



BATTERY CHARGER

MVD



USER'S MANUAL

1. SAFETY PRECAUTIONS

- 1 Before to start using the MVD Charger, read these instructions carefully.
- 2 Installation and Service operations can be done by qualified personnel only.
- 3 To prevent the risk of electric shock, don't touch uninsulated portions of the MVD-F Charger and the Battery.
- 4 Remove AC input before to disconnect the battery.
- 5 The charger is suitable for indoor installation, in ambients with abundant ventilation.
- 6 Don't use the charger near flammable materials.
- 7 Don't obstruct the ventilation slots and leave sufficient free space around the unit.
- 8 Don't expose the charger to liquids or excessive dust.
- 9 Check the conditions of cables and accessories on a regular basis, and replace them immediately if they get damaged.
- 10 Don't extend the battery cables. Replace them, if necessary, with cables of the same type, length, section and insulation as the original ones.
- 11 During the installation of the charger, make sure to connect the EARTH conductor properly, and respect all the applicable Safety Standards.
- 12 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.

2. DESCRIPTION

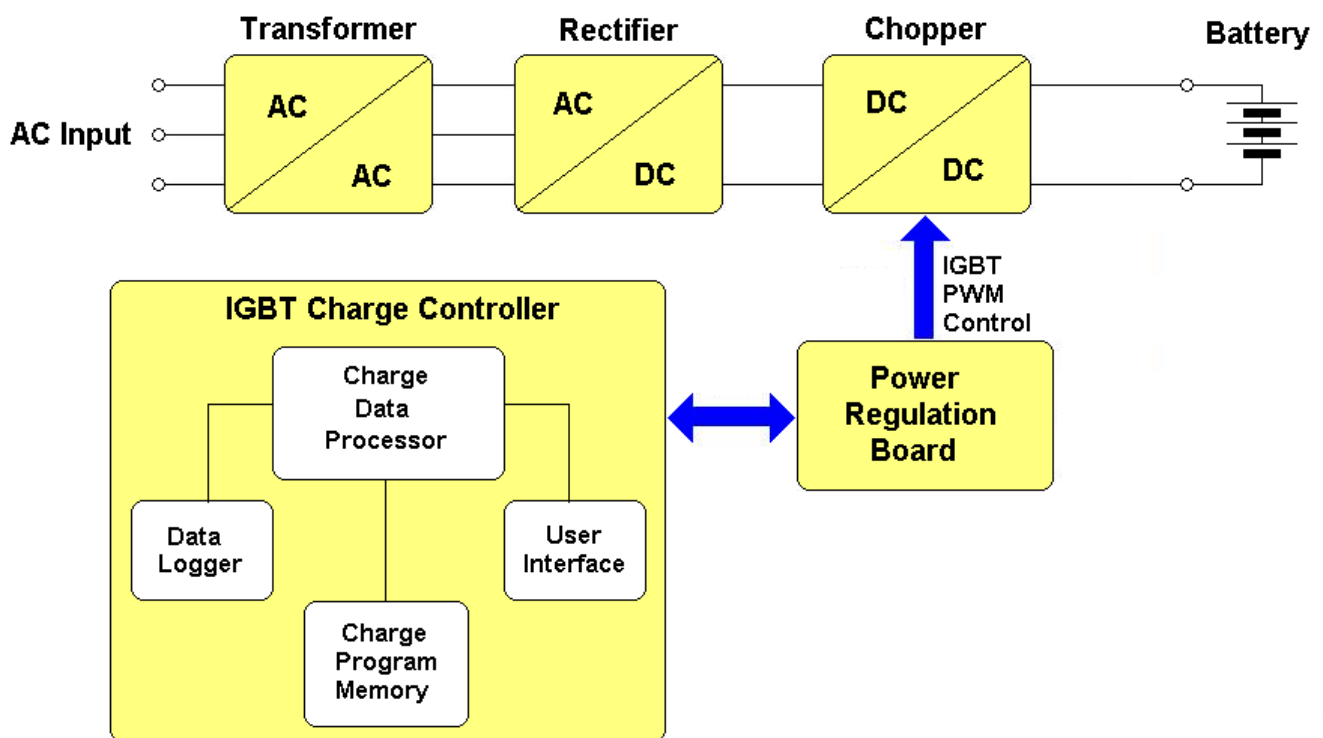
The MVD is a series of battery chargers that are based on a new “Hybrid” power conversion system.

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 MVD 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 MVD.

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.

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The POWER REGULATION BOARD 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 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.

(OPTIONAL)

For each battery, the user can program the TYPE (Flooded Lead Acid, GEL, AGM), the CAPACITY (from 5Ah to 2500Ah), the number of Elements and the curve of charging.

The MVD start to charge the curve for the given parameters.

While the programming and operation of the MVD can be done using a simplified and automatic form, expert users have the possibility to adjust the charge parameters and options without limits (Temperature Limits, Temperature compensation, Maximum voltage, Cable length and section for voltage drop cable, Language and much more).

The charging curve of the MVD charger is based on the parameters that the user entry in a easy menu of a single curve, but instead of applying a 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.

(OPTIONAL)

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.

(OPTIONAL)

The MVD Charger saves the results of the last 250 charge in the built-in data logger.

(OPTIONAL)

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.

3. INSTALLATION

Conditions of use:

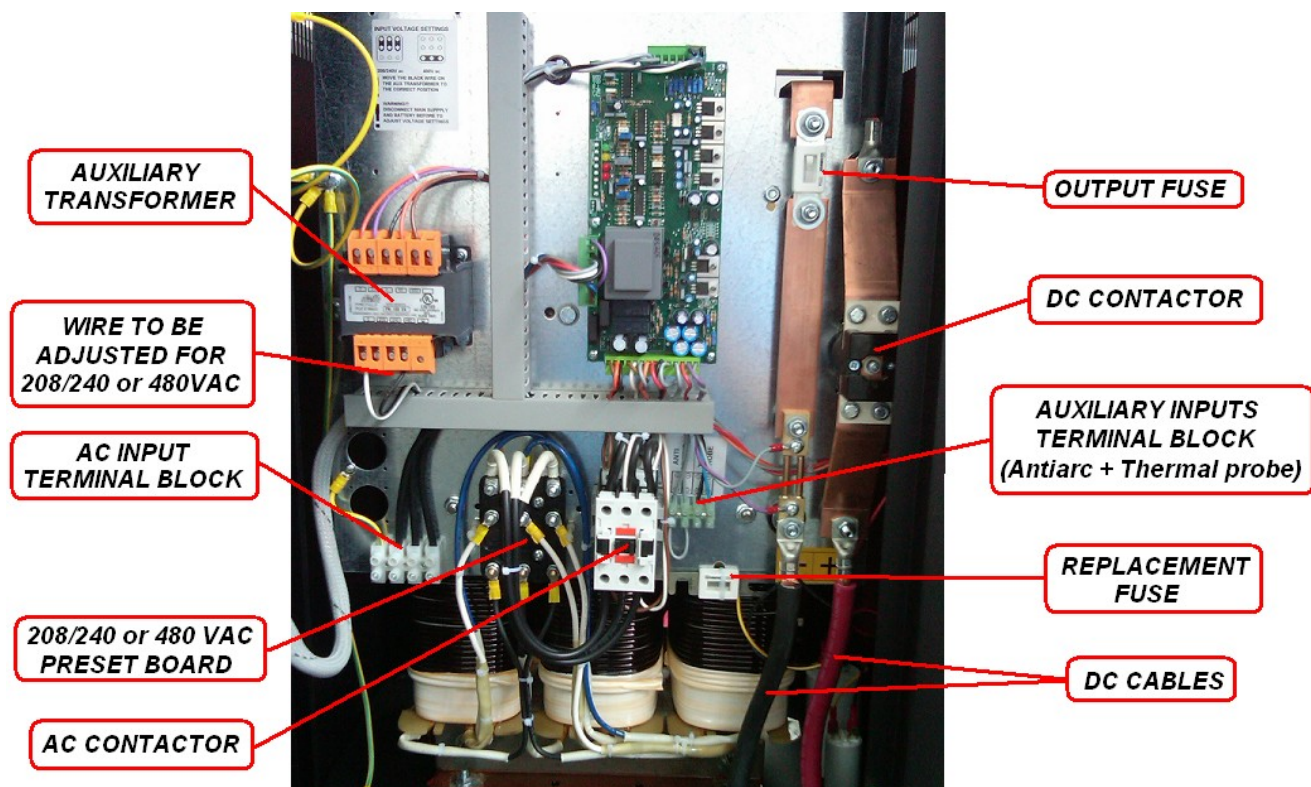
- Temperature (operation): from 0°C to 50°C.
- Temperature (storage): from -20°C to 60°C.
- Relative Humidity: less than 75 %.

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.



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AC INPUT VOLTAGE SELECTION 208/240 or 480/600 VAC

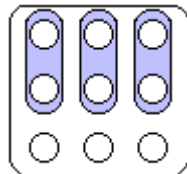
The three-phase models may be configured for 208/240 VAC or 480 VAC nominal input voltage.

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.

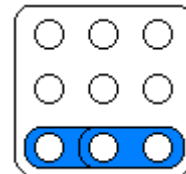
In addition, it's necessary to adjust the AC input connection of the AUXILIARY TRANSFORMER to the proper AC input voltage.

- 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.

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4. PROGRAMMING

PRELIMINARY CONTROLS

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

STARTUP SEQUENCE

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. (ONLY AFTER A BLACK/OUT HAPPENS)

The display will visualize the following messages.

BASSI
CHARGER MVD

SYSTEM CHECK
PLEASE WAIT ...

SYSTEM READY
MAX xxx V - xxx A

XX.X V	XXXX Ah
EL= XXX	PROG.XX

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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.

HOW TO ACTIVATE USER PROGRAMMING MODE

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



EDIT PASSWORD

- Enter the Programming Password. UP DW UP DW UP
The display will show the message:



MOD. USER

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.

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MENU PRG N. 1 – 8 (1-20 OPTIONAL) : PROGRAM SETTING CURVES

For each program, it's possible set at maximum 6 different STEP, and for each step it's possible set the TYPE of STEP (current constant, voltage constant, pause cooling), MAXIMUM TIME of the single STEP (0-65350 minute), CURRENT (constant current or minimum limit current), VOLTAGE (maximum voltage or holding voltage).

For each program, the display shows this setup page:
for example:

PRG N.XX
SETTING

Press ENTER to modify this particular program:

1.A I=K T= 240m
I=18%Ah V=2.40 V

PROGRAM and STEP INDICATOR-settings

1.A – 1(nr. of program [1..8..20]) A (step of the program [A.B.C.D.E.F])
f.e 2.C (program nr.2 and step C (third))
f.e 5.B (program nr.5 and step B (second))

TYPE of CHARGING CURVES (Programmable values)

I=K – **[I=K]** current constant
[V=K] voltage constant
[PAU] pause/cooling

MAXIMUM TIME of the SINGLE STEP (Programmable values)

T= 240m **[DIS,5,...,65350]** - 240minutes after this time the charger close the actual step and will begin the next step.

CURRENT SETTING/LIMIT (Programmable values)

I=18%Ah **[DIS,1,...,99]** – for every 100 Ah of the battery capacity the charger put 18 Amps.
If you have a battery of 500 Ah → 18%Ah = 18 * 5 = 90 Ampere
If you have a battery of 750 Ah → 25%Ah = 25 * 7.5 = 187.5 Ampere
If you have a battery of 1100 Ah → 10%Ah = 10 * 11 = 110 Ampere
In TYPE of CHARGING CURVES → (I=K) I value is the current constant during this step
In TYPE of CHARGING CURVES → (V=K) I value is the minimum limit of current before to end this step of program.

VOLTAGE SETTING/LIMIT (Programmable values)

V=2.40 **[DIS,2.20,...,2.80]** V/Cell – limit voltage for single elements.
In TYPE of CHARGING CURVES → (I=K) V value is the maximum limit of battery voltage before to end this step of program.
In TYPE of CHARGING CURVES → (V=K) V value, the charger compensation the current to hold voltage value.

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It's possible to scroll between each programs using the buttons UP/DOWN, and press ENTER to modify or skip each single parameter.

ERROR SETTING IN CURVE PARAMETER

If the user insert the parameter not correct during the set of internal programs (curves), when you try to work with this program, the charger don't start and the display show:

ERROR
SETTING

You must entry in a menu of this program and check the parameters in errors.

The display show ERROR SETTING even you try to work with a program that are all steps A,B,C,D,E,F empty.

1.A PAU T= DIS.
I=DIS. V=DIS.

1.B PAU T= DIS.
I=DIS. V=DIS.

1.C PAU T= DIS.
I=DIS. V=DIS.

1.D PAU T= DIS.
I=DIS. V=DIS.

1.E PAU T= DIS.
I=DIS. V=DIS.

1.F PAU T= DIS.
I=DIS. V=DIS.

In this way the PROG NR.1 not work.

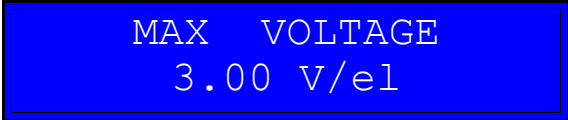
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PARAMETER : MAX VOLTAGE

Programmable values: from 2.40 to 3.00 V/Cell, or DISABLED

Default value: 3.00 V/cell



MAX VOLTAGE
3.00 V/e1

NOTES: 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 : MAX TEMPERATURE

Programmable values: from (45 to 70 °C) 115 to 160 °F, or DISABLED

Default value: (60 °C) 140 °F

NOTES: 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.



TEMPERATURE
TOO HIGH

PARAMETER : TEMPERATURE COMPENSATION

Programmable values: ENABLE or DISABLED.

Default value: (recommended ENABLE if the temperature probe is installed)

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

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PARAMETER : CABLE SECTION

Programmable values: from (1 to 250 mm²) or DISABLED.

Default value: section of the installed cable.

NOTES: The charger can calculate the voltage drop in the cable of the battery, in order to approximate the correct value of the battery voltage.

PARAMETER : CABLE LENGHT

Programmable values: from (20 to 3000 cm) 0.65 to 98.40 ft, or DISABLED.

Default value: lenght of the installed cable.

NOTES: The charger can calculate the voltage drop in the cable of the battery, in order to approximate the correct value of the battery voltage.

PARAMETER : LANGUAGE

Programmable values: ENGLISH, FRANCAIS, ITALIANO..

Default value:

NOTES: The language of the display.

(OPTIONAL) PARAMETER : DATE and TIME

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

Default value: *****

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.

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(OPTIONAL) PARAMETER : WIRED NET / TEST WIRELESS / LOCAL USB

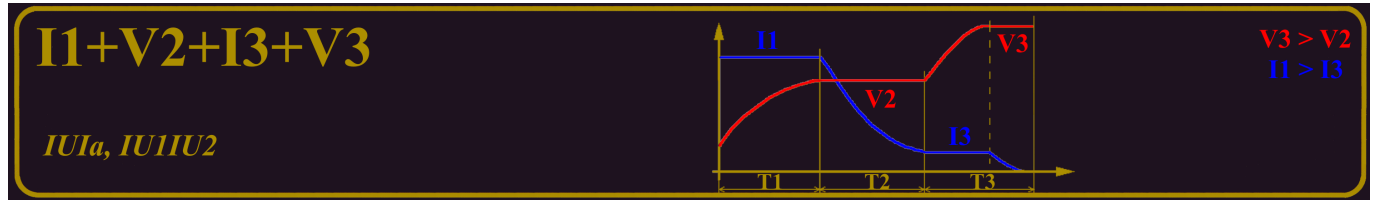
NOTE:

This is an advanced function, described on the MVD “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.

5. PROGRAM EXAMPLES

PROGRAM CURVE : IU1a



1.A I=K T= 480m
I=18%Ah V=2.40 V

1.B V=K T= 240m
I=5%Ah V=2.40 V

1.C I=K T= 180m
I=5%Ah V=2.65 V

1.D PAU T= DIS.
I= DIS. V= DIS.

1.E PAU T= DIS.
I=DIS. V=DIS.

1.F PAU T= DIS.
I=DIS. V=DIS.

Using this Program for the follow battery: reading battery voltage 24.7 V

24.7 V 500 Ah
EL= 12 PROG.01

Press the buttons UP and DOWN simultaneously.

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In the first step A **(1.A)** , the charger workes in current costant way (**$I=K$**) for the maximum time of **(480 minutes)** with a current of **(18%Ah --> [500 Ah] $5 \cdot 18 = 90$ Amp)**, and if the battery voltage reache **(2.40 V/Cell)** before the end of the time, the charger will go to next step.

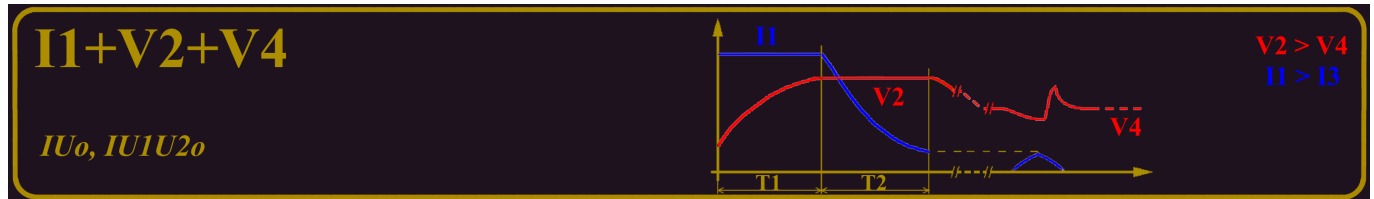
In the second step B **(1.B)** , the charger workes in voltage costant way (**$V=K$**) for the maximum time of **(240 minutes)** and compensation the current for hold the battery to **(2.40 V/Cell)**, and if the current go down until **(5%Ah --> [500 Ah] $5 \cdot 5 = 25$ Amp)**, before the end of the time, the charger will go to next step.

In the first step C **(1.C)** , the charger workes in current costant way (**$I=K$**) for the maximum time of **(180 minutes)** with a current of **(5%Ah --> [500 Ah] $5 \cdot 5 = 25$ Amp)**, and if the battery voltage reache **(2.65 V/Cell)** before the end of the time, the charger will go to next step.
Steps **(1.D)**, **(1.E)**, **(1.F)** are empty, the charger jump this state and finisch the cycle.

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PROGRAM CURVE : IU1 U2



3.A I=K T= 200m
I=25%Ah V=2.40 V

3.B V=K T= 240m
I=3%Ah V=2.40 V

3.C V=K T=FULL
I=DIS V=2.25 V

3.D PAU T= DIS.
I= DIS. V= DIS.

3.E PAU T= DIS.
I= DIS. V= DIS.

3.F PAU T= DIS.
I= DIS. V= DIS.

Using this Program for the follow battery: reading battery voltage 39.6 V

39.6 V 800 Ah
EL= 18 PROG.03

Press the buttons UP and DOWN simultaneously.

In the first step A (3.A) , the charger workes in current costant way ($I=K$) for the maximum time of (200 minutes) with a current of (25%Ah --> [800 Ah] $8 \times 25 = 200$ Amp), and if the battery voltage reache (2.40 V/Cell) before the end of the time, the charger will go to next step.

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In the second step B **(3.B)** , the charger workes in voltage costant way **(V=K)** for the maximum time of **(240 minutes)** and compensation the current for hold the battery to **(2.40 V/Cell)**, and if the current go down until **(3%Ah --> [800 Ah] $8 \cdot 3 = 24$ Amp)**, before the end of the time, the charger will go to next step.

In the third step C **(3.C)** , the charger workes in voltage costant way **(V=K)** for ever **(FULL)** and compensation the current for hold the battery to **(2.25 V/Cell)**.

Steps **(3.D)**, **(3.E)**, **(3.F)** are empty, the charger jump this state and finisch the cycle.

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PROGRAM CURVE : I1 + I2 + I3 + I4 + I5 + I6

8.A	I=K	T= 60m
I=15%Ah		V=DIS

8.B	I=K	T= 120m
I=20%Ah		V=DIS

8.C	I=K	T= 180m
I=25%Ah		V=2.40

8.D	I=K	T= 240m
I=15%Ah		V=2.60 V

8.E	I=K	T= 120m
I=10%Ah		V=DIS

8.F	I=K	T= 120m
I=5%Ah		V=DIS

Using this Program for the follow battery: reading battery voltage 0.0 V

0.0 V	600 Ah
EL= 24	PROG.08

Press the buttons UP and DOWN simultaneously.

In the first step A (8.A) , the charger workes in current costant way (I=K) for the maximum time of (60 minutes) with a current of (15%Ah --> [600 Ah] $6 \times 15 = 90$ Amp).

In the first step B (8.B) , the charger workes in current costant way (I=K) for the maximum time of (120 minutes) with a current of (20%Ah --> [600 Ah] $6 \times 20 = 120$ Amp).

In the first step C (8.C) , the charger workes in current costant way (I=K) for the maximum time of (180 minutes) with a current of (25%Ah --> [600 Ah] $6 \times 25 = 150$ Amp), and if the battery voltage reache (2.40 V/Cell) before the end of the time, the charger will go to next step.

In the first step D (8.D) , the charger workes in current costant way (I=K) for the maximum time

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of **(240 minutes)** with a current of **(15%Ah --> [600 Ah] $6 \times 15 = 90$ Amp)**, and if the battery voltage reaches **(2.60 V/Cell)** before the end of the time, the charger will go to next step.

In the first step E **(8.E)** , the charger works in current constant way **(I=K)** for the maximum time of **(120 minutes)** with a current of **(10%Ah --> [600 Ah] $6 \times 10 = 60$ Amp)**.

In the first step F **(8.F)** , the charger works in current constant way **(I=K)** for the maximum time of **(120 minutes)** with a current of **(5%Ah --> [600 Ah] $6 \times 5 = 30$ Amp)**.

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PROGRAM CURVE : Voltage Refresh

6.A	V=K	T= FULL
I=DIS.		V=2.25

6.B	PAU	T= DIS.
I= DIS.		V= DIS.

6.F	PAU	T= DIS.
I= DIS.		V= DIS.

Using this Program for the follow battery: reading battery voltage 83.0 V

83.0 V	1200 Ah
EL= 40	PROG.06

Press the buttons UP and DOWN simultaneously.

In the first step A **(6.A)** , the charger works in voltage costant way (**V=K**) for ever (**FULL**) and compensation the current for hold the battery to (**2.25 V/Cell**). **During this step not exist any limits of current and MVD can work until the maximum current.**

Steps **(6.B)**, ... , **(6.F)** are empty.

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PROGRAM CURVE : Voltage Refresh - Limited current

12.A	I=K	T= 5m
I=5%Ah		V=2.25

12.B	V=K	T= FULL
I=DIS.		V=2.25

12.C	PAU	T= DIS.
I= DIS.		V= DIS.

.....

12.F	PAU	T= DIS.
I= DIS.		V= DIS.

Using this Program for the follow battery: reading battery voltage 80.0 V

80.0 V	1000 Ah
EL= 36	PROG.12

Press the buttons UP and DOWN simultaneously.

In the first step A (12.A) , the charger workes in current costant way (I=K) for the maximum time of (5 minutes) with a current of (5%Ah --> [1000 Ah] $10 \cdot 5 = 50$ Amp), and if the battery voltage reached (2.25 V/Cell) before the end of the time, the charger will go to next step.

In the second step B (12.B) , the charger workes in voltage costant way (V=K) for ever (FULL) and compensation the current for hold the battery to (2.25 V/Cell).

Steps (12.C), ..., (12.F) are empty. During this step exist a limit of current and this limit is the value of current of the step before [12.A] (5%Ah --> [1000 Ah] $10 \cdot 5 = 50$ Amp)

6. OPERATION

START OF THE CHARGE

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

XX.X V	XXXX Ah
EL= XX	PROG.XX

- Battery voltage of last charging cycle
 - Ampere Hour of last charging cycle
 - Nr. Element of last charging cycle
 - Program Nr.of last charging cycle
- 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 go to the next value. At this point the new value will be saved.

BEGIN THE CHARGE

When you are ready and every parameter is correct you can force the start of the charge.

HOW TO BEGIN THE CHARGE

- Press the buttons UP and DOWN simultaneously.

When the charge begins, the display visualizes the message:

PREPARING TO CHARGE

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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.

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 MVD-F Charger performs an IEC charge cycle, and the management of the charging curve is totally automatic.

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, time..., with reference to the picture below.
- TEMPERATURE
 - Visualizes the temperature of the battery, if the optional probe is connected.
- HISTORY LOG (OPTIONAL)
 - Visualizes the history log of the previous charge cycles. Refer to Paragraph 6 "History Log"

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EMERGENCY STOP

MAXIMUM VOLTAGE – MAXIMUM TEMPERATURE (see previous char.)

INTERNAL STANDBY

When the fuse is failed, the internal temperature of the charger is too high, or the power supply of the charger is not able to work fine. The charger wait for 10 minutes in a temporarily state (INTERNAL STANDBY) if this condition continue the MVD will go in EMERGENCY STOP, and wait a manual operation of the user.

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 MVD 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:



CYCLE
COMPLETE

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

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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:



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

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

ANTI ARCING PROTECTION

The MVD 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.

7. BATTERY DESULPHATION

The Battery Desulphation/Recovery function is useful when batteries are overdischarged, or they have been left unused for a long time.

The Desulphation/Recovery cycle can be activated at any moment, while a battery is connected, by pushing the button ENTER and keeping it pressed for 3 seconds.

The display will show the message:



BATTERY
DESULPHATATION

At this point, using the UP/DOWN buttons, it's possible to edit the battery desulphation parameters:

- Desulphation Time
 - From 1 to 250 hours
- Desulphation Current
 - From 5%Ah to 99%Ah - for every 100 Ah of the battery capacity the charger put XX Amps.

Once all the parameters are set correctly, push the buttons UP+DOWN Simultaneously in order to start the Desulphation cycle. The display will show the message:



STARTING
DESULPHATATION

The it will visualize the standard charging parameters.

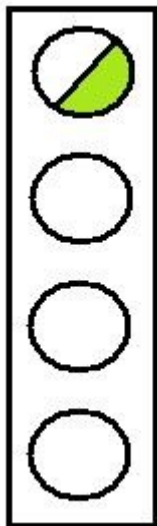
8. LED STATE

The MVD during the charge, the display will show the message:

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

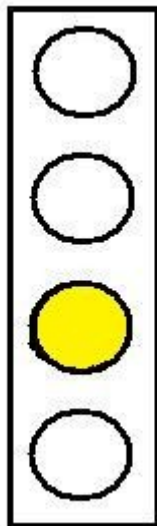
see chapter **CHARGE CYCLE** for more info.
The state of the leds are the follow.

STEP CURRENT CONSTAT [I=K]



Blink first green light.

+

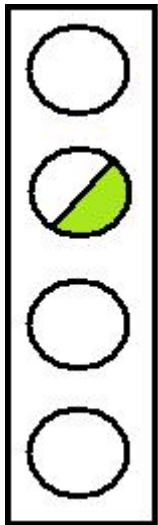


And if the power of the charger go up its maximum limit, the MVD auto limit the current and the third led is fixed YELLOW

Battery Charger MVD

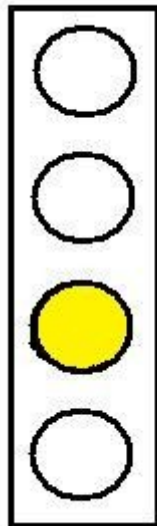
User's Manual

STEP VOLTAGE CONSTAT [V=K]



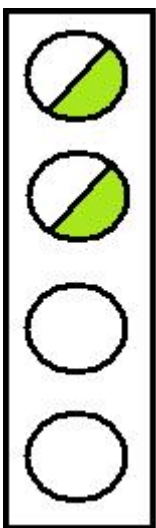
Blink second green light.

+



And if the power of the charger go up its maximum limit, the MVD auto limit the current and the third led is fixed YELLOW

STEP PAUSE / COOLING [PAU]

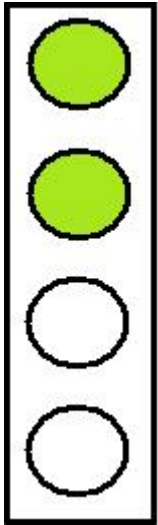


Blink first and second green lights.

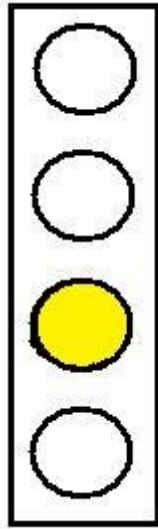
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MANUAL DESULPHATION

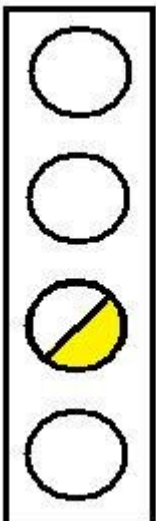


Fix first and second green lights.



And if the power of the charger go up its maximum limit, the MVD auto limit the current and the third led is fixed YELLOW

CYCLE COMPLETE



At the end of Cycles the charger waits for the disconnection of the charger. Use the UP and DOWN pushbuttons to scroll the menu. The menu shows the following informations.

25.3 V	END
37 Ah	0:13 t

- *) Battery voltage V
- *) Total Ah charged
- *) Total time of charge

Battery Charger MVD

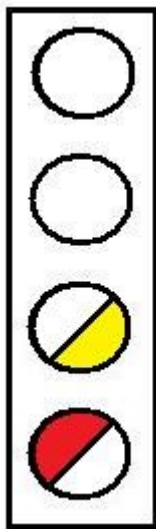
User's Manual

MANUAL STOP / MANUAL RESTART

At all times it's possible to STOP the charge process pressing and keeping pressed the UP pushbutton until the display shows:

MANUAL
STOP

Releasing the pushbutton the charge stops and the display shows:



25.3 V STOP
37 Ah 2.00 t

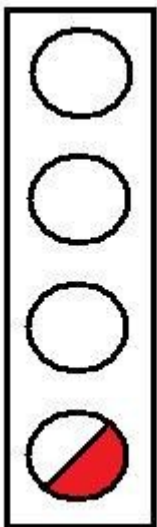
- *) Battery voltage V
- *) Total Ah charged
- *) Total time of charge

The charger keeps in memory the state of the charge.

Pressing and keeping pressed again the UP pushbutton, the display shows:

Releasing the pushbutton the charge restart.

ALARM



When there is an alarm, the input contactors open immediately interrupting the charge, the buzzer beeps and the display shows the cause of the alarm. When an alarm occurs the red led blinks.

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9. HISTORY LOG (OPTIONAL)

The internal memory of the MVD charger contains a log of the last 250 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

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

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PAGE B

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***

01-18

Charge completed successfully.

06

Desulphation cycle completed successfully.

GROUP 2: ***MANUAL STOP***

11

Charge stopped manually, during a generic cooling state

24

Charge stopped manually, during desulphation.

G1

Charge stopped manually, during the constant current phase.

G3

Charge stopped manually, during the constant voltage phase.

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GROUP 3: **BATTERY DISCONNECTED**

- 33
The battery has been disconnected during cooling phase.
- 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
- 47
Battery disconnected during the constant current phase.
- 49
Battery disconnected during the constant voltage phase.

GROUP 4: **EMERGENCY STOP**

- 65
Charge never started.
Battery voltage was too HIGH
- 76
Emergency Stop!
Maximum temperature exceeded during desulphation.
- 79
Emergency Stop!
Battery voltage exceeded maximum programmed value during the constant current phase.

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M0

Emergency Stop!

Battery voltage exceeded maximum programmed value during the constant voltage phase.

M1

Emergency Stop!

Battery temperature exceeded maximum programmed value during the constant voltage phase.

L5

Emergency Stop!

Battery temperature exceeded maximum programmed value during the constant current phase.

GROUP 5: WARNING MESSAGES

82

The battery has been disconnected while the charge was in progress, in a generic state.

83

Output fuse blown.

86

Battery temperature probe malfunction

95

The charger don't execute the program because the parameter of the program are uncorrectly.
Setting program error

99

Black out of the AC input.

- End of Manual -