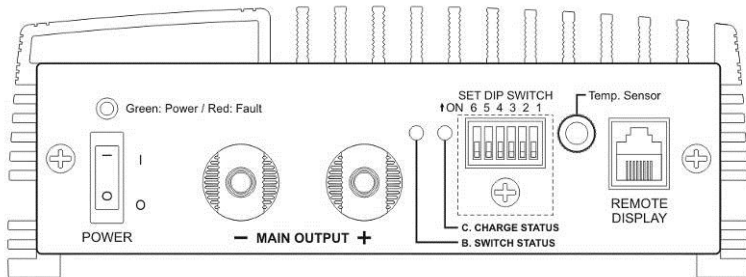




BBC-3140

USER MANUAL

DC-DC CHARGER / BATTERY EQUALIZER / VOLTAGE REDUCER



Important

The BBC -3140 must be used according to the local safety standards with the particular application. All wiring and connections to the units should be done by a qualified person. No modification or adjustment is allowed on the unit.

Safety Precautions and Installation Procedure

1. Always disconnect the 24VDC supply at the source before any connection made on the output.
2. ***Always double check on the correct polarity on both the input and the output before the last wire connection is made on the output and input terminals.***
3. Use appropriate gauge of wires and fuse /circuit breaker.
4. Mount the unit as close as possible to the battery banks and at a well ventilated spot.
The cables must have proper sized lugs with heat-shrunk insulation.
5. Double check tightness of terminal nuts by wriggling joining cable a few times. It pays to double check on the tightness of the nuts which may become loosen due to vibration and shocks from the vehicle on the road.

Introduction

This micro-processor controlled 3 stage DC-DC charger can be installed as: battery charger or battery equalizer or regulated dc-dc step-down converter. It operates with any DC input source of 24- 30 V with various output voltage according to selected installation.

Applications & Features

1. As a 3 stage charger for 12V battery bank from a 24V source, it has selection for Wet, AGM and Calcium-Calcium battery types.
With the optional Remote Display Module, user can set the absorption voltage level & time and the float voltage.
2. As a Battery Equalizer which balances both 12V series connected batteries in a 24V battery system during charging and even under highly unbalanced load from center tap.
3. As a DC-DC Step Down Converter (Voltage Reducer) with regulated 40A, 13.8 VDC output for voltage sensitive load.
4. Automatic car ignition connection to enable operation only when car is switched on or by manual remote simple on-off contact control.
5. Optional remote control display module (BBR-3100) for charger application.
6. Optional temperature sensor (ATS-5120) for battery.

Protection

Low Input Voltage

Unit output will be off when input voltage is less than 22V +/- 1V. The output will shut down immediately and LED A turns red. When input voltage rises higher than 24V for 2 minutes continuously, the unit will return to normal operation again, LED A turns green again.

High Input Voltage

Unit output will be off when input voltage is above factory preset level LED A turns red.
When input voltage drops below the preset level unit operates again, LED A turns green again.

Output Short Circuit

When output is short circuited, unit will be disabled and LED A turns red.
After short circuit is removed, unit has to be manually switched off then on again to restore normal operation

Output Overloaded

If unit is continuously overloaded, unit will be disabled and LED A turns red.
After overload is fixed, unit has to be manually switched off then on again to restore normal operation

High Output Voltage

When output voltage is higher than factory preset, unit will be disabled and LED A turns red. Unit has to be manually switch off then on again to restore normal operation

Thermal Overload

When unit's internal temperature exceeds factory preset limit, unit shuts down and LED A turns red. Unit has to be manually switch off then on again to restore normal operation when unit cools down to room temperature.

Battery Over temperature

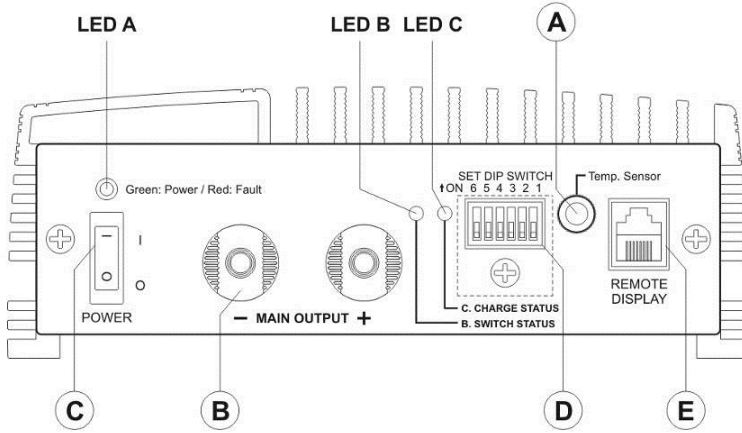
When battery is detected by the remote sensor to be over 60°C, the output will shut down and LED A will turn red.

When battery temperature decreases to appropriate level, output will be restored automatically

Output Reverse Polarity Connection

By internal thermal fuse.

Front Panel Operation



| SWITCH | SWITCH TO ↑ ON | LED B |
|--------|-----------------------|-------|
| 1 | AGM / GEL | OFF |
| 2 | WET | OFF |
| 3 | CALCIUM-CALCIUM | OFF |
| 4 | User Defined Charge A | ON |
| 5 | User Defined Charge B | ON |

| | | |
|--|---|--------------------------|
| 6 | Battery Equalizer: Output V = ½ Input V | LED B OFF , LED C OFF |
| All switches to OFF : Output = 13.8VDC | | LED B OFF , LED C OFF |
| 2 or more switches to ↑ ON : NO OUTPUT | | LED B BLINKS , LED C OFF |

LED A. LED operation status:

Green: Unit in normal operation and power on.

Red: Unit is not operating and is in protection mode or wrong dip switch selection.

LED B. Battery type/ DIP Switches status.

OFF: Indicates one of the three standard battery type is selected.

Orange blinking: Error in setting of DIP switches.

More than one switch set to "ON".

Orange solid: User defined charge profile selected.

Must be used with the optional Remote Panel

LED C. Charging status:

Green blinking: Bulk/ Absorption Charge

Green solid: Float Charge

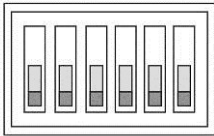
A. Remote Temperature sensor socket for battery

B. Output to battery or load.

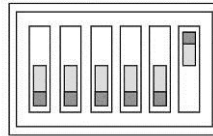
C. Power ON / OFF switch.

D. Explanation of the DIP switches settings for Battery Type or charge profile selection.

SET DIP SWITCH
1 ON 6 5 4 3 2 1



SET DIP SWITCH
1 ON 6 5 4 3 2 1



There are 6 DIP switches Up position is the On or Selected position.

Caution

Only one switch is allowed to be set to ON (up position) at any one time. If more than one switch set to ON, output will shut down and the orange B LED will blink until selection has been corrected.

BATTERY CHARGER MODE

DIP 1 UP: AGM/GEL battery type. Absorption 14.1V, Float 13.2V.

DIP 2 UP: Wet battery type. Absorption 14.4V, Float 13.5V.

DIP 3 UP: Calcium-Calcium type. Absorption 15.5V, Float 13.8V.

DIP 4 UP: User defined 1 in which Absorption, Float Voltages and Absorption time are set via Remote Display Module.

DIP 5 UP: User defined 2 in which Absorption, Float Voltages and Absorption time are set via Remote Display Module.

BATTERY EQUALIZER MODE

DIP 6 UP: Battery Equalizer: Output V = $\frac{1}{2}$ Input V.

VOLTAGE REDUCER MODE

All 6 DIP switches DOWN: Unit becomes a DC Voltage Reducer with regulated 13.8V output.

E. Remote Display connecting / connector is RJ12.

Installation and operation

The remote on-off/ ignition control terminal at the back of the unit are shorted as default setting for continuous operation.

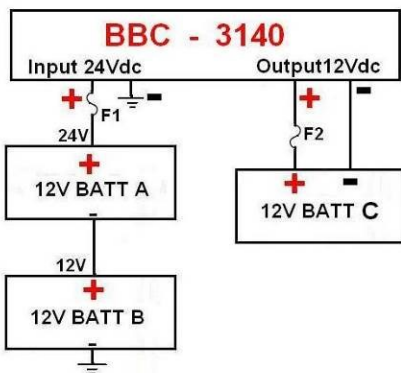


See section of instruction for remote on-off and ignition control application in the appendix A.

DC-DC CHARGER INSTALLATION:

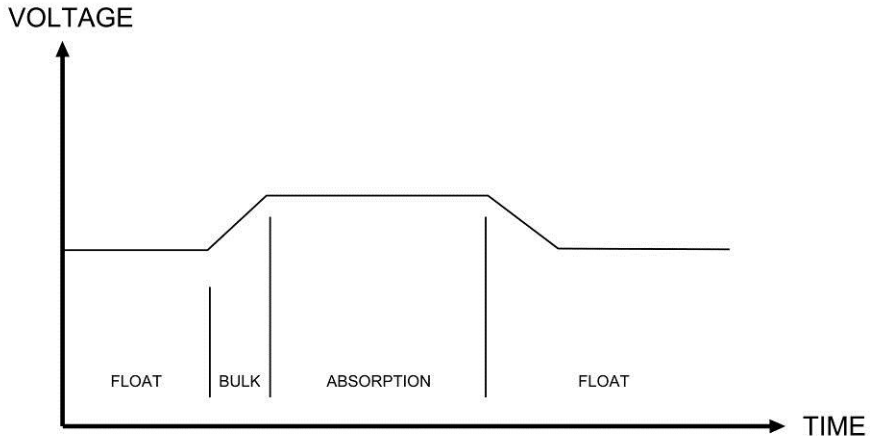
1. Check all the DIP SWITCHES are at down position
2. Push up the single DIP SWITCH that matches your battery type
3. DIP 1 = AGM/ GEL; DIP 2 = WET; DIP 3 = CALCIUM-CALCIUM
4. Only one DIP switch is allowed to be in up position
5. **Double check for correct polarity on the input and output before connections are made.**
Any wrong polarity on the input or output connection will damage unit.
6. LED A in green color when unit is working normally.
7. LED C shows the charging status:
Flashing Green = Boost Charging (Bulk/ Absorption)
Solid Green = Float Charging with less than 10A & less than 13.8V

DC - DC Charger Mode



Charging Profiles

This special 3 Stage charging profile is designed to give quick and complete charge to the auxiliary battery bank and at the same time provides sufficient power to the loads that connected to the auxiliary battery while keeping the battery fully charged.



Float (LED C solid green):

Charger will start with 13.2 to 13.8 charging voltage and keeps at this voltage until current drawn by battery is more than 10 Amp for 5 minutes or battery voltage is less than 12.5V for 5 minutes then charger goes into Bulk Charge Mode.

Bulk (LED C flashing green):

At Bulk charge mode , charger puts about 40 Amp of constant charging current to the battery until the battery voltage rises to the Absorption Voltage level (according to the selected battery type) then charger goes into Absorption Charge Mode.

Absorption (LED C flashing green):

In Absorption charge mode, the charging voltage is kept constant (according to the selected battery type). The charging current decreases as the battery is charged up. When the charging current drops to about 4 Amps or after 3 hours in absorption mode, the charger will go to Float charge mode. Whilst in float mode, if the battery draws a current as large as 10Amp continuously for about 5 minutes, the unit will recycle charge to Bulk charge mode.

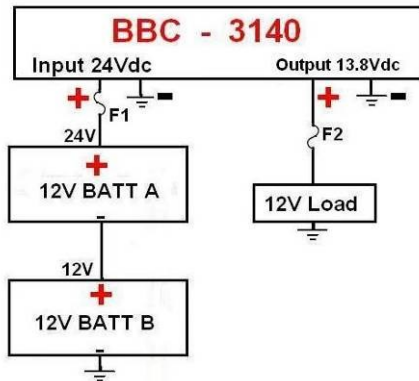
Voltage Reducer Mode (Step Down Converter):

1. Set all the DIP switches to down position , check LED B and LED C are both off to confirm unit becomes a Voltage Reducer with 13.8V & 40A output.
2. **Double check for correct polarity on the input and output before connections are made.**
Any wrong polarity on the input or output connection will damage unit.
3. Unit can be set to Automatic car ignition control or manual remote on-off via the Ignition terminal as the back of the unit.
For continuous operation short circuit the Ignition terminal.



4. All the protections of the unit are applicable in this mode as in charger mode.

Voltage Reducer Mode



Battery Equalizer Mode

As a Battery Equalizer, it can be installed in any 24VDC (two 12V battery in series) system where the center tap is used to power heavy 12V loads. It keeps both batteries balanced during charging of 24V battery and balanced the second battery when used as a 12VDC source.

Short circuit the remote control ignition terminal for continuous operation

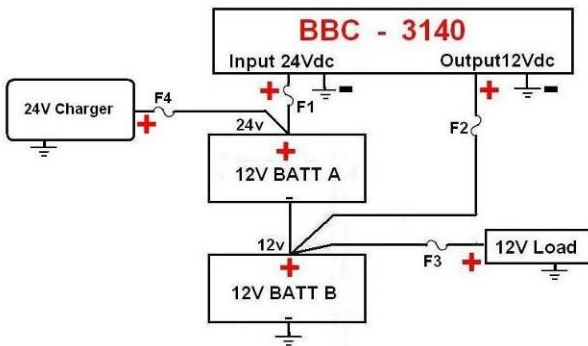


Double check for correct polarity on the input and output before connections are made.

Any wrong polarity on the input or output connection will damage unit.

Connect the unit, battery and center tap load as shown in the following diagram.

Battery Equalizer Mode



Specifications

| | |
|----------------------|-----------------------------|
| Rated Output Power | 40A at 13.8V |
| Efficiency | 86% |
| Input Voltage Range | 24 – 30VDC |
| Output Voltage Range | according to operation mode |

| DC-DC Battery Charger Mode | |
|---|---------------------|
| Float (GEL/ AGM) | 13.2V |
| Float (WET) | 13.5V |
| Float (Calcium-Calcium) | 13.8V |
| Absorption (GEL/ AGM) | 14.1V |
| Absorption (WET) | 14.4V |
| Absorption (Calcium-Calcium) | 15.5V |
| With Optional Remote Control Module BBR-3100 | |
| User Defined Float Voltage Range | 12.6V ~ 14.0V |
| User Defined Absorption Voltage Range | 13.0V ~ 15.5V |
| User Defined Absorption Time Range | 1 ~ 6hours |
| DC Voltage Reducer Mode | |
| Regulated Output Voltage | 13.8V |
| Battery Equalizer Mode: Output V = ½ Input V (11-15V) | |
| Output Voltage | ½ Input Voltage ±3% |
| Voltage Regulation: | |
| Load | 200mV |
| Line | 80mV |
| Ripple & Noise | 35mVrms |
| DC Input Current | |
| No Load Input Current (Standby) | 170mA |
| Full Load Input Current (at output 13.8V / 40A) | 26.5A |
| Input Current Level when Output Short Circuit | 2.5A |
| Protections | |
| Input Under Voltage (LVD Low Voltage Disconnect), (Auto reset) | (22V) (24V) |
| Input Over Voltage (Auto Reset) | 32V |
| Output Over Voltage (Manual Reset) | 17.5V |
| Output Over Current / Short Circuit (Manual reset) | 41A |
| Battery Over Temp. with remote temp. sensor (Auto Reset) | 60°C |
| Unit Over Temperature Protection | Yes |
| Reverse Polarity (Output) | 30A x 2 Fuses |
| Other | |
| Approval | CE EMC EN55014 |
| Dimensions (L x W x H) mm | 243 x 156 x 61 |
| Weight | Approx. 2.4kg |
| Supplied Accessories: A. one set of mounting bracket & taper screws B. hardwire input cable 1600mm AWG#22 C. one single red wire (for ignition control) 1500mm AWG#22 | |
| Optional Accessories: A. Remote Display Module BBR-3100 B. Remote Temperature Sensor for battery model ATS-5120 | |

Appendix A

Remote on/off ignition control

A. Ignition Terminals

The ignition terminals are short circuit by factory setting as shown for continuous operation of the unit.

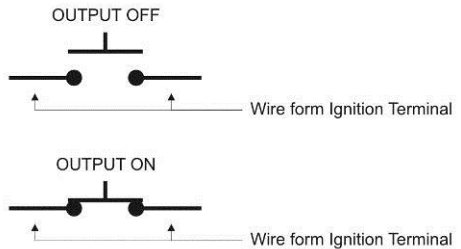


B. When these two terminals are open circuit there will be no output.



C. Remote On-Off function by connecting the two wires to the ignition terminal as shown Short=On, Open=Off. This function is applicable for the Charger Mode and Voltage Reducer Mode installation.

The master power on-off switch F must be on all the time in order to use this remote on-off function.



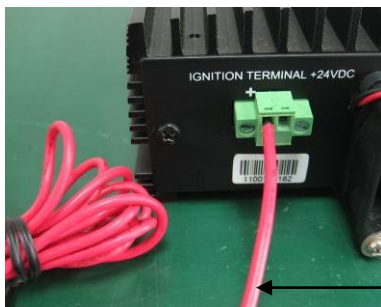
D. Ignition Control

Connect the supplied red wire to the + ignition terminal at back of unit.

Make connection of the red wire to the ignition switch of the car.

The unit will operate when the ignition is switched on.

The power on-off switch F of the unit must be on all the time in order to use this function.



To Ignition Switch

Appendix B

Remote Display Module BBR-3100 (optional)

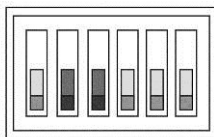
I. Introduction

The Remote Display Module is an optional module which has two functions:

1. Displays real time key information of the BBC-3140.
2. Sets charging parameters of the two user defined charging profiles.
Absorption Voltage Range: 13V to 15.5V
Absorption Time: 1 hour to 6 hours
Float Voltage: 12.6V to 14V

PREPARATION FOR USE WITH REMOTE DISPLAY PANEL
CORRECT SETTING OF DIP SWITCH 4 OR 5

SET DIP SWITCH
1 ON 6 5 4 3 2 1



Push either DIP 4 or DIP 5 to On (up position).

Only one DIP switch is allowed to set to On (up position)

DIP 4 UP: User defined 1

DIP 5 UP: User defined 2

Check LED B is in orange solid to confirm correct setting of DIP switch.

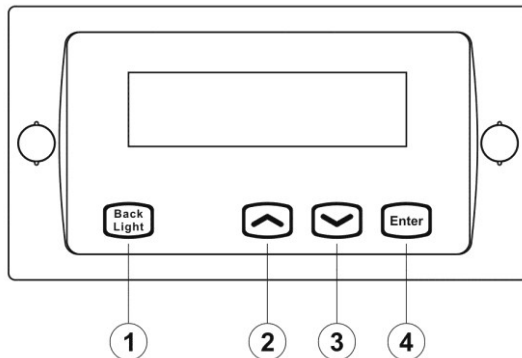
If LED B is in blinking orange then more than one DIP switch, unit is not set for this mode.

II. Connection



1. 10 Meters Phone Cable
2. In Line Coupler 6P6C
3. BBR-3100 Remote Display Module

III. Panel Buttons Operation



1. To switch ON LED backlight.
2. Scroll up display of the real time information of main unit BBC-3140.
3. Scroll down display of the real time information of main unit BBC-3140.
4. Enter input of charging parameters for the User Defined Charge Profiles.

IV. Indications

When Remote Display Module is connected to BBC-3140, it displays the “Initialization”, “Version of software”, “Brand or Make” and then scrolls cyclically to show all the real time information according to the mode selected in the main unit.

Following is displayed when in charger mode:

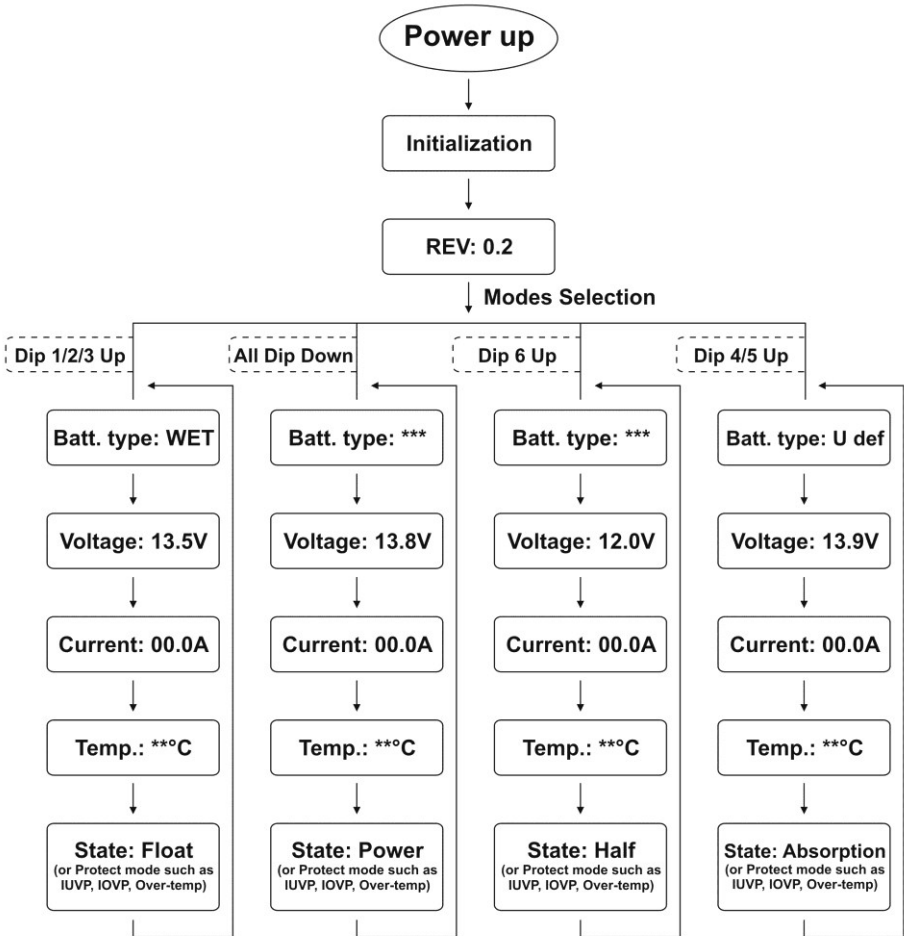
- Battery type selected.
- Charging voltage.
- Charging current.
- Temperature of the battery.
- State of charging (bulk, absorption, float).
- Type of fault if unit is in fault mode.

Following is displayed when in user defined charging mode:

Batt type shows: “U def” and so on.

When in Voltage Reducer Mode, no battery type is shown, and the “State” displays “Power” or “Half” depending on the selection.





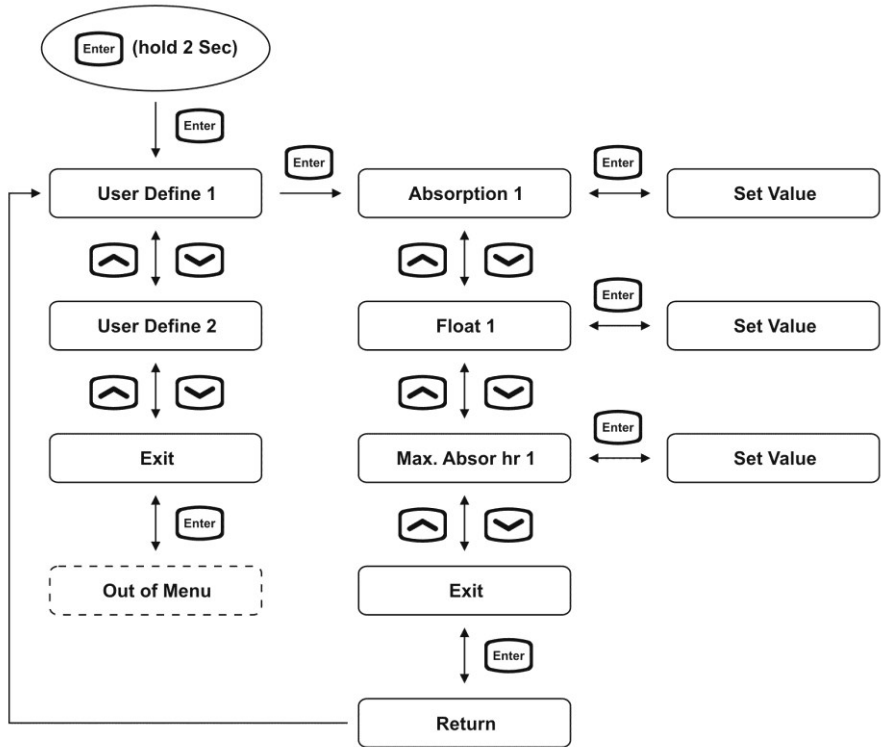
Decoding the indications of the display.

1. IUVP: Input Under Voltage Protection
2. IOVP: Input Over Voltage Protection
3. Over-temp: Battery Over Temperature protection
4. Power: unit is set at 13.8V Voltage Reducer Mode
5. Half: Output = Half the Input voltage

V. Setting the User Defined Charging Parameters

The Absorption voltage (13.0V to 15.5V), float voltage (12.6 to 14.0V) and the maximum absorption time (1 to 6 hour) can be set in the User Defined Charging Modes.

VI. Flow Chart of Value Setting Instruction



An example of setting the values in user defined charging profile.

