SHAKTI

PUMPING LIFE

INSTALLATION & OPERATING INSTRUCTIONS

KALPAVRIKSHA
HYBRID/GRID-TIE CONTROLLER

SAP No. : 2000017925

VC : 0000

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SHAKTI PUMPS (INDIA) LIMITED

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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 hybrid controller.
4. Customers are NOT authorized to open the hybrid controller or to do any kind of modification, or repair; otherwise, there is a danger of shock and loss of warranty.
5. To store the hybrid controller, 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 hybrid controller should be carried out on a solar structure with proper ground clearance & specified nuts & bolts.
4. Install the hybrid controller on metal or other non-flammable material, and keep it away from any combustible material.
5. The hybrid controller 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, hybrid controller, motor, grid, and all other accessories are properly fitted on their designated place.

7. Ensure that the hybrid controller, motor, 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 hybrid controller's voltage. Also, note that all PV panels are connected in series or parallel as per system's 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's circuit.
12. Ensure that the output of the hybrid controller is turned off while setting all the required parameters.
13. Ensure that no unauthorized filter is connected to the output of the hybrid controller. It may cause loss of warranty.

1.3 Safety during Operation

1. Make sure that the ratings of the pump, motor, PV panels, grid, and hybrid controller 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 hybrid controller with the wet hand.
4. Do not put any of your belongings like mobile etc. on the hybrid controller.
5. Disconnect PV power from the hybrid controller under the supervision or presence of a trained electrician.
6. Before opening the housing, the hybrid controller must be disconnected from all the energy sources like Grid and PV.
7. After the input is disconnected from the hybrid controller, 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 hybrid controller.

9. At over 2,000 metres altitude, the hybrid controller 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 800V.
2. At the hybrid controller 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. Hybrid controller 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 KLPHYB/KLPGT and KLPHYB-H/KLPGT-H products are not recommended for elevators, emergency operation, medical products etc.

CHAPTER 2 : INTRODUCTION

2.1 Product Overview

The KALPAVRIKSHA Hybrid (KLPHYB) Controller is a hybrid pumping solution designed for maximum utilization of solar power available at the site. The product is a unique combination of a solar-powered VFD and a grid-tied inverter in a single product. This product comes with two operating modes i.e. Standalone and Hybrid mode. Standalone mode ensures only one operation at a time i.e. either VFD or grid-tied operation. In hybrid mode, the additional power available is fed back to the grid while VFD is operational. This product is designed and developed in India and comes with an IP 65 ingress protection. This product can also be configured as a pure grid-tie inverter whenever/wherever required. The plug and play installation and electrically safe user handling are the additional attractions of this product.

2.2 Storage Instructions

The Hybrid Controller 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 Hybrid Controller's storage
✔ Storage area should be clean, dry, and free from direct sunlight or corrosive fumes.
✔ Storage area has an ambient temperature range of -20 fiC to 60 fiC.
✔ 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^{0}C. Storage for more than a year may reduce the lifespan of the product.

2.3 Receiving and Inspection

The Hybrid Controller 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	69
Serial Number & Barcode	69-0001-0-04-10-19
	‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖
	69-0001-0-04-10-19
Software Version	MAINKLP_X.XX

Digits	Description
69	Model number
0001	Serial number for the batch
0	Batch number
04	Date of manufacturing
10	Month of manufacturing
19	Year of manufacturing

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 and 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.
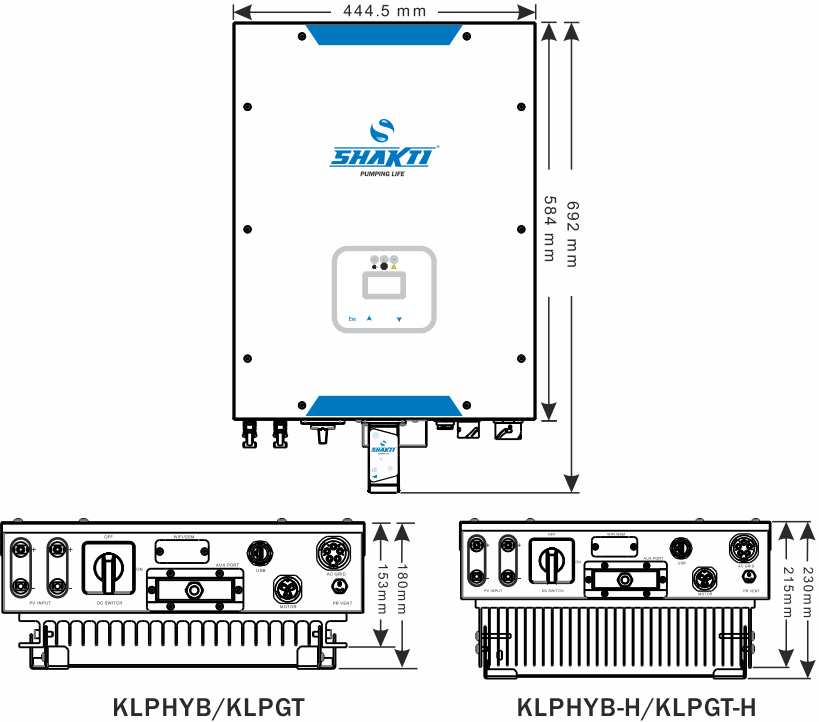
Fig. 3.1 Kalpavriksha Hybrid /Grid-tie Controller - KLPHYB/KLPGT

Following is the list of items in the packaging.
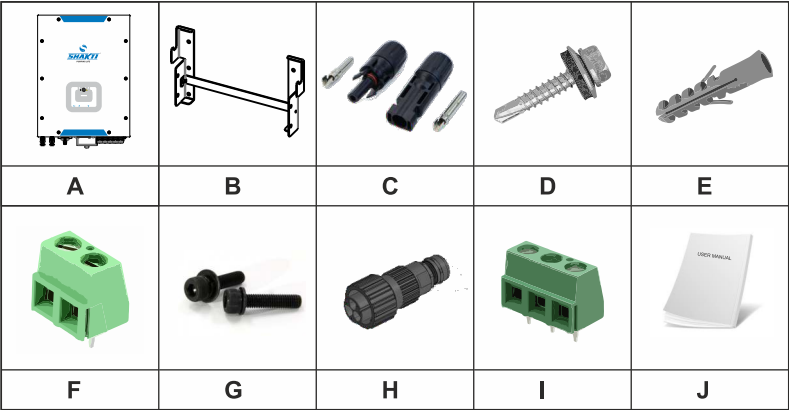
Fig. 3.2 Images of list of Items in Kalpavriksha Packaging

Table 3.1 List of Items

S. No.	Name	Qty	Unit
A	Kalpavriksha Unit	1	Set
B	Wall Mount Bracket Set	1	EA
C	PV connectors	2	EA
D	M6Ï 50 Hex Head Tapping Screw	3	EA
E	Anchor - Expansion tube	3	EA
F	Conn. Ext Fan 2 POS	1	EA
G	M6 X 15 HEX Head Screw	4	EA
H	AC connector	1	EA
I	Conn. Dry Contact 3 POS	1	EA
J	User Manual	1	EA

CHAPTER 4 : SPECIFICATIONS

Parameters	KLPHYB/KLPGT		KLPHYB-H/KLPGT-H	
PV INPUT				
PV Voltage Range	220 - 770 VDC		220 - 770 VDC	
Max. PV Current	10A		20 A	
MPPT Range	250 - 650 VDC		250 - 650 VDC	
Nominal PV Voltage	600 VDC		600 VDC	
Number of PV Inputs	1		1	
Max. Power	5000W		10000W	
PV Start Voltage	220 VDC		220 VDC	
VFD OUTPUT*				
Voltage range	0 - 415 VAC		0 - 415 VAC	
Max. Current	12 A		16 A	
Frequency range	0 - 200 Hz		0 - 200 Hz	
Power factor range	0.8 (lag) ~ 0.8 (lead)		0.8 (lag)~ 0.8 (lead)	
Motor Types	IPMSM, PMSM, BLDC, ACIM			
Peak Efficiency	> 96%		> 96%	
Protection	Shortcircuit, Dryrun, Overtemperature, Overload, etc			
GRID - TIE OUTPUT				
Voltage Range	337 - 440 V $_{LL}$ AC			
Topology	Transformer less 3 leg inverter			
Max. Current	8.5 A		16 A	
Rated AC Power (@230V,50Hz)	3kW	5kW	7.5kW	10kW
Rated AC Current	5A	7.5A	10.5A	14A
Nominal Frequency	50Hz		50Hz	
Power Factor, adjustable	0.8 leading~0.8 lagging			
Peak MPPT Accuracy	> 99.5%			
Feed-in Grid	3L+N+PE			
Total Harmonic Distortion (THDi)	< 5% (at nominal power)			
Peak Efficiency	> 96%		> 96%	
Protection	Anti islanding , grid monitoring, Shortcircuit, Over voltage, Overtemperature, Overload, etc			
DISPLAY & COMMUNICATION				
Display Type	Graphical LCD			
Status Indicator	LEDs			
Serial Communication	RS232 & RS485 (MODBUS)			
Aux Ports	3 nos -1 Input port & 2 Output ports (Optional)			
Remote Monitoring	Yes (Optional)			
WiFi	Yes (Optional)			
USB	Yes			
PHYSICAL				
L X W X H	584.5 x 444.5 x 182.4 mm³		584.5 x 444.5 x 230 mm³	
Net Wt. / Gross Wt.	23kg/27kg		26kg/30kg	
OTHER INFO				
Pollution Degree	PD3			
Over Voltage Category	Category II			
Protection Class	Class I			
Operating Temperature	-10 to 60℃			
Relative Humidity	0~95% RH (Non-condensing)			
Altitude	3000 m (> 2000 m power derating)			
IP Degree of Protection	IP 65 (Indoor & Outdoor Installation)			
Cooling	Natural Convection			
Standards	BIS16221-1/2, IEC61683, IEC60068-2-(1,2,14,30), IEC 60529 ISI16169			

* For pure grid tie product (KLPGT & KLPGT-H) all parameters, settings, specification etc related to VFD output and motors are not applicable.

CHAPTER 5 : INSTALLATION

Mounting Method, Installation Position and Mounting Procedure of the Hybrid Controller 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 hybrid controller tilted forwards, sideways, horizontally or upside down.
3. Install the hybrid controller at eye level for convenience when checking the LCD display and possible maintenance activities.
4. When mounting the hybrid controller please consider that disassembly for service work may be required.
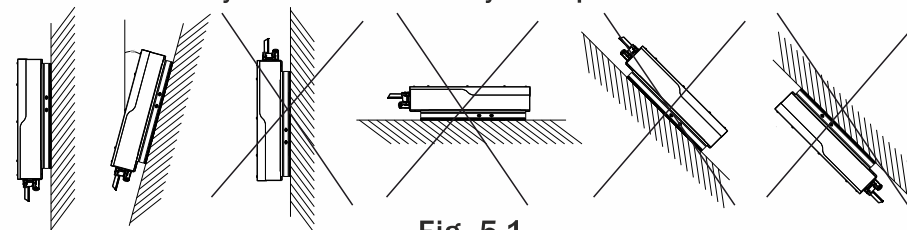
Fig. 5.1

5.2. Installation Position

Do not expose the hybrid controller to direct solar irradiation as this could cause power derating due to overheating. The ambient temperature should be between -25℃ ~ 60℃ (-13℉ ~ 140℉) 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.

30CM

50CM

30CM

30CM

50CM

50CM
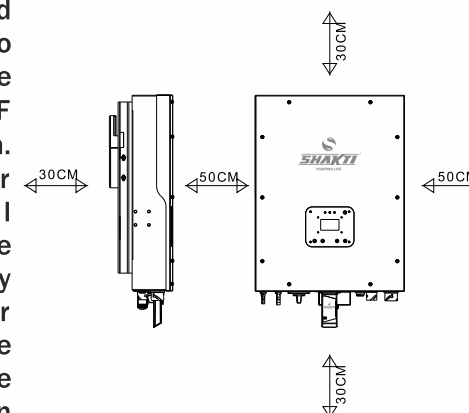
Fig. 5.2

5.3. Mounting Procedure for Kalpavriksha

This section provides the mounting procedure and drawings for Kalpavriksha 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 & 5.6
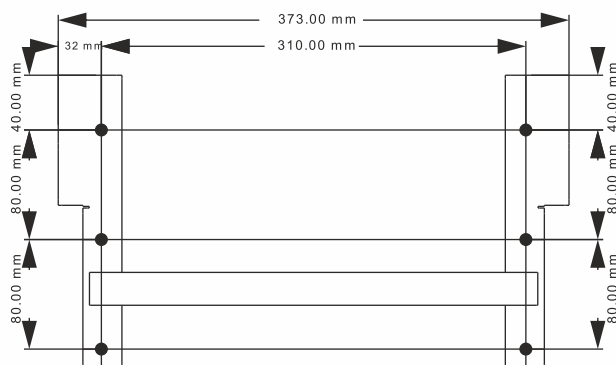
Fig. 5.3 Mounting Brackets for KLPHYB/KLPGT

2. Drill Holes and Place the Expansion Tubes

According to the guides, drill 6 holes in the wall (in conformity with position marked in Figure 5.4 & 5.7) and then place expansion tubes.
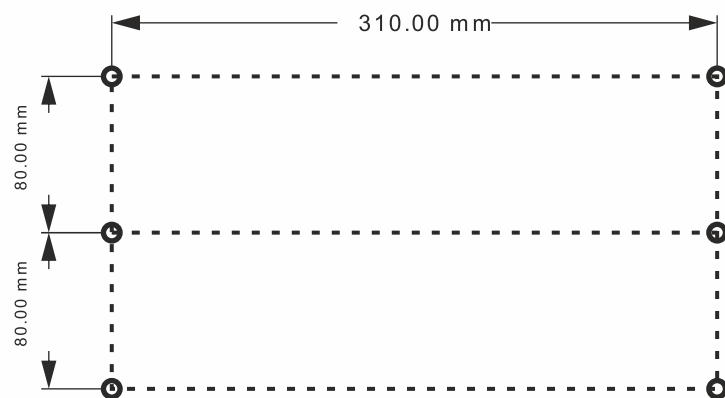
Fig. 5.4 Drilling drawing for KLPHYB/KLPGT

3. Mount the Kalpavriksha

Carefully mount the Kalpavriksha to the mounting bracket following the steps shown in figure 5.5 & 5.8 Make sure that the rear part of the equipment is closely mounted to the mounting bracket .

(A)

(B)

(C)

STEP 1:
Place the mounting
bracket using 6 screws

STEP 2:
Hold the unit gently &
hook the unit to the
wall mount brackets.

STEP 3:
After installation put
the 4 nos. of M6 screws
in the side holes
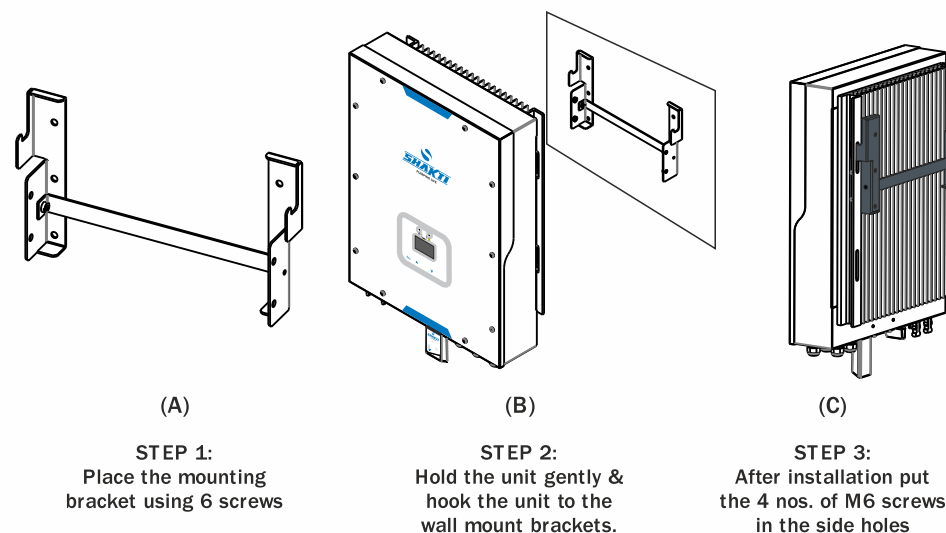
Fig. 5.5 Mounting Procedures for KLPHYB/KLPGT
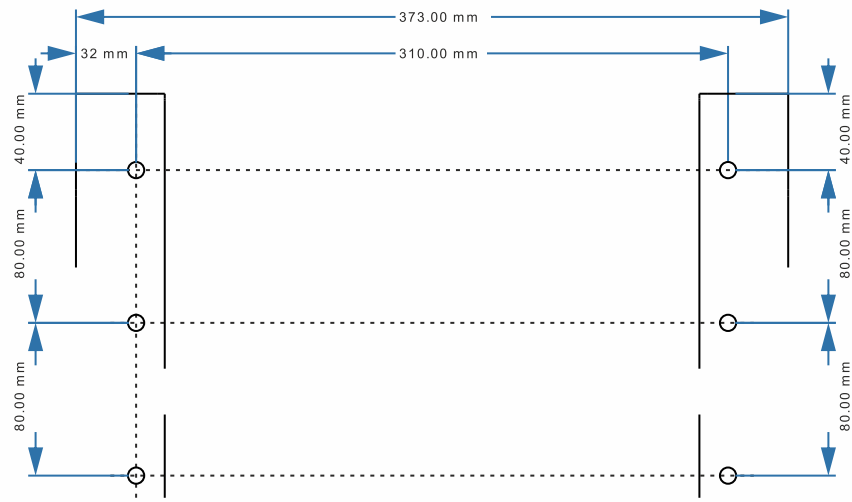
Fig. 5.6 Mounting Brackets for KLPHYB-H/KLPGT-H
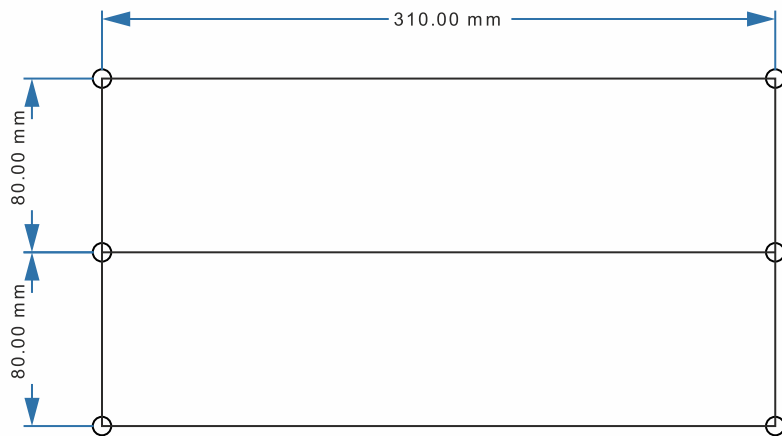
Fig. 5.7 Drilling drawing for KLPHYB-H/KLPGT-H

(A)

STEP 1:
Place the mounting
bracket using 6 screws

(B)

STEP 2:
Hold the unit gently &
hook the unit to the
wall mount brackets.

(C)

STEP 3:
After installation put
the 4 nos. of M6 screws
in the side holes
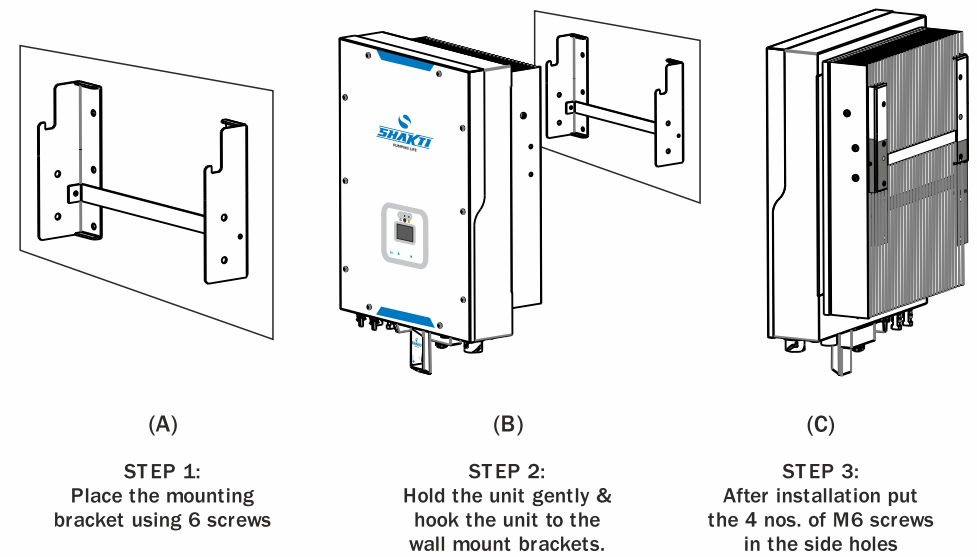
Fig. 5.8 Mounting Procedures for KLPHYB-H/KLPGT-H

CHAPTER 6 : CONNECTIONS & CONNECTING PROCEDURE

6.1. Rear Panel

Rear Panel view with Aux covers
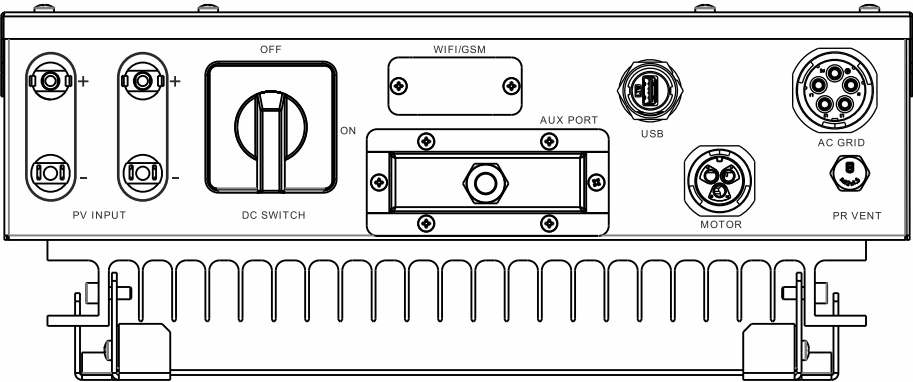
Fig. 6.1

Rear Panel view with Aux cover & Dongle Connected
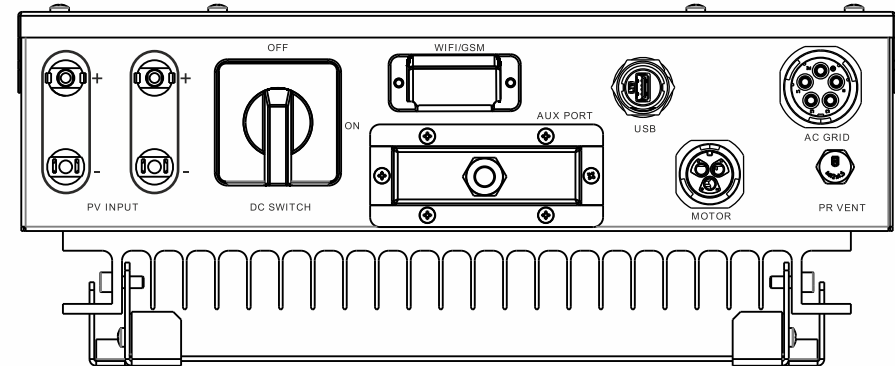
Fig. 6.2

Rear Panel view without Aux and dongle cover
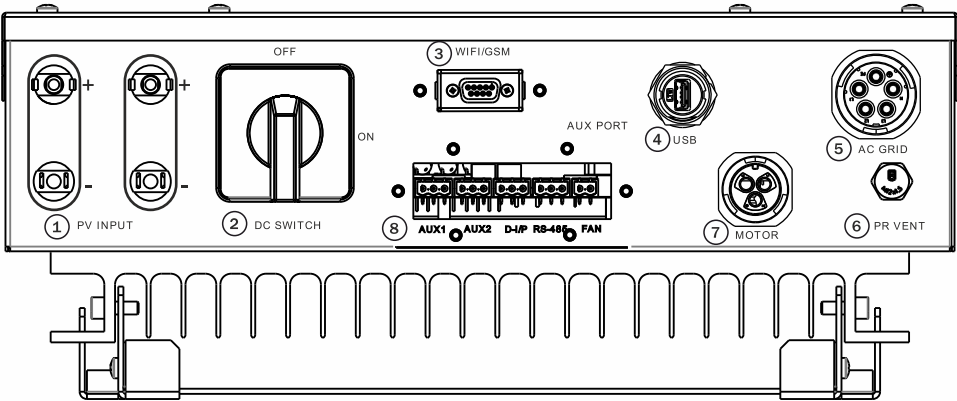
Fig. 6.3

Table 6.1

Marking	Description
1	PV Input Connectors
2	PV DC Disconnect Switch
3	WIFI/GPRS DB9 Connector
4	USB Connector
5	5 pin AC Input Connector
6	Pressure Relief Vent
7	Motor Connector
8	Aux Input/ Output Connectors

6.1.1 PV Input Connectors

Table 6.2

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

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

① ②
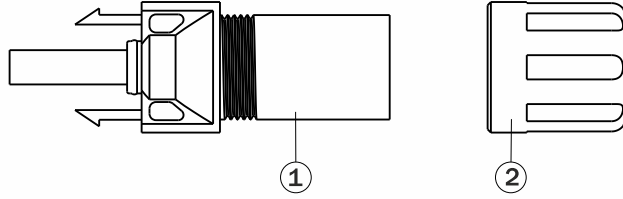
1. Insulated Enclosure 2. Lock Screw

Fig. 6.4 Positive Connector

① ②
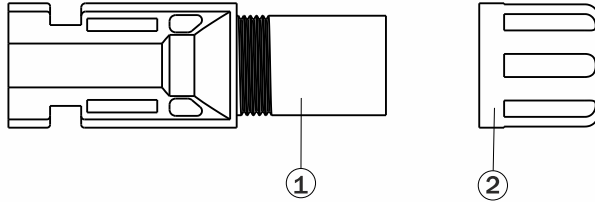
1. Insulated Enclosure 2. Lock Screw

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.

L2 = 8-10 mm

1

L2 = 8-10 mm

2
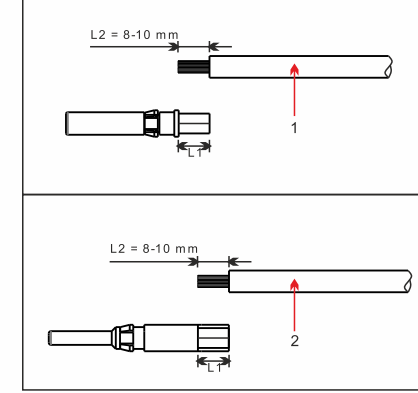
1. Positive Cable   2. Cathode Cable

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.

①

①
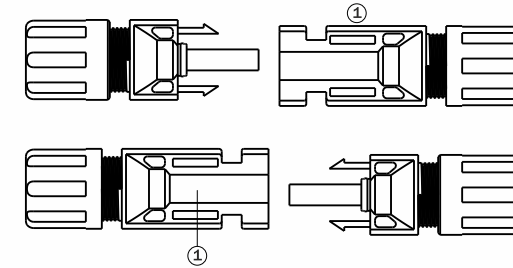
1. Connection Port

Fig. 6.7

6.1.2 PV DC Disconnect switch

This switch is provided to isolate the PV DC input from the hybrid 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 the hybrid controller 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.

Pin 1: +5V VCC (few milliamperes)
Pin 2: Received Data (RXD)
Pin 3: Transmit Data (TXD)
Pin 4: Not Connected (NC)
Pin 5: Ground (GND)

Pin 6: Not Connected (NC)
Pin 7: Not Connected (NC)
Pin 8: Not Connected (NC)
Pin 9: Not Connected (NC)
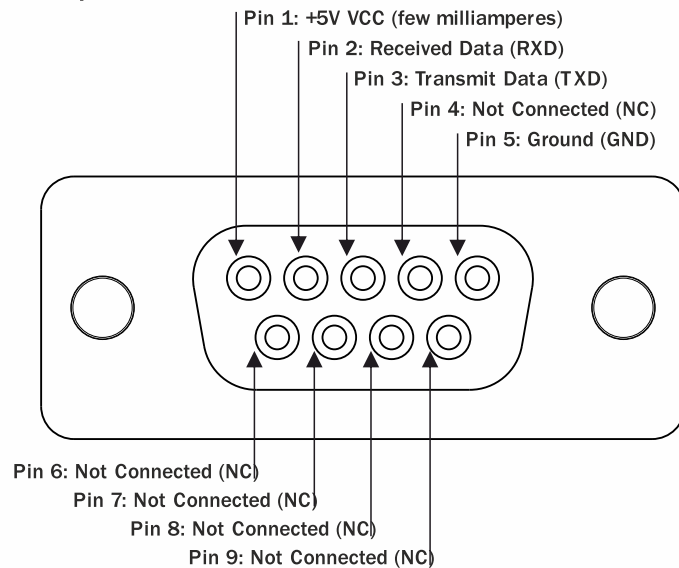
Figure 6.8 RS232 Connector

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

Figure 1

DB9 serial port

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]
	Blink 4 times in 1 sec	Data transfer in process[2]
Signal LED (RED)[1]	ON	Normal[2]/ GPS location fixed[2]
GPS (RED)[2]	Blink in every second	Getting GPS location[2]
	OFF	Abnormal(Signal low)[1]/ GPS off[2]
NETWORK LED (GREEN)[2]	Constant ON	4G Connectivity[2]
	Constant OFF	2G Connectivity[2]
Wi-Fi LED (YELLOW)[1]	ON/Blink	Normal[1]
	OFF	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.

Figure 2

Figure 3

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.

Figure 4

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 Iot 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.
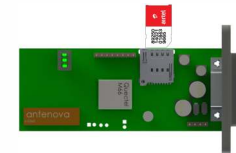
Step3:
To configure the Wi-Fi follow these steps:3.1)

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:

connect automatically

SHAKTI_DONGLE

WiFiManger

Configure Wifi

Configure Wifi(No Scan)

Info

Reset

Figure 6

3.2) Now "Configure Wi-Fi" now new page will open like this:
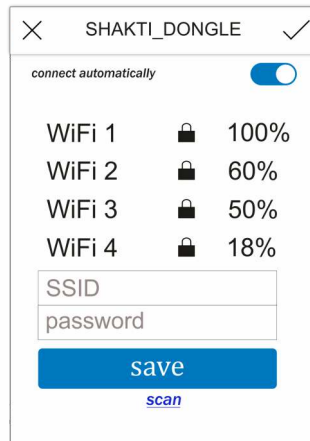
3.3) Select your preferred WiFi with proper password and then save. In case your WiFi network is not visible in the list scan again.

✕ SHAKTI_DONGLE ✓

connect automatically

WiFi 1   🔒 100%
WiFi 2   🔒 60%
WiFi 3   🔒 50%
WiFi 4   🔒 18%

SSID
password

save
scan

Figure 7

✕ SHAKTI_DONGLE ✓

connect automatically

WiFi 1   🔒 100%
WiFi 2   🔒 60%
WiFi 3   🔒 50%
WiFi 4   🔒 18%

WiFi 1
• • • • • • • •

save
scan
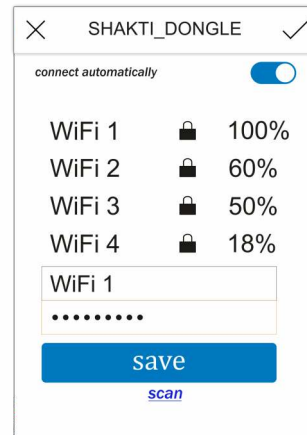
Figure 8

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.

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

Table 6.2 MODBUS Address

S.No.	Cumulative Data On Server	MODBUS_ADDRESS(DEC)	OFFSET	DVT Factor	Min	Max	Default	Unit	Cumulative Data On Server
1	MAX_PV_POWER_VFD	15	4	1	1000	10000	9600	W	MAX_PV_POWER_VFD
2	MAX_PV_POWER_GSC	16	4	1	1000	11200	9600	W	MAX_PV_POWER_GSC
3	SWITCHING_FREQ	17	4	1	1600	16000	3200	Hz	SWITCHING_FREQ

| S.No.	Configuration Parameters	MODBUS_ADDRESS(DEC)	OFFSET	DVT Factor	Min	Max	Default	Unit	Configuration Parameters
1	FACTORY MODE	256	1	1	0	1	1	NA	FACTORY_MODE
2	LANGUAGE	257	1	1	0	0	0	NA	LANGUAGE_SELECTED
3	EEPROM ERASE	258	1	1	0	1	1	NA	EEPROM_ERASE_FLAG
4	INSTALL DATE	259	1	1	1	31	1	NA	INST_DATE
5	INSTALL MONTH	260	1	1	1	12	1	NA	INST_MONTH
6	INSTALL YEAR	261	1	1	18	99	20	NA	INST_YEAR
7	LCD CONTRAST	262	1	1	27	39	33	%	LCD_CONTRAST
8	PVGFD	263	1	1	0	1	1	NA	PVGFD_ENABLE
9	ELCFD	264	1	1	0	1	1	NA	ELCFD_ENABLE
10	MASTER_ON_OFF_GSC	265	1	1	0	1	1	NA	MASTER_ON_OFF_GSC
11	ENERGY_ERASE_FLAG	266	1	1	1	2	2	NA	ENERGY_ERASE_FLAG
12	ON_HOUR_MOTOR	267	1	1	1	12	1	NA	ON_HOUR_MOTOR
13	ON_MINUTE_MOTOR	268	1	1	0	59	1	NA	ON_MINUTE_MOTOR
14	OFF_HOUR_MOTOR	269	1	1	1	12	1	NA	OFF_HOUR_MOTOR
15	OFF_MINUTE_MOTOR	270	1	1	0	59	1	NA	OFF_MINUTE_MOTOR
16	RS232 BAUD RATE	271	1	1	1	6	2	NA	RS232_BAUD_RATE
17	RS485 BAUD RATE	272	1	1	1	6	2	NA	RS485_BAUD_RATE
18	GRID_POWER_DRAWN_RESTRICT	273	1	1	0	1	1	NA	GRID_POWER_DRAWN_RESTRICT
19	AUTOROLL ENABLE	274	1	1	1	2	1	NA	ROLLING_PAGE_ENABLE
20	MODBUS ADD RS232	275	2	1	1	99	1	NA	MODBUS_ADD_RS232
21	MODBUS ADD RS485	277	2	1	1	99	1	NA	MODBUS_ADD_RS485
22	RUN FROM SS	281	1	1	0	1	0	NA	RUNFROMSS_ENABLE
23	DISPLAY MODE	282	1	1	1	2	1	NA	DISPLAY_MODE_FLAG
24	PRIMARY HEALTH CHECK	283	1	1	1	2	1	NA	HC_ENABLE_FLAG
25	TZ ENABLE	284	1	1	1	2	2	NA	TZ_ENABLE_FLAG
26	FAULT_ADDRESS_POINTER	285	1	1	0	255	0	NA	FAULT_ADDRESS_POINTER
27	Logger Date	286	1	1	1	31	1	NA	Logger Date
28	Logger Month	287	1	1	1	12	1	NA	Logger Month
29	Logger Year	288	1	1	1	99	1	NA	Logger Year
30	FLAG PARK	289	1	1	0	1	1	NA	FLAG_PARK_EEPROM
31	DISPLAY LOCK	290	1	1	1	2	2	NA	DISPLAY_LOCK_ENABLE
32	DISPLAY LOCK PASSWORD	291	2	1	0	999	345	NA	DISPLAY_PASSWORD_CHECK
33	IND VS STD	293	1	1	1	2	2	NA	IND_VS_STD
34	NEUTRAL CONNECTED	294	1	1	0	1	1	NA	NEUTRAL_CONNECTED
35	Night Mode Select EEPROM	295	1	1	0	1	0	NA	Night_Mode_Select_EEPROM

S.No.	VFD Parameters	MODBUS_ADDRESS(DEC)	OFFSET	DVT Factor	Min	Max	Default	Unit	VFD Parameters
1	MASTER ON OFF	1000	1	1	0	1	0	NA	MASTER_ON_OFF
2	CONTROL MODE	1001	1	1	1	4	2	NA	SPEED_MODE_SELECT
3	DIRECTION	1002	1	1	1	2	1	NA	SPEED_DIRECTION_SELECT
4	APPLICATION	1003	1	1	0	1	0	NA	APP_MODE
5	LOCK_UNLOCK	1004	1	1	0	1	0	NA	LOCK_UNLOCK
6	CONTROL TYPE	1005	1	1	0	1	0	NA	CONTROL_TYPE
7	MIN POWER VFD	1006	2	1	100	9999	700	W	MIN_PV_POWER_VFD
8	MAX CURRENT	1008	2	10	50	250	160	A	MAX_CURRENT
9	OVER CURRENT VFD	1010	2	1	5	19	16	A	OVER_CURR_VFD_LIMIT
10	DRY RUN CURRENT	1012	2	1	1	10	5	A	DRY_RUN_LIMIT
11	DRY RUN POWER	1014	2	1	100	9999	200	W	DRY_RUN_POWER
12	DC BUS OVER VOLTAGE	1016	2	1	500	800	790	V	DC_BUS_OV_LIMIT
13	OVER TEMPERATURE VFD	1018	2	1	100	130	115	°C	VFD_OVER_TEMP_LIMIT
14	THERMAL DERATING	1020	2	1	0	200	100	NA	THERMAL_DERATING_FACTOR
15	MAX FREQ	1022	2	1	1	400	240	Hz	MAX_FREQ_SET
16	OVER_VOLT_PV_LIMIT	1024	2	1	400	800	790	NA	OVER_VOLT_PV_LIMIT
17	UNDER_VOLT_PV_LIMIT	1026	2	1	100	300	160	NA	UNDER_VOLT_PV_LIMIT
18	OVERLOAD_GSC_LIMIT	1028	2	10	70	160	160	NA	OVERLOAD_GSC_LIMIT
19	GSC_OVER_TEMP_LIMIT	1030	2	1	100	130	108	°C	GSC_OVER_TEMP_LIMIT
20	Retry_time_Minutes	1034	2	1	1	30	10	NA	Retry_time_Minutes

S.No.	Motor Parameters	MODBUS_ADDRESS(DEC)	OFFSET	DVT Factor	Min	Max	Default	Unit	Motor Parameters
1	MOTOR TYPE	2000	1	1	0	2	2	NA	MOTOR_TYPE
2	TORQUE PERCENT	2001	2	100	0	200	200	%	TORQUE_PERCENT
3	RATED CURRENT	2003	2	10	50	180	140	A	Motor_Rated_I
4	RATED POWER	2005	2	10	3	10	10	HP	MOTOR_POWER
5	RATED VOLTAGE INDUCTiON	2007	2	1	40	460	456	V	MOTOR_VOLTAGE_IND
6	RATED VOLTAGE S4RM	2009	2	1	40	460	456	V	MOTOR_VOLTAGE_S4RM
7	RATED VOLTAGE PMSM	2011	2	1	40	460	360	V	MOTOR_VOLTAGE_PM
8	RATED FREQUENCY INDUCTION	2013	2	1	0	120	60	Hz	MOTOR_RATED_FREQ_IND
9	RATED FREQUENCY S4RM	2015	2	1	0	120	60	Hz	MOTOR_RATED_FREQ_S4RM
10	RATED FREQUENCY PMSM	2017	2	1	0	250	120	Hz	MOTOR_RATED_FREQ_PMSM
11	NO OF POLES INDUCTION	2019	2	1	2	8	2	NA	IND_MOTOR_POLES
12	NO OF POLES S4RM	2021	2	1	2	8	2	NA	S4RM_MOTOR_POLES
13	NO OF POLES PMSM	2023	2	1	2	8	4	NA	PMSM_MOTOR_POLES
14	REFERENCE SPEED	2025	2	1	100	4000	3300	RPM	SPEED_REF_INPUT_DISPLAY
15	POWER FACTOR	2027	2	100	60	100	75	NA	POWER_FACTOR
16	LEAKAGE INDUCTANCE	2029	2	10000	5	999	56	H	Lls
17	MAGNETIC INDUCTANCE	2031	2	10000	20	9999	881	H	Lm
18	ROTOR RESISTANCE	2033	2	100	20	9999	33	ohm	Rr
19	STATOR RESISTANCE	2035	2	100	20	9999	43	ohm	Rs
20	START TIME	2037	2	1	1	60	15	Min	MOTOR_START_TIME
21	STOP TIME	2039	2	1	1	60	15	Min	MOTOR_STOP_TIME

S.No.	PUMP Parameters	MODBUS_ADDRESS(DEC)	OFFSET	DVT Factor	Min	Max	Default	Unit	PUMP Parameters
1	PUMP TYPE	3000	1	1	0	2	1	NA	PUMP_TYPE
2	PUMP HEAD	3001	2	1	5	999	50	m	PUMP_HEAD
3	POW1	3003	2	1	0	9999	1000	W	POW1
4	D1	3005	2	1	0	9999	40	LPM	D1
5	POW2	3007	2	1	100	9999	3000	W	POW2
6	D2	3009	2	1	0	9999	80	LPM	D2
7	POW3	3011	2	1	200	9999	6000	W	POW3
8	D3	3013	2	1	0	9999	120	LPM	D3
9	POW4	3015	2	1	300	9999	8000	W	POW4
10	D4	3017	2	1	0	9999	160	LPM	D4
11	POW5	3019	2	1	400	9999	9999	W	POW5
12	D5	3021	2	1	0	9999	200	LPM	D5

S.No.	GRID_PARAMETERS	MODBUS_ADDRESS(DEC)	OFFSET	DVT Factor	Min	Max	Default	Unit	GRID_PARAMETERS
1	RATED GRID FREQ	4000	2	1	50	60	50	Hz	RATED_GRID_FREQ
2	OVER_CURR_BOOST_LIMIT	4002	2	1	6	15	10	NA	OVER_CURR_BOOST_LIMIT
3	KP_PLL	4004	2	1000	1	9999	96	NA	KP_PLL
4	KI_PLL	4006	2	1000	1	9999	6	NA	KI_PLL
5	KP_PLL_SLOW	4008	2	1000	1	9999	96	NA	KP_PLL_SLOW
6	KI_PLL_SLOW	4010	2	1000	1	9999	6	NA	KI_PLL_SLOW
7	MIN VOLTAGE	4012	2	10	1500	2300	1650	V	V_GRID_RMS_MIN
8	MAX VOLTAGE	4014	2	10	2300	2850	2700	V	V_GRID_RMS_MAX
9	VOLT HYSTERESIS	4016	2	1	5	40	5	V	V_GRID_HYS
10	V_GRID_UNBALANCE_SET	4018	2	1	3	50	50	V	V_GRID_UNBALANCE_SET
11	V_GRID_UNBALANCE_RESET	4020	2	1	3	50	45	V	V_GRID_UNBALANCE_RESET
12	ONE_PHASE_MISSING_FACTOR	4022	2	100	1	100	80	NA	ONE_PHASE_MISSING_FACTOR
13	TWO_PHASE_MISSING_FACTOR	4024	2	100	1	100	80	NA	TWO_PHASE_MISSING_FACTOR
14	MIN FREQUENCY	4026	2	10	450	595	470	Hz	GRID_FREQ_MIN
15	MAX FREQUENCY	4028	2	10	505	650	520	Hz	GRID_FREQ_MAX
16	FREQ HYSTERESIS	4030	2	10	1	50	1	Hz	GRID_FREQ_HYS
17	RELAY_CLOSING_INIT_DELAY	4032	2	1000	100	1000	167	NA	RELAY_CLOSING_INIT_DELAY
18	RELAY_CLOSE_DELAY	4034	2	100	1	100	5	NA	RELAY_CLOSE_DELAY
19	BOOST VOLTAGE REF	4036	2	1	550	700	620	V	BOOST_VDC_REF
20	BOOST VOLTAGE KP	4038	2	1000	1	9999	1	NA	BOOST_VDC_KP
21	BOOST VOLTAGE KI	4040	2	1000	0	9999	5	NA	BOOST_VDC_KI
22	BOOST CURRENT KP	4042	2	1000	0	9999	5	NA	BOOST_KP_CURR
23	BOOST CURRENT KI	4044	2	1000	50	9999	100	NA	BOOST_KI_CURR
24	VOLTAGE REF	4046	2	1	550	780	650	V	GSC_VDC_REF
25	VOLTAGE KP	4048	2	1000	0	9999	100	NA	GSC_VDC_KP
26	VOLTAGE KI	4050	2	1000	0	9999	1	NA	GSC_VDC_KI
27	CURRENT KP	4052	2	10	55	999	250	NA	GSC_KP_CURR
28	CURRENT KI	4054	2	10	10	9999	4000	NA	GSC_KI_CURR
29	GAIN_ADJUST_A	4056	2	1000	0	9999	1010	NA	GAIN_ADJUST_A
30	GAIN_ADJUST_B	4058	2	1000	0	9999	1000	NA	GAIN_ADJUST_B
31	GAIN_ADJUST_C	4060	2	1000	0	9999	1000	NA	GAIN_ADJUST_C
32	I_GRD_A_OFFSET_TEST_L	4062	2	100	0	999	131	NA	I_GRD_A_OFFSET_TEST_L
33	I_GRD_B_OFFSET_TEST_L	4064	2	100	0	999	100	NA	I_GRD_B_OFFSET_TEST_L
34	I_GRD_C_OFFSET_TEST_L	4066	2	100	0	999	100	NA	I_GRD_C_OFFSET_TEST_L
35	Wvcos_A2_L	4068	2	100	0	9999	5500	NA	Wvcos_A2_L
36	Wvcos_B2_L	4070	2	100	0	9999	4920	NA	Wvcos_B2_L
37	Wvcos_C2_L	4072	2	100	0	9999	5000	NA	Wvcos_C2_L
38	Wvsin_A2_L	4074	2	100	0	9999	5000	NA	Wvsin_A2_L
39	Wvsin_B2_L	4076	2	100	0	9999	4500	NA	Wvsin_B2_L
40	Wvsin_C2_L	4078	2	100	0	9999	5000	NA	Wvsin_C2_L
41	Wvcos_A4_L	4080	2	100	0	9999	5100	NA	Wvcos_A4_L
42	Wvcos_B4_L	4082	2	100	0	9999	5000	NA	Wvcos_B4_L
43	Wvcos_C4_L	4084	2	100	0	9999	5000	NA	Wvcos_C4_L
44	Wvsin_A4_L	4086	2	100	0	9999	5000	NA	Wvsin_A4_L
45	Wvsin_B4_L	4088	2	100	0	9999	5200	NA	Wvsin_B4_L
46	Wvsin_C4_L	4090	2	100	0	9999	5000	NA	Wvsin_C4_L
47	ELCFD_MUL_FACT	4092	2	10	1	999	15	NA	ELCFD_MUL_FACT
48	TEMP_DERATING_START	4094	2	1	70	100	80	NA	TEMP_DERATING_START

S.No.	CONTROL PARAMETERS	MODBUS_ADDRESS(DEC)	OFFSET	DVT Factor	Min	Max	Default	Unit	CONTROL PARAMETERS
1	SPEED KP	5000	2	100	0	1000	5	NA	Speed_ErrorPI_PM_Kp
2	SPEED KI	5002	2	100	0	1000	2	NA	Speed_ErrorPI_PM_Ki
3	DRYRUN RPM LIMIT	5004	2	1	0	9999	2500	RPM	DRY_RUN_RPM_LIMIT
4	TORQUE BOOST PER	5006	2	1000	0	100	30	%	INIT_VOLTPERCENT_FACTOR
5	Id REF PMSM	5008	2	10	0	200	0	NA	Id_ref_PM
6	PMSM THETA FACTOR	5010	2	10	0	50	0	NA	PMSM THETA FACTOR
7	MIN RPM PMSM	5012	2	1	200	999	500	RPM	PMSM_MIN_RPM
8	RAMP TIME PMSM	5014	2	10	30	400	30	s	INIT_RAMP_TIME_PMSM
9	LPF_CUTOFF_VDC_FCORR	5016	2	100	10	4000	400	NA	LPF_CUTOFF_VDC_FCORR
10	LPF_CUTOFF_VDC_MOD	5018	2	100	10	4000	1000	NA	LPF_CUTOFF_VDC_MOD

S.No.	PV PARAMETERS	MODBUS_ADDRESS(DEC)	OFFSET	DVT Factor	Min	Max	Default	Unit	PV PARAMETERS
1	MPPCR VFD	7000	2	1	50	5000	3600	NA	VFD_MPPT_CALL_RATE
2	MPPCR GSC	7002	2	1	100	9999	3600	NA	GSC_MPPT_CALL_RATE
3	VOLTAGE TOLERANCE	7004	2	1	0	300	50	NA	TOL_V
4	CURRENT TOLERANCE	7006	2	1	0	4999	60	NA	TOL_I
5	PVO FACTOR	7008	2	100	1	300	20	NA	VFD_VDC_KP
6	IVO FACTOR	7010	2	100	0	500	50	NA	VFD_VDC_KI
7	DVO FACTOR	7012	2	100	20	700	300	NA	VFD_VDC_STEP
8	MIN_PV_MPPT_VOLT	7014	2	1	150	500	180	NA	MIN_PV_MPPT_VOLT
9	I_PV1_REF_MAX	7016	2	10	20	200	100	NA	I_PV1_REF_MAX
10	IMP FACTOR	7018	2	100	0	100	25	NA	IMP_FACTOR

S.No.	FLOAT PARAMETERS (Not for Server)	MODBUS_ADDRESS(DEC)	OFFSET	DVT Factor	Min	Max	Default	Unit	FLOAT PARAMETERS (Not for Server)
1	MAX POWER VFD	6020	3	1	1000	10000	9600	W	MAX_PV_POWER_VFD
2	MAX POWER GSC	6024	3	1	1000	11200	9600	W	MAX_PV_POWER_GSC
3	SWITCHING FREQ	6028	3	1	1600	16000	3200	Hz	SWITCHING_FREQ

S.No.	DISPLAY PARAMETERS	MODBUS_ADDRESS(DEC)	OFFSET	DVT Factor	Min	Max	Default	Unit	DISPLAY PARAMETERS
1	FIRMWARE_VER	3860	1	1	NA	NA	NA	NA	FIRMWARE_VER
2	Today_Time	6052	4	1	NA	NA	NA	Hr	Today_Time
3	P_Motor_Slowest_Server	6056	4	1	NA	NA	NA	NA	P_Motor_Slowest_Server
4	FREQ_HZ_DISPLAY	6060	4	10	NA	NA	NA	Hz	FREQ_HZ_DISPLAY
5	V_RMS_DISPLAY_VFD	6064	4	10	NA	NA	NA	V	V_RMS_DISPLAY_VFD
6	I_OUTPUT_DISPLAY	6068	4	10	NA	NA	NA	A	I_OUTPUT_DISPLAY
7	SPEED_RPM_DISPLAY	6072	4	1	NA	NA	NA	RPM	SPEED_RPM_DISPLAY
8	flow_LPM	6076	4	10	NA	NA	NA	LPM	flow_LPM
9	Fault_Code	6080	4	1	NA	NA	NA	NA	Fault_Code
10	STATUS_KALPA	6084	4	1	NA	NA	NA	NA	STATUS_KALPA
11	PV1_Volt_Avg_RMS	6088	4	10	NA	NA	NA	V	PV1_Volt_Avg_RMS
12	BOOST_I1_Avg	6092	4	100	NA	NA	NA	A	BOOST_I1_Avg
13	PV2_Volt_Avg_RMS	6096	4	10	NA	NA	NA	V	PV2_Volt_Avg_RMS
14	BOOST_I2_Avg	6100	4	100	NA	NA	NA	A	BOOST_I2_Avg
15	TEMP_VFD_LPF	6104	4	10	NA	NA	NA	°C	TEMP_VFD_LPF
16	Today_Energy_VFD	6108	4	1	NA	NA	NA	NA	Today_Energy_VFD
17	V_An_RMS	6112	4	10	NA	NA	NA	V	V_An_RMS
18	I_GRD_A_RMS	6116	4	10	NA	NA	NA	A	I_GRD_A_RMS
19	V_Bn_RMS	6120	4	10	NA	NA	NA	V	V_Bn_RMS
20	I_GRD_B_RMS	6124	4	10	NA	NA	NA	A	I_GRD_B_RMS
21	V_Cn_RMS	6128	4	10	NA	NA	NA	V	V_Cn_RMS
22	I_GRD_C_RMS	6132	4	10	NA	NA	NA	A	I_GRD_C_RMS
23	Freq_PLL	6136	4	10	NA	NA	NA	Hz	Freq_PLL
24	POWER_GRD_LPF	6140	4	100	NA	NA	NA	KW	POWER_GRD_LPF
25	Today_Energy_GSC	6144	4	1	NA	NA	NA	NA	Today_Energy_GSC
26	Today_Time_GSC	6148	4	1	NA	NA	NA	NA	Today_Time_GSC
27	Cumulative_Energy_GSC_Import	6152	4	100	NA	NA	NA	NA	Cumulative_Energy_GSC_Import
28	Today_Energy_GSC_Import	6156	4	1	NA	NA	NA	NA	Today_Energy_GSC_Import
29	LATITUDE	6160	4	10000	0	999999	226275	NA	LATITUDE
30	LONGITUDE	6164	4	10000	0	999999	755802	NA	LONGITUDE

S.No.	AUX PARAMETERS	MODBUS_ADDRESS(DEC)	OFFSET	DVT Factor	Min	Max	Default	Unit	DISPLAY PARAMETERS
1	TERMINAL MODE SELECT	8000	1	1	1	2	1	NA	TERMINAL_MODE_SELECT
2	TOGGLE SWITCH ENABLE	8001	1	1	1	2	2	NA	TOGGLE_SWITCH_ENABLE
3	FREQ CONTROL MODE	8002	1	1	1	3	1	NA	FREQ_CONTROL_MODE
4	VOLTAGE SENSE MIN VALUE	8003	2	10	0	100	10	NA	VOLTAGE SENSE MIN VALUE
5	VOLTAGE SENSE MIN VALUE PER	8005	2	1	0	100	100	NA	VOLTAGE SENSE MIN VALUE PER
6	VOLTAGE SENSE MAX VALUE	8007	2	10	0	100	100	NA	VOLTAGE SENSE MAX VALUE
7	VOLTAGE SENSE MAX VALUE PER	8009	2	1	30	100	100	NA	VOLTAGE SENSE MAX VALUE PER
8	CURRENT SENSE MIN VALUE	8011	2	10	40	200	40	NA	CURRENT SENSE MIN VALUE
9	CURRENT SENSE MIN VALUE PER	8013	2	1	0	30	0	NA	CURRENT SENSE MIN VALUE PER
10	CURRENT SENSE MAX VALUE	8015	2	10	40	200	200	NA	CURRENT SENSE MAX VALUE
11	CURRENT SENSE MAX VALUE PER	8017	2	1	30	100	100	NA	CURRENT SENSE MAX VALUE PER
12	DELAY SENSING	8019	2	1	20	900	30	NA	DELAY SENSING

6.1.5. USB Connector

This port is for mobile charging and can be used for firmware upgrade by Shakti Tuner software.
NOTE: This port is unisolated, therefore care must be taken when connecting external device for charging.

6.1.6 AC Input Connector

5 PIN AC connector from lit kit to be assembled to cable as per recommended gauge and connected hybrid controller as shown location.

1. Cross-sectional area of cable (mm²) - Recommended Value : 4.0~6.0
2. Outside diameter of the cable (mm) : 4.2~5.3
3. Secure all the parts of the AC connectors tightly.
4. Plug in the AC connector to the equipment securely, ensuring the pins are connected directly.
5. Connect appropriate rating circuit breaker at the output terminal of AC grid.

Connect the cables according to connection marks and following connections

i)   L1 : Phase 1 of AC Input
ii) L2 : Phase 2 of AC Input
iii) L3 : Phase 3 of AC Input
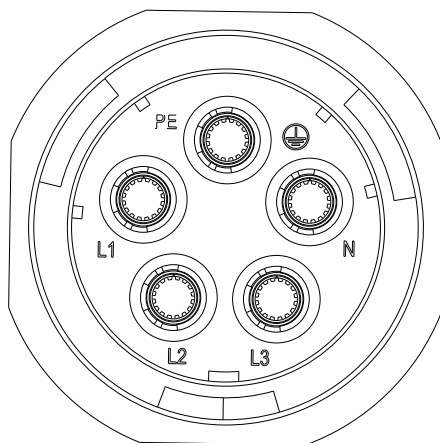iv) N : Neutral of AC Input
v)   PE : Earth Connection

Fig. 6.9

6.1.7 Pressure Relief Vent

Pressure relief vent releases the internal pressure.

6.1.8 Motor Connector

3 PIN AC connector from lit kit to be assembled to cable as per recommended gauge and connected universal controller as shown in figure 6.10.

I) L: Phase 1 of AC Input   ii) N: Phase 2 of AC Input
iii) PE: Phase 3 of AC Input
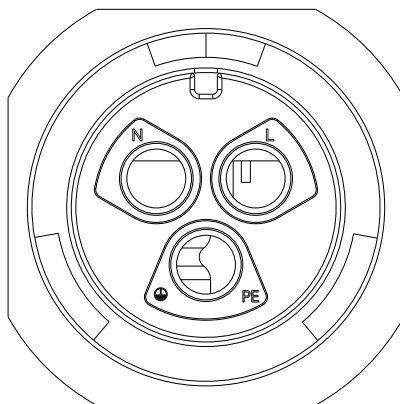
Figure 6.10

6.1.9 Aux Input/output & RS485 Communication Connectors

1. Remove the Aux terminal connector cover by removing the screws.
2. Use wire gauge from 25 AWG to 20 AWG for the connections to Terminal blocks.
3. Pass the Aux/RS485 terminal block cable through cable glands.
4. Connect the cable to terminal block receptacle.
5. Ensure IP covers are installed back after connections to ensure IP rating compliance.
6. Tightly secure the terminal block cover using the cover screws and do not disturb the gaskets.

Following are the details of terminal blocks.

● **Aux Output Ports**

1. There are three Aux ports, two output (AUX 1 & AUX 2) & one input (D-I/P) are provided.
2. The Aux Output ports are potential free contacts, which would toggle based on the configuration.

- **Aux Input Ports**

1. Normally, Pin-1 & 2 are closed and based on configuration, Pin-1 would connect with Pin-3.
2. Aux Input port can trigger an event for the hybrid controller by connecting Pin-1 & 3 by some external circuit or means. The events which can be triggered by Aux input port can be configured.
3. The Aux Input port can be also configured for firmware upgrade by service personals.

- **RS 485**

1. The RS485 MOD BUS communication connection to the hybrid controller can be done by using RS485 terminal block.
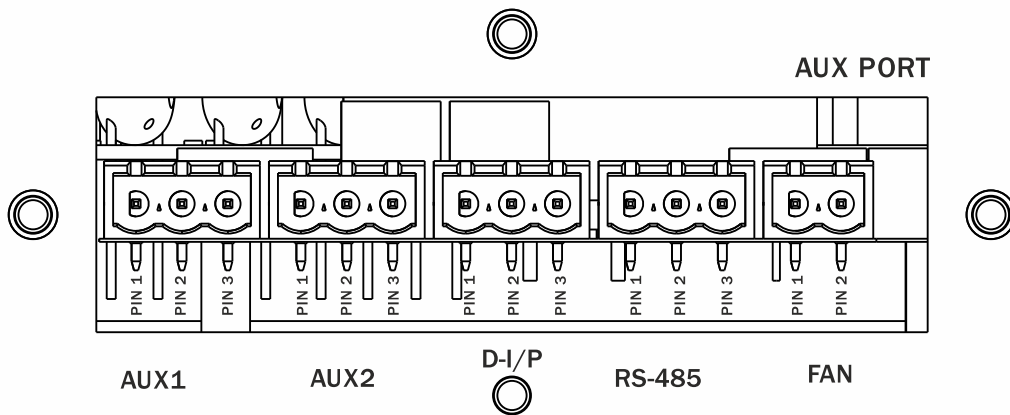2. Connect A to Pin-1, B to Pin-3 and Ground to Pin-2

Figure 6.11 AUX Port

- **FAN**
  Do not connect or use this port.

CHAPTER 7 : OPERATION OF UNIT

7.1 Display Module Description

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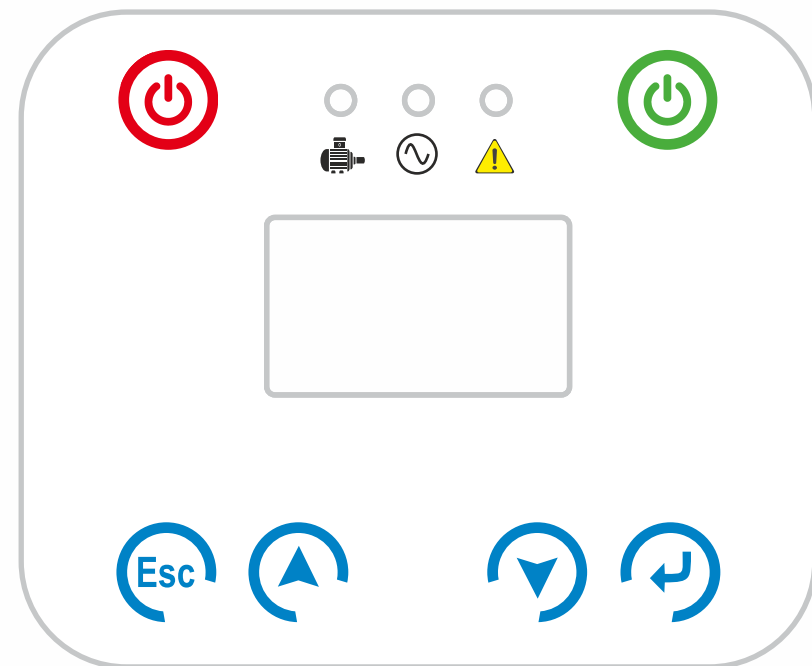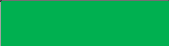

Figure 7.1 LCD display layout

7.2. Button Description and Operation

		Functionality
Power On	⏻	● To Turn ON the Motor*
Power Off	⏻	● To Turn OFF the Motor*
ESC	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

*NA for GT Product

7.3. LED Description and Indication

INDICATION	LED 1	LED 2		LED 3
	GREEN (Motor)	AMBER(Grid)	GREEN (Grid)	RED (Warning)
Motor Running	███			
Feeding To Grid			███	
Drawing Power from Grid		███		
Warning & Fault				███

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.

A RPM page based on the NOB functionality can be accessed by long pressing UP/DOWN button. The speed can be varied in multiples of 10, 50 and 100 using the same buttons.

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NOTE: The highlighted 5 compulsory parameters need to set before exiting the startup menu.

Startup

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MADE IN INDIA

Setup Wizard (Factory Setup)

LANGUAGE
RTC DATE
RTC TIME
APPLICATION
INSTALL DATE
PROTECTION
SOLAR PARAMETERS
MOTOR PARAMETERS
PUMP PARAMETERS
GRID PARAMETERS
BOOT MODE OPTIONS
EEPROM RESET
DONGLE DATA CONFIG

Round Robbin Display → Status Screen →

VOLTAGE
CURRENT
RUNTIME
TEMP
ENERGY EXPORT
ENERGY IMPORT
VFD OUTPUT
MOTOR
PUMP
POWER
DATE
SOLAR

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, CONTROL,** 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.

Main Menu

STATUS →
SOLAR
DRIVE
MOTOR
PUMP
GRID
ENERGY & TIME
TEMPERATURE
LIMIT VAR
LOCATION
DEBUG
*1

CONTROL →
ON/OFF
CONTROL MODE
DIRECTION
*2

CONFIGURATION →
APPLICATION
PROTECTION
LANGUAGE
DATE & TIME
DISPLAY
MODBUS CONFIG
OUTPUT CONTROL
NIGHT MODE
FACTORY SETUP
GPS CONFIG
AUX CONFIGURATION
*3

LOGS →
FAULT LOGS
DAY LOGS EXTRACT
YEAR LOGS EXTRACT

ABOUT →
FIRMWARE
SERIAL NUMBER
NETWORK DETAILS

Figure 7.3 Main Menu tree

▸ **STATUS** (*1)

A) SOLAR

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

B) DRIVE

This status shows the real time condition of Variable Frequency Drive of the system, such as output voltage (V), output current (A), output frequency (Hz), and output power (W).

C) MOTOR

This status shows the real time data of the Motor driving the pump, such as type of the motor selected for operation, rated voltage (V), instantaneous current (A), rated power (HP), rated frequency (Hz), and operating speed (RPM).

D) PUMP

This status shows the real time PUMP condition connected to the system, such as type of the pump, head (m), cumulative discharge (kL), and cumulative hour (Hr).

E) GRID

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

F) ENERGY

Under ENERGY the data of total energy sent to grid & VFD, 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)
VFD EDAY	:	Total energy sent to VFD today (kWh)
VFD ETOT	:	Total energy sent to VFD till date (kWh)
GRD TTOT	:	Total time energy is sent to grid (Hr)
VFD TTOT	:	Total time energy is sent to VFD (Hr)
IMP EDAY	:	Today energy import is sent to VFD from grid (kWh).
IMP ETOT	:	Total energy import is sent to VFD from grid(kWh).

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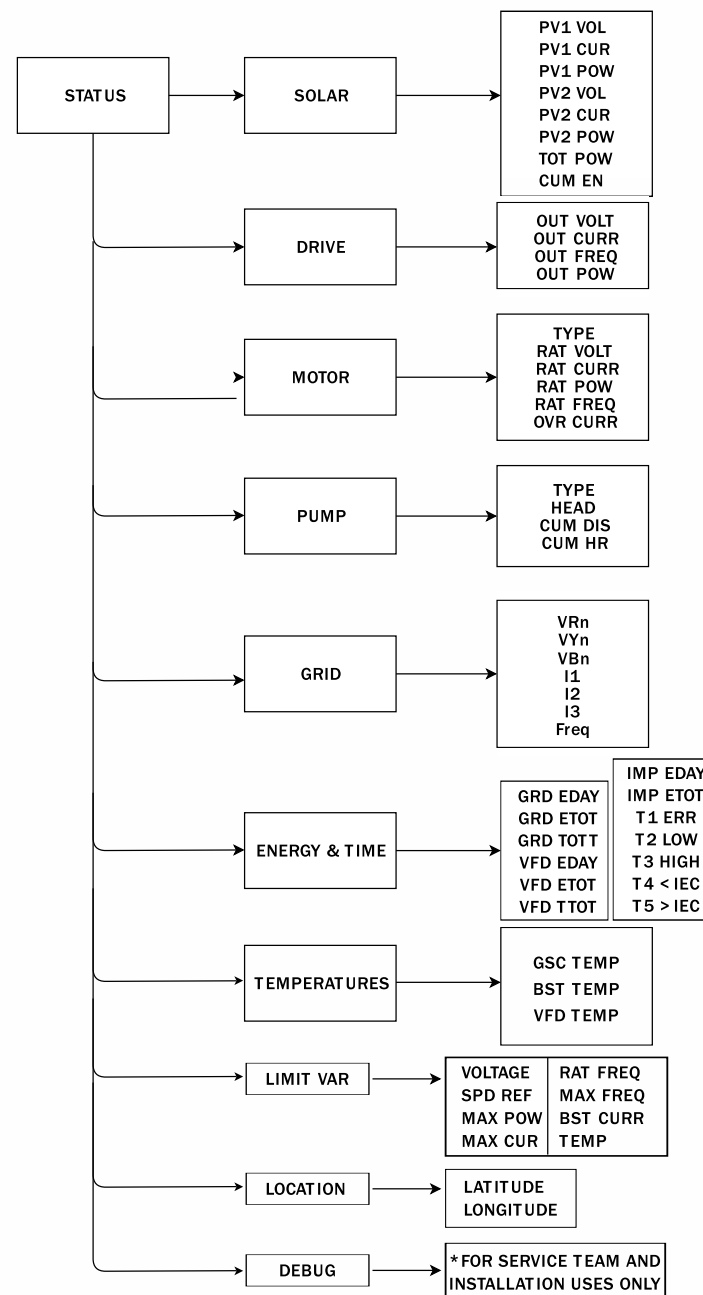
Figure 7.4 STATUS Menu tree

▶ CONTROL ✱2

A) ON/OFF
Whenever ON option is selected the motor will turn on until it is turned off manually through LCD.

B) CONTROL MODE
The motor can be controlled in either of the four modes, namely AUTO, MANUAL, JOG and SPEED MODE. In the JOG mode, the speed and the direction can be set. To start the motor Enter into ENTER THE JOG and press the power button, until the power button is pressed motor is in running state. Releasing the power button will lead to the stopping of the motor.
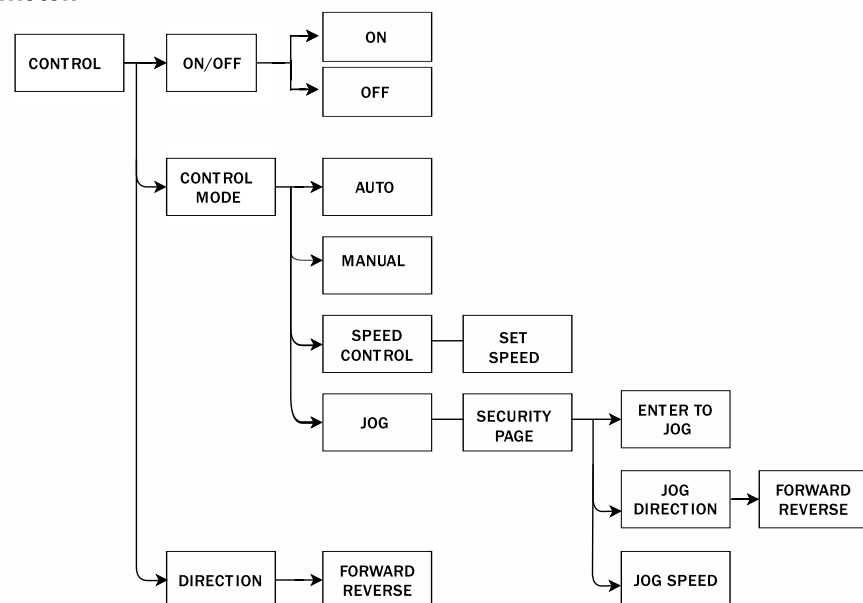
Figure 7.5 CONTROL Menu tree

▶ CONFIGURE ✱3

A) APPLICATION
   This system can work for two applications: Standalone & Hybrid.
B) PROTECTION
   The protection limit for various parameters can be set according to the users requirements.
C) LANGUAGE: User get the chance to select the language (by default, it is English).

D) DATE & TIME: User can update date and time to synchronise with real time.
E) DISPLAY: User can select Display mode either Shakti screen or Rolling page.
F) MODBUS CONFIG: When communicating through RS232 and Rs485, user have to select slave id and baud rate i.e. 1 and 9600 respectively.
G) OUTPUT CONTROL: User can either enable or disable output control.
H) NIGHT MODE: User can either enable or disable Night mode.
I) FACTORY SETUP
   A security password is required to access this menu block.
i. SOLAR PARAMETERS : According to PV panels connected to the system parameters shown in the figure 7.6 can be set.
ii. MOTOR PARAMETERS : First the type of the motor is selected and by entering into the selected motor the rated parameters of that specific motor can be set. For all the three motors i.e. INDUCTION, S4RM, and PMSM same parameters options are available for configuring.
iii. PUMP PARAMETERS : After selecting the pump to be operated the parameters specific to that pump can be configured.
iv. GRID PARAMETERS : If required the parameters can be set according to the local GRID, keeping in mind the safety regulation specific to that area.
v. BOOT MODE OPTIONS : This functionality requires another security password to upgrade the firmware of the system by USB or SERIAL BOOT MODE.
vi. EEPROM RESET : EEPROM can be reset only by authorized technician/service personnel. Users are not allowed to reset the EEPROM since it may cause malfunctioning of the unit.
J) GPS CONFIG: Latitude and Longitude can be configured manually according to the location.
K) AUX CONFIG.: This section describe the usage of control input for this drive. There are two digital inputs & 2 analog inputs available in terminal connection block as shown in fig. 7.6

The SHAKTI drives uses a MACRO based configuration for control purpose. The control input functionality and MACRO description is given in the Application Note:
Control Input configuration which is available in the controller section in the link given below:

https://www.shaktipumps.com/download-catalogues.php

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CONFIGURE

- APPLICATION

- PROTECTION
  - MAX VFD POWER
  - MIN VFD POWER
  - MAX CURRENT
  - OVER CURRENT
  - DRY RUN CURRENT
  - DRY RUN POWER
  - DC BUS OVER VOLT
  - OVER TEMPERATURE
    - THERMAL DERATING
    - MAX FREQ
    - PVGFD
    - ELCFD
    - RUN FROM SS
    - NEUTRAL CONFIG
    - ELCFD FACTOR
    - RETRY MIN
    - DERATING TEMP

- FACTORY SETUP
  - LANGUAGE
  - DATE & TIME
  - DISPLAY
  - MODBUS CONFIG
  - OUTPUT CONTROL
  - NIGHT MODE

- SOLAR PARAMET ERS
  - MPPCR VFD
  - MPPCR GSC
  - VOLTAGE TOLERANCE
  - CURRENT TOLERANCE
  - PVO FACTOR
  - IVO FACTOR
  - DVO FACTOR

- MOTOR PARAMET ERS
  - INDUCTION
  - S4RM
  - PMSM
    - DEFAULT
    - RAT ED POWER
    - RATED VOLTAGE
    - RATED FREQUENCY
    - NO OF POLES
      - RATED CURRENT
      - START TIME
      - STOP TIME
      - CONTROL TYPE

- CONTROL PARAMETERS
  - SPEED KP
  - SPEED KI
  - DRY RUN RPM LIMIT
  - TORQUE BOOST PER
  - ID REF PMSM
  - PMSM THETA FACTOR
  - SWITCHING FREQ
    - MIN RPM PMSM
    - RAMP TIME PMSM
    - WC FCORR VDC
    - WC MOD VDC
    - IMP FACTOR
    - PRIMARY HEALTH CHK
    - FLAG PARK

- PUMP PARAMET ERS
  - SURFACE PUMPS
  - SUBMERSIBLE PUMPS
  - HELICAL PUMPS
    - HEAD
    - POW1
    - POW2
    - D1
    - D2
      - POW3
      - D3
      - POW4
      - D4
      - POW5
      - D5

- GRID PARAMETERS
  - SELECT REGION
  - MAX GSC POWER
  - MIN VOLTAGE
  - MAX VOLTAGE
  - GRID UNBALANCE SET
  - RATED GRID FREQ
  - MIN FREQ
  - MAX FREQ
  - GRID POWER RESTRICT
    - BOOST VOLTAGE KP
    - BOOST VOLTAGE KI
    - BOOST CURRENT KP
    - VOLTAGE KP
    - VOLTAGE KI
    - CURRENT KP
    - CURRENT KI
    - VOLT HYSTERESIS
    - FREQ HYSTERESIS

- DONGLE DATA CONFIG

- BOOT MODE OPTIONS
  - USB BOOT MODE
  - SERIAL BOOT MODE

- EEPROM RESET

- GPS CONFIG
  - SET LONGITUDE
  - SET LATITUDE

- AUX CONFIGUARATION
  - AUX ENABLE
  - DIGITAL INPUT
    - DIGITAL INPUT 1
    - DIGITAL INPUT2
  - ANALOG INPUT
    - ANALOG INPUT 1
    - ANALOG INPUT 2
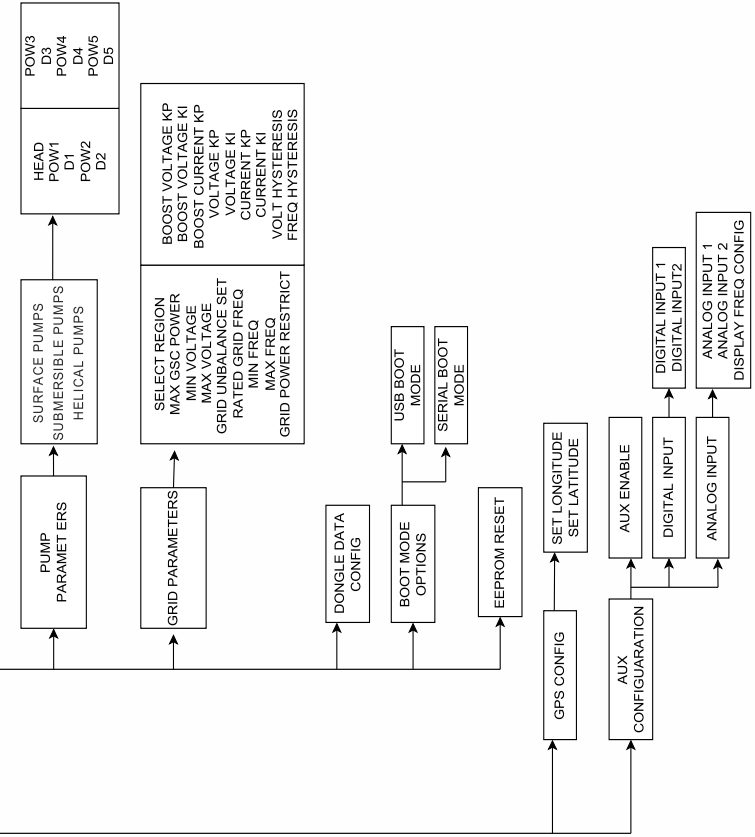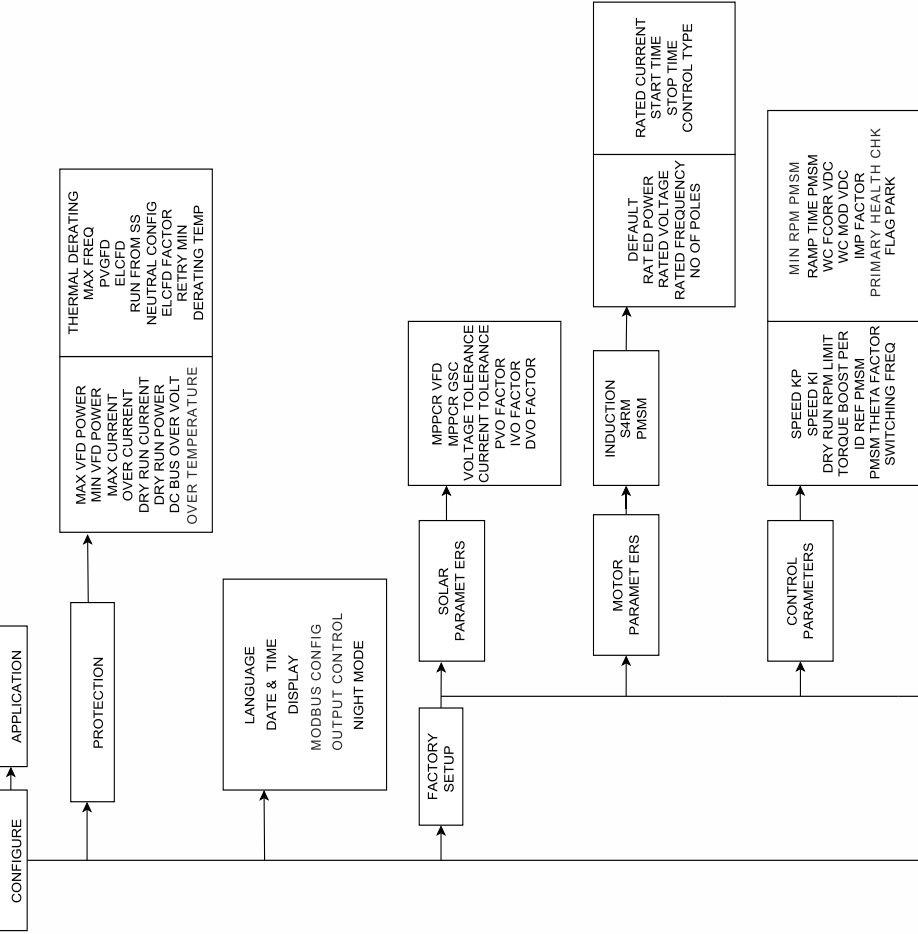   - DISPLAY FREQ CONFIG

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 also. The location of pages wrt numerals has a definite sequence as described below:

Table 8.1.1 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., CONTROL is at 2nd location and is therefore designated as 2 in the front. Any page inside CONTROL will start with 2. For example ON/OFF page is at 1st location inside CONTROL page so, it's numeral designator is 21, wherein 2 corresponds to CONTROL PAGE and 1 corresponds to the first page inside page number 2.

Another example, To understand numeral location of RATED FREQUENCY of PMSM is given below:
3 CONFIGURE >> 9 FACTORY SETUP >> 2 MOTOR PARAMETERS >>3 PMSM >> 4 RATED FREQUENCY.

Hence, Numeral designator for RATED FREQUENCY of PMSM is 39234 as shown in figure 8.1, which signifies go to the 3rd page of menu to reach CONFIGURATION then go to 9th location of CONFIGURATION to reach FACTORY SETUP(page 39). Then enter the 2nd location of page 39 to reach MOTOR PARAMETERS (page 392) then enter into 3rd location to go to PMSM MOTOR(page 3923) there go to 4th location which is RATED FREQ(page 39234).

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-12th location inside any page is designated as _12.

E.g., Numeral designator of FLAG PARK is 393_14.

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

Page no.

Location no.
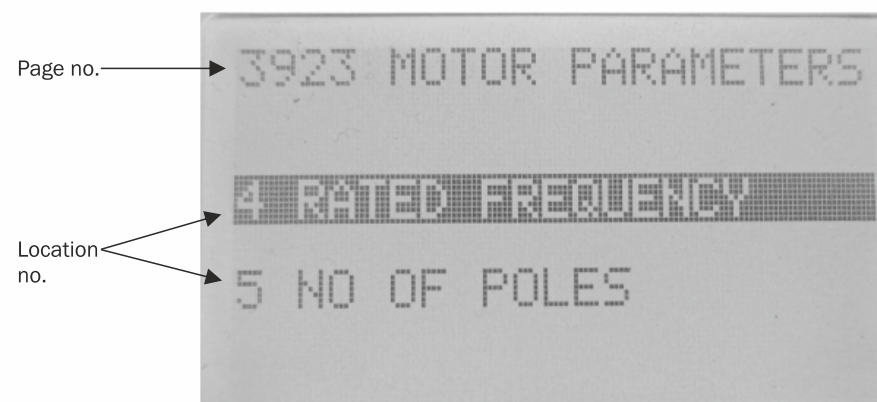
fig. 8.1

S.NO.	HEADINGS	S.NO.	HEADINGS	S.NO.	HEADINGS
0	MENU	3	CONFIGURE	342	SET TIME
		31	APPLICATION	35	DISPLAY
1	STATUS	311	STAND ALONE	351	DISPLAY MODE
11	SOLAR	312	HYBRID	3511	ROLLING PAGES
12	DRIVE	32	PROTECTION	3512	SHAKTI SCREEN
13	MOTOR	321	MAX VFD POWER	352	CONTRAST
14	PUMP	322	MIN VFD POWER	353	AUTOROLL
15	GRID	323	MAX CURRENT	3531	YES
16	ENERGY AND TIME	324	OVER CURRENT	3532	NO
17	TEMPERATURES	325	DRY RUN CURRENT	354	DISPLAY LOCK
18	LIMIT VAR	326	DRY RUN POWER	3541	YES
19	LOCATION	327	DC BUS OVER VOLTAGE	3542	NO
1_10	DEBUG	328	OVER TEMPERATURE	3543	CHANGE PASSWORD
		329	THERMAL DERATING	36	MODBUS CONFIG
2	CONTROL	32_10	MAX FREQ	361	RS232 SLAVE ADD
21	ON/OFF	32_11	PVGFD	362	RS232 BAUD RATE
211	ON	32_11_1	ENABLE	363	RS485 SLAVE ADD
212	OFF	32_11_2	DISABLE	364	RS485 BAUD RATE
22	CONTROL MODE	32_12	ELCFD	37	OUTPUT CONTROL
221	AUTO	32_12_1	ENABLE	371	ENABLE
222	MANUAL	32_12_2	DISABLE	372	DISABLE
223	SPEED CONTROL	32_13	RUN FROM SS	38	NIGHT MODE
224	JOG	32_14	NEUTRAL CONFIG	381	DISABLE
2241	ENTER TO JOG	32_14_1	YES	382	ENABLE
2242	JOG DIRECTION	32_14_2	NO	39	FACTORY SETUP
22421	FORWARD	32_15	ELCFD FACTOR	391	SOLAR PARAMETERS
22422	REVERSE	32_16	RETRY MIN	3911	MPPCR VFD
2243	JOG SPEED	32_17	DERATING TEMP	3912	MPPCR GSC
23	DIRECTION	33	LANGUAGE	3913	VOLTAGE TOLERANCE
231	FORWARD	331	ENGLISH	3914	CURRENT TOLERANCE
232	REVERSE	34	DATE & TIME	3915	PVO FACTOR
		341	SET DATE	3916	IVO FACTOR

S.NO.	HEADINGS	S.NO.	HEADINGS	S.NO.	HEADINGS
3917	DVO FACTOR	393_13_1	ENABLE	S.NO.	HEADINGS
392	MOTOR PARAMETERS	393_13_2	DISABLE	3957	MIN FREQUENCY
3921	INDUCTION	393_14	FLAG PARK	3958	MAX FREQUENCY
39211	DEFAULT (INDUCTION)	393_14_1	DISABLE	3959	GRID POWER RESTRICT
39212	RATED POWER (INDUCTION)	393_14_2	ENABLE	39591	DISABLE
		394	PUMP PARAMETERS	39592	ENABLE
39213	RATED VOLTAGE (INDUCTION)	3941	SURFACE PUMP	395_10	BOOST VOLTAGE KP
		39411	HEAD	395_11	BOOST VOLTAGE KI
39214	RATED FREQUENCY (INDUCTION)	39412	POW1	395_12	VOLTAGE KP
		39413	D1	395_13	VOLTAGE KI
39215	NO OF POLES (INDUCTION)	39414	POW2	395_14	CURRENT KP
		39415	D2	395_15	CURRENT KI
39216	RATED CURRENT (INDUCTION)	39416	POW3	395_16	VOLTAGE HYSTERESIS
		39417	D3	395_17	FREQUENCY HYSTERESIS
39217	START TIME	39418	POW4	396	DONGLE DATA CONFIG
39218	STOP TIME	39419	D4	3961	NO
39219	CONTROL TYPE (INDUCTION)	3941_10	POW5	3962	YES
		3941_11	D5	397	BOOT MODE OPTIONS
39219_1	SCALAR	3942	SUBMERSIBLE PUMP	3971	SERIAL BOOT MODE
39219_2	VECTOR	39421	HEAD	398	EEPROM RESET
3922	S4RM	39422	POW1	3981	NO
39221	DEFAULT (S4RM)	39423	D1	3982	YES
39222	RATED POWER (S4RM)	39424	POW2	310	GPS CONFIG
39223	RATED VOLTAGE (S4RM)	39425	D2	3101	SET LATITUDE
		39426	POW3	3102	SET LONGITUDE
39224	RATED FREQUENCY (S4RM)	39427	D3	311	AUX CONFIGURATION
		39428	POW4	3111	AUX ENABLE
39225	NO OF POLES (S4RM)	39429	D4	31111	NO
3923	PMSM	3942_10	POW5	31112	YES
39231	DEFAULT (PMSM)	3942_11	D5	3112	DIGITAL INPUT
39232	RATED POWER (PMSM)	3943	HELICAL PUMP	31121	DIGITAL INPUT 1
		39431	HEAD	311211	FORCE STOP
39233	RATED VOLTAGE (PMSM)	39432	POW1	31122	DIGITAL INPUT 2
		39433	D1	311221	YES
39234	RATED FREQUENCY (PMSM)	39434	POW2	311222	NO
		39435	D2	3113	ANALOG INPUT
39235	NO OF POLES (PMSM)	39436	POW3	31131	ANALOG INPUT 1
393	CONTROL PARAMETERS	39437	D3	311311	AI MIN VALUE
		39438	POW4	311312	AI MIN PERCENTAGE
3931	SPEED KP	39439	D4	311313	AI MAX VALUE
3932	SPEED KI	3943_10	POW5	311314	AI MAX PERCENTAGE
3933	DRYRUN RPM LIMIT	3943_11	D5	311315	SENSE DELAY SET
3934	TORQUE BOOST PER	395	GRID PARAMETERS	31132	ANALOG INPUT 2
3935	ID REF PMSM	3951	SELECT REGION	311321	VS MIN VALUE
3936	PMSM THETA FACTOR	39511	INDIAN GRID	311322	VS MIN PERCENTAGE
3937	SWITCHING FREQ	39512	IEC-61727	311323	VS MAX VALUE
3938	MIN RPM PMSM	3952	MAX GSC POWER	311324	VS MAX PERCENTAGE
3939	RAMP TIME PMSM	3953	MIN VOLTAGE	311325	SENSE DELAY SET
393_10	WC MOD VDC	3954	MAX VOLTAGE	31133	DISPLAY FREQ CONF
393_11	WC FCORR VDC	3955	GRID UNBALANCE SET		
393_12	IMP FACTOR	3956	RATED GRID FREQ		
393_13	PRIMARY HEALTH CHK	3956_1	50 Hz		
		3956_2	60 Hz		

Table 8.1

S.NO.	HEADINGS
4	LOGS
41	FAULT LOGS
42	RS232 EXTRACT
421	DAY DATA EXTRACT
422	YEAR DAT EXTRACT
423	FAULT DATA EXTRACT
43	RS485 EXTRACT
431	DAY DATA EXTRACT
432	YEAR DAT EXTRACT
433	FAULT DATA EXTRACT
5	ABOUT
51	FIRMWARE
52	SERIAL NUMBER
521	DRIVE SERIAL NO.
522	DONGLE SERIAL NO.
53	NETWORK DETAILS

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 • Fault information will be shown at LCD display • Output of drive will be cut-off and motor will decelerate and stop.
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.

If the short circuit fault occurs:
1. Remove the motor connection and run the drive.
2. If the drive runs OK
a. Check the loose connection of motor wire in the connector side, some strands may be touching.
b. Check the cable for the motor.
c. Check the megger of the motor and motor winding related problems.
   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
*Low Power(Input power is lesser than set_min power)	01 LOW POWER	PUMP	1.Low input power due to lesser intensity of sunlight or shadow on panels. 2. PV panels may not be in a healthy condition. 3. Solar power is less than minimum PV power settings.	1. Check is there low intensity of sunlight. If yes wait till proper sunlight come. 2. Decrease minimum input power settings. 3. Contact customer care.
DC Bus OVERVOLTAGE	02 DC BUS OVERVOLTAGE	BOTH	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.7. 3. Contact customer care
OUTPUT OVER VOLTAGE	03 OUTPUT OVERVOLTAGE	BOTH	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.7. 3.Contact customer care
DRY RUN	04 DRY RUN DETECTED	PUMP	1. No water available on the suction / inlet side of pump	1. Check for availability of water at pump inlet. 2. Wait for water to come in, in case of submersible motor. 3. Check water level in water tank in case of surface motor. 4. Kindly do the priming properly.
VFD OVER TEMP	05 VFD OVER TEMP	PUMP	1. The drive heating is more than expected. 2. Improper ventilation.	1. Check for ventilation and mounting style. 2. Contact Customer care.
VFD OVER CURRENT	06 VFD OVER CURRENT	PUMP	1. Wrong values set (for rated current) in the factory setup. 2. Mismatch of connected loat and selected parameter.	1. Set right values in the rated current parameter. 2. Check the output load connected. 3.Contact customer care
VFD SHORT CKT TRIP	07 VFD SHORT CKT TRIP	PUMP	1. Any of the connection internal or output is shorted. 2. Voltage is too low. 3. A sudden load.	1.Correct Shorted connection. 2. Check insulation health of cable. 3. Contact customer care.
HIGH INRUSH CURRENT	08 VFD HIGH INRUSH CURRENT	PUMP	1. Sudden increase in load. 2. Wrong motor selected. 3. Cable joint not proper.	1. Select the proper motor and also select correct motor in menu. 2. Make proper joint of cable. 3. Contact Customer care.
OUTPUT OPEN CIRCUIT	09 OUTPUT OPEN CIRCUIT	PUMP	1.Occurs during the operation when any of the output is opened	1. Check whether motor is connected at the output. 2. 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	BOTH	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	BOTH	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.
PVGFD GSC FAULT	21 PVGFD 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.	1. Ensure output is not short and restart the device. 2. Contact Customer care.
DC BUS UNDERVOLTAGE	23 DC BUS UNDERVOLTAGE	PUMP	1. When motor is running and PV voltage is less than the minimum DC bus voltage.	1. 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. 3.Contact customer care
OUTPUT DISABLE FLAG	26 OUTPUT DISABLED	BOTH	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.
PMSM START FAIL	28 START FAIL PMSM	PUMP	1. Starting torque not enough. 2. Mechanical Jam(Pump/Motor).	1. Increase the torque boost % parameter value. 2. Increase INIT_RAMP_TIME_PMSM parameter value. 3. 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. s
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.

*This is not a fault but a warning.
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.

SHAKTI®
PUMPING LIFE

WARRANTY CERTIFICATE

Dear Customer. Congratulation. for purchasing our product.

Pump and Motor 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 pump 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 pump sets. The warranty also does not cover consequential losses/ damages arising due to failure of pump/ motor. No warranty will be provided on mechanical seal, rubber parts, fasteners, cables in pump motor / pump sets. Our obligation is limited to recycling or repairing or replacing product/ parts exî 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:	:	....

BOOK-POST

To,
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Visit us at : www.shaktipumps.com

Stamp