Grid-tie Transformerless Solar Inverter

RPI-M8/ M10/ M12/ M15/ M15A/ M20/ M20A/ M30

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1. General Information

1.1 About this Manual

This manual provides the detail information of specification, installation procedures and all related function setting about the solar inverter model RPI-M8/ M10/ M12/ M15/ M15A/ M20/ M20A/ M30. Installation technicians must be well-trained and qualified for installing solar system and must follow all the safety instruction and installation procedures.

1.2 Safety Symbol & Instruction

CAUTION！

Machine and equipment damage may occur if not avoid the hazardous situation

WARNING！

Death and serious injuries may occur if not avoid the hazardous situation

DANGER！

Death and serious injuries will occur if not avoid the hazardous situation

WARNING：BURN HAZARD

The enclosure temperature may exceed over 70° C while operating. Danger may occur owing to hot surface. Please do not touch!

1.3 Validity

This user manual describes the installation procedures, maintenance, technical data and safety instruction of the following solar inverter models under DELTA brand.

- ◆RPI-M8
- ◆ RPI-M10
- ◆ RPI-M12
- ◆RPI-M15
- ◆ RPI-M15A
- ◆ RPI-M20
- ◆RPI-M20A
- ◆ RPI-M30

1.4 Product Description

The “RPI-M8/ M10/ M12/ M15/ M15A/ M20/ M20A/ M30” is a 3 phase grid-tied solar inverter. This device converts direct current (DC) electricity from photovoltaic power collected from PV Array into 3 phase alternating current (AC) to feed the excess capacity back to the local mains electrical grid. Using of cutting-edge technology allows wide voltage input range (200~1000V) and high performance efficiency based on user friendly operation design. In addition, special DSP (Digital Signal Processor) design decreases the circuit complication and electronic component. Please note that this device does not support off-grid function. The following are the features of RPI-M8/ M10/ M12/ M15/ M15A/ M20/ M20A/ M30.

1.5 Features

- Power Rating：8/ 10/ 12/ 15/ 20/ 30 kVA
- 3Phase, Grid-tie, Transformerless solar inverter
- Maximum efficiency：> 98 %
- Europe efficiency: >97.5%
- Reactive power capability (Cap 0.8 – Ind 0.8)
- Low output current harmonic distortion (THD < 3%) @ full load
- 2 MPP Trackers
- Record up to 30 event logs.
- 5” LCD display

1.6 Application& Usage

The operation of solar inverter is shown as the figure 1-1. In order to save energy and electricity, solar inverter convert the DC input power supplied from the PV Array into three-phase AC output power to Grid.

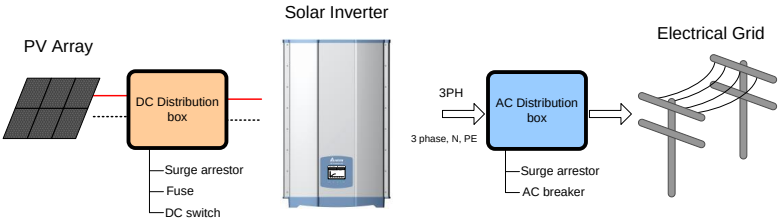


Figure 1-1 Solar inverter system operation illustration

1.7 Additional Information

For more detail information of RPI-M8/ M10/ M12/ M15/ M15A/ M20/ M20A/ M30 or other related product information, please visit the website at http://www.deltaww.com for more support.

2. Installation and Wiring

2.1 Instruction before Installation

Due to the variety of user's installation environment, reading thoroughly on this before installation is strongly recommended. All the installation and start-up procedures must be undertaken by professional and well-trained technician.

2.2 Check Package

There might be some unpredictable situation during transportation. Please check if there is any damage on the package. After open the package, please check both outer case and inner part of this inverter as below.

Check the right side on the inverter case to ensure the model number and the specification is the same with the model you purchased previously.

1. Check if there is any loose component.

2. Check if all the accessories are in the package, the standard accessories are list as below table:

Table 2-1 Packing list

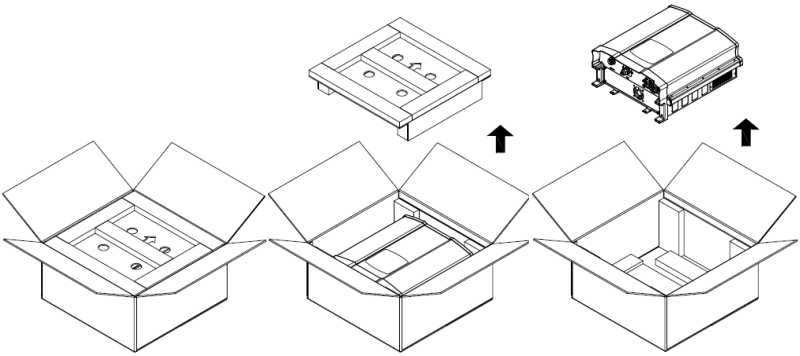
RPI-M8/ M10/ M12/ M15/ M15A/ M20/ M20A/ M30		
Object	Qty	Description
PV Inverter	1	RPI-M8/ M10/ M12/ M15/ M15A/ M20/ M20A/ M30 solar inverter
User Manual	1	The Instruction to provide the information of safety, Installation, specification, etc.
AC Plug	1	Connector for AC connection
Mounting Bracket	1	Wall mounting bracket to mount the solar inverter on the wall

Caution: When there is any outer or inner damage on inverter or any incompleteness or damages on the packaged accessories, please contact your inverter supplier.

2.3 Unpacking

◆ Unpacking process for RPI-M8/ M10/ M12/ M15A/ M20A.

1. Open the carton (see Figure 2-2a).
2. Remove the cover on the inner box (see Figure 2-2b).
3. Lift Inverter (see Figure 2-2c).

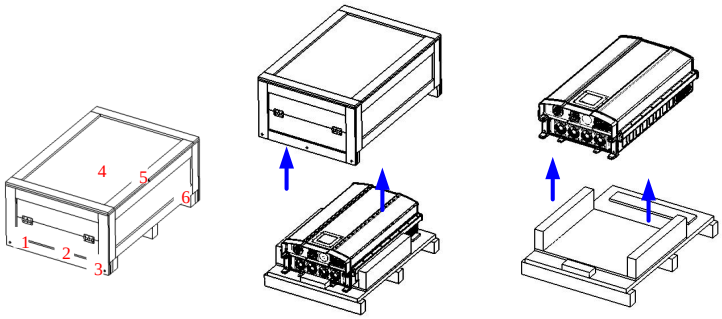


a. b. c.

Figure 2-1 Carton unpacking process

◆ Unpacking process for RPI-M15/ M20/ M30.

1. Unscrew the 6 screws (see Figure 2-1a for the locations).
2. Lift the cover of box (see Figure 2-1b).
3. Lift Inverter (see Figure 2-1c).



a. b. c.

Figure 2-2 Wooden case unpacking process

2.4 Identify of Inverter

Users can identify the model number by the information on the product label. The model number, specification and the series No. is specified on the product label. Regard to the label location, please refer to the figure 2-3.

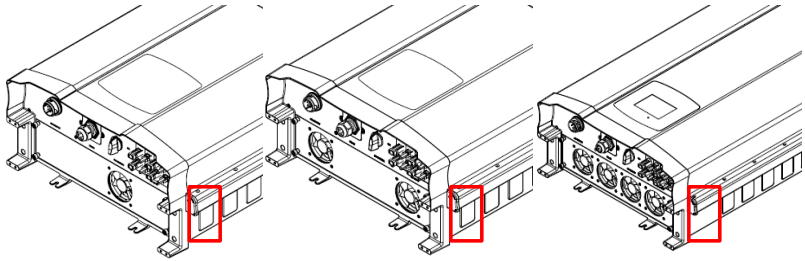


Figure 2-3 The identification label

3. Product Overview

3.1 Exterior Objects

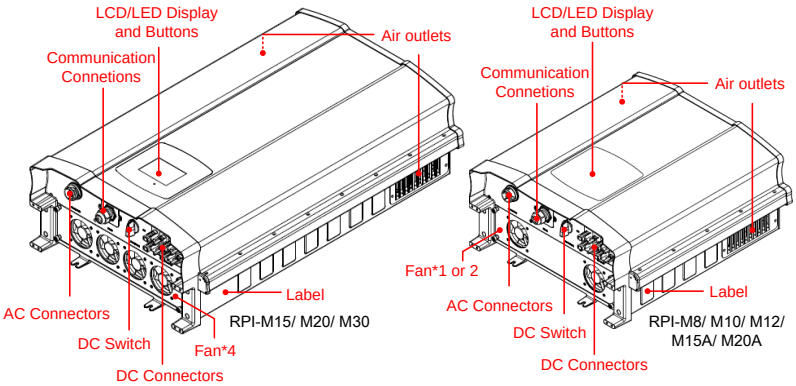


Figure 3-1 Inverter exterior objects

3.2 Dimension

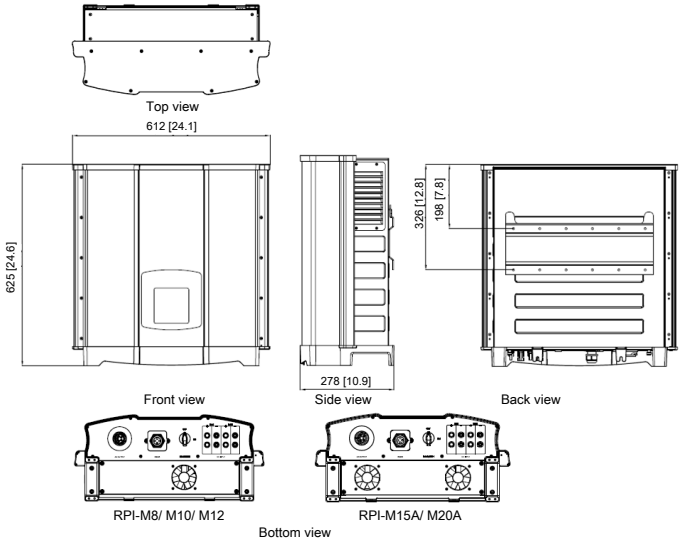


Figure 3-2 Dimension of RPI-M8/ M10/ M12/ M15A/ M20A

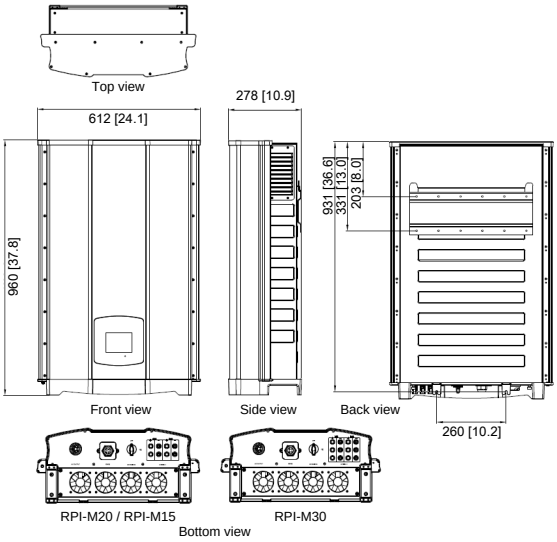


Figure 3-3 Dimension of RPI-M15/ M20/ M30

3.3 Inverter Input/Output Interface

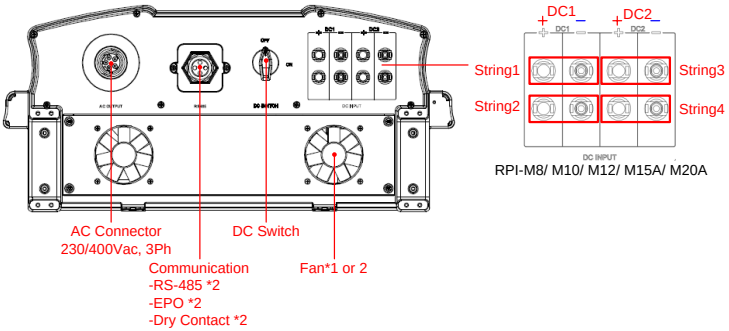


Figure 3-4 Input/Output interfaces of M8/ M10/ M12/ M15A/ M20A

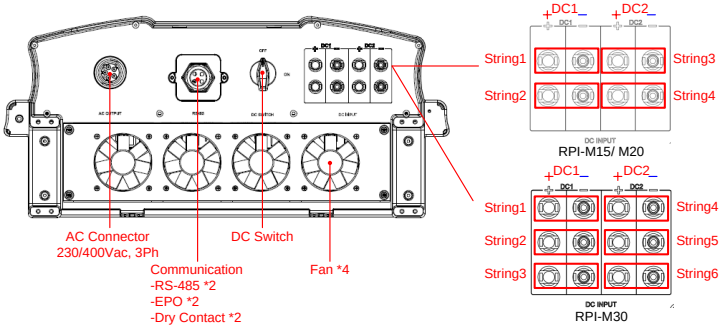


Figure 3-5 Input/Output interfaces of M15/ M20/ M30

3.4 LCD Display and Buttons

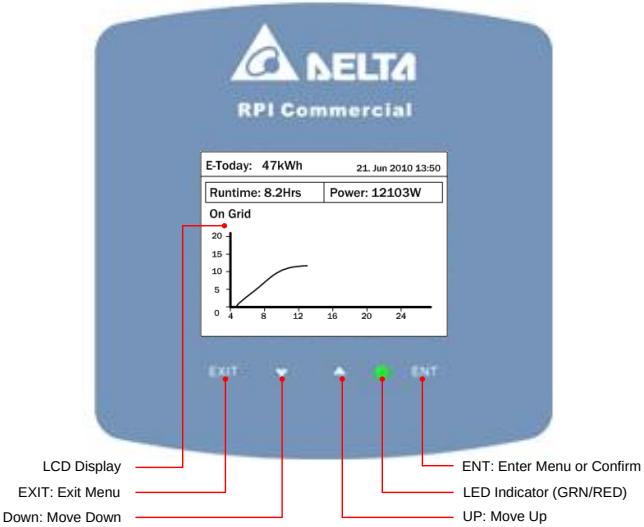


Figure 3-6 LCD display and control panel

3.5 Air Outlet

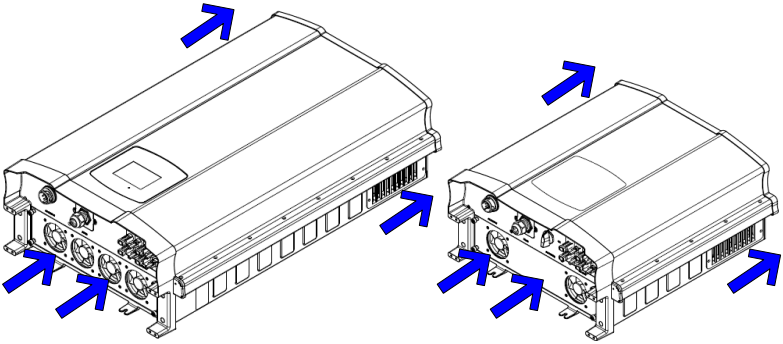


Figure 3-7 Air outlet illustration

4. Installation

4.1 Installing Location

WARNING！ Death and serious injuries may occur.

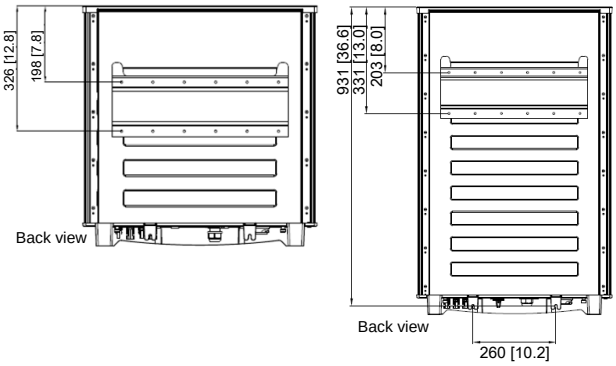
- ●Do not install the unit near/on the flammable objects.
- ●Do not install the unit at the location that people can entry/touch easily.
- ●Please mount the unit tightly on the solid/ smooth wall.
- ●In order to ensure the safety of installers, installer shall be at least two people to process the installation.
- ●When moving the Inverter, installer shall not stand under machines.

CAUTION！ Machine and equipment damage may occur.

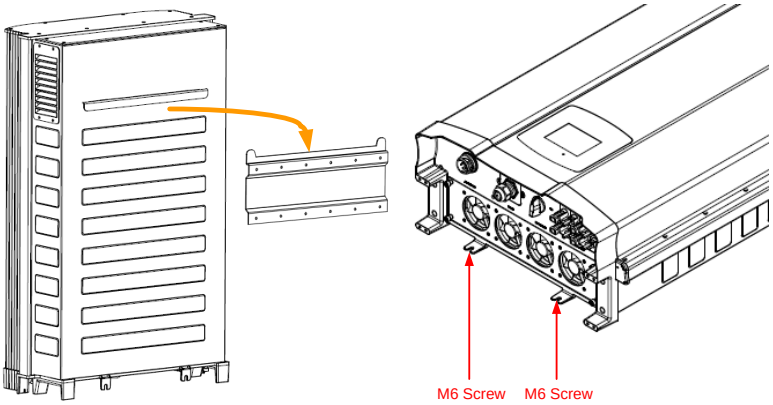
- ●Do not install the unit at the location that directly expose to sunlight.

4.2 Mounting

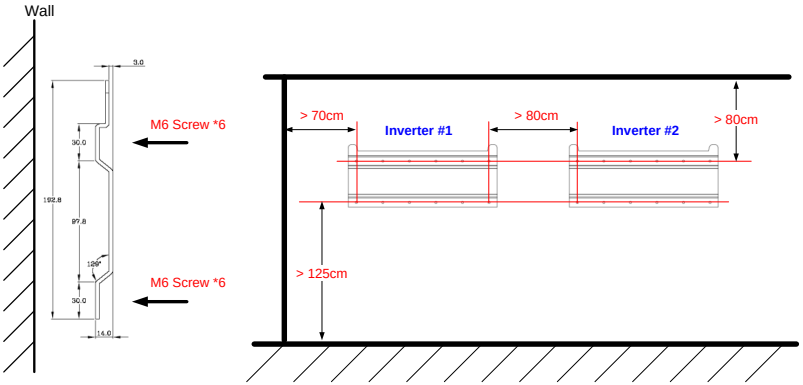
This unit is a wall-mounting system. Please ensure the installation is perpendicular and with AC plug at the bottom. Do not install the device on a slanting wall. The dimensions of mounting bracket are shown as the following figures. There are 12pcs of M6 screws required for mounting plate. Fix the supplied wall-mount plate tightly on the wall before mounting the inverter to the mounting plate.



4-1-a



4-1-b



4-1-c *4-1-d*

Figure 4-1 Screw the mounting bracket

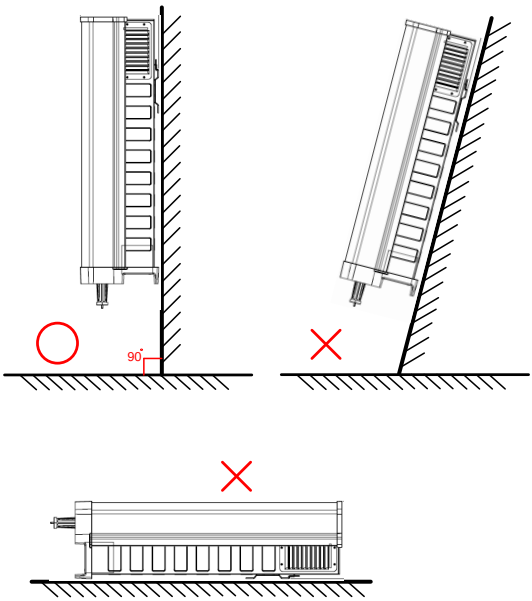


Figure 4-2 Correct and incorrect installation illustration

CAUTION

- The location and hardware should be a solid surface or a firm holder that suitable for the weight of inverter.
- Suggested to install the inverter to the location which offers free and safe access. It would streamline the service and maintenance
- Please leave an appropriate gap in between when installing singe/ several solar inverters.
- Please install solar inverter at an eye level to allow easy observation for operation and parameter setting.
- The ambient temperature should in between -18°C ~ 40°C.

There shall be sufficient space for product operation as shown as the Figure 4-3. If necessary, installer can increase the gap space for sufficient operation space.

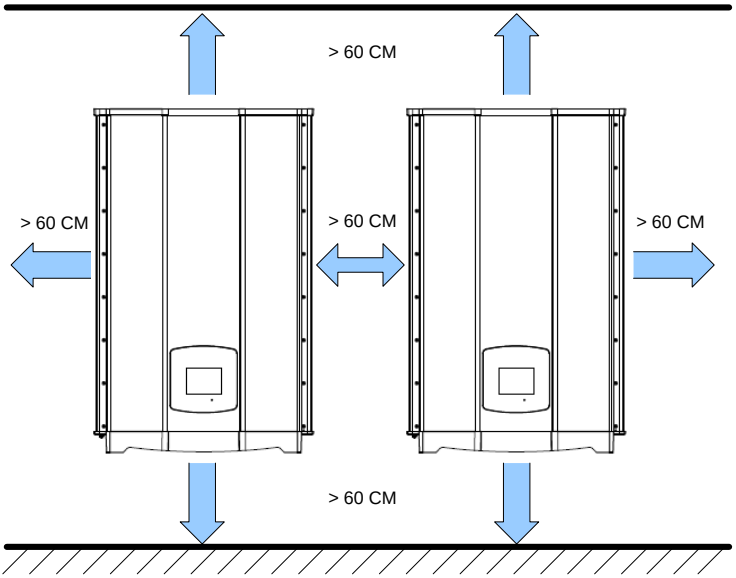


Figure 4-3 Proper installation gap

5. Wiring

5.1 Preparation before Wiring

To avoid accidents, please confirm that the PV inverter's power of both DC and AC are switched off. Please confirm whether the input/output of PV inverter's wiring are clearly indicated. Make sure whether the value, polarity, voltage and phase are correct.The whole system wiring is shown as in Figure 5-1 and 5-2. Different wiring detail is described in the following paragraphs.

- When DC input is floating, external transformer is not necessary. Please refer the Figure 5-1 for the connection. Inverter can accept DC inputs in parallel (1 MPP tracker) or separate DC input connections (2 MPP Tracker).
- When DC input is positive ground or negative ground, all of the strings must be connected in parallel and then connected to inverters. In addition, an external isolation transformer must be installed at AC side, otherwise damage will be caused and the inverter will not work properly.

Different DC connection type needs different settings of insulation detection. About setting, please refer to **7.2.6.3 Install Setting.**

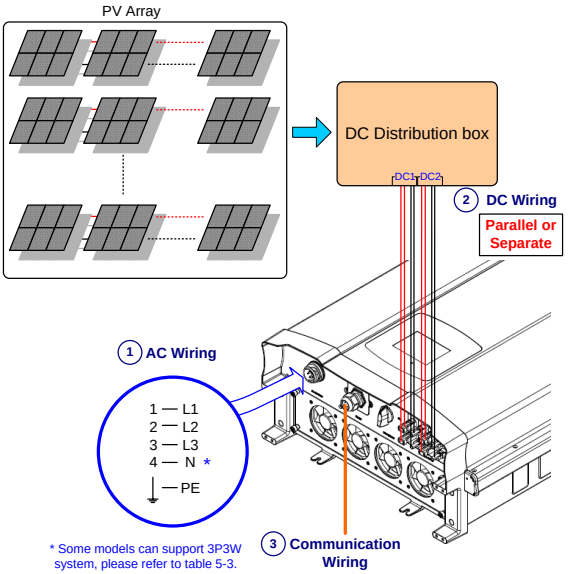


Figure 5-1 Connection of system if DC inputs are floating

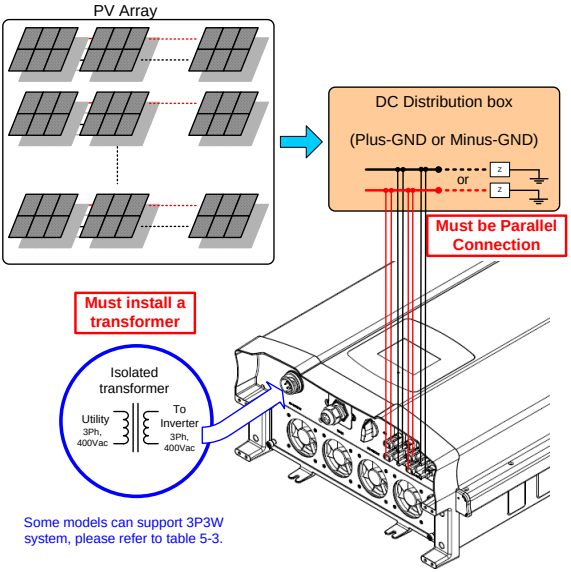


Figure 5-2 Connection of system with Positive Ground or Negative Ground

5.2 AC Grid Connection: 3-Phase+PE or 3-Phase+N+PE

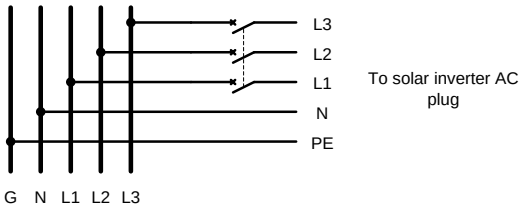
WARNING! Death and serious injuries may occur.
Before AC wiring, please ensure AC breaker is switched off.

5.2.1 Required Protective Devices and Cable Cross-sections

Please use proper upstream circuit breaker to protect the inverter.

Table 5-1 Recommended upstream protection

Model	Upstream circuit breaker
RPI-M8	20A
RPI-M10	20A
RPI-M12	30A
RPI-M15	30A
RPI-M15A	30A
RPI-M20	40A
RPI-M20A	40A
RPI-M30	60A



Please use proper wire to connect correct poles. User can refer to the following table to select the appropriate wire.

Table 5-2 Wire size of AC input

Model	Current Rating	Wire size	Torque	Temperature
RPI-M8 RPI-M10 RPI-M12 RPI-M15 RPI-M15A RPI-M20 RPI-M20A	40 A	5 - 8 mm^2	0.7 N·m	Meet UL 10070
RPI-M30	60 A	16 mm^2	0.9 N·m	Meet UL 10070

AC's wiring can be separated into 3-phase and PE (3P3W) or 3-phase, N, and PE (3P4W). In figure 5-3, the connector has to connect to the inverter's AC plug. After de-assembling, please follow the polarity to do the proper wiring. (This product allows either positive or negative phase sequence. That means the sequence of L1~ L3 can be adjusted; however, N and PE must be connected correctly.)

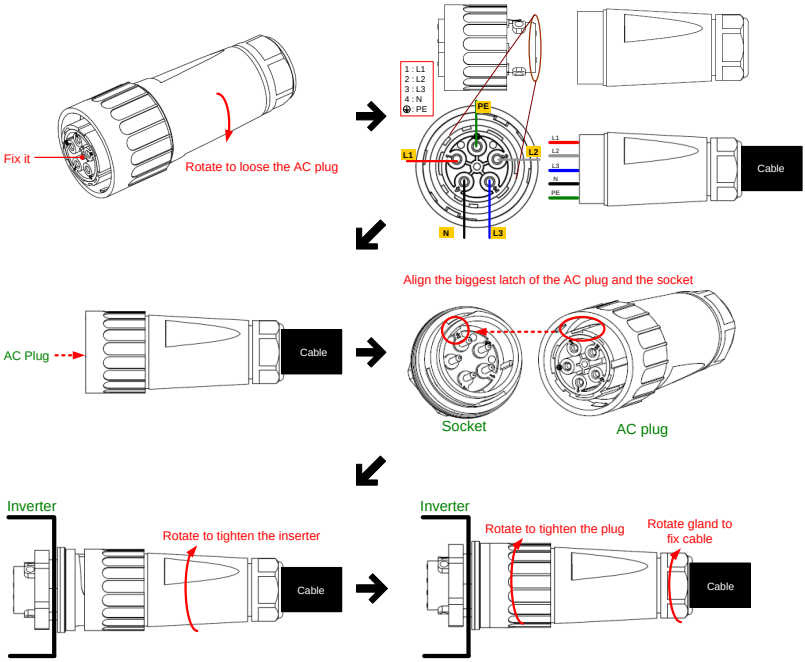


Figure 5-3 AC plug illustrationfor M8/ M10/ M12/ M15/ M15A/ M20/ M20A.

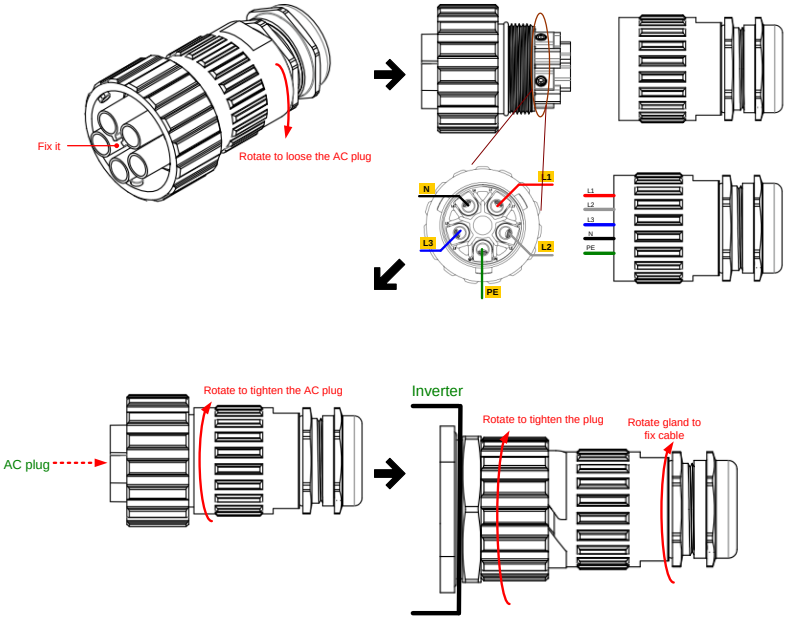


Figure 5-4 AC plug illustration for M30

Table 5-3 The wiring system of the inverter.

Model / Wiring	RPI-M8/ M10/ M12	RPI-M15/ M20 P/N: RPIXX3N543009**8** or **09**
3P3W+PE	✕	✕
3P4W+PE	○	○
Model / Wiring	**RPI-M15/ M20 P/N: RPIXX3N5431000**	**RPI-M15A/ M20A/ M30**
3P3W+PE	○	○
3P4W+PE	○	○

After wiring, users should choose the AC connection type on the control panel. About setting, please refer to **7.2.6.3 Install Setting**.

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%

5.3 DC Connection (from PV Array)

WARNING

- When doing DC wiring, please choose the proper wiring by connect to the correct polarity.
- When doing DC wiring, please confirm that PV Array's power switch is off.

CAUTION

- The connection number of PV Array, open circuit voltage and power of String_1 and String _2 must be coherent.
- The connection number of PV Array, open circuit voltage and power of String _3 and String _4 must be coherent.
- The maximum open circuit voltage of PV Array can not be higher then 1000V.
- The range of Vmpp of Input1 and Input2 shall be in 350~800 Vdc.
- The device installed between PV Array and inverter must meet the rating of voltage >1000 Vdc and > Short current.
- The input power to the inverter is not recommended to exceed the maximum rated power which show in table 5-3.

Table 5-4 Maximum rating of input power

Type of limit	**RPI-M8**	**RPI-M10**	**RPI-M12**	**RPI-M15**
Total input power	8.8 kW	11 kW	13.2 kW	16.5 kW
Input1 or Input2	5.9 kW	7.4 kW	8.8 kW	8.25 kW
Type of limit	**RPI-M15A**	**RPI-M20**	**RPI-M20A**	**RPI-M30**
Total input power	16.5 kW	22 kW	22 kW	32 kW
Input1 or Input2	8.25 kW	11 kW	11 kW	16 kW

Table 5-5 Cable size

Model	**Current Rating**	**Wire size**	**Temperature**
M8	DC 10A	2 - 3mm^2 / 14 AWG	Meet UL 10070
M10/ M12	DC 20A	3 - 5mm^2 / 12 AWG	Meet UL 10070
M15A/ M20A	DC 34A	5 - 6mm^2 / 10 AWG	Meet UL 10070
M15/ M20/ M30	DC 34A	5 - 6mm^2 / 10 AWG	Meet UL 10070

DC wiring polarity is divided into positive and negative, which is shown as in figure 5-5. The connection shall be coherent with the indication marked on inverter.

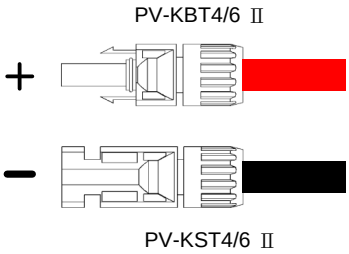


Figure 5-5 DC Wiring illustration

5.4 Communication Module Connections

The Communication Module support the functions of communication with computer, also provides 2 EPO input signals and 1 dry contact.

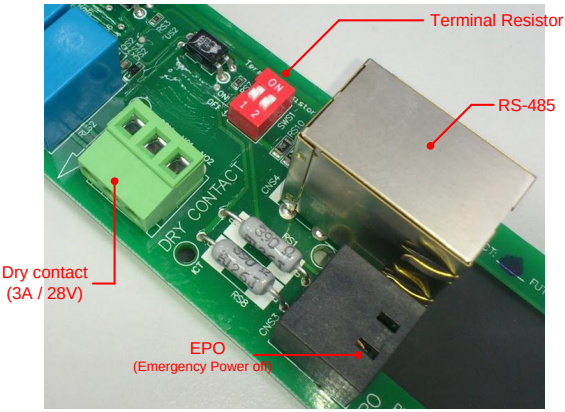


Figure 5-6 Communication module

5.4.1 RS-485 Connection

The pin definition of RS-485 is shown as in table 5-5. Installers should switch **ON** the terminal resistor when single inverter is installed. The wiring of multi-inverter connection is shown as figure 5-7. Installers should switch **ON** terminal resister at the first and last devices of the RS485 chain as Figure 5-7. The other terminal resisters should be switch **OFF**. Please refer to table 5-7 for the terminal resister setting.

Table 5-6 Definition of RS 485 pin

PIN	FUNCTION
4	DATA-
5	DATA+
7	VCC(+12V)
8	GND

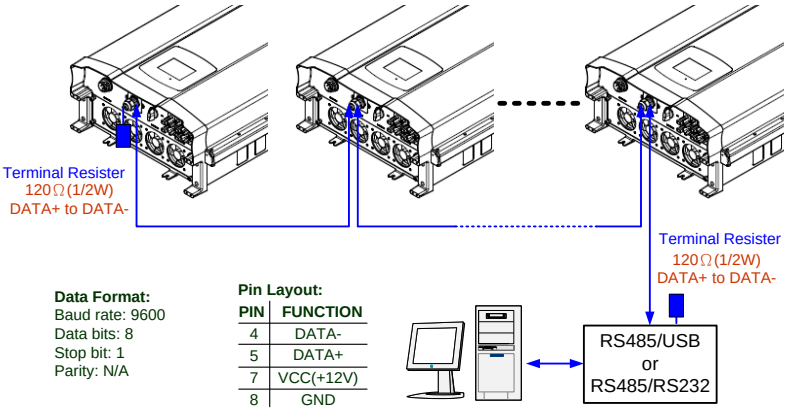
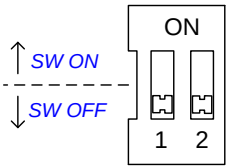


Figure 5-7 Multi-inverter connection illustration

Table 5-7 RS-485 data format

RS-485 Data format	
Baud rate	9600
Data bit	8
Stop bit	1
Parity	N/A

Tabel 5-8 Terminal resister setting



Terminal Resistor \ SW	1	2
OFF	OFF	OFF
ON	ON	OFF
	OFF	ON
	ON	ON

5.4.2 EPO Functions

RPI-M8/ M10/ M12/ M15/ M15A/ M20/ M20A/ M30 provides 2 sets of emergency power off function. When the outer external switch is short, the inverter will shutdown immediately.

Tabel 5-9 EPO functions

Enable EPOs	
EPO1	Short Pin1 & Pin2
EPO2	Short Pin4 & Pin5

5.4.3 Dry Contact Connection

RPI-series provides 1 set of Dry Contact function. When inverter is on grid, Com & NO2 will be shorted. When the Fan Fail is detected, Com & NO1 will be shorted.

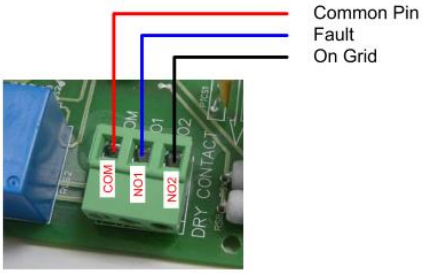


Figure 5-8 Dry contact port & Assignments

6. Active / Reactive Power Control and Fault Ride Through

User can adjust Active/Reactive power control only when Grid System = Germany MV, Germany LV, Italy LV, or Italy MV (Must enter a password to change these settings). Fault ride through (FRT) can only be adjust when Grid System = Germany MV, Italy MV, or Italy LV.

There are 2 settings for active power control and 4 settings for reactive power control based on the requirement from network operator.User can select either or both active power control methods and/or one of the reactive power control methods.

6.1 Active Power Control

6.1.1 Power Limit

According to BDEW technical guideline in page 25 of June 2008 version as below:

It must be possible to operate the generating facility at reduced power output. In the cases listed below, the network operator is entitled to require a temporary limitation of the power feed-in or disconnect the facility:

- *potential danger to secure system operation,*
- *congestion or risk of overload on the network operator's network,*
- *risk of islanding,*
- *risk to the steady-state or dynamic network stability,*
- *rise in frequency endangering the system stability,*
- *repairs or implementation of construction measures,*
- *within the scope of generation management/ feed-in management/ network security*
- *management (see „Grundzüge zum Erzeugungsmanagement")*

User can reduce inverter output power by set percentage of actual or rated power. Please refer to **7.2.6.4.1 Power Limit** for the settings procedure.

6.1.2 Power vs. Frequency

There're 2 different operation curves depends on Country setting.

Country = Germany LV, follow the curve in Figure 6-1-a

Country = Germany MV, Italy BT or Italy MT, follow the curve in Figure 6-1-b

Where:

P_m	is the power generated at the time of exceeding f_{start}
P	is the feeding power
f	is the mains frequency
fstart	is the freuqncy which starting power reduction
fstop	is the frequency which has zero power
Gradient	is the slop of power reduction

User can set all necessary settings to meet the requirements from network operator. Please refer to **7.2.6.4.2 Power vs. Frequency** for the settings procedure.

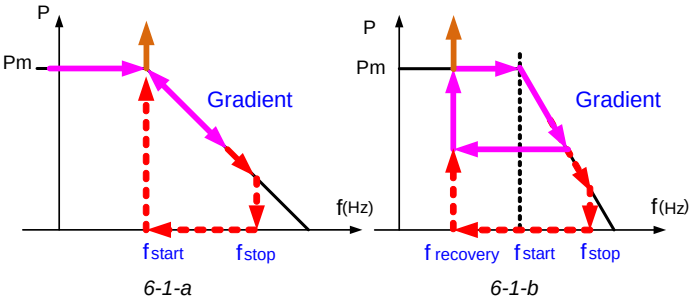


Figure 6-1 Power vs. frequency characteristic

6.2 Reactive Power Control

According to BDEW:

With active power output, it must be possible to operate the generating plant in any operating point with at least a reactive power output corresponding to a active factor at the network connection point of

cos φ = 0.95 underexcited to 0.95 overexcited

Values deviating from the above must be agreed upon by contract. In the consumer reference arrow system (see Annex B.4), that means operation in quadrant II (under-excited) or III (overexcited).With active power output, either a fixed target value for reactive power provision or a target value variably adjustable by remote control (or other control technologies) will be specified by the network operator in the transfer station. The setting value is either

a) a fixed active factor cosφ or

b) a active factor cosφ(P) or

c) a fixed reactive power in MVar or

d) a reactive power/voltage characteristic Q(U).

6.2.1 Fixed Active Factor cosφ

User can set reactive current from Cap 0.80 to Ind 0.80 (inverter would stop reactive power control if output power is below 10% rated power).

6.2.2 Active Factor cosφ(P)

Once user enables this method, inverter will deliver reactive current according to output active power at that moment. The below figure is an example. Please refer to **7.2.6.4.4 cosφ(P)** for the settings procedure.

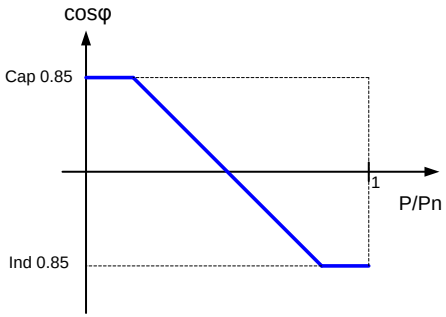


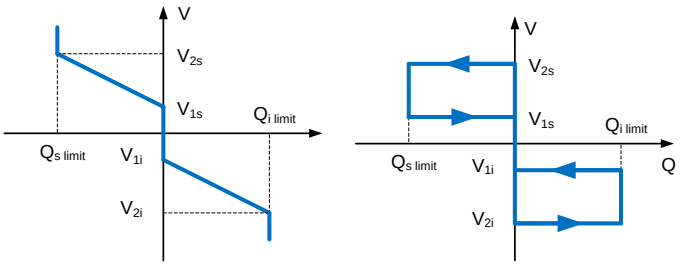
Figure 6-2 cosφ(P) characteristic

6.2.3 Fixed Reactive Power

Enables this method, inverter will deliver reactive power (ie. Q) according to the fixed reactive power setting. The setting range is from Cap 53% to Ind 53%.

6.2.4 Reactive Power / Voltage Characteristic Q(U)

After selecting “Q(U) control”, User can adjust Q vs. Grid voltage operation curves as below. The left curve is “Curve A”, the right curve is “Curve B”.



CurveA *CurveB*

Figure 6-3 Q(U) characteristic.

6.3 Fault Ride Through (FRT)

According to BDEW:

2.5.1.2 Dynamic network support

Dynamic network support means voltage control in the event of voltage drops within the high and extra-high voltage network with a view to avoiding unintentional disconnections of large feed-in power, and thus network collapse. In the light of the strong increase in the number of generating plants to be connected to the medium-voltage network, the integration of these plants into the dynamic network support scheme is becoming ever more important. Consequently, these generating plants must generally participate in dynamic network support even if this is not required by the network operator at the time of the plant's connection to the network. That means that generating plants must be able in technical terms

- *not to disconnect from the network in the event of network faults,*
- *to support the network voltage during a network fault by feeding a reactive current into the network,*
- *not to extract from the medium-voltage network after fault clearance more inductive reactive power than prior to the occurrence of the fault.*

These requirements apply to all types of short circuits (i.e. to single-phase, two-phase and three-phase short circuits).

Just like in the Transmission Code 2007 7, a distinction is made in these guidelines between type-1 and type-2 generating plants with regard to their behaviour in the event of network disturbances. A type-1 generating unit exists if a synchronous generator is directly (only through the generator transformer) connected to the network. All other plants are type-2 generating units.

The following conditions shall apply to type-2 generating plants, taking the Transmission Code 2007, Section 3.3.13.5, into account:

- *Generating units must not disconnect from the network in the event of voltage drops to 0 % Uc of a duration of ≤ 150 ms.*
- *Below the blue line shown in Figure 2.5.1.2-2, there are no requirements saying that generating plants have to remain connected to the network.*

Voltage drops with values above the borderline 1 must not lead to instability or to the disconnection of the generating plant from the network (TC2007; 3.3.13.5, section 13; extended to asymmetrical voltage drops).

If the voltage drops at values above the borderline 2 and below the borderline 1, generating units shall pass through the fault without disconnecting from the network. Feed-in of a short-circuit current during that time is to be agreed with the network operator. In consultation with the network operator, it is permissible

to shift the borderline 2 if the generating plant's connection concept requires to do so. Also in consultation with the network operator, a short-time disconnection from the network is permissible if the generating plant can be resynchronized 2 seconds, at the latest, after the beginning of the short-time disconnection. After resynchronization, the active power must be increased with a gradient of at least 10% of the nominal capacity per second (TC2007; 3.3.13.5, section 14).

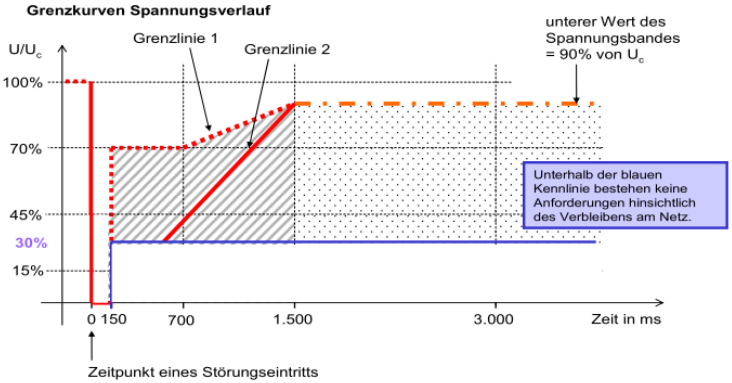


Figure 6-4 Borderlines of the voltage profile of a type-2 generating plant at the network connection point

RPI-M8/ M10/ M12/ M15/ M15A/ M20/ M20A/ M30 implements the FRT behavior as the figure below, in area

1. Keep normally operate
2. Feed-in reactive current according to ΔU/Un and K factor
3. Short time disconnect
4. Long time disconnect

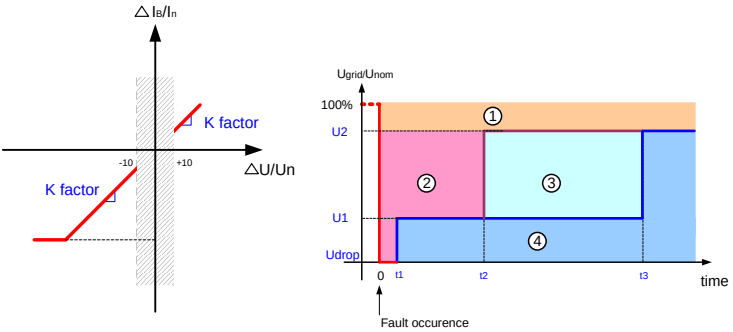


Figure 6-5 FRT characteristic

7. Turn on/off PV inverter

WARNING：BURN HAZARD

The enclosure temperature may exceed over 70° C while operating. Danger may occur owing to hot surface. Please do not touch!

After installation, please confirm the AC, DC, and Communication connection are correct. Turn the DC switch to the ON postion. When solar irradiation is sufficient, the device will operate automatically after no mistakes on self-auto test (about 2 minutes at 1st startup of a day). Please refer to the LCD Display and Control Panel as figure 7-1. The display includes 5" graphic LCD with 320*240 dots in resolution and LED indicator for inverter status. There are green and red colors for LED indicator to represent different inverter working status. Please refer the table 7-1 for detail information of LED indicator.

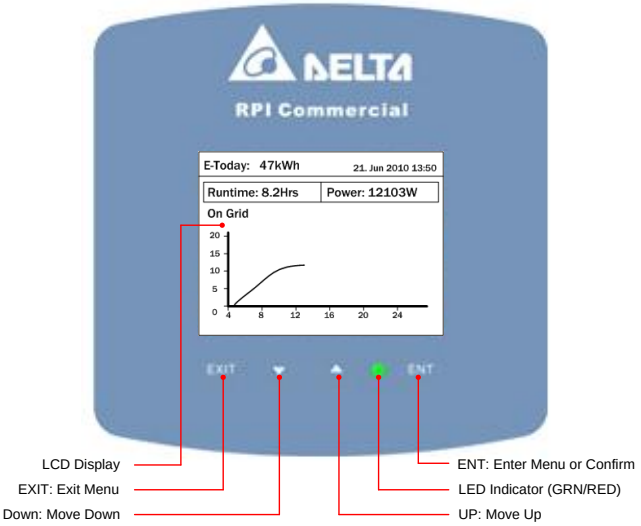


Figure 7-1 LCD display &control panel

Table 7-1 LED 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

First startup, user has to select the country and language. System will show the main menu after user has done the selection.

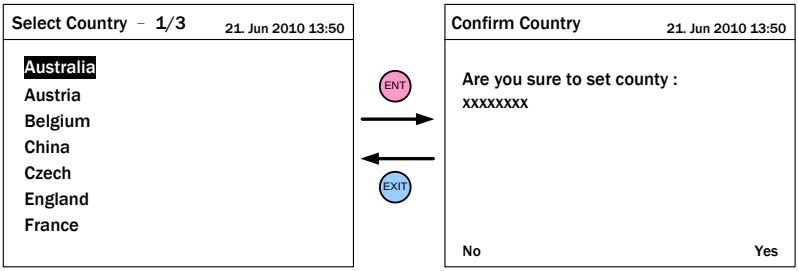


Figure 7-2 Select county page

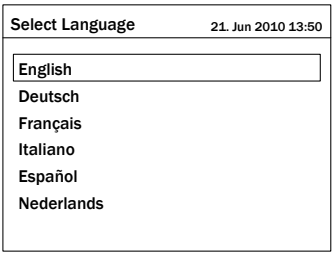


Figure 7-3 Select language page

7.1 Home Page

When inverter is operating normally, LCD will show home page as Figure 7-4, user can get the information of output power, inverter status, E-today, date and time.

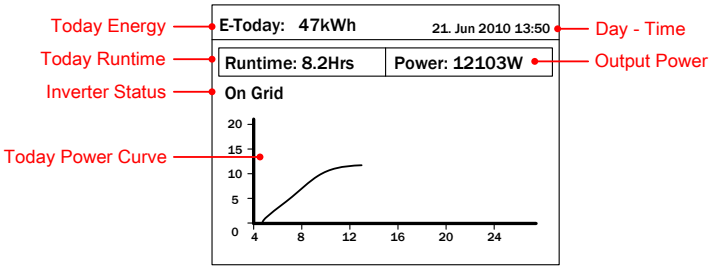


Figure 7-4 Home page

7.2 LCD Flow Chart

Press EXIT button will enter menu page (Figure 7-5), E-today is home page, every other item is described in 7.2.1 ~ 7.2.6

Power Meter	7.2.1
Energy Log	7.2.2
Event Log	7.2.3
Operation Data	7.2.4
Inverter Information	7.2.5
Setting	7.2.6

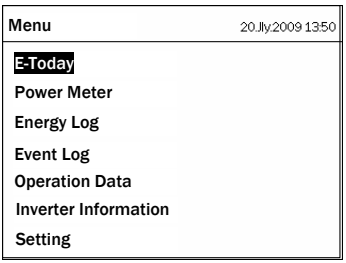


Figure 7-5 Menu page

7.2.1 Power Meter

This page shows the information about input and output power.

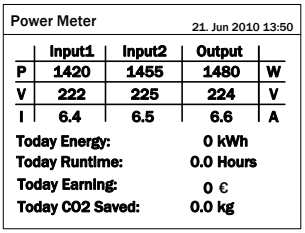


Figure 7-6 Power meter page

7.2.2 Energy Log

After pressing ENT in this page, user can view the historical data about power generating yearly, monthly, and daily.

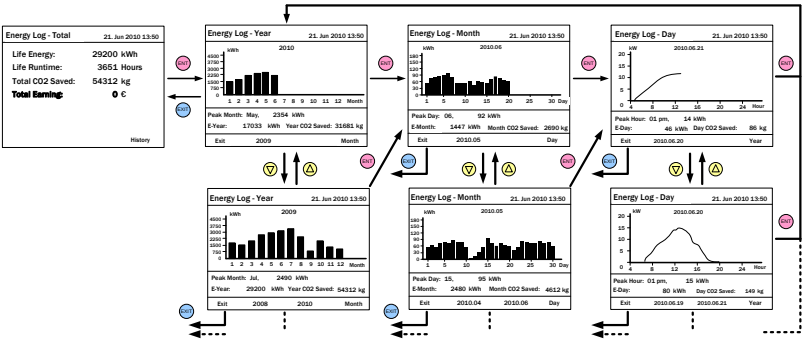


Figure 7-7 Energy log flow chart

7.2.3 Event Log

When entering this page, the display will show all the events (error or fault) and it can show 30 records at most with the latest one on the top. When pressing ENT, user can view all the statistic data.

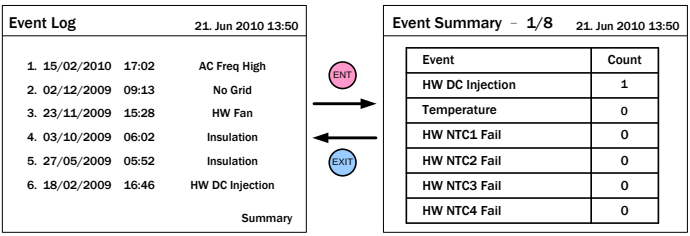


Figure 7-8 Event log flow chart

7.2.4 Operation Data

Has 4 pages, record the maximum and/or minimum values of history, including voltage, current, power and temperature.

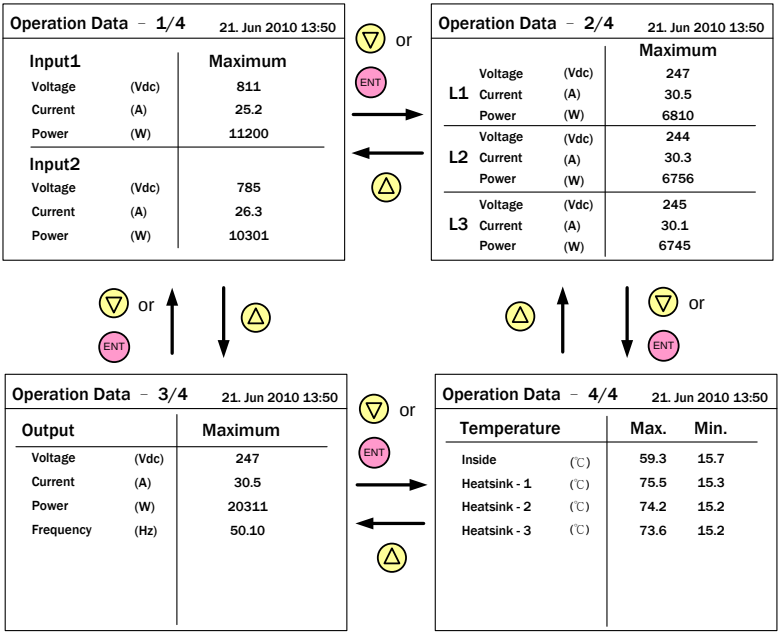


Figure 7-9 Operation data flow chart

7.2.5 Inverter Information

This page has the following information: serial number, firmware version, installation date and inverter ID. If user wants to change inverter ID, please refer to **7.2.6.3 Install Setting**.

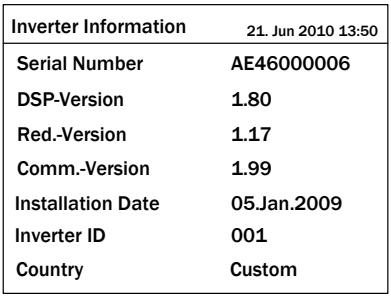


Figure 7-10 Inverter information page

7.2.6 Settings

"Settings" includes Personal Setting, Coefficients setting, Install Setting, Active/Reactive Power Control, and FRT.

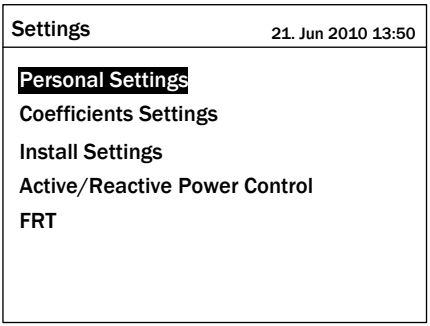


Figure 7-11 Setting page

7.2.6.1 Personal Setting

User can set Language, Date, Time, Screen Saver, LCD brightness and contrast in Personal Setting. Screen Saver can adjust from 5min-60min. When over the setting time limitation without using button functions, the LCD backlight will turn off automatically. Brightness and Contrast can adjust the level 1-5 (low- high)

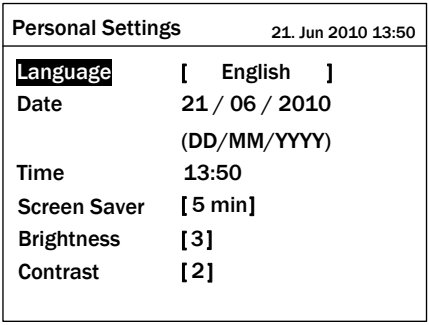


Figure 7-12 Personal setting page

7.2.6.2 Coefficient Setting

Users can set the following parameters according their needs.

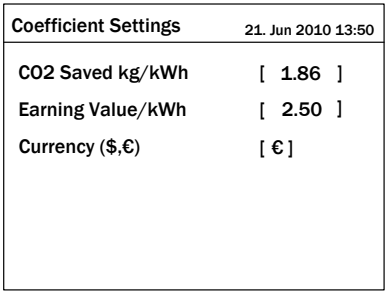


Figure 7-13 Coefficient setting page

7.2.6.3 Install Setting

Correct passwords are requested when entering Install Setting. Install Setting for user and installation technician are different. The password can not be revised. After confirmation as the general user password, user can set Inverter ID, Insulation, RCMU, Reconnection Time, Ramp-up Power and AC Conection.

CAUTION！ Machine and equipment damage may occur.

The following settings can only be adjusted by installers or engineers. Changing these settings may cause damage to the inverter.

- **Insulation:** Inverter will meansure the impedance between Array and PE before connect to grid. If the impedance between Array and PE is lower then the value that set in Insulation Settings, inverter will stop connecting to grid. There are 6 modes users can select in Insulation settings: ON, Positive Ground, Negative Ground, DC1 Only, DC2 Only, or Disable. Installer can also select different impedance according to the actual situation.
- **DC Injection:** Inverter will shutdown if the DC component in AC current over the limit.
- **RCMU:** If leakage current between input and output exceeds the limit, inverter will shutdown immediately.
- **Reconnction Time:** The countdown time before inverter connected to grid.
- **Ramp-up Power:** The rate of increase in output power. (%/min)
- **AC connection:** Users can choose 3P3W or 3P4W system depending on the site conditions.

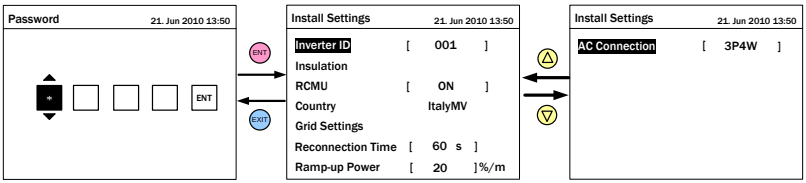


Figure 7-14 Install setting page –User mode

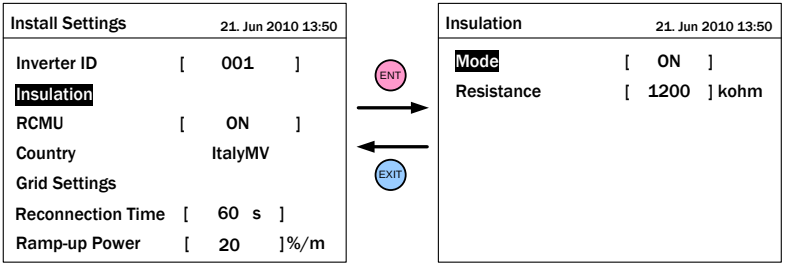


Figure 7-15 Insulation setting

After confirmation as the installation technician passwords, system will add setting options of DC-Injection, Return to Factory, Country and Grid Setting. In Grid Setting selection, technician can adjust the parameter for protection (OVR, UVR, OFR, UFR, etc.) to Utility. Before setting of the protection to Utility in Grid Settings page, please set country as “Custom.” Return to Factory will turn inverter to default setting and delete all the records of event and energy.

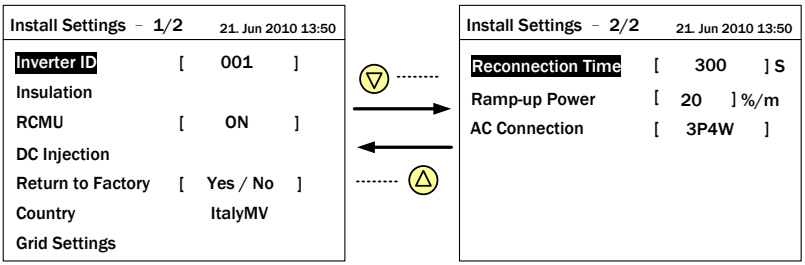


Figure 7-16 Install setting page – Installer mode

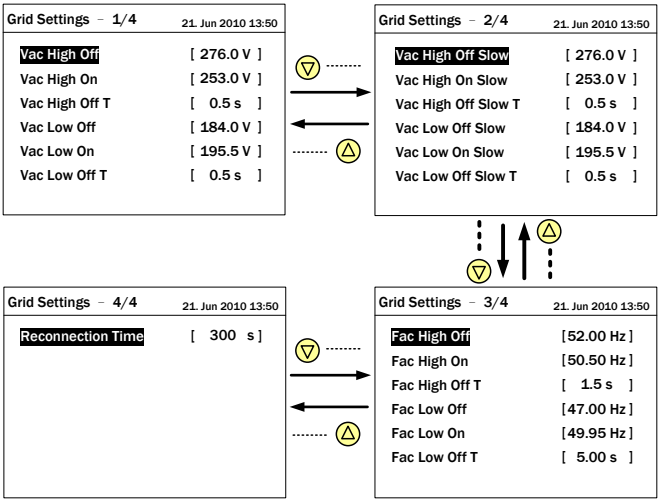


Figure 7-17 Grid setting page

There are 19 parameters in Grid Settings page. User can refer to table 7-2 for the function of each parameter.

Table 7-2 Grid setting parameters

Parameter	Description
Vac High Off	Inverter will be disconnected from grid if the phase voltage of AC rises to this value.
Vac High On	Inverter will be reconnected to grid if the phase voltage of AC drops to this value.
Vac High Off T	If AC voltage reaches to the value of Vac High Off, inverter will be disconnected in this time.
Vac Low Off	Inverter will be disconnected from grid if the phase voltage of AC drops to this value.
Vac Low On	Inverter will be reconnected to grid if the phase voltage of AC rises to this value.
Vac Low Off T	If AC voltage reaches to the value of Vac Low Off, inverter will be disconnected in this time.
Vac High Off Slow	The function is same as Vac High Off, but the value must be lower than former.
Vac High On Slow	The function is same as Vac High On, but the value must be lower than former.

Vac High Off Slow T	The function is same as Vac High Off T, but the time must be longer than former.
Vac Low Off Slow	The function is same as Vac Low Off, but the value must be higher than former.
Vac Low On Slow	The function is same as Vac Low On, but the value must be higher than former.
Vac Low Off Slow T	The function is same as Vac High Off T, but the time must be longer than former.
Fac High Off	Inverter will be disconnected from grid if AC frequency rises to this value.
Fac High On	Inverter will be reconnected to grid if AC frequency drops to this value.
Fac High Off T	If AC frequency reaches to the value of Fac High Off, inverter will be disconnected in this time.
Fac Low Off	Inverter will be disconnected from if AC frequency drops to this value.
Fac Low On	Inverter will be reconnected to grid if AC frequency rises to this value.
Fac Low Off T	If AC frequency reaches to the value of Fac Low Off, inverter will be disconnected in this time.
Reconnection Time	The countdown time before inverter connected to grid.

7.2.6.4 Active/Reactive Power Control

Only when country sets as Germany LV, Germany MV, Italy LV, or Italy MV can user enters this page. User has to enter user's password before enter this page.

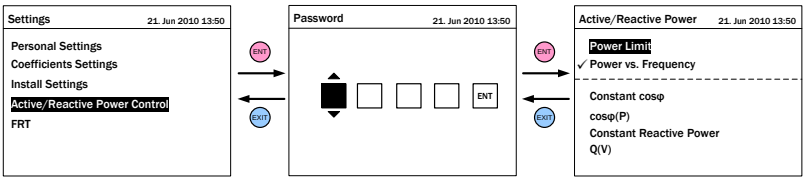


Figure 7-18 Active/Reactive powersetting page

7.2.6.4.1 Power Limit

User can set percentage of actual or rated power to limit inverter's output power. Inverter will start the action once user set Mode as "ON". On the contrary, inverter will stop power reduction and back to MPP Tracking once user set Mode as "OFF".

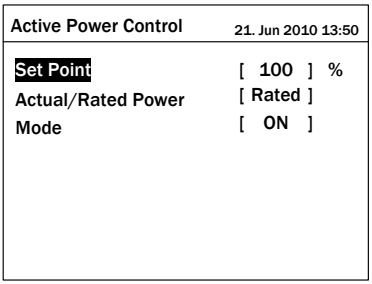


Figure 7-19 Power limit setting page

7.2.6.4.2 Power vs. Frequency

Please be noticed, the definition of Gradient is different between Italy and other countries, the explanation as below,

- For Italy BT/ MT: It is used to calculate the frequency of zero power, ie. Fstop = fstart + Gradient * 50
- For other countries (ex. Germany LV or MV): Gradient means the slope of power reduction, ie. –xx%/Hz

Recovery Time is accessible only If Country setting is Italy BT or MT, means the inverter has to stay on the power at that time and can't increase power if frequency back to normal till this time was up.

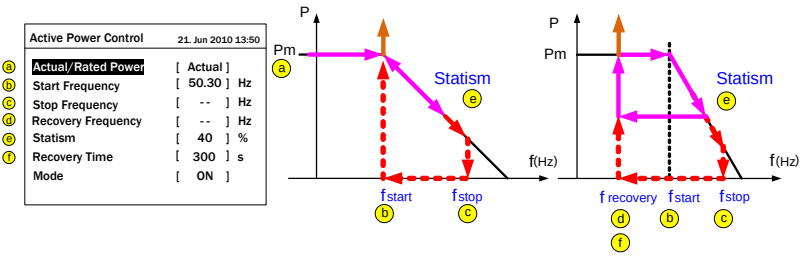


Figure 7-20 Power vs. frequency setting page.

7.2.6.4.3 Constant cosφ

When this Mode is turned on, inverter will maintain power factor as a constant value. Users can set power factor from Cap 0.80 to Ind 0.80.

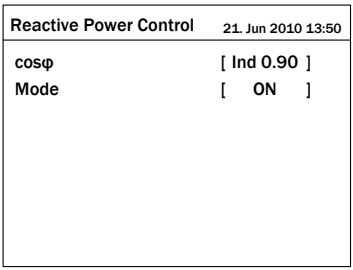


Figure 7-21 Constant cosφ setting page

7.2.6.4.4 cosφ(P)

The output power factor would be affected by feeding power. Lock-in voltage and Lock-out voltage are only adjustable if Country setting is Italy BT or Italy MT. Inverter would feed-in reactive power depends on active power once Grid voltage is higher than Lock-in voltage and back to pure active power when Grid voltage is lower than Lock-out voltage. For the countries other than Italy, cosφ (P) control will not concern Grid voltage.

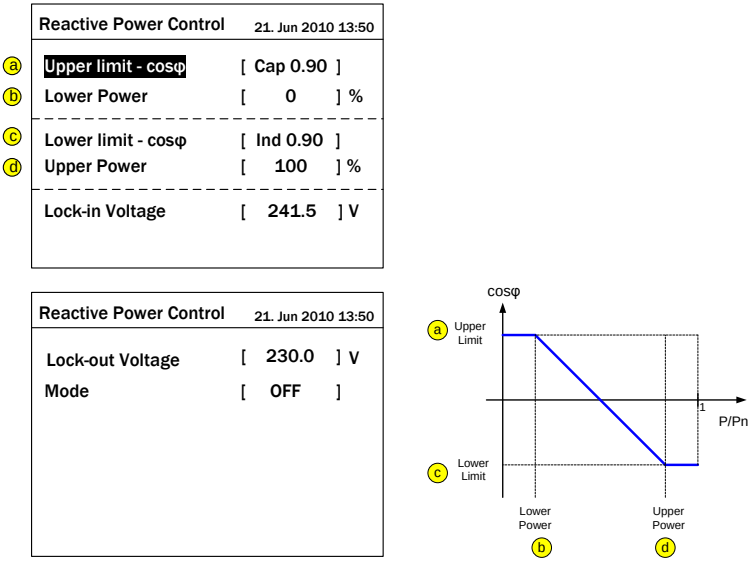


Figure 7-22 cosφ(P) setting page

7.2.6.4.5 Constant Reactive Power

When this Mode is turned on, inverter will maintain reactive power as a constant value.

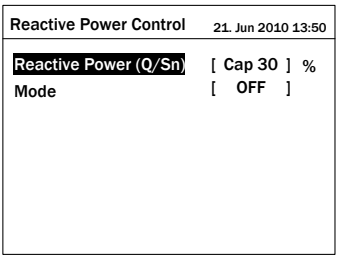


Figure 7-23 Constant Reactive Power setting page

7.2.6.4.6 Q(U)

RPI-series support two kind of Q(U) curves. Please refer to fiqure 7-24.

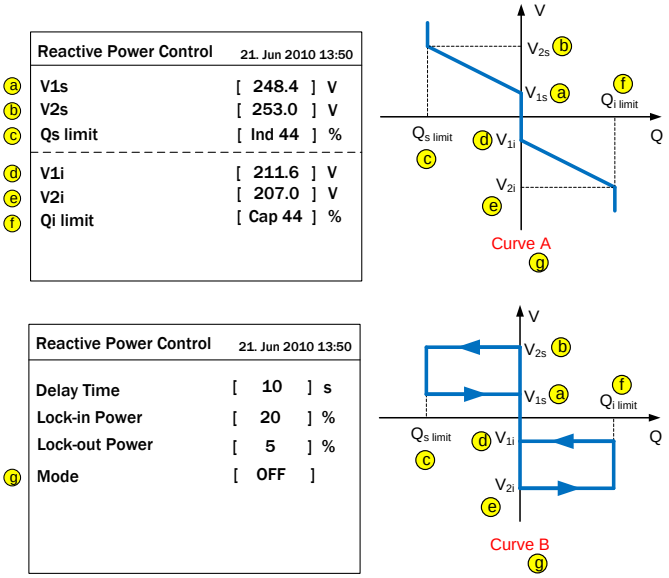


Figure 7-24 Q(U) setting page

7.2.6.5 FRT (Fault ride through)

This function is only for Germany MV, Italy LV, and Italy MV. It is not recommended that users modify the default values.

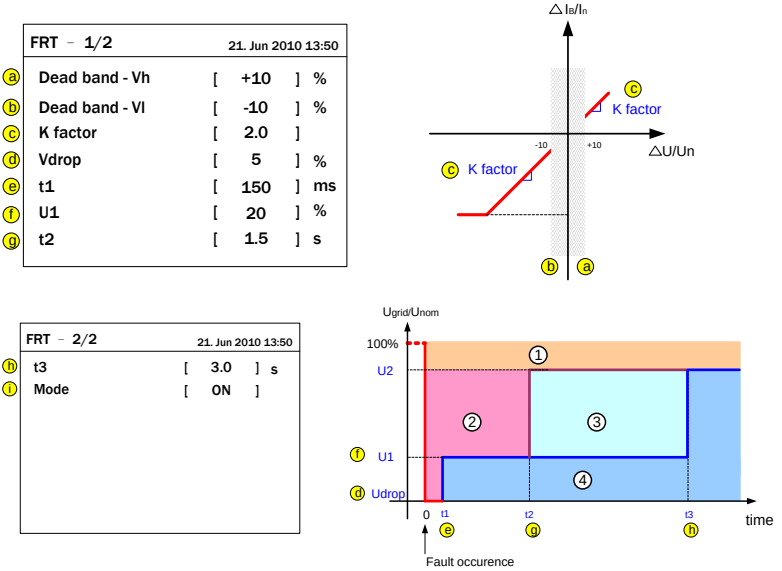


Figure 7-25 FRT setting page

8. Maintenance

In order to ensure the normal operation of PV Inverter, please check up regularly at least once each year or each half year. Check all the terminals, screws, cables are connected well. If there are any impaired parts, please contact with the qualified technician to repair or replace to the new spare part. To ensure that no foreign body stocks at the heat outlet, please clean up once a half year by qualified technicians.

Danger！Death and serious injuries may occur.

Before maintenance, please disconnect AC and DC to avoid risk of electronic shock.

8.1 Clean Fan

Loose the 4 screws of the Fan bracket at the 4 corners first. User can see the connectors of fan(s) when pull the fan bracket slightly. RPI-M10/ M12 has 1 set of fan. RPI-M15A/ M20A has 2 sets of fan. RPI-M15/ M20/ M30 has 4 sets of fan. After disconnect the connectors, user can pull out the whole fan bracket from inverter and clean up the fan.

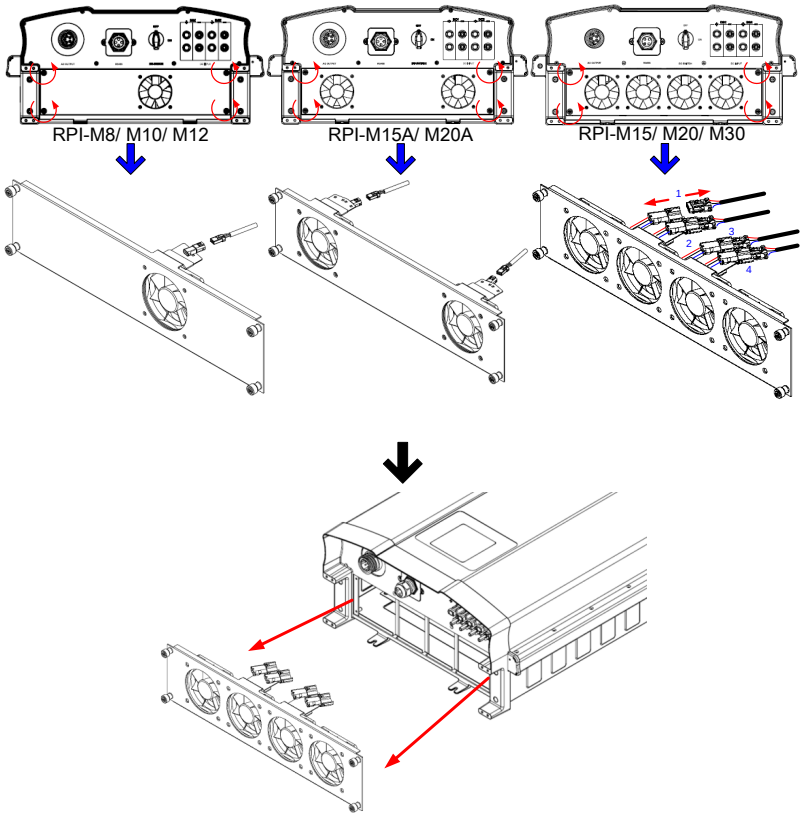


Figure 8-1 Steps of disassembling fan bracket

8.2 Replace Fan

If fans fail and need to be replaced, user has to disassemble 4 pcs screws around the fans and disconnect the connector right behind the fan bracket. Then replace new fan and installed it reversely (Figure 8-2 illustrates about replacing the first fan on fan bracket).

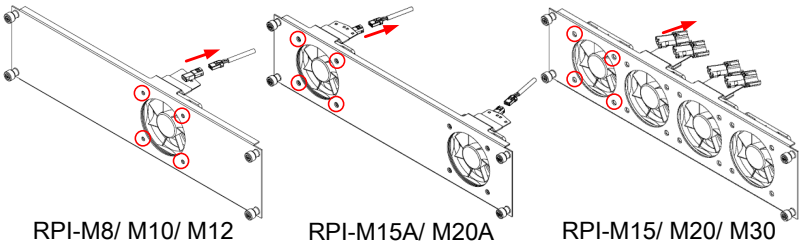


Figure 8-2 Disassembling fan

8.3 Clean Air Outlets

Please refer to figure 8-3 about cleaning the air outlet. Disassemble 4 screws of air outlet and then clean the dust. The air outlets at both two side of inverter have to be cleaned regularly.

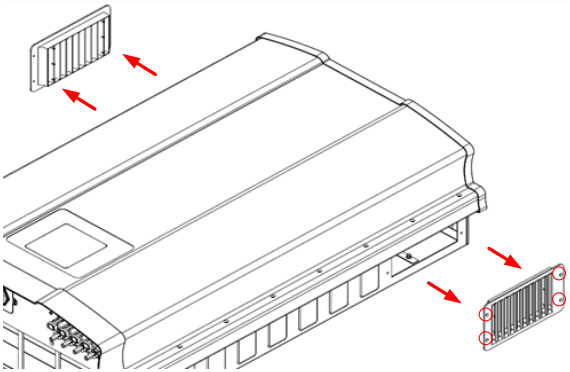


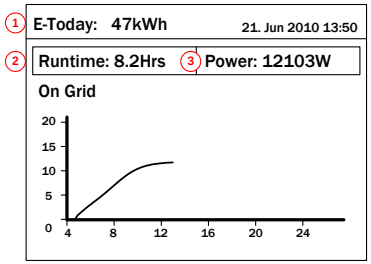
Figure 8-3 Disassembling air outlets

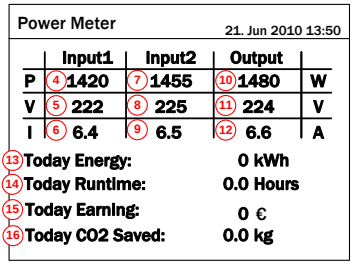
9. Measurement, Error message and Trouble Shooting

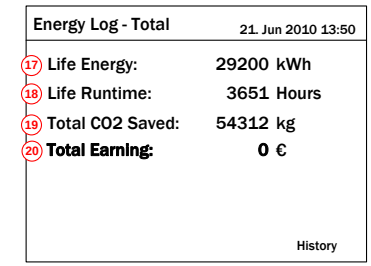
Please refer to the following tables for Measurement, Error message, and Trouble Shooting information.

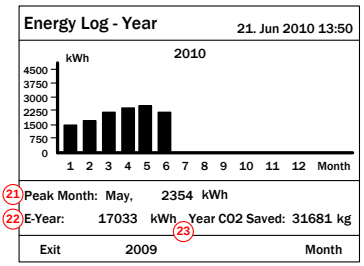
9.1 Measurement

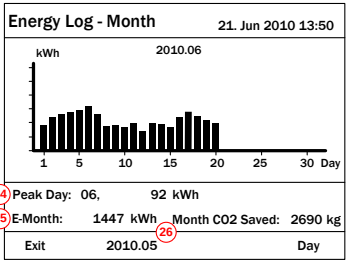
Table 9-1 Measurement and message

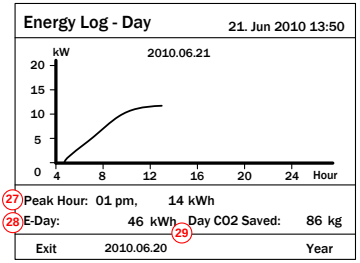


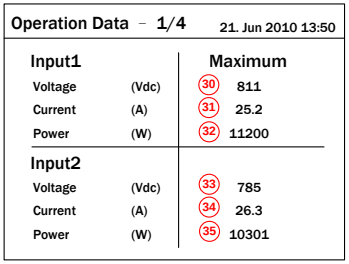


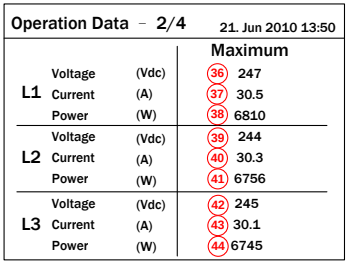


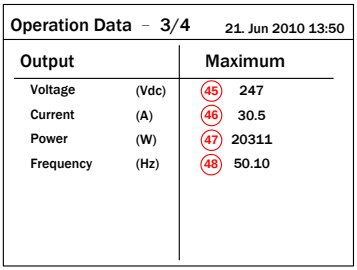


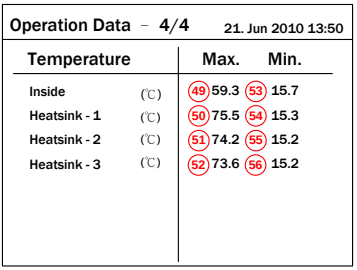












No.	Measurement	Meaning
1	E-Today	Total energy generated today
2	Runtime	Operation time today
3	Power	Actual power is generating
4	Input1 - P	Power of DC Input1
5	Input1 - V	Voltage of DC Input1
6	Input1 - I	Current of DC Input1
7	Input2 - P	Power of DC Input2
8	Input2 - V	Voltage of DC Input2
9	Input2 - I	Current of DC Input2
10	Output - P	Power of AC output
11	Output- V	Voltage of AC output
12	Output- I	Current of AC output
13	Today Energy	Accumulate electricity generated today
14	Today Runtime	Accumulated operation time today
15	Today Earning	Accumulated dollars amount earned today
16	Today co2 saved	Accumulated CO2 emission retrenched today
17	Life Energy	Total energy generated to present time
18	Life Runtime	Accumulated operation time to present time
19	Total co2 saved	Accumulated CO2 emission retrenched to present time
20	Total Earning	Accumulated the total amount of money earned
21	Peak Month	The maximum energy generated of one month in that year.
22	E-Year	Total energy generated in that year
23	Year CO2 saved	Accumulated CO2 emission retrenched in that year
24	Peak Day	The maximum energy generated of one day in that month

25	E-Month	Total energy generated in that month
26	Month CO2 saved	Accumulated CO2 emission retrenched in that month
27	Peak Hour	The maximum energy generated of one hour in that day
28	E-Day	Total energy generated in that day
29	Day CO2 saved	Accumulated CO2 emission retrenched in that day
30	Input1 Voltage Maximum	The maximum DC Input1 voltage from history
31	Input1 Current Maximum	The maximum DC Input1 current from history
32	Input1 Power Maximum	The maximum DC Input1 power from history
33	Input2 Voltage Maximum	The maximum DC Input2 voltage from history
34	Input2 Current Maximum	The maximum DC Input2 current from history
35	Input2 Power Maximum	The maximum DC Input2 power from history
36	L1 Voltage Maximum	The maximum L1 phase voltage from history
37	L1 Current Maximum	The maximum L1 phase current from history
38	L1 Power Maximum	The maximum L1 phase power from history
39	L2 Voltage Maximum	The maximum L2 phase voltage from history
40	L2 Current Maximum	The maximum L2 phase current from history
41	L2 Power Maximum	The maximum L2 phase power from history
42	L3 Voltage Maximum	The maximum L3 phase voltage from history
43	L3 Current Maximum	The maximum L3 phase current from history
44	L3 Power Maximum	The maximum L3 phase power from history
45	Output Voltage Maximum	The maximum Grid voltage from history
46	Output Current Maximum	The maximum output current from history
47	Output Power Maximum	The maximum output power from history
48	Output Frequency Maximum	The maximum Grid frequency from history
49	Inside Max.	The maximum inverter inner temperature value
50	Heatsink-1 Max.	The maximum Heatsink-1 temperature value
51	Heatsink-2 Max.	The maximum Heatsink-2 temperature value
52	Heatsink-3 Max.	The maximum Heatsink-3 temperature value
53	Inside Min.	The minimum inverter inner temperature value
54	Heatsink-1 Min.	The minimum Heatsink-1 temperature value
55	Heatsink-2 Min.	The minimum Heatsink-2 temperature value
56	Heatsink-3 Min.	The minimum Heatsink-3 temperature value

9.2 Error Message & Trouble Shooting

Table 9-2 Error Message

ERROR		
Message	**Possible cause**	**Action**
AC Freq High	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	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	Non-linear load in Grid and near to inverter	Grid connection of inverter need to be far away fromnon-linear load if necessary
HW Connect Fail	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	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	1. Actual utility voltage is under the UVR setting 2. Incorrect country or Grid setting 3. Wrong connections in AC plug 4. One or more internal fuses are broken 5. 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. Replace fuses (FUC1-3) and check all switching devices in boost & inverter stages 5. Check the detection circuit inside the inverter
AC Volt High	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

Solar1 High	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	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	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 9-3 Warning Message

Warning		
Message	**Possible cause**	**Action**
Solar1 Low	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	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
HW FAN	1. One or more fans are locked 2. One or more fans are defective 3. One ore more fans are disconnected 3. Detection circuit malfunction	1. Remove the object that stuck in the fan(s) 2. Replace the defective fan(s) 3. Check the connections of all fans 4. Check the detection circuit inside the inverter

Table 9-4 Fault Message

FAULT		
Message	**Possible cause**	**Action**
HW DC Injection	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 High	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
HW NTC1 Fail	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 (RTM1)
Temperature Low	1. Ambient temperature is <-30℃ 2. Detection circuit malfunction	1. Check the installation ambient and environment 2. Check the detection circuit inside the inverter (RTM1, RTB1, RTG1 and RTH1)
HW NTC2 Fail	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 (RTB1)
HW NTC3 Fail	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 (RTG1)
HW NTC4 Fail	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 (RTH1)
HW DSP ADC1	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 ADC2	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	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	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	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 Efficiency	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 COMM2	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
HW COMM1	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
Ground Current	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
HW Connect Fail	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	1. RCMU is disconnected 2. Detection circuit malfunction	1. Check the RCMU connection inside the inverter 2. Check the detection circuit inside the inverter

Relay Test Short	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
Relay Test Open	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 detection accuracy
Bus Unbalance	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	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 Current High	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	1. Test current loop is broken 2. CSC1 is defective 3. Detection circuit malfunction	1. Check the connection of WC3 to CNC16 2. Replay CSC1 with new one 3. Check the detection circuit inside the inverter
HW CT B Fail	1. Test current loop is broken 2. CSC2 is defective 3. Detection circuit malfunction	1. Check the connection of WC3 to CNC16 2. Replace CSC2 with new one 3. Check the detection circuit inside the inverter
HW CT C Fail	1. Test current loop is broken 2. CSC3 is defective 3. Detection circuit malfunction	1. Check the connection of WC3 to CNC16 2. Replace CSC3 with new one 3. Check the detection circuit inside the inverter

HW AC OCR	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	The detection circuit for synchronal signal malfunction	Check the detection circuit for synchronal signal inside the inverter
DC Current High	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

10. De-Commissioning

10.5 De-Commissioning Procedure

If it is necessary to put the RPI-M8/ M10/ M12/ M15/ M15A/ M20/ M20A/ M30 out of operation for RMA or maintenance, please follow the instruction below.

WARNING！Death and serious injuries may occur.

To avoid injuries, please follow the procedures below:

1. Switch off AC circuit breaker to disconnect with electricity grid.
2. Switch off DC switch to disconnect with DC source.
3. Switch off the PV Array switch to disconnect with PV Array.
4. Use proper voltage meter to confirm that the AC and DC power present totally absent.
5. Remove the AC wiring immediately to completely disconnect with electricity grid.
6. Remove the DC wiring to disconnect with PV Array.
7. Remove the Communication module RS-485 with the computer connection.

After finishing all the procedures, user can remove the RPI-M8/ M10/ M12/ M15/ M15A/ M20/ M20A/ M30.

11. Technical Data

11.1Specification

Table 11-1 Specification for RPI-M8/ M10/ M12

	RPI-M8	RPI-M10	RPI-M12
GENERAL			
Enclosure	Powder coated aluminum		
Operating temperature	-20~60℃, full power up to 40℃		
Relative humidity	5 – 95% non-condensing.		
Protection degree	IP65 (Electronics)		
Galvanic isolation	NO		
Safety class	Class I metal enclosure with protective earth		
Weight	40kg	40kg	40kg
Dimensions	625 × 612 × 278 mm		
Connectors	Weather resistant connectors		
DC INPUT (Solar side)			
Maximum input power	9kW	11kW	13.2kW
Recommended PV power range	7kW–10.5kW	8.8kW–13.2kW	10.5kW– 15.5kW
Nominal voltage	635Vdc		
Operating voltage	200Vdc – 1000 Vdc		
Startup voltage	> 250 Vdc		
Start up power	40W		
MPP tracker	Parallel inputs: 1 MPP tracker Separate inputs: 2 MPP trackers		
Absolute maximum voltage	1000Vdc		
MPP voltage range	250~850 Vdc	350~850 Vdc	416~850 Vdc
Number of inputs	4 inputs (2 MPP trackers)		
Rated current	Each MPPT: 17A Total: 30A	Each MPPT: 20A Total: 30A	Each MPPT: 20A Total: 30A
AC OUTPUT (GRID SIDE)			
Nominal power	8kVA	10kVA	12kVA
Maximum power	8.4kVA	10.5kVA	12.6kVA
Voltage	3Ph, 230/400Vac (3phase / N / PE)		
Nominal current	11.6 A	14.5 A	17.4A
Maximum current	12.8 A	16.8 A	19 A
Frequency	50 Hz model: 47 – 53 Hz 60 Hz model: 57 – 63 Hz		
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		<2 W		
Maximum efficiency		98.2%	98.3%	98.3%
EU efficiency		97.4%	97.7%	97.7%
AC connector		3 Ph + N + PE ; IP67 3-phase AC plug suitable for 4 mm^2		
Fuse		N/A. Please connect to an external protection device (1.25 rated current)		
SYSTEM INFORMATION / COMMUNICATION				
User interface		Black-on-white graphical LCD display		
		365 days data logger and real time clock		
		30 events record		
Externalcommunication		2 RS-485 connections		
REGULATIONS & DIRECTIVES				
CE conformity		Yes		
Grid interface		VDE0126-1-1, VDE-AN-N 4105, RD1699, CEI 0-21		
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				
Cooling		Fan, 1pcs	Fan, 1pcs	Fan, 1pcs
Enclosure		Mounting bracket		
		Aluminum with powder coating		

Table 11-2 Specification for RPI-M15/ M20/ M30

	RPI-M15	RPI-M20	RPI-M30
GENERAL			
Enclosure	Powder coated aluminum		
Operating temperature	-20~60℃, full power up to 40℃		
Relative humidity	5 – 95% non condensing.		
Protection degree	IP65 (Electronics)		
Galvanic isolation	NO		
Safety class	Class I metal enclosure with protective earth		
Weight	67.2kg	67.2kg	72.2kg
Dimensions	960 × 612 × 278 mm		
Connectors	Weather resistant connectors		
DC INPUT (Solar side)			
Maximum input power	16.5kW	22 kW	33kW
Recommended PV power range	14kW – 19kW	18kW – 25kW	26kW – 38kW
Nominal voltage	650Vdc		
Operating voltage	200Vdc – 1000 Vdc		
Startup voltage	> 250 Vdc		
Start up power	40W		
MPP tracker	Parallel inputs: 1 MPP tracker Separate inputs: 2 MPP trackers		
Absolute maximum voltage	1000V		
Maximum power MPPT range			
Balanced inputs (50/50)	350-800Vdc	350-800Vdc	480-800Vdc
Unbalanced inputs (33/67)	470-800Vdc	480-800Vdc	620-800Vdc
Number of inputs	4 inputs (2 MPP trackers)		
Rated current	24 A * 2	30A * 2	34 A * 2
AC OUTPUT (GRID SIDE)			
Nominal power	15kVA	20kVA	30kVA
Maximum power	16kVA	21kVA	30kVA
Voltage	3Ph, 230/400Vac		
Nominal current	22 A	29A	43 A
Maximum current	25 A	32 A	46 A
Frequency	50 Hz models: 47 – 53 Hz 60 Hz models: 57 – 63 Hz		
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		<2 W
Maximum efficiency		98.2 %
EU efficiency		> 97.5 %
AC connector		3 Ph + N + PE ; IP67 3-phase AC plug suitable for 4 mm^2 and 6 mm^2
Fuse		N/A. Please connect to an external protection device (1.25 rated current)
SYSTEM INFORMATION / COMMUNICATION		
User interface		Black-on-white graphical LCD display
		365 days data logger and real time clock
		30 events record
Externalcommunication		2 RS-485 connections
REGULATIONS & DIRECTIVES		
CE conformity		Yes
Grid interface		VDE0126-1-1, VDE-AR-N 4105, RD1699, CEI 0-21
Emission		EN 61000-6-3
Harmonics		EN 61000-3-12
Variations and flicker		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		
Cooling		Fan, 4pcs
Enclosure		Mounting bracket
		Aluminum with powder coating

Table 11-3 Specification for RPI-M15A/ M20A

	RPI-M15A	RPI-M20A
GENERAL		
Enclosure	Powder coated aluminum	
Operating temperature	-20~60℃, full power up to 40℃	
Relative humidity	5 – 95% non condensing.	
Protection degree	IP65 (Electronics)	
Galvanic isolation	NO	
Safety class	Class I metal enclosure with protective earth	
Weight	43kg	43kg
Dimensions	625 × 612 × 278 mm	
Connectors	Weather resistant connectors	
DC INPUT (Solar side)		
Maximum input power	16.5kW	22 kW
Recommended PV power range	14kW – 19kW	18kW – 25kW
Nominal voltage	635Vdc	
Operating voltage	200Vdc – 1000 Vdc	
Startup voltage	> 250 Vdc	
Start up power	40W	
MPP tracker	Parallel inputs: 1 MPP tracker Separate inputs: 2 MPP trackers	
Absolute maximum voltage	1000V	
MPPT Voltage Range	355-820Vdc	470-820Vdc
Number of inputs	4 inputs (2 MPP trackers)	
Rated current	22 A * 2	22 A * 2
AC OUTPUT (GRID SIDE)		
Nominal power	15kVA	20kVA
Maximum power	16kVA	21kVA
Voltage	3Ph, 230/400Vac	
Nominal current	22 A	29 A
Maximum current	25 A	32 A
Frequency	50 Hz models: 47 – 53 Hz 60 Hz models: 57 – 63 Hz	
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		<2 W
Maximum efficiency		98.3 %
EU efficiency		97.7 %
AC connector		3 Ph + N + PE ; IP67 3-phase AC plug suitable for 4 mm^2 and 6 mm^2
Fuse		N/A. Please connect to an external protection device (1.25 rated current)
SYSTEM INFORMATION / COMMUNICATION		
User interface		Black-on-white graphical LCD display
		365 days data logger and real time clock
		30 events record
Externalcommunication		2 RS-485 connections
REGULATIONS & DIRECTIVES		
CE conformity		Yes
Grid interface		VDE0126-1-1, VDE-AR-N 4105, RD1699, CEI 0-21
Emission		EN 61000-6-3
Harmonics		EN 61000-3-12
Variations and flicker		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		
Cooling		Fan, 2pcs
Enclosure		Mounting bracket
		Aluminum with powder coating

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