



MARINE BATTERY CHARGERS

Voyager Elite Series

Installation/ Operation



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SAFETY PRECAUTIONS

TO PREVENT ANY RISK OF ELECTRIC SHOCK OR FIRE, READ THIS MANUAL CAREFULLY BEFORE INSTALLING THE EQUIPMENT.

This equipment is not designed for use by people (including children) with diminished physical, sensory or mental capacities, or people without experience or knowledge of such equipment, unless they have received prior instruction in the use of the equipment from a person responsible for their safety or are under the supervision of such a person. Ensure that children are supervised in order to prevent them playing with the device.

Warning: This equipment contains components that may cause electric arcs or sparks, when connecting cables. To prevent any risk of fire or explosion, do not install this equipment close to flammable materials, liquids or gases.

Installation precautions

To prevent any risk of irreversible damage to the equipment, ensure that you comply with the following recommendations.

- This device must not be installed close to a heat source or any flammable liquids or gases such as a gas engine room.
- It must not be installed in an airtight or poorly-ventilated compartment.
- The ventilation inlets must not be obstructed.
- Clearance of at least 4" (10 cm) must be allowed around the housing to guarantee adequate circulation.
- This device must not be exposed to running water, water spray and dust of any kind.
- We recommend securing the device in a vertical position, with the cable outlet pointing downwards.
- You are prohibited from making mechanical alterations to the housing, including making additional holes, for example.

Connection Precautions

To prevent any risk of electric shock or irreversible damage to the equipment, you should comply strictly with the following recommendations.

- The installation to which this device is connected must comply with any applicable regulations such as ABYC.
- This device is designed to be connected to 220-240V 50/60Hz or 100-120V 60Hz single phase circuits. 115V / 230V selection is automatic. 220-240V only for 24V, 80A, 100A version.
- The main power line must utilize a circuit breaker, to Protect individuals against electric shocks. Refer to the device's electrical specifications to select the size and type of circuit breaker.

Prior to main power connection, the cable gland in the packaging must be assembled and

correctly attached to the housing (using the nut provided), in the hole designed for this purpose.

For safety reasons, the device's EARTH Ground terminal (PE "Protective Earth" terminal), must be connected to the system's physical earth ground (yellow & green wire of the main power). Refer to the wiring diagram for more information.

To prevent wire or terminal heating, ensure that the cable size is correct and the connectors are properly tightened.

WARNING: This device is not Protected against battery polarity reversals. A battery connection error automatically causes the battery fuses to blow as well as irreversible damage to the circuit board.



Operational safety precautions

To prevent any risk of electric shock on activation or during operation, the Protective cover must be correctly positioned and screwed into the housing.

This device complies with the applicable regulations governing transmitted interference and immunity from external disturbances (see EMC paragraph in the Technical specifications section).

When in operation, take particular care that this device is not subjected to conducted or radiated interference at levels higher than the legal limits otherwise malfunctions may occur (e.g.: device too close to a powerful transmitter).

This device transmits conducted and radiated interference at levels that comply with the applicable regulations. Ensure that other sensitive equipment used in the vicinity is compatible with this device otherwise malfunctions may occur.

Charger serial number

The serial number appears on the data plate label on one side of the device. This number is aligned vertically and comprises a first number indicating the year of manufacture (e.g.: 12 for 2012), a letter indicating the month of manufacture (e.g.: C for the month of March).



Important note about charging curves

It is important to note that the use of an incorrect charging cycle for the battery type may extensively impair or even damage the battery and/or charger.

This is particularly true for cycles where the charge voltages are higher than the levels recommended by the battery manufacturers.

Example: A serious risk of overheating the batteries and releasing gases that are harmful to users' health or could cause an explosion.

Curve no. 9 is compatible with a LiFeSo4 battery provided that the battery is equipped with BMS-type battery Protection (Battery Management System) within the actual battery. In this case, refer to the battery manufacturer's recommendations for the choice of charging cycle.

GENERAL INSTRUCTIONS

Maintenance precautions

To prevent any risk of electric shock during maintenance operations, ensure that the following recommendations are studied carefully before performing any maintenance on the device:

- All maintenance operations must only be carried out by a suitably qualified technician.
- In the event of damage to the main power and/or batteries, these may only be replaced by a qualified person, to avoid any danger.
- The main power supply must be disconnected (cable or switch).
- The -DC or -BAT supply on the battery must also be disconnected to prevent any transfer of power.
- To allow the high voltage capacitors to discharge (on the circuit board), wait for 5 minutes before carrying out any work inside the housing.
- The fuses must be replaced by fuses with strictly identical characteristics and performance levels.

Model Number

The model number can be determined by the following code:

SVE = Sentry Voyager Elite series
12 or 24 = DC Voltage Output
20, 40, 60... = DC Amp Output
/3 = 3 battery banks
X = 115/230vac or C = 230vac only
J = 50/60 Hz

CONTENTS OF THE BOX

RECEIPT OF THE PRODUCT

Contents of the packaging

The charger.
The user manual.



The main power cable gland and mounting nut (to be installed)

on the housing prior to connection).



The battery temperature sensor (24V100A version only)

Verify

Verify the Product's data plate label, attached to one side of the Product, to ensure that the technical details actually meet your needs (main supply voltage, charger capacity, etc.).

INSTALLATION INSTRUCTIONS

The charger is attached using 4 x #8 (4mm Ø) screws (not supplied), to a secure mounting frame or wall.

Ideally, the charger should be in a vertical position, with the cable outlet pointing downwards. Clearance of at least 4" (10 cm) must be allowed around the device to guarantee optimum convection, in particular along the sides allowing the air needed for ventilation to flow in and out.

The circulation and convection direction of the air inside the charger is from right to left, viewed from the front of the Product.

CONNECTIONS

Ventilation direction

Warm ←←← Cool

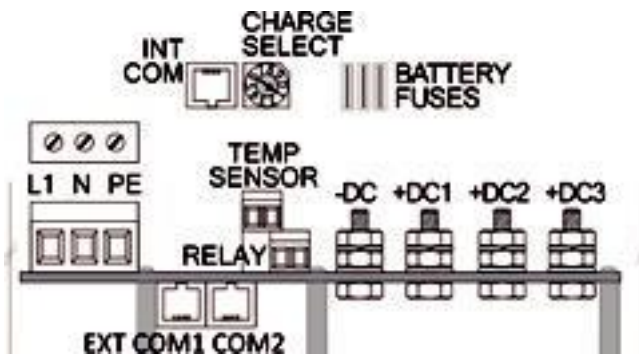
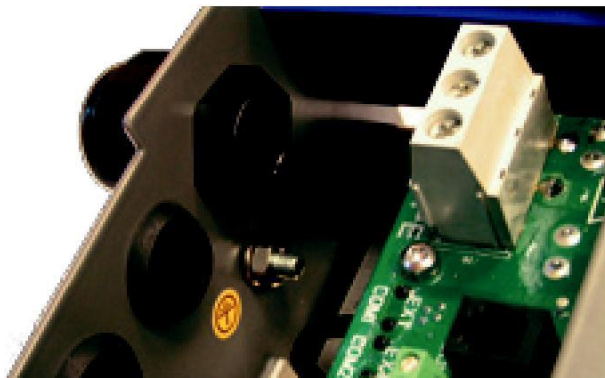
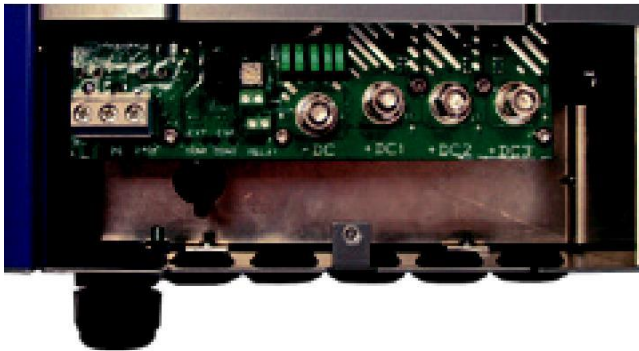
CONNECTIONS

To gain access to the charger's connections, the front cover must be removed. To do this, simply unscrew the screw on the front cover. The cover is removed by rotating it.

Prior to making connections, the main power cable gland must be positioned and attached to the housing in the hole designed for this purpose (hole on the left, when viewed from the front of the charger).

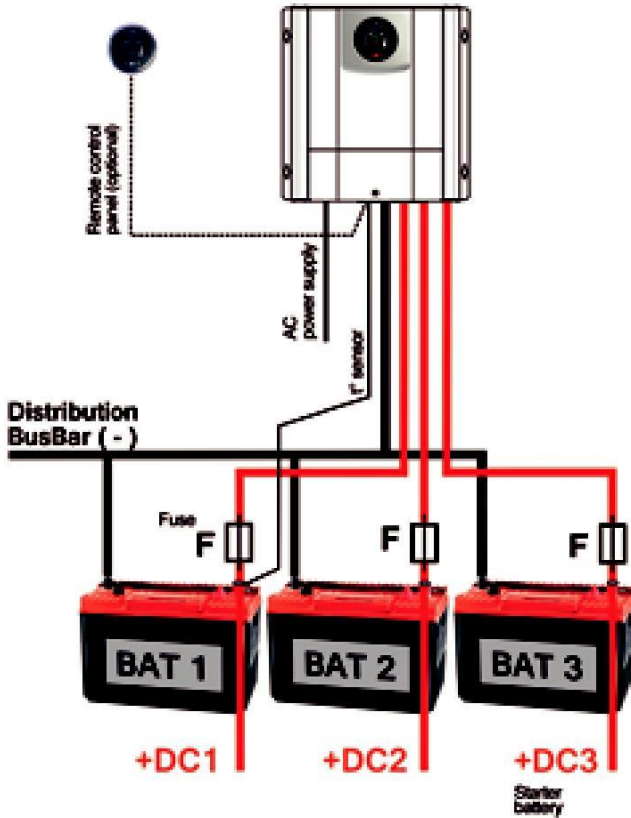
The plastic nut supplied with the cable gland allows it to be attached to the housing. This nut is positioned on the inside of the housing. Ensure the correct tightening torque is applied.

CONNECTION DETAILS



Marking	Description
L1	AC main, 8 AWG (10mm ²) max (wire color code: brown or black)
N/L2	AC neutral or L2, 8 AWG (10mm ²) max (wire color code: blue, white or red)
PE (Ground)	AC ground, 8 AWG (10mm ²) max (wire color code: green & yellow or green)
-DC	Battery negative (common), pin M8 (wire color code: black)
+ DC1	Main battery positive, pin M8 (wire code: red)
+ DC2	Auxiliary battery 2 positive, pin M8 (wire color code: red)
+ DC3	Auxiliary battery 3 positive, pin M8 (wire color code: red)
CHARGE SELECT	Charge curve and battery charging mode selector, 10 positions (from 0 to 9) (refer to curve settings p14)
BATTERY FUSES	Battery Protection fuses (on the –DC supply)
EXT COM 1	External communication bus (CAN bus) (for an external digital display or communication between chargers)
EXT COM 2	External communication bus (CAN bus) (for an external digital display or communication between chargers)
INT CoM	Communication bus for a digital display built into the charger
TEMP SENSOR	Battery temperature sensor (2 non-polarized wires, no polarity) Connect to the positive terminal of the main battery
RELAY	Dry alarm contact

Example of connection on the basis of 3 distinct sets of batteries



Important

Check for proper torque and crimp of connections and terminals.

AC CABLES AND CIRCUIT BREAKER SIZING

AC wiring

Check the quality of connections and proper tightening of connections. For main power, preferably use a HO7RNF-type industrial cable. Ensure that you comply with the following recommendations.

Charger capacity	220-240V AC 50/60Hz Length < 5m (16ft)	100-120V AC 60Hz Length < 5m (16ft)
12V 60A	2.5mm ² / AWG12	4mm ² / AWG10
12V 90A	2.5mm ² / AWG12	4mm ² / AWG10
24V 40A	2.5mm ² / AWG12	4mm ² / AWG10
24V 60A	2.5mm ² / AWG12	4mm ² / AWG10
24V 100A	4mm ² / AWG10	6mm ² / AWG8

The AC main power line must feature a cut-off device with differential protection(GFCI), to specifically Protect individuals against electric shock. The circuit breaker’s sensitivity must be 30mA. Its current capacities comply with the charger’s power consumption. Comply with the following recommendations in this respect.

Charger capacity	Main power 220-240V 50/60Hz	Main power 100-120V 60Hz
12V 60A	8A – 30mA	16A – 30mA
12V 90A	8A – 30mA	16A – 30mA
24V 40A	8A – 30mA	16A – 30mA
24V 60A	10A – 30mA	20A – 20mA
24V 100A	20A – 30mA	-

Note: The charger has an internal Protection fuse on the L1 supply, in the event of a general fault on the circuit board in particular. Due to the irreversible nature of this fault, the fuse is not accessible for maintenance of any kind.

DC CABLES AND FUSES

DC wiring

Check the quality of connections and Proper tightening of connections.

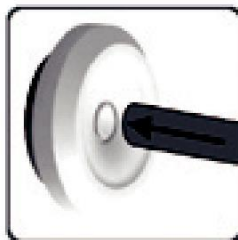
Battery cables must be as direct and short as possible.

Each battery output can Provide the charger’s full amperage and all the cables must have identical cross-sections. Ensure that you comply with the following recommended cross-sections.

Charger capacity	Length < 2m (6ft)	Length between 3 and 5m (10 to 16ft)
12V 60A	25mm ² / AWG3	35mm ² / AWG2
12V 90A	35mm ² / AWG2	50mm ² / AWG0-1
24V 40A	16mm ² / AWG5	20mm ² / AWG4
24V 60A	25mm ² / AWG3	35mm ² / AWG2
24V 100A	35mm ² / AWG2	50mm ² / AWG0-1

These chargers are equipped with airtight grommets with “automatic” opening.

Simply pressing the center section of the membrane is sufficient to allow the cable to pass through the grommet.



DC fuses

When maintaining the charger’s internal fuses, these must be replaced by fuses with strictly identical characteristics and performance levels. Risks of irreversible damage to the equipment.

It is essential and highly recommended that you install, as close as possible to each positive output on the battery, a fuse to Protect connections, specifically in the event of a short circuit and/or overheating of the battery cables, as the result of damage to the Protective sleeves, for example.

Charger capacity	Internal charger	External battery
	fuse (–DC supply)	fuse (+BAT supply for each battery)
12V 60A	3 x 25A 32V rapid (mini automotive fuse)	80A 32V rapid
12V 90A	4 x 30A 32V rapid (mini automotive fuse)	100A 32V rapid
24V 40A	3 x 25A 32V rapid (mini automotive fuse)	60A 32V rapid
24V 60A	3 x 25A 32V rapid (mini automotive fuse)	80A 32V rapid
24V 100A	5 x 30A 32V rapid (mini automotive fuse)	150A 32V rapid

CHARGE CURVE SELECTION

The digital electronics, based on an RSC microcontroller, monitor the charging process by optimizing, the voltage, current and recharging time parameters. This is based on the initial charge level of the batteries, using the exclusive “scanning charge” function.



The performance and usable life of batteries are thereby maximized.

By virtue of fully automated charging cycles, the batteries are protected against surges, providing a permanent connection for the charger.

Selection of the charging Program takes place on installation using the “CHARGE SELECT” dial on the charger board.

The position of the arrow indicates the number of the Program selected (e.g.: Program No. 1 in the photograph above). Selection is made using a small flat-head screwdriver.



CAUTION

It is important to note that the use of an inappropriate charging cycle for the battery technology may extensively impair or even damage the latter.

This is particularly true for cycles where charge voltages are higher than the levels recommended by the battery manufacturers.

A serious risk of overheating the batteries and releasing gases that are harmful to users' health.

Curve no. 9 is compatible with a LiFeSo₄ battery, provided that the battery is equipped with BMS-type battery Protection (Battery Management System) within the actual battery. In this case, refer to the battery manufacturer's recommendations for the choice of charging cycle.

CHARGER CURVE SETTINGS

CURVE BAT TYPE		PHASE	12V	24V
0	Open Lead	V. BOOST	14.4V	28.8V
		V. FLOAT	13.2V	26.4V
1	Sealed lead	V. BOOST	14.2V	28.4V
		V. FLOAT	13.6V	27.2V
2	Lead calcium	V. BOOST	14.8V	29.6V
		V. FLOAT	13.8V	27.6V
3	«Delphi» type	V. BOOST	15.4V	30.8V
		V. FLOAT	13.8V	27.6V
Charge curve		<p>$T2 = T1 \times 3.95$ 4hr max</p>		
4	«Optima» type	V. BOOST V. MAX V. FLOAT	14.8V 15.5V 13.8V	29.6V 31.0V 27.6V
Charge curve		<p>$T2 = T1 \times 3.95$ 4hr max</p>		
5	Winter Open lead	V. BOOST V. FLOAT	14.4V 13.2V	28.8V 26.4V
Charge curve				

6	Winter Sealed lead	V. BOOST V. FLOAT	14.2V 13.6V	28.4V 27.2V
Charge curve				
7	GEL & AGM	V. BOOST V. FLOAT	14.4V 13.8V	28.8V 27.6V
Charge curve				
8	Power supply	V. FLOAT	13.6V	27.2V
Charge curve				
9	LiFeSo4 + integrated BMS	V. FLOAT	14.4V	28.8V
Charge curve				

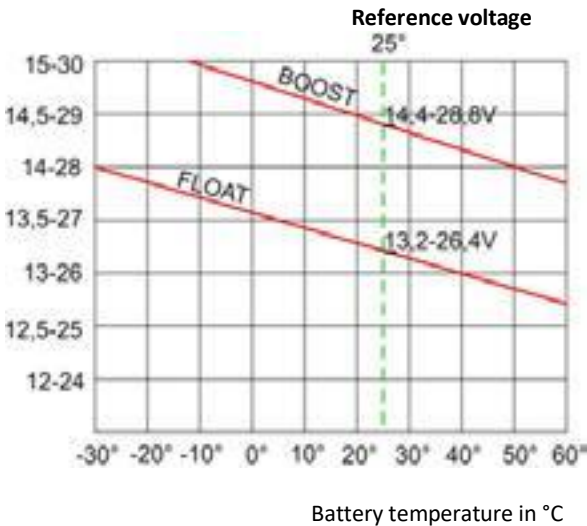
OPERATION of BATTERY TEMPERATURE SENSOR

The temperature sensor allows the charging voltage to be automatically adjusted depending on the battery and ambient temperature.

This function increases battery life, by reducing output voltage and current due to high ambient and/or battery temperature.

This sensor is screwed onto the main battery's positive terminal (a service/house battery as a general rule). The 2 wires are connected to the "TEMP SENSOR" connector on the charger board (not polarity sensitive).

The compensation level is around $\pm 25\text{mV per }^\circ\text{C}$ for a 24V battery and between $\pm 12\text{mV per }^\circ\text{C}$ for a 12V battery (see curves below).



The temperature sensor initially simulates a temperature of 77°F (25°C). The action of the battery temperature sensor allows the charge to be adjusted, upwards or downwards, depending on the battery temperature, i.e.:

$\pm 15\text{ mV per }^\circ\text{C}$ at 12 V

$\pm 30\text{ mV per }^\circ\text{C}$ at 24 V

LED DISPLAY

The Voyager Elite charger is equipped with a local multifunction LED display, which, among other things, shows the details of the key stages of the battery charging process.

BOOST phase: The battery is in its recharging phase, reaching a level of charge of close to 80%. This recharging phase is limited to a period of 6 hours.

ABSORPTION phase: The voltage is maintained and the amperage is reduced until the battery returns to a level of charge approaching 100%. This phase is limited to a period between 30 minutes and 4 hours, depending on the battery's initial charge level.

FLOAT phase: The voltage and the amperage are reduced to maintain the battery at 100% full charge. During the Floating phase, the charger only delivers what the battery requires to prevent overcharging.

Fault Indicators: The Temperature (TEMP), Battery (BAT) and fuse (FUSE) fault indicators are shown on the LED display.

Screen



Mode and display operation

MODE	DESCRIPTION	SOLID LED	FLASHING LED
INITIALIZATION	Charger powered on and/or Change of charging cycle	All LEDs for 3 seconds	-
BOOST PHASE	Batteries in charging phase (charge from 0 to 80%)	POWER ON BOOST	-
ABSORPTION/ EQUALIZATION PHASE	Batteries in charging phase (charge from 80% to 100%)	POWER ON ABS	-
	End of the equalization cycle within a period of 30 minutes	POWER ON	ABS
FLOATING PHASE	Charging cycle completed (charge at 100%)	POWER ON FLOAT	-
MAIN VOLTAGE FAULT	Main voltage fault, excessively high or abnormally Low voltage Immediate automatic restart, subject to disappearance of the fault	-	POWER ON
CHARGER TEMPERATURE FAULT (TEMP)	Excessive charger temperature fault Automatic restart after a min delay for 30 seconds, subject to disappearance of the fault	TEMP	-

MODE	DESCRIPTION	SOLID LED	FLASHING LED
BATTERY TEMPERATURE FAULT	Excessive battery temperature fault Automatic restart after a min delay for 30 seconds, subject to disappearance of the fault	-	TEMP
BATTERY SENSOR FAULT	External temperature sensor fault Automatic restart after a min delay for 30 seconds, subject to disappearance of the fault	-	TEMP BAT
OUTPUT VOLTAGE FAULT	Charging voltage fault, excessively high or abnormally low Automatic restart after a min delay for 60 seconds, subject to disappearance of the fault	BAT	-
OUTPUT FUSES FAULT	Output fuse fault Restart following a main reset, subject to disappearance of the fault	FUSE	-
CAN FAULT	CAN fault secure load	-	TEMP BAT FUSE

Technical specifications

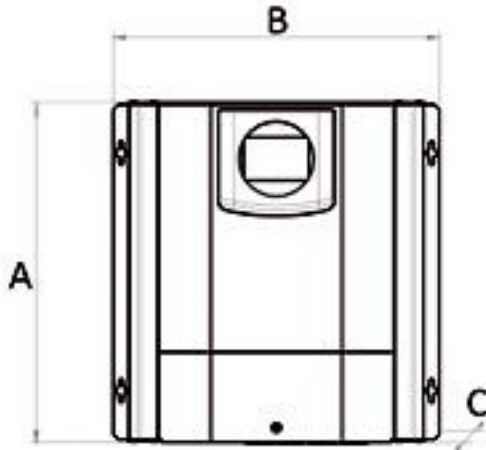
	12V 60A	12V 90A	24V 40A	24V 60A	24V 100A
MAIN POWER CHARACTERISTICS					
Main voltage	100V-120V 60Hz and/or 220-240V 50/60Hz (+/-15%)				220-240V (+/-15%)
Power factor	typically 0.9				
Output	typically 83%		typically 87%		
Inrush current	< 60A	< 30A, limited by soft start			< 60A
Current Draw	12A/5A	16A/7A	14A/6A	15A/9A	15A
Active power	1200VA	1500VA	1350VA	2000VA	3500VA
Derating @ 115V	Without derating			70% of P _{nom} (rated power)	-
Main fuse	T16A (6.3x32 mm)	T20A (6.3x32 mm)	T20A (6.3x32 mm)	T20A (6.3x32 mm)	2xT20A (6.3x32 mm)
BATTERY CHARGING CHARACTERISTICS					
Number of outputs	3 independent supplies				
Number of cycles	10 charging cycles (from 0 to 9), setting by means of a dial				
Charge curves	In general 3 status, type I.U.Uo				
Open lead	V.BOOST = 14.4V V.FLOAT = 13.2V		V.BOOST = 28.8V V.FLOAT = 26.4V		
Sealed lead	V.BOOST = 14.2V V.FLOAT = 13.6V		V.BOOST = 28.4V V.FLOAT = 27.2V		
Lead calcium	V.BOOST = 14.8V V.FLOAT = 13.8V		V.BOOST = 29.6V V.FLOAT = 27.6V		
«Delphi» Type	V.BOOST = 15.4V V.FLOAT = 13.8V		V.BOOST = 30.8V V.FLOAT = 27.6V		
«Optima» Type	V.BOOST = 14.8V then 15.5V V.FLOAT = 13.8V		V.BOOST = 29.6V then 31.0V V.FLOAT = 27.6V		
Winter Off Season open lead	V.BOOST = 14.4V V.FLOAT = 13.2V		V.BOOST = 28.8V V.FLOAT = 26.4V		

	12V 60A	12V 90A	24V 40A	24V 60A	24V 100A
Winter Off Season Sealed lead	V.BOOST = 14.2V V.FLOAT = 13.6V		V.BOOST = 28.4V V.FLOAT = 27.2V		
Gel & AGM	V.BOOST = 14.4V V.FLOAT = 13.8V		V.BOOST = 28.8V V.FLOAT = 27.6V		
Power supply	V.FLOAT = 13.6V		V.FLOAT = 27.2V		
LifeSo4 + integrated BMS	V.FLOAT = 14.4V		V.FLOAT = 28.8V		
Tempe- rature compen- sation	+/-12mV / °C (by an external sensor)		+/-25mV / °C (by an external sensor)		
Voltage tole- rance	+/-2%				
Ripple	< 1% (BW < 20MHz)				
Maxi- mum current	60A (+/-5%)	90A (+/-5%)	40A (+/-5%)	60A (+/-5%)	100A (+/-5%)
Supply fuse -DC	3 x F30A (minia- ture automotive fuse)	4 x F30A (minia- ture automotive fuse)	3 x F25A (miniature automo- tive fuse)		5 x 30A (minia- ture automotive fuse)

PROTECTION	
Output surge	"Current limited" type
Output short circuit	"Shutdown" type with automatic restart once the fault has disappeared
Excessive output voltage	"Shutdown" type with automatic restart once the fault has disappeared
Battery polarity reversal	Output fuse
Excessive internal temperature	"Shutdown" type with automatic restart once the fault has disappeared

	12V 60A - 12V 90A 24V 40A - 24V 60A	24V 100A
HS temperature sensor	"Shutdown" type with automatic restart once the fault has disappeared	
General main supply fault	Main fuse	
General battery supply fault	Output fuses on –DC supply	
Circuit Board	Conformal Coated protection on circuit board	
Operating temperature	14°F to +130°F (-10°C to +55°C)	
Storage temperature	-4°F to +158°F (-20°C to +70°C)	
Humidity	10% to 90% (without condensation)	
Convection	Forced by thermostat-controlled fan	
Housing	Wall-mounted housing in painted aluminium	
Protection rating	IP20	
Mounting	Using 4 x #8 (4mm Ø) screws	
Overall dimensions (Depth x Width x Height)	125 x 340 x 360 mm 4.9 x 13.4 x 14.2 inches	190x340x 360 7.5x13.4x 14.2
Weight	13.2lbs (6 Kg)	25.4lbs (11.5 kg)
EMC	EN55014-1	
SAFETY	EN60335-2-29	
Display	Front LED display	
Main connector	3-point cage terminal for cables with a cross-section of 6AWG10mm ² max	
Battery connectors	M8 pins	
Battery sensor connector	2-point cage terminal for cables with a cross-section of 16AWG1.5mm ² max	
Alarm relay connector	2-point cage terminal for cables with a cross-section of 16AWG1.5mm ² max	
External CAN bus connectors	2 x RJ11 connectors (CAN bus)	

Dimensions



	12V 60A	12V 90A	24V 40A	24V 60A	24V 100A
Height A	14.2 inch (360 mm)				
Width B	13.4 inch (340 mm)				
Depth C	4.9 inch (125 mm)				(190 mm) 7.5 inch

Warranty

TO PREVENT ANY RISK OF INCORRECT USE OF THE CHARGER, CAREFULLY READ THE LIST OF POTENTIAL SCENARIOS OR FAULTS NOT COVERED BY THE PRODUCT WARRANTY

This device is not protected against battery polarity reversals. Risk of irreversible damage to the equipment.

Should the device be dropped, this could cause irreversible distortion of the housing as well as damaging internal fans and certain electronic components.

Modifications to the housing (additional holes in particular) could result in the scattering of metal filings onto the circuit board and, consequently, malfunctions or irreversible damage to the equipment.

Interference with or modifications to the circuit board could result in operating modes not originally anticipated, and consequently, in malfunctions or irreversible damage to the equipment.

Powering the device from an unsuitable power source (example: supply voltage that is too high).

Accidental original main supply surge or lightning strike generally causes irreversible damage to the equipment.

Replacement of fuses with fuses with different characteristics could cause irreversible damage to the equipment.

Obvious connection errors causing irreversible damage to the equipment.

Water spray or running water inside the device could result in irreversible electronic damage.

Precautions for disposal

This device contains electronic components and materials that must be recycled at the end of the Product's usable life for environmental reasons.

At the end of the device's usable life, all devices must be returned either to the local distributor or properly disposed of.

EC compliance

This device complies with the applicable European standards and has a CE mark. Its certificate of compliance is available on request.