

GECI™ RED 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 Red 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. Don't use the charger near flammable materials.
6. Don't obstruct the ventilation slots and leave sufficient free space around the unit.
7. Don't 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. Don't 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. Don't 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™ RED DIAMOND CHARGER DESCRIPTION

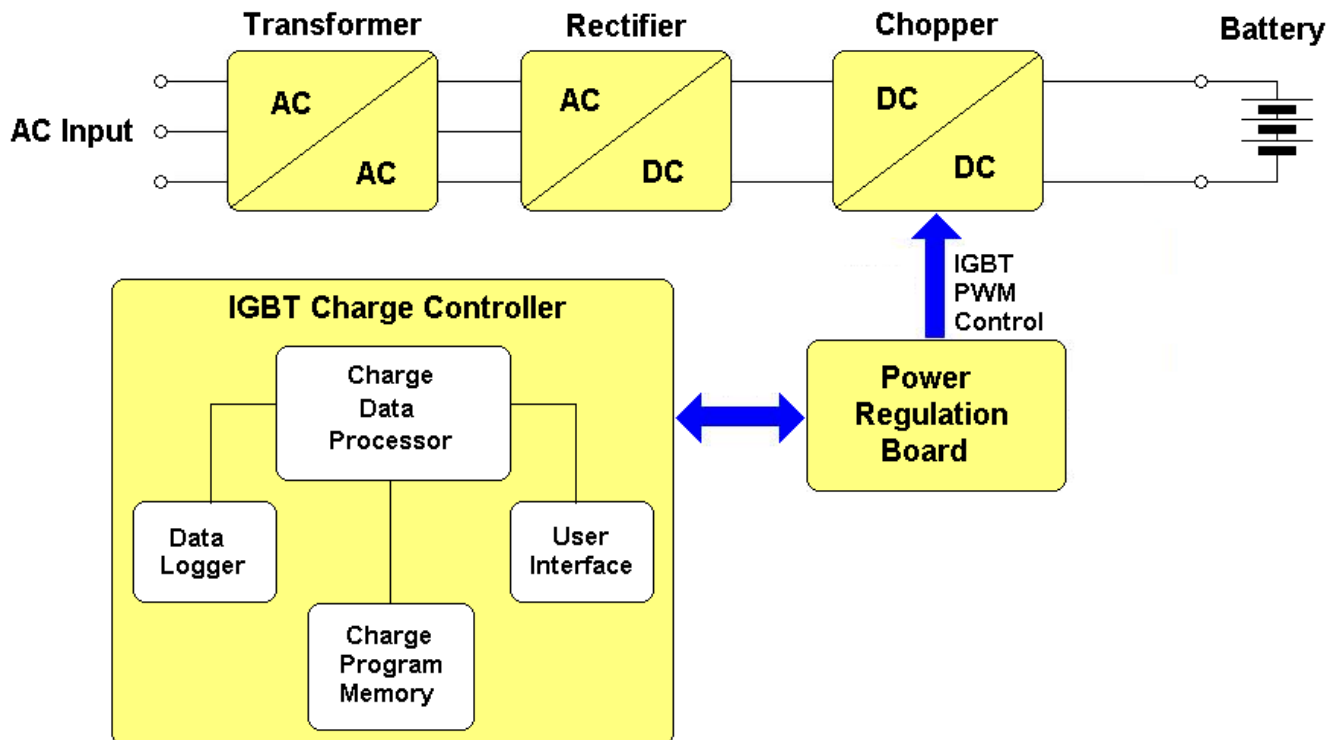
The Red Diamond is a series of battery chargers that are based on a new “Hybrid” power conversion system.

The two parts that are combined together to compose this “Hybrid” system are:

- Special isolation transformer, with line frequency multiplication system;
- High frequency switchmode converter, based on IGBT technology.

This system offers very high electrical efficiency, near unity power factor and very low output current ripple, moreover it features a real universal charging capability: multi-voltage, multi-current, multi-application.

The electrical structure of the Red Diamond charger is represented in the following block diagram.



The TRANSFORMER reduces the AC input voltage and provides electrical insulation between the input and the output of the charger. The RECTIFIER converts the AC output of the transformer to an unregulated DC voltage.

The CHOPPER (operating at high frequency), regulates the output voltage and current to the desired values. It generates a perfectly constant output current, with negligible ripple.

The IGBT CHARGE CONTROLLER is the main control unit of the IBCI Red Diamond.

It's a microprocessor based electronic board, and it contains the USER INTERFACE (Display, LEDs and Keyboard), the CHARGE PROGRAM MEMORY (where all the programmed parameters are saved), the DATA LOGGER (where the charge history is saved) and the CHARGE DATA PROCESSOR, which manages the entire charge process.

The POWERREGULATIONBOARD controls the operation of all the power components. It receives command signals from the IGBT CHARGE CONTROLLER, and it generates the high frequency PWM control signal that drives the IGBT regulator.

The Red Diamond chargers are available in a variety of models, with singlephase or threephase input. The standard models are listed in the following table, while customized models are available on request.

MODEL	BATTERY VOLTAGE RANGE	MAXIMUM OUTPUT CURRENT
RD 3	12V - 24V	120A
RD 4	12V - 24V	200A
RD 5	12V - 24V - 36V	120A
RD 6	12V - 24V - 36V	200A
RD 7	12V - 24V - 36V - 48V	120A
RD 11	12V - 24V - 36V - 48V	200A
RD 9	24V - 36V - 48V - 72V - 80V	120A
RD 13	24V - 36V - 48V - 72V - 80V	200A
RD 14	12V - 24V	250A
RD 19	12V - 24V - 36V	250A
RD 18	12V - 24V - 36V - 48V	250A
RD 19	24V - 36V - 48V - 72V - 80V	250A
RD 20	12V - 24V - 36V	300A
RD 30	12V - 24V - 36V - 48V	300A
RD 40	24V - 36V - 48V - 72V - 80V	300A
RD 50	12V - 24V - 36V	500A
RD 55	12V - 24V - 36V - 48V	500A

The control panel is complete and easy to use: four coloured LEDs indicate the state of the charge, while a 2x20 character dot matrix display gives complete information and error messages in plain text (multilingual).

A three button flat membrane keyboard is used for programming and data review.

A unique feature of the Red Diamond charger is the automatic recognition of the battery. This functionality can operate in three different modes: it can recognize the batteries by voltage, it can use optional battery identification modules, or it can use a combination of the two systems.

For each battery, the user can program the TYPE (Flooded Lead Acid, GEL, AGM), the CAPACITY (from 5Ah to 2500Ah) and the desired charging current. The Red Diamond charger calculates automatically the ideal charge curve for the given parameters.

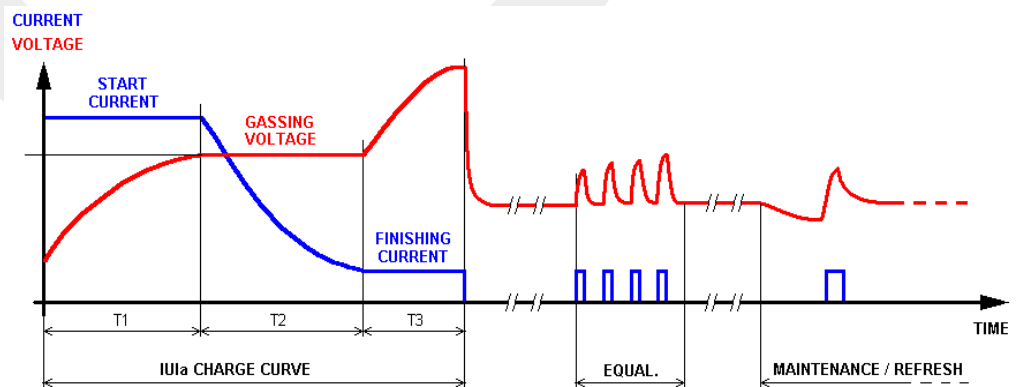
While the programming and operation of the Red Diamond can be done using a simplified and automatic form, expert users have the possibility to adjust the charge parameters and options without limits (Gassing Voltage, Temperature Limits, Equalization Mode, Refresh Mode, Language and much more).

The charging curve of the Red Diamond charger is based on the "IEI" (or "IUIa") system, but instead of applying a pre-defined charge curve to the battery, the charger calculates all the parameters (Currents, Voltage Limits, Maximum Times) according with the Battery Data and the User programming. Moreover, the curve is dynamically adjusted while the charge is in progress, depending on the real status of the battery.

The Red Diamond Charger is suitable for Conventional and Opportunity charging applications. It's equipped with a 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 Red Diamond Charger saves the results of the last 50 charge in the built-in data logger. In addition, it's possible to connect the charger to the DoctorFleet.com

Fleet Management System, which allows to monitor the complete fleet through a WEB based interface, and to send automatic messages/reports by email.



GECI™ RED DIAMOND CHARGER INSTALLATION

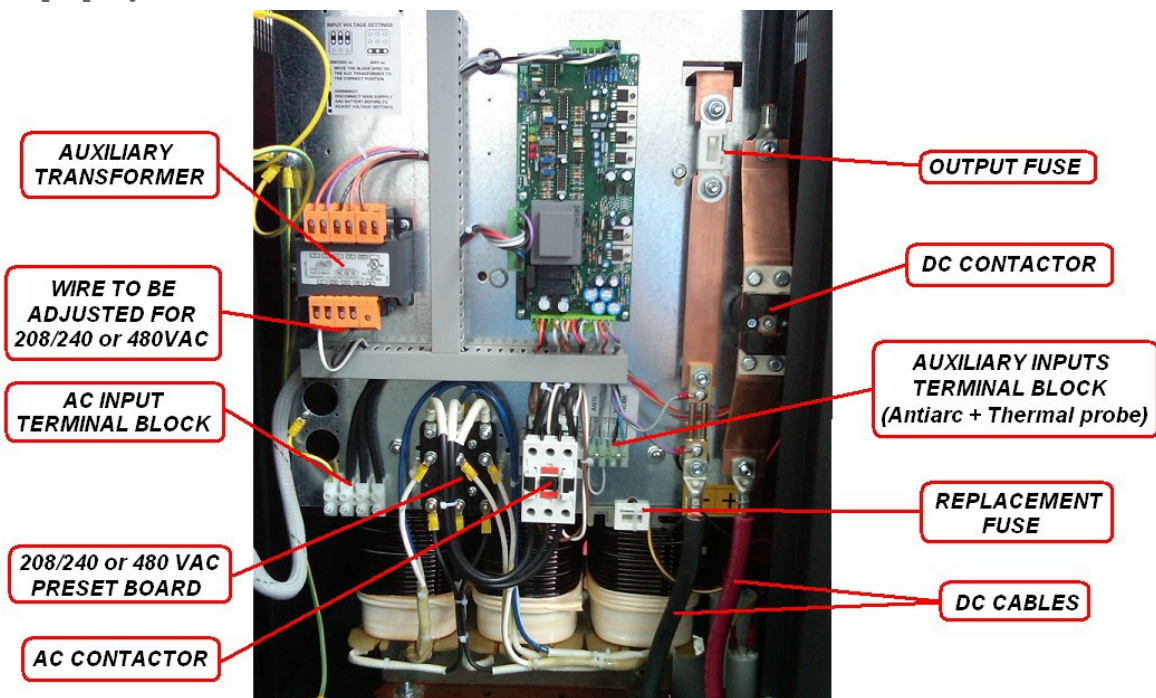
CONDITIONS OF USE:

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

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:

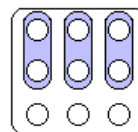
The three-phase models may be configured for 208/240 VAC or 480 VAC nominal input voltage.

This selection can be done using the apposite terminal block, that is located at the center of the internal panel, between the terminal blocks for the AC input wires and the AC contactor.

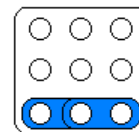
In addition, it's necessary to adjust the AC input connection of the AUXILIARY TRANSFORMER to the proper AC input voltage.

- 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



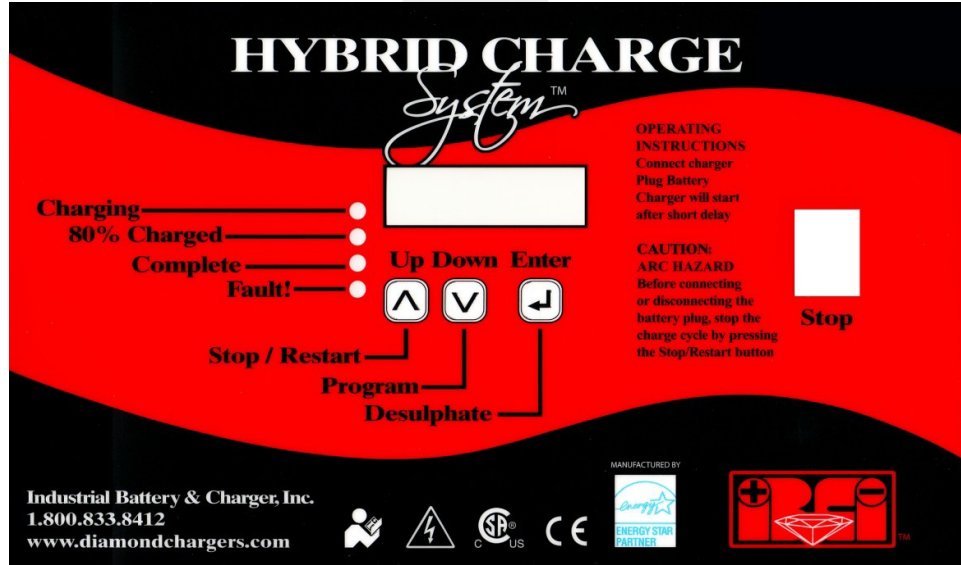
>>>ATTENTION!<<<

Remember to set BOTH the three metal bars AND the input wire on the Auxiliary Transformer. If one of the two are not set properly, the charger may be damaged.

GECI™ RED DIAMOND CHARGER PROGRAMMING

PRELIMINARY CONTROLS

Before to proceed with the programming sequence and before to connect a battery, make sure that the Red 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™ RED 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.

IBCI
RED DIAMOND

SYSTEM CHECK
PLEASE WAIT ...

SYSTEM READY MAX
xxx V - xxx A

SYSTEM READY
DATE TIME

USER PROGRAMMING MODE

>>>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™ RED 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 Programming Password.
The display will show the message:

EDIT PASSWORD

MOD. SETTING

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.

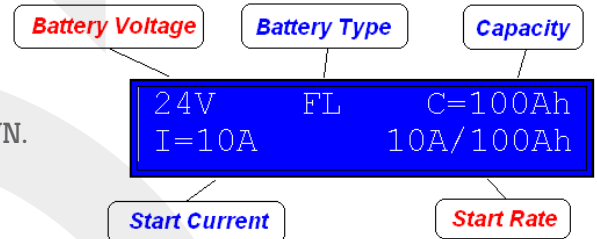
PARAMETERS 1 – 2 – 3 – 4 – 5: BATTERY INFORMATION

For each battery voltage that is supported by the charger, it's possible to set the TYPE, CAPACITY and desired START CURRENT.

For each supported battery voltage, the display shows this setup page:

It's possible to scroll between each battery voltage using the buttons UP/DOWN.

The fields identified by the BLUE labels (Type, Capacity, Start Current) are editable, while the fields identified by the RED labels are NOT editable, as the battery voltage is fixed, and the Start Rate is automatically calculated as percent of Current over Capacity (A/100AH).



PROGRAMMABLE VALUES:	TYPE	FL - Flooded Lead Acid GE - Gel Cell AG - AGM NN - Type Unknown
	CAPACITY	From 5 to 2500 Ah
	START CURRENT	From 2A to the maximum supported by the charger

NOTE: The values programmed in these setup pages will be used when the charger recognizes the batteries automatically, using the VOLTAGE DRIVEN MODE (see next pages). If the battery is equipped with Battery Identification module, only the programmed START RATE value will be used.

EXAMPLE SETTINGS:

Battery A) Lead Acid type, 12 cells, 24 V nominal, 600 Ah, Start Current 100A

Battery B) Lead Acid type, 18 cells, 36 V nominal, 1000 Ah, Start Current 250A

24V FL C=600Ah
I= 100A 16A/100Ah

36V FL C=1000Ah
I= 250A 25A/100Ah

In this example, when batteries with nominal voltages 24 V or 36 V will be connected to the charger, they will be always recognized as type A or type B, using the "VOLTAGE DRIVEN" recognition mode.

If batteries with nominal voltages of 24 V or 36 V, equipped with Battery Identification Modules, will be connected to the charger, the charger will receive all the information about the battery directly from the Battery

Identification Module. In this case, the battery will be charged using the same start rate (A/100Ah) that has been set for the same voltage.

For example, if a third type of battery (GEL, 12 cells, 24 V nominal, 200 Ah) equipped with with Battery Identification Module will be connected, it will receive a start rate of 32A (correspondent to 16A/100Ah), while all the other charge parameters will be calculated automatically by the charger, based on the battery type and capacity.

PARAMETER 6: GASSING VOLTAGE

Programmable values: from 2.35 to 2.50 V/Cell, or TEMPERATURE COMPENSATED

Default value: 2.40 V/cell

NOTE: The charging algorithm of the Red 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.

GASSING VOLTAGE
2.40 v/e1

When a battery temperature probe (optional) is used, the charger can calculate the gassing voltage dynamically, in order to compensate the effect of the temperature of the electrolyte.

In order to activate this function, it's sufficient to reduce the gassing voltage below 2.35 V/cell. In this case, the message "TEMP. COMPENSAT." will appear.

GASSING VOLTAGE
TEMP. COMPENSAT.

PARAMETER 7: 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 8: MAXIMUM TEMPERATURE

Programmable values: from 115 to 160 °F, or DISABLED

Default value: 140°F

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 functionality requires the connection of an optional temperature probe.

PARAMETER 9: EQUALIZE DURATION

Programmable values: from 1 to 8 hours

Default value: 6 hours

NOTE: This parameter allows to adjust the duration of the weekly Equalize cycle.

In most of the cases the default value of 6 hours 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 13 and 14). If the Equalize time window is not set, or it's set too short, the battery will not receive a sufficient Equalize.

PARAMETER 10: DATE AND TIME

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

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. The Charger calculates the Day of the Week automatically, however it's necessary to adjust the Clock manually in Daylight saving time periods.

PARAMETER 11: START 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 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.

```
START BEG<->END
00:00 23.59
```

PARAMETER 12: FULL CHARGE / 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 and to let the battery go through the gassing / overcharge process.

```
FULLCH BEG<->END
00:00 23.59
```

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 13 AND 14: 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.

```
EQ BEGIN TIME
SAT 12.00
```

```
EQ END TIME
MON 03.00
```

PARAMETER 15: DISPLAY CONTRAST

Programmable values: From 10% to 100%

Default value: 90%

NOTE: This parameter sets the display contrast. It can be modified in order to improve the visibility when the intensity of the ambient lighting changes.

PARAMETER 16: BATTERY RECOGNITION MODE

Programmable values:

- VOLTAGE DRIVEN
- BATTERY ID MODULE
- AUTOMATIC

Default value: VOLTAGE DRIVEN

NOTE: This parameter sets the method that the charger uses for the identification of the battery. The **VOLTAGE DRIVEN** mode is based exclusively on the battery voltage at the moment of the connection to the charger.

```
BATT. IDENTIFIC.
VOLTAGE DRIVEN
```

The **BATTERY ID MODULE** mode is based exclusively on the presence of a battery ID module, that stores the battery Type, Voltage, Capacity and ID number. In this operating mode, if the battery ID module is absent the charger will not charge the battery.

The **AUTOMATIC** mode allows to combine the two modes. When the battery is connected, the charger tries to establish a wireless connection with the Battery ID Module.

If the ID module is found, the charger proceeds, and it uses the information stored in the module for the calculation of the charging cycle.

If the ID module is NOT found within 5 minutes, the charger recognizes the battery using the **VOLTAGE DRIVEN** mode, then it uses the default Battery information that have been programmed (Parameters 1 to 5).

PARAMETER 17: WIRED NET / TEST WIRELESS / LOCAL USB

NOTE: This is an advanced function, described on the IBCI Red Diamond "ADVANCED PROGRAMMING MANUAL". It's used when the charger is equipped with a Communication Card to the fleet management system DoctorFleet.com, or when it's equipped with an Expanded Data-Logger Card with USB connection.

GECI™ RED DIAMOND CHARGER OPERATION

CONNECTION OF THE BATTERY AND AUTOMATIC RECOGNITION

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

RECOGNITION WITH BATTERY ID MODULE (OPTIONAL)

If the Battery Recognition mode is set to BATTERY ID MODULE or AUTOMATIC, the charger will attempt to establish a wireless connection with the ID module. And the display will visualize the message:

SEARCHING BATT.
ID MODULE

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, and the charger is now ready to start.

NOTE: The first time that a battery ID module is installed on a battery, it has to be initialized and programmed. Please refer to Paragraph 7 "PROGRAMMING BATTERY ID MODULES".

VOLTAGE DRIVEN BATTERY RECOGNITION

If the Battery Recognition mode is set to VOLTAGE DRIVEN, the display will show the message:

BATTERY
RECOGNITION

At this point, the battery information are transferred to the charger and are visualized on the display, and the charger is now ready to start.

If the battery voltage cannot be recognized, the charger shows the message:

BATT. ANONYMOUS
PLEASE WAIT...

In this condition, the charger will wait the battery voltage stabilize, and will retry the automatic recognition.

If the battery voltage is particularly low, due to sulphation or overdischarge, it's possible to activate a DESULPHATATION / RECOVERY cycle, by pushing the button ENTER for 5 seconds. Please refer to Paragraph 8: "BATTERY DESULPHATION".

AUTOMATIC START

Once the battery has been recognized, depending on the programmed start time window (Parameter 11), 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 clock time at that moment, and (hh.mm)B represents the programmed start time.

PREPARING
TO CHARGE

When the charge begins, the display visualizes the message:

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.

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 or damaged 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]

xx.x V xxx A
xxx Ah x.x t

The Red Diamond Charger performs an IEI charge cycle, and the management of the charging curve is totally automatic.

Depending on the programming of the Full Charge time window (Parameter 12), when the battery reaches the 100% state of charge, the charger may suspend the charge (opportunity charge cycle). In this situation, the display visualizes the message:

DELAYED FULLCH.
(hh.mm) A → (hh.mm) B

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

While the charge is in progress, it's always possible to scroll between different menu pages, using the buttons UP/DOWN:

- CHARGE STATE - Identifies the position in the charge curve, with reference to the picture blow.
- TEMPERATURE - Visualizes the temperature of the battery, if the optional probe is connected.
- HISTORY LOG - Visualizes the history log of the previous charge cycles. Refer to Paragraph 6 "History Log"

EMERGENCY STOP

If the battery doesn't reach the gassing voltage within a predefined time limit, 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.

The Red Diamond charger adjusts the maximum time limits automatically, depending on the battery capacity and the programmed charge current.

This function is important to provide the maximum protection for the battery in any type of application.

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

REVERSE POLARITY PROTECTION

The Red Diamond chargers are equipped with an active protection against the connection of batteries with Reverse Polarity. If a battery with reverse polarity is connected, the charger remains in a safe Stand-By mode.

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.

EQUALIZATION CYCLE

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.

DISCONNECTION OF THE BATTERY DURING THE CHARGE

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.

>>>WARNING !<<<

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

ANTI ARCING PROTECTION

The Red Diamond charger is equipped with a built-in Anti-Arcing protection.

In order to activate this function, it's necessary to add an optional wire loop, using a battery connector equipped with Auxiliary Pins.

Contact your local dealer for more information.

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:

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

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

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

GECI™ RED DIAMOND CHARGER HISTORY LOG

The internal memory of the Red Diamond charger contains a log of the last 60 charge cycles. The most significative parameters can be visualized on the display of the charger, while the complete history log can be accessed and downloaded through DoctorFleet.com management system.

The history log can be accessed at any moment, even while a charge cycle is in progress. It's sufficient to scroll the menu using the UP-DOWN buttons, until the display will visualize the first page of the most recent history log, that will have a format of this type:

```
01 24.0V 31.3V
2009/06/01 10:30
```

At this point, press ENTER for 3 seconds, until the cursor will start blinking over the number 01 on the top left of the display.

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

PAGE A (ALWAYS VISUALIZED):

```
No VSTART VSTOP
Start 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
- Start Date and Time = Date and Time of the BEGINNING of the charge

PAGE B (Not visualized if the battery recognition is set to VOLTAGE DRIVEN mode):

```
BATT. xxxxxxxxxx
TYPE VOLTAGE CAP
```

Where:

- XXXXXXX = Identification number of the battery (ZZZZZZZ if ID module was not found)
- TYPE = Battery Type
- VOLTAGE= Battery Nominal Voltage
- CAP= Battery Capacity

End Date and Time
TT HH.MM AHRET

Where:

End Date and Time =	Date and Time of the TERMINATION of the charge
TT =	Charge Termination Code (see next paragraph)
HH.MM=	Total charge time
AHRET=	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. Equalize completed successfully.
- 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.
- 11 Charge stopped manually.
- 12 Charge completed successfully. Equalize completed successfully.
- 13 Charge completed successfully. Termination by maximum time (dV/dt not reached)
- 14 Charge completed successfully.
Termination by maximum time limit during the Constant Voltage phase.

GROUP 2: 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.
- 41 Battery disconnected during the preparation of the cycle. Charge never started.
- 42 Battery disconnected during the calculation of the cycle. Charge never started.
- 43 Battery disconnected during the initial identification sequence. Charge never started
- 44 Battery disconnected during the constant voltage phase.

GROUP 3: 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.
- 73 Emergency Stop!
The charger was not able to keep the battery at constant voltage.
- 74 Emergency Stop!
Battery temperature exceeded maximum programmed value during the constant voltage phase.
- 75 Emergency Stop! Wrong/Unknown Battery.
- 76 Emergency Stop! Invalid Battery Parameters.

GROUP 4: WARNING MESSAGES

- 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.
- 86 Battery temperature probe malfunction
- 98 Battery voltage out of range at the connection. Recognition driven by voltage may not work correctly.
- 99 Black out of the AC input.





WARRANTY

GECI™ RED 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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