OPERATING MANUAL

ESS PEGASUS Li+ SERIES | ESS SPHINX Li+ SERIES

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ENERGY STORAGE SYSTEM

SOLAR POWER DEFENCE RAILWAYS TELECOM

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I. PRODUCT DESCRIPTION

1. ENERGY STORAGE SYSTEM (ESS)

The Energy Storage System is aimed for the new urban consumers who want a system that is sufficient to run their modern lifestyle with energy savings while maintaining their budget

This would involve uninterrupted running of all household loads along with air conditioner (upto 1.5 ton) during multiple power cuts throughout the day. These machines are a perfect fit for low maintenance and efficient supply for residential usage. The ESS under the series name of PEGASUS Li+ & SPHINX Li+ is 1-phase system of 3 to 5 KVA with 48 V Lithium battery.

ESS PEGASUS LI+

ESS SPHINX LI+

2. BATTERY

Your ESS contains inbuilt BMS or Battery Management System for the Lithium battery wherein all protections and charging parameters are taken care through sophisticated power electronics and the user need not worry about the battery.

Battery specifications:

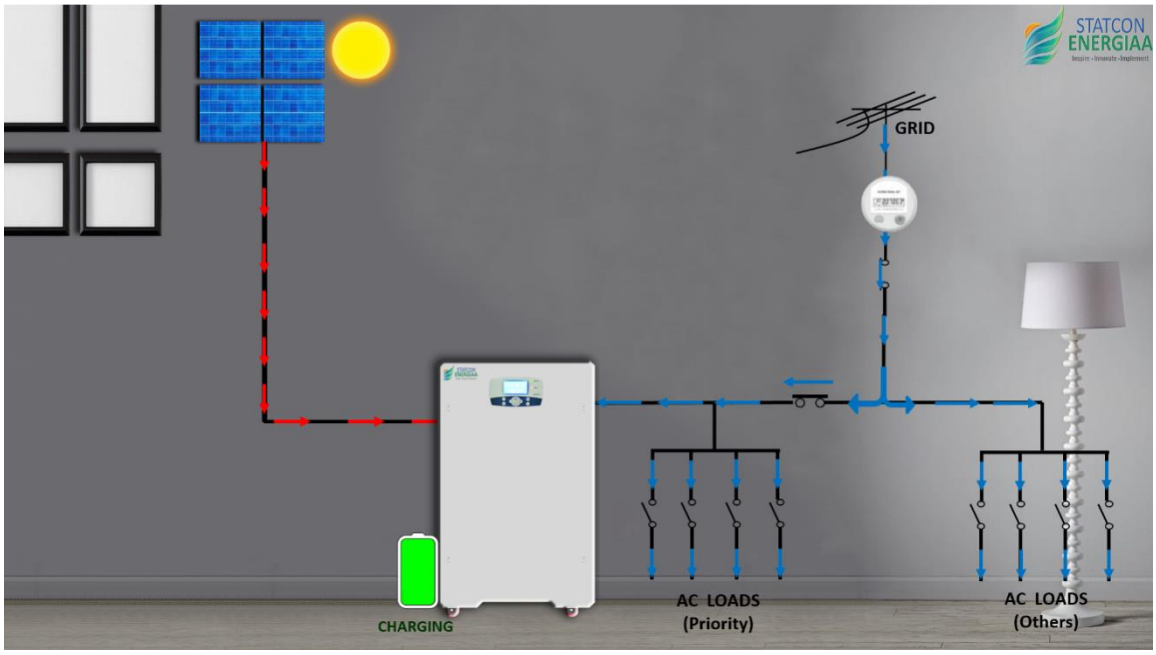
TYPE	$LiFePO_4$ (LFP type)
VOLTAGE	48 V DC
CAPACITY	3.6/4.8/7.2/9.6 KWH

3. PACKAGE CONTENTS

- **ESS**
- **Manual**
- **Test Report**
- **Fuse(optional)**
- **Connectors (optional)**

4. WORKING OF SYSTEM

A typical block diagram is shown the given figure involving the integration of SOLAR, GRID, BATTERY and GENSETS with the site loads. Inbuilt intelligence manages all the sources selectively to provide seamless power to the loads so as to incur minimum bills with optimum utilization.



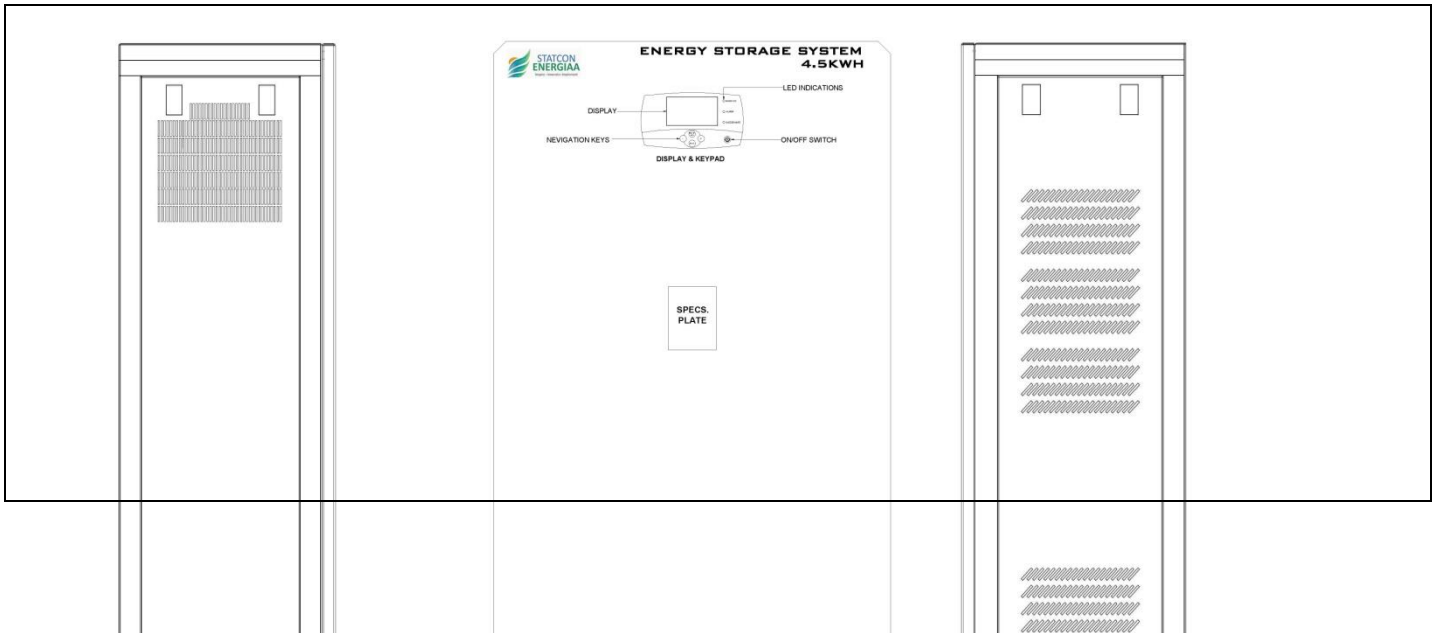
ENERGY FLOW DIAGRAM

II. PRODUCT NOMENCLATURE

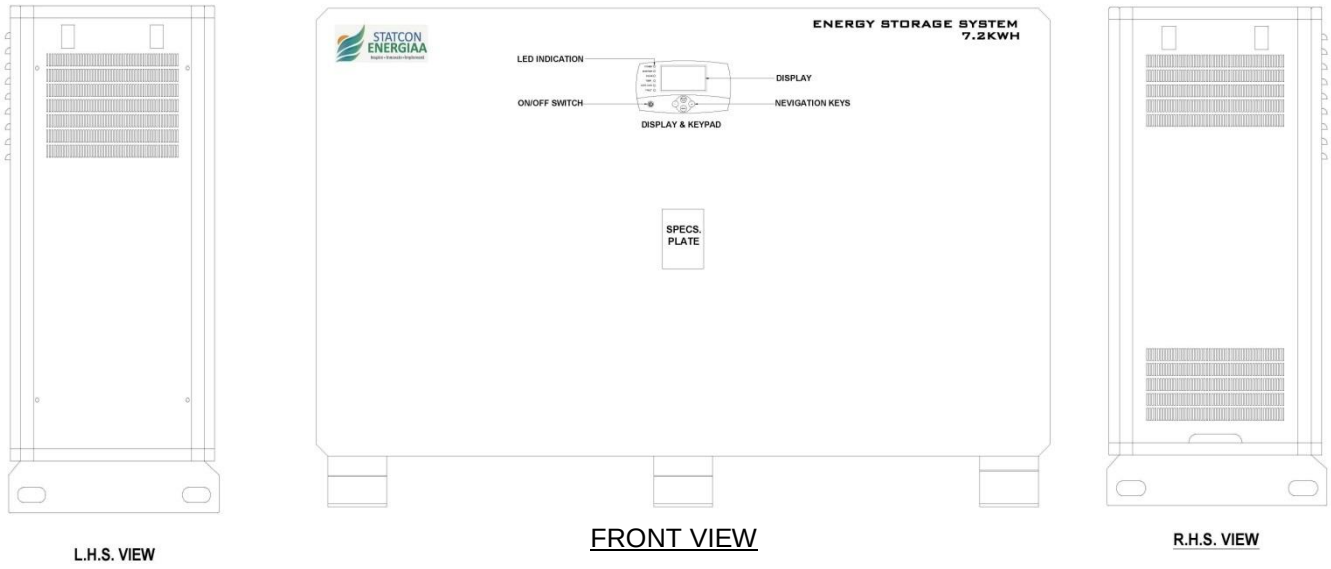
ESS-PGSLI-048-003K-1P-003M 1-11-C02-100AH

SYSTEM TYPE	ESS-PGSLI	ESS - PEGASUS LITHIUM
BATTERY VOLTAGE	048	48 V
KVA RATING OF INVERTER	003K	3KVA
PHASE	1P	SINGLE PHASE
kWp RATING OF MPPT CHARGER	003M	3KW SOLAR CHARGE CONTROLLER
NUMBER OF MPPT CHANNEL	1	SINGLE MPPT CHANNEL
LOAD TYPE	00 11	EXTENDED OVERLOADS STANDARD OVERLOADS
COMMUNICATION TYPE	C00 C01 C02	WITHOUT COMMUNICATION RS 485 COMMUNICATION GPRS COMMUNICATION
BATTERY CAPACITY	100AH	100AH CAPACITY

III. PRODUCT SCHEMATIC



PEGASUS Li+



SPHINX Li+

IV. SAFETY GUIDELINES

1. SYMBOL INDICATIONS

	Warning! Electrical Shock Hazard. Do Not Open. 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		**Caution! Risk Of Electric Shock!!**

2. GENERAL SAFETY RULES

- ✓ Installation, maintenance & repair should be done by trained & experienced persons only.
- ✓ Disconnect the battery, grid, solar panel & load before any service on the inverter to avoid electrocution.

- ✓ To disconnect the ESS, turn off the MCBs/switch/terminals on the ESS & remove the battery fuse holder.
- ✓ Use the ESS according to our instructions for operation.
- ✓ Metal bracelets, rings and other metal objects should be removed before touching the ESS to avoid contact with electricity carrying items.
- ✓ Dispose the battery through the Gov. 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.

3. PRECAUTIONS DURING INSTALLATION & REPAIR

- ✓ Grounding of ESS & 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 ESS 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.
- ✓ Avoid the contact with inverter if bare feet even if the machine is grounded properly. The body of the inverter may still be live with AC and DC voltages.

4. PRODUCT SAFEGUARDING

- ✓ Keep ventilation holes on the unit always open.
- ✓ The system works well in areas where temperature does not exceed the range between 0 ºC to 50 ºC.
- ✓ There should be no contact of the inside of the ESS with liquid of any kind as it may result in a shorting of the circuit.
- ✓ Dust free areas are preferred otherwise the performance may deteriorate over time resulting in a system failure.

V. INSTALLATION

1. UNPACKING & CONTENTS INSIDE

The ESS is supplied in standard cardboard/ wooden packing depending upon the size of the machine. Proper thermocol and cellophane sheet/bubble wrap is provided for protection against impact and water ingress. Still proper precautions are mandatory to prevent any damage due to mishandling or water ingress. Manufacturer shall not be responsible for any such damage during transport, unloading or storage at site.

Please take a few moments to unpack your new ESS by following the below given steps:

1. Unpack the wooden packing carefully.
2. Go through the rating plate and verify that the Model No. matches with that ordered.
3. Please open the doors of the inverter to check there are no hanging wires/connectors that may have resulted during the transport. This is just to be sure about the readiness of the unit before being powered up. In case something does not look OK, please contact us.

2. PLACEMENT

- ✓ This machine has high voltages of both AC and DC nature inside and hence should be kept away from access of children, infants or pets. Proper caution marks should be displayed close by to avoid any accidental conditions. Location should be chosen accordingly.
- ✓ This machine may be hot during operation and location should be such that any accidental, contact to this should be avoided.

- ✓ The room where this machine is placed should be of stationary nature with firm walls, base and roof. It should be well ventilated with a proper mechanism of fresh air entry and exhaust. Air conditioned room will ensure a more reliable functioning of this machine.
- ✓ Minimum clearances should be maintained on two sides of the ESS for ease of access. Ensure both side doors can easily be opened without obstruction.
- ✓ This machine is inflammable in nature and hence no high pressure items such as gas cylinders, gas pipe lines, sprays, hay etc should be close by. Please ensure presence of a fire extinguisher close by in case of emergency.
- ✓ Once the machine has been firmly secured in its place, open the side doors of the unit using the proper tool provided along with the machine for battery placement and cable connections.

3. CABLE CONNECTIONS

- ✓ Ensure that all the circuit breakers/ MCBs'/ MCCB's/ Dis-connectors are in OFF position before any connections are made.
- ✓ Locate the terminals on the side of ESS provided for connecting the external cables of PV, Mains and Load. All the terminals are with ring type connections.
- ✓ Use thimbles for proper connections

THIMBLE AND CONNECTIONS

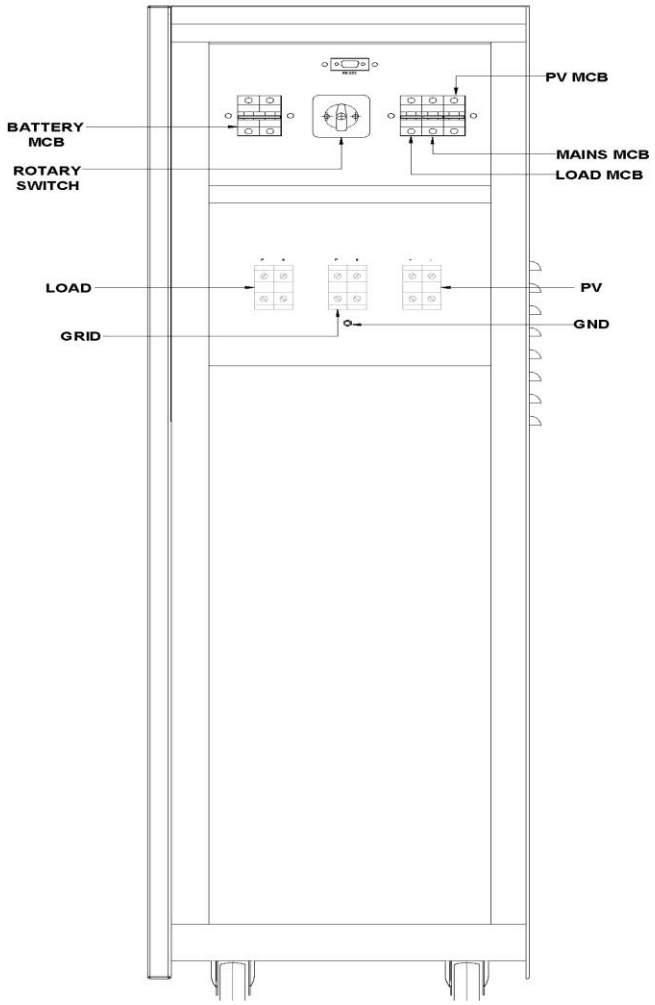
WIRING AND THIMBLE SIZE CHART (for reference)

ESS MODEL	MAINS WIRE (SQ. MM.)	LOAD WIRE (SQ. MM.)	PV WIRE (SQ. MM.)
48V/3KVA	4	2.5	10
48V/5KVA	6	2.5	25

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

- ✓ Follow the sequence of connections:

1. Always start with battery connections. Connect DC (-) followed by DC (+) terminals.
2. Connect the PV (-) followed by PV (+) cables.
3. Connect the MAINS (P) and MAINS (N).
4. Connect the load terminals in proper sequence.
5. Neutral of Grid and Neutral of Loads are connected to a common point to maintain the continuity of Neutral under all circumstances.

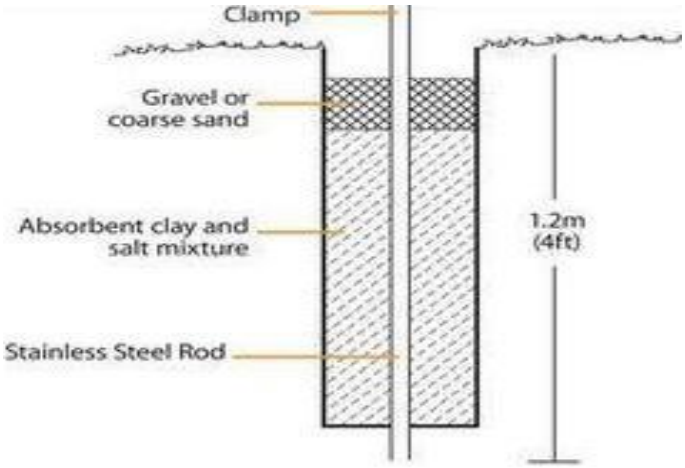


TERMINAL CONNECTIONS

- ✓ All terminals provided are of copper material only. Hence lugs used should be of copper only for homogeneity of contact. In case of Aluminium cable, bimetallic lugs are mandatory.
- ✓ Use proper spanners to tighten the nut/ bolts. Ensure that once tightened, all the lugs should be vertical. The conductors are carrying high currents and voltages; hence clearances between them should be maintained.
- ✓ Double check all the connections for polarity and type to avoid any malfunction later on.
- ✓ Double check the tightness of all the nut and bolts.
- ✓ It is recommended to route AC and DC cables with some minimum clearances in between.

4. EARTHING

- ✓ Earthing of any equipment is required to ensure that the chassis of the equipment is at ground potential & the user does not experience any shock in case of contact.
- ✓ Earthing is also needed to provide protection to device from lightening.
- ✓ Earthing kit contains rod & 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. Always ground the inverter using a minimum of $6mm^2$ copper cables. Avoid using aluminum cable for grounding of inverters.



EARTHING

- ✓ For earthing of our solar power energy system, connect the earth wire from PV panels and ESS to the common earthing of house.
- ✓ Inverter ground should not be connected to the PV structure ground or the light~~e~~ning arrestor ground.

VI. COMMISSIONING

Once the unit has been firmly secured and all the incoming/ outgoing cables properly connected, this machine is ready for being powered up. However, before we start please perform a couple of pre-checks, which are mandatory:

1. PRECHECKS BEFORE ENERGIZING

Now the unit is ready to be turned on, but to be double sure. Let's just perform a couple of checks:

- ➢ Body machine should be firmly connected to building earth.
- ➢ Check the battery connections as both positive and negative cables should be tight.
- ➢ Check the polarity of the connections visually or preferably through a multi meter.
- ➢ Check the value of battery voltage and it should match with the nominal battery voltage mentioned on the rating sticker of this machine.
- ➢ In case of discrepancy in any of the above rectify it or refer troubleshooting manual.

2. FIRST TIME ENERGIZING THE MACHINE

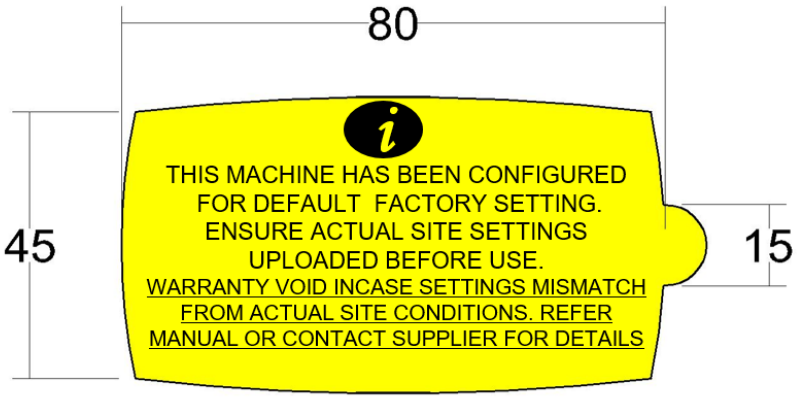
- ✓ Now turn on the battery MCB and with a pause of 1 second the machine should become live. There should be a sound of contactor and display should lit up with possibly a buzzer sound.
- ✓ Ensure that all the other circuit breakers (PV, Load and Grid) are in OFF position only.
- ✓ Before we proceed further and energize the loads we have to ensure that the settings in the machine supplied are correct to suit the site conditions. Please note that these machines are supplied with default settings and hence may or may not suit your requirements
- ✓ To change any kind of settings of this machine, the user needs to interact with the Display Keypad Unit (DKU) provided on the front side of this machine.

3. SETTINGS UPLOAD

To implement the change of settings we need to follow the below procedure in order:

I. Turn on the battery circuit breaker so that the unit is powered up. Ensure all the other circuit breakers -PV, Grid and Load are strictly in OFF condition.

II. The front panel will not be visible because of the below sticker pasted on the display unit. Remove the sticker to access the display-keypad panel. Remove the sticker only when you are updating the settings. This sticker is for one time use only and can be disposed off.



STICKER ON DISPLAY KEYPAD UNIT

III. On removing the sticker it can be found that the Display unit is live with an active Buzzer sound. Use the mute button to deactivate the buzzer sound.

IV. First Update the Time & Date and then press the reset button to arrive at the home page. (refer chapter on DKU for the Date and Time settings procedure)

V. Refer SYSTEM CONFIGURATION in detail given in the chapter on DISPLAY KEYPAD UNIT.

VI. Once the machine rating has been located on the initial test setting chart, move from left to right in that row and set the values one by one through the DKU. (For authorized personnel only)

VII. If required you can refer to our YOUTUBE videos on how to set these values as per site requirements.

VIII. Press back button to Save and Exit the settings once all the changes have been made. Double check that the change of settings made has been correctly updated by re-entering the settings MENU. Warranty shall be void in case there is a malfunction in the settings parameters and manufacturer shall not be held responsible for that.

IX. Turn off the Battery circuit breaker and wait for 2 minutes for the unit to completely turn off. Restart the unit by turning the Battery Circuit breaker ON again.

X. The required settings have been uploaded successfully and the unit is now ready for use.

4. POWER UP & LOAD TRANSFER

The unit is now ready for use and all the power sources Battery, PV and Grid can now be used to provide seamless power to the connected loads in the following manner.

I. Turn on the battery Circuit Breaker. The unit should power up within 1-2 seconds and the display should come up. Use the front display-keypad panel to view the battery voltage and other relevant parameters. Ensure that the battery is in charged condition.

II. Within 15 seconds the inverter should start providing AC 230V/ 415V output on the load terminals. The load circuit breaker should be in OFF condition at this moment.

III. Ensure that initially only a couple of loads such as bulbs/ CFL etc are connected. Turn on the Load circuit breaker and check that the connected loads are getting powered up. Check the display panel for the same. Now increase the loads one by one up to a maximum load of the capacity of inverter.

IV. Turn on the PV Circuit Breaker. Ensure PV power is available during this time. Also ensure that the PV series-parallel configuration is as recommended by the inverter manufacturer. Refer Appendix for more guidance. Ensure PV panels are clean for better generation.

V. Use a clamp meter to measure the PV current and PV Voltage.

VI. Next step is synchronizing the inverter with the Grid/ Mains. Check the Grid supply for voltage and frequency. It should be within the permissible range mentioned on datasheet or rating plate.

VII. Turn on the Grid circuit Breaker. Wait for 15 seconds.

VIII. Grid contactor will come up with a thud sound and grid will get synchronized to the inverter. Check the mimic page of display unit to see the grid synchronized with inverter output.

IX. The machine is now connected to all the power sources and the loads connected are getting powered up. The sequence of operation will depend on the mode selected.

It is recommended to keep all circuit breakers in ON position normally. The machine is intelligent enough to use the power sources only if required.

VII. DISPLAY KEYPAD UNIT

1. BUTTON DEFINITION

MUTE	Mute Active Alarms
MODE	Acknowledge Alarms/ Scroll to Next Display Screen
BACK	Previous Display Screen/ Move out of Sub Menu
PLUS	Increase Parameter Value/ Turn On System (if pressed for >3 sec.)
MINUS	Decrease Parameter Value/ Turn Off System (if pressed for >3 sec.)

BOOST	For internal use
TEST	For internal use
RESET	Turn off Alarm Mute/ Clear Fault/ Latch Reset Battery

2. LED DESCRIPTION

LABEL	INDICATION	MEANINGS
MAINS ON	**Green**	Green: Mains voltage is present within acceptable limits
ALARM	**Red**	No Flash: Normal condition Red : Abnormal condition occurs **NOTE:** Light will flash on and a buzzer will sound. The operator can acknowledge new alarms by pressing the MODE/ACK key. The light will then remain lit until the fault is cleared and the RESET key has been pressed to clear the latched alarms. See Appendix-1 "Display fault Analysis "for details.
BUZZER MUTE	**Yellow**	It lights up when the MUTE key has been pressed, indicates that alarm is silent. **NOTE:** The muting function will cancel by itself after 24 hours, or it may be manually cancelled by pressing the RESET key.

3. HOW TO IMPLEMENT OPERATIONS USING DISPLAY KEYPAD UNIT

All the operations, settings change and parameter viewing on display are performed using pushbuttons or combination of pushbuttons. In this section we describe some of the events that can be performed using the pushbutton keys provided on the DKU. Some these operations include:

- Date & Time Settings
- Scrolling through the various screens
- Turn ON and Turn OFF the Inverter Unit
- Resetting the Unit in case of fault occurrence
- Change of Settings

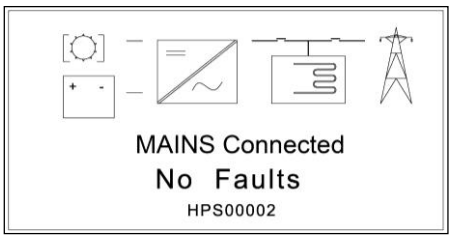
I. DATE & TIME SETTINGS

To set date and time press MODE/ACK button for 10sec then use Mode/ACK to move next and +/- to increment and decrement. Now set the date, time, year, and hour, minute and second one by one and accept the changes using RESET button until the display starts showing the Home Page.

II. SCROLLING PAGES

The active screen can be changed by pressing the MODE key to advance a screen and the BACK key to go back a screen. There are a total of 12 standard display screens of the DKU displaying the various parameters of the machine :

1. HOME PAGE



HOME PAGE/MIMIC

The Mimic has three lines, each of which has a specific set of data as:

- The first line shows the mode of operation in which the machine is at that moment of time. The operations are mains connected, Anti-Islanding, Standalone, boost charging, float Charge, Bulk charge, charge absorption, Invrt + Sync and System off. The details and understanding of all these modes have been explained later on.
- The 2nd line talks about the existing/ latched faults if any otherwise it will declare that there are no faults in the system. See Appendix-3 for possible faults and their troubleshooting.
- The 3rd line talks about the firmware version that has been uploaded in this machine. It is relevant if manufacturer recommends any update to the machine.

2. BATTERY AND PV STATUS SCREEN

TEXT DISPLAYED	INFERRED PARAMETER
DC Bus Volts	Battery Instantaneous Voltage.
Batt. Amps	Total current from or into the batteries (Positive value indicates batteries discharging).
CAPACITY %	Indicate battery charged capacity.
Solar Amps	Current being delivered by the solar system.
#press +/- to check the current drawn by other MPPT channels, if they are available. **#CAPACITY %**is not a relevant parameter for this system. It has been designed for a specific discharger application which requires additional hardware.	

3. TEMPERATURE STATUS SCREEN

TEXT DISPLAYED	INFERRED PARAMETER
Inv.1 Temp1	Indicating temperature of 1st switching device of Inverter's R-Phase (via heat sink)
Inv.1 Temp2	Indicating temperature of 2nd switching device of Inverter's R-Phase.
Batt. Temp1	Indicates Battery temperature.
Int/chg1 Temp	Temperature of MPPT section.
#press +/- to checkthe temperature of switch device using in **Y and B phase,** if they are available.	

4. AC PARAMETERS (PHASE-NEUTRAL)

TEXT DISPLAYED	INFERRED PARAMETER
Invert.1 AC Volts	R-Phase (Inverter) voltage with respect to neutral.
Invert.1 Freq	R-Phase (Inverter) frequency.
Mains1 AC Volts	R-Phase (Mains) voltage with respect to neutral.
Mains1 Freq	R-Phase (Mains) frequency.
#press +/- to check the voltage and frequency of **Y and B phase**, if they are available.	

TEXT DISPLAYED	INFERRED PARAMETER
Load AC Amps	Total current consumed by load from inverter as well as grid
Invert. AC Amps	Current delivered by inverter section
Invert. AC kVAR	Inverter reactive power for each phase
Mains AC kw	Total power delivered by Grid

Load AC kw	Total power consumed by load
Invert. AC kw	Total power delivered by Inverter section

5. CURRENT SCREEN

6. POWER SCREEN

TEXT DISPLAYED	INFERRED PARAMETER
Load Max kw	Maximum overall kW load running on three phase.
Load Avg kw	Average load running on all three phases and it will update in every 5 Minutes
Mains Max kw	Maximum kW Power is drawing from Grid/Mains.
Mains Avg kw	R-Phase (Mains) frequency.
Load P.F.1	load power factor
Mains P.F.1	Mains power factor
Mains Avg kw	Average power delivered/taken from Grid by three phases. It will update in every 5 minutes
# PFand**max kW**are on same line but at alternate time.	

7. GENERATION SCREEN

TEXT DISPLAYED	INFERRED PARAMETER
Import kwh	Total Energy consumed from Mains/Grid
Export kwh	Total Energy delivered by Inverter to Load/Grid
Run Time	Total running time of Inverter
Solar kWh	Total kilowatt hour power delivered by solar

8. ENVIRONMENTAL

This parameter is not valid for this machine.

III. TURN ON AND TURN OFF THE INVERTER UNIT

Whenever any of the stable sources of power is turned on (i.e. battery or grid), the DKU immediately powers up. In case battery is ON, then inverter mode starts with a time delay of 15 seconds. In case only grid is on, then grid contactor connects to the load (in Bypass Mode). The machine can be turned ON or OFF using the (+) and the (-) buttons respectively within 3 seconds.

NOTE: This operation will TURN ON/TURN OFF only the electronics. All the DC and AC sides will be live and the status of all the circuit breakers will remain as it is.

IV. FAULT RESET OF INVERTER

For normal category faults such as overloads, short circuit, AC UV and AC OV are auto reset in 60 seconds. In case you want to manually reset it without waiting for 60 seconds, you can press RESET button. In case of few critical faults manual RESET has to be done using the keypad once the fault has been cleared.

V. CHANGE OF SETTINGS

The settings change should be performed by authorized personnel only and whenever any such changes are made, manufacturer should be intimated about this. In case of faulty settings, the warranty of the machine may be void.These KEYS if pressed together for 5 seconds give access to the settings inside the DKU:

On entering configuration menu, following settings are accessible….

MAIN CHART

PRESS MODE/ACK TO

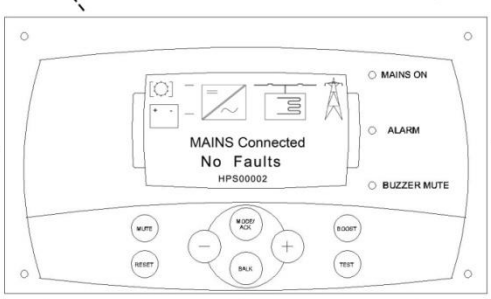
1) Float & Boost Charging Setup
1) Float Voltage
2) Bulk Voltage
3) Bulk Restart Voltage
4) Bulk Time out
5) Absorb time out
6) Boost Voltage
7) Auto Boost Timer
8) Boost Timeout
9) Mains Volts Slow charging
10) Mains volts stop charging
11) Charging eff.

2.Alarm & TRIP SETTING
1.LO Volts Alarm
2.LO Volts alarm time
3.HI Volts Alarm
4.HI Volts Alarm Time
5.Load Threshold

3.Battery Test Setup
1.Battery Test
2.Max. Impedance
3.Battery test cycle

4.Inhibit & Latch setting
1.Temp comp Enable
2.Boost Enable
3.Fahrenheit Enable
4.Genset Enable
5.Flash Amber
6.Auto Batt Test
7.Auto Start
8.Schedule Export
9.Schedule Charge
10. Charge Inhibit
11. Schedule Island
12. Monitor inputs
13. Aux. Batt Amps Sense
14. Island Needs mains present
15. Island initially
16. AVR Enable
17. Backlight Timer
18. Extend Logging

PRESS + TO NAVIGATE AHEAD



9.Factory setting
1.System Type
2.Max. Batt. Current
3.Nominal Voltage
4.Min Mains voltage
5.Max Mains voltage
6.Min Mains Freq
7.Max Mains Freq
8.Mains Loss delay
9.Balancing Current

5.System Definition Setup
1 Serial No.
2 Temp Comp Factor
3 No. Cells
4 MPPT min
5 MPPT MAX
6 Global Scan period
7 New Security code

8.Auto Schedule Setting
1 AC Charge On Lv1
2 AC Charge Off Lv1
3 Event1 Time
4 Event 1 Type
5 Event 2 Time
6 Event 2 Type
7 Event 3 Time
8 Event 3 Type
9 Event 4 Time
10 Event 4 Type
11 Event 5 Time
12 Event 5 Type
13 Event 6 Time
14 Event 6 Type
15 Event 7 Time
16 Event 7 Type
17 Event 8 Time
18 Event 8 Type
19 Export Watts
20 Export VARs
21 Min SOC Export%
22 Min SOC Island%
23 Charge Inhibit time
24 Schedule test
25 Import Ramp time
26 Export Ramp Time

7.Communication Setup
1 SMA Bus Enable
2 Modbus Adder
3 Baud Rate
4 DNP3 Addr
5 Ethernet DHCP
6 Local IP Addrr
7 Local IP Mask
8 Gateway IP Addr
9 Client IP Addr
10 Client IP Mask
11 SMTP Server IP Addr
12 SMS Prefix
13 SMS Suffix
14 Access PIN CODE
15 Report period
16 Log Period

6.Metering calibration
1.Battery Volt Call
2.Batt. Amp. Call off sets
3.Batt Amp. Cal

 # Press –TO GO BACK

#Each of these may or may not be password protected, which can be changed whenever required. Each of these contains a bunch of set points which can be changed as per the requirement.

SYSTEM CONFIGURATION

1. FLOAT & BOOST CHARGING SETUP

These settings are not required for ESS type of Systems

2. ALARM & TRIP SETTING

Path: Menu> Press# **+/-** button>Alarm & Trip Setting.

Press# Mode/Ack to enter sub menu. And use **+/-** buttons to set the parameter.

SECURED MENU CODE-100(default)

Parameter	Meaning	Value
LO Volts Alarm	Battery low voltage Alarm	Do not change default value
LO Volts alarm time	Low voltage alarm duration	Do not change default value
HI Volts Alarm	Battery high voltage Alarm	Do not change default value
HI Volts Alarm time	High voltage alarm duration	Do not change default value
Load threshold	It defines Minimum power before load is considered present (inverter) Minimum array power before disconnection (Grid Feed)	2% of rated capacity
MG Droop start frequency	Special feature for AC coupled system	Do not change default value
MG Droop stop frequency	Special feature for AC coupled system	Do not change default value
MGDroop threshold frequency	Special feature for AC coupled system	Do not change default value

3. BATTERY TEST SETUP

CAUTION! Do not change these settings yourselves without informing the servicing team. Incorrect settings may result in system breakdown.

Path: Menu> Press# **+/-** button> Battery Test Setup.

Press# Mode/Ack to enter sub menu. And use **+/-** buttons to set the parameter.

SECURED MENU CODE-100(default)

Parameter	Meaning	Value
Battery test	Not for use	Do not change default value
Max. Impedance	Not for use	Do not change default value
Battery Test Cycle	Not for use	Do not change default value

4. INHIBIT & LATCH SETTINGS

CAUTION! Do not change these settings yourselves without informing the servicing team. Incorrect settings may result in system breakdown.

Path: Menu> Press# **+/-** button> Inhibit & latch Settings.

Press# Mode/Ack to enter sub menu. And use **+/-** buttons to set the parameter.

SECURED MENU CODE-100(default)

Parameter	Meaning	Value

Temp comp Enable	Enable battery temperature compensation	Off
Boost Enable	Enable boost equalization	Off
Fahrenheit Enable	Temperature unit configuration	Off
Genset Enable	Enables automatic Genset changeover if mains is not present	Off
HVDC Enable	High voltage inverter application	Off
Auto Batt Test	Not for use	Off
Auto Start	Enable inverter's automatic starting	On
Schedule Export	Enables automatically scheduled grid export	On
Schedule Charge	Enables automatically scheduled battery charging	On
Charge Inhibit	Enables automatic inhibit of battery charging	On
Schedule Island	Enables automatic grid disconnection	On
Monitor inputs	Not for use	Off
Aux. Batt Amps Sense	Not for use	Off
Island Needs mains present	Not for use	Off
Island initially	Not for use	On
AVR Enable	Not for use	Off
Backlight Timer	Display standby timing. Display light will be automatically off after 5 minute.	On
Extend Logging	Not for use	Off

5. SYSTEM DEFINITION SETUP

For Authorised service personnel only

6. METER CALIBRATION

For Authorised service personnel only

7. COMMUNICATION SETUP

CAUTION! Do not change these settings yourselves without informing the servicing team. Incorrect settings may result in system breakdown.

Path: Menu> Press# **+/-** button>Communication Setup.

Press# Mode/Ack to enter sub menu. And use **+/-** buttons to set the parameter.

SECURED MENU CODE-100(default)

Parameter	Meaning	Value
ModBus Addr	Modbus Address of Supervisory	001
Baud Rate	For internal uses	9600
DNP3 Addr	Not for use	Do not change default value
Ethernet DHCP		
Local IP Addr		
Local IP Mask		
Gateway IP Addr		
Client IP Addr		
Client IP Mask		
SMTP Server IP Addr		

SMS Prefix		
SMS Suffix		
Access PIN CODE		
Report period		
Log Period		
Solar kWh	Total solar energy (in kWh) generated till now	Enable (Do not change default value)

8. AUTO SCHEDULE SETTINGS

CAUTION! Do not change these settings yourselves without informing the servicing team. Incorrect settings may result in system breakdown.

Path: Menu> Press# (**+**) button (7 times)> Auto Schedule Settings.

Press# Mode/Ack to enter sub menu. In addition, use **+/-** buttons to set the parameter.

Parameter	**Meaning**	**Value**
AC Charge On Lv1	It is minimum voltage at which grid start to charge battery system if battery is under voltage	N.A for ESS
AC Charge Off Lv1	It is maximum voltage at which grid start to charge battery system if battery is full charged.	N.A for ESS
Event1 Time	Programs scheduled event to occur daily at the nominated time. The event can be charge inhibit (inhibit), charge, export, off, island or standby.	
Event 1 Type		
Event 2 Time		
Event 2 Type		
Event 3 Time		
Event 3 Type		
Event 4 Time		
Event 4 Type		
Event5 Time		
Event 5 Type		
Event 6 Time		
Event 6 Type		
Event 7 Time		
Event 7 Type		
Event 8 Time		
Event 8 Type		
Export Watts	Maximum amount of real power that can be exported to the bus to maintain the Battery voltage.	N.A for ESS
Export VARs	Sets the number of constant VARs to inject during grid support mode.	0

Min SOC Export%	Sets the minimum state of charge that the battery is allowed to operate to during scheduled grid disconnect and scheduled grid export operation. This prevents excessive battery cycling, extending battery life.	0%
Min SOC Island%	The level at which inverter should stop feeding the load	0%
Charge Inhibit time	Sets the minimum number of minutes to inhibit the charging if the charge inhibit line is asserted and the released.	15 minute
Import Ramp time	Sets the number of seconds the system should take to ramp to maximum charging power.	60 Sec
Export Ramp Time	Sets the number of seconds the system should take to ramp to maximum export power.	4 Sec

9. **FACTORY SETTINGS**

CAUTION! Do not change these settings yourselves without informing the servicing team. Incorrect settings may result in system breakdown.

Path: Menu> Press# (**+**) button (8 times)> Factory Settings.

Press# Mode/Ack to enter sub menu. And use **+/-** buttons to set the parameter.

SECURED MENU CODE-200(default)

Parameter	Meaning	Value
System Type	It defines System Type	2
Max. Batt. Current	Maximum current permissible for battery charging. This set points control the maximum amount of combined renewable and Inverter charging current into battery.	N.A for ESS
Nominal Voltage	It is the recommended operating voltage given by the manufacturer. It is always in safety region of rated voltage	240 V
Min Mains voltage	It is minimum rated voltage at which system is designed. Below the minimum level of this parameter system does not connect with grid.	-20% of Nominal voltage
Max Mains voltage	It is maximum rated voltage at which system is designed. Below the minimum level of this parameter system does not connect with grid.	10% of Nominal Voltage
Min Mains Freq	It is minimum rated frequency at which system is designed. Below the minimum level of this parameter system does not connect with grid.	-5% of Nominal Frequency
Max Mains Freq	It is maximum rated frequency at which system is designed. Below the minimum level of this parameter system does not connect with grid.	5% of Nominal Frequency
Mains Loss delay	Not for use	Do not change default value
Balancing Current	Not for use	Do not change default value

VIII. APPENDIX

1. CABLE SIZING CHART FOR INPUT/ OUTPUT CONNECTIONS

Some important parameters to be kept in mind while cable sizing are as below:

- ✓ Lower is the size of the cable, more are the power losses and lower is the efficiency. Hence always opt for higher thickness of cables.
- ✓ Lesser are the cable distances, lesser are the power losses and more is the efficiency. Hence, always try to minimize the distance of cables from machine to other components such as AJB, Battery, ACDB etc.

- ✓ More is the current in any path, more are the losses. Hence always bother about the sizing (gauge and length) of higher current paths first.
- ✓ DC side losses are always higher than the AC side losses. Hence always give preference to minimize DC side losses through #1, #2 and #3.
- ✓ Inverter machines are provided with copper type connectors. SO, always give preference to copper conductors and avoid using aluminum conductors.
- ✓ In case of aluminum cables, ensure to use bimetallic lugs while making connections on the inverter side.
- ✓ Always check the permissible conductor size/ Lug size mentioned in the datasheet of any Inverter. Using a matched lug size is very important for proper current flow. If not proper, it may lead to fire hazards ultimately.
- ✓ Routing of cables also has an effect on the sizing depending upon weather the route is through open or enclosed in cable tray.
- ✓ Always route the DC and AC cables separately as it may hamper EMI/ EMC performance of the machine.
- ✓ In case of 3 Phase inverters never use a 3 ½ core cable because this inverter supports imbalanced loads on the AC side. Hence neutral wire should always be sized at least 1.25 times the phase current.
- ✓ Follow proper IEC standards for cable sizing in AC and DC. Sample chart has been shown below for the AC and DC cable sizing. In case the lengths are more than 10 meters, always opt for one size higher. Please be noted that values given in the chart are just for reference and user shall be entirely responsible for the selection.

AS PER IEC-3961-PART-V:

S. No	Wire Cross Section Area (mm^2)	Single Phase AC/DC (A)
1	1	12
2	1.5	16
3	2.5	22
4	4.0	29
5	6.0	37
6	10	51
7	16	68
8	25	86
9	35	110
10	50	145
11	70	215
12	95	260

2. PV MODULE ARRAY SERIES-PARALLEL ARRANGEMENT

ESS containing hybrid inverter machines are basically DC coupled Solar inverters which have an inbuilt but separate MPPT solar Charger between the PV and the Battery. This Solar MPPT charger is of Buck type which strictly means that PV power will be extracted only when the PV voltage is higher than the battery voltage at that instant. Hence, the series parallel arrangement becomes very important for proper functioning and best generation results. So, before we present the PV sizing chart, we would like to highlight a few points about the series-parallel arrangement of PV modules:

1. Always keep information handy about the PV module you are going to use. This includes: Open-Circuit Voltage (Voc), MPPT Voltage (Vmp), Short-Circuit Current (Isc), MPPT Current (Imp), Module Power (Pmp) and no. of cells in PV module used.
2. Always refer the Inverter datasheet while designing the series parallel arrangement. The parameters of importance include:

- ➢ PV Nominal Capacity (Total)

- No of MPPT Channels
- Per Channel PV Capacity (Nominal/ Peak)
- Max. Open Circuit PV Volts (Voc)
- MPPT Voltage Range
- PV Minimum Voltage
- Max I/P Amps per channel

3. More are the number of modules in series, higher is the plant efficiency and higher is the generation from PV modules. But there is a limit to maximum number of modules mentioned in the inverter datasheet.
4. Never exceed the Max. Open circuit Voltage permitted by the inverter datasheet. This value is mentioned as Max. Open circuit PV Volts (Voc) in the inverter datasheet
5. Open circuit voltage of PV module increases in cold season due to module characteristics and hence always keep a margin between the System Voc and permissible Voc mentioned in the datasheet.
6. The number of strings in parallel should always be kept as low as possible. Also, the summation of all the string currents should always be less than the Max I/P amps per channel mentioned in the datasheet of inverter.
7. (In case of multi MPPT channel designs (above 50KVA generally) distribute the no of modules equally among all the 3 MPPT channels for better generation.)
8. In case of multi MPPT channels ensure 3 separate PV fields are made. That is, do not combine all the PV modules in a single AJB and then bring 3 separate set of cables for 3 MPPT chargers in Multi MPPT inverters. This will hamper the PV generation as MPPT function will not take place at all.
9. Series parallel arrangement of PV modules is dependent on the inverter being used. It may differ from one make of inverter to other. Please consult the Inverter manufacturer before usage for proper generation.

PV CONFIGURATION CHART

BATTERY VOLTAGE	NOMINAL PV CAPACITY PER CHANNEL	PEAKPV CAPACITY PER CHANNEL	TOTAL MODULES	315Wp/ 72 CELLS	
				MODULES IN SERIES	NUMBER OF STRINGS
48	**3000**	**3300**	**9**	3	3
	5000	**5500**	**15**	3	5

NOTE: In these cases, it is not possible to achieve the exact kWp capacity using the said series-parallel combination. Hence, the achieved kWp capacity is slightly more or slightly less than the required kWp capacity.

3. TROUBLESHOOTING

DISPLAY FAULT ANALYSIS

The second line of the screen shows the alarms that have been raised. If no alarms are active, the message. 'No Faults' is shown. The possible faults and their meanings are as follows:

Sl. No	DISPLAY FAULT	MEANS	CAUSE	ACTION
1	LO AC Volts	Low Mains Voltage.	The voltage on the grid source that was on-line was too low and out of range and the source has been disconnected.	**1.** Check whether Mains is available or not. **2.** If fault remain persists contact our Technical personnel.
2	HI AC Volts	High Mains Voltage	The voltage from the source that was on-line was too high and out of range and the source has been disconnected.	**3.** Some time grid voltage comes out of range. And cross the maximum permissible voltage. Check the voltage and wait till mains come within range.

3	HI Inverter Volts	The inverter voltage became high and out of range.	The fault could have been caused by the inverter voltage tolerance settings being narrower than the source voltage tolerance and the inverter was set up to track the source voltage.	**4.** Reduce your source high voltage tolerance. The inverter may not operate continuously at more than ±2% of its nominal voltage rating (at standalone mode) and +10%/-20% (In synch mode). **5.** Menu/factory setting/Min Mains voltage and Max Mains Voltage. **6.** Contact our Technical Support **7.** Note: The inverter will attempt restart 3 times after every 1 minute to clear this fault. If fault is not cleared the inverter will shut down.
4	Inv. Trip	The Inverter current exceeded its safety limit.	Sometime system get abrupt changes in itself, it can be due to high current change during synchronization, short circuit at connected load, battery beyond to its DOD level, Overload.	**8.** Make sure if there is no any short circuit. It can be damage system. **9.** Check DC voltage, whether it is above to its end cell voltage. **10.** Press Reset button on main display. System will try to start again. **11.** Contact our technical personnel, if needed. **12.** Note: The inverter will attempt restart 3 times after every 1 minute to clear this fault. If fault is not cleared the inverter will shut down.
5	HI AC Load	The apparent power of the load exceeded the overload limits	The load on the inverter exceeds the inverter rating. The inverter will have stopped to prevent overheating or damage to itself.	**13.** Reduce Load and press Reset button. **14.** If problem continue contact to our technical personnel. **15.** Note: The inverter will attempt restart 3 times after every 1 minute to clear this fault. If fault is not cleared the inverter will shut down.
6	HI AC AMPS	The Inverter current exceeded beyond limit.	The system has detected a high current or dc voltage disturbance and has temporarily shut down. This fault is similar to a current limit fault except that it could not be traced to a specific line. This fault could also be caused if the battery voltage rises above the hardware protection but is still below the high dc voltage setting.	**16.** Carry out Fault Reset **17.** Contact Technical Support. **18.** Note: The inverter will attempt restart 3 times after every 1 minute to clear this fault. If fault is not cleared the inverter will shut down.
7	LO DC Volts	Battery is heavily discharge	This fault could be occurs when there is no Solar and grid available for many time. Internal losses of the battery down its gravity. Then battery is not able to start the inverter.	**19.** Charge battery immediately to prevent permanent damage.
8	HI DC Volts	The Battery voltage sensing is reporting an invalid measurement.	The battery voltage has exceeded its safe high limit. The solar regulator will be tripped and if the fault persists the source will be masked. If the condition still persists the inverter is masked	**20.** Make sure that there are no external DC sources (solar/wind) that are not controlled by the ESS System that could cause the battery to overcharge.

			eventually.	**21.** If fault continues contact Technical Support
9	HI Temp	Cabinet ambient temperature is high	The inverter heat sink temperature on this system is too high and the inverter has shut down to protect itself again permanent damage. System gets tripped and supply load in bypass mode.	**22.** Reduce the load for 15 minutes so that temperature can lower. **23.** Check for any wiring damaged. **24.** Contact our Technical personnel.
10	Inv. Temp Sense	The Inverter heat sink temperature is too high to operate the Inverter	The inverter heat sink temperature on this system is too high and the inverter has shut down to protect itself again permanent damage. System gets tripped and supply load in bypass mode.	**25.** . Reduce load and Wait 15 minutes for heat sink to cool and carry out Fault Reset. **26.** If fault continues contact Technical Support **27.** Note: The inverter will attempt restart 3 times after every 1 minute to clear this fault. If fault is not cleared the inverter will shut down.
11	LO AC Freq	Low AC Source Frequency	The frequency from the source that was on-line was too high and out of range and the source has been disconnected. If the source was a generator then the system will attempt to start and connect to it four times. If the fault is still present the system selects another generator as the source.	**28.** Repair or replace source. **29.** If fault continues contact Technical Support
12	HI AC Freq	High AC Source Frequency	The frequency from the source that was on-line was too high and out of range and the source has been disconnected. If the source was a generator then the system will attempt to start and connect to it four times. If the fault is still present the system selects another generator as the source.	**30.** Repair or replace source. **31.** If fault continues contact Technical personnel.
13	Batt. Temp Sense	High Battery Temperature	The battery temperature is too high. The system should automatically reduce the battery voltage in an attempt to regulate the battery temperature. This requires the battery temperature compensation and charge voltages to be set up correctly. If the temperature cannot be regulated the system will trip the solar regulator in an attempt to reduce the battery temperature. If still unsuccessful the system will mask the inverter and continue running off a source.	**32.** Disconnect batteries **33.** Wait 15 minutes for battery to cool. **34.** If fault continues contact Technical personnel.

14	DC Offset		The Inverter control is experiencing an excessively large DC offset.	**35.** Contact our technical personnel.
15	COMMS Fail	Communication fails	The Inverter controller is not communicating with the supervisory system.	**36.** Open front door and check is the wire, FRC Cable for any loose or damage. **37.** Contact our technical personnel.
16	MAINS Relay	The Mains change-over relay is not engaging		**38.** Contact our technical personnel.
# FOR ANY OTHER QUERY OR ASSISTANCE PLEASE VISIT www.energiaa.in				

4. HOW TO SELECT OPERATING MODE OF YOUR CHOICE

The sequence of power from Solar PV, Grid, DG and Battery depends on the mode of operation. Hence we will first discuss the pros and cons of each of the three modes:

OFF-GRID MODE

1. Order of Priority here is PV > Battery > Grid.
2. Lesser consumption of grid power which is used only if PV and Battery are not able to meet the load demand.
3. Good for areas where grid is available all the time of the power cut is at a fixed time of the day. This is because grid should be available at the time when PV and battery are no more available.
4. Number of charge-discharge cycle of battery is high which may cause battery end-of-life to reach soon.
5. Incase of weak grid availability this may not be a good option. Grid may be available when battery is getting discharged. Once batteries are drained, grid may or may not be available. This may lead to complete black outs.
6. Chances are high that battery may remain in shallow charge condition ultimately leading to shorter battery life.
7. In case of rainy season, grid shall charge battery and once charged, inverter shall take over and again batteries shall get discharged. Hence the overall losses involved due to Power Electronics are double. Hence to deliver the same units to the load, more grid units shall be consumed.

HYBRID MODE

1. Order of Priority is PV > Grid > Battery.
2. Grid power will be given preference over battery in case PV power is not able to meet load demand
3. Grid output synchronizes with inverter output and hence shares the load demand.
4. Battery remains in top of charge as long as grid is available and hence has a longer life.
5. Lesser number of charge discharge cycles increases the battery life.
6. Lesser chances of power blackout because battery is always the last alternative.
7. Better system efficiency because PV charges the battery and grid caters to loads and hence inverter conversion efficiencies are not involved in normal scenario.
8. In this mode, surge loads do not cause any stress on inverter or battery as the peaks of the surge is shared by the grid supply.
9. In case of widely varying Grid, load end voltage varies just like the Grid voltage. This is because the inverter voltage tracks the grid voltage for synchronization. This may not be good for some sensitive appliances. A fix to this problem is by reducing the grid window range as per requirement.
10. Grid units consumed may be high in areas where there are no power cuts and loads are also partial. Solution to this is the following discussed mode.

11. In case of partial loads and battery charged, there are chances that PV power is available but not getting utilized. This will lead to poor PV generation as power export is not allowed.

HYBRID MODE WITH EXPORT

1. Order of Priority is PV > Grid > Battery along with export of PV power allowed.
2. This mode is same as hybrid mode with the additional feature of allowing PV power being exported beyond the grid terminals. To explain this further, PV power will be used to charge battery and cater to loads. In case of deficit, grid will share the burden. In case PV power is excess and not being utilized then it will be exported in to the grid terminals.
3. This mode should be permitted only if net metering is allowed in the building or the over load building loads are very high as compared to the PV connected so that all the PV power is consumed within the building and no PV power is exported beyond the utility meter.
4. This mode gives excellent PV generation because of the export feature.
5. In case there are a lot of captive loads (not connected directly to PCU) then can also utilize the PV power as long as grid is available and the PV power is excess.
6. In case of weak grid areas (where supply voltages are low), this mode tends to stabilize the Grid supply.
7. In case DG is connected and PV excess power available, then PV power may be fed through grid terminals to the Grid and may incur damages.
8. In this mode, battery power is never exported to grid unless commanded externally (available in selected models only).

NOTE: Apart from this it is important to locate the MASTER CARD provided on the control panel which houses the necessary jumpers for change in MODE settings. The location of this MASTER CARD has been kept slightly off-the –access so as to avoid unwanted changes done. Please contact the manufacturer to locate this card in case of problem

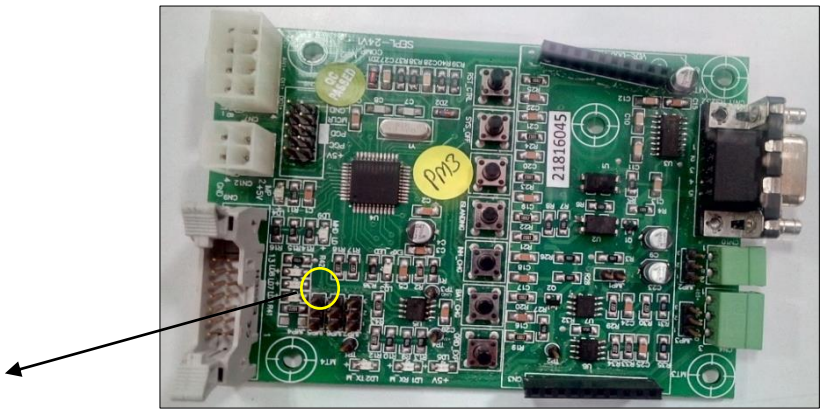
Refer the below chart to implement the changes

Sl. No.	Existing Mode	New Mode	Changes in DKU**	Jumper change in New Card
1	Off-Grid	Hybrid	Only change **Ac charge start:** Off-Grid/Hybrid/Hybrid with Export Mode : 1.92 X Battery Voltage/2 **Ac charger stop:** Off-Grid : 2.39 X Battery Voltage/2; Hybrid/Hybrid with Export :2.58*Battery Voltage/2	Ensure jumper is connected to JMP5 pin 2 and 3 in CC21 (SEPL-24V1) Ref. below figure
2	Off-Grid	Hybrid with Export	Only change **Ac charge start:** Off-Grid/Hybrid/Hybrid with Export Mode : 1.92 X Battery Voltage/2 **Ac charger stop**: Off-Grid : 2.39 X Battery Voltage/2; Hybrid/Hybrid with Export :2.58*Battery Voltage/2	No change in jumper
3	Hybrid	Off-Grid	Only change **Ac charge start:** Off-Grid/Hybrid/Hybrid with Export Mode : 1.92 X Battery Voltage/2 **Ac charger stop:** Off-Grid : 2.39 X Battery Voltage/2; Hybrid/Hybrid with Export :2.58*Battery Voltage/2	No change in jumper

4	Hybrid	Hybrid with Export	No change in DKU	Remove the jumper from JMP5 in CC21 (SEPL-24V1) Ref. below figure
5	Hybrid with Export	Off-Grid	Only change **Ac charge start:** Off-Grid/Hybrid/Hybrid with Export Mode : 1.92 X Battery Voltage/2 **Ac charger stop**: Off-Grid : 2.39 X Battery Voltage/2; Hybrid/Hybrid with Export :2.58*Battery Voltage/2	No change in jumper
6	Hybrid with Export	Hybrid	No change in DKU	Connect the jumper to JMP5 pin 2 and 3 in CC21 (SEPL-24V1) Ref. below figure

#Please **TURN OFF Load, Grid** and **PV MCB** whenever changes are being made to the MODE OF OPERATION. Only battery MCB/ MCCB should be on when changes are being made in MODE OF OPERATION.

******To change AC charge start and stop settings please follow CHANGE OF SETTINGS procedure to enter into **AUTO SCHEDULE SETTING SECTION**



Pin no. 2&3 for SEPL24V1

5. SINGLE PHASE ENERGY STORAGE SYSTEM DATASHEET

INVERTER (VA)		3000	5000
A. SOLAR CHARGE CONTROLLER (SCC)			
1	Charger Type & Topology	Buck Type MPPT	
3	PV Total Nominal Capacity (W)	3000	5000
4	No of MPPT Channels	1	1
5	Per Channel PV Capacity (W) (Nominal/ Peak)	3000/3300	5000/5500
6	Max. Open Circuit PV Volts (Voc)	165	165
7	MPPT Voltage Range (Volts)	66-137	66-137
8	PV Minimum Voltage (Volts)	53	53
9	Max I/P Amps per channel (Amps)	45	76
10	Max Battery Amps during PV charging (Amps)	47	81
11	Max SCC O/P (Amps)	53	87
12	Battery type Supported	LFP,LMLA	
13	Min. Battery AH Required (AH)	120	
14	Peak Charging Efficiency (%)	92	
B. SOLAR INVERTER			
1	No of Phases/Connection Type	**1-phase/2 wire**	**1-phase/2 wire**
2	Nominal Battery Voltage (Volts)	**48**	**48**
3	Nominal Output Voltage/ Frequency (Volts/ Hz)	**240/50**	**240/50**
5	Nominal Capacity (W) (Total/ Per Phase)(*4)	**2400/2400**	**4000/4000**
6	Output Amps per Phase (*4)	**10**	**17**
7	Voltage Regulation (in Standalone Mode)	**±2%**	**±2%**
8	Freq. Regulation (in Standalone Mode)	**+/- 0.5 Hz**	**+/- 0.5 Hz**
9	THD	**< than 5 %**	**< than 5 %**
10	Load Power Factor	**0.8 lag to unity**	**0.8 lag to unity**
11	Efficiency (%): Peak/ 100% Load/20% Load	**>90/ >89/ >80**	**>90/ >89/ >80**
12	Over Loads (%): 60 sec/ 30 sec/ 5 sec*	**110/ 125/ 150**	**110/ 125/ 150**
13	Max Allowed Phase Imbalance (%)	**NA**	**NA**
14	Auto Bypass Feature(*3)	✓	✓
16	Parallel Operation with Grid/ DG	✓	✓
16	Power Export to Grid Facility	✓	✓
17	Anti Islanding from Grid	✓	✓
C. GRID CHARGER			
1	Grid Voltage Range (Voltage Sync. Range)	**+10 % -20 %**	**+10 % -20 %**
2	Grid Frequency range (Freq. Sync Range)	**±5Hz**	**±5Hz**
3	Max Grid Import Power (W)	**3000**	**5000**
4	Max Battery Amps during Grid charging (Amps) (For LM Batt)	**32**	**32**
5	Peak Charging Efficiency (%)	**>80**	

NOTE (*) Overload protection at load end is applicable only in Standalone mode. (*3) Auto Bypass does not ensure complete bypass of the grid supply to loads. (*4) valid @0.8 power

factor			
INVERTER RATING (VA)		**3000**	**5000**
D. PROTECTIONS			
1	PV Side	Reverse Polarity, Surge Protection (Class D)	
2	Battery Side	Reverse Polarity, Over/ Under Voltage, Current Limit	
3	Grid Side	Over/ under Voltage, Over/ Under Frequency, Surge Protection (Class D)	
4	Load Side	Overloads, Short circuit	
5	System Protection	Over Temperature	
E. USER INTERFACE			
1. DISPLAYED PARAMETERS			
1	Battery Side	Voltage, Current	
2	PV Side	Voltage**, Current**, Power**, Energy**, MPPT Charger O/P Amps	
3	Grid Side	Phase Voltage, Phase Power, Frequency, Power factor	
4	Load Side	Phase Voltage, Phase Power, Frequency, Power Factor	
5	System level	Mode of Operation, Active Faults, Heat Sink/ IGBT temperature, System Mimic	
NOTE:** parameters provided on separate LCD display for each MPPT channel(optional).			
2. INDICATIONS/ AUXILIARY			
1	Indications:	Mains On, Alarm, Buzzer Mute	
2	User Keypad for Settings Change.	✓	✓
3	Breakers at all Inputs	✓	✓
4	Remote monitoring: Optional*	✓	✓
NOTE (*) All parameters on display can be remotely accessed via GPRS or MODBUS over RS485			
F. MISCELLANEOUS			
1	Degree Of Protection	IP-21	IP-21
2	Cooling Method	Temp Controlled Force Cooling	
3	Operating Temperature (without Derating)	0-55 degrees (without De-rating)	
4	Humidity (Non-Condensing)	Max. 95% Non-Condensing	
5	Altitude (above sea level)	1000m above sea level	
6	Housing	Floor Standing	
7	Color shade	Eggshell White	Eggshell White, Blue
8	Cable Entry	Side	
9	Cable Termination Type	Bus Bar Type with ring type lugs	
10	Terminal Sizes (PV/ Battery/ Grid/ Load)	M5 / M5 / M5 / M5	
11	Dimensions in mm (H X W X D)	885 X 315 X 1150	1130X 320 X 625
12	Approx. Weight(kg)	114,123	187,205

WARRANTY CLAIMS

- StatconEnergiaaPvt. Ltd warrants to the original purchaser provided the product is still in possession of used by the original purchaser from the date of purchase.
- The warranty stands on all parts (except LEDs, switches and external body) for ESS.
- The warranty will be automatically terminated on the expiry of the warranty period, even in case of ESS not being in use in the specified period.
- This warranty is valid only if the authorized dealer/ Manufacturer duly signs it.
- Warranty in case of defects caused by household pets, rats, cockroaches or other animals or insects is invalid.
- The purchaser shall intimate any change of address to the concerned Authorized Service Centre & warranty will be applicable only after the inspection of the unit & clearance of condition by Authorized Service Centre personnel.
- The warranty will be invalidated if defects arising in company's opinion by reasons of accident, abuse, misuse, neglect, improper installation (if not undertaken by the company or its representative), fire, flood, other acts of GOD, natural calamities and any other unauthorized repairs done or carried out will have to be borne by the purchaser. Services given for the same will be paid service.
- The company will not be held liable in any condition for any loss or injury or damage caused to life or property or death and disability caused to any form of life for any reason whatsoever.
- The warranty will not apply if the original seals are found broken or tampered with.
- Free service under the terms of warranty will be provided only by authorized representatives / dealers of the company anywhere in India.
- The company expressly denies the right of any person to incur or assure for it any other liability or obligation in connection with the sale of ESS.
- Claims if any, to this warranty shall be made only before courts having jurisdiction in New Delhi.
- Register your product or launch online complaints at www.energiaa.in for prompt after sales service.
- The product Warranty period for ESS is 60 months from invoicing date with proof of invoice.
- Consumable wearing items in the products like string fuses, SPD, MOV, switches, plugs, door locks and sockets are excluded from guarantee and will be replaced on a pre-defined chargeable basis.
- The guarantee is valid only for end customers residing in India and within a 100 km radius of the distributor purchased from, unless a written letter or mail by the manufacturer is provided for longer distances. Places covered under warranty are listed out in the servicing section of the website.
- If within the guarantee period a product exhibits a defect which compromises functioning of the product (a guarantee claim),Energiaa will, at its discretion, either repair the product at the premises or replace (if deemed necessary by the manufacturer) with a used or new one, of equivalent type and age. Purely aesthetic defects which have no effect on product functionality or operability are not covered by the guarantee.
- Repairs are performed at site for ratings ≥ 5 kVA.
- If the product is to be repaired at the end customer's premises, the guarantee covers related travel costs for Energiaa's service personnel.
- For a guarantee claim to be valid, the warranty card of the respective product bearing the date of manufacturing / purchase must be fully legible, the guarantee seal undamaged and the end customer Invoice must be available.
- The end user first needs to log a complaint online at http://www.energiaa.in/ service support, describing the error in detail and sends the form to the Energiaa Solar Support Team.
- If ENERGIAA decides that a defective product is to be repaired at the end customer's premises, ENERGIAA arranges the repair date with the customer. ENERGIAA then sends out an authorized service engineer to the customer's premises at the arranged date and time.

GUARANTEE CLAIMS ARE ONLY VALID FOR PRODUCT DEFECTS NOT RESULTING FROM ANY OF THESE CIRCUMSTANCES:

1. Force majeure (in particular storm damage, lightning, fire, thunderstorm, flood etc.)
2. Incorrect use or operation / installation and commissioning (for example: loose connections of AC and DC wires, unclean panels, Fluctuating or low voltage from grid, Overload at customer end, Improper String connection, angle of panels, low gravity of batteries).
3. Failure to comply with the operating, installation and/or maintenance manual
4. Incorrect ventilation and cooling
5. Heavy soiling with dirt or dust
6. Transport damage
7. Changes to the product or repair attempts without prior approval from STATCON ENERGIAA.
8. Failure to comply with the applicable safety regulations.

For more detail of ESS working visit our website and

Watch presentation slide.

www.energiaa.in/downloads

THANK YOU FOR CHOOSING STATCON ENERGIAA . . .

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WARRANTY CARD

STATCON ENERGIAA

Inspire • Innovate • Implement

NAME ----------

ADDRESS ----------

CITY ----------

STATE ----------

PHONE NO. ----------

PRODUCT NAME ----------

MODEL NO. ----------

DATE ----------

PERIOD OF WARRANTY:----------Yrs.

STAMP SIGNATURE

*valid under warranty claims

STATCON ENERGIAA

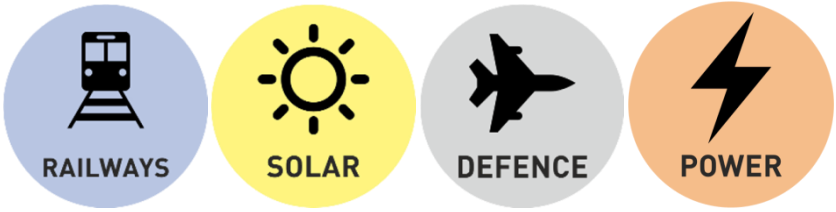
Inspire • Innovate • Implement

AVAILABLE PRODUCTS VARIANTS FOR SOLAR APPLICATIONS

Single Phase Off-Grid Solar Inverter
3 Phase Central Grid Tie Inverters
1/3 Phase Hybrid Solar Inverter
3 Phase String Inverters

Telecom DC Hybrid System
Intelligent String Monitoring Units
Array Junction/Combiner Boxes
Energy Storage Systems

Solar, Power, Defence & Railways



www.energiaa.in

Date: .....

Customer/Company/Firm Details: .....

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Contacted Person: .....

Period: From ..... **To** .....

Product Details: .....

S. No.	Particulars	Rating With Marking				
		Not Satisfactory (1)	Satisfactory (2)	Good (3)	Very Good (4)	Excellent (5)
1.	Communication					
2.	Quantity					
3.	Quality					
4.	Packaging					
5.	Delivery Time					
6.	Transportation					
7.	Servicing					

Note: If marked "Not Satisfactory", please provide suggestion to improve further.

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Authorized Signatory
(Customer/Company/Firm)

Customer Satisfaction Index (To be filled by STATCON ENERGIAA PVT. LTD.)**:**

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