POWER SUPPLY

SAMLEX EUROPE® B.V.

Switch Mode DC Power Supply with Battery Backup

Model No.

SEC-1225G-BBM

Manual

Please read this manual before operating your power supply

OWNER'S MANUAL | Index

SECTION 1 | Safety Instructions

1.1 IMPORTANT SAFETY INSTRUCTIONS

This manual contains important Safety and Operating Instructions.
Please read before using this unit.

1.2 SAFETY SYMBOLS

The following safety symbols will be used in this manual to highlight safety and information:

WARNING!
Indicates possibility of physical harm to the user in case of non-compliance.

CAUTION!
Indicates possibility of damage to the equipment in case of non-compliance.

1.3 INSTRUCTIONS

Please read these instructions before installing or operating the unit to prevent personal injury or damage to the unit.

WARNING!

a) DO NOT OPEN TO REDUCE RISK OF FIRE OR ELECTRIC SHOCK. THERE ARE NO USER SERVICEABLE PARTS INSIDE - REFER TO QUALIFIED SERVICE PERSONNEL.

b) The unit should be grounded to reduce the risk of electric shock. It comes with a detachable power cord that has a 2-Pole, 3 Wire grounding European CEE-7/7 "Schuko" plug. The grounding contact of the plug gets connected to the chassis of the unit. When the power cord is plugged into the corresponding European CEE-7/7 "Schuko" receptacle in the power outlet, the chassis of the unit is automatically connected to the Earth Ground through the Equipment Grounding Conductor that is connected to the grounding contact of the European CEE-7/7 "Schuko" outlet. The power cord must be plugged into a European CEE-7/7 "Schuko" outlet that is properly installed and grounded in accordance with all local codes and ordinances. Never alter the power cord that has been provided. If the plug of the cord will not fit the outlet, have a proper outlet installed by a qualified electrician. Improper connection can result in risk of electric shock.

c) It is recommended that you return your power supply to a qualified dealer for any service or repair. Incorrect assembly may result in electric shock or fire.

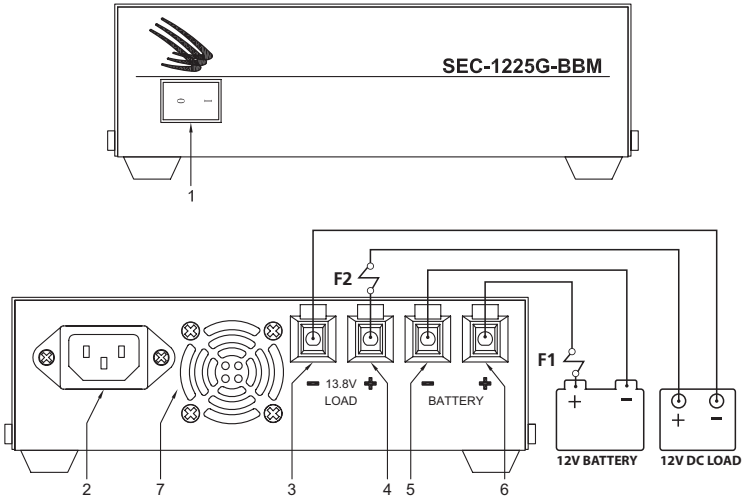
d) To reduce the risk of electric shock, unplug the power supply from the outlet before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.
e) To reduce risk of damage to electric plug and cord, pull by plug rather than cord when disconnecting the unit.
f) An extension cord should not be used unless absolutely necessary. If an extension cord is used, make sure that it has 2-Pole, 3 Wire Grounding, European CEE-7/7 "Schuko" configuration with current carrying capacity of at least 10A.
g) Place the unit in an area that will allow air to flow freely around the unit. DO NOT block or obstruct vent openings on the sides or install the unit in an enclosed compartment.
h) Keep the unit away from moisture and water.
i) NEVER OPERATE TWO OR MORE UNITS IN PARALLEL.
j) Precautions when working with batteries.
   - Batteries contain very corrosive diluted Sulphuric Acid as electrolyte. Precautions should be taken to prevent contact with skin, eyes or clothing.
   - Batteries generate Hydrogen and Oxygen during charging resulting in evolution of explosive gas mixture. Care should be taken to ventilate the battery area and follow the battery manufacturer's recommendations.
   - NEVER smoke or allow a spark or flame near the batteries.
   - Use caution to reduce the risk of dropping a metal tool on the battery. It could spark or short circuit the battery or other electrical parts and could cause an explosion.
   - Remove metal items like rings, bracelets and watches when working with batteries. The batteries can produce a short circuit current high enough to weld a ring or the like to metal and thus cause a severe burn.
   - If you need to remove a battery, always remove the Negative Ground Terminal from the battery first. Make sure that all the accessories are off so that you do not cause a spark.

CAUTION!

a) Please refer to Fig 2.1. Please ensure that the battery is connected with correct polarity - Positive of the battery to the "Battery +" terminal (6, Fig 2.1) and the Negative of the battery to the "Battery -" terminal (5, Fig 2.1). Reversal of polarity will blow external Fuse F1. Reversal of polarity may result in permanent damage to the unit and to the load. DAMAGE DUE TO REVERSE POLARITY IS NOT COVERED UNDER WARRANTY.
b) Protect the unit against AC line input transients. Use Transient Suppressor in line with the AC input.

SECTION 2 | Layout & Dimensions

2.1. LAYOUT



LEGEND

1. Lighted Power ON /OFF Rocker Switch (Lights Red when ON)
2. AC Power Cord Inlet – Type "IEC 60320-C14" (Detachable Power Cord with "IEC 60320-C13" connector on one end and CEE-7/7 "Schuko" Plug on the other end is provided with the unit)
3. Black Negative (-) DC Load Terminal
4. Red Positive (+) DC Load Terminal
5. Black Negative (-) Battery Terminal
6. Red Positive (+) Battery Terminal

} Tubular hole dia 5mm with set screw

7. Vent opening for cooling fan discharge

F1. Fast blow Fuse: 32V, 25A
F2. Fast blow Fuse: 32V, 25A

Fig. 2.1 Layout and Output Connections

SECTION 2 | Layout & Dimensions

2.2 DIMENSIONS

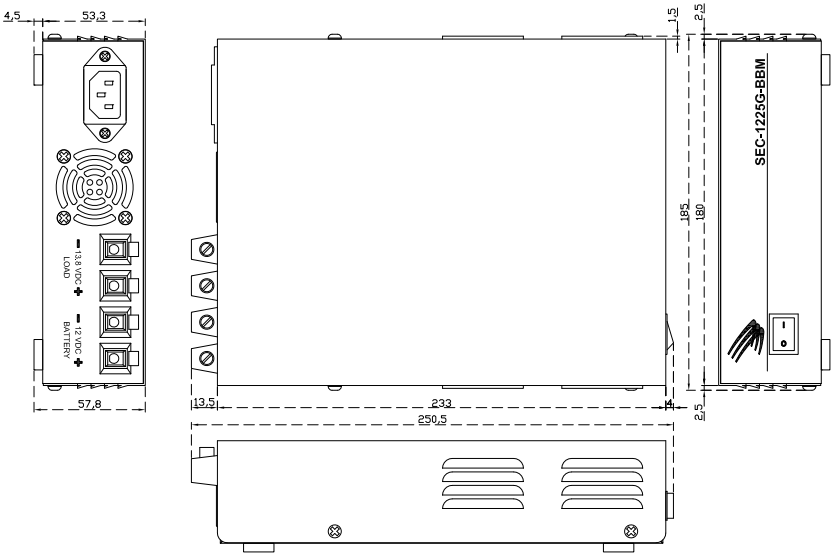


Fig 2.2 Dimensional Drawing

SECTION 3 | Description & Principle of Operation

3.1 DESCRIPTION

SEC-1225G-BBM is a Switch Mode Power Supply (SMPS), which converts 115/230 VAC, 50/60 Hz to regulated 13.8 VDC at 25A continuous. It has additional provision for battery backup with charging in conjunction with external 12V Lead Acid Battery. The battery is float charged to 13.5 ± 0.2V (when fully charged).

3.2 FEATURES

- Advanced Switch Mode Technology
- Reliable, 12V DC Uninterruptible Power Source (DC UPS) in conjunction with external 12V Lead Acid Battery backup
- Under battery backup function, short time overload of up to 50A for < 1 sec can be supplied to allow starting of devices that require higher starting surge current.
- High efficiency, compact and portable

- Protected against short circuit, overload, over voltage and over temperature
- Cooling by temperature controlled fan improves efficiency and prolongs life of the fan
- CE marked for safety and EMI / EMC compliance

3.3 PRINCIPLE OF OPERATION

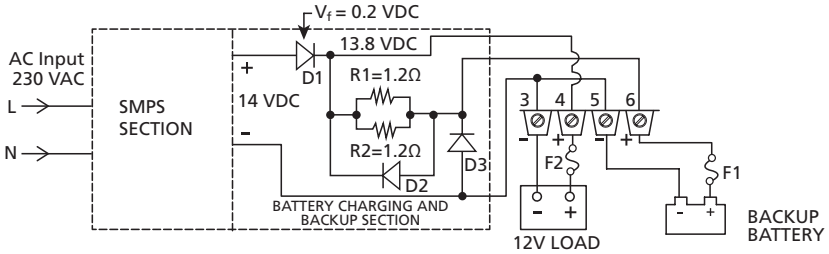


Fig 3.1 Schematic Diagram - Battery Charging / Backup

Please refer to the schematic diagram at Fig 3.1.

The unit consists of 2 Sections:

a) High efficiency Switched Mode Power Supply (SMPS) Section (See details at Section 3.3.1)
b) Battery Charging and Backup Section (See details at Section 3.3.2)

3.3.1 High Efficiency Switched Mode Power Supply (SMPS) Section

Refer to Fig 3.1

This Section is a high efficiency SMPS that converts 115/230 VAC, 50/60 Hz to regulated DC voltage of 13.8V at the load output (14.0V after SMPS section). It uses Switched Mode controller with Pulse Width Modulation (PWM) Control.

3.3.2 Battery Charging and Backup Section

Refer to Fig 3.1

3.3.2.1

In battery charging and backup application, the SMPS Section (details at Section 3.3.1 above) will supply the load current as well as the battery charging current to keep the battery charged to Float Voltage of 13.5V± 0.2V as long as AC input to the SMPS is available and the SMPS is working normally. If the AC input to the SMPS Section fails or if the SMPS Section itself fails, the battery will act as backup power source and instantaneously supply power to the load.

3.3.2.2
Regulated 14.0VDC from the SMPS Section (details at Section 3.3.1 above) is fed to the Battery Charging / Backup Section through Schottky Diode "D1" that provides isolation between the SMPS Section and the battery to prevent the battery from feeding back into the SMPS Section. When current passes through a diode, there will be a nonlinear Forward Voltage Drop (Vf) across it. As the power dissipated across the diode will be equal to Forward Voltage Drop (Vf) multiplied by the diode current, it is desirable that the Forward Voltage Drop (Vf) has a lower value to reduce power dissipation and hence, improve efficiency. Therefore, "Schottky" type of diode has been used that has lower Forward Voltage Drop (Vf) of 0.4A at about 25A.
Schottky Diode "D1" has a non linear Forward Voltage Drop (Vf) as follows:

TABLE 3.1 FORWARD VOLTAGE DROP (VF) AND VOLTAGE AT CATHODE OF SCHOTTKY DIODE "D1" (FIG 3.1)

(Column 1)	Diode "D1" current = 0A (Column 2)	Diode "D1" current =0.1 to 5A (Column 3)	Diode "D1" Current = 19 to 25A (Column 4)
Forward Voltage Drop (Vf) for Diode "D1"	0V	0.25V	0.4V
Voltage at Cathode of Diode "D1" (14.0V – Vf)	14V	13.75V	13.6V

It will be seen from Table 3.1 above that the Forward Voltage Drop (Vf) of Schottky Diodes "D1" " varies from 0V at 0A (no load) to 0.4V at about 25A. Hence, the voltage at the Cathode of Schottky Diode "D1" will be = 14.0VDC – Forward Voltage Drop across "D1" and will range from 14.0 V to 13.6V (or say 13.8 ± 0.2V).

3.3.2.3
13.8V ± 0.2V from the Cathode of Schottky Diode "D1" is fed to 2 branches as follows:

a) **Branch 1 for DC Load:** To the Positive Load Terminal (4, Fig 2.1) directly
b) **Branch 2 for Battery Charging and Backup:** To the Battery Positive Terminal (6 in Fig 3.1) through 2 x 1.2 Ohm parallel connected resistances R1 and R2 (2 x 1.2 Ohm parallel connected resistances will present effective series resistance of 1.2 Ohm ÷ 2= 0.6 Ohm). The battery charging current will be determined by the following approximate equation:

Charging Current = [Voltage at Cathode of Diode "D1" – Voltage at the Battery Terminals] ÷ 0.6 Ohm …**Equation 1**

3.3.2.4
Using Equation 1 above, it will be seen that the effective series resistance of 0.6 Ohm will limit the charging current. The charging current will be higher when the battery is more discharged and will progressively reduce as the battery voltage rises when charged. The rated charging current of 4A is based on the unit supplying 21A to load

and at the same time, charging a typical 100 Ampere Hour (Ah) battery discharged to 11.1V (70% discharged at Discharge Rate of 23A i.e. at around 5 Hr Discharge Rate of C/5). When the battery is charged to Float Voltage of 13.5V± 0.2V, the charging current will reduce to a very low value of around 0.1% of its Ampere Hour (Ah) capacity to compensate for its self discharge. For example, assuming that 100Ah capacity battery is being used, the Float Charging Current will be 0.1% of 100Ah or, 0.1A. Therefore, applying Equation 1 at Section 3.3.2.3 above, the voltage at the Battery Terminals (5, 6 in Fig and 3.1) will be as given in Tables 3.2.1 and 3.2.2:

TABLE 3.2.1 CHARGING VOLTAGE AT BATTERY TERMINALS – LOAD CURRENT 0A		
Column (1)	• Load Current = 0A • Float Charging Current = 0.1A • Total SMPS Current = 0.1A Column (2)	• Load Current = 0A • Full Charging Current = 4.0A • Total SMPS Current = 4.0A Column (3)
Voltage at Battery Terminals based on Equation 1 (Section 3.3.2.3)	13.75V* – (0.1A x 0.6 Ohm) = 13.69V *Based on Table 3.1, Column (3)	13.75V* – (4.0A x 0.6 Ohm) = 11.35V *Based on Table 3.1, Column (3)

TABLE 3.2.2 CHARGING VOLTAGE AT BATTERY TERMINALS – LOAD CURRENT 21A		
Column (1)	• Load Current = 21A • Charging Current = 4.0A • Total SMPS Current = 25A Column (2)	• Load Current = 21A • Charging Current = 0.1A • Total SMPS Current = 21.1A Column (3)
Voltage at Battery Terminals based on Equation 1 (Section 3.3.2.3)	13.6V** – (4.0A x 0.6 Ohm) = 11.2V **Based on Table 3.1, Column (4)	13.6V** – (0.1A x 0.6 Ohm) = 13.54V **Based on Table 3.1, Column (4)

3.3.2.5

When the AC input to the SMPS Section fails or if the SMPS itself fails, the battery will provide backup power to the load instantaneously through Schottky Diode "D2". Please note that current from the battery to the load will NOT pass through Resistors R1 and R2 because Schottky Diode "D2" will bypass these resistors due to its lower resistance.

3.3.2.5.1

Current flow through Schottky Diode "D2" will produce non-linear Forward Voltage Drop (Vf) as given in Table 3.3 below:

TABLE 3.3 FORWARD VOLTAGE DROP (VF) OF SCHOTTKY DIODES "D2"			
Column (1)	Diode "D2" Current = 0A Column (2)	Diode "D2" Current = 0.1A Column (3)	Diode "D2" Current = 19 to 23A Column (4)
Forward Voltage Drop (Vf) for Diode "D2"	0V	0.25V	0.4V
Voltage at Cathode of Diode "D2"	Battery Voltage – 0V	Battery Voltage – 0.25V	Battery Voltage – 0.4V

3.3.2.6.1
The voltage available at the Load Terminals (3,4 in Figs 2.1 and 3.1) during battery backup will be as per Equation 2 below:

Voltage at Load Terminals when battery is supplying the load	=	Battery Voltage – Forward Voltage Drop across Schottky Diode "D2"	**...Equation 2**

3.3.2.6.2
Examples of voltages at the Battery Terminals (5, 6 in Fig 3.1) at different states of charge / discharge are given at Table 3.4 below:

TABLE 3.4 VOLTAGE AT BATTERY TERMINALS WHEN AC INPUT POWER HAS FAILED AND THE BATTERY IS SUPPLYING THE LOAD

	• **Load current = 21A** • **Battery voltage at Floating Voltage of 13.55V**	• **Load current = 21A** • **Battery voltage of say 11.4V at 80% discharged state based on 100Ah capacity discharging at 5 Hr Discharge Rate of C/5**
Column (1)	**Column (2)**	**Column (3)**
Voltage at battery terminals (5, 6 in Fig 3.1) when AC input power has failed and the battery is supplying the load [Based Equation 2 (Section 3.3.2.6.1)]	13.54V* – 0.4**V = 13.14V *Based on Table 3.2.2, Column (3) ** Based on Table 3.3, Column (4)	11.4V – 0.4*V = 11.0V * Based on Table 3.3, Column (4)

3.3.3 Output Voltage Adjustment at No Load

The no load output voltage is factory preset at 14.0V at both the Load and Battery Terminals. The output voltage will drop to 13.8V ± DC when load is connected. Potentiometer marked "VR1" is provided in the SMPS Circuit Board for no load output voltage adjustment range of 10.8 VDC to 16.2 VDC.

3.3.4 Normal Power Supply Function when Battery Backup is not used

If battery backup function is not used (external backup battery is not connected), the unit will work as a normal power supply with ability to supply 25A continuous at 13.8 ± 0.2 V at the Load Terminals (3, 4 in Figs 3.1 and 2.1).

SECTION 4 | Protections

4.1 OVER LOAD / SHORT CIRCUIT CURRENT PROTECTIONS

4.1.1 Battery Backup Function is not Used - External Battery is not Connected and the Unit is Used as a Power Supply

In this case, the entire load current will be supplied by the Power Supply Section and will be limited to a maximum of 27A by its Current Limit Circuitry. If the load tries to draw a higher current than the current limit value of 27A, the output voltage at the Load Terminals (3, 4 in Fig 2.1) and the Battery Terminals (5, 6 in Fig 2.1) will not be regulated and will drop below 13.8V± 0.2V. If the load impedance is further reduced, the current will remain limited at 27A but the voltage will drop further. In case of short circuit, maximum limited current of 27A will continue to be supplied into the short circuit but the voltage will drop to < 2V in case of a near dead short (Load impedance will be very low – say < 100 milli Ohm). If over-load / short-circuit current continues over prolonged period, the external 25A load side Fuse (F2, in Fig 2.1) will blow and will disconnect the load. If the overload / short circuit is removed before the external 25A load side Fuse (F2, in Fig 2.1) blows, the output voltage at the Load / Battery Terminals will automatically recover when the load current drops to less than 25A.

4.1.2 Battery Backup Function is Used - External Battery is Connected

If the load tries to draw current higher than the current limit value of 27A of the Power Supply Section, the output voltage of the Power Supply Section will not be regulated and the voltage at the Load Terminals (3, 4, Fig 2.1) will drop. Portion of overload current beyond 27A will now be fed from the battery and the battery will start draining at this differential current. For example, if the overload current was 40A, the Power Supply Section will provide 27A and the battery will provide the balance 13A. The battery will start draining at 13A. The voltage at the Battery Terminals (5, 6, Fig 2.1) will start dropping and will be equal to the voltage corresponding to its actual State of Charge. The voltage at the Load Terminals (3, 4 in Fig 2.1) will be up to 0.4 VDC below the voltage at the Battery Terminals (5, 6 in Fig 2.1) because of forward voltage drop across diode D2 (Fig 3.1). This drop will depend on the current being supplied through this diode (table 3.3). External 25A Fuse (F2, Fig 2.1) on the load side will blow only on sustained current ≥ 25A for > 100 sec but will not blow at higher short duration surge currents determined by its Time Current characteristics. For example, based on the Time Current Characteristics of 32V, 25A fuse Type ATC-25 from Cooper Bussmann, the fuse can pass extremely high currents for shorter durations is as follows:

- 550A for 10 ms
- 170A for 100 ms
- 40A for 1 sec
- 25A continuous (for > 100 sec)

SECTION 4 | Protections

In case of short circuit on the load side, the external 25A Fuse (F2) on the load side will blow because of very high additional current supplied by the battery (Additional battery current supplied into the short circuit on the load side = Short circuit current - 27A from the Power Supply Section). For example, if a short circuit current of 170A tries to flow for > 100 ms, 27A will be supplied by the Power Supply Section and the balance 143A will be supplied by the battery. As the external 25A Fuse (F2, Fig 2.1) on the load side will see 170A and the external 25A Fuse (F1, Fig 2.1) on the battery side will see 143A, the external 25A load side Fuse (F2, Fig 2.1) will blow first.

4.2 PROTECTION AGAINST REVERSE POLARITY OF BATTERY CONNECTION

In case of reverse polarity of battery connection, internal Diode connected across the battery output terminals (D3, Fig 3.1) will be forward biased and the external 32V, 25A battery side Fuse (F1, Fig 2.1) will blow.

CAUTION!
Reversal of polarity may result in permanent damage to the unit and to the load.
DAMAGE DUE TO REVERSE POLARITY IS NOT COVERED UNDER WARRANTY.

4.3 OVER TEMPERATURE PROTECTION

CAUTION!
vent holes on the sides or the discharge openings of the cooling fan at the bottom of the unit.

The unit is cooled by convection and in addition, has a temperature-controlled fan located at the bottom for forced air-cooling. Two Normally Closed Thermal Switches are mounted on the windings of the Switching Power Transformer – one for fan control and the other for over temperature shut down. When the temperature of the transformer windings rises to ≥ 60°C ± 5°C, Thermal Switch for fan control will open and will activate fan switching circuit to switch ON the fan. When the transformer windings cool down to ≤ 40°C ± 5°C, the switch will close and de-activate fan switching circuit to switch OFF the fan.

NOTE: The fan may not switch ON at all in case of low loads or in colder ambient temperatures because the temperature of the transformer windings may not rise to threshold of ≥ 60°C ± 5°C under these conditions.

In case the fan fails or if the cooling is not adequate due to higher ambient temperature, inadequate air circulation or blockage of ventilation openings, the temperature of the transformer windings will rise. At temperature ≥ 105°C ± 5°C, Thermal Switch for over temperature shut down will open and will activate over-temperature protection circuit to shut down the Power Supply Section. When the

SECTION 4 | Protections

windings cool down to temperature ≤ 75°C ± 5°C, the switch will close, shut down circuit will be de-activated and the output power from the Power Supply Section will be restored automatically. During the time the Power Supply Section is shut down due to over temperature, the backup battery will supply the load and will start discharging. When the Power Supply Section cools down and resets, it will once again start supplying the load and re-charge the battery.

CAUTION!
The fan draws cool air from the vent openings on the sides of the unit and discharges hot air through vent openings at the bottom of the unit. PLEASE ENSURE THAT THESE VENT OPENINGS ARE NOT OBSTRUCTED.

4.4 OVER VOLTAGE PROTECTION

Over voltage protection is provided through the internal PWM controller.

SECTION 5 | Installation

5.1 WARNING!

WARNING!

a) Before commencing installation, please read the safety instructions explained in Section 1.
b) It is recommended that the installation should be undertaken by a qualified, licensed / certified electrician.
c) Various recommendations made in this manual on installation will be superseded by the National / Local Electrical Codes related to the location of the unit and the specific application.

5.2 INSTALLATION DIMENSIONS

Refer to Section 2, Figs 2.2 for installation dimensions.

5.3 LOCATION OF INSTALLATION

Please ensure that the following requirements are met:

Working Environment: Indoor use.

Cool: Heat is the worst enemy of electronic equipment. Hence, please ensure that the units are installed in a cool area that is also protected against heating effects of direct exposure to the sun or to the heat generated by other adjacent heat generating devices.

SECTION 5 | Installation

Well ventilated: The unit is cooled by convection and by forced air-cooling by temperature controlled fan on the backside of the unit. The fan at the backside of the unit draws cool air from air intake openings on the sides and discharges hot air through the exhaust openings behind the fan. To avoid shut down of the unit due to over temperature, do not cover or block the ventilation / suction / exhaust openings or install the unit in an area with limited airflow. Keep a minimum clearance of 25 cm around the unit to provide adequate ventilation. If installed in an enclosure, openings must be provided in the enclosure, directly opposite to the air-suction and air-exhaust openings of the unit.

Dry: There should be no risk of condensation, water or any other liquid that can enter or fall on the units.

Clean: The area should be free of dust and fumes. Ensure that there are no insects or rodents. They may enter the units and block the ventilation openings or short circuit electrical circuits inside the units.

Protection against fire hazard: The unit is not ignition protected and should not be located under any circumstance in an area that contains highly flammable liquids like gasoline or propane as in an engine compartment with gasoline-fueled engines. Do not keep any flammable / combustible material (i.e., paper, cloth, plastic, etc.) near the unit that may be ignited by heat, sparks or flames.

Accessibility: Do not block access to the front panel. Also, allow enough room to access the AC inlet and the DC wiring terminals and connections at the back of the unit, as they will need to be checked and tightened periodically.

Preventing Radio Frequency Interference (RFI): The unit uses high power switching circuits that generate RFI. This RFI is limited to the required standards for EMI / EMC for CE marking. Locate any electronic equipment susceptible to radio frequency and electromagnetic interference as far away from the unit as possible. For additional information, please read Section 7 titled “Limiting Electromagnetic Interference (EMI)”.

SECTION 5 | Installation

5.4 MOUNTING ORIENTATION

The unit has air intake openings on the sides and exhaust openings at the backside for the cooling fan. The unit should be mounted in such a manner so that small objects should not be able to fall easily into the unit from these openings and cause electrical / mechanical damage. Also, the mounting orientation should be such that if the internal components overheat and melt / dislodge due to a catastrophic failure, the melted / hot dislodged portions should not be able to fall out of the unit on to a combustible material and cause a fire hazard. The size of openings has been limited as per the safety requirements to prevent the above possibilities when the unit is mounted in the recommended orientations. In order to meet the regulatory safety requirements, the mounting has to satisfy the following requirements:

- Mount on a non-combustible material.
- The mounting surface should be able to support the weight of the unit
- Mount horizontally on a horizontal surface (e.g. table top or a shelf).
- Mounting horizontally on a vertical surface – The unit can be mounted on a vertical surface (like a wall) with the DC output terminals either facing up or down.

WARNING!
Mounting the unit on a vertical surface with the ventilation slots on the sides facing up / down is NOT recommended. As explained above, this is to prevent (i) falling of objects into the unit through the slots causing short circuit or (ii) falling out of dislodged overheated / melted components on to a combustible material in case of catastrophic internal failure.

5.5 AC SIDE CONNECTION

115/230 VAC power is fed to the unit through detachable, 115/230 VAC power cord supplied with the unit. The power cord has the following specifications:

- Length of the cord: 190 cm
- Cable : 3 conductors (Line – Brown; Neutral – Blue; Protective Earth – Green / Yellow), each 0.75 mm^2
- 10A, 250V connector for power supply end: "IEC 60320 – C13" female connector [Insert this end into the AC Power Inlet on the unit (2, Figs 2.1)]
- 16A, 250V CEE-7/7 "Schuko" Plug for connecting to 115/230 VAC "Schuko" outlet 5.6 DC OUTPUT TERMINALS

5.6.1 DC Output Terminals: DC output is provided as follows:

- Red Positive Terminal for Load (4, Figs 2.1) and for Battery (6, Fig 2.1):
  o Tubular Hole – Diameter 5 mm
  o Set Screw

- Black Negative Terminal for Load (3, Figs 2.1) and for Battery (5, Fig 2.1):
  o Tubular Hole – Diameter 5 mm
  o Set Screw

5.6.2 Pin Type of Terminal Lugs for Wiring to be Connected to DC Output Terminals:

The DC output terminals have a tubular hole with a set screw (See Section 5.6.1 above for specifications). As the DC terminals have been provided with a set screw, do not connect bare stranded wire end directly to the DC output terminal as the strands will spread out when the set screw is tightened and all the strands may not be pinched firmly under the set screw. This will result in (i) reduction in effective area of cross section for current conduction leading to increased voltage drop and overheating along output wiring and (ii) sparking / loose connection under the set screw leading to overheating / melting of the plastic material of the terminals. The ends of stranded wiring to be connected to the DC output terminals should be crimped to Terminal Lugs. After crimping the Terminal Lugs, use insulating heat shrink tubing or tape to insulate the bare cylindrical portion of the lugs.

5.7 DC OUTPUT CONNECTIONS

Load Connection: The load is connected to the terminals marked "Load +" (4, Fig 2.1) and "Load - " (3, Fig 2.1) through 32V, 25A Fuse (F2, Fig 2.1) (See details below under heading "External Fuses"). Please ensure that the polarity of the connection is correct - Positive of the load to the "Load +" terminal (4, Fig 2.1) and the Negative of the load to the "Load - " terminal (3, Fig 2.1).

Battery Connection: The Positive of the battery is connected to the "Battery +" terminal (6, Fig 2.1) and the Negative of the battery to the "Battery - " terminal (5, Fig 2.1) through 32V, 25A Fuse (F1, Fig 2.1) [Refer to Section 5.9 for details].

Recommended Battery Capacity: Battery should not be charged at very high current. Normally, as a Rule of Thumb, the maximum charging current should be limited to 10% of the Ah capacity at 20 Hour Rate unless higher current is allowed by the manufacturer. Higher charging current produces higher heating which reduces the life of the battery. Further, higher charging current will not re-charge the battery to full 100% capacity unless the charging voltage is increased proportionately. It is recommended that the capacity of the battery used with this unit should be in the range of 40 to 100Ah.

5.8 DC OUTPUT WIRE SIZING

Use 6mm^2, 90°C insulation wire for the load and battery connections for a distance of up to 1 m. Thicker wire will be required for distance longer than 1 m. (See Table 5.1). **USE THICKER WIRE OUT THE 2 SIZES CALCULATED BASED ON THE FOLLOWING 2 CONSIDERATIONS:**

5.8.1 Safety of Conductor Insulation

Current (I) flowing through resistance (R) of conductor produces power loss (I2R) in the form of heat which results in temperature rise in the conductor. Temperature rise is higher for higher current, higher resistance (longer length and thinner cross

section produce higher resistance) and higher ambient temperature. Temperature rise higher than the temperature rating of conductor insulation will melt / burn the insulation resulting in possibility of electrical shock and fire. The National Electrical Code specifies maximum current flow (Ampacity) through a particular wire size [normally specified as cross-section in American Wire Gauge (AWG)] for a particular temperature rating of conductor insulation, ambient temperature and type of surrounding medium (like free air, raceway, etc.). NEC further specifies that the Ampacity of the wire should be 1.25 times the maximum current flow. The maximum output current in the unit is 25A.

- The maximum output continuous current in the unit is 25A. Hence, the Ampacity of the wires as per NEC should 1.25 x 25 = 31.25A or say 40A
- As per NEC Table 310.15(B)(17) for 90°C conductor insulation, free air, 40°C ambient and Ampacity of 40A, the minimum conductor size should be 6 mm^2.

5.8.2 Limiting Voltage Drop along the Length of the Wiring

Current flowing through resistance produces voltage drop. Voltage drop is higher for higher resistance (longer length and thinner cross section produce higher resistance). Excessive voltage drop across the length of wires connecting the power source to the load produces excessive power loss and may also shut down the load due to under voltage created at the load end. Hence, the voltage drop should be kept to the minimum at around 2% by using thicker wires for longer distances. Table 5.1 given below shows thickness of wire for 2% voltage drop consideration for 12 V battery / load when carrying 25A:

TABLE 5.1: RECOMMENDED WIRE SIZES FOR 3 FT., 6FT. AND 10 FT. DISTANCES			
	Size of Wiring for 2% Voltage Drop		
Rated Current	1 m	2 m	3 m
25A	6 mm^2	10 mm^2	16 mm^2

As mentioned above, the calculated wire size is 6 mm^2 when considering safety of conductor insulation. Hence, use 6 mm^2, 90°C insulation wire for the load and battery connections for a distance of up to 1 m. If the distance of the Load / Battery is > 1 m, the size on account of 2% voltage drop and 25A current flow consideration will be thicker than 6 mm^2 as shown in Table 5.1 above and these thicker sizes should be used.

5.9 EXTERNAL FUSES ON THE BATTERY AND LOAD SIDES

A battery is an unlimited source of current that can drive thousands of Amperes of current into a short circuit leading to overheating and burning of wiring / circuit components along the path from the battery terminals to the point of short circuit. This can cause injury and is a fire hazard. Similarly, a power source is also be capable of driving considerably high value of current into a short circuit on the load side and causing damage as above (the current will, however, be limited to the maximum

rated overload current and not unlimited as in the case of a battery). Appropriate fuse should, therefore, be used in series with the battery Positive post / Load terminal of power source to protect against the above safety hazard. FOR EFFECTIVE PROTECTION, APPROPRIATE SIZES OF FUSES SHOULD BE LOCATED AS FOLLOWS:

- External Battery Side Fuse (F1, Fig 2.1) should be LOCATED as close to the battery Positive post as possible, preferably within 20 cm of the battery Positive post.
- External Load Side Fuse (F2, Fig 2.1) should be installed as close as possible to the Positive Load Terminal (4, Fig 2.1).

For this unit, external fuses must be used for protection against reverse polarity and short circuit as follows:

- 32V, 25A fast acting Fuse (F1, Fig 2.1) in series with the Positive battery wire within 20 cm from the battery Positive post. This fuse provides the following protections:
  - Prevents overheating and burning of wiring due to very heavy current fed from the battery into a short circuit along the length of wiring from the battery to the Battery Input Terminals (5, 6 in Fig 2.1).
  - Prevents damage to the unit and to the load due to reverse polarity of battery connection
- 32V, 25A fast acting Fuse (F2, Fig 2.1) in series with the Positive load wire and within 20 cm of the Positive Load Terminal (4, Fig 2.1). This fuse protects against overload and short circuit on the load side.

SECTION 6 | Operation

6.1

CAUTION!
If AC input power is not available and a battery has been connected for backup function, the load will be powered by the battery and the battery will continue to discharge as long as the load is in ON condition. When the load is not delivering power, it still draws current for its self-consumption (called “No Load Current”). When AC input power is not available, switch OFF the load if not required, otherwise the battery will get discharged because of the “No Load Current” drawn by the load.

SECTION 6 | Operation

6.2 SWITCHING ON / OFF

6.2.1 Switching ON (Without Battery Backup - No External Battery - Unit Operates as a Normal Power Supply):

- Check that the load has been connected to the Load Terminals (3, 4 in Fig 2.1) and NOT TO THE BATTERY TERMINALS (5, 6 in Fig 2.1)
- Switch ON the unit with the help of the Red Power ON / OFF Switch (1, Fig 2.1). If AC power is available and the internal AC side fuse is intact, the ON / OFF Switch will be lighted Red indicating that the Power Supply Section is in ON condition
- After a few milli sec, 13.8V ± 0.2V will be available at the Load and Battery Terminals
- Switch ON the load

6.2.2 Switching ON (With Battery Backup - External Battery is Connected):

- Check that the load has been connected to the Load Terminals (3, 4 in Fig 2.1) through external 25A Load Side Fuse (F2, Fig 2.1)
- Check that the external battery has been connected to the Battery Terminals (5, 6 in Fig 2.1) through external 25A Battery Side Fuse (F1, Fig 2.1) - Switch ON the unit with the help of the Red Power ON / OFF Switch (1, Fig 2.1). If AC power is available and the internal AC side fuse is intact, the ON / OFF Switch will be lighted Red indicating that the Power Supply Section is in ON condition
- After a few milli sec, 13.8V ± 0.2V will be available at the Load Terminals (3, 4 in Fig 2.1) and the external battery will start charging at current of up to 4A determined by its State of Charge. The voltage at the Battery Terminals (5,6) will get clamped to the actual terminal voltage of the battery corresponding to its State of Charge
- Switch ON the load
- The Power Supply Section will supply all the current consumed by the load and the external battery will be maintained in charged condition all the time at Float Voltage of 13.5V ± 0.2V (when fully charged) 6.2.3 Switching OFF:
- Switch OFF the load first
- Switch OFF the unit with the help of the Red Power ON / OFF Switch (1, Fig 2.1). Red light inside the ON /OFF switch will switch OFF

6.3 CHARGING AND BACKUP OPERATION

Charging current will be proportional to the discharged state of the battery and is limited to maximum of 4A when the battery is completely discharged (Standing Voltage of 11.1V). The current will taper down from 4A as the battery gets charged and its voltage rises. When the battery is fully charged, the current will drop down to 0.1% of the Ah capacity of the battery to compensate for self-discharge. When fully charged, the voltage at the Battery Terminals (5, 6) will be the Float Voltage of 13.5V ± 0.2V.

Battery should not be charged at very high current. Normally, as a Rule of Thumb, the maximum charging current should be limited to 10% of the Ah capacity at 20 Hour Rate unless higher current is allowed by the manufacturer. Higher charging current produces higher heating, which reduces the life of the battery. Further, higher charging current will not re-charge the battery to full 100% capacity unless the Absorption Voltage is increased proportionately. This may not be possible with chargers that do not have programmable charging voltages. It is, therefore, recommended that the capacity of the battery used with this unit should be in the range of 40 to 100Ah which is appropriate for 4A charging current.

The voltage seen at the Battery Terminals (5, 6 in Fig 2.1) will be the actual terminal voltage of the battery (assuming no voltage drop in the battery cables) and will be proportional to its State of Charge. When the battery is fully charged, the voltage at the Battery Terminals (5, 6 in Fig 2.1) will approach 13.5V ± 0.2V.

If AC input power fails, the DC load(s) will be instantaneously transferred to the external 12V backup battery and the battery will start discharging. When the battery is supplying the load, the voltage seen at the Load Terminals will be up to 0.4 VDC less than the voltage at the Battery Terminals (5,6 in Fig 2.1) due to forward voltage drop across diode D2 (Fig 3.1). This drop will depend upon the current being supplied through this diode (TABLE 3.3). When AC input power is restored, the DC load will once again be transferred instantaneously to the Power Supply Section and the external backup battery will be recharged and kept in charged condition all the time at Float Voltage of 13.5V ± 0.2V (when fully charged).

6.4 SURGE POWER CAPABILITY IN DC UPS BATTERY BACKUP MODE

When operating in DC UPS Battery Backup Mode (external 12V battery is connected), the unit is capable of providing short term surge current of up to 50A for < 1 sec (external 25A fuse on the load side will not blow for this short duration). Maximum 25A will be provided by the Power Supply Section and balance 25A will be supplied by the battery. During the period of this short term overload, the voltage seen by the load will be = (battery voltage – 0.3V± 0.2V).

6.5 OPERATION AS NORMAL POWER SUPPLY WITHOUT EXTERNAL BATTERY

If battery backup function is not used (external backup battery is not connected), the unit will work as a normal power supply with ability to supply 25A continuous at 13.8V ± 0.2VDC at the Load Terminals (3, 4 in Fig 2.1). The maximum overload current will be limited to 27A. Under overload conditions, the output voltage will not be regulated and will drop.

SECTION 7 | Limiting Electro-Magnetic Interference (EMI)

7.1

CAUTION!
Conducted and radiated noises in this unit are limited as per the applicable National / International Standards. In North America, the applicable standard is FCC Part 15(B) for Class "B" Digital Devices for Residential Installations. The corresponding European standard is EN55032, Class "B" & EN61000-3-2, 3.

This unit generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, this does not guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the measures recommended in the following paragraphs.

7.2 UN-INTENTIONAL RF NOISE GENERATED BY SWITCHED MODE POWER SUPPLIES (SMPS)

Switched Mode Power Supplies (SMPS) employ high frequency switching (25 KHz in this unit) and thus, are a source of radio interference, a recipient of radio interference and a conduit of radio interference. (Older Linear Type, low frequency 50 / 60 Hz transformer based power supplies do not employ high frequency switching voltages and will be quieter as compared to SMPS).

The primary emission sources originate in the switching devices due to their fast switching current transitions: harmonics of the switching frequency and broadband noise created by under-damped oscillations in the switching circuit. The secondary source is from the bridge rectifier, both rectifier noise and diode recovery. The AC input rectifier / capacitor in the front end of the SMPS (excepting those with Power Factor correction) generate power supply harmonics due to the non-linear input current waveform. The noise is both conducted and radiated through the input power cord and the DC output wiring to the radio.

7.3 FILTRATION OF CONDUCTED NOISE

The conducted RF noise from this SMPS unit is limited to the maximum allowable levels by internal filtration. The filtered RF noise currents (< few hundred micro Amps) are bypassed to the chassis of the power supply. The chassis is, in turn, connected to the Earth Ground pin of the AC input power cord (for Class 1 units). Thus, the filtered noise currents are intentionally leaked to the Earth Ground. This is termed as the "Earth Leakage Current".

SECTION 7 | Limiting Electro-Magnetic Interference (EMI)

7.4 EXCESSIVE RF OUTPUT INTERFERENCE BY SMPS DUE TO INCOMING RF INTERFERENCE WHEN POWERING RADIO TX / RX

SMPS are also recipients of radio interference. The normal operation of the power supply can be disturbed due to RF noise getting coupled into the power supply. Thus, the power supply may generate excessive RF noise and lose output voltage regulation due to excessive transmitter energy being coupled through the AC / DC lines to the power supply's regulator feedback path. This may be due to antenna being too close or due to the antenna or feed system not radiating properly. First, check the antenna system SWR. Then, if necessary, relocate either the antenna or the power supply farther apart. The receiver may "hear" the power supply. A slowly moving, slightly buzzing carrier heard in the receiver may be caused by the antenna being too close. As with the transmitter related noise pick up, a loose coaxial connector or a broken or a missing ground may aggravate this problem. Normally, this noise will be below the background or "band" noise. Increase the separation between the power supply and the receiving antenna. Use an outdoor antenna. This will reduce the amount of signal picked up from the power supply and also increase the amount of the desired signal.

7.5 ADDITIONAL GUIDELINES FOR REDUCING RF NOISE

- Use additional appropriate AC Radio Frequency Interference (RFI) Power Line Filter rated for minimum 10A immediately before the AC input of the power supply. Filtered, Ferrite Coated Cord Set is another choice. These cord sets, with integral line interference filters, reduce Common and Differential Mode Interferences over a wide frequency range. Because they are shielded, they are also effective against radiated interferences. In addition to the built-in filter networks, the cable conductors are coated with an RF absorbing ferrite compound. This provides additional attenuation at high frequencies that is lacking in most regular LC filters. The RF absorption of the ferrite-coated cable avoids resonances at high frequencies, reducing the conducted and radiated RF noises even further.
- Use additional appropriate DC radio frequency interference (RFI) power line filter rated for minimum 30 A immediately after the DC output of the power supply.
- Twist the Positive and Negative wires from the output of the power supply to the radio.
- The DC side Positive and Negative outputs of these power supplies are isolated from the chassis. As explained earlier, the noise currents are filtered to the chassis of the unit and the chassis is connected to the Earth Ground through the Earth Ground Pin of the AC power outlet receptacle. Avoid connecting (referencing) the DC Negative output terminal of the power supply to the Earth Ground.

- Connect a ¼" wavelength of wire on the Negative terminal of the power supply. Connect one end of the wire to the Negative terminal and leave the other end free. The wavelength corresponds to the wavelength of the interfering frequency. (May not be practical for long wave lengths).

  [Formula: Wave length (Meters) = 300 / frequency in MHz]

7.6 COMBINED FILTERED NOISE CURRENTS FROM MULTIPLE SMPS ON A BRANCH CIRCUIT MAY TRIP GROUND FAULT CIRUIT INTERRUPTER (GFCI)

During malfunction or an accident, the metal chassis of a device may get energized to unsafe voltage due to internal high voltage section coming in contact with the chassis. If a person standing on Earth touches this energized chassis, a leakage current proportional to the person's skin resistance will flow through the person's body to Earth Ground. The leakage current through the body is higher when the skin contact resistance is lower i.e. if the skin is wet or wounded. This leakage current does not return to the power source but is dissipated in Earth Ground. A leakage current of > 5mA could produce lethal electrical shock. Ground Fault Circuit Interrupter (GFCI) is used for safety against electrical shock due to leakage. GFCI measures the difference between the current sent to the load and returned from the load and will trip and disconnect the power circuit if the difference is exceeding GFCI limit. GFCIs are normally installed in AC Branch Circuits feeding power outlets in wet areas like marine craft, RVs, spas, hot-tubs, kitchens, washrooms, etc.

As explained earlier, RF noise filtration circuits in SMPS generate intentional Earth Leakage Current. SMPS are used extensively as DC power sources in modern day electrical / electronic devices e.g. Audio / Video / Computing devices, power supplies, battery chargers etc. A single GFCI outlet / GFCI breaker may be serving multiple SMPS loads and therefore, will be sensing the sum of all the Earth Leakage Currents and, if the sum is exceeding the GFCI limit after connecting this unit, the GFCI will trip. In such a case, disconnect other SMPS based device(s) being served by this GFCI one by one till the net leakage current is reduced and the GFCI does not trip.
Other solution is to power this unit from a GFCI outlet / GFCI breaker that does not have any SMPS load or power from an outlet that is not protected by GFCI.

SECTION 8 | Troubleshooting Guide

8.1 TROUBLESHOOTING GUIDES ARE GIVEN AT TABLES 8.1 AND 8.2 BELOW:

a. **TABLE 8.1:** This Table is based on operation as a simple power supply i.e. there is no external battery connected to the unit for battery backup.
b. **TABLE 8.2:** This Table is based on battery backup operation with external battery connected to the unit.

TABLE 8.1 TROUBLESHOOTING GUIDE (OPERATION AS A SIMPLE POWER SUPPLY - NO BATTERY BACKUP)

SYMPTOM	POSSIBLE CAUSE	REMEDY
ON / OFF Switch is ON • Switch is NOT lighted • No DC output	No AC power from the AC outlet	Check AC power is available at the AC outlet. Breaker feeding the AC outlet may have tripped.
	Internal AC side fuse is blown	Open the top cover and check the internal AC side fuse. Replace if blown. If the fuse blows again, the input section is damaged. Please call Tech Support.
ON / OFF Switch is ON • Switch is lighted • No DC output	Unit has shut down due to over temperature – Temperature of output transformer windings is: ≥ 105°C ± 5°C	Check that the fan is running. If not, the fan / fan control circuit may have been damaged. Call Tech Support. Check that the fan suction vents on the sides of the unit and the discharge vents on the bottom of the unit are not blocked. The unit will reset automatically when the transformer windings cool down to ≤ 75°C ± 5°C
ON / OFF Switch is ON • Switch is lighted • DC Output voltage drops	If the voltage loses regulation and drops to < 13.5V, the unit is overloaded and is in current limit. The load is trying to draw ≥ the current limit value of 27A	Reduce the current drawn by the load to less than the continuous rating of 25A.
	If the voltage drop is considerable with voltage < 2V, the load side is seeing a short circuit and short circuit current limited to 27A is being driven into the short circuit	Switch OFF the load. Remove the short circuit on the load side.

SECTION 8 | Troubleshooting Guide

SYMPTOM	POSSIBLE CAUSE	REMEDY
GFCI outlet / GFCI breaker supplying AC power to the unit trips when the unit is switched ON	Additional RF noise currents from the unit that are filtered to Earth Ground increase the net Leakage Current on the GFCI outlet / GFCI breaker	Switch OFF other SMPS devices operating from the same GFCI outlet / GFCI breaker to reduce the net leakage current Move the unit to another GFCI outlet / GFCI breaker that has lesser number of SMPS load(s) or no SMPS load Power the unit from normal, non GFCI outlet or from an outlet not protected by GFCI breaker

TABLE 8.2 TROUBLESHOOTING GUIDE (BATTERY BACKUP WITH EXTERNAL BATTERY)		
SYMPTOM	**POSSIBLE CAUSE**	**REMEDY**
ON / OFF Switch is ON • Switch is NOT lighted • Load is ON and is operating normally • Output voltage at the Battery Terminals is < 13.5 ± 0.2V and is dropping • Output voltage at the Load Terminals is up to 0.4 VDC lower than the Battery Terminals and is dropping	No AC power from the AC outlet Internal AC side fuse of the Power Supply Section is blown	Check AC power is available at the AC outlet. Breaker feeding the AC outlet may have tripped. Open the top cover and check the internal fuse. Replace if blown. If the fuse blows again, the input section is damaged. Please call Tech Support.
ON / OFF Switch is ON • Switch is lighted • Load is ON and is operating normally • Output voltage at the Battery terminals is <13.5V ± 0.2V and is dropping • Output voltage at the Load Terminals is up to 0.4 VDC lower than the Battery Terminals and is dropping	Power Supply Section of the Unit has shut down due to over temperature – Temperature of output transformer windings is ≥ 105°C ± 5°C	Check that the fan is running. if not, the fan / fan control circuit may have been damaged. Call Tech Support. Check that the fan suction vents on the sides of the unit and the discharge vents on the bottom of the unit are not blocked. The Power Supply Section will reset automatically when the transformer windings cool down to ≤ 75°C ± 5°C. During the time the Power Supply Section is OFF, the battery will supply the load and will discharge during this period.

ON / OFF Switch is ON • Switch is lighted • Load is ON • Output voltage at the Load Terminals loses regulation and drops below 13.8 ± 0.2V • Output voltage at the Load Terminals is up to 0.4 VDC lower than the Battery Terminals and is dropping	Power Supply Section is overloaded and is in current limit condition. The load is trying to draw excessive current ≥ the current limit value. The Time Current Characteristic of the 25A fuse (F2, Fig 2.1) in the Load circuit will determine the allowable value of overload current > 25A and the time it can be sustained before the fuse blows. The allowable value will be higher for shorter duration of overload. Power Supply Section provides 25A and the balance of current is fed from the battery and the battery starts discharging at current = (Overload current - 25A)	Remove the cause of overload
ON / OFF Switch is ON • Switch is lighted • Load is ON • Voltage at the Load Terminals is 13.8 ± 0.2V • Voltage at Battery Terminals is the same as the Load Terminals • Battery backup function does not operate – Load shuts OFF when AC power is interrupted	25A Fuse F1 (Fig 2.1) in the battery circuit is blown due to: - Reversal of battery input connections - Short circuit in the battery wiring	Check that the polarity of battery connections is correct. Replace the fuse. Check for short circuit in the battery wiring and correct.
GFCI outlet / GFCI breaker supplying AC power to the unit trips when the unit is switched ON	Additional RF noise current from the unit that is filtered to Earth Ground increases the net Leakage Current on the GFCI outlet / GFCI breaker	Switch OFF other SMPS devices operating from the same GFCI outlet / GFCI breaker to reduce the net leakage current Move the unit to another GFCI outlet / GFCI breaker that has lesser number of SMPS load(s) or no SMPS load. Power the unit from normal, non GFCI outlet or from an outlet not protected by GFCI breaker.

SECTION 9 | Specifications

Model name	SEC-1225G-BBM
Input Voltage (Normal)	120-240VAC 50-60Hz
Output Voltage at Load Terminals	13.8 VDC (± 1%)
Output Ripple & Noise (On full load, peak to peak)	150 mV
Output Current, Continuous	25A
Current Limit	27A
Output Voltage at Battery Terminals (without battery)	13.8 VDC (± 1%)
Output Voltage at Battery Terminals (without battery)	Actual battery voltage corresponding to State of Charge; 13.5V ± 0.2V when battery is fully charged and floating
Continuous Output Current at Load Terminals	21A (with battery backup); 25A (without battery backup)
Continuous Output Current at Battery Terminals (battery backup)	Up to 4A (when battery is completely discharged to Standing Voltage of 11V)
Output Current Limit at Battery Terminals (battery backup)	4A (when battery is completely discharged to Standing Voltage of 11V)
External Backup Battery	Type & Voltage Lead Acid, 12V; Capacity 40 Ah to 100 Ah
Efficiency	> 90%
PFC	Active
Cooling	Temperature controlled fan
Protections	Over current, short circuit and over voltage Over temperature shut down (through PWM controller)
Fuse rating (slow blow)	T4A/250V
DC Output connection	Tubular hole dia 5 mm with set screw
Safety Standard	EN62368-1
EMC Standard	EMI: CLASS B EN55032 EN61000-3-2,3; EMS: EN55035 EN61000-4-2,3,4,5,6,8,11
C-tick	AS/NZS CISPR 32: 2015 A1:2020
Dimensions, cm (L X W X H)	250.5 x 185 x 57.8
Weight, kg	1.95

SECTION 10 | Warranty

WARRANTY / LIMITS OF RESPONSIBILITY
SAMLEX EUROPE B.V. (SAMLEX) warrants this Power Supply Unit (PSU) to be free from defects in workmanship or materials for 24 months from the date of purchase. During this period SAMLEX will repair the defective PSU free of charge. SAMLEX is not responsible for any costs of the transport of this PSU.

This warranty is void if the PSU has suffered any physical damage or alteration, either internally or externally, and does not cover damage arising from improper use[1)], attempting to operate the PSU with excessive power consumption requirements, or from use in an unsuitable environment.

This warranty will not apply where the product has been misused, neglected, improperly installed or repaired by anyone other than SAMLEX. SAMLEX is not responsible for any loss, damage or costs arising from improper use, use in an unsuitable environment, improper installing of the PSU and PSU malfunctioning.

Since SAMLEX cannot control the use and installation (according to local regulations) of their products, the customer is always responsible for the actual use of these products. SAMLEX products are not designed for use as cricital components in life support devices or systems, that can potentially harm humans and/or the environment. The customer is always responsible when implementing SAMLEX products in these kind of applications. SAMLEX does not accept any responsibility for any violation of patents or other rights of third parties, resulting from the use of the SAMLEX product. SAMLEX keeps the right to change product specifications without previous notice.

[1)] Examples of improper use are:
- Too high input voltage applied.
- Reverse connection of battery polarity.
- Mechanical stressed enclosure or internals due to harsh handling and/or incorrect Packaging.
- Contact with any liquids or oxidation caused by condensation.

SECTION 11 | Declaration of Conformity

For the following equipment :

Product Name:
SWITCH MODE DC POWER SUPPLY WITH BATTERY BACKUP

Model No.:
SEC-1225G-BBM

Trade Name:

SAMLEX EUROPE® B.V.

Applicant:
SAMLEX EUROPE B. V.

Address:
ARIS VAN BROEKWEG 15, 1507 BA ZAANDAM THE NETHERLANDS

Is herewith confirmed to comply with the EMC requirements set out in the Directive 2014/30/EU and LVD requirements set out in the Directive 2014/35/EU of the European Parliament and of the Council on the approximation of the laws of the Member States relating to electromagnetic compatibility and EC Low Voltage Directive. For the evaluation regarding the electromagnetic interference, the following EMC standards were applied:

EMI: CLASS B
EN 55032:2015/A11:2020
EN 61000-3-2:2014
EN 61000-3-3:2013

LVD:
EN 62368-1

EMS:
EN 55035:2017 /A11:2020
EN 61000-4-2:2009
EN 61000-4-3:2006+A1:2008+A2:2010
EN 61000-4-4:2012
EN 61000-4-5:2014+A1:2017
EN 61000-4-6:2014
EN 61000-4-8:2010
EN 61000-4-11:2004+A1:2017

The following manufacturer/importer is responsible for this declaration:

M. van Veen Zaandam 12-04-2024

SECTION 11 | Declaration of Conformity UK CA

For the following equipment :

Product Name:
SWITCH MODE DC POWER SUPPLY WITH BATTERY BACKUP

Model No.:
SEC-1225G-BBM

Trade Name:

SAMLEX EUROPE® B.V.

Applicant:
SAMLEX EUROPE B. V.

Address:
ARIS VAN BROEKWEG 15, 1507 BA ZAANDAM THE NETHERLANDS

Is herewith confirmed to comply with the EMC requirements set out in the Directive 2014/30/EU and LVD requirements set out in the Directive 2014/35/EU of the European Parliament and of the Council on the approximation of the laws of the Member States relating to electromagnetic compatibility and EC Low Voltage Directive. For the evaluation regarding the electromagnetic interference, the following EMC standards were applied:

EMI: CLASS B
EN 55032:2015/A11:2020
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EN 61000-3-3:2013

LVD:
EN 62368-1

EMS:
EN 55035:2017 /A11:2020
EN 61000-4-2:2009
EN 61000-4-3:2006+A1:2008+A2:2010
EN 61000-4-4:2012
EN 61000-4-5:2014+A1:2017
EN 61000-4-6:2014
EN 61000-4-8:2010
EN 61000-4-11:2004+A1:2017

The following manufacturer/importer is responsible for this declaration:

M. van Veen Zaandam 12-04-2024

NOTES:

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