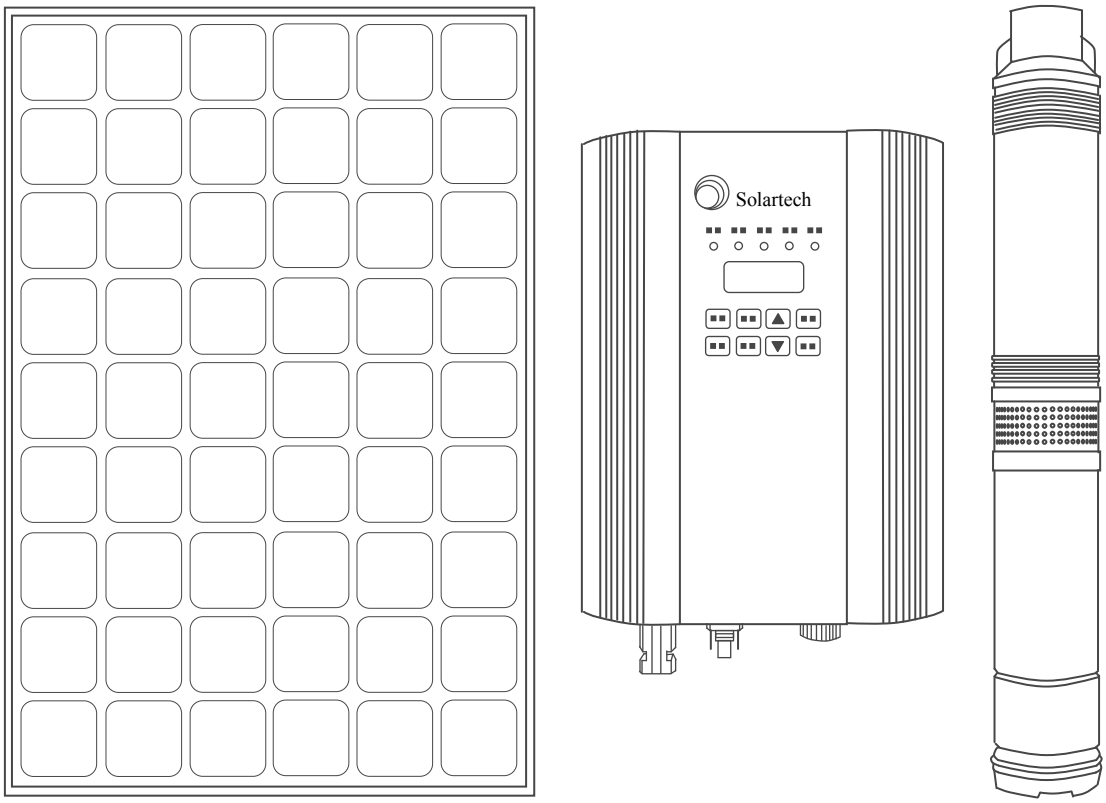
Maxima SOLAR

Solartech®

Solar Pumping Inverter

Operation Manual



Infinite Solar Energy

Shenzhen Solartech Renewable Energy Co.,Ltd

2018/2019

Preface

Thank you very much for using the PB series of solar pumping inverter manufactured by Shenzhen Solartech Renewable Energy Co., Ltd.

To fully utilize the performance of this product and ensure the safety of users and device, please read this manual carefully before installation and use.

In order to facilitate the routine inspection and maintenance of the inverter, and understand the causes of abnormality and countermeasures in the future, please keep the manual properly.

If there are any problems or special requirements during use, please contact our distribution agent or ask our technical service center for support directly.

Contents in this manual are subject to change without prior notice.

Index

Safety Instruction

Safe operation of this product depends on proper transport, installation, operation and maintenance. Before proceeding, please read through the following notices. There are three types of safe warning:

 **Danger:** Misuse may cause fire, severe damage to human and animal bodies and may cause death.

 **Caution:** Misuse may damage equipment or cause light to medium damage to human and animal bodies.

 **Note:** Useful information.

- Purchase Inspection

 Caution
1. Do NOT install the inverter if it is damaged or with missing parts. Otherwise it may cause accidents.

- Installation

 Caution
1. In order to ensure good convection cooling effect, the inverter must be installed vertically with at least 10cm space left above and below. 2. Please install the inverter in an indoor place with air vents or ventilation devices. It is NOT allowed to install the inverter in direct sunlight. 3. Do NOT drop the drilling residue into the inverter radiator or fan during the installation, otherwise it may weaken the heat dissipation.

- Connection

 Danger
1. The wiring must be performed by qualified electrical professionals, otherwise it may cause electric shock or fire. 2. Please make sure input power supply has already been cut off before wiring,

otherwise it may cause electric shock or fire.
3. Earth terminal must be reliably grounded, otherwise inverter enclosure may be electrified.
4. The selection of solar array, motor and inverter shall be reasonable.

Caution

1. Please use the fasten terminals with specified torque, otherwise it may cause fire.
2. Do NOT install capacitor or phase-advanced LC/RC noise filter at the output of the inverter. It is recommended to install an output reactor if the distance between the inverter and motor exceeds 200m.

- Running

Danger

1. Make sure all the wiring and connections are correct before powering on, otherwise it may damage the combiner box or cause fire.
2. Please do NOT change wiring after powering on, otherwise it may cause electric shock.

Caution

1. Before the first operation, please modify the relevant function parameters according to the initial settings in this manual. Do NOT change the parameters of the inverter arbitrarily, otherwise it may damage the device.
2. The temperature of radiator is high during operating, do NOT touch it for a long time, otherwise it may cause burns.
3. If the altitude is over 2000m, the inverter should be derated, i.e. the rated output current should be derated by 10% for every 1500m increase in height.

- Others

Danger

1. Maintenance and inspection must be performed by the qualified electric professionals.
2. Do not dismantle the inverter during electrifying. Conduct maintenance and inspection at least 5 minutes after the power off.

3. It is absolutely forbidden to reconstruct the inverter by oneself, as this can cause personnel injury or equipment damage.
4. The inverter should be treated as industrial waste when being abandoned. During incineration, the electrolytic capacitor is possible to explode and some parts may produce toxic and harmful gas.

Chapter 1 Products Introduction

1.1 Introduction of Solar Pumping System

Solar pumping systems produced by Shenzhen Solartech Renewable Energy Company can be applied to living water supply, agricultural irrigation, forestry irrigation, desert control, pasture animal husbandry, island water supply, wastewater treatment and so on. In recent years, with the promotion of the utilization of new energy resources, solar pumping systems are more and more used in civil engineering, city squares, green parks, tourist sites, resorts and hotels, as well as fountain landscapes in residential areas.

The system consists of a solar array, a pump and a solar pumping inverter (see figure 1-1). Based on the design philosophy that it is better to store water than electricity, there is no energy storing device such as storage battery in the system.

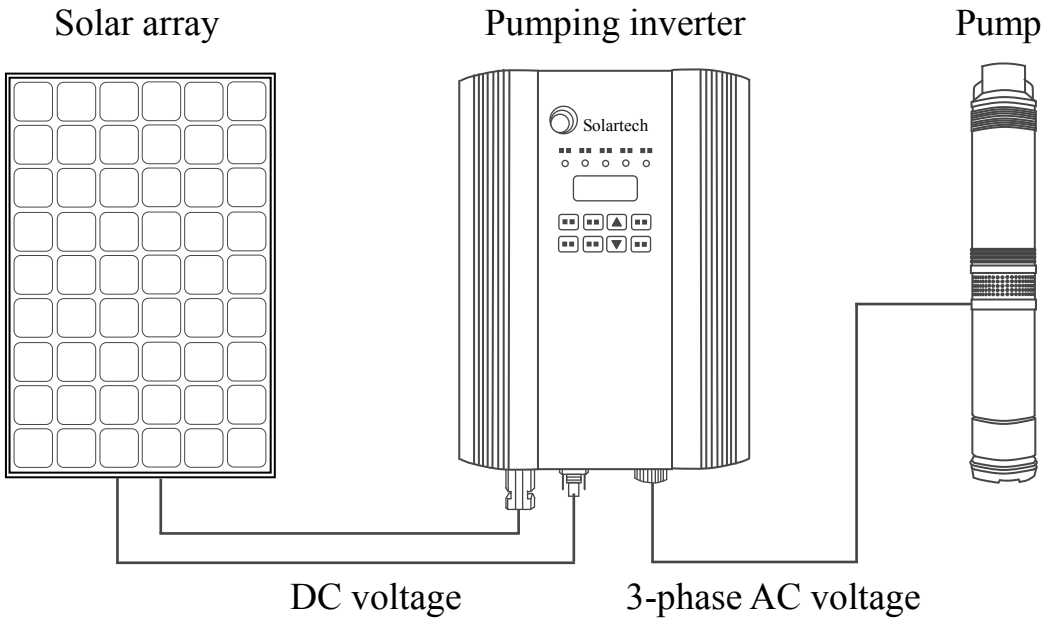


Fig. 1-1 Structure of solar pumping system

The solar array includes many solar panels connected in series and in parallel, it absorbs sunlight radiation and converts it into electrical energy, providing energy source for the whole system. The solar pumping inverter controls and adjusts the system operation and converts the DC produced by the solar array into AC in order to drive the pump, it adjusts the output frequency in real-time according to the solar radiation to implement the maximum power point tracking (MPPT). The pump, driven

by 3-phase AC motor, can draw water from the deep wells or rivers and lakes to fill into the storage tank or reservoir, or directly connect to the irrigation system, fountain system, etc. According to the actual system demand and installation condition, different types of pumps such as centrifugal pump, axial flow pump, mixed flow pump or deep well pump can be applied.

1.2 Product Features

Based on years of development and experiments, Solartech self-developed solar pumping inverters (figure 1-2) have the following features:

- Patented dynamic VI maximum power point tracking (MPPT) algorithm, fast response speed and good stability. Better than the conventional methods which may lead to the problems including poor tracking performances, unstable operation or even damaging water hammer effects when the irradiation on the array changes rapidly.
- Digital control with full automatic running, data storage and complete protective function.
- Intelligent power module (IPM) for the main circuit with high reliability.
- New design of aluminum alloy case, LED display operating panel, in-line blocks. User friendly. Convenient for operating. Perfect cooling and shielding.
- Option of up and down water level detection and control circuit is available.
- IP52 protection grade. Ambient temperature: -10 ~ +50˚C.

Fig. 1-2 PB series of pumping inverter

1.3 Inverter Specification

Nameplate and Type Description

The product's nameplate is located under lower right of the inverter, which contains the important information such as product series, voltage, power grade, software and hardware version that'll provide important basis for product application, maintenance and after service.

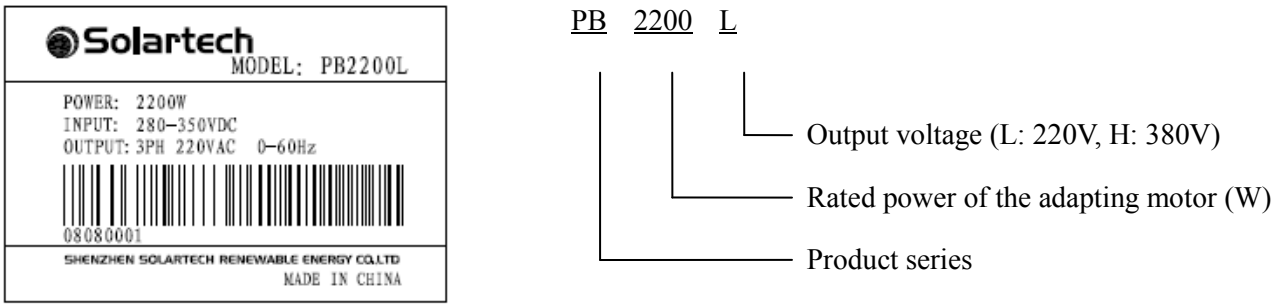


Fig. 1-3 Product nameplate and type description

Caution: Do not tear off the product's nameplate label.

Product Specification and Technical Index

Model	Adapting pump motor		Maximum solar input power (kWp)	Maximum DC input voltage (V)	Recommended MPP voltage (V)	Rated AC output current (A)	Output frequency (Hz)
	Rated power (kW)	Rated voltage (V)					
PB400L	0.15 ~ 0.37	200 ~ 240	0.6	450	280 ~ 350	3	0 ~ 50/60
PB750L	0.37 ~ 0.75	200 ~ 240	1.1	450	280 ~ 350	5	0 ~ 50/60
PB1500L	0.75 ~ 1.5	200 ~ 240	2.2	450	280 ~ 350	7	0 ~ 50/60
PB2200L	1.5 ~ 2.2	200 ~ 240	3.3	450	280 ~ 350	11	0 ~ 50/60
PB3700L	2.2 ~ 3.7	200 ~ 240	5	450	280 ~ 350	17	0 ~ 50/60
PB5500L	3.7 ~ 5.5	200 ~ 240	8	450	280 ~ 350	25	0 ~ 50/60
PB3700H	2.2 ~ 3.7	380 ~ 440	5	750	500 ~ 600	9	0 ~ 50/60
PB5500H	4 ~ 5.5	380 ~ 440	8	750	500 ~ 600	13	0 ~ 50/60
PB7500H	5.5 ~ 7.5	380 ~ 440	11	750	500 ~ 600	18	0 ~ 50/60
PB11KH	9.2 ~ 11	380 ~ 440	16	750	500 ~ 600	24	0 ~ 50/60
PB15KH	13 ~ 15	380 ~ 440	22	750	500 ~ 600	30	0 ~ 50/60
PB18KH	18.5	380 ~ 440	28	750	500 ~ 600	39	0 ~ 50/60

Caution: Please be sure to select the appropriate model according to the solar

array and motor load.

 Caution: High-power machine model uses multiple-channel DC input structure. The maximum DC input current of each string should not exceed 15A.

Chapter 2 Installation and Wiring

2.1 Purchase Inspection

Solartech has rigid quality assurance system in product manufacturing and packing. If any abnormity is found, please contact the distributors of our company immediately or directly keep in touch with our technology service center. We will solve the problems for you as early as possible. Once you get the product, please confirm the following items:

Inspection item	Inspection method
Consistency with ordered product	Inspect the product's nameplate label
Damage or exfoliation phenomenon	Inspect whole appearance
Completeness of main machine and accessories	Check carefully according to the product list
Looseness of fastening parts such as screw	If necessary, inspect with screwdriver

2.2 Dimension and Weight

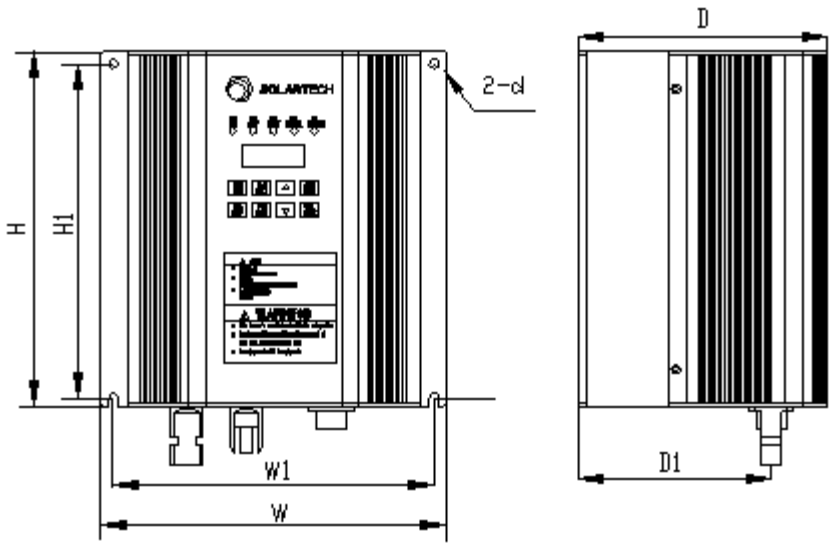


Fig. 2-1 Product appearance and installation dimension

Machine Model	Appearance and installation dimension (mm)							Weight (kg)
	W	H	D	W1	H1	D1	d	
PB400L PB750L	202.0	209.0	146.0	187.0	197.0	113.0	6.0	3.5
PB1500L PB2200L	202.0	244.0	146.0	187.0	232.0	113.0	6.0	4.0 ~ 4.3

Machine Model	Appearance and installation dimension (mm)							Weight (kg)
	W	H	D	W1	H1	D1	d	
PB3700L PB5500L	250.0	310.0	200.0	235.0	295.0	167.0	7.0	8.0 ~ 8.5
PB3700H ~ PB18KH	250.0	310.0	200.0	235.0	295.0	167.0	7.0	8.0 ~ 8.5

Caution: PB series solar pumping inverters are for wall mounted. Please ensure that the mounting back can support the weight of the inverter.

2.3 Wiring Diagram

Case socket description

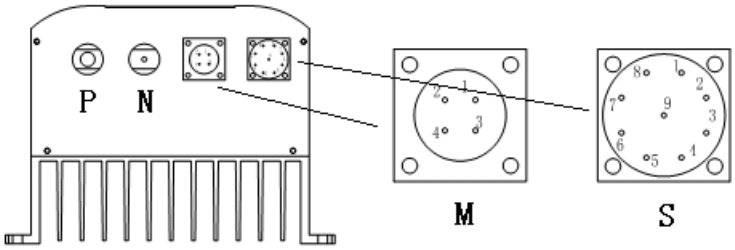


Fig. 2-2 PB-L wiring diagram

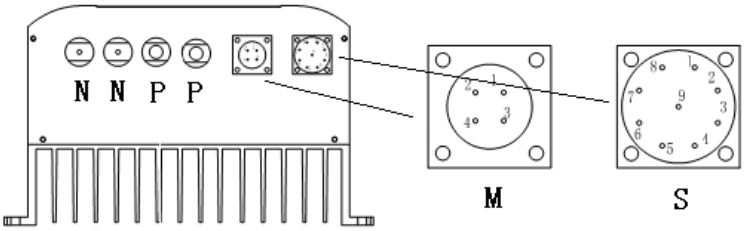


Fig.2-3 PB-H wiring diagram

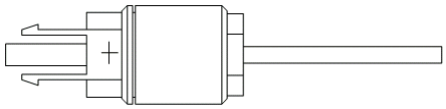
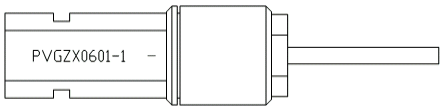
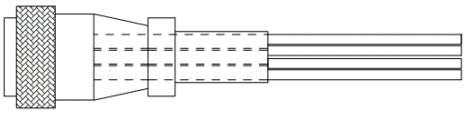
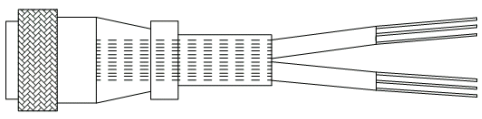
Socket	Terminal description	Connection description
DC input	P	Connected to positive electrode of solar array
	N	Connected to negative electrode of solar array
AC output	M-1	Connected to protective ground wire
	M-2	Connected to U phase of the motor
	M-3	Connected to V phase of the motor
	M-4	Connected to W phase of the motor

Socket	Terminal description	Connection description
Sensor input	S-1	Connected to signal common ground wire
	S-2	Connected to UART communication receiving signal wire
	S-3	Connected to UART communication transmitting signal wire
	S-6	Connected to well sensor signal wire
	S-8	Connected to tank sensor signal wire

Caution: Please identify with the plug to ensure the exact locations of the DC input "P" and "N" sockets for different model.

Caution: Please ensure the AC output wiring based on the marks of the sockets.

External socket description

Socket	Wire description		Connection description
	One-strand, black		Connected to positive electrode of solar array
	One-strand, black		Connected to negative electrode of solar array
	Four-core wire	Yellow green wire	Connected to protective ground wire
		Red wire	Connected to U phase of the motor
		Yellow wire	Connected to V phase of the motor
		Blue wire	Connected to W phase of the motor
	White three-core wire	Red wire	Connect to well signal wire
		Yellow wire	Connect to tank signal wire
		Black wire	Connect to ground signal wire
	Black three-core wire	Red wire	Connect to the data monitor RXD signal wire
		Yellow wire	Connect to data monitor TXD signal wire
		Black wire	Connect to data monitor ground wire

Caution: To ensure normal operation of the system, please select the wire size according to the following recommended principle.

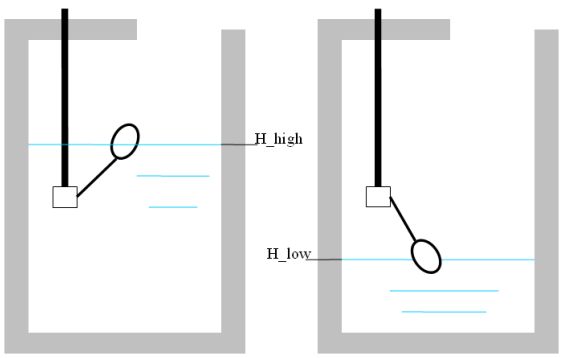
Recommended wire size

Machine Model	Connecting wire of the PV module (P, N) (mm2)	Earth wire (PE) (mm2)	Connecting wire of the motor (U, V, W) (mm2)	Water level sensor (S) (mm2)
PB400L	2.5	2.5	2.5	1.5
PB750L				
PB1500L				
PB2200L				
PB3700L				
PB5500L				
PB3700H				
PB5500H				
PB7500H				
PB11KH				
PB15KH		4	4	
PB18KH		6	6	

Note: Ambient temperature condition for the above-recommended wire size is ≤50°C.

Note: High-power wall-mounting machine model uses multiple DC input strings, the cable size recommended above should be applied for all strings.

Instruction of Water Level Switch



Water Level	For Well		For Tank	
	Normal open type	Normal close type	Normal open type	Normal close type
Over H_high	Disconnected	Connected	Connected	Disconnected
Under H_low	Connected	Disconnected	Disconnected	Connected

Caution: Please connect the wire as per the instruction. Incorrect connection will cause the abnormal operation of the system.

Chapter 3 Operation Control

3.1 Panel Layout and Instruction

Solar energy inverter uses LED display operating panel which is shown as the figure below, including 5 LED lamps and 5-digital 8-section nixie tubes and 8 keys in 2 rows.

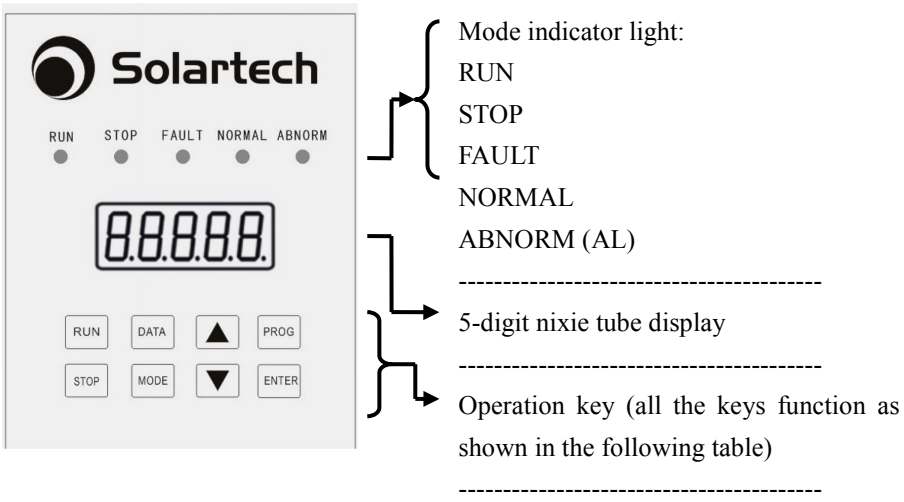


Fig. 3-1 Keyboard layout and name of each part

Indicator light and key	Name	Function Description	
RUN	Running indicator light	Green	Bright: Inverter is running.
STOP	Stopping indicator light	Red	Bright: Inverter is stopped.
FAULT	Fault indicator light	Red	Bright: System fault.
NORMAL	Normal indicator light	Green	Bright: System normal.
ABNORM	Abnormal indicator light	Red	Bright: Water level in tank or well is abnormal.
RUN	Run key	Control the start of the inverter.	
STOP	Stop key	Control the stop of the inverter.	
DATA	Data inquiry key	Enter or quit from the historical data display status.	
MODE	Mode switch key	1. Switch the contents to be displayed during data viewing. 2. Switch the digit to be modified during data modifying.	
▲	Increasing key	1. Increase parameter number or its value in control parameter display status. 2. Change historical date upward and historical data	

Indicator light and key	Name	Function Description
		content viewing in historical data display status. 3. Increase output frequency or display current running data upward in running data display status according to operation mode.
▼	Decreasing key	1. Decrease parameter number or its value in control parameter display status. 2. Change historical date downward and historical data content viewing in historical data display status. 3. Decrease output frequency or display current running data downward in running data display status according to operation mode.
PROG	Programming key	Enter or quit from the control parameter display status.
ENTER	Enter key	1. Confirm the content to be viewed or modified. 2. Confirm and save the parameter value when the parameter is modified.
▲ + ▼	Reset key	Press the key combination to restore normal operation in protection status.

3.2 Operation Method of Panel

Instruction for Display Status

There are 3 kinds of status for operating panel display: running data display, control parameter display, historical data display. The default status is the status of running data display.

Press the PROG key to enter the status of control parameter display, and press the key again to return to the default status.

Press DATA key to enter the status of historical data display, and press the key again to return to the default status. Schematic diagram as follows:

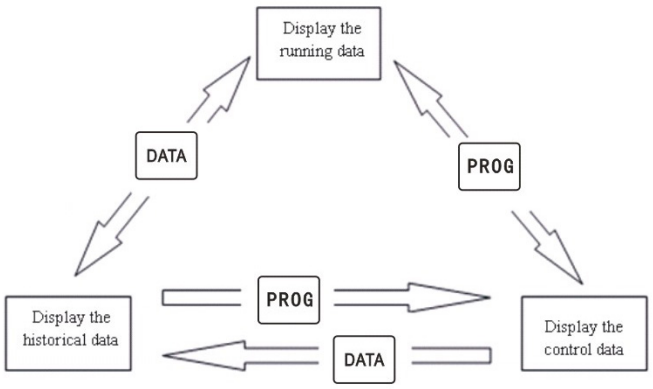


Fig. 3-2 Diagram for display status switching

◆ View Running Data

Operation	Description	Display
Initial status: Current running data ↓ MODE ↓	Display current running data Output frequency of the inverter	Example: F. 50.00 Represent: 50.00Hz
MODE ↓	Display current running data Input voltage of the inverter	Example: U. 340 Represent: 340V
MODE ↓	Display current running data Input current of the inverter	Example: A. 5.00 Represent: 5.00A
MODE ↓	Display current running data Input power of the inverter	Example: P. 1.50 Represent: 1.50kW
MODE ↓	Display current running data Output current of the inverter	Example: o. 6.0 Represent: 6.0 A
MODE ↓	Display current running data Time	Example: 12-30 Represent: 12:30
MODE ↓	Display current running data Rotation speed of pump motor	Example: r. 3000 Represent: 3000 r/min
MODE ↓	Display current running data Inverter temperature	Example: A. 37.0 Represent: 37.0℃
MODE	Display current running data Water level sensor status	Example: Ab. n.o. Represent: Water level is normal

◆ View Historical Data

Operation	Description	Display
Initial status: non-historical data display ↓ DATA ↓ MODE ↓ ▲ or ▼ ↓ ENTER ↓ MODE ↓ MODE ↓ MODE ↓ MODE ↓ MODE ↓ MODE ↓ DATA		
	Enter the data inquiry interface Display current date	Example:  Represent: Jan 1st.
	Select the object to be modified (day, month, year)	Example:  Modified digit: Scintillation
	Modify the date to be inquired	Example:  Represent: Feb second
	Confirm the date to be inquired	Example:  Represent: year 2008
	Display historical data Accumulated generated energy of the day	Example:  Represent: 9.99°
	Display historical data Maximum power of the day	Example:  Represent: 2.20kW
	Display historical data Maximum power point voltage of the day	Example:  Represent: 320V
	Display historical data Starting time of the day	Example:  Represent: 5:10
	Display historical data Shutdown time of the day	Example:  Represent: 17:40
	Display historical data Running time of the day	Example:  Represent: 12.5h
	Quit from the display status of the historical data Display current running data	Example:  Represent: 50.00Hz

◆ View or Modify Control Parameter

Operation	Description	Display
Initial status: non-control parameter display ↓ PROG ↓ ▲ or ▼ ↓ ENTER ↓ ▲ or ▼ ↓ ENTER ↓ PROG		
	Enter the parameter modification interface Display parameter 0	Represent: Pr.0
	Select the parameter to be viewed and modified Display parameter number	Example: Represent: Pr.9
	Confirm the parameter to be viewed or modified Display parameter value	Example: Represent: 30
	Modify the parameter value	Example: Represent: 25
	Confirm and save the modification Display the next code number	Example: Represent: Pr.10
	Quit from the parameter display mode Display current running data	Example: Represent:0.00Hz

Note: It can only view the control parameter during inverter operation. The control parameter cannot be modified until the inverter stops running.

3.3 Function Parameter Description

Number	Name	Scope	Description	Factory set value
Pr.0	Parameter set mode	0 ~ 3	0: Parameter can be read and written. Other parameter values cannot be modified until this parameter is modified as 0. 1: The parameter can only be read. 2: Restores user parameters to factory value. 3: Time calibration, modify Pr.6~Pr.10 first, then set this parameter as 3 to save the change.	1
Pr.1	MPP voltage ratio	0.00 ~ 1.00	The ratio of MPP voltage (Vmp) to open circuit voltage (Voc) of solar array. Unit: 0.01	0.85
Pr.2	Open circuit voltage	1 ~ 1000	Open circuit voltage (Voc) of solar array. Unit: VDC	350V 600V
Pr.3	Rated voltage	1 ~ 1000	Rated voltage of the motor load.	220V 380V
Pr.4	Rated current	0.1 ~ 300.00	Rated AC output current.	

Number	Name	Scope	Description	Factory set value
Pr.5	Startup latency	1 ~ 6000	Start delay time after power up or shutdown.	30s
Pr.6	Year	2000 ~ 2999	Year required to be corrected.	
Pr.7	Month	1 ~ 12	Month required to be corrected.	
Pr.8	Day	1 ~ 31	Day required to be corrected.	
Pr.9	Hour	0 ~ 23	Hour required to be corrected.	
Pr.10	Minute	0 ~ 59	Minute required to be corrected.	
Pr.11	Resources of frequency instruction	0 ~ 2	0: Press RUN key to run while the frequency is determined by Pr.12. 1: Full-automatic operation. 2: Press RUN key to run, adjust the frequency automatically according to the sunlight.	1
Pr.12	Reference frequency	0 ~ Pr.13	Target frequency when Pr.11 is 0.	20.00Hz
Pr.13	Maximum operating frequency	0.01 ~ 60.00	To protect the motor load, maximum operating frequency must be same as rated frequency of the motor.	50.00Hz
Pr.14	Stopping frequency	0 ~ 60.00	Shutdown when the output frequency is less than the set value.	20.00Hz
Pr.15	Water tank sensor setting 1(connection terminal S-8 for S-1)	0 ~ 9	0: Not use water level sensor. 6: Normally close water level sensor. 7: Normally open water level sensor. Caution: other value setting is forbidden, otherwise it can cause abnormal operation.	0
Pr.16	Reserved	0 ~ 9	The value must be set to 0, otherwise the inverter may work abnormally.	0
Pr.17	Well sensor setting 1 (connection terminal S-6 for S-1)	0 ~ 9	0: Not use water level sensor. 6: Normally close water level sensor. 7: Normally open water level sensor. Caution: other value setting is forbidden, otherwise it can cause abnormal operation.	0
Pr.18	Reserved	0 ~ 9	The value must be set to 0, otherwise the inverter may work abnormally.	0
Pr.19	Total generated energy	Read-only		0
Pr.20 ~ Pr.24	Fault type record 1 ~ 5	Read-only	See chapter 4 the operating code explanation.	No
Pr.25	Pump rated power	0.1~300.00	In order to enable the loss of load protection function for pump motor, the parameter must be set correctly, otherwise abnormal operation can happen.	Depends on model
Pr.26	Pump motor pole pairs	1~10	Pump motor pole number is used to calculate the synchronous speed.	1

Number	Name	Scope	Description	Factory set value
Pr.27	Delay time of restart pump if well water level abnormal	1~30000	The delay time when well water level is abnormal or loss of load protection has stared. Unit: seconds. (if countdown is more than 999 seconds, the code letters flashing, but the delay time 999 is unchanged)	600
Pr.28	Loss of load protection is valid or not	0~1	0: Invalid. 1: Valid (the delay time of loss of load protection is set by Pr.27). Note: When the loss of load protection is set to valid, the inverter will only determine the loss of load when output frequency is higher than the setting value of Pr14.	0
Pr.29	Delay time of restart pump if tank water level abnormal	1~30000	The delay time when tank water level is abnormal. Unit: seconds. (if countdown more than 999 seconds, the code letters flashing, but the delay time 999 is unchanged)	600

Note: After modifying the parameter with shading in the table above, the next operation cannot be performed until the inverter has been reset.

Note: Under-voltage fault code caused by insufficient solar radiation is not recorded.

3.4 Debugging before First Operation

To ensure the efficient, reliable and stable operation of the solar pumping system, professional electric technician must set partial parameters of the inverter according to the system structure as following steps before first operation.

Steps	Debugging contents	Operating method
1	Modify the control parameter as read-write parameter	Modify the Pr.0 value as 0.
2	Modify date and time	Modify Pr.6~Pr.10 (year, month, day, hour, minute) according to the date and time. Modify the Pr.0 parameter value to 3 to save the time update.
3	Modify solar array parameter	Modify Pr.2 parameter (Voc) according to the solar array. Note: Inverter can also work without modifying Pr.2, but will work better after modifying Pr.2.
4	Modify the water level sensor setting	Set Pr.15 and Pr.17 values properly according to water level sensor type (for tank or for well), set all to 0 if not use water level sensor.
5	Modify rated voltage of the pump	Modify Pr.3 parameter (rated voltage) according to the rated voltage of the pump.

Steps	Debugging contents	Operating method
6	Modify the maximum operating frequency	Modify Pr.13 parameter (rated frequency) according to the pump rated frequency
7	Confirm the motor wiring	Modify Pr.11 value as 0. Modify Pr.12 value as 30.00. (in a shining day) Press the RUN key to run and observe water yield from the outlet. Press STOP key to stop and exchange any pair of pump cable connection with the inverter. Press the RUN key to run and observe water yield from the outlet. Press STOP key to stop, select the wiring method with bigger water yield to ensure the motor is rotated in forward direction.
8	Modify the minimum operating frequency	Modify Pr.12 value as 10.00. Press RUN key to run. Observe the effluent of the water outlet. If there is no effluent in the outlet, press UP key to slowly increase the output frequency. If there is effluent of the pump, record the operating frequency f0. Modify the Pr.14 value as f0 (stopping frequency).
9	Set the operating mode of the inverter	User sets Pr.11 (operating mode) according to his own demand. 0: Press RUN key to operate, the initial frequency value is determined by Pr.12, the output frequency can be changed by pressing UP key or DOWN key. 1: Full-automatic operation: the inverter will start automatically if the solar radiation is strong enough. The inverter output frequency is in accordance with the solar radiation to control the solar array to output the maximum power. 2: Press RUN key to run. The inverter output frequency is in accordance with the solar radiation to control the solar array to output the maximum power.
10	Modify the control parameter as read-only.	Modify the Pr.0 value as 1 before the inverter restart.

Caution: Please do not modify the control parameters of the inverter freely, or else it will cause abnormal operation.

Chapter 4 Fault Diagnosis

4.1 Fault Code Description and Countermeasure

PB series of solar pumping inverter have perfect protection. When the system fault occurs, the inverter will take protection measures: The general protection measure is stopping the driving signals output (jump stop) immediately and not allowing the inverter to restart in a while.

It will automatically switches to the fault display unit when fault or protection occurs. The fault code will be displayed in the last two digit nixie tubes and flash. If the first digit nixie tube displays "P", meaning fault or protection needs to reset the inverter. You can shut off the input power supply and then power on the inverter until the internal power supply is off or press the "RESET" key combination to reset. If the fault still exists after resetting, please contact the manufacturer to report the fault and get a solution.

After the fault or protection to be reset is eliminated, the inverter will conduct automatically a time-delayed restart. At this time the fault number will appear in the first and second digit nixie tubes. The last several digit nixie tubes will display the countdown of the restart, when the countdown is 0, fault display unit will disappear automatically and running status data will be displayed.

CODE	Code description	Possible reason	Countermeasures
oU.	Over-voltage	Too high input voltage	Inspect solar array voltage.
LU.	Under-voltage	Too low input voltage Too weak sunlight intensity	Inspect solar array voltage.
oC.	Over-current	Too large pump load Low solar array voltage Too long pump cable	Change low-power pump load. Inspect solar array voltage. Reduce the cable length between inverter and motor.
oL.	Overload	Too large load	Reduce the highest operating frequency.
oP.	Over-current of the module	Output short-circuit or grounding Module damaged	Inspect the wiring. Ask manufacturer for help.
HC.	Over-temperature of the module	Air duct blocked Too high ambient temperature	Clear the air duct or improve the ventilation condition.

CODE	Code description	Possible reason	Countermeasures
C.A.	AC CT fault	Device or circuit damaged	Ask manufacturer for help.
C.d.	DC CT fault	Device or circuit damaged	Ask manufacturer for help.
dE.	Date error	Wrong time setting Device or circuit damaged	Check Pr.6~Pr.10 values of time setting. Ask manufacturer for help.
E.E.	Pump idle running	Pump idle running Pump cables all broken Pump model does not match with inverter	Check water level. Check pump cable connections. Check if pump rated power is matching with inverter capacity.
PArEE.	Communication fault	Device or circuit damaged	Reset. Ask manufacturer for help.

4.2 Description for Other Codes

CODE	Code description	Relevant description
PArIU.	Parameter initialization	Return to normal after resetting.
PArEC.	Important parameter modification	Return to normal after resetting.
U-1.50	Inverter type	U: 220V series; 1.50: rated power 1.5 kW
on 30	Start time-delay	Countdown of the restart: 30 s
A6.P.2	Water level sensor 1 is abnormal	When water level returns normal, system will be normal automatically after restart countdown.
A6.P.3	Water level sensor 2 is abnormal	When water level returns normal, system will be normal automatically after restart countdown.
A6.P.4	Water level sensor 3 is abnormal	When water level returns normal, system will be normal automatically after restart countdown.
A6.P.5	Water level sensor 4 is abnormal	When water level returns normal, system will be normal automatically after restart countdown.
A6.P.A.	Water level sensor 1,2 matching use are abnormal	When water level returns normal, system will be normal automatically after restart countdown.
A6.P.b.	Water level sensor 3,4 matching use are abnormal	When water level returns normal, system will be normal automatically after restart countdown.
UPEoL.	PV voltage is lower to the start value Too weak sunlight intensity Pr.2 parameter is unsuitable	When PV voltage is up to the start value, pumping system will automatically start. Modify Pr.2 parameter (open circuit voltage) according to the solar array. (The real measured value, but not rated value in the datasheet)

4.3 Fault Inquiry and Reset

PB series of solar pumping inverter record the last 5 fault codes, checking this information will help to find the fault cause. Fault information is stored in the control parameter Pr.20~Pr.24. Please refer to the keyboard operation method to check and find out relevant information.

When the inverter fault occurs, by pressing ▲ and ▼ keys simultaneously or cutting off the power supply to restore normal operation.

Caution: Before resetting, completely check up on the fault cause is required. If the inverter cannot be reset or turns wrong after resetting, the fault cause should be identified first, because continuous resetting can damage the inverter.

Caution: The protection restart countdown time is 5 minutes for overload and overheat.

Chapter 5 Service and Maintenance

5.1 Routine Inspection and Maintenance

Affected by ambient temperature, humidity, dust, vibration and aging internal device, the inverter may have some potential problems during operation. To make sure the inverter can run stably for longer time, keeping at least a yearly inspection is necessary.

Requirement of Inspection and Maintenance

The inspection must be performed by professional technician. The power supply of the inverter should be cut off when necessary.
Avoid leaving any extra metal parts in the inverter, or else it can cause damage to the equipment.
Electric insulation test has been performed on the inverter before factory delivery, so user does not have to carry on a withstand-voltage test.
If it is necessary to conduct insulation test on the inverter, all the input and output terminals must have reliably short circuits. It is forbidden to conduct insulation test on a single terminal. Please use the 500V megohmmeter to conduct the test.
It is forbidden to use the megohmmeter to test in the control circuit.
When conducting insulation test on the motor, you have to dismantle the connection between motor and inverter.

Main Points for Inspection and Maintenance

Please use the inverter in recommended environment of the manual. Inspection and maintenance shall be proceeded as the following table.

Inspect Frequency		Inspection Item	Inspection Content	Judgment Standard
Routine	Regular			
√		Running environment	1. Temperature, humidity 2. Dust, air	1. Temperature<50°C. 2. Humidity<90%, no dew condensation. 3. No peculiar smell, nor flammable and explosive gas.
	√	Cooling system	1. Installation environment 2. Radiator	1. Installation environment with good ventilation. 2. Radiator air duct not blocked.

Inspect Frequency		Inspection Item	Inspection Content	Judgment Standard
Routine	Regular			
√		Inverter body	1. Vibration, temperature rise. 2. Noise 3. Wire, terminal	1. Stable vibration, normal temperature of the shell. 2. No abnormal noise and peculiar smell. 3. Fastening screw not loosen.
√		Motor	1. Vibration, temperature rise. 2. Noise	1. Steady running and normal temperature. 2. No abnormal and uneven noise.
√		Input and output parameter	1. Input voltage 2. Output current	1. Input voltage in the specified range. 2. Output current under the rated value.

5.2 Inspection and Replacement of the Damageable Part

Filter Capacitor

Pulsating current of the main circuit will influence the performance of the aluminum electrolytic filter capacitor, the impact depends on the ambient temperature and working condition. In normal condition, the inverter shall replace its electrolytic capacitor every 10 years. When the filter capacitor's electrolyte leaks, safety valve bursts out or the capacitor main body expands, it shall be replaced immediately.

Cooling Fan

PB7500H and power above models have cooling fans inside the inverter. Service life of the cooling fan is around 15,000 hours. When the fan has noise or vibration, it shall be replaced immediately.

5.3 Storage and Warranty

Storage

If the inverter is not used temporarily or to be stored for long time after purchasing, please paid attention to the following points:
Avoid placing the inverter in high temperature or humid place or where there is vibration or with metal dust, ensure good ventilation.
Inside filter capacitor performance of the inverter will decline for long–time disuse. It is necessary to power on the inverter every 2 years to restore the performance of the

filter capacitor, inverter inspection can be proceeded at the same time. When power on, it is necessary to increase the voltage through a DC power supply, and the power-on time should be not less than 5 hours.

Warranty

The warranty of this inverter is three years counted from the factory delivery date. When any fault or damage occurs on the product, within the warranty period, our company will provide free maintenance. After the warranty time, we can provide lifetime paid warranty service.

Certain maintenance charge will be considered during warranty period if the fault is caused by the following reason:

1. Operating against the manual or surpass the standard specification.
2. Fix and modification without permission.
3. Poor preservation.
4. Using the inverter in an unusual way.
5. Machine damage caused by fire, salt corrosion, gas corrosion, earthquake, storm, flood, lightning, abnormal voltage or other force majeure.

Note: Warranty only covers the body of the inverter.

Warranty Card

Client name		Contact person	
Client address		Telephone number	
Product type		Date of purchase	
Machine serial number		Warranty length (from the factory delivery date)	
Distributor (Seal)			

Packing List

1. Main machine, 1
2. Operation manual (including warranty card), 1
3. Plug of the positive electrode of the solar array, 1
4. Plug of the negative electrode of the solar array, 1
5. AC output plug, 1
6. Sensor plug, 1

Email: info@maxima.solar | **Phone:** +971 4 552 4462 | **Website:** www.maxima.solar

Warranty Agreement

1. The warranty of this inverter is three years. When any fault or damage occurs on the product, within the warranty period, our company will provide free maintenance. After the warranty time, we can provide lifetime paid warranty service.
2. The warranty time starts from the date when the product is leaving the factory, and the machine frame code is the only proof to determine the warranty period.
3. Certain maintenance charge will be considered during warranty period if the fault is caused by the following reason:
   a) Operating against the manual or surpass the standard specification.
   b) Fix and modification without permission.
   c) Poor preservation.
   d) Using the inverter in an unusual way.
   e) Machine damage caused by fire, salt corrosion, gas corrosion, earthquake, storm, flood, lightning, abnormal voltage or other force majeure.
4. Please be sure to retain this card and show it to the maintenance service.

Email: info@maxima.solar | **Phone:** +971 4 552 4462 | **Website:** www.maxima.solar