the average of the readings taken at the last minute, not the instantaneous one.

2.2 Settings Menu

The following figure shows the Settings menu



Pressing the "Home" area returns to the system main screen

2.2.1 Timer Menu

The following figure shows the Timer menu, that can be activated only if the automatic operation mode is selected



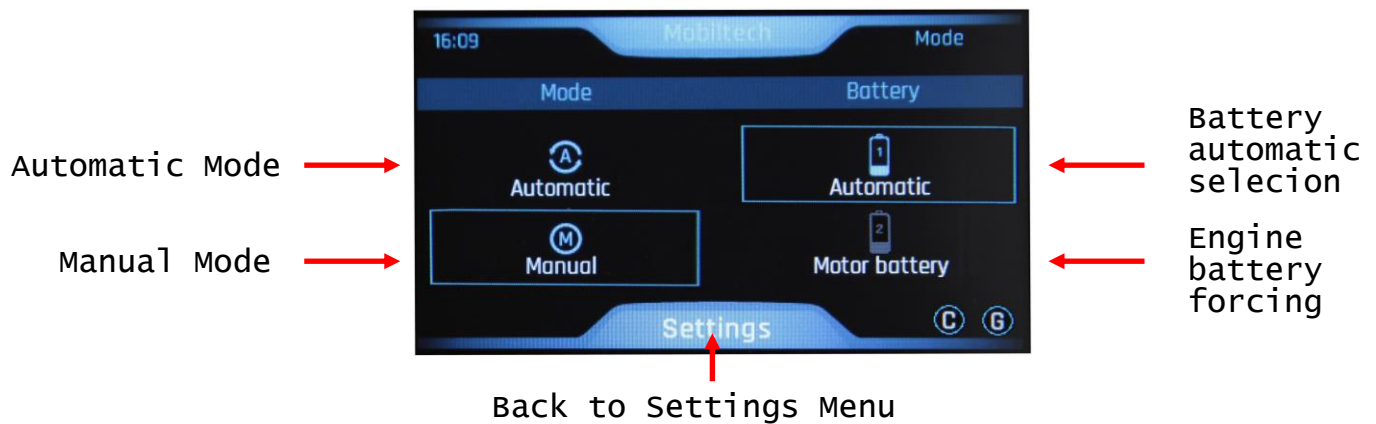
In this menu it is possible to activate, deactivate and adjust the on-off times of the two available Timers, as well as the internal clock. To set a timer, press the related time and make the desired adjustments in the central part of the screen. When the two timers are activated, the related icons on the main screen light up.

The settings made in this menu will be immediately active and saved when exiting the Timer menu.

With Timer on, the generator will be automatically activated, in the selected time range, only if the battery voltage drops below the minimum threshold.

2.2.2 Mode Menu

The following figure shows the menu related to the different modes of system operation.



➤ **Mode - Automatic:** this mode operates as follows:

Type	Power on	Filter	Power off	Filter	End of charge
Seal Pb	12,2V	For 3 min	14,2V or charge current <6A	For 3 min	After 5 min
Free acid Pb	12,2V	For 3 min	14,8V or charge current <6A	For 3 min	After 5 min
Lithium	12,8V	For 1 min	14,2V or charge current <3A	For 1 min	After 1 min

In case of 24V batteries turn on and turn off voltages will be doubled




• **Mode – Manual:** this mode operates as follows:

Power on:

- Pressing the icon  in Home Menu

Power off:

- Same as automatic mode or pressing 



- **Battery - Automatic:** in this case the priority is given to the charge of the primary battery (services) with respect to the engine battery. Nevertheless, the latter is constantly monitored and if its voltage falls below a minimum value it will be immediately charged



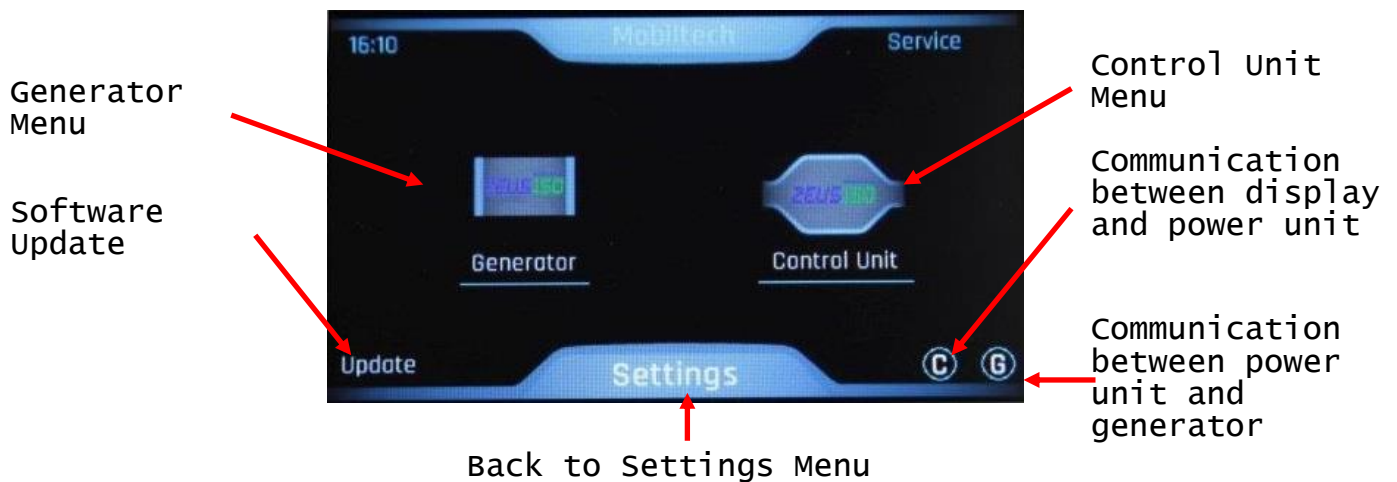
- **Battery – Engine Battery:** forcing engine battery charging; **to be used only in the event of an emergency in case the vehicle’s battery is too low.** By activating this function all the energy produced (over 150Wh) will be sent to the secondary battery (motor) in order to quickly recharge it. This function is automatically excluded after 6 hours or when the battery is fully charged. Once the secondary battery has been recharged, the system automatically switches to the primary battery (services). **Note:** In this mode the energy required for ignition and operation is taken from the primary battery. Before selecting this function, make sure that the primary battery is fully charged.

2.2.3 Language Menu

The following figure shows the menu related to the different languages for which the system can be configured.



2.2.4 Service Menu



In the above menu it is possible to activate the Service menus related to:

- Generator
- Control Unit (reserved for installers)
- Software update

The two icons at the bottom right display the status of communications between the different components of the system:

- C → communication between the display unit and the power unit
- G → communication between the power unit and the generator

Both of them have the same visualization mode:

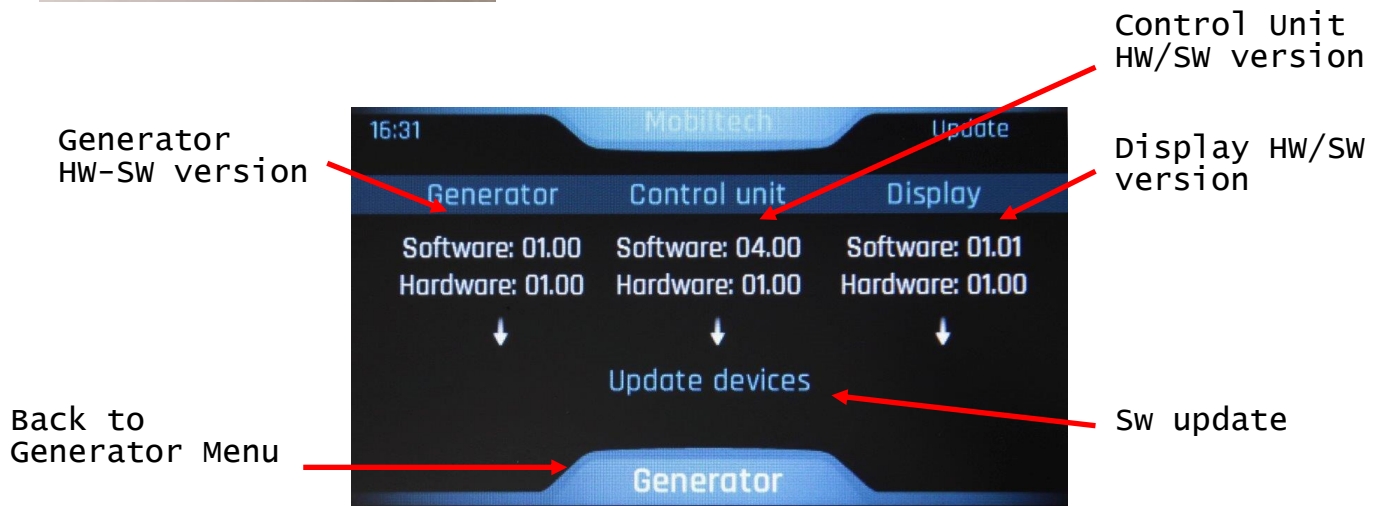
- Flashing blue → communication OK
- Red → communication error

2.2.5 Update Menu

In this menu is possible to update the software of the various components of the system, using the SW update packages available on the manufacturer site www.mobiltech.it

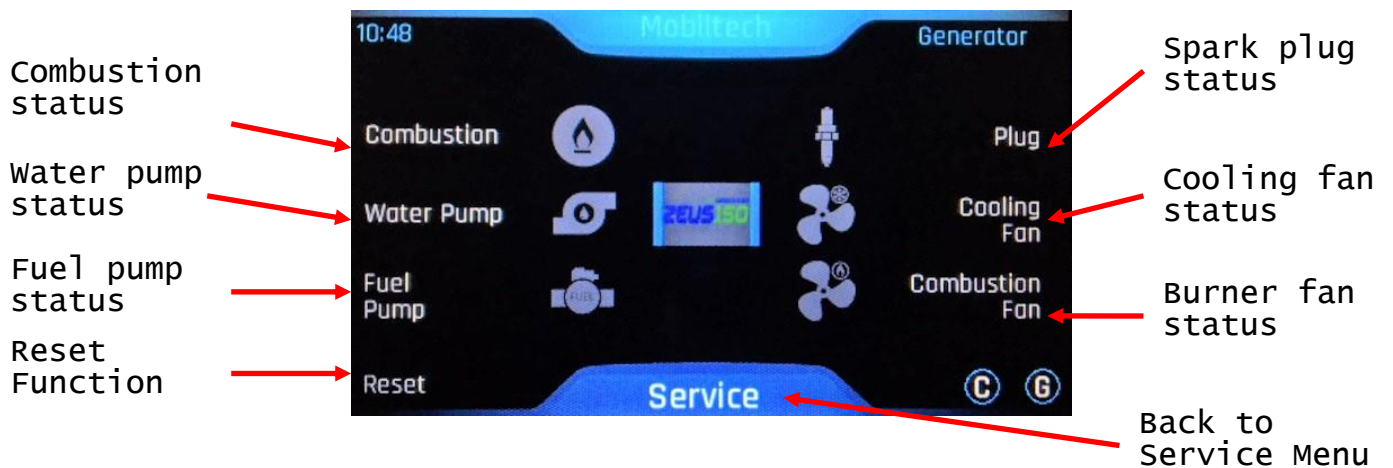


The update is performed by inserting a memory card with the new software package into the MicroSD slot. the instructions for programming the memory card are provided on the manufacturer site, as well as the updated software



2.2.6 Generator Menu

In this menu is possible to check the operating status of the generator components:



The icons shown in this figure can have on three different colors:

- Blue: working element actually active
- Gray: working element actually not active
- Red: failed element, error issued

In the event of an error signal, the error can be reset by pressing the relative icon for 3-5 seconds and waiting for another 5-10 seconds for the update and the checks performed by the system. It is possible to reset errors by pressing the reset button (see paragraph 2.2.7)

2.2.7 Reset Function

Use the reset button to reset all settings to factory state. All errors will be cleared and timers, models and management of the batteries will be reset.


3 System messages and fault table

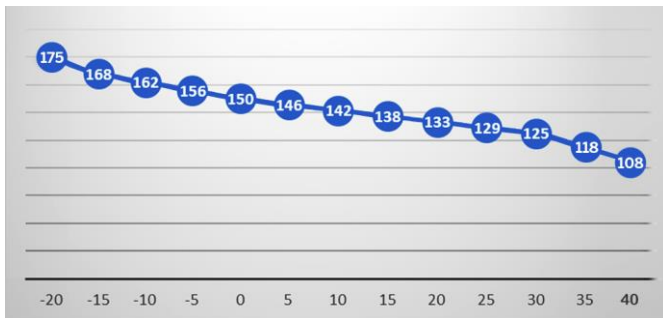
The following table shows the most common causes of errors, together with the possible cause and possible solutions.

Error	Possible cause	Possible solution
System does not power on	- No power supply	- Check the fuse on the charging unit - Verify that all cables are correctly connected
Low power production	- Battery charged - High outdoor temperature - Battery exhausted - Smoke temperature doesn't reach the correct working temperature	- Verify the production of electricity during the first recharge phase - Verify the production of electricity with lower temperatures - Replace the battery - Contact an authorized center for verification
Display shows "Service batt. low"	- Low voltage of service battery	- Power on the generator
Display shows "Service batt. overtemp."	- Service battery temperature too high	- Place the service battery in a more ventilated place
Display shows "Engine batt. low"	- Low voltage of engine battery	- Turn on the generator and force the charge on the engine battery - Switch on vehicle's engine, if possible
Display shows "Too low battery"	- Primary battery voltage too low. The generator may not be able to turn on	- Charge the primary battery - Switch on the vehicle's engine in order to raise the primary battery voltage and start the generator using the manual mode
Display shows "Charged battery"	- Correct voltage on the primary battery	- It is not needed to turn on the generator
Display shows "No communication"	- No communication between display, central unit and / or generator control unit	- Check cables and connections between the display, the charging unit and / or the generator
Display shows "Combustion error"	- Low tank level - Frozen fuel	- Refuel - Wait for the defrosting of the fuel - Contact an authorized center for verification

Error	Possible cause	Possible solution
Display shows "Burner fan error"	- Fault, obstruction or lack of connection to the burner fan	- Contact an authorized center for verification
Display shows "Fuel Pump error"	- Fault or lack of connection to the fuel pump	- Contact an authorized center for verification
Display shows "Cooling fan error"	- Obstruction on the radiator cooling fans - Lack of connection with the radiator cooling fans	- Remove any obstruction and clean the fans - Check cables and connections between cooling fans and generator
Display shows "Water pump error"	- Fault or lack of connection with water pump	- Contact an authorized center for verification
Display shows "Spark plug fault"	- Fault or lack of connection with the spark plug	- Contact an authorized center for verification
Display shows "Water overtemperature"	- Coolant temperature too high	- Wait for the coolant temperature to drop
Display shows "Water outlet probe error"	- Fault or lack of connection with outlet water probe	- Contact an authorized center for verification
Display shows "Water inlet probe error"	- Fault or lack of connection with inlet water probe	- Contact an authorized center for verification
Display shows "Fume probe error"	- Fault or lack of connection with exhaust gas probe	- Contact an authorized center for verification
Display shows "Low liquid level"	- Insufficient cooling liquid	- Top up the coolant using the special tank. ATTENTION: for the top-up use only specific cooling liquid
Display shows "Wait for cooling"	- Generator temperature too high to be able to perform a new ignition	- Wait for the system to cool down
Battery charges too fast	- Exhaust battery, not able to store energy anymore	- Replace battery
Battery does not charge	- One or more elements damaged; battery does not reach charge voltage level	- Replace battery

4 Technical data

Power Supply	12V model Z150CD12 24V model Z150CD24
Operating temperature	-20°C / +40°C
Dimensions and weight	Generator: 550x330x265 mm. 28,9 Kg Cooling system: 526x175x260 mm. 5,9 Kg
Battery types	Free acid, Pb Seal, LiFePO4
Fuel consumption	From 0,2 to 0,6 lt/h
Electrical consumption	Max (45 sec during power on): up to 15A Standby: with display on: 190mA with display off: 120mA 30 minutes after display switch off: 85mA
Max operating height	3000 mt above sea level
Standard EMC 	ECE Regulation R10 rev. 5 + A1 EN61000-6-1:2007 + EN61000-6-3:2007+A1:2011
Standard ENV (Cold A)	EN60068-2-1 (-15°C)
Standard acoustic tests	EN ISO 3744
Power supplied	150 Wh typical, see graphic below.



Note how the production of energy (horizontal axis) varies according to the external temperature (vertical axis). In addition, the system can be affected by other factors such as humidity, rarefaction of air due to altitude or atmospheric pressure and positioning of the cooling radiator.

P.S.: data subject to change without notice and without changing functionality

5 Warranty

The Zeus150 generator is covered by a two-year warranty, which can be extended to 3 (three) years by registering the product on support.mobiltech.it
Warranty conditions are available on www.mobiltech.it

6 Possible checks

Date	Hours of operation
Stamp and Signature	

Date	Hours of operation
Stamp and Signature	

Date	Hours of operation
Stamp and Signature	

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Date	Hours of operation
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7 Manufacturer



MOBIL TECH SRL

Via Don Luigi Sturzo, 1

20832 Desio (MB)

Tel: (+39) 0 362 544.928 Fax: (+39) 0 362 576.478

Internet: www.mobiltech.it Mail: info@mobiltech.it – service@mobiltech.it