SABMATIC USER MANUAL

For

ELOS (Emergency Lift Operating System)

Chapter One: Outstanding Features

1. High frequency PWM sine wave Inverter technology yields an excellent overall performance.
2. The high crest factor of the inverter can handle all high-inrush current loads
3. State-of-Art IGBT/Mosfet Technology and Industrial grade quality ensures highest efficiency and Reliability under worst operating conditions.
4. Extremely low noise level makes it ideal for office environments.
5. Highly stable output voltage and frequency.
6. Soft start facility
7. Audio-Visual indications for system status.
8. Industry leading inverter protection technology incorporated 2-stage output current sensor, smart overload output current control, improved crest factor, and feedback failure proof circuit.
9. DC start function makes sure of the start-up of Inverter during power outages.
10. Voltmeter and current meter (above 5 KVA) to show output voltage and output current status during Inverter operation.

Chapter Two: TECHNICAL SPECIFICATIONS

PARAMETERS	LIFT OPERATING SYSTEM
INPUT	
Voltage	415VAC +20% -30%
Frequency	50Hz / 60 Hz ± 10%
Phase	Three Phase
INVERTER	
Technology	IGBT/Mosfet
Rating	3 KVA to 100KVA
Output Voltage	415V AC Three Phase
Voltage Regulation	± 2% for DC l/p variation & o/p load variation
Frequency	50 Hz / 60Hz ± 0.5Hz
Waveform	Pure Sine Wave
Harmonic Distortion	Less than 3%
Efficiency	85 to 92 % depending on DC Voltage
Overload	<105% continuous, 105% to 400% for 30sec, >400% Inverter Trips
Battery Voltage	72VDC to 384VDC
Charging Time	12 Hours for 100% of full capacity
GENERAL	
Changeover	Electro-mechanical
Back-up Time	10 min to 10 Hours
Operating Temperature	0°C to 50°C
Humidity	Max 95%, Non-condensing
Acoustic Noise	Less than 45dB at 1 Meter
INDICATIONS & ALARMS	Mains on, Mains Fail, Inverter On, Battery Low, Overload, Output Under & Over voltage & DC Over voltage
PROTECTIONS	Output Under & Over voltage, Overload, Battery Low, DC Over voltage, Short-Circuit

* Specifications are subject to change without prior notice due to constant improvement in design & technology.

Chapter Three: Construction

The Power Inverter is housed in a sheet-metal powder-coated enclosure and is free floor standing type. The status indicators are provided on the front panel together with start, stop & alarm reset switches. One input Circuit breaker, input/output & battery connectors, Input & Battery fuses are provided at the back of the unit land the same are accessible. The system base is provided with suitable holes to enable entry of wires / cables in to the system.

The system has been engineered in such a way that the side panels can be removed in minimum amount of time, to ease maintenance. Once the side doors are removed almost all the components are accessible for servicing .

Colour coding is used to identify various power and signal wires. The signal wires are routed through PVC Channels.

The assembly of the system ensures tightness of all connections. The equipment is forced air-cooled and the construction of the unit ensures a free path for air and adequate ventilation to ensure reliable system operation up to 50°C ambient.

Chapter Four: System Description

Sabmatic Inverter System explained in this manual consists of the following sections:

1. **Charger Section-** The Rectifier-Charger is a controlled rectifier that provides Constant Voltage Constant current to charge the battery. The charger control circuit senses the battery current and automatically adjusts the Thyristor firing angle so as to control the DC current and keep it equal to the set value. Automatic changeover from CV to CC mode takes place to provide constant voltage current limited charging that is the best-recommended method of battery charging.
2. **Sinewave Inverter-**The function of the inverter is to provide alternating current output from the DC supply. The DC supply is obtained from the battery DC bus, during mains failure. The inverter design is most critical part of the system since it is required to have highest reliability as compared to any other part of the system.

   Although a number of topologies are applied to produce a reliable design, our inverter uses a Sine-weighted High Frequency PWM Technique. The inverter design is extremely rugged and provides the ride through for momentary overloads. In fact the inverter is capable of blowing a normal H.R.C. branch fuse, which has a rating of up to 20% of the total output rating, without affecting other branch circuits.
3. **Storage Battery-**The energy source for Inverter during a power outage. Inverter storage batteries are made up of a string of series connected cell to achieve the operating voltage of the Static Inverter.

Chapter Five: PRE INSTALLATION PROCEDURE

PACKING

The unit is packed and protected by a bubble polythene sheet wrapped around the unit. A corrugated packing box provides protections against mechanical impacts and shocks. Wooden box is provided for mechanical strength for long destinations.

UNPACKING

Unpack the UPS as outlined below.

1) Cut the metal straps at the outside corners and top of the crates.
2) Remove the top, front sides and wooden planks using a standard nail puller.
3) Remove the corrugated box.
4) Remove the polythene cover.
5) Move the unit to the operating site.

INSPECTION

After unpacking, perform the visual inspection as follows:

1) Inspect all components for evidence of damage.
2) Inspect all meters, internal components for evidence of damages.
3) Check all the internal components for loose hardware and connections.

Chapter Six: INSTALLATION AND WIRING

ENVIRONMENT:

- **A.** The maximum ambient temperature is 50°C. When operating in locations where temperature is higher additional ventilation and cooling must be provided.
- **B.** Avoid using equipment in locations with high humidity, moisture and corrosive gases.
- **C.** Install equipment in locations free from shock and vibrations.

WIRING:

- **A.** Keep all the circuit breakers and switches of Inverter in OFF position before proceeding with wiring.
- **B.** Wires / Cables should be routed through the holes provided on rear panel or through cable entry holes at the bottom.
- **C.** Remove the battery fuse.
- **D.** Two DC terminals are provided (Battery +, -) for battery connections. Connect battery positive to the +ve terminal and –ve to the –ve terminal. Make sure that battery polarity is **NOT REVERSED** while making connection.

WARNING

Make sure with multi meter(volt meter) that the battery voltage is of correct polarity, before connecting the BATTERY

- E. Ensure that Line (Phase) and Neutral points of the mains input is according to the standard.
- F. Ensure proper Earthing.

OPERATING INSTRUCTION:

- **A.** Ensure proper line (phase) and Neutral connection (1-phase) / Proper Phase sequence (3-phase) of load (equipment) to be connected to Inverter.
- **B.** Ensure proper Earthing of load.

MAKING THE SYSTEM ON:

- **A.** Ensure that all wiring is carried as per details given above.
- **B.** Initially all the switches and circuit breakers should be in OFF position.
- **C.** Remove the battery fuse.
- **D.** Connect the input power (230V / 415V mains supply)
- **E.** Switch on the input circuit breaker, after a delay of 10 sec. several indications on the front panel will turn ON and the buzzer will start sounding.
- **F.** Reset the buzzer by pressing the reset switch.

G. After resetting only Mains ON LED on the front panel lights up.

H. Check the charging voltage and current and then connect the battery fuse.

I. Switch of the mains and the output voltage of the inverter will build up slowly as will be seen on output voltmeter and inverter indication will be ON.

J. It is recommended that the system runs in this condition for a period of 10 minutes before connecting the load.

K. Loads may be switched on in a sequence now.

L. If the AC input power fails, the mains ON indication will turn OFF and mains fail indication will come ON and give an alarm for approximately 20 secs. The inverter is now operating on battery mode.

M. When the battery approaches end of its discharge capacity, (cell voltage 1.8V per cell instead of 2 V per cell) the inverter will activate the battery low pre-alarm as warning for DC low tripping. At 1.75V/Cell level, the inverter turns off instantaneously showing DC Low indication.

Chapter Seven: INTERPRETATION OF INDICATION AND ALARMS

1. **MAINS ON**
   This indication will turn on when mains supply is normal.
2. **DC LOW**
   This indication turns on when the battery voltage goes to 1.75V per cell.
3. **DC OVERVOLTAGE**
   This indication turns ON when the Charging DC voltage exceeds the set limit.
4. **OUTPUT UNDERVOLTAGE**
   This indication turns ON when the Inverter output voltage drops blow the set limits (200V).
5. **OUTPUT OVERVOLTAGE**
   This indication turns ON when the inverter output voltage exceeds the set limit (250V).
6. **INVERTER ON**
   When the indication turns ON it means that the inverter is ON.
7. **MAINS FAIL**
   This indication shows failure of mains supply or abnormal input supply. This indication will remain ON up to10 sec. even after normal mains supply resumes. Annunciation is provided together with this indication.
8. **OUTPUT OVERLOAD**
   This indication will turn ON when the inverter trips due to extra load or short circuit.
9. **START SWITCH**
   The switch is used to start the system output.
10. **STOP SWITCH**
    The switch is used to stop the system output
11. **RESET SWITCH**
    The reset switch is used to Reset the indication and Buzzer.

Chapter Eight: PROTECTIONS

DC Low Protection:

As soon as the battery is fully discharged, the DC LOW protection circuit automatically stops operation of the Inverter. This prevents further discharge of the battery. This protection is factory set. To restart the system press reset and starts switch after the main supply resumes.

DC Over Voltage Protection:

DC over voltage condition will only occur if the control action of the rectifier control circuits fails. The DC OVER VOLTAGE detection circuit stops the operation of the rectifier and Inverter as soon as the DC Voltage reaches beyond safe limit, and the same is indicated on the front panel. This condition will be reset as soon as the reset switch& start switch is pressed.

If the DC OVER VOLTAGE condition persists, the same should be reported to service personnel.

Output Under Voltage & Output Over Voltage Protection:

If the output voltage of the Inverter goes below 200V or rises beyond 250V, the detection circuit instantaneously trips the inverter thereby preventing damage to the loads connected. The prevalent condition is indicated on the front panel and the “INVERTER ON” indication will turn OFF. The OUTPUT UNDER VOLTAGE or OUTPUT OVER VOLTAGE INDICATION will appear.

Pressing Reset Switch & Start switch respectively can reset this condition.

If the above condition persist even when the load is disconnected from the system, the same should be to Service personnel.

Output Overload Protection

If the inverter is loaded beyond its rated capacity, the inverter will turn off and OUTPUT OVER LOAD condition will result.

These conditions can be reset after removing the extra load.

Chapter Nine: MAINTENANCE

CLEANING AND INSPECTION:

The system is solid state and contains no moving parts that require periodic maintenance. At least once a year, and more often in dirty environments, the system should be inspected for accumulation of dust. Excess dust should be blown out by forced air. At this time a visual inspection for problems such as loose connections and over heated components should be made.

All connectors should be checked for tightness. All electrical connections should also be examined for corrosion. DC and AC capacitors should be checked carefully.

Proper maintenance of the battery is very important. Observe the battery manufacturer's instructions for checking electrolyte level and specific gravity.

ADJUSTMENTS:

Most of the adjustments should not be changed except by authorized service representative of **Sabmatic Trading LLC.** Output voltage be checked periodically at least once every six months is desirable.

TESTING BATTERY OPERATION:

Battery operation may be checked by disconnecting the normal source of input power to the Inverter and observing the transition to battery operation.

(**NOTE:** Many batteries are not designed to handle a large number of deep discharge cycles. Repeated testing of capacity of the battery may reduce the ampere – hour capacity and shorten battery life.)

Chapter Ten: SERVICING PRECAUTIONS

WARNING:

The servicing information given in the next few lines is for use by personnel qualified to handle energized electrical equipment and trained on Online power supplies.

Caution:-

1) Hazardous voltage will be present during certain measurements.
2) Always be sure that appropriate external power inputs are de-energized before changing connections or disassembling any part of the system.
3) Even with power off, capacitors may store potentially dangerous charges. Care must be taken to avoid contact with capacitor terminals until the charge has been dissipated.
4) Insulated tools having least possible exposed metals should only be used.

Chapter Eleven: TROUBLE SHOOTING GUIDE

A number of likely faults and necessary corrective actions to eliminate the same are listed below:

1) **Inverter trips due to output overload:-**

   This condition is most likely to occur when the load connected to the Inverter exceeds the Inverter Capacity, or there is a short circuit in one of the loads connected.

   All loads should be disconnected from the Inverter and connected one by one. This will help in locating the faulty load. If the load connected exceeds Inverter capacity, the same can be checked from the output ammeter provided on the Inverter front panel or by an external meter, when connecting the loads in a sequence as indicated above.

2) **No output is available from the Inverter although the front panel indicates that the Inverter is ON.**

   If the cable / wiring connected to the inverter output terminal block is open at one or more points, AC supply may not be available at the distribution board sockets.

3) **The inverter fails immediately after the mains supply fails and no battery backup is available.**

   A. If one of the interconnecting links in the battery bank is open the above condition is likely to result. This condition can be checked by disconnecting the battery from the Inverter and measuring the voltage of the complete bank.
   B. If one of the cells in the battery is damaged, the above condition is likely to occur. This may be checked by measuring voltage of each cell individually.
   C. This condition may occur if the battery fuse inside the Inverter is open. The fuse can be checked by opening the back panel of the Inverter.

4) **Although commercial AC supply is available the battery does not get charged.**

   A. The battery may not get charged if one of the cells is open or the cells need servicing. Battery State can be easily verified by measuring battery voltage, individual cell voltage and by measuring specific gravity of the acid inside the battery.
   B. This condition may occur if the battery fuse inside the Inverter is open. The fuse can be checked by opening the back panel of the Inverter.

5) **Alarm starts sounding although the cause is not immediately apparent.**

   A. The alarm annunciation circuit inside the Inverter is very sensitive and gets activated even due to momentary failure of mains supply, which may not be visible to the naked eye.

Chapter Twelve: STATIC SWITCH (OPTIONAL)

DESCRIPTION OF – STATIC SWITCH

Instead of Electromechanical switch (Relay), a Static Switch can be provided on demand at extra cost. The static switch is a solid-state with no moving part thus becomes more reliable than relays and contactors.

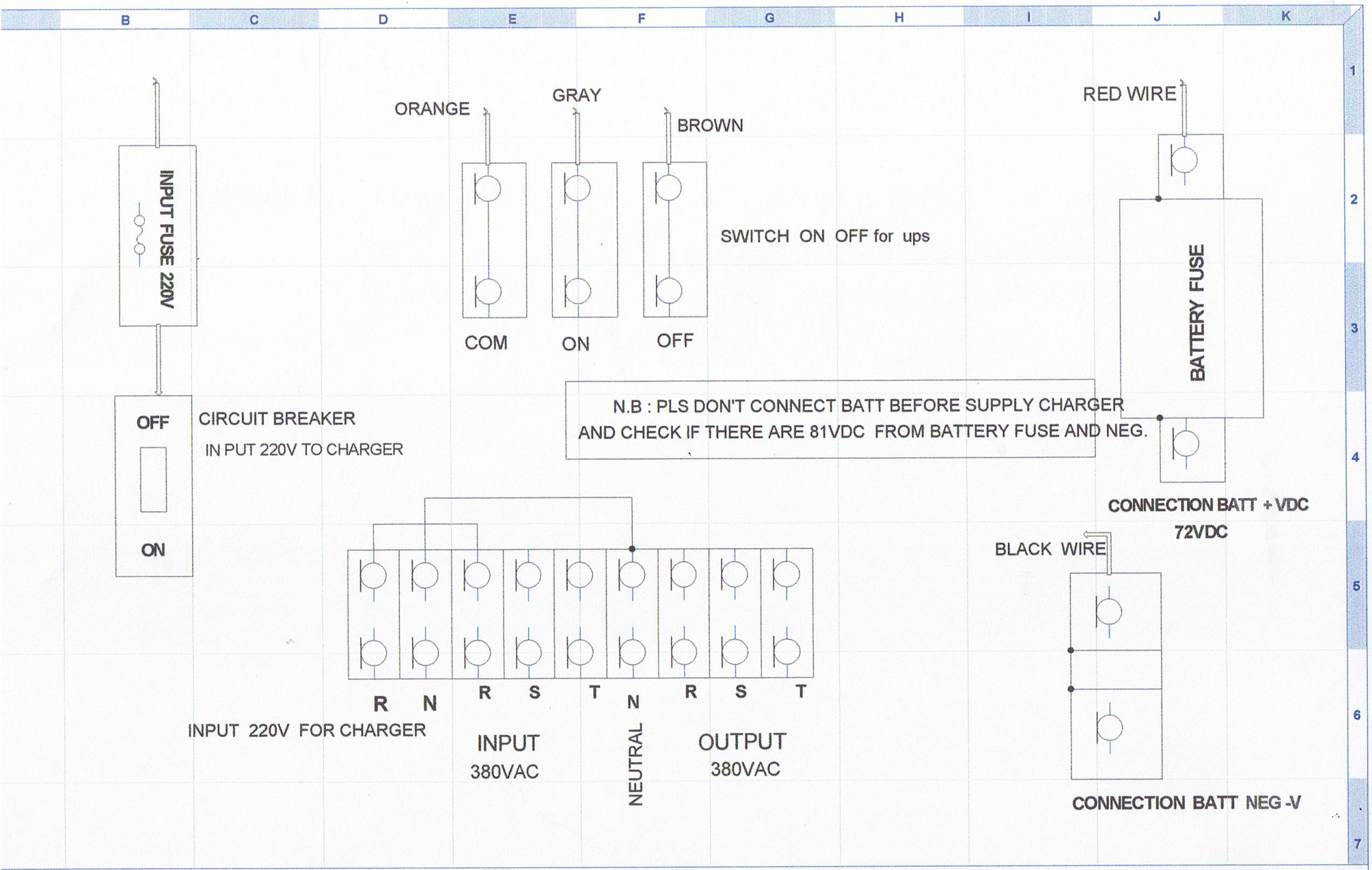
One static switch is present in the inverter output and the other is connected in series with the Mains supply. The output of both the static switches is made common and the load is connected to this point. For a Power Inverter, the Mains Static switch is normally "ON" and supports the Load. In case of a fault with the Mains Supply or when the Mains Supply fails then the Inverter static switch turns "ON" and supports the Load. This operation is fully automatic and does not need any manual operation.

TROUBLE SHOOTING GUIDE (STATIC BYPASS)

A number of likely faults and necessary corrective action to eliminate the same, are listed below.

1. **The Mains has failed but Inverter supply is not available at the output.**
   This condition is likely to occur if Inverter is off or the Inverter has tripped due to some fault, this can be confirmed by checking the front panel indications and resetting them and then pressing the start switch. If still the Inverter doesn't start then call for service engineer stating the fault indication.

2. **The Mains is present but Load is working on Inverter.**
   A. This condition is likely to occur if Mains supply present is below or above normal level, which is necessary for the correct operation of the Inverter.
   B. This condition is likely to occur if the Breaker or fuse connected in the Mains line is tripped.


INPUT FUSE 220V
OFF
ON
CIRCUIT BREAKER
IN PUT 220V TO CHARGER
ORANGE
GRAY
BROWN
COM
ON
OFF
SWITCH ON OFF for ups
RED WIRE
BATTERY FUSE
N.B : PLS DON'T CONNECT BATT BEFORE SUPPLY CHARGER
AND CHECK IF THERE ARE 81VDC FROM BATTERY FUSE AND NEG.
CONNECTION BATT + VDC
72VDC
BLACK WIRE
R N
INPUT 220V FOR CHARGER
R S T
INPUT
380VAC
N
NEUTRAL
R S T
OUTPUT
380VAC
CONNECTION BATT NEG -V