SmartGen

MAKING CONTROL SMARTER

BACMXX10 SERIES BATTERY CHARGER

BACM2410/BACM1210

USER MANUAL

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Table 1 Software Version

Date	Version	Note
2015-6-10	1.0	Original Release.
2020-12-25	1.1	Modified the insulation voltage; optimize the format.
2022-08-24	1.2	Update company logo and manual format.
2023-04-24	1.3	Add the notes for wiring connections.
2025-08-18	1.4	Add BACM1210 charger for 12V battery pack and battery types.

CONTENT

1 OVERVIEW

BACMXX10 series chargers are intelligent and multi-functional battery chargers, specially designed for the charging characteristics of various battery types such as lead-acid, lithium and nickel-cadmium, used for engine starting. This includes the BACM2410 charger for 24V battery packs with a maximum output current of 10A, as well as the BACM2410 charger for 12V battery packs, also with a maximum output current of 10A.

2 PERFORMANCE AND CHARACTERISTICS

1) Switch power supply structure, wide input AC voltage range, small size, light weight, high efficiency;
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 up to 0.99;
4) Built-in current protection circuit for over current protection, short-circuit protection and reverse connection protection. The output will recover 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) BACM2410 charger is suitable for 24V battery; rated current is 10A; BACM1210 charger is suitable for 12V battery and rated current is 10A;
11) LED display: Full charged indication (Green light) and charging indication (Red light);
12) Built-in multiple battery charging curves; once the battery type is selected, it automatically charges according to the battery's characteristics without manual parameter adjustment.

3 CHARGING PRINCIPLE

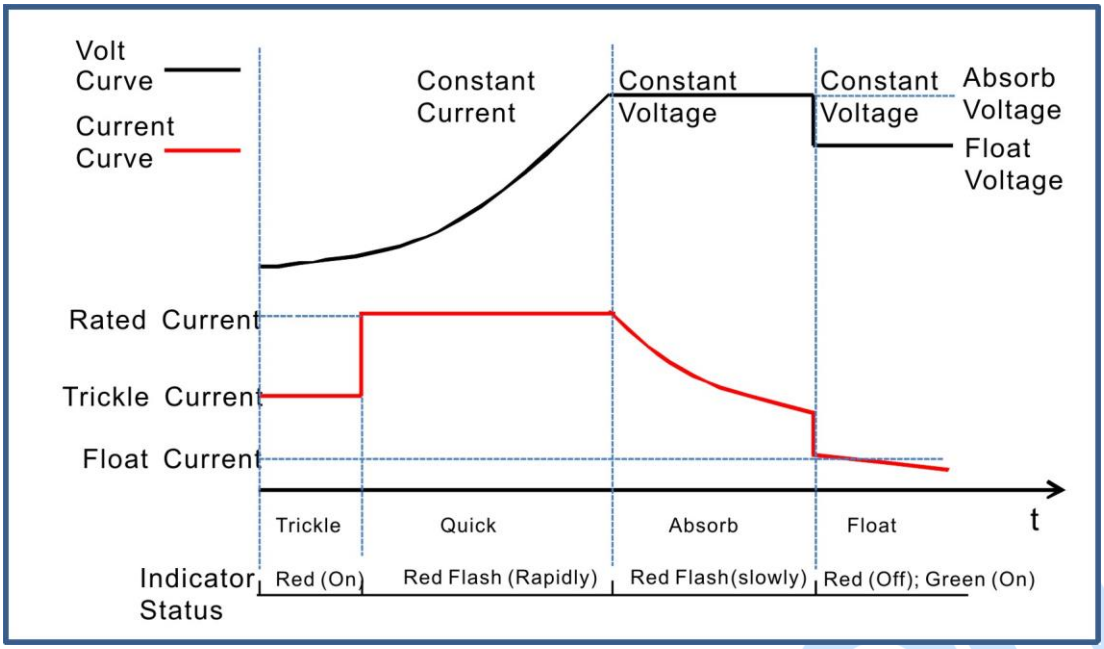

Fig.1 Three-stage Charging Curve

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

1) 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 damage due to high temperature. The charging indicator (Red color) status is always illuminated. 2): Quick Charge: When the battery terminal voltage is relatively high, the charging current will rise to rated value. Large current charging operation leads to an increase in the electricity quantity of the battery. The charging indicator (Red color) status is flash rapidly (0.2s/per) as the battery power rising quickly.
2) The second stage is named as Absorption Charge: after the first stage, the battery voltage will rise 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 flash slowly (1s/per).
3) 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.

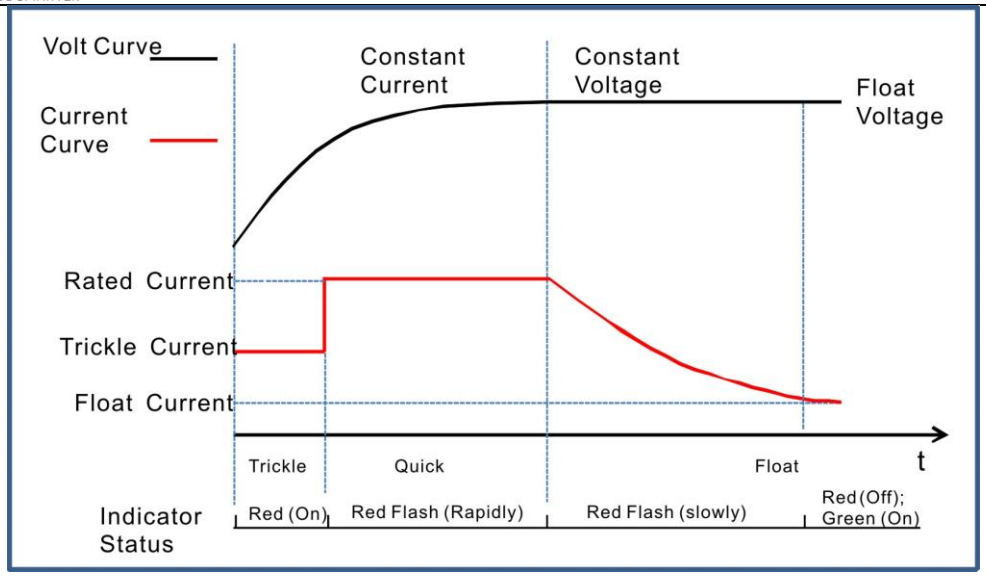

Fig.2 Two-stage Charging Curve

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

1) 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 temperature is too high. 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 leads to an increase in the electricity quantity of the battery. The charging indicator (Red color) status is flash rapidly (0.2s/per) as the battery power rising quickly.
2) 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 flash 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 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.

Table 2 Charging Indicator Status

Mode	Indicator	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 CHARGING PARAMETERS

Table 3 Charging Parameters

Battery Types	Absorption Charge Voltage		Float Charge Voltage	
	BACM2410	BACM1210	BACM2410	BACM1210
Lead-acid	28.20V	14.10V	27.00V	13.50V
Lithium	29.40V	14.70V	27.00V	13.50V
Nickel-cadmium	29.00V	14.50V	28.20V	14.10V

5 PARAMETERS CONFIGURATION

Table 4 Parameters Configuration

Parameter Items	Default		Adjustable Range		Description
	BACM 2410	BACM 1210	BACM 2410	BACM 1210	
Charging Stage	3		(2~3)		2: Two Stage; 3: Three Stage
Rated Current	100%		(0~100)%		Maximum charging current percentage
Absorption Charge Voltage	28.2V	14.10V	(20.00~30.00)V	(10.00~15.00)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	0.50A		(0.20~3.00)A		The transition current from “Absorption Charge” transfer to “Float Charge”.
Float Charge Voltage	27.00V	13.50V	(20.00~30.00)V	(10.00~15.00)V	The voltage of “Float Charge”
AUTO BOOST Voltage	25.60V	12.80V	(20.00~30.00)V	(10.00~15.00)V	When the charger is in “Float Mode”, it enters into “Quick Charge” if the battery voltage has fallen below the set value.
AUTO BOOST Voltage Delay	20s		(0~3600)s		Delay time after voltage drops to the BOOST voltage value.
Trickle Charge	1		(0~1)		0: Disable; 1: Enable
Trickle Charge Voltage	22.00V	11.00V	(20.00~30.00)V	(10.00~15.00)V	The voltage of “Trickle Charge”
Trickle Charge Current	50%		(0~100)%		Maximum 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	23.00V	11.50V	(16.00~30.00)V	(8.00~15.00)V	“Under voltage” alarm will be initiated if the battery voltage has fallen below the set value.
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	24.00V	12.00V	(16.00~30.00)V	(8.00~15.00)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

Parameter Items	Default		Adjustable Range		Description
	BACM 2410	BACM 1210	BACM 2410	BACM 1210	
					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	0.036 V/°C	0.018 V/°C	(0.020~0.060)V/°C	(0.010~0.030)V/°C	On the basis of 20°C, the value for which the output voltage rises (or drops) for every 1°C above (or below).
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 temperature 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 temperature 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. 2: Enable Battery Detection: The battery charger enters into Standby Status if the input is active but there is no battery voltage signal. 3: Manual BOOST: The battery charger enters into BOOST if the input is active.
Auxiliary Input Port Delay	2.0s		(1.0~60.0)s		The corresponding action will be active if the input is active and the delay timer has expired.
Communication Address	10		1~250		RS485 Communication Address
Baud Rate	0		(0~2)		0: 9600; 1: 19200; 2: 38400

6 PARAMETERS SPECIFICATION

Table 5 Parameters Specification

Items	Contents	Parameters			
		BACM2410		BACM1210	
Input Characteristics	Nominal AC Voltage	AC (100~240)V			
	Max. AC Voltage	AC (90~280)V			
	AC Frequency	50Hz/60Hz			
	Max. Active Power	340W		172W	
	Max. Current	4A		1.85A	
	Efficiency	AC 110V	AC 220V	AC 110V	AC 220V
		>86%	>88%	>85%	>87%
	Power Factor Calibration	AC 110V	AC 220V	AC 110V	AC 220V
		>0.99	>0.95	>0.98	>0.93
Output Characteristics	No-load Output Voltage	27V, Error±1%		13.5V, Error±1%	
	Rated Charging Current	10A, Error±2%			
	Max. Output Power	290W		150W	
Insulating Property	Insulation Resistance	Between input and output, input and shell both are: DC500V 1min $R_L \geq 50M\Omega$			
	Insulation Voltage	Between input and output, input and shell both are: DC2400V 1min Leakage current: $I_L \leq 3mA$ Between output and shell is: DC800V 1min leakage current: $I_L \leq 3mA$			
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	1.17kg			
	Dimension	210mm×131mm×55mm (length*width*height)			

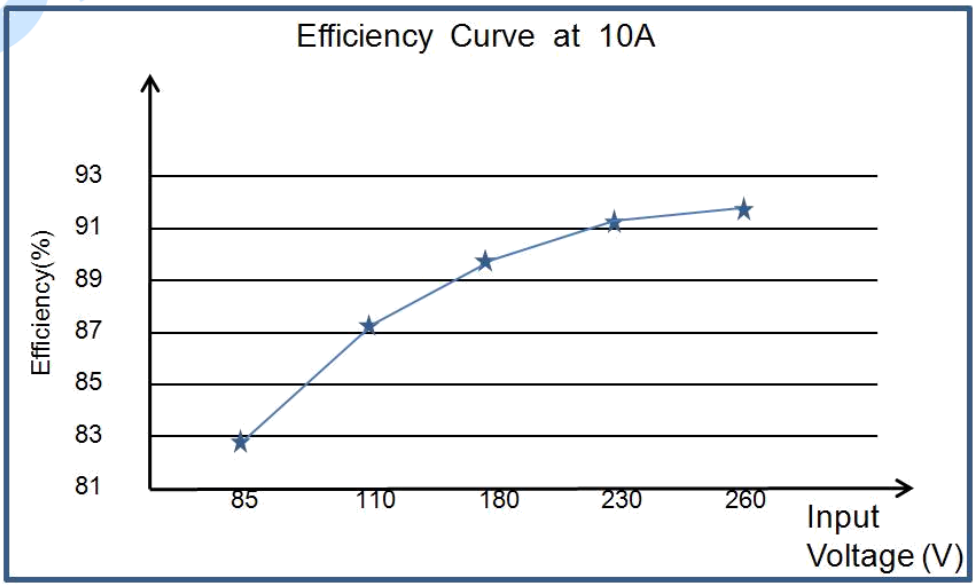

Fig.3 Efficiency Curve

7 OPERATION

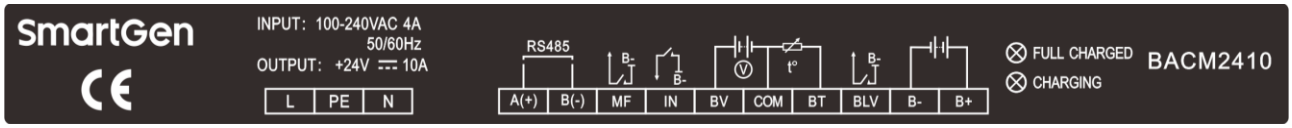

Fig.4 BACM2410 Mask

Fig.5 BACM1210 Mask

Table 6 Connection Instuctions

Terminal	Function	Description
L	AC Terminals	Connect terminals L and N to AC voltage (100~240)V using greater than BVR 1.5mm^2 multi-strand copper line.
N		
PE	GND Terminals	Connect to shell internally.
A(+)	RS485 Communication Port	Standard RS485 communication port
B(-)		
MF	Mains Failure Output Port	It will output low level immediately when the AC input is interrupted.
IN	Auxiliary input port	Active when level is low.
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 2.5mm^2 multi-strand copper lines.
B+	Battery Positive	Connect to battery positive using greater than BVR 2.5mm^2 multi-strand copper lines.
FULL CHARGED	Green LED Indicator	Full Charged Indicator.
CHARGING	Red LED Indicator	Charging Indicator.

NOTES:

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.

3) When manually adjusting the system wiring, please operate after the charger is powered off, otherwise may cause the damage.

8 CONNECTION

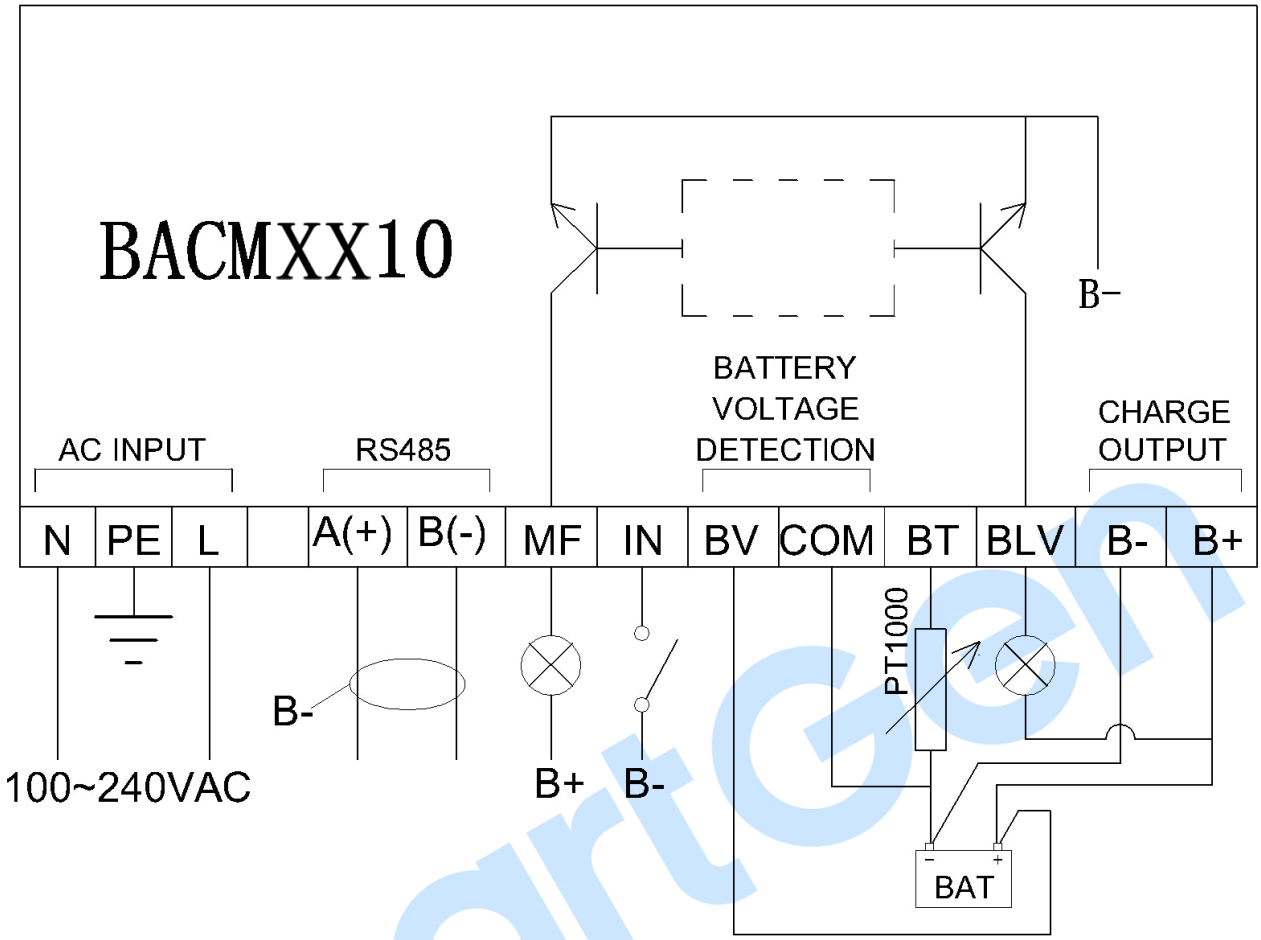

Fig.6 Connection Diagram

9 CASE DIMENSIONS

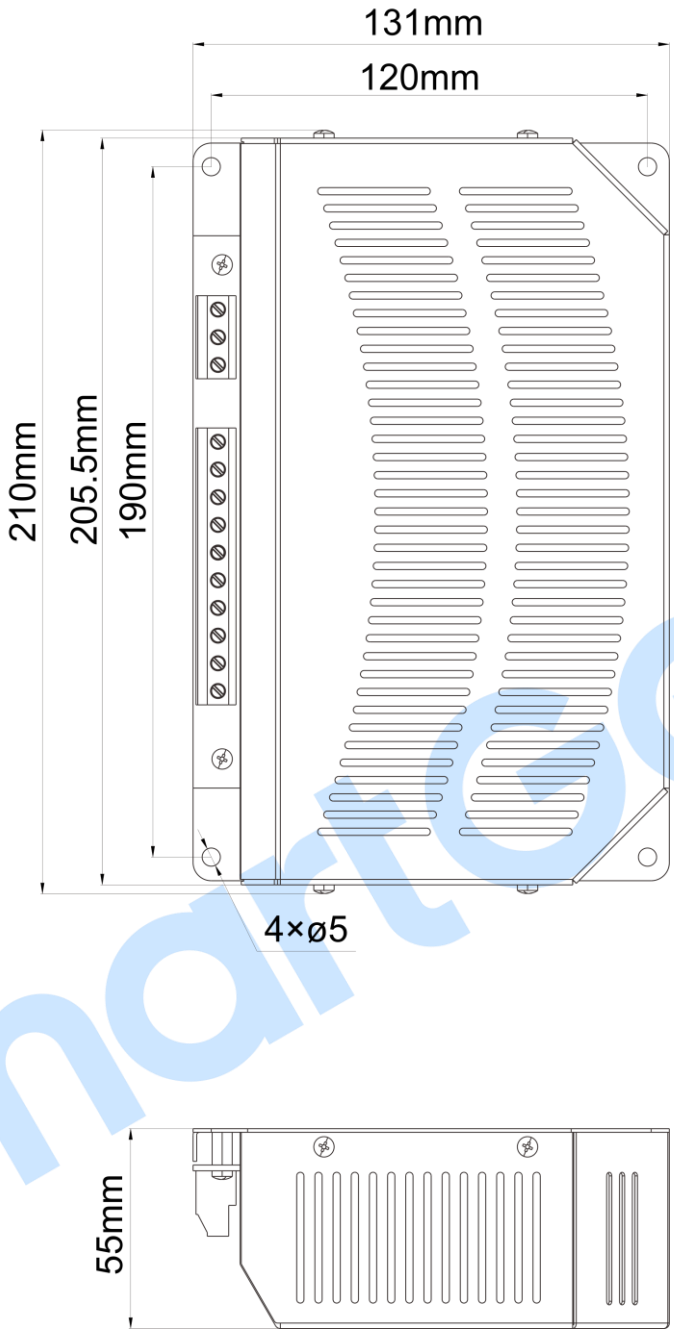

Fig.7 Case Dimensions