



## User's Manual



8kW Fast Charging Battery Charger

With CAN interface  
IGBT power modules inside



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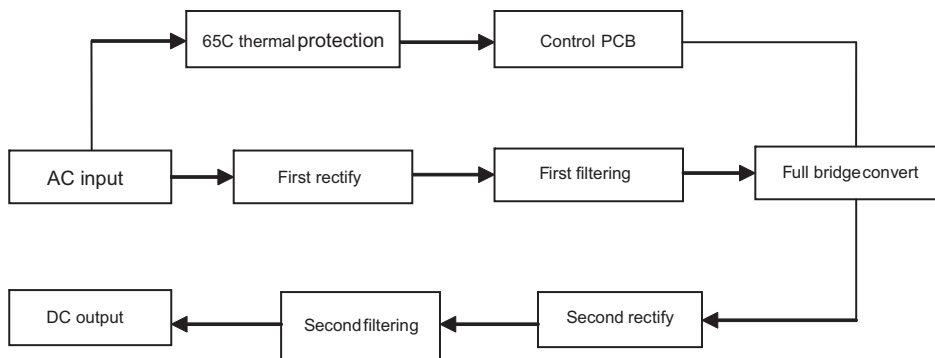


## Overview

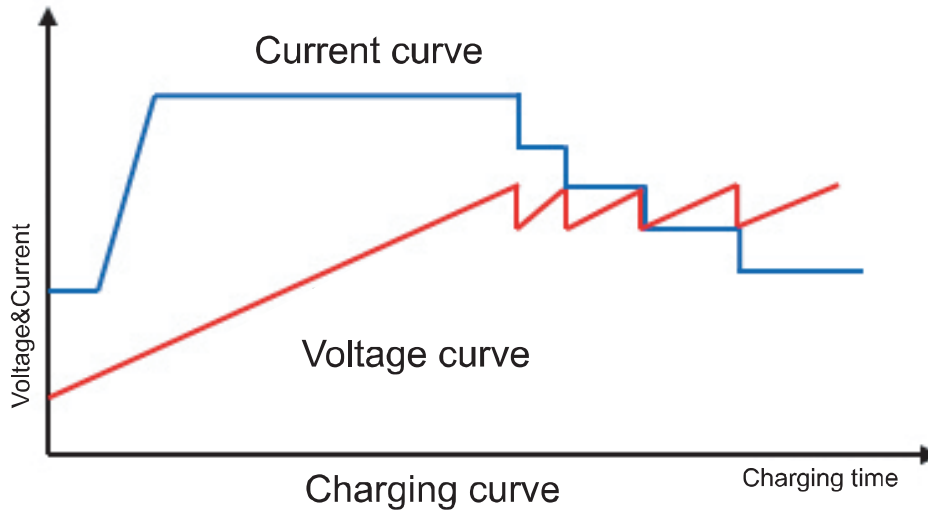
This smart charger for electric vehicle uses high-frequency switching power supply technology, which learn from and absorb the advanced control technology designed. It is a practical, functional and reliable products. This electric vehicle charger is light weight, small size, charge stability, high efficiency, anti-seismic capability, safety and reliability. And it has under voltage, over voltage, reverse polarity, short circuit, overload protection. Curve with a reasonable charge and SCM control the charging process to ensure that the battery is fully charged, and extend the battery life.

### The principle of introduction:

This charger apply full bridge rectification principle. AC input rectifier bridge for the first time into the rectifier filter, resulting in a smooth DC voltage, and the DC voltage through full bridge inverter, generate high frequency AC signal, then the high-frequency alternating current after the second rectifier filter, produces a smooth DC.



## The charge curve



### Charging process description:

1. Preconditioning Charge: when charging machine starts, first 3-5A charging current for four minutes, and then high current charging. Four minutes is a small current to activate the battery charging purposes the chemical reaction inside the battery fully established, to avoid charging the battery in the cold state;
2. After four minutes the end of a small current, the charging unit into the preset current (eg 20A) constant current charging phase. When the voltage charge to a preset voltage (eg 400V), the charger reduces the charge without entering the voltage constant current value of the stage. Since then continue to detect the charging voltage, when the battery voltage again reaches 400V, the charger reduces the charge current once again (each time decreasing 2A), repeatedly until the charging current over the charging process to 2A, the charger that the battery is fully charged and shut down;
3. Charging authorities in the no-load machine just off the charge rather than the whole state down.



### **Working conditions:**

1. Suitable the battery type: Lead-acid battery, Li-FePO<sub>4</sub> battery, NI-MH battery.
2. Altitude: not exceeding 1,200 m.
3. Ambient temperature: -20 °C ~ +50°C .
4. Relative humidity: 30%~90%.
5. To ensure placement in the No explosive material charge location, there is no corrosion of metal and insulation damage to the gas or steam, dry and ventilated environment.
- 6.No severe vibration and shock, the vertical gradient of not more than 5%.
- 7.the grid voltage fluctuation range of continuing convergence value does not exceed the rated  $\pm 5\%$ , short-term fluctuations (less than 1 second) does not exceed 10% of the fundamental peak instantaneous volatility of not more than 20%.

### **Features:**

- 1.According to the design characteristics of the battery charge a reasonable curve, both full of batteries and can extend battery life.
- 2.Easy to use, simple maintenance, intelligent charging, without human duty.
- 3.the protection function. Over voltage, under voltage, over current, over heating, short circuit, output reverse polarity protection, etc.
- 4.Intuitive and strong. Charging process and the failure by the LCD screen display, can at a glance.
- 5.Using high-frequency soft switch technology, making the charger and high efficiency, small size, light weight.
- 6.Charger fan switch control by the temperature 45 °C, when the radiator temperature is below 45 °C, the fan does not rotate. When the radiator temperature is higher than 45 °C, the fans began to turn, can reduce noise and extend fan life.

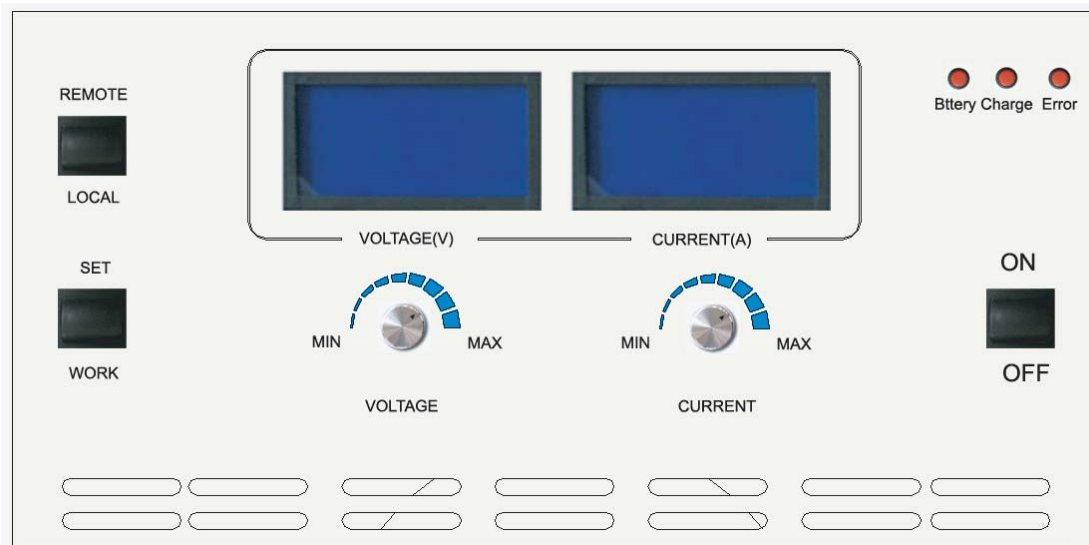
### **The major technical specification:**

- 1) The input is AC380V (three-phase three-wire);
- 2) Input voltage and frequency to adapt to wide range of power in the AC 380V  $\pm 10\%$ , and frequency of 50Hz  $\pm 10\%$  enter the work can be stable and reliable;
- 3) DC output value from 40-400V continuously adjustable.
- 4) Output DC Current value from 5-20A potentiometer continuously adjustable;
- 5) Load regulation:  $\leq 1\%$ ;
- 6) voltage regulation rate:  $\leq 1\%$  load regulation:  $\leq 1\%$ ;
- 7) Ripple Voltage:  $\leq 1\%$ ;
- 8) Leakage current:  $\leq 10\text{mA}$ ;
- 9) Duty cycle: 100%;
- 10) the overall efficiency:  $\geq 92\%$  (full load);
- 11) Power factor:  $\geq 0.80$  (full load);
- 12) Insulation resistance: DC1000V test  $\geq 50\text{M}\Omega$ ;
- 13) Charging Mode: Auto + Manual;
- 14) With charging voltage, current, charge status, display and parameter setting functions;
- 15) With failure alarm and display;
- 16) With pre-constant current charging, constant voltage float late, full auto-stop function;
- 17) Protection class: IP32;
- 18) Cooling: Air Cooled;
- 19) With the protection function of fatal error (such as load reverse polarity, input and output short circuit)

shutdown, the general error alarm function;

20) With over voltage, under voltage, over current, over heating, lack phase, corresponding to short-circuit protection;

### Front operation panel



**ON / OFF switch:** When to start charging machine, please switch to the **ON** position, when the charger need to turn off, please the switch to the **OFF** position.

**REMOTE / LOCAL:** When the switch to the **REMOTE** position, the charger from the CAN control, manual operation is not Work; when the switch on the **LOCAL** position: CAN communication cut off, charging into the machine by manual operation way.

**SET / WORK:** When the manual operation, first press the **SET** switch position, the voltage and current values can be set manually. When the voltage and current value finish setting, put the switch to the **WORK** position to start charging machine according to previous setting .

**VOLTAGE (V):** Display the actual output of charging voltage value.

**CURRENT (A):** Display the actual output current work.

**VOLTAGE:** Voltage adjustment potentiometer to change the voltage value.

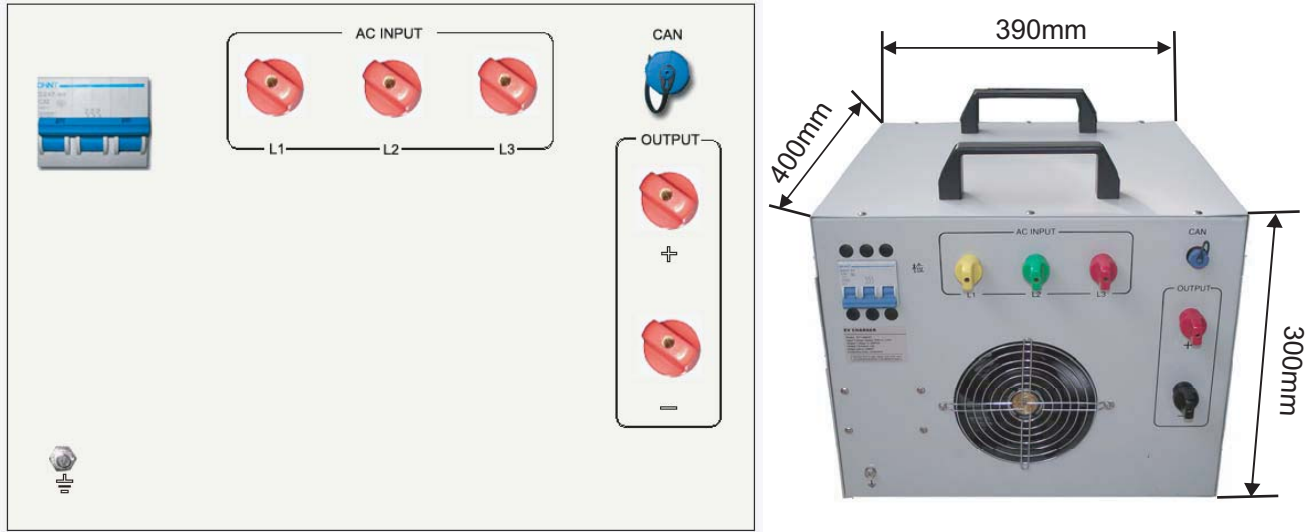
**CURRENT:** Current adjustment potentiometer to change the current value.

**BATTREY:** This LED will be light after the battery connections correctly.

**CHARGE:** When charging is normal this LED will be light.

**ERROR:** When the reverse or short circuit

### Rear operation panel introduction



AC INPUT: AC 3-phase 380V;

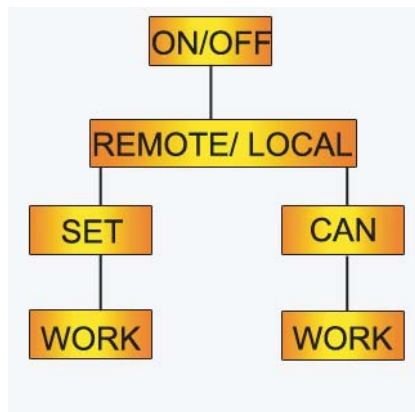
OUTPUT: DC output, the red terminal is positive, the black terminal is negative;

CAN: CAN communication, 1 foot (red line) is high, 2 feet (black line) is low.

#### Wiring connection:

1. Firstly, take the charger and the battery connected, the red terminal is positive output, access to battery positive, black-side output is negative, access to the battery negative.
2. the AC input connected, the input for the three-phase 380V, three-phase for the firing line, there is no zero line.
3. Please take a good ground to avoid danger.
4. Turn on the AC switch, charger start.

#### Operation option



1. Firstly, open the voltage switch, then select the charging mode.

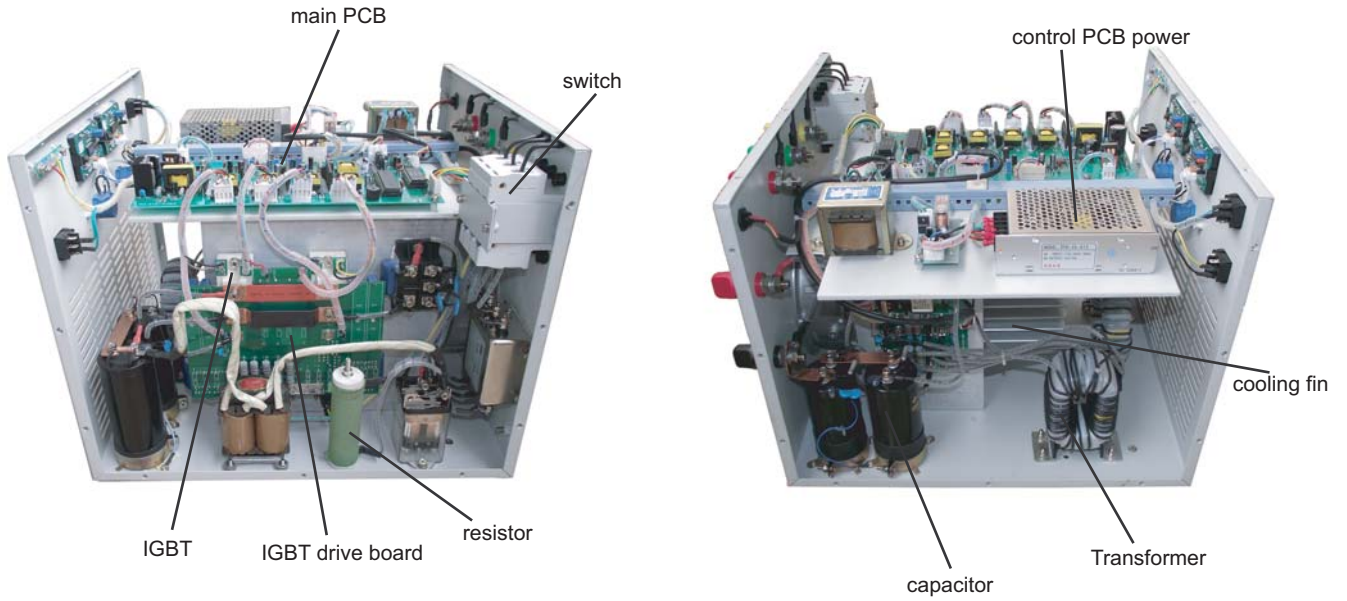
2. When the manual operation, please select **LOCAL mode**, if controlled through the CAN, select **REMOTE mode**;

3. When you select **LOCAL mode**, turn the **SET / WORK** switch to the **SET** position, according to your need to set the voltage, current, and the turn to **WORK** position then the charger start to work.

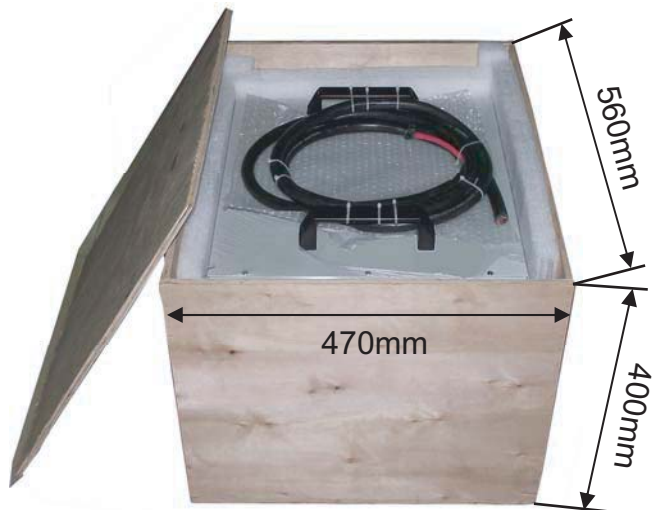
4. When you select **REMOTE** mode, please connect the CAN communication lines with the BMS or outer company.



## Inner structure



## Packing



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## BMS: CAN BUS COMMUNICATION SPECIFICATION

### 1. Communication Specification

The principle for data link layer.

Communication speed for bus line: 250Kbps.

The provision for data link layer: Refer to the related regulation of CAN2.0B and J1939.

Use and redefine 29 identifiers of CAN extended frame. The distribution of 29 identifiers are listed below:

IDENTIFIER		IDENTIFIER EXTENSION											SOURCE ADDRESS(SA)																
11BYTES		18BYTES																											
PRIORITY	R	DP	PDU FORMAT(PF)								PDU SPECIFIC(PS)																		
3	2	1	1	8	7	6	5	4	3		2	1	8	7	6	5	4	3	2	1									
28	27	26	25	24	23	22	21	20	19	18		17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Herein, Priority has 3-bit and there can be 8 priority levels. R is generally fixed as 0. DP is fixed as 0 at present. 8-byte PF is the code for message. 8-byte PS refers to destination address or array extension. 8-byte SA refers to the source address for sending messages.

- ›There is a name and an address for every node which accesses to the network. The name is used for nodes identification and address arbitration. The address is used for data communication to node.
- ›Every node has at least one function. Multiple nodes might have the same function or one node might have multiple functions.

### CAN Network Address Distribution

Obtain the node address of CAN Bus from the definition of J1939 Standard:

Node Name	SOURCE ADDRESS(SA)
Motor Controller	239(0xEF)
Battery Management System (BMS)	244(0xF4)
Charger Control System (CCS)	229(0xE5)
Charger Control System 2 (CCS2)	230(0xE6)
Broadcast Address (BCA)	80(0x50)

**Message Format**

Message1: (ID: 0x1806E5F4)

OUT	IN	ID			Cycle Time (ms)
BMS	CCS	P	R	DP	1000
		6	0	0	
<b>Data</b>					
Position	Data Name				
BYTE1	Max Allowable Charging Terminal Voltage High Byte(VOL_SET_H)				
BYTE2	Max Allowable Charging Terminal Voltage Low Byte (VOL_SET_L)				
BYTE3	Max Allowable Charging Current High Byte (VOL_SET_H)				
BYTE4	Max Allowable Charging Current Low Byte (VOL_SET_L)				
BYTE5	Control				
BYTE6	Reserved				
BYTE7	Reserved				
BYTE8	Reserved				
		0.1V/byte offset:0 e.g. Vset=3201, its corresponding 320.1V			
		0.1A/byte offset:0 e.g. Iset=582, its corresponding 58.2A			
		0: Charger is open and on charge. 1:Battery protection, the charger closes its output.			

**Message 10: (ID: 0x1806E6F4) new added message( only available for charging station)**

OUT	IN	ID			Cycle Time(ms)
BMS	CCS	P	R	DP	1000
		6	0	0	
<b>Data</b>					
Position	Data Name				



BYTE1	Max Allowable Charging Terminal Voltage High Byte (VOL_SET_H)	0.1V/byte offset:0 e.g. Vset=3201, its corresponding 320.1V
BYTE2	Max Allowable Charging Terminal Voltage Low Byte (VOL_SET_L)	
BYTE3	Max Allowable Charging Current High Byte (CUR_SET_H)	0.1A/byte offset:0 e.g. Iset=582, its corresponding 58.2A
BYTE4	Max Allowable Charging Current Low Byte (CUR_SET_L)	
BYTE5	Control (CONTROL_FLG)	0: Charger is open and on charge. 1:Battery protection, the charger closes its output.
BYTE6	Max Allowable Discharging Current (DISCUR_MAX)	10A/byte offset:0 e.g. Iset=2, its corresponding 20A
BYTE7	Reserved	
BYTE8	page=1	=1

Message 11: (ID: 0x1806E6F4) new added message( only available for charging station)

OUT	IN	ID		Cycle Time(ms)
BMS	CCS	P	R	DP
		6	0	0
				PF
				6
				1000
Position	Data Name			
BYTE1	Battery Nominal AH High Byte (AH_marker_H)			
BYTE2	Battery Nominal AH Low Byte (AH_marker_L)			
BYTE3	Battery Actual AH High Byte (AH_actual_H)			
BYTE4	Battery Actual AH Low Byte (AH_actual_L)			
BYTE5	Single Battery Max Protection Voltage High Byte (VOL_CELL_OV_protect_H)			
BYTE6	Single Battery Max Protection Voltage Low Byte (VOL_CELL_OV_protect_L)			
BYTE7	Battery Numbers (BATTER_NUM)			
BYTE8	page=2			

**Message 12: (ID: 0x1806E6F4) new added message( only available for charging station)**

OUT	IN	ID		Cycle Time(ms)
BMS	CCS	P	DP	1000
		6	0	
<b>Data</b>				
Position	Data Name			
BYTE1	Single Battery Max Voltage High Byte (VOL_CELL_MAX_H)			
BYTE2	Single Battery Max Voltage Low Byte (VOL_CELL_MAX_L)			
BYTE3	Single Battery Min Voltage High Byte (VOL_CELL_MIN_H)			
BYTE4	Single Battery Min Voltage Low Byte (VOL_CELL_MIN_L)			
BYTE5	Single Battery Min Protection Voltage High Byte (VOL_CELL_ULV_protect_H)			
BYTE6	Single Battery Min Protection Voltage Low Byte (VOL_CELL_ULV_protect_L)			
BYTE7	Battery State (BATTER_STATE)			
BYTE8	page=3			
				1mV /byte
				1mV /byte
				1mV /byte
				Byte0: over-voltage mark, Byte1:under-voltage mark. Normal:0x00
				=3

**Message 13: (ID: 0x1806E6F4) new added message( only available for charging station)**

OUT	IN	ID		Cycle Time(ms)
BMS	CCS	P	DP	1000
		6	0	
<b>Data</b>				
Position	Data Name			
BYTE1	Battery Pack Total Voltage High Byte (VOL_BATTER_H)			
BYTE2	Battery Pack Total Voltage Low Byte (VOL_BATTER_L)			
BYTE3	Actual Charging Current High Byte (CUR_CHARGE_H)			
BYTE4	Actual Charging Current Low Byte (CUR_CHARGE_L)			
				0.1V/byte
				0.1A/byte offset:0 Max byte means mark. 0: charging; 1: discharging



BYTE5	Present soc (SOC)	0-100
BYTE6	Battery Max Temperature (TEMPERATURE_MAX)	1 degree/byte, offset 100. eg: 0:-100 degree, 125: 25degree
BYTE7	Battery Min Temperature (TEMPERATURE_MIN)	1 degree/byte, offset 100. eg: 0:-100 degree, 125: 25degree
BYTE8	页 page=4	=4

Message 14: (ID: 0x1806E6F4) new added message( only available for charging station)

OUT	IN	ID	Cycle Time(ms)
BMS	CCS	P	DP
		6	0
		R	PF
		0	6
		0	1000
Data			
Position	Data Name		
BYTE1	Battery Numbers High Byte (BATTER_NUM_H)		
BYTE2	Battery Numbers Low Byte (BATTER_NUM_L)		
BYTE3	0: Invalid Information		
BYTE4			
BYTE5			
BYTE6			
BYTE7			
BYTE8	page=5		
		=5	

Message 2: (ID: 0x18FF50E5)

OUT	IN	ID	Cycle Time(ms)
CCS	BCA	P	DP
		6	0
		R	PF
		0	0xFF
		0	1000
Data			
Position	Data Name		
BYTE1	Output Voltage High Byte		
BYTE2	Output Voltage Low Byte		
		0.1V/byte offset:0	e.g. Vout=3201, its corresponding 320.1V



BYTE3	Output Current High Byte	0.1A/byte offset:0 e.g. Iout=582, its corresponding 58.2A
BYTE4	Output Current Low Byte	Max byte means mark. 0: charging; 1: discharging
BYTE5	Status Flags	
BYTE6	Reserved	
BYTE7	Reserved	
BYTE8	Reserved	

STATUS	Mark	Description
Bit 0	Hardware Failure	0: Normal. 1: Hardware Failure
Bit 1	Temperature of Charger	0: Normal. 1: Over temperature protection
Bit 2	Input Voltage	0: Input voltage is normal. 1: Input voltage is wrong, the charger will stop working.
Bit 3	Stating State	0: The charger detects the voltage of the battery and enter into starting state. 1: The charger stays closed (to prevent reverse polarity)
Bit 4	Communication State	0: Communication is normal. 1: Communication receive time-out.
Bit 5		
Bit 6		
Bit 7		

### Operation Mode

1. BMS send operating information (Message 1) and (Message 10+Message 11+Message 12) to charger at fixed interval of 1s. After receiving the message, the charger will work under the Voltage and Current in Message. If the Message is not received within 5s, then it will enter into communication error state and the output will be closed.
2. The charger send broadcast message (Message 2) at intervals of 1s. The display meter can show the status of the charger according to up-to-date information.