

EBD BATTERY CHARGER UNIT

USER MANUAL

EBD- 1P24V/50A



INFORMATION

- 1. Please read this manual to be able to use the device for a much longer period.**
- 2. Keep the manual in a place that is easy to reach.**
- 3. Follow all the instructions in order.**
- 4. Do not use the device without earthing.**
- 5. Do not carry out anything that you are not certain of.**

CAUTION

- 1. The hatch of the device should never be opened. There are not any parts that the user can interfere with.**
- 2. No liquid or object should go into the vent holes nor should these holes be blocked.**
- 3. Do not use the device with a voltage rate other than its specific rate on the power tag.**
- 4. Use your device only with the specific kind of batteries that the manufacturer recommended.**
- 5. The cables also should be chosen as stated in the manual.**
- 6. The environmental status of the place must be in compatible with the ones in the part, "TECHNICAL FEATURES"**
- 7. 1. If this device has optional input filter; at low loads, reactive energy (inductive or capacitive) can be consume from grid. Because of that please take necessary precaution.**

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I. INTRODUCTION

DESCRIPTION OF THE DEVICE

The Battery Charger works according to the principle of Constant Voltage and Constant Current. The output voltage remains constant up to the set maximum current value, and when a higher current is desired to be pulled, the device reduces the output voltage and keeps it constant at the set value. The latest set values keep those values constant even when the energy is cut by the processor.

It is designed and produced for use in the communication and alarm circuits of boats and yachts, in the security systems of the work places and residences, in petrochemical industry and power electronics applications, in experiments and laboratories of schools, in the test laboratories of factories or in the power supply systems of the devices supplied with DC voltage. Flat B series BATTERY Rechargers are suitable for recharging lead acid, nickel cadmium and dry type batteries and for DC supply systems. As it allows for turning on and off in short periods with high discharge currents, it provides suitable solutions for emergency lighting, alarm, communication circuits, galvanize and aluminum anodizing facilities, petrochemical industry and power electronics applications.

General characteristics:

- Adjustable timer for quick charge
- Adjustable normal and quick charge voltage
- Adjustable maximum charge current
- External alarm contacts
- Modular design
- Electronic high / low voltage and overvoltage protections
- Short circuit protection
- Transformer and isolated output
- Parallel / serial connectivity
- User friendly control panel
- Double digital indicator for voltage and current
- Input filter and overvoltage protection
- Internal overheat protection
- Rectifier failure warning light and warning contact
- Battery critical discharge level warning light and warning contact

II. FLAT- BATTERY CHARGER UNIT TECHNICAL FEATURES

INPUT:

Input Voltage	: 1 Phase 230V AC
Input Frequency	: 50 Hz $\pm$ 2%
Input Protection	: Thermal Magnetic Fuse (MCB) for over Current and over voltage

OUTPUT:

Float Charge Voltage	: 27,5V DC
Boost Charge Voltage	: 30V DC
Boost Charge Time	: 0 - 999 min. adjustable
Output Voltage Tolerance	: $\pm$ % 1
Low Voltage Protection	: 20 V DC
High Voltage Protection	: 35V DC
Output Current	: 50A
Control System	: Thyristor controlled
Output Fuse Protection	: Thermal Magnetic Fuse (MCB)
Battery Fuse Protection	: Thermal Magnetic Fuse (MCB)
Output Current Limit	: 5 A – 50 A (Adjustable)

LDC PANEL

Measurement	: Input voltage (VAC), output voltage (VDC), Output Current Value (ADC), Boost Charge duration, Battery voltage (VDC), Battery current (ADC), Input Frequency
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Illuminated Cautions	: Input CB, Output CB, Battery CB, Boost Charge, Float Charge, Fault, Overtemp, Earth Leakage, Battery Low
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Buttons	: Reading buttons (Up, Down, Right, Left, and Enter)
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GENERAL:

Cooling	: Internal fan
Efficiency	: At full load 90%
Working Temperature	: -10 C +50 C
Humidity	: 90% not condensed
Noise Level	: < 60dB
Input / Output Connection	: MCB

III. FLAT BATTERY CHARGE UNIT PROTECTION

A. PROTECTION UNITS

Low Output Voltage Warning: When the Output Voltage of battery charge unit decreases below the “LOW VOLTAGE PROTECTION” –defined in “TECHNICAL FEATURES” part- it will give the audible and written warning: LOW OUTPUT VOLTAGE-. “OUTPUT LOW” warning will appear on the front panel and an audio will be on. Audio warning can be stopped by pressing up arrow “L” button. This warning is only to inform, it does not bring about any change in the running of the device.

As for AUTOMATION type battery charge units, the warning is given with the relay switch.

Low Battery Voltage Protection: There is an optional “LOW BATTERY”, “LVD” protection in the FLAT-B battery charge units, so that the battery group connected in the charging device output would not discharge excessively when there is a problem with the rectifier or when the network voltage is cut down. It composes of a contactor and control unit that cuts down the energy that is given to these charges; rate of which can be adjusted from front panel menu. An audio is on when the battery voltage is below the LVD set rate. On the LCD panel “LVD FAULT” appears and in 5 seconds LVD contactor is released and the energy is cut down. When the batteries are recharged and the battery voltage goes back to normal, the energy is given back to the LVD contactor and the charger.

Output Voltage High Protection: When the output voltage of battery charge unit is above the HIGH VOLTAGE PROTECTION VALUE” level which is defined in “TECHNICAL FEATURES” part, an audio is on and on LCD front panel “OUTPUT HIGH” appears. Audio warning can be stopped by pressing up arrow “U” button. After this warning, if output voltage does not go back to the normal rate in 5 seconds, battery charge device will turn off its thyristor units and cease the charging process. After the output rates go back to the normal level, battery charge device waits for 30 seconds and starts the charging process automatically.

As for AUTOMATION type battery charge units, the warning is given with the relay switch.

Input Voltage Protection: When one of the input voltages of battery charge unit is out of the “INPUT VOLTAGE PROTECTION” level, which is defined in “TECHNICAL FEATURES” part, an audio is on and a warning showing the faulty phase will appear on the LCD front panel. After this warning, if output voltage does not go back to the normal rate in 5 seconds, battery charge device will turn off its thyristor units and cease the charging process. On the LCD front panel, one of the following warnings will appear in order to show the faultiest part. “INZ FAULT”, “INL FAULT”, “INH FAULT” After the input rates go back to the normal level, battery charge device waits for 30 seconds and starts the charging process automatically.

As for AUTOMATION type battery charge units, the warning is given with the relay switch.

Overload Protection: Battery charge unit has the excessive current protection facility. When the total circuit extracted from the battery charge unit proceeds the “OUTPUT CURRENT” rate-which is defined in “TECHNICAL FEATURES”- control card output circuit carries out “CIRCUIT RESTRICTION” till it turns back to the normal rate. When the total circuit rate decreases, output voltage will turn back to the rate that is set on the LCD front panel. In any case of overcharging “OVERLOAD” warning will appear on the LCD. If the circuit rate is higher than 200% the control card will perceive it as a “SHORT CIRCUIT”. In this case, battery charge device will shut down its thyristor units and cease the charging process. “SCF FAULT” will appear on the LCD monitor. After output circuit rate goes back to normal, battery charge device will wait for 30 seconds and will start charging automatically.

Fuse Protection: There are Thermal Magnetic (MCB) fuses on the three phase input feeding, DC output line and BATTERY line. In any case of malfunction, faulty connection or excessive high power extraction; these fuses will be off and thus protect the system.

Over heat protection: If the cabin heat excessively rises or the thyristor module group is excessively heated, excessive heat protection is put into use to prevent any harm. Excessive heat protection works in two steps. When the ambient temperature is low and charge is little, cooling fans are not put into use because the battery charge unit is cooled by the air circulation. If the inner heat exceeds 50 °C, cooling fans start to work. If there is a problem such as excessive heat, excessive charging, fan malfunction etc. causing cabin heat to exceed 80 °C, protection is put into use and battery charge unit shuts down with an audio warning. "OVT warning is seen on the front panel and when the rates go back to normal, charge unit runs automatically.

Earth Leakage Protection: If there is any leakage from the (+) and (-) output ends to the body part, " EARTH LEAKAGE" caution will be seen on the front panel of the LCD and an audio warning is run. Earth leakage does not prevent battery charge unit from working. It is just for caution.

For AUTOMATION type battery charges units, switch output is made for the EARTH LEAKAGE CAUTION.

IV. INSTALLATION OF THE BATTERY CHARGE UNIT

A. UNPACKING

1. Before using the stabilizer that package of which is damaged or not available, call technical service.
2. The package of the stabilizer should be opened carefully and necessary precautions should be taken to avoid damage to the device in it.
3. After opening the package, whether the stabilizer was damaged during transportation should be inspected. To do this, switch, MCB fuses and etc. on the stabilizer will be inspected, and broken or removed parts will be observed. Whether the monitor on the front panel is damaged will be checked.
4. To ensure that electrical connections are not damaged, the stabilizer will be checked physically.
5. In case any slam or thud is released inside the stabilizer, do not operate the device considering the possibility of damage. Contact the technical service.
6. Before installing the stabilizer, always contact authorized service or have the installation of the device carried out by qualified technical personnel.

B. TRANSPORTATION

1. Follow the instructions on the package while transporting the device.
2. The device must be carried with a convenient pallet.
3. During the process device must be prevented from any falling, hitting and damages. It must be carried without being exposed to water, dust and harmful chemicals.

If your unit has plinths same as figure a;

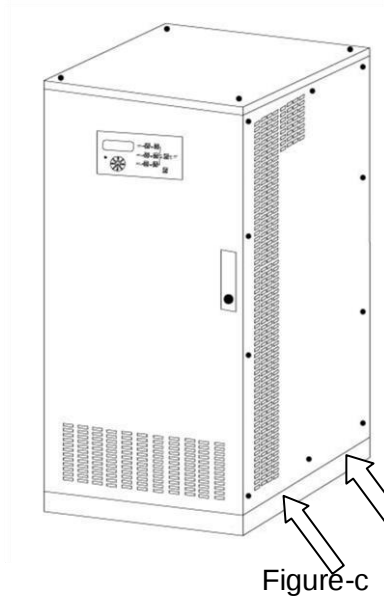


Figure-a



Figure-b

- a-)**When you open the package of the unit, please check the plinth covers whether they are damaged or not.
- b-)**Please remove all screw of the plinth covers with using an appropriately screwdriver or electrical handle tool. You can see screw of the plinth covers in figure b.
- c-)**Please remove the plinth covers and don't throw the screws and plinth covers, save them due to the fact that you will use them again.



d-) Please carry the unit by forklift with the place points that are shown in figure -c .Don't try to lift the units from another places of the unit, if you carry the units apart from the places that shown in figure-c can be damaged to the units.

e-) Please put the unit will be perpendicular to the ground slowly. If you put the units to the ground fastly and hardly, the leg of the plinth covers can be damaged.

f-) The place must be strong as much as lifting the unit weight.

g-) The unit that you put in the place must be straight. If it is not straight, the weight of the unit will not disperse to the all plinth legs equally in this case it would have damaged and bent

h-) The place is covered with a tough and durable material that is placed (such as concrete) can be embedded into the ground otherwise the balance of the plinth legs can be disrupted and damaged.

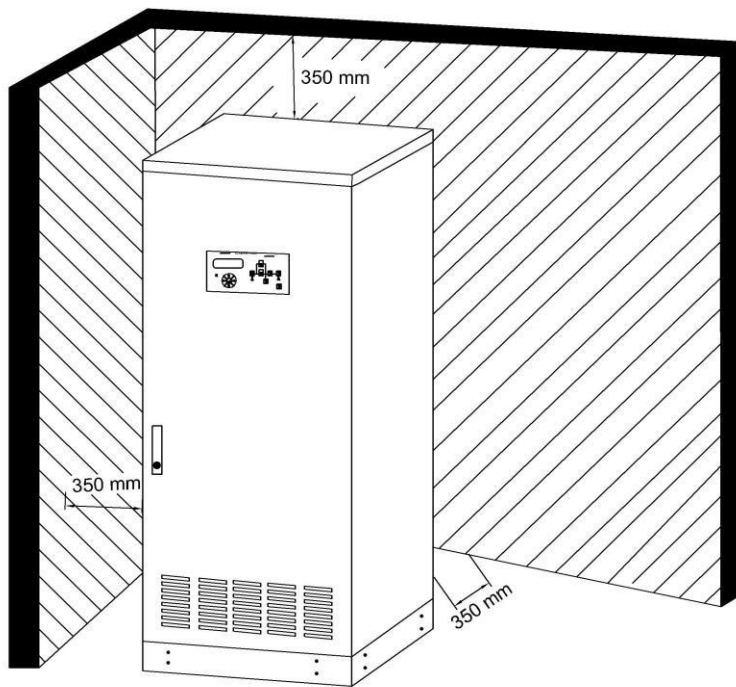
i-) Do not drag the unit after put the unit on the ground. If you drag the unit on the movement of the plinth legs, it would have damaged the plinth legs

j-) When plinth legs are damaged, you can not close the plinth covers once more.

k-) Please put the plinth covers and then screwed them after you placed the units

C. PLACE SELECTION

- 1- For smooth operation of cooling system of the stabilizer, the room where the stabilizer is installed should be ventilated.
- 2- Make sure to hold the stabilizer at least 350 mm apart from the nearest object.
- 3- Note that the ambient where the stabilizer is present has convenient environment mentioned at "TECHNICAL SPECIFICATIONS"
- 4- Select the places that are neither extremely dusty nor extremely damp and will not lead to corrosion for the stabilizer.
- 5- Do not use the stabilizer in the places where inflammable and explosive materials are present.
- 6- Choose places where no liquid is possible to splash or drip on the stabilizer.

**Figure-2: Place Selection**

D. ELECTRICAL CONNECTION

An Input separation device must be provided in order to connect the battery charge unit to the wiring of the building. The rates of this device are given in the chart below. The device must be turned off before the battery charge connections are carried out.

A separation device can be kept between the output of battery charge unit and the CHARGES. The rates of this device are given in the chart below. The device must be turned off before the battery charge connections are carried out.

A separation device can be kept between the output of battery charge unit and the BATTERY GROUP. The rates of this device are given in the chart below. The device must be turned off before the battery charge connections are carried out.

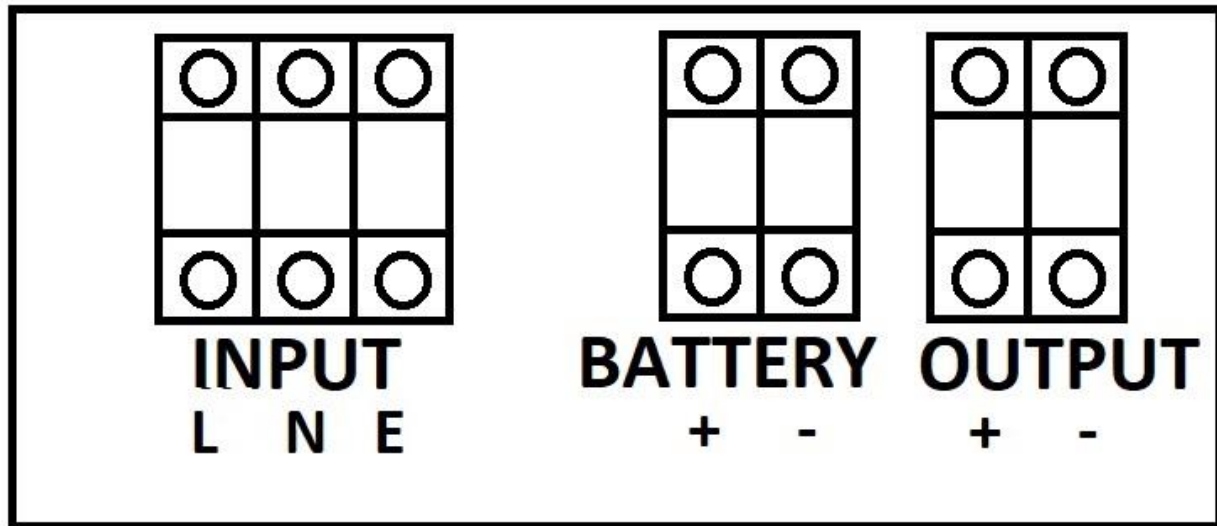
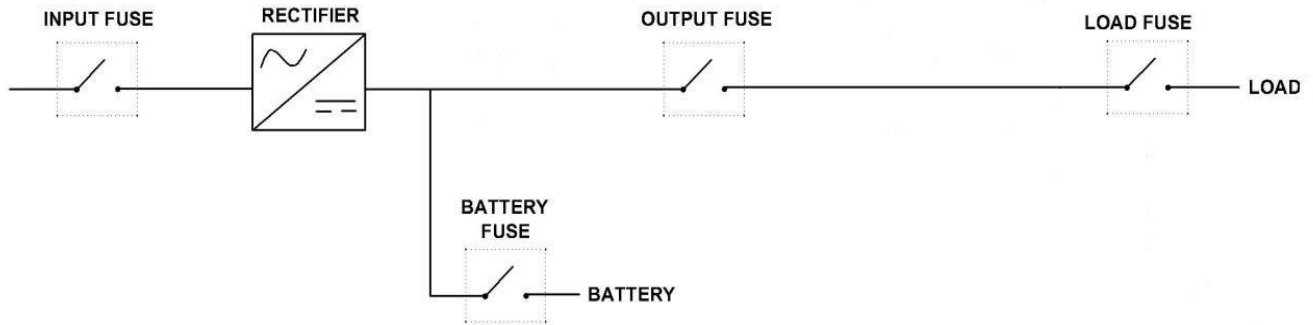


Figure -3

	Circuit Breaker Device And Its Value	Cable Sections(mm ²)
INPUT	Thermal Magnetic Fuse 20A	6 mm ²
OUTPUT	Thermal Magnetic Fuse 50A	16 mm ²
BATTERY	Thermal Magnetic Fuse 50A	16 mm ²
NEUTRAL		6 mm ²
GROUND		6 mm ²

Figure -4

E. BLOCK DIAGRAM**Figure-6:** Block Diagram

F. OPERATING

1. An Input separation device must be provided in order to connect the battery charge unit to the wiring of the building. This device must be a convenient thermal magnetic fuse. Cut the electricity down before running the device.
2. Check if the system is properly working before circulating the Battery charge unit. Input and output cables must have the convenient capacity. Neutral and earth connections must be carried out properly. Measure the Neutral-Earth voltages, the Phase-Neutral and Phase- Phase rates of the input voltages with an AVO meter. Check if there is any short circuit or leakage.
3. Input-Output connections are carried out according to the diagram on Figure-3. After all the connections are made and controlled, Output and battery fuses of the battery charge unit are turned off. INPUT fuse is switched on and energy is transmitted to the device.
4. When energy is transmitted, LCD front panel will be turned on. Input and Output voltages, condition and malfunction information are checked on the LCD front panel. All the information about these rates are explained in the "LCD FRONT PANEL" menu.
5. The Input-Output voltage rates must be the same as tag rates of the device and the rates in the "TECHNICAL FEATURES" section. If they are different from one another, turn off the device and call technical support.
6. When battery charge unit is run for the first time, it is turned on in "BOOST CHARGE" position. Output voltage will be the same as the "BOOST CHARGE VOLTAGE" output voltage of battery charge unit will remain at "BOOST CHARGE" as long as "BOOST TIMER" is "0". When it is "0" output voltage is set to the "FLOAT CHARGE". As long as output voltage's set rates are not changed or "BOOST TIMER" is reset, it will remain at "FLOAT CHARGE" voltage. Measure voltage rate of the output connection terminals with an AVO meter DC voltage measurement position. Check if the rates are the same as seen on the LCD panel. If there is any inconsistency, call technical support.
7. After the output voltage rates are proved to be correct, "OUTPUT FUSE" is removed and energy is given to the charges. When energy is given for the first time, there will be some decrease in the output voltage of battery charge unit. But it should go back to normal in 1-2 seconds. Check "OUTPUT CR." on the LCD monitor after energy is given. "OUTPUT CR." Shows the total circuit rate that is extracted from the output of battery charge unit. This rate should not exceed "OUTPUT CIRCUIT". If it does, battery charge unit will limit the circuit and decrease the output voltage. Check the charge if the output circuit rate is high. Measure voltage rate of the output connection terminals with an AVO meter DC voltage measurement position. Check if the rates are the same as seen on the LCD panel. If there is any inconsistency, call technical support.
8. BATTERY GROUP that will be connected to the battery charge unit is prepared. The connections between the battery group and the battery charge unit must be within proper capacity level as stated in "ELECTRICAL CONNECTION" section. After the connections are made properly, measure the voltage rate in the battery connection terminal with an AVO meter DC voltage measure position; before switching "BATTERY FUSE". Check if the (+) and (-) poles of the battery charge voltage are connected in the correct terminal. The voltage rate must be between the "FLOAT CHARGE ADJUSTMENT" rates. If there is any inconsistency, do not switch the battery fuse and call technical support. If everything is properly working, switch it on to start the process.
9. After energy is given to battery group, "OUTPUT CR." is checked again on the LCD monitor. In that case "OUTPUT CR." rate shows the total circuit that is extracted from the output of the battery charge unit. This rate is not supposed to exceed "OUTPUT CIRCUIT" rate. If the battery group is empty (uncharged) output voltage will decrease as the total circuit exceeds "OUTPUT CIRCUIT" rate. When battery group is charged, circuit rates will go back to normal and output voltage rate will remain at "FLOAT CHARGE" rate.
10. If there is not any caution on the LCD panel, the device is done with the circulating.
11. Check the environment and safety requirements of the device. Check the connection cables again. Close the hatches of the device.

G. TURNING THE BATTERY CHARGE DEVICE OFF

1. In cases of an emergency, turn off the Input separation device or Input, output and battery fuses.
2. If there is no emergency, turn off the devices that are connected on the DC Outputs before turning off battery charge unit.
3. When you turn off battery charge unit, all the information on the LCD front panel will disappear. If you are turning it off due to a malfunction or if you need to inform technical support staff, save all the information on the LCD panel beforehand.
4. Turn off the input fuse of the battery charge unit. Charging process will cease. Control cards and the LCD panel will carry on running, if the batteries are compatible with the regular voltage rate.
5. Switch off the battery and output fuses. Control cards and the LCD panel will cease after some time (2-5 minutes), due to the energy that are accumulated in the filter units of the battery charge unit. In the meantime there will be several audio and flashing signals but do not pay attention to those.
6. There are dangerously high AC and DC voltages in the fuses and filter units even after the battery charge unit is turned off. Therefore do not open up the hatches and do not separate the connections such as input, output, battery etc.
7. Battery charge unit is safely switched off. Call the technical support for any kind of problems.
8. If the battery charge unit is running properly, in order to restart it, please follow the instructions that are stated in the section "CIRCULATING".

CAUTION

Be sure that you conduct the earthing. Never run the device without the earthing process. Earth-neutral voltage must be lower than 3 V.

V. LCD FRONT PANEL

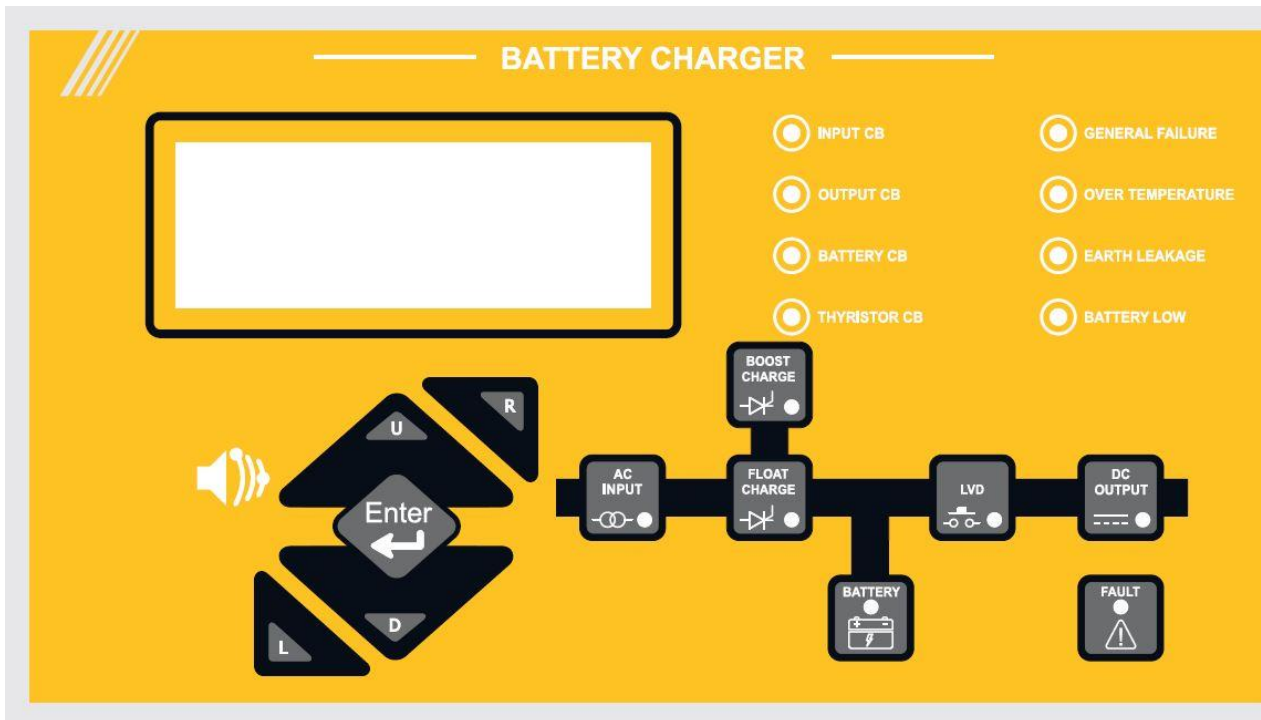


Figure-7: LCD Panel

- 1st line is the condition line. It gives information about the working condition of the battery charge.
- On the 2nd-3th and 4th lines of the LCD, there is "Input", "Output", "Out .CR %", "Freq.", "Temp.", "Error" information. You can access them with CONTROL buttons.
- **INPUT** : If there are input voltages and they are within tolerance limits. (green)
- **RECT.BOOST**: It shows that the battery charge unit is making BOOST CHARGING.
- **RECT.FLOAT**: It shows that the battery charge unit is making FLOAT CHARGING.
- **OUTPUT** : It shows that the battery charge unit DC output voltage is within the normal limits.(green)
- **BATT** : It shows that the battery voltage is within the normal limits.
- **FAULT** : It is on when there is any warning or malfunction occurs.(red)

Use the buttons to move between the menus. Through RIGHT (R) and LEFT (L) buttons transition between the menus is carried out and any audible warning is ceased. UP (U) and DOWN (D) buttons are used in order to adjust the set rate that is to be changed. "Enter" is used in order to choose the parameter set rate of which is to be adjusted.

Front Panel Selftest: Frontpanel selftest can be made by user (to check sound and frontpanel leds). To maket this test, go to " Menu 1" and push to "enter" button 5 times repeadly. After this application all frontpanel leds turn on and off, heard short alarm voice (To here that voice, the alarm sound option must be "ON" in Settings Menu)

LCD INDICATOR MENUS:

MENU 1:

This menu is normal running monitor. When battery charge unit is run, this one appears. It is recommended that the indicator is left in this screen after anything is conducted in other menus.

2nd. LINE: OUTPUT V.&CR. : It shows the output voltage rate and current rate of the battery charge device.

3rd. LINE: BATTERY V.&CR. : It shows the battery voltage rate and current rate of the battery charge device.

MENU 2:

INPUT VOLTAGES: It shows the voltage rate of the battery charge device between the Input phase and the neutral. When this rates get out of the ones that are describes in "INPUT PROTECTION MEASURE" in "TECHNICAL FEATURES" part, battery charge unit gives "INL-R" or "INH-R", the error warnings.

MENU 3:

2nd. LINE : Shows the frequency of the input voltage.

3rd. LINE : Shows remaining time of the boost charging. After reaching 0 device automatically switches to float charging.

4th. LINE : Shows the temperature of the device. If the temperature exceeds 70°C the script which is 'NORMAL' becomes 'OVER'.

MENU 4:

The code of the last occurred error is shown here. Other lines below this one show the previous errors. To switch between lines press 'U' or 'D'.

MENU 5:

Settings entrance screen. To enter the settings screen, press enter then up up (once enter then twice up button). When you enter this code, settings menu will appear.

How to change operation Datas from front panel LCD?

Press enter to make the arrow sign (>) at the start of the line to equal sign (=). After you make the sign equal sign then press up and down arrow keys to change the voltage set value. When you are done with setting the voltage, press enter to make the equal sign to arrow sign again. The setting is not saved yet. Setting will be saved at save and exit line later.

Data	Description
FLOAT V.	Float charging voltage setting. Float voltage is the maximum voltage of the batteries. In normal conditions batteries are charged at this voltage level. Float voltage setting is suggested to be set to battery maximum voltage. Also this setting will determine the output voltage of the device to the loads.
BOOST V.	Boost charging voltage setting. Boost voltage is higher than float voltage. When the batteries are charged at boost charging voltage, they can draw more current, thus can be charged faster. Boost charging is a small period fast charging operation.
OUT CR.	Output current setting. To change the setting perform same operations explained in previous part.
BAT CR.	Battery current setting.
BOOST T.	Boost charge duration setting. This setting can be as high as 999 minutes, but it is suggested that you do not set this setting higher than 5 minutes. If you set this setting to a very long time, your batteries can reaches to higher voltage levels than their maximum voltage level, which will degrade their working life.
LVD V.	LVD (Low Voltage Disconnect). If the output voltage gets below this set value, device shuts itself down. When mains input power is lost, batteries start to supply power to loads and their voltage drops in time. Set a value here where device will shut itself down to protect over discharge and damage of the batteries which should be the minimum voltage level of the batteries.
Set Year	Adjustment System Clock and Time
Set Month	Adjustment System Clock and Time
Set Day	Adjustment System Clock and Time
Set Hour	Adjustment System Clock and Time
Set Minute	Adjustment System Clock and Time
Sound Alarm	Sound alarm on/off data.
Modbus Add.	Modbus Device ID of RS485 Communication
MB1 Baud Rate	Modbus CH1 Baud Rate of RS485 Communication
MB1 Parity	Modbus CH1 Parity of RS485 Communication
OutVolMax	DC Output Voltage High Limit ; If the device Output dc voltage higher than "OutVolMax", The device output contactor will be open circuit and Device will record a log; output voltage error.

MENU 6- System Information Screen:

Status of the device as well as version information is shown in this menu. It is informative only. There is no user changeable settings.

W. Mode: Device working mode is displayed.

Time: Current time and date information is displayed.

First C. Op. : For Productor.

FP FW ver. : Front panel firmware version is displayed.

FP HW ver. : Front panel hardware version is displayed.

MB FW ver. : Mainboard firmware version is displayed.

SD1 : 1 step Silicon Dropper Unit is displayed being active.

SD2 : 2 step Silicon Dropper Unit is displayed being active.

IP : Device IP is displayed.

VI. LCD INDICATOR WARNING MESSAGES

The warning messages that appear on the first line of the LCD indicator:

Errors

Error Format ; yaaa

y : for 1 means Mainboard Errors y : for 4 means Frontpanel Errors

aaa: means specific error code

Code	Description
y001	input Voltage zero
y002	input Voltage Low
y003	input Voltage High
y004	Output Voltage High
y005	Output Voltage Low
y006	Over Temperature
y007	Current Zero Failure
y008	Square Wave Failure
y009	Short Circuit Failure
y010	Overload Error
y011	Undefined Error
y012	Phase error
y013	Phase Rotate Error
y014	Phase Rotate Error
y015	Phase Rotate Error
y016	L1 input Voltage Low
Y017	L1 input Voltage High
y018	L2 input Voltage Low
y019	L2 input Voltage High
y020	L3 input Voltage Low
y021	L3 input Voltage High
y022	Earth Leakage
y023	Out Current Limit
y024	Bat Current Limit
y025	Mainboard and frontpanel Communication Error
Y026	Low electrolyte level

VII. DETECTION AND FIXING OF THE MALFUNCTION

MALFUNCTION		SOLUTION TO THE PROBLEM
MALFUNCTION TYPE	PROBABLE CAUSE	
NO DC OUTPUT	One of the output charge fuses is waste or malfunctioning	Check the Output charging fuses. Replace them with the new ones if they are wasted or malfunctioning.
	Battery charge unit is on the protection mode because of a fault such as excessive heat, charge, short-circuit, low input voltage, high input voltage LVD or frequency error etc.	Check the error cautions from the LCD display. Fix, if there is any problem. Measure the Input AC voltage with an AVO meter and check the heat of the device.
	Malfunctioning of the control card.	Check the feeding and malfunction led of the control card. Replace it with a new one and restart the battery charge unit.
	One of the Tristor-Diode modules is malfunctioning	Localize the malfunctioning Tristor-Diode module. Replace it with a new one and restart the battery charge unit.
NO AC INPUT, INPUT LOW CAUTION ON LCD DISPLAY	Input voltage is out of the limits stated in TECHNICAL FEATURES	Check AC Input cable system. If it is working properly, wait for the network voltage to reach normal levels.
	Input fuse of the battery charge unit or the fuses in main distribution chart may be wasted or malfunctioning	Check the input fuse of the battery charge unit and the fuses at the main distribution panel. Replace them if they are wasted or malfunctioning.
INPUT HIGH CAUTION LCD DISPLAY	Input voltage is out of the limits stated in TECHNICAL FEATURES	Check AC Input cable system. If it is working properly, wait for the network voltage to reach normal levels.
“OVER TEMP” CAUTION ON	Cooling fans or fan control thermostat may be malfunctioning	Check if the fans are working properly. If they are not, replace them with new ones. Check fan control thermostats. Replace them if there is any problem.

LCD DISPLAY	The atmosphere may be too heated. Vent holes may be blocked	Eliminate the environmental factors that cause excessive heat. The room is ventilated and vent holes are unsealed. Check the dust filters in the vent holes.
COMM. ERROR ON LCD DISPLAY	Malfunctioning of the LCD Display card	Check LCD Display card. Malfunctioning one is replaced with a new one
	LCD Display card and the control card may not be communicating	The Flex cable which connects the LCD Display and the Control card may be harmed or the sockets may be plugged off. Replace them with the new ones.
SMELL COMING OUT OF THE DEVICE	Drying of Transformator's insulation gloss	There might be a gloss smell for the first few days, this is not a malfunction
	Ignition of the cables or connection terminals due to excessive charge and heat	Check if there is any looseness or oxidation in the connection terminals after turning off the device. They are replaced with new ones that have the same features. Check the cable insulation Check if there is any overcharging and if the input voltages are within the normal rates. Call the technical service if no malfunction cause is detected.
	Ignition of the transformers due to short circuit, excessive charge and heat	Check if there is any looseness or oxidation on the Transformator's. They are replaced with new ones. Check if there is any short circuit in the inner rollers. Check if the output voltages are correct by giving the transformator some voltage. If so, they are replaced with the new ones that have the same features. Call the technical service if no malfunction cause is detected.
EXCESSIVE NOISE OUT OF THE DEVICE	Cooling fans may be malfunctioning	Fans are replaced with new ones
	Looseness on the transformator or power control units' connections	Check out all the parts of the device

VIII. PERIODICAL MAINTENANCE

The maintenance of the device is simple and easy as the battery charge unit is composed of semi-conductor material. Therefore you do not have open the hatch for maintenance.

Following procedure should be carried out for periodical maintenance:

- a. Firstly, all the devices that are connected to battery charge unit are turned off. Input of the battery charge unit is shut down both on the fuse or switch of the panel and on its own switch. Output and battery fuses are turned off. (Battery charge unit is switched to OFF.)
- b. The dust is cleaned by a moist cloth.
- c. Check if there is any looseness on the wiring and connectors of the battery charge unit. If so, tighten it or else it may lead to a malfunction.
- d. Check if anything is blocking the vent holes.
- e. Turn on the battery charge unit with both the panel and its own fuse is switched on. (Turn it to ON)
- f. Check if cooling fans are working properly.
- g. Measure input and output voltages of the battery charge unit. Check if these rates are compatible with the ones that are stated in TECHNICAL FEATURES section.
- h. While BATTERY group or other devices that are connected to battery charge unit are running, check if Output voltages are within the normal rate levels. (When the charges of the unit are turned on alternately, some fluctuations will be observed. This indicates that Battery charge unit is working properly and that it conducts voltage check-ups.)
- i. Measure the output circuit rate with an ammeter. Check if it is compatible within the normal rate levels.
- j. After a while, measure the output voltage once again and compare the result with the normal rate levels.
- k. Measure the rates such as Input / Output voltage, Output current etc. with an AVO meter and compare the rates with the ones on LCD Display. Both rates must be the same. If these rates are higher than $\pm\%1-2$, please call technical support for calibration adjustment.