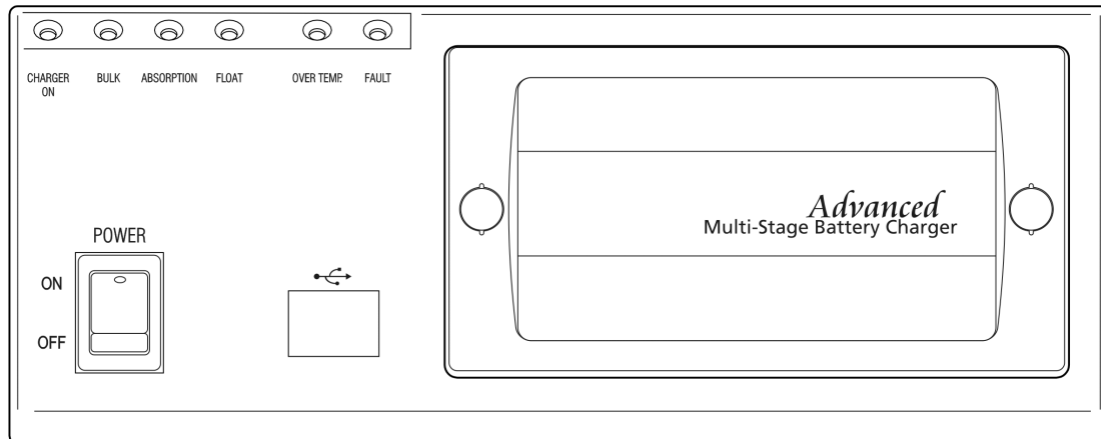


HBC-3130/3140/3160

Multi- Stage Battery Chargers

User Manual



Keep this manual in a safe place for quick reference at all times.

This manual contains important safety and operation instructions for correct use of the battery charger. Read through the manual and pay special attention to the markings and labels of the charger, battery and equipment connected to the battery system.

Pay special attention to these two types of notices used in this manual.

WARNING :

Failure to heed this warning may cause injury to persons and damage to Equipment.

CAUTION :

Failure to observe this warning may result in damage to equipment and improper functioning of the Charger.

WARNING :

- The charger is designed for in-door use. Protect the charger from ingress of water.
- This charger is made to charge only properly sized lead acid batteries.
- Don't recharging non-rechargeable batteries.
- Charging other types of battery or under-sized lead acid batteries may cause fire or explosion.
- Install the charger in accordance with all local codes
- Do not use the charger if it has been dropped or damaged.
- Do not remove casing of the charger, there is no user –serviceable parts inside.
- Do not charge the battery on boats. Remove the battery and charge on shore.
- Never attempt to charge a frozen battery
- Never attempt to charge a damaged battery.
- Wear protective goggles and turn your face away when connecting or disconnecting the battery.
- Never place the charger on top of a battery .
- Never smoke, use an open flame, or create sparks near battery or charger during normal charging operation as batteries may give out explosive gas.
- Do not charge batteries in an enclosure (box- in) due to possible explosion of entrapped explosive gas.
- Use of accessory not recommended may cause risk of fire, electric shock.
- Disconnect the mains supply before connecting or disconnecting the links to the battery.
- If the charger does not work properly or if it has been damaged ,unplug its AC and DC connection.

CAUTIONS :

- Refer to battery manufacturer's specific recommended values for battery type settings and float voltage setting.
- Fix the charger to a horizontal solid support via four grooves at the flange of chassis, with four screws or nuts.
- Ensure all ventilation ports are not obstructed for efficient fan cooling, keep loose soft material or paper off at the bottom of the charger.
- During charging, the battery must be placed in a well ventilated area.
- If longer output charging cord is required, make sure the diameter is adequate for the current in given cable length.

Introduction

Congratulations on purchasing our new Multi-Stage (IU0U) Switching Mode Battery Charger.

This series of advanced chargers use Micro-Processor to control the charging profiles and protective functions.

Innovative charging profiles blend in with the ever changing “ state of charge “ of the batteries to give just the right amount of current and voltage so your batteries will not be under or over charged . There are 8 sets of selectable charging profiles specifically designed for a wide range of Wet , Gel , AGM, LiFePO4 and Calcium-Calcium lead acid batteries . There are two user programmable charging profiles for the professional users through USB port by personal computer. In addition, the programmed maintenance charge provides a timely Equalization charge for the Wet lead acid battery and refreshing charge to the sealed batteries.

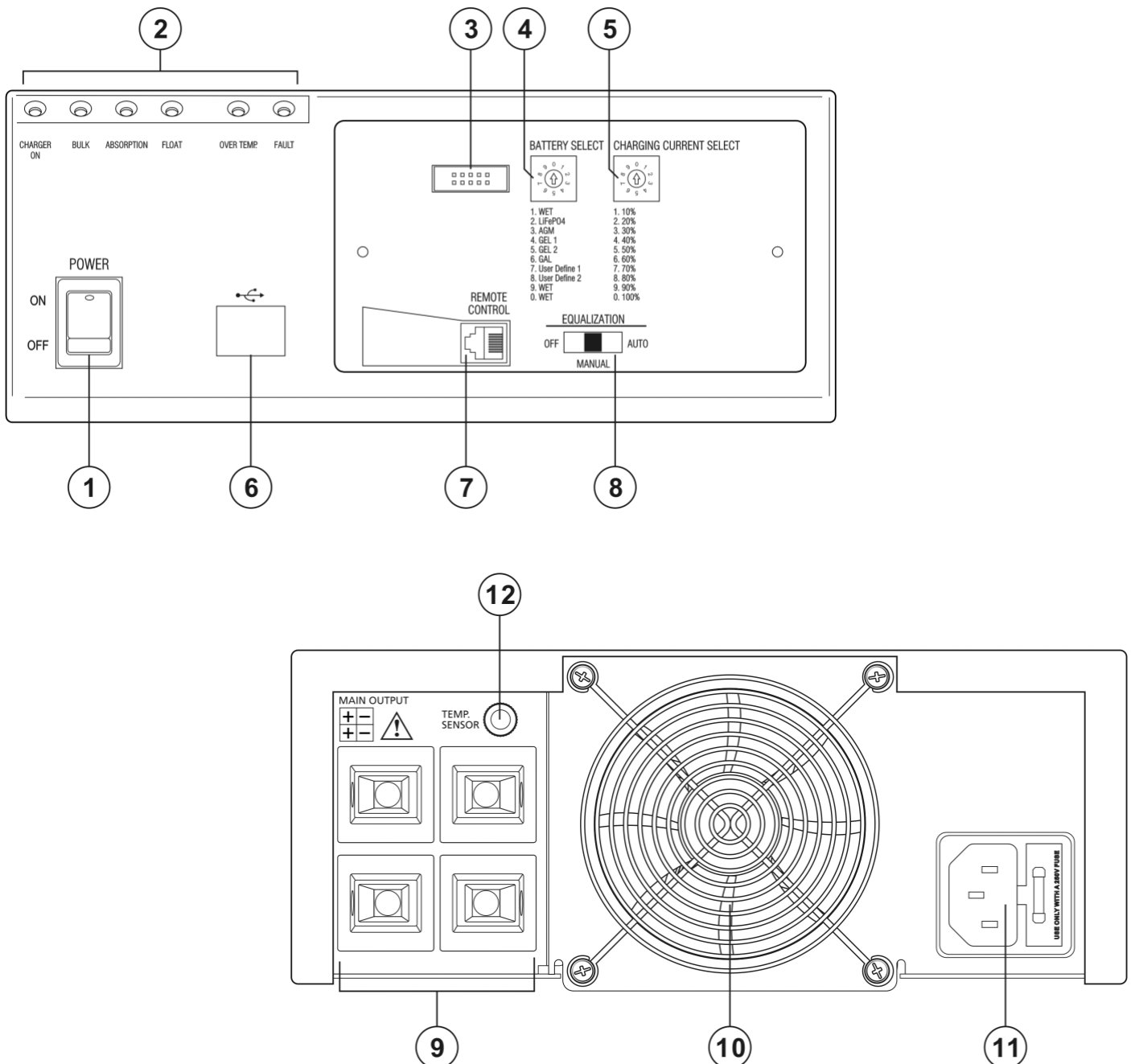
Almost all the protections are controlled by the Micro-Processor. On start up, the chargers run a series of self tests on the protective functions, displays and critical components like the cooling fan.

The optional detachable Remote Control Panel provides exceptional monitoring of the batteries, charger output, protection status, hours of operation and etc.

Intended Use:

All Automotive, Marine, Mobile Home, Electric Scooters, Golf Carts, Solar, Deep Cycle, UPS Standby, Industrial & Commercial Applications.

A. Control and Indicators



1. Power Switch
To turn ON and OFF AC power to charger
2. Charger status LED display
 - Charger ON LED (Green) : Lights up when power ON
 - Bulk LED (Red) : Bulk charging with constant max. current
 - Absorption LED (Orange) : Absorption charging with preset constant max. voltage
 - Float LED (Green) : Float charging with preset constant voltage
 - Over Temp LED (Red) : Lights up when over temperature protection,
Flashing when current de-rating
 - Fault LED (Red) : Charger malfunction
(overload, output short circuit, reverse polarity, output over voltage protection)
3. Programming Port
Factory use only
4. Battery selection switch
For AGM, GEL, LiFePO4, Calcium-Calcium, 2x user define & WET (Flooded) batteries (default at GEL P-1)
5. Charging current selection switch
Current can be selected from 10% to 100%. Details please see the table on front panel. (Default at 100%)
6. USB port
Connect charger to computer for charger user define setting
7. Remote display Port
Connect to accessory HBR-3100 remote display
To remote display the charging voltage & charging status and remote control the charger output ON/OFF & Equalization.
8. Equalization mode selection switch
Can be selected by Manual or Auto
9. Charging Banks
Terminal blocks to connect to charging cable
10. Ventilation Fan
11. Inlet AC socket with fuse holder
12. Temperature Sensor Socket
Connection to optional accessory temperature sensor
Sensor to increase / decrease charging voltage at low/ high battery temperature

B. Battery Type Selection

Make sure the charger is power OFF, use a small slot type screw driver to select the battery through Battery Selection Switch (4).

AGM/GEL : Sealed type (VRLA) , AGM-GEL , Maintenance Free , Automotive or Deep Cycle lead acid batteries

WET : Flooded Type lead acid batteries (to which water can be added) Automotive or Deep Cycle

Calcium-Calcium : Sealed type (VRLA) Lead Acid batteries with Calcium content Automotive or Deep Cycle

LiFePO4 : Sealed type Lithium Iron Phosphate batteries

User define : User can set their own charging voltage and setting through USB port (6) by personal computer

B1. Recommended Battery Capacity

The following minimum AH capacities are a generalized suggestion, some batteries can take higher charge current, check with battery manufacturers for charging batteries with smaller capacity.

Charger Model	HBC-3130 , 30A	HBC-3140 , 40A	HBC-3160 , 60A
Battery Capacity	12 AH - 300 AH	15 AH - 400 AH	20 AH - 600 AH

C. Battery Charger Installation and Connection

Observe the warnings & safety precautions before rushing to install and operate the charger.

Check battery condition, fill up cells for wet battery, clean battery poles.

Secure the battery charger in a well ventilated place, make sure the mounting surface is flat and without soft covering material or

loose paper sheet. The air intake is at the bottom and air outlet at the back. Make sure both intake and outlet are not blocked. Never place charger on top of battery.

Plug in the AC mains and turn on Power Switch. All the indicators on the front panel will lit up, cooling fan spins at full speed for 10 seconds by means of Self-Testing.

Charger ON LED and the Float LED should be on green indicating Charger is in good order for charging lead acid battery.

Before connecting or disconnecting the charging cable, turn off the Power Switch and unplug AC cord from the mains.

First connect the Red cable to Positive + terminal of charger and the battery Positive + Pole. Then connect the Black cable to the Negative – terminal and the Negative – Pole of the battery.

Make sure all the connections are secured and well tighten up, double check on the correct polarity.

Double check again for correct selection of Battery Selection Switch (4) for battery type (default at GEL P-1) and Charging Current Selection Switch (5) for output current setting (default at 100%)

When install in caravans and similar vehicles, the connection to the supply mains is to be in accordance with national wiring rules.

When charging automotive batteries:

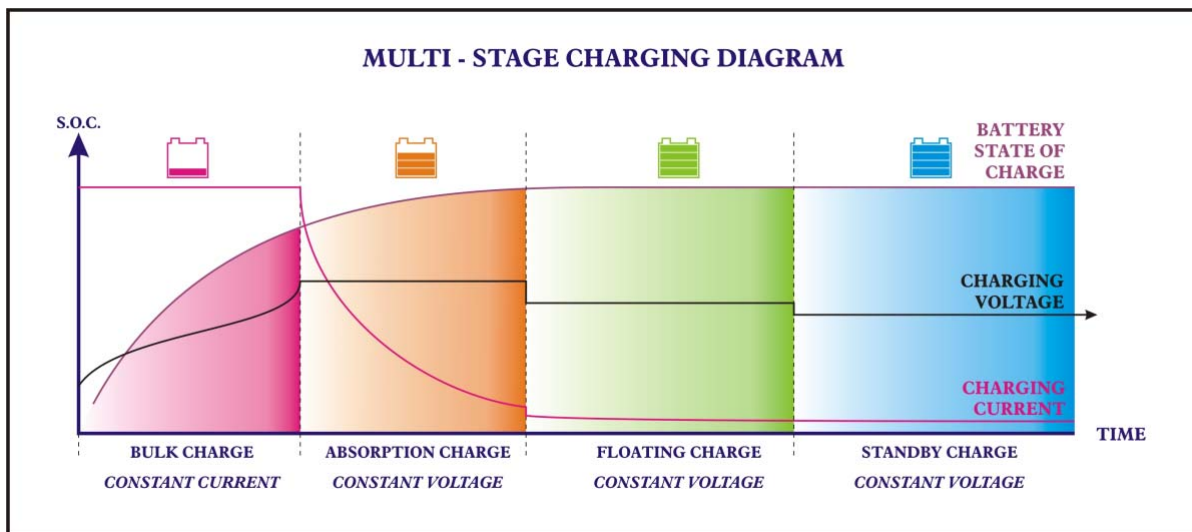
- The battery terminal not connected to the chassis has to be connected first. The other connection is to be made to the chassis, remote from the battery and fuel line. The battery charger is then to be connected to the supply mains;
- After charging, disconnect the battery charger from the supply mains. Then remove the chassis connection and then the battery connection.

Please notice the tightness of the power cables from the power supply to the load. If the cables are not fastened well enough, the total resistance of the connecting cables will increase, resulting in a huge voltage drop between the terminals to the load.

D. Normal 4-Stage (IUoU) Charging Operation

The 4-stage IUOU charge algorithm ensures fast, complete and at the same time gentle charging of the lead acid battery.

Charging Profile



Stage 1. THE I-PHASE. The constant current charging, Bulk LED is ON.

Normally the battery is charged at constant maximum current until it rises to the selected Absorption voltage level.

The charging voltage changes with the battery voltage.

If the initial battery voltage is less than 10.5V due to deep discharge, the bulk charge current is reduced to half of the maximum until battery voltage rises over 10.5V.

Stage 2. THE UO-PHASE . The constant voltage charging, Absorption LED is ON.

Battery Type Selection : Gel P-1: 14.1V / Gel P-2: 14.3V / AGM: 14.3V / LiFePO4: 14.6V / Wet : 14.4V / Calcium : 15.1V

When the battery voltage rises to the selected Absorption voltage level, the charging switches to Constant voltage charging and battery is over 85% full. The battery is kept at this high voltage while the current reduces gradually to set value at which the charger automatically switches to Float Stage.

Stage 3. THE UO-PHASE. The constant voltage charging, Float LED is ON.

In this stage , the battery is full and only takes in the amount of current necessary for maintaining the capacity. The float voltage is preset by factory according to the type of battery.

In case of the charger keeps at this mode with charging current less than 5A for over 72 hours. The charger will go into the Standby mode.

Stage 4. THE UO-PHASE. The constant voltage charging, Float LED is ON.

In this stage, The charging voltage at this mode will be 4% less than the Float voltage only for maintaining the capacity.

Remark: If the battery does not reaches the charging voltage in 12 hours, the charger will automatically goes to Float mode. This is call safety timer.

E. User Define battery setting

There are two user define can be preset by end user, Battery Selection Switch (4) set to position 7 or 8.

Connect the charger to personal computer through USB port (6) then you can set your own charging configuration.

Remark: Optional remote display cannot configure the user define battery.

F. Equalization Charging for wet type battery only

Wet lead acid battery requires periodic high voltage charging (about 10% overcharge absorption voltage) to balance the voltage of each cell, reverse the high concentration of electrolyte at the bottom and clear up large sulfate crystals on the plates. You can use the Equalization Selection Switch (8) to perform the manual equalization through optional remote display or Auto equalization by charger itself.

Once Auto it is selected, the charger will start Equalization automatically if charger keeps at Float mode for over 21 days.

After entered into this mode, the Absorption indicator will flash. This will put the charger keep Equalization for 240 minutes.

The charger will go to Float once completed.

- Remark :
1. This mode only can be operated at Flooded battery selected (Battery Selection Switch (4) set to positions 1, 9 or 0)
 2. During this mode, operator can press the FUNC button (optional remote display) for 5 seconds to force the charger to Float mode anytime.
 3. Take special precautions as battery will emit explosive gas during equalization charge.

G. Dual bank charging

This feature is for caravans, and vehicles with two separate batteries.

The two batteries must be of same chemical make up and type to avoid over and under charging because only one setting of charging profile for both.

Two batteries are charged simultaneously and the battery with the lowest level gets most share of the current in the Bulk charge stage until it is up to the same voltage level of the second battery (battery with higher initial level).

Both batteries will go to the Absorption and the Float Charge at the same time.

H. Power Level adjustment

End user can set the maximum output current so to make the charger can suitable for different capacity battery

Make sure the charger is power OFF before adjust the power level.

Use a small slot type screw driver to select the maximum output current through the Charging Current Selection Switch (5).

1. Position 0: 100% of the rated current
2. Position 9: 90% of the rated current
3. Position 8: 80% of the rated current
4. Position 7: 70% of the rated current
5. Position 6: 60% of the rated current
6. Position 5: 50% of the rated current
7. Position 4: 40% of the rated current
8. Position 3: 30% of the rated current
9. Position 2: 20% of the rated current
0. Position 1: 10% of the rated current

I. Temperature Sensor

Warning :

The temperature sensor must be installed at the Negative Terminal of the battery terminal, wrong connection to the Positive Terminal will damage the charger and the sensor .

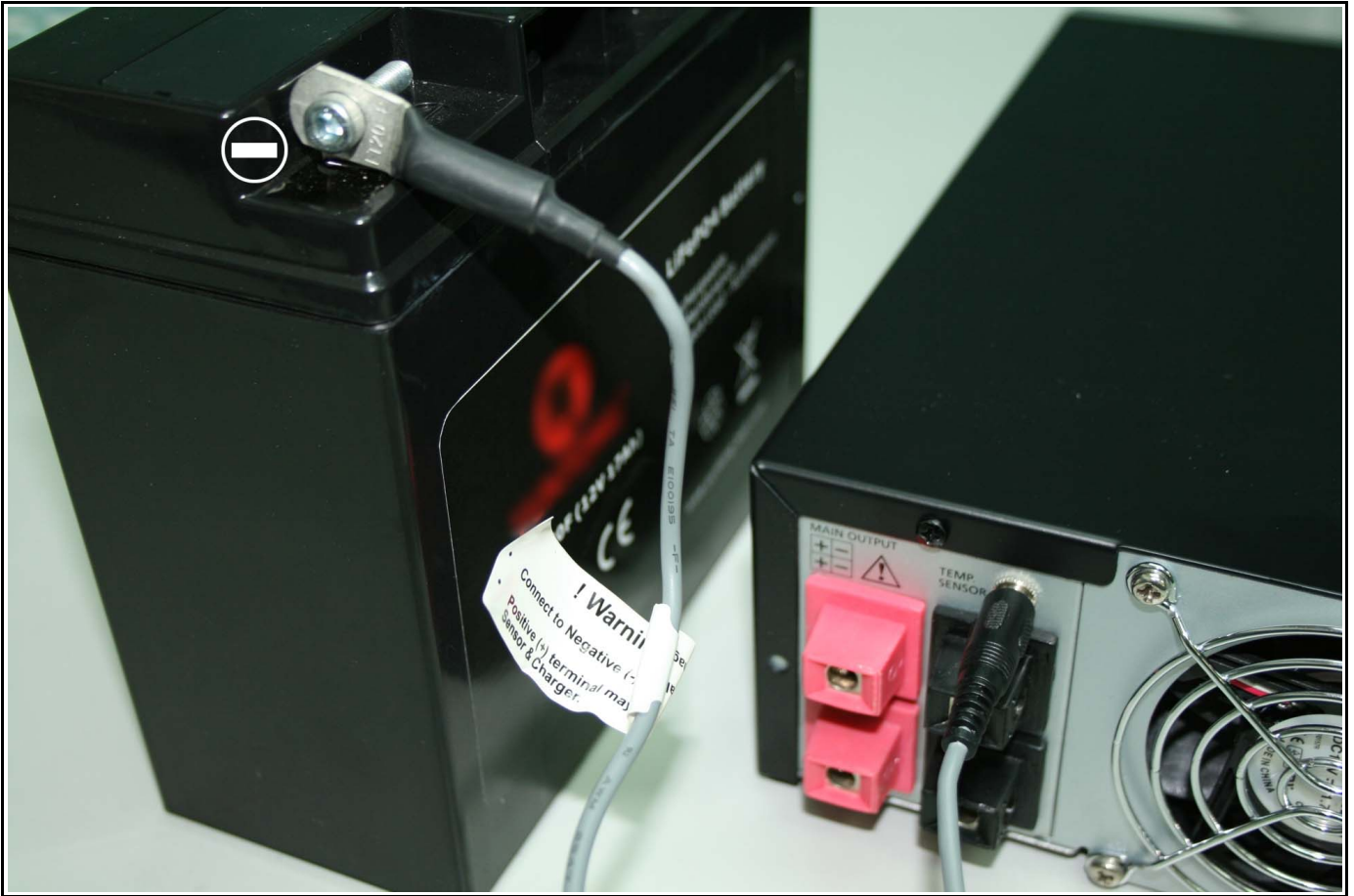
The temperature sensor (accessory) is used to optimal charging over wide ambient temperature range.

Fix the temperature sensor in a position on the battery which is not affected by other cooling or heating source.

Plug in the temperature sensor before switch on the charger to activate the temperature control function, never plug in the charger during charging.

Compensation voltage for this temperature sensor is 20mV/C, the higher the battery temperature, the lower the charging voltage.

When battery temperature reaches 60°C, the charger will shutdown, Fault and OTP indicator will light up.



J. Cable Size Selection

Wire Size (AWG)	Area (mm ²)	Maximum one-way distance (feet) for 2% Voltage loss (30A)	Maximum one-way distance (feet) for 2% Voltage loss (40A)	Maximum one-way distance (feet) for 2% Voltage loss (60A)
10	5.26	3.8	2.8	1.6
8	8.37	6	4.5	2.5
6	13.3	9.5	7.2	3.6
4	21.2	15	11.2	6.8
2	33.6	24	18	11
1/0	53.5	38	27.5	17.7
2/0	67.4	48	36	22
4/0	107	76	58	34

Table: Selection of cable size and length versus current

K. Trouble Shooting

PROBLEM	INDICATIONS	POSSIBLE CAUSES	SUGGESTED SOLUTION
Charger does not work	Indicator lights not turn on	No AC power AC input socket fuse blown	Check AC connections are correct Replace with correct AC fuse by qualified electrician
No DC output	Charger - On LED is not on, Float and Fault LEDs are on	Output short circuit Over temperature protection triggered Severe over loading charger Reverse polarity connection DC fan locked by foreign object or malfunction	Check DC connections between charger and battery. Charger can auto reset if remove the fault within 20 seconds. Check air intake vent at bottom of charger is blocked or not. Check charger ambient ventilation . Check battery AH capacity within recommended range Check for correct polarity, replace car blade fuse (6) Check DC fan
Battery does not get full charge	All indicator LED work normally and sequentially OTP LED flashing	Bad battery connection Battery type select switch in wrong setting Battery capacity too large Ambient temperature too low Battery has damaged cell or battery is too old Wrong set the lower power level	Check for loose contact, right cable size, cable integrity Recheck battery type and change to correct battery selection Make sure charger rating matches battery capacity see table (B2) Move battery to a room temperature location, or get an optional temperature sensor Replace battery Recheck the current selection switch (5) to correct right setting
Long charging time , float light does not come on even after 12 hours charging time.	Absorption light remains on all the time	Charger internal fault	Return the charger to distributor to repair
Bulk LED is on all the time			
	Bulk light remains on all the time	Wrong battery type selection Battery is excessively depleted and the soft charging is triggered Battery temperature too high	Check charged battery label and change battery type selection to correct setting Recharge the battery after a day, if bulk light remains after several hours, the battery is most likely damaged and cannot accept charge. Replace battery. Use accessory temperature sensor

L. Specifications

Model	HBC-3130	HBC-3140	HBC-3160	
Output	Output (Charge) Voltage Selections	Absorption		Float
	WET	14.4V	13.5V	
	LiFePO4	14.6V	13.6V	
	AGM	14.3V	13.2V	
	GEL 1	14.1V	13.7V	
	GEL 2	14.3V	13.8V	
	CALCIUM	15.1V	13.8V	
	User Define 1	12V - 16V		
	User Define 2	12V - 16V		
	Equalization	15.5V		
	Maximum Output Charging Current (Continuous)	30A	40A	60A
	Recommended Battery Capacity Range	12 – 300AH	15 – 400AH	20 - 600AH
	Soft Start Bulk Charge			
	Battery Voltage to Trigger (cut-in) Soft Start Bulk Charge Mode	<10.5V		
	Soft Start Bulk Charge Current (Current Limit)	1/2 of the charging current	1/2 of the charging current	1/2 of the charging current
	Ripple and Noise (Peak to Peak)	<200mV	<200mV	<200mV
	Efficiency at Maximum Power (230V)	>83%	>83%	>83%
Dual Bank Charging (Battery must be of same type)	Yes	Yes	Yes	
Input	AC Voltage Range	200 – 240V 50Hz~		
	AC Current at Full Load (230V)	2.5A	3.5A	5.0A
Protection	Overload	90-110% Rated Output Current or 50% Rated Output Current (Soft Charge) Protection Type : Constant Current Limiting, recovers Automatically after Fault Condition is Removed.		
	Short Circuit	Recovers Automatically if Fault Condition is Removed within 20 seconds Otherwise the charger will shutdown until re-start the charger again		
	Reverse Polarity	Car Blade Fuse		
	Over Temperature	Protection Type: Shut Down		
	OVP Output Over Voltage	Yes		
Cooling	Cooling Method	Thermostatic, Variable Speed Fan		
Indicators	4-Stage Battery Charger	Yes		
	Charge Phase Bulk / Absorption / Float	Yes		
	Fault Mode	Yes		
	Over Temp	Yes		
	Charger ON	Yes		
Fuses	AC Fuses at IEC AC Power Socket	T3.15A	T4A	F8A
	DC Car Blade Fuse at Front Panel	25Ax2	30Ax2	30Ax3
Accessories	Remote Temperature Sensor, Cable & Spare Fuses	Yes		
	Remote Control Panel	Optional		
Approvals	Safety : EN 60335	Yes		
	EMC: EN 55014; EMF: EN50366	Yes		
Others	Dimensions and Weight	200x80x260mm ; 3.2kg	200x80x260mm ; 3.2kg	200x80x320mm ; 4.2kg
Remarks	All values are based on the standard ambient temperature 25°C and pressure 0.1Mpa.			

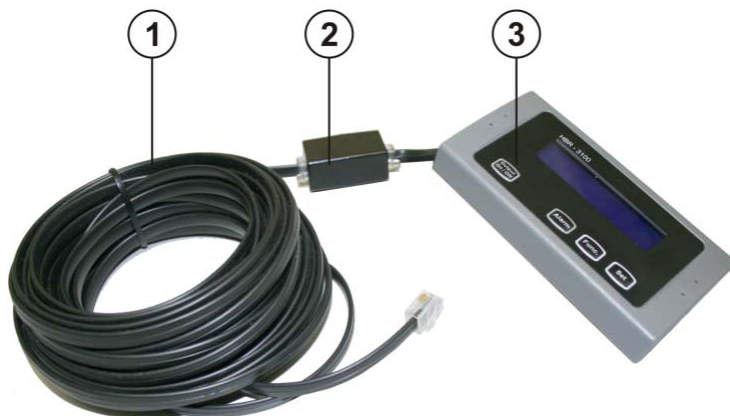
M. Optional Remote Display HBR-3100

I. Introduction

When the optional remote HBR-3100 is installed, it will display the current status of the charger along with the voltage & amperage and can remote control the charger to Equalization mode.

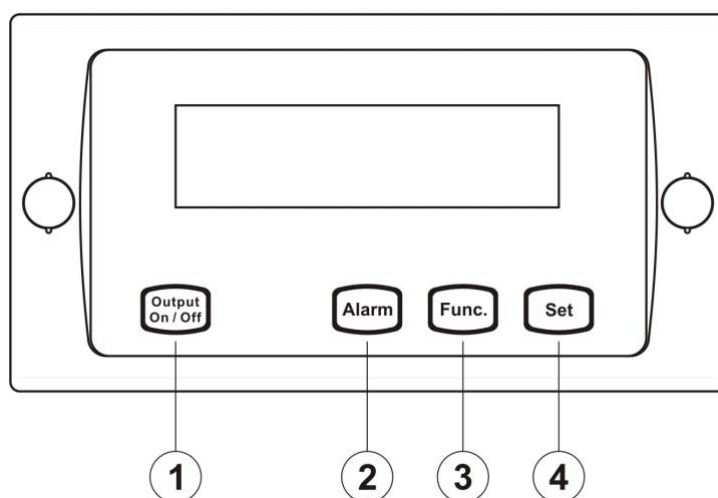
It can be mounted on HBC charger by replacing the dummy cover on the front panel or individual mount with 10m extension cable and coupler (HBR-3100 accessories).

II. Connection



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

III. Control and Indicator



1. Output ON/OFF : To switch the charger output ON and OFF. Green LED is illuminated when output is ON.
2. Alarm : Can be silenced or audible by toggling this button, default is audible. Red LED will illuminate when fault occurred
3. Func. : To toggle charger setting Menu and select scrolling to make display continue to scroll all setting (See optional remote programming section)
4. Set : To confirm the chosen feature you selected.

IV. Programming using the optional remote

- A. Pressing Func. Button to display “Scrolling” or until any setting you want to display
- B. Pressing Set button to confirm

Remote Panel “Scrolling” Menu Options

1. Charger Name	Display charger model
2. Charger Status	Display Bulk / Absorption / Float
3. Battery Type	Display the battery type selected
4. Fault	Display the “No Fault Found” or allow scrolling through fault
5. Bat. Bank 1	Display the charging voltage and current of Bank 1
6. Bat. Bank 2	Display the charging voltage and current of Bank 2
7. Bat. Bank 3	Display N.A as no Bank 3 for this series of charger
8. Total Run Time	Display units total run time
9. Output Power Level	Display current output level
10. Software Version	Displays the current control software version

Remote Short cut

1. Press and hold the SET button for 5 seconds and release the button to enter Equalization mode.
(Equalization selection slide switch on main unit should be selected at manual position)
2. Press and hold the Func button for 5 seconds and release the button to force the charger to Float mode.

V. Fault Indication

1. Charger High Temp : Charger over temperature
2. Bat Over Temp : Battery temperature over 60°C as detected by remote sensor
3. Output V High : Output over voltage
4. Overload : Overload (OCP)
5. Output Shorted : Output short circuit
6. Wrong Polarity : Output reverse polarity
7. Fan Fault : Fan stuck or not working

HBC SOFTWARE INSTALLATION

Introduction

There are two software in the CD , one is the USB Driver for the USB socket , the other one is the Charge Program for the self–defined charging profile of the charger.

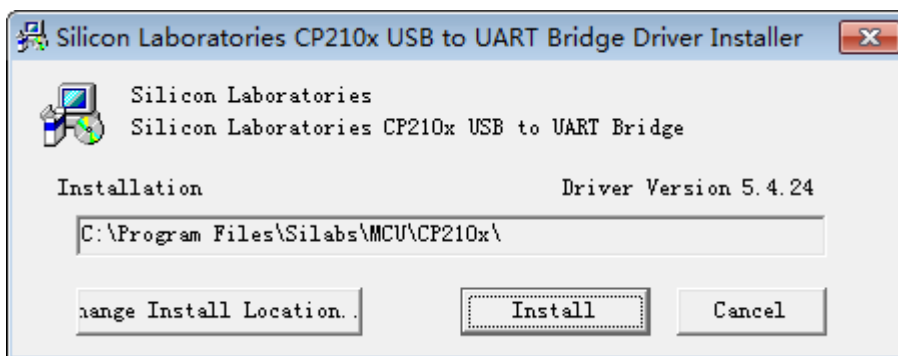
First install the USB Driver into the PC so that your PC can communicate with the charger. After installation of the USB driver then install the Charge Program software to your PC.

Compatible Operating Systems:

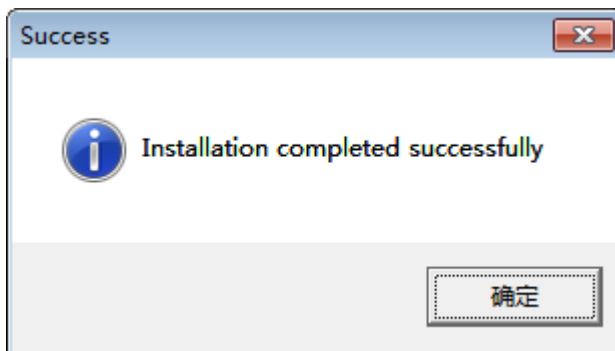
This software is compatible with 32 bit computer and operating systems of Win Vista ,XP and Win 7.

Installing the USB Driver

- 1.1、 (CD)\USB Drivers for Win_2K_XP_S2K3_Vista\CP210xVCPIInstaller.exe



- 1.2、 **Click [Install] to get to**



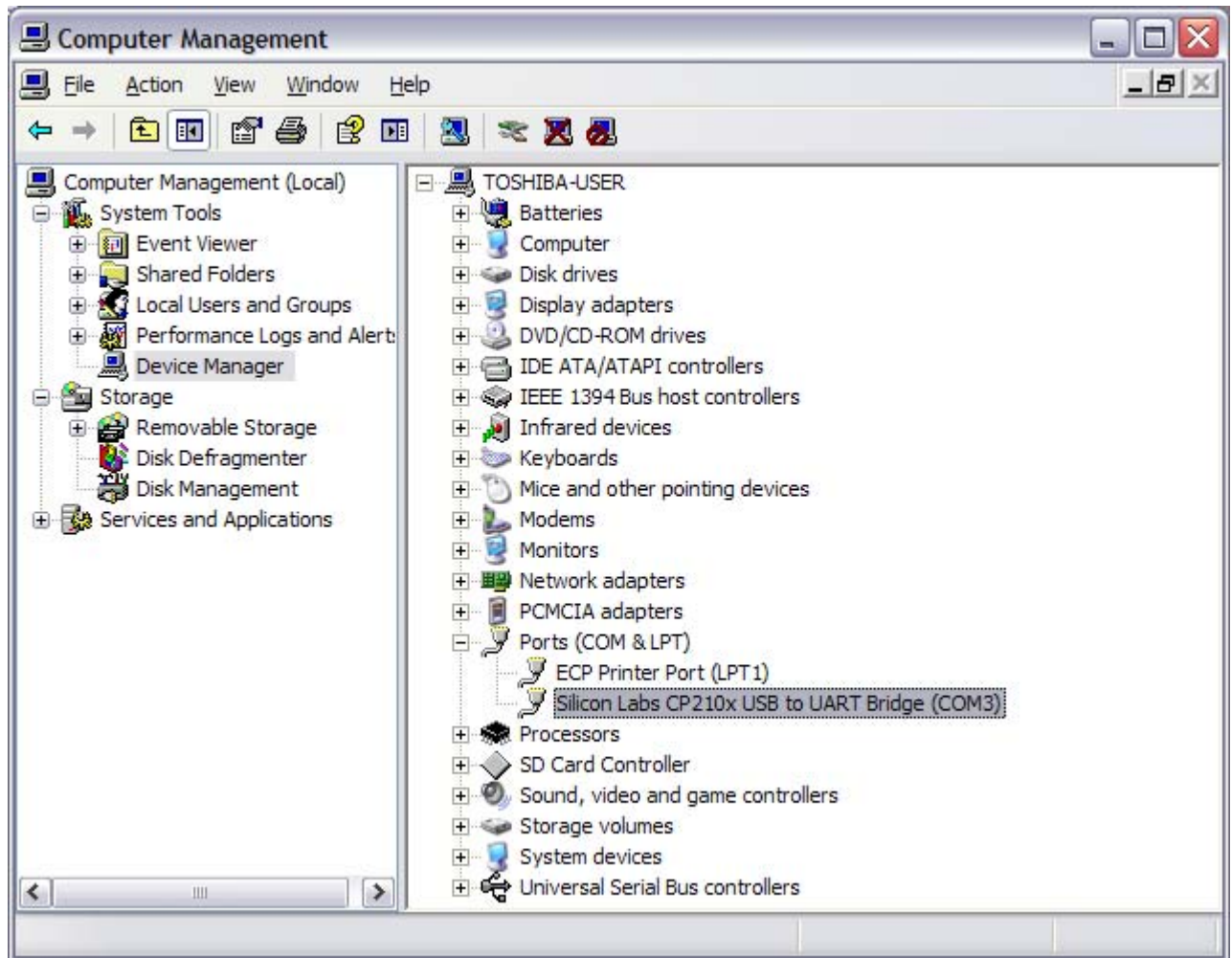
- 1.3、 **After installation of USB Driver , connect the HBC Charger to PC via USB cable.**

- 1.4、 **Go to the Computer Management window and click on the Device Manager At the Ports(COM & LPT1) , you should find" Silicon Labs CP210 x USB to UART Bridge (COM) ".**

An available Com port number will appear on the Computer Management Window.

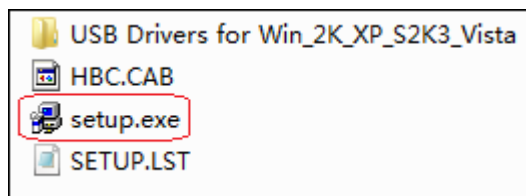
In this example it is COM3 is available and has been selected.

This confirms the USB Driver has been successfully installed.

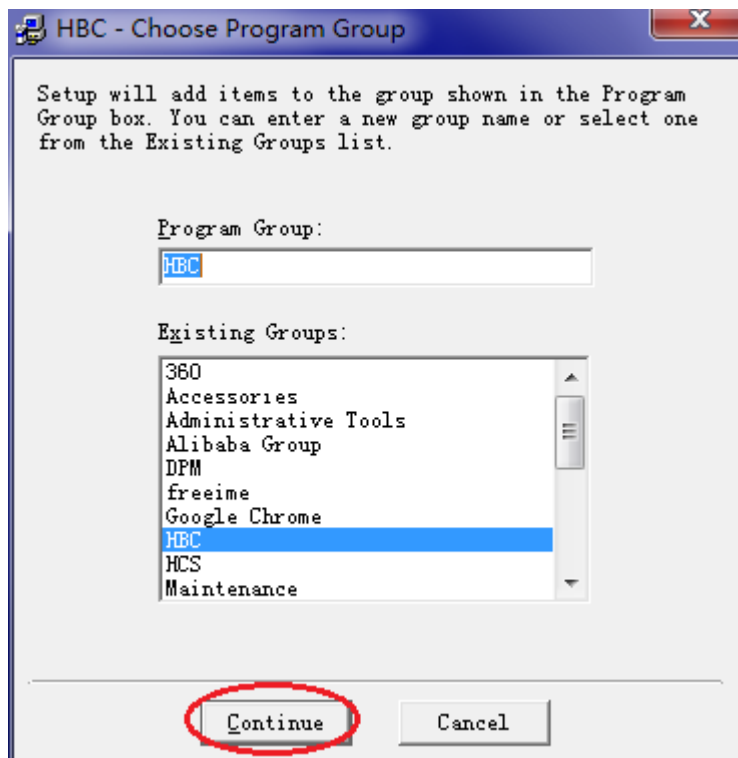
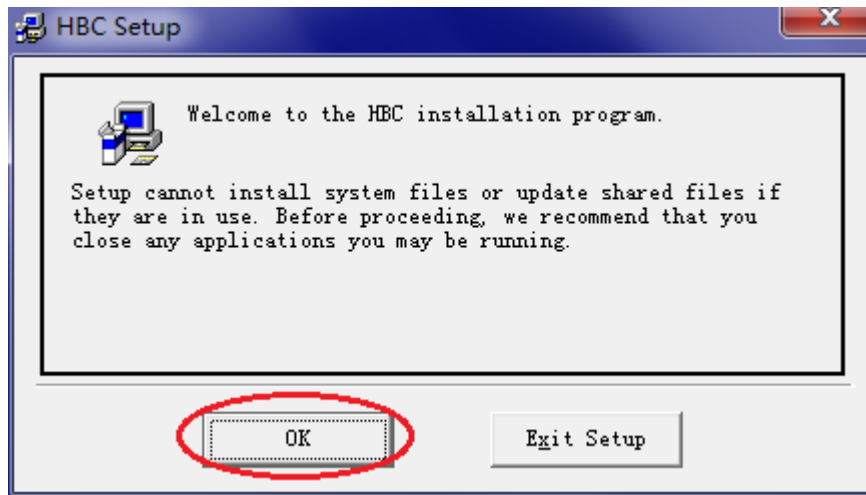


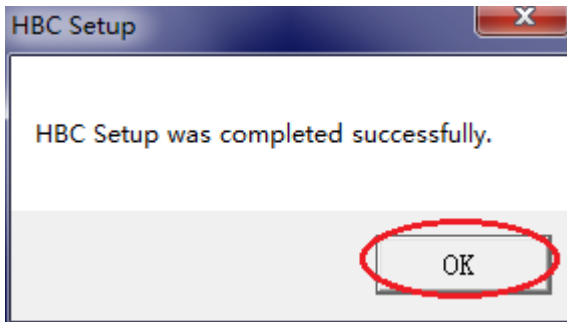
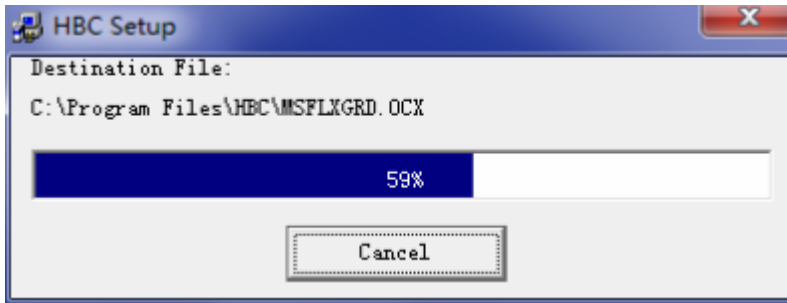
2. Installing the HBC Charge Program

2.1 Double click on (CD)\setup.exe



2.2 Follow the steps as shown in the following windows , it may take a few minutes to install this software .





2.3 You will find the HBC Charge Program! Icon in your computer .

3、 Using the Charging Program

3.1、 Connect a USB cable to the PC and charger which is not connected to battery .

Switch on the charger and run the HBC Charge Program .

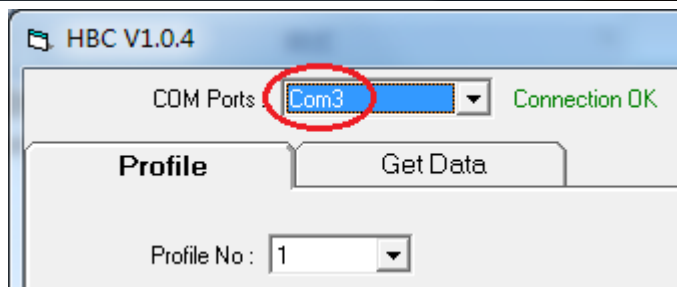
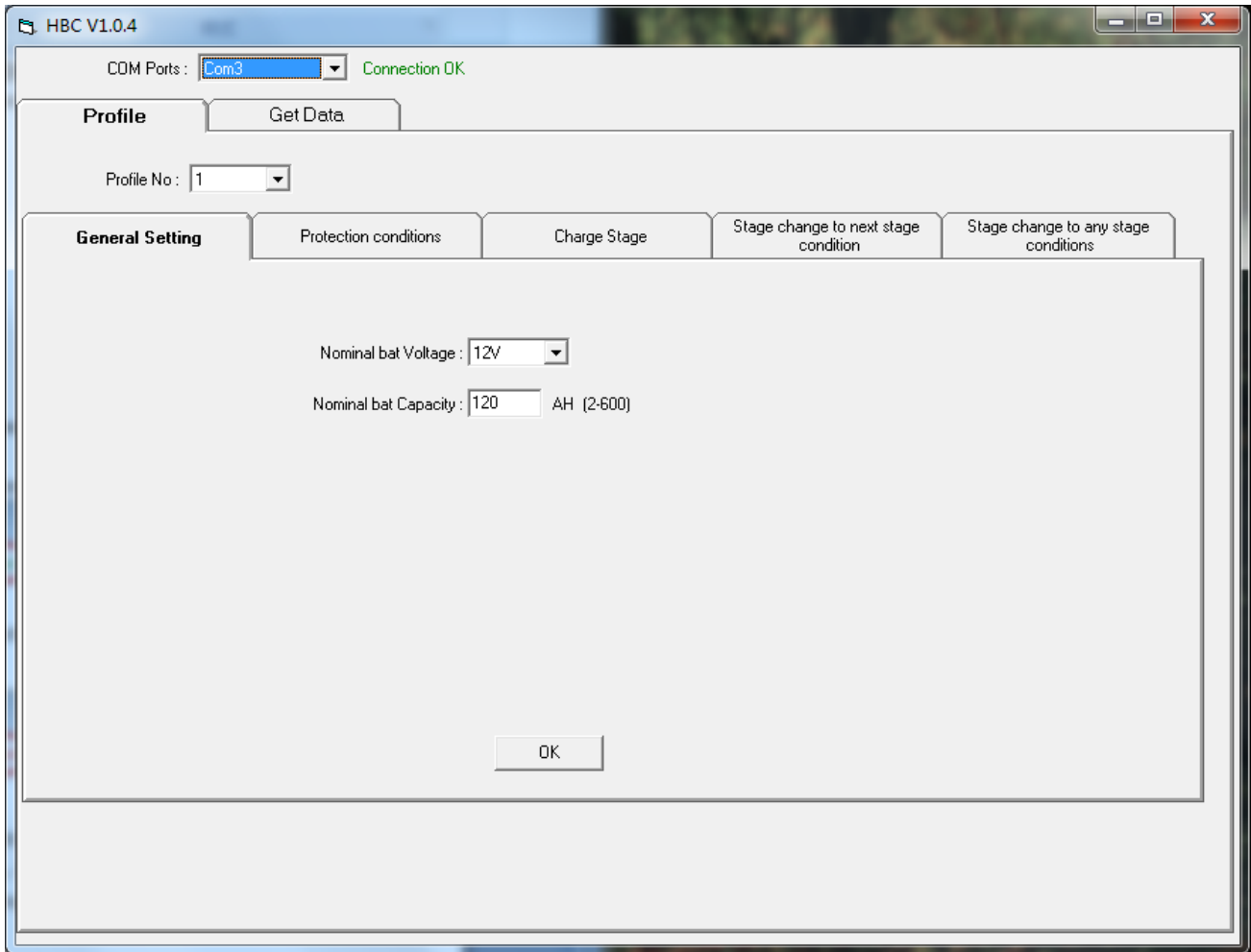
3.2 Select a COM Port number that matches the USB com port number .

3.3 You can find your USB Com number from your device manager as shown in window at section1.4

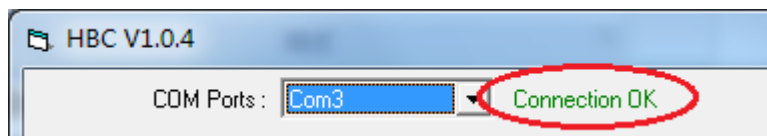
In this example is Com 3 for the USB Com Port and also Com 3 for the Charger Program .

3.4 Now your PC can communicate with the Charger via the USB using the HBC Charge Program software.

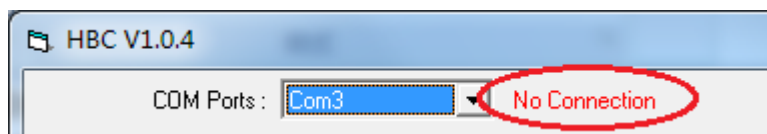
3.5 The following windows show the sequence of a successful communication connection.



a) If the configuration is successful "connection OK " will appear .



b) If configuration fails , "No Connection " will appear.



3.6 Trouble shooting for No Connection

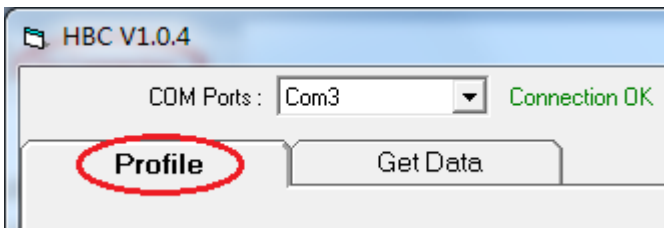
- A. Check USB cable connections are secured at both ends.
- B. Check Charger has been switched on .
- C. Make both Com port numbers (one from USB port and one at the Charging Program are the same).

3.6 Overview of the HBC Charge Program

There are two main functions of this program , the “ Profile” allows user to adjust the charging profile such as charging stages , protection threshold values , conditions to move from one stage to next stage or to jump from one stage to any stage designated. There are as many as 7 charging stages available , and threhold values of voltage , current , temperature and time that can be set for moving among set stages.

The “Get Data” allows user to download : accumulative run time of the charger since the first operation , the Output (charging) voltage and current values at 10 minute intervals , the voltage at each of the two battery terminals are also recorded. Each set of the above 10 minute interval data can be retrived to your computer . User can use our program to plot the charging graph or otherwise .

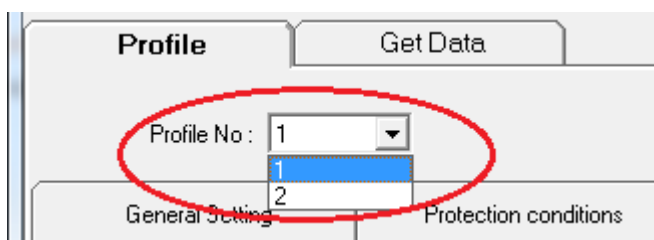
3.7.1 Profile : setting of user defined charging profiles

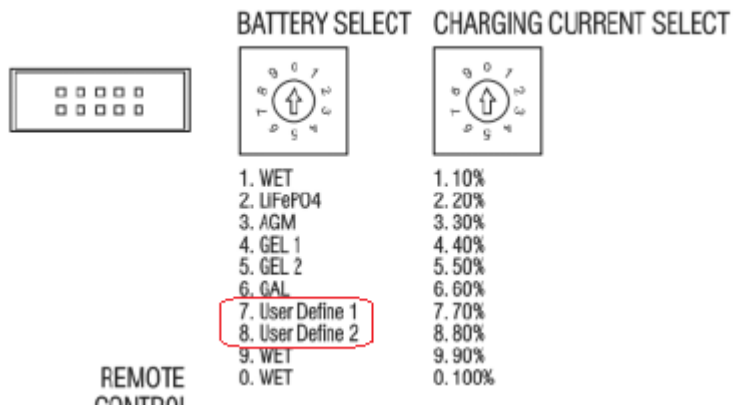


There are two self defined charging profiles : Profile 1 is set by position 7 and Profile 2 set by position 8 at your charger panel . See user manual CONTROL & INDICATORS ,switch4. User defined Profile 1 corresponds to Position 7 at your charger BATTERY SELECT SWITCH USER defined Profile 2 corresponds to Position 8 at your charger BATTERY SELECT SWITCH

PRECAUTION

Before proceed to set the profiles , make sure the Switch 4 is not in position 7 or 8.





3.7.2 Profile – General setting

General Setting Protection conditions Charge Stage

Nominal bat Voltage : 12V

Nominal bat Capacity : 120 AH (2-600)

OK

Nominal bat Voltage : select 12V or 24 V battery .

Nominal bat Capacity: Key in the battery bank AH .

Click **OK to confirm & save settings.**

General Setting **Protection conditions** Charge Stage

Bat temperature above : 100 C

Battery voltage above : 16 V (15-16.5)

Charging time longer than : 60 h

OK

3.7.3 Profile - Protection conditions setting

Bat temperature above : Charger will shut down output when temperature detected by remote sensor is about the set value.

Battery voltage above : Charger will shut down output if battery voltage is over this set voltage.

Charging time longer than : Charger shuts down output if the total charging time in bulk and absorption stages is longer than this set limit in hour.

3.7.4 Profile- Charge Stage setting

There are 1 to 7 charging stage that can be used , each has its own charging voltage and current limit.

Stage No	Voltage (V)	Current (A)
1	14.5	12
2	15	10
3	14	5
4	13	3
5		
6		
7		

3.7.5 Profile- Charge Stage change to next stage condition :

These are the available threshold parameters that cause shift of charging stage to the next one, it is not necessary to use all the parameters. The inter-action among the parameters is controlled by the following logic :

None means skip this condition

And means must get to this condition to move to the next stage

Or means any one the selected conditions will move to the next stage

Note: It is not permissible to have “And “ with “Or” in the stage

Always press “OK” key to store set conditions.

General Setting		Protection conditions		Charge Stage		Stage change to next stage condition		Stage change to any stage conditions	
Condition \ Stage	For 1 to 2	For 2 to 3	For 3 to 4	For 4 to 1					
Charging voltage above (V)	or 14.3	non 0	non 0	non					
Temperature above (C)	non 0	non 0	non 0	non					
Charging current below (A)	non 0	or 5	or 2	non					
Charging time of this section above (Minute)	non	non	non	or 200					

OK

3.7.6 Profile - Conditions for Jumping from one **Stage to any other Stage**

General Setting		Protection conditions		Charge Stage		Stage change to next stage condition		Stage change to any stage conditions	
Condition \ Stage	For 1 to 2	For 2 to 4	For 3 to 1	For 4 to 3					
Charging voltage above (V)	or 14.3	non	non	non					
Temperature above (C)	non	non	non	non					
Charging current below (A)	non	or 5	non	or 2					
Charging time of this section above (Minute)	non	non	or 200	non					

OK

Non-sequential change of stage selection and condition windows

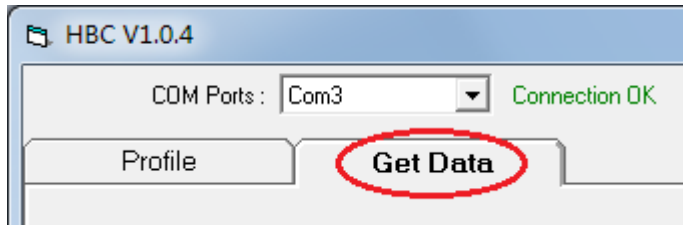
For 1 to 2

or 3

non 4

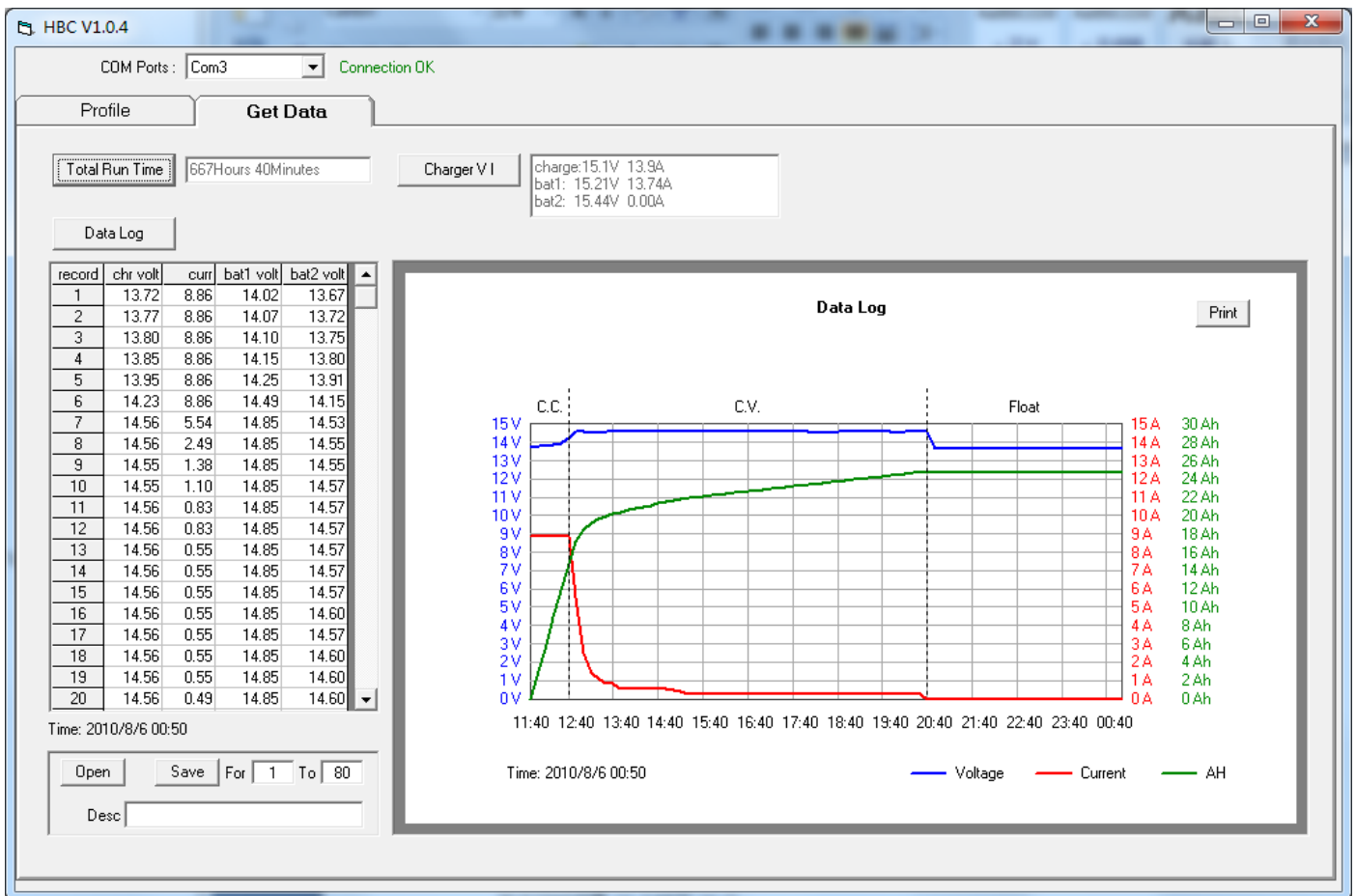
Stage	For 1 to 2
e (V)	or 14.3
(C)	non 0
v (A)	and 5
ction	non

3.8 Get Data



This “ Get Data” program is a separate program that retrieves data stored in the IC of charger .

Once the charger is switched on , data of charging voltage , charging current , voltage at each of the battery terminals are recorded down at 10 minute interval . When the data bank is full new data will push the oldest out .Each set of data is marked with a number , new set of data has the highest number..



3.8.1 Get Data- Total Run Time

This drop window gives the accumulative run time of charger , as soon as the charger is switched on, the clock starts counting and even no battery is connected .

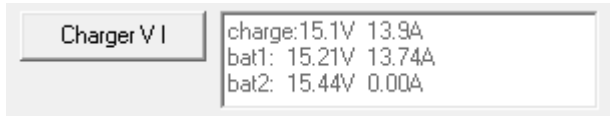


The total Run Time here is 77hours and 40 minutes from the first time charger has been switched on.

3.8.2. Get Data- Charger V I

This window shows the operation condition of the charger : in this example , charger is giving out a charging voltage of 15.1V , and current 13.9A

Voltage measured at the Bat1 terminal is 15.21V at 13.74A and 15.44V at 0.00A;



Get Data -Data Log

You can browse through all the data from record 1 which is the oldest one to the most recent one .

Chr volt = charging voltage

Curr = charging current

bat 1 volt = voltage at battery terminal 1

bat 2 volt = voltage at battery terminal 2

The screenshot shows a window titled "Data Log" containing a table with the following data:

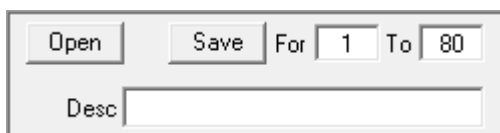
record	chr volt	curr	bat1 volt	bat2 volt
1	13.72	8.86	14.02	13.67
2	13.77	8.86	14.07	13.72
3	13.80	8.86	14.10	13.75
4	13.85	8.86	14.15	13.80
5	13.95	8.86	14.25	13.91
6	14.23	8.86	14.49	14.15
7	14.56	5.54	14.85	14.53
8	14.56	2.49	14.85	14.55
9	14.55	1.38	14.85	14.55
10	14.55	1.10	14.85	14.57
11	14.56	0.83	14.85	14.57
12	14.56	0.83	14.85	14.57
13	14.56	0.55	14.85	14.57
14	14.56	0.55	14.85	14.57
15	14.56	0.55	14.85	14.57

3.8.3 Get Data -Saving the data

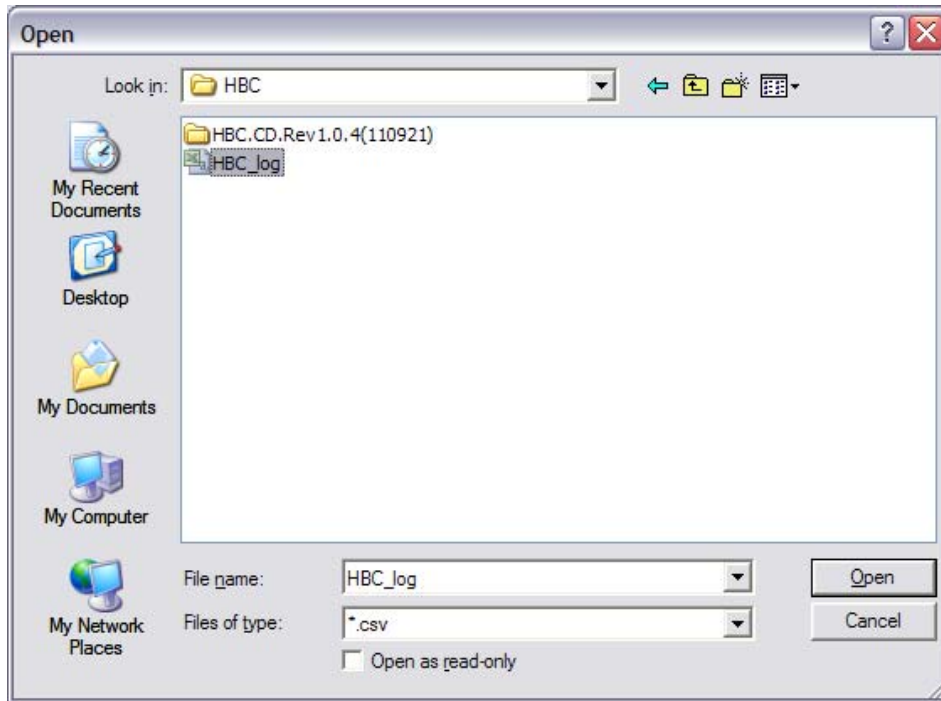
You can save selectively the data you want for a desired period/data lots.

Oldest data with the smallest record number ,latest data with the highest number.

The file format is CSV.

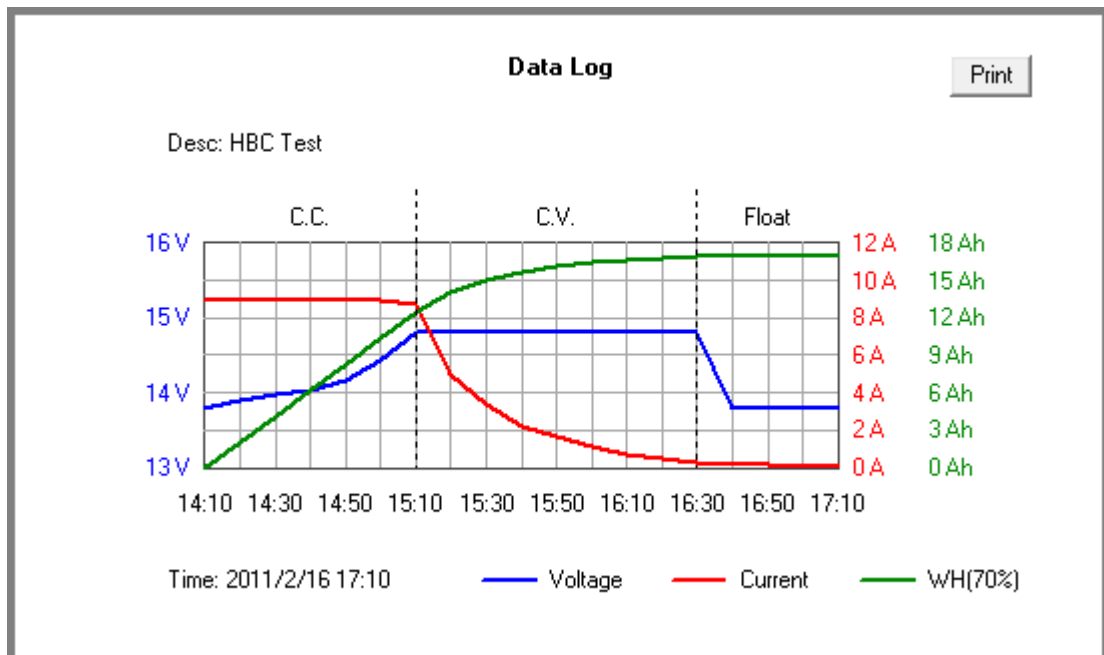


In this example we create a folder named HBC for storage of the data logged.



3.8.4 Get Data- Using the Data Log Graph

When you open the data log you saved by this software, the following graph will appear .



Voltage= Blue color

Current= red color

WH = Watt hour with 30% deducted adjustment for energy charged to battery .