



**SmartGen**  
ideas for power

**BACM2420**  
**BATTERY CHARGER**  
**USER MANUAL**



**SMARTGEN (ZHENGZHOU) TECHNOLOGY CO., LTD.**



Chinese trademark

**SmartGen** English trademark

**SmartGen** — make your generator *smart*

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#### Software Version

Date	Version	Note
2016-11-24	1.0	Original Release
2017-03-01	1.1	BACM2420 configuration item added 24V/12V self-adaption option.
2017-09-27	1.2	In "Parameters Specification" section, changed the "Efficiency" parameter to "Max. Efficiency".



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## 1 OVERVIEW

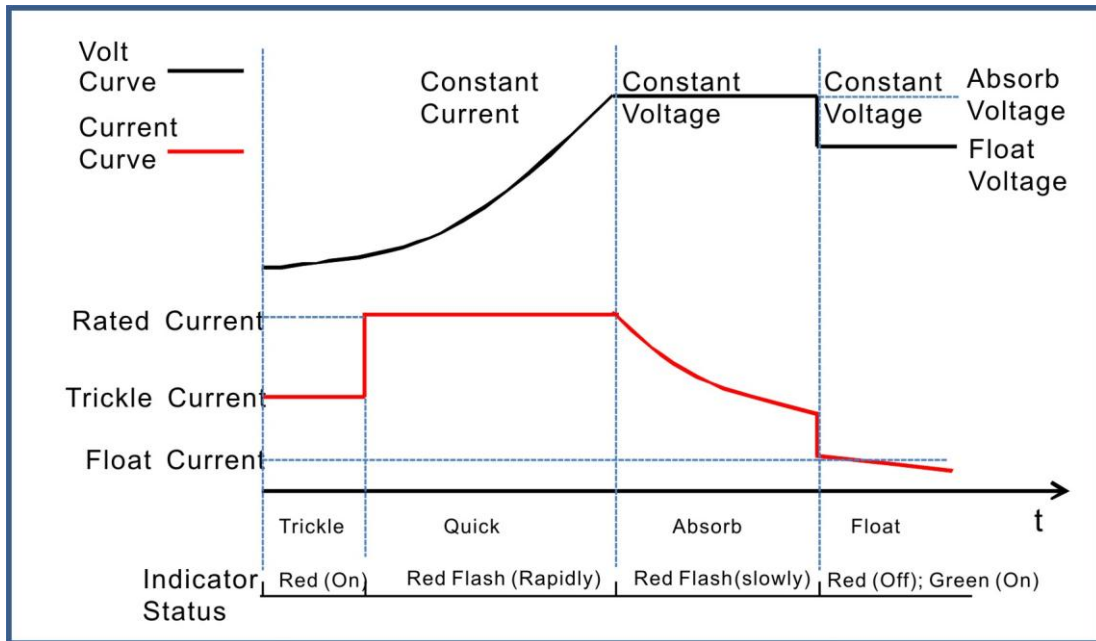
BACM2420 battery charger is intelligent and multi-function which is specially designed for meet the charging characteristics of the lead-acid engine starter batteries. Suitable for 24V or 12V battery and the maximum charge current is 20A.

## 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) Battery voltage detection ports can detect the battery voltage in real time.
- 5) Battery low voltage output port; it will output low level immediately after the battery voltage has fallen below the set value for preset delay.
- 6) 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.
- 7) Mains failure port; It will output low level when the AC input is interrupted.
- 8) Standard RS485 communication port.
- 9) BACM2410 charger is suitable for 24V battery, or suitable for 12V battery after changing the configuration information; Rated current: 20A.
- 10) LED display: Full charged indication (Green light) and charging indication (Red light).

### 3 CHARGING PRINCIPLE

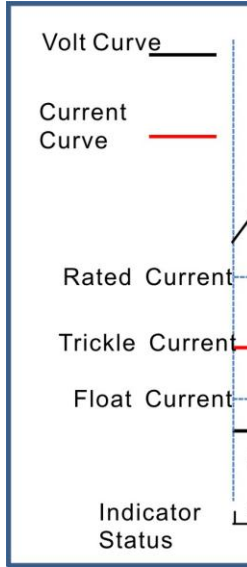
Three-stage Method is as follows,



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

- 1) The first stage is named as 'constant current': a) 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. b) 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 is 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.

Two-stage Method is as follows



Charging is performed according to the following stages:

- 1) The first stage is named as **Trickle Charge**. In this stage, the voltage is relatively low, the temperature is too high. The charging current is constant. When the battery temperature reaches a normal value, the charging current increases. Large current charging is performed in this stage. The charging indicator is green. The battery is charging quickly.
- 2) The second stage is named as **Float Charge**. In this stage, the battery electricity is low. The charging current is constant. The charging current value falls to a low value. The charging indicator is red. The battery is charging slowly. The charger can keep the battery at a constant voltage.

Charging Indicator Status is as follows:

Mode	Indicator	Constant
		Trickle Charge

**4 PARAMETERS CONFIGURATION**

Items	Default		Adjustable Range		Description
	24V	12V	24V	12V	
Battery Type	1		(0~2)		0:12V; 1:24V; 2:Self-adaption
Charging Stage	3		(2~3)		2: Two Stage; 3: Three Stage
Max. Rated Current	20.0A		Nonadjustable		Maximum charging current
Rated Current	100%		(0~100)%		Maximum charging current percentage
Absorption Charge Voltage	28.2V	14.1V	(20~30)V	(10~15)V	The charging voltage of "Constant Voltage"
Absorption Charge Time	1		(0~1)		0: Disable; 1: Enable
Absorption Charge Time 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)%		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	23.0V	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.
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".

Items	Default		Adjustable Range		Description
	24V	12V	24V	12V	
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	0.036 V/°C	0.18 V/°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 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		(0~4)		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. 4、12V system: if input is active, charger will be in 12V system.
Auxiliary Input Port Delay	2.0s		(0~60.0)s		The corresponding action will be active if the input is active.
Communication Address	10		1~254		RS485 Communication Address
Baud Rate	0		(0~2)		0、9600; 1、19200; 2、38400 (One Stop Bit)

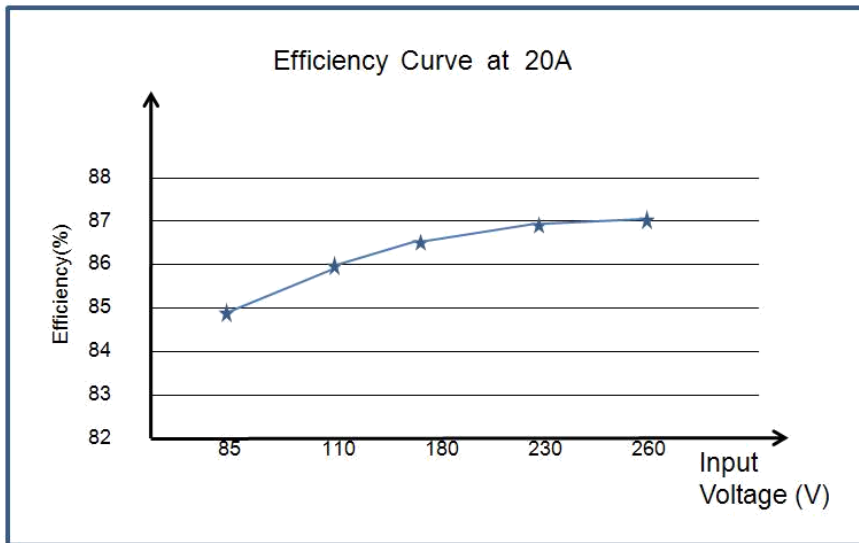


**5 PARAMETERS SPECIFICATION**

Items	Contents	Parameters			
		24V		12V	
Input Characteristics	Nominal AC Voltage Range	AC (100~277)V			
	Max. AC Voltage Range	AC (90~305)V			
	AC Frequency	50Hz/60Hz			
	Max. Active Power	680W		340W	
	Max. Current	7A		3.5A	
	Max. Efficiency	87%		81%	
	Power Factor Calibration	AC 110V >0.99	AC 220V >0.95	AC 110V >0.99	AC 220V >0.95
Output Characteristics	No-load Output Voltage	27V, Error±1%		13.5V, Error±1%	
	Rated Charging Current	20A, Error±2%			
	Max. Output Power	580W		290W	
Insulating Property	Insulation Resistance	Between input and output, input and shell all are DC500V1min, : insulation resistance $R_L \geq 50M\Omega$			
	Insulation Voltage	Between input and output, input and shell all are: AC1600V 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)			
Shape Structure	Weight	2.2kg			
	Dimension	265mm×156mm×68mm (length*width*height)			

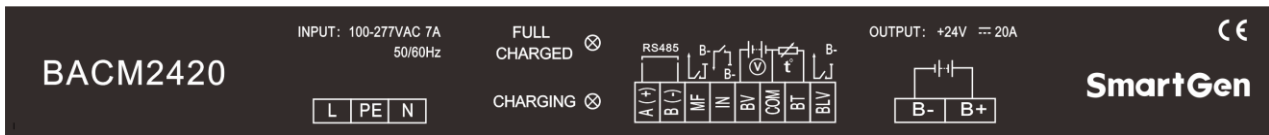


Efficiency curve is as follows,



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## 6 OPERATION



BACM2420 Mask

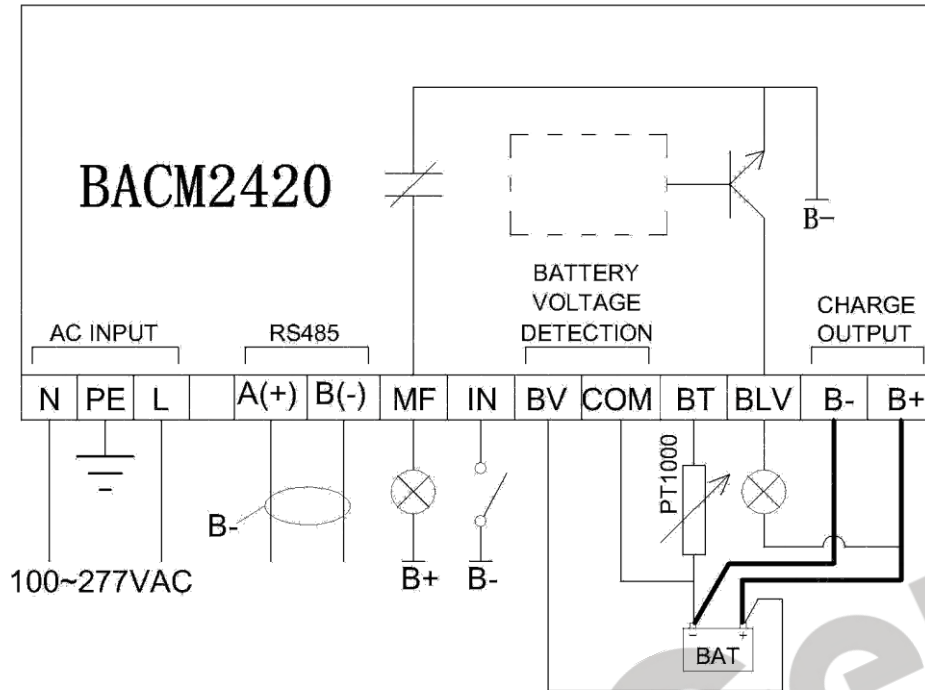
Terminal	Function	Description
L	AC Terminals	Connect terminals L and N to AC voltage (100~240) V using greater than BVR 2.0mm <sup>2</sup> multi-strand copper line.
N		
PE	GND Terminals	Connect to shell internally.
A(+)	RS485 Communication Port	Standard RS485 serial communication interface
B(-)		
MF	Mains Failure Output 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 temperature acquisition terminal. Connect to battery negative.
BT	Temperature Sensor Port	Connect to PT1000 sensor
BLV	Battery Low Voltage Alarm Output 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 4mm <sup>2</sup> multi-strand copper lines.
B+	Battery Positive	Connect to battery positive using greater than BVR 4mm <sup>2</sup> multi-strand copper lines.
FULL CHARGED	Green LED Indicator	Full Charged Indicator
CHARGING	Red LED Indicator	Charging status 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 CONNECTION



Wiring Diagram



## 8 CASE DIMENSIONS

Unit: mm

