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Grid-tie Transformerless Solar Inverter

RPI M6A/M8A/M10A

Operation and Installation Manual

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Contents

Safety Instructions

This manual uses the following instructions for conveying important safety related information.

CAUTION !

Machine and equipment damage may occur if this hazardous situation is not avoided.

WARNING !

Death and serious injury may occur if this hazardous situation is not avoided.

Repair work on the device should ONLY be carried out by the manufacturer. No user serviceable parts inside.

In Australia, installation and maintenance work shall be conducted by qualified electrician and shall comply with Australian Regulations.

DANGER !

To avoid risk of electrical shock, do not open the solar inverter. Death and serious injury will occur if this hazardous situation is not avoided.

WARNING ! BURN HAZARD

The unit may reach very high temperatures and the device surface can become hot. Sufficient cooling is necessary for optimal yield.

1.General Information

1.1. About this Manual

This manual is to provide the explanation and procedures for installing, operating, maintaining, and troubleshooting the below solar inverters:
RPI M6A/ RPI M8A/ RPI M10A

1.2. Product Description

This device is a 3-phase grid-tied solar inverter which does not support off-grid functionality.

The operation of solar inverter is shown as ***Figure 1-1***. Inverters convert the DC input power supplied from the PV Array into 3-phase AC output power to Grid.

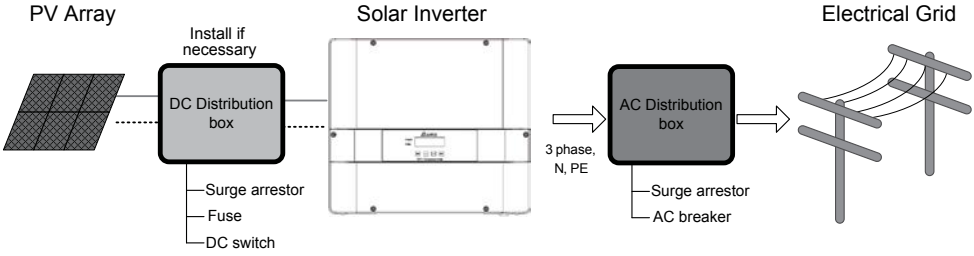


Figure 1-1 Solar system operation illustration

1.3. Additional Information

For more detailed or other related product information, please visit http://www.deltaww.com

2.Product Overview

2.1 Checking Unit and Accessories

Unpredictable damages may occur during shipment. Check if all the accessories are in the package, the standard accessories are list as Table 2-1. If there is any visible damage to the inverter/accesories or any damage to the packaging, please contact your inverter supplier.

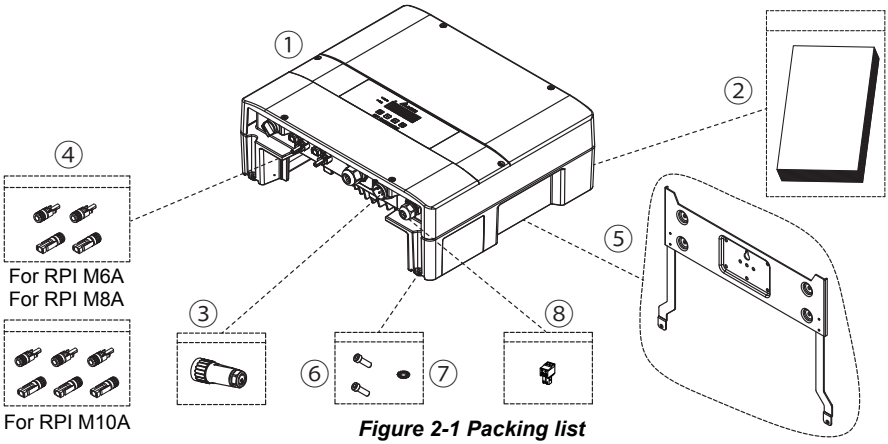


Figure 2-1 Packing list

RPI M6A/ RPI M8A/ RPI M10A			
	Object	Qty	Description
1	PV Inverter	1	RPI M6A/ RPI M8A/ RPI M10A solar inverter.
2	a. User Manual b. Quick Installation Guide (EU/AU/ EN/ DE/ FR/ NL) c. General Safety Instruction	1	The Instruction to provide the information of safety,Installation, specification, etc.
3	AC Plug	1	Connector for AC connection.
4	DC Plug	2 / 3 sets	Connector for DC connection. 2 sets for M6A / M8A 3 sets for M10A
5	Mounting Bracket	1	To mount solar inverters on the wall.
6	Screw	2	To fix solar inverter on the wall.
7	Washer	1	Use for external grounding.
8	12VDC Output Connector	1	For CNC406 using only, DC output 12V / 0.5A max.

Table 2-1 Packing list

2.2. Product Label

Users can identify the model number and the specifications by the information on the product label. The location for the label please see ***Figure 2-2***.

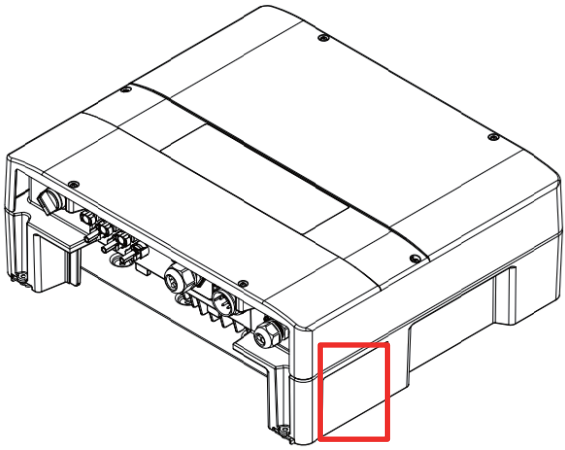


Figure 2-2 Product label

2.3. Exterior Objects

The Inverter's exterior objects are shown in ***Figure 2-3***. The detailed input/output interfaces illustration is shown in ***Figure 2-4***.

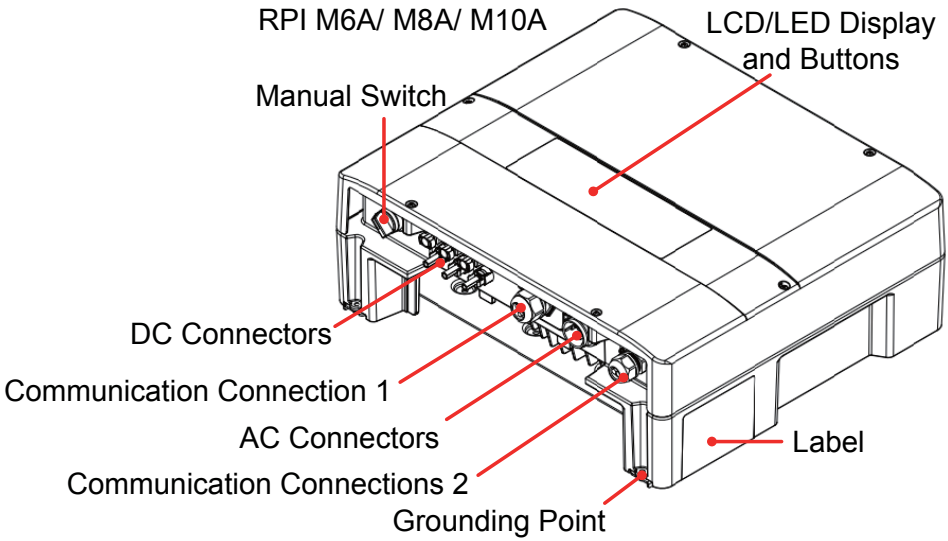


Figure 2-3 Inverter's exterior objects

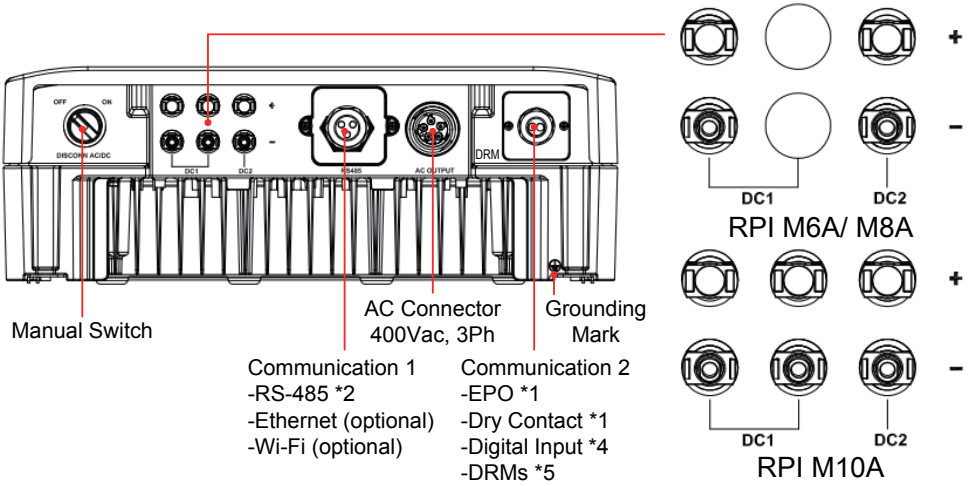


Figure 2-4 Input/output panels

3.Installation

CAUTION !

The unit should not be installed in direct sunlight.

WARNING !

- Do not install the unit near or on flammable surfaces.
- Please mount the unit tightly on a solid/smooth surface.

3.1. Unpack the Inverter

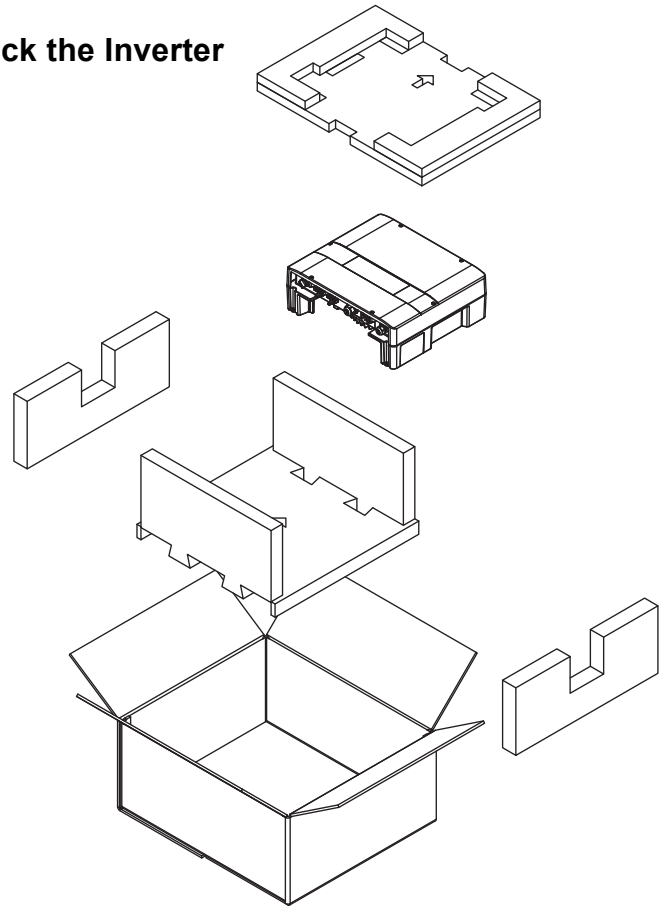


Figure 3-1 Unpacking the inverter

3.2. Mount the Inverter

This unit is designed to be wall-mounted. Please ensure the installation is perpendicular to the floor and the AC plug at the bottom. Do not install the device on a slanting wall.

To mount the inverter on the wall, please follow the procedure below:

1.Screw the mounting bracket on the wall with 8 M6 Phillips head screws. Please refert to ***figure 3-4***.
2.Attach the inverter to the mounting bracket.
3.Use Hex Wrench fixing the inverter with 2 M4 Hexagon Socket screws. Please refer to ***figure 3-5***.

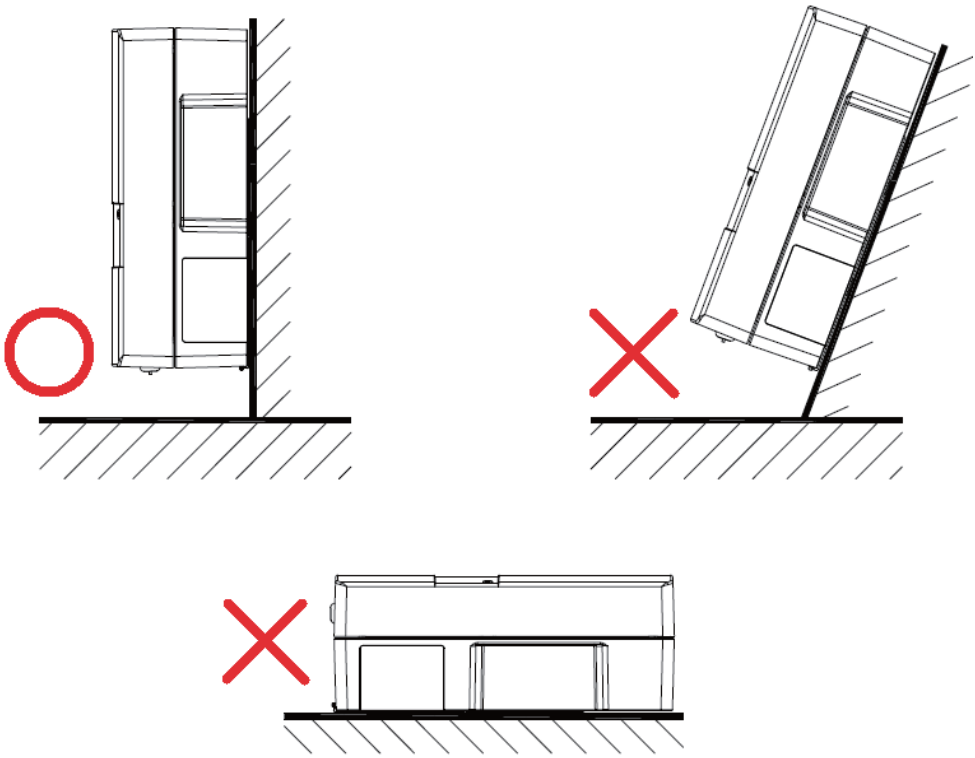


Figure 3-2 Correct and incorrect installation

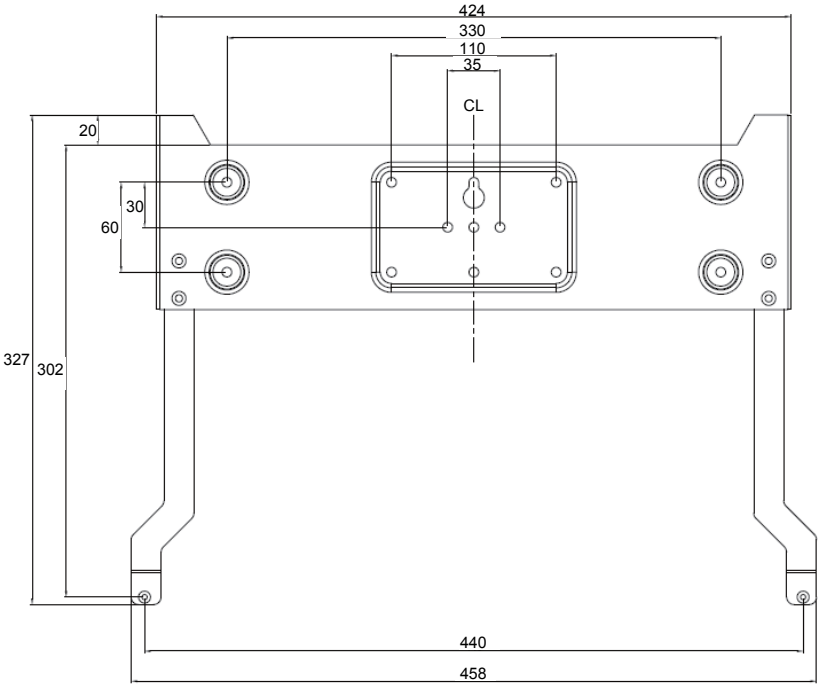


Figure 3-3 Mounting bracket dimension

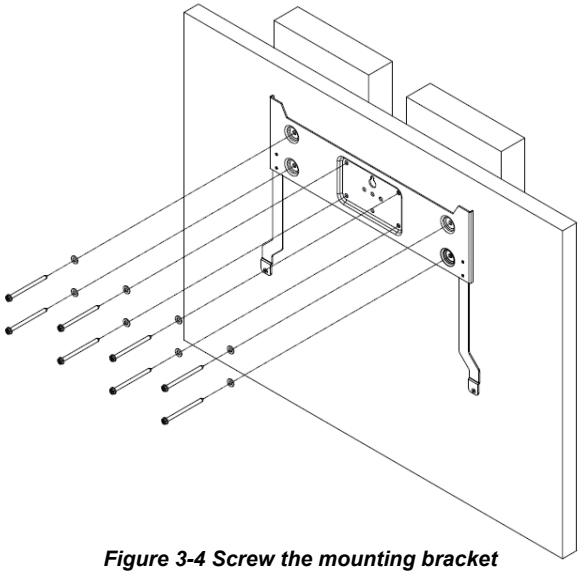


Figure 3-4 Screw the mounting bracket

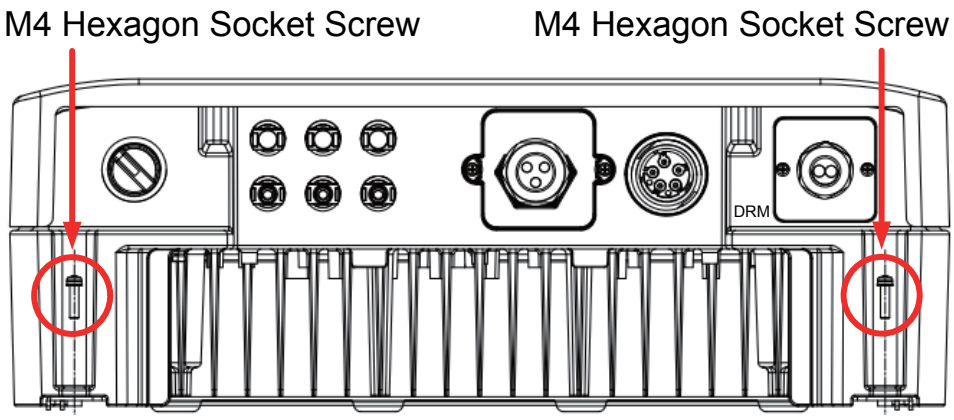


Figure 3-5 Attach inverter to the bracket and fasten with screws

CAUTION !

- The bracket supplied with the unit is specially designed and should be the only mounting device used for the unit.
- It is recommended to install the inverter in a suitable location which offers non-obscured and safe access, in turn ensuring easy access for service and maintenance.
- Please leave an appropriate gap between floor, ceiling, and unit when installing inverter as shown in ***Figure 3-6***. (There is no mandatory requirement of the gap between unit and unit.)
- Please install solar inverter at an eye level to allow easy observation for operation and parameter setting.
- Ambient temperature -25° C~60° C.(power de-rating above 40° C)

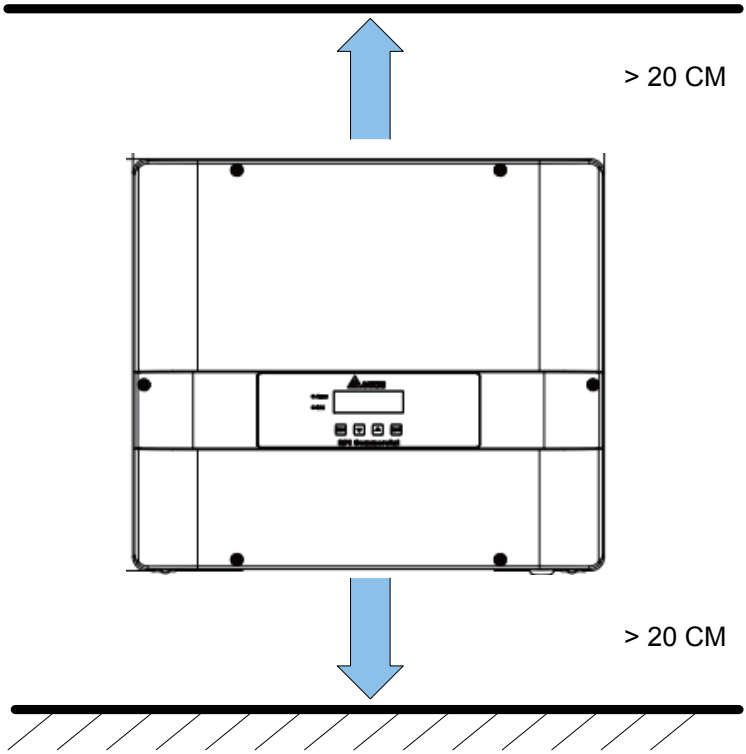


Figure 3-6 Proper installation gap

4. Wiring

4.1. Preparation before Wiring

- When grounding the solar array, an isolation transformer is required due to the RPI M6A/ M8A/ M10A not having galvanic isolation between the DC-input and AC-output. Wiring illustrations please refer to ***Figure 4-1***.
- Inverters provide DC inputs in parallel (2 MPP tracker/ 3 parallel inputs).
- Different DC connections type need different settings of insulation detection.
- It must to keep DC and AC power off when disconnected the DC connector even if turn off the manual switching that in the button cover.

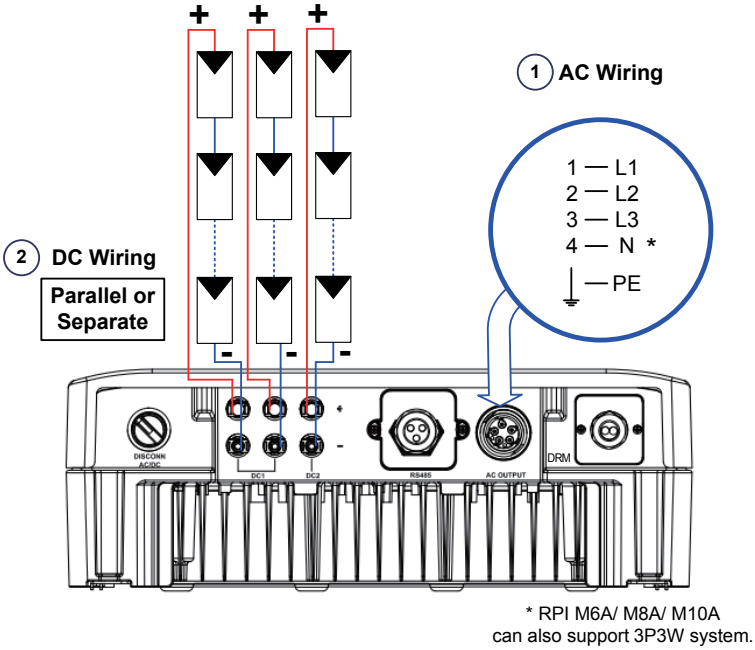


Figure 4-1 Connection of a system for floating solar array

WARNING ! SHOCK HAZARD

Whenever a PV array is exposed to sunlight, a shock hazard may exist due to output wires or exposed terminals. To reduce the risk of shock during installation, cover the array with an opaque (dark) material and ensure that the Disconnect Device in the inverter is set to OFF before commencing any wiring.

4.2. AC Grid Connection: 3-Phase+PE or 3-Phase+N+PE

WARNING !

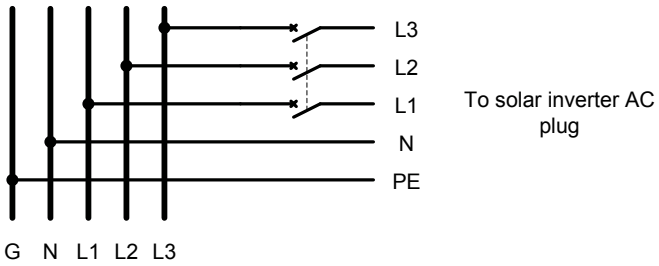
Before commencing AC wiring, please ensure AC breaker is switched off.

4.2.1. Required Protective Devices and Cable Cross-sections

It is recommended to install an upstream circuit breaker between AC side and inverter side for over current protection.

Model	Upstream circuit breaker
RPI M6A/ M8A/ M10A	20A

Table 4-1 Recommended upstream protection



The AC cable must be jacked and meet the specifications in table 4-2.

Model	Current Rating	Wire size	Recommended Torque
RPI M6A RPI M8A RPI M10A	25 A	5 - 8 mm^2	0.7 N.m

Table 4-2 AC input cable requirement

Model M6A/ M8A/ M10A supports both 3P3W (3-phase and PE) and 3P4W (3-phase, N, and PE).

CAUTION ! Machine and equipment damage may occur.

- Make sure to choose proper size for AC cable.
  Please choose the terminals as shown in ***figure 4-2*** for wires crimping.
- Failed to follow these instructions may cause AC plug damage.

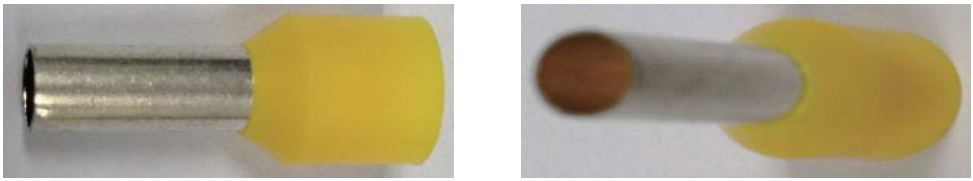


Figure 4-2 Terminal for wire crimping

Follow the steps below to strip the wires before assembling the AC plug as shown in ***Figure 4-3***:

- Remove 55 mm (2.2 inch) of AC cable outer jacket.
- Trim the L1, L2, L3, and N wire to 52.5 mm (2.0 inch).
- Strip 12 mm (0.5 inch) of insulation from all wires ends.
- Crimp terminals for all wires.

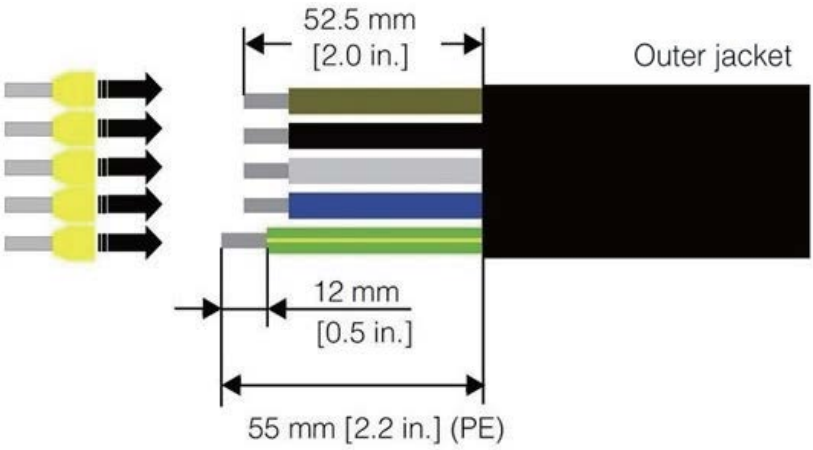


Figure 4-3 Striping the wires

RPI M6A/ M8A/ M10A use Amphenol AC connector with part number C016 20E004 800 2. Assemble the AC plug and wires as the procedures shown in ***Figure 4-4***. The sequence of L1~ L3 can be random. However, N and PE must be connected correctly.

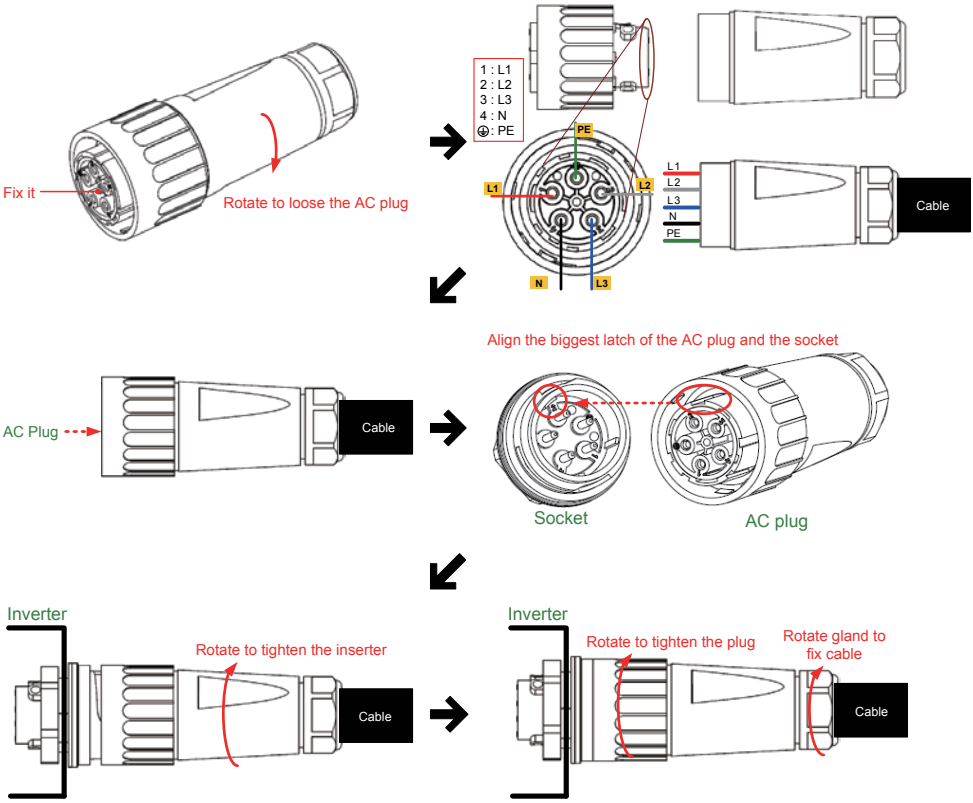


Figure 4-4 AC plug illustration for RPI M6A/ M8A/ M10A.

After wiring, installer should choose the AC connection type on the control panel. About setting, please refer to 5.3.6 Install Settings.

The AC voltage should be as followings:

3P3W	3P4W
L1-L2: 400 Vac ± 10%	L1-N: 230 Vac ± 10%
L1-L3: 400 Vac ± 10%	L2-N: 230 Vac ± 10%
L2-L3: 400 Vac ± 10%	L3-N: 230 Vac ± 10%

4.3. DC Connection (from PV Array)

WARNING !

- When undertaking DC wiring, please ensure the correct polarities are connected.
- When undertaking DC wiring please ensures that the power switch on the PV array is OFF.

CAUTION !

- The connection number of PV Array, open circuit voltage and power of all strings in DC1 must be coherent.
- The maximum open circuit voltage of PV Array cannot exceed 1000V.
- Any device installed between PV Array and inverter must meet the following specifications:
  Rated voltage > open-circuit voltage of PV Array.
  Rated current > short-circuit current of PV Array.
- The input power to the inverter should not higher than the rated power shown in table 4-3.

Type of limit	RPI M6A	RPI M8A	RPI M10A
DC1	4.25 kW @ Vdc=425V-800V	5.65 kW @ Vdc=565V-800V	7 kW
DC2			5.4 kW
Maximum input power	6.6 kW	8.8 kW	11 kW

Table 4-3 Maximum rating of input power

Model	Current Rating	Wire size
M6A	DC 10A	2 - 3mm^2 / 14 AWG
M8A	DC 10A	2 - 3mm^2 / 14 AWG
M10A	DC 15A	3 - 5mm^2 / 12 AWG

Table 4-4 Cable size

DC wiring polarities are divided into positive and negative, which is shown in Figure 4-5. The connection shall be coherent with the indication marked on inverter.

Figure 4-5 DC Plug Wiring illustration

4.4. Multiple Inverter Combinations

4.4.1. Three-Phase Parallel Combination System

RPI M6A/8A/10A can be used in three-phase parallel combination system. In this application, inverter may be parallel connected to a same AC grid. Please refer to ***Figure 4-6.***

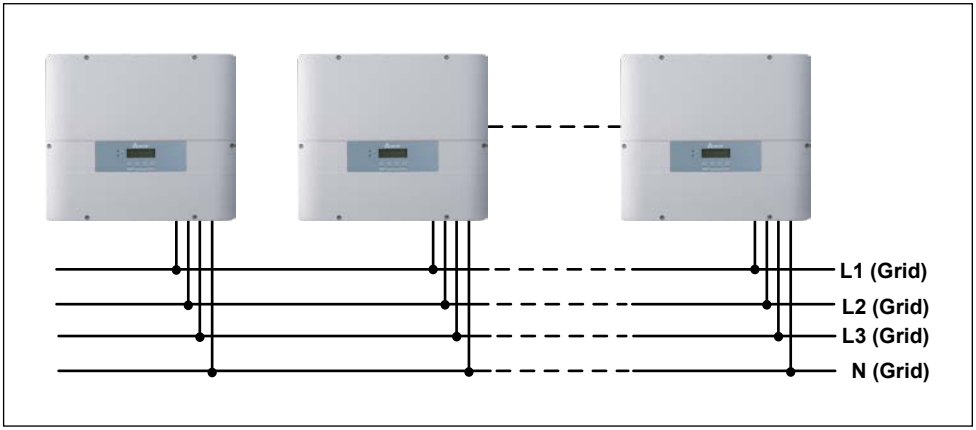


Figure 4-6 Three-phase parallel combinations

4.4.2. Communication Module Connections

The Communication 1 Module illustration please see ***Figure 4-7***, the module supports a RS-485 terminal for communication with a computer.

The Communication 2 Module illustration please see ***Figure 4-7***, the module Supports Digital Input, Demand Response Modes (DRMs), EPO, Dry Contact and DC Output : 12V / 0.5A

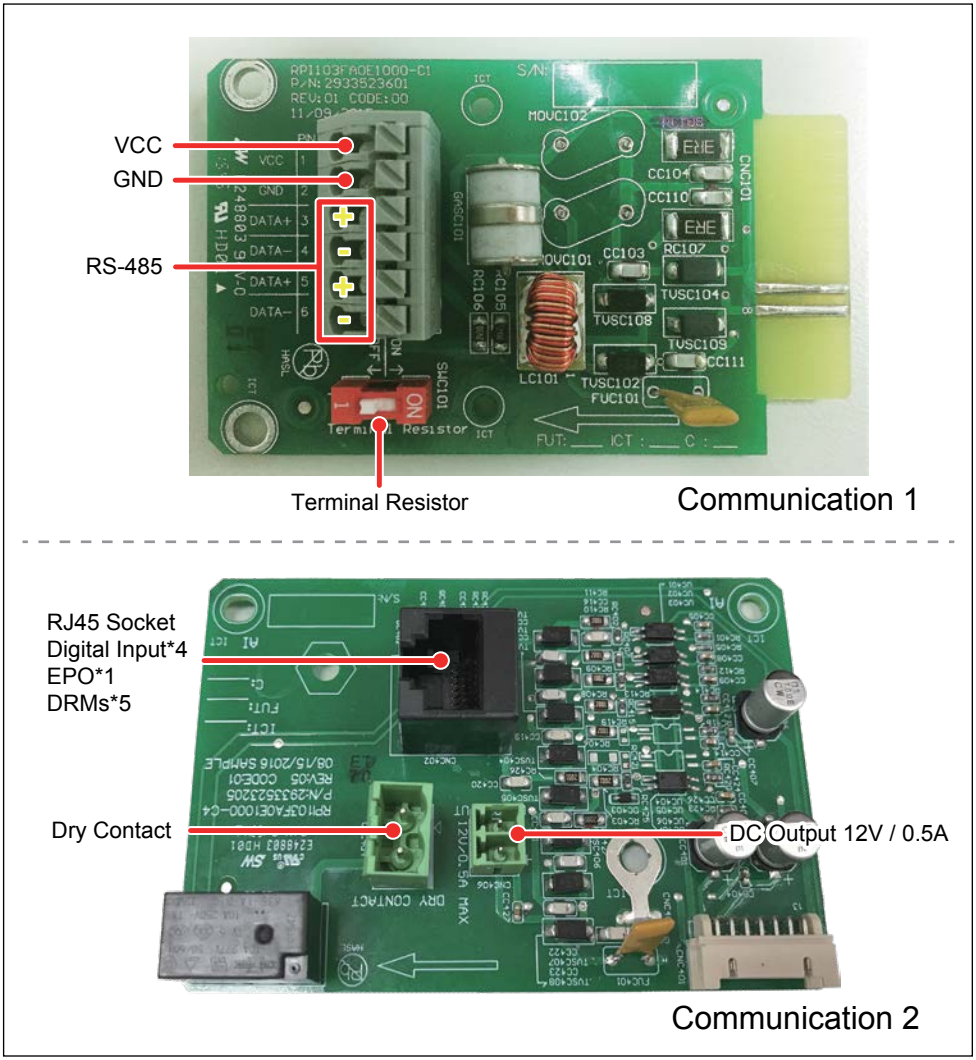
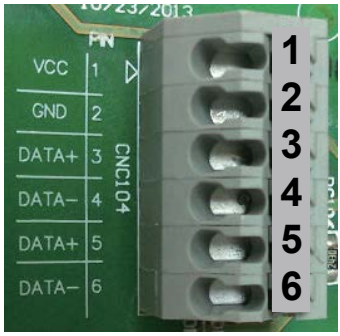


Figure 4-7 Communication module

4.4.3. RS-485 Connection

The pin definition of RS-485 is shown in ***Table 4-5***. Installers should switch ON the terminal resistor when single inverter is installed. The wiring of multi-inverters connection is shown as ***Figure 4-8***. Installers should switch ON terminal resister at the first and last devices of the RS-485 chain as shown. Other terminal resisters should be switched OFF.

Pin	Function
1	VCC (+12V)
2	GND
3	DATA+
4	DATA-
5	DATA+
6	DATA-



RPI M6A/ M8A/ M10A

Table 4-5 Definition of RS 485 pin

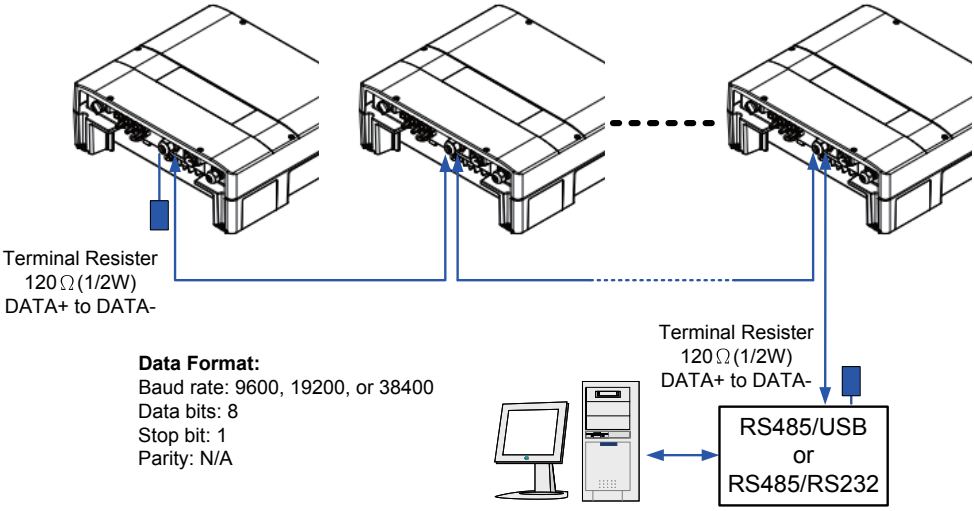


Figure 4-8 Multi-inverter connection illustration

EPO, digital input function and DRMs can be parallel connection in multi-inverter operation, refer to ***Figure 4-9*** for the connection.

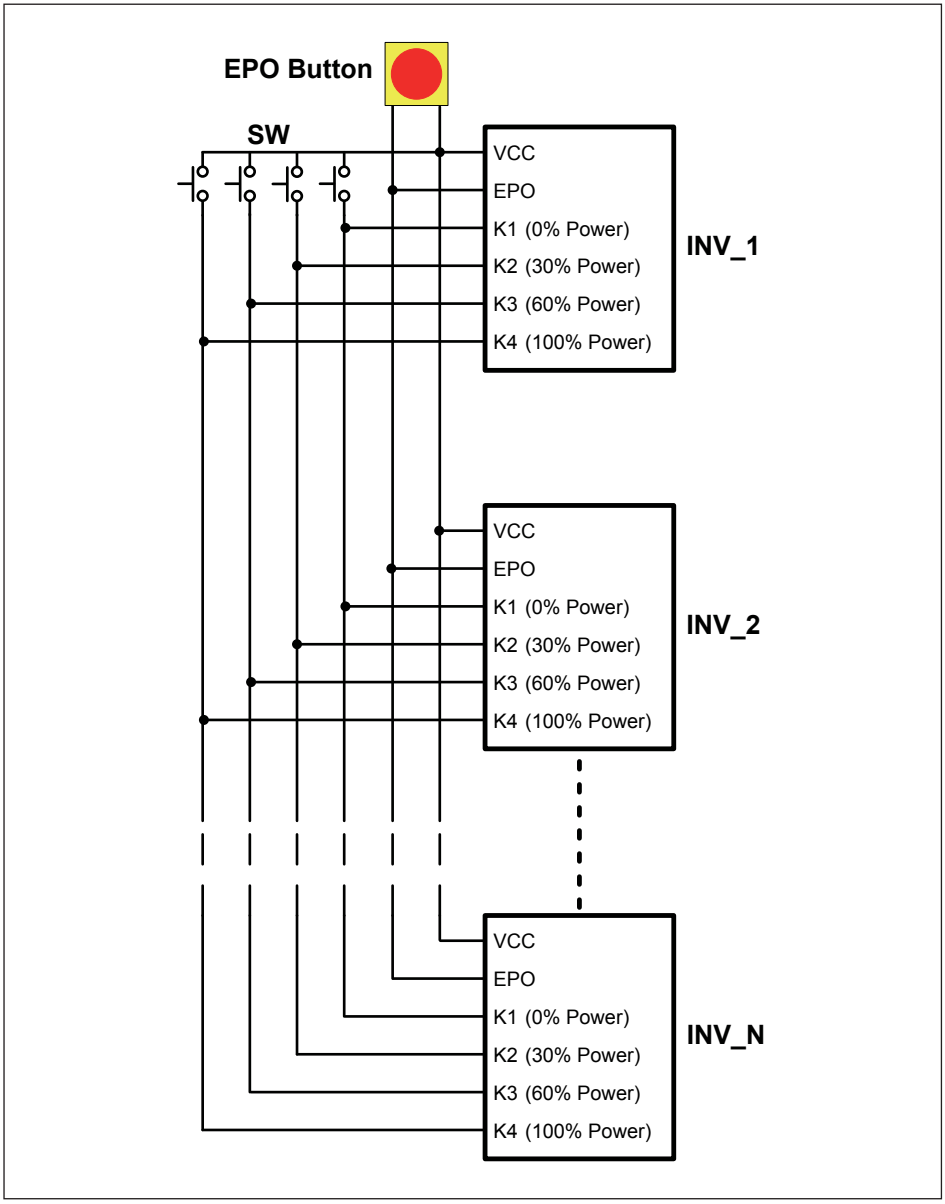


Figure 4-9 : EPO & Digital input & DRMs parallel connection

4.4.4. Digital Input & EPO Function & DRMs

Communication 2 Module has 1 set of emergency power off function (EPO). Users can customize EPO function in Install Settings page. Please refer to section 5.3.6.6 EPO. also provides 4 sets of digital input function (K1~K4). Please refer to ***Table 4-7*** In Australia (AU 2015) and New Zealand (NZ 2015), the DRMs are also use digital input function to assert. The definition is different from normal digital input function; please refer to ***Table 4-8*** for the DRMs pin definitions.

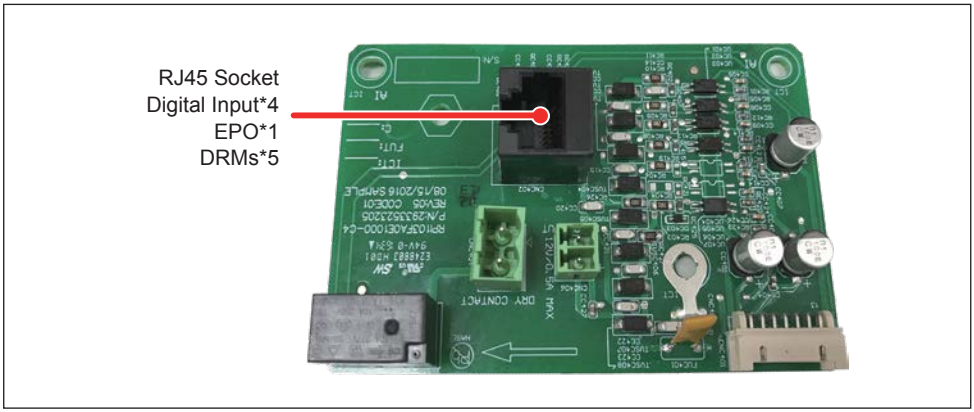


Figure 4-10 Digital function & EPO & DRMs

Pin	Define
1	K1
2	K2
3	K3
4	K4
5	VCC*
6	EPO*
7	EPO
8	VCC

Tabel 4-6
Definition of RJ45 Socket Pin

Short	Inverter's action
VCC & K1	0% active power
VCC & K2	Maximum 30% active power
VCC & K3	Maximum 60% active power
VCC & K4	Maximum 100% active power
VCC & EPO	Emergency power off (EPO)

Table 4-7 Definition of digital input & EPO function

Short	Inverter's action
VCC* & K1	DRM5 (0% active power)
VCC* & K2	DRM6 (Maximum 50% active power)
VCC* & K3	DRM7 (Maximum 75% active power and sink reactive power)
VCC* & K4	DRM8 (Maximum 100% active power and sink reactive power)
VCC* & EPO*	DRM0 (Emergency power off)

Tabel 4-8 Definition of DRMs for Australia (AU 2015) and New Zealand (NZ 2015)

4.4.5. Dry Contact Connection

RPI M6A/ M8A/ M10A provide 1 set of Dry Contact function and its triggering condtion can be customized by users. When dry contact function is triggered, the output two ports will be short-circuted. For more information about triggering condtion settings, please refer to section 5.3.6.5 Dry Contact.

Figure 4-11 Dry contact port

4.4.6. DC Output Connection

RPI M6A/ M8A/ M10A provide 1 set of DC Output and it can be used by external device (EX: Alarm light or Buzzer).
The output spec is 12V / 0.5A max and its connector in packing, please refer to ***Table 2-1*** Packing list.

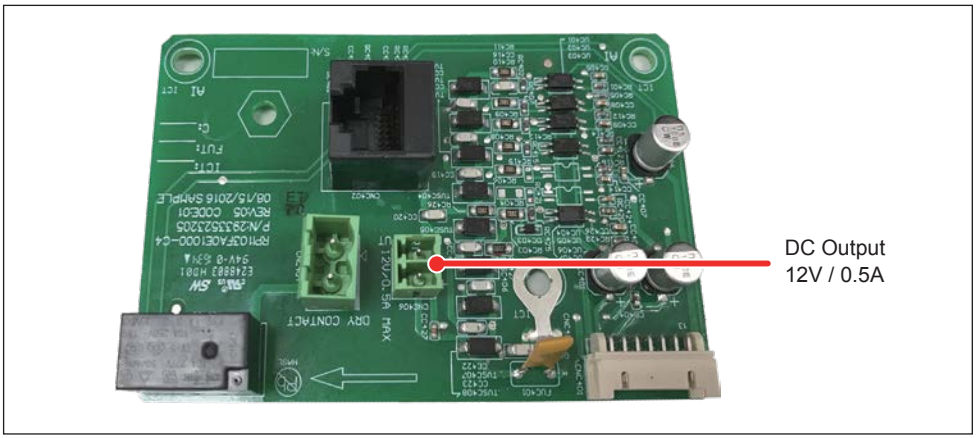


Figure 4-12 DC Output port

5.Turn on / off PV inverter

WARNING ! BURN HAZARD

The enclosure temperature may exceed 70°C while inverter is operation.
A dangerous burn hazard is present in this situation.

5.1. First startup

At first startup, users have to feed in AC power and switch on the Manual Switch. Inverter will start up on AC power and LCD display panel will come live. When the LCD display lighting up, please set Language and Country according to your needs. After these two items set correctly, LCD display will enter home page ***(Figure 5-3)***. Please make sure “status:” showing no any error, fault or warning on home page before you feed in DC power. After DC and AC power are ready, inverter will initially self-test which may take about 2 minutes and start to feed in power to grid.

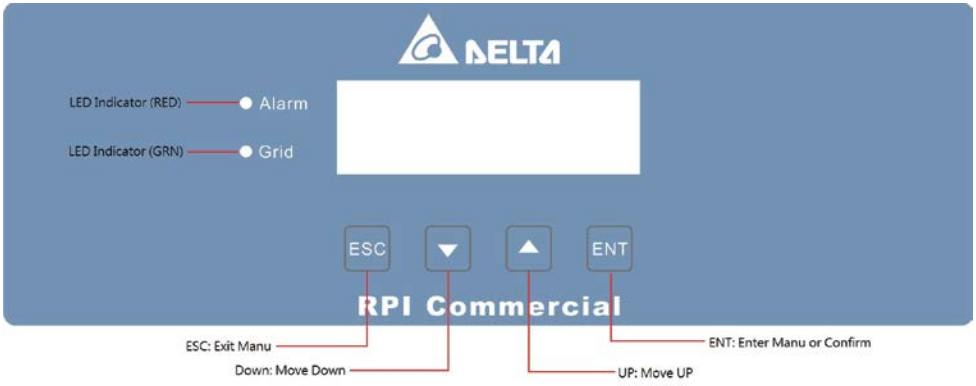


Figure 5-1 panel indicator

Condition	Green LED	Red LED
Standby or Countdown	FLASH *1	OFF
Power ON	ON	OFF
Error or Fault	OFF	ON
Night time (No DC)	OFF	OFF
Bootloader mode	FLASH *2	

*1 ON 1s / OFF 1s
*2 ON 1s / OFF 1s, Green and Red are interleaving

Table 5-1 LED indicator

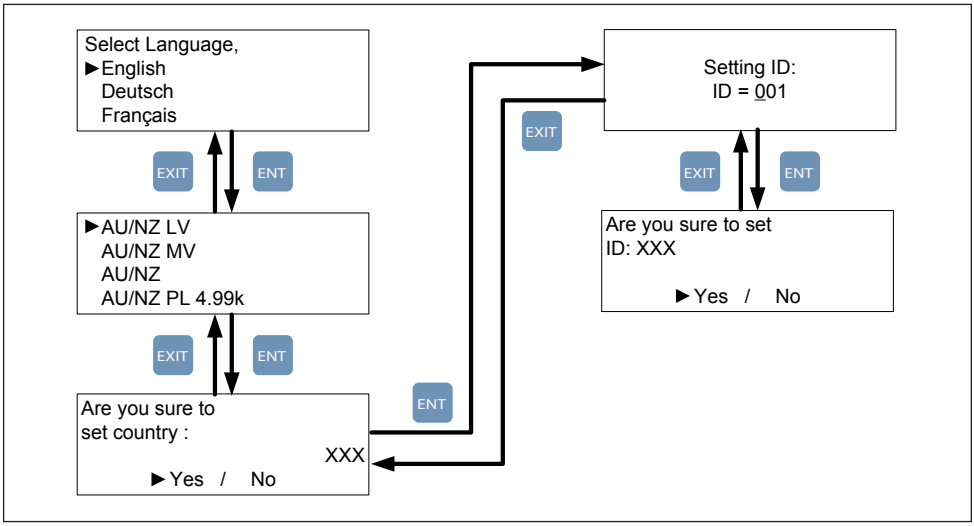


Figure 5-2 Country and language settings for first startup

5.2. Home Page

When inverter is operating normally, the LCD will display homepage as shown in ***Figure 5-3***, user can get the information of output power, inverter status, E-today, date and time.

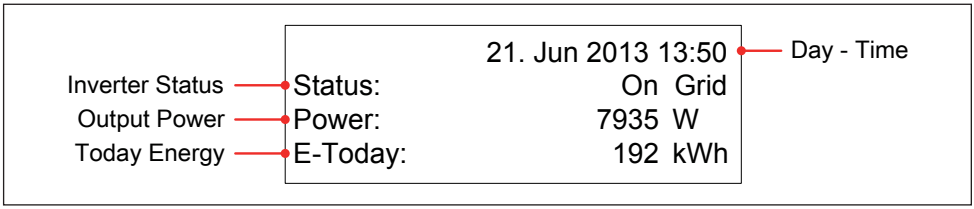


Figure 5-3 Home page for M6A/ M8A and M10A

5.3. LCD Flow Chart

Press any key at home page can users enter main menu page (shown as ***Figure 5-4***). Press Esc key at main menu can go back to homepage. When users adjust settings, the cursor on display will change from "►" to "➔"

Meter	5.3.1
Energy Log	5.3.2
Event Log	5.3.3
Inverter Information	5.3.4
General Setting	5.3.5
Install Setting	5.3.6
Active/Reactive Power	5.3.7
FRT	5.3.8

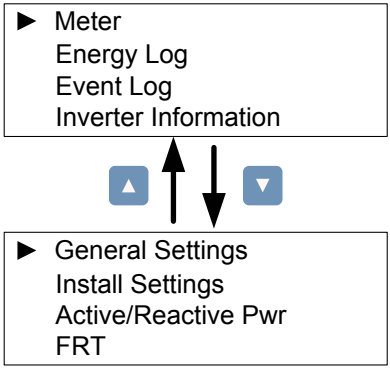


Figure 5-4 Menu page

5.3.1. Power Meter

This page displays voltage, current and power from both AC and DC side.

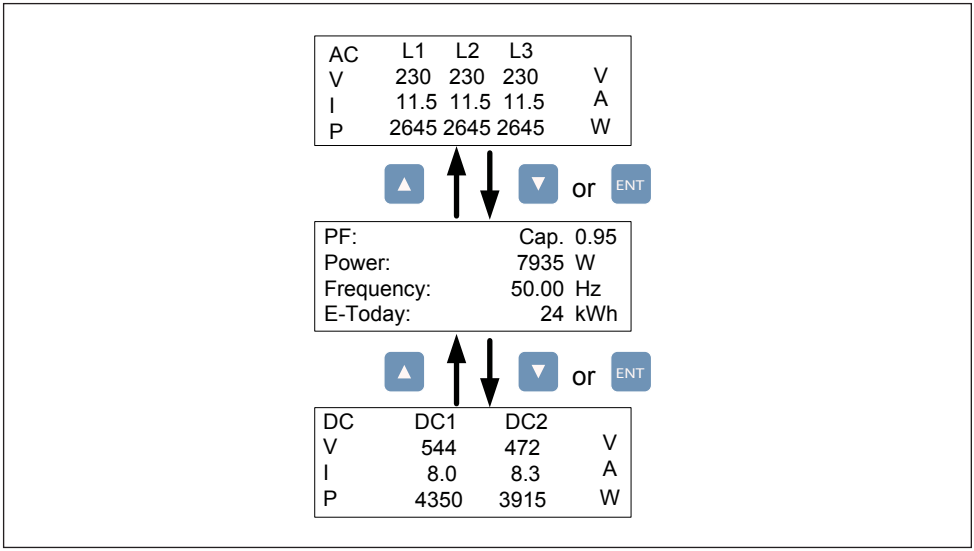


Figure 5-5 Power meter page

5.3.2. Energy Log

User can view the inverter's life energy and life runtime via Energy Log page.

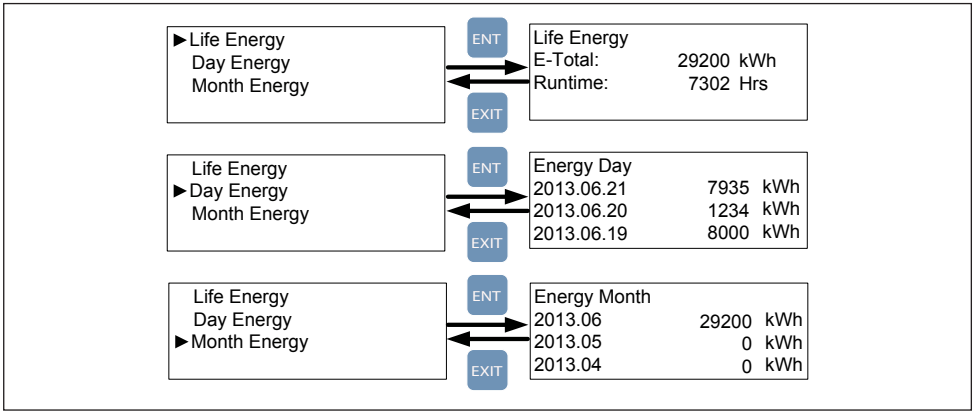


Figure 5-6 Energy log flow chart

5.3.3. Event Log

Event Log has two subpages: Error Events page and Grid Report page. Error Events page displays all the events (Error and Fault) and it can show 30 records at a time. Grid Report page only displays the error that occurred at grid side, and it can show 5 records at a time.

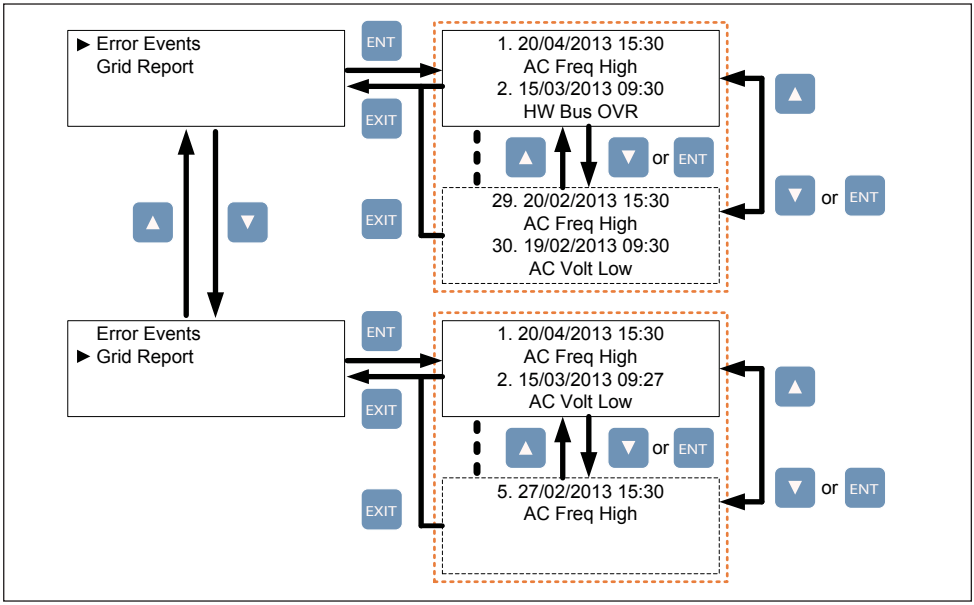


Figure 5-7 Event log flow chart

5.3.4. Inverter Information

This page can helps user to recognize the inverter. First section displays serial number, installation date, ID, and firmware version. Another 3 sections displays the settings of inverter functions. For more infromation about these settings, please refer to 5.3.6 Install Settings, 5.3.7 Active/Reactive power, and 5.3.8 FRT (Fault ride through).

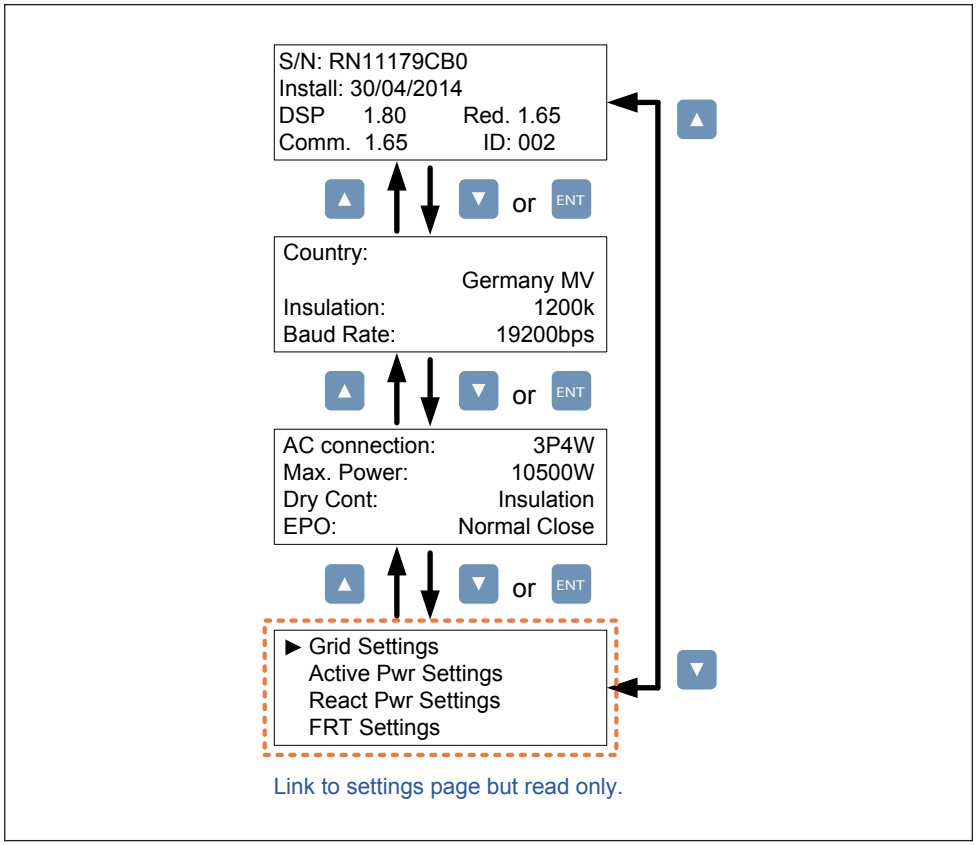


Figure 5-8 Inverter information page

5.3.5. General Settings

Users can set Language, Date and Time, and RS-485 communication baud rate in this page.

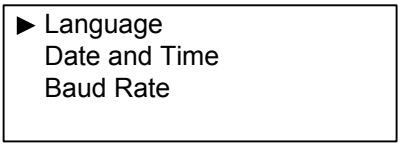


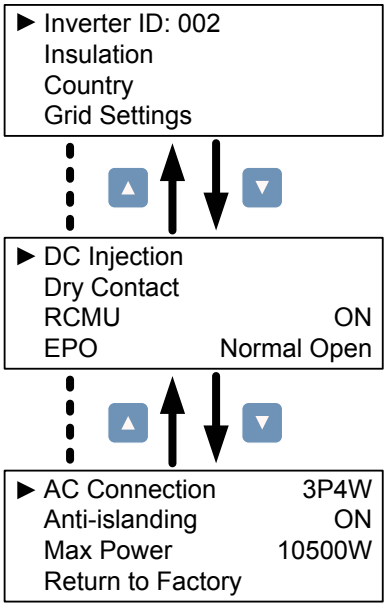
Figure 5-9 General Settings page

5.3.6. Install Settings

CAUTION !

The settings in Install Settings page can only be adjusted by qualified installers or engineers. Changing these settings may result in damage to the inverter and other equipment.

To enter Install Settings page, users have to enter correct password.
There are 3 sets of password with different permissions: user level, installer level, and manufacturer level. The following sub-sections will introduce the setting items in Install Settings page of user level and installer level.



User Level:
- Inverter ID
- Insulation
- Country
- Dry Contact
- EPO
- AC Connection
- Max. Power

Installer Level:
- Inverter ID
- Insulation
- Country
- Grid Settings
- Dry Contact
- EPO
- AC Connection
- Max. Power

Manufacturer Level:
- All Settings

Figure 5-10 Install settings page and password permissions

5.3.6.1. Inverter ID

Inverter ID is used in RS-485 communication, for PC recognizing the inverter. If users connect several inverters together via RS-485, each inverter must have different ID.

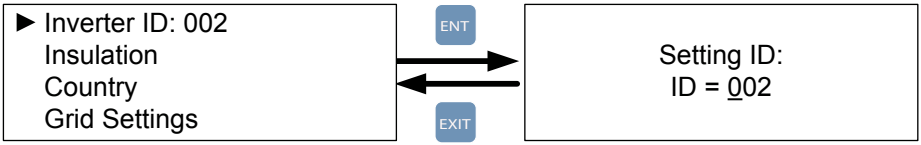


Figure 5-11 Inverter ID page

5.3.6.2. Insulation

Before connecting to grid, inverter will measure the impedance between the PV array and PE first. RPI M6A/ M8A/ M10A models provide 6 types of impedance measurement methods (ON, DC1 only, DC2 only, Plus Grounded, Minus Grounded, and OFF) and 3 impedance limits. Installer must select the appropriate method based on PV array's wiring.

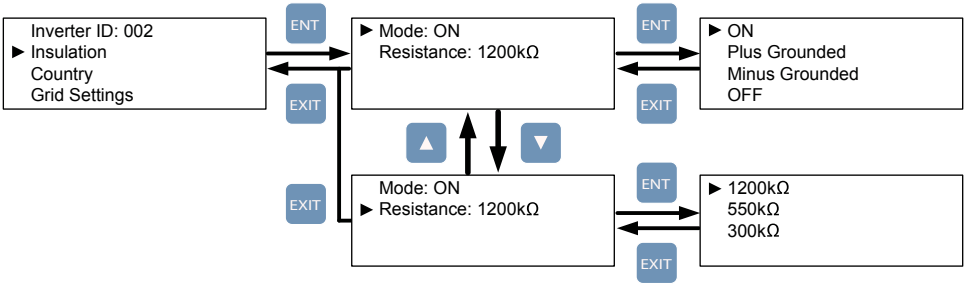


Figure 5-12 Insulation page

5.3.6.3. Country

Each country has its own electricity regulations. Installer must select the country correctly.

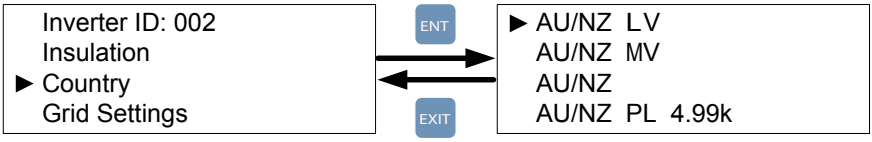


Figure 5-13 Country page

5.3.6.4. Grid Settings

Grid settings page includes the voltage and frequency protection points. These protection points are linked to electricity regulations. If there is no any special requirement, please do not change any grid settings.

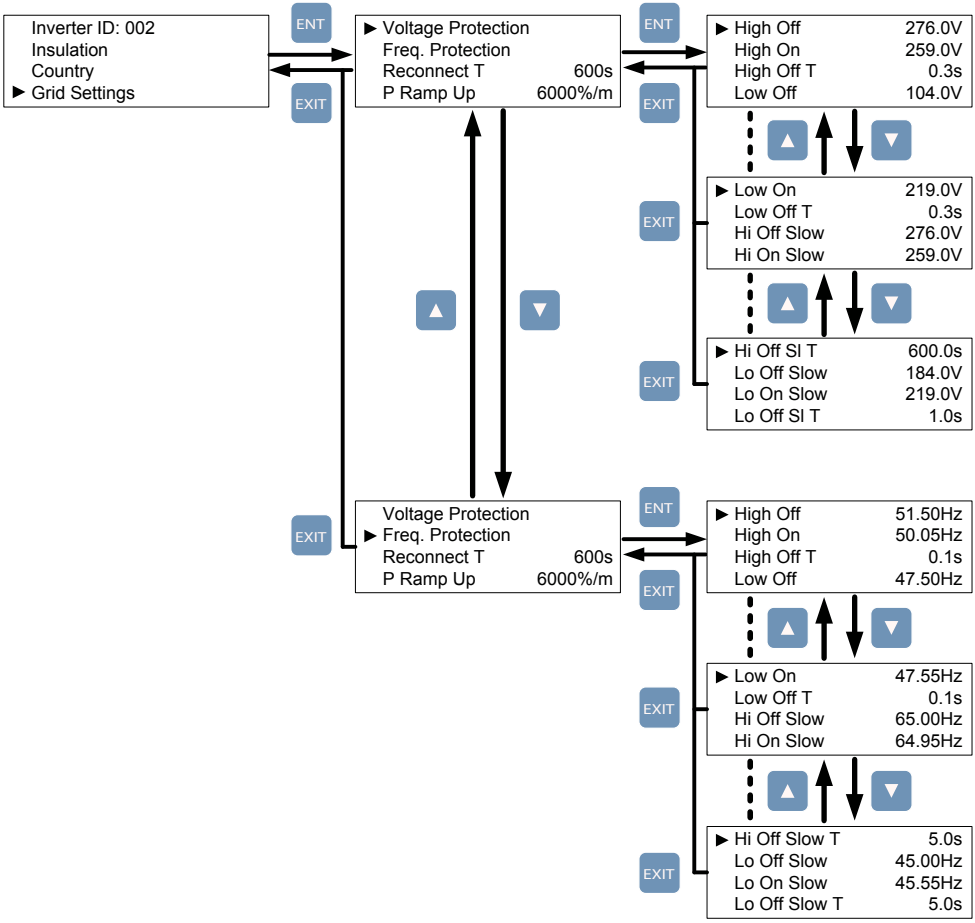


Figure 5-14 Grid Settings page

5.3.6.5. Dry Contact

Users can choose the trigger condition of dry contact. There are 8 options in the setting page: Disable, On Grid, Fan Fail, Insulation, Alarm, Error, Fault, and Warning. Please refer to Table 5-2 for more details about these options.

Setting	Dry Contact Trigger Timing
Disable	No action.
On Grid	Inverter is connecting to grid.
Fan Fail	Fan Fail occurs.
Insulation	Insulation test fail.
Alarm	Any error, fault, or warning occurs.
Error	Any Error occurs.
Fault	Any Fault occurs.
Warning	Any Warning occurs.

Table 5-2 Dry Contact Trigger Setting

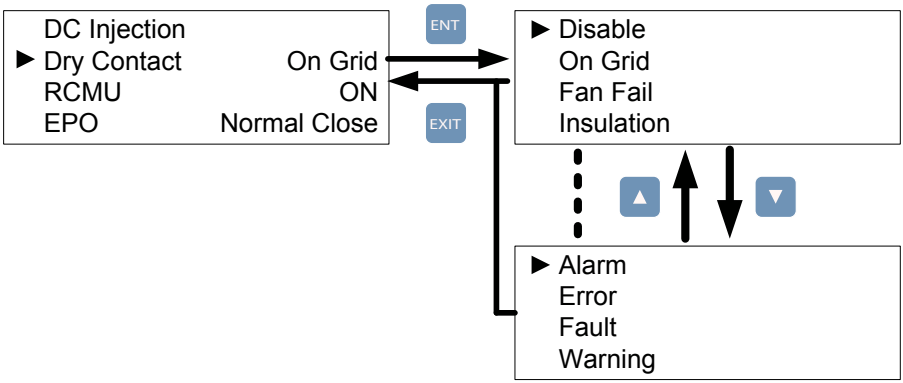


Figure 5-15 Dry Contact page

5.3.6.6. EPO

EPO function has 2 detection methods: Normal Open and Normal Close. Normal Open means EPO pins are usually open-circuited. When these two pins are short-circuited, inverter will shut down immediately. Normal Close is contrary to Normal Open. Please choose an appropriate detection method according to your needs.

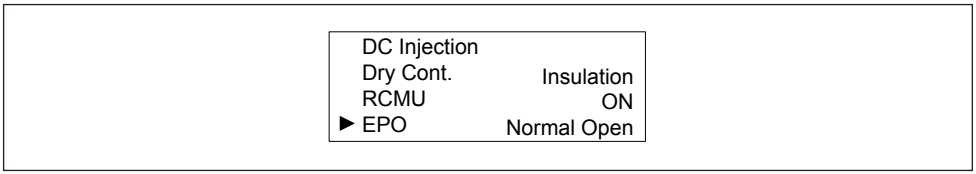


Figure 5-16 EPO page

5.3.6.7. AC connection

RPI M6A/ M8A/ M10A models can support 3P3W and 3P4W system. Please select the correct AC wiring type.

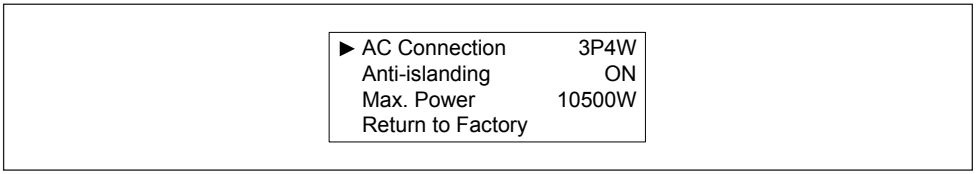


Figure 5-17 AC connection page

5.3.6.8. Max Power

Electricity regulation in some area requests that inverter must have power limit function. In these areas, users can adjust Max Power to limit the maximum output power of the inverter.

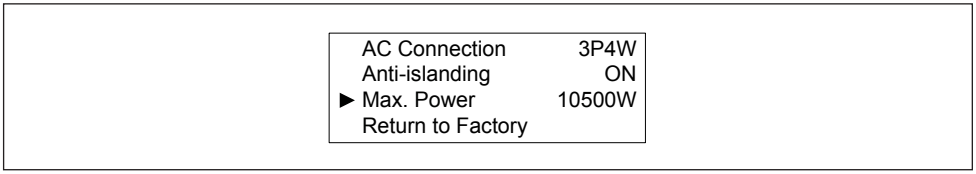


Figure 5-18 Max Power page

5.3.7. Active/Reactive power

A password is required to enter Active/Reactive Power page. This page includes two kinds of function: active power control and reactive power control. In active power control function, there are 3 control modes: Power Limit, Power vs. Frequency, and P(V). In reactive power control function, there are 4 control modes: Constant cosphi, cosphi(P), Constant Q, and q(V). These modes will be introduced in next section.

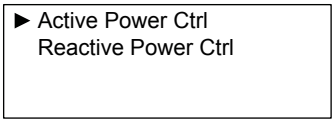


Figure 5-19 Active/Reactive power page

5.3.7.1. Power Limit

This control mode can reduce the output power to a percentage of inverter's rated power. Users can limit the output power by set the Set Point in Power Limit page.

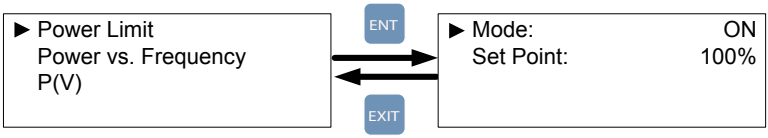


Figure 5-20 Power Limit page

5.3.7.2. Power vs. Frequency

Inverter will reduce output power when grid frequency rises up if this mode enabled. Users can tune the parameters in Power vs. Frequency page to change the inverter's behavior.

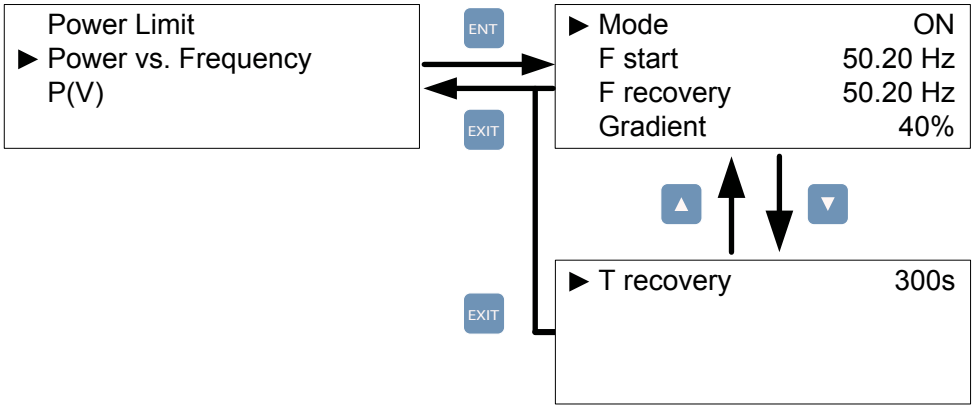


Figure 5-21 Power vs Frequency page

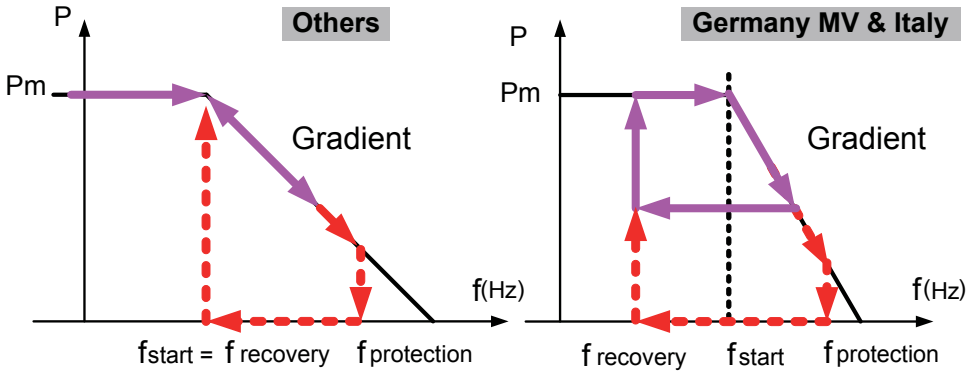


Figure 5-22 Power vs Frequency parameters

5.3.7.3. P(V)

When grid voltage rises up to a lock-in voltage(V lock-in) and inverter's present output power is greater than lock-in power(P lock-in), inverter will reduce the output power and keep it at a certain value(P lock-out) until grid voltage drop back to lock-out voltage(V lock-out) and passing a certen time(T revcovery).

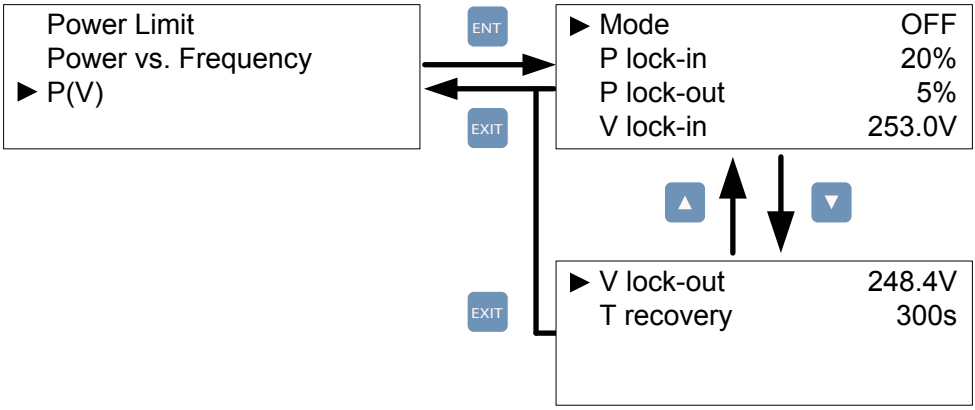


Figure 5-23 P(V) page

5.3.7.4. Constant cosphi

Inverter can feed in a fixed reactive power to grid. Users can set the power factor(cosphi) in Constant cosphi page.

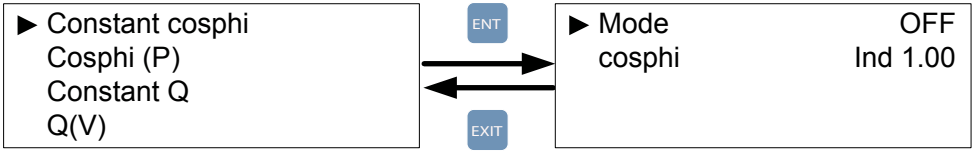


Figure 5-24 Constant cosphi page

5.3.7.5. Cosphi (P)

Cosphi (P) is a function that inverter will feed in reactive power when its output active power reach the setting values. For country Italy MV and Italy LV, users can set lock-in voltage and lock-out voltage to assign the operation interval. When grid voltage reach the lock-in voltage(V lock-in), inverter will enable cosphi (P) function automatically and disabled it when grid voltage reach lock-out voltage(V lock-out).

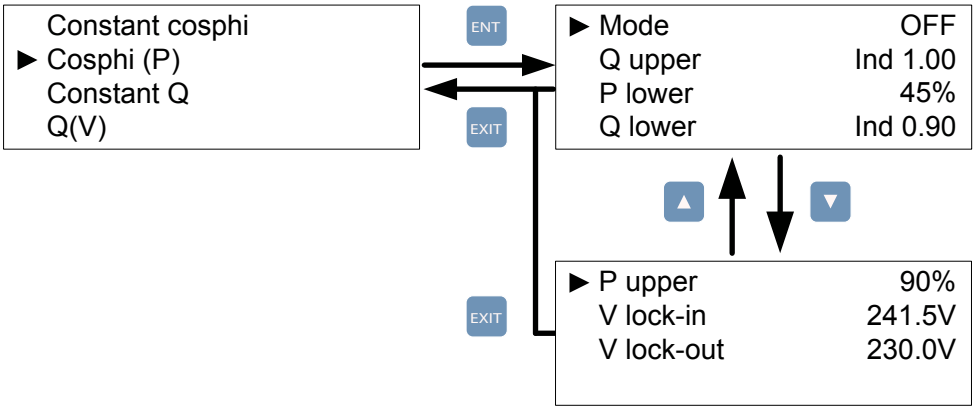


Figure 5-25 Cosphi (P) page

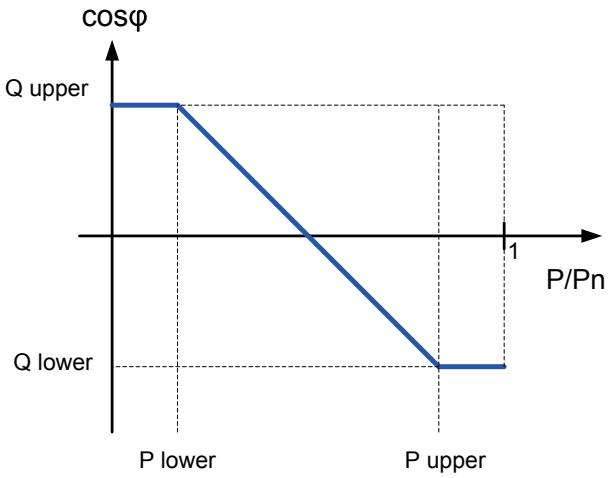


Figure 5-26 Cosphi (P) parameters

5.3.7.6. Constant Q

Like Constant cosphi function, users can assign a percentage of reactive power in Constant Q page.

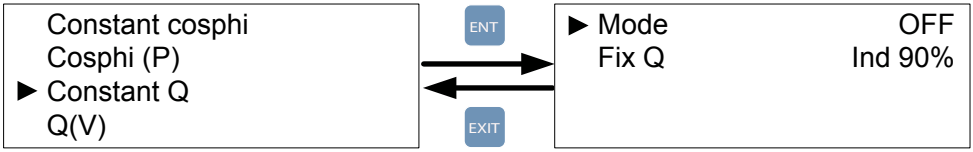


Figure 5-27 Cosphi (P) parameters

5.3.7.7. Q(V)

Q(V) is a control mode that inverter will provide reactive power accroding to grid voltage. For country Italy MV and Italy LV, users can set lock-in power and lock-out power to assign Q(V) function operation interval.

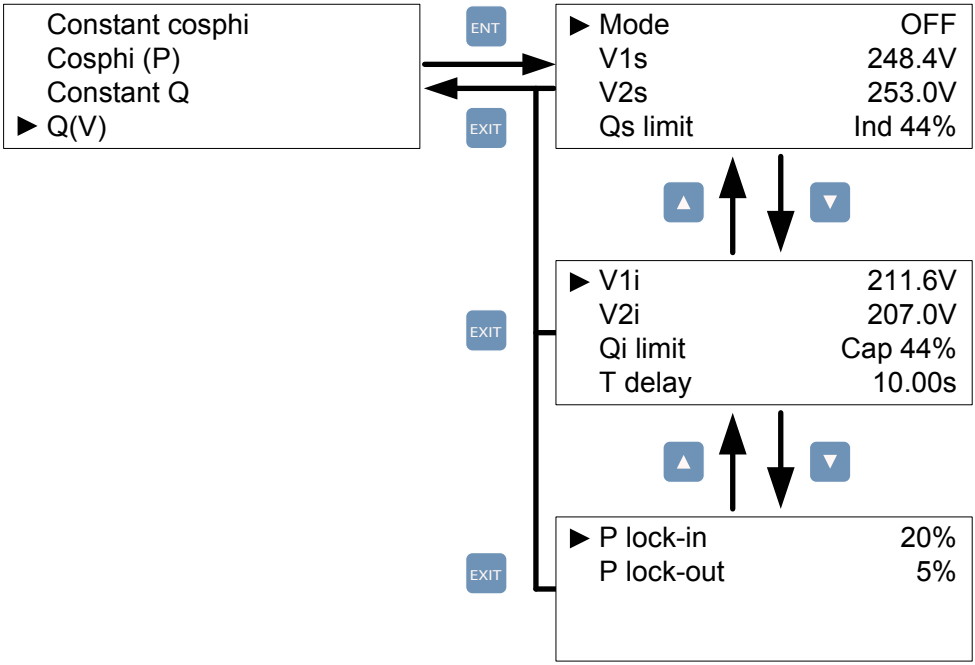


Figure 5-28 Q(V) page

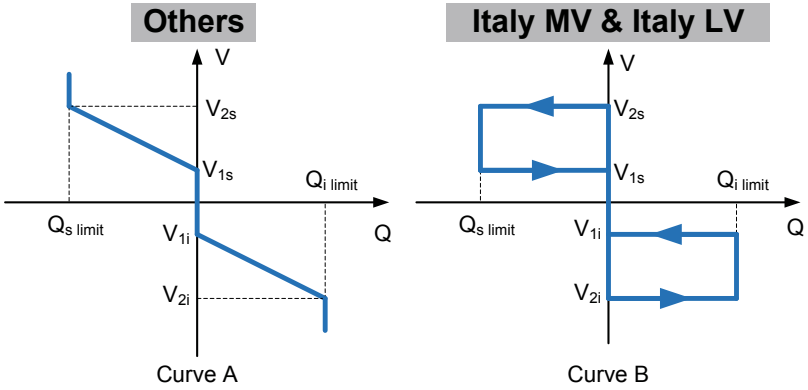


Figure 5-29 Q(V) parameters

5.3.8. FRT (Fault ride through)

Some area requests that inverter should keep connected to grid when grid voltage drops suddenly in few seconds. In these areas, users can enable FRT function and adjust the parameters to meet the requirement.

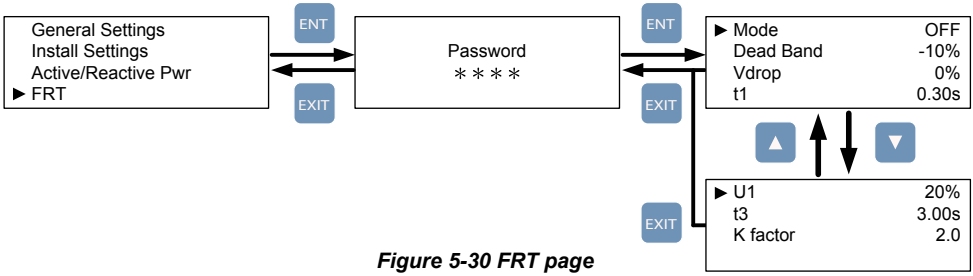


Figure 5-30 FRT page

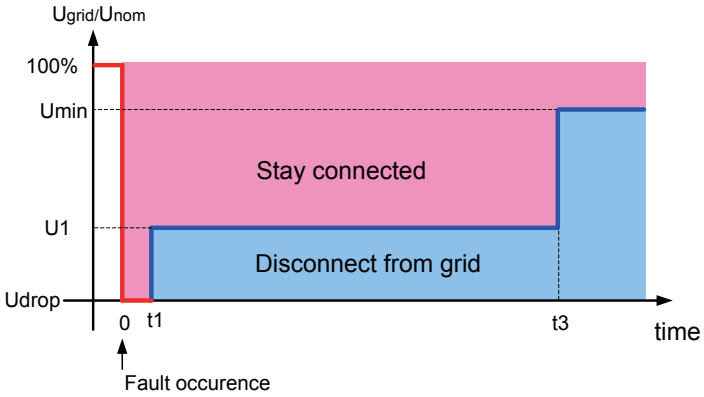


Figure 5-31 FRT Parameters

6.Maintenance

In order to ensure normal operation of the inverter, please check the unit regularly. Check that all terminals, screws and cables are connected and appeared as they did upon installation. If there are any impaired or loose parts, please contact your solar installer.

Ensure that there are no foreign objects in the path of the heat outlet and keep the unit and its surroundings clean and tidy.

Warning ! Electric Shock

Before any maintenance, please switch AC and DC power off to avoid risk of electric shock even if manual switching turn off.

7.Error message and Trouble Shooting

ERROR		
Message	**Possible cause**	**Action**
AC Freq High (E01)	1. Actual utility frequency is over the OFR setting 2. Incorrect country setting 3. Detection circuit malfunction	1. Check the utility frequency on the inverter terminal 2. Check country setting 3. Check the detection circuit inside the inverter
AC Freq Low (E02)	1. Actual utility frequency is under the UFR setting 2. Incorrect country or Grid setting 3. Detection circuit malfunction	1. Check the utility frequency on the inverter terminal 2. Check country & Grid setting 3. Check the detection circuit inside the inverter
Grid Quality (E07)	Non-linear load in Grid and near to inverter	Grid connection of inverter need to be far away from non-linear load if necessary
HW Con. Fail (E08)	1. Wrong connection in AC plug 2. Detection circuit malfunction	1. Check the AC connection, must accords to manual 2. Check the detection circuit inside the inverter
No Grid (E09)	1. AC breaker is OFF 2. Disconnect in AC plug	1. Switch on AC breaker 2. Check the connection in AC plug and make sure it connects to inverter
AC Volt Low (E10, E15, E20)	1. Actual utility voltage is under the UVR setting 2. Incorrect country or Grid setting 3. Wrong connections in AC plug 4. Detection circuit malfunction	1. Check the utility voltage connection to the inverter terminal 2. Check country & Grid setting 3. Check the connection in AC plug 4. Check the detection circuit inside the inverter
AC Volt High (E11, E13, E16, E18, E21, E23)	1. Actual utility voltage is over the OVR setting 2. Utility voltage is over the Slow OVR setting during operation 3. Incorrect country or Grid setting 4. Detection circuit malfunction	1. Check the utility voltage on the inverter terminal 2. Check the utility voltage on the inverter terminal 3. Check country & Grid setting 4. Check the detection circuit inside the inverter

ERROR		
Message	**Possible cause**	**Action**
Solar1 High (E30)	1. Actual Solar1 voltage is over 1000Vdc 2. Detection circuit malfunction	1. Modify the solar array setting, and make the Voc less than 1000Vdc 2. Check the detection circuit inside the inverter
Solar2 High (E31)	1. Actual Solar2 voltage is over 1000Vdc 2. Detection circuit malfunction	1. Modify the solar array setting, and make the Voc less than 1000Vdc 2. Check the detection circuit inside the inverter
Insulation (E34)	1. PV array insulation fault 2. Large PV array capacitance between Plus to Ground or Minus to Ground or both. 3. Detection circuit malfunction	1. Check the insulation of Solar inputs 2. Check the capacitance, dry PV panel if necessary 3. Check the detection circuit inside the inverter

Table 7-1 Error Message

Warning		
Message	**Possible cause**	**Action**
Solar1 Low (W01)	1. Actual Solar1 voltage is under the limit 2. Some devices were damaged inside the inverter if the actual Solar1 voltage is close to "0" 3. Detection circuit malfunction	1. Check the Solar1 voltage connection to the inverter terminal 2. Check all switching devices in boost1 3. Check the detection circuit inside the inverter
Solar2 Low (W02)	1. Actual Solar2 voltage is under the limit 2. Some devices were damaged inside the inverter if the actual Solar2 voltage is close to "0" 3. Detection circuit malfunction	1. Check the Solar2 voltage connection to the inverter terminal 2. Check all switching devices in boost2 3. Check the detection circuit inside the inverter

Table 7-2 Warning Message

FAULT		
Message	**Possible cause**	**Action**
DC Injection (F01, F02, F03)	1. Utility waveform is abnormal 2. Detection circuit malfunction	1. Check the utility waveform. Grid connection of inverter need to be far away from non-linear load if necessary 2. Check the detection circuit inside the inverter
Temperature (F05)	1. The ambient is over 60℃ (The installation is abnormal) 2. Detection circuit malfunction	1. Check the installation ambient and environment 2. Check the detection circuit inside the inverter
Temperature (F07)	1. Ambient temperature is <-30℃ 2. Detection circuit malfunction	1. Check the installation ambient and environment 2. Check the detection circuit inside the inverter
HW NTC1 Fail (F06)	1. Ambient temperature >90℃ or <-30℃ 2. Detection circuit malfunction	1. Check the installation ambient and environment 2. Check the detection circuit inside the inverter
HW NTC2 Fail (F08)	1. Ambient temperature >90℃ or <-30℃ 2. Detection circuit malfunction	1. Check the installation ambient and environment 2. Check the detection circuit inside the inverter
HW NTC3 Fail (F09)	1. Ambient temperature >90℃ or <-30℃ 2. Detection circuit malfunction	1. Check the installation ambient and environment 2. Check the detection circuit inside the inverter
HW NTC4 Fail (F10)	1. Ambient temperature >90℃ or <-30℃ 2. Detection circuit malfunction	1. Check the installation ambient and environment 2. Check the detection circuit inside the inverter
DC RLY Fail (F13)	1. Driver circuit for relay is defective 2. Relay(s) is defective 3. Detection circuit malfunction (Inverter voltage)	1. Check the input voltage, must >150Vdc 2. Check the auxiliary circuitry inside the inverter 3. Check the detection circuit inside the inverter
HW DSP ADC1 (F15)	1. Insufficient input power 2. Auxiliary power circuitry malfunction 3. Detection circuit malfunction	1. Check the input voltage, must >150Vdc 2. Check the auxiliary circuitry inside the inverter 3. Check the detection circuit inside the inverter

FAULT		
Message	**Possible cause**	**Action**
HW DSP ADC2 (F16)	1. Insufficient input power 2. Auxiliary power circuitry malfunction 3. Detection circuit malfunction	1. Check the input voltage, must >150Vdc 2. Check the auxiliary circuitry inside the inverter 3. Check the detection circuit inside the inverter
HW DSP ADC3 (F17)	1. Insufficient input power 2. Auxiliary power circuitry malfunction 3. Detection circuit malfunction	1. Check the input voltage, must >150Vdc 2. Check the auxiliary circuitry inside the inverter 3. Check the detection circuit inside the inverter
HW Red ADC1 (F18)	1. Insufficient input power 2. Auxiliary power circuitry malfunction 3. Detection circuit malfunction	1. Check the input voltage, must >150Vdc 2. Check the auxiliary circuitry inside the inverter 3. Check the detection circuit inside the inverter
HW Red ADC2 (F19)	1. Insufficient input power 2. Auxiliary power circuitry malfunction 3. Detection circuit malfunction	1. Check the input voltage, must >150Vdc 2. Check the auxiliary circuitry inside the inverter 3. Check the detection circuit inside the inverter
HW Eff. (F20)	1. The calibration is incorrect 2. Current feedback circuit is defective	1. Check the accuracy of current and power 2. Check the current feedback circuit inside the inverter
HW COMM1 (F23)	1. DSP is idling 2. The communication connection is disconnected 3. The communication circuit malfunction	1. Check reset and crystal in DSP 2. Check the connection between DSP and COMM 3. Check the communication circuit
HW COMM2 (F22)	1. Red. CPU is idling 2. The communication connection is disconnected	1. Check reset and crystal in Red. CPU 2. Check the connection between Red. CPU and DSP
Ground Cur. (F24)	1. PV array insulation fault 2. Large PV array capacitance between Plus to Ground or Minus to Ground 3. Either side of boost driver or boost choke malfunction 4. Detection circuit malfunction	1. Check the insulation of Solar inputs 2. Check the capacitance (+ <-> GND & - <-> GND), must < 2.5uF. Install a external transformer if necessary 3. Check boost driver & boost choke 4. Check the detection circuit inside the inverter

FAULT		
Message	**Possible cause**	**Action**
HW Con. Fail (F26)	1. Power line is disconnected inside the inverter 2. Current feedback circuit is defective	1. Check the power lines inside the inverter 2. Check the current feedback circuit inside the inverter
RCMU Fail (F27)	1. RCMU is disconnected 2. Detection circuit malfunction	1. Check the RCMU connection inside the inverter 2. Check the detection circuit inside the inverter
RLY Short (F28)	1. One or more relays are sticking 2. The driver circuit for the relay malfunction	1. Replace the defective relay(s) 2. Check the driver circuit inside the inverter
RLY Open (F13, F29)	1. One or more relays are abnormal 2. The driver circuit for the relay malfunction 3. The detection accuracy is not correct for Vgrid and Vout	1. Replace the defective relay(s) 2. Check the driver circuit inside the inverter 3. Check the Vgrid and Vout voltage detect on accuracy
Bus Unbal. (F30)	1. Not totally independent or parallel between inputs 2. PV Array short to Ground 3. Driver for boost is defective or disconnected 4. Detection circuit malfunction	1. Check the inputs connections 2. Check the PV Array insulation 3. Check the driver circuit for boost inside the inverter 4. Check the detection circuit inside the inverter
HW Bus OVR (F31, F33, F35)	1. Driver for boost is defective 2. Voc of PV array is over 1000Vdc 3. Surge occurs during operation 4. Detection circuit malfunction	1. Check the driver circuit for boost inside the inverter 2. Modify the solar array setting, and make the Voc less than 1000Vdc 3. N/A 4. Check the detection circuit inside the inverter
AC Cur. High (F36, F37, F38, F39, F40, F41)	1. Surge occurs during operation 2. Driver for inverter stage is defective 3. Switching device is defective 4. Detection circuit malfunction	1. N/A 2. Check the driver circuit in inverter stage 3. Check all switching devices in inverter stage 4. Check the detect circuit inside the inverter
HW CT A Fail (F42)	1. Test current loop is broken 2. CTP3 is defective 3. Detection circuit malfunction	1. Check the connection of CNP4 to CNM4 2. Replay CTP3 with new one 3. Check the detection circuit inside the inverter

FAULT		
Message	**Possible cause**	**Action**
HW CT B Fail (F43)	1. Test current loop is broken 2. CTP4 is defective 3. Detection circuit malfunction	1. Check the connection of CNP4 to CNM4 2. Replace CTP4 with new one 3. Check the detection circuit inside the inverter
HW CT C Fail (F44)	1. Test current loop is broken 2. CTP5 is defective 3. Detection circuit malfunction	1. Check the connection of CNP4 to CNM4 2. Replace CTP5 with new one 3. Check the detection circuit inside the inverter
HW AC OCR (F45)	1. Large Grid harmonics 2. Switching device is defective 3. Detection circuit malfunction	1. Check the utility waveform. Grid connection of inverter need to be far away from non-linear load if necessary 2. Check all switching devices in inverter stage 3. Check the detection circuit inside the inverter
HW ZC Fail (F50)	The detection circuit for synchronal signal malfunction	Check the detection circuit for synchronal signal inside the inverter
DC Cur. High (F60, F61, F70, F71)	1. Switching device in boost is defective 2. Driver for boost is defective 3. Input current detection circuit malfunction	1. Check all switching device in boost 2. Check the driver curcuit for boost inside the inverter 3. Check input current detection circuit

Table 7-3 Fault Message

8.De-Commissioning

If it is necessary to put the device out of operation for maintenance or storage, please follow the instructions below.

WARNING !

To avoid injuries, please follow the procedures:

- Switch off AC circuit breaker to disconnect with electricity grid.
- Switch off DC switch to disconnect with DC source.
- Switch off the PV array switch to disconnect from the PV array.
- Use proper voltmeter to confirm that the AC and DC power are disconnected from the unit.
- Remove the AC wiring immediately to completely disconnect from electricity grid.
- Remove the DC wiring to disconnect from PV Array.
- Remove the communication module RS-485 connection from the computer connection.

Now you may unload the inverter.

9.Technical Data

	RPI M6A	RPI M8A	RPI M10A
GENERAL			
Enclosure	Powder coated aluminum		
Operating temperature	-25~60℃ , full power up to 40℃		
Operating Altitude	2000m		
Relative humidity	0 – 100% non-condensing.		
Environmental category	Outdoor, wet locations		
Protection degree	IP65 (Electronics)		
Pollution degree	Internal : II, External : III		
Overvoltage category	AC output :III, DC Input :II		
Maximum backfeed current to the array	0		
Galvanic isolation	NO		
Safety class	Class I metal enclosure with protective earth		
Weight	25kg	25kg	26kg
Dimensions(W*H*D)	510 × 445 × 177mm		
Connectors	Weather resistant connectors		
DC INPUT (Solar side)			
Maximum input power	6.6kW	8.8kW	11kW
Recommended PV power range	5.7kW–7.5kW	7.6kW–10kW	9.5kW– 12.5kW
Nominal voltage	600Vdc		
Operating voltage	200Vdc – 1000Vdc		
Startup voltage	> 250 Vdc		
Start up power	40W		
MPP tracker	Parallel inputs: 1 MPP tracker Separate inputs: 2 MPP trackers		
Absolute maximum voltage	1000Vdc		

	RPI M6A	RPI M8A	RPI M10A
MPPT range at Nominal Power			
Balanced inputs	315~800Vdc	415~800Vdc	415~800Vdc
Unbalanced inputs	425~800Vdc	565~800Vdc	415~800Vdc
DC INPUT (Solar side)			
Number of inputs	MPPT1 (1pair MC4) MPPT2 (1pair MC4)		MPPT1 (2pair MC4) MPPT2 (1pair MC4)
Rated current	MPPT1 (10A) MPPT2 (10A)	MPPT1 (10A) MPPT2 (10A)	MPPT1 (15A) MPPT2 (10A)
Maximum short circuit current per MPPT (Isc)	13A / 13A		19.5A / 13A
AC OUTPUT (GRID SIDE)			
Nominal power	6kVA	8kVA	10kVA
Maximum power	6.3kVA(1)(2)	8.4kVA	10.5kVA
Voltage	3Ph, 230/400Vac (3phase / N / PE)		
Nominal current	8.7A	11.6A	14.5A
Maximum current	9.7A	13A	16A
Inrush current	31A / 100us	31A / 100us	31A / 100us
Maximum output fault current (rms)	13.6A	18.2A	22.4A
Maximum output overcurrent protection	11.6A	15.6A	19.2A
Frequency	Rated 50/60Hz (Programmable 45Hz - 65Hz)		
Active anti-islanding method	Reactive power injection		
Total harmonic distortion	< 3 %		
Power factor	> 0.99 @ full power Adjustable: 0.80 leading – 0.80 lagging		
DC current injection	<0.5% rated current		
Tare loss	< 2W		
Maximum efficiency	98.3%	98.3%	98.3%
EU efficiency	97.6%	97.9%	98.0%
AC connector	3 Ph + N + PE; 3-phase AC plug that meets IP67		
Fuse	N/A. Please connect to an external protection device (1.25 rated current)		

		RPI M6A	RPI M8A	RPI M10A
SYSTEM INFORMATION / COMMUNICATION				
User interface		Black-on-white character type LCD display		
		365 days data logger and real time clock		
		30 event record		
External communication		2 RS-485 connections		
REGULATIONS & DIRECTIVES				
CE conformity		Yes		
Grid interface		VDE0126-1-1, VDE-AR-N 4105, AS4777		
Emission		EN 61000-6-3		
Harmonics		EN 61000-3-2		EN 61000-3-12
Variations and flicker		EN 61000-3-3		EN 61000-3-11
Immunity		EN 61000-6-2		
Immunity	ESD	IEC 61000-4-2		
	RS	IEC 61000-4-3		
	EFT	IEC 61000-4-4		
	Surge	IEC 61000-4-5		
	CS	IEC 61000-4-6		
	PFMF	IEC 61000-4-8		
Electrical safety		IEC 62109-1/ -2		
MISCELLANEOUS				
Enclosure		Mounting bracket		
		Aluminum with powder coating		

(1) 4.99kW max. for Australia (AU / NZ PL 4.99kW).
(2) 6.3kW max. for Australia (AU / NZ).

Table 9-1 Specifications for RPI M6A/ M8A/ M10A

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Version 09170223