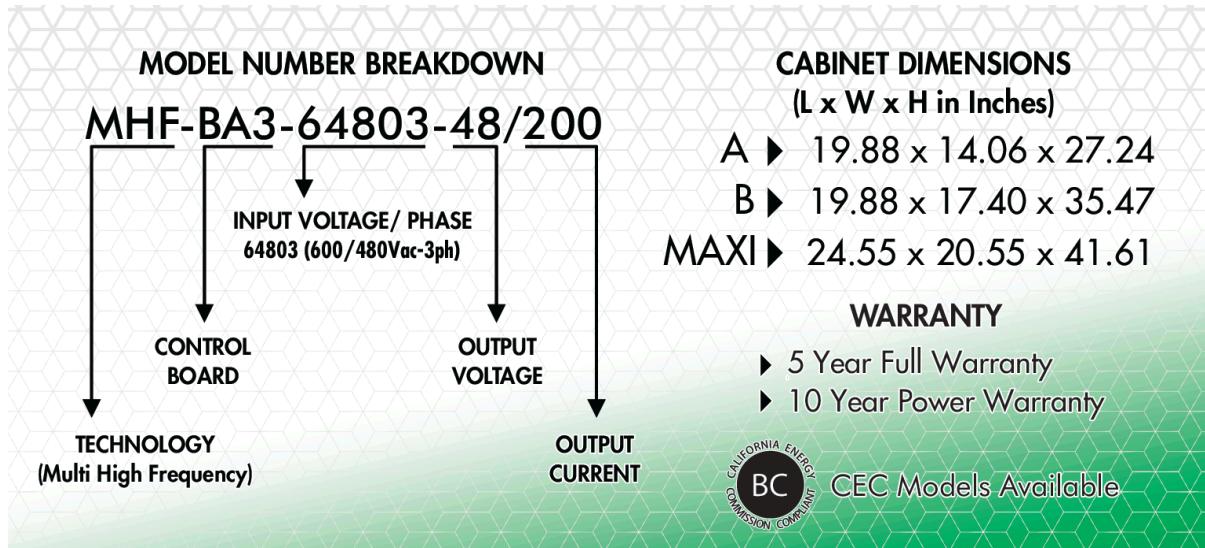


# LOGIK MHF68



## USER'S MANUAL

[www.Tecnikchargers.com](http://www.Tecnikchargers.com)



# 1. SAFETY INSTRUCTIONS AND WARNINGS

## GENERAL

Battery chargers can cause injury or death, or damage to other equipment or property, if the user does not observe all safety rules and take precautionary actions.

Safe practices must be learned through study and training before using this equipment.

Only qualified personnel should install, use, or service this battery charger.

## SHOCK PREVENTION

Bare conductors, or terminals in the output circuit, or ungrounded, electrically-live equipment can fatally shock a person. To protect against shock, have competent electrician verify that the equipment is grounded and learn what terminals and parts are electrically HOT.

The body's electrical resistance is decreased when wet, permitting dangerous current to flow through the body. Do not work in damp area without being extremely careful. Stand on dry rubber mat or dry wood and use insulating gloves when dampness or sweat cannot be avoided. Keep clothing dry.

**INSTALLATION AND GROUNDING** – Electrical equipment must be installed and maintained in accordance with all the applicable national and local codes.

A power disconnect switch must be located at the equipment. Check the data label for voltage and phase requirements. If only 3-phase power is available, connect single-phase equipment to ONLY TWO WIRES of the 3-phase line.

DO NOT CONNECT the equipment grounding conductor to the third live wire of the 3-phase line as this makes the equipment frame electrically HOT, which can cause a fatal shock.

If a grounding conductor is part of the power supply cable, be sure to connect it to a properly grounded switch box or building ground. If not part of the supply cable, use a separate grounding conductor. Don't remove a ground prong from any plug. Use correct mating receptacles. Check ground for electrical continuity before using equipment.

The grounding conductor must be of a size equal to or larger than the size recommended by Code or this manual.

**CHARGING LEADS** – Inspect leads often for damage to the insulation. Replace or repair cracked or worn leads immediately. Use leads having sufficient capacity to carry the operating current without overheating.

**BATTERY TERMINALS** – Do not touch battery terminals while equipment is operating.

**SERVICE AND MAINTENANCE** – Shut OFF all power at the disconnect switch or line breaker BEFORE inspecting, adjusting, or servicing the equipment. Lock switch OPEN (or remove line fuses) so that the power cannot be turned ON accidentally.

Disconnect power to equipment if it is to be left unattended or out of service.

Disconnect battery from charger.

Measure voltage on capacitors and, if there is any voltage reading, wait 5 minutes before to proceed.

Keep inside parts clean and dry. Dirt and/or moisture can cause insulation failure. This failure can result in high voltage at the charger output.

## BURN AND BODILY INJURY PREVENTION

The battery produces very high currents when short circuited and will burn the skin severely if in contact with any metal conductor that is carrying this current.

Do not permit rings on fingers to come in contact with battery terminals or the cell connectors on top of the battery.

Battery acid is very corrosive. Always wear correct eye and body protection when near batteries.

## FIRE AND EXPLOSION PREVENTION

When batteries are being recharged, they generate hydrogen gas that is explosive in certain concentrations in air (the flammability or explosive limits are 4.1% to 72% hydrogen in air). The spark-retarding vents help slow the rate of release of hydrogen, but the escaping hydrogen may form an explosive atmosphere around the battery if ventilation is poor.

The ventilation system should be designed to provide an adequate amount of fresh air for the number of batteries being charged. This is essential to prevent an explosion.

Always keep sparks, flames, burning cigarettes, and other sources of ignition away from the battery recharging area. Do not break "live" circuits at the terminals of batteries. Do not lay tools or anything that is metallic on top of any battery.

To prevent arcing and burning of the connector contacts, be sure the charger is OFF before connecting or disconnecting the battery. The digital display must be completely OFF.

## MEDICAL AND FIRST AID TREATMENT

First aid facilities and a qualified first aid person should be available for each shift for immediate treatment of electrical shock victims.

**EMERGENCY FIRST AID:** Call physician and ambulance immediately and use First Aid techniques recommended by the American Red Cross.

In case of acid in the eyes, flush very well with clean water and obtain professional medical attention immediately.

## EQUIPMENT WARNING LABELS

Inspect all precautionary labels on the equipment.

*Order and replace all labels that cannot be easily read.*

## **2. DESCRIPTION**

The LOGIK MHF68 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 LOGIK 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 LOGIK 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 LOGIK 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 LOGIK 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 CO <sub>2</sub> ) |
| ▲ Total Saving on Energy Bill                | (USD)                     |

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

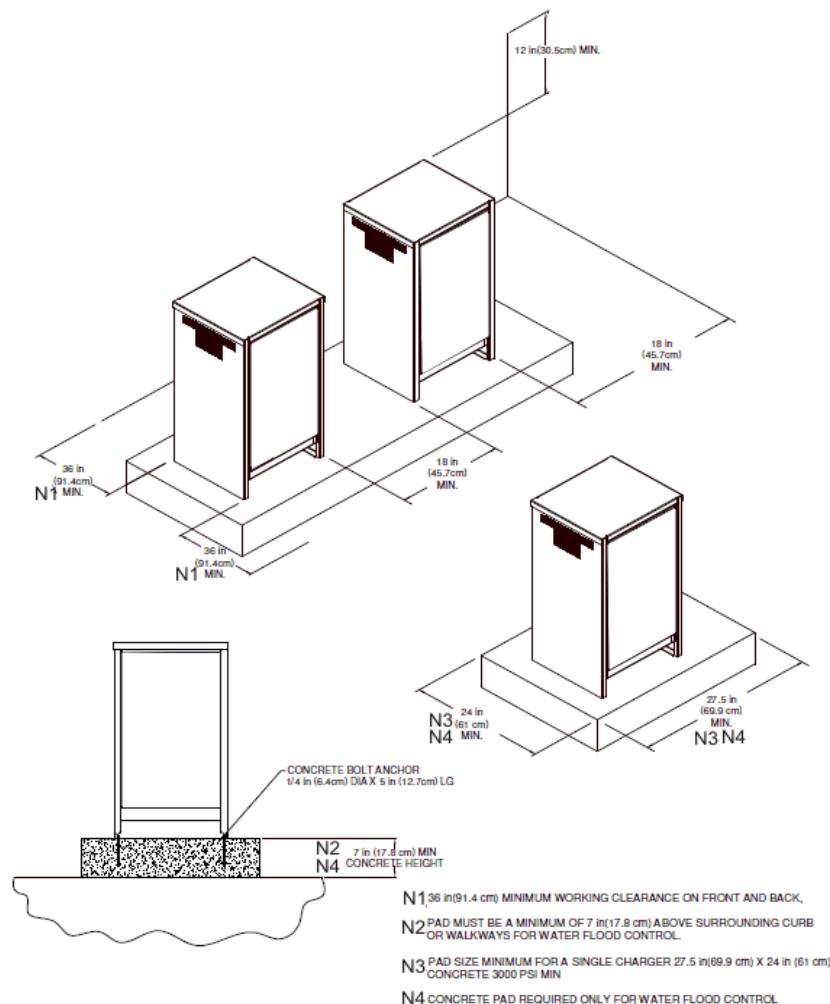
In addition, it's possible to connect the charger to the Fleet Management System DoctorFleet.com, which allows to monitor the complete fleet through a WEB based interface, and to send automatic alarm messages and usage reports by email.

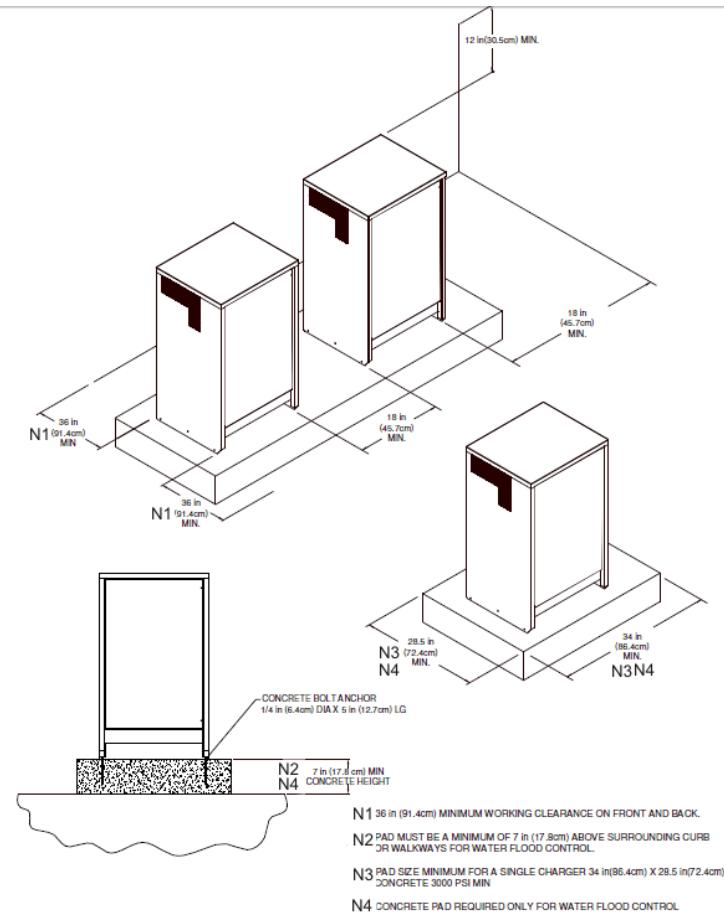
### 3. INSTALLATION OF CHARGER

**LOCATION - *Choose your installation location to:***

- Avoid temperature and humidity extremes.
- Minimize moisture and dust.
- Provide adequate air circulation to prevent the buildup of fumes.
- Install on a cement pad minimum 7" above surrounding curbing or walkways for water flood control,  
see Figure A and Figure B
- Maintain a minimum of 18" of clearance on the sides of the unit for proper ventilation.
- Maintain 36" minimum clearance on Front and Back for servicing as required by local codes.
- Do not install unit where it will be exposed to direct sunlight.

***Fig.A***



***Fig.B***


# INSTALLATION OF THE AC SUPPLY PROCEDURES

Please refer to  
[www.tecnikchargers.com](http://www.tecnikchargers.com) for the latest  
AC installation manual.

## 4. HOT USE OF THE CHARGER



### PRELIMINARY CHECKS

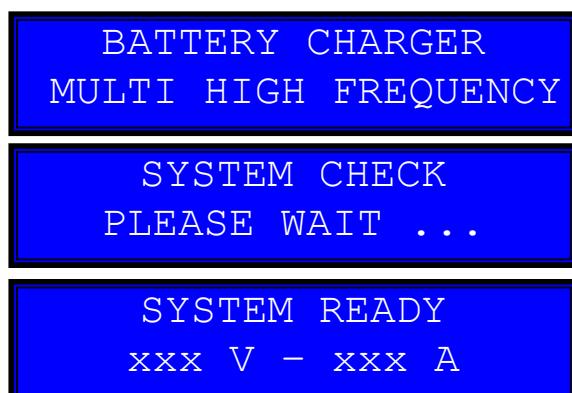
- ✗ Inspect the charger completely for loose screws, electrical connections or other damages;
- ✗ Check that all the ventilation slots are not obstructed to assure proper air flow;
- ✗ Make sure that the charger is installed as instructed in this manual and in accordance with any applicable national or local Code.

### PROGRAMMATION

Turn on the charger by moving the main switch to position “1”.

The charger will perform an automatic test of the control circuits and will wait for a random delay on start.

The display will visualize the following messages.



## **USER PROGRAMMING 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:



### **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 1: DATE and TIME**

JJ/MM/AN	hh:mm
20/04/18	10:15

**Programmable values:** Day/Month/Year, Hour/Minute**Default value:** Eastern Time (GMT-5)**NOTES:**

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.

**PARAMETER 2: TIMEZONE DAYLIGHT**

TIMEZONE DAYLIGHT
USA-MEX-CAN

**Programmable values:** USA-MEX-CAN, EUROPE, AUSTRALIA**Default value:** USA-MEX-CAN**NOTES:**

When this parameter is well set it's not necessary to adjust the Clock manually in Daylight saving time periods.

**PARAMETER 3: FULL CHARGE TIME WINDOW**

FULL.CH BEG<>END
00:00 08:00

**Programmable values:** From 00.00 to 23:59**Default value:** From 00.00 to 08:00**NOTES:**

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 4 and 5: EQUALIZE TIME WINDOW**

EQ BEGIN TIME  
SAT 20:00

EQ END TIME  
SUN 12:00

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

**Default value:** From SATURDAY at 20.00 to SUNDAY at 12.00

**NOTES:**

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 6: TOTAL kWh USED**

TOTAL kWh USED  
0.0kWh

**Programmable values:** zzz or RESET to 0

**Default value:** 0.0 kWh

## 5. 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

### AUX. 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 aux. 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 is transferred to the charger and are visualized on the display.

The charger is now ready to start.

Depending on the programmed start time window, 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 LOGIK 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 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”.



## 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

## OVERTCURRENT 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.

## **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:



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

## **EQUALIZE CYCLE – MANUAL**

During the charging of the battery the operator press button ENTER few secs, and he can force an EQ manual cycle at the end of this cycle.



FORCE MANAUL EQ  
ENABLED



FORCE MANAUL EQ  
DISABLE

## REFRESH-MAINTENANCE

This function is useful to keep the battery in perfect condition when it's not used for a 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]

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 from the charger while it is being charged.  
ARCING AND BURNING OF CONNECTORS OR BATTERY EXPLOSION MAY RESULT!

**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:



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

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

## 6. HISTORY LOG

The internal memory of the LOGIK CHARGER contains a log of the last >200 charge cycles.

In order to visualize the most recent cycles, it's sufficient to scroll the menu using the UP-DOWN buttons to MENU STATS 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

## 7. 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. Over range maximum time during pulsed

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.

77

Battery module ERROR

Waterlevel was too low!

**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.

**- END OF MANUAL -**