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INSTALLATION & OPERATING INSTRUCTIONS

GARUDA GRID TIE INVERTER



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CHAPTER 1 : SAFETY INSTRUCTIONS

⚠ WARNING! Ignoring the following instructions can cause physical injury or damage to the equipment or death.

1.1 Pre-Installation Safety Measures

1. Before using the unit, read all instructions and cautionary markings on the unit and all the sections of this manual.
2. The gross weight of the equipment is close to 25-30 Kg. Kindly lift the hybrid controller carefully to avoid any physical injury.
3. Please check the package for any sign of damage to ensure personal safety. Don't use the damaged or incomplete Grid Tie Inverter.
4. Customers are NOT authorized to open the Grid Tie Inverter or to do any kind of modification, or repair; otherwise, there is a danger of shock and loss of warranty.
5. To store the Grid Tie Inverter, kindly follow instructions given in Chapter 2 "INTRODUCTION".

1.2 Installation Safety Measures

1. Installation should be done in presence of a professional technician. Safety equipment like safety shoes, helmets, and gloves should be used by the technician. Only licensed person, who has been trained in design, installation, commissioning, and operation of hybrid controller, is permitted to operate this equipment.
2. To prevent risk of shock during installation and maintenance, please make sure that all AC and DC terminals are plugged out.
3. Installation of the Grid Tie Inverter should be carried out on a solar structure with proper ground clearance & specified nuts & bolts.
4. Install the Grid Tie Inverter on metal or other non-flammable material, and keep it away from any combustible material.
5. The Grid Tie Inverter should not be installed inside a closed chamber. Ventilation is required to ensure proper heat dissipation. Ignoring this will result in malfunctioning of the unit and loss of warranty.
6. Before starting wiring and connections make sure that PV panels, Grid Tie Inverter, grid, and all other accessories are properly fitted on their designated place.
7. Ensure that the Grid Tie Inverter, and adjoining equipment are properly earthed to reduce electromagnetic emission and interference.

8. Unit must be earthed using appropriate wire size diameter and its diameter should be equal to or higher than that input power supply wires (refer regional safety standard specific to your location).
9. Make sure that the voltage grade of the power supply is consistent with the Grid Tie Inverter voltage. Also, note that all PV panels are connected in series or parallel as per systems requirement in order to have required voltage fed to the drive.
10. There must not be any loose connection. Make sure that all insulations are proper in order to prevent any damage/injury. Also periodically inspect insulation in case of a bad weather.
11. Check whether the wiring is correct and firm, there should not be any short circuit in the peripheral equipment as circuit.
12. Ensure that the output of the Grid Tie Inverter is turned off while setting all the required parameters.
13. Ensure that no unauthorized filter is connected to the output of the Grid Tie Inverter. It may cause loss of warranty.

1.3 Safety during Operation

1. Make sure that the ratings of the PV panels, grid, and Grid Tie Inverter comply with each other.
2. The heat sink should not be touched otherwise there is a danger of getting burnt.
3. Do not operate or touch the Grid Tie Inverter with the wet hand.
4. Do not put any of your belongings like mobile etc. on the Grid Tie Inverter
5. Disconnect PV power from the Grid Tie Inverter under the supervision or presence of a trained electrician.
6. Before opening the housing, the Grid Tie Inverter must be disconnected from all the energy sources like Grid and PV.
7. After the input is disconnected from the Grid Tie Inverter, wait for at least five minutes so as to allow the internal capacitors to get discharged for the safety of operation.
8. Ensure polarity, tightness and wire size are correct, before energizing the Grid Tie Inverter.
9. At over 2,000 metres altitude, the Grid tie inverter as heat dissipation function deteriorates, therefore, use proper derating.
10. Untrained workers are banned to check the signals in the running stage.
11. Remove the PV power supply only after the electric machine stops running.

⚠ ATTENTION

1. The DC connection terminals PV+ and PV- carry a dangerous DC voltage of up to 900V.
2. At the Grid tie inverter input, the photovoltaic cells generate DC voltage even at low intensity of sunlight.
3. While cabling, make sure that it does not come in the path of any other work e.g. harvesting or digging.
4. If there is any abnormality contact customer care.
5. Grid Tie Inverter and its heat sink may be relatively at high temperature than the atmosphere.
6. Improper wiring and utilization or unauthorized alteration may result in damage to hybrid controller and other equipments. Users will be responsible for the cause and there will be a loss of warranty.
7. The Garuda Grid Tie product is not recommended for elevators, emergency operation, medical products etc.

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 mm² copper/ 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.

SAFETY SYMBOLS

The safety symbols used in this manual highlight potential risks and provide important safety information, as listed below:



SHOCK HAZARD -

Caution, Risk of Electric Shock symbol indicates important safety instructions, which if not correctly followed, could result in serious injury or death.



WARNING-

Warning symbol indicates important safety instructions, which if not correctly followed, could result in electric shock, minor injury or damage to the equipment.



HIGH TEMPERATURE HAZARD -

Caution, Hot Surface symbol indicates important safety instructions, which if not correctly followed, could result in burns. (Inverter body temperature may exceed 80° C during operation). Please do not touch inverter surface.



EARTHING -

It Indicates location of grounding, if inverter is not grounded properly, could result in electric shock, minor injury or damage to the equipment.



5 minutes

ENERGY STORAGE TIMED DISCHARGE -

Caution, Risk of electric shock, energy storage discharge time symbol indicates important safety instructions, which if not correctly followed, could result in electric shock. (Discharge time is 5 minutes from de-energization. Please do not touch inverter until it discharges energy).



REFER TO OPERATING INSTRUCTIONS -

It indicates that user should refer to operating or installation instructions before proceeding.

CHAPTER 2 : INTRODUCTION

2.1 Product Overview

The Garuda grid tie inverter transformer less Inverter is designed to extract maximum direct current power from Solar PV panel and convert to AC power to feed into utility grid. This unique inverter plays a vital role in optimizing energy production, ensuring grid synchronization, and enhancing safety. This product is designed and developed in India and comes with an IP65 ingress protection. Their efficient performance leads to cost savings, reduces environmental impact, and contributes to a sustainable energy in the future. The plug and play installation and electrically safe user handling are the additional attraction of this product.

2.2 Storage Instructions

The Garuda grid tie inverter should be stored properly in the original shipping package or crate when not in use especially for extended period of time to retain warranty.

Measures to be taken for Garuda grid tie inverter storage

- ✓ Storage area should be clean, dry, and free from direct sunlight or corrosive fumes.
- ✓ Storage area has an ambient temperature range of -20 °C to 60 °C.
- ✓ Storage area has a relative humidity range of 0% to 90% and non-condensing environment.
- ✓ Storage area has an air pressure range of 85kPa to 107kPa.

Do Not Store

- ✗ In an area with the rapid change in temperature (condensation and frost may be caused).
- ✗ In a place with significant water leakage.
- ✗ In a place which has a high risk of fire ignition.

NOTE: If storage of drive is for more than 3 months then ensure that temperature should not be more than 30° C. Storage for more than a year may reduce the lifespan of the product.

2.3 Receiving and Inspection

The Garuda grid tie inverter has gone through rigorous quality control tests before shipment. After receiving the drive, please check if the part no. indicated on the name plate corresponds with part no. of your order.

● Serial Number Explanation from Left to Right

Model Number	6D	Digits	Description
Serial Number & Barcode	6D-0001-0-04-10-19  6D-0001-0-04-10-19	6D	Model number
		0001	Serial number for the batch
		0	Batch number
		04	Date of manufacturing
		10	Month of manufacturing
		19	Year of manufacturing
Software Version	MAINGARUDA_X.XX		

CHAPTER 3 : PACKAGE CONTENTS

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. Inspect the entire exterior of the Inverter to see if there are any scratches or other damage resulting from shipping.
2. Ensure there is operation manual & warranty card in the packing box.
3. Ensure the nameplate is correct as ordered.
4. Ensure the optional parts are as per order, if ordered.
5. Contact the customer care if there is any damage to the unit or the optional parts.

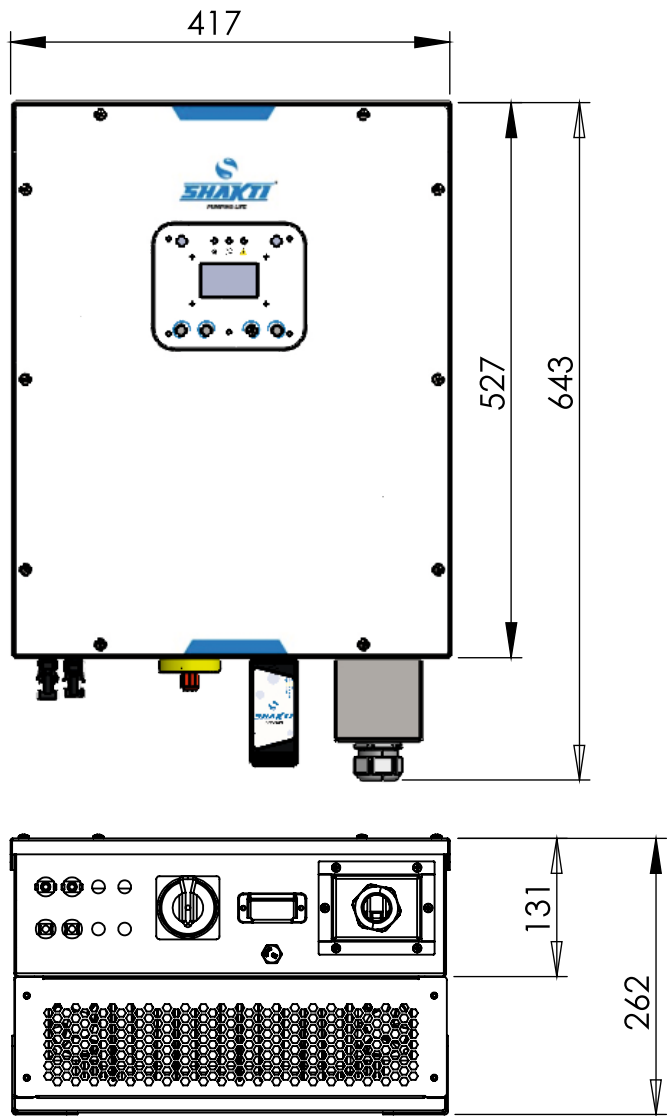


Fig. 3.1 Garuda grid tie inverter

Following is the list of items in the packaging.

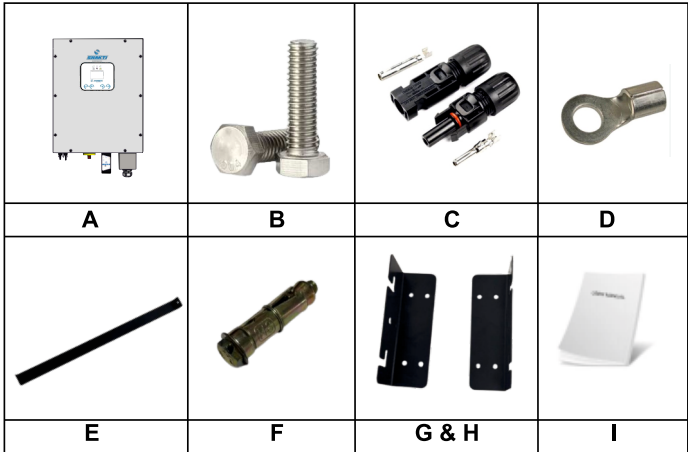


Fig. 3.2 Images of list of Items in Garuda Packaging

S.No.	Description	Qty.	Unit
A	GARUDA UNIT	1	Set
B	H.H.BOLT M8X20 (SS304)	6	EA
C	PV CONNECTORS	4	EA
D	COPPER LUGS RING TYPE	2	EA
E	MNTPLT HOLDER	1	EA
F	WALL MOUNT ANCHOR FASTENER	8	EA
G	RH SIDE MOUNTING BRACKET	1	EA
H	LH SIDE MOUNTING BRACKET	1	EA
I	MANUAL GARUDA 3P 20KW	1	EA

Table 3.1 List of Items

CHAPTER 4 : SPECIFICATIONS#

Parameters	GARUDA
PV INPUT	
PV Voltage Range	200-900 VDC
Max PV Current	40 A
MPPT Range	250-800 VDC
Nominal PV Voltage	660 V
Number of PV Inputs	2
Max PV Power	20000W
PV Start Voltage	200 V
GRID TIE OUTPUT	
Voltage Range	330 – 460 V_{LL} AC
Topology	Transformer-less Three Phase Multilevel Inverter
Rated AC Power(230V, 50Hz)	19.99 KW
Max Grid Current	32A
Nominal Frequency	50/60Hz
Power Factor , adjustable	0.9 leading – 0.9 lagging
Peak MPPT accuracy	>99%
Feed-in Grid	3L+PE
Total Harmonic Distortion	< 5% (at nominal power)
Peak Efficiency	>97.5%
Protection	Anti islanding, Grid monitoring, Short circuit, Over voltage, Over temperature, Overload etc.
DISPLAY & COMMUNICATION	
Display type	Graphical LCD
Status Indicator	LEDs
Serial Communication	RS232 (MODBUS)
Remote monitoring	YES(Optional)
Wi-Fi	YES(Optional)
PHYSICAL	
L X W X H	640mm X 417mm X 248 mm
Gross wt.	Approx 30 kg
OTHER INFO	
Pollution Degree	PD3
Over Voltage Category	Category II
Protection Class	Class I
Operating Temperature	-25 TO 60 °C
Relative Humidity	0-95% RH(Non-condensing)
Altitude	3000 m (>2000m power derating)
IP Degree of Protection	IP 65 (Indoor & Outdoor Installation)
Cooling	Air forced

(#The above parameters are subject to change, Please refer sticker parameters 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 Grid Tie Inverter tilted forwards, sideways, horizontally or upside down.
3. Install the Grid Tie Inverter at eye level for convenience when checking the LCD display and possible maintenance activities.
4. When mounting the Grid Tie Inverter please consider that disassembly for service work may be required.

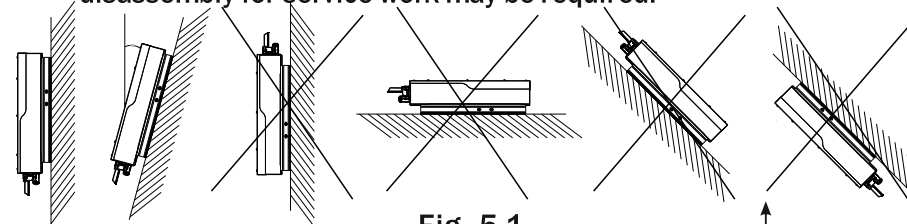


Fig. 5.1

5.2. Installation Position

Do not expose the Grid Tie 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.

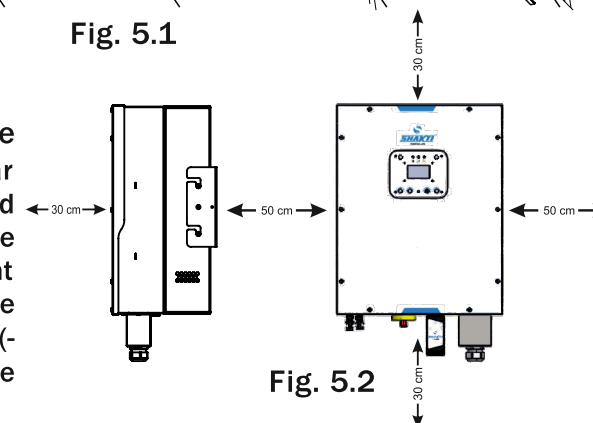


Fig. 5.2

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.

5.3 INSTALLATION LOCATION

1. Do not install the inverter in areas containing highly flammable material or gases.
2. Do not install the inverter in potential explosive atmosphere.
3. Do not install the inverter in closed space where air cannot circulate freely (to avoid overheating).
4. Do not install the inverter in direct sunlight and raining. (Exposure to direct sunlight will increase the operating temperature of the inverter and cause de-rated performance).
5. To prevent accidents, install the device where it can't be reached by children.
6. Install on Wall or strong structure capable of bearing inverter's weight.

5.4. Mounting Procedure for Garuda

This section provides the mounting procedure and drawings for Garuda unit.

1. Connect the mounting plate strip to the mounting brackets and then mark the Positions of the Drill Holes of the wall mount bracket. The mounting position should be marked as shown in Figure 5.3.

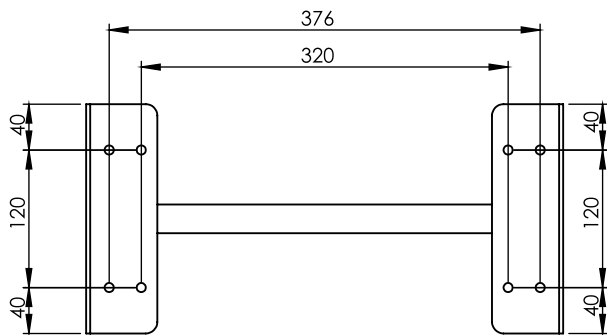


Fig. 5.3 Mounting Bracket for Garuda

2. Drill Holes and Place the Expansion Tubes

According to the guides, drill 8 holes in the wall (in conformity with position marked in Figure 5.4) and then place expansion tubes.

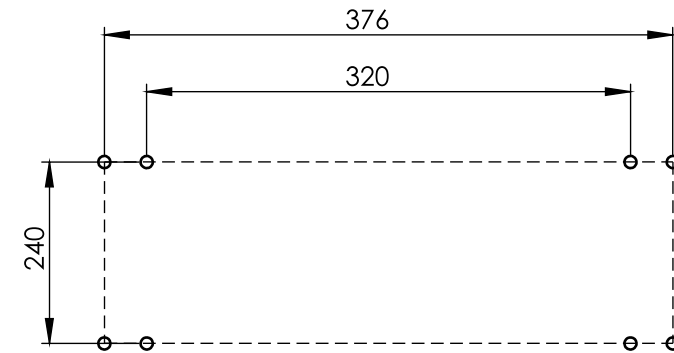


Fig. 5.4 Drilling drawing for Garuda

3. Mount the Garuda

Carefully mount the Garuda to the mounting bracket following the steps shown in figure 5.5. Make sure that the rear part of the equipment is closely mounted to the mounting bracket.

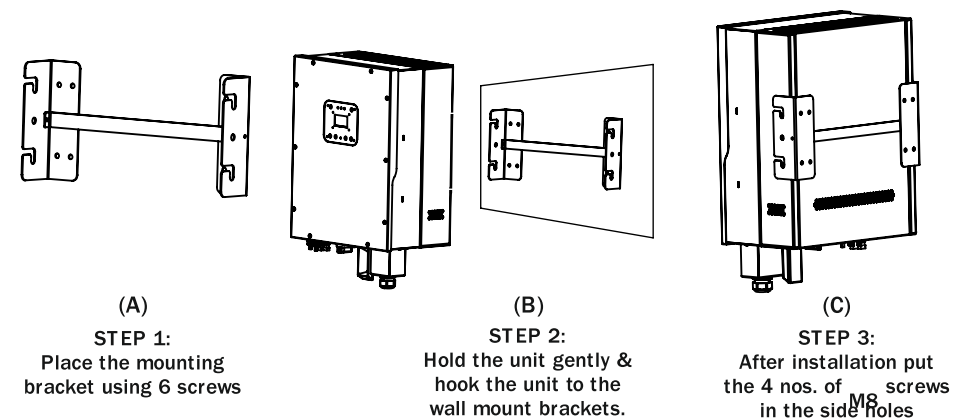


Fig. 5.5 Mounting Procedure for Garuda

CHAPTER 6 : CONNECTIONS & CONNECTING PROCEDURE

6.1. Rear Panel

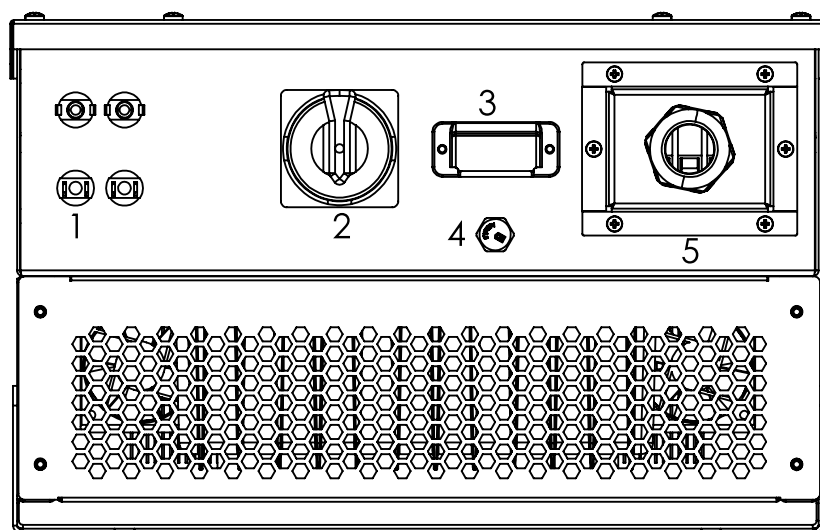


Fig. 6.1

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

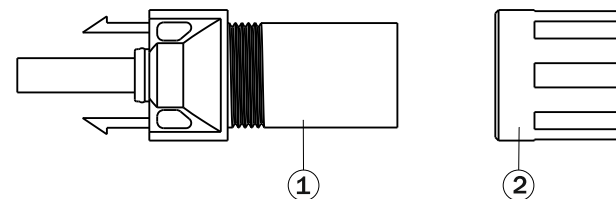
Table 6.1

6.1.1 PV Input Connectors

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

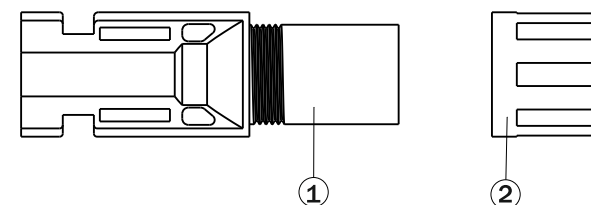
Table 6.2

DC connector is made up of a positive connector and a negative connector as shown in figure 6.4 & 6.5



1. Insulated Enclosure 2. Lock Screw

Fig. 6.4 Positive Connector



1. Insulated Enclosure 2. Lock Screw

Fig. 6.5 Negative Connector

Connecting Procedure

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 with appropriate length.

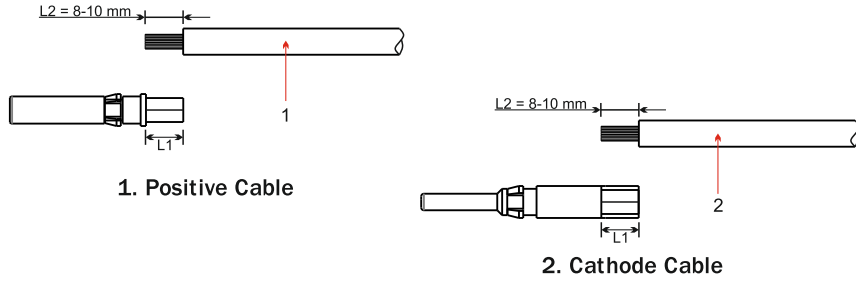


Fig. 6.6 Connecting Cables

3. Feed the positive and cathode cables into corresponding lock screws.
4. Put the metal positive and cathode terminals into positive cable and cathode cable whose insulated enclosure has been stripped, and crimp them tightly with a wire crimper. Make sure that the withdrawal force of the pressed cable is bigger than 400N.
5. 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.
6. Fasten the lock screws on positive and negative connectors into respondent insulated enclosure and make them tight.
7. Connect the positive and cathode connectors into positive and negative DC input terminals of the inverter, a "click" should be heard or felt when the contact cable assembly is seated correctly.

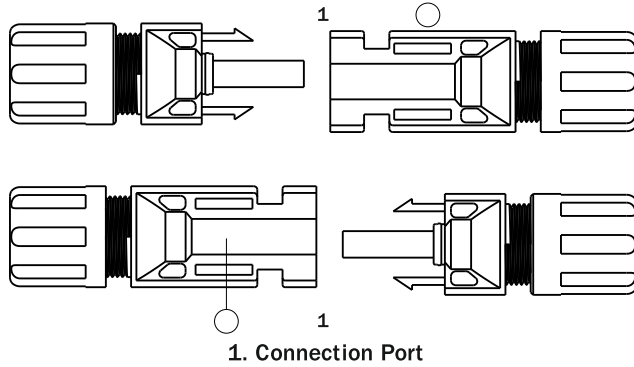


Fig. 6.7

6.1.2 PV DC Disconnect switch

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

6.1.3 WIFI/GPRS DB9 Connector

Connect IoT dongle or RS 232 to USB converter cable to this port for recording and observing data from inverter on online portal. When the dongle is connected it sends recorded data of all the parameters used in operation of the unit. But if some specific parameter is required to be observed RS 232 to USB converter cable can be connected and data corresponding to a particular address according to the table 6.2 can be accessed.

NOTE: The Pins 1 & 5 of the DB9 Connector are the source pins of 5 V at few milliamperes current. These pins cannot be used as sink even for a single milliampere current.

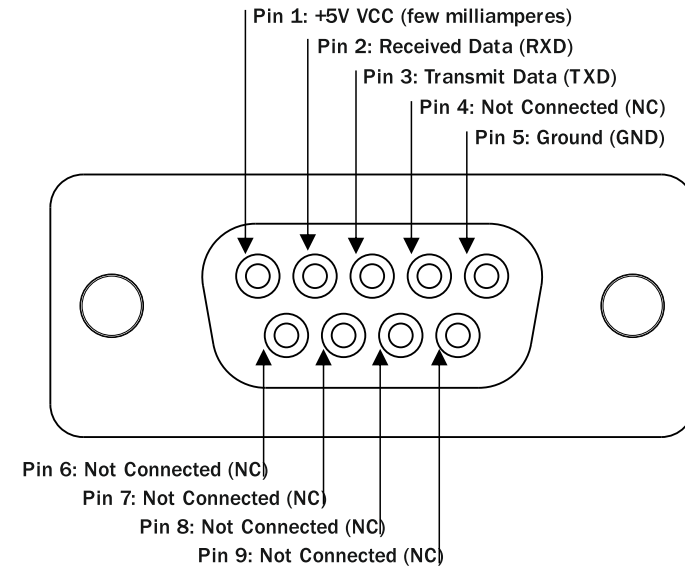


Figure 6.8 RS232 Connector

6.1.4 SHAKTI RMS/IoT DONGLE

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

1. Product Appearance

Status Indicator:

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

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

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.

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)¹ will be ON for 2G dongle and Pulse LED (GREEN)² will blink in every second for 4G dongle.

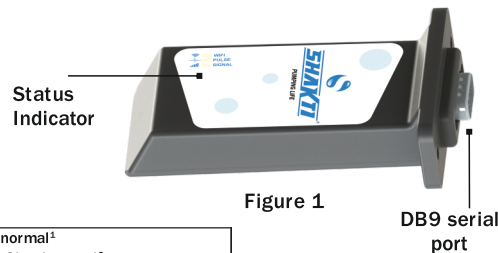


Figure 1



Figure 2

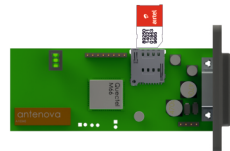


Figure 3



Figure 4

Step3:

To configure the Wi-Fi 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:

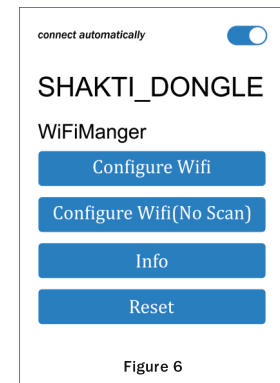


Figure 6

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

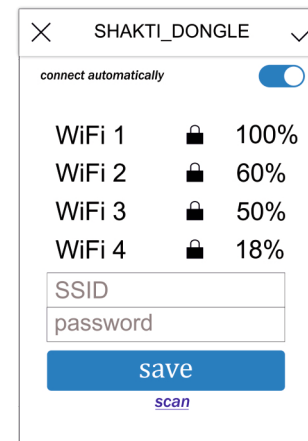


Figure 7

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.

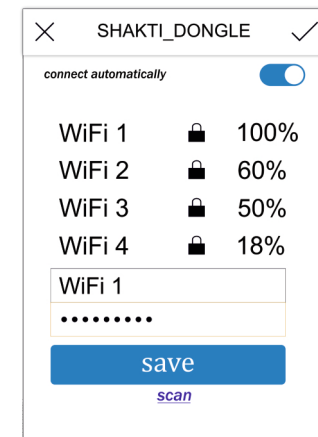


Figure 8

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

* NOTE *

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

4. Troubleshooting

- If Pulse LED is constantly ON/OFF, check main device power supply or restart the device.
- If signal LED not glowing, check sim card / signal strength.
- If Wi-Fi LED not glowing, check Wi-Fi network / reconfigure Wi-Fi settings.
- Contact Shakti to integrate IoT Dongle to other products & solutions.

Table 6.2 MODBUS Address

S.No.	Configuration Parameters	MODBUS_ADDRESS(DEC)	DVT Factor	Item min	Item Max	Item Default	Unit	Configuration Parameters
1	FACTORY MODE	256	1	0	1	1	NA	FACTORY_MODE
2	LANGUAGE	257	1	0	0	0	NA	LANGUAGE_SELECTED
3	EEPROM ERASE	258	1	0	1	1	NA	EEPROM_ERASE_FLAG
4	INSTALL DATE	259	1	1	31	1	NA	INST_DATE
5	INSTALL MONTH	260	1	1	12	1	NA	INST_MONTH
6	INSTALL YEAR	261	1	18	99	20	NA	INST_YEAR
7	LCD CONTRAST	262	1	27	39	33	%	LCD_CONTRAST
8	PVGFD	263	1	0	1	1	NA	PVGFD_ENABLE
9	ELCFD	264	1	0	1	1	NA	ELCFD_ENABLE
10	MASTER_ON_OFF_GSC	265	1	0	1	1	NA	MASTER_ON_OFF_GSC
11	ENERGY_ERASE_FLAG	266	1	1	2	2	NA	ENERGY_ERASE_FLAG
12	RS232 BAUD RATE	271	1	1	6	2	NA	RS232_BAUD_RATE
13	RS485 BAUD RATE	272	1	1	6	2	NA	RS485_BAUD_RATE
14	GRID_POWER_DRAWN_RESTRICT	273	1	0	1	1	NA	GRID_POWER_DRAWN_RESTRICT
15	AUTOROLL ENABLE	274	1	1	2	1	NA	ROLLING_PAGE_ENABLE
16	MODBUS ADD RS232	275	1	1	99	1	NA	MODBUS_ADD_RS232
17	MODBUS ADD RS485	277	1	1	99	1	NA	MODBUS_ADD_RS485
18	RUN FROM SS	281	1	0	1	0	NA	RUNFROMSS_ENABLE
19	DISPLAY MODE	282	1	1	2	1	NA	DISPLAY_MODE_FLAG
22	FAULT_ADDRESS_POINTER	285	1	0	255	0	NA	FAULT_ADDRESS_POINTER
23	Logger Date	286	1	1	31	1	NA	Logger Date
24	Logger Month	287	1	1	12	1	NA	Logger Month
25	Logger Year	288	1	1	99	1	NA	Logger Year
27	DISPLAY LOCK	290	1	1	2	2	NA	DISPLAY_LOCK_ENABLE
28	DISPLAY LOCK PASSWORD	291	1	0	999	345	NA	DISPLAY_PASSWORD_CHECK
29	IND VS STD	293	1	1	2	1	NA	IND_VS_STD
30	NEUTRAL CONNECTED	294	1	0	1	1	NA	NEUTRAL_CONNECTED
32	DATA_READ_MODE	296	1	1	2	2	NA	DATA_READ_MODE
33	Energy_Meter_Slave_Address	297	1	1	99	5	NA	Energy_Meter_Slave_Address

S.No.	VFD Parameters	MODBUS_ADDRESS(DEC)	DVT Factor	Item min	Item Max	Item Default	Unit	VFD Parameters
1	DC BUS OVER VOLTAGE	1016	1	500	950	950	V	DC_BUS_OV_LIMIT
2	THERMAL DERATING	1020	1	0	200	100	NA	THERMAL_DERATING_FACTOR
3	MAX FREQ	1022	1	1	400	240	NA	MAX_FREQ_SET
4	OVER_VOLT_PV_LIMIT	1024	1	400	950	950	NA	OVER_VOLT_PV_LIMIT
5	UNDER_VOLT_PV_LIMIT	1026	1	100	300	160	NA	UNDER_VOLT_PV_LIMIT
6	OVERLOAD_GSC_LIMIT	1028	10	70	320	320	NA	OVERLOAD_GSC_LIMIT
7	GSC_OVER_TEMP_LIMIT	1030	1	100	130	108	°C	GSC_OVER_TEMP_LIMIT

S.No.	CONTROL PARAMETERS	MODBUS_ADDRESS(DEC)	DVT Factor	Item min	Item Max	Item Default	Unit	CONTROL PARAMETERS
1	TZGSC_ENABLE_FLAG	5021	1	0	1	1	NA	TZGSC_ENABLE_FLAG
2	TZ_DSAT_GSC_FLAG_EEPROM	5023	1	0	1	1	NA	TZ_DSAT_GSC_FLAG_EEPROM

S.No.	GRID_PARAMETERS	MODBUS_ADDRESS(DEC)	DVT Factor	Item min	Item Max	Item Default	Unit	GRID_PARAMETERS
1	RATED GRID FREQ	4000	1	50	60	50	Hz	RATED_GRID_FREQ
2	OVER_CURR_BOOST_LIMIT	4002	1	6	26	25	NA	OVER_CURR_BOOST_LIMIT
3	KP_PLL	4004	1000	1	9999	96	NA	KP_PLL
4	KI_PLL	4006	1000	1	9999	6	NA	KI_PLL
5	KP_PLL_SLOW	4008	1000	1	9999	96	NA	KP_PLL_SLOW
6	KI_PLL_SLOW	4010	1000	1	9999	6	NA	KI_PLL_SLOW
7	MIN VOLTAGE	4012	10	1500	2300	1850	V	V_GRID_RMS_MIN
8	MAX VOLTAGE	4014	10	2300	2900	2900	V	V_GRID_RMS_MAX
9	VOLT HYSTERESIS	4016	1	5	40	5	V	V_GRID_HYS
10	V_GRID_UNBALANCE_SET	4018	1	3	50	50	V	V_GRID_UNBALANCE_SET
11	V_GRID_UNBALANCE_RESET	4020	1	3	50	45	V	V_GRID_UNBALANCE_RESET
12	ONE_PHASE_MISSING_FACTOR	4022	100	1	100	80	NA	ONE_PHASE_MISSING_FACTOR
13	TWO_PHASE_MISSING_FACTOR	4024	100	1	100	80	NA	TWO_PHASE_MISSING_FACTOR
14	MIN FREQUENCY	4026	10	450	595	470	Hz	GRID_FREQ_MIN
15	MAX FREQUENCY	4028	10	505	650	520	Hz	GRID_FREQ_MAX
16	FREQ HYSTERESIS	4030	10	1	50	1	Hz	GRID_FREQ_HYS
17	RELAY_CLOSING_INIT_DELAY	4032	1000	100	1000	167	NA	RELAY_CLOSING_INIT_DELAY
18	RELAY_CLOSE_DELAY	4034	100	1	100	5	NA	RELAY_CLOSE_DELAY
19	BOOST VOLTAGE REF	4036	1	550	700	625	V	BOOST_VDC_REF
20	BOOST VOLTAGE KP	4038	1000	1	9999	1	NA	BOOST_VDC_KP
21	BOOST VOLTAGE KI	4040	1000	0	9999	5	NA	BOOST_VDC_KI
22	BOOST CURRENT KP	4042	1000	0	9999	5	NA	BOOST_KP_CURR
23	BOOST CURRENT KI	4044	1000	50	9999	100	NA	BOOST_KI_CURR
24	VOLTAGE REF	4046	1	550	780	650	V	GSC_VDC_REF
25	VOLTAGE KP	4048	1000	0	9999	100	NA	GSC_VDC_KP
26	VOLTAGE KI	4050	1000	0	9999	50	NA	GSC_VDC_KI
27	CURRENT KP	4052	10	20	999	20	NA	GSC_KP_CURR
28	CURRENT KI	4054	10	10	9999	2000	NA	GSC_KI_CURR
29	GAIN_ADJUST_A	4056	1000	0	9999	1010	NA	GAIN_ADJUST_A
30	GAIN_ADJUST_B	4058	1000	0	9999	1000	NA	GAIN_ADJUST_B
31	GAIN_ADJUST_C	4060	1000	0	9999	1000	NA	GAIN_ADJUST_C
32	I_GRD_A_OFFSET_TEST_L	4062	100	0	999	131	NA	I_GRD_A_OFFSET_TEST_L
33	I_GRD_B_OFFSET_TEST_L	4064	100	0	999	100	NA	I_GRD_B_OFFSET_TEST_L
34	I_GRD_C_OFFSET_TEST_L	4066	100	0	999	100	NA	I_GRD_C_OFFSET_TEST_L
35	Wvcos_A2_L	4068	100	0	9999	5500	NA	Wvcos_A2_L
36	Wvcos_B2_L	4070	100	0	9999	4920	NA	Wvcos_B2_L
37	Wvcos_C2_L	4072	100	0	9999	5000	NA	Wvcos_C2_L
38	Wvsin_A2_L	4074	100	0	9999	5000	NA	Wvsin_A2_L
39	Wvsin_B2_L	4076	100	0	9999	4500	NA	Wvsin_B2_L
40	Wvsin_C2_L	4078	100	0	9999	5000	NA	Wvsin_C2_L
41	Wvcos_A4_L	4080	100	0	9999	5100	NA	Wvcos_A4_L
42	Wvcos_B4_L	4082	100	0	9999	5000	NA	Wvcos_B4_L
43	Wvcos_C4_L	4084	100	0	9999	5000	NA	Wvcos_C4_L
44	Wvsin_A4_L	4086	100	0	9999	5000	NA	Wvsin_A4_L
45	Wvsin_B4_L	4088	100	0	9999	5200	NA	Wvsin_B4_L
46	Wvsin_C4_L	4090	100	0	9999	5000	NA	Wvsin_C4_L
47	ELCFD_MUL_FACT	4092	10	1	999	15	NA	ELCFD_MUL_FACT
48	TEMP_DERATING_START	4094	1	70	100	80	NA	TEMP_DERATING_START

S.No.	PV PARAMETERS	MODBUS _ADDRES (DEC)	DVT Factor	Item min	Item Max	Item Default	Unit	PV PARAMETERS
1	MPPCR GSC	6168	1	100	36000	32000	NA	GSC_MPPT_CALL_RATE
2	VOLTAGE TOLERANCE	7004	1	0	300	50	NA	TOL_V
3	CURRENT TOLERANCE	7006	1	0	4999	60	NA	TOL_I
4	MIN_PV_MPPT_VOLT	7014	1	150	500	180	NA	MIN_PV_MPPT_VOLT
5	I_PV1_REF_MAX	7016	10	20	200	100	NA	I_PV1_REF_MAX

S.No.	FLOAT PARAMETERS (Not for Server)	MODBUS _ADDRES (DEC)	DVT Factor	Item min	Item Max	Item Default	Unit	FLOAT PARAMETERS (Not for Server)
1	MAX POWER GSC	6024	1	1000	11200	9600	W	MAX_PV_POWER_GSC
2	SWITCHING FREQ	6028	1	1600	16000	3200	Hz	SWITCHING_FREQ

S.No.	DISPLAY PARAMETERS	MODBUS _ADDRES (DEC)	DVT Factor	Item min	Item Max	Item Default	Unit	DISPLAY PARAMETERS
1	FIRMWARE_VER	3860	1	NA	NA	NA	NA	FIRMWARE_VER
2	Today_Time	6052	1	NA	NA	NA	Hr	Today_Time
3	FREQ_HZ_DISPLAY	6060	10	NA	NA	NA	Hz	FREQ_HZ_DISPLAY
4	Fault_Code	6080	1	NA	NA	NA	NA	Fault_Code
5	STATUS_GARUDA	6084	1	NA	NA	NA	NA	STATUS_GARUDA
6	PV1_Volt_Avg_RMS	6088	10	NA	NA	NA	V	PV1_Volt_Avg_RMS
7	BOOST_I1_Avg	6092	100	NA	NA	NA	A	BOOST_I1_Avg
8	PV2_Volt_Avg_RMS	6096	10	NA	NA	NA	V	PV2_Volt_Avg_RMS
9	BOOST_I2_Avg	6100	100	NA	NA	NA	A	BOOST_I2_Avg
10	V_An_RMS	6112	10	NA	NA	NA	V	V_An_RMS
11	I_GRD_A_RMS	6116	10	NA	NA	NA	A	I_GRD_A_RMS
12	V_Bn_RMS	6120	10	NA	NA	NA	V	V_Bn_RMS
13	I_GRD_B_RMS	6124	10	NA	NA	NA	A	I_GRD_B_RMS
14	V_Cn_RMS	6128	10	NA	NA	NA	V	V_Cn_RMS
15	I_GRD_C_RMS	6132	10	NA	NA	NA	A	I_GRD_C_RMS
16	Freq_PLL	6136	10	NA	NA	NA	Hz	Freq_PLL
17	POWER_GRD_LPF	6140	100	NA	NA	NA	KW	POWER_GRD_LPF
18	Today_Energy_GSC	6144	1	NA	NA	NA	NA	Today_Energy_GSC
19	Today_Time_GSC	6148	1	NA	NA	NA	NA	Today_Time_GSC
20	Cumulative_Energy_GSC_Import	6152	100	NA	NA	NA	NA	Cumulative_Energy_GSC_Import
21	Today_Energy_GSC_Import	6156	1	NA	NA	NA	NA	Today_Energy_GSC_Import
22	LATITUDE	6160	10000	0	999999	226275	NA	LATITUDE
23	LONGITUDE	6164	10000	0	999999	755802	NA	LONGITUDE

6.1.5 Pressure Relief Vent

Pressure relief vent releases the internal pressure.

CHAPTER 7 : OPERATION OF UNIT

7.1 Display Module Description

Following figure 7.1 indicates the outer look of Display. It has five buttons, three LED indicators, one 128X64 pixel LCD Display and Buzzer.



Figure 7.1 LCD display layout

7.2.Button Description and Operation

	Functionality
Power On	• NA
Power Off	• NA
ESC	• Previous Screen
UP ARROW	• Used for Scrolling up • For increasing the parameter values in Configuration menu
DOWN ARROW	• Used for Scrolling down • For decreasing the parameter values in Configuration menu
ENTER	• Selection

7.3.LED Description and Indication

INDICATION	LED 1	LED 2		LED 3
	GREEN	AMBER	GREEN	RED (Warning)
PV OK	GREEN			
Feeding To Grid			GREEN	
1 Min Countdown		AMBER		
Warning & Fault				RED

7.4. LCD Operation

● 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 parameter required for the proper functioning of the product which are illustrated in the figure 7.2.

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. For example in the language setting user has an option to choose one language out of the four options available. The RTC Date is set in the format DD/MM/YY and the RTC Time in HH:MM:SS format. Other options are common to factory setup option in main menu therefore, is discussed in section C of CONFIGURE. After the successful starting of the product or whenever the LCD is not operated for a period of time, 11 status screens appears in rolling until menu button is pressed.

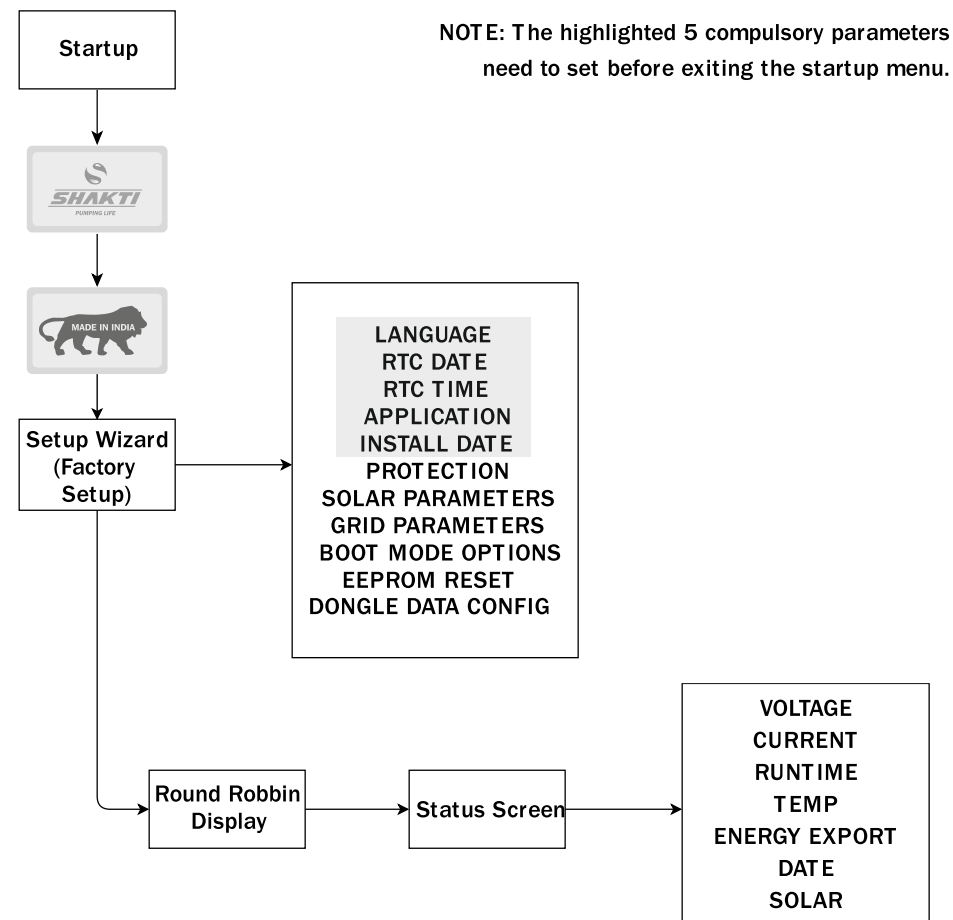


Figure 7.2 Startup menu tree

● Main Menu

In the main menu user can change the setting or get information by transferring from one interface to another. The STATUS and CONFIGURE, are discussed separately in further sections. FAULT, DAY, and YEAR LOGS of the product can be viewed in the LOGS. The ABOUT section provides the information of firmware version, serial number, network details.

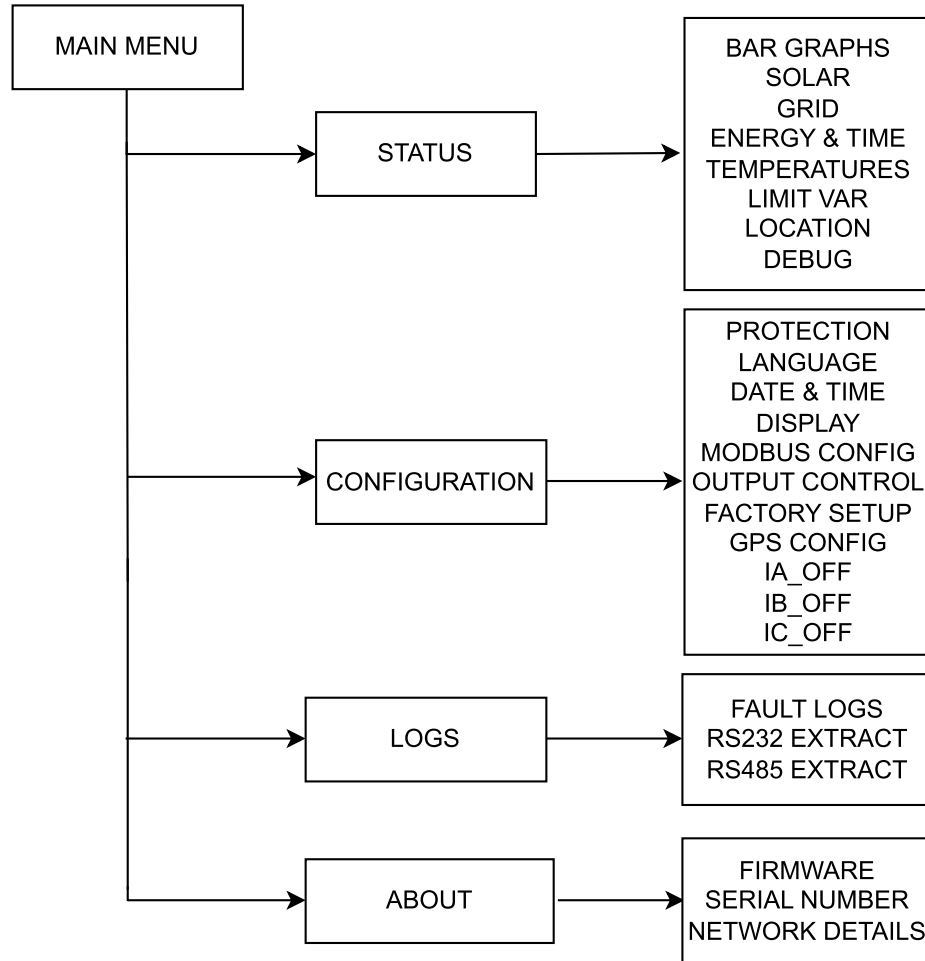


Figure 7.3 Main Menu tree

► STATUS^{*1}

A) BAR GRAPHS

The bar graphs show today's energy usage data for ongoing month and last month.

B) SOLAR

This status shows the real time PV condition of the system, such as input voltage (V), input current (A), input power (W), total power (W), and cumulative energy (kWh).

C) GRID

This status shows the situation of GRID connected to the system, it includes line voltages (V), line currents (A), and frequency (Hz).

D) ENERGY and TIME

Under ENERGY the data of total energy sent to grid, today and till date with their duration is available.

GRD EDAY : Total energy sent to grid today (kWh)
 GRD ETOT : Total energy sent to grid till date (kWh)
 GRD TTOT : Total time energy is sent to grid (Hr)

E) TEMPERATURES

This section provides the temperature readings from different system components.

F) LIMIT VARIABLE

This status displays system limit indications which is used by authorized technicians or service personnel. Each limit has a corresponding flag indicating either 0 or 1. A value of 0 means the respective condition is not causing the limitation, while 1 means it is contributing to the limit. The following flags help identify reasons for limiting power output, voltage, current, or frequency.

G) LOCATION

This section shows the latitude and longitude of a location.

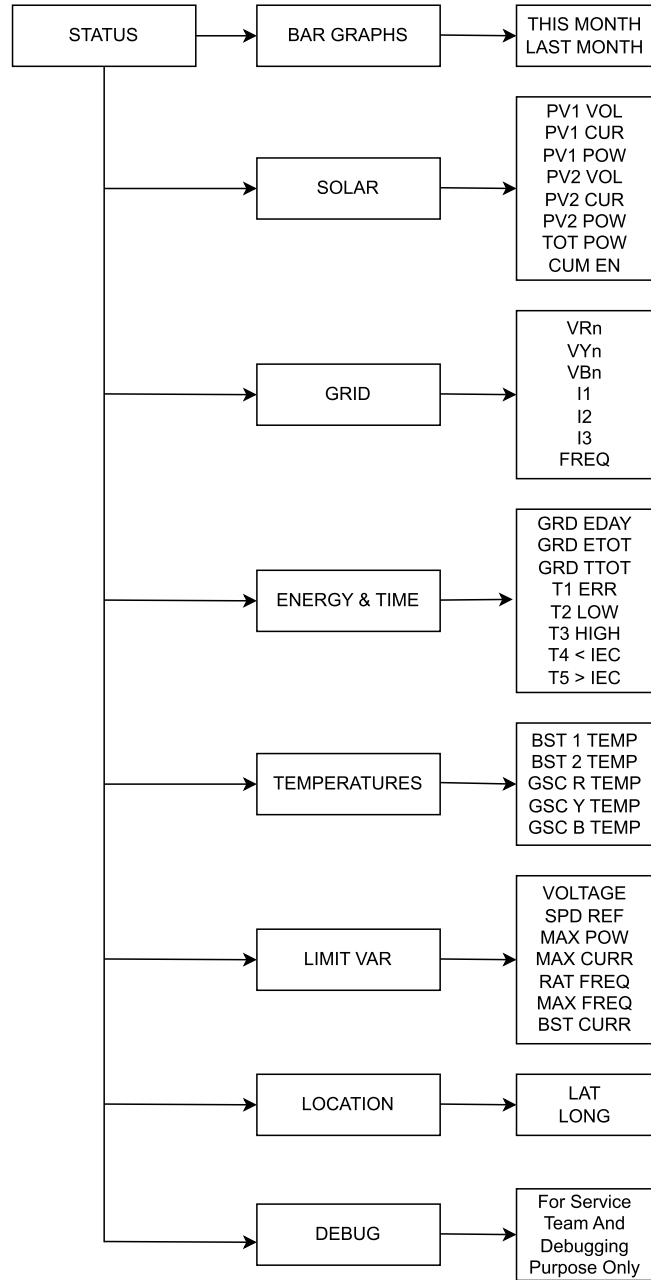


Figure 7.4 STATUS Menu tree

► CONFIGURATION *2

A) PROTECTION

To ensure operational safety, the protection limits for the parameters shown in Fig. 7.6 can be configured according to the user's requirements.

B) LANGUAGE

English is selected as the default language and is the only language currently supported by the system.

C) DATE & TIME

User can update date and time to synchronize with real time.

D) DISPLAY

Various parameters related to display such as display mode, contrast etc. can be configured.

E) MODBUS CONFIG

When communicating via RS232/RS485, you can select or modify the slave ID and baud rate in this setting to match those of the connected device.

To enable communication with the Energy Meter, first set 'Data Read EM' to 'Enable', then select the appropriate Slave ID. (Note: This feature is available only in specific firmware versions).

F) OUTPUT CONTROL

If disabled, the grid disconnects from the system which eventually stops the grid tie operation.

G) FACTORY SETUP

A security password is required to access this menu section.

i. SOLAR PARAMETERS

According to PV panels connected to the system, parameters (as shown in Figure 7.6) can be configured.

ii. GRID PARAMETERS

If required, parameters can be set according to the local GRID, keeping in mind the safety regulations specific to that area.

iii. BOOT MODE OPTIONS

This functionality requires another security password to upgrade the firmware of the system by USB or SERIAL BOOT MODE.

iv. EEPROM RESET

EEPROM can be reset only by authorized technician/service personnel. Users are not allowed to reset the EEPROM as it may cause malfunctioning of the unit.

H) GPS CONFIG

Latitude and Longitude can be configured manually according to the location.

I) IA_OFF

J) IB_OFF

K) IC_OFF

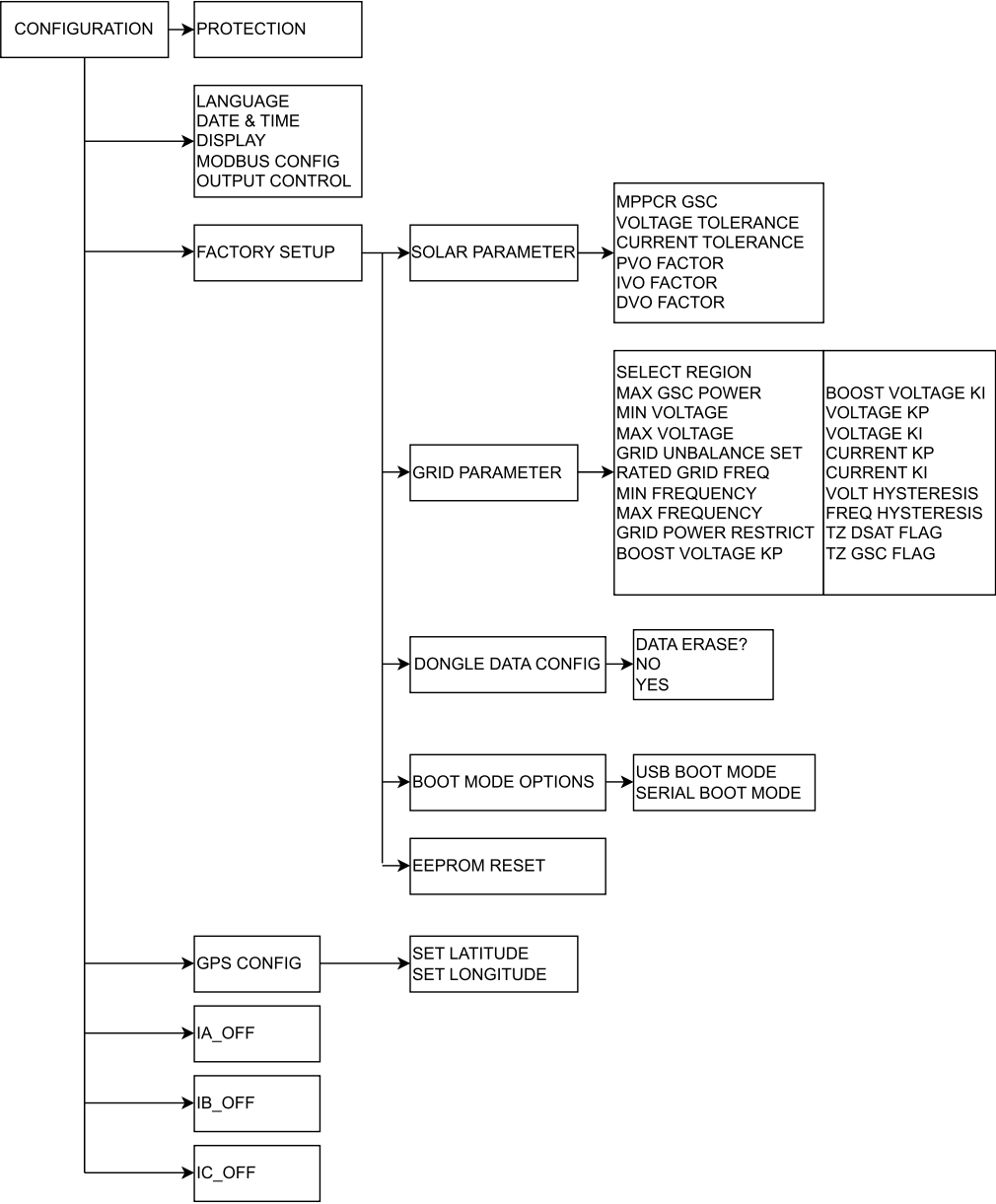


Figure 7.6 CONFIGURE Menu tree

CHAPTER 8 : 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 8.1 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 RATED FREQUENCY of GRID PARAMETERS is given below:

2 CONFIGURATION >> 7 FACTORY SETUP >> 2 GRID PARAMETERS >> 6 RATED GRID FREQ.

Hence, Numeral designator for RATED GRID FREQ of GRID PARAMETERS is 2726, which signifies go to the 2nd page of menu to reach CONFIGURATION then go to 7th location of CONFIGURATION to reach FACTORY SETUP (page 28). Then enter the 2nd location of page 28 to reach GRID PARAMETERS (page 282) then enter into 6th location to go to RATED GRID FREQ (page 2826).

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 BOOST VOLTAGE KI is 272_11.

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

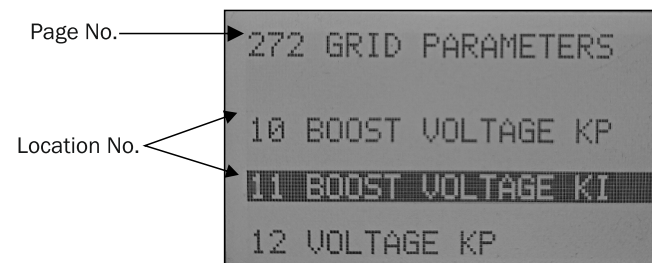


fig. 8.1

S.NO.	HEADINGS	S.NO.	HEADINGS	S.NO.	HEADINGS
0	MENU	221	ENGLISH	271	SOLAR PARAMETERS
1	STATUS	23	DATE & TIME	2711	MPPCR GSC
11	BAR GRAPHS	231	SET DATE	2712	VOLTAGE TOLERANCE
111	THIS MONTH	232	SET TIME	2713	CURRENT TOLERANCE
112	LAST MONTH	24	DISPLAY	2714	PVO FACTOR
12	SOLAR	241	DISPLAY MODE	2715	IVO FACTOR
13	GRID	2411	ROLLING PAGES	2716	DVO FACTOR
14	ENERGY AND TIME	2412	SHAKTI SCREEN	272	GRID PARAMETERS
15	TEMPERATURES	242	CONTRAST	2721	SELECT REGION
16	LIMIT VAR	243	AUTOROLL	27211	INDIAN GRID
17	LOCATION	2431	YES	27212	IEC-61727
18	DEBUG	2432	NO	2722	MAX GSC POWER
2	CONFIGURE	244	DISPLAY LOCK	2723	MIN VOLTAGE
21	PROTECTION	2441	YES	2724	MAX VOLTAGE
211	DC BUS OVER VOLTAGE	2442	NO	2725	GRID UNBALANCE SET
212	THERMAL DERATING	2443	CHANGE PASSWORD	2726	RATED GRID FREQ
213	PVGFD	25	MODBUS CONFIG	2726_1	50 Hz
213_1	ENABLE	251	RS232 SLAVE ADD	2726_2	60 Hz
213_2	DISABLE	252	RS232 BAUD RATE	2727	MIN FREQUENCY
214	ELCFD	253	RS485 SLAVE ADD	2728	MAX FREQUENCY
214_1	ENABLE	254	RS485 BAUD RATE	2729	GRID POWER RESTRICT
214_2	DISABLE	255	EM DATA READ	2729_1	DISABLE
215	RUN FROM SS	2551	DISABLE	2729_2	ENABLE
215_1	ENABLE	2552	ENABLE	272_10	BOOST VOLTAGE KP
215_2	DISABLE	256	ENERGY MTR SLAVE ID	272_11	BOOST VOLTAGE KI
216	NEUTRAL CONFIG	26	OUTPUT CONTROL	272_12	VOLTAGE KP
216_1	YES	261	ENABLE	272_13	VOLTAGE KI
216_2	NO	262	DISABLE	272_14	CURRENT KP
22	LANGUAGE	27	FACTORY SETUP	272_15	CURRENT KI

S.NO.	HEADINGS	S.NO.	HEADINGS	S.NO.	HEADINGS
272_16	VOLT HYSTERESIS	2742	SERIAL BOOT MODE	321	DAY DATA EXTRACT
272_17	FREQ HYSTERESIS	275	EEPROM RESET	322	YEAR DAT EXTRACT
272_18	TZ DSAT FLAG	2751	YES	323	FAULT DATA EXTRACT
272_18_1	DISABLE	2752	NO	33	RS485 EXTRACT
272_18_2	ENABLE	28	GPS CONFIG	331	DAY DATA EXTRACT
272_19	TZ GSC FLAG	281	SET LATITUDE	332	YEAR DAT EXTRACT
272_19_1	DISABLE	282	SET LONGITUDE	333	FAULT DATA EXTRACT
272_19_2	ENABLE	29	IA OFF	4	ABOUT
273	DONGLE DATA CONFIG	2_10	IB OFF	41	FIRMWARE
2731	NO	2_11	IC OFF	42	SERIAL NUMBER
2732	YES	3	LOGS	421	UNIT SERIAL NO.
274	BOOT MODE OPTIONS	31	FAULT LOGS	422	DONGLE SERIAL NO.
2741	USB BOOT MODE	32	RS232 EXTRACT	43	NETWORK DETAILS

Table 8.1

CHAPTER 9 FAULT DIAGNOSIS AND SOLUTION

This chapter describes the drive faults, related messages on LCD display, possible reasons of fault and their troubleshooting.

9.1 Fault Type

Type	Drive action when fault happen
Drive fault	If any fault is detected it will occur in following manner <ul style="list-style-type: none"> Fault information will be shown at LCD display Output of drive will be cut-off
External fault	For monitoring and protecting drive external signal can be given which can trip the drive.

Table 9.1 Fault type

Note : In case of remote monitoring the motor will not turn on and the fault status can be seen in menu under fault report.

Reason for low power and DC bus under voltage:

1. Check dust deposition on the solar panel.
2. Check the direction of solar panels.

9.1.1 Fault information and description in detail

Fault Type	LCD Display Message	Load Type	Possibility Reason/s (reasons do not limit to the following given reasons)	Troubleshooting
DC Bus OVERVOLTAGE	02 DC BUS OVERVOLTAGE	GRID	1. DC bus voltage in the drive is more than the voltage set. 2. Mechanical Jam(Pump/Motor)	1. Check the no. Of PV cells connected in series. 2. Make sure the voltage is less than the voltage mentioned in the specification sheet on page no.9. 3. Contact customer care
OUTPUT OVER VOLTAGE	03 OUTPUT OVERVOLTAGE	GRID	1. DC bus voltage in the drive is more than the voltage set.	1. Check the no. Of PV cells connected in series. 2. Make sure the voltage is less than the voltage mentioned in the specification sheet on page no.9. 3. Contact customer care
GRID VOLTAGE LOW	10 GRID VOLT LOW	GRID	1. Grid voltage is low.	1. Decrease minimum grid voltage settings. 2. Contact Customer care.
GRID ERROR	11 GRID ERROR	GRID	1. Grid voltage is less than 50V in any phase.	1. Check for availability of grid. 2. Contact Customer care.
TWO PHASE ERROR	12 TWO PHASE ERROR	GRID	1. Voltage in two phases of grid connector is low. 2. Wire is loose at the connector.	1. Check for availability of grid. 2. Check the connection at the grid connector side. 3. Contact customer care.
ONE PHASE ERROR	13 ONE PHASE ERROR	GRID	1. Voltage in one phase of grid connector is low. 2. Wire is loose at the connector.	1. Check for availability of grid. 2. Check the connection at the grid connector side. 3. Contact customer care
GRID VOLTAGE HIGH	14 GRID VOLT HIGH	GRID	1. When grid voltage in any of the phase is greater than 258V.	1. Increase the maximum grid voltage settings. 2. Contact customer care.
GRID SIDE OVERLOAD	15 GRID SIDE OVERLOAD	GRID	1. When grid current is greater than the set limits.	1. Restart the device. 2. Contact Customer care.
GSC OVER CURRENT	16 GSC OVER CURRENT	GRID	1. During grid tie, any of the grid current increases suddenly.	1. Restart the device. 2. Contact Customer care.
PV OVER VOLTAGE	18 PV OVERVOLTAGE	GRID	1. If PV average voltage exceed the 765 volts.	1. Reduce the PV string voltage. 2. Contact Customer care.
PV UNDER VOLTAGE	19 PV UNDERVOLTAGE	GRID	1. If PV average voltage is under the 150 volts.	1. Increase the PV string voltage. 2. Wait for sufficient sunshine. 3. Contact customer care.
GSC OVER TEMPERATURE	20 GSC OVER TEMP	GRID	1. Unit temperature raised above over temperature limits.	1. Restart the device. 2. Increase the GSC over temperature limits. 3. Contact customer care.
PV/GFD GSC FAULT	21 PV/GFD DETECTED	GRID	1. When PV ground fault is detected.	1. Check PV connections. 2. Contact Customer care.

GSC SHORT CIRCUIT TRIP	22 GSC SHORT CKT TRIP	GRID	1. When there is a short circuit at the grid output of unit. 2. Contact Customer care.	1. Ensure output is not short and restart the device. 2. Contact Customer care.
EARTH LEAKAGE FAULT	24 EARTH LEAKAGE	GRID	1. Leakage current is greater than the set level.	1. Restart the device. 2. Increase the ELCFD MUL FACT parameter value. 3. Contact Customer care.
PV UNBALANCE GSC FAULT	25 PV UNBALANCE	GRID	1. For a 5-10 KW device, voltage more than 200V is reflecting even if in that particular string PV is not connected. 2. PV1 or PV2 is not active even if PV panels are connected.	1. Restart the device. 2. Contact customer care.
OUTPUT DISABLE FLAG	26 OUTPUT DISABLED	GRID	1. Output control is disabled.	1. Enable the output control from output control page in configuration. 2. Contact customer care.
ISLANDING FAULT	27 ISLANDING DETECTED	GRID	1. When grid is not present and load matches the input power.	1. Check whether grid is present. 2. Contact Customer care.
GRID UNBALANCE FAULT	29 GRID UNBALANCE	GRID	1. Difference between the phase voltages is greater than the set value.	1. Increase the grid unbalance set voltage value. 2. Restart the device.
PHASE SEQUENCE ERROR	30 PHASE SEQUENCE ERR	GRID	1. The phase sequence of grid power supply is not correct.	1. Check the connection at the grid connector side. 2. Contact customer care.
GRID FREQUENCY LOW	31 GRID FREQ LOW	GRID	1. When grid frequency is less than the set value.	1. Decrease the minimum grid frequency parameter value. 2. Contact customer care.
GRID FREQUENCY HIGH	32 GRID FREQ HIGH	GRID	1. When grid frequency is more than the set value.	1. Increase the maximum grid frequency parameter value. 2. Contact customer care.
ISLANDING FREQUENCY FAULT	33 ISLANDING FREQ DETECTED	GRID	1. When grid frequency varies more than 0.15 Hz in 2ms.	1. Restart the device. 2. Contact customer care.

Table 9.2 fault information and description

CHAPTER 10 : RECYCLING & DISPOSAL

Electrical & electronic waste should not be thrown out in open or buried or fired. They must never be treated as residential waste. A unit which was reached end of its life or is not needed any more should be returned to the dealer or to the company. A user may also act as per the government norms prevailing in the area.

WARRANTY CERTIFICATE

Dear Customer, Congratulation for purchasing our product.

Grid Tie Inverter are warranted against defects in workmanship and material under normal use, service & specified duty conditions. We provide one time warranty service for twelve months 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 Twelve Months 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 Grid Tie Inverter set 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/ sandy condition/ dry running and improper use of the Grid Tie Inverter. The warranty also does not cover consequential losses/ damages arising due to failure of Grid Tie Inverter. No warranty will be provided on mechanical seal, rubber parts, fasteners, cables in Grid Tie Inverter. Our obligation is limited to recycling or repairing or replacing product/ parts ex^l 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 *

Model name :

Serial number :

Device ID :

Date of installation /commissioning :

Invoice number :

Name and address of customer :

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Contact number :

Dealer's name & sign

WARRANTY TERMS & CONDITIONS -

The product is not covered by warranty in the following cases:

1. Normal wear and tear including color fade, minor scratches, white patches due to humidity.
2. Any defects that occur when the limited warranty period has expired.
3. Product installation must be performed by trained installers. If it's proven that the problem was caused by faulty installation, the faults or damages are NOT covered in warranty. e.g. insufficient isolation caused by broken DC cable; DC cable is not connected using the supplied PV connector and terminals (please see the installation, operation and maintenance instructions for correct handling).
4. Failures or damages resulting from not following the product manual or the prescribed installation and maintenance guidelines mentioned in the manual.
5. Disassembly, repair or modifications performed by a third-party company/person not authorized by SHAKTI. Product modifications, design changes or part replacements not approved by SHAKTI.
6. Faults or damages due to unforeseen circumstances, man-made factors, or examples of force majeure including but not limited to stormy weather, flooding, over voltage, power surge, pests, inappropriate handling, misuse, neglect, fire, water, lightning or other acts of nature.
7. For the products equipped with the SPD module, when the lightening is beyond the AC SPD's protection range, it won't be able to protect the inverter and it does NOT cover the inverter or accessory damage caused by such lightening.
8. External surge, over voltage or condition which causes inverter to fail and damage external SPD.
9. Vandalism, engraving, labels, irreversible marking or contamination or theft.
10. Violation of the original equipment warranty seal without written authorization from SHAKTI.
11. Usage which does not comply with the safety regulations.
12. Faults or damage caused by other factors not related to product quality issues.
13. Any rust that appears on the device's enclosure caused by harsh environmental conditions. Faults or damage caused by exposure to sea coasts/saltwater or other aggressive atmospheres or environmental conditions without SHAKTI's written confirmation/approval prior to the installation.
14. Product failure is not reported to SHAKTI within 15 Days of appearance.
15. The defect is caused by improper usage of the product or failure to comply with the usage of the product for purposes other than those for which the product was designed or intended.
16. The product is moved for any reason after it has been installed (regardless of whether it has been reinstalled subsequently or moved back to the same location) unless it is reinstalled at the same address by a qualified installer who has provided a test report to SHAKTI.
17. The damage or defect is caused by embedded or external software or hardware (e.g. the devices to control the inverters or the devices to control battery charging or discharging) from third parties without authorization (agreement in writing) from SHAKTI.
18. The product is modified or altered (including the cases in which the product series number or product label is altered, removed, or defaced).
19. Failed to comply with the safety rules and regulations (Statuary /Legal) in respect of the inverter or accessory and during installation.
20. Improper earthing or earth resistance found more than 5 Ohm.
21. Voltage between Earth & Neutral observes more than 5 Volt.
22. Setting inverter parameters beyond recommended limits.
23. DC input voltage must not exceed maximum value of the model.

INSTALLATION & OPERATING INSTRUCTIONS

BOOK-POST

To,
SHAKTI PUMPS (INDIA) LIMITED
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Stamp

