

# SmartGen

MAKING CONTROL SMARTER

## BACMXX06 SERIES BATTERY CHARGER

### BACM2406/BACM1206

## USER MANUAL



郑州众智科技股份有限公司  
SMARTGEN(ZHENGZHOU)TECHNOLOGY CO.,LTD.

**SmartGen** 众智 Chinese trademark

**SmartGen** English trademark

Smartgen – make your generator *smart*

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**Table 1 Software Version**

Date	Version	Contents
2014-12-20	1.0	Original release.
2022-06-15	1.1	Update manual format and company logo.

This manual is suitable for BACMXX06 Series Battery Charger only.

**Table 2 Sign Instruction**

Sign	Instruction
 Note	Highlights an essential element of a procedure to ensure correctness.
 Caution!	Indicates a procedure or practice, which, if not strictly observed, could result in damage or destruction of equipment.
 Warning!	Indicates error operation may cause death, serious injury and significant property damage.

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## 1 OVERVIEW

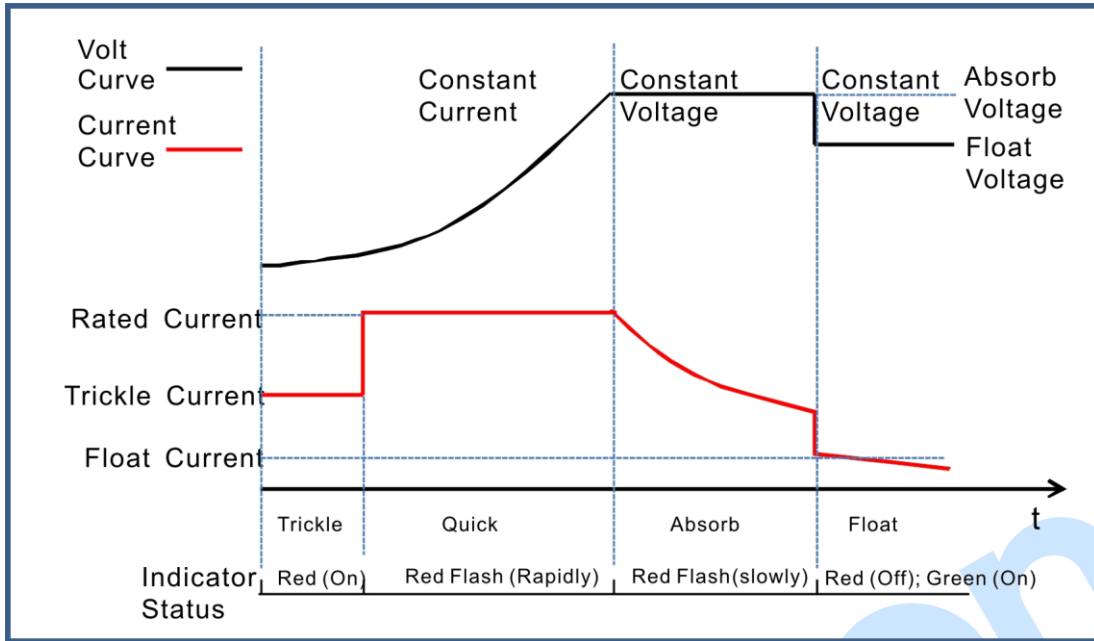
BACMXX06 series battery charger is intelligent and multi-function which is specially designed for meet the charging characteristics of the lead-acid engine starter batteries. BACMXX06 battery chargers are divided into 2 types according to the battery voltage: BACM2406 (suitable for 24V) and BACM1206 (suitable for 12V). Both of their maximum charge current are 6A.

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## 2 PERFORMANCE AND CHARACTERISTICS

- 1) Switch power supply structure, wide input AC voltage range, small size, light weight, high efficiency rate;
- 2) Users can select automatic two-stage charging process or automatic three-stage charging process as needed. Both the two charging process are carried out according to storage battery charging characteristics to prevent overcharging and significantly prolong battery lifetime;
- 3) Built-in PFC circuit can calibrate the power factor above 0.99;
- 4) Built-in current protective circuit for over current protection, short-circuit protection and reverse connection protection. The output will be recovery automatically after the failure is removed;
- 5) Battery voltage detection ports can detect the battery voltage in real time;
- 6) Battery low voltage output port; It will output low level immediately after the battery voltage has fallen below the set value for preset delay;
- 7) Temperature sensor port allows for monitoring the battery temperature in real time and temperature compensation function which can prevent the battery temperature is too high effectively;
- 8) Mains failure port; It will output low level immediately when the AC input is interrupted;
- 9) Standard RS485 communication port;
- 10) BACM2406 charger is suitable for 24V battery; rated current: 6A; BACM1206 charger is suitable for 12V battery; rated current: 6A;
- 11) LED display: Full charged indication (Green light) and charging indication (Red light).

**3 CHARGING PRINCIPLE**



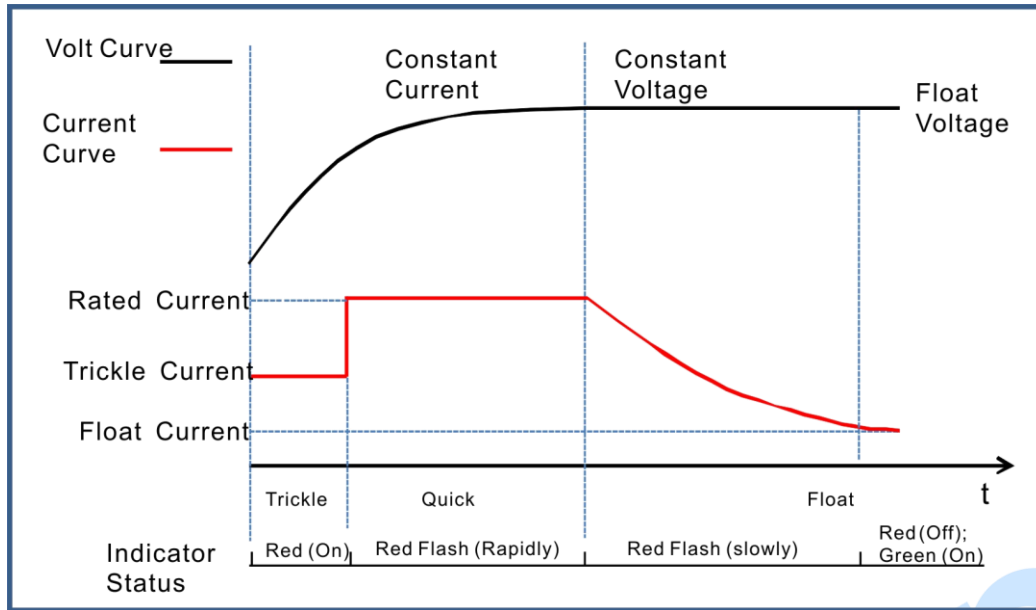
**Fig.1 Three-stage Method**

Charging is performed according to the battery charging characteristics using three-stage method.

The first stage is named as “Constant Current”: 1): Trickle Charge: When the battery terminal voltage is relatively low, then the charging current is low likewise which can prevent the battery damaging due to high temperature. The charging indicator (Red color) status is illuminated. 2): Quick Charge: When the battery terminal voltage is relatively high, the charging current will rise to rated value. Large current charging operation leading to an increase in the electricity quantity of the battery. The charging indicator (Red color) status is flashing rapidly (0.2s/per) as the battery power rising quickly.

The second stage is named as “Absorption Charge”: After the first stage, the battery voltage rises to absorption charge value rapidly, and the charger voltage will keep constant. The battery terminal voltage will stabilize in the absorption charge value with the decreasing of charging current. The charging indicator (Red color) status is flashing slowly (1s/per).

The third stage is named as “Float Charge”: After the above two stage, the charge is basically completed and the Float Charge is started automatically. In this stage, the charger voltage reduces to float voltage and the charger current reduces to float value (Red indicator will extinguish and the green indicator will be illuminated). After that charging current will only neutralize the battery self-discharge. Even long-term charging cannot harm the battery, as charger can keep the battery fully charged and so guarantee long lifetime of the battery.



**Fig.2 Two-stage Method**

Charging is performed according to the battery charging characteristics using two-stage method.

The first stage is named as “Constant Current”: 1): Trickle Charge: when the battery terminal voltage is relatively low, then the charging current is low likewise which can prevent the battery damaging due to high temperature. The charging indicator (Red color) status is illuminated. 2): Quick Charge: When the battery terminal voltage is relatively high, the charging current will rise to rated value. Large current charging operation leading to an increase in the electricity quantity of the battery. The charging indicator (Red color) status is flashing rapidly (0.2s/per) as the battery power rising quickly.

The second stage is named as “Float Charge”: The charging current will decrease with the rising of battery electricity. The charging indicator (Red color) status is flashing slowly (1s/per). As soon as charging current value falls below 0.3A, the battery is basically charged (Red indicator will extinguish and the green indicator will illuminate). After that charging current will only neutralize the battery self-discharge. Even long-term charging cannot harm the battery, as charger can keep the battery fully charged and so guarantee long lifetime of the battery.

**Table 3 Charging Indicator Status**

Charging Stage Charging Mode		Constant Current		Constant Voltage	Float Charge	Charge Failure
		Trickle Charge	Quick Charge			
Two Stage	Red	On	Flash (Rapidly)	None	Flash (Slowly) → Off	Flash (Rapidly)
	Green	Off	Off	None	Off → On	Flash (Rapidly)
Three Stage	Red	On	Flash (Rapidly)	Flash (Slowly)	Off	Flash (Rapidly)
	Green	Off	Off	Off	On	Flash (Rapidly)



**4 PARAMETERS CONFIGURATION**

**Table 4 Parameters Configuration**

Items	Default		Adjustable Range		Description
	BACM 2406	BACM 1206	BACM2406	BACM1206	
Charging Stage	3		(2~3)		2: Two Stage; 3: Three Stage
Rated Output Current	6.0A		Non-adjustable		Max charging current.
Charging Current	100%		(0~100)%		Max charging current percentage.
Absorption Charge Voltage	28.2V	14.1V	(20~30)V	(10~15)V	The charging voltage of "Constant Voltage".
Absorption Charge Delay	1		(0~1)		0: Disable; 1: Enable
Delay Setting	1.0h		(0.1~100)h		The charging time of "Constant Voltage".
Absorption Charge Complete Current	1		(0~1)		0: Disable; 1: Enable
Complete Current Setting	0.5A		(0.20~3.00)A		The transition current from "Absorption Charge" transfer to "Float Charge".
Float Charge Voltage	27.0V	13.5V	(20~30)V	(10~15)V	The voltage of "Float Charge".
AUTO BOOST Voltage	25.6V	12.8V	(20~30)V	(10~15)V	When the charger is in "Float Mode", it enters into "Quick Charge" if the battery voltage has fallen below the set value.
Trickle Charge	1		(0~1)		0: Disable; 1: Enable
Trickle Charge Voltage	22.0V	11.0V	(20~30)V	(10~15)V	The voltage of "Trickle Charge"
Trickle Charge Current	50%		(0~100)%		Max charging current percentage.
Battery Detection	0		(0~1)		0: Disable; 1: Enable
Battery Under Voltage Warn	1		(0~1)		0: Disable; 1: Enable
Under Voltage Set Value	23.0V	11.50V	(16.0~30.0)V	(8.0~15.0)V	"Under voltage" alarm will be initiated if the battery voltage has fallen below the set value.

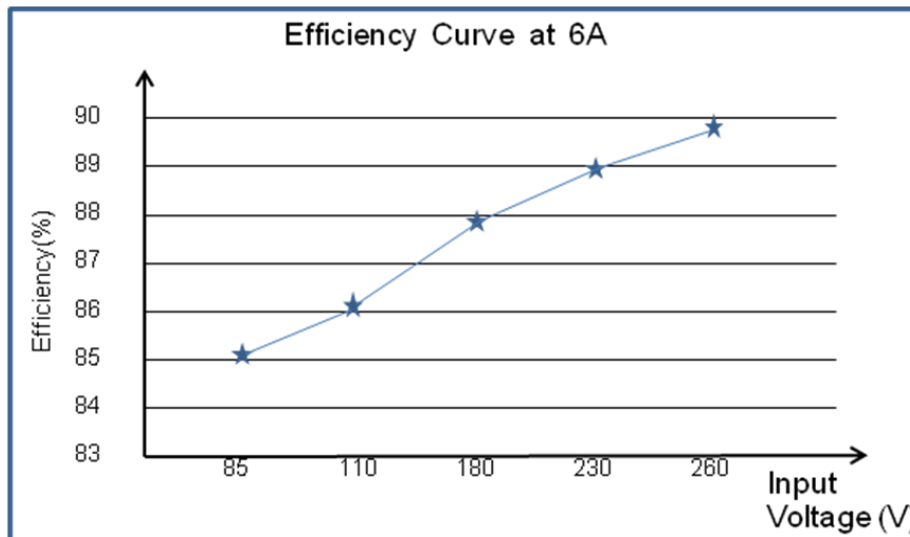
Items	Default		Adjustable Range		Description
	BACM 2406	BACM 1206	BACM2406	BACM1206	
Under Voltage Delay	120s		(0~3600)s		"Under voltage" alarm will be initiated if the battery voltage has fallen below the set value and the delay timer has expired.
Under Voltage Return Value	24.0V	12.0V	(16.0~30.0)V	(8.0~15.0)V	The transition voltage from "under voltage" transfer to "normal voltage".
Under Voltage Return Delay	10s		(0~3600)s		"Under voltage" alarm will be removed if the battery voltage has exceeded the return value and the delay timer has expired.
Temperature Sensor	1		(0~1)		0: Disable; 1: Enable
Temperature Compensation	1		(0~1)		0: Disable; 1: Enable
Temperature Compensation Set Value	0.036V/°C	0.018V/°C	(0.020~0.060)V/°C	(0.010~0.030)V/°C	The Compensation of every 1°C change on 20°C basis.
High Temp. Warn	1		(0~1)		0: Disable; 1: Enable
High Temp. Set Value	55°C		(0~80)°C		"High Temp." alarm will be initiated if the battery temp has exceeded the set value.
High Temp. Delay	0.5s		(0~60.0)s		"High Temp." alarm will be initiated if the battery temperature has exceeded the set value and the delay timer has expired.
High Temp. Return Value	50°C		(0~80)°C		The transition temp from "High Temp." transfer to "Normal Temp.".
High Temp. Return Delay	1s		(0~60.0)s		"High Temp." alarm will be removed if the battery temperature has fallen below the return value and the delay timer has expired.
Auxiliary Input Port	3		(0~3)		0: Not Used; 1: Shutdown: The battery charger enters into Standby Status if the input is active.

Items	Default		Adjustable Range		Description
	BACM 2406	BACM 1206	BACM2406	BACM1206	
					<p>2: Enable Battery Detection: The battery charger enters into Standby Status if the input is active but there is no battery voltage signal.</p> <p>3: Manual BOOST: The battery charger enters into BOOST if the input is active.</p>
Auxiliary Input Port Delay	2.0s		(0~60.0)s		The corresponding action will be active if the input is active and the delay timer has expired.
Communication Address	10		0~250		RS485 Communication Address
Baud Rate	0		(0~2)		0: 9600; 1: 19200; 2: 38400 (One Stop Bit)

**5 PARAMETERS SPECIFICATION**

**Table 5 Product Parameters**

Items	Contents	Parameters							
		BACM2406		BACM1206					
Input Characteristics	Nominal AC Voltage	AC (100~240)V							
	Max. AC Voltage	AC (90~280)V							
	AC Frequency	50Hz/60Hz							
	Max. Active Power	210W		105W					
	Max. Current	3A		1.5A					
	Efficiency	AC 110V	>86%	AC 220V	>88%	AC 110V	>86%	AC 220V	>88%
		Power Factor Calibration	AC 110V	>0.99	AC 220V	>0.95	AC 110V	>0.99	AC 220V
Output Characteristics	No-load Output Voltage	27V, Error±1%		13.5V, Error±1%					
	Rated Charging Current	6A, Error±2%							
	Max. Output Power	180W		90W					
Insulating Property	Insulation Resistance	Between input and output, input and shell, output and shell all are: $R_L \geq 500M\Omega$							
	Insulation Voltage	Between input and output, input and shell both are: AC1500V 50Hz 1min; leakage current: $I_L \leq 3.5mA$ Between output and shell is: AC500V 50Hz 1min; leakage current: $I_L \leq 3.5mA$							
Working Condition	Working Temperature	(-30~+55)°C							
	Storage Temperature	(-40~+85)°C							
	Working Humidity	20%RH~93%RH (No condensation)							
	Storage Humidity	10%RH~95%RH (No condensation)							
Shape Structure	Weight	0.9kg							
	Dimension	145.5mm×131mm×55mm (length*width*height)							



**Fig.3 Efficiency Curve**

## 6 OPERATION

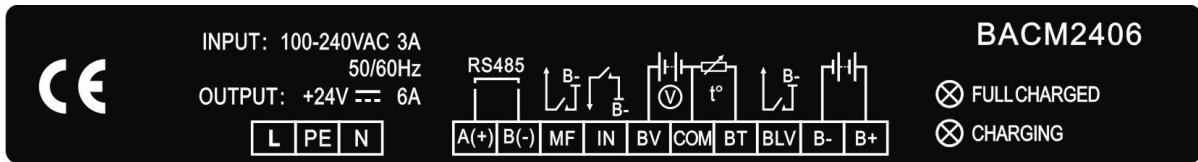


Fig.4 BACM2406 Mask

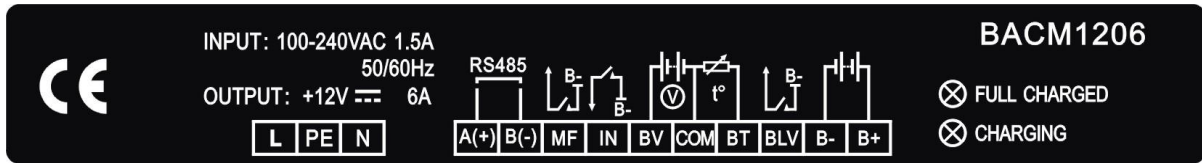


Fig.5 BACM1206 Mask

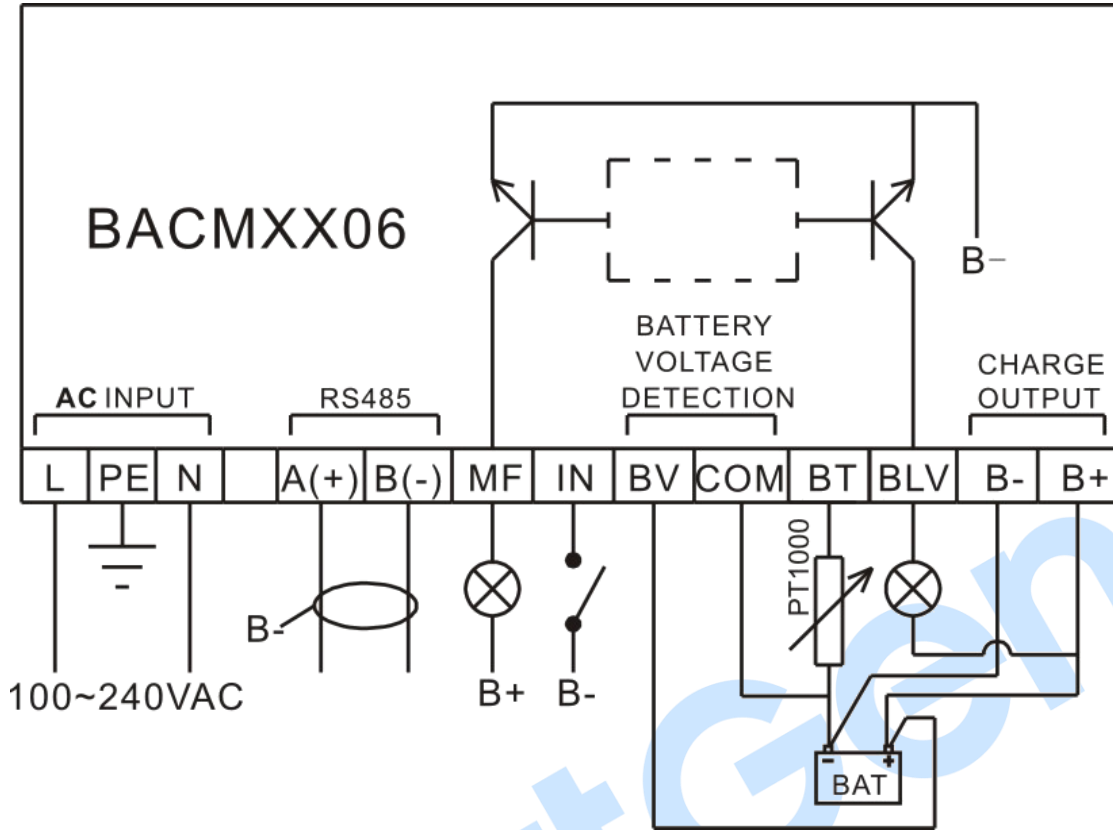
Table 6 Wiring Description

Terminal	Function	Description
L	AC Terminals	Connect terminals L and N to AC voltage (100~240)V using greater than BVR 1mm <sup>2</sup> multi-strand copper line.
N		
PE	GND Terminals	Connect to shell inner.
A(+)	RS485 Communication Port	Standard RS485 communication port.
B(-)		
MF	Mains failure port	It will output low level immediately when the AC input is interrupted.
IN	Auxiliary input port	Low level is active.
BV	Battery Voltage Port	Connect to battery positive.
COM	Common Port	COM port of BV and BT terminal. Connect to battery negative.
BT	Temperature Sensor Port	Connect to PT1000 sensor.
BLV	Battery Low Voltage Port	It will output low level when the battery voltage has fallen below the set value.
B-	Battery Negative	Connect to battery negative using greater than BVR 2.0mm <sup>2</sup> multi-strand copper line.
B+	Battery Positive	Connect to battery positive using greater than BVR 2.0mm <sup>2</sup> multi-strand copper line.
FULL CHARGED	Green LED Indicator	Full Charged Indicator.
CHARGING	Red LED Indicator	Charging Indicator.

**NOTE:**

- 1) Because there is diode and current-limiting circuit inner the charger, it can be used together with charging generator, and there is no need to disconnect the charger when cranking.
- 2) During genset is running, high current will cause voltage drop in charging line, so recommend separately connecting to battery terminal to avoid disturbance on sampling precision.

**7 WIRING**



**Fig.6 Wiring Diagram**

8 CASE DIMENSIONS

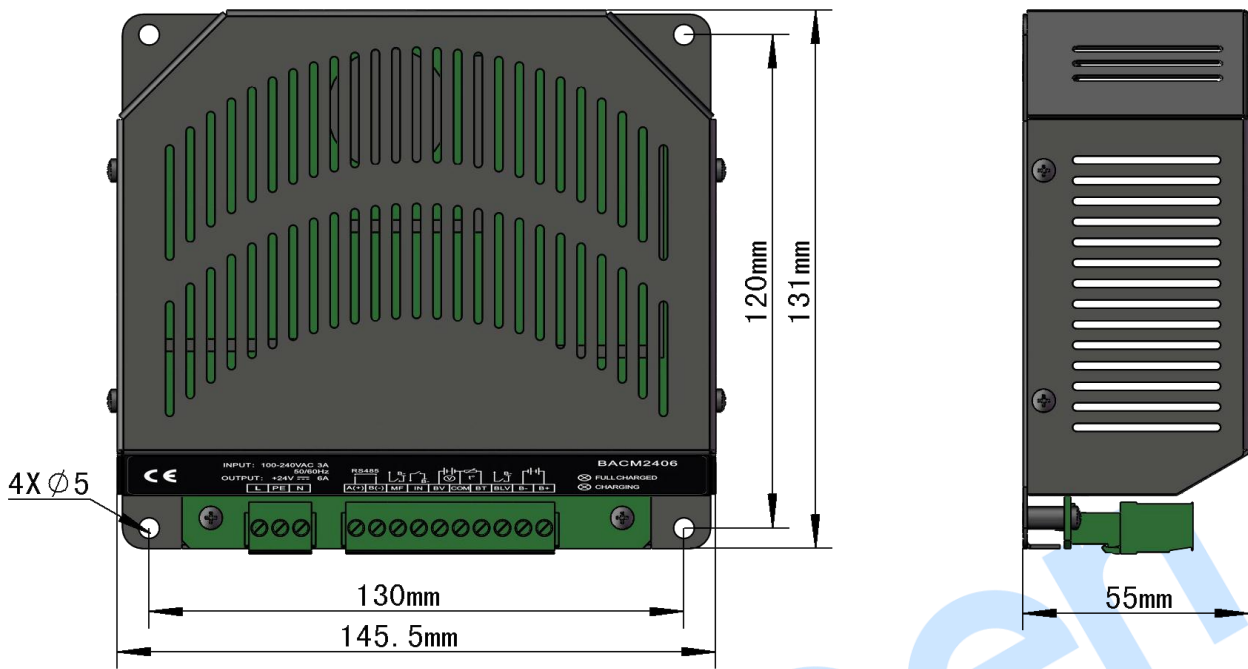


Fig.7 Case Dimensions