

PVBOF SERIES

1KVA/24V

1-6KVA/48V

5-7.5KVA/96V

5-12.5KVA/120V

15KVA/240V

MPPT-BASED PCU (SINGLE PHASE)

The Heavyduty Soldier of Solar Inverters

PRODUCT MANUAL

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Copyright Declaration

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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 PVBOF MPPT-Based 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 PVBlink Technology Pvt. Ltd.





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

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

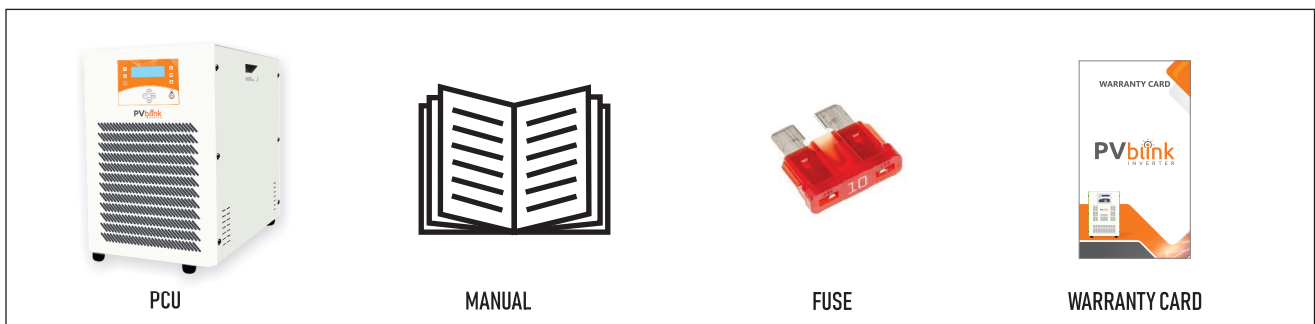


Figure 1

2. INTRODUCTION

2.1 PRODUCT DESCRIPTION

The PVBOF 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.

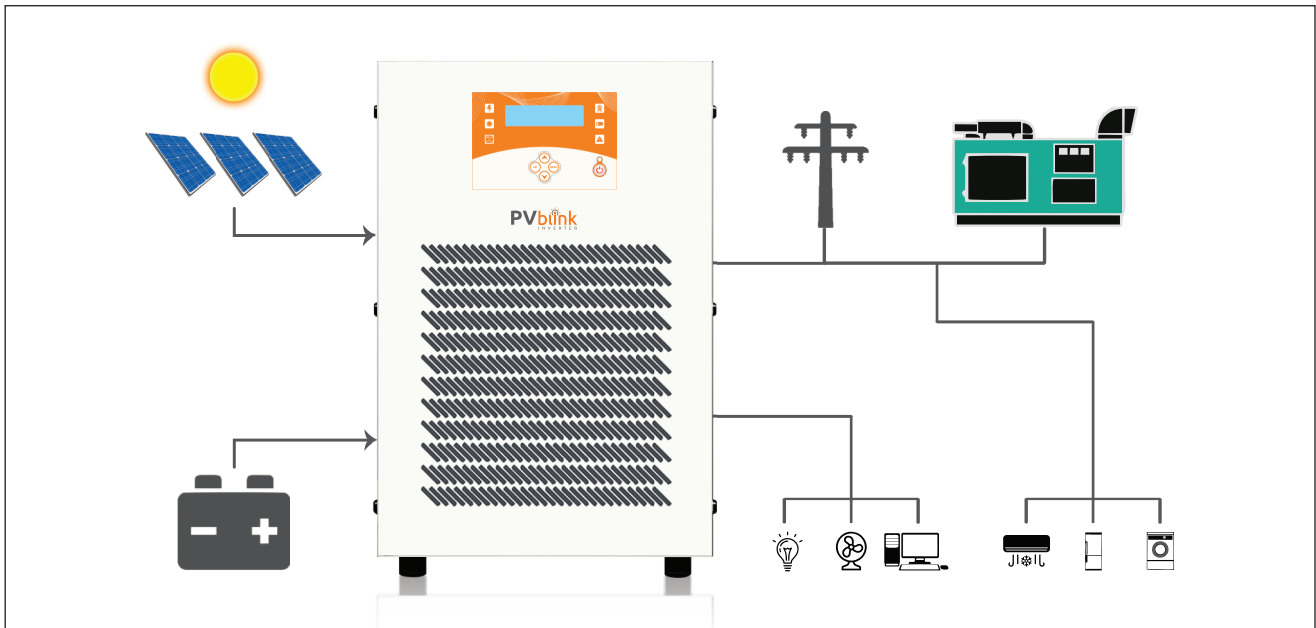


Figure 2

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.pyblink.com 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

	PVB	OF	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							
COMMUNICATIONS	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

Note : Above nomenclature shall be valid only for PVBOF MPPT-Based Power Conditioning Unit.

2.3 PHYSICAL APPEARANCE & TERMINATION DETAILS OF INVERTER

PVBOF 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	0.5-1 KVA Single Phase PCU	450 X 360 X 200	TABLE TYPE	WHITE	Figure 4
2	2-4 KVA Single Phase PCU	275 X 611 X 448.5	TOWER TYPE	WHITE	Figure 5
3	5-6 KVA Single Phase PCU	400 X 753.5 X 650	TOWER TYPE	WHITE	Figure 6
4	5-8 KVA Single Phase PCU	400 X 753.5 X 650	TOWER TYPE	WHITE/BLACK	Figure 7
5	10 KVA Single Phase PCU	450 X 753.5 X 650	TOWER TYPE	WHITE/BLACK	Figure 7
6	15 KVA Single Phase PCU	590 X 450 X 734	TOWER TYPE	WHITE/BLACK	Figure 8

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.

2.3.1 PVBOF - TABLE TOP TYPE MODEL : 0.5-1 KVA/24V/48V MPPT-Based PCU

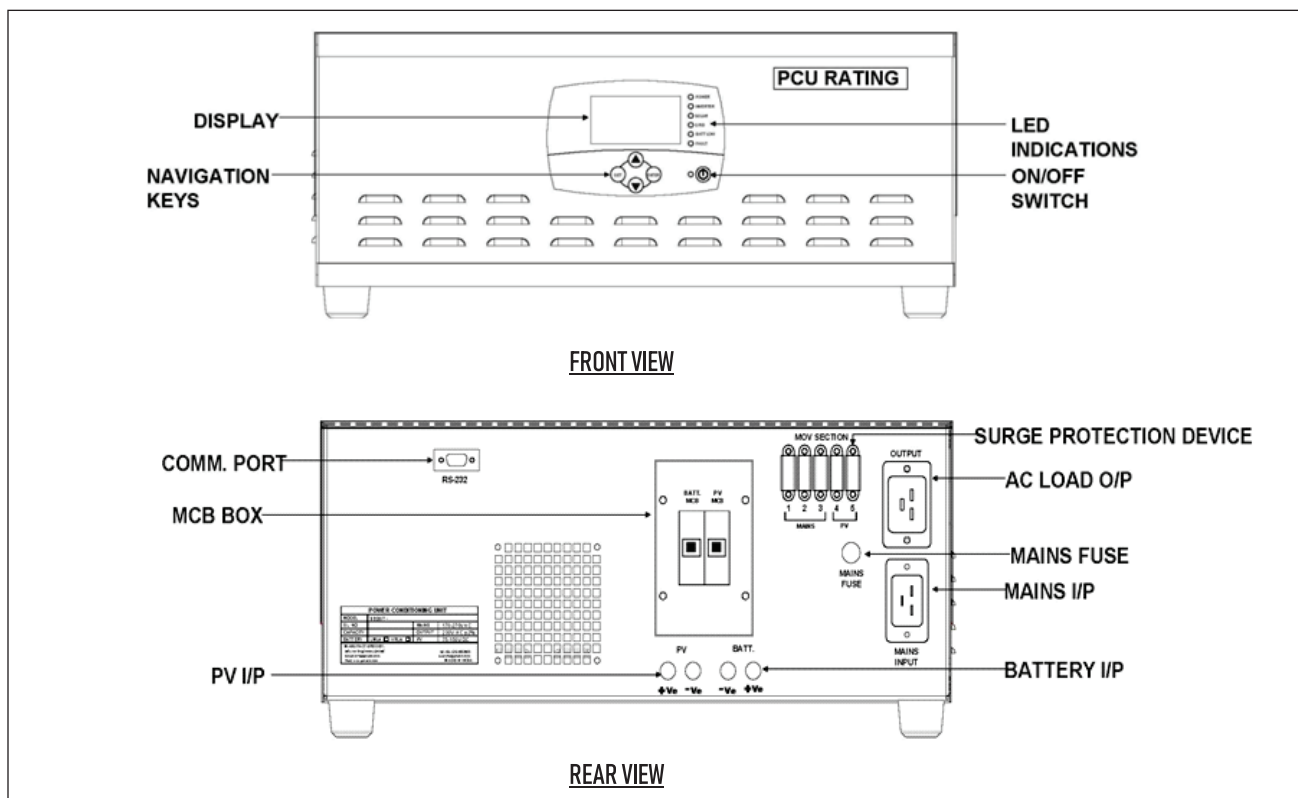


Figure 4

2.3.2 PVBOF - TOWER TYPE MODEL : 2-4 KVA/48V MPPT-Based PCU

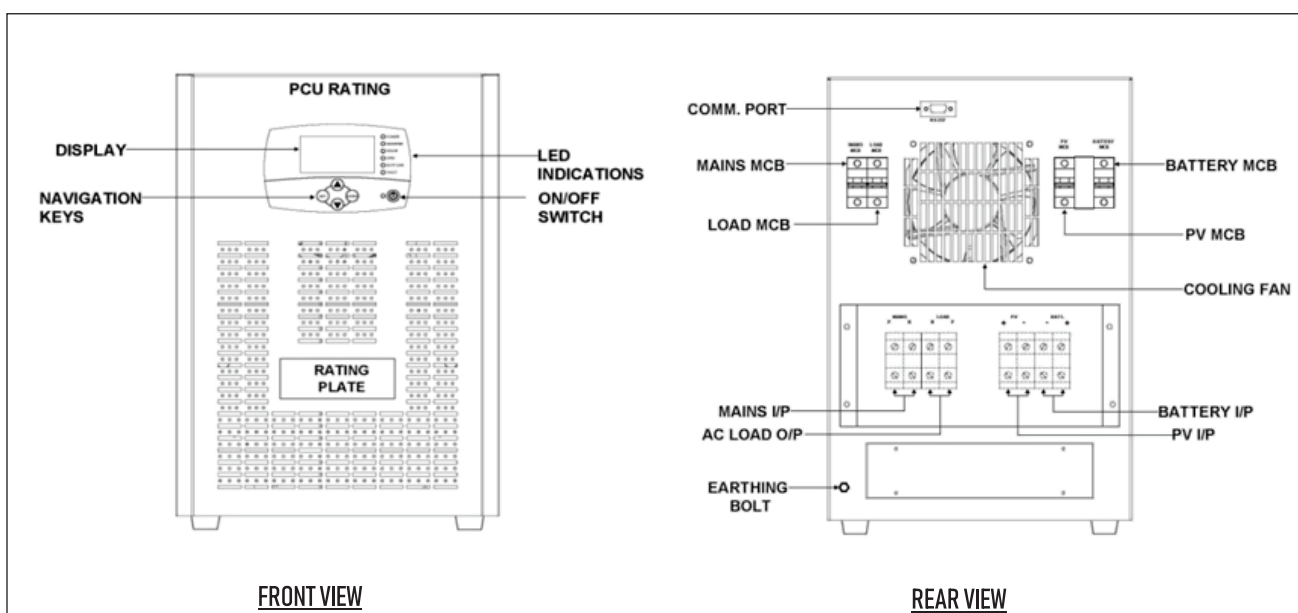


Figure 5

2.3.3 PVBOF - TOWER TYPE MODEL : 5-6 KVA/48V MPPT-Based PCU

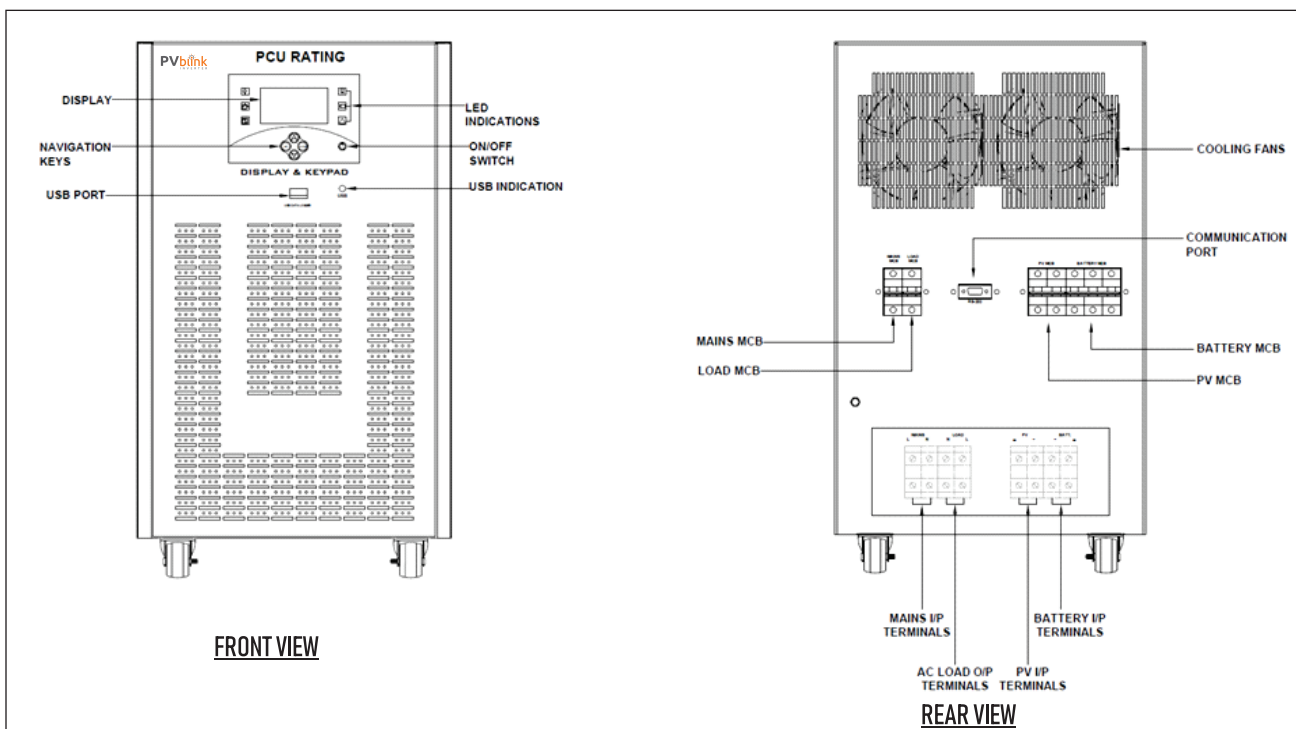


Figure 6

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

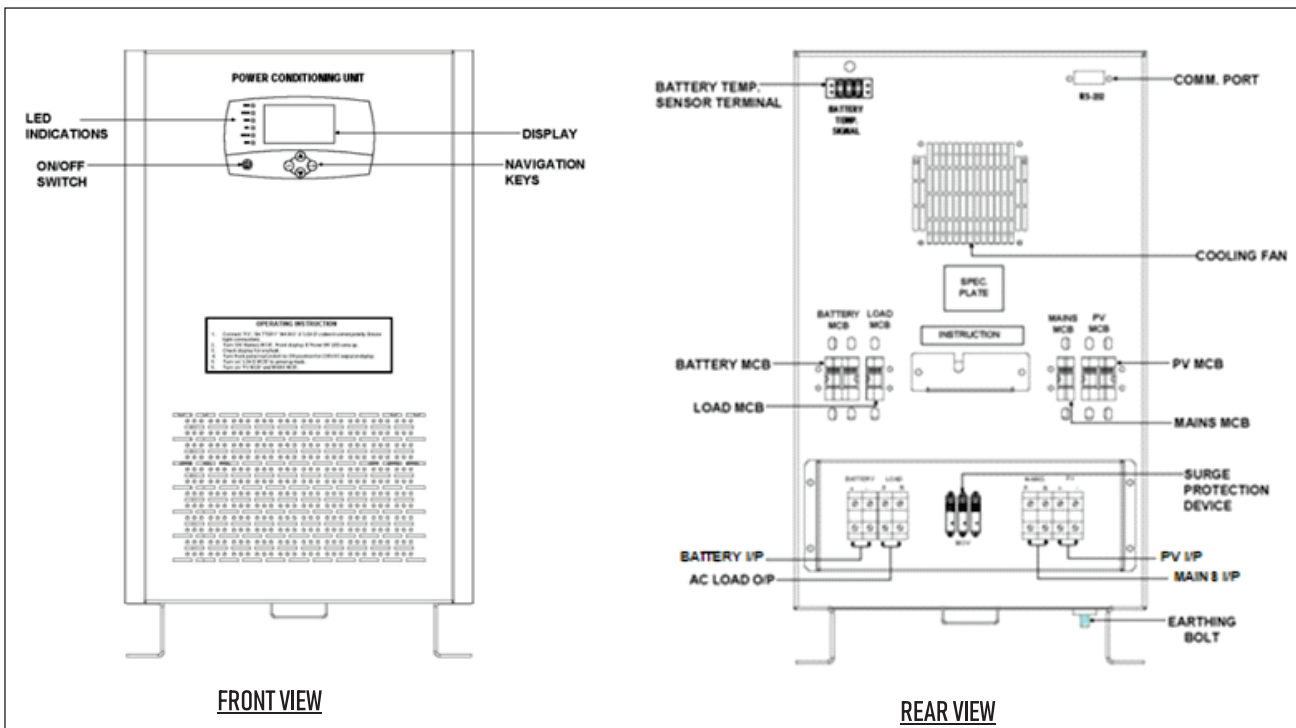


Figure 7

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

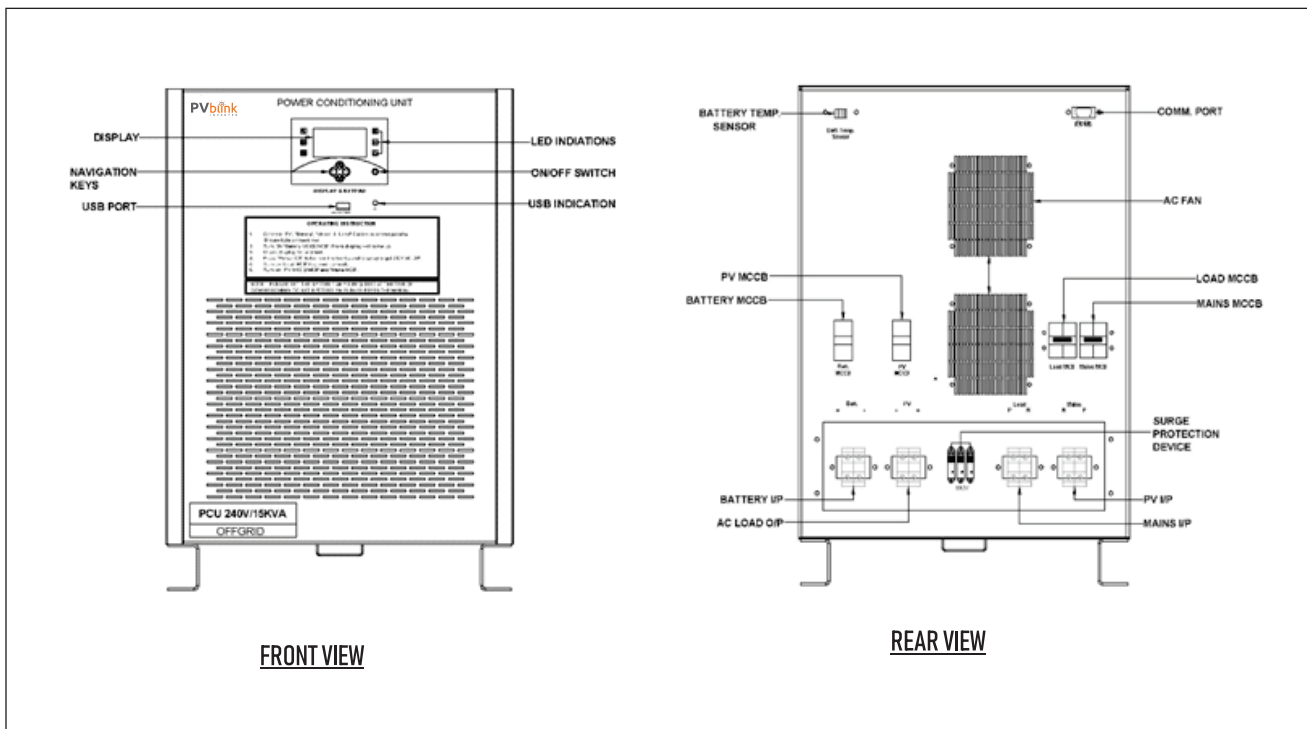


Figure 8

2.4 FEATURES

- PVBOF series PCU's provide a complete solution for 230VAC, 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 : Solar > Grid > Battery*
- ✓ MODE-2 : Solar > Grid > Battery
- ✓ MODE-3 : Solar > Battery > Grid
- ✓ MODE-4 : Solar > Grid > Battery**
- ✓ MODE-5 : Grid > Solar > Battery

2.4.2 MONITORING

- ✓ Largest LCD display in its class for great visuals
- ✓ Inbuilt data logging capability up to 5 years (optional)
- ✓ RS 232/RS 485, GPRS, 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

3.0 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:

3.1 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

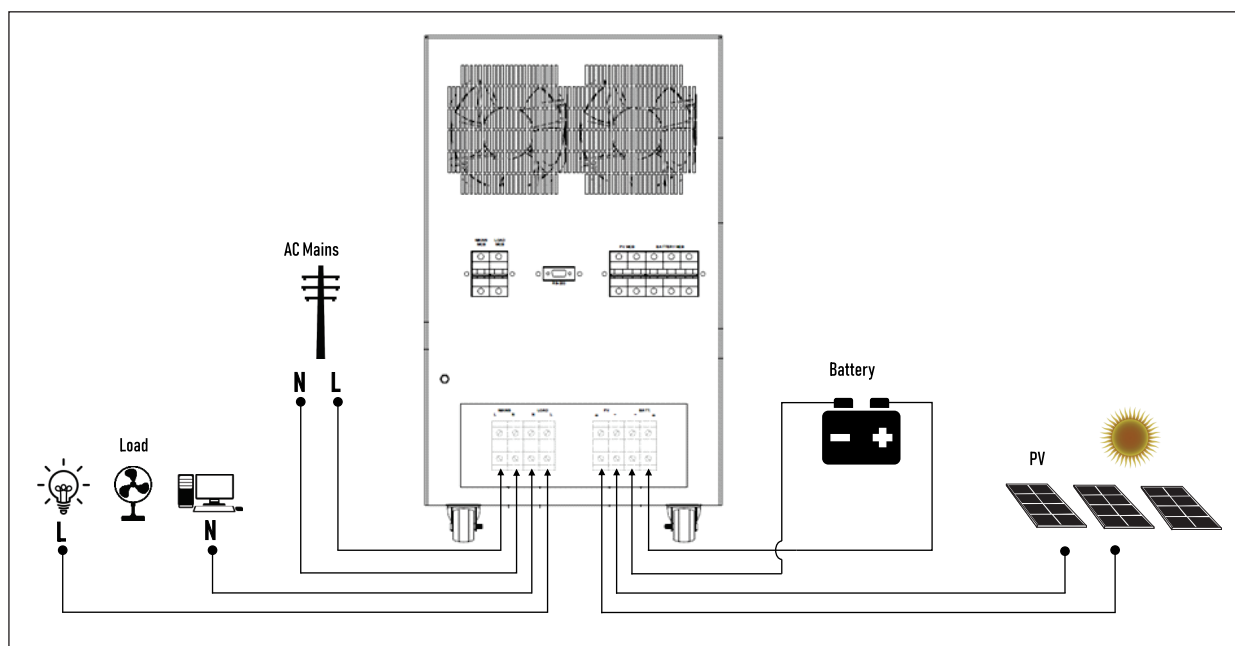


Figure 9



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

3.2 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.

3.3 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 10

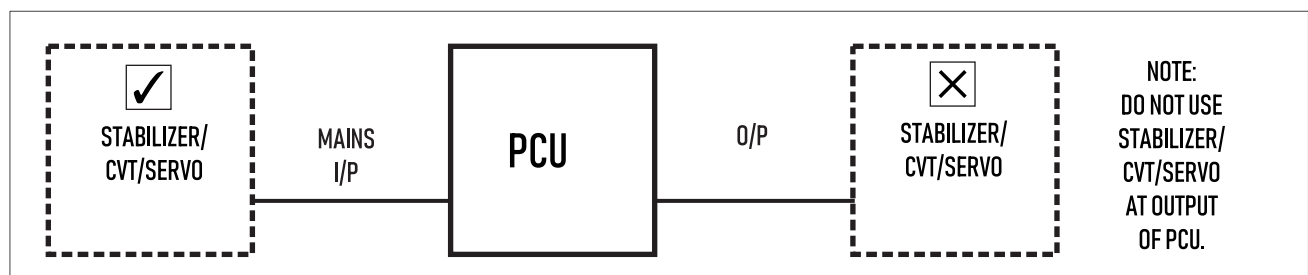


Figure 11

3.4 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.

3.5 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

4.0 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 kWh.
- ❖ Date, Time.

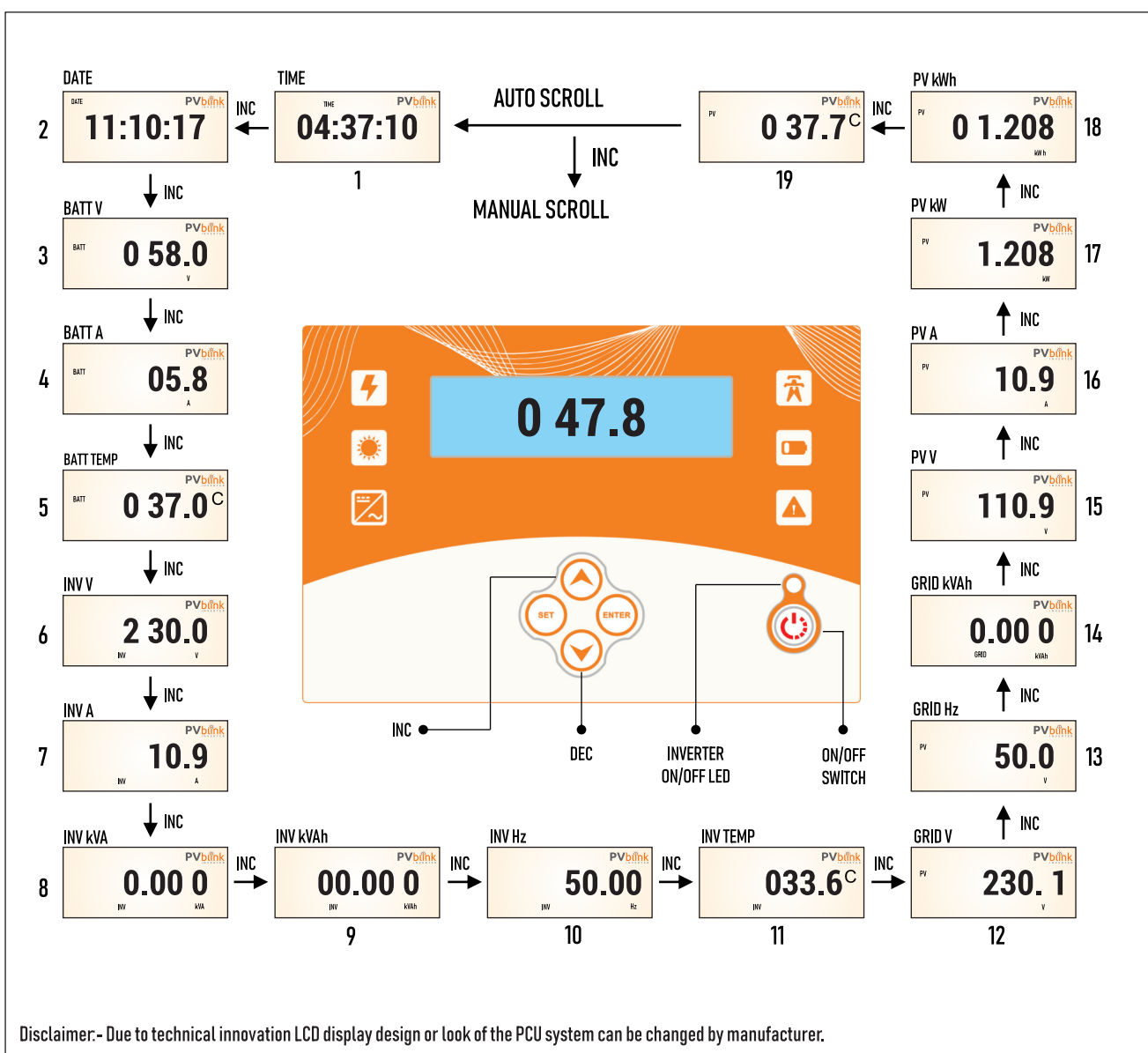


Figure 12

4.3 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

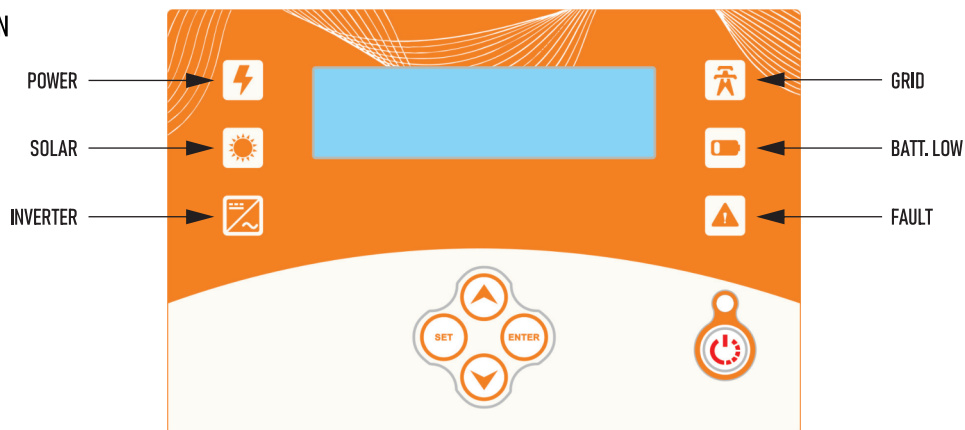


Figure 13

- ❖ 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

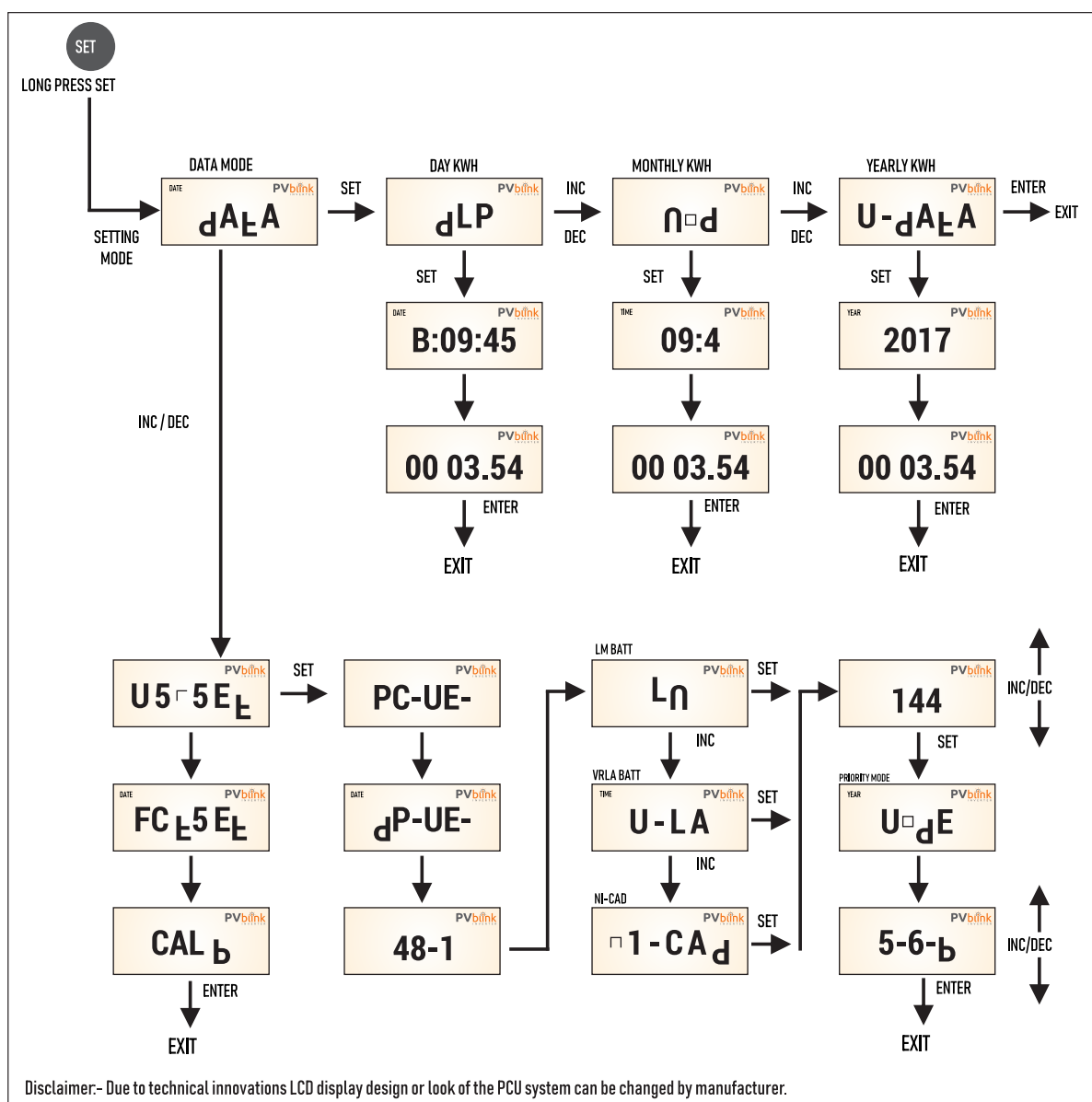


Figure 14



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 INTERPRETATION	FAULT CODE IN DISPLAY
SYSTEM TRIP	FAULT * 0
INVERTER UNDER VOLTAGE	FAULT * 1
INVERTER OVER VOLTGE	FAULT * 2
BATTERY UNDER VOLTAGE	FAULT * 3
BATTERY OVER VOLTAGE	FAULT * 4
SYSTEM OVER TEMPERATURE	FAULT * 5
BATTERY TEMP. COMPENSATION FAIL	FAULT * 6
SOLAR CHARGE OVERLOAD	FAULT * 7
SOLAR OVER VOLTAGE	FAULT * 8
INVERTER O/P OVER LOAD	FAULT * 9
BATTERY UNDER VOLTAGE ALARM	FAULT * a
MAINS UNDER FREQUENCY	FAULT * b
MAINS OVER FREQUENCY	FAULT * c
SYSTEM O/P SHORT CIRCUIT	FAULT* d

Table 4

5. OPERATING MODES AND LOAD CHART

5.1 DETAILS OF PRIORITY MODES

MODES	MEANING	REASON TO SELECT THIS MODE
MODE-1	S>G>B*	Suitable for the case where customers wants no battery charging through grid supply. This mode allows the battery to discharge approx. 40%-50% then AC loads switch to grid source, if grid supply available.
MODE-2 (default)	S>G>B	This mode allows the battery to discharge approx. 40%-50% then AC loads switch to grid source, if grid supply available. This mode allows the battery charging through grid when battery discharge more than 80%
MODE-3	S>B>G	This mode allows the battery to discharge aprox. 60%-70% then AC loads switch to grid source, if grid supply available. This mode allows the battery charging through grid when battery discharge more than 80%.
MODE-4	S>G>B**	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 approx. 80% of its capacity to make sure to get more battery backup in night time as compared to above 3 modes.
MODE-5	G>S>B	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 inverter and the cables for visible damage and pay attention to the operating status display of the inverter.
- 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 electricians.



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 inverter.
- Only the exterior of the inverter should be cleaned.
- Use a soft and dry brush to remove dust from the fan cover and from the top side of the inverter on a regular basis.



LETHAL VOLTAGES ARE STILL PRESENT IN THE TERMINALS AND CABLES OF THE INVERTER EVEN AFTER THE INVERTER 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 depth of discharge to 60% 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.

- **FAULT*0 (SYSTEM TRIP):** 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 FAULT*0 and refer their remedies. Immediate consultation with a service expert is required.



IN CASE OF ANY OTHER REASON CONTACT TO SERVICE ENGINEER.

- **FAULT * 1 (INVERTER 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.

- **FAULT*2 (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.

- **FAULT*3 (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.

- **FAULT*4 (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.

- **FAULT*5 (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.

- **FAULT*6 (TCS_FAIL):** Contact to service engineer.

- **FAULT*7 (SOLAR OVERLOAD):** This fault may occur due to exceeding the load from nominal range of your PCU or due to connecting the PV Panel of lower rating from the suggested rating of your PCU.

REMEDY:

- ✓ Check the PV rating.
- ✓ Check of load is exceeding the limit of PCU.
- ✓ Check the battery Ah setting in user mode. (It must be as your battery specification).



IN CASE OF ANY OTHER ISSUE CONTACT TO SERVICE ENGINEER.

- **FAULT*8 (SOLAR OVER VOLTAGE):** This fault may occur due to exceeding the PV output from nominal range of your PCU.

REMEDY:

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



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

- FAULT*9 (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.

- FAULT * A (BATT_UNDER_VOLTAGE_ALARM) : This fult/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.

- FAULT*B (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.

- FAULT*C (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.

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

REMEDY:

- ✓ Switch off all the MCB's/disconnect the connections of PCU and check the load terminals and load.



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



Maximum utilisation of solar power



No dependency on grid



5 modes of priority



PVbLink inverters are the perfect amalgamation of power and performance. Our powerful inverters are ideal for running high-load requirements. PVbLink's inverter range comes with intelligent charging features to ensure extended power backup. Our inverters have been designed to save energy by providing high performance and minimum losses. The compact size and light weight of the inverters make them easy to install. With continuous research and development in PV inverters and renewable power, PVbLink is your one-stop solar technology solutions provider.

LOW VOLTAGE MPPT PCU PVBOF SERIES SINGLE PHASE

RATINGS	1KVA/24V		1KVA/48V		2KVA/48V		3KVA/48V		4KVA/48V		5KVA/48V		6KVA/48V	
Models	PVBOF-024-1K0-1P		PVBOF-048-1K0-1P		PVBOF-048-2K0-1P		PVBOF-048-3K0-1P		PVBOF-048-4K0-1P		PVBOF-048-5K0-1P		PVBOF-048-6K0-1P	
A. MPPT CHARGER														
Type (Buck)	MPPT													
Nominal capacity (Kwp)	1		1		2		3		4		5		6	
Max PV strings in parallel	2		1		2		3		4		5		6	
No of MPPT channel	1													
Max. open circuit voltage (Voc)	105		190											
MPPT tracking range (Vmp)	35-72		75-160											
Max. output current (A)	40		20		40		60		80		100		120	
Peak efficiency	≥92%				≥94%									
B. SOLAR INVERTER														
Nominal capacity	1KVA		1KVA		2KVA		3KVA		4KVA		5KVA		6KVA	
Output current(A)	3.5		3.5		7.0		10.4		13.9		17.4		20.8	
Battery voltage (V)	24		48											
Output Voltage/Freq/Phase	230V(±2%)/50Hz/1P													
Power Factor	0.8-unity													
Peak efficiency	≥85%		≥88%											
Over loads:60sec/30sec/5sec	101-110%/111-125%/126-150%													
Auto bypass feature	Provided													
C. GRID CHARGER														
Grid voltage range (V)	230V(+10% & -20%)													
Grid freq range (Hz)	50Hz(+5% & -5%)													
Max. grid import power	1.5KVA		1.5KVA		3KVA		4.5KVA		6KVA		7.5KVA		9KVA	
D. PROTECTIONS & DISPLAY PARAMETERS														
PROTECTIONS														
PV side	• Reverse polarity, PV overload, Surge protection (MOV)													
Battery side	• Reverse polarity, O/U Voltage, Current limit													
Grid side	• O/U voltage, O/U frequency, Surge protection (MOV)													
Load side	• O/U voltage, Overloads, Short circuit, Surge protection (MOV)													
Miscellaneous	• Over temperature													
LCD PARAMETERS														
• Voltage, Current, Power, Energy														
• Voltage, Current, Battery charging/discharging														
• Voltage, Current, Frequency														
• Voltage, Current, Frequency, Power														
• Mode of operation, Faults														
E. MISCELLANEOUS														
Switchgear protection	MCB/MCCB provided on PV, Battery, Load & grid path.													
LED indications	Power on, Inverter on, Solar present/Charging, Load on grid/Charging, Battery low, System trip													
Remote monitoring	Optional through GPRS based modem													
Degree of protection	Indoor type (IP-20)													
Operating temperature	0-50 degrees (without derating)													
Type of cooling	Forced cooled (Temp. controlled)													
Humidity	Max. 95% Non-condensing													
Altitude	1000m above sea level													
Dimensions (H x W x D)*	175 x 450 x 360		347 x 275 x 385				348 x 295 x 415				448 x 275 x 580		498 x 300 x 680	



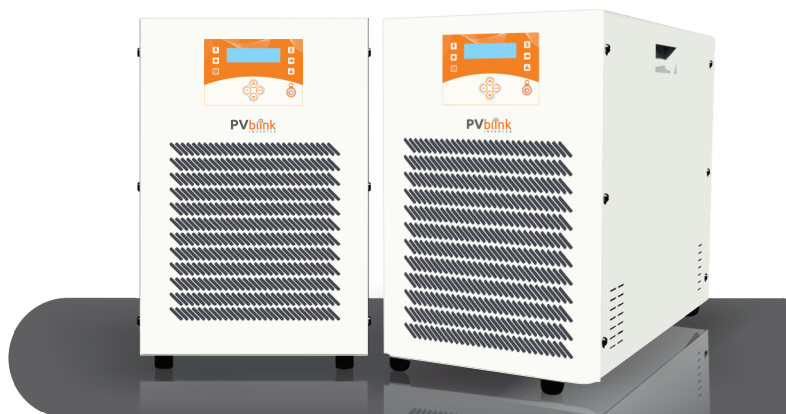
Optional grid charging



Optional two-way lot access



Large LCD display



Residences



Petrol Pumps



Schools



Hotels



**Rural Micro
Grids**



**Construction
Sites**

HIGH VOLTAGE 5-15 KVA PVBOF SERIES SOLAR MPPT PCU

RATINGS	5KVA/96V	6KVA/96V	7.5KVA/96V	5KVA/120V	7.5KVA/120V	10KVA/120V	12.5KVA/120V	15KVA/240V
Models	PVBOF-096-5K0-1P	PVBOF-096-6K0-1P	PVBOF-096-7K5-1P	PVBOF-120-5K0-1P	PVBOF-120-7K5-1P	PVBOF-120-10K0-1P	PVBOF-120-15K0-1P	PVBOF-240-15K0-1P
A. SOLAR CHARGE CONTROLLER								
PV nominal capacity (Total Kwp)	5	6	7.5	5	7.5	10	10	15
Max. PV strings in parallel	4	5	6	4	6	6	6	5
Charge controller type (Buck)	MPPT							
No of MPPT channel	1							
MPPT Voltage range	140-299		165-299				165-299	365-560
Max. Open circuit PV Volts (Voc)	360						360	700
Max. O/P Amps	50	60	75	40	60	80	80	60
Peak charging efficiency	≥94%							
B. SOLAR INVERTER								
Nominal capacity	5KVA	6KVA	7.5KVA	5KVA	7.5KVA	10KVA	12.5KVA	15KVA
Output current (A)	17.5	21	26	17.5	26	35	43.5	52
Battery voltage (V)	96			120				240
Output Voltage/Freq/Phase	230V/50Hz/1P							
Power Factor	0.8-unity							
Peak efficiency	≥88%							
Over loads:60sec/30sec/5sec	101-110%/110-125%/126-150%							
Auto bypass feature	Provided							
C. GRID CHARGER								
Grid voltage range (V)	230V(+10% & ~20%)							
Grid freq range (Hz)	50Hz(+5% & ~5%)							
Max. grid import power	7.5KVA	9KVA	11.3KVA	7.5KVA	11.3KVA	15KVA	18.7KVA	22.5KVA
D. PROTECTIONS & DISPLAY PARAMETERS								
<div><div>PROTECTIONS</div><div>LCD PARAMETERS</div></div>								
PV side	• Reverse polarity, PV overload, Surge protection (MOV)				• Voltage, Current, Power, Energy			
Battery side	• Reverse polarity, O/U Voltage, Current limit				• Voltage, Current, Battery charging/discharging			
Grid side	• O/U Voltage, O/U Frequency, Surge protection (MOV)				• Voltage, Current, Frequency			
Load side	• O/U Voltage, Overloads, Short circuit, Surge protection (MOV)				• Voltage, Current, Frequency, Power			
Miscellaneous	• Over temperature				• Mode of operation, Faults			
E. MISCELLANEOUS								
Switchgear protection	MCB/MCCB provided on PV, Battery, Load & grid path.							
LED indications	Power on, Inverter on, Solar present/Charging, Load on grid/Charging, Battery low, System trip							
Remote monitoring	Optional through GPRS based modem							
Degree of protection	Indoor type (IP-20)							
Operating temperature	0-50 degrees (without derating)							
Type of cooling	Forced cooled (Temp. controlled)							
Humidity	Max. 95% Non-condensing							
Altitude	1000m above sea level							
Dimensions (H x W x D)*	652 x 375 x 625					650 x 400 x 700	650 x 450 x 700	667.5 x 500 x 700

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

The above models are compatible with lead-acid batteries only.

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@pvblink.com
2. Call us at +9178618 68893

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 PVBlink Technology Pvt. Ltd. our customer support.

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