



samlexpower®

**OWNER'S
MANUAL**

Please read this
manual BEFORE
operating your
battery charger

**Switch Mode,
Automatic, Lead
Acid Battery
Charger**

MODELS:
SEC-1215UL
SEC-1230UL
SEC-2415UL

SECTION 1 | Safety Precautions

Hazardous conditions may result if the charger is not installed or operated correctly. Please read the following instructions to prevent personal injury or damage to the charger:

Battery Related

- To reduce the risk of battery explosion, follow these instructions and those marked on the battery
- Never smoke or allow an open spark or flame in the vicinity of the battery or engine
- Charge only Lead Acid type of batteries (Flooded / Absorbed Glass Mat (AGM) / Gel Cell). Do not charge other type of batteries like Nickel Cadmium (NiCad)
- Nickel-Metal Hydride (Ni-MH), Dry-Cell etc. Other types of batteries might burst causing personal injury
- Never charge a frozen battery
- Working in the vicinity of Lead Acid batteries is dangerous. Batteries generate explosive gases during normal operation. Take necessary safety precautions when installing the charger near a battery or in a battery compartment (Follow safety instructions given by the battery manufacturer)
- Never place the charger directly above or below the battery being charged; gases or fluids from the battery will corrode and damage the charger. Locate the charger as far away from the battery as DC cables permit. Do not install in the same compartment as batteries
- Install in a well ventilated, cool, dry place.
- The charger must not be operated in a damp or wet environment. When mounting in a boat, make sure it is not subjected to bilge water splash
- Do not block the ventilation openings / openings for the cooling fan. There should be at least 6 inches clearance all around the unit
- Installation and wiring must comply with the local and the national electrical codes.
- It is recommended that installation and wiring may be done by a certified electrician
- Wrong installation on a boat may lead to corrosion of the boat. It is recommended that installation on the boat must be carried out by a boat electrician
- Disconnect the AC input power to the charger before connecting / disconnecting the batteries or other DC loads or when working on the charger
- Disconnect the AC input power before changing setting of the DIP Switch
- The chassis of the charger is connected to the earth ground pin of the power cord plug. Ensure that the earth ground pin of AC receptacle feeding the charger is connected to earth ground
- Do not use an adapter. If a grounding type of receptacle is not available, do not use this charger until the proper outlet is installed by a qualified electrician.
- Do not operate the charger if the power cord is damaged

Charger Related

- Do not operate the charger in a closed-in area or restrict ventilation in any way.

SECTION 2 | Layout

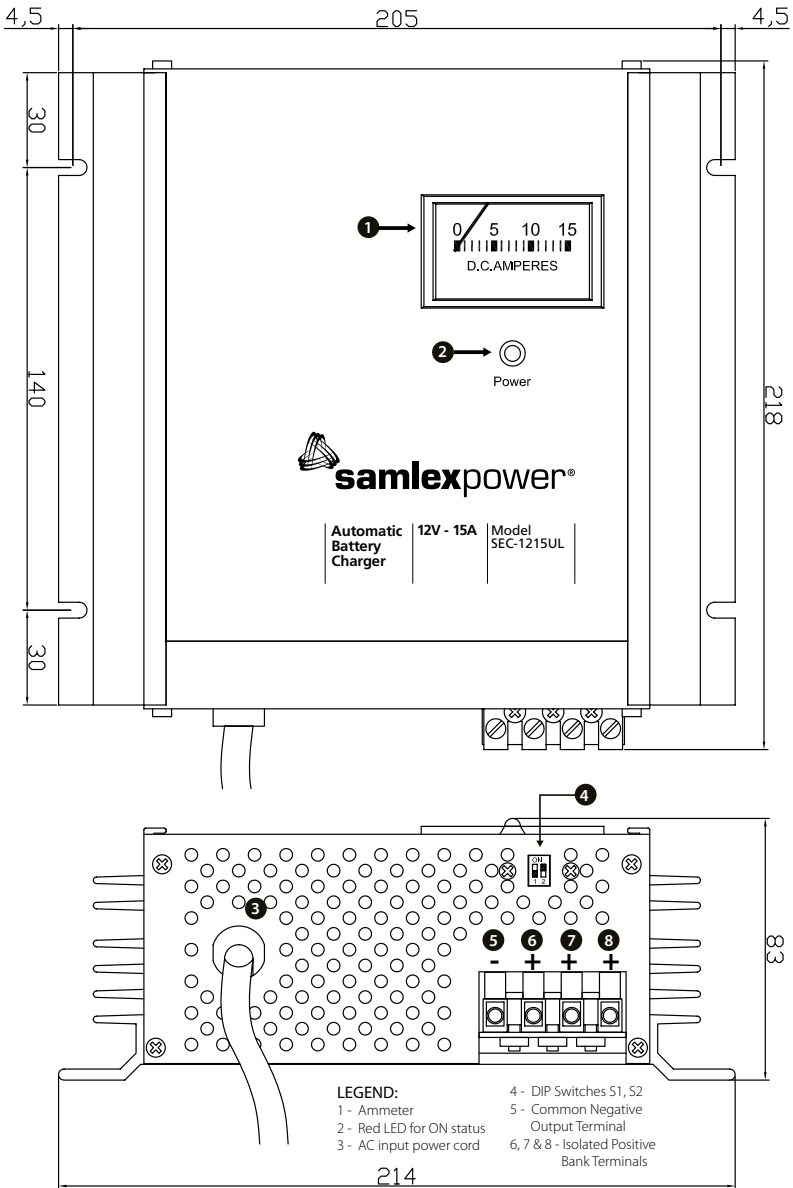


Fig. 2.1: Layout - SEC-1215UL

SECTION 2 | Layout

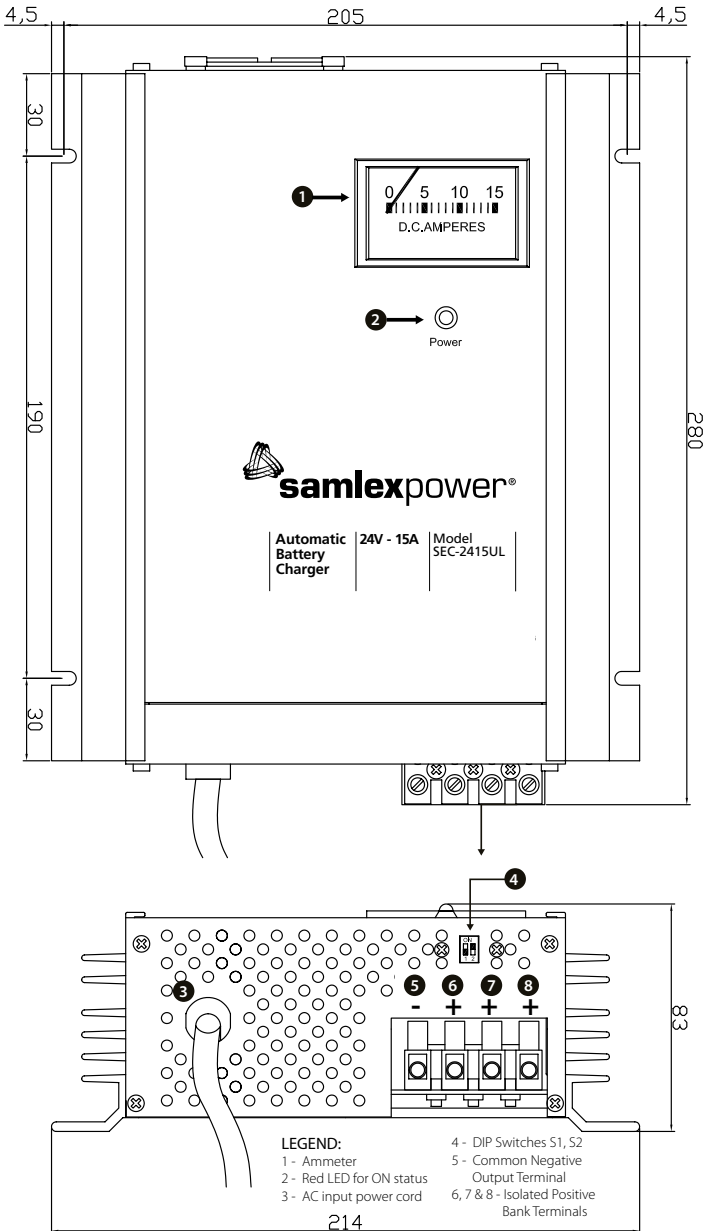


Fig. 2.3: Layout - SEC-2415UL

SECTION 3 | Description, Features & Cooling

Description

These chargers are used to charge Lead Acid Batteries (Flooded, AGM or Gel Cell). SEC-1215UL (Maximum charging current 15A) and SEC-1230UL (Maximum charging current 30A) are used to charge 12 V batteries. SEC-2415UL (Maximum charging current 15A) is used to charge 24 V batteries. These chargers can be powered from AC power source of either 120 V, 60 Hz (Pre-set) or 230 V, 50 Hz (By changing jumper position inside the unit - See page 10 for instructions).

Features

- State of the art switched mode technology is used for very high efficiency, lightweight and quiet operation.
- User selectable AC input voltage - 120 V , 60 Hz (Pre-set) or 230 V , 50 Hz (By changing jumper position inside the unit (See page 10 for instructions).
- User selectable 2 or 3 stage charging algorithm ensures rapid and safe charging of all types of lead acid batteries - Flooded, AGM, Gel Cell or batteries with external load. (Through externally accessible DIP Switch - see pages 11 for instructions)
- Fully automatic "Connect and Forget" operation
- 3 banks of batteries can be charged simultaneously without use of an external battery isolator
- Monitoring through ON status LED and Ammeter
- Temperature controlled cooling fan (SEC-1230UL, SEC-2415UL)

- Protections against short circuit, over current, reverse battery connection and over temperature (over temperature for SEC-1230UL and SEC-2415UL)
- Can be used as a power supply or as a DC UPS (Uninterruptible DC Power Supply) when used with a battery (DIP Switch set at "Battery with load")

Cooling

SEC-1215UL is cooled by convection and does not have any thermal overload shut down.

SEC-1230UL and SEC-2415UL are cooled by convection and in addition, have a temperature controlled fan for forced air cooling. Two temperature sensors mounted on the power transformer control the switching of the fan and over temperature shut down. The fan will be switched on by the first temperature sensor when the power transformer reaches 70°C.

Hence, at lower loads, the fan may not cut in and will be off. This is normal.

In case the fan fails or if the cooling is not adequate, the second temperature sensor will shut down the unit if the power transformer reaches 100°C. The red LED will switch OFF. The unit will automatically recover on removal of thermal overload condition.

SECTION 4 | Charging States & Protections

NOTES:

1. VOLTAGE READINGS ON NO LOAD

The output has one common Negative terminal and three Positive terminals for charging 3 banks of batteries. Each Positive terminal has an internal isolating diode in series which has a forward voltage drop of 0.8 to 1.1 V. On no load (that is when no battery or other DC load is connected to any of the 3 terminals), the voltage reading will read 0.8 to 1.1 V higher than the specified float voltage. Note that the specified float voltage is at a load of 1 A. Also, the voltage on the terminals not connected to the load (for example, when one bank of battery is connected to one Positive terminal, the other 2 Positive terminals will remain disconnected) will read 0.8 to 1.1 Volt higher than the voltage of the loaded terminal.

2. VOLTAGE SPECIFICATIONS

All rated voltages are specified at battery temperature of 80°F.

These chargers can be manually selected to operate in 3 stage or 2 stage modes (Please see "**Selecting the Type of Battery and Charging Stages**"). The charging stages are described below:

Stage 1 - Constant Current or Bulk Charge Stage

When the battery is low, it will try to draw larger charging current. The charger senses the current draw and limits this to the maximum permissible value (15A for SEC-1215UL / SEC-2415UL and 30A for SEC-1230UL). Bulk charging takes place at this constant current. **In this condition of constant current, the voltage measured at the charger or battery terminals will be the battery's own voltage.**

The constant current injected into the battery starts restoring the battery capacity and it's voltage starts rising. When this voltage approaches the threshold of battery "gassing", termed "Boost or Absorption Voltage", the charger automatically switches over to Stage 2 - "Boost or Absorption Stage". The value of this voltage depends upon the type of battery being charged (See DIP Switch Settings). By this time, approximately 80% of the battery capacity will normally have been

restored (**Note:** The percentage capacity restored till the point the battery reaches the Boost or Absorption Voltage is inversely proportional to the value of the bulk charge current.)

Stage 2 - Constant Voltage Boost or Absorption Stage

As explained above, when the battery voltage approaches the point where battery "gassing" can begin, the charger automatically switches over to the "Boost or Absorption Stage". The charger applies a constant voltage whose value depends upon the type of battery selected (See DIP Switch Settings). This controlled overcharge restores the balance 20% of the capacity in a minimum amount of time. As the capacity is fully restored, the charging current starts reducing. When the current reduces below the preset threshold, the charger automatically switches to the "Float or Maintenance Stage".

Stage 3 - Constant Voltage, Float or Maintenance Charging Stage

As explained above, as the charging current drops below the preset threshold (1.5 to 2 amps for SEC-1215UL / SEC-2415UL and 2.5 A to 3 A for SEC-1230UL), it signals that the battery is 100% charged.

SECTION 4 | Charging States & Protections

In this "Float or Maintenance Charging Stage", the charger outputs a constant voltage of 13.5 V for 12 V system and 27 V for 24 V system. This helps in maintaining 100% capacity of the battery and also compensates for self discharge. The battery can remain connected in this stage indefinitely without the risk of overcharging or excessive loss of electrolyte.

CAUTION!

3 stage charging is recommended for charging stand-alone, unloaded batteries (there is no load connected to the battery when it is being charged).

If a load is also connected simultaneously, a part of the charger's output current will be diverted to this load. Thus, the charger may remain locked in the "Boost or Absorption Mode" if the current drawn by the load is more than the preset value of threshold current determining change over between the Boost and Float Stages. **This will lead to overcharging and loss of electrolyte.**

For charging a battery when a load is also connected simultaneously, the "Boost or Absorption Stage" is required to be disabled. Select "Battery with Load" using the DIP switch. See details under "Powering other DC Loads"

THE CHARGER HAS THE FOLLOWING PROTECTIONS:

Short Circuit Shut Down

In case of a short circuit on the output side, the charger will shut down. The Red LED will switch off. The charger will automatically recover once the short circuit condition is removed.

Over load Current Limiting

The current drawn by the load is automatically limited to a maximum of 15 A for SEC-1215UL / SEC-2415UL and 30 A for SEC-1230UL. If the load tries to draw a

higher current than these limits, the output voltage of the unit will start to drop. **If a battery is connected, the output voltage will be clamped to the actual battery voltage.** The unit will automatically recover when the overload condition is removed.

Reverse Battery Connection Cut Off

The output is internally fused on the DC side. In case, the polarity of the battery connection is reversed, the fuse(s) will blow. The red LED will switch off. The fuse(s) will be required to be replaced for the unit to function again.

Thermal Overload Shutdown

SEC-1215UL is cooled by convection and does not have any thermal overload shut down.

SEC-1230UL and SEC-2415UL are cooled by convection and in addition, have a temperature controlled fan for forced air cooling. Two temperature sensors mounted on the power transformer control the switching of the fan and over temperature shut down. The fan will be switched on by the first temperature sensor when the power transformer reaches 70°C. **Hence, at lower loads, the fan may not cut in and will be off. This is normal.**

In case the fan fails or if the cooling is not adequate, the second temperature sensor will shut down the unit if the power transformer reaches 100°C. The red LED will switch off. The unit will automatically recover on removal of thermal overload condition.

CAUTION:

Keep the charger in a well ventilated, cool and open area. Do not block the vent holes on the sides or the discharge openings of the cooling fan.

SECTION 5 | Installation & Charger Operation

INSTALLATION

Location, Mounting & Safety

The charger is required to be installed in a safe, well ventilated and dry location. Please see the details given under "Important Safety Instructions"

With the help of 4 screws, mount the charger on a vertical bulkhead with the output terminal side facing down.

Output connectors

A terminal block with tubular, screw down type of terminals is used for output connection. The diameter of the tubular holes is as follows :

SEC-1215UL	0.14 inches
SEC-2415UL / SEC-1230UL	0.19 inches

Wires for Battery Connection

To avoid polarity errors and possible damage, never use wires of only one color. Use red insulated wire(s) for Positive connection(s) and black for Negative connection(s)

Recommended DC wire sizes are given below. The length in feet is the length of the pair of the Positive and Negative DC wires from the charger to the battery / other DC load:

Length of the pair of the Positive & Negative cables	SEC-1215UL SEC-2415UL	SEC-1230UL
0 to 6 ft.	AWG #10	AWG #8
6 to 10 ft.	AWG #8	AWG #6
10 to 20 ft.	AWG #6	AWG #4

Termination of Wire Ends

Wire ends for connection to the charger should be terminated with pin type of lugs provided.

CAUTION!

For firm connection when using stranded cable, crimp / solder "pin" style terminal on the charger end of the DC wires used for connecting to the battery / other DC loads.

CHARGER OPERATION

Preparing the Charger for Operation: Selecting AC input voltage

The charger is pre-set to operate from input AC voltage of 120 VAC, 60 Hz. To operate the charger from AC input voltage of 230 VAC, 50 Hz, change the internal setting as follows:

1. Remove the 4 screws on the ammeter side of the top cover
2. Gently slide the top cover out by 2 to 3 inches. **(CAUTION! The top cover will be restrained from fully sliding out by the wires connecting the ammeter, LED and the fan)**
3. Locate the jumper wire with a quick female disconnect. In the pre-set condition, it is connected to the male vertical pin marked "115 V". Pull this female disconnect upwards to disconnect from the "115 V" position. Connect this to the male vertical pin marked "230 V"
4. Replace the fuse with the fuse recommended for 230 VAC operation (See fuse rating at page 17)
5. Replace the AC plug of the power cord with a suitable 3 pin grounded

SECTION 5 | Installation & Charger Operation

plug to mate with the 230 VAC outlet. **CAUTION: The new plug should have 3 poles i.e. Line (L) , Neutral(N) and Earth ground. Color code for the power cord conductors is:**

- Line (L) - Black
- Neutral (N) - White
- Earth ground - Green

Preparing The Charger For Operation: Selecting The Type Of Battery And Charging Stages

The Float Voltage and Boost Voltage (Also called Absorption or Overcharge Voltage) of different types of Lead Acid Batteries are different. Also, when a charger is used to charge a battery and simultaneously supply a load , the Boost Stage is required to be disabled to prevent overcharging of

the battery. A DIP Switch is provided on top of the output terminals for selecting the battery type and for disabling the Boost Stage when charging loaded batteries. The following selections can be made with the help of the DIP Switch.

CAUTION! Do not change the DIP Switch setting when the charger is operating. Always change the DIP Switch setting when the charger is off, i.e. after disconnecting the charger from the AC input power.

NOTE: The voltages are for a temperature of 80°F.

CAUTION! Please ensure that the position No. 4 of the DIP switch (S1-ON & S2-ON) is NEVER selected.

DIP SWITCH SETTINGS: SEC-1215UL/SEC-1230UL					
S1	S2	Float	Boost	Battery Type	Charging Stages
OFF *	ON *	13.5 V *	14.4 V *	Flooded / AGM *	3 Stages (Stages 1, 2, 3)
ON *	OFF	13.5 V	14.0 V	Gel Cell	3 Stages (Stages 1, 2, 3)
OFF	OFF	13.5 V	Disabled	Battery with Load	2 Stages (Stages 1, 3)
ON	ON	Caution! Do NOT use this setting			

* Factory pre-set in this position

DIP SWITCH SETTINGS - SEC-2415UL					
S1	S2	Float	Boost	Battery Type	Charging Stages
OFF *	ON *	27 V *	28.8 V *	Flooded / AGM *	3 Stages (Stages 1, 2, 3)
ON	OFF	27 V	28.0 V	Gel Cell	3 Stages (Stages 1, 2, 3)
OFF	OFF	27 V	Disabled	Battery with load	2 Stages (Stages 1, 3)
ON	ON	Caution! Do NOT use this setting			

* Factory pre-set in this position

SECTION 5 | Installation & Charger Operation

Connecting The Batteries or Other DC Loads

The output has a common Negative (-) terminal and 3 Positive terminals for charging up to 3 independent banks of batteries. Each Positive connector has it's own internal isolating diode which works as a battery isolator. If more than one bank of batteries is connected, these will be charged at the same time as long as the AC power is available to the charger (the maximum charging current of 15 A of SEC-1215UL/SEC-2415UL and 30 A of SEC-1230UL will be shared among the connected banks of the batteries depending upon their discharged states). In case the AC power fails or if there is no output from the charger, the isolating diodes will prevent charging / discharging among the batteries connected to the banks.

The above arrangement works as a battery isolator and can divide the charging current into a maximum of 3 isolated branches and allows current flow in each branch in one direction only. If more than one battery systems are being used independently, the system batteries will discharge to different levels. If system batteries are connected in parallel to charge from a single charger, a weak or a dead battery will drain the charge from the strong battery. Such situation occurs in RVs, boats and other vehicles where 2 separate battery systems are used – starter battery for starting and running the engine and the other auxiliary / house battery system for running auxiliary devices like inverters, refrigerators, car stereos etc. Here, the starter battery should be connected to one bank and the auxiliary / house battery to the second bank. Fig. 5.1 shows this connection.

In a single battery bank, two or more batteries may be connected in parallel to

increase their AH capacity. These will be discharged and charged as a single battery bank. In this case, the paralleled bank of multiple batteries is to be considered as a single bank and connected to any one of the 3 banks of the charger as shown in Fig. 5.2 for bank of 4 batteries. For proper charging of all the batteries, please ensure that the Positive wire "A" from the charger is connected to the Positive terminal of the first battery (Battery 1) and the Negative wire "B" is connected to the Negative terminal of the last battery (Battery 4). This will ensure the following:

- Resistance of the interconnecting cables will be balanced and the individual batteries will see the same series resistance
- All the individual batteries will be charged at the same charging current and thus will be charged to the same state of charge
- None of the batteries will see an over-charge condition

When connecting a single battery or other single DC load, it can be connected to the common Negative and any one of the 3 Positive terminals as in Fig. 5.2.

OPERATION

When the charger is switched on, the red LED lights up indicating that output voltage is available. When the batteries are being charged or when the charger is supplying other DC load, the current fed by the charger will be indicated by the ammeter.

When the batteries are discharged, they will draw charging current proportional to their discharged condition (up to a maximum current rating of the charger) and this current draw will be shown by

SECTION 5 | Installation & Charger Operation

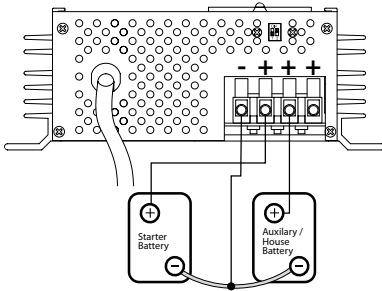


Fig. 5.1:
Connecting 2 separate battery systems to
2 separate banks.

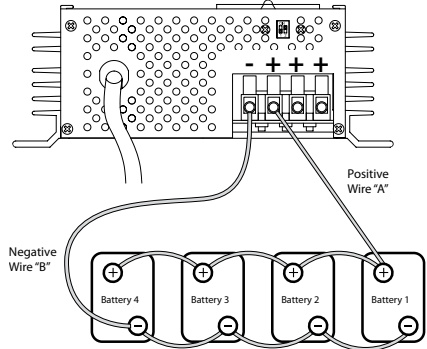


Fig. 5.2:
Connecting bank of paralleled batteries to
single bank.

the ammeter. When the batteries are fully charged, they will draw very low current (may not be registered by the ammeter) to compensate for their self discharge.

Charging a Battery Installed in a Vehicle

Follow these steps when the battery is installed in a vehicle. A spark near a battery may cause battery explosion. For safety and to reduce the risk of spark near the battery:

1. Position AC and DC cords to reduce risk of damage by hood, door or moving engine parts
2. Stay clear of fan blades, belts, pulleys and other parts that can cause injury to persons
3. Check the polarity of the battery posts. A Positive (Pos, P, +) battery post usually has a larger diameter than a Negative (Neg, N, -) post
4. Determine which post of the battery is grounded (Connected to the chassis Engine Block). If the Negative post is grounded to the Engine Block (As in most vehicles), see sub paragraph 5. If the Positive post is grounded, see sub paragraph 6)
5. For a Negative grounded vehicle, connect the Positive (red) DC wire from the charger to the Positive of the battery post. Connect the Negative (black) DC wire from the charger to a section of heavy gauge metal part of the frame or engine block which is away from battery. Do not connect to carburetor, fuel lines or sheet metal body parts.
6. For a Positive grounded vehicle, connect the Negative (black) DC wire from the charger to the Negative of the battery post. Connect the Positive (red) DC wire from the charger to a section of heavy gauge metal part of the frame or engine block which is away from battery. Do not connect to carburetor, fuel lines or sheet metal body parts.
7. Connect the charger AC power cord to the AC outlet
8. When disconnecting the charger, turn switches to off, disconnect AC power

SECTION 5 | Installation & Charger Operation

cord, remove connection from the vehicle chassis and then remove connection from the battery terminal

Charging a Battery outside the Vehicle

Follow these steps when the battery is outside the vehicle. A spark near the battery may cause battery explosion. For safety and to reduce risk of spark near the battery, connect the charger as follows:

1. Check the polarity of the battery posts.
A Positive (Pos, P, +) battery post usually has a larger diameter than a Negative (Neg, N, -) post
2. Attach a piece of at least 3" of AWG #6 insulated battery wire to the Negative battery post
3. Connect the Positive (red) DC wire from the charger to the Positive battery post
4. Position yourself and the free end of the piece of wire attached to the Negative post as far away from the battery as possible and then connect the Negative (black) DC wire from the charger to the free end of the piece of wire attached to the Negative battery post
5. Do not face the battery when making the final connection
6. Connect the charger AC power cord to the AC outlet
7. When disconnecting the charger, always do so in reverse sequence of connecting procedure and break the first connection while standing as far away from the battery as practical

CHARGING MORE THAN ONE BANK OF BATTERIES

CAUTION! When charging more than one bank of batteries at the same time using 3 Stage Charging, ensure that the batteries in the banks are in a similar discharged condition. If one bank is completely discharged and another is almost fully charged, the bank that is fully charged will be subjected to over charge condition during the time when the charger remains in Boost Stage for charging the completely discharged bank. If batteries are in dissimilar states of charge, select DIP Switch setting for "Battery with Load."

Powering Other DC Loads

The charger can be used as a power supply or as a DC UPS. For both these applications, first set the DIP Switch to "Battery with load". (See under "Selecting the Type of Battery and Charging Stages")

To use as a power supply, first switch off the DC load. Connect the DC load between the common Negative terminal and one of the three Positive terminals. **Ensure that the maximum current drawn by the DC load is below the maximum current rating of the charger. Switch on the charger and then the DC load.**

In a DC UPS (Un-interruptible Power Supply), the charger simultaneously powers the DC load as well as the battery. As long as the AC power to the charger is available and the charger is working normally, the charger will supply the DC load as well as charge/float the battery. In case the AC power fails or if the charger stops work-

SECTION 5 | Installation & Charger Operation

ing, the battery will automatically power the DC load. As soon as the AC power to the charger is restored, the DC load will once again be fed by the charger and at the same time the battery will be recharged.

CAUTION! Please ensure that the sum of the current drawn by the DC load and the current desired for charging the battery is less than the maximum current capacity of the charger.

To use as a DC UPS, first switch off the DC load and connect it to the battery. Now connect the battery as explained above under "Charging a Battery outside the Vehicle". Switch on the charger and then switch on the DC load.

SECTION 6 | Troubleshooting

SYMPTOMS: CHARGER POWERED AND CONNECTED TO THE BATTERY

The Red LED Is OFF

The DC side fuse may have blown due to wrong polarity of battery connection. Ensure Positive of the battery is connected to the Positive of the charger and the Negative of the battery is connected to the Negative of the charger. Check the fuses inside the charger and replace, if blown.

The battery may be shorted. In this condition, the unit is shut down by the short circuit protection circuit. Remove the battery connection. If the red LED now comes on, the battery is shorted. If the red LED still does not come on, check if there is AC power in the receptacle. If there is power, check the AC side fuse inside the unit. If the fuse is not blown, call Technical Support.

The Red LED Is ON but the Ammeter Shows No Reading

The battery is fully charged. If the battery is not fully charged, the connection to the

battery may be loose or open. Check tightness and continuity of the battery connection.

The Battery Is Getting Over Charged or Boils

The charger is also feeding other DC load(s) in parallel with the battery. The DIP Switch is not selected for "Battery with Load". Change DIP Switch setting to "Battery with Load" (see under "Powering other DC loads")

SYMPTOMS: CHARGER POWERED & DISCONNECTED FROM BATTERY

The Red LED Is OFF

Check there is AC power in the receptacle. If there is power, check the AC side fuse inside the unit. If the fuse is not blown, check the DC side fuse. If the DC side fuse is not blown, the output may be shorted. In this condition, the charger is shut down by the short circuit protection circuit. Check that the output terminals are not shorted. If the terminals are not shorted, call Technical Support.

SECTION 6 | Troubleshooting

AC Side Fuse Blows As Soon As Power Is Turned ON

The AC input is selected for 120 VAC but the unit is plugged into 230 VAC. Always check that the charger is set for the correct AC mains voltage. If the AC input voltage is correct, the charger is defective. Call Technical Support.

DC Side Fuse Blows As Soon As The Battery Is Connected

Wrong polarity of the battery connection. Ensure Positive of the battery is connected to the Positive of the charger and the Negative of the battery is connected to the Negative of the charger.

SYMPTOMS WHEN THE CHARGER IS POWERED AND IS BEING USED AS A DC POWER SUPPLY/UPS

The Voltage Drops When Load Is Switched On

The load is trying to draw current more than the current limit value of the charger (the current limit value is the maximum

specified charging Amps). Once the load current reaches the current limit value, the current limit circuit is activated and the output voltage drops. Some loads like motors, compressors, incandescent lamps, halogen lamps, heating elements, relays, coils, capacitors etc. draw very large inrush/starting currents which may reach up to 10 times their normal operating currents. Ensure that the starting / inrush current or the maximum operating current of the load is lower than the current limit value of the charger.

SECTION 7 | Internal Fuse Ratings & Specifications



Both the AC side and DC sides have fuses that are located inside the charger. Disconnect the AC power when checking or changing the fuses. Open the charger as follows:

1. Remove the 4 screws on the ammeter side of the top cover
2. Gently slide the top cover out by about 2 to 3 inches.
(CAUTION! The top cover will be restrained from fully sliding out by the wires connecting the ammeter , LED and fan)
3. The fuses will now be accessible

Fuse Ratings Table

FUSE RATINGS	SEC-1215UL	SEC-1230UL	SEC-2415UL
120 VAC INPUT	4A / 125V	8A / 125V	8 A / 125V
DC OUTPUT	20A / 32V	2 x 20A / 32V	2 x 10A / 32V
230 VAC INPUT	2A / 250V	4A / 250V	4A / 250V
DC OUTPUT	20A / 32V	2 x 20A / 32V	2 x 10A/32V

Specifications Table

SPECIFICATIONS	SEC-1215UL	SEC-1230UL	SEC-2415UL
Nominal Input Voltage (pre-set)	120 VAC, 60 Hz, 3.3A	120 VAC, 60 Hz, 6.5A	120 VAC, 60 Hz, 6.5A
Internal Jumper Change	230 VAC, 50 Hz	230 VAC, 50 Hz	230 VAC, 50 Hz
Input Frequency	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz
Output Voltage, Boost ^{1,2}	14 VDC, or 14.4 VDC or disabled	14 VDC, or 14.4 VDC or disabled	28 VDC, or 28.8 VDC or disabled
Output Voltage, Float ¹	13.5 VDC	13.5 VDC	27.0 VDC
Output Amps	15A	30A	15A
Operating Temperature Range	0 - 40°C	0 - 40°C	0 - 40°C
Weight	2.2 kg. / 4.8 lbs.	2.9 kg. / 6.4 lbs.	2.9 kg. / 6.4 lbs.
Housing Dimensions (L x W x H) Inches / Millimetres	8.5 x 8.4 x 3.3 / 218 x 214 x 83	10.8 x 8.4 x 3.3 / 280 x 214 x 83	10.8 x 8.4 x 3.3 / 280 x 214 x 83
Protections	Short Circuit Overload	Short Circuit Overload / Over Temperature	Short Circuit Overload / Over Temperature
Output Banks	3	3	3
Safety Compliance	i) Conforms to ANSI/UL STD 1564 ii) Certified to CAN/CSA STD C22.2 No. 107.2		 Intertek 4004711
EMI Compliance	FCC Part 15(B), Class B		

1. Voltages based on battery temperature of 80° F

2. Based on selection by DIP SWITCH. See pages 8 & 9

Specifications are subject to change without notice.