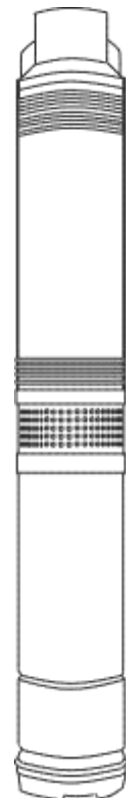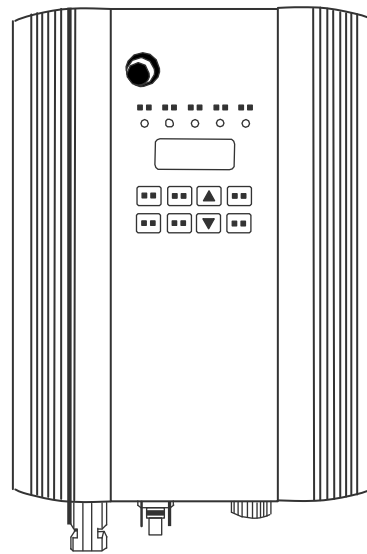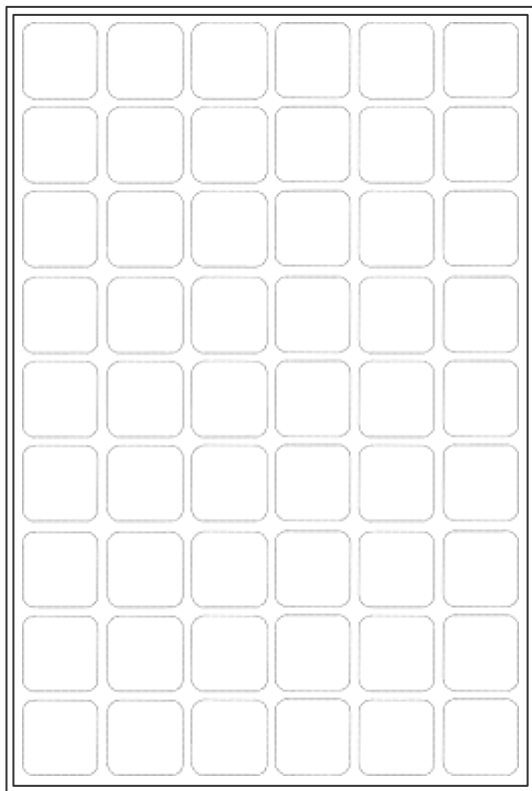# *Solar Pumping Inverter*

Operation Manual

Infinite Solar Energy

Preface

Thank you very much for using the PB series of solar pumping inverter.

Please be sure to read this manual carefully before installation and use in order to give full play to the performance of this product and ensure the safety of user and equipment.

Please preserve the manual in an orderly manner in order to subsequently facilitate the routine inspection and maintenance of the inverter and find out the cause of abnormity and treatment countermeasure.

If there are any puzzling questions or specific requirement during using, please contact the distributors of our company or directly keep in touch with the technology service center of our company.

The manual will be subject to change without any further notice.

Table of Contents

Safety Instruction

Safe operation of this product depends on its correct transportation, installation, operation and maintenance. Before doing these, please be sure to notice the safety-related prompt. There are 3 kinds of safety-related warning signs in this manual as follows:

Warning: Misuse will result in fire, serious injure to person or even death.

Caution: Misuse will cause low or middle-grade injure to person or equipment damage.

Prompt: Point out some useful information.

- Purchase Inspection

Caution
1. Never install if you find inverter damage or lack of component, or else it will cause occurrence of accident.

- Installation

Caution
1. To ensure a good convective cooling effect, the inverter must be installed vertically with at least 10 cm space left in the top and bottom.
2. Install it in the indoor location which is possessed of ventilation opening or ventilating device. It is forbidden to install where exposes directly to the sunlight.
3. Do not let the drilling remains fall into the inverter fin or fan during installation in case that heat dissipation is effected.

- Connection

Warning
1. Connection job must be performed by qualified electric professionals, or else it will cause electrocution or fire.

2. Please confirm that input power has already been cut off before connection, or else it will cause electrocution or fire.

3. Earth terminal must be reliably grounded, or else the inverter shell will have a danger of being electrified.

4. The type selection of PV array, motor load and inverter must be reasonable, or else the equipment will be damaged.

⚠ Caution

1. Please use the fasten terminal of the specified torque, or else it will cause fire.

2. Do not connect the output terminal of the inverter to the capacitor and phase-advanced LC/RC noise filter. It is recommended to use the output reactor when the distance between the inverter and motor load exceeds 100m.

● Running

⚡ Warning

1. Energize after confirming the correct connection or else it will damage the inverter or cause fire.

2. Do not modify the connection during electrifying, or else it will cause electrocution.

⚠ Caution

1. Adjust partial control parameters according to the steps indicated by the manual before its first running. Do not change the control parameters of the inverter randomly, or else it will cause damage to the equipment.

2. Because the heat sink's temperature is high during running, do not touch it for a long time, or else it will cause burn.

3. In the condition of altitude over 1000m, the inverter should be de-rated for use, that is, output current will be de-rated by 10% at every 1500 m increment of height.

● Others

Warning
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, or else it will cause personnel injury or equipment damage.
4. Treat the inverter as industrial waste when processing the abandoned inverter. It is possible that the electrolytic capacitor will explode during incineration and that part of components will produce toxic and harmful gas.

Chapter 1 Products Introduction

Introduction of Solar Pumping System

This Solar pumping systems can be applied to daily use (underground water), agricultural irrigation, forestry irrigation, desert control, pasture animal husbandry, water supply for islands, wastewater treatment engineering, 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 municipal engineering, city centre squares, parks, tourist sites, resorts and hotels, the landscapes and fountain systems in the residential areas.

The system is composed 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.

PV array   Pumping inverter   Pump

Solartech
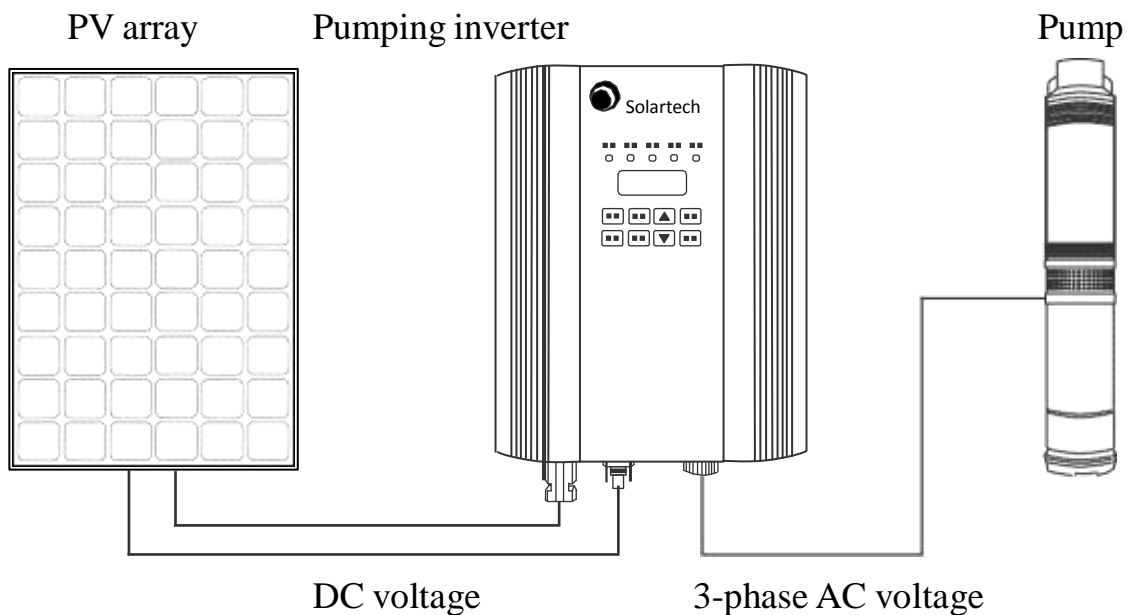
DC voltage   3-phase AC voltage

Fig. 1-1 Structure of solar pumping system

The PV array, an aggregation of many PV modules connected in series and in parallel, absorbs sunlight radiation and converts it into electrical energy, providing dynamical power for the whole system. The pumping inverter controls and adjusts the system operation and converts the DC produced by the PV array into AC to drive the pump, and adjusts the output frequency in real-time according to the variation of sunlight intensity to realize 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 pour 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 used.

Product Features

Based on many years of development and experiment, the self-developed pumping inverter (figure 1-2) by our company has the following features:

Adopting the proposed dynamic VI maximum power point tracking (MPPT) control method which has independent intellectual property; Fast response speed and stable operation; 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.

- Protection level IP52 (machine type's rated power less than 18.5 kW); ambient temperature for using: -10 ~ +50°C.
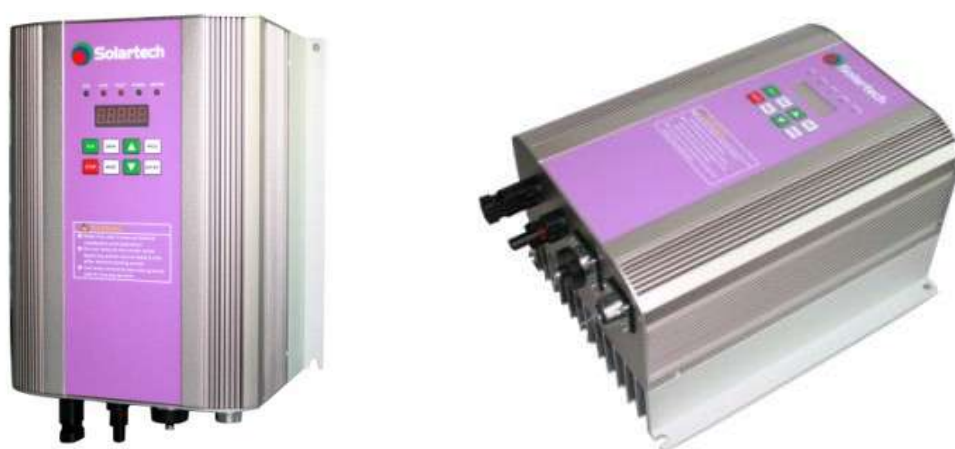

Fig. 1-2   PB series of pumping inverter

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 and SW and HW version that'll provide important basis for product application, maintenance and after service.
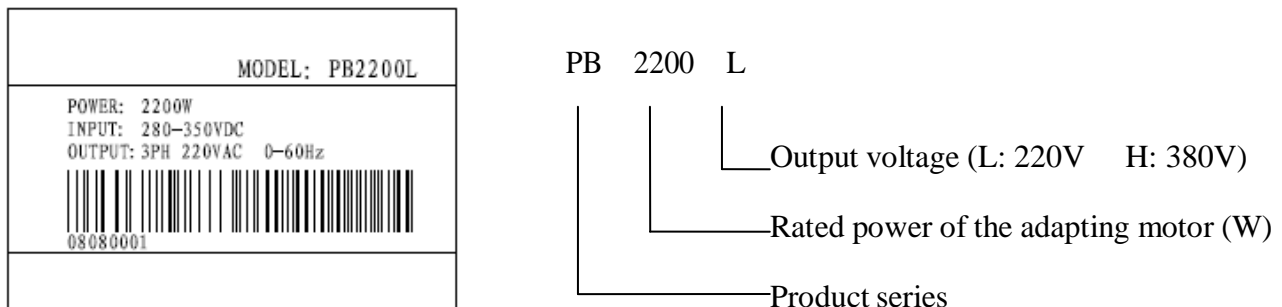

Fig. 1-3 Product nameplate and type description

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

Product Specification and Technical Index

Model	Adapting pump motor		Maximum DC input voltage (V)	Recommended MPP voltage (V)	Rated AC output current (A)	Output frequency (Hz)
	Rated power (kW)	Rated voltage (V)				
PB400L	0.25 ~ 0.4	200 ~ 220	430	280 ~ 350	3	0 ~ 60
PB750L	0.55 ~ 0.75	200 ~ 220	430	280 ~ 350	5	0 ~ 60
PB1500L	1.1 ~ 1.5	200 ~ 220	430	280 ~ 350	7	0 ~ 60
PB2200L	2.2	200 ~ 220	430	280 ~ 350	11	0 ~ 60
PB3700H	3 ~ 3.7	380 ~ 440	750	500 ~ 600	9	0 ~ 60
PB5500H	4 ~ 5.5	380 ~ 440	750	500 ~ 600	13	0 ~ 60
PB7500H	7.5	380 ~ 440	750	500 ~ 600	18	0 ~ 60
PB11KH	9.2 ~ 11	380 ~ 440	750	500 ~ 600	24	0 ~ 60
PB15KH	13 ~ 15	380 ~ 440	750	500 ~ 600	30	0 ~ 60
PB18KH	18.5	380 ~ 440	750	500 ~ 600	39	0 ~ 60
PB22KH	22	380 ~ 440	750	500 ~ 600	45	0 ~ 60

PB30KH	26 ~ 30	380 ~ 440	750	500 ~ 600	60	0 ~ 60
PB37KH	37	380 ~ 440	750	500 ~ 600	75	0 ~ 60
PB45KH	40 ~ 45	380 ~ 440	750	500 ~ 600	91	0 ~ 60
PB55KH	55	380 ~ 440	750	500 ~ 600	112	0 ~ 60

⚠ Caution: Please be sure to select the appropriate model according to the PV array and motor load.

⚠ Caution: High-power machine model uses multiple-channel DC input structure. The input power in the above table indicates total multi-channel input power; maximum DC current input should not exceed 15A.

Chapter 2 Installation and Wiring

Purchase Inspection

Our company has rigid quality assurance system in product manufacturing, package, etc. If any abnormity is found, please immediately contact the distributors of our company or directly keep in touch with the technology service center of our company. We will solve the problems for you immediately. 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

Dimension and Weight
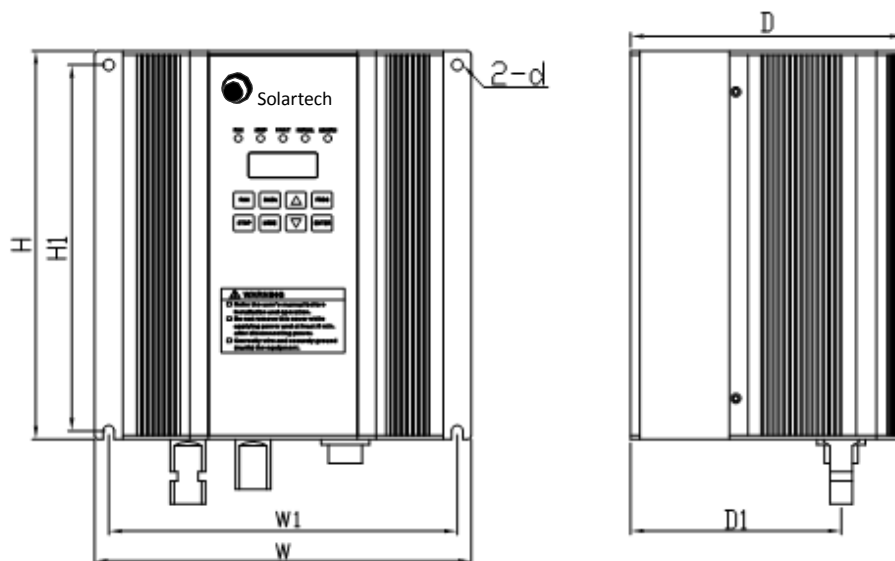
Fig. 2-1 Product appearance and installation dimension

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**	
PB3700H ~ PB18KH	250.0	310.0	200.0	235.0	295.0	167.0	7.0	8.0 ~ 8.5
PB22KH PB30KH	360.0	450.0	235.0	340.0	425.0	140.0	10.0	18
PB37KH ~ PB55KH	360.0	450.0	235.0	340.0	425.0	140.0	10.0	20

⚠ Caution: Most of PB series machine types are to be wall mounted. Please ensure that the mounting backplane can support the weight of the inverter.

Wiring Diagram

Case socket description
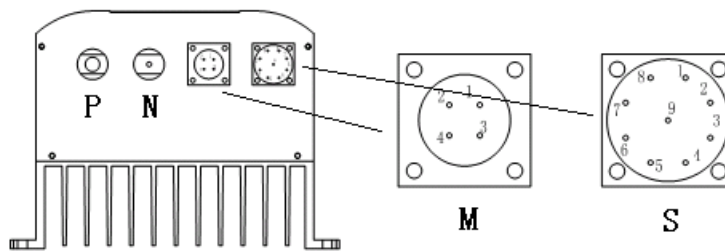
Fig. 2-2 PB-L wiring diagram
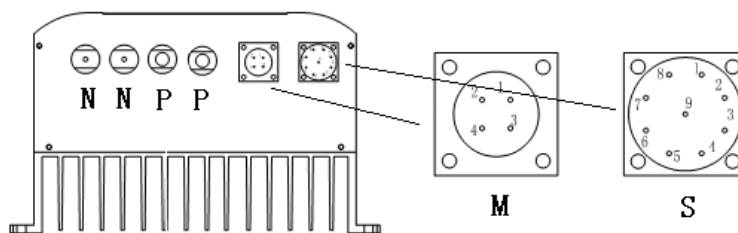
Fig.2-3 PB-H wiring diagram
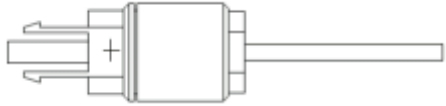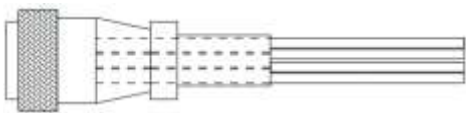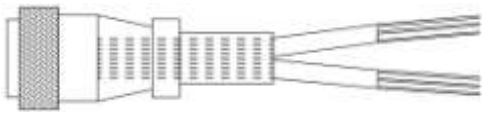
Socket	Terminal description	Connection description
DC input	P	Connected to positive electrode of PV array
	N	Connected to negative electrode of PV array
AC output	M-1	Connected to protective ground wire
	M-2	Connected to U phase of the motor

	M-3	Connected to V phase of the motor
	M-4	Connected to W phase of the motor
	S-1	GND Signal
	S-8	Tank Signal 1
Water level sensor input	S-7	Tank Signal 2
	S-6	Well Signal 1
	S-5	Well Signal 2

⚠ 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 PV array
One-strand, black			Connected to negative electrode of PV 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	Tank signal wire 1
		Yellow wire	Tank signal wire 2
		Black wire	Tank ground wire
	Black three-core wire	Blue wire	Well signal wire 1
		White wire	Well signal wire 2
		Black wire	Well 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	0.75 ~ 1.5
PB750L				
PB1500L				
PB2200L				
PB3700H				
PB5500H				
PB7500H			4	
PB11KH				
PB15KH		4	6	
PB18KH				

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

👉 Prompt: High-power wall-mounting machine model uses multi-channel DC input. Wire size of DC of each channel is selected and used as per the recommendation in the above table.

Instruction of Float Water Level Switch
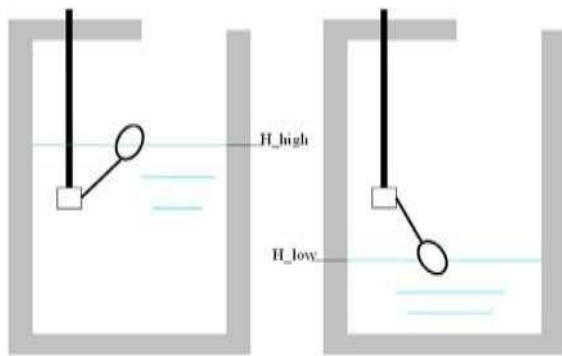
	Normal Open Type	Normal Close Type
Water level Over H-high	Closed	Opened
Water level Under H-Low	Opened	Closed

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

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Chapter 3 Operation Control

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.

Mode indicator light:

   RUN, STOP, FAULT, NORMAL ,ABNORM (AL)

7 Segment display elements

Operation key

(The function of the keys is shown in the table below)
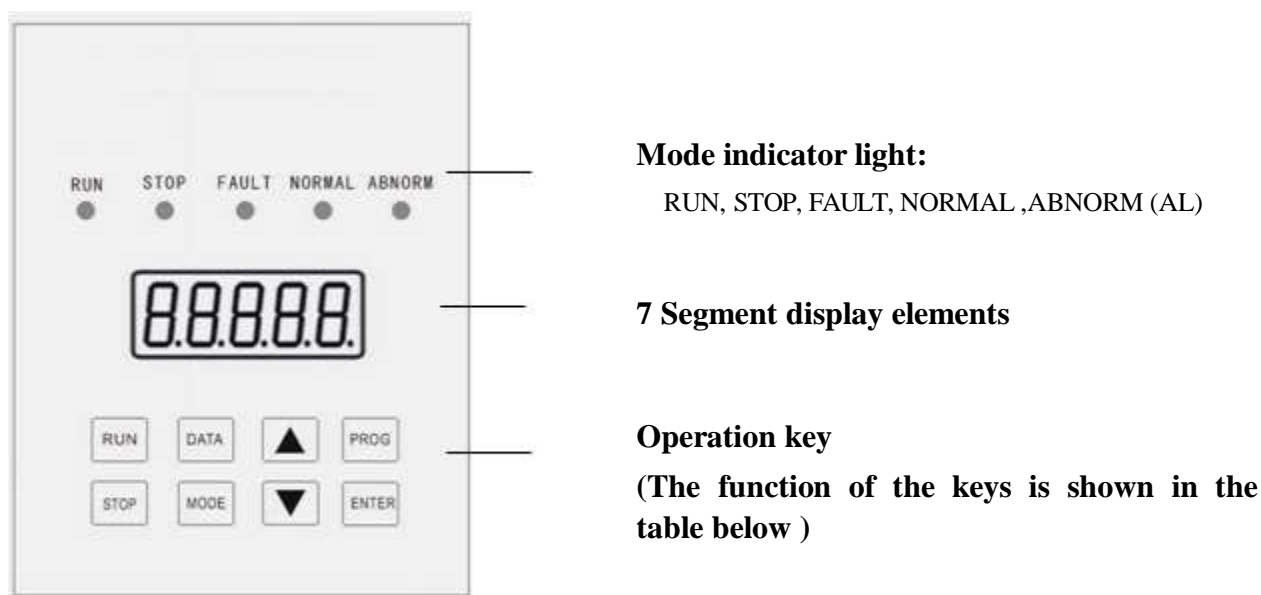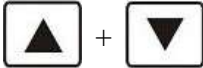
Fig. 3-1 Keyboard layout and name of each part

Indicator light and key	Name	Function Description	
RUN	Running indicator light	Green	Bright: Inverter is running
STOP	Shutdown indicator light	Red	Bright: Inverter is shut down
FAULT	Fault indicator light	Red	Bright: System fault
NORMAL	Normal indicator light	Green	Bright: System normal
ABNORM	Abnormal indicator light	Red	Bright: Tank or well water level is abnormal
RUN	Run key	Starting control for the inverter	
STOP	Stop key	Shutdown control for the inverter	
DATA	Data inquiry key	Enter or quit from the display status of the historical data.	

Indicator light and key	Name	Function Description
MODE	Mode switch key	1. Switch the contents to be displayed during data viewing. 2. Switch the digit to be edited during data editing.
▲	Increment key	1. Increase the parameter number or its value when the status of the control parameter is displayed. 2. Change the historical date upward or display the content of the historical data by turns when the status of the historical data is displayed. 3. Increase the output frequency or display current running data upward by turns when the data status is displayed during running.
▼	Decreasing key	1. Decrease the parameter no. or its value when the status of the control parameter is displayed. 2. Change the historical date downward or display the content of the historical data by turns when the status of the historical data is displayed. 3. Decrease the output frequency or display current running data downward by turns when the data status is displayed during running.
PROG	Programming key	Enter or quit from the display status of the control parameter
ENTER	Enter key	1. Confirm the content to be viewed or edited. 2. Confirm and save the parameter value when the parameter is edited.
▲ + ▼	Reset key	Press the combination key to reset in the protection status.

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:
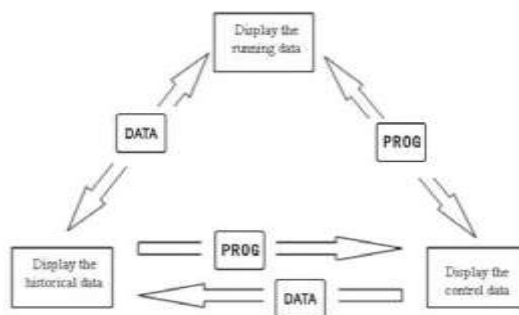

Fig. 3-2 Diagram for display status switching

View running data

Operation	Description	Display
Initial status: Current running data ↓ MODE ↓ MODE		
	Display current running data Output frequency of the inverter	Example: F. 50.00 Represent: 50.00Hz
	Display current running data Input voltage of the inverter	Example: Ud.340 Represent: 340V
↓ MODE ↓ MODE ↓ MODE	Display current running data Input current of the inverter	Example: A. 5.00 Represent: 5.00A
	Display current running data Input power of the inverter	Example: P. 1.50 Represent: 1.50kW
	Display current running data Output current of the inverter	Example: Io.6.0 Represent: 6.0 A
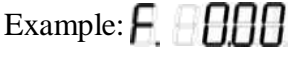
	Display current running data Inverter temperature	Example: A. 37.0 Represent: 37.0℃
↓ MODE	Display current running data Water level sensor status	Example: Ab n.o. Represent: normal water level
↓ MODE	Display current running data Time	Example: 12-30 Represent: 12:30
↓ MODE		

View Historical Data

Operation	Description	Display
Initial status: non-historical data display		
↓ DATA	Enter the data inquiry interface Display current date	Example: d 1.1. Represent: Jan 1st.
↓ MODE	Select the object to be modified (day, month, year)	Example: d 1.1. Modified digit: Scintillation
↓ ▲ or ▼	Modify the date to be inquired	Example: d 2.2. Represent: Feb second
↓ ENTER	Confirm the date to be inquired	Example: 2008 Represent year 2008
↓ MODE	Display historical data Accumulated generated energy of the day	Example: E 9.99 Represent: 9.99°
↓ MODE	Display historical data Maximum power point voltage of the day	Example: U. 320. Represent: 320V
↓ MODE	Display historical data Maximum power of the day	Example: P. 220. Represent: 2.20kW
↓ MODE	Display historical data Starting time of the day	Example: 105.10 Represent: 5:10
↓		

Operation	Description	Display
MODE ↓	Display historical data Shutdown time of the day	Example: **0.17.40** Represent: 17:40
MODE ↓	Display historical data Running time of the day	Example: **H 12S** Represent: 12.5h
MODE	Quit from the display status of the historical data Display current running data	Example: **F.5000** Represent: 50.00Hz

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View or modify the control parameter

Operation	Description	Display
Initial status: non-control parameter display		
↓ PROG	Enter the parameter modification interface Display No.0 parameter	**Pr 0** Represent: Pr.0
↓ ▲ or ▼	Select the parameter to be viewed and edited Display parameter number	Example: **Pr009** Represent: Pr.9
↓ ENTER	Confirm the parameter to be viewed or edited. Display parameter value	Example: **30** Represent: 30
↓ ▲ or ▼	Edit parameter value	Example: **25** Represent: 25
↓ ENTER	Confirm the editing and save the parameter value Display the next code number	Example: **Pr 10** Represent: Pr.10
↓ PROG	Quit from the parameter display mode Display current running data	Example: **F 000** Represent:0.00Hz

☞ Prompt: It can only view the control parameter during inverter operation. The

control parameter cannot be modified until the inverter stops running.

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: User parameter restores its factory set value. 3: Date clock calibration, modify the Pr.6~Pr.10 first, then set this parameter as 3.	1

Number	Name	Scope	Description	Factory set value
Pr.1	Maximum power point voltage	0 ~ Pr.2–1	Maximum power point voltage of the PV array.	310V 530V
Pr.2	Open circuit voltage	Pr.1+1 ~ 1000	Open circuit voltage of the PV array. Notes: Interlock function between Pr.1 and Pr.2, if necessary, needs to coordinate with the modification.	380V 650V
Pr.3	Rated voltage	1 ~ 1000	Rated voltage of the motor load	220V 380V
Pr.4	Rated current	0.1 ~ 300.00	Output current of rated AC	
Pr.5	Startup latency	1 ~ 6000	Startup 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 in line with rated frequency of the motor.	50.00Hz
Pr.14	Stopping frequency	0 ~ 60.00	Shut down after the output frequency is less than the set value.	20.00Hz
Pr.15	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 Others: other value setting is forbidden, or will cause abnormity to the inverter working.	0

Number	Name	Scope	Description	Factory set value
Pr.16	Tank sensor setting 2(connection terminal S-7 for S-1)	0 ~ 9	0：Not use water level sensor. 6：Normally close water level sensor 7：Normally open water level sensor Others: other value setting is forbidden, or will cause abnormity to the inverter working.	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 Others: other value setting is forbidden, or will cause abnormity to the inverter working.	0
Pr.18	Well sensor setting 2 (connection terminal S-5 for S-1)	0 ~ 9	0：Not use water level sensor. 6：Normally close water level sensor 7：Normally open water level sensor Others: other value setting is forbidden, or will cause abnormity to the inverter working.	0
Pr.19	Total generated energy	Read-only		0
Pr.20 ~ Pr.24	Fault type record 1 ~ 5	Read-only	See chapter 5 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 rate power, the parameter must be set correctly, or abnormal operation may caused.	Depends on model
Pr.26	Pump motor pole pairs	1~10	Pump motor pole number is used to calculate the synchronous speed.	1
Pr.27	Delay time of restart pump if Well water level abnormal	1~30000	The delay time if abnormal water level of well or loss of load protection, unit is seconds. (if countdown more than 999 seconds, the code letters flashing, but the delay time 999 is unchanged)	600

Number	Name	Scope	Description	Factory set value
Pr.28	Loss of load protection is valid or not	0~1	0：invalid 1：valid(delay time of loss of load protection is the same as value Pr.27) 　Note: When the loss of load protection is set to valid, the loss of load will determine only the output frequency is higher than Pr.14 frequency．	0
Pr.29	Delay time of restart pump if Tank water level abnormal	1~30000	The delay time if abnormal water level of tank, unit is seconds. (if countdown more than 999 seconds, the code letters flashing, but the delay time 999 is unchanged)	600

☞ Prompt: After modifying the parameter with shading in the table above, the

next operation cannot be performed until the inverter is reset.

☞ Prompt: Record is not made because of the under-voltage fault of input voltage

caused by the weakness of the sunlight intensity.

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	1. Modify Pr.6~Pr.10 (year, month, day, hour, minute) according to the date and time. 2. Modify the Pr.0 parameter value as3.
3	Modify PV array parameter	1. Modify Pr.1 parameter (maximum power point voltage) according to the cell array. 2. Modify Pr.2 parameter (open circuit voltage) according to the PV array. (The real measured value ,but not rated value in the datasheet) Note: Interlock function between Pr.1 and Pr.2, if necessary, needs to coordinate with the modification.

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4	Modify the water level sensor setting	1. If inverter is matched with tank sensor, modify the Pr. 15, Pr.16 as 8 or as 0. 2. If inverter is matched with well sensor, modify the Pr. 17, Pr.18 as 9 or as 0.
5	Modify rated voltage of the pump	Modify Pr.3 parameter (rated voltage) according to the rated voltage of the pump.
6	Modify the maximum operating frequency	Modify Pr.13 parameter (rated frequency) according to the pump rated frequency
7	Confirm the motor wiring	1. Modify Pr.11 parameter value as 0. 2. Modify Pr.12 parameter value as 30.00. (in a shining day) 3. Press ⬚RUN⬚ to run and observe water yield from the outlet. 4. Press ⬚STOP⬚ to shut down and change the order of output connection. 5. Press ⬚RUN⬚ to run and observe water yield from the outlet. 6. Press ⬚STOP⬚ to shut down, select the wiring method with larger water yield to ensure the pump's co-rotation.
8	Modify the minimum operating frequency	1. Modify Pr.12 parameter value as 10.00. 2. Press ⬚RUN⬚ key to run. 3. Observe the effluent of the water outlet. 4. If there is no effluent in the outlet, press ⬚▲⬚ to slowly increase the output frequency. 5. If there is effluent of the pump, record the operating frequency f0. 6. Modify the Pr.14 parameter value as f0 (shutdown 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, then modify the output frequency

		by pressing ▲ or ▼.
		1: Full-automatic operation: the inverter will start automatically if the sunlight is strong enough, the output frequency will track automatically according to the sunlight. The control cell array will export maximum power.
		2: Press RUN to run, output frequency will track automatically according to the sunlight. The control cell array will export maximum power.
10	Modify the control parameter as read-only.	Modify the Pr.0 parameter value as 1 before the inverter start up.

⚠ Caution: Please do not modify the control parameters of the inverter randomly,

or else it will cause abnormal working of the system.

Chapter 4 Fault Diagnosis

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: general protection measure is to stop driving signals output of the motor (breakaway) immediately while the restart is forbidden for a certain period of time.

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 cut off the input power supply and get electricity until the internal power supply is cut or press the "RESET" key to reset. If the fault still exists after resetting, please contact the manufacturer and make relevant processing.

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 operating status data will be displayed.

CODE	Code description	Possible reason	Countermeasures
o.U.	Over-voltage	Too high input voltage	Inspect PV array voltage
L.U.	Under-voltage	Too low input voltage Too weak sunlight intensity	Inspect PV array voltage
o.C.	Over-current	Too large pump load Low PV array voltage Too long motor wiring	Change low-power pump load Inspect PV array voltage Reduce the connection between inverter and motor.
o.L.	Overload	Too large load	Reduce the highest operating frequency.

0P.	Over-current of the module	Shorted output or grounding Module damaged	Inspect the connection Turn to manufacturer for service
I.r.	Over-temperature of the module	Air duct blocked Too high ambient temperature	Clear the air duct or improve the ventilation condition
E.I	AC CT fault	Device or circuit damaged	Turn to manufacturer for service
Ed.	DC CT fault	Device or circuit damaged	Turn to manufacturer for service
dE.	Data record fault	Device or circuit damaged	Turn to manufacturer for service
E.L.	pump running empty	Pumping empty, pump wire are all broken, pump is not match with inverter.	To check with water level, pump wire connection, pump rate is match with inverter capacity or not.
P EE.	Communication fault	Device or circuit damaged	Reset Turn to manufacturer for service

Description for Other Codes

CODE	Code description	Relevant description
P IU.	Parameter initialization	Return to normal after resetting
P EC.	Important parameter modification	Return to normal after resetting
C - I50	Inverter type	C: 200V series; $I50$: rated power 1.5 kW
on 30	Start time-delay	Countdown of the restart: 30 s
Ab P2	water level sensor 1 is abnormal	When water level is normal, system will be normal automatically before delayed-restart.
Ab P3	water level sensor 2 is abnormal	When water level is normal, system will be normal automatically before delayed-restart.
Ab P4	water level sensor 3 is abnormal	When water level is normal, system will be normal automatically before delayed-restart.
Ab P5	water level sensor 4 is abnormal	When water level is normal, system will be normal automatically before delayed-restart.
Ab PA.	water level sensor 1,2 matching use are abnormal	When water level is normal, system will be normal automatically before delayed-restart.

CODE	Code description	Relevant description
Rb. Pb.	water level sensor 3,4 matching use are abnormal	When water level is normal, system will be normal automatically before delayed-restart.
UPtoL.	Voltage of PV panel is too low to start.	Low irradiation or Pr.2 setting error Module voltage less than starting voltage

Fault Inquiry and Reset

This series of inverters record the fault codes of the latest 5 times. Searching this information will help find the fault cause. Fault information is stored together with the control parameter, code numbers are Pr.20 ~ Pr.24. Please refer to the keyboard operation method to search 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: Completely check up on the fault cause and eliminate it before resetting. If it can not be reset or goes wrong after resetting, check up on the cause, because continuous resetting will damage the inverter.

⚠ Caution: Delay 5 minutes to reset during overload and overheat protection.

Chapter 5 Service and Maintenance

Routine Inspection and Maintenance

Affected by ambient temperature, humidity, dust, vibration and internal device aging of the inverter, the inverter will appear some potential problems during operation. To make the inverter run stably for longer time, a periodic inspect must be exerted every year.

Requirement of Inspection and Maintenance

1. The inspection must be performed by professional technical personnel, if necessary, cut off power supply of the inverter first.

2. Avoid leaving the metal components in the inverter, or else it will cause damage to the equipment.

3. Electric insulation test has been made on the inverter before it is leaving factory, so the user doesn't have to carry on a withstand-voltage test.

4. If it is necessary to conduct insulation test on the inverter, all the input and output terminals must be reliably shorted. It is forbidden to conduct insulation test on single terminal. Use the 500V megohm meter to conduct the test.

5. It is forbidden to use the megohm meter to test in the control circuit.

6. 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 under environment recommended by this manual. Inspect and maintain as per the following table.

Inspect frequency		Inspection item	Inspection content	Judgment standard
Routine	Regular			
√		Running environment	1. temperature, humidity 2. dust, gas	1. Temperature<50°C. 2. Humidity <90%, no dew condensation. 3. No peculiar smell, flammable,

Inspect frequency		Inspection item	Inspection content	Judgment standard
Routine	Regular			
				explosive gas.
	√	Cooling system	1. Installation environment 2. Radiator	1. Excellent ventilation in installation environment. 2. Radiator air duct not blocked.
√		Inverter body	1. Vibration, temperature rise. 2. Noise 3. Lead, 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 scope. 2. Output current under the rated value.

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, of which the degree will depend on the ambient temperature and application condition. The inverter used under normal condition should replace its electrolytic capacitor every 10 years. When the filter capacitor's electrolyte is leaking, safety valve bursting out or the capacitor main body expanding, replace it immediately.

Cooling Fan

Of PB series of pumping inverter, all the inverters above PB 5500 have cooling fans inside. Cooling fan's service life is about 1, 5000 hours. If the fan appears abnormal noise or produces vibration, replace it immediately.

Storage and Warranty

Storage

If the storage is not used temporarily or stored for long time after purchasing, the following notice should be paid attention to:

Avoid placing the inverter in high temperature or humid place or where there is vibration and metal dust, and excellent ventilation should be ensured.

Inside filter capacitor performance of the inverter will decline for long–time disuse. It is necessary to energize one time every 2 years to restore the performance of the filter capacitor and inspect the inverter function at the same time. It is necessary to increase the voltage through a DC power supply during energizing with power-on time not less than 5 hours.

Warranty

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.

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

1. Fault caused by operating against the manual or surpass the standard specification
2. Fault caused by self fix and modification without permission.
3. Fault caused by poor preservation
4. Fault by using the inverter in abnormal function
5. Machine damage caused by fire, salt corrosion, gas corrosion, earthquake, storm, flood, lightning, abnormal voltage or other force majeure.

☞ Prompt: Warranty only covers the body of the inverter.

Warranty Card

Client name		Contact person	
Client address		Telephone number	
Product type		Date of purchase	
Machine frame code		Warranty length (from the leaving factory day.)	
Distributor (Seal)			

Packing List

1. Main machine, 1
2. Operation manual(including warranty card), 1
3. Plug of the positive electrode of the PV array, 1
4. Plug of the negative electrode of the PV array, 1
5. AC output plug, 1
6. Water level sensor plug, 1 (matching)

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Warranty Agreement

1. The warranty of this inverter is two 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 should be considered during warranty period if the fault is caused by the following reason:

   a) Fault caused by operating against the manual or surpass the standard specification

   b) Fault caused by self fix and modification without permission.

   c) Fault caused by poor preservation

   d) 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.

Infinite Solar Energy