

## Specification of EP-2308 Series 3.3KW Fully Sealed Car Charger

### • Overview

EP-2308 series 3.3KW Charger is specially designed for supplementing electric energy of FSE (Formula Student Electric) racing cars and new energy vehicles. The core components of charger conform to CE standards, and the whole accumulator container comply with FSE rules.

The charger has the characteristics of high efficiency, small size, high stability, long life, high protection level, high reliability, and complete protection functions, etc., it's an ideal charging product for FSE racing cars and new energy vehicles. It also has built-in thermal induction devices, with overheating protection function, which can recover automatically. It can be guaranteed to work in any complex environment.

Main features: air cooling, can work reliably at  $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$ , with built-in temperature sensor, can power off the output under dangerous working conditions (internal  $95^{\circ}\text{C}$ ).



### • Function Introduction

**1. CAN Communication Function:** communicating with BMS through built-in CAN communication function, can use BMS to control the working status (work/stop) of charger and adjust its charging current.

**2. Working Mode:** the charger is in the CC (Constant Current) charging state when start charging, and it will convert to CV (Constant Voltage) charging when output voltage reaches to the voltage that set by BMS. At this time, the charging current will gradually decrease. When the charging current decreases to a certain level, the charging ends. The high voltage output is automatically cut off by charger.

**3. Self-Locking Function Of HV (High Voltage) Socket:** when the high-voltage output plug isn't plugged into its socket of charger, the charger doesn't provide +12V/+24V power for the SHUTDOWN of accumulator container (this function is realized by connecting the low-voltage socket to the accumulator container), At this moment, the accumulator container doesn't have high voltage output, and the charger doesn't have high voltage output as well; unplugging the high voltage plug of the charger during charging, the charger immediately cut off the +12V/+24V output that connected to the SHUTDOWN of accumulator container, and cut off the high voltage output of charger at the same time.

**4. Emergency Stop Switch:** after pressing the emergency stop switch, the +12V/+24V power supply that power the SHUTDOWN of accumulator container is cut off, and the high voltage output of charger also cut off at the same time.

**5. IMD Alarm Control {no IMD (Insulation Monitoring Device) module is installed within the charger, the IMD alarm signal is introduced by the built-in Bender IMD module of accumulator container}:**

A. When the accumulator container or charger trigger the IMD alarm due to excessive electric leakage, the corresponding IMD alarm light on the charger will light up, the +12V/+24V power supply that power the SHUTDOWN of accumulator container is cut off, and the high voltage output of charger and accumulator container also cut off at the same time.

B. When the charger receives IMD alarm signal (if the alarm lasts longer than 300ms), the charger will lock this alarm. The charger won't re-recognize the status of external IMD alarm signals until press the IMD alarm reset button. The lock function can be activated or deactivated through the internal settings of charger.

**6. BMS Alarm (the BMS alarm signal is introduced from the accumulator container):**

A. When BMS alarm occur in the accumulator container, the corresponding BMS alarm light on the charger is lit up, and the +12V/+24V power supply (that power the SHUTDOWN of accumulator container) is cut off, and the high voltage output of charger and accumulator container also cut off.

B. When the charger receives BMS alarm signal (if the alarm lasts longer than 300ms), the charger will lock this alarm. The charger won't re-recognize the status of external BMS alarm signals until press the BMS alarm reset button. The lock function can be activated or deactivated through the internal settings of charger.

**7. Voltage / Current Indicator Meter:** the charger is equipped with voltage/current indicator meter to display the output voltage and charging current of charger.

**8. AC Input & DC Output, HV & LV Isolation:** AC input and DC output is isolated with a transformer.

HV&LV is also isolated with a transformer

**9. HV (High Voltage) Discharge Circuit:** the charger is equipped with high voltage discharge circuit. Whenever high voltage was cut off, the internal discharge circuit will quickly release the stored electric energy of capacitive or inductive components of charger, it will make the output residual voltage of charger lower than 60V within 5 Seconds. The high-voltage discharge resistor adopts the constant-time online method, and the resistance value is 120kΩ, 10W.

**10. HV (High Voltage) Detection Point & GND Jacks:** the charger is equipped with high voltage detection point TS+, TS- and GND Jacks (4mm shrouded banana jacks, 1000V CAT III). The above jacks all equipped with insulating caps, and these caps which shall be covered tightly during non-testing periods.

High-voltage detection point: lead high voltage TS+ or TS- to high voltage detection point through current limiting resistor { The resistance value is 5kΩ 5W, 10kΩ 10W, or 15kΩ 15W. Users can adjust the resistance value through internal settings. Corresponding adjustments will be made when leave factory according to the will of customers}.

**11. Grounded Socket:** the charger is equipped with grounding socket, which connecting the charger with accumulator container.



**12. Power Switch & Fuse:** the charger is equipped with AC power switch and fuse to provide safety protection for the charger. It is recommended to use a power strip with electric leakage protection.

**13. AC Power Plug:** the charger uses a 16A standard plug.

- **Technical Specification**

## 1. General Parameters

Communication Function	CAN Communication	Charger has the CAN Communication function to exchange information with BMS (battery management system).
	Baud Rate	250Kbps (Default set) ; 125Kbps、500Kbps (customized)
	Terminal Resistance	None
Input	Range of Input Voltage	AC 90~265V
	Range of Input Frequency	45-65Hz
	Maximum Input Current	≤16A
	Power Factor	≥0.99 Above Half Load
	Maximum Efficiency	≥94.2%
	Standby Power Consumption	≤5W

Low Voltage Output	Output Method	constant voltage/constant current
	Range of Output Voltage	12V~13.8 V
	Rated Current	5A
	precision of Constant voltage	±2%
	Maximum Current	5.5A±0.5A
	Output Power	≥62.5W
	Voltage Ripple Factor	≤1%
Protection Function	Input Overvoltage Protection	AC280±5V
	Input Undervoltage Protection	AC85±5V
	Output Overvoltage Protection	The output will be turn off when it 3% higher than the maximum output voltage, and the functions will be automatically recovered after troubleshooting.
	Output Undervoltage Protection	The output will be turn off when it 5% lower than the minimum output voltage, and the functions will be automatically recovered after troubleshooting.
	Output Overcurrent Protection	The output will be turn off when it 1% higher than the maximum output current, and the functions will be automatically recovered after troubleshooting.
	Over-temperature Protection	90℃ begin to reduce the power, 95℃ power off; and the functions will be automatically recovered after temperature returns to normal.
	short-circuit Protection	Before starting, it won't start if output short circuit exists; during working process, the output will be shut off if output short circuit exists. The functions will be automatically recovered after troubleshooting.
	Reverse Connection Protection	Blown fuse
	Ground Protection	The resistance between the conductive part that can be directly touched by human body and potential equatequation is ≤0.1Ω.
	CAN Communication Protection	The output will be automatically stopped when there is CAN communication failure.
Power-off Protection	The power supply will be cut off quickly when under abnormal conditions.	

Safety Rules and Others	Dielectric Strength	Among the independent circuit of charger with ground (metal shell), and all circuits without electrical contact, proceed 2000V AC dielectric strength test according to the requirements of QC/T895-2011 7.6.2, time is 1min, without breakdown or flashover.
	Insulating Property	AC Input, DC Output , LV Output or CAN to ground (metal shell), $\geq 10M\Omega$ , (1000V DC) AC Input to DC Output $\geq 10M\Omega$ ; (1000V DC); LV to HV $\geq 10M\Omega$ (1000V DC)
	Electromagnetic Immunity	Conform to the requirements of GB/T 18487.3-2001 11.3.1
	Electromagnetic Harassment	Conform to the requirements of GB/T 18487.3-2001 11.3.2
	Harmonic Current	Conform To The Requirements of GB 17625.1-2003 6.7.1.1
	Starting Surge Current	$\leq 24A$
	Output Response Time	The rise time of output voltage $\leq 5s$ , overshoot $\leq 5\%$
	Off Response Time	After receiving the power off command, the current will decline from 100% to less than 10% within 50ms, and decline to 0A within 200ms.
	Industrial Solvent-Resistant Properties	The charger was tested according to QC/T895-2011 7.8.3, no corrosion defects.
	Anti-salt Spray Performance	Tested according to GB/T2423.17-2008, lasts for 48h, no corrosion defects and work properly.
	Vibration Resistance	10-25 Hz amplitude 1.2mm, 25-500Hz 30m / s <sup>2</sup> , sweep rate 1 (oct / min), 8 hours in each direction; charger without loose fasteners, and work properly.
	Noise	$\leq 60dB$ (A Level)
	M T B F	150000H
	Working Environment	Relative humidity 5% -95%, without condensation and moisture condensation.
Operating Temperature		-40 ~ 85°C
Storage Temperature		-55°C ~ +60°C

## 2. Main output parameters of different models/specifications:

Model No.		EP2308-116
Main Output	Output Method	CC (Constant Current) / CV (Constant Voltage)
	Range of Output Voltage	58-116V
	Output Current	40A Max
	Output Power	<a href="#">3300W@220VAC</a> 1600W@110VAC
	Precision of Constant Voltage	$\pm 1\%$
	Precision of Constant Current	$\pm 2\%$
	Voltage Ripple Factor	<5%
Model No.		EP2308-440
Main Output	Output Method	CC (Constant Current) / CV (Constant Voltage)
	Range of Output Voltage	220-440V
	Output Current	10A Max
	Output Power	<a href="#">3300W@220VAC</a> 1600W@110VAC
	Precision of Constant Voltage	$\pm 1\%$
	Precision of Constant Current	$\pm 2\%$
	Voltage Ripple Factor	<5%
Model No.		EP2308-600
Main Output	Output Method	CC (Constant Current) / CV (Constant Voltage)
	Range of Output Voltage	325-650V
	Output Current	6A Max
	Output Power	<a href="#">3300W@220VAC</a> 1600W@110VAC
	Precision of Constant Voltage	$\pm 1\%$
	Precision of Constant Current	$\pm 2\%$
	Voltage Ripple Factor	<5%