SHAKTI

PUMPING LIFE

INSTALLATION & OPERATING INSTRUCTIONS

**SIMHA UNIVERSAL DRIVE
0.75 - 10 HP**

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Preface

Thank you for choosing Shakti's Simha Universal Drive. We are pleased to provide you a product that incorporates the latest technology and exceptional services to the customers.

This manual includes information for installation, maintenance, and safety of the drive. Please read the instructions of this manual carefully to ensure equipment's proper functioning and personal safety.

The images of the product shown are only for illustration the original product may vary.

In this manual company refers to Shakti Pumps India Ltd. Our contact details are given on the last page.

Please check the latest version at www.shaktipumps.com

Fig.1 Simha Universal Drive

CHAPTER 1 : SAFETY INSTRUCTIONS

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

1.1 Pre-Installation Safety Measures
1. Before using the unit, read all the instructions and cautionary markings, on the unit and all its appropriate sections.
2. The gross weight of the equipment is close to 6 Kg. Kindly lift the drive carefully.
3. Please check the condition of the package and look for any sign of damage. Don't use the damaged or incomplete drive.
4. Customers are NOT authorized to open the drive or to do any kind of modification, or repair; otherwise, there is a danger of shock and loss of warranty.
5. To store the drive, kindly follow instructions given in chapter 2.

1.2 Installation Safety Measures
1. Installation should be done in the presence of a professional technician. Safety equipments such as shoes, helmets, and gloves should be used by the technician.
2. Installation of the drive should be carried out on a solar structure with proper ground clearance and specified nuts and bolts.
3. Install the drive on metal or other non-flammable material, and keep it away from any combustible material.
4. The drive should not be installed inside a closed chamber; to ensure proper heat dissipation. Ignoring this will result in malfunctioning of drive and loss of warranty.
5. Before starting wiring and connections make sure that PV panels, drive, motor, and all other accessories are properly fitted on their designated place.
6. Ensure that the drive, motor, and adjoining equipment are properly earthed to reduce electromagnetic emission and interference.
7. Make sure that earth conductors are adequately sized as required by safety regulations.
8. Make sure that the voltage grade of the power supply is consistent with the drive'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.
9. 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.
10. Make sure that earthing wire is connected with drive. The wire diameter should be 4sq. mm and color coded is yellow-green or green.

10. Check whether the wiring is correct and firm, there should not be any short circuit in the peripheral equipment's circuit.
11. Ensure that the output of the drive is turned off while setting all the required parameters.
12. For the drives whose storage time is over 1 year, when electrification, the voltage should be raised by booster from low to high. Otherwise it may damage the drive.
13. Ensure that no unauthorised filter is connected to the output of the drive. It may cause loss of warranty.
14. No magnetic switch or magnetic contactor should be connected to the output circuit of the drive; when drive is in the operation with load, magnetic switch or magnetic contactor can falsely trigger the over-current protection function leading to mal-operation of the system.

1.3 Safety during Operation

1. Make sure that the ratings of the pump, motor, and drive comply with each other.
2. The cooling fan or the heatsink should not be touched otherwise there is a danger of getting burnt.
3. Do not operate or touch the drive with the wet hand.
4. Do not put any of your belongings like mobile etc. on the drive.
5. Disconnect PV power from the drive under the supervision or presence of a trained electrician.
6. It is mandatory to disconnect input power before starting any maintenance work.
7. After the input is disconnected from the drive, wait for at least five minutes so as to allow the internal capacitors to get discharged for the safety of operation.
8. Do not conduct any insulation or voltage withstands tests on the drive.
9. At over 1,000 metres altitude, the drive'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.
12. The load should be motor or pump. Any other load may cause heating or burn the device
13. The solar panel and drive should be clean once in a three months for proper operation of the drive.

Attention
1. The DC connection terminals PV+ and PV- carry a dangerous DC voltage of up to 800V.
2. At the drive 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 kindly contact our customer care.
5. The drive and its heat sink may be at a relatively higher temperature than the ambient.
6. The drive output is pulse wave type. If a digital multimeter is used for measurement then there could be a large deviation in the measurement, and these deviations would be different for different kinds of digital multimeters.
7. Improper wiring and utilization or unauthorized alteration may result in damage to drive or other equipment, users will be responsible for the cause and there will be a loss of warranty.

CHAPTER 2 : INTRODUCTION

2.1 Product Overview

Shakti's Simha Universal Drive is a unique product designed, developed and manufactured in India. SIMHA series are three phase variable frequency drive compatible with solar power system.

SIMHA drive can convert the DC generated by solar panels into AC, which is in accordance with current required to drive motor.

Note : No internal or external isolation transformer is required.

Solar Panel	Simha	Motor & Pump
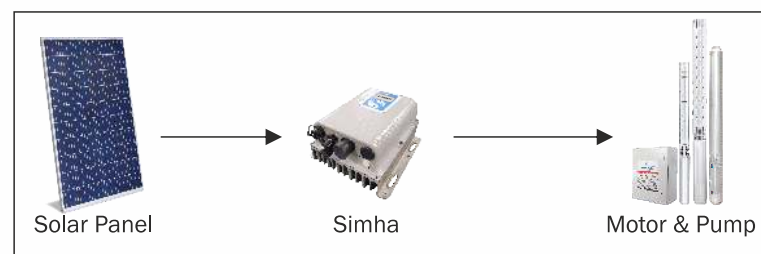
Name	Description	Remarks
A	Solar panels	Monocrystalline or polycrystalline silicon, and thin-film PV modules
B	VFD	SIMHA 0.75HP, 1HP, 2HP, 3HP, 5HP, 7.5HP, 10HP
C	Motor	AC-IM, PMSM, IPMSM & S4RM

2.2 Caution

Measures to be taken for drive storage

- ✔ The solar variable frequency drive should be kept in the shipping carton or crate before installation.
- ✔ 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 lots of water leakage.
- ✘ In a place which has a high risk of fire ignition.
- ✘ Do not dispose of batteries in a fire. The batteries may explode.
- ✘ Do not open or damage batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.

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

2.3 Receiving and Inspection

2.3.1 Model Explanation
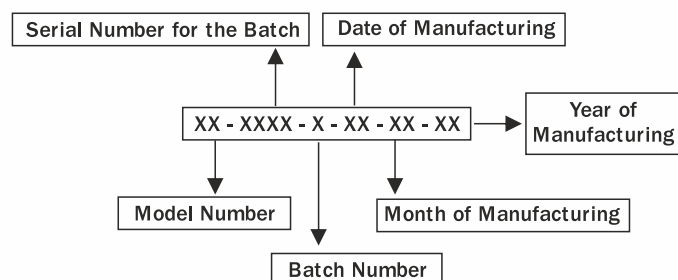
2.3.2 Terminal Connection

TERMINAL DESCRIPTION	TERMINAL MARKING	CONNECTION SEQUENCE	
		1- PHASE	3-PHASE
LINE/LIVE/PHASE	L / R	Live / Phase	Red
NEUTRAL	N / Y	Neutral	Yellow
EARTH	PE / B	Earth	Blue
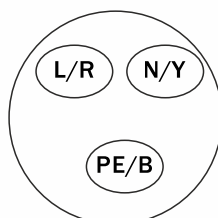
Fig 2.1

2.3.3 # Items Inside the Drive Box
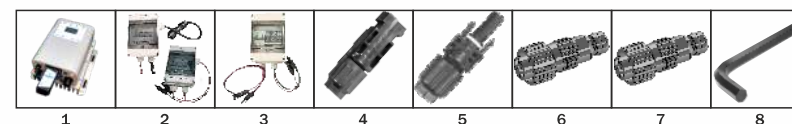
S. No.	Item Name	Qty.	Manufacturer Part Number	Manufacturer Name
1	Simha Universal Drive 0.75 - 10 HP	1		
2	Changeover Switch (1 Phase / 3 Phase)*	1		
3	DC Circuit Breaker & SPD Box*	1		
4	Input PV Connector (M)	1	FCI-10145487-M/F-001LF	Amphenol
5	Input PV Connector (F)	1	FCI-10141432-M/F-001LF	Amphenol
6	AC Input Connector*	1	VPAC07EW-3S6	Vacon
7	Output Connector	1	VPAC06EW-3P(SC)	Vacon
8	Allen key	1	STANDARD	
9	User Manual	1		

* only with certain models

The Accessories varies based on the various models & configuration.

Note : The internal battery is Coin cell, 20.0mm Lithium 3V Non-Rechargeable (Primary). The battery life is 5 years.
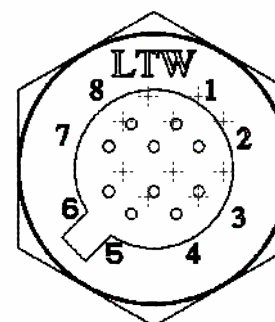
PIN	NAME
1	TX RS 485
2	RX RS 485
3	GROUND
4	
5	24 V
6	PLC_VS_SNS
7	DRY CONTACT 0
8	DRY CONTACT 1
9	PLC_I2V+VE_SNS
10	PLC_I_OUT

Fig 2.2 - COM Port

USB Standard A

1. DRY CONTACT
2. Rs485+
3. Rs485-
4. DRY CONTACT

Fig 2.3 - USB port

NOTE: COM Port & USB Port is optional, if it is unavailable RS485 is operational from USB Port.

2.3.4 Specification

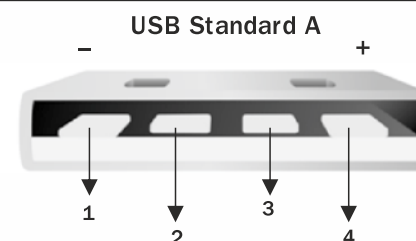| Product	SIMHA UNIVERSAL DRIVE						
Power	0.75 HP	1 HP	2 HP	3 HP	5 HP	7.5 HP	10 HP
Input (DC)							
AC Voltage range (if applicable)	207-245 VAC (1-φ)	90-245 VAC (1-φ)	90-245 VAC (1-φ)	200-440 VAC (3-φ)	200-440 VAC (3-φ)	360-460 VAC (3-φ)	360-460 VAC (3-φ)
Min. DC Voltage	40 V	70 V	90 V	200 V	200 V	200 V	200 V
Max. DC Voltage	150 V	180 V	360 V	450 V	720 V	550 V	720 V
Nominal DC Voltage	90 V	120 V	240 V	400 V	600 V	400 V	600 V
Start Voltage	50 V	90 V	90 V	200 V	200 V	200 V	200 V
MPPT Voltage Range	60 -150 V	90-180 V	90-360 V	200-450 V	300-720 V	250-550 V	300-720 V
Max. DC Input Current	10 A	10A	10A	10A	10A	20 A	20 A
Max. Power at DC Side	750 W	1000 W	2000 W	3000 W	5000 W	7500 W	10,000W
No. of MPPT	1						
No. of PV Strings	1	1	1	1	1	2	2
Output (AC)							
Nominal AC Voltage Range	0-120 VAC	0-120 VAC	0-200 VAC	0-415 V			
Frequency	0-400 Hz						
Max. AC current	12A					20A	
Rated Power at AC Side	750 W	850 W	1700 W	2900 W	4700 W	6400 W	9300 W
Power Factor	0.8 lead to 0.8 lag	0.7-1 at full load	0.7-0.9 at full load				
THD-	70-150%	70-150%	70-150%	70-150%	70-150%	70-150%	70-150%
slope-	4000 V/uS	4000 V/uS	4000 V/uS	7200 V/uS	7200 V/uS	7200 V/uS	7200 V/uS
Peak-	400 V	400 V	400 V	750 V	750V	750 V	750 V
Connection Phases	3-Phase						
Efficiency							
Max. Efficiency	>90 %	>92%	>93%	>95%	>97%		
MPPT Efficiency	>99%						
Protection							
Short Circuit Protection	60 A						
Lighting/Surge Protection	4 kV						
Over Temprature	80 ⁰C						
Over Current	12A/ User defined					20A / User defined	
Over Voltage	300 V	420 V	420 V	720 V	720 V	720 V	720 V
Dry Run	Yes, Depends on Load Parameters						
Insulation Protection	Protective Class (I)						
Ingress Protection	IP 65						
Pressure Vent	70 mBar for 4000 ml/min						
Interface							
Input Connection (DC)	MC4						
Y Connection Connector	NO					YES	
Output Connection (AC)	Plug in Connector						
LCD Display	Graphical LCD (128 X 64 Pixels)						
Display Language	English						
General Data							
Topology	Three Phase two level VSI						
Cooling Method	Natural Cooling			Forced Cooling			
Ambient Humidity	0-90%						
Altitude	<1000 m						
Mounting	Vertical (Max. 15 degrees from vertical)						
Noise (dBA)	<20 dBA						
Pollution Degree	PD3						
Over Voltage Category	Category (II)						
Operating Temperature Range	-20˚C to 70˚C (45˚C to 70˚C with derating)						
Dimensions (L*W*H)	270X280X146 mm^3						
Net Wt. / Gross Wt.	6.5/7.5 Kg						
Standard Warranty	1 Year						
Certificates	IEC 61683, IEC 600682-2-(1,2,14,30), IS 16221-2(IEC 62109-2), IEC 60529, EN 50530						

2.3.5 Drive Frames and Appearances
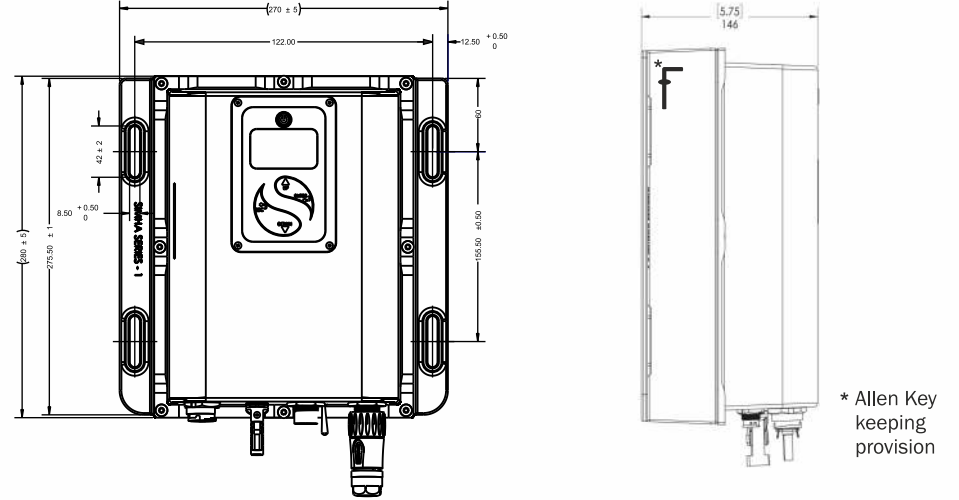

Figure 2.4 Drive top and side view

* Allen Key keeping provision

INPUT VOLTAGE PV(+VE)

USB PORT

COM PORT

OUTPUT VOLTAGE (TO MOTOR INPUT)

AC INPUT

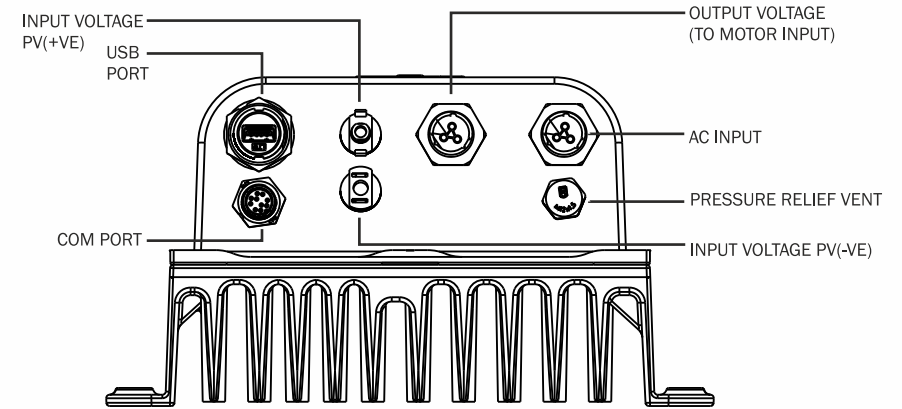PRESSURE RELIEF VENT

INPUT VOLTAGE PV(-VE)

Figure 2.5 Drive front view
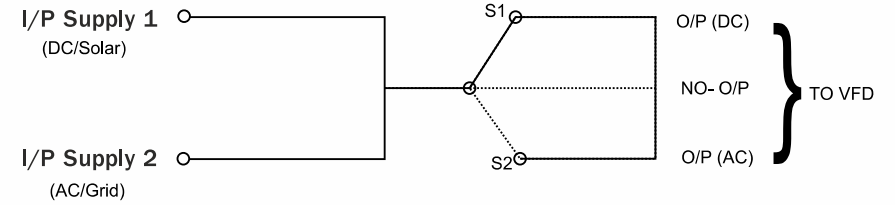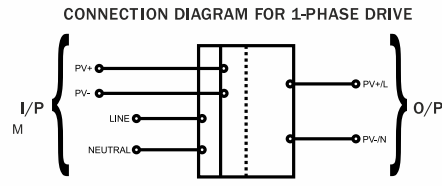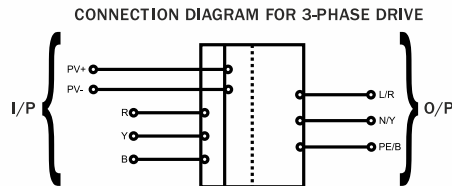
2.3.6 Simha with Change Over Switch

The change-over switch provided with this model of SIMHA Universal Drive is a dual input single output device, which is used to change the input power source to the controller. It is generally used with controllers/drives which have options to run from solar as well as from grid. There are three operative positions in change-over switch corresponding to S1, S2, (Up and Down) & M (Middle). In the case of S1 and S2 positions, the corresponding sources are connected to output whereas and in M position none of the sources are connected to output. Conventionally, the name of the sources is marked in S1 and S2 position for the convenience of the user. The change-over switch is provided in a dust and rainproof IP 65 rated box.

Note: It should be noted that while changing the power source through change-over the M position should be used until the display of the controller turns off. This intermediate use of the M position avoids inrush currents through the changeover switch and improves its life.

I/P Supply 1 (DC/Solar) — S1 — O/P (DC)
NO- O/P
I/P Supply 2 (AC/Grid) — S2 — O/P (AC)
TO VFD

2.3.7 DC Circuit Breaker and SPD Box

SPDs (Surge Protection Device) are designed to limit transient over voltages due to lightning or switching and divert the associated surge currents to earth, so as to limit these over voltages to levels that are unlikely to damage the electrical installation or equipment. This device is connected to the power supply in parallel with the loads (circuits) that it is intended to protect.

In addition to safety, the surge protectors dedicated breaker performs the following functions:

- Allows power to the protector to be removed without interrupting power to other loads.

- Should a component fail inside the protector, only the protector's breaker will trip, and power to other loads is not disturbed.

MODELS:

1. For VFD (1HP- 5HP) - DC Circuit Breaker & SPD Box_ 16 Amp

2. For VFD (7.5HP & 10HP) - DC Circuit Breaker & SPD Box_ 25 Amp

Three Phase Above 3 HP

Single Phase Below 2 HP

Connection to Drive

Solar Input   Grid Input

Connection to Drive

Solar Input   Grid Input

CONNECTION DIAGRAM FOR 3-PHASE DRIVE

CONNECTION DIAGRAM FOR 1-PHASE DRIVE

CONNECTION DIAGRAM
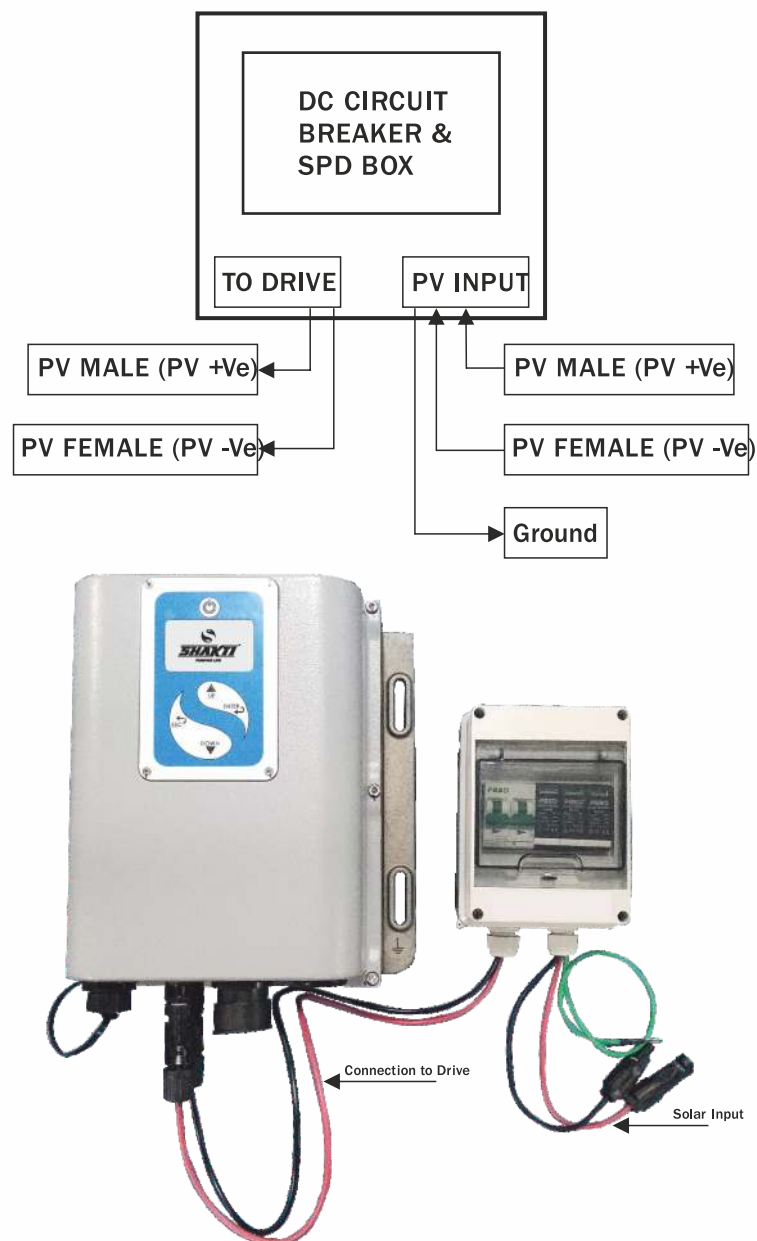
CHAPTER 3: INSTALLATION AND WIRING

Installation of the drive is simple with effortless wiring connections for Simha Universal Drive. Its DC input has poka-yoke connectors i.e. wrong connection is not possible by virtue of its construction. The drive works properly even in case of reverse polarity connection.

3.1 Guidelines for installation and wiring

1. The drive should be taken out of the packing box properly keeping in mind its weight.
2. Installation of drive should be carried out on solar structure with proper ground clearance and specified nuts and bolts.
3. Install it vertically on the pole (maximum inclination allowed is 15 degrees only).
4. Pay attention to the installing place to guarantee the effective heat dissipation.
5. Screw the nuts and bolts and make sure they tightened nut and bolt properly. Connect the earthing wire at the bolting place.
6. Connect the plug in PV inputs to the drive. Please refer labeled diagram of drive.
7. After that follow instructions given in chapter 4 of this manual.
8. Connect the output plug in connector to the load.
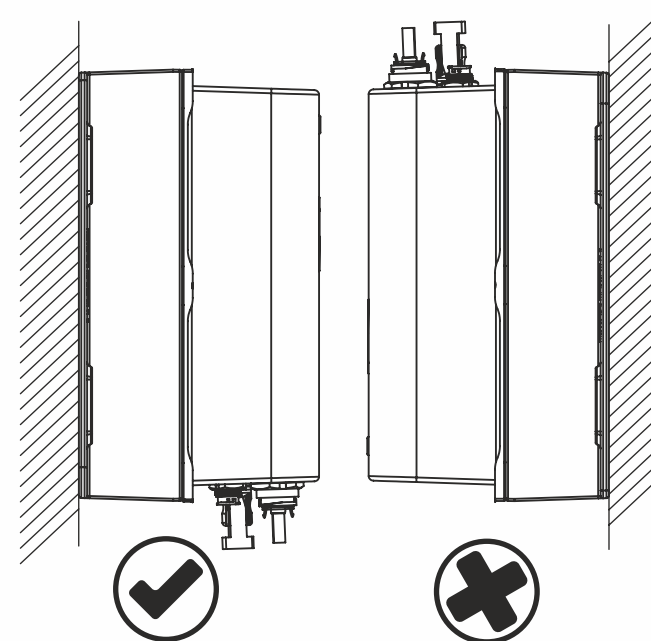
Figure 3.1 Correct and Incorrect installation of drive

CHAPTER 4: BASIC OPERATION

4.1 Display Module Description

POWER BUTTON

LCD DISPLAY

UP ARROW BUTTON

ESCAPE BUTTON

ENTER BUTTON

DOWN ARROW BUTTON
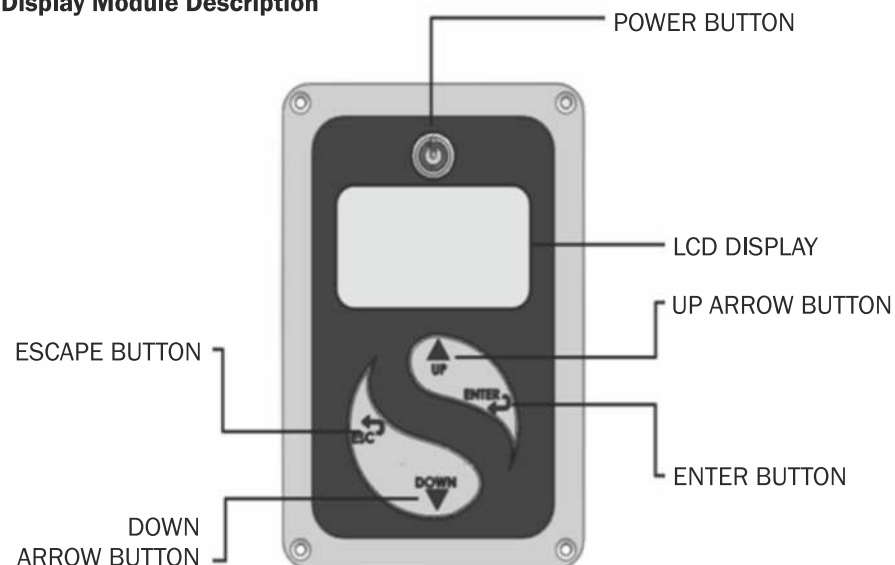
Figure 4.1 LCD Module

S.No.	LCD Parts	Description
1.	POWER BUTTON	This button is used for turning ON/OFF the Motor.
2.	LCD MONITOR	LCD Monitor is used for displaying the system related information like motor parameters, pump parameters, signals strength, date and time etc.
3.	ENTER	This button is used for the open menu or select menu.
4.	ESC	This button is used for going back to the previous menu.
5.	UP	This button is used to scroll up in the menu.
6.	DOWN	This button is used to scroll down in the menu.

4.2 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 4.2.

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. The Date & INSTALL DATE are set in the format DD/MM/YY and the Time in HH:MM:SS. Other options are common to factory setup option in main menu therefore, are discussed in section c of CONFIGURE.

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

Startup

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Setup Wizard (Factory Setup)

LANGUAGE
DATE
TIME
APPLICATION
INSTALL DATE
PROTECTION
SOLAR PARAMETERS
MOTOR PARAMETERS
PUMP PARAMETERS
CONTROL PARAMETERS
EEPROM RESET

Round Robbin Display → Status Screen

TEMP
TIME
SOLAR/INPUT
OUTPUT
MOTOR
PUMP
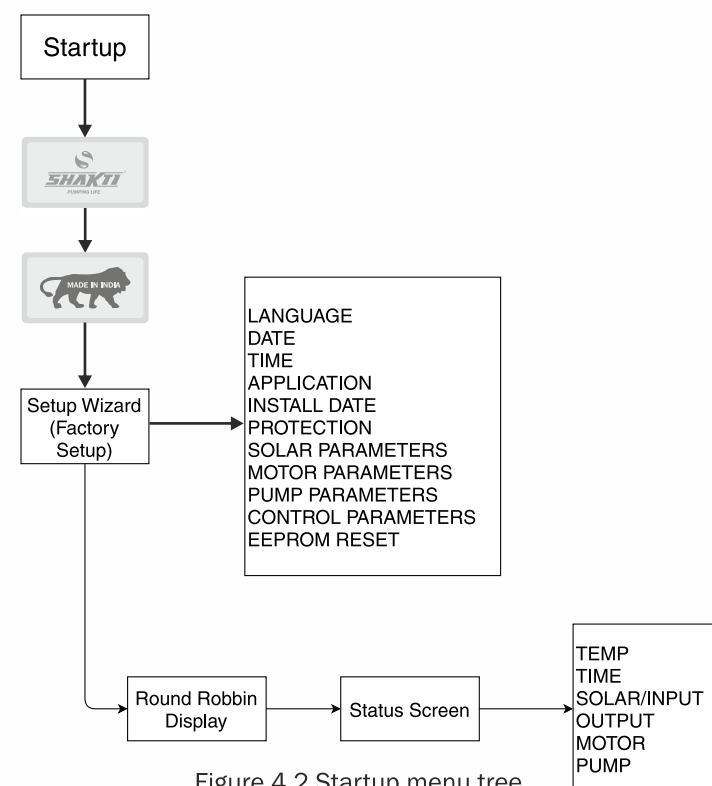
Figure 4.2 Startup menu tree

● 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 LOG, CUMMULATIVE DATA, and LAST 15 DAYS data can be viewed in LOGS. The ABOUT section provides the information of firmware version, serial number & network details.
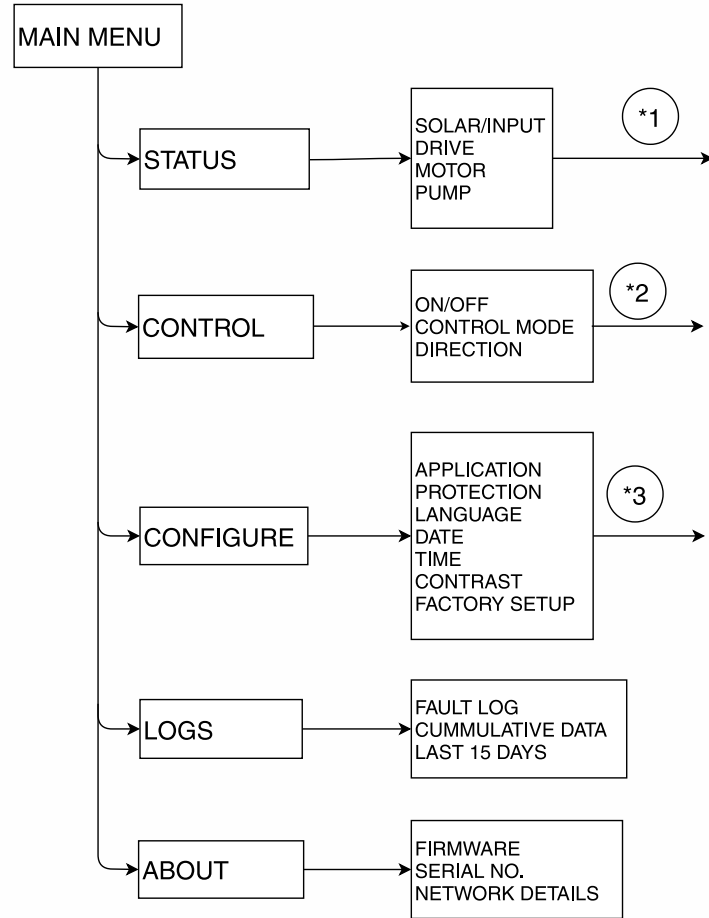
Figure 4.3 Main menu tree

▶ STATUS (*1)

a) SOLAR/INPUT
This status shows either the real time parameters of SOLAR or INPUT depending upon the APPLICATION selected. In SOLAR mode 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) are visible in status. Similarly, in case of INPUT mode parameters are: as input voltage (V), input current (A), input frequency (Hz).

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).
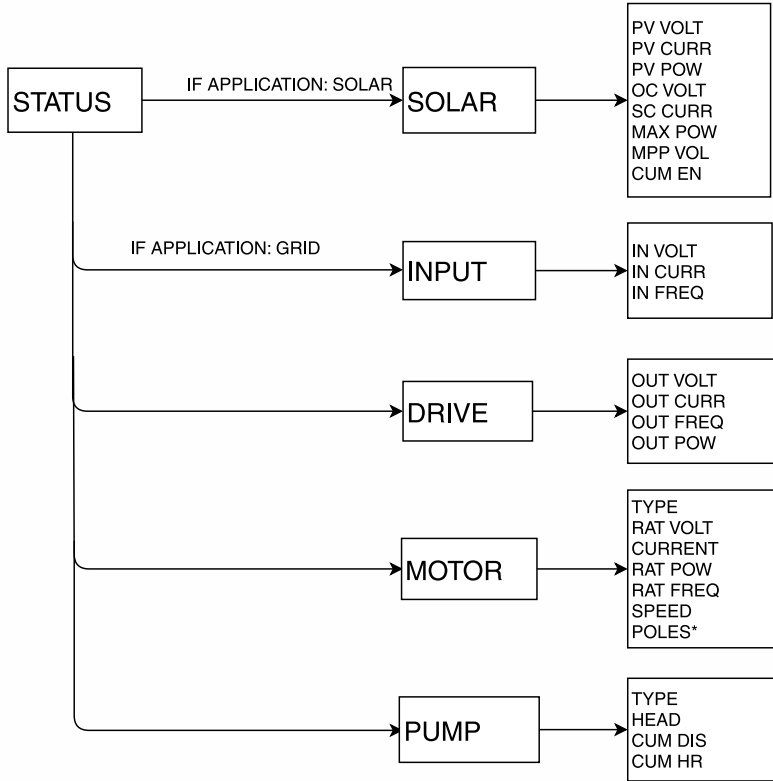
Figure 4.4 STATUS menu tree

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), operating speed (RPM), and number of poles.

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).

▶ CONTROL *2

a) ON/OFF

Whenever ON option is selected the motor will turn on until it is turned off manually or when some fault is generated.

b) CONTROL MODE

The motor can be operated in any of the four modes: AUTO, MANUAL, SPEED CONTROL and JOG. If SOLAR is selected in APPLICATION, JOG mode can be accessed. But if APPLICATION is GRID, SPEED CONTROL mode is available. To start the motor in JOG mode press Enter button inside the ENTER THE JOG option, Until the Enter button is pressed motor is in running state. Releasing the button will lead to stopping of the motor.
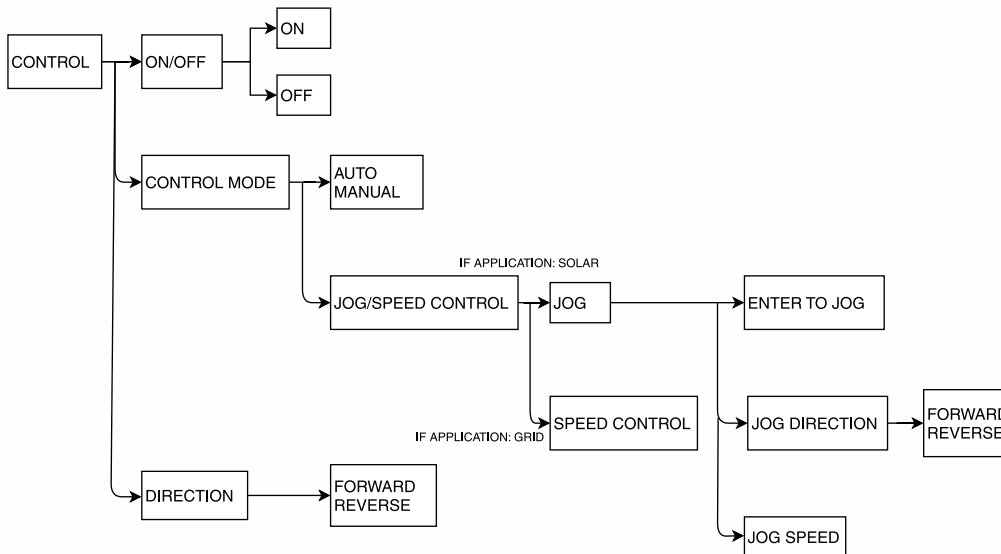
Figure 4.5 Control menu tree

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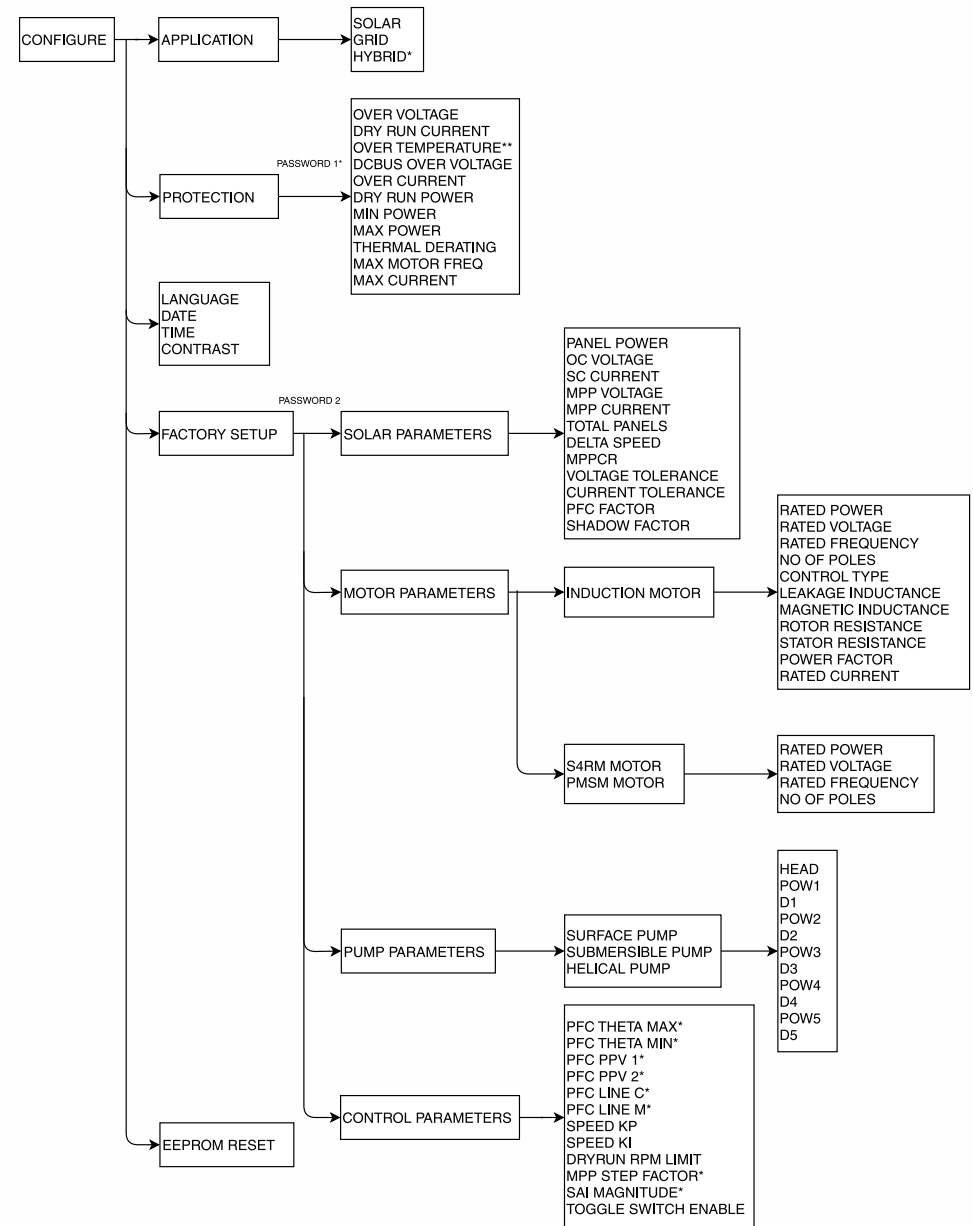
Figure 4.6 CONFIGURE menu tree

*Only for SIMHA (7.5HP - 10 HP)
**OVER TEMP in SIMHA (3HP - 5HP) & SIMHA (7.5HP - 10HP)

▶ Only for certain models

▶ CONFIGURE (*3)

a) APPLICATION
This system can work for three applications: Solar, Grid & Hybrid.

b) PROTECTION
The protection limit for various parameters can be set according to the requirements by entering the correct password.

c) 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 4.6 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.

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

iv. CONTROL PARAMETERS
The number of options available under control parameters varies with different models of the product.
The Toggle Switch is provided in customized models which provides the facility of turning ON and OFF the pump without operating the LCD power button.

v. 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.

CHAPTER 5 FAULT DIAGNOSIS AND SOLUTION

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

5.1 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 5.1 Fault type

5.1.1 Fault information and description in detail

Fault Type	LCD Display Message	Possibility Reason/s (reasons do not limit to the following given reasons)	Troubleshooting
DC Bus Overvoltage	⚠ DC BUS OVERVOLTAGE	1.DC bus voltage in the drive is more than the voltage set (720 V PV cell max voltage).	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
High Inrush Current	⚡ HIGH INRUSH CURRENT	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
Short Circuit Trip	⚡ SHORT CIRCUIT TRIP	1. Any of the connection internal or output is shorted. 2.Voltage is too low 3. A sudden load is added during operation. 4. Drive model is of too small power class.	1.Correct shorted connection 2.Check insulation health of cable 3. Contact Customer Care
Dry Run	⚠ DRY RUN DETECTED	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
Over Temperature	🔥 OVER TEMP PROTECTED	1.The drive heating is more than expected. 2.Improper ventilation	1. Check for ventilation and mounting style. 2.Contact Customer Care
*Low Power (Input power is lesser than set min power)	⚠ LOW POWER	1.Low input power due to lesser intensity of sunlight or shadow on panels. 2. PV panels may not be in healthy condition.	1. Check is there low intensity of sunlight. If yes wait till proper sunlight come.
Over Current at Output (RMS value of Output current more than set value in drive parameters in factory setup)	⚠ OVER CURRENT DETECTED	1.Wrong values set (for rated current) in the factory setup. 2.Mismatch of connected load and selected parameters.	1. Set right value in the rated current parameter. 2. Check the output load connected. 3. Contact Customer care

*This is not a fault but a warning.

Table 5.2 Fault information and description

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.

CHAPTER 6 : SIMHA MODBUS COMMUNICATION PROTOCOL

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

6.2 RTU Frame Structure:-

Slave address   0X01
Function field   0x03 :Read single parameter
0x06 :   Write single parameter
Data field   Data field includes address field and data load domain
CRC field   16bit CRC check value

6.2.1 Function code: 0X03

This function code is used to read the contents of a contiguous block of registers but in Simha only single register can be read, multiple read is not supported

Request	Hex	Response	Hex
Slave address	0X01	Slave address	0x01
Command	0x03	Command	0x03
High bit of register starting address	0X06	Byte count	0x02
Low bit of register starting address	0X01	High bit of register value	0X00
High bit of register number	0X00	Low bit of register value	0X01
Low bit if register number	0x01	CRC low bit	-------
CRC low bit	------	CRC high bit	-------
CRC high bit	------		

Query–

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

Response—

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

Positive response

The response function code echoes the request function code

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

Note:-
·If some error come then there is no response form drive
·Minimum time interval between two request is 500ms

6.3 MODBUS address

		BASIC FUNCTION PARAMETER				
Item Num	Item Type	Function Name	Defination and Setting Range	Default Setting	Property	Address
1	int	MASTER_ON_OFF	0-Off 1-ON	0	R/W	0X601
2	int	SPEED_MODE_SELECT	1 : AUTO 2 : MANNUAL	2	R/W	0X602
3	int	SPEED_DIRECTION_SELECT	1 : FORWARD 2 : REVERSE	1	R/W	0X603
6	int	APP_MODE	0 : SOLAR 1 : GRID 2 : HYBRID	0	R/W	0X606
7	int	MOTOR_TYPE	0 : Induction 1 : S4RM 2 : PMSM	2	R/W	0X607
8	int	PUMP_HEAD	10 ~ 200m	50	R/W	0X608
9	int	PUMP_TYPE	0 : SURFACE 1 : SUBMERSIBLE	1	R/W	0X609
10	int	MOTOR_POWER	1 ~ 10HP	3	R/W	0X680
11	int	MOTOR_VOLTAGE_IND	Rated for IM 72 ~ 415 Volt	250	R/W	0x684
12	int	MOTOR_VOLTAGE_S4RM	Rated for S4RM 72 ~ 415 Volt	250	R/W	0x688
13	int	MOTOR_VOLTAGE_PM	Rated for PMSM 72 ~ 350 Volt	250	R/W	0X68C
14	int	PANEL_POWER	Single solar panel power 250~350 Watts	300	R/W	0x690
15	int	TOTAL_PANELS	3 ~ 32 Nos. Panels	10	R/W	0x694
16	int	OC_VOLTAGE	Open circuit voltage 40~ 50 Volts	45	R/W	0x698
17	int	SC_CURRENT	Short circuited Voltage 5 ~ 10 A	9	R/W	0X69C
18	int	MPP_VOLTAGE	Max power point voltage 25 ~ 40 V	37	R/W	0x6A0
19	int	MPP_CURRENT	Max power point Current 5 ~ 10 A	8	R/W	0x6A4
20	int	NO_OF_STRINGS	NO_OF_STRINGS for PV panels 1 ~ 2 Nos.	1	R/W	0X6A8
21	int	MIN_PV_POWER	MIN_PV_POWER for given head 100 ~ 999 Watts	700	R/W	0x6AC
22	int	MAX_PV_POWER	MAX_PV_POWER for given head 1000 ~ 5100 Watts	3000	R/W	0x6B0
23	int	OVER_VOLT_LIMIT	Output voltage 100 ~ 440 Volts	370	R/W	0x6B4
24	int	DRY_RUN_LIMIT	No Load current (3~8A)	5	R/W	0x6B8
25	int	OVER_TEMP_LIMIT	Temp 100 ~ 130 ˚c	115	R/W	0x6BC
26	int	OVER_LOAD_LIMIT	Current 5 ~ 13 Amp.	10	R/W	0x6C0
27	int	OVER_CURR_LIMIT	Instantenous max current limit 25 ~ 45 Amp.	30	R/W	0x6C4

Item Num	Item Type	Function Name	BASIC FUNCTION PARAMETER Defination and Setting Range	Default Setting	Property	Address
28	int	DC_BUS_OV_LIMIT	600 ~ 800 Volts	750	R/W	0x6C8
31	int	Rated Frequency Induction Motor	1~200 Hz	50	R/W	0x6D4
32	int	Rated Frequency S4RM Motor	1~200 Hz	50	R/W	0x6D8
33	int	Rated Frequency PMSM Motor	1~200 Hz	100	R/W	0x6DC
34	int	IND_MOTOR_POLES	2,4,6 & 8	2	R/W	0x6E0
35	int	S4RM_MOTOR_POLES	2,4,6 & 8	2	R/W	0x6E4
36	int	PMSM_MOTOR_POLES	2,4,6 & 8	4	R/W	0x6E8
37	int	SPEED_REF_INPUT_DISPLAY	SPEED_REF_INPUT_DISPLAY(100-4000 RPM)	500	R/W	0x6EC
39	int	DRY_RUN_POWER	DRY_RUN_POWER	200	R/W	0x6F4
41	int	Motor Frequency(Hz)	(Scale factor=value /10)		R	0XF00
42	int	Drive Output Voltag	(Scale factor=value/10)		R	0XF01
43	int	Drive Output Current	(Scale factor=value/10)		R	0XF02
44	int	SPEED (RPM)	0-5000		R	0XF03
45	int	FLOW(LPM)	(Scale factor=value/10)		R	0XF04
46	int	DC Bus Voltage(V)	(Scale factor=value/10)		R	0XF05
47	int	PV Current (I)	(Scale factor=value/10)		R	0xF06
48	int	Fault Code	256=Output Open Fault 128=Slew Rate Fault 64=DC Bus Over Voltage 32=Output Over Voltage 16=Dry Run Fault 8=Over Temperature Fault 4=Over Load Fault 2=Output Short Circuit 1=Output Over Current	0	R	0XF07
49	int	Inverter Temperature(C)	(Scale factor=value/10)		R	0XF08
50	int	Heat Sink Temp	(Scale factor=value/10)		R	0XF09
51	int	Processor Temperature(C)	(Scale factor=value/10)		R	0XF0A
52	int	GSM_signal_strength (%)	(Scale factor=value*25)		R	0XF0B

• For reading real time pump parameters at ones, use address 0XF10. Which will give value of 13 parameter at ones.
Function Code=0X03 and offset registers=0x0D.

Item No	Item Type	Item Type	Basic function parameter	Default Setting	Property	Address
53	int	Motor Frequency	(Scale factor=Value/10)		R	0xF10
	int	Drive Output voltage	(Scale factor=Value/10)		R	
	int	Drive Output current	(Scale factor=Value/10)		R	
	int	SPEED(RPM)	0-5000		R	
	int	FLOW	(Scale factor=Value/10)		R	
	int	Dc Bus Voltage(V)	(Scale facto=Value/10		R	
	int	Pv Current	(Scale facto=Value/10)		R	
	int	Fault Code	(Same as on item no 48)		R	
	int	Inverter Temperature	(Scale facto=Value/10)		R	
	int	Heat Sink Temperature	(Scale factor=Value/10)		R	
	int	Processor Temp	(Scale facto=Value/10)		R	
	int	GSM Signal Strength	(Scale facto=Value*4)		R	
	int	Total Working Minute			R	

• For reading devise ID use address 0XF11. The format of devise ID is as below.
Function Code=0X03 and offset registers=0x08

Item No	Item Type	Item Type	Basic function parameter	Default Setting	Property	Address
54	int	Model No			R	0xF11
	int	Serial No H			R	
	int	Serial No L			R	
	int	Batch No		0	R	
	int	Date of Mnf			R	
	int	Month of Mnf			R	
	Int	Year of Mnf			R	
	Int	Reserve		0	R	

CHAPTER 7 : RECYCLING AND DISPOSAL

Electrical and electronic waste should not be thrown out in open or buried or fired. They must never be treated as residential waste. A drive which has 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 SERVICE

Shakti Pumps provides the warranty on this product as per Shakti Warranty Policy.

Warranty Conditions

If product gets fault and requires troubleshooting or for any kind of repair, kindly contact your dealer or company. To claim warranty kindly supply us the following:

1. Model and serial number of product.
2. Copy of invoice and warranty card.
3. Copy of installation report.
4. Message appearing on LCD display or any kind of information which could be helpful to resolve the fault.
5. Documents related to previous claims or exchanges.

   Upon receiving such information Shakti Pumps will decide about the repair/exchange.

A. Company may send person from its factory

B. Or from its service centre.

C. Or offer an equivalent exchange as per the model and age.

In case of exchange, the remaining portion of the original warranty period will be transferred to the exchanged drive and it is to be noted that customer will not get any new warranty card/certificate. All such exchanges and repair will be documented.

In case of exchange, Shakti Pumps will send the replacement unit as soon as possible and the defective unit should be sent back to the nearest service centre or to the dealer or to the company if possible in its original packing conditions.

Service after warranty expiration will be as per Shakti Warranty policy.

Exclusion from warranty/liability

Kindly note the following conditions which cause exclusion from warranty/liability.

1. Customer has not sent warranty card to the dealer or to the company.
2. Customer has done any unauthorized modification or replacement or repair or maintenance.
3. Any attempt to change or erase model or serial number or seals of the product.
4. Failure to follow the safety instructions. (safety instructions are given in this manual)
5. Failure to properly store the drive. (Storage instructions are given in this manual)
6. Physical damage due to drop of equipment.
7. Failure to follow any kind of instructions given in this manual.
8. Improper use or misuse of the drive.
9. Insufficient ventilation of the drive.
10. Influence of foreign objects and force majeure (fire or lightning or severe weather or grid over voltage or natural calamities or animal attacks etc.)
11. The toggle switch is not covered under warranty.
12. This warranty excludes every condition whether statutory or otherwise, whatsoever not herein expressly set out.
13. For any further information please visit our website www.shaktipumps.com

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

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