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RI-ENERGYFLOW-3P-SERIES-80

# RI-ENERGYFLOW

## 3Phase Solar Inverter



E&OE. Please check critical parameters at time of order. ISSUE : 20221114

# User Manual

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## **1. Introduction to signs**

In order to make better use of this manual, please read the following sign explanation carefully.



### **Warning!**

This sign indicates that it may cause danger to the safety of users and/or hardware.



### **Warning!**

This sign indicates important actions that are required for good operation of the system.

## **2. Introduction**

### **2.1 Preface**

Dear user, thank you for purchasing this grid-connected PV inverter. Please read this user manual in-full prior to undertaking installation or maintenance.

### **2.2 PV Grid-connected Generation System**

A photovoltaic grid-connected generation system consists of PV Solar panels, a grid-tied PV inverter, metering equipment and the power grid that is connected to the inverter. Solar energy is supplied from the PV solar panels in DC form to the PV inverter. The PV inverter converts the generated DC into AC power that matches the power grid voltage and frequency. The generated power is then either exported to the grid, or consumed by the user.



Figure 1: PV Solar system example image

## **2.3 How to Use This Manual**

This user manual aims to provide detailed product information and installation instructions for users of this PV grid-tied inverter.

Please read this manual carefully, and in-full, prior to use of this product. This manual should be retained in a safe place as it may be required for future maintenance or operation.

### 3. Safety Instructions

- > Please read this manual carefully prior to installation. Rayleigh Instruments Ltd assume no responsibility for damage to products or injury to persons if the user fails to follow the instructions correctly
- > All aspects of wiring and installation must be undertaken by suitably qualified personnel.
- > All wiring must be performed in accordance with local wiring regulations.
- > The final installation must be approved by the electricity grid operators.



#### **Warning!**

Ensure that the DC input to the PV inverter does not exceed 1100V. Exceeding this level will cause permanent damage to the inverter. Rayleigh Instruments Ltd accept to liability for this damage.

## 4. Product Introduction

Figure 2 shows main circuit of inverter through which the direct current pass through the DC/DC inverter, DC/AC inverter and the filter in turn and finally output to the grid. To make the photovoltaic array generate in maximum power, the new type power devices are adopted for this machine and the advanced MPPT algorithm is used at the DC side.

System Block Diagram

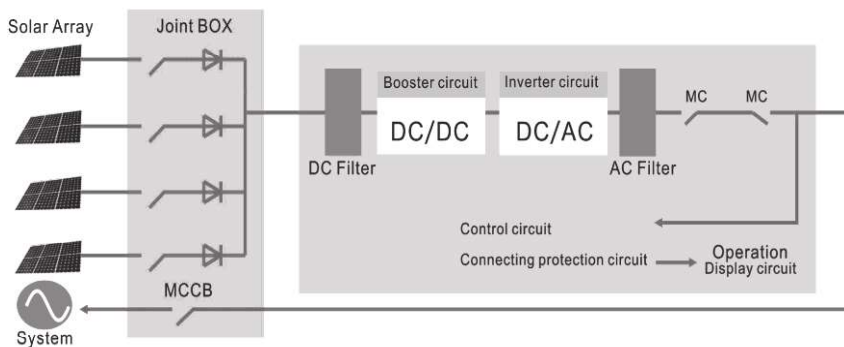


Figure 2: Main Circuit of Inverter

## 4.2 Description of External Connections

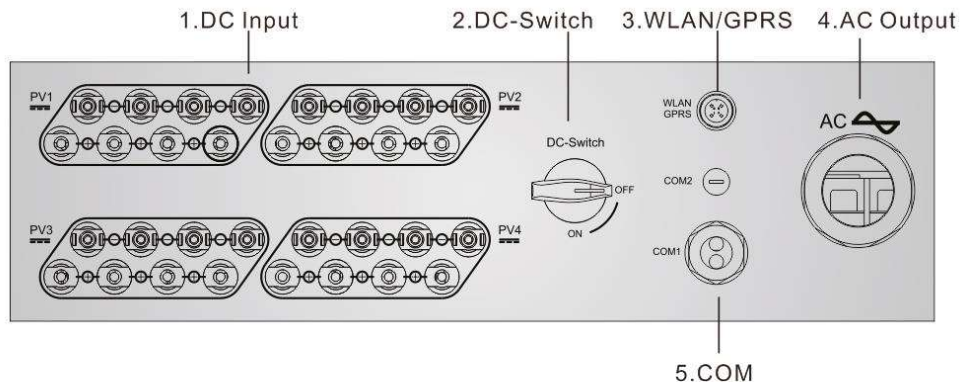


Figure 3: Interface of Inverter

- 1. DC Input:** DC input terminal, connected to positive and negative electrode input of photovoltaic array respectively.
- 2. DC switch:** Internally isolates the DC feed from the PV panel inputs
- 3. WLAN/GPRS:** Connection point for WIFI or GPRS module.
- 4. AC OUTPUT:** AC Three-phase output to grid.
- 5. COM:** RS485 communication port. Allows connection to a management system or PC.

## **5. System Operation**

### **5.1 System Mode**

The operation modes of grid- connected type inverter include the initialization, waiting, self-checking, grid-connected operating and error modes.

- > Initialization mode: the internal data will be initialized upon power on of controller.
  
- > Waiting mode: the inverter will be under waiting mode if the output voltage of PV battery board is low and it has not detected any fault.
  
- > Self-checking mode: self-checking will be conducted by inverter each time prior to grid-connected operation. The inspection items include: inspection on insulation impedance at DC side, self- checking for leakage current self-check for invert bridge and inspection on AC output relay.
  
- > Grid-connected operating mode: the direct current of PV battery board is converted to alternating current by the inverter for grid- connected operation. The advanced MPPT algorithm is adopted for controller, making the inverter operating at the maximum power point of PV arrays.
  
- > Error mode: the inverter will enter error mode when grid voltage/ frequency is abnormal or fault arises during grid-connected process. At this time, it will stop transformation of electric energy and cut away from the grid.

## 5.2 Grid-connected Operation

Prior to grid connection of the inverter, please confirm if the wirings among input side of inverter, PV arrays, output side and power grid are all correct. Two kinds of modes are optional for connection between DC input side of grid- connected inverter and PV arrays:

> Independent input mode: four groups of different PV arrays may be connected to input end of inverter and independent MPPT controller is available for each group of PV arrays to control grid- connected operation

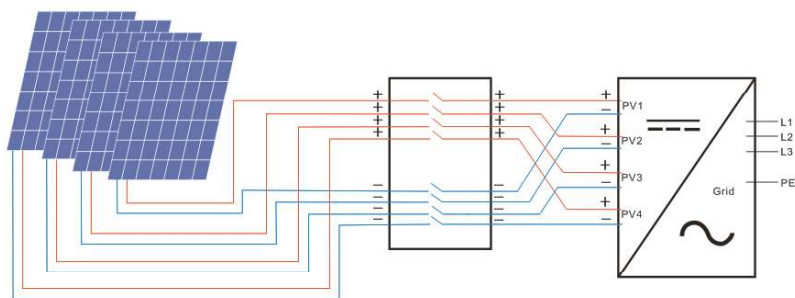


Figure 4: Independent Input Mode

> Parallel input mode: only one group of PV arrays is connected with input end of the inverter, which is then connected to input side of inverter via four groups of parallel input terminals.

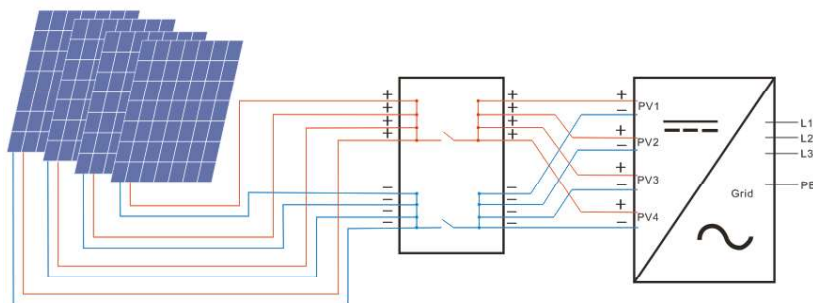


Figure 5: Parallel Input Mode





Users are required to set the item “Input Mode” under LCD menu correctly based on actual conditions of photovoltaic generating system and confirm that the mode of connection at input side is consistent with setting (refer to 7.4.1).

If both input and output wiring is correct and the power grid is free of abnormal conditions, the inverter will enter waiting mode. The grid connection of the inverter will be fully automatic. After PV voltage is higher than  $V_{pv}$ , count down for grid connection will be started automatically for controller and prepare for grid-connected operation after delayed for  $T_d$ . Manual setting is available for both  $V_{pv}$  and  $T_d$  through LCD panel.

### 5.3 System Shutdown

If grid-connected power of inverter is smaller than 100W continuously, the alarm “zero power” will be shown. After indicating the alarm for one minute, the inverter will disconnect from the grid and re-enter waiting mode. The inverter will disconnect from the grid upon discovery of any abnormal condition during the grid-connected process.

### 5.4 Error and Alarm Conditions

**Table 5.1 Working conditions and fault/alarm messages**

Working conditions	Message Displayed	Description
Normal working status		
Inverter OFF	No display	PV voltage <250V, the inverter is switched off
Inverter Stand-by	Stand-by	210V< PV voltage <350V(adjustable)
Self-test	Checking	PV voltage >350V(adjustable), the inverter get started and self-test all modules

Normal Power Generation	Normal	Generate AC power and feed to municipal Grid after self-test is completed
<b>Monitoring parameter display</b>		
Instant Power Rate & Volume Of Power Generated	XXXX W/ XXXXXX Kwh	Instant power rate & accumulated power generated.
Voltage And Current Of PV1/PV2/PV3/PV4 Input	DC :XXX.X V XXX.X A	Voltage and current from PV arrays
Voltage And Current Of AC output	AC: XXX.X V XXX.X A	Grid Voltage and current
<b>System faulty display</b>		
AC Voltage Low	F00	AC Voltage is too low.
AC Voltage High	F01	AC Voltage is too high.
AC Frequency Low	F02	AC frequency is too low.
AC Frequency High	F03	AC frequency is too high.
Bus Voltage Low	F04	Bus voltage is too low.
Bus Voltage High	F05	Bus voltage is too high.
Bus Voltage Abnormal	F06	BUS+ or BUS- is too high or too low on bus.
Insulation Impedance Low	F07	PV arrays Insulation impedance is too low.
Input current high	F08	PV Input current is too high.
Reserved	F09	Reserved
Inverter Current High	F10	Inverter current is too high.
Inverter DC Current High	F11	Inverter DC current is too high.
Reserved	F12	Reserved
Heatsink Temperature High	F13	Heatsink temperature is too High.
AC Relay Abnormal	F14	AC relay is abnormal.
PV Input Voltage Low	F15	One of PV input is idle when inverter is set on parallel mode.
Remote Off	F16	Status of inverter is on remote off.
Reserved	F17	Reserved
SPI Communication Fault	F18	Communication fault on control
Reserved	F19	Reserved
Leakage Current High	F20	Leakage current is too high.
Self-Checking Failure Of Leakage Current	F21	Self-checking Failure of Leakage Current.
Consistency Voltage Fault	F22	Inconsistent voltage between primary CPU and secondary CPU.

Consistency Frequency Fault	F23	Inconsistent frequency between primary CPU and secondary CPU.
DSP Operation Fault	F25	DSP communication fault
DSP Communication Lost	F32	DSP communication fault

**Table 5.2 Alarm Information**

Alarm message	Alarm	Solutions
Speed Low Of Fan_ A	W00	Alarm message for speed low of Fan_ A.
Speed Low Of Fan_ B	W01	Alarm message for speed low of Fan_ B.
Speed Low Of Fan_ C	W02	Alarm message for speed low of Fan_ C.
Zero Power	W03	It is only a warning message to show DC inputs very low and inverter is about to shut down.
Clock Warning	W16	Alarm message for clock
Speed Low Of Fan_4	W17	Alarm message for speed low of Fan_4.
Speed Low Of Fan_5	W18	Alarm message for speed low of Fan_5.
Speed Low Of Fan_7	W19	Alarm message for speed low of Fan_7.
Speed Low Of Fan_8	W20	Alarm message for speed low of Fan_8.
Lightning protection device warning	W21	Alarm message for Lightning protection device action

## 5.5 System Faults and Solutions

Trouble Shooting		
	Alarm Message	Solution
	AC voltage & frequency are too high or too low. (F00-F03)	(1)Please check mains voltage whether it is complied with local safety standard (2)Please check the AC output line is properly connected. Make sure its output voltage to see if it is normal. (3)Disconnect PV input and restart the inverter and check whether fault still exists. (4)Contact with your local distributor if the fault still exists.
	Bus voltage is too high or too low (F04-F05)	(1)Please check the setting of input mode. (2)Disconnect PV input and restart the inverter and check whether fault still exists. (3)Contact with your local distributor if the fault still exists.

System Faulty Or Failure Type	Bus Voltage Abnormal (F06)	(1)Please check the setting of input mode. (2)Please try to restart inverter every few minutes for several times and check whether fault still exists. (3)Contact with your local distributor if the fault still exists.
	Insulation impedance Fault (F07)	(1)Disconnect PV input and restart the inverter and check whether fault still exists. (2)Please measure impedance of PV+/PV- to ground whether is over than 500K $\Omega$ . (3)Please contact your local distributor if impedance is less than 500K $\Omega$ .
	Input Current High (F08)	(1)Please check the setting of input mode (2)Disconnect PV input and restart the inverter and check whether fault still exists. (3)Contact with your local distributor if the fault still exists.
	Hardware Current High (F09)	(1)Disconnect PV input and restart the inverter after few minutes and check whether fault still exists. (2)Contact with your local distributor if the fault still exists.
	Inverter Current High (F10)	(1)Disconnect PV input and restart the inverter after few minutes and check whether fault still exists. (2)Contact with your local distributor if the fault still exists.
	Inverter DC Current high (F11)	(1)Disconnect PV input and restart the inverter after few minutes and check whether fault still exists. (2)Contact with your local distributor if the fault still exists.
	Ambient Temperature High (F12)	(1)Disconnect PV input and cool down the inverter then restart the inverter to see if it is back to normal operation. (2)Please check environmental temperature whether out of working temperature. (3)Contact with your local distributor if the fault still exists.
	Heatsink Temperature High(F13)	(1)Disconnect PV input and cool down the inverter then restart the inverter to see if it is back to normal operation. (2)Please check environmental temperature whether out of working temperature. (3)Contact with your local distributor if the fault still exists.
	AC Relay Fault (F14)	(1)Disconnect PV input and restart the inverter and check whether fault still exists. (2)Contact with your local distributor if the fault still exists.
	PV Input Voltage Low (F15)	(1)Please check the configuration of PV input, one of PV input is idle when inverter is set on parallel mode. (2)Disconnect the PV input and restart the inverter and check whether fault still exists. (3)Contact with your local distributor if the fault still exists.

Remote Off (F16)	The inverter is on remote OFF status, the Inverter can be turned off/on remotely by monitoring software.
SPI communication Fault (F18)	(1)Disconnect PV input and restart the inverter and check whether fault still exists. (2)Contact with your local distributor if the fault still exists.
Leakage Current High (F20)	(1)Disconnect PV input and restart the inverter and check whether fault still exists. (2)Contact with your local distributor if the fault still exists.
Leakage Current Self-Checking Failure (F21)	(1)Disconnect PV input and restart the inverter and check whether fault still exists. (2)Contact with your local distributor if the fault still exists.
Consistency Voltage Fault (F22)	(1)Disconnect PV input and restart the inverter and check whether fault still exists. (2)Contact with your local distributor if the fault still exists.
Consistency Frequency Fault(F23)	(1)Disconnect PV input and restart the inverter and check whether fault still exists. (2)Contact with your local distributor if the fault still exists.
DSP Operation Fault(F25)	(1)Disconnect PV input and restart the inverter and check whether fault still exists. (2)Contact with your local distributor if the fault still exists.
DSP communication Lost (F32)	(1)Disconnect PV input and restart the inverter and check whether fault still exists. (2)Contact with your local distributor if the fault still exists.

## 6. Human-machine Interface

There are 4 push-buttons and 4 LEDs on the front panel of the inverter. The functions of each are described below.



Figure 6: LCD Controlled Panel

Table 6.1 Description LED Lights

LED light	Definition
WAIT	Indicator light for waiting of grid connection
NORMAL	Indicator light for normal operation (generating electricity)
ALARM	Indicator light for warning alarm
FAULT	Indicator light for error (fault)

Table 6.2 Description of button functions

Buttons	Functions
ESC	Return/Cancel/Exit
UP	Upwards choice menu/increase value when setting parameters
DOWN	Downwards choice menu/decrease value when setting parameters
ENTER	Enter menu/confirm set value/move cursor



**Note:** press any button, backlight of LCD will last for a certain period, specific time can be set in the menu.

## 6.2 Networking for monitoring

The inverter is provided with various kinds of communication modes, when the user requires to monitor the running information of photovoltaic power generation system, we will offer the following design scheme for monitoring system.

### ■ Intelligent cluster controller:

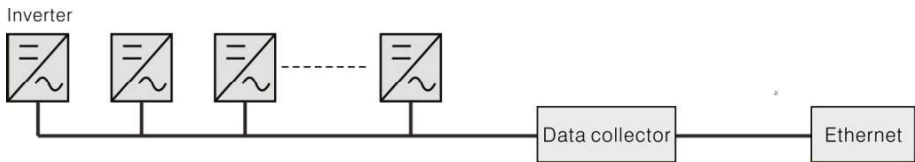


Figure 7: Data collector conducts monitoring through RS485

### ■ PC machine

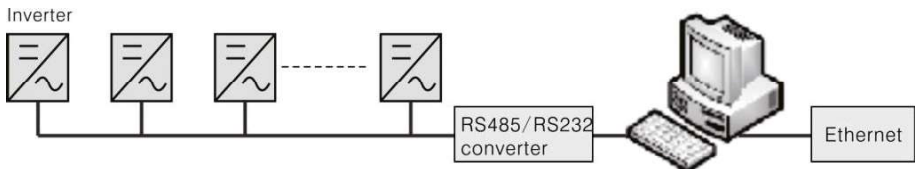


Figure 8: PC machine conducts monitoring through RS485

### ■ Data collector+ PC machine

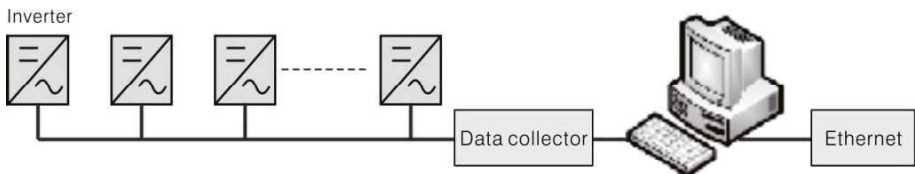
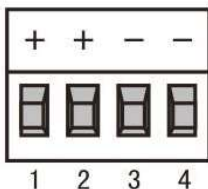
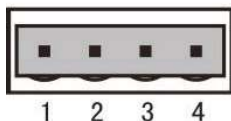


Figure 9: Data collector and PC machine conduct monitoring through RS485

Signal Pins of Inverter RS485 terminal block are defined as follow:

RS485 terminal block



**Inverter 485 Block**

Pin NO.	RS485
1	(A) R/T+
2	(A) R/T+
3	(B) R/T-
4	(B) R/T-

Figure 10: RS485 Port

### 6.3 Dry contact

Interface (optional).

### 6.4 Remote control

The inverter can realize the remote SHUTDOWN and ON and power limit regulatory function by the associated monitoring software.



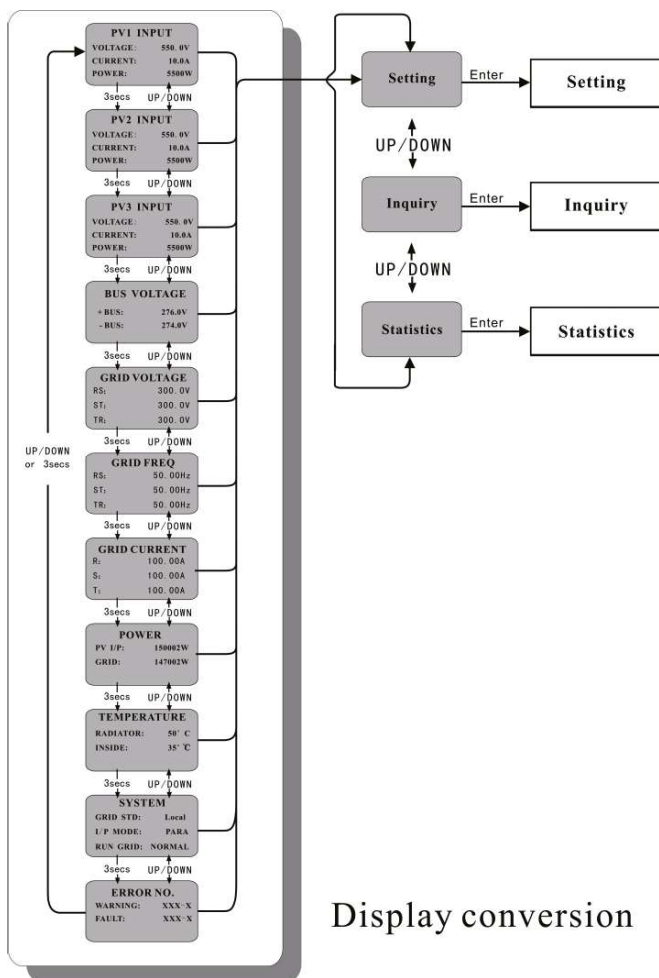
## 7. LCD Operation Menu

### 7.1 Initialization

Interface	Explanation
<div>Initializing... Please Wait!</div>	After starting-up of inverter, LCD will Initially enter this interface, and deliver parameters required by operation of the machine to DSP.

### 7.2 Display Pages

After initialization, LCD will enter a major cycle menu to display running information of the inverter in a circulating mode, including 10 interfaces for network voltage, frequency of electric network, etc. Time for automatic switch-over between interfaces is 3 seconds, also the interfaces can be switched manually by pressing UP or DOWN buttons, if you want to fix at a certain interface, press ENTER to lock this interface, after successful locking, a lock icon will occur at upper right corner of this interface, press ENTER button again, this interface will be unlocked, and the menu will continue to display in a circulating mode.



## Display conversion

Figure 11: Display Pages

When the menu is in an automatic cycling display mode, if error (fault) or warning alarm occurs, it will skip into system interface immediately and lock to it, and this will make convenience for the user to determine its cause based on codes on the interface. After disappearing of error (fault) or warning alarm, the menu will return to automatic circulating mode. Press ESC button to exit major circulating menu interface and enter user interface (refer to 7.3).

### 7.3 User interface

Interface	Description
<div style="border: 1px solid black; padding: 10px; margin: 10px;"> <p>-----USER-----</p> <p>→1:Setting</p> <p>2:Inquire</p> <p>3:Statistics</p> </div>	Select corresponding options by pressing UP or DOWN button, enter “setting”, “inquiry” and “statistics” menus by pressing ENTER button. Press ESC to return major circulating menu.

### 7.4 Programming

Interface	Description
<div style="border: 1px solid black; padding: 10px; margin: 10px;"> <p>-----PASSWORD-----</p> <p>Input: <u>XXXXX</u></p> </div>	After entering into the setup interface, the system will prompt to input password, the default password is “000000”, and this password can be altered Password setting menu (refer to 7.4.12); press UP/DOWN to increase or decrease the input figure, press ENTER button to move the cursor backwards, press ESC button to move the cursor forward.
<div style="border: 1px solid black; padding: 10px; margin: 10px;"> <p>-----SETUP-----</p> <p>→1: INPUT MODE</p> <p>2: GRID STD</p> <p>3: REMOTE CTRL</p> </div>	After successful input of password, it will enter setting option interface. Press UP/DOWN to move corresponding options, and enter the selected menu by pressing ENTER button; press ESC button to return back the user interface (refer to 7.3), there are 16 options in total, including Input mode, Grid std, Remote ctrl, Run setting, 485 address, Baud rate, Protocol, Language, Backlight, Date/Time, Clear rec, Password, Maintenance, Factory reset, Array detect and Three-phase system.

### 7.4.1 Input mode

Interface	Description
<pre> ----- INPUT MODE ----- →1:INDEPENDENT   2:PARALLEL </pre>	<p>Press UP/DOWN button to move corresponding option. Then confirm the selected option and enter interface of please restart (refer to 7.4.4.11) by pressing ENTER button. Press ESC button to cancel choice and return back setup interface (refer to 7.4). Default option is independent.</p>

### 7.4.2 Standard for electric network

Interface	Description
<pre> -----GRID STD----- →1: China   2:Germany   3:Australia   4: Italy   5: Spain   6: U.K. </pre>	<p>Press UP/DOWN button to move corresponding options, including China, Germany, Australia, Italy, Spain, U.K; with 16 kinds in total. Then confirm the selected option and enter interface of please restart (refer to 7.4.4.11) by pressing ENTER button. Press ESC button to cancel choice and return back setup interface (refer to 7.4).</p>

### 7.4.3 Remote CTRL

Interface	Description
<pre> ----REMOTE CTRL ---- →1:DISABLE   2:ENABLE </pre>	<p>Press UP/DOWN button to move corresponding options. Then confirm the selected option and return back setup interface (refer to 7.4) by pressing ENTER button. Press ESC to cancel choice and return back setup interface (refer to 7.4). Default option is disabled.</p>

## 7.4.4 Working parameters

Interface	Description
<div> -- RUN SETTING--  →1: VPV-START  2: DELAY-START  3: VAC-MIN </div>	Press UP/DOWN button to move corresponding options, press ENTER to enter into the selected menu; return back setup interface (refer to 7.4) by pressing ESC, there are 6 options in total, including VPV-START, DELAY-START, VAC-MIN, V AC-MAX, FAC-MIN, FAC-MAX, ACTIVE POWER, REACT POWER, FREQ POWER and V LOAD.

### 7.4.4.1 Start-up Voltage

Interface	Description
<div> ---START-UP VOLT---  INPUT:        <u>350V</u>  UNIT:            V </div>	Press UP/DOWN to increase or decrease the input figure, move the cursor backwards and confirm completion of input as well as enter into interface of please restart (refer to 7.4.4.11) by pressing ENTER button, press ESC to move the cursor forward and return back working interface (refer to 7.4.4); the input figure is between 250 and 850, default is 350.

### 7.4.4.2 Start-up Delay Time

Interface	Description
<div> -- START-UP DELAY--  INPUT:        <u>60</u>  UNIT:            SEC </div>	Press UP/DOWN to increase or decrease the input figure, confirm input and enter into interface of please restart (refer to 7.4.4.11) by pressing ENTER button; press ESC to 4 cancel input and return back working interface (refer to 7.4.4), input figure is between 60 and 300. This parameter is changed by grid standards.

### 7.4.4.3 Low voltage of electric network

Interface	Description
<div style="border: 1px solid black; padding: 10px; margin: 10px;"> --GRID VOLT LOW--  INPUT:        <u>450</u>  UNIT:         V </div>	Press UP/DOWN to increase or decrease the input figure, confirm input and enter into interface of please restart (refer to 7.4.4.11) by pressing ENTER button; press ESC to cancel input and return back working interface (refer to 7.4.4), input figure is between 450 and 490. This parameter is changed by grid standards.

### 7.4.4.4 High voltage of electric network

Interface	Description
<div style="border: 1px solid black; padding: 10px; margin: 10px;"> -- GRID VOLT HIGH --  INPUT:        <u>550</u>  UNIT:         V </div>	Press UP/DOWN to increase or decrease the input figure, confirm input and enter into interface of please restart (refer to 7.4.4.11) by pressing ENTER button; press ESC to cancel input and return back working interface (refer to 7.4.4), the input figure is between 510 and 550. This parameter is changed by grid standards.

### 7.4.4.5 Low frequency of electric network

Interface	Description
<div style="border: 1px solid black; padding: 10px; margin: 10px;"> -- GRID FREQ LOW--  INPUT:        <u>49.5</u>  UNIT:         Hz </div>	Press UP/DOWN to increase or decrease the input figure, confirm input and enter into interface of please restart (refer to 7.4.4.11) by pressing ENTER button; press ESC to cancel input and return back working interface (refer to 7.4.4), the input figure is between 45.0 and 49.8. This parameter is changed by grid standards.

#### 7.4.4.6 High frequency of electric network

Interface	Description
-- GRID FREQ HIGH-- INPUT: <u>50.5</u> UNIT:       Hz	Press UP/DOWN to increase or decrease the input figure, confirm input and enter into interface of please restart (refer to 7.4.4.11) by pressing ENTER button; press ESC to cancel input and return back working interface (refer to 7.4.4), the input figure is between 50.2 and 55. This parameter is changed by grid standards.

#### 7.4.4.7 Active power

Interface	Description
-- ACTIVE POWER -- →1.PERCENT SET 2.VALUE SET	Press UP/DOWN to move corresponding options, and enter the selected menu by pressing ENTER button; press ESC button to return back working interface (refer to 7.4.4)

##### 7.4.4.7.1 Power Limit

Interface	Description
----POWER LIMIT---- INPUT : <u>019 %</u>	Press UP/DOWN to increase or decrease the input figure, confirm input and enter into interface of Active power (refer to 7.4.4.7) by pressing ENTER button; press ESC to cancel input and return back Active power (refer to 7.4.4.7), the input figure is between 000 and 100.

#### 7.4.4.7.2 Power Value

Interface	Description
<div style="border: 1px solid black; padding: 10px; width: fit-content;"> <p>---- POWER VALUE ---- INPUT : <u>066KW</u></p> </div>	<p>Press UP/DOWN to increase or decrease the input figure, confirm input and enter into interface of Active power (refer to 7.4.4.7) by pressing ENTER button; press ESC to cancel input and return back Active power (refer to 7.4.4.7), the input figure is between 0 and Pmax. (Pmax: 70kW = 77kW; 75kW = 75kW; 80kW = 88kW )</p>

#### 7.4.4.8 Reactive power

Interface	Description
<div style="border: 1px solid black; padding: 10px; width: fit-content;"> <p>-- RE-POWER SET -- →1.RE-POWER CTL 2.POWER FACTOR 3.PE RCENT SET</p> </div>	<p>Press UP/DOWN to move corresponding options, and enter the selected menu by pressing ENTER button; press ESC button to return back working interface (refer to 7.4.4)</p>

##### 7.4.4.8.1 RE-POWER CTL

Interface	Description
<div style="border: 1px solid black; padding: 10px; width: fit-content;"> <p>--RE-POWER CTL-- →1 : POWER FACTOR 2 : REACT POWER 3 : QV W AVE</p> </div>	<p>Press UP/DOWN button to move corresponding options. And confirm selected option and return back the Reactive power by pressing ENTER button (refer to 7.4.4.8), press ESC button to cancel choice and return back Reactive power (refer to 7.4.4.8);</p>



**7.4.4.8.2 Power factor**

Interface	Description
<div> --POWER FACTOR--  INPUT :     <u>0.000</u> </div>	Press UP/DOWN to increase or decrease the input figure, confirm input and return back Reactive power (refer to 7.4.4.8) by pressing ENTER button, press ESC button to cancel input and return back Reactive power (refer to 7.4.4.8); the input numerical value is between 0.000 and 1.200.

**7.4.4.8.3 Reactive power**

Interface	Description
<div> -REACTIVE POWER-  INPUT :   <u>-26%</u> </div>	Press UP/DOWN to increase or decrease the input figure, confirm input and return back Reactive power (refer to 7.4.4.8) by pressing ENTER button, press ESC button to cancel input and return back Reactive power (refer to 7.4.4.8); the input numerical value is between -60and +60.

**7.4.4.9 Over-frequency Derating**

Interface	Description
<div> ----FREQ POWER----  →1.FUNC ENB  2.THRES   HOLD </div>	Press UP/DOWN button to move corresponding options, press ENTER to enter into the selected menu; return back working interface (refer to 7.4.4) by pressing ESC, there are 2 options in total, including function enable and frequency threshold .

#### 7.4.4.9.1 Over frequency derating enable

Interface	Description
<div style="border: 1px solid black; padding: 10px; margin: 10px;"> --FREQ POWER--  →1.ENABLE  2.DISABLE </div>	Press UP/DOWN button to move corresponding options, press ENTER to enter into the Over frequency derating interface (refer to 7.4.4.9); return back Over frequency derating interface (refer to 7.4.4.9) by pressing ESC, there are 2 options in total, including enable and disable .

#### 7.4.4.9.2 Frequency threshold

Interface	Description
<div style="border: 1px solid black; padding: 10px; margin: 10px;"> ----THRESHOLD----  INPUT : 65.0  UNIT : Hz </div>	Press UP/DOWN to increase or decrease the input figure, confirm input and enter into interface of Over frequency derating interface (refer to 7.4.4.9) by pressing ENTER button; press ESC to cancel input and return back Over frequency derating interface (refer to 7.4.4.9).the input numerical value is between 50.2 and 65.0.

#### 7.4.4.10 Over voltage derating

Interface	Description
<div style="border: 1px solid black; padding: 10px; margin: 10px;"> --- V LOAD ---  →1.ENABLE  2.DISABLE </div>	Press UP/DOWN button to move corresponding options, press ENTER to enter into the working interface (refer to 7.4.4); return back working interface (refer to 7.4.4) by pressing ESC, there are 2 options in total, including enable and disable.

#### 7.4.4.11 Please restart

Interface	Description
<div>Please Restart!</div>	A prompt that it is required to start the machine once again, so that the setup relevant to working will be effective, and it will return back working interface (refer to 7.4.4) within 2 seconds.

#### 7.4.5 485 Address

Interface	Description
<div>---- 485 ADDRESS ---- INPUT:</div>	Press UP/DOWN to increase or decrease the input figure, confirm input and return back setup interface (refer to 7.4) by pressing ENTER button, press ESC button to cancel input and return back setup interface (refer to 7.4); the input numerical value is between 1 and 64.

#### 7.4.6 485 Baud rate

Interface	Description
<div>----SELECT---- →1:2400 bps 2:4800 bps 3:9600 bps</div>	Press UP/DOWN button to move corresponding options. And confirm selected option and return back the setup interface by pressing ENTER button (refer to 7.4), press ESC button to cancel choice and return back setup interface (refer to 7.4); options include 2400, 4800, 9600 and 19200, with 4 in total.

### 7.4.7 485 protocol

Interface	Description
<div style="border: 1px solid black; padding: 10px; margin: 10px;"> <p>-----SELECT----- →1: MODBUS</p> </div>	<p>Press UP/DOWN button to move corresponding options. And confirm selected option and return back the setup interface by pressing ENTER button (refer to 7.4), press ESC button to cancel choice and return back setup interface (refer to 7.4);</p>

### 7.4.8 Display language

Interface	Description
<div style="border: 1px solid black; padding: 10px; margin: 10px;"> <p>---Display language--- →1:中文 2:ENGLISH 3:DEUTSCH</p> </div>	<p>Press UP/DOWN button to move corresponding options. And confirm selected option and enter into the setup interface (refer to 7.4) by pressing ENTER button, press ESC button to cancel choice and return back setup interface (refer to 7.4).</p>

### 7.4.9 LCD backlight

Interface	Description
<div style="border: 1px solid black; padding: 10px; margin: 10px;"> <p>---LIGHT TIME---</p> <p>INPUT:        <u>20</u></p> <p>UNIT:         SEC</p> </div>	<p>Press UP/DOWN to increase or decrease the input figure, confirm input and return back setup interface (refer to 7.4) by pressing ENTER button, press ESC button to cancel input and return back setup interface (refer to 7.4); the input numerical value is between 20 and 120.</p>

### 7.4.10 Date/time

Interface	Description
<div>-----DATE/TIME----- DATE: 2000-01-01 TIME: 02:43:03 WEEK: 6</div>	Press UP/DOWN to increase or decrease the input figure; press ENTER button to move the cursor backwards, confirm input and return back setup interface (refer to 7.4); and move the cursor forward and return back setup interface (refer to 7.4) by pressing ESC button.

### 7.4.11 History clearing

Interface	Description
<div>--- DEL REC--- →1: CANCEL 2: CONFIRM</div>	Clear all records in inquiry/ record menu (refer to). Press UP/ DOWN button to move corresponding options, and confirm the selected option and enter into setup interface (refer to 7.4) by pressing ENTER; press ESC button to cancel option and return back setup interface (refer to 7.4).

### 7.4.12 Password setting

Interface	Description
<div>----- PASSWORD ----- OLD: XXXXX NEW: XXXXX CONFIRM: XXXXX</div>	This interface will be used to alter password when entering into the setup interface (refer to 7.4). Press UP/ DOWN to increase or decrease the input figure, press ENTER button to move the cursor backwards, confirm input and return back setup interface (refer to 7.4); and move the cursor forward and return back setup interface (refer to 7.4) by pressing ESC button.

### 7.4.13 Maintenance

Interface	Description
<div style="border: 1px solid black; padding: 10px; margin: 10px;"> <p>-----PASSWORD----- INPUT:    <u>XXXXXX</u></p> </div>	<p>This interface will be used for factory testing, and be protected by password.</p>

### 7.4.14 Factory reset

Interface	Description
<div style="border: 1px solid black; padding: 10px; margin: 10px;"> <p>-FACTORY RESET- →1: CANCEL 2: CONFIRM</p> </div>	<p>This interface will be used to reset inverter parameter to default. Press UP/DOWN button to move corresponding options, and confirm the selected option and enter into setup interface (refer to 7.4) by pressing ENTER; press ESC button to cancel option and return back setup interface (refer to 7.4).</p>

### 7.4.15 Array detection

Interface	Description
<div style="border: 1px solid black; padding: 10px; margin: 10px;"> <p>- ARRAY DETECT - →1 : DETECT ENB 2 : THRESHOLD</p> </div>	<p>Press UP/DOWN button to move corresponding options, and confirm the selected option and enter into setup interface (refer to 7.4) by pressing ENTER; press ESC button to cancel option and return back setup interface (refer to 7.4).</p>

### 7.4.15.1 ARRAY

Interface	Description
<div>--ARRAY-- 1 : ENABLE →2 : DISABLE</div>	Press UP/DOWN button to move corresponding options. And confirm selected option and return back Array detection by pressing ENTER button (refer to 7.4.15), press ESC button to cancel choice and return back Array detection (refer to 7.4.15);

### 7.4.15.2 THRESHOLD

Interface	Description
<div>--THRESHOLD-- INPUT : <u>8A</u></div>	Press UP/DOWN to increase or decrease the input figure, confirm input and return back Array detection (refer to 7.4.15) by pressing ENTER button, press ESC button to cancel input and return back Array detection (refer to 7.4.15); the input numerical value is between 5 and 25.

### 7.4.16 Three-phase System

Interface	Description
<div>--Three-phase system-- 1 : 3W+N+PE →2 : 3W+PE</div>	<p>3W+N+PE is three-phase four-wire system, 3W+PE is three-phase three-wire system;</p> <p>Press UP/DOWN button to move corresponding options, and confirm the selected option and enter into setup interface (refer to 7.4) by pressing ENTER; press ESC button to cancel option and return back setup interface (refer to 7.4).</p>

## 7.5 Inquiry

Interface	Description
<div style="border: 1px solid black; padding: 10px; margin: 10px;"> <p>-----INQUIRE-----</p> <p>→1: INV MODEL</p> <p>2: MODEL NO</p> <p>3: FIRMWARE</p> <p>4: RECORD</p> </div>	<p>Press UP/DOWN button to move the corresponding option, enter into the selected menu by pressing ENTER button; and return back the user interface (refer to 7.3) by pressing ESC button, there are 5 options in total, including INV MODEL, MODEL NO, FIRMWARE, RECORD And ERROR EVENT.</p>

### 7.5.1 INV MODEL

Interface	Description
<div style="border: 1px solid black; padding: 10px; margin: 10px;"> <p>-----INVERTER-----</p> <p>XXXXX</p> <p>XXXXX</p> </div>	<p>This interface displays product Model and Three-phase system. of the inverter. UP/DOWN button is invalid, ENTER button is invalid; and press ESC button to return back the inquiry interface (refer to 7.5).</p>

### 7.5.2 MODEL SN

Interface	Description
<div style="border: 1px solid black; padding: 10px; margin: 10px;"> <p>-----INVERTER-----</p> <p>SN:</p> </div>	<p>This interface displays product series No. of the inverter. UP/DOWN button is invalid, ENTER button is invalid; and press ESC button to return back the inquiry interface (refer to 7.5).</p>



### 7.5.3 Firmware

Interface	Description
<div>-----FIRMWARE----- ARM VER: DSP VER:</div>	This interface displays edition No. of firmware such as ARM and DSP in inverter. UP/DOWN button is invalid, ENTER button is invalid; and press ESC button to return back the inquiry interface (refer to 7.5).

### 7.5.4 RECORD

Interface	Description
<div>-----REC( 35)----- 1:F01-1 DATE: 2011-10-21 TIME: 16:35:26</div>	This interface displays record and its occurring time, including two types of fault and warning alarm, its content will be described in codes, with total number of 500 at utmost, after exceeding this extent, the one with earliest time will be covered. Press UP/DOWN button to look over record backwards or forwards, and press ENTER to enter into explanation interface for corresponding record content, as shown in the following Figure. Press ESC to return back inquiry interface (refer to 7.5).
<div>-----DETAIL----- Grid voltage High</div>	This interface is used for Description for the recorded codes. UP/DOWN button is invalid, and ENTER is also invalid; press ESC button to return back to the last interface.

<div data-bbox="98 172 416 402"> <p>--- VALUE--- 285V</p> </div>	<p>This interface is used for displaying the corresponding specific numerical value when the code generates. For example, producing error code for Grid voltage High, and we can refer to the voltage value of the Grid at that time in this interface. Some codes correspond no numerical values, and then these interfaces are blank. UP/ DOWN button is invalid, and ENTER is also invalid; press ESC button to return back the last interface.</p>
--	--

### 7.5.5 ERROR EVENT

Interface	Description
<div data-bbox="98 742 416 971"> <p>-----EVE( 20)----- 1:F01-1 Date: 2011-10-21 Time: 16:35:26</p> </div>	<p>Press UP/DOWN button to look over record backwards or forwards, and press ENTER to enter into explanation interface for corresponding record content, as shown in the following Figure. Press ESC to return back inquiry interface (refer to 7.5).</p>
<div data-bbox="98 1024 416 1217"> <p>--EVE( 1)-- +BUS: 350.0V -BUS: 350.0V RADIATOR: 50°C</p> </div>	<p>Press UP/DOWN button to look over record backwards or forwards, press ESC button to return back the last interface.</p>
<div data-bbox="98 1264 416 1458"> <p>--EVE(1)-- RS: 0.00Hz ST: 0.00Hz TR: 0.00Hz</p> </div>	<p>Press UP/DOWN button to look over record backwards or forwards, press ESC button to return back the last interface.</p>

## 7.6 Statistics

Interface	Description
<div><p>----- TIME-----</p><p>RUN: 86</p><p>GRID: 56</p><p>UNIT: HOUR</p></div>	This interface is used to select various options for statistics. UP/DOWN button is used to move corresponding options, press ENTER button to enter the selected menu; and press ESC to return back the user interface (refer to 7.3), there are 8 options, including time, networking number, total, that day, that week, that month, that year, power peak.

### 7.6.1 Time Statistics

Interface	Description
<div><p>----- TIME-----</p><p>RUN: 86</p><p>GRID: 56</p><p>UNIT: HOUR</p></div>	This interface displays operational time and generating duration of the inverter. UP/DOWN button is invalid, and ENTER is also invalid; press ESC button to return back statistics interface (refer to 7.6).

### 7.6.2 Times of paralleling in

Interface	Description
<pre>--CONNE.TIMES- TIMES:          45</pre>	This interface displays times of paralleling in for the inverter. UP/ DOWN button is invalid, and ENTER is also invalid; press ESC button to return back statistics interface (refer to 7.6).

### 7.6.3 Power peak

Interface	Description
<pre>-----PEAK POWER----- HISTORY:  10645 TODAY:    9600 UNIT:      W</pre>	This interface displays history power peak and today power peak of the inverter. UP/DOWN button is invalid, and ENTER is also invalid; press ESC button to return back statistics interface (refer to 7.6).

### 7.6.4 Generated energy today

Interface	Description
<pre>-----E-TODAY ----- NUM:      100 UNIT:      KWH</pre>	This interface displays generated energy of that day. UP/DOWN button is invalid, and ENTER is also invalid; press ESC button to return back statistics interface (refer to 7.6).

### 7.6.5 Generated energy this week

Interface	Description
<pre>-----E-WEEK----- NUM:      700 UNIT:      KWH</pre>	This interface displays generated energy of that week. UP/DOWN button is invalid, and ENTER is also invalid; press ESC button to return back statistics interface (refer to 7.6).

### 7.6.6 Generated this month

Interface	Description
<div>-----E-MONTH----- NUM:           3000 UNIT:           KWH</div>	This interface displays generated energy of that month. UP/DOWN button is invalid, and ENTER is also invalid; press ESC button to return back statistics interface (refer to 7.6).

### 7.6.7 Generated this year

Interface	Description
<div>-----E-YEAR----- NUM:           30000 UNIT:           KWH</div>	This interface displays generated energy of that year. UP/DOWN button is invalid, and ENTER is also invalid; press ESC button to return back statistics interface (refer to 7.6).

### 7.6.8 Gross generation

Interface	Description
<div>-----E-TOTAL----- NUM:           100000 UNIT:           KWH</div>	This interface displays gross generation of the inverter. UP/DOWN button is invalid, and ENTER is also invalid; press ESC button to return back statistics interface (refer to 7.6).

## 8. Installation

### 8.1 Overview

The installation introduction of inverter is as follows. Please read this chapter carefully to help you install the photovoltaic grid- connected inverter correctly.

#### **Inspection of damage during transportation**

The inverter may be damaged during transportation even if we have conducted the test and detection for it before transportation. Therefore, please inspect it before installation. If any damage is detected, please contact with the transportation company or our company directly. We will provide you with the best and quickest service after you provide the photo of damaged part.

#### **Basic installation requirement**

The inverter can be installed outdoors with water-proof and dust-proof level of IP65. Some basic installation requirements are as follows:

- > It is the best to install it in the place where it is away from the living area due to some noise produced during its operation
- > Assure there is no vibrations in the installation environment.
- > Assure that the LED light or LCD can be observed conveniently installation place.
- > Assure that the ambient temperature is of  $-25^{\circ}\text{C} \sim +60^{\circ}\text{C}$ .
- > Good ventilation is required.
- > Clean installation environment is required.

## 8.2 Mechanical installation

### 8.2.1 Installation introductions

For any live part of electronic product, the deadly dangerous may happen due to touch of it. For this product, the voltage of direct current is 1000V and the voltage of alternating current is 400V.

#### Attention!



A suitably qualified electrician must be used to install the inverter.

### 8.2.2 Mechanical dimension

We offer the dimension of case aiming to create the convenience for your mechanical installation of inverter. The mechanical dimension: 640×841×265mm in Width× Height×Depth.

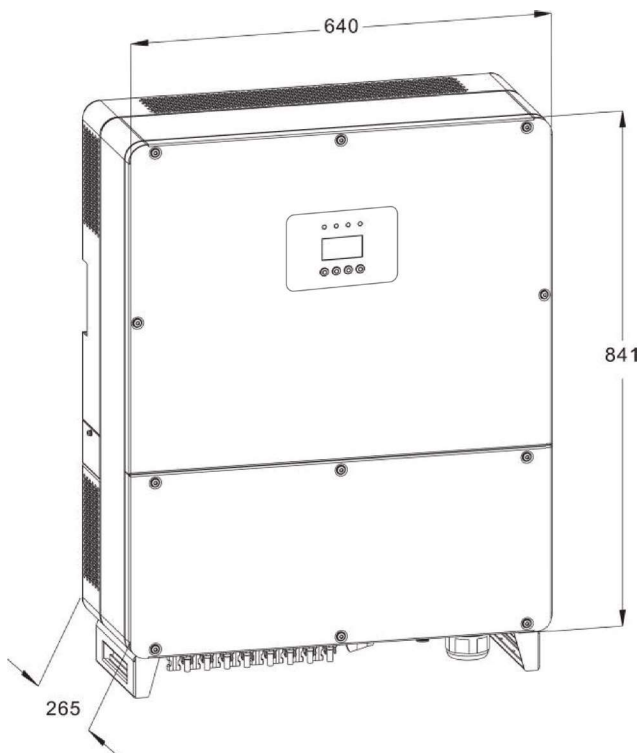


Figure 12: Dimension

### **8.2.3 Packing**

Please check carefully before opening the package of the equipment. It may cause the inverter damage in case the packing material is found damage, please contact with forwarder for claim. If necessary, Please feel free to contact us.

### **8.2.4 Installation of Inverter**

Please read the following installation instruction before you start your work so as to achieve best effect of the inverter.

1. In order to keep long life of inverter, the installation site should be always kept dry.
2. Select suitable location to install the inverter, where is not easily touched, but consider easy installation and easy maintenance as well.
3. Make sure the inverter should be kept at least 1M away from other stuff.
4. Don't directly expose the inverter under the sun light, high temperature will affect the inverter's working efficiency. When the temperature keeps below 45°C, the inverter will be in best working status, the life of inverter will be maximum.
5. Keep good ventilation so as to reduce heat accumulation.
6. Once installing inverter in living environment, don't mount it in plastics plate or wooden plate to avoid noise, it is better to mount it on the wall.
7. The inverter generates heat during normal working status, don't install it on a flammable objects or near the place to store flammable materials. Don't install it near potential explosion area.



## 8.2.5 Installation Location

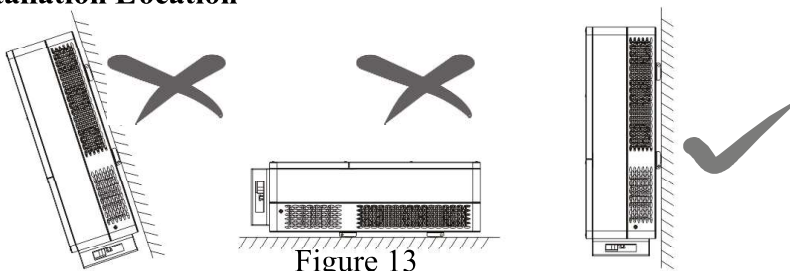


Figure 13

1. The inverter is suitable to be installed on vertical or backwards tilt wall as shown above, the tilt angle should be less  $15^{\circ}$ .
2. Don't install inverter on forward tilt wall.
3. Don't install inverter on horizontal wall.
4. Mount the inverter at height same as eyesight for easy operation and data reading.

## 8.2.6 Installation Procedure

### ● Fix the rack to metal holder (standard)

The inverter standard with bolt group (including nut, flat gasket, spring washer) before delivery. To make the inverter can be installed to various metal holder. Use  $\varnothing 12$  driller kit to drill installation holes on the metal holder according to the hole position of the rack. Then fix the rack to metal holder by using bolt group.

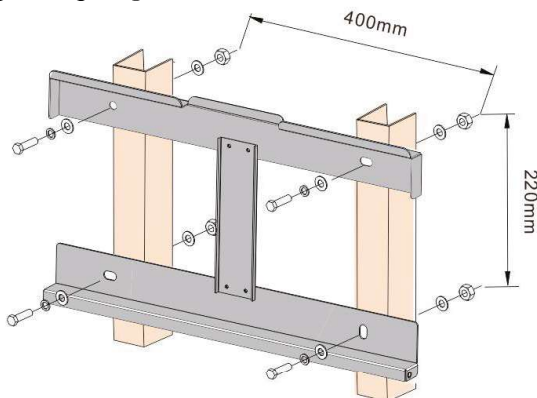
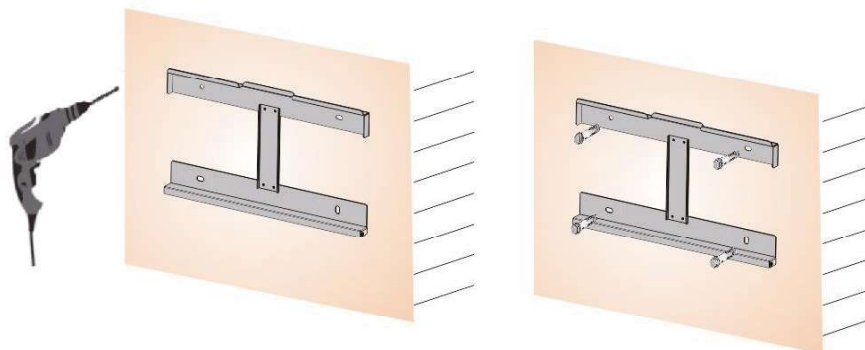


Figure 14

● **Fix the rack to concrete wall (option)**

1. Stick the rack from the packing list to the wall. Use Ø14 driller kit to drill installation holes according to the hole positions in the framework.
2. Clean the dust inside the holes, and insert expansion bolt into the holes. Make the expansion pipe into the wall, screw the bolt, take the rack, aimed at the hole, then tighten.



3. Hang the inverter to rack from the top to bottom, check both sides and keep the inverter in the right position, and tighten screws in both sides.



Figure 16

### 8.2.7 Ambient requirement

**Attention!**

The scope of ambient is  $-25^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$ . Meanwhile, no direct sunlight for inverter should be satisfied, or the high temperature can influence the generated energy.

**Warning!**

Don't place inverter with inflammable materials.

**Warning!**

The temperature of some parts of inverter is very high. Avoid contacting with them.

### 8.3 Electric connection

- **Photovoltaic array**

The open-circuit voltage for photovoltaic array cannot exceed 1100V.



Maximum open-circuit voltage for array: 1100V

- **Three-phase grid**

The grid is detected continuously by inverter to refer to whether it can meet the grid connection condition. The grid limitation for grid condition is as follows. Meanwhile, the grid-connected inverter should be installed with permit of local electric department.



Voltage of three phase grid: 180V~270V

Frequency of grid: 50/60Hz

### ● **Connected wire**

Select the inner diameter of 12AWG (4mm<sup>2</sup>) and the outer diameter of Ø5~8mm of the photovoltaic cable as the connecting line of the PV input terminal. Select the inner diameter of 2AWG-0AWG (35mm<sup>2</sup>-50mm<sup>2</sup>) and the outer diameter of Ø32~38mm of the photovoltaic cable as the connecting line of the AC output terminal. Cables should avoid high temperature, flame and rain water whenever possible. The inverter should be connected with earth permanently. The protective earthing conductor cross-sectional area is more than 10mm<sup>2</sup>.

### ● **Tools**

The multimeter, wire stripper and screw driver are required during electric connection.

## **8.3.2 Wire for alternating current connection**

- > The breaker of alternating current is cut off when wiring to assure that there is no electricity at the terminal of alternating current wire. And then, confirm it after measuring of multimeter.
- > Connect the “L1” of alternating current output with “L1” of grid;
- > Connect the “L2” of alternating current output with “L2” of grid;
- > Connect the “L3” of alternating current output with “L3” of grid;
- > 3PH, without “N”
- > The earth terminal is connected with the land via guide line.
- > Confirm that the wiring is firm.



### **Warning!**

Assure there is no live part of inverter during electric wiring.

### 8.3.3 Wire for direct current connection

**Warning!**

The open-circuit voltage of photovoltaic array should not exceed 1100V, or the equipment will be damaged. Measure the open-circuit voltage of photovoltaic array with multimeter when connecting.

**Warning!**

The positive pole and negative pole of voltage for photovoltaic array must not be reversed, this must be measured with a multimeter to ensure correct polarity.

- > Isolate the direct current to assure that there is no live wiring of direct current
- .
- > Measure the open-circuit voltage for photovoltaic array with multimeter to assure that it cannot exceed 1100V.
- > Confirm the positive and negative pole with multimeter.
- > The positive pole of photovoltaic array is connected with “PV+” of direct current input
- > The negative pole of photovoltaic array is connected with “PV-” of direct current input.
- > Confirm that the wiring is secure

### 8.3.4 Wire for communication connection

The communication method of RS485 bus is adopted for this machine when PC is used for monitoring of signal or multiple grid-connected inverters and the RJ45 terminal of terminals for inverter is the port that is used for connection of internal 485 Bus. The monitoring can be fulfilled when PC is connected with RS485 Bus via RS485/RS232 converter. The wiring diagram of communication system is in Figure 17. The diagrams for RS485/RS232 converter and RJ45 terminal and 485 bus ports are in Figure 18 and 19 respectively.

## 8.4 Starting and closing

### **Starting process:**

1. Connect the photovoltaic array, inverter and alternating current grid correctly according to the above- mentioned installation process.
2. Measure whether the voltage of alternating and direct current meets the starting condition of machine with multimeter before starting.
3. First, close the breaker of direct current input.
4. Then, close the breaker of grid.
5. The inverter will be started automatically and combined to the grid when the conditions for normal operation of machine are satisfied.
6. The grid-connected inverter cannot be controlled manually after its normal operation and it has the functions of automatic starting and closing after fault.

### **Closing process:**

1. The grid-connected inverter will close automatically when the solar cannot meet the requirement for generating.
2. The operation can be performed via LCD on the panel.

### **Closing process for emergency:**

Firstly, cut off the breaker of grid and then cut off the breaker of direct current for photovoltaic array if the emergency closing is required, or the direct current breaker will be damaged and the personal hazardous will be produced. Our company cannot commit the quality assurance and bear any responsibility arising from it due to failure of complying with this requirement.

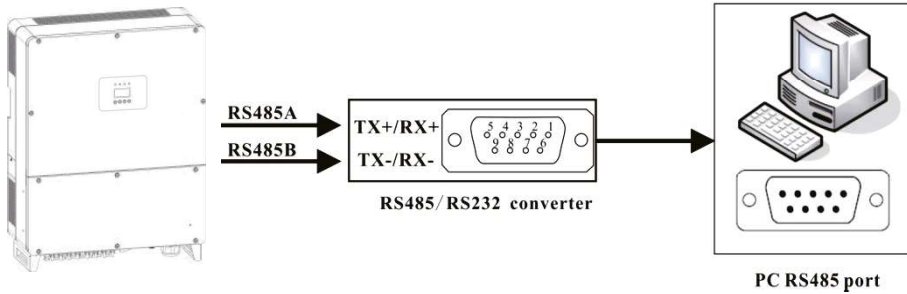


Figure 17: Communication Conn ection

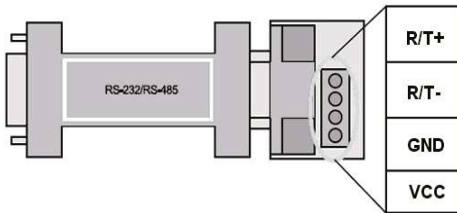


Figure 18: RS485/ RS232 Converter

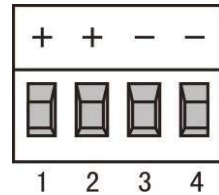
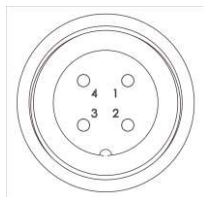


Figure 19: RS485 Port

When the GPRS/WIFI data controller monitor the PV inverter, the pin definition of GP RS/WIFI as shown in the figure20 below.



- 1- VCC
- 2- GND
- 3- 485A
- 4- 485B
- 5-

Figure 20

## 9. Technical Data Table 9.1

Model	70K	75K	80K
Input Data			
Max. Recommended PV Power	105000W	112500W	120000W
Max.DC Input Voltage	1100V		
MPPT voltage Range	200-1000V		
Start-up Voltage	250V		
No. of MPP Trackers	4		
No. of Input Strings per Tracker	3/3/3/3	4/4/3/3	4/4/3/3
Max. DC Input Current	35A/35A/35A/35A	44A/44A/35A/35A	44A/44A/35A/35A
DC Switch	Integrated		
AC Output Data			
Rated AC Power	70000W	75000W	80000W
Max.output power	77000VA	75000VA	88000VA
Max. AC Current	111.1A	109A	127A
Rated AC Voltage/Range	3/PE 380, 400;+/-20%; 3/N/PE 380, 400;+/-20%;		
Grid Frequency/ Range	50Hz/60Hz ; ±5Hz		
Adjustable Power Factor[cos φ]	0.8leading ~0.8lagging		
Output THDi(@Rated Output)	<3%		
Efficiency			
Max.Efficiency	99.00%	99.00%	99.00%
Euro Efficiency	98.50%	98.50%	98.50%
MPPT Efficiency	99.90%	99.90%	99.90%
Protection			
DC Insulation Monitoring	Integrated		
Input Reverse Polarity Protection	Integrated		
Anti-island Protection	Integrated		
Residual Current Monitoring	Integrated		
Over-heat Protection	Integrated		



AC Overcurrent Protection	Integrated		
AC Short-circuit Protection	Integrated		
AC Overvoltage Protection	Integrated		
DC Surge Protection	Integrated		
AC Surge Protection	Optional(Type II)		
General Data			
Size(Width*Height*Depth)	640×841×265mm		
Weight	76KG	79KG	79KG
User Interface	LCD		
Communication	RS485(Standard), Wifi or GPRS		
Ambient Temperature Range"	-25 °C ~ 60 °C		
Relative Humidity"	0-100%		
Operating Altitude"	≤4000m		
Standby Self Consumption	<1W		
Topology	Transformerless		
Cooling	Fan Cooling		
Protection Grades	IP65		
Noise	<60db		
Warranty	5 /7/10 years		
Certifications & Standards			
Grid Regulation	PEA,MEA, IEC61727,IEC62116		
Safety Regulation	IEC 62109-1, IEC 62109-2		
EMC	EN 61000-6-2, EN 61000-6-4		

**Table 9.2 Grid Specification(3W+N+PE/LN)**

Grid specification	Output Voltage Range(Vac)	Output Frequency Range (Hz)	Boot wait time (S)	Error recovery time (S)
China	187 - 252	48 - 50.5	60	60
Germany	196 - 264	47.5 - 51.5	60	60
Australia	200 - 270	48 - 52	60	60
Italy	184 - 276	49.7 - 50.3	60	60
Spain	196 - 253	48 - 50.5	180	60
U.K.	184 - 264	47 - 52	180	60
Hungary	198 - 253	49.8 - 50.2	300	60
Belgium	184 - 264	47.5 - 51.5	60	60
AUS-W	200 - 270	47.5 - 50.5	60	60
Greece	184 - 264	49.5 - 50.5	180	60
France	184 - 264	47.5 - 50.4	60	60

**Table 9.3 Grid Specification(3W+PE/LL)**

Grid specification	Output Voltage Range(Vac)	Output Frequency Range (Hz)	Boot wait time (S)	Error recovery time (S)
China	340 - 480	48 - 50.5	60	60
Germany	340 - 460	47.5 - 51.5	60	60
Australia	340 - 480	48 - 52	60	60
Italy	320 - 480	49.7 - 50.3	60	60
Spain	340 - 440	48 - 50.5	180	60
U.K.	320 - 460	47 - 52	180	60
Hungary	360 - 440	49.8 - 50.2	300	60
Belgium	320 - 460	47.5 - 51.5	60	60
AUS-W	340 - 480	47.5 - 50.5	60	60
Greece	320 - 460	49.5 - 50.5	180	60
France	320 - 460	47.5 - 50.4	60	60
Metro	346 - 416	49 - 51	60	60
Thailand	342 - 418	48 - 51	60	60
GB19964	320 - 480	48 - 52	60	60
Local	320 - 480	45 - 55	60	60
60Hz	320 - 480	58 - 62	60	60

In the running process, errors such as AC overvoltage, AC undervoltage, AC overfrequency and AC underfrequency occur, the series go to boot wait time directly after 60 seconds when the power grid

## **10. Appendix**

### **10.1 Quality assurance**

The quality assurance for product of Our company can be conducted only on the condition that invoice and date when customer purchases the product should be presented and the trade on the product is clear during quality assurance period.

#### **Condition:**

- > Our company will maintain or replace the product having fault with the new one free of charge when the fault is produced during quality assurance period.
- > The unqualified product after replacing should be returned to our company.
- > The reasonable period must be reserved by customer so that our company can repair the equipment having fault.

#### **Our company has the right to reject the quality assurance when the following conditions appear:**

- > Damage due to transportation
- > Incorrect installation
- > Incorrect refit
- > Incorrect use
- > Operate it beyond the extreme hostile environment described in this manual.
- > Install and use it beyond the scope of any provision in relevant international standard.
- > Damage due to abnormal natural environment. Please refer to the newest data if product dimension and parameter is changed without prior notice.

If you have any further technical questions about our product  
please contact us:

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