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## INSTALLATION & OPERATING INSTRUCTIONS

### KALPAVRIKSHA UNIVERSAL SOLAR PUMP CONTROLLER



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

7. Ensure that the USPC, 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 USPC'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 USPC is turned off while setting all the required parameters.
13. Ensure that no unauthorized filter is connected to the output of the USPC. It may cause loss of warranty.

### 1.3 Safety during Operation

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

9. At over 2,000 metres altitude, the USPC's 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 USPC 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. USPC 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 USPC and other equipments. Users will be responsible for the cause and there will be a loss of warranty.
7. The KUSPC and KUSPC-H products are not recommended for elevators, ICU, life saving products etc.

## CHAPTER 2 : INTRODUCTION

### 2.1 Product Overview

Kalpavriksha Universal Solar Pump Controller (KUSPC) is a solar converter designed for maximum utilization of solar power available at the site throughout the year. Multiple applications such as Water Pumping, Atta Chakki, Deep Freezer, Thresher etc. can be operated from this single solar powered product. The KUSPC automatically supports the application selected by the user from the graphical display.

The product comes with IP65 rating and thus is suitable to be installed in an external environment. All the protection features for various applications are inbuilt. An option to monitor and control the KUSPC remotely using a mobile APP or a website is also available.

### 2.2 Storage Instructions

The USPC 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 USPC'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 °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

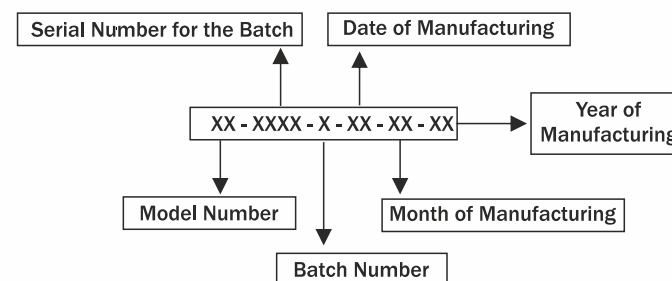
- ✗ In an area with the rapid change in temperature (condensation and frost may be caused).
- ✗ In a place with significant water leakage.
- ✗ In a place which has a high risk of fire ignition.

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 USPC 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





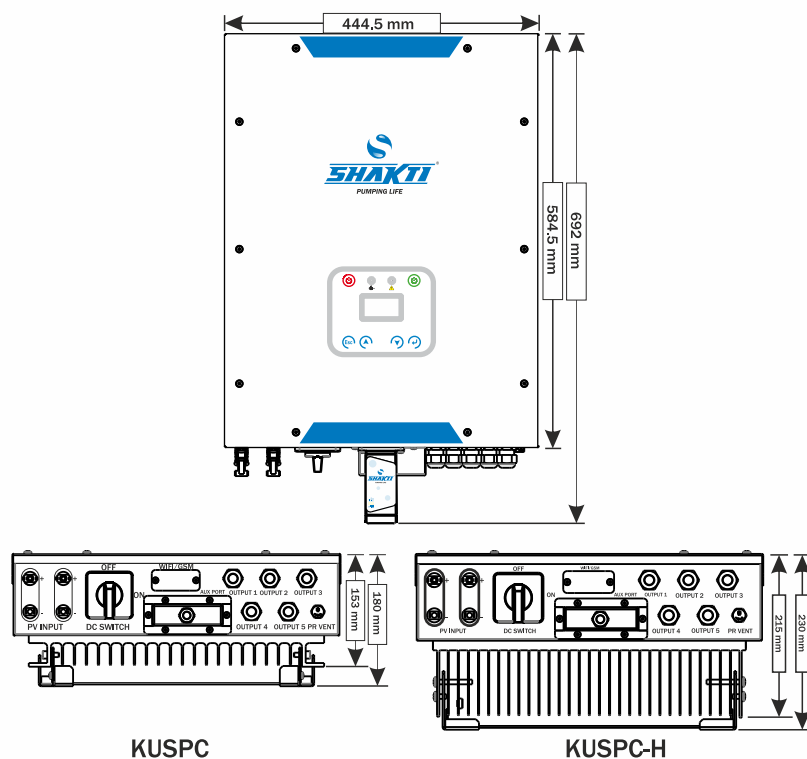
### CHAPTER 3 : PACKAGE CONTENTS

#### Inspection

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

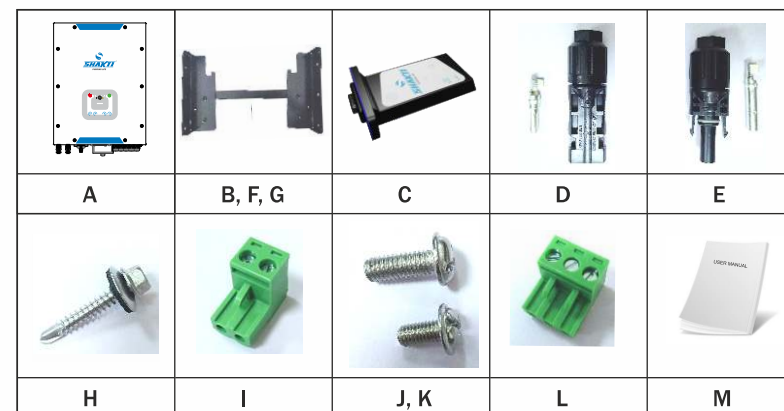
Check the following items when unpacking the Inverter:

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 Universal Solar Pump controller (KUSPC)**

Following is the list of items in the packaging.



**Fig. 3.2 Images of list of Items in KUSPC Packaging**

**Table 3.1 List of Items**

S.No.	Name	Qty.	Unit	Manufacturer	Manufacturer Name
				Part number	
A	Universal Solar pump controller	1	Set		
B	MOUNTING PLATE STRIP KALP_H 371x24x2.4MM	1	EA		
C	SHAKTI RMS DONGLE WITHOUT WIFI	1	EA		
D	PV CONNECTOR MC4 MALE WITH TERMINAL	2	EA	ESC-4 (MALE)	ELCOM INTERNATIONAL PVT.L
E	PV CONNECTOR MC4 FEMALE WITH TERMINAL	2	EA	KF2ED6K-5.08-02P	Cixi Kefa Electronics Co., Ltd.
F	FAB SHEETMETAL BKT WALLMOUNT KALP H RHS	1	EA		
G	FAB SHEETMETAL BKT WALLMOUNT KALP H LHS	1	EA		
H	SCREW HEX HEAD SELF TAP WTH GRIP M5.5X35	6	EA	ESC-4 (FEMALE)	ELCOM INTERNATIONAL PVT.L
I	CONN. DRY CONTACT EXTERN 2 POS 320V 12A	1	EA		
J	PAN HEAD PHILLIPS DRIVE M5X10MM+WASHER	2	EA		
K	PHILIP PAN HEAD SCREW M6X16 W.WASHER(SS)	4	EA		
L	CONN. DRY CONTACT EXTERN 3 POS 320V 12A	4	EA	MSTB 2,5/ 3-ST-5	PHOENIX CONTACT
M	MANUAL KALPAVRIKSHA USPC	1	EA		

## CHAPTER 4 : SPECIFICATIONS

PARAMETERS	KUSPC		KUSPC - H	
	3 HP	5 HP	7.5 HP	10 HP
PV INPUT				
PV Voltage Range	200 - 770 VDC			
Max. PV Current	10 A		20 A	
MPPT Range	220 - 450 VDC	290 - 650 VDC	220 - 450 VDC	290 - 650 VDC
Nominal PV Voltage	370 VDC	580 VDC	370 VDC	580 VDC
Number of PV Inputs	1		2	
Max. Power	3000 W	5500 W	7500 W	10000 W
PV Start Voltage	200 VDC			
MOTOR-PUMP OUTPUT				
Voltage Range	0 - 460 VAC			
Max. Current	12 A		16 A	
Operating Frequency Range	0 - 200 Hz			
Power Factor Range	0.75 - 1			
Motor Types	IPMSM, PMSM, BLDC, ACIM			
Peak Efficiency	>93%	>96%	>96%	>96%
Protection	Shortcircuit, Dryrun, Overtemperature, Overload etc			
OTHER APPLICATION OUTPUTS (4 NOs)				
Voltage Range	415VAC ± 5%			
Motor Type	ACIM			
Max. Current	5A	8.5 A	10A	16 A
Nominal Frequency	48-50Hz			
Operating Frequency Range	0-52 Hz (Through Constant V by F)			
Power Factor Range	0.75 - 1			
MPPT Accuracy	>99%			
Peak Efficiency	>93%	>93%	>93%	>93%
Total Harmonic Distortion (THDv)	<3% (at nominal power)			
Protection	Output voltage low, Output frequency low/high, Low Irradiance/PV power, Over Current, Peak Torque 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)			
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.	26kg/30kg		30kg/35kg	
OTHER INFO				
Pollution Degree	PD3			
Over Voltage Category	Category II			
Protection Class	Class I			
Operating Temperature	-10 to 50°C			
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	Follows MNRE guide line.			

## CHAPTER 5 : INSTALLATION

Mounting Method, Installation Position and Mounting Procedure of the USPC is illustrated as follows:

### 5.1. Mounting Method

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

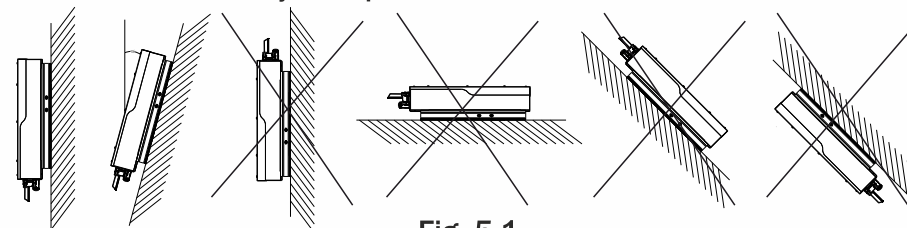


Fig. 5.1

### 5.2. Installation Position

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

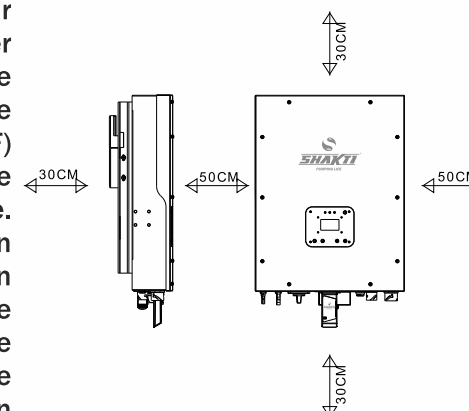


Fig. 5.2

### 5.3. Mounting Procedure for KUSPC

This section provides the mounting procedure and drawings for lower power KUSPC Model.

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.

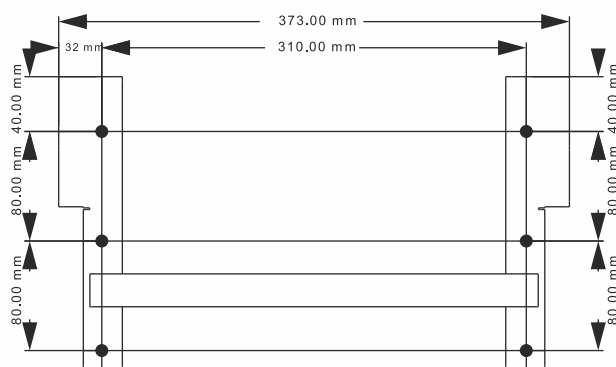


Fig. 5.3 Mounting Brackets for KUSPC

### 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.

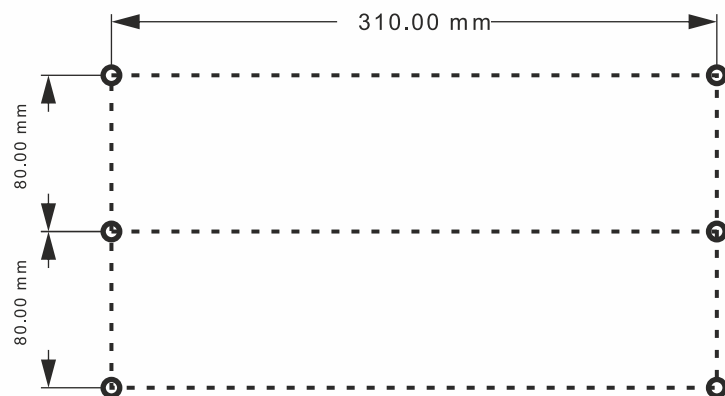


Fig. 5.4 Drilling drawing for KUSPC

### 3. Mount the KUSPC

Carefully mount the USPC 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.

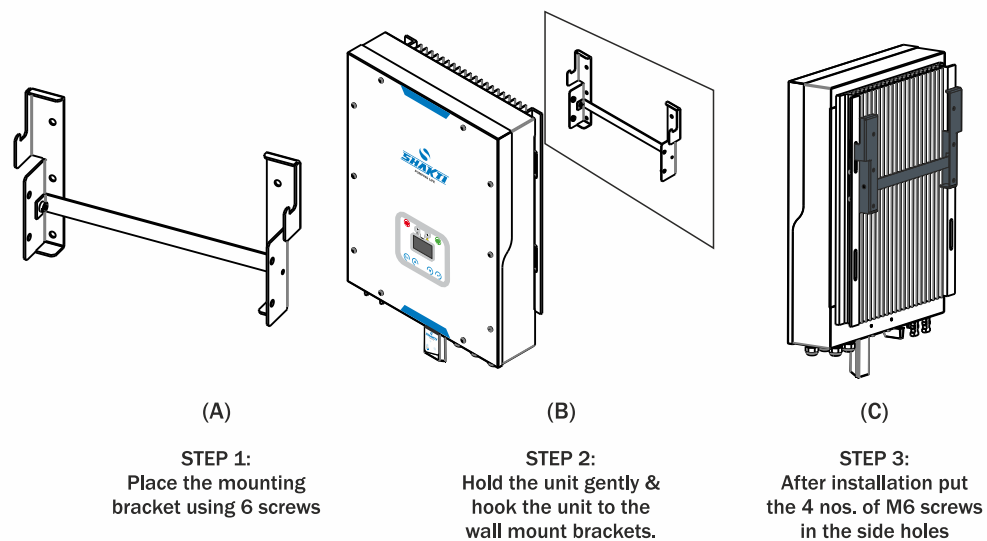


Fig. 5.5 Mounting Procedures for KUSPC



Fig. 5.6 Mounting Brackets for KUSPC - H

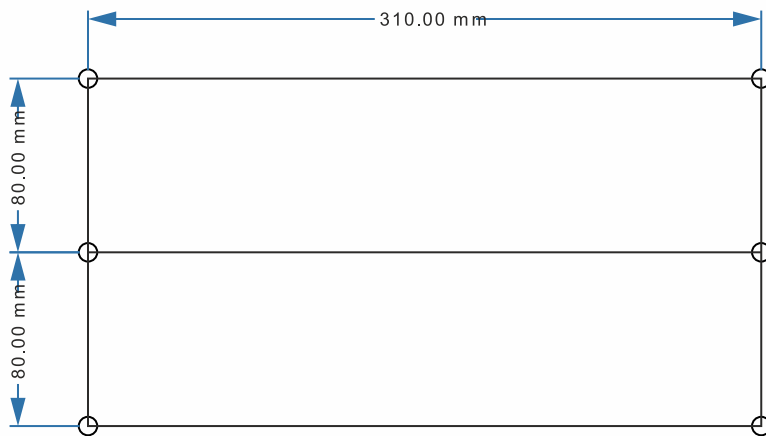
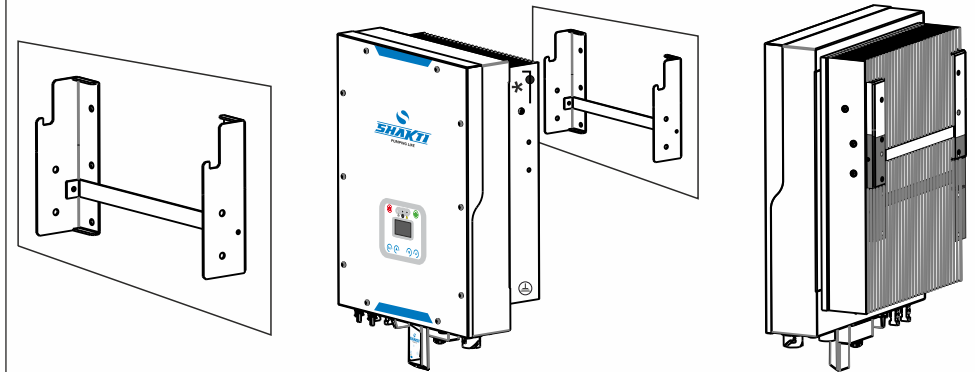


Fig. 5.7 Drilling drawing for KUSPC - H



(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

\* Allen Key keeping provision

Fig. 5.8 Mounting Procedures for KUSPC - H



CHAPTER 6 : CONNECTIONS AND CONNECTING PROCEDURE

6.1. Rear Panel  
Rear Panel view with covers

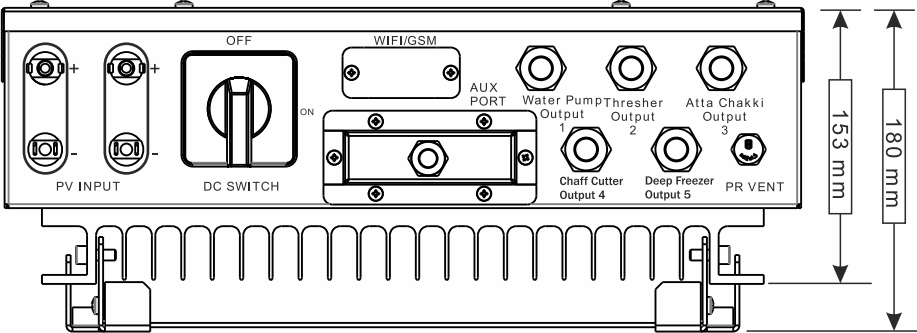


Fig. 6.1

Rear Panel view with cover & Dongle Connected

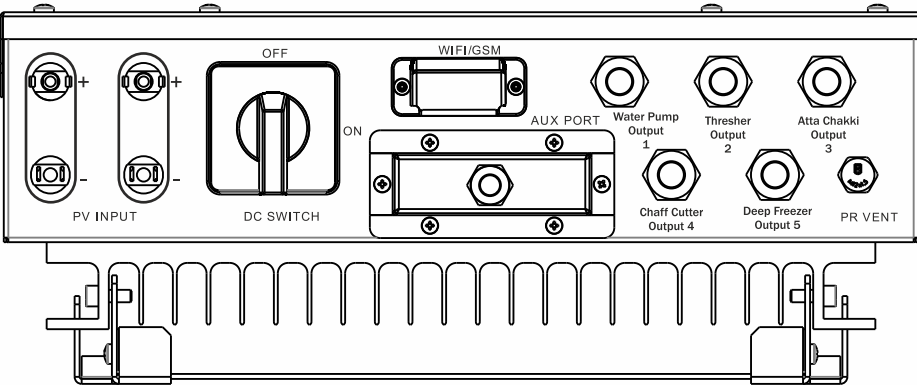


Fig. 6.2

Rear Panel view without cover

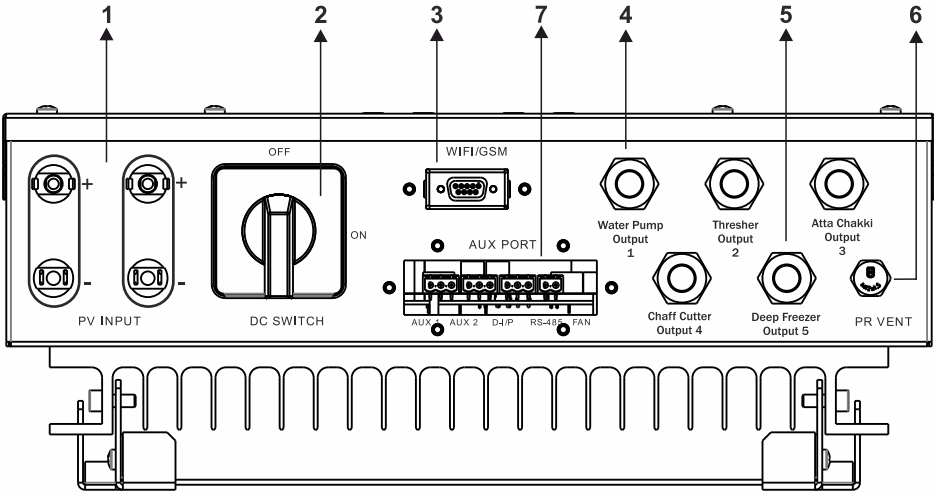


Fig. 6.3

Table 6.1

Marking	Description
1	PV Input Connectors
2	PV DC Disconnect Switch
3	WIFI/GPRS DB9 Connector
4	Connection for sine output (out 1-4)
5	VFD Motor Connection (out 5)
6	Pressure Relief Vent
7	Aux Input/ Output Connectors

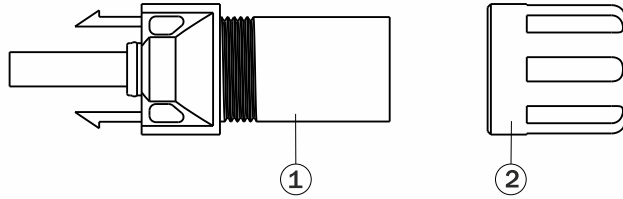
Note: Please refer section 6.1.3 & 6.1.4 for output wire connection.

### 6.1.1 PV Input Connectors

Table 6.2

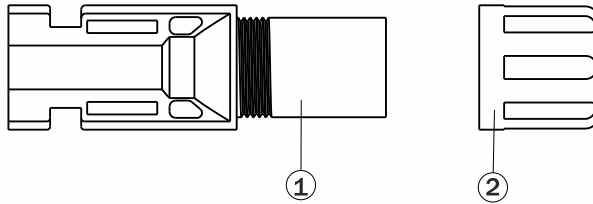
Cross - Sectional Area of Cables (mm <sup>2</sup> )		Outside Diameter of the Cables (mm)
Scope	Recommended Value	
4.0-6.0	4.0	4.2 ~5.3

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



1. Insulated Enclosure 2. Lock Screw

Fig. 6.4 Positive Connector

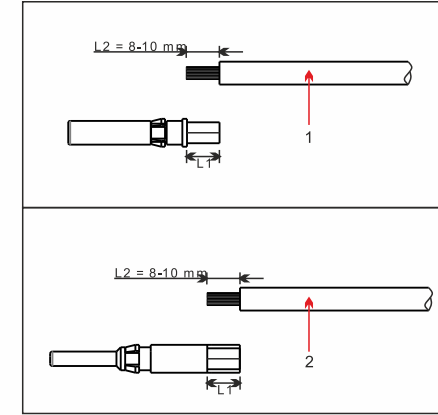


1. Insulated Enclosure 2. Lock Screw

Fig. 6.5 Negative Connector

#### Connecting Procedure

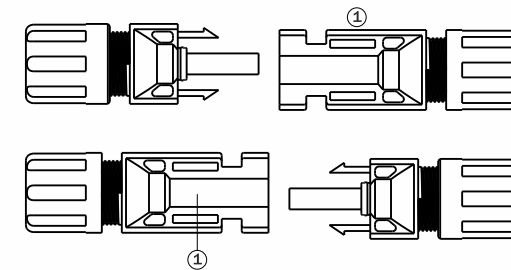
1. Tighten the lock screws on positive and cathode connector.
2. Use specified strip tool to strip the insulated enclosure of the positive and cathode cables with appropriate length.



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. Connection Port

Fig. 6.7

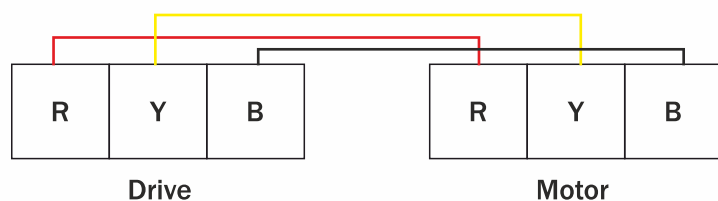
### 6.1.2 PV DC Disconnect switch

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

### 6.1.3 Procedure for connecting three-phase induction motor with KUSPC:

KUSPC provides a feature to operate three phase as well as single phase Induction motors. In KUSPC 5 types of three phase motors can be connected at a time out of which any one motor operates at a time. The motor to be operate is selected via display settings.

Notation to connect three-phase motor to KUSPC is given below:



The connection diagram with changeover switch is shown in fig. 6.8

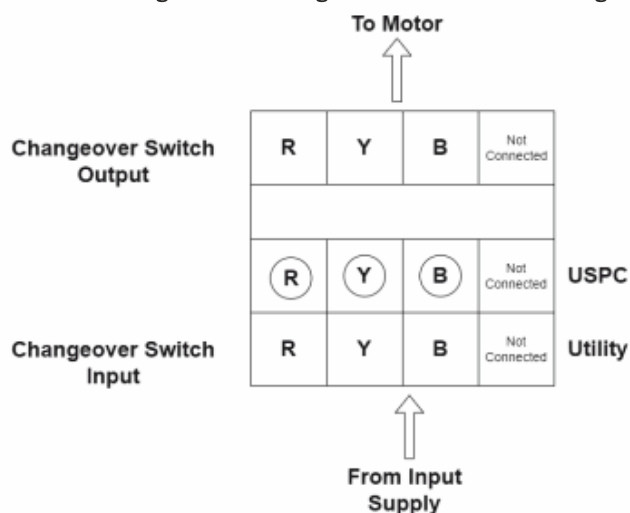


Fig 6.8 Change over switch connection of three-phase motor with KUSPC

### 6.1.4 Operation of KUSPC with Single phase IM:

In order to connect single-phase induction motor with KUSPC follow below mentioned procedure.

- Connect single-phase motor to single-phase utility supply.
- Measure the voltage across main winding and the auxiliary winding.
- The winding having voltage equal to the supplied voltage is the main winding. (nearly 230 V)
- The other winding measuring voltage between 200-400 V is the auxiliary winding.
- Enter the values of main and auxiliary winding voltage in the USPC parameters along with the motor type and poles.
- Remove the start capacitor from the motor (If present).
- Connect KUPSC as per the fig. 6.9

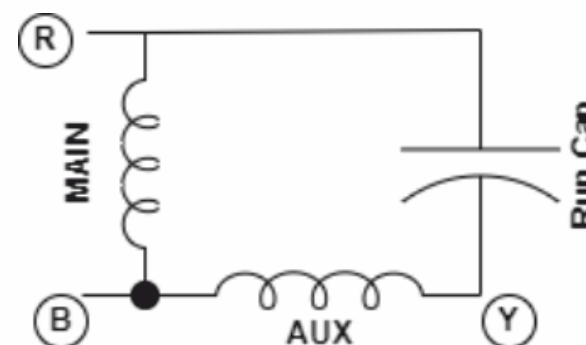


Fig 6.9 Connection diagram for Single phase IM to KUSPC

- Make sure that “B” wire of the drive connects to the “Common (C) / junction of main and Aux winding” of the motor. The controller makes VRB = Main winding voltage and VYB = Aux winding voltage.
- If someone wants to use the motor with the utility supply as well as USPC. A shakti changeover switch is required to switch the input power connection. The overall connection diagrams are shown in Fig 6.10a and Fig 6.10B, wherein the start capacitor should be connected on the utility side of changeover box.

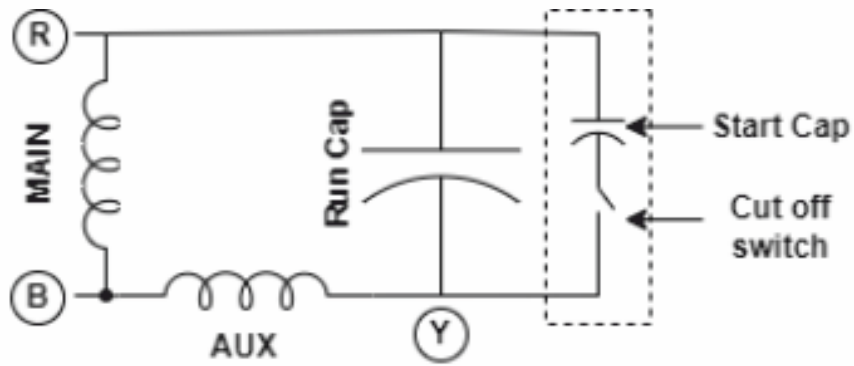


Fig 6.10a Connection diagram with cut-off switch connected to Aux winding

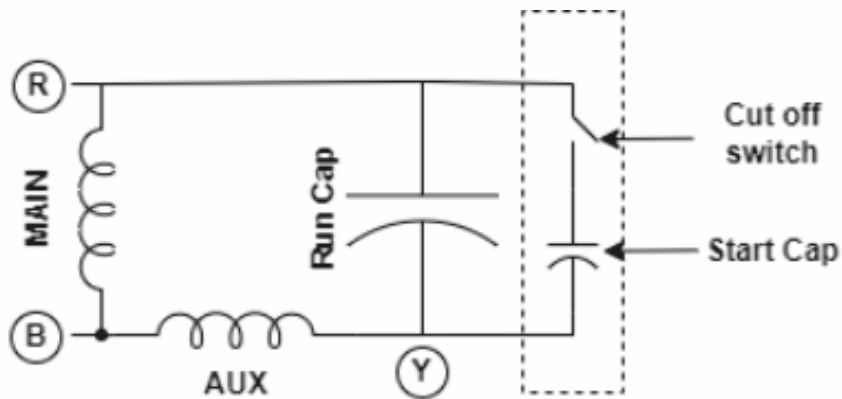


Fig 6.10b Connection diagram with cut-off switch connected to main winding

The changeover switch connections are shown in Fig 6.11a and Fig 6.11b. Make sure that start capacitor does not come into picture when the motor is operated from KUSPC.

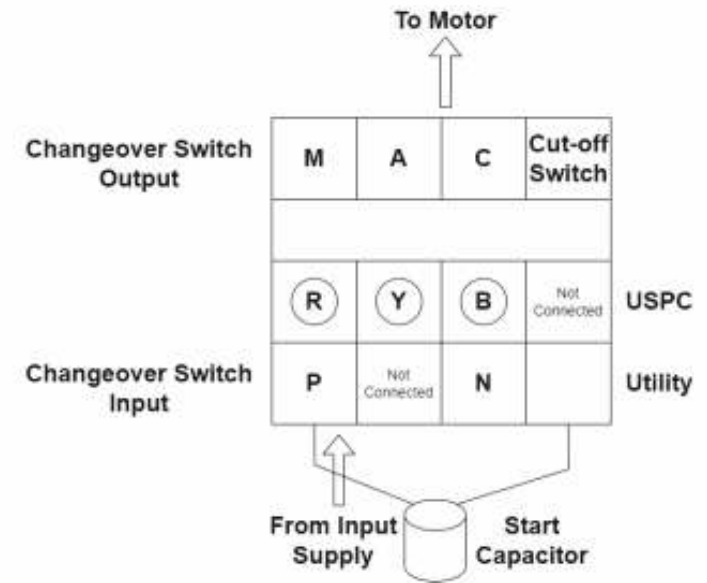


Fig 6.11a Changeover switch connection corresponding to Fig 6.10a

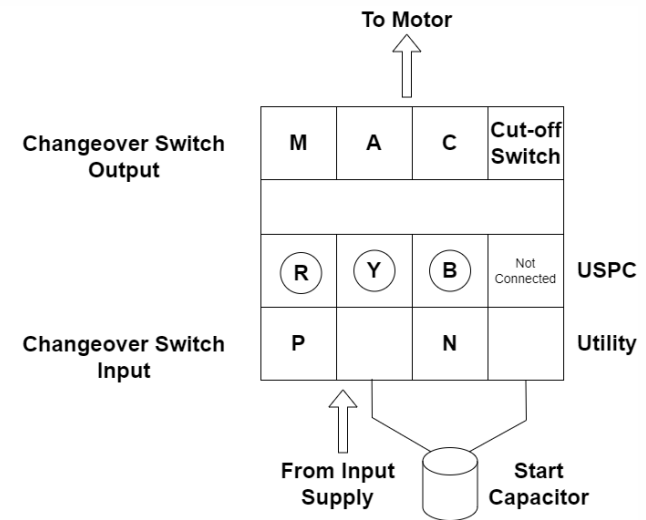


Fig 6.11b Changeover switch connection corresponding to Fig 6.10b

NOTE: To change the direction of motor rotation, go to USPC PARAMETERS >> Direction.



### 6.1.5 Operation of KUSPC with Single-phase Load:

Single-phase load can be connected across thresher, aata chakki, chaff cutter or deep freezer. Load type is selected from the USPC parameters in the factory setup. For example if single phase load is connected across thresher go to: **FACTORY SETUP<<USPC PARAMETERS<< THRESHER<< LOAD TYPE<<SINGLE PHASE LOAD** Single-phase load connects across YB terminals of the drive as shown in the fig. 6.12

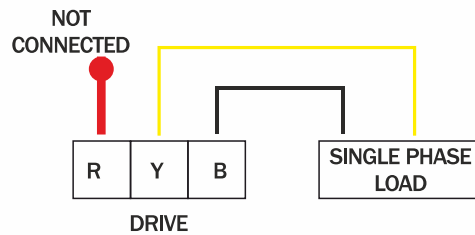


Fig 6.12 Connection diagram of drive with single-phase load

### 6.1.6 WIFI/GPRS DB9 Connector

Connect IoT dongle or RS 232 to USB USPC cable to this port for recording and observing data from the USPC 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 milliamperere current.

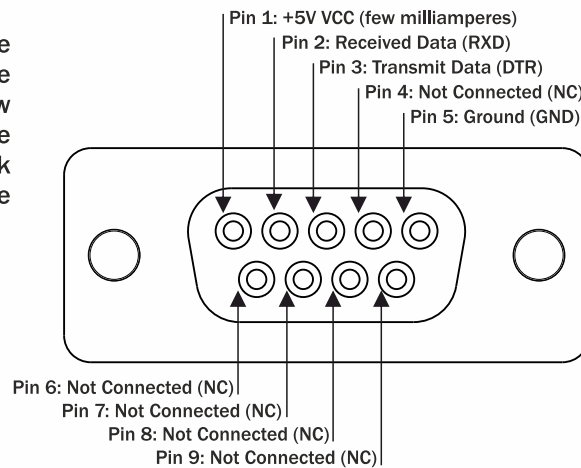
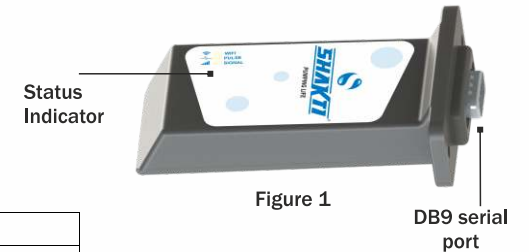


Figure 6.8 RS232 Connector

### 6.1.7 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)	Blink in every second	Normal
	Constant ON/OFF	Abnormal
Signal LED (RED)	ON	Normal (signal strength good)
	OFF	Abnormal (Signal low / Zero)
Wi-Fi LED (yellow)	ON/ Blink	Normal
	OFF	No WiFi Network

#### 2. Installation and Connection:

For installing the SHAKTI IoT dongle.  
Follow these steps :

**Step1:** Remove the cover and take out the motherboard.



Figure 2

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

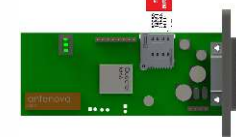


Figure 3

**Step3:**  
Put the motherboard back into the enclosure.



Figure 4

**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 IoT dongle" and 2G network is available in that area the Signal LED (RED) will be ON.

(\*Note\* it will be ON only in good signal strength).

**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:

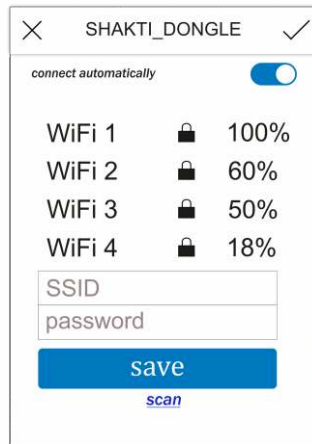


Figure 7

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.

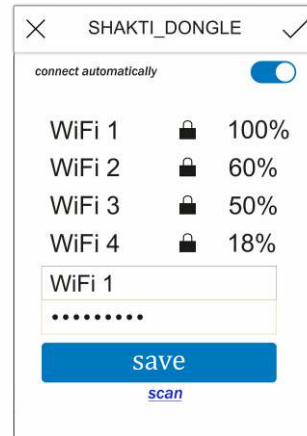


Figure 8

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.

S.No.	Configuration Parameters	MODBUS ADDRESS (DEC)	OFFSET	Item min	Item Max	Item Default	Scale Factor	Unit
1	FACTORY MODE	256	1	0	1	1	1	NA
2	LANGUAGE	257	1	0	0	0	1	NA
3	INSTALL DATE	259	1	1	31	1	1	NA
4	INSTALL MONTH	260	1	1	12	1	1	NA
5	INSTALL YEAR	261	1	18	99	21	1	NA
6	LCD CONTRAST	262	1	27	39	33	1	NA
7	ENERGY_ERASE_FLAG	263	1	0	2	2	1	NA
8	ON_HOUR_MOTOR	264	1	1	12	1	1	NA
9	ON_MINUTE_MOTOR	265	1	0	59	1	1	NA
10	OFF_HOUR_MOTOR	266	1	1	12	1	1	NA
11	OFF_MINUE_MOTOR	267	1	0	59	1	1	NA
12	RS232 BAUD RATE	268	1	1	6	2	1	NA
13	RS485 BAUD RATE	269	1	1	6	2	1	NA
14	AUTOROLL ENABLE	270	1	1	2	1	1	NA
15	MODBUS ADD RS232	271	2	1	99	1	1	NA
16	MODBUS ADD RS485	273	2	1	99	1	1	NA
17	DISPLAY MODE	277	1	1	2	1	1	NA
18	PRIMARY HEALTH CHECK	278	1	0	1	0	1	NA
19	TRIP ZONE ENABLE	279	1	1	2	1	1	NA
20	USPC APPLICATION	280	1	1	5	1	1	NA
21	RUNFROMSS_ENABLE	283	1	0	1	0	1	NA
22	FLAG PARK	284	1	0	1	1	1	NA
23	DISPLAY LOCK	285	1	1	2	1	1	NA
24	DISPLAY LOCK PASSWORD	290	2	0	999	345	1	NA

\* Applicable on some models.

S.No.	VFD Parameters	MODBUS ADDRESS (DEC)	OFFSET	Item min	Item Max	Item Default	DVT Factor	Unit
1	MASTER ON OFF	1000	1	0	1	0	1	NA
2	CONTROL MODE	1001	1	1	4	2	1	NA
3	DIRECTION	1002	1	1	2	1	1	NA
4	APPLICATION	1003	1	0	0	0	1	NA
5	LOCK_UNLOCK	1004	1	0	1	0	1	NA
6	CONTROL TYPE	1005	1	0	1	0	1	NA
7	MIN POWER VFD	1006	2	100	9999	700	1	W
8	MAX CURRENT	1008	2	50	250	160	10	A
9	OVER CURRENT VFD	1010	2	5	23	16	1	A
10	DRY RUN CURRENT	1012	2	1	10	5	1	A
11	DRY RUN POWER	1014	2	100	9999	200	1	W
12	DC BUS OVER VOLTAGE	1016	2	500	800	770	1	V
13	OVER TEMPERATURE VFD	1018	2	100	130	115	1	°C
14	THERMAL DERATING	1020	2	0	100	100	1	%
15	MAX FREQ	1022	2	1	400	200	1	Hz

S.No.	Motor Parameters	MODBUS ADDRESS (DEC)	OFFSET	Item min	Item Max	Item Default	DVT Factor	Unit
1	MOTOR TYPE	2000	1	0	2	0	1	NA
2	TORQUE PERCENT	2001	2	0	200	200	100	%
3	RATED CURRENT	2003	2	10	200	140	10	A
4	RATED POWER	2005	2	3	10	10	10	W
5	RATED VOLTAGE INDUCTION	2007	2	40	460/560*	456	1	V
6	RATED VOLTAGE S4RM	2009	2	40	460/560*	456	1	V
7	RATED VOLTAGE PMSM	2011	2	40	460/560*	360	1	V
8	RATED FREQUENCY INDUCTION	2013	2	0	120	60	1	Hz
9	RATED FREQUENCY S4RM	2015	2	0	120	60	1	Hz
10	RATED FREQUENCY PMSM	2017	2	0	250	120	1	Hz
11	NO OF POLES INDUCTION	2019	2	2	8	2	1	NA
12	NO OF POLES S4RM	2021	2	2	8	2	1	NA
13	NO OF POLES PMSM	2023	2	2	8	4	1	NA
14	REFERENCE SPEED	2025	2	100	4000	500	1	RPM
15	POWER FACTOR	2027	2	60	100	75	100	NA
16	LEAKAGE INDUCTANCE	2029	2	5	999	56	10000	H
17	MAGNETIC INDUCTANCE	2031	2	20	9999	881	10000	H
18	ROTOR RESISTANCE	2033	2	20	9999	33	100	Ohm
19	STATOR RESISTANCE	2035	2	20	9999	43	100	Ohm
20	START TIME	2037	2	1	60	15	1	sec

S.No.	PUMP Parameters	MODBUS ADDRESS (DEC)	OFFSET	Item min	Item Max	Item Default	DVT Factor	Unit
21	STOP TIME	2039	2	1	60	15	1	sec
22	MOTOR AUX VOLTAGE USPC2	2041	2	40	460	350	1	V
23	MOTOR AUX VOLTAGE USPC3	2043	2	40	460	350	1	V
24	MOTOR AUX VOLTAGE USPC4	2045	2	40	460	350	1	V
25	MOTOR AUX VOLTAGE USPC5	2047	2	40	460	350	1	V
26	USPC2 MOTOR TYPE	2049	1	0	1	0	1	NA
27	USPC3 MOTOR TYPE	2050	1	0	1	0	1	NA
28	USPC4 MOTOR TYPE	2051	1	0	1	0	1	NA
29	USPC5 MOTOR TYPE	2052	1	0	1	0	1	NA
30	SPEED DIRECTION SELECT USPC2	2053	1	1	2	1	1	NA
31	SPEED DIRECTION SELECT USPC3	2054	1	1	2	1	1	NA
32	SPEED DIRECTION SELECT USPC4	2055	1	1	2	1	1	NA
33	SPEED DIRECTION SELECT USPC5	2056	1	1	2	1	1	NA

S.No.	USPC PARAMETERS	MODBUS ADDRESS (DEC)	OFFSET	Item min	Item Max	Item Default	DVT Factor	Unit
1	RATED VOLTAGE THRESHER	4000	2	40	460/560*	400	1	V
2	RATED VOLTAGE ATTA CHAKKI	4002	2	40	460/560*	400	1	V
3	RATED VOLTAGE CHAFF CUTTER	4004	2	40	460/560*	400	1	V
4	RATED VOLTAGE DEEP FREEZER	4006	2	40	460/560*	400	1	V
5	RATED FREQUENCY THRESHER	4008	2	40	400	50	1	Hz
6	RATED FREQUENCY ATTA CHAKKI	4010	2	40	400	50	1	Hz
7	RATED FREQUENCY CHAFF CUTTER	4012	2	40	400	50	1	Hz
8	RATED FREQUENCY DEEP FREEZER	4014	2	40	400	50	1	Hz
9	RATED POLES THRESHER	4016	2	2	8	2	1	NA
10	RATED POLES ATTA CHAKKI	4018	2	2	8	2	1	NA
11	RATED POLES CHAFF CUTTER	4020	2	2	8	2	1	NA
12	RATED POLES DEEP FREEZER	4022	2	2	8	2	1	NA
13	RATED CURRENT THRESHER	4024	2	30	200	160	10	A
14	RATED CURRENT ATTA CHAKKI	4026	2	30	200	160	10	A
15	RATED CURRENT CHAFF CUTTER	4028	2	30	200	160	10	A
16	RATED CURRENT DEEP FREEZER	4030	2	30	200	160	10	A
17	OVER VOLTAGE THRESHER	4032	2	100	500	435	1	V
18	OVER VOLTAGE ATTA CHAKKI	4034	2	100	500	435	1	V
19	OVER VOLTAGE CHAFF CUTTER	4036	2	100	500	435	1	V
20	OVER VOLTAGE DEEP FREEZER	4038	2	100	500	435	1	V
21	UNDER VOLTAGE THRESHER	4040	2	50	350	250	1	V
22	UNDER VOLTAGE ATTA CHAKKI	4042	2	50	350	250	1	V
23	UNDER VOLTAGE CHAFF CUTTER	4044	2	50	350	250	1	V
24	UNDER VOLTAGE DEEP FREEZER	4046	2	50	350	250	1	V
25	OVER FREQUENCY THRESHER	4048	2	100	660	520	10	Hz
26	OVER FREQUENCY ATTA CHAKKI	4050	2	100	660	520	10	Hz
27	OVER FREQUENCY CHAFF CUTTER	4052	2	100	660	520	10	Hz
28	OVER FREQUENCY DEEP FREEZER	4054	2	100	660	520	10	Hz
29	UNDER FREQUENCY THRESHER	4056	2	100	500	200	10	Hz
30	UNDER FREQUENCY ATTA CHAKKI	4058	2	100	500	200	10	Hz



# INSTALLATION & OPERATING INSTRUCTIONS

31	UNDER FREQUENCY CHAFF CUTTER	4060	2	100	500	200	10	Hz
32	UNDER FREQUENCY DEEP FREEZER	4062	2	100	500	200	10	Hz
33	TORQUE BOOST THRESHER	4064	2	0	100	10	1000	NA
34	TORQUE BOOST ATTA CHAKKI	4066	2	0	100	10	1000	NA
35	TORQUE BOOST CHAFF CUTTER	4068	2	0	100	10	1000	NA
36	TORQUE BOOST DEEP FREEZER	4070	2	0	100	10	1000	NA
37	MAX FREQUENCY THRESHER	4072	2	1	68	55	1	Hz
38	MAX FREQUENCY ATTA CHAKKI	4074	2	1	68	55	1	Hz
39	MAX FREQUENCY CHAFF CUTTER	4076	2	1	68	55	1	Hz
40	MAX FREQUENCY DEEP FREEZER	4078	2	1	68	55	1	Hz
41	MAX CURRENT THRESHER	4080	2	50	220	200	10	A
42	MAX CURRENT ATTA CHAKKI	4082	2	50	220	200	10	A
43	MAX CURRENT CHAFF CUTTER	4084	2	50	220	200	10	A
44	MAX CURRENT DEEP FREEZER	4086	2	50	220	200	10	A
45	USPC START TIME	4088	2	1	60	15	1	s
46	USPC STOP TIME	4090	2	1	60	15	1	s
47	VDC KP USPC 2	4092	2	0	9999	500	10000	NA
48	VDC KP USPC 3	4094	2	0	9999	500	10000	NA
49	VDC KP USPC 4	4096	2	0	9999	500	10000	NA
50	VDC KP USPC 5	4098	2	0	9999	500	10000	NA
51	VDC KI USPC 2	4100	2	0	9999	5000	10000	NA
52	VDC KI USPC 3	4102	2	0	9999	5000	10000	NA
53	VDC KI USPC 4	4104	2	0	9999	5000	10000	NA
54	VDC KI USPC 5	4106	2	0	9999	5000	10000	NA
55	USPC2 START TIME	4108	2	1	60	15	1	s
56	USPC3 START TIME	4110	2	1	60	15	1	s
57	USPC4 START TIME	4112	2	1	60	15	1	s
58	USPC5 START TIME	4114	2	1	60	15	1	s
59	USPC2 STOP TIME	4116	2	1	60	15	1	s
60	USPC3 STOP TIME	4118	2	1	60	15	1	s
61	USPC4 STOP TIME	4120	2	1	60	15	1	s
62	USPC5 STOP TIME	4122	2	1	60	15	1	s

# INSTALLATION & OPERATING INSTRUCTIONS



S.No.	CONTROL PARAMETERS	MODBUS ADDRESS (DEC)	OFFSET	Item min	Item Max	Item Default	DVT Factor	Unit
1	PSL	5000	2	0	1000	12	100	NA
2	ISL	5002	2	0	1000	2	100	NA
3	DRYRUN RPM LIMIT	5004	2	0	9999	2500	1	RPM
4	TORQUE BOOST PER	5006	2	0	160	30	1000	%
5	Id REF PMSM	5008	2	0	200	0	10	NA
6	PMSM THETA FACTOR	5010	2	0	50/150*	10	10	NA
7	MIN RPM PMSM	5012	2	100	1000	500	1	RPM
8	RAMP TIME PMSM	5014	2	30	400	90	10	s
9	WC FCORR VDC	5016	2	10	4000	400	100	NA
10	WC MOD VDC	5018	2	10	4000	1000	100	NA
11	BOOST VOLTAGE REF	5020	2	550	700	620	1	V
12	PBC	5022	2	0	9999	10	10000	NA
13	IBC	5024	2	0	9999	2	1000	NA
14	IMP FACTOR	5026	2	0	100	25	100	NA

S.No.	PV PARAMETERS	MODBUS ADDRESS (DEC)	OFFSET	Item min	Item Max	Item Default	DVT Factor	Unit
1	MPPCR VFD	7000	2	50	5000	3600	1	NA
2	MPPCR USPC	7002	2	100	9999	3600	1	NA
3	VOLTAGE TOLERANCE	7004	2	0	300	50	1	NA
4	CURRENT TOLERANCE	7006	2	0	4999	60	1	NA
5	PVO FACTOR	7008	2	1	300	20	100	NA
6	I/O FACTOR	7010	2	0	500	50	100	NA
7	DVO FACTOR	7012	2	20	700	300	100	V

S.No.	FLOAT PARAMETERS (Not for Server)	MODBUS ADDRESS (DEC)	OFFSET	Item min	Item Max	Item Default	DVT Factor	Unit
1	TOTAL TIME GSC	6000	3	NA	NA	NA	1	Hr
2	TOTAL TIME VFD	6004	3	NA	NA	NA	1	Hr
3	TOTAL ENERGY GSC	6008	3	NA	NA	NA	1	Kwh
4	TOTAL ENERGY VFD	6012	3	NA	NA	NA	1	Kwh
5	TOTAL FLOW	6016	3	NA	NA	NA	1	ML
6	MAX POWER VFD	6020	3	1000	9999	9600	1	W
7	MAX POWER USPC	6024	3	1000	9999	9600	1	W

### 6.1.8. AC Output (v/f sinusoidal)

There are at least 4 outputs of this category. The output voltages are 3 phase balanced sinusoids with constant flux control. These outputs can be configured via display, mobile application etc.. Any one output is functional at a time. Typical loads like Thresher, Aatta Chakki, Deep Freezer, Chaff Cutter etc. can be connected to these output terminals.

### 6.1.9 Pressure Relief Vent

Pressure relief vent releases the internal pressure.

### 6.1.10 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 USPC 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 USPC can be done by using RS485 terminal block.
2. Connect A to Pin-1, B to Pin-3 and Ground to Pin-2

- **FAN**

Do not connect or use this port.

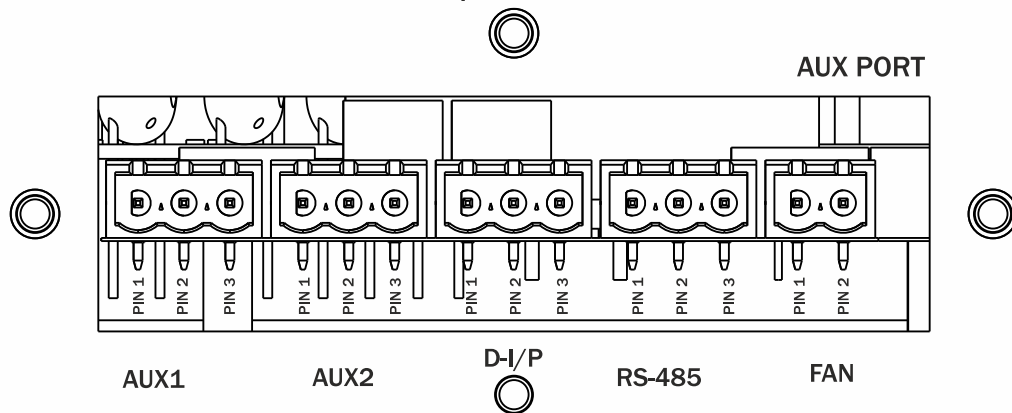


Figure 6.11 AUX Port

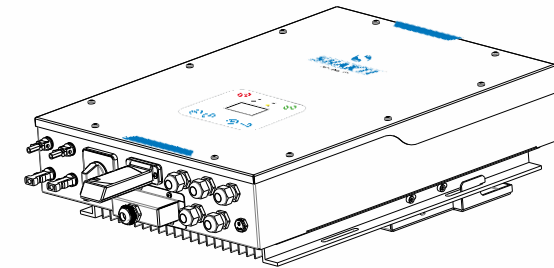
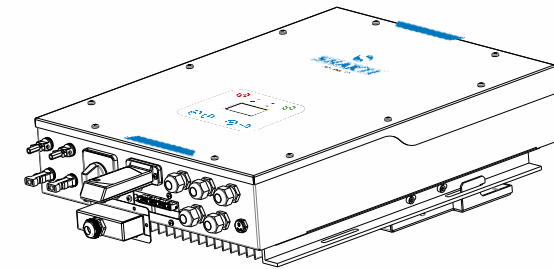
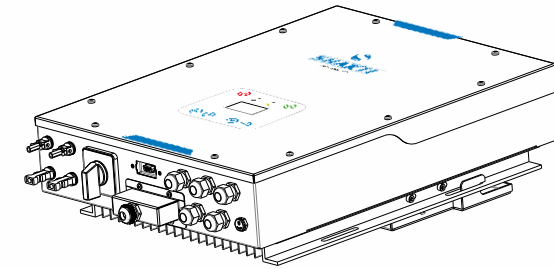


Figure 6.12 Connections for Terminal Block

## CHAPTER 7 : OPERATION OF UNIT







### 7.1 Display Module Description



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



Figure 7.1 LCD display layout

### 7.2.Button Description and Operation

		Functionality
Power On		<ul style="list-style-type: none"> <li>To Turn ON the Motor*</li> </ul>
Power Off		<ul style="list-style-type: none"> <li>To Turn OFF the Motor*</li> </ul>
ESC		<ul style="list-style-type: none"> <li>Previous Screen</li> </ul>
UP ARROW		<ul style="list-style-type: none"> <li>Used for Scrolling up</li> <li>For increasing the parameter values in Configuration menu</li> </ul>
DOWN ARROW		<ul style="list-style-type: none"> <li>Used for Scrolling down</li> <li>For decreasing the parameter values in Configuration menu</li> </ul>
ENTER		<ul style="list-style-type: none"> <li>Selection</li> </ul>

Indiction	LED 1 Green (Motor)	LED 1 Green (Motor)
Motor Running		
Fault		
Stand By		

### 7.3.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.



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

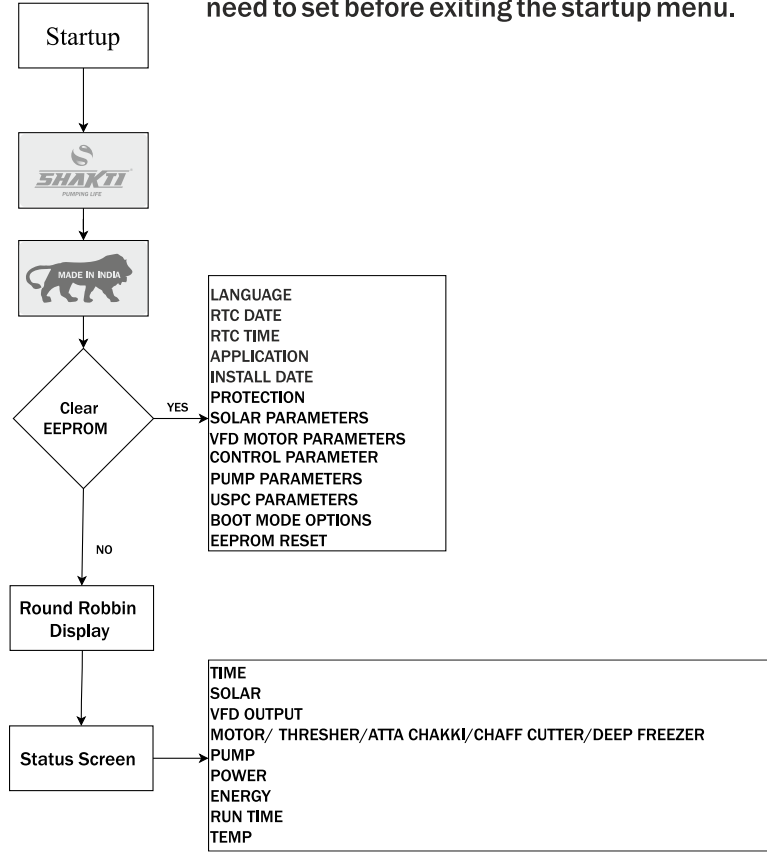


Figure 7.2 Startup menu tree

#### ● 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. The Faults occurring in the system is displayed in the FUALT LOGS. The information regarding faults of different durations can be extracted from the LOG menu. The ABOUT section provides the information of firmware version, serial number, network details.

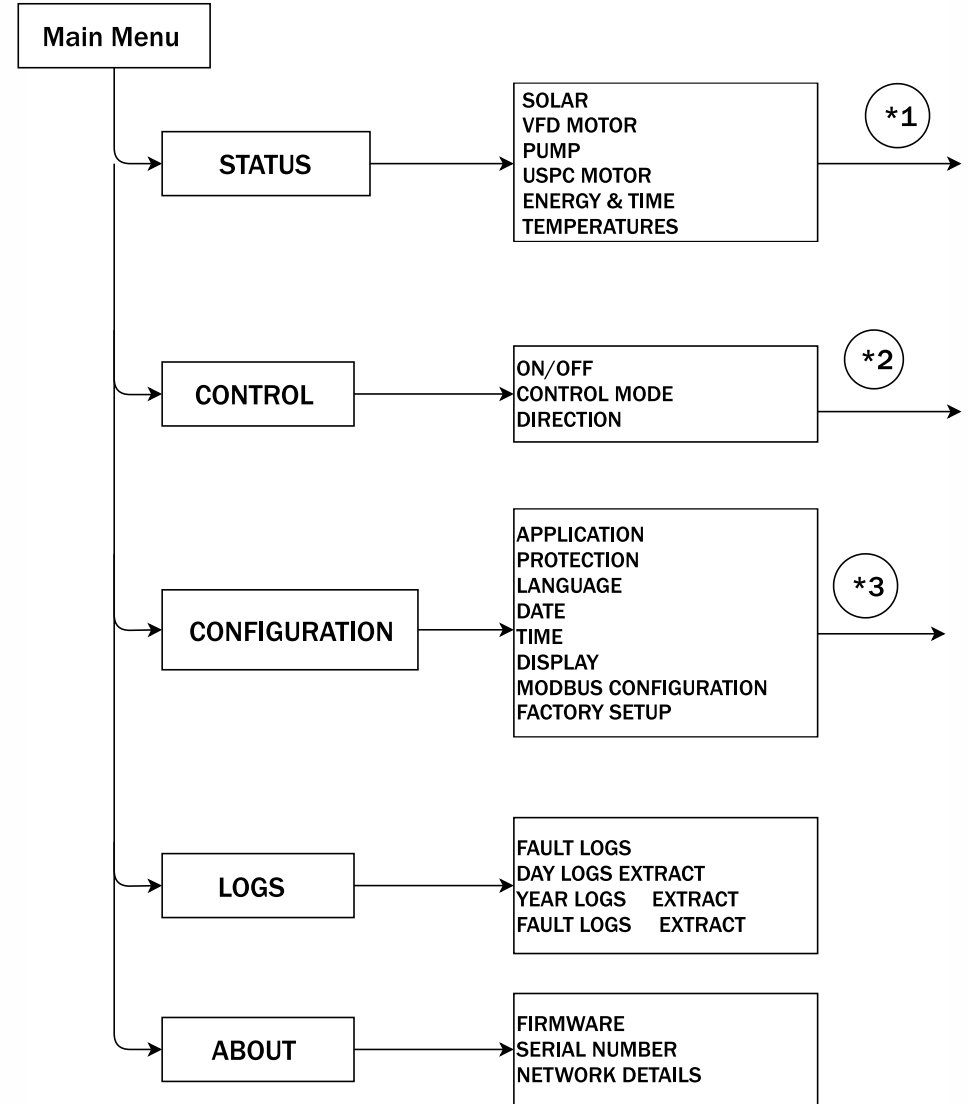


Figure 7.3 Main Menu tree

## ► 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 and cumulative energy (kWh).

### B) VFD MOTOR

This status shows the real time data of the motor driving the pump. The type of the motor selected for operation, rated voltage (V), rated current (A), rated frequency (Hz), no. of poles, output voltage (V), output current (A) and operating speed (RPM) for VFD motor are shown in this menu.

### C) PUMP

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

### D) USPC MOTOR

This status shows the real time conditions of the equipments connected to the AC sinusoidal output of the unit. The type of the motor selected for operation, rated voltage (V), rated current (A), rated frequency (Hz), no. of poles, output voltage (V), output current (A) and operating speed (RPM) for USPC motor are shown in this menu.

### E) ENERGY & TIME

This section provides energy and time information. The day (mentioned with DAY) parameters provide information for the running day and the total (mentioned with TOT) provides the cumulative data since the manufacturing of the product.

1. USPC EDAY : Total energy consumed by USPC motor today (kWh)
2. USPC TDAY : Total run time for USPC motor today (Hr)
3. USPC ETOT : Cumulative energy consumed by USPC motor (kWh)
4. USPC TTOT : Cumulative run time for USPC motor (Hr)
5. VFD EDAY : Total energy consumed by VFD motor today (kWh)
6. VFD TDAY : Total run time for VFD motor today (Hr)
7. VFD ETOT : Cumulative energy consumed by VFD motor (kWh)
8. VFD TTOT : Cumulative run time for VFD motor (Hr)

### H) TEMPERATURES

Various temperatures related to the device are display in this status in real time. It includes temperatures of the processor, USPC device, heat sink, drive and boost device.

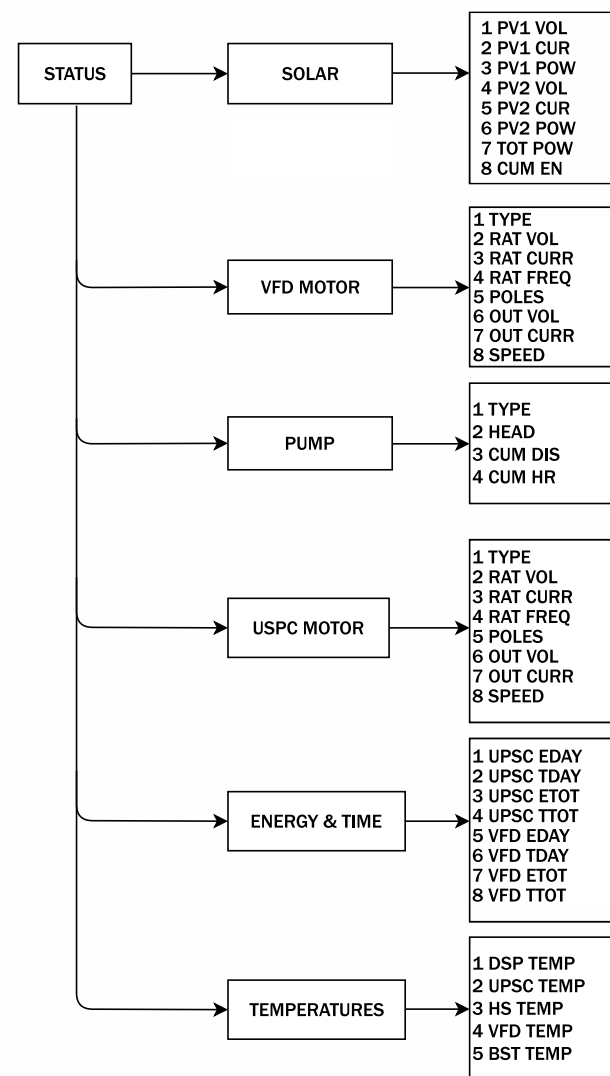


Figure 7.4 STATUS Menu tree

## ► 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.

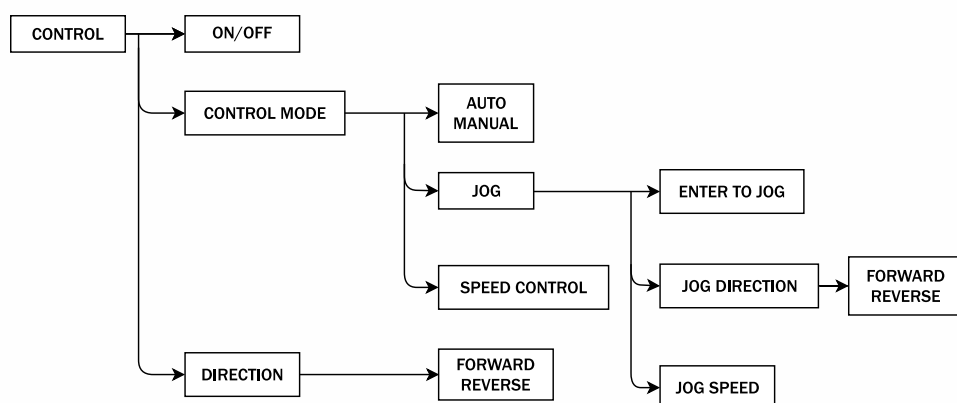


Figure 7.5 CONTROL Menu tree

## ► CONFIGURE \*3

### A) APPLICATION

This system can work for 5 possible applications where in the output 1 to 4 are sinusoidal voltages and output 5 (VFD motor) is PWM voltage. The output 5 is normally used for pumping application where is output 1 to 4 are general purpose outputs.

### B) PROTECTIONS

The protection limit for various parameters related to VFD motor can be set according to the user's requirements as per figure 7.6.

### C) Language, Calender, Display

These settings are used for configuring language, date, time & display settings. The device has an internal real time clock to remember date & time settings even if solar power is not available. The display contrast can be set via display settings.

### D) FACTORY SETUP

A security password is required to access this menu block. Various control & setting for device operation are available in this menu.

#### i. SOLAR PARAMETERS

This menu contains various control parameters related to MPPT operations.

#### ii. VFD MOTOR PARAMETERS

In this menu at first the type of the motor is selected and then by entering into the selected motor the rated parameters specific to that can be set. For all the three motors i.e. INDUCTION, S4RM and PMSM same parameters options are available as per figure 7.6.

#### iii. PUMP PARAMETERS

After selecting the pump to be operated the parameters specific to that pump can be configured.

#### iv. USPC PARAMETERS

The load to be operated is selected from this option.

#### v. BOOT MODE OPTIONS

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

#### vi. EEPROM RESET

This menu is used to reset all settings to default. EEPROM should be reset only by authorized technician/service personnel. Users are not allowed to reset the EEPROM.

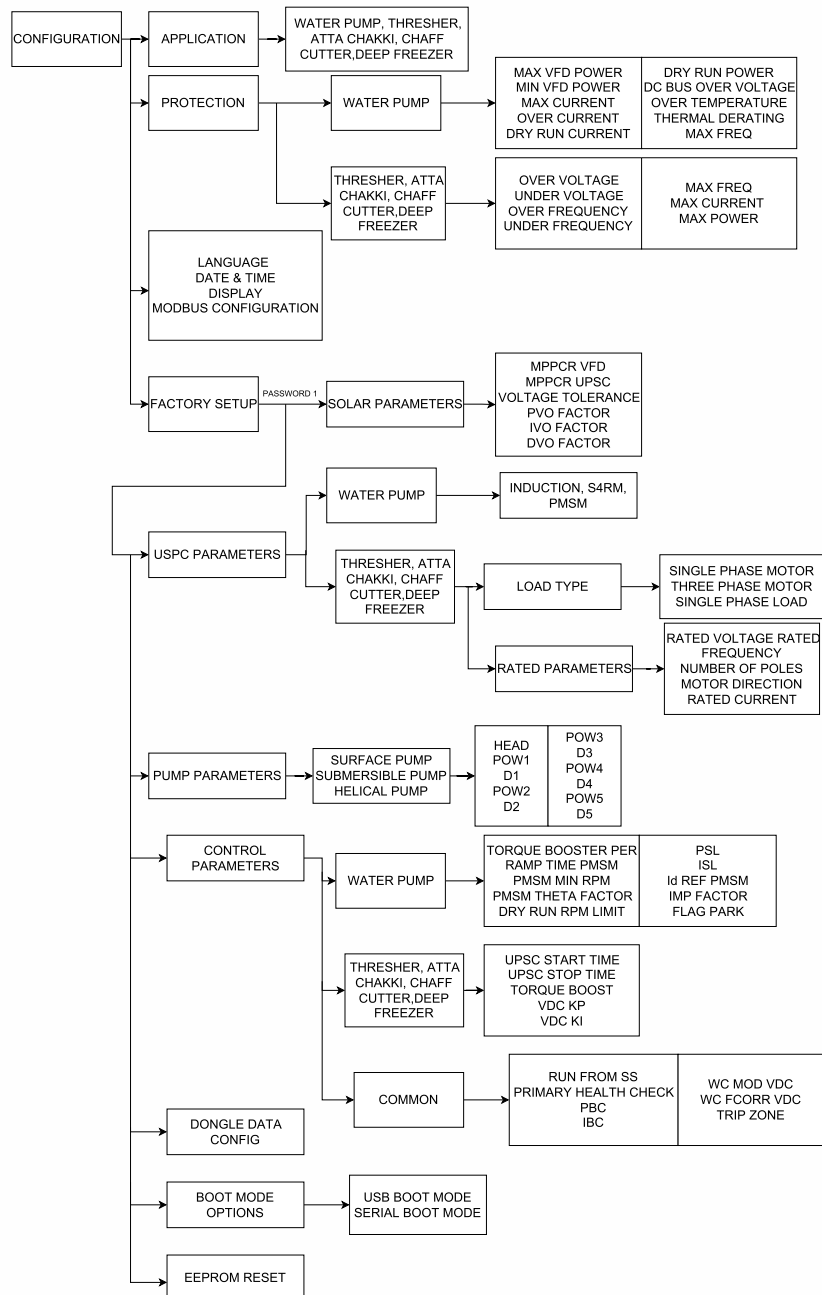


Figure 7.6 CONFIGURE Menu tree

## 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 >> 7 FACTORY SETUP >> 4 CONTROL PARAMETERS >> 1 WATER PUMP >> 2 RAMP TIME PMSM.

Hence, Numeral designator for RAMP TIME PMSM of WATER PUMP is 37412 as shown in figure 8.1, which signifies go to the 3rd page of menu to reach CONFIGURATION then go to 7th location of CONFIGURATION to reach FACTORY SETUP (page 37). Then enter the 4th location of page 37 to reach CONTROL PARAMETERS (page 374) then enter into 1st location to go to WATER PUMP (page 3741) there go to 2nd location which is RAMP TIME PMSM (page 37412).

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 3741\_10.

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

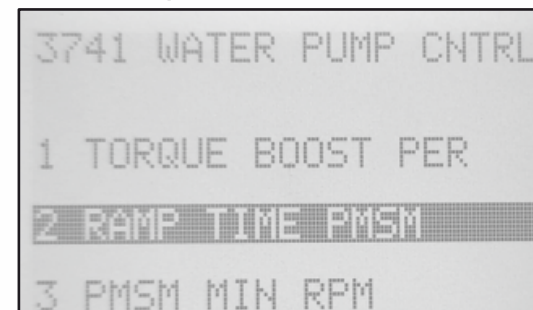


Figure 8.1

**8.1.1  
Display  
Information**

SR. NO.	HEADING
0	MENU
1	STATUS
11	SOLAR
12	VFD MOTOR
13	PUMP
14	USPC MOTOR
15	ENERGY AND TIME
16	TEMPERATURE
17	LIMIT VAR
18	DEBUG
2	CONTROL
21	ON/OFF
211	ON
212	OFF
22	CONTROL MODE
221	AUTO
222	MANUAL
223	SPEED CONTROL
224	JOG
2241	ENTER TO JOG
2242	JOG DIRECTION
22421	FORWARD
22422	REVERSE
2243	JOG SPEED
23	VFD DIRECTION
231	FORWARD
232	REVERSE
3	CONFIGURE
31	APPLICATION
311	WATER PUMP
312	THRESHER
313	ATTA CHAKKI
314	CHAFF CUTTER
315	DEEP FREEZER
32	PROTECTION
321	WATER PUMP
3211	MAX VFD POWER
3212	MIN VFD POWER
3213	MAX CURRENT
3214	OVER CURRENT
3215	DRY RUN CURRENT
3216	DRY RUN POWR
3217	DC BUS OVER VOLTAGE
3218	OVER TEMPERATURE

SR. NO.	HEADING
3219	THERMAL DERATING
321_10	MAX FREQ
322	THRESHER
3221	OVER VOLTAGE
3222	UNDER VOLTAGE
3223	OVER FREQUENCY
3224	UNDER FREQUENCY
3225	MAX FREQUENCY
3226	MAX CURRENT
3227	MAX POWER
323	ATTA CHAKKI
3231	OVER VOLTAGE
3232	UNDER VOLTAGE
3233	OVER FREQUENCY
3234	UNDER FREQUENCY
3235	MAX FREQUENCY
3236	MAX CURRENT
3237	MAX POWER
324	CHAFF CUTTER
3241	OVER VOLTAGE
3242	UNDER VOLTAGE
3243	OVER FREQUENCY
3244	UNDER FREQUENCY
3245	MAX FREQUENCY
3246	MAX CURRENT
3247	MAX POWER
325	DEEP FREEZER
3251	OVER VOLTAGE
3252	UNDER VOLTAGE
3253	OVER FREQUENCY
3254	UNDER FREQUENCY
3255	MAX FREQUENCY
3256	MAX CURRENT
3257	MAX POWER
33	LANGUAGE
331	ENGLISH
34	DATE & TIME
341	SET DATE
342	SET TIME
35	DISPLAY
351	DISPLAY MODE
3511	ROLLING PAGES
3512	SHAKTI SCREEN
352	CONTRAST
353	AUTOROLL
3531	YES
3532	NO

SR. NO.	HEADING
354	DISPLAY LOCK
3541	YES
3542	NO
3543	CHANGE PASSWORD
36	MODBUS CONFIG
361	RS232 SLAVE ADD
362	RS232 BAUD RATE
363	RS485 SLAVE ADD
364	RS485 BAUD RATE
37	FACTORY SETUP
371	SOLAR PARAMETERS
3711	MPPCR VFD
3712	MPPCR USPC
3713	VOLTAGE TOLERANCE
3714	CURRENT TOLERANCE
3715	PVO FACTOR
3716	IVO FACTOR
3717	DVO FACTOR
372	USPC PARAMETERS
3721	WATER PUMP
37211	INDUCTION
372111	DEFAULT
372112	RATED POWER
372113	RATED VOLTAGE
372114	RATED FREQUENCY
372115	NO OF POLES
372116	RATED CURRENT
372117	START TIME
372118	STOP TIME
37212	S4RM
372121	DEFAULT
372122	RATED POWER
372123	RATED VOLTAGE
372124	RATED FREQUENCY
372125	NO OF POLES
37213	PMSM
372131	DEFAULT
372132	RATED POWER
372133	RATED VOLTAGE
372134	RATED FREQUENCY
372135	NO OF POLES
3722	THRESHER
37221	LOAD TYPE
372211	THREE PHASE MOTOR
372212	SINGLE PHASE MOTOR
372213	SINGLE PHASE LOAD

SR. NO.	HEADING
37222	RATED PARAMETERS
372221	RATED VOLTAGE
3722211	MAINS VOLTAGE
3722212	AUX VOLTAGE
372222	RATED FREQUENCY
372223	NUMBER OF POLES
372224	MOTOR DIRECTION
3722241	FORWARD
3722242	REVERSE
372225	RATED CURRENT
3723	ATTA CHAKKI
37231	LOAD TYPE
372311	THREE PHASE MOTOR
372312	SINGLE PHASE MOTOR
372313	SINGLE PHASE LOAD
37232	RATED PARAMETERS
372321	RATED VOLTAGE
3723211	MAINS VOLTAGE
3723212	AUX VOLTAGE
372322	RATED FREQUENCY
372323	NUMBER OF POLES
372324	MOTOR DIRECTION
3723241	FORWARD
3723242	REVERSE
372325	RATED CURRENT
3724	CHAFF CUTTER
37241	LOAD TYPE
372411	THREE PHASE MOTOR
372412	SINGLE PHASE MOTOR
372413	SINGLE PHASE LOAD
37242	RATED PARAMETERS
372421	RATED VOLTAGE
3724211	MAINS VOLTAGE
3724212	AUX VOLTAGE
372422	RATED FREQUENCY
372423	NUMBER OF POLES
372424	MOTOR DIRECTION
3724241	FORWARD
3724242	REVERSE
372425	RATED CURRENT
3725	DEEP FREEZER
37251	LOAD TYPE
372511	THREE PHASE MOTOR
372512	SINGLE PHASE MOTOR
372513	SINGLE PHASE LOAD
37252	RATED PARAMETERS

SR. NO.	HEADING
372521	RATED VOLTAGE
3725211	MAINS VOLTAGE
3725212	AUX VOLTAGE
372522	RATED FREQUENCY
372523	NUMBER OF POLES
372524	MOTOR DIRECTION
3725241	FORWARD
3725242	REVERSE
372525	RATED CURRENT
373	PUMP PARAMETERS
3731	SURFACE PUMP
37311	HEAD
37312	POW1
37313	D1
37314	POW2
37315	D2
37316	POW3
37317	D3
37318	POW4
37319	D4
3731_10	POW5
3731_11	D5
3732	SUBMERSIBLE PUMP
37321	HEAD
37322	POW1
37323	D1
37324	POW2
37325	D2
37326	POW3
37327	D3
37328	POW4
37329	D4
3732_10	POW5
3732_11	D5
3733	HELICAL PUMP
37331	HEAD
37332	POW1
37333	D1
37334	POW2
37335	D2
37336	POW3
37337	D3
37338	POW4
37339	D4
3733_10	POW5
3733_11	D5

SR. NO.	HEADING
374	CONTROL
	PARAMETERS
3741	WATER PUMP
37411	TORQUE BOOST PER
37412	RAMP TIME PMSM
37413	PMSM MIN RPM
37414	PMSM THETA FACTOR
37415	DRY RUN RPM LIMIT
37416	PSL
37417	ISL
37418	ID REF PMSM
37419	IMP FACTOR
3741_10	FLAG PARK
3741_10_1	DISABLE
3741_10_2	ENABLE
3742	THRESHER
37421	USPC START TIME
37422	USPC STOP TIME
37423	TORQUE BOOST
37424	VDC KP
37425	VDC KI
3743	ATTA CHAKKI
37431	USPC START TIME
37432	USPC STOP TIME
37433	TORQUE BOOST
37434	VDC KP
37435	VDC KI
3744	CHAFF CUTTER
37441	USPC START TIME
37442	USPC STOP TIME
37443	TORQUE BOOST
37444	VDC KP
37445	VDC KI
3745	DEEP FREEZER
37451	USPC START TIME
37452	USPC STOP TIME
37453	TORQUE BOOST
37454	VDC KP
37455	VDC KI
3746	COMMON
37461	RUN FROM SS
374611	ENABLE
374612	DISABLE
37462	PRIMARY HEALTH CHK
374621	DISABLE
374622	ENABLE
37463	PBC

SR. NO.	HEADING
37464	IBC
37465	WC MOD VDC
37466	WC FCORR VDC
37467	TRIP ZONE
374671	YES
374672	NO
375	DONGLE DATA CONFIG
3751	NO
3752	YES
376	BOOT MODE OPTIONS
3761	USB BOOT MODE
3762	SERIAL BOOT MODE
377	EEPROM RESET
3771	YES
3772	NO

SR. NO.	HEADING
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	UNIT SERIAL NO.
522	DONGLE SERIAL NO.
53	NETWORK DETAILS

## CHAPTER 9 : TROUBLESHOOTING









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










### 9.1 Fault Type

Type	Solar drive action when fault happen
Internal fault	<p>If any fault is detected it will occur in following manner</p> <ul style="list-style-type: none"> <li>Fault information will be visible on LCD Display</li> <li>Output of device will be cut-off and motor will decelerate and stop.</li> </ul>
External fault	<p>For monitoring and protecting drive external signal can be given which can trip the drive.</p>



### 9.1.1.1 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.
DC Bus OVERVOLTAGE	02 DC BUS 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	05 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.
WRONG MOTOR	06 WRONG MOTOR 	Pump	1. Wrong motor is connected such as Instead of PMSM, Induction motor is connected and vice versa.	1. Connect correct motor. 2. Change setting according to motor.
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.
PV OVER VOLTAGE	18 PV OVER VOLTAGE 	Both	1. If PV average voltage is exceed the 765 volts.	1. Reduce the PV string voltage.
PV UNDER VOLTAGE	19 PV UNDER VOLTAGE 	Both	1. If PV average voltage is under the 450 volts.	1. Increase the PV string voltage. 2. Wait for sufficient sunshine.

Fault Type	LCD Display Message	Load Type	Possibility Reason/s(reasons do not limit to the following given reasons)	Troubleshooting
USPC OVER TEMPERATURE	20 USPC OVER TEMP 	Both	1. The drive heating is more than expected. 2. Improper ventilation	1. Check for ventilation and mounting style. 2. Contact customer care
PEAK TORQUE OVERLOAD	24 PEAK TORQUE OVERLOAD 	Pump	1. Will trigger when the load torque is greater than 150%.	1. Remove the extra load. 2. Select the proper motor and also select correct motor in menu. 3. Make proper joint of cable.
USPC FREQUENCY HIGH	25 USPC FREQUENCY HIGH 	USPC	1. The output frequency is greater than the permissible range (settable).	1. Check connection. 2. Check the value of the USPC over Frequency limit. 3. Check the value of the USPC Rated Frequency. 4. Check the output load connected. 5. Contact customer care
USPC FREQUENCY LOW	26 USPC FREQUENCY LOW 	USPC	1. The output frequency is lower than the permissible range (settable).	1. Check connections. 2. Check the value of the USPC under Frequency limit. 3. Check the value of the USPC Rated Frequency. 4. Check the output load connected. 5. Contact customer care
USPC SHORT CIRCUIT	27 USPC SHORT CIRCUIT 	USPC	1. Any of the connection internal or output is shorted. 2. Voltage is too low. 3. A sudden load	1. Correct shorted connections. 2. Check insulation health of cable 3. Contact customer care
USPC VOLTAGE HIGH	28 USPC VOLTAGE HIGH 	USPC	1. Output voltage is 4% higher than the rated voltage. 2. Input is connected to Output.	1. Check connections. 2. Check the output load connected. 3. Contact customer care
USPC VOLTAGE LOW	29 USPC VOLTAGE LOW 	USPC	1. The output voltage is less than the permissible range (settable).	1. Check connections. 2. Remove Extra load. 3. Check the value of the USPC under Voltage limit. 4. Contact customer care
USPC OVER CURRENT	31 OVER CURRENT 	USPC	1. Output current is more than the predefined set value of over current in display.	1. Change the over current set value. 2. Contact customer care
START FAIL PMSM	32 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.

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.

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



**WARRANTY CARD**

Customer to fill following details

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

Information on Device:

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

Installer to fill following details

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



INSTALLATION & OPERATING INSTRUCTIONS

BOOK-POST

To,  
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Plot No. 401, 402, & 413, Industrial Area, Sector - 3, Pithampur - 454774,  
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Stamp

