

SEOG SERIES

Single Phase



Large LCD display



Less dependency on grid



3 modes of priority



Grid Charging enabled as per user needs



Maximum utilisation of solar power



Optional two-way IoT access

1KVA/24V

1-7.5KVA/48V

5-7.5KVA/96V

10-15KVA/120V

15-20KVA/240V *

MPPT-BASED PCU (SINGLE PHASE)

The Heavyduty Soldier of Solar Inverters

PRODUCT MANUAL

*Other customised ratings available on request



www.energiaa.in



1800-891-3319

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1. NOTES ON THE MANUAL

1.1 SCOPE OF VALIDITY

This manual is an integral part of inverter, and it describe the assembly, installation, commissioning, maintenance and failure analysis/ troubleshooting of MPPT Solar PCU. List of inverters for which this operation manual is valid have been mentioned in the below list. This manual is not applicable for customized built ratings provided in writing by Statcon Energiaa Pvt. Ltd. (hence for the 'SEPL' or the company').

Sr. No.	Model	Sr. No.	Model
1	SEOG-024-1K0-1P	10	SEOG-096-6K0-1P
2	SEOG-048-1K0-1P	11	SEOG-096-7K5-1P
3	SEOG-048-2K0-1P	12	SEOG-096-8K0-1P
4	SEOG-048-3K0-1P	13	SEOG-120-5K0-1P
5	SEOG-048-4K0-1P	14	SEOG-120-8K0-1P
6	SEOG-096-4K0-1P	15	SEOG-120-10K0-1P
7	SEOG-048-5K0-1P	16	SEOG-120-12K5-1P
8	SEOG-048-6K0-1P	17	SEOG-240-15K0-1P
9	SEOG-048-8K0-1P	18	SEOG-120-15K0-1P
10	SEOG-096-5K0-1P	19	SEOG-240-20K0-1P

NOTE : This manual may be applicable for other models as well on selective basis. In case your model of inverter is not mentioned in the above list, please contact manufacturer before using this manual.

Table 1

Keep this manual close to the inverter where it is easily accessible for the operator / end-user.

1.2 SYMBOL INDICATIONS:

	WARNING! ELECTRICAL SHOCK HAZARD. NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.		DANGER ELECTRICAL HAZARD. TURN OFF POWER BEFORE SERVICING.
	DANGER INDICATES A HAZARDOUS SITUATION WHICH, IF AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY.		RISK OF FIRE

1.3 SAFETY

1.3.1 GENERAL SAFETY RULES:

- ✓ Installation, maintenance & repair should be done by authorised, trained & experienced personnel only.
- ✓ Disconnect the battery, grid, solar panel & load before any service on the inverter to avoid electrocution.
- ✓ To disconnect the inverter, turn off the MCBs/Switch/Terminals on the PCU & remove the battery fuse holder.
- ✓ Use the PCU according to our instructions for operation.
- ✓ Metal bracelets, rings and other metal objects should be removed before touching the PCU to avoid contact with electricity carrying items.
- ✓ Dispose the battery through the Govt-approved agencies only, as it contains lead and other harmful chemicals.
- ✓ Ensure that the unit is out of reach of small children who may be exposed to serious injuries otherwise.
- ✓ Do not place inverter/ battery in the environment of heating vents, near the radiations or other source of heat.

1.3.2 PRECAUTIONS DURING INSTALLATION & REPAIR:

- ✓ Grounding of PCU & Panel should be done prior to connecting power.
- ✓ Before installation disconnect PV & Grid as they may start automatically under certain conditions.
- ✓ Baking powder neutralizes battery acid electrolyte. Always keep some handy.
- ✓ For disconnecting the battery first remove the negative terminal to avoid the spark.
- ✓ High voltage is present at the battery terminals even after the inverter is shut down.
- ✓ Before working on the unit always be assured the charge is discharged completely.
- ✓ Be careful while working with metal tools to avoid short circuit.

1.3.3 PRODUCT SAFEGUARDING:

PCU should be placed in accordance with the given instructions:

- ✓ Routine checks should be carried out to monitor the system health.
- ✓ Keep ventilation holes on the unit always open.
- ✓ The system works well in areas where temperature does not exceed the range between 0°C to 50°C.
- ✓ There should be no contact of the inside of the PCU with liquid of any kind as it may results in a shorting of the circuit.
- ✓ Dust free areas are preferred otherwise the performance may deteriorate over time resulting in a system failure, lightning, rain and adverse conditions.

1.3.4 PACKAGED CONTENTS:

- ✓ PCU
- ✓ Product Manual
- ✓ Spare Fuse (optional)
- ✓ Warranty Card

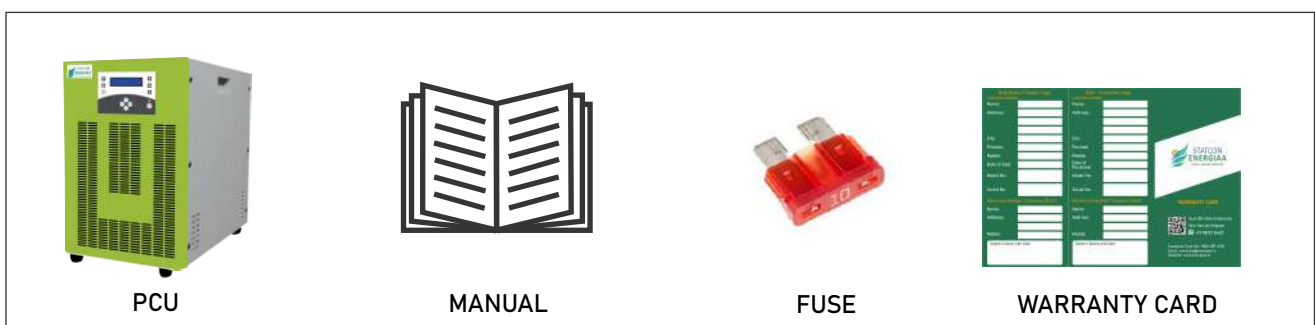


Figure 1

2. INTRODUCTION

2.1 PRODUCT DESCRIPTION

The SEOG MPPT-Based PCUs are mechanically and electrically robust with a operating range and suitable for operating in harsh environments. This unit is perfectly fit for low-maintenance for industrial and residential applications both.

A typical block diagram is shown in Figure 2 involving the integration of SOLAR, GRID, BATTERY and GENSETS with the site loads. its inbuilt Intelligence manages all the sources selectively to provide seamless power to the loads so as to incur minimum bills with optimum utilization.

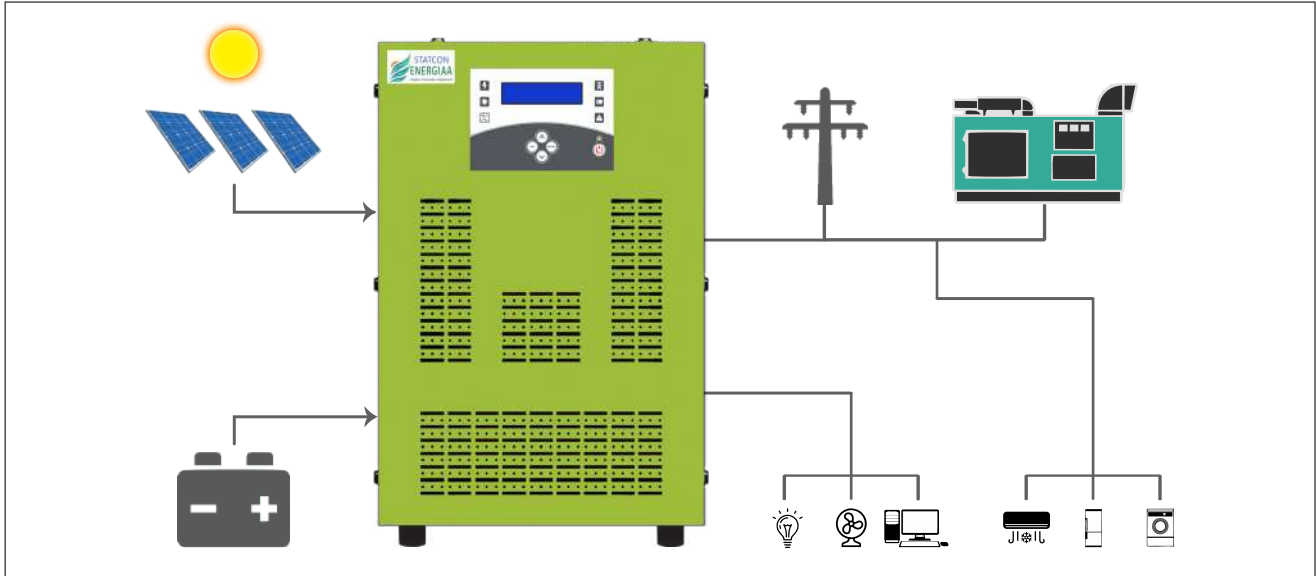


Figure 2

Congratulations on being a part of the Indian solar revolution and buying a product that helps in sustainable development, guarantees peace of mind and, more importantly, cuts a major portion of your electricity bill!

The solar Power Conditioning Unit (PCU) gives you the most savings through Solar PV + Battery + Mains.

Kindly visit www.energias.in to know more about our product range. Custom built ratings of inverter are also available on request and can be designed as per user requirements.

2.2 PRODUCT NOMENCLATURE FOR SEOG MPPT-Based PCU

	SE	OG	T	1K00	1M00	48	C01	0
MANUFACTURER								
SERIES	OG-OFF GRID							
MODEL TYPE	T- TOWER TYPE TT-TABLE TOP TYPE W-WALL MOUNTED TYPE F-FLOOR STAND TYPE							
VOLTAGE RATING KVA	1K00 - 1KVA 6K25 - 6.25KVA							
MPPT RATING	5M00 - 5KWp 1M00 - 1Kpw							
BATTERY RATING	024 - 24 Volts 048 - 48 Volts 096 - 96 Volts C01 - RS-232 C02 - GPRS C03 - DATA LOGGING C04 - GPRS + DATA LOGGING C05 - LAN EATHERNET							
VERSION OF PCU WITH DESCRIPTION	0 - GLASS LCD DISPLAY LARGE 1 - 16 X 2 LCD 2 - PUMP APPLICATION WITH LARGE DISPLAY 3 - PUMP APPLICATION WITH 16 X 2 DISPLAY 4 - HV MPPT WITH BIG DISPLAY 5 - HV MPPT WITH SMALL DISPLAY 6 - POWER BOARD & CONTROL BOARD COMBINED							

Figure 3

2.3 PHYSICAL APPEARANCE & TERMINATION DETAILS OF INVERTER

SEOG MPPT-Based PCU comes in sheet metal enclosure of standard sizes and colour shades depending upon the size of the machine. Any machine can be either Tower type or Table top type depending upon its capacity. All the units are for Indoor application only and should not be kept in open.

All the wire connections to unit are made from the bottom end at rear side. The terminology and sequence of terminals have been kept the same for as many models as possible for ease of understanding and has been explained below in detail.

The below chart brings out all the variants available in terms of dimensions and capacity of the machine.

SR. NO.	RATING	DIMENSIONS (W X D X H)	ENCLOSURE TYPE	COLOUR SHADE	VIEWS
1	1-3 KVA Single Phase PCU	295 X 415 X 325	TABLE TYPE	GREEN/WHITE	Figure 4
2	4-6 KVA Single Phase PCU	300 X 680 X 475	TOWER TYPE	GREEN/WHITE	Figure 5
3	5-8 KVA Single Phase PCU	375 X 625 X 590	TOWER TYPE	BLACK	Figure 6
4	10 KVA Single Phase PCU	400 X 700 X 590	TOWER TYPE	BLACK	Figure 7
5	15 KVA Single Phase PCU	450 X 700 X 590	TOWER TYPE	BLACK	Figure 8
6	20 KVA Single Phase PCU	500 X 700 X 668	TOWER TYPE	BLACK	Figure 9

Table 2

Note : Please note that the dimensions, enclosure type, colour shade and cable entry can be changed by the manufacturer without prior notice, owing to technological innovation.

2.3.2 SEOG - TOWER TYPE MODEL : 1-3 KVA/48V MPPT-Based PCU

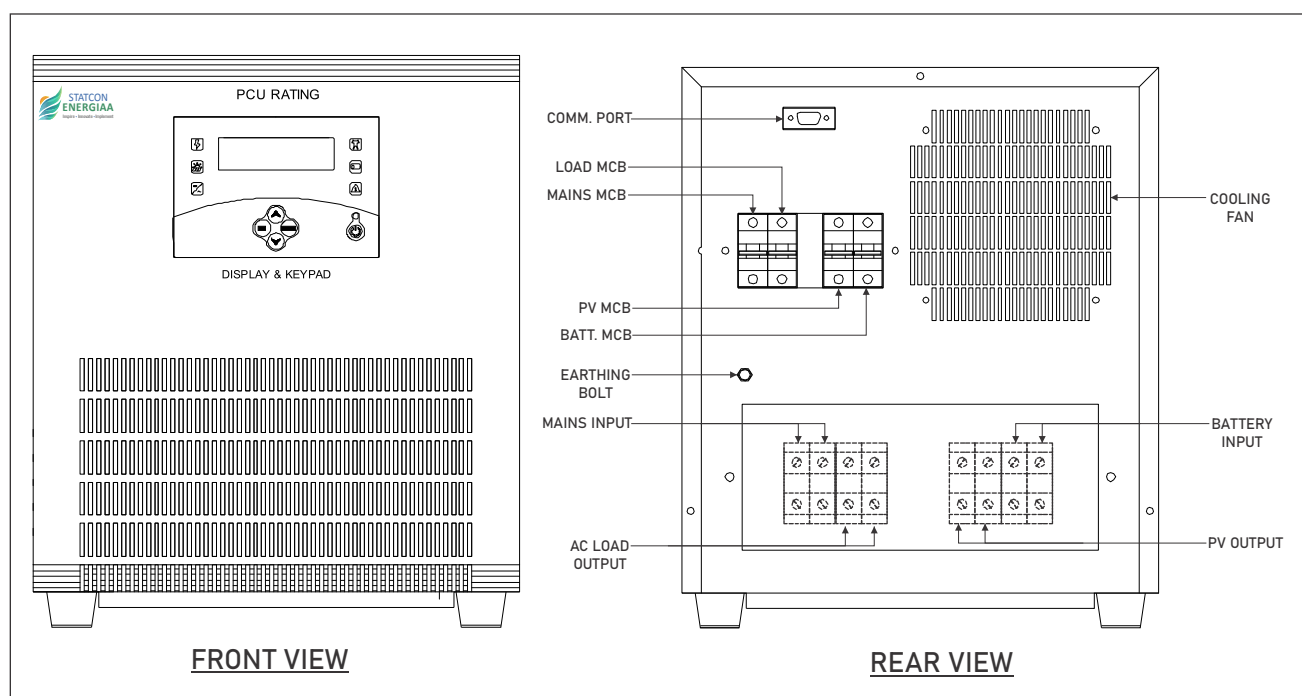


Figure 4

2.3.3 SEOG - TOWER TYPE MODEL : 4-6 KVA/48V MPPT-Based PCU

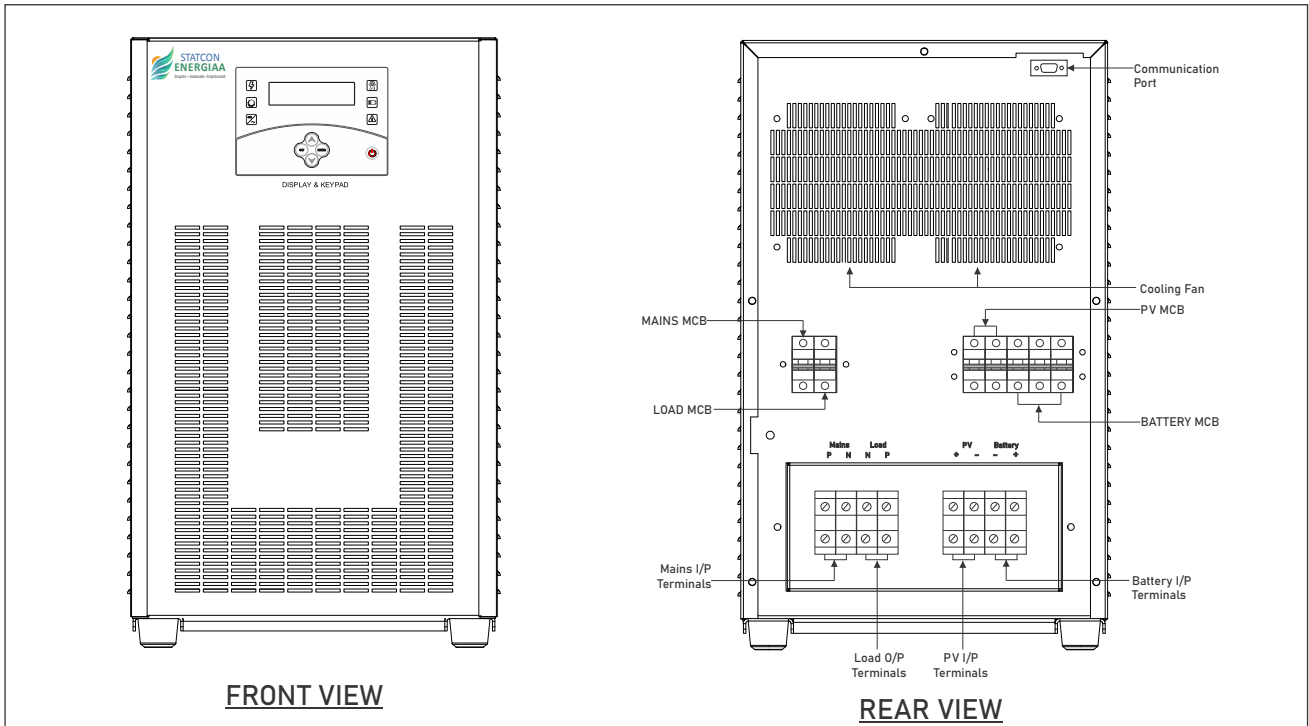


Figure 5

2.3.4 SEOG - TOWER TYPE MODEL : 10KVA/96/120V MPPT-Based PCU

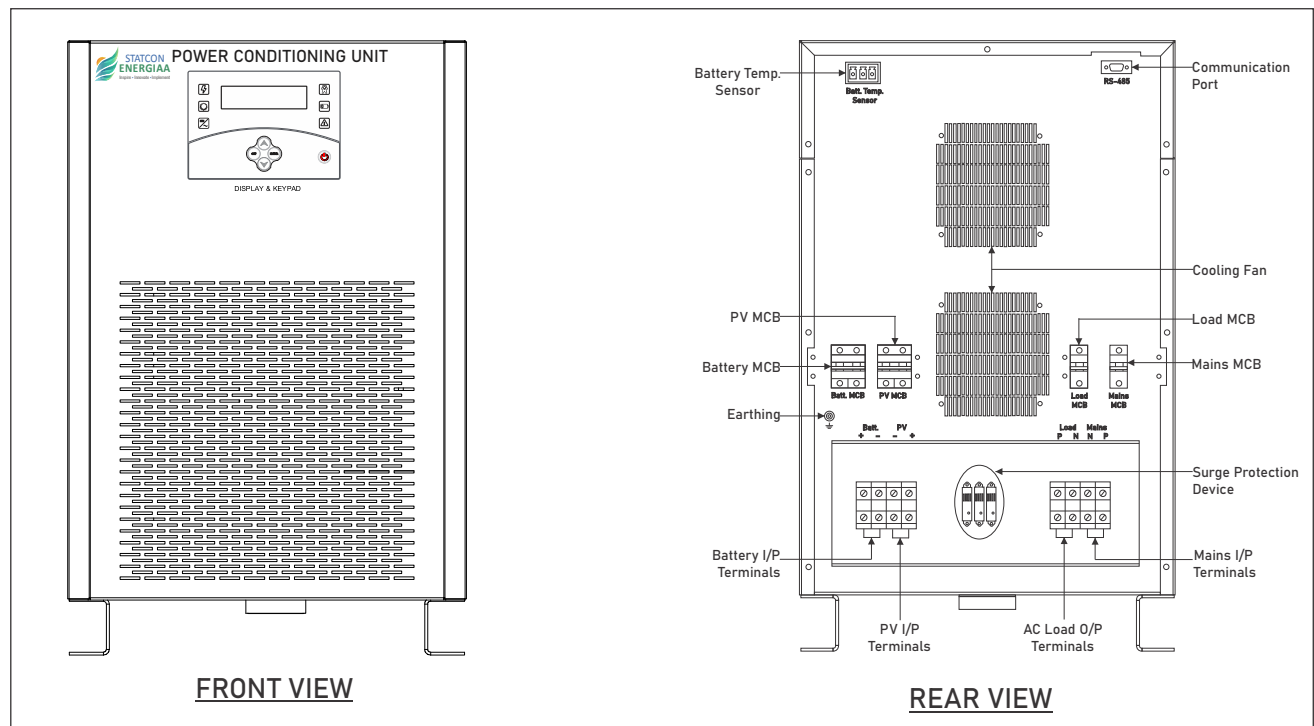


Figure 6

2.3.5 SEOG - TOWER TYPE MODEL : 15KVA/240V MPPT-Based PCU

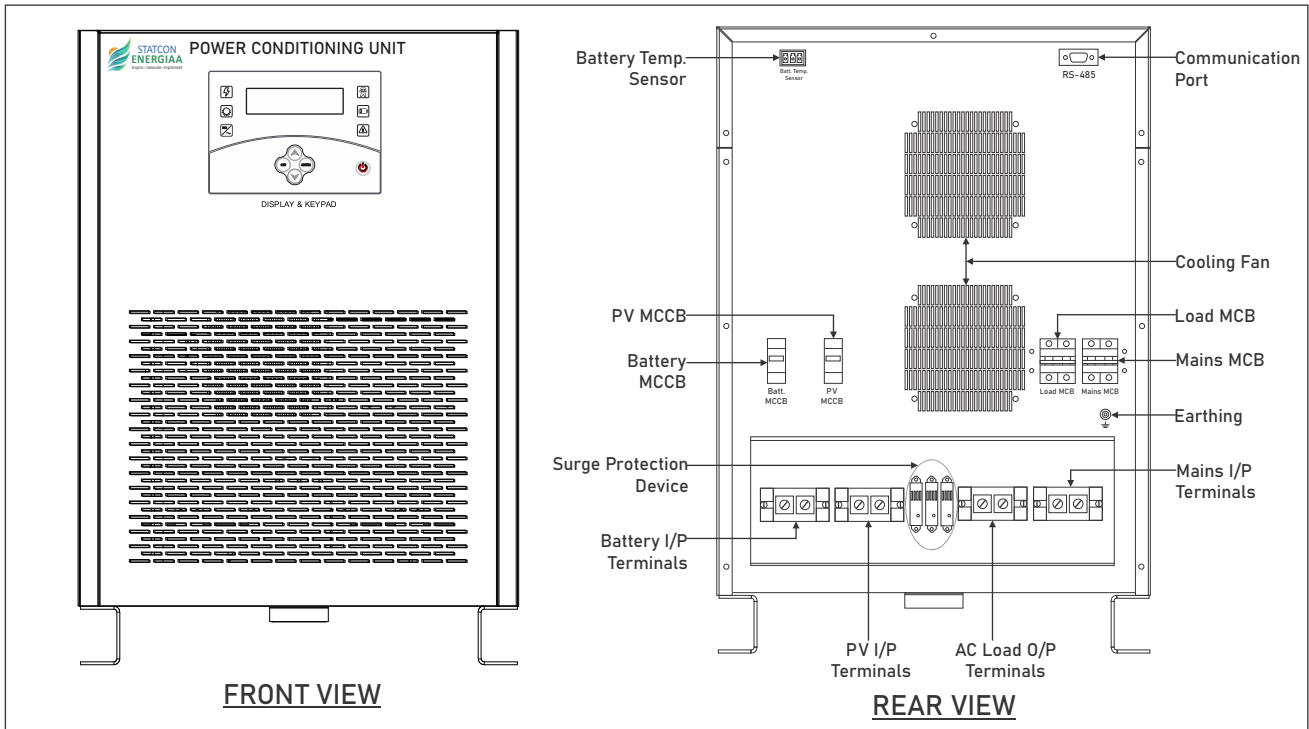


Figure 7

2.3.5 SEOG - TOWER TYPE MODEL : 15KVA/ 120V MPPT-Based PCU

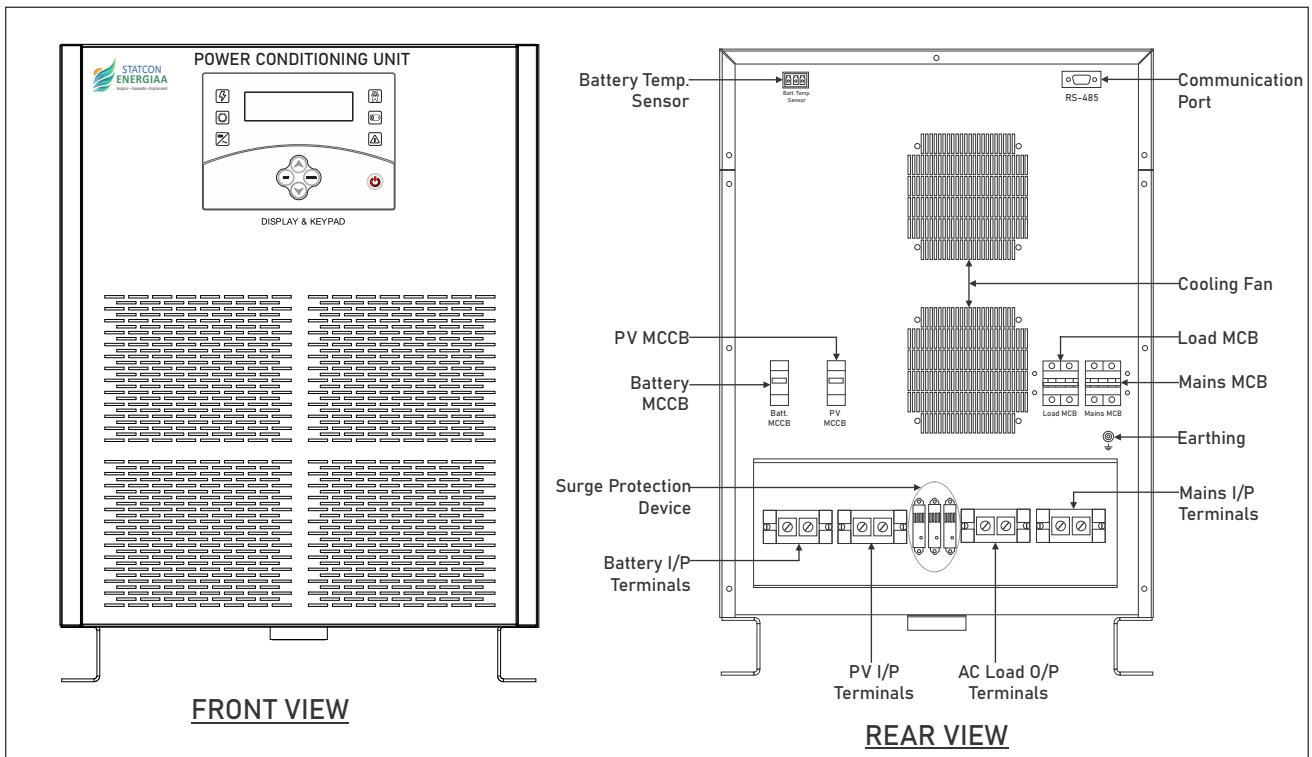


Figure 8

2.3.5 SEOG - TOWER TYPE MODEL : 20KVA/ 240V MPPT-Based PCU

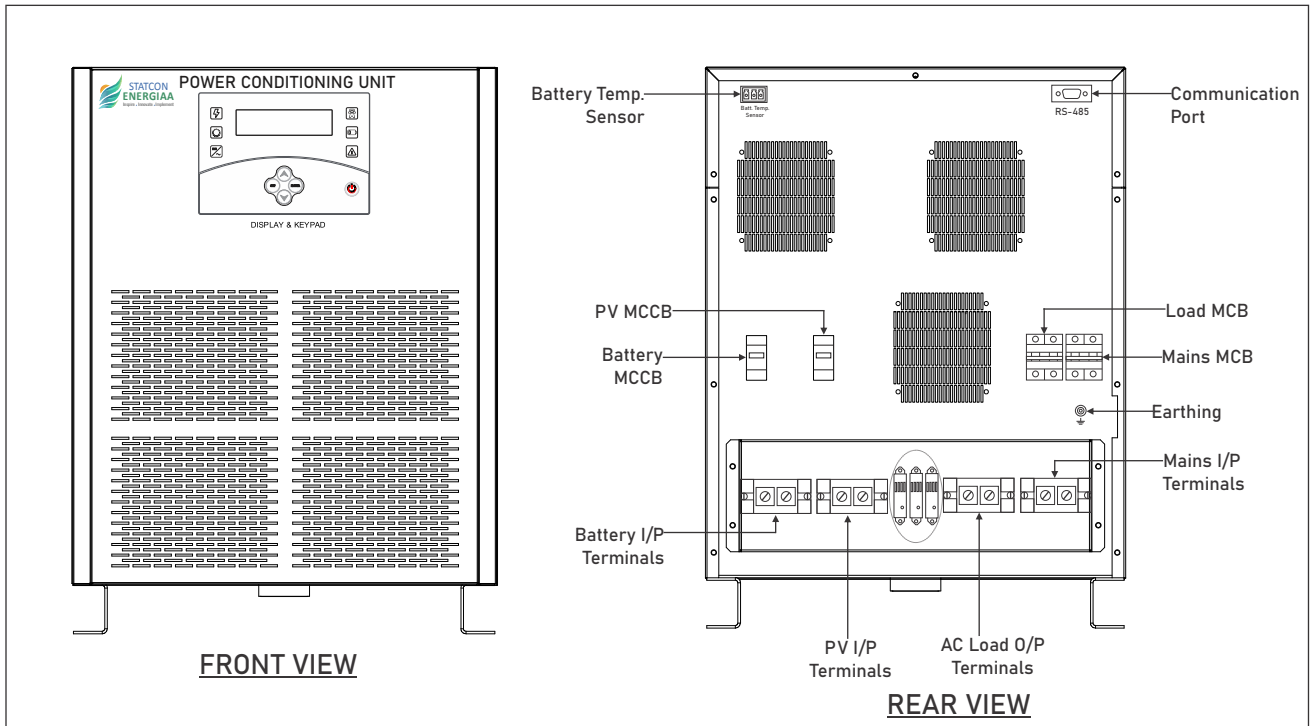


Figure 9

2.4 FEATURES

- SEOG series PCU's provide a complete solution for 230V AC, 50Hz power requirements. This series PCUs are rich in the following features:

2.4.1 5 MODE PRIORITY SELECTION AS PER USER REQUIREMENT

- ✓ MODE-1 : Super Saver 40
- ✓ MODE-2 : Super Saver 50
- ✓ MODE-3 : Super Saver 60
- ✓ MODE-4 : Backup Mode
- ✓ MODE-5 : No Solar Mode

2.4.2 MONITORING

- ✓ 16x2 LCD display in its class for great visuals.
- ✓ Inbuilt data logging capability up to 5 years (optional).
- ✓ RS 232/RS 485, GRPS, remote monitoring available (optional).

2.4.3 INDUSTRIAL GRADE INVERTER

- ✓ Designed for reliability against frequent grid variations
- ✓ Our Transformer provides galvanic isolation & has a long life
- ✓ Protective breakers at all inputs and outputs

2.4.4 PLUG IN PLAY

- ✓ Designed for screw-type/ pin type terminal blocks for all input and output
- ✓ Ideal for solar integrators due to ease of installation
- ✓ Designed for hassle free commissioning

Note: Refer the OPERATING MODES (Table 5)-Page No.-19 and LOAD CHART (Table 6)-Page No.-20 for details.

3. INSTALLATION

3.1 LOCATION AND PLACEMENT

3.0.1 PCU

The Inverter should be placed in accordance with the following:

- ✓ Unpack PCU completely then unwrap the stretch film from PCU.
- ✓ In a well-ventilated room.
- ✓ Placed on a raised platform for better insulation from the ground, protection from water, and so on.
- ✓ Gas cylinders, spray and other inflammable items should not be placed near it.
- ✓ Should not be placed in direct sunlight, near running water or at excessively humid location.
- ✓ In case the system is not going to be installed immediately, it must be stored carefully in vertical position, as indicated on the packing and stored in a dry and sheltered room. Cover it with an envelope (paper/light material cover) so that it is protected from dust.
- ✓ If the inverter installation is over 6 months, be sure to charge batteries for at least 8 hours before the first use.

3.0.2 BATTERY

- ✓ Battery should be placed on a 3"(inch) ramp above from ground.
- ✓ Battery bank terminals should always be insulated to avoid and electrical shock.
- ✓ Batteries should preferably be placed in a separate room to avoid acidic fumes.
- ✓ Length of cable from battery to PCU should be kept to minimum to avoid the losses. Cable sizing should also be done keeping in mind to minimum the losses.

3.0.3 PV

- ✓ Place the solar panels (PV) in the direction of maximum duration time of sun.
- ✓ There should not be shadow of any object on the panel.
- ✓ Should be placed at sufficient height.
- ✓ Panel should be fixed properly.
- ✓ Since India is located in northern hemisphere so solar panel's face should true south direction.
- ✓ Solar panel tilt angle lies between 10°-30° but it should be determined according to the latitude of your position.

3.0.4 SURGE PROTECTION DEVICE (SPD)

- ✓ Surge Protection are a part of plant installations and hence, should be installed in addition to protection offered in PCU. Type and size surge protections vary from site to site and adequate consultation should be done with a subject matter expert before selection of SPD.
- ✓ Apart from SPD in AJB used for solar protection, additional SPD is recommended before PCU inside the room.
- ✓ Suitable SPD on AC side (both Grid and Load) is mandatory inside the room before PCU to avoid any damage to it caused by surges. A typical such schematic drawing can be seen in figure below for single phase PCU. An installer may contact some expert and use alternate scheme similar to this reliable working of PCU and site.

See the image below on next page:

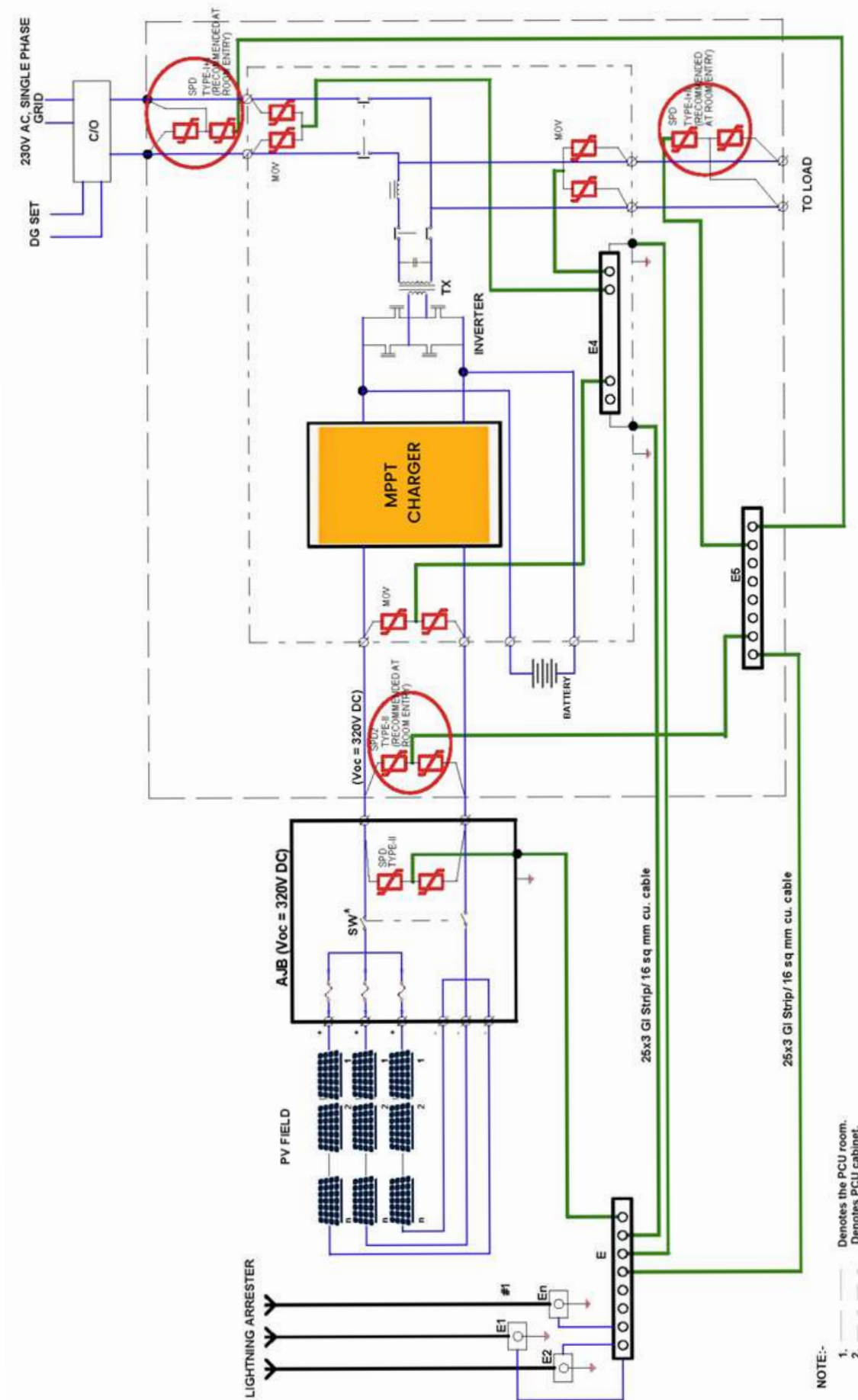


Figure 10

This image shows a typical single-line diagram showing use of SPD and earth connection there of.

3.2 ELECTRICAL WIRING

WIRING AND THIMBLE/LUG SIZE CHART AS PER IS-3961-PART V

*THIMBLE/LUG DIA AT SCREW SIDE IS 6.2 MM. THIMBLE/LUG size should be same as wire size given below.

Wire size (SQ. MM) Details				
PCU Models	Mains Wire	Load Wire	PV Wire	Battery Wire
24V/500VA	1.5	1.5	2.5	6
24V/1kVA	1.5	1.5	6	10
24V/1.5kVA	2.5	1.5	10	16
48V/1kVA	1.5	1.5	2.5	6
48V/2kVA	2.5	1.5	6	10
48V/3kVA	4	2.5	10	16
48V/4kVA	6	2.5	16	25
48V/5kVA	6	4	16	25
48V/6kVA	10	6	25	35
96V/4kVA	10	2.5	6	10
96V/5kVA	10	4	10	16
96V/6kVA	10	4	10	16
96V/7.5kVA	10	6	16	25
96V/8kVA	10	6	16	25
120V/4kVA	6	2.5	6	10
120V/5kVA	10	4	10	16
120V/6kVA	10	4	10	16
120V/7.5kVA	16	6	16	25
120V/8kVA	16	6	16	25
120V/10kVA	25	10	25	35
240V/15kVA	25	16	16	16

Table 3

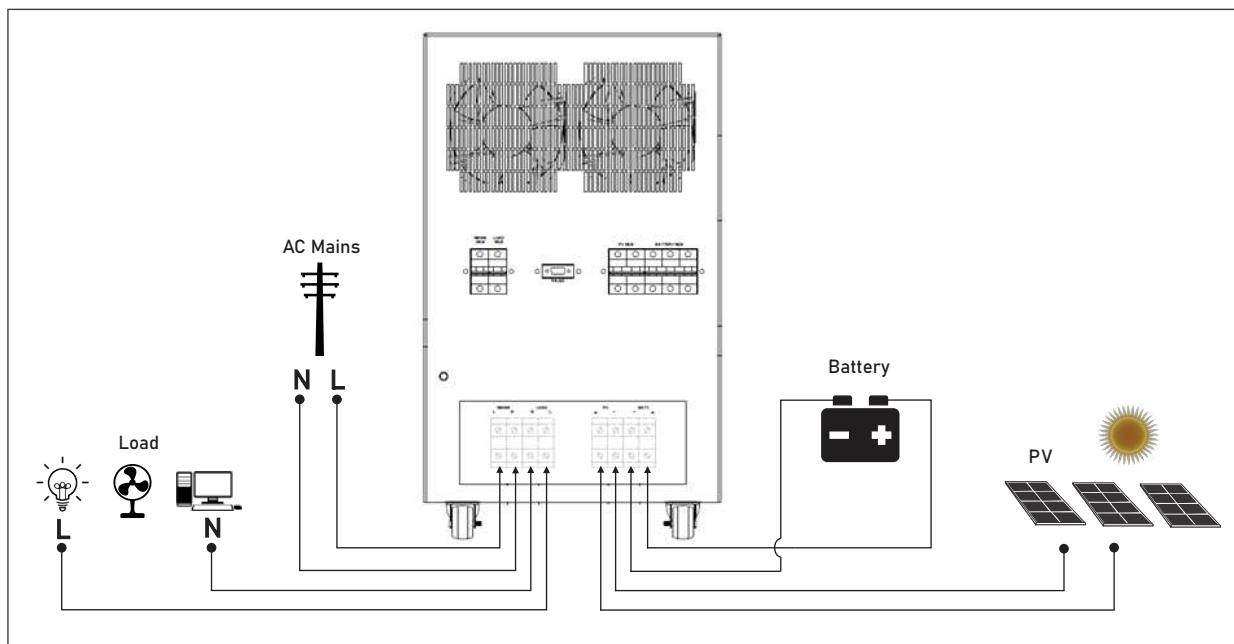


Figure 11



ENSURE THAT ALL THE MCB's ARE IN OFF POSITION BEFORE STARTING THE CONNECTION.

3.3 ELECTRICAL CONNECTIONS

3.2.1 CONNECTION TO THE BATTERY

- ✓ Connect the +ve terminal of the battery to the 'BATT+' terminal of PCU.
- ✓ Connect the -ve terminal of the battery to the 'BATT-' terminal of PCU.
- ✓ Keep wire to be of minimum possible length.
- ✓ Follow the wire size and lug details as per given in Table 3.



BEFORE CONNECTING BATTERY WIRES MAKE SURE THAT ALL MCB's ARE IN OFF POSITION.

3.2.2 CONNECTION TO AC SUPPLY IN

- ✓ Use a 2-core cable for connection of load to PCU.
- ✓ The AC Mains must be connected to the screw/plug type terminals of AC Mains of PCU.
- ✓ Connect the Phase wire of the AC Mains to the 'L' terminal of PCU.
- ✓ Connect the Neutral wire of the AC Mains to the 'N' terminal of PCU.
- ✓ Follow the wire size and lug details as per given in Table 3.

3.2.3 CONNECTION OF SOLAR MODULES (PV) : SOLAR IN

- ✓ The PV output must be connected to the 'PV' screw terminals of PCU.
- ✓ Connect the +ve terminal of the PV output to the 'PV+' terminal of PCU.
- ✓ Connect the -ve terminal of the PV output to the 'PV-' terminal of PCU.
- ✓ Follow the wire size and lug details as per given in Table 3.

3.2.4 CONNECTION OF LOAD : LOAD OUT

- ✓ Use a 2-core cable for connection of load to PCU.
- ✓ The AC load must be connected to Load terminals of PCU.
- ✓ Connect the Phase wire of the Load to the 'L' terminal of PCU.
- ✓ Connect the Neutral wire of the Load to the 'N' terminal of PCU.
- ✓ Follow the wire size and lug details as per given in Table 3.

3.4 INSTRUCTION TO FOLLOW

- ✓ Charge the batteries before first use.
- ✓ MCBs on the inverter should be OFF during connecting wires to the PCU.
- ✓ Use thimbles for proper connection of wire at screw terminals



Figure 12

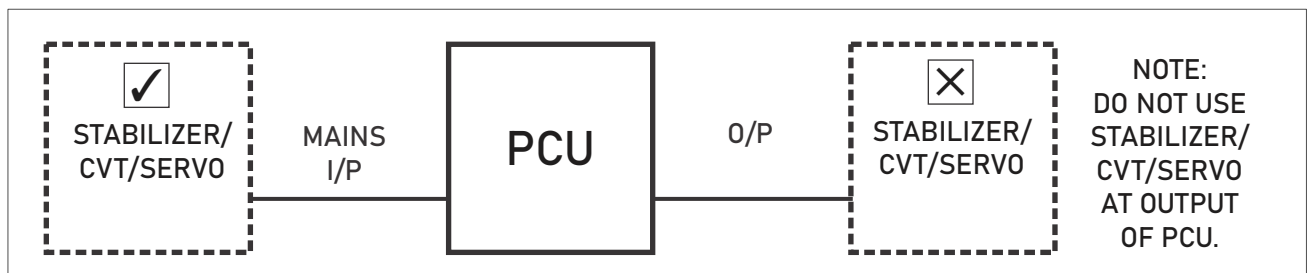


Figure 13

3.5 EARTHING

- ✓ Earthing of any equipment is required to ensure that the chassis of the equipment is at ground potential and the user does not experience any shock in case of contact.
- ✓ For SPDs to operate and protect the equipment against lightning, earthing is mandatory.
- ✓ Quality of earthing and related values are important for adequate protection and vary from site to site, and equipment to equipment.
- ✓ Earthing kit contains rod and clay-salt mixture.
- ✓ For earthing, dig a 4-5 feet hole in ground and put the rod with mixture and water.
- ✓ Connect the earth wire from house to clamp.
- ✓ It is advisable to have a proper earthing near your house or solare panels.
- ✓ Please ensure that earth connection of SPD as per section 3.0.4 above is as drawing.

3.6 STARTING UP THE PCU

- Check all the connections twice before starting the PCU.
- Ensure that:
 - Battery terminals (+ve to +ve & -ve to -ve) are connected tightly and properly.
 - Load is connected properly.
 - AC Mains is connected properly.
 - PV is connected properly.
 - Check the polarity correct.
- After checking all the connections, Switch on the Battery MCB first.
- After switching on the MCB, the display is switched ON.
- Now switch ON all the MCB's : AC Mains MCB, Load MCB and PV MCB.
- Now press the power button given below the display for a few seconds till the green LED comes ON.
- Your PCU will start now.

4. DISPLAY

4.1 DISPLAY OVERVIEW

- ✓ The Flow diagram of home display on the page shows the basis navigation of the display panel through the buttons provided : namely INC, DEC, SET, ENTER.
- ✓ The display automatically scrolls the parameters after the unit is switched ON.
- ✓ Various parameters are displayed one after the other with a 5 second time period for each and 10 second delay for TIME and DATE.
- ✓ Press "INC" key to see each parameter manually and now each parameter can be scrolled through one by one by pressing INC key successively.

4.1 DISPLAY PARAMETERS

- ❖ BATTERY : Voltage, Charging Current, Discharging Current, Temperature
- ❖ PV : PV Voltage, PV Current, PV Power, PV Today's kWH.
- ❖ INVERTER : Voltage Current, Frequency, Load kVA.
- ❖ GRID : Voltage, Frequency, Grid kVAh.
- ❖ Date, Time.

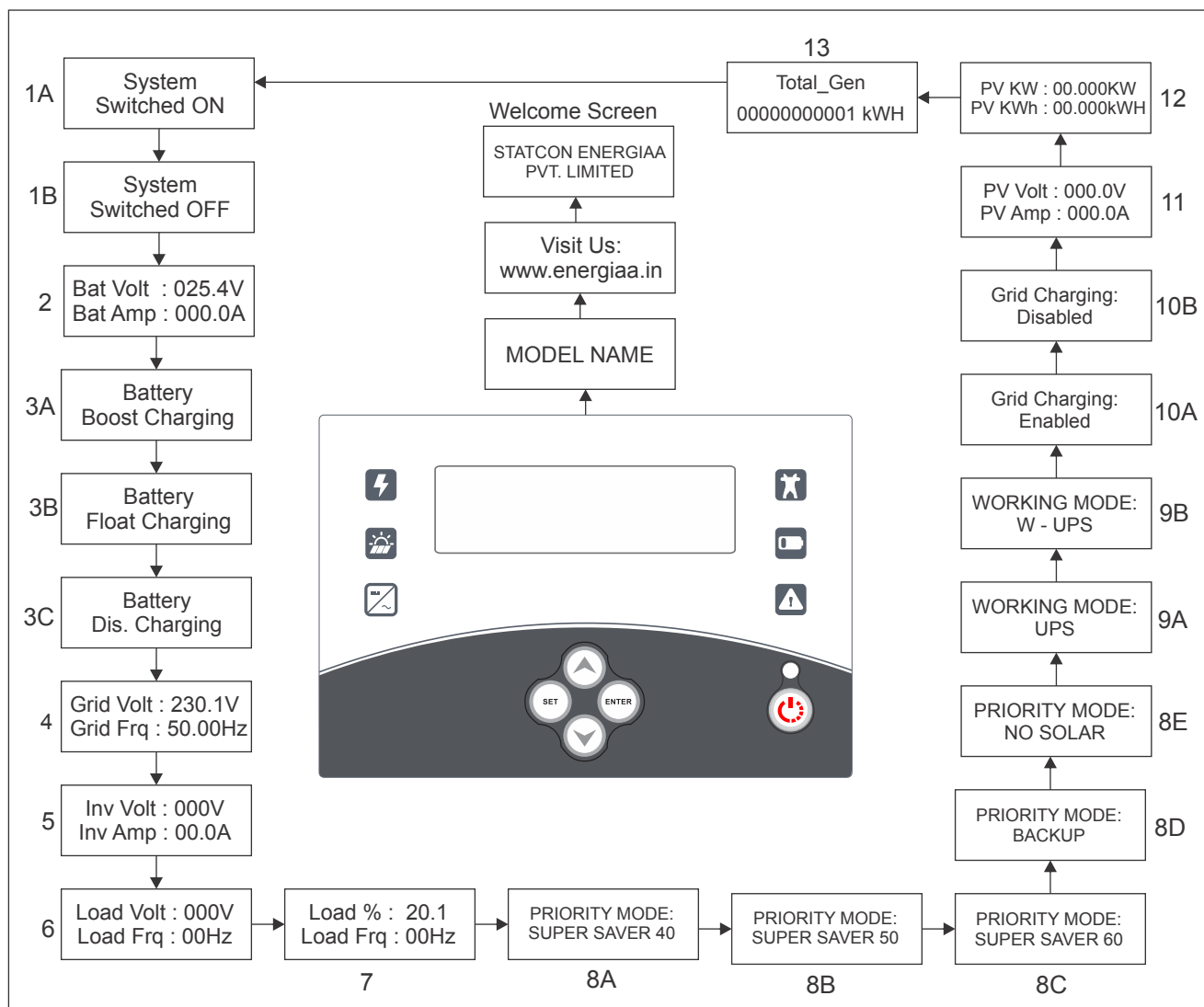


Figure 14

4.2 MENU SETTING

- ✓ Long Press key SET to enter MENU setting Mode.
- ✓ In MENU press key INC successively to go in DATA LOGGING MODE, USER MODE, USER SETTING MODE, FACTORY SETTING MODE and PARAMETER CALIBRATION MODE. To exit from this mode press ENTER.

4.3.1 DATA LOGGING MODE

- ✓ Press key SET to enter in data mode when displayed on screen.
- ✓ Press key SET to see days unit generation (KWh) day wise data.
- ✓ Press key SET to see monthly unit generation (Kwh) data.
- ✓ Press key SET to see year wise (Kwh) data.
- ✓ Press key ENTER to exit this mode.

4.3.2 USER SETTING MODE

- ✓ Press key SET to enter in user mode when displayed on screen.
- ✓ After entering in user mode it will show software versions.
- ✓ PC-UEr (XX.X) and dp-UEr (X.X)
- ✓ After this, it will show rating of your PCU. e.g. 48-4 kVA.
- ✓ Press key INC to select your battery type (LM/VRLA/NI-CAD). Now press key SET to select battery capacity (Ah).
- ✓ Using INC/DEC keys, we can change battery capacity. Now press SET key to choose priority mode now.
- ✓ Press key INC/DEC to choose your source priority mode (S>G>B*/S>G>B/G>B>G/S>G>B**/G>S>B).
- ✓ Press key ENTER to save your settings. It will automatically return to main menu.

4.3.3 FACTORY SETTINGS MODE

- ✓ This mode is password protected. (to be operated only by trained personnel of company).

4.3.4 PARAMETER CALIBRATION MODE

- ✓ This mode is password protected. (to be operated only by trained personnel of company).

4.4 LED INDICATION

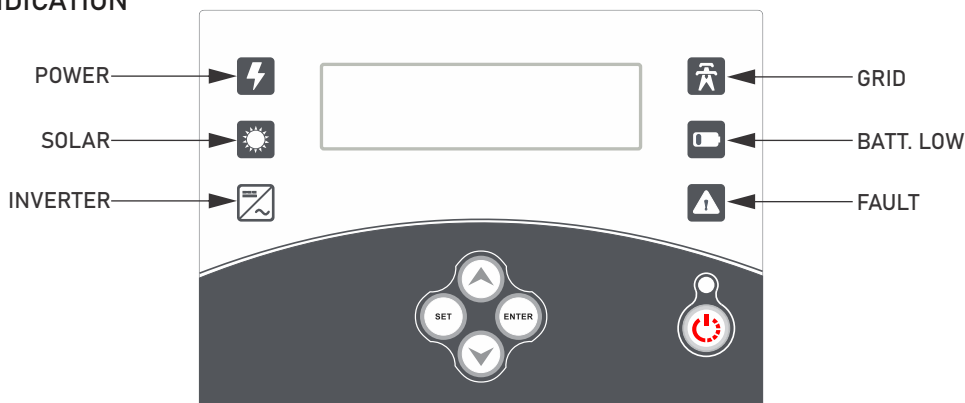


Figure 15

- ❖ **POWER** : This green LED indicates PCU's control circuitry is power ON.
- ❖ **INVERTER ON** : This yellow LED glows when AC load is on INVERTER.
- ❖ **SOLAR ON** : This yellow LED glows in steady state - this tells that the solar present and the charging is completed/stopped. When blinking, it tells the solar is present and the charging is in process
- ❖ **GRID ON** : This yellow LED glows in steady state - this tells that grid is present and the load are bypassed on GRID supply. When blinking with 1 second interval, it tells that (i) the grid is present, (ii) the grid charging is in process and , (iii) the load is running on GRID supply. When blinking with a 5 second interval, it means that the GRID supply is available and the loads are running on PV+Battery.
- ❖ **BATT LOW** : This red LED glow when your battery is low/discharged. Once Battery voltage falls below Battery Under Voltage set value; Inverter will shut down and disconnect the load to stop further discharging of battery. Next, "BATT. LOW" indication will appear on the display. Now Inverter will again given the O/P to load only when Battery Voltage rises up to more than float voltage set value.
- ❖ **FAULT** : This red LED glow if any Fault occurs.
- ❖ **INV ON/OFF** : Press and hold button to turn on your PCU, green LED nearby button will start glowing, which indicates inverter is switched ON.

PRESS AND HOLD BUTTON TO TURN ON YOUR PCU, GREEN LED NEARBY BUTTON WILL START GLOWING, WHICH INDICATES INVERTER IS SWITCHED ON.

LED OF CHARGING SOURCE WILL KEEP BLINKING DURING CHARGING.

4.5 MENU SETTING FLOW CHART

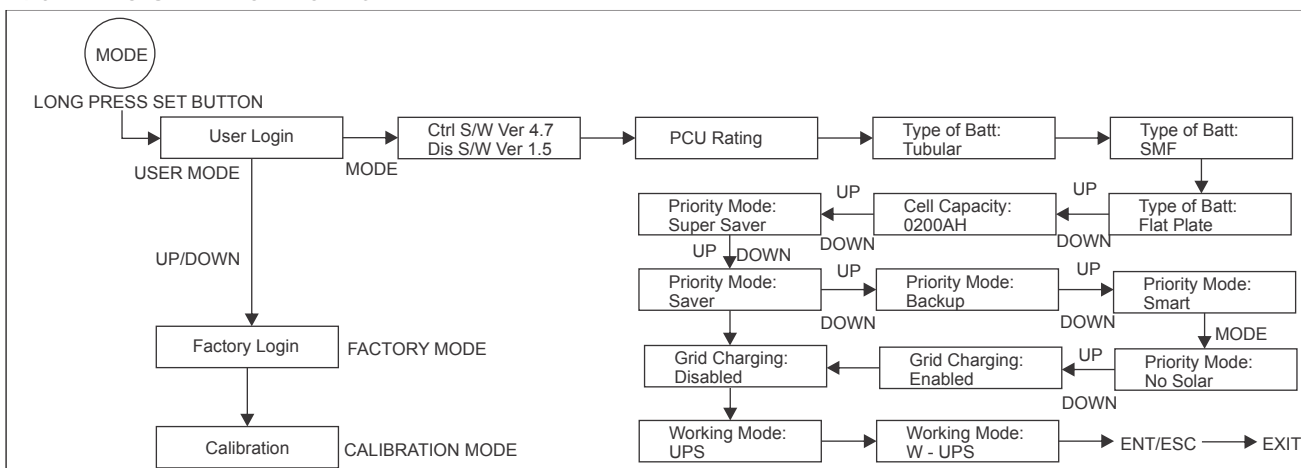


Figure 16

IN USER SETTING MODE BATTERY TYPE, BATTERY CAPACITY & PRIORITY MODE MUST BE CHOSEN PROPERLY AS PER YOUR REQUIREMENT.

4.6 FAULT ANALYSIS

4.6.1 FAULT / ALARM INDICATION VIA BUZZER

In the PCU system, if any fault/alarm occurs then an audio alarm indication is generated by a buzzer –a continuous beep sound. By pressing ENTER key after checking the fault type in LED/LCD, buzzer sound gets deactivated.

4.6.2 FAULT DISPLAY

If any fault occurs in the PCU system, predefined fault no. start display in upper right side of the LCD display with the FAULT*--- as a prefix with each fault number. The lists of fault name are given in the Table 4 as per their respective fault number/codes.

FAULT NAME IN DISPLAY	FAULT DESCRIPTION
SYSTEM TRIP/OFF	When system Shuts Down due to any fault/internal error
INVERTER UNDER VOLTAGE	When Inverter O/P Voltage goes below inverter under voltage set value
INVERTER OVER VOLTGE	When Inverter O/P Voltage goes above inverter over voltage set value
BATTERY UNDER VOLTAGE	When Battery Voltage goes below the battery under voltage set value
BATTERY OVER VOLTAGE	When Battery voltage goes above the battery over voltage set value
SOLAR CHARGE OVER LOAD	When Over Rated PV panel connected to the system
PV OVER VOLTAGE	When PV panel or PV string voltage connected beyond the maximum allowe PV voltage range value
SYSTEM OVER LOAD	When Inverter O/P Load goes above the rated system
GRID UNDER FREQUENCY	When Grid/DG supply frequency goes below the under frequency set value
GRID OVER FREQUENCY	When Grid/DG supply frequency goes above the over frequency set value
SHORT CIRCUIT	It Indicates that Inverter O/P short circuited
SYSTEM OVER TEMPRATURE	When temperature of inverter system goes above the safe range
GRID BACK FEED	When Grid supply connected to the load point directly
MAINS OVER VOLTAGE	When mains voltage goes above the set grid over voltage value
MAINS UNDER VOLTAGE	When mains voltage goes below the set grid under voltage value

Table 4

5. OPERATING MODES AND LOAD CHART

5.1 DETAILS OF PRIORITY MODES

MODES	EXPLANATION OF MODE / REASON TO SELECT THE MODE
Super Saver 40	Solar+Battery will run loads till battery reaches 40% DOD. At 40% DOD, grid will bypass to load, and solar power if available will charge the battery. Grid charging of battery will start if battery reaches 60% DOD. (only applicable if grid charging is enabled)*
Super Saver 50	Solar+Battery will run loads till battery reaches 50% DOD. At 50% DOD, grid will bypass to load, and solar power if available will charge the battery. Grid charging of battery will start if battery reaches 70% DOD. (Only applicable if grid charging is enabled)*
Super Saver 60	Solar+Battery will run loads till battery reaches 60% DOD. At 60% DOD, grid will bypass to load, and solar power if available will charge the battery. Grid charging of battery will start if battery reaches 80% DOD. (Only applicable if grid charging is enabled)*
Backup Mode	Suitable for areas where grid supply is available only for 6-8 hours in a day. So, whenever grid available it charges the battery up-to more than 80% of its capacity to make sure to get more battery backup in night time as compared to above 3 modes.*
No Solar	Suitable for areas when sufficient solar power is not available for long duration (i.e. in rainy days or where solar panel non available due to some reason). By selecting this mode PCU will run like conventional home inverter.

Table 5

Note: Above stated battery's SOC in percentage is estimated (based on Battery Voltage only) but not actual. This holds true for all percentage mentioned in the table above.

5.3 LOAD CHART & BATTERY SIZING

PCU must be chosen as per load requirement, as this affects the life of your battery as well as the PCU. Manufacturer shall not be responsible for the selection of mode as well as the size of the PCU (that can only be determined by the installer/end-user).

PCU Rating →	24V-1KVA		48V-3KVA		96V-4KVA		96V-6KVA	
*LOADS ↓	QTY	TOTAL WATSS	QTY	TOTAL WATTS	QTY	TOTAL WATTS	QTY	TOTAL WATTS
 15W	3	45	6	90	12	180	15	225
 40W	1	40	3	120	6	240	10	400
 60W	2	120	4	240	8	480	12	720
 150W	1	150	2	300	3	450	4	600
 250W	1	250	1	250	1	250	2	500
 350W	—	—	1	350	1	350	2	700
 450W	—	—	1	450	1	450	1	450
TOTAL		605W		1800W		2400W		3595W
BATTERY SIZING	12V X 2 = 24V 70Ah X 2 = 140Ah		12V X 4 = 48V 100Ah X 4 = 400Ah		12V X 8 = 96V 70Ah X 8 = 560Ah		12V X 8 = 96V 100Ah X 8 = 800Ah	

Table 6

*These ratings are based on assumption of load rating, battery rating and consumption of power by battery for charging & operation of load for 1 hours.

5.2 WORKING OF SYSTEM

EXPLAINED FOR MODE-2 : SOLAR > GRID > BATTERY

SOLAR SOURCE	GRID	BATTERY VOLTAGE	AC LOAD ON	BATTERY STATUS
✓ PV POWER < AC LOAD POWER	✓	<= NOMINAL VOLTAGE	 + 	 ↓
✓ PV POWER > AC LOAD POWER	✓	> NOMINAL VOLTAGE		 ↑
✓ PV POWER > AC LOAD POWER	✗	> NOMINAL VOLTAGE		 ↓
✓ PV POWER < AC LOAD POWER	✗	<= NOMINAL VOLTAGE	 + 	 ↑
✗	✓	> NOMINAL VOLTAGE		 ↓
✗	✓	< NOMINAL VOLTAGE		NEITHER CHARGE NOT DISCHARGE
✗	✓	< NOMINAL VOLTAGE (DISCHARGED UPTO 70%)		 ↑
✗	✗	< NOMINAL VOLTAGE		 ↓
✗	✗	< NOMINAL VOLTAGE (DISCHARGED UPTO 100%)	OFF	NEITHER CHARGE NOR DISCHARGE

Table 7



HERE NOMINAL VOLTAGE OF BATTERY COULD BE OF 24V/48V/96V/120V ETC.

6. MAINTENANCE & TROUBLESHOOTING

6.1 VISUAL INSPECTION

- Inspect the PCU and the cables for visible damage and pay attention to the operating status display of the PCU.
- Before maintenance, you must disconnect AC and DC to avoid risk any shock.
- In case of any damage, notify your installer. Repair may only be carried out by authorised eletricians.



PLEASE CARRY OUT VISUAL INSPECTION AT LEAST ONCE OR TWICE A YEAR.

6.1.1 CLEANING THE INVERTER EXTERNALLY

- Only use completely dry cloth/tissue to clean the PCU.
- Only the exterior of the PCU should be cleaned.
- Use a soft and dry brush to remove dust from the fan cover and from the top side of the PCU on a regular basis.



LETHAL VOLTAGES ARE STILL PRESENT IN THE TERMINALS AND CABLES OF THE PCU EVEN AFTER THE PCU HAS BEEN SWITCHED OFF AND DISCONNECTED.

6.1.2 BATTERY MAINTENANCE

- Batteries should not be discharged more than 50% of their capacity on a regular basis. Under extreme conditions (such as a severe storm or a long utility outage), cycling to a discharge level of 80% is acceptable.
- Totally discharging a battery may result in permanent damage and reduced life. Our PCUs limit the deep depth of discharge to prolong the life of the batteries and save on your battery costs in the long run.

6.1.3 PV MAINTENANCE

- PV Panel surface should be clean.
- PV Panel should be replaced in case of any damage of upper layer (Non reflective layer).
- PV Panel should be checked regularly to ensure that it is receiving maximum sunlight possible.

6.2 TROUBLESHOOTING



PRESS KEY ENTER WHILE IN NORMAL PARAMETER DISPLAY TO SEE THE FAULT INDICATION IN PCU.

- SYSTEM TRIP/OFF : This fault may occur due to different reasons of accompanied fault or may be due to internal issues in PCU.

REMEDY:

- ✓ Check the other faults indicated with system trip/off refer their remedies. Immediate consultation with a service expert is required.



IN CASE OF ANY OTHER REASON CONTACT TO SERVICE ENGINEER.

- PCU OUTPUT UNDER VOLTAGE/INVERTER OUTPUT BAD : This fault may occur due to improper output of inverter or due to loose connections.

REMEDY:

- ✓ Check all connections of your PCU.



IN CASE OF ANY OTHER REASON CONTACT TO SERVICE ENGINEER.

- INVERTER OVER-VOLTAGE: This fault occurs due to internal fault of PCU or due to loose connections.

REMEDY:

- ✓ Check all connections of your PCU.



IN CASE THESE DO NOT WORK, CONTACT THE SERVICE ENGINEER.

- **BATTERY UNDER-VOLTAGE** : This fault/alarm may occur due to loose connection of your battery or due to deep discharging of battery. The other reason of this fault may be due to issues related battery.

REMEDY:

- ✓ Check the connections of your battery.
- ✓ Check the settings of your PCU in USER mode.
- ✓ Check the battery voltage.
- ✓ Check the battery if required.



IN CASE THESE DO NOT WORK, CONTACT THE SERVICE ENGINEER.

- **BATTERY OVER-VOLTAGE** : This fault may occur due to the battery voltage exceeding your PCU rating.

REMEDY:

- ✓ Choose the battery as per your inverter rating and load.



IN CASE OF ANY OTHER REASON CONTACT TO SERVICE ENGINEER.

- **SYSTEM OVER-TEMPERATURE** : This fault occurs due to overheating of PCU than its nominal range. It may be due to fan failure or improper ventilation of room & the PCU.

REMEDY:

- ✓ Check the fans of your PCU.
- ✓ Check the location of PCU to suitable environment.
- ✓ Check the ventilation holes of PCU. They should not be blocked.



IN CASE OF ANY PERSISTENT ISSUE, CONTACT THE SERVICE ENGINEER.

- **SOLAR OVERLOAD** : This fault may occur due to connecting the PV Panel of higher rating from the suggested rating of your PCU.

REMEDY:

- ✓ Check the PV rating.



IN CASE OF ANY OTHER ISSUE CONTACT TO SERVICE ENGINEER.

- **SOLAR OVER VOLTAGE** : This fault may occur due to exceeding the PV input voltage from the suggested PV range.

REMEDY:

- ✓ Check the PV output (It must be as per your PCU specification).



IN CASE OF ANY OTHER ISSUE, CONTACT TO SERVICE ENGINEER.

- **SYSTEM OVER LOAD** : This fault may occur due to exceeding the load from PCU rating.

REMEDY:

- ✓ Check the total load your are connecting to your PCU. (It should not exceed the nominal limit of PCU).



IN CASE OF ANY OTHER ISSUE, CONTACT TO SERVICE ENGINEER.

- **BATT_UNDER_VOLTAGE_ALARM** : This fault/alarm may occur due to low voltage. (It may be due to discharging of battery or battery damage. It may occur due to loose connection of battery terminals.

REMEDY:

- ✓ Check the battery voltage and battery connections.



IN CASE OF ANY OTHER ISSUE, CONTACT TO SERVICE ENGINEER.

- MAINS UNDER FREQUENCY : This fault may occur due to improper frequency of mains.

REMEDY:

- ✓ Check the mains supply.



IN CASE OF ANY OTHER ISSUE, CONTACT TO SERVICE ENGINEER.

- MAINS OVER FREQUENCY : This fault may occur due to improper frequency of mains.

REMEDY:

- ✓ Check the mains supply.



IN CASE OF ANY OTHER ISSUE CONTACT TO SERVICE ENGINEER.

- SYSTEM SHORT CIRCUIT : This fault may occur due to short circuiting of output terminals of PCU or due to fault in your load.

REMEDY:

- ✓ Disconnect the connections of PCU and check the load terminals and load.



IN CASE OF ANY OTHER ISSUE, CONTACT TO SERVICE ENGINEER.

- SYSTEM OVER TEMPERATURE : This fault may occur due to cooling/ventilation may not proper in the place where PCU system installed.

REMEDY:

- ✓ Install the PCU in proper ventilated area.



IN CASE OF ANY OTHER ISSUE, CONTACT TO SERVICE ENGINEER.

APPENDIX-1 GENERAL FAULT AND THEIR SOLUTIONS

1. INVERTER OUTPUT VOLTAGE IS NOT AVAILABLE

CAUSE	REMEDY
Input DC Voltage is not available	Make it available first
MCB switch is kept in OFF position	Check the position of MCB and keep it at ON position
Battery connected in reverse polarity	Check the position of ON/OFF switch and keep it at ON position
System is trip DC under voltage condition	Assure input DC range is above the DC under voltage cut setting

2. SOLAR CHARGING IS NOT AVAILABLE

CAUSE	REMEDY
PV voltage is not available	Make it available first
PV MCB switch is kept in OFF position	Check the position of PV MCB and keep it at ON position
ON/OFF switch is kept in OFF position	Check the position of ON/OFF switch and keep it at ON position
PV is connected in reverse polarity	Check the PV connection polarity
Check the input PV range is within the specified range	Input PV range should be within the specified range

3. MAINS CHARGING IS NOT HAPPENING

CAUSE	REMEDY
Mains MCB switch is kept in OFF position	Check the position of mains MCB and keep it at ON position
ON/OFF switch is kept in OFF position	Check the position of ON/OFF switch and keep it at ON position
Relay and contactors may be faulty	Check relay and contactors are operated
Mains voltage is not available	Make it available first

4. OUTPUT FLUCTUATION

CAUSE	REMEDY
Inappropriate connection of output terminal	Tightly and correctly connect the output terminals

APPENDIX-2 TECHNICAL SPECIFICATIONS

RATING	1KVA/24V	1KVA/48V	2KVA/48V	3KVA/48V	4KVA/48V	5KVA/48V	6KVA/48V	8KVA/48V
Model No. SEOG	024-1K0-1P	048-1K0-1P	048-2K0-1P	048-3K0-1P	048-4K0-1P	048-5K0-1P	048-6K0-1P	048-8K0-1P
A. SOLAR CHARGE CONTROLLER								
PV Nominal Capacity	1	1	2	3	4	5	6	8
Max PV String in parallel	2	1	2	3	4	5	6	8
Charge Controller Type (Buck)	MPPT							
No Of MPPT Channel	1							
MPPT Voltage Range	35-72	75-160						
Max Open Circuit PV Volts (Voc)	90	190						
Max SCC O/P Amps	40	20	40	60	80	100	120	160
Peak Charging Efficiency	≥92%	≥94%						
B. SOLAR INVERTER								
Nominal Capacity (Total)	1KVA	1KVA	2KVA	3KVA	4KVA	5KVA	6KVA	8KVA
Output Amps Per Phase	3.5	3.5	7	10.4	13.9	17.5	20.8	27.8
Nominal Battery Voltage	24	48						
Output Voltage/ Frequency/ Phase	230V/50Hz/1P							
Power Factor	0.8-unity							
Peak Efficiency	≥85%	≥88%						
Over Loads: 60 sec 30 sec / 5 sec	101-110 % (60sec),111-150 % (20sec),151-200 % (8sec),201 -225 % (5sec),226-250%(Immeediate Trip)							
Overload Restart	3 Times Auto Restart and then after 1 min Manual Reset							
Auto Bypass Feature	Provided							
C. GRID CHARGER								
Grid Voltage Range	230V(+10% & -20%)							
Grid Operating Range (Hz)	50Hz (+5% & -5%)							
Max Grid Import Power	1.5KVA	1.5KVA	3KVA	4.5KVA	6KVA	7.5KVA	9KVA	12KVA
D. PROTECTION & DISPLAY PARAMETERS								
Protections	PV: Reverse Polarity, Battery Reverse Power Through to Diode, PV Over Load, PV MCB/MCCB, Mov Battery: Under Voltage Cut, Over Voltage Cut, Reverse Ploarity, Overcharge Limit (BCL), Battery MCB/MCCB, Mov Grid: Over Voltage, Under Voltage, Over Frequency, Under Frequency, Grid MCB/MCCB, Mov Load: Overload, Short Circuit, Over Heat, Output Low, Load MCB/MCCB, Mov							
Display Parameters	PV: Voltage, Current, Power, Total KWH Generation. Battery: Voltage, Current, Charge/ Discharge Status Grid: Voltage, Frequency. Load: Voltage, Load %, Frequency. Setting: Operating Modes (UPS/ Wide Range), Priority Selection), Grid Charging Enable/ Disable, Battery Status (Charging/ Discharging) Start Up: Firmware versions Miscellane: Over Temperature, Mode of Oparation, Faults							
E. MISCELLANEOUS								
LED Indications	Power On, Inverter ON, Solar Present/Charging,Load On Grid/Charging, Battery Low, System Trip							
Remote monitoring	Optional though GPRS based Modem							
Degree of Colling	Indor Type (IP-20)							
Type of Cooling	Forced Cooled (Temp. Controlled)							
Operating temperature	0-50 Degrees(without Derating)							
Humidity	Max.95% Non-Condensing							
Altitude	1000m above sea level							
Color Shade	SEED GREEN & GLOSSY WHITE							
Weight IN Kg (approx)	25Kg	34Kg	38Kg	42Kg	55Kg	65Kg	68Kg	
Dimensions in MM	325 X 385 X 275MM				425 X 275 X 580MM		475 X 680 X 300MM	

RATING	5KVA/96V	6KVA/96V	7.5KVA/96V	5KVA/120V	8KVA/120V	10KVA/120V	12.5KVA/120V	15KVA/120V	15KVA/240V	20KVA/240V
Model No. SEOG	096-5K0-1P	096-6K0-1P	096-7.5K0-1P	120-5K0-1P	120-8K0-1P	120-10K0-1P	120-12.5K0-1P	120-15K0-1P	240-15K0-1P	240-20K0-1P
A. SOLAR CHARGE CONTROLLER										
PV Nominal Capacity	5	6	7.5	5	8	10	10	15	15	20
Max PV String in parallel	4	5	6	4	6	6	6	9	5	6
Charge Controller Type (Buck)	MPPT									
No Of MPPT Channel	1									
MPPT Voltage Range	140-299			165-299				365-560		
Max Open Circuit PV Volts (Voc)	360							700		
Max SCC O/P Amps	50	60	75	40	65	80	80	120	60	80
Peak Charging Efficiency	≥94%									
B. SOLAR INVERTER										
Nominal Capacity (Total)	5KVA	6KVA	7.5KVA	5KVA	8KVA	10KVA	12.5KVA	15KVA	15KVA	20KVA
Output Amps Per Phase	17.5	21	26	17.5	27.8	35	43.5	52	52	70
Nominal Battery Voltage	96			120				240		
Output Voltage/ Frequency/ Phase	230V/50Hz/1P									
Power Factor	0.8-unity									
Peak Efficiency	≥85%									
Over Loads: 60 sec 30 sec / 5 sec	101-110 % (60sec),111-150 % (20sec),151-200 % (8sec),201 -225 % (5sec),226-250%(Immeediate Trip)									
Overload Restart	3 Times Auto Restart and then after 1 min Manual Reset									
Auto Bypass Feature	Provided									
C. GRID CHARGER										
Grid Voltage Range	230V(+10% & -20%)									
Grid Operating Range (Hz)	50Hz (+5% & -5%)									
Max Grid Import Power	7.5KVA	9KVA	11.2KVA	7.5KVA	12KVA	15KVA	18.7KVA	22.5KVA	30KVA	
D. PROTECTION & DISPLAY PARAMETERS										
Protections	PV: Reverse Polarity, Battery Reverse Power Through to Diode, PV Over Load, PV MCB/MCCB, Mov Battery: Under Voltage Cut, Over Voltage Cut, Reverse Ploarity, Overcharge Limit (BCL), Battery MCB/MCCB, Mov Grid: Over Voltage, Under Voltage, Over Frequency, Under Frequency, Grid MCB/MCCB, Mov Load: Overload, Short Circuit, Over Heat, Output Low, Load MCB/MCCB, Mov									
Display Parameters	PV: Voltage, Current, Power, Total KWH Generation. Battery: Voltage, Current, Charge/ Discharge Status Grid: Voltage, Frequency. Load: Voltage, Load %, Frequency. Setting: Operating Modes (UPS/ Wide Range), Priority Selection), Grid Charging Enable/ Disable, Battery Status (Charging/ Discharging) Start Up: Firmware versions Over Temperature, Mode of Operation, Faults									
E. MISCELLANEOUS										
LED Indications	Power On, Inverter ON, Solar Present/Charging,Load On Grid/Charging, Battery Low, System Trip									
Remote monitoring	Optional though GPRS based Modem									
Degree of Colling	Indor Type (IP-20)									
Type of Cooling	Forced Cooled (Temp. Controlled)									
Operating temperature	0-50 Degrees(without Derating)									
Humidity	Max.95% Non-Condensing									
Altitude	1000m above sea level									
Color Shade	RAL9005 (BLACK)									
Weight (approx)	94Kg	99Kg	110Kg	94Kg	106Kg			138Kg		148Kg
Dimensions	590+60 X 625 X 375MM			650.25 X 700 X 400MM			650X700X450MM		650X700X450MM	667.50X700X500MM

APPENDIX-3 SERVICING AND CUSTOMER CARE

In the unlikely event that you encounter any technical issues with one of our products, please contact our servicing customer support in one of the following ways:

1. Email us at servicing@energiaa.in
2. Call us at 1800-891-3319 (toll free)
3. Message us on Energiaa Care WhatsApp: +91-9821396421
4. Scan the QR Code below and directly message us on WhatsApp:



5. Visit us at www.energiaa.in for updated servicing contact details and to know more about our product range.

APPENDIX-4 WARRANTY CARD

Please find attached a Warranty Card at the end of this manual. Kindly ensure you keep it safe as this will be the only way to claim your warranty against this product. Please make sure your installer/dealer fills the warranty card and gives you the customer copy. In case of any issues regarding the warranty claims, you can contact Energiaa Care – our customer support.

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