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INSTALLATION & OPERATING INSTRUCTIONS

**SUNSHAKTI 2.0
GRID-TIE INVERTER**

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CHAPTER 1 : SAFETY INSTRUCTIONS

GENERAL SAFETY

- Read the user manual before operating the product.
- Installation and maintenance of the product must be carried out by trained and qualified person only.
- To prevent risk of shock during installation & maintenance, please make sure that all AC and DC terminals are plugged out.
- Before opening the housing, the inverter must be disconnected from all the energy sources like Grid & PV.
- After disconnecting all the inputs / sources of the unit, wait 5 minutes before opening the unit cover, it takes couple of minutes to discharge all the capacitors inside the unit.
- Ensure polarity, tightness and wire size are correct, before energizing the Inverter.
- Unit must be earthed using appropriate wire size diameter & its diameter should be equal to or higher than that of input power supply wires (refer regional safety standard specific to your location).
- Ensure the PV Panel specifications are matching with the product specifications.

GROUNDING THE INVERTER

This inverter is transformer less hence DC side of the inverter (positive and the negative pole of the PV array) should to be NOT GROUNDED, Otherwise it will cause inverter failure. In the PV power generation system, all non current carrying metal parts (such as Bracket, Junction box shell, inverter enclosure etc) should be connected to earth.

⚠ ATTENTION

- It is recommended that the earthing cable to be 4 mm² or greater and to be coloured yellow-green.
- Earth resistance should be as low as possible and shall never be higher than 5 ohms.
- For 10 KW and above systems, separate three earth pits shall be provided for individual three earthing viz.: DC side earthing (If Required) , AC side earthing and lightning arrestor earthing.
- The minimum requirement for a lightning protection system designed for class of LPS III is a 6 mm²copper/ 16 mm² aluminum or GI strip bearing size 25*3 mm thick. Separate pipe for running earth wires of Lightning Arrestor shall be used.

Note* - Power factor (@nominal power) is > 0.95 and the PF ranges from 0.8 leading to 0.8 lagging.

CHAPTER 2 : PRODUCT DESCRIPTION

Sun Shakti Grid-Tie Inverter is a high performance, transformer-less, high switching frequency based grid-tie Inverter with IP 65 ingress protection. The Grid-Tie Inverter's digital control coordinates with PV source and ensures maximum energy harvesting from it. The system is enabled with RS232 communication port. A Shakti dongle can be connected to the same to achieve unique user experience where it can be controlled and monitored by Shakti RMS mobile app. The dongle system is equipped with GSM/GPRS/WiFi and Bluetooth modules for communication.

The operation of the grid tie inverter is depicted in the Fig. 2.1. The inverter convert the DC power input from the PV array to single phase AC power output which is fed to the grid.

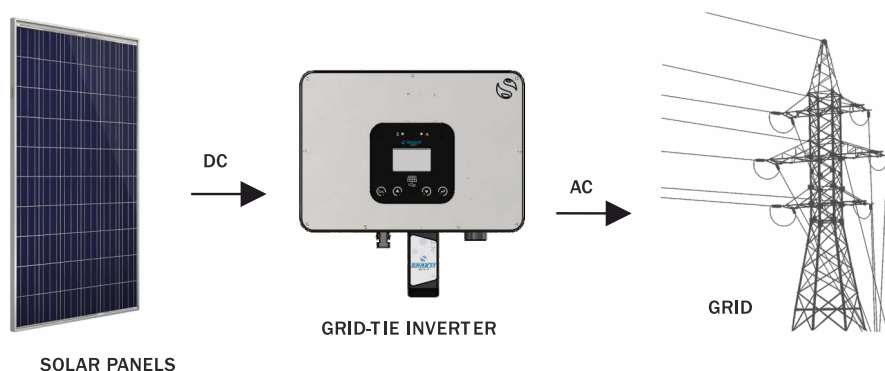


Fig 2.1 Grid-Tie Inverter operation illustration

CHAPTER 3 : PACKAGE CONTENTS

3.1 INSPECTION

Note: Never install or operate any unit which is damaged or has missing components. Doing so can result in injury.

Check the following items when unpacking the Inverter:

1. Ensure there is operation manual and warranty card in the packing box.
2. Ensure the nameplate is correct as ordered.
3. Ensure the optional parts are as per order, if ordered.
4. Contact the customer care if there is any damage to the unit or the optional parts.

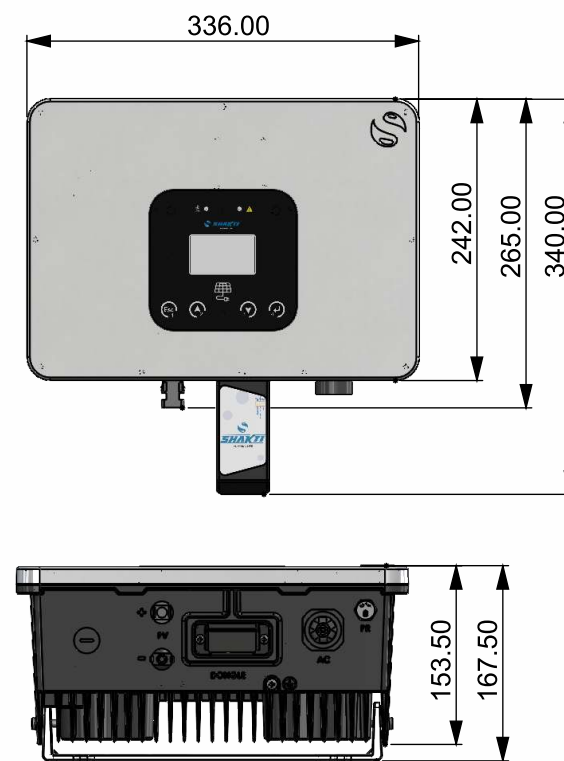


Fig. 3.1 Grid-Tie Inverter unit

3.2 LIST OF ITEM

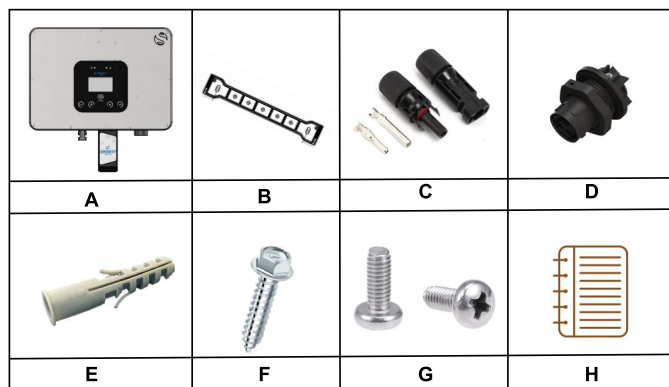
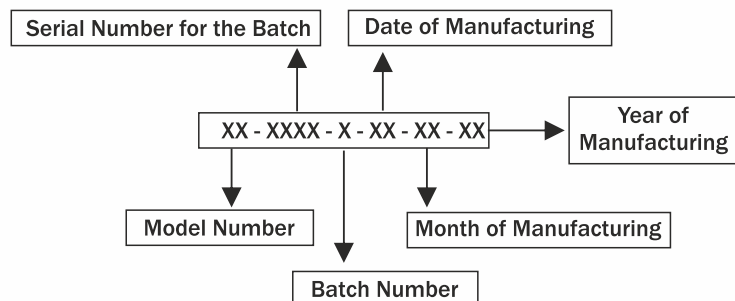


Fig. 3.2

Table 3.1

S. No.	Name	Quantity	Unit
A	Inverter	1	No.
B	Wall mount bracket	1	EA
C	PV connectors	2	EA
D	AC connector	1	EA
E	Anchor expansion tube	2	EA
F	M6x55 Hex head tapping screw	2	EA
G	M4x10 screw	2	EA
H	User manual	1	EA

3.3 MODEL EXPLANATION



CHAPTER 4 : SPECIFICATIONS

Model Name	SSG 1P 1kW	SSG 1P 2kW	SSG 1P 3kW	SSG 1P 3.3 kW
INPUT PV DATA				
Maximum PV Power	1200 W	2400 W	3300 W	3600 W
Maximum PV Voltage	510 VDC			
PV Startup Voltage	80 VDC			
Max. PV Current	1 x 16 A			
Max PV Isc Current	18 A			
MPPT Range	110 - 415 VDC			
Nominal PV Voltage	400 VDC			
Peak MPPT Efficiency	> 99%			
Number of PV Inputs	1			
OUTPUT AC DATA				
Rated Output Power	1000 W	2000 W	3000 W	3300 W
Max. Output Power	1100 W	2200 W	3300 W	3300 W
Rated Grid Voltage	230 V 1L/N/PE			
Rated Grid Frequency	50/60 Hz			
Rated Grid Current	4.5 A	9 A	13.5 A	14.5 A
Max. Grid Current	5 A	10 A	15 A	15 A
Power Factor	0.8 leading ~ 0.8 lagging			
Total Harmonic Distortion	< 5% (at nominal power)			
EFFICIENCY				
Max. Efficiency	>93%	>95%	>95%	>95%
PROTECTION				
DC Reverse Polarity	YES			
Grid Monitoring	YES			
Shortcircuit	YES			
Over Temperature	YES			
Integrated DC Switch	Yes(Optional)			
Output Over Current	YES			
Insulation Resistance Detection	YES			
Residual Current Monitoring Unit	YES			
Surge Protection AC Side	YES			
Anti-Islanding	YES			
DISPLAY & COMMUNICATION				
Display Type	Graphical LCD			
Status Indicator	LEDs			
Serial Communication	RS232 / UART			
Remote Monitoring	Yes(Optional)			
WiFi	Yes(Optional)			
OTHER INFO				
LXWXH	265 X 336 X 167mm ³			
Gross Wt.	Approx 10.5 kg			
Topology	Transformer less 2 leg Inverter			
Pollution Degree	PD3			
Over Voltage Category	PV OVC II/Grid OVC III			
Protection Class	Class I			
Operating Temperature	-25 to 60 °C			
Relative Humidity	0~95% RH(Non-Condensing)			
Altitude	2000 m			
Environmental	Indoor & Outdoor Installation			
IP Degree of Protection	IP 65			
Cooling	Natural Convection			
Standards	IS 16221(Part-2),IEC60529,IEC62109, IEC62116,IS16169			

(# The above specification are subject to change please refer sticker parameter for final value.)

CHAPTER 5 : INSTALLATION

Mounting Method, Installation Position and Mounting Procedure of the Grid-Tie Inverter is illustrated as follows:

5.1 MOUNTING METHOD

1. The equipment employs natural convection cooling, and it can be installed indoor or outdoor.
2. Please install the equipment under the guidance of Figure 5.1. Vertical installation on floor level is recommended. Mount vertically or tilted backwards by max. 15°. Never install the inverter tilted forwards, sideways, horizontally or upside down.
3. Install the inverter at eye level for convenience when checking the LCD display and possible maintenance activities.
4. When mounting the inverter, please consider that disassembly for service work may be required.

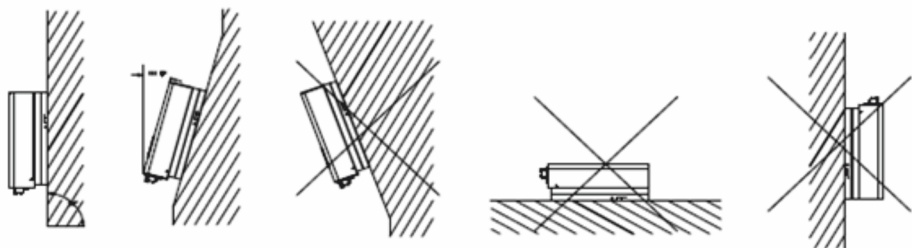


Fig. 5.1

5.2 INSTALLATION POSITION

Do not expose the inverter to direct solar irradiation as this could cause power derating due to overheating. The ambient temperature should be between -25°C ~ 60°C (-13°F ~ 140°F) to ensure optimum operation. Choose locations with sufficient air exchange. Ensure additional ventilation, when necessary. To make sure the installation spot is suitably ventilated, if multiple grid-tie solar inverter units are installed in same area, the following safety clearance shall be followed for proper ventilation conditions.

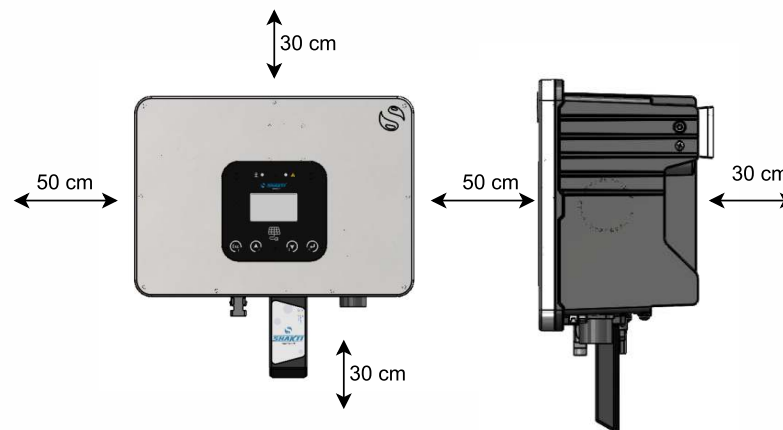


Fig 5.2 Grid-Tie Inverter Clearance

5.3 MOUNTING PROCEDURE

1. Mark the Positions of the Drill Holes of the wall mount bracket. The mounting position should be marked as shown in Fig. 5.3.



Fig. 5.3

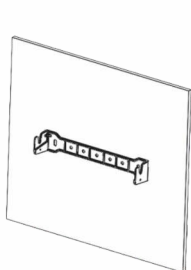
2. Drill holes and place the expansion tubes according to the guides, drill 2 holes in the wall (in conformity with position marked in Fig. 5.4), and then place the expansion tubes in the holes using a rubber mallet.



Fig. 5.4

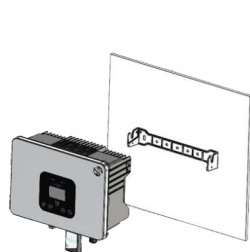
3. Mount the Inverter

Carefully mount the inverter to the rear panel as shown in Figure A, Figure B, & Figure C. Make sure that the rear part of the equipment is closely mounted to the rear panel.



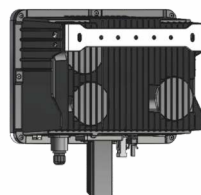
(A)

STEP 1:
Mount wall mount Bracket
2 nos. Anchor & Screws



(B)

STEP 2:
2 persons hold unit and Hook
on the wall mounting bracket
Install unit as shown



(C)

STEP 3:
After unit installation use
2 nos. of M6 screws for
assembly

Fig 5.5 Mounting Steps for Grid-Tie Inverter unit

CHAPTER 6 : CONNECTIONS AND INSTALLATION

6.1 WARNING

1. Violation of these messages may cause severe injury or property damage.
2. Untrained person should not work on any part/system of inverter.
3. Only licensed person, who has been trained on design, installation, commissioning and operation of inverter is permitted to operate this equipment.
4. Input power cable must be connected tightly.
5. Earth the equipment securely.
6. Wait for 5 minutes after the power is switched off to install/service the inverter.
7. The gauge of the grounding cable must not be less than that of power supply cable.
8. Use recommended circuit breaker for inverter input.

6.2 REAR PANEL

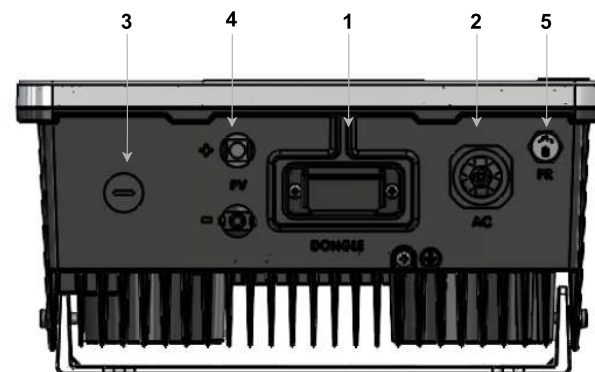


Fig. 6.1 Rear Panel view of Grid-Tie Inverter

Table 6.1

Marking	Description
1	DB9 Connector
2	AC Output Connector
3	PV DC Disconnect Switch
4	PV Input Connectors
5	Pressure Relief Vent

6.2.1 DB9 Connector

Connect SPL dongle for GSM/WiFi and Mobile App connectivity. Shakti RMS / Iot Dongle Appearance and configuration is described in section 6.3.

6.2.2 AC Output Connector

3 PIN AC connector from lit kit to be assembled to cable as per recommended gauge and connected inverter as shown in Fig. 6.1 labelled as 2.

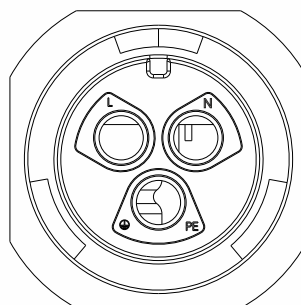


Fig. 6.2 AC OUTPUT

1. Connect cable according to connections mark on the connector L, N & PE.
2. Cross-sectional area of cable (mm²) - Recommended Value : 4.0~6.0
3. Outside Diameter of the Cable (mm) : 4.2~5.3
4. Secure all the parts of the AC connectors tightly.
5. Plug in the AC connector to the equipment securely, ensuring the pins are connected directly.
6. Connect a 32 A external circuit breaker at the AC output.
Connect the cables according to the connection marked in Fig. 6.2 :

1. L : Phase of AC output
2. N : Neutral of AC output
3. PE : Earth connection

6.2.3 PV DC DISCONNECT SWITCH

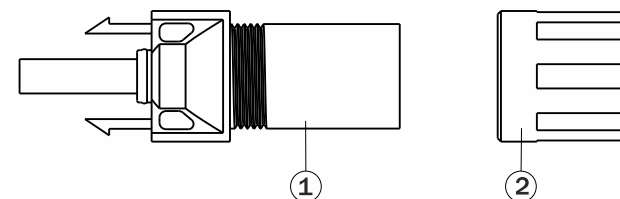
This switch is provided to isolate the PV DC input from the inverter during servicing of the inverter or any other maintenance work on the PV panels.

6.2.4 PV INPUT CONNECTORS

Table 6.2

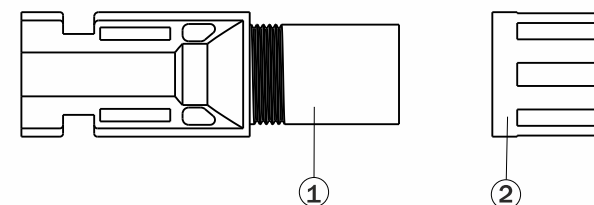
Cross - Section Area of Cables (mm ²)		Outside Diameter of the Cables (mm)
Scope	Recommended Value	
4.0-6.0	4.0	4.2 ~5.3

DC connector is made up of the positive connector and the negative connector as shown in fig 6.3 & 6.4.



1. Insulated Enclosure 2. Lock Screw

Fig 6.3 Positive Connector

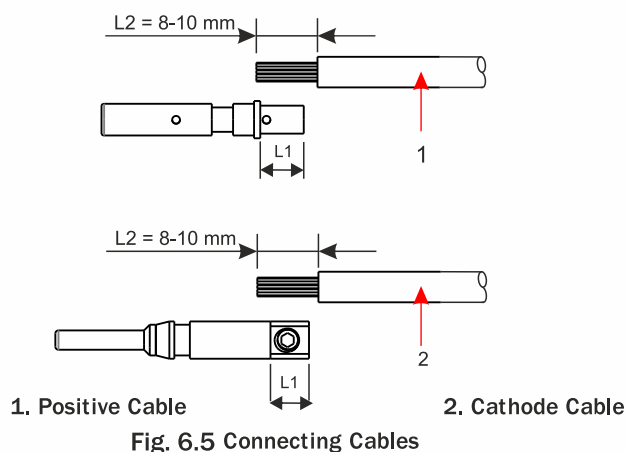


1. Insulated Enclosure 2. Lock Screw

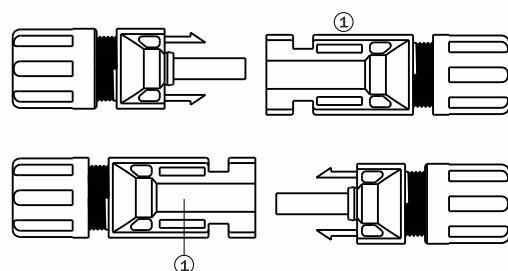
Fig 6.4 Negative Connector

Connecting Procedures

1. Tighten the lock screws on positive and cathode connector.
2. Use specified strip tool to strip the insulated enclosure of the positive and cathode cables and appropriate length.
3. Feed the positive and cathode cables into corresponding lock screws as shown fig 6.5



- Put the metal positive and cathode terminals into positive cable and cathode cable whose insulated enclosure has been stripped, & crimp them tightly with a wire crimper. Make sure that the withdrawal force of the pressed cable is bigger than 400N.
- Plug the pressed positive and cathode cables into relevant insulated enclosure, a "click" should be heard or felt when the contact cable assembly is seated correctly.
- Fasten the lock screws on positive and negative connectors into respondent insulated enclosure and make them tight.
- Connect the positive and cathode connectors into positive & negative DC input terminals of the inverter, a "click" should be heard or felt when the contact cable assembly is seated correctly as shown in fig 6.7.

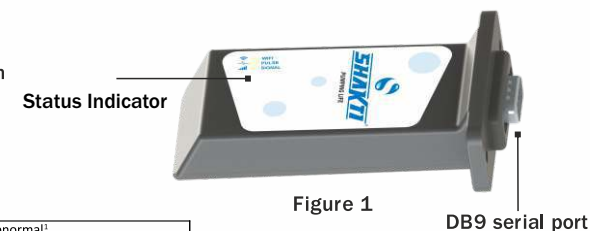


6.2.5 Pressure Relief Vent

Pressure relief vent releases the internal pressure.

6.3 SHAKTI RMS/IoT DONGLE

Remote Monitoring and Control
In-built Data Logger & RTC
Compatible with GSM, WiFi & Bluetooth



6.3.1 Product Appearance

Status Indicator:

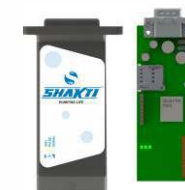
Pulse LED (GREEN)	Constant ON/OFF	Abnormal ¹
	Blink 1time in 2sec	No Sim detected ²
	Blink in every second	Normal ¹ / No Internet ²
	Blink 2 times in 1sec	Internet Connected ²
Signal LED (RED) ¹	Blink 4 times in 1 sec	Data Transfer in Process ²
	ON	Normal ¹ / GPS location fixed ²
GPS (RED) ²	Blink in every second	Getting GPS location ²
	OFF	Abnormal(Signal low)/ GPS off ²
Network LED (GREEN) ²	Constant ON	4G Connectivity ²
	Constant OFF	2G Connectivity ²
Wi-Fi LED (YELLOW) ²	ON/Blink	Normal ¹
	OFF	No WiFi Network ²

here 1 and 2 indicates 2G and 4G dongle respectively.

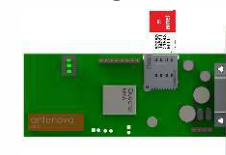
6.3.2 Installation and Connection:

For installing the SHAKTI IoT dongle.
Follow these steps :

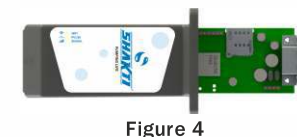
Step1: Remove the cover and take out the motherboard.



Step2:
Insert SIM card as per the correct direction marked.



Step3:
Put the motherboard back into the enclosure.



Step 4:
Insert the dongle into DB9 port and use two M3x10 screws to fix the dongle along with gasket.

6.3.3 Configuration

Step1: Connect the "Shakti IoT dongle" to the main device and check the "pulse LED" (green) blinking in every second.

Step2:
If the sim card is present in the "Shakti lot dongle" and 2G or 4G network is available in that area, the Signal LED (RED)¹will be ON / Pulse LED (GREEN) will blink as per the status indicator table

Step3:
To configure the Wi-Fi in 2G dongle follow these steps:

3.1) Turn ON Wi-Fi on your Mobile and select "SHAKTI_DONGLE and connect it with the password "shakti123".

An HTML page will open in your browser otherwise browse <http://192.168.4.1>. You will get the HTML page like this:



Figure 6

3.2) Now "Configure Wi-Fi" now new page will open like this:



Figure 7

3.3) Select your preferred WiFi with proper password and then save. In case your WiFi network is not visible in the list scan again.



Figure 8

On successful configuration, WiFi LED (yellow) will be ON.

*** NOTE ***

- a) Shakti IoT Dongle is designed to work with GSM on priority, WiFi is always secondary.
- b) For using Wi-Fi remove SIM card then connect shakti dongle.
- c) On successful TCP connection Wi-Fi yellow LED will blink in every second.

6.3.4 Troubleshooting

- 1) If Pulse LED is constantly ON/OFF, check main device power supply or restart the device.
- 2) If signal LED not glowing, check sim card / signal strength.
- 3) If Wi-Fi LED not glowing, check Wi-Fi network / reconfigure Wi-Fi settings.

6.3.5 Contact Shakti to integrate IoT Dongle to other products & solutions.

CHAPTER 7 : BASIC OPERATION

7.1 LCD MODULE DESCRIPTION

Following table describes the functionality of the status LEDs/Buttons on the display.



Fig. 7.1 LCD Display

Table 7.1

BUTTON	FUNCTIONALITY
ESC	Previous Screen
UP BUTTON	Used for Scrolling up / Increasing the parameter value
DOWN BUTTON	Used for Scrolling down / Decreasing the parameter value
ENTER	Selection

Table 7.2

LED STATUS		
STATUS	LED 1	LED 2
Grid Error		
Grid Detected		
Grid Tie		
Fault		

● STARTUP

Upon starting the unit for the first time, the LCD Display enters into Factory Setup interface. In factory setup, the user gets an option to set various parameters required for the proper functioning of the product which are illustrated in the below figure. Scroll through various options displayed on the screen with the up & down buttons and press Enter to set the parameter and Esc to exit the particular option. The Date & Install Date are set in the format DD/MM/YY and the Time in HH:MM:SS. Other options are common to factory setup option in main menu therefore, are discussed in the CONFIGURE section.

After the successful starting of the product or whenever the LCD is not operated for a period of time, 6 status screens appears in rolling until menu button is pressed.

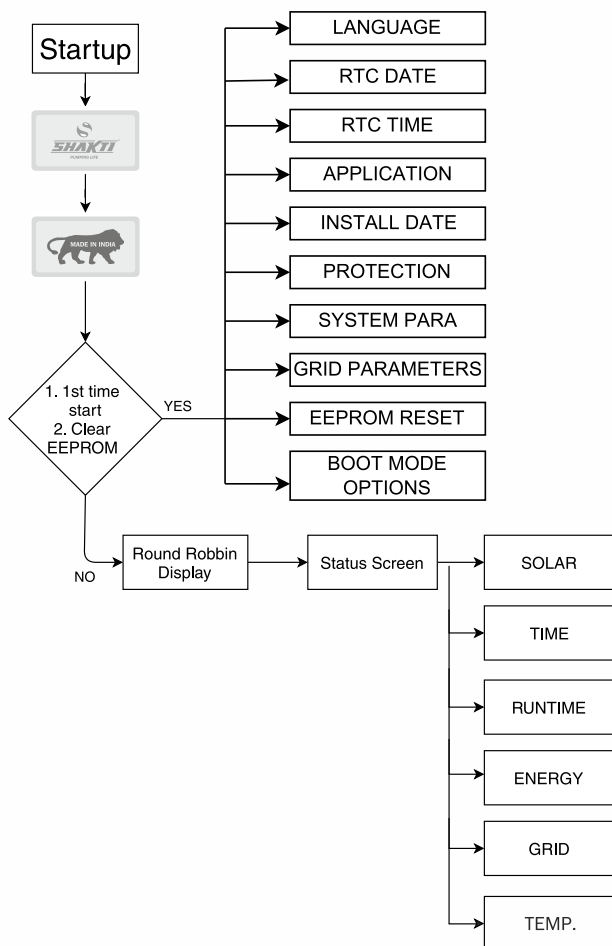


Fig. 7.2 Startup menu tree

● MAIN MENU

In the main menu, the user can access various features and retrieve information by navigating between different sections. The STATUS, CONFIGURATION, and LOGS are discussed in detail in separate sections. The STATUS section provides the real-time information of the device. CONFIGURATION, and LOGS are discussed in separate sections. The ABOUT section provides the information of firmware version, serial number, and network-related information.

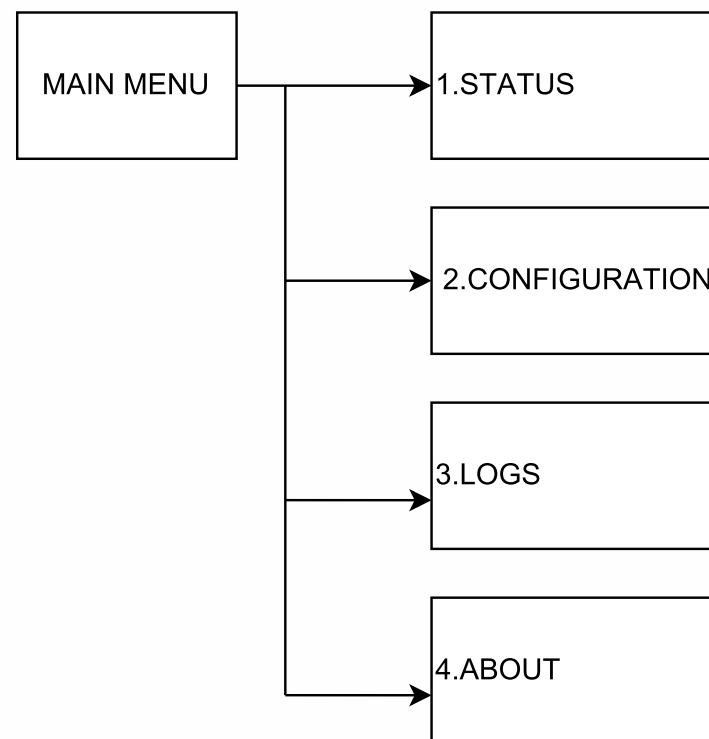


Fig. 7.3 Main menu tree

● STATUS

The **STATUS** menu shows the real time values of the device. The **BAR GRAPHS** section displays energy statistics for the current month and previous months. The **SOLAR** section shows parameters like solar mode, voltage, current, and power. The **GRID** section shows grid voltage, power, frequency, and current. In the **TEMPERATURE** section, users can view temperature values. The **CUMULATIVE DATA** section shows the values of total energy, total time, today energy and today time. The **LOCATION** section displays latitude and longitude, while the **DEBUG** section is for service team and debugging purpose only.

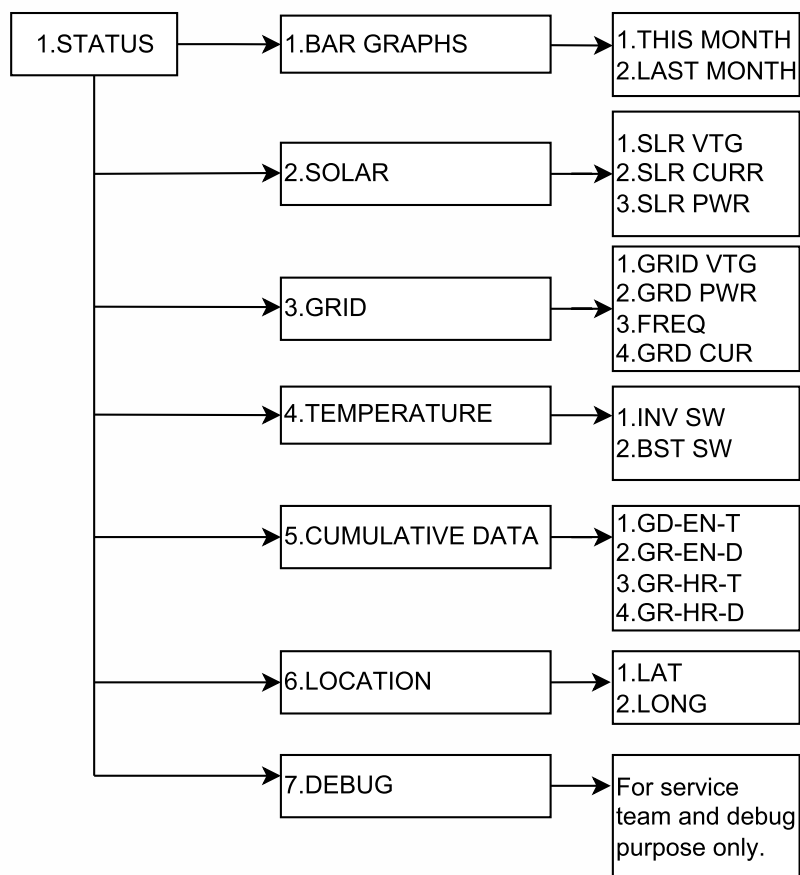


Fig. 7.4 Status Menu Tree

● CONFIGURATION

In the **CONFIGURATION** section, users can configure various parameters listed under Application, Protection, Language, Date & Time, Display, Modbus config, GPS config, and Factory setup as shown in below figure.

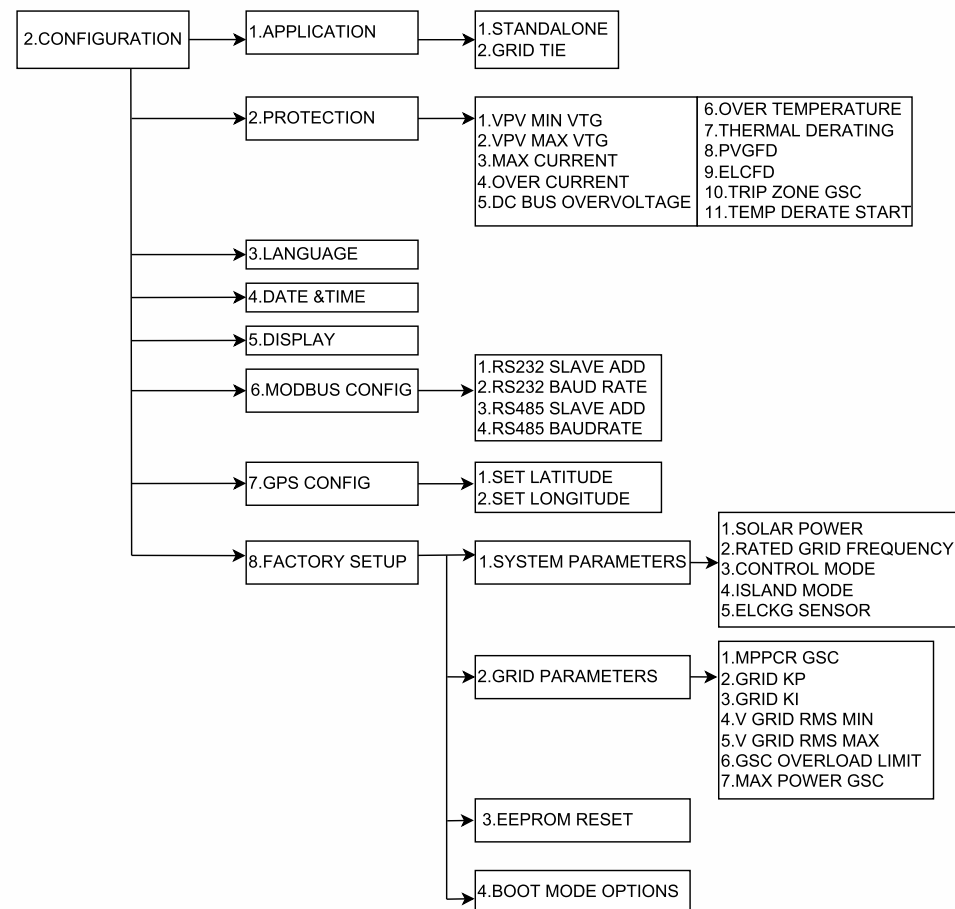


Fig. 7.5 Configuration Menu Tree

CHAPTER 8 : FAULTS & TROUBLESHOOTING

This chapter describes the inverter faults, related messages on LCD display, possible reasons of fault and their troubleshooting. Fault information and description is shown in table no. 8.1.

If inverter is not powering ON:

- Check the PV and Grid connections.
- Check the DC switch position.

If grid tie is not working:

- Check the weather conditions.
- Check the installation direction and orientation of the panel.
- Check whether the DC switch position is towards ON/OFF.

Table 8.1

S.NO.	FAULT MESSAGE	LOG MENU DISPLAY	DESCRIPTION	TROUBLESHOOTING
1	01 GRID VOLT LOW	"GRDVL"	When the grid voltage is lower than the set limit.	Check the minimum grid voltage parameter setting.
2	02 GRID VOLT HIGH	"GRDVH"	When the grid voltage is higher than the set limit.	Check the maximum grid voltage parameter setting.
3	03 GRIDSIDE OVERLOAD	"GSCOL"	When the grid current is greater than the set limit.	Restart the unit.
4	04 DC BUS UNDERVOLTAGE	"DCBUV"	DC Bus Voltage is less than the set value	Ensure that the voltage is within the range specified on the label.
5	05 GSC OVERTEMP	"GSCOT"	Unit temperature raised above temperature limits	Restart the unit.
6	06 EARTH LEAKAGE	"ELCDT"	Leakage current is greater than the set limit.	Check for proper grounding and ensure that the no external wire is touching the device or restart the unit.
7	07 ISLANDING DETECTED	"ISLFT"	When the grid is not present and load matches the output power.	Check whether the grid is present or restart the unit.
8	08 ISLANDING FREQ DETECTED	"ISLFF"	When the grid frequency varies more than 0.15Hz in 2ms.	Restart the unit.
9	09 PVGFD DETECTED	"PVGFD"	When PV to ground fault is detected.	Check PV Connections or restart the unit.
10	10 DC BUS OVERVOLTAGE	"DCBOV"	DC Bus voltage is more than the set value.	Ensure that the voltage is within the range specified on the label and also check the number of PV panels connected in series.
11	11 GSC HIGH CURRENT	"GSCHC"	When grid side current reaches its maximum value.	Restart the unit.
12	12 PV OVERVOLTAGE	"PVSOV"	When the PV input is greater than the set limit.	Decrease the PV string voltage.
13	13 PV UNDERVOLTAGE	"PVSUV"	When the PV input is lesser than the set limit.	Wait for sufficient sunlight or increase the PV string voltage.
14	14 GRID FREQ LOW	"GRDFL"	When grid frequency is less than the set limit.	Decrease the minimum grid frequency parameter value.
15	15 GRID FREQ HIGH	"GRDFH"	When grid frequency is more than the set limit.	Increase the maximum grid frequency parameter value.
16	16 GRID ERROR	"GRDER"	When grid voltage is not available.	Check for the availability of grid.
17	17* OUTPUT DISABLED	-	When output control is disabled.	Enable the output control from output control page in configuration.

(*This is not a fault but a warning)

CHAPTER 9 : NUMERICAL DISPLAY INFORMATION

The shakti display has got an unique feature that all the pages can be uniquely located with the use of words as well as numerals. The location of pages wrt numerals has a definite sequence as described below:

Table 9.1 contains all parameters with their display number.

No numbers are displayed corresponding to ROLLING PAGES and MENU. Once someone enters the menu, all the pages are numbered based on their sequential location in the menu.

For e.g., STATUS is at 1ST location and is therefore designated as 1 in the front. Any page inside STATUS will start with 1. For example BAR GRAPH page is at 1st location inside STATUS page so, it's numeral designator is 11, wherein 1 corresponds to STATUS PAGE and another 1 corresponds to the first page inside page number 1. Another example, To understand numeral location of CONTROL MODE of SYSTEM PARAMETERS is given below:

2 CONFIGURATION >> 8 FACTORY SETUP >> 1 SYSTEM PARAMETERS >> 3 CONTROL MODE

Hence, Numeral designator for CONTROL MODE of SYSTEM PARAMETERS is 2813 as shown in table 9.1, which signifies go to the 2nd page of menu to reach CONFIGURATION then go to 8th location of CONFIGURATION to reach FACTORY SETUP (page 28). Then enter the 1st location of page 28 to reach SYSTEM PARAMETERS (page 281) then enter into 3rd location to go to CONTROL MODE (page 2813). All parameters and pages are numbered as per the above description. Except when the location inside a page is more than 9 then the designator is added with an extra underscore for example ;

11th location inside any page is designated as _11.

E.g., Numeral designator of TEMP DERATE START is 22_11.

For ease of customers, the page numbers are displayed on the top and locations are displayed in front of all the parameters.

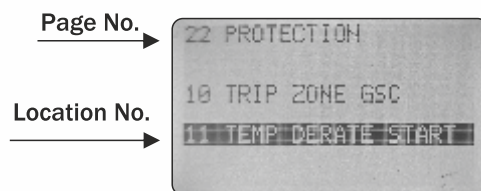


Fig. 9.1

S.NO.	HEADINGS
0	MENU
1	STATUS
11	BAR GRAPHS
111	THIS MONTH
112	LAST MONTH
12	SOLAR
13	GRID
14	TEMPERATURES
15	CUMMULATIVE DATA
16	LOCATION
17	DEBUG
2	CONFIGURATION
21	APPLICATION
211	STAND ALONE
212	GRID TIE
22	PROTECTION
221	VPV MIN VTG
222	VPV MAX VTG
223	MAX CURRENT
224	OVER CURRENT
225	DC BUS OVERVOLTAGE
226	OVER TEMPERATURE
227	THERMAL DERATING
228	PVGFD
229	ELCFD
22_10	TRIP ZONE GSC
22_11	TEMP DERATE START
23	LANGUAGE
231	ENGLISH
232	ITALIANO
233	DEUTSCH
24	DATE & TIME
241	SET DATE
242	SET TIME
25	DISPLAY
251	DISPLAY MODE
2511	ROLLING PAGES
2512	SHAKTI SCREEN
252	CONTRAST
253	AUTOROLL
2531	ENABLE AUTO ROLL
25311	YES
25312	NO
254	DISPLAY LOCK
2541	ENABLE LOCK
25411	YES
25412	NO
25413	CHANGE PASSWORD
26	MODBUS CONFIG

S.NO.	HEADINGS
26	MODBUS CONFIG
261	RS232 SLAVE ADD
262	RS232 BAUD RATE
2621	SET RS232 BAUD RATE
263	RS485 SLAVE ADD
264	RS485 BAUD RATE
2641	SET RS485 BAUDRATE
27	OUTPUT CONTROL
271	ENABLE
272	DISABLE
28	GPS CONFIG
281	SET LATITUDE
282	SET LONGITUDE
29	FACTORY SETUP
291	SYSTEM PARAMETERS
2911	SOLAR POWER
29111	2KVA
29112	3KVA
2912	RATED GRID FREQ
29121	50Hz
29122	60Hz
2913	CONTROL MODE
29131	CONTROL TYPE1
29132	CONTROL TYPE2
2914	SLAND MODE
29141	ENABLE
29142	DISABLE
2915	ELCKG SENSOR
29151	SINOMAGS
29152	LEM
292	GRID PARAMETERS
2921	MPPCR GSC
2922	GRID KP
2923	GRID KI
2924	VGRID RMS MIN
2925	VGRID RMS MAX
2926	GSC OVERLOAD LIMIT
2927	MAX GSC POWER
293	EEPROM RESET
294	BOOT MODE OPTIONS
2941	SERIAL BOOT MODE
3	LOGS
31	FAULT LOGS
32	RS232 EXTRACT
321	DAY DATA EXTRACT
322	YEAR DATA EXTRACT
323	FAULT DATA EXTRACT
33	RS485 EXTRACT
331	DAY DATA EXTRACT
332	YEAR DATA EXTRACT
333	FAULT DATA EXTRACT
4	ABOUT
41	FIRMWARE
42	SERIAL NUMBER
421	DRIVE SERIAL NUMBER
422	DONGLE SERIAL NO.
43	NETWORK DETAILS

CHAPTER 10 : MODBUS COMMUNICATION

10.1 Com Port Setting :

- RS485 in half duplex mode
- Port Setting:- Baud Rate -9600, Data Bits-8, Stop Bits-1, Parity-None

10.2 RTU Frame Structure :

Slave address 0X01

Function field 0x03 :Read single parameter

0x06 : Write single parameter

Data field Data field includes address field and data load domain

CRC field 16bit CRC check value

10.2.1 Function Code : 0X03

This function code is used to read the contents of a contiguous block of registers.

Query—

Slave Address	Function Code	Register Address High	Register Address Low	High Register No	Low Register No	CRC Low	CRC High
0X01	0X03	—	—	0x00	0X01	—	—

Response—

Slave Address	Function Code	Byte Count	High bit	Low bit	CRC Low	CRC High
0X01	0X03	0X02	—	—	—	—

10.2.2 Function Code : 0X06

This function code is used to write the contents of a contiguous block of registers.

Query—

Slave Address	Function Code	Register Address High	Register Address Low	High Register No	Low Register No	CRC Low	CRC High
0X01	0X06	—	—	0x00	0X01	—	—

Response—

The response function code echoes the request function code

Slave Address	Function Code	Register Address High	Register Address Low	High Register No	Low Register No	CRC Low	CRC High
0X01	0X06	—	—	0x00	0X01	—	—

Note : If some error occurs, there is no response from the drive.
Minimum time interval between two request is 500ms.

S.No.	Configuration Parameters	MODBUS ADD(DEC)	PAGE NUMBER	OFFSET	DVT Factor	Item min	Item Max	Item Default	Unit	Configuration Parameters
1	APP MODE	256	6	1	1	0	1	1	NA	APP_MODE
2	ROLLING PAGE ENABLE	257	6	1	1	1	2	1	NA	ROLLING_PAGE_ENABLE
3	DISPLAY LOCK	258	6	1	1	1	2	2	NA	DISPLAY_LOCK_ENABLE
4	FACTORY MODE	259	6	1	1	0	1	1	NA	FACTORY_MODE
5	LANGUAGE	260	6	1	1	1	3	1	NA	LANGUAGE_SELECTED
6	SOLAR POWER	261	6	1	1	0	1	1	NA	SOLAR_POWER
7	CONTROL MODE	262	6	1	1	0	1	1	NA	CONTROL_MODE
8	ISLANDING ENABLE	264	6	1	1	0	1	1	NA	ISLANDING_ENABLE
9	INSTALL DATE	265	6	1	1	1	31	1	NA	INST_DATE
10	INSTALL MONTH	266	6	1	1	1	12	1	NA	INST_MONTH
11	INSTALL YEAR	267	6	1	1	1	99	21	NA	INST_YEAR
12	LCD CONTRAST	268	6	1	1	27	39	33	NA	LCD_CONTRAST
13	LOCK_UNLOCK	269	6	1	1	0	1	0	NA	LOCK_UNLOCK
14	DISPLAY MODE	270	6	1	1	1	2	1	NA	DISPLAY_MODE_FLAG
15	FAULT_ADDRESS_POINTER	271	6	1	1	0	255	0	NA	FAULT_ADDRESS_POINTER
16	RS232 BAUD RATE	272	6	1	1	1	6	2	NA	RS232_BAUD_RATE
17	RS485 BAUD RATE	273	6	1	1	1	6	2	NA	RS485_BAUD_RATE
18	Logger Date	274	6	1	1	1	31	1	NA	logger_date
19	Logger Month	275	6	1	1	1	12	1	NA	logger_month
20	Logger Year	276	6	1	1	1	99	1	NA	logger_year
21	ENERGY_ERASE_FLAG	277	6	1	1	1	2	2	NA	ENERGY_ERASE_FLAG
22	ADC_ISR_PRIORITY	278	6	1	1	0	1	0	NA	ADC_ISR_PRIORITY
23	MODBUS ADD RS232	285	7	2	1	1	99	1	NA	MODBUS_ADD_RS232
24	MODBUS ADD RS485	287	7	2	1	1	99	1	NA	MODBUS_ADD_RS485
25	TZ_GSC_FLAG	289	6	1	1	0	1	1	NA	TZ_GSC_FLAG
26	ELCFD_ENABLE	290	6	1	1	0	1	1	NA	ELCFD_ENABLE
27	PVGFD_ENABLE	291	6	1	1	0	1	1	NA	PVGFD_ENABLE
28	RATED_GRID_FREQ	292	6	1	1	50	60	50	Hz	RATED_GRID_FREQ
33	ELCKG_SENSOR_SELECT	293	6	1	1	###	1	2	NA	ELCKG_SENSOR_SELECT

S.No.	GRID_PARAMETERS	MODBUS_ADD(DEC)	PAGE NUMBER	OFFSET	DVT Factor	Item min	Item Max	Item Default	Unit	GRID_PARAMETERS
1	GSC_OVER_TEMP_LIMIT	4000	7	2	1	40	130	110	°C	GSC_OVER_TEMP_LIMIT
2	GSC_OVER_CURR_LIMIT	4002	7	2	1	2	30	12	A	GSC_OVER_CURR_LIMIT
3	DC BUS OVER VOLTAGE	4004	7	2	1	150	550	520	V	DC_BUS_OV_LIMIT
4	THERMAL DERATING	4006	7	2	1	0	200	100	A	THERMAL_DERATING_FACTOR
5	GRID_MAX_CURRENT	4008	7	2	1	1	40	15	A	GRID_MAX_CURRENT
6	GSC_MPPT_CALL_RATE	4010	7	2	1	25	100	100	NA	GSC_MPPT_CALL_RATE
7	GRIDTIE_ILIMIT	4012	7	2	1	10	35	32	A	GRIDTIE_ILIMIT
8	GRIDTIEI_kp	4014	7	2	1000	0	9999	100	NA	GRIDTIEI_kp
9	GRIDTIEI_ki	4016	7	2	1000	0	9999	1	NA	GRIDTIEI_ki
10	GRID_FREQ_MIN	4018	7	2	1	45	50	49	Hz	GRID_FREQ_MIN
11	GRID_FREQ_MAX	4020	7	2	1	50	65	51	Hz	GRID_FREQ_MAX
12	GRID_FREQ_HYS	4022	7	2	10	1	50	1	NA	GRID_FREQ_HYS
13	V_GRID_RMS_MIN	4024	7	2	1	150	230	180	V	V_GRID_RMS_MIN
14	V_GRID_RMS_MAX	4026	7	2	1	230	300	290	V	V_GRID_RMS_MAX
15	OVERLOAD_GSC_LIMIT	4028	7	2	1	1	40	17	NA	OVERLOAD_GSC_LIMIT
16	TEMP_DERATING_START	4030	7	2	1	80	100	80	NA	TEMP_DERATING_START
17	MAX_PV_POWER_GSC	4032	7	2	1	2500	3600	3600	W	MAX_PV_POWER_GSC
18	V_GRD_HYS	4034	7	2	1	0	10	5	NA	V_GRD_HYS

S.No.	PV PARAMETERS	MODBUS_A DD(DEC)	PAGE NUMBER	OFFSET	DVT Factor	Item min	Item Max	Item Default	Unit	PV PARAMETERS
1	MIN_PV_MPPT_VOLT	7000	7	2	1	100	500	100	V	MIN_PV_MPPT_VOLT
2	OVER_VOLT_PV_LIMIT	7002	7	2	1	250	550	520	V	OVER_VOLT_PV_LIMIT
3	PV_OV_UV_RESET_HYS	7004	7	2	1	0	50	30	NA	PV_OV_UV_RESET_HYS
4	UNDER_VOLT_PV_LIMIT	7006	7	2	1	100	300	100	V	UNDER_VOLT_PV_LIMIT
5	DC_BUS_OV_RESET_HYS	7008	7	2	1	0	50	30	NA	DC_BUS_OV_RESET_HYS

S.No.	DISPLAY PARAMETERS	MODBUS_A DDRESS(DEC)	PAGE NUMBER	OFFSET	DVT Factor	Item min	Item Max	Item Default	Unit	DISPLAY PARAMETERS
1	FIRMWARE_VER	3860	NA	1	1	NA	NA	NA	NA	FIRMWARE_VER
2	TODAY_TIME_GSC	5012	NA	4	1	NA	NA	NA	NA	TODAY_TIME_GSC
3	TODAY_ENERGY_GSC	5016	NA	4	1	NA	NA	NA	NA	TODAY_ENERGY_GSC
4	BOOST_I1_Avg	5020	NA	4	100	NA	NA	NA	NA	BOOST_I1_Avg
5	FAULT CODE	5024	NA	4	1	NA	NA	NA	NA	FAULT CODE
6	LATITUDE	5028	8	4	10000	0	999999	226275	NA	LATITUDE
7	LONGITUDE	5032	8	4	10000	0	999999	755802	NA	LONGITUDE
8	PV_Volt_Avg	5036	NA	4	10	NA	NA	NA	NA	PV_Volt_Avg
9	Grid_VoltRMS	5040	NA	4	10	NA	NA	NA	NA	Grid_VoltRMS
10	Grid_CurrRMS	5044	NA	4	10	NA	NA	NA	NA	Grid_CurrRMS
11	Freq_PLL	5048	NA	4	10	NA	NA	NA	NA	Freq_PLL
12	POWER_GRD_LPF	5052	NA	4	1	NA	NA	NA	NA	POWER_GRD_LPF
13	TEMP_GSC_LPF	5056	NA	4	10	NA	NA	NA	NA	TEMP_GSC_LPF
14	STATUS_SUNSHAKTI	5060	NA	4	1	NA	NA	NA	NA	STATUS_SUNSHAKTI

CHAPTER 11 : MAINTENANCE

To ensure the normal operation of the inverter, it is advisable to perform the following checks regularly:

1. The tightness and condition of all the terminals, screws and cables.
2. Ensure the environmental conditions like temperature humidity etc., around the inverter are well within the specified limits.
3. Ensure there is no dust accumulation on the inverter's body.
4. No physical damage on the outer cover of the inverter.

If maintenance is required in the inverter, please follow the instructions given below to put the inverter out of operation:

1. Switch off the AC circuit breaker connected between inverter and grid.
2. Switch off the DC switch to turn off the DC input power.
3. Use proper voltmeter to confirm the disconnection of AC and DC power from the unit.
4. Remove the AC wiring completely to disconnect unit from the grid.
5. Remove the DC wiring to disconnect unit from PV Array.

Note: Before any maintenance work, please switch off the AC and DC power to avoid any risk of electric shock.

CHAPTER 12 : RECYCLING AND DISPOSAL

Electrical and electronics waste should not be thrown out in open, put to fire or buried. They must never be treated as residential waste. An inverter which has reached end of its life or is not needed any more should be returned to the dealer or the company. User is advised to act as per the government norms prevailing in the area.

WARRANTY CERTIFICATE

Dear Customer, Congratulations, for purchasing our product. Inverters are warranted against defects in workmanship and material under normal use, service & specified duty conditions. We provide one time warranty service for seven years from the date of purchase by the first user.

Shakti Pumps (India) Limited warrants this product to be free from damage/ defects in material and workmanship under normal use and service for seven years from the date of purchase by the first user. The user shall produce valid and original copy of invoice for availing warranty. The user shall carry defective device to nearest authorized service center.

This warranty does not cover any loss or damage/ defect of any nature resulting from wrong product selection/ improper installation or installation by unauthorized/ untrained person and improper use of the inverter.

The warranty also does not cover consequential losses/ damages arising due to failure of inverter. No warranty will be provided on mechanical seal, rubber parts, fasteners and cables.

Our obligation is limited to recycling or repairing or replacing product/ parts ex-factory.

Equipment for repairs should be returned free of cost to us. The forgoing is subject to the provision that the user does not open the unit and make any change or repair without prior approval of authorized service center during the warranty period. This warranty excludes every condition whether statutory or otherwise, whatsoever not herein expressly set out.

WARRANTY CARD

Customer to fill following details

Name :
 Address :
 City/Village :
 District :
 State :
 Country :
 Pin Code :
 Mobile no. :
 Email id :

Information on Device:

Model no :
 Serial no. :
 Invoice no. :
 Commissioning date :
 Fault date and time :
 Message related to fault on display :
 Brief fault description and photo of display :
 Sign :
 Date :
 Place :

Installer to fill following details

Modules Used :
 Modules per string :
 Number of strings :
 Dealer license Number :
 Company :
 City/Village :
 State :
 Country :
 Pin Code :
 Mobile no. :
 Email id :
 Sign :
 Date :
 Place: :