



# **PDS33 Solar Pump Controller User Manual**

## **Preface**

Thank you for using PDS33 series products. This manual provides you with relevant operation instructions and detailed description of parameters. Please read this manual carefully before installation, running, maintenance or inspection.

Please make sure the wiring and the pump's rotation direction is correct before using.

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## Notes for Safe Operation

### ■ Before Installation



Do not install or operate the controller which is damaged or has missing parts. Otherwise, it may result in equipment damage or life harm.

### ■ Installation



- ◎ Hold the bottom of the controller when installing or moving the controller, you must not just hold the shell, in order to prevent the injury or breaking of controller.
- ◎ Install the controller on nonflammable material like metal. Otherwise it may cause a fire.
- ◎ When the controller is mounted in a protective cabinet, the cabinet needs to set vents to ensure ambient temperature is below 40°C, Otherwise it may be damaged because of high temperature.
- ◎ When installing the controller, you should avoid direct sunlight, the controller can be installed under the PV arrays.



- ◎ Ensure only qualified personnel can install and operate the controller. Otherwise it can cause an electrical shock or damage of the controller.
- ◎ Make sure the controller is isolated from power supply by the circuit breaker. Otherwise it may cause a fire.
- ◎ Make sure that the ground terminal  is grounded correctly.
- ◎ Do not touch the power input terminals or the pump's terminals. Otherwise it may cause an electrical shock.

## ■ Operation



- ⊙ Do not open or remove the front cover during operation. Otherwise it may cause an electrical shock.
- ⊙ Before testing the pump must be installed; you cannot make the pump dry-run for a long time. In order to test the pump, the maximum dry-run time is not more than 15s
- ⊙ If the pump turning is reversed, it can change any two cables of the pump's three power cables.
- ⊙ When the water pump is stopped due to the light shadow, it will restart the operation after 300s.
- ⊙ If a water level probe is installed in the well, when the water level is below the level of water shortage, the water pump will stop. If there is no water level probe, it will need to be short connection of controller's related terminals. If a water level probe is not used, the controller's terminals must be short connected

## ■ Maintenance and check



- ⊙ Only qualified or authorized professional personnel can maintain, replace and inspect the controller. Otherwise it may cause damage and injury.
- ⊙ Wait at least 10 minutes after the power failure, or make sure that is no residual voltage before carry out maintenance and inspection, otherwise it may cause damage.

## ■ Others



- ⊙ Failing to follow these instructions, which result in damage to the machine, cannot enjoy the warranty service.

## Chapter 1 How It Works

The PDS33 solar pumping system serves to provide water in remote applications where electrical grid power is either unreliable or unavailable. The controller can convert DC power from the PV array to AC power, and drive variable kinds of pumps. In sunny days, the PDS33 solar pumping system can continuously pump water. The system is without batteries and other energy storage devices, it is recommended to take water to a reservoir for later use and water sources are those natural or special such as river, lake, well or waterway, etc. A float switch can be installed in the water tower to control the pump operation. And install a low-level probe in well to detect the well water so that when the water shortage pump is stopped. Figure 1 shows a typical diagram of a PDS33 solar pumping system. The major parts and components in the system are listed after the diagram.

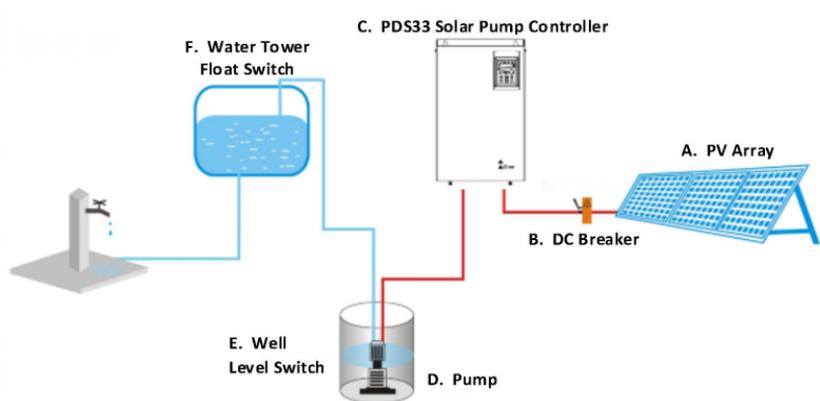


Figure 1 PDS33 solar pumping system

**The PDS33 solar pumping system is designed which consists of:**

A. Solar Array

- B. DC Breaker or Disconnecting Switch
- C. PDS33 series Solar Pump Controller
- D. Pump and Motor
- E. Water Source Level Switches (optional)
- F. Tank Level Switches (optional)

The PDS33 solar pump controller runs at variable speed while matching the changing power provided by the solar array. Variable speed operation means there is no in-rush or surge of energy during the pump/motor start-up, helping to eliminate wear on the motor and pumping system.

### **Pump Check Valve Requirements**

**Notice:** In order to ensure maximum system reliability and water delivery, check valves must be installed in the drop pipe. The first check valve must be installed at the pump and additional check valves should be installed every 30m (100 ft) of vertical pipe after the pump.

## **1.1 Features**

### **System Diagnostics**

The PDS33 solar pump controller continuously monitors system performance and detects a variety of abnormal conditions. In many cases, the controller will compensate as needed to maintain continuous system operation; however, if there is high risk of equipment damage, the controller will protect the system and display the fault condition. If possible, the controller will try to restart itself when the fault condition subsides. See Diagnostics and Troubleshooting section for a list of Fault Codes and corrective actions.

### **Motor Soft-Start**

Normally, when there is a demand for water and power is available, the PDS33 solar pump controller will be operating. Whenever the PDS33 solar pump controller detects a need for water, the controller always “ramps up” the motor speed while gradually increasing motor voltage, resulting in a cooler motor and lower start-up current compared to conventional water systems. Due to the controller’s soft-start feature this will not harm the motor.

### **Over Temperature Monitoring**

The PDS33 solar pump controller can be operated at full power when the ambient temperature reaches 45 °C. At temperatures above 45 °C, the controller reduces the carrier frequency and maintains operation as much as possible.

### **Level Control Switch**

The PDS33 solar pump controller can access two water level switch detects remotely control the pump automatically. Level switch for PDS33 solar pump controller is optional, not mandatory.

### **Switching to Backup AC Power**

The PDS33 solar pump controller's input power terminal may be switched manually to a backup AC power source.

Note: Depending on the model number, PDS33 solar pump controllers support power input either 220VAC single phase, or 380VAC three phase, Please contact controller manufacturer or authorized agencies for details.

When the system is running on back-up AC power, please check for sufficient DC primary source power every 30 minutes. If the primary DC power is available, shut down the controller, switch back to primary power and attempt to run on DC power supply.

**NOTICE** :A DC circuit switch and a generator power switch must be installed, and these two switches must be mechanically interlocked from each other to prevent switching on together resulting the solar PV and the generator being connected to the solar PDS33 solar pump controller simultaneously! Please check if the design is in accordance with all applicable national and local electrical codes.

## Chapter 2 General Information

The PDS33 solar pump controller is a variable speed motor drive designed to run any IEC three-phase asynchronous motors. The PDS33 solar pumping system provides water to remote locations by converting high voltage, direct current from a solar array into alternating current to run a standard three-phase asynchronous motor. When solar power is not available, the controller can be switched manually to an alternate single-phase or three-phase AC input such as a generator or inverter from battery, if available. The controller provides fault detection, motor soft start, and speed control. The PDS33 solar pump controller is designed to provide these features with the plug and play ease of installation.

The PDS33 solar pump controller is designed with the high standard of reliability expected of products. The controller attempts to drive the pump and motor to deliver water even under adverse conditions, reducing output as necessary to protect the system components from damage, and only shutting down in extreme cases. Full operation is restored automatically whenever abnormal conditions subside.

### 2.1 Inspection

Before starting , inspect the PDS33 solar pump controller unit. Verify that the part number is correct and that no damage has occurred during transit.

**NOTE:** PDS33 solar pump controller is one component of a PDS33 solar pumping system which has other two optional components, solar array and AC pump with motor.

### 2.2 Descriptions and Features

The PDS33 solar pump controller is based on a standard PDS33 platform controlling a standard three-phase asynchronous motor driving a pump powered by

a solar array or an optional AC generator backup.

The PDS33 solar pump controller continuously monitors system performance and incorporates a number of features for pumping system protection. In the event of a fault, the PDS33 solar pump controller will indicate the type of fault through the LED display mounted on the front cover of controller.

The PDS33 solar pumping system is optimized for pumping under adverse input power conditions unique to solar arrays:

- Internal diagnostics will tolerate a lower input voltage.
- Whenever possible, the controller attempts to drive the pump load by maximizing power output from the solar array.

An easy to use interface is provided to enhance configurability and enable remote system monitoring.

- A LED display provides a detailed indication of system status.
- A small keypad offers flexibility for selection of user options.

## 2.3 Protection Features

Electronic monitoring gives the controller the capability to monitor the system and automatically shut down in the event of:

- Dry well conditions – with low level switch
- Bound pump – with auto-reversing torque.
- High Voltage Surge
- Low Input Voltage
- Open motor circuit
- Short circuit
- Over heat

**NOTE:** This controller provides motor overload protection by preventing motor current from exceeding rating current and by limiting the duty cycle in the event of low water level. This controller does not provide over temperature sensing of the motor.

## 2.4 PDS33 Solar Pump Controller Model Description

### 2.4.1 Model Description

PDS33 - 4 T 5R5  
 ① ② ③ ④ ⑤

Segment	Description	Options
①	PDS series	
②	Series ID	3: Series of 3rd generation. 3: Apply to three-phase induction motor
③	Rated Output Voltage	2: 220V three phase; 4: 380V three phase
④	Input Voltage	S: DC 310V rating, MPPT range DC 275V~ 380V (Note 1) T: DC 540V rating, MPPT range DC 500V~750V (Note 2)
⑤	Motor Power Rating	004:4kW;5R5:5.5kW;R: decimal point
<p><b>Note 1:</b> Supporting Alternating Current input, with voltage rating of AC 220V single phase connected to terminal R&amp;T.</p> <p><b>Note 2:</b> Supporting Alternating Current input, with voltage rating of AC 380V three phase connected to terminal R, S and T.</p>		

### 2.4.2 PDS33 Solar Controller General Parameters

General Parameters			
Protection			
Surge Protection	Integrated	Overvoltage Protection	Integrated
Under voltage Protection	Integrated	Locked pump Protection	Integrated
Open circuit Protection	Integrated	Short circuit Protection	Integrated
Overheated Protection	Integrated	Dry Run Protection	Integrated
Communication			
MODBUS Communication Card	Optional RS-485		
Others			
Ambient Temperature Range	-20°C~60°C;>45°C, Derating as Required		
Cooling Method	Fan Cooling		
Ambient Humidity	≤ 95%RH		
Standard Warranty(month)	18		
Certificates	IEC/EN 61800-5-1,IEC/EN 61800-2:2004,IEC/EN61800-3:2004,CE		

## 2.4.3 PDS33 Solar Controller Input and Output Data

### PDS33-2SXX/4TXX Input and Output Data

Controller Model	PDS33-2S2R2	PDS33-4T2R2	PDS33-4T004	PDS33-4T5R5
<b>Input Data</b>				
Max Input Voltage(Voc)	DC 450V	DC 800V		
Recommended Voltage, at MPP	DC 275-380V	DC 500-750V		
Recommended PV Array Power [kW]	2.7~3.5	2.7~3.5	4.8~6.4	6.6~8.8
<b>Alternate AC Generator</b>				
Input Voltage	AC 220V(±15%)	Three Phase AC 380(±15%)		
Max Amps(RMS)[A]	23	5.8	10.5	14.6
Power and VA Capability[kVA]	4	4	5.9	8.9
<b>Output Data</b>				
Output Voltage, Rated	AC 220V(±15%)	Three Phase AC 380(±15%)		
Max Amps(RMS)[A]	9.6	5.1	9	13
Output Power, Rated[kW]	2.2	2.2	4	5.5
Output Frequency	0~50Hz/60Hz			

Controller Model	PDS33-4T7R5	PDS33-4T011	PDS33-4T015	PDS33-4T18R5
<b>Input Data</b>				
Max Input Voltage(Voc)	DC 800V			
Recommended Voltage, at MPP	DC 500-750V			
Recommended PV Array Power [kW]	9~12	13.2~17.6	18~24	22.2~29.6
<b>Alternate AC Generator</b>				
Input Voltage	Three Phase AC 380V(±15%)			
Max Amps(RMS)[A]	20.5	26	35	38.5
Power and VA Capability[kVA]	11	17	21	24
<b>Output Data</b>				
Output Voltage, Rated	Three Phase AC 380V(±15%)			
Max Amps(RMS)[A]	17	25	32	37
Output Power, Rated[kW]	7.5	11	15	18.5
Output Frequency	0~50Hz/60Hz			

Controller Model	PDS33-4T022	PDS33-4T030	PDS33-4T037	PDS33-4T045
<b>Input Data</b>				
Max Input Voltage(Voc)	DC 800V			
Recommended Voltage, at MPP	DC 500-750V			
Recommended PV Array Power [kW]	26.4~35.2	36~48	44~59.2	54~72
<b>Alternate AC Generator</b>				
Input Voltage	Three Phase AC 380V(±15%)			
Max Amps(RMS)[A]	46.5	62	76	92
Power and VA Capability[kVA]	30	40	57	69
<b>Output Data</b>				
Output Voltage, Rated	Three Phase AC 380V(±15%)			
Max Amps(RMS)[A]	45	60	75	91
Output Power, Rated[kW]	22	30	37	45
Output Frequency	0~50Hz/60Hz			

Controller Model	PDS33-4T055	PDS33-4T075	PDS33-4T093	PDS33-4T110
<b>Input Data</b>				
Max Input Voltage(Voc)	DC 800V			
Recommended Voltage, at MPP	DC 500-750V			
Recommended PV Array Power [kW]	66~88	90~120	112~149	132~176
<b>Alternate AC Generator</b>				
Input Voltage	Three Phase AC 380V(±15%)			
Max Amps(RMS)[A]	113	157	180	214
Power and VA Capability[kVA]	85	114	134	160
<b>Output Data</b>				
Output Voltage, Rated	Three Phase AC 380V(±15%)			
Max Amps(RMS)[A]	112	150	176	210
Output Power, Rated[kW]	55	75	93	110
Output Frequency	0~50Hz/60Hz			

Note: according to different regions, the recommended PV array power is 1.2 ~ 1.6 times the power of the controller.

## 2.5 Outline & Installation Dimensions

### 2.5.1 Outline & installation dimensions diagram

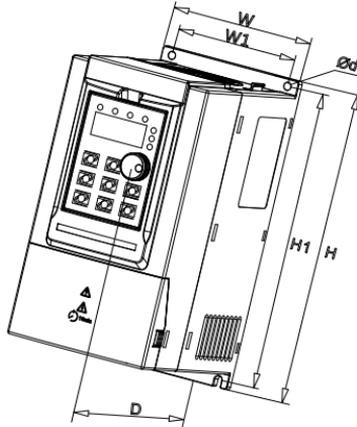


Figure 2 2.2kW-7.5kW Outline Dimension

Type	Outline Dimension			Installation Dimension		Hole Size
	H	W	D	H1	W1	d
PDS33-2S2R2	187	88	138	177	73	5
PDS33-4T2R2						
PDS33-4T004	207	100	147	197	85	5
PDS33-4T5R5	247	130	167	237	113	5
PDS33-4T7R5						

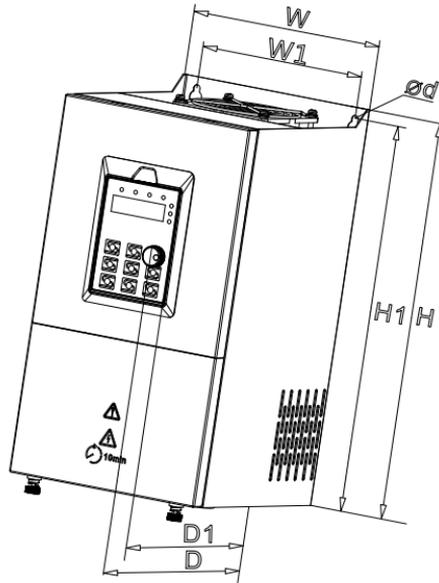


Figure 3 11kW-110kW Outline Dimension

Type	Outline Dimension			Installation Dimension		Hole Size
	H	W	D	H1	W1	d
PDS33-4T011	360	182	197	331	156	7
PDS33-4T015						
PDS33-4T18R5	385	219	197	356	156	7
PDS33-4T022						
PDS33-4T030	442	256	228	414	199	7
PDS33-4T037						

PDS33-4T045	543	310	280	523	245	10
PDS33-4T055						
PDS33-4T075	580	358	328	560	270	10
PDS33-4T093						
PDS33-4T110						

## Chapter 3 Mechanical and Electrical Installation

### 3.1 Mechanical Installation

#### 3.1.1 Overheat protection

Install the PDS33 solar pump controller in a control box with control terminals and power wiring. Install the control box out of direct sunlight to prevent overheating and reduced performance. The optimum location is on the mounting pole for the solar array underneath the array for protection from the sun, heat, and weather elements. Placing the control box in direct sunlight or high ambient temperatures will result in reduced performance due to temperature foldback protection of the PDS33 solar pump controller. For optimum performance, maximize the shading of the control box.

It is recommended that use a wire tube to protect the electric wire from the destruction of wildlife and natural weathering, and bury the wire tube into the ground to strengthen protection. If you do not use a wire tube, you can use a higher quality outdoor cable.

#### 3.1.2 Location Selection

The PDS33 solar pump controller is intended for operation in ambient temperatures up to 60°C, but in order to avoid overheating caused by the failure, it is recommended to install the controller in the shadow position.

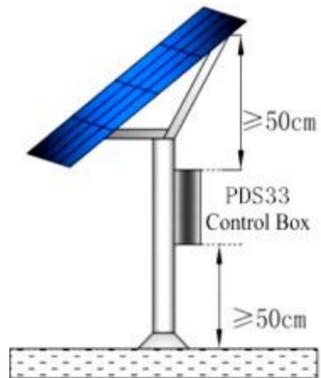


Figure 5 Control Box Location

The PDS33 solar pump controller must be installed into a control box which has a tight enclosure to avoid direct sunshine, rain, dust, moisture, animals, plants, etc. The control box should have a bottom gland plate for installing wire cord or conduit. To decide the size of control box, Please refer to the following Figure 5.

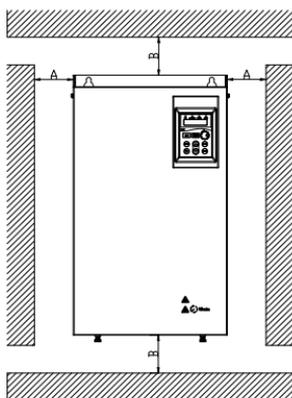


Figure 6 Ventilation Arrangement and Required Distances

Power grade	Installation dimensions	
	A	B
<7.5kW	> 10mm	> 100mm
11kW-15kW	> 30mm	> 150mm
18.5kW-37kW	≥ 50mm	≥ 200mm
45kW-110kW	≥ 50mm	≥ 300mm

### 3.2 Electrical Installation

#### 3.2.1 Terminals

The following are typical figures of terminal blocks.

**Note: Terminals are different in shapes and combinations, depending on different sizes of PDS33 Solar Controllers.**

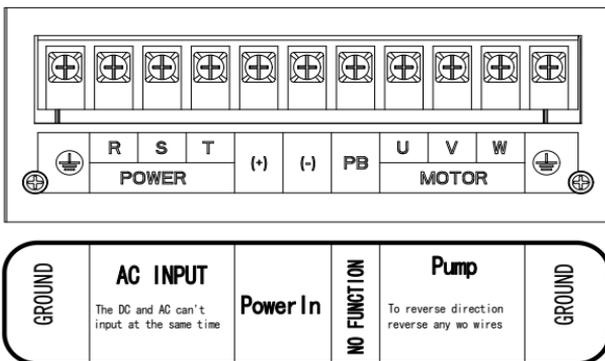


Figure 7 Main terminals (The sequence may be different from actual product)

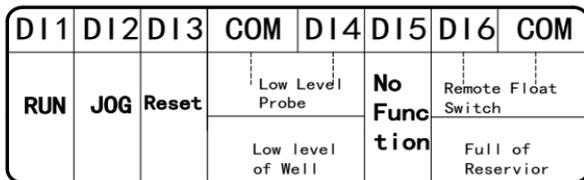


Figure 8 Control terminals (The sequence may be different from actual product)

### 3.2.2 Power in DC Wiring

For Solar Pumping Systems, a two-pole DC disconnecting switch must be installed between the solar array and the PDS33 solar pump controller.

Connect the cables which comes from the two-pole DC disconnect Switch downstream terminals marked with “+” and “-” (positive and negative poles of Solar panel output), to PDS33 solar pump controller’s terminals block labeled as “+”, “-”.

Note: The R, S, T terminals are with anti reverse connection protection; DC power supply can be connected in the R, S, T terminals, can not consider the phase sequence.



Before connect DC wiring, following the steps below to prevent hazardous electric shock resulting in serious injury or device burning.

- Make sure that the external DC disconnect switch is off.
- To ensure that the polarity of the solar array cable must be properly connected to the controller's +, - pole, otherwise possible damage the controller.
- Make sure that AC power is disconnected (If AC power supply is wired as backup power, AC and DC power supply can not simultaneously put into the controller, otherwise it will damage the controller.)

### 3.2.3 Junction box connection

If there are a large number of solar modules, it is necessary to use a junction box to converge the bus to the solar array. The junction box need to install fuses, lightning protection device and DC switch. The fuse and the DC switch can prevent the short circuit protection; the lightning protection device can play the direct current side the lightning protection function. The junction box must be sealed, and water can not enter

### 3.2.4 Ground Wiring

Ground terminal (GND) is labeled as this icon  Please refer to the instruction to this icon, or other equivalent icon or sign by local electrical codes or international standard. Correct grounding helps to prevent shock hazard if there is a fault in the motor.

### 3.2.5 Motor Wiring

Connect the cable with four wires from the Motor to the controller terminal block to terminals U, V, W, and GND .Check motor lead color to ensure correct installation.

**Note: To reverse direction of motor rotation, reverse any two wires**

US	Black (BLK)	Red (RED)	Yellow (YEL)	Ground (GND)
International	Gray (GRY)	Black (BLK)	Brown (BRN)	Ground (GND)

### 3.2.6 Low water level probe wiring (optional)

In order to avoid dry pumping lead to pump damage can be connected a wells probe to the terminals of the PDS33 solar pump controller, so as to detect the water level in wells and the wire maximum length can not more than 50m. If there is no water level probe for the detection of the water level, please keep the two terminals of the controller short. The controller can also detect water through the built-in software water detection function.

### 3.2.7 Water tank level float wiring (optional)

Use a floating ball switch to prevent reservoir overflow is recommended. When the reservoir is full, the pump will stop; when the water level is lower than the low level, the pump will be restarted. It can prevent the overflow, limit the unnecessary pump wear. The PDS33 controller allows the use of small signal line to connect to remote float switch, even if the position of the reservoir is far away.

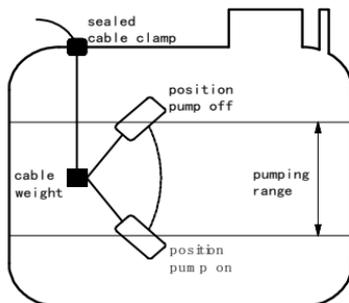
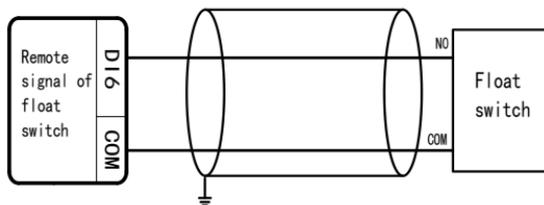


Figure 9 Floating Ball Diagram

#### Floating ball switch request:

1. The minimum requirements for 1 mm<sup>2</sup> line diameter, the distance up to 50m
2. If the application is in a long distance transmission, the need to use the shielded wire. The end of the shielding layer close to the controller needs to be grounded, the end close to the floating ball switch; the end close to the float switch is not required to be grounded.



If the cable is shielded, just connect to ground

Figure 10 Float ball wiring diagram

### 3.2.8 Electrical conduit

When the system installed in the outdoor, electrical conduit can be used to protect the outdoor electric wires, so as to avoid the impact from the weather, human activities, chewing animals. If you do not use the electrical conduit, use the higher quality outdoor wire.

### 3.2.9 System Wiring Diagram

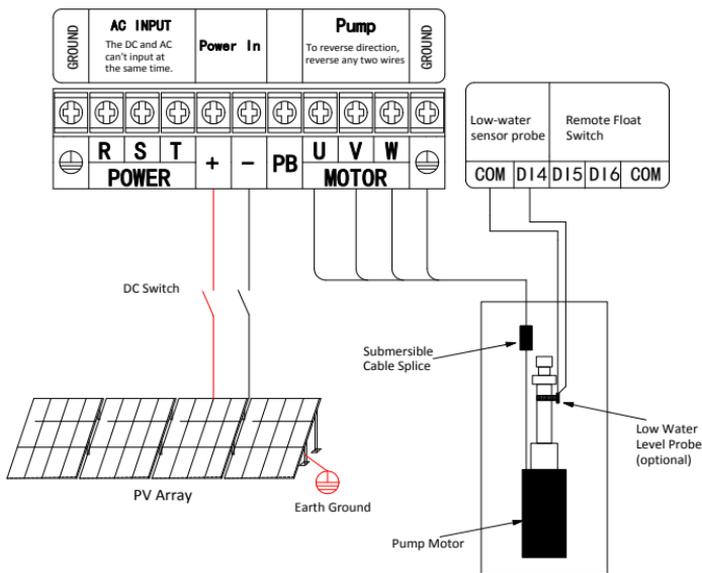


Figure 11 System Wiring Diagram

**NOTE:**

In the case of conventional 250W polycrystalline components, the peak voltage is 30.6V and the open circuit voltage is 37V. Description of the number of input components in series:

The PDS33-4T series controller is connected in series with the serial number of the input components of the 18~20 blocks, and the 250W DC 500~750V (MPPT) is satisfied.

## Chapter 4 Start-up and Operation

### 4.1 Keypad Description



Figure 12 Keypad Schematic Diagram

Item	Name	Function
Indicator light	Unit indicator light	Hz: Frequency unit; A: Current unit; V: Voltage unit; RPM (Hz+A) : Speed unit; % (A+V) : Percentage
	Status indicator light	RUN: On/Running; Off/Stopped FWD/REV: On/FWD; Off/REV; Flickering/Switching between FWD & REV TUNE/TC: Flickering /Fault status LOCAL/REMOTE: On/Terminal control; Flickering/Communication control; Off/Keypad control
Key	PRG (Programming key)	Enter or exit first class parameters
	ENT (Enter key)	Enter next class menu and confirm parameter setting
	△ (Increment key)	Increment of data and function codes
	▽ (Decrement key)	Decrement of data and function codes

Item	Name	Function
	>> (Shift key)	In the stop display interface and the running display interface, the display parameters can be selected cyclically; when the parameters are modified, the modified bits of the parameters can be selected.
	RUN	In keypad control mode, it can start the controller
	STOP/RESET	Can be used for stop running or fault reset
	MF.K	Function switching
Knob	Pulse potentiometer	Can be source of set frequency

## 4.2 Keypad Operation Process

### 4.2.1 Parameter Setting

Three levels of menu are as following:

- Function code group (first-class)
- Function code (second-class)
- Setting parameter of function code (third-class)

In order to set up the electric automatic start function FD.07=1 as an example, the modified parameter flow chart is as follows:

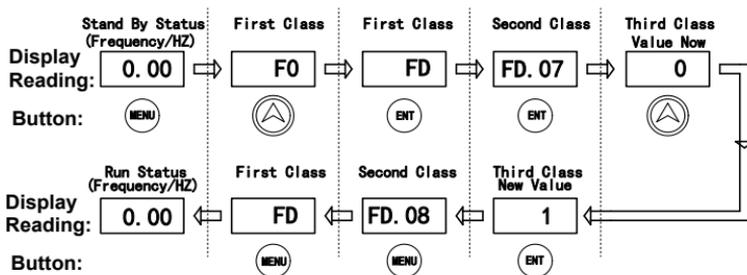


Figure 13 Schematic Diagram of Function Parameters

### 4.2.2 Fault Reset

After the controller has failed, the controller will display the relevant fault code information. The conventional fault code (Err02/3/4/5/6/7/8/9/10/11/12/18) can automatically reset after 10s operation, and can also choose to reset the STOP/RESET on the keyboard. If the conventional failure persists, the controller will reset once every 10s. Special fault code (Err13/14) requires the user through the STOP/RESET key on the keyboard to reset the fault; the controller can continue to run after the reset.

### 4.3 Trial operation

- Check and make sure wiring are correct. If needed, take a megger to test the insulation of motor, cable, etc.;
- Use a multimeter to test the PV output voltage at the DC switch.;
- Power on the controller by switch the DC switch.
- If necessary, modify and set the parameters of motor to the controller

For Example, if the motor which rated frequency is 60Hz, these parameters need modification:

High limit of running frequency F0.12=60;

Other related parameters are: motor rated power F2.01, motor rated frequency F2.04=60, motor rated speed F2.05, motor rated voltage F2.02, motor rated current F2.03.

Note: default motor rated frequency setting is 50Hz.

Slowly start to check the direction

Pressing the RUN/STOP key to start the motor shortly and slowly, and check the direction of the pump.

If the pump is in dry-run state, the maximum operating time cannot exceed 15s, otherwise it may cause damage to the pump.

If the pump is in dry-run, the maximum operating time cannot exceed 15seconds; otherwise it may cause damage to the pump. If the pump steering error, close the DC switch, according to the pump / motor wiring to change the wiring of the motor section of the two leads.

After the above parts are complete, you can try to run the system.

Let the system work for an hour, check the water supply capacity.

### **Commissioning finish**

When the light is insufficient, the solar power module output power will be reduced, and the pump operation speed will be very slow until stop. The controller will attempt to start every 300 s, and during the trial run, the running indicator is always on.

When a shadow suddenly passes through the battery array, the controller will lose track of the input voltage, and the pump will stop working. But the controller does not show the fault, the controller will try to restart the pump.

## 4.4 User Definable Parameters

○ : The parameters can be modified at stop or running status.

● : The parameters cannot be modified at running status.

◎ : The parameters which are actual-detecting record value and cannot be modified.

Function Code	Function	Description	Unit	Factory setting	Modification Type	Communication Address
<b>F0 Group: Basic Function</b>						
F0.01	Start/stop signal option	0: Keypad (LED off) 1: Terminal (LED on) 2: RS485 Communication (LED Flickering)	1	0	●	F001
F0.03	Main frequency source	1: F0.08 (Knob and UP/DOWN available) 2: AI1 3: AI2 8: MPPT 9: Communication	1	8	○	F003
F0.08	Keypad set frequency	0.00Hz ~Max F0.10	0.01Hz	50.00Hz	○	F008
F0.09	Running direction	0: FWD 1: REV	1	0	○	F009
F0.10	Max output frequency	50.00Hz ~ 320.00Hz	0.01Hz	50.00Hz	●	F00A
F0.12	Up limit frequency	F0.14 ~F0.10	0.01Hz	50.00Hz	○	F00C
F0.14	Low limit frequency	0.00Hz ~F0.12	0.01Hz	0.00Hz	○	F00E
F0.15	Use of low limit frequency	When set frequency is lower than low limit frequency, 0: Run at low limit frequency 1: Stop 2: Run at 0.00Hz	1	0	○	F00F
F0.16	Carrier	0.5kHz ~ 16.0kHz	0.1kHz	Due to	○	F010

Function Code	Function	Description	Unit	Factory setting	Modification Type	Communication Address
	frequency			type		
F0.18	Acceleration time 1	0.0s ~ 6500.0s	0.1s	Due to type	○	F012
F0.19	Deceleration time 1	0.0s ~ 6500.0s	0.1s	Due to type	○	F013
F0.20	Default setting	0: Not restore to default setting 1: Restore to factory setting 2: Fault record clearing	1	0	●	F014
<b>F2 Group: Motor Parameters</b>						
F2.01	Motor rate power	0.1KW ~ 400.0KW	0.1KW	Due to type	●	F201
F2.02	Motor rate voltage	1V ~ 440V	1V	Due to type	●	F202
F2.03	Motor rate current	0.01A ~ 655.35A (≤55KW) 0.1A ~ 6553.5A (>55KW)	0.01A/ 0.1A	Due to type	●	F203
F2.04	Motor rate frequency	0.01Hz ~ Max frequency	0.01Hz	Due to type	●	F204
F2.05	Motor rate speed	1rpm ~ 36000rpm	1rpm	Due to type	●	F205
<b>F4 Group: VF control</b>						
F4.00	V/F curve setting	0: Straight line V/F curve 2: 2.0th power low torque V/F curve	1	2	●	F400
F4.01	Torque boost	0.1% ~ 30.0%	0.1%	Due to type	○	F401
F4.02	Cut-off frequency	0.00Hz ~ F0.10	0.01Hz	50.00Hz	○	F402
<b>F5 Group: Input Terminals</b>						
F5.00	Function of DI1	0: No function 1: Forward run (FWD)	1	1	●	F500
F5.01	Function of DI2	4: Forward JOG (FJOG)	1	4	●	F501

Function Code	Function	Description	Unit	Factory setting	Modification Type	Communication Address
F5.02	Function of DI3	9: Error Reset (RESET) 11: External error input (NO) 44: Input of well low level 45: Input of reservoir	1	9	●	F502
F5.03	Function of DI4		1	44	●	F503
F5.04	Function of DI5		1	0	●	F504
F5.05	Function of DI6		1	45	●	F505
<b>F6 Group: Output terminals</b>						
F6.02	Output of relay 1	0: No output 1: Controller running 2: Error output	1	2	○	F602
F6.03	Output of relay 2		1	1	○	F603
F6.12	Output of AO1	0: Running frequency 1: Set frequency 2: Output current 3: Output torque 4: Output power 5: Output voltage	1	0	○	F60C
F6.13	Output of AO2		1	1	○	F60D
<b>F7 Group: Display Interface parameters</b>						
F7.07	Temperature of IGBT	0°C ~ 100°C	1°C	.	◎	F707
F7.08	Temperature of rectifier bridge	0°C ~ 100°C	1°C	.	◎	F708
F7.09	Accumulated running time	0h ~ 65535h	1h	.	◎	F709
F7.11	Software Version	-		.	◎	F70B
F7.13	Accumulated time of powering on	0h ~ 65535h	1h	.	◎	F70D
<b>FA Group: Errors and protection</b>						
FA.00	Motor overload protection	0: Disabled 1: Enabled	1	1	○	FA00
FA.01	Motor overload	0.20 ~ 10.00	0.01	1	○	FA01

Function Code	Function	Description	Unit	Factory setting	Modification Type	Communication Address
	protection gain					
FA.02	Early warning coefficient of motor overload protection	50% ~ 100%	1%	80%	○	FA02
FA.03	Gain of over voltage stall protection	0 ~ 100	1	10	○	FA03
FA.04	Value of over voltage stall protection	120% ~ 150%	1%	130%	○	FA04
FA.05	Gain of over current stall protection	0 ~ 100	1	20	○	FA05
FA.06	Value of over current stall protection	100% ~ 200%	1%	150%	○	FA06
FA.07	Short to ground protection	0: Invalid 1: valid	1	1	○	FA07
FA.08	Auto reset times	0 ~ 5	1	0	○	FA08
FA.11	Input phase loss protection	0: Disabled 1: Enabled	1	1	○	FA0B
FA.12	Output phase loss protection	0: Disabled 1: Enabled	1	1	○	FA0C
<b>FC Group: Communication parameters</b>						
FC.00	Local address	1 ~ 247, 0 for broadcast address	1	1	○	FC00
FC.01	Baud rate	0: 300 bps 1: 600 bps 2: 1200 bps 3: 2400 bps 4: 4800 bps 5: 9600 bps 6: 19200 bps 7: 38400 bps 8: 57600 bps 9: 115200 bps	1	5	○	FC01

Function Code	Function	Description	Unit	Factory setting	Modification Type	Communication Address
FC.02	Data bit check	0: (8.N.2)no check 1: (8.E.1) even check 2: (8.O.1) odd check 3: (8.N.1) no check	1	3	○	FC02
FC.03	Communication response delay time	0ms ~ 20ms	1ms	2	○	FC03
FC.04	Communication timeout fault time	0.0(invalid) , 0.1s~60.0s	0.1s	0	○	FC04
FC.05	Current resolution of communication	0: 0.01A 1: 0.1A	1	0	○	FC05
<b>FD Group: Special parameters for solar pump controller</b>						
FD.00	Solar pump controller function	0: Disabled 1: Enabled	1	1	○	FD00
FD.01	Source of MPPT set	0: Keypad 1: MPPT Tracing	1	1	○	FD01
FD.02	MPPT voltage keypad setting	FD.14 ~FD.15	0.1V	530.0V	○	FD02
FD.03	Weak light detect time	0.0s ~ 1000.0s	0.1s	100.0s	○	FD03
FD.04	Weak light restart time	0.0s ~ 3600.0s	0.1s	300.0s	○	FD04
FD.05	MPPT voltage default value	70.0% ~100.0%	0.1%	80.0%	○	FD05
FD.06	PV Open circuit voltage	250.0 ~ 800.0 220V type: 360.0V 380V type: 750.0V	0.1%	750.0V	○	FD06
FD.07	Auto start function	0: Disabled 1: Enabled	1	0	○	FD07
FD.08	Auto start delay time	0.0s ~ 100.0s	0.1s	10.0s	○	FD08
FD.09	MPPT Default value adjusting range	0.0V ~ 100.0V	0.1V	30.0V	○	FD09

Function Code	Function	Description	Unit	Factory setting	Modification Type	Communication Address
FD.10	Water shortage detect time	0.0s ~ 3600.0s	0.1s	0.0s	○	FD0A
FD.11	Water shortage detect frequency	1.00Hz ~ F0.12	0.01Hz	45.00Hz	○	FD0B
FD.12	Water shortage detect current percentage	0.0% ~ 100.0%	0.1%	40.0%	○	FD0C
FD.13	Water shortage restart time	0min ~ 9000min	1min	20min	○	FD0D
FD.14	MPPT low limit voltage	250.0V ~ FD.15 220V type: 275.0V 380V type: 480.0V	0.1V	480.0V	○	FD0E
FD.15	MPPT high limit voltage	FD.14 ~ 800.0V 220V type: 330.0V 380V type: 580.0V	0.1V	580.0V	○	FD0F
FD.16	MPPT low limit of output frequency	0.0% ~ FD.17	0.1%	20.0%	○	FD10
FD.17	MPPT low limit of high frequency	FD.16 ~ 100.0%	0.1%	100.0%	○	FD11
FD.18	MPPT fast speed down rate	0 ~ 200	1	20	○	FD12
FD.19	MPPT fast speed down time	0.0s ~ 3600.0s	0.1s	0.5s	○	FD13
FD.20	MPPT start disturbance voltage initial value	0.1V ~ 50.0V	0.1V	20.0V	○	FD14
FD.21	MPPT given voltage	0.0V ~ 800.0V	0.1V	/	◎	FD15
FD.22	MPPT enable voltage	0.0V ~ 800.0V	0.1V	/	◎	FD16
FD.23	MPPT open voltage	0.0V ~ 800.0V	0.1V	/	◎	FD17

Function Code	Function	Description	Unit	Factory setting	Modification Type	Communication Address
FD.24	MPPT flag	/	/	0	◎	FD18
FD.25	MPPT voltage added	0.0V~1.0V	0.1V	0	○	FD19
<b>FE Group: Parameters management</b>						
FE.00	User password	0 ~ 65535	1	0	○	FE00
FE.01	Fault record display times	0 ~ 15	1	5	○	FE01
<b>E0 Group: Current fault record</b>						
E0.00	Type of current fault record	0: No error 1: Reserved 2: Over current during acceleration (Err02) 3: Over current during deceleration (Err03) 4: Over current at constant speed (Err04) 5: Over voltage during acceleration (Err05) 6: Over voltage during deceleration (Err06) 7: Over voltage at constant speed (Err07) 8: Overload of buffer resistor (Err08) 9: Under voltage error (Err09) 10: Controller overload (Err10) 11: Motor overload (Err11) 12: Input phase loss (Err12) 13: Output phase loss (Err13) 14: Module overheat (Err14) 15: External error (Err15)	—	—	◎	E000

Function Code	Function	Description	Unit	Factory setting	Modification Type	Communication Address
		16: Communication abnormal (Err16) 17: Relay failure (Err17) 18: Current detection failure (Err18) 19: Motor tuning failure (Err19) 21: Parameters writing & reading failure (Err21) 22: EEPROM checking failure (Err22) 23: Motor short to ground (Err23) 24: Water shortage (Err24) 26: Running time reached (Err26) 29: Powering time reached (Err29) 30: Loss of load (Err30) 31: PID feedback loss when running (Err31) 40: Overtime fault of fast-current limit (Err40)				
E0.01	Frequency record of current fault	—	—	—	◎	E001
E0.02	Current record of current fault	—	—	—	◎	E002
E0.03	Voltage record of current fault	—	—	—	◎	E003
E0.04	Input terminals' status record of current fault	—	—	—	◎	E004
E0.05	Output terminals' status record of current fault	—	—	—	◎	E005
E0.06	Temperature record of	—	—	—	◎	E006

Function Code	Function	Description	Unit	Factory setting	Modification Type	Communication Address
	current fault					
E0.07	Controller's status record of current fault	—	—	—	◎	E007
E0.08	Time record of current fault (Calculated from powering on)	—	—	—	◎	E008
E0.09	Time record of current fault (Calculated from starting)	—	—	—	◎	E009

### Parameter interpretation:

F0.01, Start/Stop Mode Option: If set to 0, start-stop control of keyboard panel, if set to 1, the external terminal control start-stop, DI1 and COM conduction start, disconnected to stop;

F2.01-F2.05, Motor parameter: the user can set according to the actual pump motor nameplate parameters

FE.00 user password: the user can set a 5 digits password; after the password is set up and confirmed, the password will be valid for a minute.

FD.07, Automatic start when power on: the factory defaults to 0 (disabled). It can be set to 1 (enabled), then as long as the solar module power supply, the controller will automatically start and achieve automatic operation of the whole day.

FD.10 water shortage detection time: when applied to a deep well pump, not using the water level probe to detect the water shortage, the controller can use the built-in water shortage detection function to complete the water shortage detection. When this parameter is not 0, the software will start the function of water shortage.

Software shortage detection principle: If the water shortage happens, the controller

will still run FD.10 time, after that it will appear the water shortage fault Err24. The fault will be reset and the controller will restart automatically after 20 minutes. If there is no water shortage but fails Err24, it may appear false; then you can simply reduce FD.12 value.

**Note:**

FD. 14 and FD. 15 is working voltage range for MPPT, check the DC input voltage value of the machine, such as input voltage is 650 v, the FD.06 can be modify to 650.0V

FD.16, Low limit of MPPT running frequency: this parameter defaults to 20%(low frequency= $FD16 * F0.10 = 10.00\text{Hz}$ ), when the light becomes weak, and the controller output frequency is lower than FD.16( $FD.16 * F0.10 = 10.00\text{Hz}$ ), the controller will be in standby mode. After the light becomes strong, the controller will rerun. Can set this parameter artificially, in order to avoid pump at low speed without water, reduce the pump abrasion at low speed.

**WARNING:** DO NOT touch any other piece inside the PDS33 Solar pump controller while power is applied. To service any other areas of the controller, disconnect ALL power sources and wait 5 minutes before continuing.

## Chapter 5 Diagnostics and Troubleshooting

The PDS33 solar pump controller will attempt to drive the pump to deliver water even under adverse conditions. To ensure years of reliable service, it must also protect the system components from conditions that might result in equipment damage. When adverse conditions arise, the controller will continue to deliver as much water as possible at reduced output if necessary, and will shut down only in extreme cases. Full operation will resume automatically whenever abnormal conditions subside.

If the controller has stopped to indicate a fault code on the display, the associated time-out delay will vary depending on the nature of the fault. The number following the “Err” symbol corresponds to the error code for the offending condition.

### 5.1 Fault Codes

<b>Fault code</b>	<b>Fault description</b>	<b>Possible causes</b>	<b>Remedy</b>
Err02	Over-current during acceleration	Too fast acceleration	Increase acceleration time
		Too low input voltage	Check the input power supply or wiring
		Lower-rating controller	Replace with higher-rating controller
Err03	Over-current during deceleration	Too-fast deceleration	Increase deceleration time
		Too-heavy and large-inertia load	Add proper braking units
Err04	Over-current at constant running speed	Sudden change of load	Check the load
		Too low input voltage	Check the input power supply or wiring

<b>Fault code</b>	<b>Fault description</b>	<b>Possible causes</b>	<b>Remedy</b>
		Lower-rating controller	Replace with higher-rating controller
Err05	Over-voltage during acceleration	Abnormal input voltage	Check input power
		Restart the motor when instantaneous trip-off occurs	Avoid prompt restart when trip-off
Err06	Over-voltage during deceleration	Too-fast deceleration	Add proper braking units
		Abnormal input voltage	Check input power supply or wiring
Err07	Over-voltage at constant running speed	Abnormal input voltage	Adjust input voltage to normal range
Err08	Overload of buffer resistor	Abnormal input voltage	Adjust input voltage to normal range
Err09	Under voltage of DC bus	Too-low input voltage	Check input power supply or wiring
Err10	Controller overload	Too fast acceleration	Increase acceleration time
		Restart the motor when instantaneous trip-off occurs	Avoid prompt restart when trip-off
		Too-low input voltage	Check input power supply or wiring
		Too-heavy load	Replace with higher-rating controller
Err11	Motor overload	Incorrect setting of FA.01&FA.02	Set the parameters correctly
		Load too heavy or motor stuck	Reduce load, or check the motor
Err12	Input phase loss	Abnormal input power source	Check input power source and wiring

<b>Fault code</b>	<b>Fault description</b>	<b>Possible causes</b>	<b>Remedy</b>
		Power board or control board failure	Look for technical support
Err13	Output phase loss	Broken wires in the output cable	Check the wiring and installation
		Broken wires in the motor winding	
		Loose output terminals	
Err14	Controller overheat	Instantaneous over-current of controller	Refer to over-current remedy
		Output short circuit	Re-wiring of output
		Too-high ambient temperature	Decrease the ambient temperature if possible
		Loose cables or terminals	Inspect and tighten the wire and terminals
		Abnormal power circuit	Ask for support
		Abnormal control PCB board	
Err15	External fault	External fault signal through DI terminals	Check external faults
Err16	Communication fault	Improper baud rate setting	Set proper baud rate
		Abnormal working of upper machine	Check upper machine
		Long-time communication interruption	Check communication devices and cables
Err17	Relay failure	Relay cannot pick up	Change relay or look for technical support
Err18	Current detection fault	Amplifying circuit abnormal	Ask for technical support
		Hall sensor is damaged	

<b>Fault code</b>	<b>Fault description</b>	<b>Possible causes</b>	<b>Remedy</b>
		Power circuit abnormal	
Err19	Motor tuning failure	Incorrect settings of motor parameters	Set motor parameters according to motor plate
Err21	Parameters writing & reading failure	Control board failure.	Change another board or look for technical support
Err22	EEPROM checking failure	EEPROM damaged	Ask for technical support
Err24	Water shortage fault	Water shortage of water source	Stop the controller Repair broken wiring or replace water level switch
		Verify if the setting of FD.12 "Water shortage detection current ratio" is too high, while FD.10 "Water shortage detection time" is non-zero and the current sensing is enabled.	Reduce setting value of FD.12
Err26	Running time reached	Accumulated running time reached set value	Restore factory settings
Err29	Powering time reached	Accumulated powering time reached set value	Restore factory settings
Err31	PID feedback loss when running	Abnormal PID feedback signal	Check PID signal
		PID feedback signal is below detect value	Adjust PID feedback detect value and detect time
Err40	Overtime fault of fast-current limit	Load too heavy or motor stuck	Reduce load, or check the motor
		Rate of controller too small	Change upper rate controller
Err98 /99	Internal Communication	Poor contact between keyboard and control board	Check connect cable

Fault code	Fault description	Possible causes	Remedy
	fault	Keypad failure	Look for technical support

## 5.2 Common Faults and Remedies

Order	Fault phenomenon	Possible cause	Remedy
1	No display on keypad	Abnormal input voltage	Check whether input voltage is in normal range
		Poor contact between keyboard and control board	Check connect cable
		Inner instrument failure	Look for technical support
2	Pump cannot run	Lack of input power (light)	Increase panel power or restart at enough light
		Motor failed or stuck	Replace the motor or check mechanical fault
		Incorrect wiring of motor	Confirm whether wiring is correct
3	DI terminal failure	Incorrect setting of parameters	Check and reset F5 group parameters
		External fault	Reconnect signal wire, and clear external faults
		Control board failure	Look for technical support
4	Controller interference	Abnormal carrier frequency	Reduce carrier frequency properly
		Incorrect ground method	The controller and pump shall both be grounded (not together with other external devices)
		Cable too long between controller and motor	Install output reactor or reduce length of cable
5	Big noise of motor	Motor failed or stuck	Replace the motor or check mechanical fault
		Abnormal carrier frequency	Increase carrier frequency properly

Order	Fault phenomenon	Possible cause	Remedy
6	Switch trip	Installed leakage switch or air switch overload	Replace the air switch (without leakage) or replace the air switch with a larger capacity
		Abnormal input power	Check input power and eliminate short circuit
		Internal instrument failure	Look for technical support

## Chapter 6 Protocol

The PDS33 series product provides an RS485 communication interface and supports the MODBUS-RTU communication protocol. The users can set the inverter to start and stop, modify or read the function code parameters, and read the working status and fault information of the inverter.

### 6.1 Address of control orders

Description	Communication address	Command content	Attributes of read or write
Communication set value	1000H	-10000~10000 (Signed number) ◆ -10000 for -100.00% ◆ 10000 for 100.00%	R/W
Control order	2000H	0001: FWD run	W
		0002: REV run	
		0003: FWD JOG	
		0004: REV JOG	
		0005: Coast to stop	
		0006: Deceleration to stop	
		0007: Reset	

### 6.2 Address of parameter status

Description	Communication address	Unit	Attributes of read or write
Running frequency	1001H	0.01Hz	R
PV voltage	1002H	0.1V	R
Output voltage	1003H	1V	R
Output current	1004H	0.1A	R
Output power	1005H	0.01kW	R
Output torque	1006H	0.1%	R
Running speed	1007H	0.01Hz	R
DI flag	1008H	1	R

DO flag	1009H	1	R
AI1 voltage	100AH	0.01V	R
AI2 voltage	100BH	0.01V	R
Set voltage	100CH	0.1V	R
PV input power	100DH	0.01kW	R
PV input current	100EH	0.1A	R
Motor speed	100FH	1rpm	R
Inverter temperature	1010H	1°C	R
Set frequency	1011H	0.01Hz	R
Max frequency	1012H	0.01Hz	R
Controller's status	1013H	0001: FWD running 0002: REV running 0003: Stand-by 0004: Fault 0005: Under voltage 0006: Exchanging between	R
Water level	1014H	0: Normal 1: Low level of well 2: High level of reservoir	R
Light status	1015H	0: Normal 1: Weak	R
Total power on hour	1016H	1H	R
Total running hour	1017H	1H	R
Inverter energy	1018H	0.01kWh	R
Fault code	101AH	Such as	R
Fault code 0	101BH	0002:Err02 0003:Err03	R
Fault frequency	101CH	0.01Hz	R
Fault current	101DH	0.1A	R
Fault voltage	101EH	0.1V	R
Fault Number	101FH	1	R

### 6.3 Description of controller's status and faults

Description	Communication address	Command content	Attributes of read or write
Controller's status	3000H	0001: FWD running 0002: REV running 0003: Stand-by 0004: Fault 0005: Under voltage 0006: Exchanging between	R
Controller's fault	8000H	0000: No error 0001: Reserved 0002: Over current during acceleration 0003: Over current during deceleration 0004: Over current at constant speed 0005: Over voltage during acceleration 0006: Over voltage during deceleration 0007: Over voltage at constant speed 0008: Overload of buffer resistor 0009: Under voltage error 000A: Controller overload 000B: Motor overload 000C: Input phase loss 000D: Output phase loss 000E: Module overheat 000F: External error 0010: Communication abnormal 0011: Relay failure	R

Description	Communication address	Command content	Attributes of read or write
		0012 : Current detection failure 0013: Motor tuning failure 0015: Parameters writing & reading failure 0016: EEPROM checking failure 0017 : Motor short to ground 0018: Water shortage 001A : Running time reached 001D: Powering time reached 001E: Reserved 001F: PID feedback loss 0028 : Overtime fault of fast-current limit 0029: Reserved	
Communication faults	8001H	0000: No fault 0001: Password fault 0002: Content order fault 0003: CRC checking fault 0004: Invalid address 0005: Invalid parameter 0006: Invalid adjustment of parameter 0007: System locked 0008: EEPROM Operating	R

## **Chapter 7 Regular maintenance**

### **7.1 Controller and Pump**

#### **• Controller**

Periodically checking of Status display, error code display and fault record, long term verification of cooling fan and cleaning of heat sink are needed.

#### **• Pump**

The pump's motor is permanently sealed, no need to maintain. Pump head is a mechanical device, may be used for a period of time, due to the sand in the water, and other impurities cause a certain wear, the performance of the pump needs to be regularly detected. If the flow of the pump is less than the normal value, may need to be replaced.

### **7.2 Solar panels**

Periodically cleaning of the surface of panels and checking wiring are required.

### **7.3 Cable**

Need to regularly check the power cable and ground wire to make sure all the wires are reliably connected and without being corroded.

## Chapter 8 Backup AC power

In order to ensure continuous water supply, solar water pump system can be manually switched to standby AC power supply when the light is insufficient or wet days. When switching, the need to ensure that the DC and AC power supply reliable mutual lock. Backup AC power source can be a local power grid, or a diesel generator (please refer to the 2.4.3 technical form).

Warning: at any time, only one power supply can be entered, otherwise it may cause the controller to damage.

Take three phase AC 380V backup AC power supply for example, the wiring is shown in the following diagram:

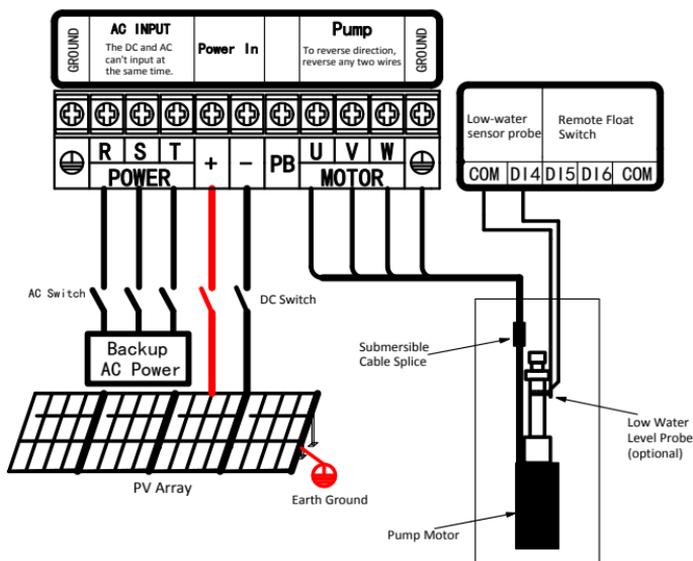


Figure 14 schematic diagram of alternate AC power supply

If the pump motor rated voltage is three-phase AC 220-240V, then the single-phase AC 220V standby power supply L/N power line, need to be connected to the main terminal R/T of the controller

## System Report

System and Components				
Date of Purchase				
Distributor (Contact details)				
<b>System</b>				
Controller Serial Number				
Motor Serial Number or Power				
Pump Type	Submersible		Surface	
<b>Solar Power</b>				
Solar Module				
Manufacturers				
Type				
Peak Voltage (Vmp)				
Open Circuit Voltage(Voc)				
Quantity				
Connection		Series		Parallel

Installation					
Installation Date					
Installer (contact details)					
Submersible Pump			Surface Pump		
Well Depth		m/ft	Head (self suction)		m/ft
Pump Depth		m/ft			
Vertical Height (well mouth to the tower top)		m/ft	Suction lift		m/ft
			MAX. Suction lift		m/ft
Static Water Level		m/ft			
Dynamic Water Level		m/ft			
Vertical Pipe in Well(pump)			Suction Pipe		
Diameter		mm/inch	Diameter		mm/inch
Type			Type		
Length		m/ft	Length		m/ft
Additional Pipe (to water tower)			Vertical Pipe		
Diameter		mm/inch	Diameter		mm/inch
Type			Type		
Length		m/ft	Length		m/ft
Cable of Submersible Pump			Cable of Surface Pump		
Wire Diameter		mm <sup>2</sup> / AWG	Wire Diameter		mm <sup>2</sup> / AWG
Length (from the controller to pump)		m/ft	Length (from the controller to pump)		m/ft

## Chapter 8 Warranty Policy

### **Standard Warranty Period:**

The pump controller manufacturer grants a standard warranty period of 18 months (1.5 years) for the pump controllers, starting from the date of shipment from manufacturer factory or 12 months (1 year) starting from the date of purchased invoice marked (whichever is longer).

### **Warranty Conditions:**

If your pump controller gets fault and requires troubleshooting, please contact your distributor or dealer directly. Alternatively, feedback briefly to manufacture service hotline for logging and send your warranty card to our service department by fax/email to process the warranty claim.

During the warranty period, the pump controller manufacturer covers all costs for replacing any product or parts of the product proved to be defective in design or manufacture. To claim the warranty under the warranty policy of pump controller manufacturer, you need to supply us with the following information and documentation regarding the faulty pump controller:

1. Product model No.(e.g. PDS33-4T5R5) and serial No. (e.g.C121661B280H000292YA).
2. Copy of the invoice and warranty certificate of the controller.
3. Copy of the installation report and installation date.
4. Error message on LED screen ( if available ) or any information which would be helpful to determine the defect
5. Detailed information about the entire system (modules, circuits, etc.).
6. Documentation of previous claims/exchanges (if applicable).

After receiving above information, The pump controller manufacturer will decide how to proceed the service:

- Repaired by manufacture factory, or
- Repaired on-site by manufacture service center, or
- Offer a replacement device of equivalent value according to model and age.

In the case of an exchange, the remaining portion of the original warranty period will be transferred to the replacement device. You will not receive a new certificate, as your entitlement is documented at pump controller manufacturer.

If the pump controller needs to be replaced following assessment, manufacture will send a replacement unit immediately. The defective pump controller should be sent back to the closest manufacture service center by packing in its original package if possible.

## Product warranty Card

<b>Customer info.</b>	Company name:	
	Company address:	
	Contact:	Tel.:
	Fax:	Zip code:
<b>Product info.</b>	Product model:	SN code:
	Buying date:	Fault date:
	Motor power:	Application situation:
<b>Fault info.</b>	Fault description:	
	Signature:	Date:

