

GECI™ GREEN DIAMOND CHARGER USER'S MANUAL

PLEASE READ CAREFULLY BEFORE OPERATING THE CHARGER OR BATTERY.

1. Installation and Service operations can be done by qualified personnel only.
2. To prevent the risk of electric shock, don't touch uninsulated portions of the Green Diamond Charger and the Battery.
3. Remove AC input before to disconnect the battery.
4. The charger is suitable for indoor installation, in ambients with abundant ventilation.
5. DO NOT use the charger near flammable materials.
6. DO NOT obstruct the ventilation slots and leave sufficient free space around the unit.
7. DO NOT expose the charger to liquids or excessive dust.
8. Check the conditions of cables and accessories on a regular basis, and replace them immediately if they get damaged.
9. DO NOT extend the battery cables. Replace them, if necessary, with cables of the same type, length, section and insulation as the original ones.
10. During the installation of the charger, make sure to connect the EARTH conductor properly, and respect all the applicable Safety Standards.
11. DO NOT modify any part of the charger. Any modification, applied without written authorization of the manufacturer, may generate unsafe operating conditions and will void the warranty.



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GECI™ GREEN DIAMOND CHARGER DESCRIPTION

The Green Diamond Charger has been designed to charge lead-acid motive batteries. This charger converts the AC input to DC, at the proper value to charge the battery.

The operation is completely automatic, and it's managed by a microprocessor based control system, composed by a Main Control Board, installed inside of the charger, and an optional wireless Battery Identification Module (WBM), that is permanently connected to the battery.

The exclusive power conversion system of the Green Diamond Charger is based on a new, patented, frequency multiplier circuit. This system offers very high electrical efficiency, near unity power factor and very low output current ripple.

These features determine a very high electrical efficiency of the entire motive power system (Battery + Charger), because all the losses of the charge/discharge cycle are minimized.

The exclusive charging curve of the Green Diamond charger allows to reduce the charging factor to the minimum value, so the duration of the overcharge/gassing phase and the average temperature of the battery are minimized.

The Green Diamond Charger is suitable for Conventional and Opportunity charging applications. It's equipped with a built-in Real-Time Clock, which allows the user to program the desired start time of the day, the full charge time window and to schedule the weekly equalize cycles.

The Green Diamond Charger is able to monitor its performances and its energy consumption. It provides estimates of the energy savings, in the three fundamental formats:

- Total Energy Saved (kWh)
- Total Reduction of Greenhouse Gas emission (lbs of CO₂)
- Total Saving on Energy Bill (USD)

These information, and all the operating parameters of the charger are shown on the alphanumeric display.

In addition, it's possible to connect the charger to the Fleet Management System DoctorFleet.com, which allows to monitor the complete fleet through a WEB based interface, and to send automatic alarm messages and usage reports by email.

GECI™ GREEN DIAMOND CHARGER INSTALLATION

CONDITIONS OF USE:

- Temperature (operation): from 0°C to 50°C.
- Temperature (storage): from -20°C to 60°C.
- Relative Humidity: less than 75 %.

>>>ATTENTION!<<<

The GECI™ Green Diamond Charger can be installed by qualified personnel only

It's recommended to control that the AC input voltage available at the installation site has the right value, and that the power available is sufficient. The nominal AC input voltages that the charger can accept, and maximum input current and power are reported on the nameplate of the unit.

In order to prevent fires or electrical shock, don't expose the GECI™ Green Diamond Charger to rain or excessive humidity.

Don't use the GECI™ Green Diamond Charger near flammable gas, because it contains components (contactors) that may generate sparks during their normal operation.

Don't open the cabinet of the charger. Only qualified personnel can service the unit.

Allow adequate air flow inside of the unit, in order to prevent excessive heat buildup.

Don't install the unit near materials that may obstruct the air passages, near devices that may generate heat, under the direct sunlight or in presence of excessive dust or mechanical vibration.

CONNECTION OF THE AC INPUT:

The charger must be connected to the AC input using an adequate cable and plug, with disconnect switch and fuses.

The AC input wires have to be connected to the AC INPUT TERMINAL BLOCK, that is located on the internal panel, just under the AC input contactor.

Make sure to tighten the terminal block screws with the proper torque, and pull each wire separately in order to verify that they are mounted properly.

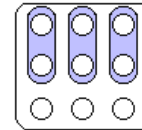
AC INPUT VOLTAGE SELECTION 208/240 OR 480 VAC:

The three-phase models may be configured for 208/240 VAC or 480 VAC nominal input voltage.

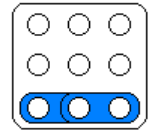
This selection can be done using the AC INPUT VOLTAGE PRESET BOARD 208-240 or 480 VAC, that is located at the center of the internal panel, near the terminal blocks for the AC input wires. In addition, it's necessary to adjust the AC input connection of the AUXILIARY TRANSFORMER to the proper AC input voltage.

- Disconnect the charger from main supply and battery.
- Remove the plastic protection over the AC INPUT VOLTAGE PRESET BOARD
- Remove the three metal bars.
- Place the metal bars in the required position, with ref to the following pictures.
- Tighten the nuts with the proper torque.
- Apply the plastic protection.
- Connect the charger to main supply.

SELECTION BOARD
IN POSITION
208-240 VAC



SELECTION BOARD
IN POSITION
480 VAC



AC INPUT VOLTAGE SETTINGS

>>>ATTENTION!<<<

The proper setting of the power transformer taps is very important for the correct operation of the GREEN Diamond chargers.

The **POWER TRANSFORMER TAPS** and the label with the list of the NOMINAL voltages that are available are located on the internal panel, in a central position. Depending on the charger model, the number of available taps may range from 3 to 5.

The following table is referred to the 3 taps version.

	SINGLE PHASE 208-240VAC	THREE PHASE 208-240-480VAC	THREE PHASE 600VAC
1	1x 240 VAC	3x 240 VAC --- 3x 490 VAC	3x 610 VAC
2	1x 220 VAC	3x 220 VAC --- 3x 480 VAC	3x 600 VAC
3	1x 208 VAC	3x 208 VAC --- 3x 460 VAC	3x 575 VAC

- Using an adequate AC-voltmeter, measure the value of the REAL AC input voltage available at the mounting location of the charger.
- Identify which of the NOMINAL voltage values is closest to the REAL measured value.
- For the singlephase units, the wires to be moved are the TWO that are connected to the AC contactor, marked with the letter "A".
- For the threephase units, the wires to be moved are the THREE that are connected to the AC contactors, marked with the letters "A", "B" and "C".

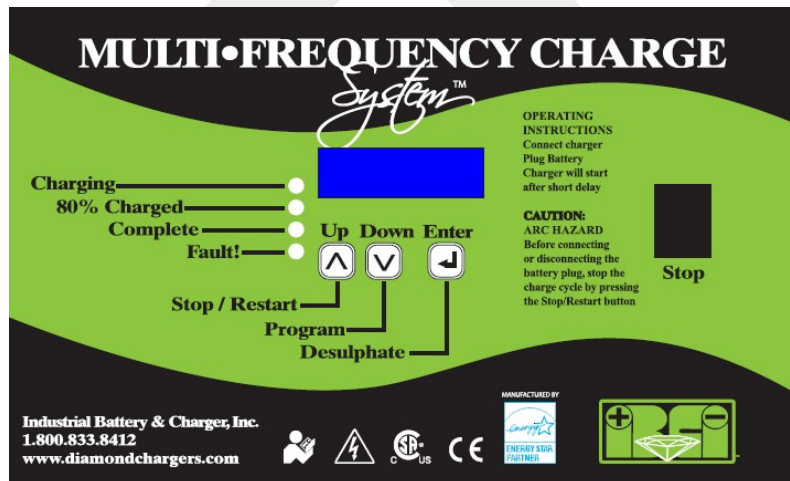
GECI™ GREEN DIAMOND CHARGER

PRELIMINARY PROGRAMMING

PRELIMINARY CONTROLS

Before to proceed with the programming sequence and before to connect a battery, make sure that the GECI™ Green Diamond Charger has been installed by a qualified electrician, according with the instructions reported in this manual. Before to use the charger, it's necessary to control that the ventilation slots are not obstructed, and that all the safety precautions reported in this manual are respected.

GECI™ GREEN DIAMOND CHARGER PROGRAMMING



GECI™ GREEN DIAMOND CHARGER STARTUP SEQUENCE

- 1 Turn on the charger by moving the main switch to position "1".
- 2 The charger will perform an automatic test of the control circuits, and will wait for a random delay on start.
- 3 The display will visualize the following messages.

>>>ATTENTION!<<<

Before to program the charger, disconnect the battery. This condition is necessary in order to activate the User Programming Mode. Only expert users should modify the settings of the charger.

GECI™ GREEN
DIAMOND

SYSTEM CHECK
PLEASE WAIT ...

SYSTEM READY
xxx V - xxx A

SYSTEM READY
DATE TIME

GECI™ GREEN DIAMOND CHARGER ACTIVATE PROGRAM MODE

HOW TO ACTIVATE USER PROGRAMMING MODE

- Press the button DOWN and keep it pressed for 3 seconds.
The display will show the message:
- Enter the Password UP-DOWN-UP-DOWN-UP
The display will show the message:

EDIT PASSWORD

HOW TO MODIFY A VALUE

- Scroll between the programmable values using the UP/DOWN buttons.
- In order to modify a value, press ENTER and keep it pressed for 2 seconds, until the cursor will start blinking over the value that can be modified.
- Modify the value using the UP/DOWN buttons.
- Confirm the modified value by pressing ENTER for 2 seconds, until the cursor will disappear. At this point the new value will be saved.

HOW TO RETURN TO NORMAL MODE

- Press the buttons UP and DOWN simultaneously.

PARAMETER A: NOMINAL OUTPUT VOLTAGE - (MANUFACTURER MODE ONLY)

Programmable values: 12-24-36-48-72-80-96-120 Volts

Default value: Nominal voltage of the charger

NOTE: This parameter should be changed only after replacing the control board of the charger.

PARAMETER B: NOMINAL CHARGING CURRENT - (MANUFACTURER MODE ONLY)

Programmable values: From 10 to 500 Amps

Default value: Nominal output current of the charger

NOTE: This parameter should be changed only after replacing the control board of the charger.

PARAMETER 1: GASSING VOLTAGE

Programmable values: from 2.35 to 2.50 V/Cell

Default value: 2.40 V/cell

NOTE: This charging algorithm of the Green charger is adaptive, so it's capable of adjusting the charging curve even if the gassing voltage of the battery deviates significantly from the programmed value. For this reason, this parameter should be modified only when using non-standard batteries, or if the operating temperature is extremely low or high. When a battery temperature probe (optional) is connected, the charger compensate the gassing voltage VS temperature of the electrolyte.

PARAMETER 2: MAXIMUM VOLTAGE

Programmable values: from 2.40 to 2.80 V/Cell, or DISABLED

Default value: 2.80 V/cell

NOTE: This parameter sets a maximum limit for the cell voltage. If this limit is reached, the charge is terminated and a specific error message is given.

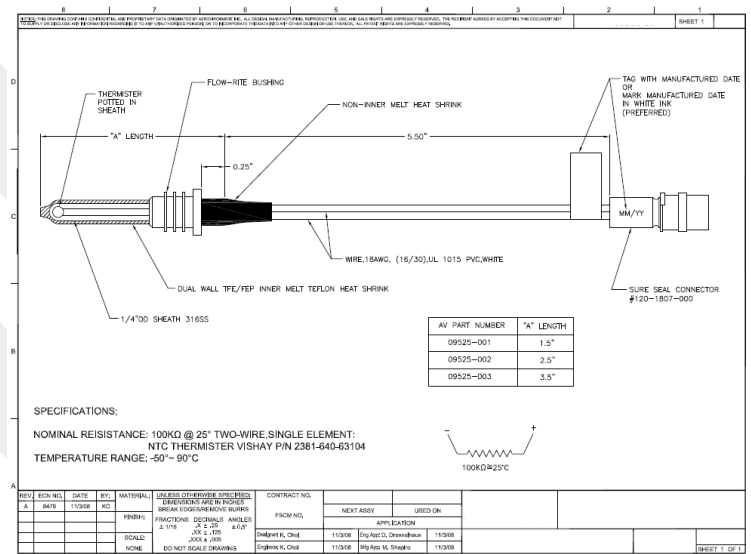
PARAMETER 3: MAXIMUM TEMPERATURE

Programmable values: from 115 to 160 F or DISABLED

Default value: DISABLED

NOTE: This parameter sets a maximum limit for the battery temperature. If this limit is reached, the charge is terminated and a specific error message is given.

This parameter works only if it is installed the temperature sensor probe. In this case the default settings is 140 F. When the charger read the temperature during the charging it applied a temperature compensation voltage



PARAMETER 4: PULSING MODE

Programmable values: A) HI (18% CONVENTIONAL) B) LO (25% OPPORTUNITY)

Default value: Usually specified at the order. If not specified, mode A).

NOTE: This parameter allows to adjust the finishing rate of the charger, depending on the matching Current VS Capacity. The proper setting of this parameter is useful to maximize the electrical efficiency of the system, and to minimize the temperature rise of the battery during the finishing charge.

In CONVENTIONAL charging applications, the charging current is generally set at ~18% of the battery capacity. In this case, the pulsing mode A) should be selected.

In OPPORTUNITY charging applications, the charging current is generally set at ~25% of the battery capacity. In this case, the pulsing mode B) should be selected.

PARAMETER 5: EQUALIZE INTENSITY

Programmable values: ULTRA LOW, LOW, MEDIUM, HIGH, ULTRA HIGH

Default value: LOW

ULTRA LOW 1 hour, LOW 2 hour, MEDIUM 3 hour, HIGH 4 hour, ULTRA HIGH 6 hour

NOTE: This parameter allows to adjust the intensity of the Equalize cycles.

In most of the cases the MEDIUM intensity works well, but sometimes it can be useful to modify this setting, depending on the status of the battery and on the operating cycle.

IMPORTANT: The battery will be equalized only during the programmed time window (See parameters 10 and 11).

If the Equalize time window is not set, or it's set too short, the battery will not receive a sufficient Equalize.

PARAMETER 6: DATE AND TIME

Programmable values: Day/Month/Year, Hour/Minute

Default value: Eastern Time (GMT-5)

NOTE: It's fundamental to keep the Real Time Clock set to the correct date and time, in order to use all the time base functions. It's necessary to adjust the Clock manually in Daylight saving time periods. The Charger calculates the Day of the Week automatically.

PARAMETER 7: START TIME WINDOW

Programmable values: from 2.40 to 2.80 V/Cell, or DISABLED

Default value: 2.80 V/cell

NOTE: This parameter sets a time window during the day in which the charger is allowed to start a new charge cycle.

If a battery is connected outside of this time window, the charger will remain in stand-by mode until the programmed Start time will be reached.

Once the charge cycle has begun, this time window is not considered anymore.

PARAMETER 8: FULL CHARGE / OVERCHARGE TIME WINDOW

Programmable values: From 00.00 to 23:59

Default value: From 00.00 to 23:59

NOTE: This parameter sets a time window during the day in which the charger is allowed to fully charge the battery. Usually, this parameter is used in opportunity charging applications, with the purpose of avoiding useless gassing of the battery during the opportunity charging cycles, and to program a daily full charge of the battery.

PARAMETER 9 AND 10: EQUALIZE TIME WINDOW

Programmable values: Any day, from 00.00 to 23:59

Default value: From SATURDAY at 12.00 to SUNDAY at 22.00

NOTE: These parameters set a time window during the week in which the charger is allowed to fully charge and Equalize the battery. It's recommended to set a minimum Equalize time of 12 hours after the normal completion of the charge cycle.

PARAMETER 11: COST OF ENERGY

Programmable values: 1 to 30 c\$/kWh

Default value: 10 c\$/kWh

NOTE: This parameter represents the average cost of the electrical energy. Typical values in the U.S.A., Canada and Mexico range from 5 to 15 c\$/kWh.

PARAMETER 12: kWh ENERGY SAVING

Programmable values: Not programmable. Can only be reset by the user.

Default value: Zero.

NOTE: This parameter represents the TOTAL estimated energy saving achieved by the Green charger, starting from the last reset. This parameter can be used exclusively to RESET this counter to ZERO.

PARAMETER 13: CO2 REDUCTION

Programmable values: Not programmable. Can only be reset by the user.

Default value: Zero.

NOTE: This parameter represents the TOTAL estimated reduction of CO2 (greenhouse gas) achieved by the Green charger, starting from the last reset. This parameter can be used exclusively to RESET this counter to ZERO.

PARAMETER 14: ECONOMIC SAVING

Programmable values: Not programmable. Can only be reset by the user.

Default value: Zero.

NOTE: This parameter represents the TOTAL estimated energy COST saving achieved by the Green charger, starting from the last reset. This parameter can be used exclusively to RESET this counter to ZERO.

PARAMETER 15: LANGUAGE

Programmable values: ENGLISH, FRANCAIS, ITALIAN

Default value: ENGLISH

NOTE: Display language

PARAMETER 16: LOCAL USB - RESET/TEST WIRELESS - WIRED NET

PARAMETER 17: ADDR. WIRED LAN

Programmable values: 1 to 254

Default value: 1

NOTE: This parameter sets the IP address of the charger, when it's connected to a wired DoctorFleet.com management network.
DoctorFleet function. [Ref. DoctorFleet user manual]

PARAMETER 18: BATT ID. MODULE

Programmable values: Enabled, Disabled, Optional

Default value: Disabled

NOTE: This parameter sets the operation of the charger with the Wireless Battery Identification module WBM (optional).

THREE DIFFERENT OPERATING MODES ARE SELECTABLE.

ENABLED: When a battery is connected, the charger establishes a communication with the WBM and uses the information stored into the WBM to optimize the charge cycle.

Only batteries with WBM installed and properly configured will be charged!

DISABLED: The communication of the charger with WBMs is disabled, and any battery (with correct voltage) will be charged.

OPTIONAL: When a battery is connected, the charger tries to establish a communication with the WBM.

If a WBM is found, it's used to optimize the charge cycle and to add the battery ID tag on the charge history log.

If a WBM is not found, the battery will be charged anyway.

GECI™ GREEN DIAMOND CHARGER OPERATION

CONNECTION OF THE BATTERY, AUTOMATIC START

Connect the Battery to the charger, using a connector of adequate size. When the battery is correctly connected, the charger visualizes the following message:

BATTERY
CONNECTED

WIRELESS CONNECTION TO BATTERY IDENTIFICATION MODULE (OPTIONAL)

If the Battery Identification Module is enabled, a few seconds after the connection of the battery, the charger will try to establish a wireless connection. And the display will visualize the message:

BATT ID MODULE
SEARCHING . . .

When the wireless connection is active the charger is ready to start the charging cycle. The display visualizes the message:

BATT ID MODULE
CONNECTED

At this point, the battery information are transferred to the charger and are visualized on the display. The charger is now ready to start. Depending on the programmed start time window (Parameter 8), the charger may enter in stand-by mode, and the display visualizes the message:

DELAYED START
(hh.mm) A → (hh.mm) B

Where (hh.mm)A represents the real time at that moment, and (hh.mm)B represents the programmed start time.

When the charge begins, the display visualizes the message:

PREPARING
TO CHARGE

BATTERY VOLTAGE TOO HIGH

If the battery voltage is higher than a maximum threshold, the charge will not start and the display visualizes the message:

BATTERY VOLTAGE
TOO HIGH !!!

If this message appears, it's recommended to verify that the nominal battery voltage matches the nominal voltage of the charger. Probably a wrong battery has been connected.

BATTERY VOLTAGE TOO LOW

If the battery voltage is lower than a minimum threshold, the charge will not start and the display visualizes the message:



BATTERY VOLTAGE
TOO LOW !!!

If this message appears, it's recommended to verify that the nominal battery voltage matches the nominal voltage of the charger. Probably a wrong battery has been connected. It's also possible that the battery has been deeply discharged, bringing the voltage below the minimum value required for the automatic start the charge. In this case, it's possible to start the charge manually, by pushing the button DOWN for 5 seconds.

CHARGE CYCLE

When the preliminary controls are complete, the charge starts automatically, and the display visualizes the following information:

- Battery Voltage [Volt]
- Charging Current [Amps]
- Time of Charge [hours.minutes]
- Capacity Returned [Ah]

The Green Diamond Charger performs an exclusive charge cycle that is composed by stages at constant current and stages at pulsed current, with cool down pauses in between. The management of the charging curve is totally automatic.

Depending on the programming of the Full Charge time window (Parameter 9), when the battery approaches the gassing voltage the charger may suspend the charge (typical opportunity charge cycle). In this situation, the display visualizes the message:

Where (hh.mm)A represents the real time at that moment, and (hh.mm)B represents the beginning of the Full Charge / Overcharge time window.

During the cool down pauses, that are normally inserted during the gassing phase, the display visualizes the message "Cooling".



xx.x V Cooling
xxx Ah x x t

EMERGENCY STOP

If the battery doesn't reach the gassing voltage within a predetermined time, the charger will suspend the charge, and it will visualize the message.



EMERGENCY STOP
VGAS NOT REACHED

In this case, the charge cannot proceed, and it's necessary to disconnect the battery. It's recommended to control the battery for damaged cells.

AC INPUT BLACK OUT

If there is a black-out of the AC input, while the charge is in progress, the charger will shut down, while the charge parameters will remain in memory.

When the AC input will be recovered, the charger will restart the charge cycle automatically, and the display will show the message:



RESTART AFTER
POWER SUPPLY OFF

OVERCURRENT PROTECTION

If the AC input voltage is abnormally high and/or the AC input adjustments have not been done correctly (See Chapter "INSTALLATION"), the charging current may reach an excessive value.

In this case, the charger will suspend the charge, and the display will visualize the message:

CURRENT
TOO HIGH

The charge will not proceed, and it's necessary to disconnect the battery. It's recommended to control the AC input connections of the charger, as explained in Chapter 3 "INSTALLATION". It's recommended to verify the condition of the battery, as it may have one or more cells in short circuit.

AUTOMATIC STOP

The charger shuts down automatically when the charge is correctly complete, and it will visualize the message:

CHARGE
COMPLETE

At this time it's possible to disconnect the battery.

EQUALIZE CYCLE - AUTOMATIC (CLOCK MODE)

At the end of the charge, if the battery is left connected to the charger for a sufficient time, the charger activates the Equalize cycle automatically, based upon the programmed schedule.

If the charge cycle ends outside of the programmed Equalize time window, the charger remains in stand-by mode, and the display shows the message:

DELAYED EQUALIZE
DAY TIME

Where DAY and TIME represent the beginning of the programmed Equalize time window.

EQUALIZE CYCLE - MANUAL

During the charging of the battery the operator can scroll the menu of the display, and he can force a EQ manual cycle at the end of this cycle.

FORCE MANUA EQ
ENABLED

DESULFATION

The operator can every time interrupt the standard charging and enable with a easy procedure a special desulfation cycle. During the charging the operator can press Enter few seconds and the display shows a desulfation menu, in this menu the operator can select the time during of desulfation and the type of restart of desulfation, infact sometimes it is strategic important to complete a standard charging after a completed desulfation cycle.

REFRESH-MAINTENANCE

This function is useful to keep the battery in perfect condition when it's not used for an long period (weeks, months, ...).

It is sufficient to leave the battery connected to the charger. After a normal termination of the charge and the equalize cycle, the control board will activate the charger automatically for 15 minutes of refresh charge every day.

While the charger waits before to activate a Refresh cycle, the display shows the messages:

- Battery Voltage [Volt]
- Nr of Refresh cycles already given to the battery
- Total Time of Charge [hours.minutes]
- Total Capacity Returned [Ah]

xx.x V R.END NR
xxx Ah x.x t

During cycle Refresh, the display shows the same set of information that are visualized during the normal charge cycle.

DISCONNECTION OF THE BATTERY DURING THE CHARGE

>>>WARNING !<<<

DON'T DISCONNECT THE BATTERY DURING THE CHARGE. RISK OF EXPLOSION!!!

If it's necessary to disconnect the battery while it's being charged, press the button UP for five seconds, in order to stop the charger manually.

The charger will suspend the charge and the display will show the message:

MANUAL
STOP

At this time it's possible to disconnect the battery.

Eventually, the charge can be restarted, by pressing the button UP for 5 seconds.

GECI™ GREEN DIAMOND CHARGER ENERGY METERING AND HISTORY LOG

The GREEN DIAMOND charger is able to estimate the energy saving during the operation. While a charge cycle is in progress, the display shows the results relative to that cycle. When the unit is in stand-by mode (battery absent), the display shows the total values.

It's sufficient to push the buttons UP and DOWN, in order to visualize the following data:

- Energy Saving [kWh]
- CO2 Reduction [lb of CO2]
- Economic Saving [USD]
- Average Power Factor [%]
- Average Efficiency [%]

These data can be reset in User Programming Mode. Please refer to Chapter 4.

The internal memory of the GREEN DIAMOND charger contains a log of the last >200 charge cycles. More than 50 parameters are saved for every charge cycle.

The most significant parameters of the 50 most recent cycles can be visualized on the display of the charger, while the complete history log can be accessed and downloaded through DoctorFleet.com management system.

In order to visualize the 50 most recent cycles, it's sufficient to scroll the menu using the UP- DOWN buttons, and to press ENTER for 3 seconds in order to access the database.

The results of each charge cycle are represented on two pages. Use the UP-DOWN buttons to scroll between each record.

First page:

No VSTART VSTOP
Date and Time

Where:

- No = Number of cycle (1 is the most recent)
- Vstart = Battery Voltage at the connection
- Vstop = Battery Voltage at the end of the charge
- Date and Time = Date and Time of the BEGINNING of the charge

Second page:

Date and Time
ENDCODE Duration Ah

Where:

Date and Time = Date and Time of the END of the charge
ENDCODE = Charge termination code (30 different codes identify all the possible situations that determined the termination of the charging cycle, see next paragraph).
Duration = Total charging time
Ah = Total capacity returned to the battery

CHARGE TERMINATION CODES

GROUP 1: CHARGE COMPLETED

- 01 Charge completed successfully.
- 02 Charge completed successfully.
Equalize NOT executed because battery was disconnected.
- 03 Charge completed successfully.
Equalize started but not completed, because battery was disconnected during the cool-down time before the Equalize cycle.
- 04 Charge completed successfully.
Equalize started but not completed, because battery was disconnected while the Equalize was in progress.
- 05 Charge completed successfully. Maximum finishing charge time exceeded.
- 06 Desulphation cycle completed successfully.
- 07 Charge completed successfully.
Equalize completed successfully.

Refresh-Cycle NOT executed because battery was disconnected.
- 08 Charge completed successfully. Equalize completed successfully.
Refresh-Cycle started but not completed, because battery was disconnected while the Refresh was in progress.
- 09 Charge completed successfully. Equalize completed successfully.
Refresh-Cycle completed successfully.
- 10 Gassing voltage reached successfully.
Full charge NOT executed because time window Disabled.
- 12 Charge completed successfully. Equalize completed successfully.

GROUP 2: MANUAL STOP

- 11 Charge stopped manually, during a generic cooling state
- 20 Charge stopped manually, before to reach the gassing voltage.

- 21 Charge stopped manually, during the finishing charge.
- 22 Charge stopped manually, during eq.
- 23 Charge stopped manually, during refresh.
- 24 Charge stopped manually, during desulphation.

GROUP 3: BATTERY DISCONNECTED

- 30 The battery has been disconnected before the begin of the charge, while the charger was waiting for the programmed Start Time window.
- 31 The battery has been disconnected during the first part of the charge, before to reach the gassing voltage.
- 32 Successful Opportunity charging cycle.
The battery reached the gassing point, the charger entered in stand-by mode waiting for the Full Charge/Overcharge time window, and at that point the battery has been disconnected.
- 33 The battery has been disconnected during the finishing charge, while it was cooling between two charging pulses.
- 34 The battery has been disconnected during the finishing charge, while it was receiving a charging pulse.
- 36 Charge never started.
The battery has been disconnected while the charger was trying to establish a wireless connection with the Battery Identification Module (WBM).
- 37 Charge never started.
The battery has been disconnected while the charger was communicating with the Battery Identification Module (WBM).
- 38 Desulphation cycle NOT completed.
The battery has been immediately disconnected, at the beginning of the Desulphation cycle
- 39 Desulphation cycle NOT completed.
The battery has been immediately disconnected, before to complete the programming of the Desulphation cycle.
- 40 Desulphation cycle NOT completed.
The battery has been disconnected while the Desulphation cycle was in progress.

GROUP 4: EMERGENCY STOP

- 60 Emergency Stop!
Maximum voltage limit exceeded during first part of the charge, before to reach the gassing voltage.
- 61 Emergency Stop!
Maximum voltage exceeded during the finishing charge.
- 62 Emergency Stop!
Maximum voltage exceeded during the equalize cycle.
- 63 Emergency Stop!
Gassing voltage not reached within the predetermined time limit.

- 64 Charge never started.
Battery voltage was too LOW
- 65 Charge never started.
Battery voltage was too HIGH
- 66 Emergency Stop!
Maximum Current Limit Exceeded.
- 67 Emergency Stop!
Maximum voltage exceeded during the refresh cycle.
- 68 Emergency Stop!
Maximum temperature exceeded before to reach the gassing voltage.
- 69 Emergency Stop!
Maximum temperature exceeded during the finishing charge.
- 70 Emergency Stop!
Maximum temperature exceeded during the equalize cycle.
- 71 Emergency Stop!
Maximum temperature exceeded during the refresh cycle.
- 72 Emergency Stop!
When a battery is connected, the WBM communicate that the voltage of battery is not compatible with this charger
- 76 Emergency Stop!

Maximum temperature exceeded during desulphation.

GROUP 5: WARNING MESSAGES

- 80 Maximum finishing charge time (safety timer) exceeded. Charge termination criteria (dV/dt) not reached.
- 82 The battery has been disconnected while the charge was in progress, in a generic state.
- 83 Output fuse blown.
- 85 Communication problem with Wireless Battery Module.
- 99 Black out of the AC input.





WARRANTY

GECI™ GREEN DIAMOND CHARGER

Green Energy Concepts, Inc. (hereinafter called "GECI") warrants that each new and unused GECI battery charger, power supply or converter (hereinafter called "equipment") manufactured and supplied by it is of good workmanship and is free from any inherent mechanical defects, provided that (1) the product is installed and operated in accordance with generally accepted industrial standards and in accordance with the printed instructions of GECI, (2) the product is used under normal conditions for which designed, (3) the product is not subjected to misuse, negligence or accident, and (4) the product receives proper care, protection and maintenance under supervision of competent personnel. This warranty is subject to the following provisions:

1. PRODUCTS AND PARTS WARRANTED. Subject to the exceptions listed below each GECI equipment is warranted for a period of three (3) years from the date of its shipment, provided the charger is used in accordance with GECI's published performance rating or the unit involved. The Warranty covers parts, components and/or assemblies supplied completely free of charge but does not extend to labor, service, interventions and or any other costs whatsoever related to fixing defective chargers and/or parts. The conditions of this parts warranty are as follows:

- a. Primary switch contacts, fuses, bulbs and filters are not warranted unless found to be defective prior to use.
- b. Power transformers of 60Hz chargers are warranted for ten (10) years after GECI's shipment of the unit(s).
- c. The charger brand names that are warranted under this document are the Green, Red, Black and Orange Diamond.
- d. The Blue Diamond is handled separately and is not part of this warranty agreement.

2. COMMENCEMENT OF WARRANTY TIME PERIODS. The warranty periods shall commence on the date of shipment by GECI.

3. PERSONS COVERED BY WARRANTY. This warranty is extended by GECI only to the purchaser of new equipment from GECI or one of its authorized distributors. The products purchased under this agreement shall be used exclusively by the buyer and its employees and by no other persons, and therefore there shall be no third party beneficiary of this warranty.

4. LIMITATION OF REMEDY. The existence of claimed defects in any product covered by this warranty is subject to GECI's factory inspection and judgment. GECI liability is limited to repair of any defects found by GECI to exist or, at GECI's option, the replacement of the defective equipment, F.O.B. factory after the defective product has been returned by the purchaser at its expense to GECI's shipping place. Replacement and exchange parts will be warranted for the remainder of the original warranty or for a period of ninety (90) days, whichever is greater. GECI and its authorized distributors or dealers shall not be liable for direct or indirect, special or consequential damages in excess of such repair or replacement. In no event shall the purchaser be entitled to recover for contingent expenses resulting from, but not limited to, telephone calls, telegrams, travel expenses, lodging, duties and taxes, labor, rental or replacement equipment, loss of business or profits or other commercial losses.

5. USE OF DEFECTIVE PRODUCTS. Continued use of GECI equipment after discovery of a defect voids all warranties.

6. ALTERED EQUIPMENT. Except as authorized in writing, the warranty specified does not cover any equipment that has been altered by any party other than GECI.

EXCEPT AS STATED ABOVE, ALL OTHER WARRANTIES AND CONDITIONS, WHETHER EXPRESSED OR IMPLIED, INCLUDING IMPLIED WARRANTIES OR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY EXCLUDED. BASSI NEITHER ASSUMES NOR AUTHORIZES ANY PERSONS TO ASSUME FOR BASSI ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OR USE OF THE GOODS SOLD, AND THERE ARE NO ORAL AGREEMENTS OR WARRANTIES COLLATERAL TO OR AFFECTING THIS WRITTEN WARRANTY.

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