PhotoVoltaic Inverter

RPI-C500 PV Inverter

Version: 1.0.0
Modified: May 27, 2013 2:19 pm

Installation Reference

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Conventions

General Conventions

The following conventions are used in this manual:

Example:

Indicates information used to demonstrate or explain an associated concept.

Note:

Indicates additional information that is relevant to the current process or procedure.

WARNING!

Warning information appears before the text it references to emphasize that the content may prevent damage to the device or equipment.

CAUTION!

CAUTIONS APPEAR BEFORE THE TEXT IT REFERENCES. CAUTIONS APPEAR IN CAPITAL LETTERS TO EMPHASIZE THAT THE MESSAGE CONTAINS VITAL HEALTH AND SAFETY INFORMATION.

Typographical Conventions

The following typographical conventions are used in this document:

Italics

Indicates denotes references to other titles, directories, files, paths, and/or programs.

`Screen Display width`

Indicates computer output shown on a computer screen, including menus, prompts, responses to input, and error messages.

Bold type

Indicates keyboard keys that are pressed by the user.

Copyright

1. Introduction

1.1. About This Manual

This manual provides the detail information of specification, installation procedures and all related function setting about the RPI-C500 PV Inverter. Installation technicians must be well-trained and qualified for installing solar system and must follow all the safety instruction and installation procedures.

1.2. Valid Models

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

- RPI-C500 PV Inverter

1.3. Target Group

The guidelines in this manual provide instructions for a person who is well training and skillful for the installation of the central inverter.

2. Safety

2.1. System Usage

See the system usage in the following diagram:

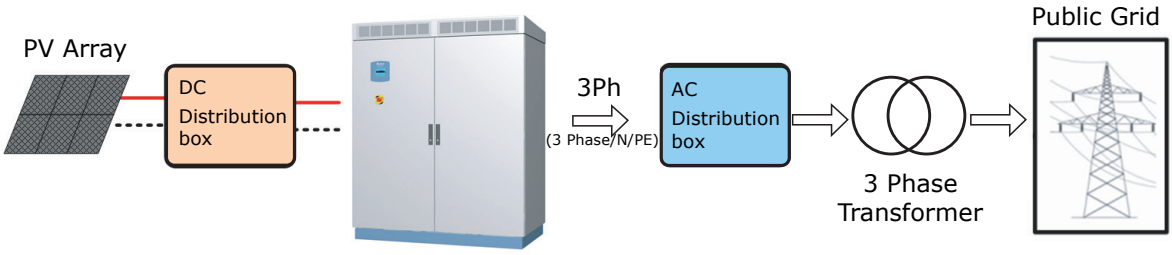


Figure 2-1. System Usage

2.2. Disconnecting

Isolation of the device must always occur under load-free conditions.

CAUTION!

RISK OF LETHAL ELECTRIC SHOCK.

It is admitted to work on the PV Inverter only after switching the relative power sources. The VDE regulations must be followed:

- Disconnect
- Ensure that the device cannot be reconnected
- Ensure that no voltage is present
- Ground and short-circuit the unit if necessary (not on the DC side)
- If necessary, cover or shield any adjacent live components

The following power sources must be isolated:

- Grid voltage for grid feeding
- Grid voltage for internal power supply (optional)
- DC voltage from the photovoltaic generator

Simply switching off the main AC and DC switches is not sufficient to ensure proper isolation of the device. The main switches only separate the power circuit from the grid and the photovoltaic generator.

CAUTION!

RISK OF LETHAL ELECTRIC SHOCK.

Dangerous accidental-contact voltages can be present in the PV Inverter even when the main AC and DC switches are switched off!

- Wait at least 5 minutes after switching off the PV Inverter.

The DC voltage is isolated using the internal or external DC input fuses, or using an external circuit breaker if present. Isolation by removing the DC input fuses must occur under load-free conditions.

The device contains capacitors on the AC and DC sides that must discharge once the device has been switched off. After switching off, dangerous accidental-contact voltages remain within the device for several minutes. If there is a fault in the device, these voltages may also be present for a longer period of time. Wait at least 5 minutes after switching off the device before opening the device.

CAUTION!

RISK OF LETHAL ELECTRIC SHOCK.

Dangerous accidental-contact voltages can be present in the PV Inverter even when the main AC and DC switches are switched off!

- Wait at least 5 minutes after switching off the PV Inverter.

3. Product Overview

3.1. Product Description

The Delta RPI inverter models include the RPI-C500. It is manufactured to meet high standards of quality and to maximize the yield of every solar plant (up to 98.5% efficiency).

The RPI series include a IP-54 protection level enclosure and corrosion resistant features to ensure the protection of the inverter within an indoor or outdoor environment.

3.2. Product View

3.2.1. Exterior Front View

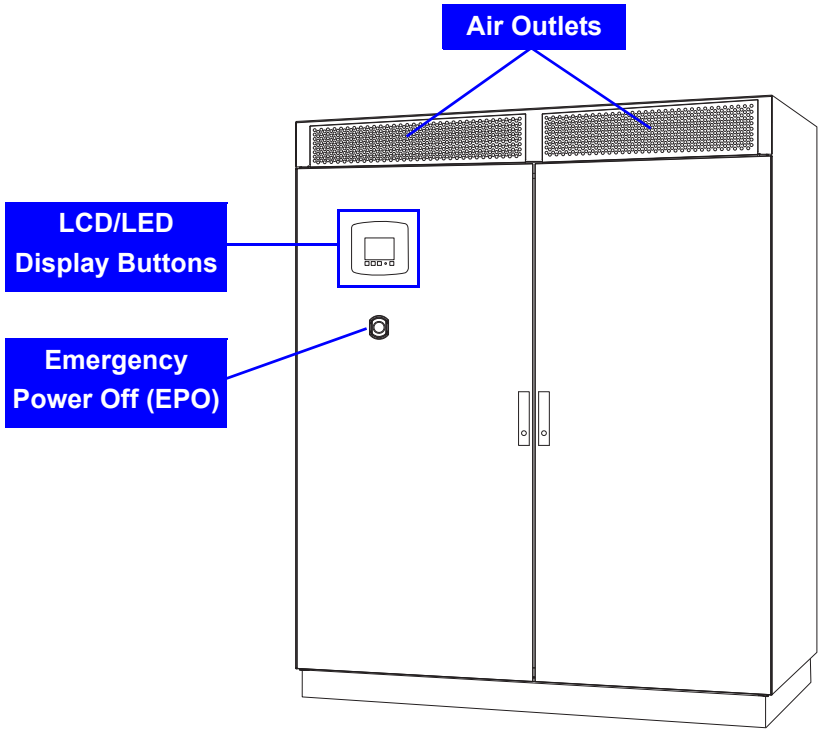


Figure 3-1. Exterior Front View

3.2.2. Exterior Triangle View

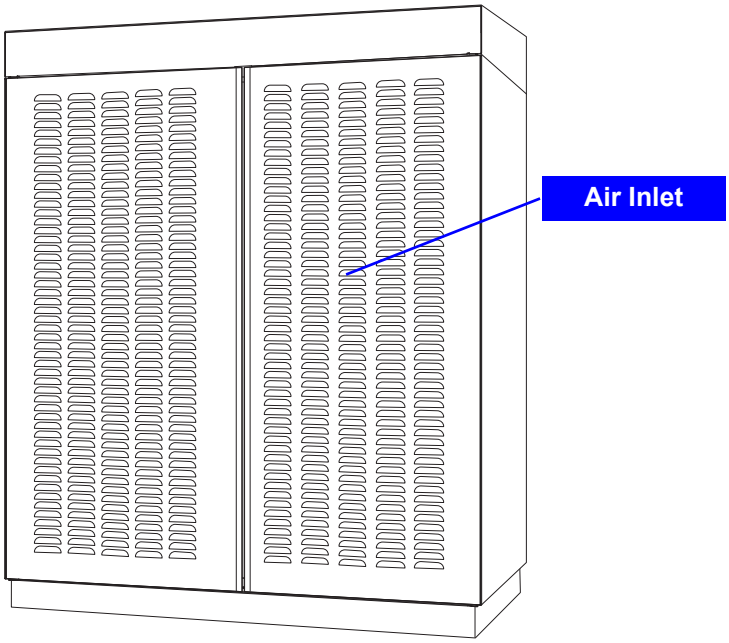


Figure 3-2. Exterior Rear View

3.2.3. Interior Front View

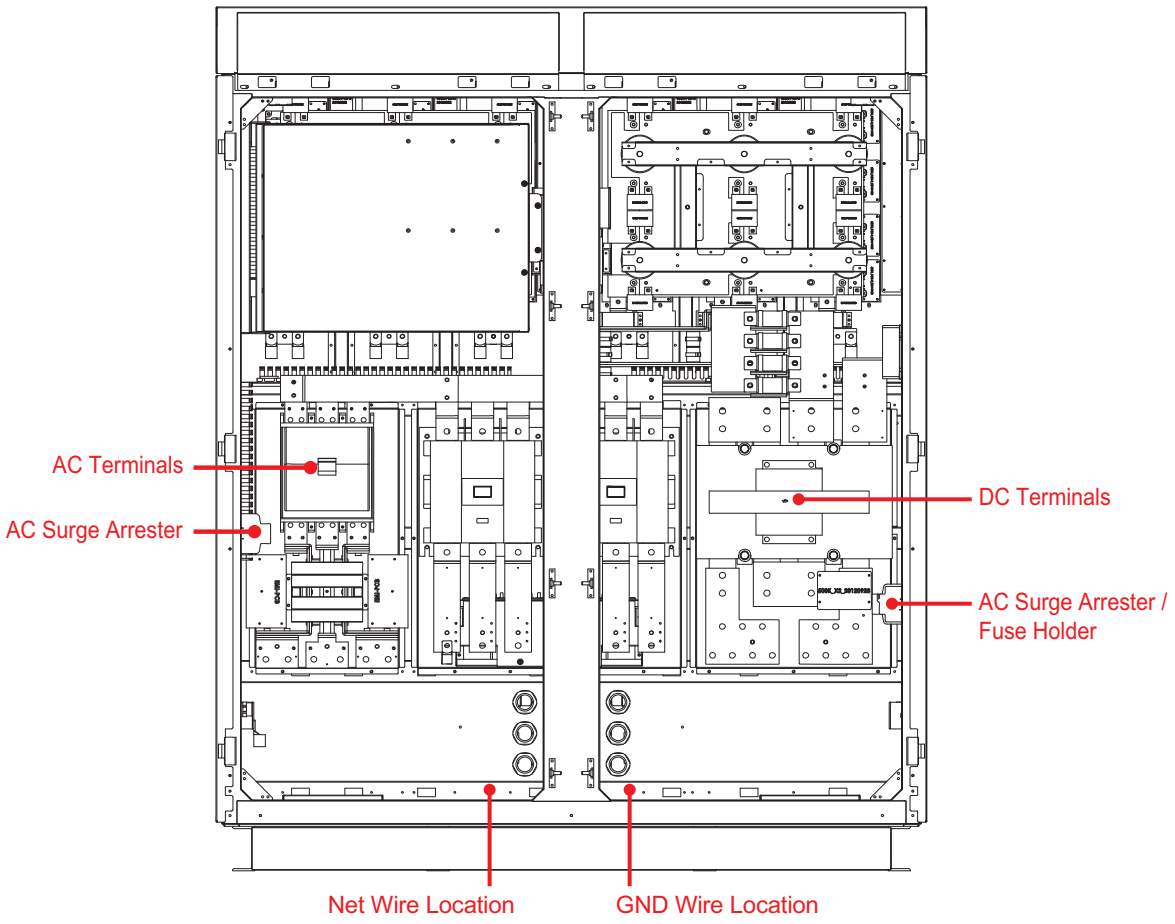


Figure 3-3. Interior Front View

3.3. Features

The following are important features of the product(s) described in this manual:

- High efficiency, peak 98.5%, EUR 98.0%
- 3 Phase (3 Lines + PE) 500kVA solar inverter
- Wide input range (450-1000Vdc)
- Wide MPPT range (450-820Vdc)
- 1 MPP Trackers
- 5” Graphic LCD display (Adjustable contrast & brightness)
- IP-54 protective level (electrics)

3.4. Identify the Inverter

Please refer to the following image for identifying the inverter.

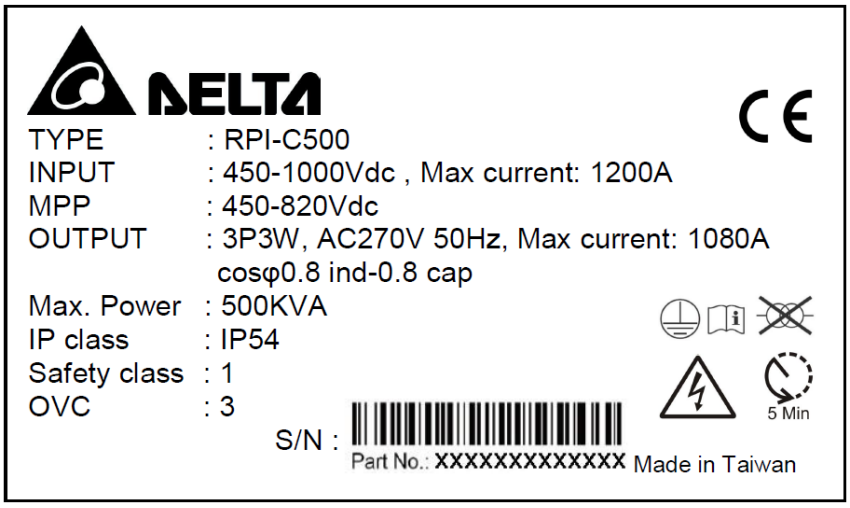


Figure 3-4. Inverter Identification

4. Transportation

4.1. Delivery Options and Recommended Vehicle

Any equipment used for the transport of the central inverter must be suitable for the weight of the central inverter. The following equipment can be used for the transport of the central inverter:

- Forklift or crane (Recommended)
- Hoisting steel cables
- Hoisting hooks
- Steel rings

4.2. Using a Forklift

To move the central inverter using a forklift:

1. Place the forks of the forklift under the unit.

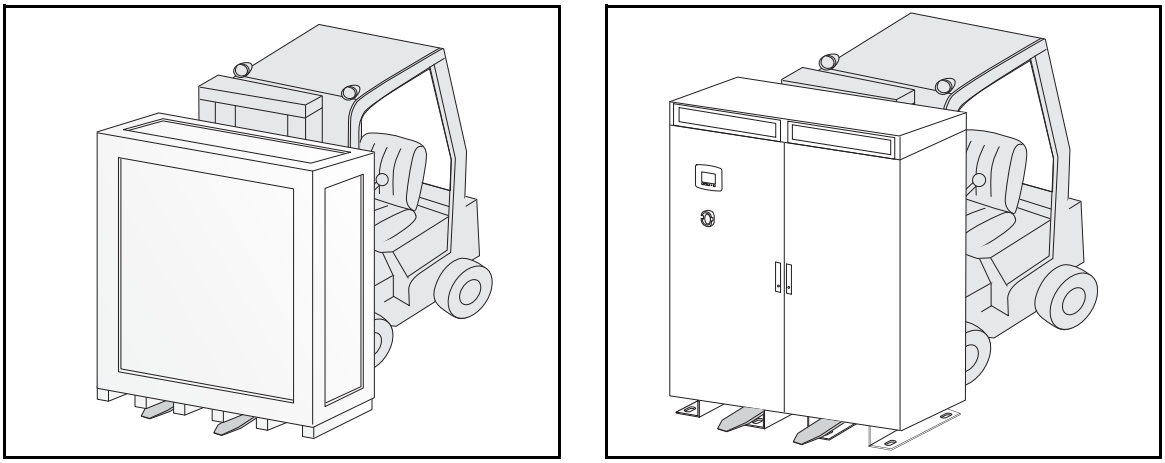


Figure 4-1. Moving the Central Inverter

2. Move the inverter to the installation base. The steps to install the inverter on the base depend on whether the unit is packed in a shipping crate:

- If the unit is not packed in a shipping crate, place it directly on the installation base.
- If the unit is packed in a shipping crate, follow these steps:

a. Using a claw hammer or pry bar, remove the crate's wood top and side panels.

b. Remove the central inverter anchor hardware that attaches it to the shipping pallet.

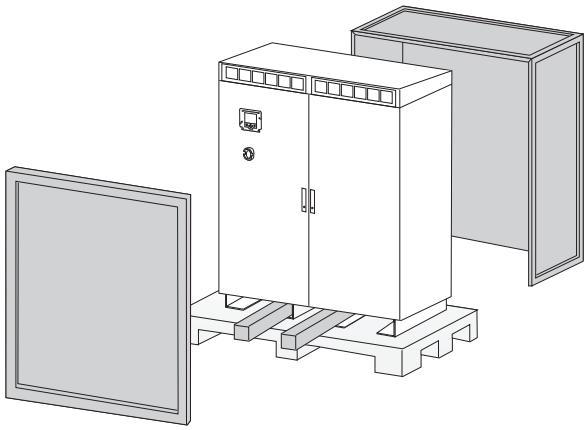


Figure 4-2. Unpacking the Shipping Crate

c. Remove the central inverter from the pallet and place it on the installation base.

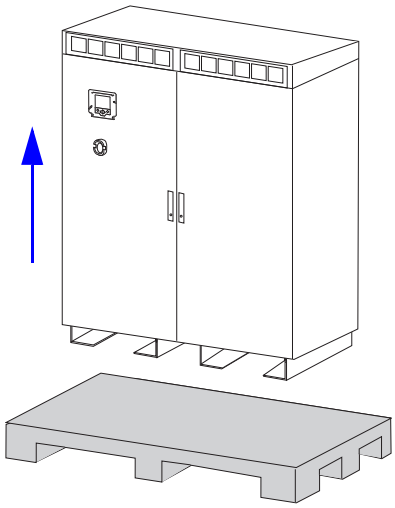


Figure 4-3. Removing the Central Inverter from the Pallet

4.3. Using a Crane

To move the central inverter using a crane:

1. Move the inverter to the installation base. The steps to install the inverter on the base depend on whether the unit is packed in a shipping crate:

- If the unit is packed in a shipping crate, follow these steps:

   a. Using a claw hammer or pry bar, remove the crate's wood top and side panels.

   b. Remove the central inverter anchor hardware that attaches it to the shipping pallet.

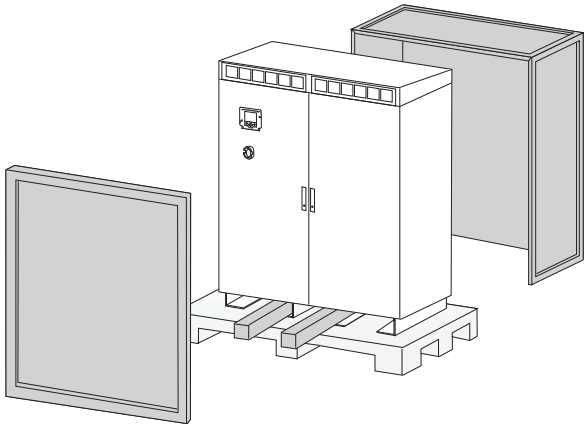


Figure 4-4. Unpacking the Shipping Crate

2. Remove the top cover of the inverter.

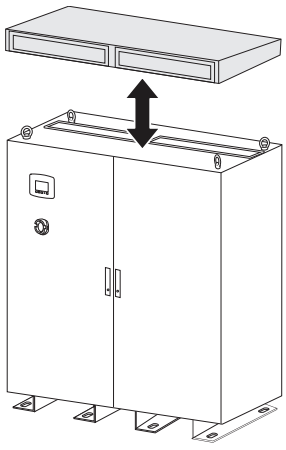


Figure 4-5. Removing the Inverter’s Top Cover

3. Attach the hoisting hooks and cables to the steel rings on the inverter.

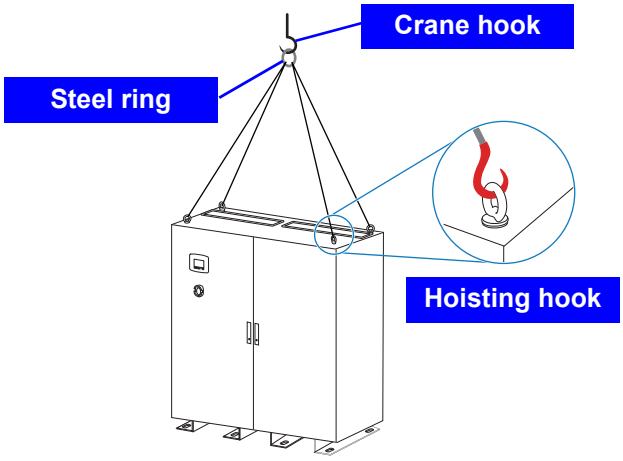


Figure 4-6. Attaching the Hoisting Cables

4. Attach the crane hook to the steel ring on the hoisting cables.
5. Place the inverter on the installation base.
6. Remove the hoisting cables.

4.4. Package Contents

Table 4-1: Package Content

Object	Qty	Description
Central Inverter	1	RPI-C500 PV Inverter
Installation Manual	1	The Instruction to provide the information of safety, Installation, specification, etc.
Key	2	Open/Close the door of the inverter
Cable Gland	22	Prevent dust and water via cable

4.5. Installation Site Requirements

4.5.1. Site Space

Make sure the room for system loading and the destination installation site meet the space requirements described in this section.

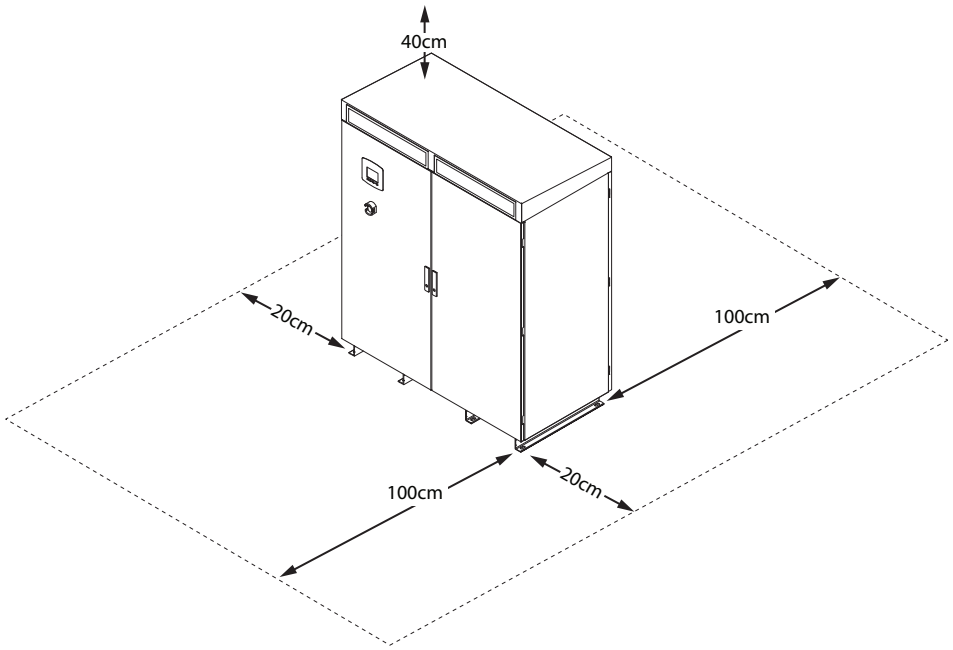


Figure 4-7. Inverter Space Requirements

The loading site should provide enough space to unpack the entire system and release the container. See the following dimensions:

- Full height of the system package on shipping pallet: 2210 mm (87 inches)
- Width of the system package, front: 1820 mm (72 inches)
- Length of the shipping pallet: 1090 mm (43 inches)
- Width of the system: 1600 mm (63 inches)
- Height of the system: 1950 mm (77 inches)
- Depth of the system: 800 mm (31 inches)

5. Installation

5.1. Preparing the Installation Site

Prior to unpacking the system, make sure that you read and understand all environmental and space requirements.

5.1.1. Building a base

Build an installation base using the dimensions from the following illustration.

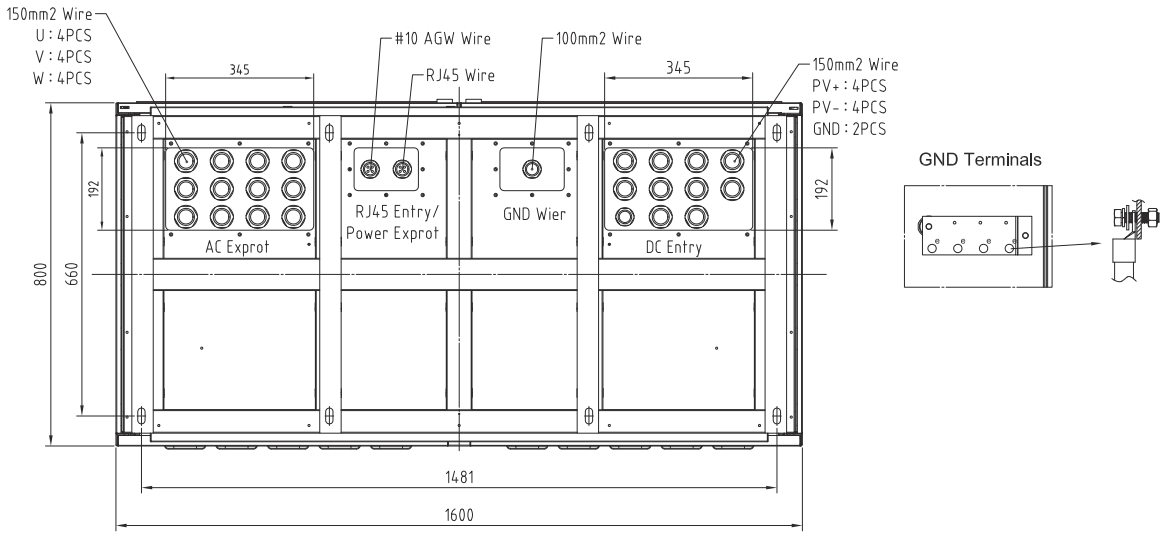


Figure 5-1. Installation Base Dimensions

5.1.2. Using the ground as a base

Install the inverter directly on the ground and dig a trench below to run the cables.

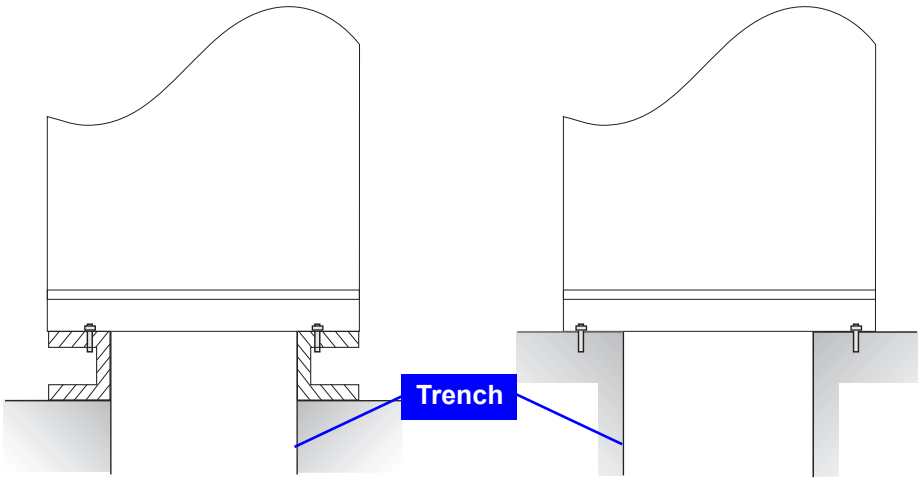


Figure 5-2. Ground as a base

5.2. Recommended Tools

Only use tools that have been recommended to install the unit.

- Power meter (power analyzer)
- Voltmeter
- Current meter
- Adjustable / Torque / Socket Wrench
- Screwdriver

5.3. DC Connection

Connect the power cable from the DC distribution box to the PV Inverter through the input power cable gland shown in Figure 5-3.

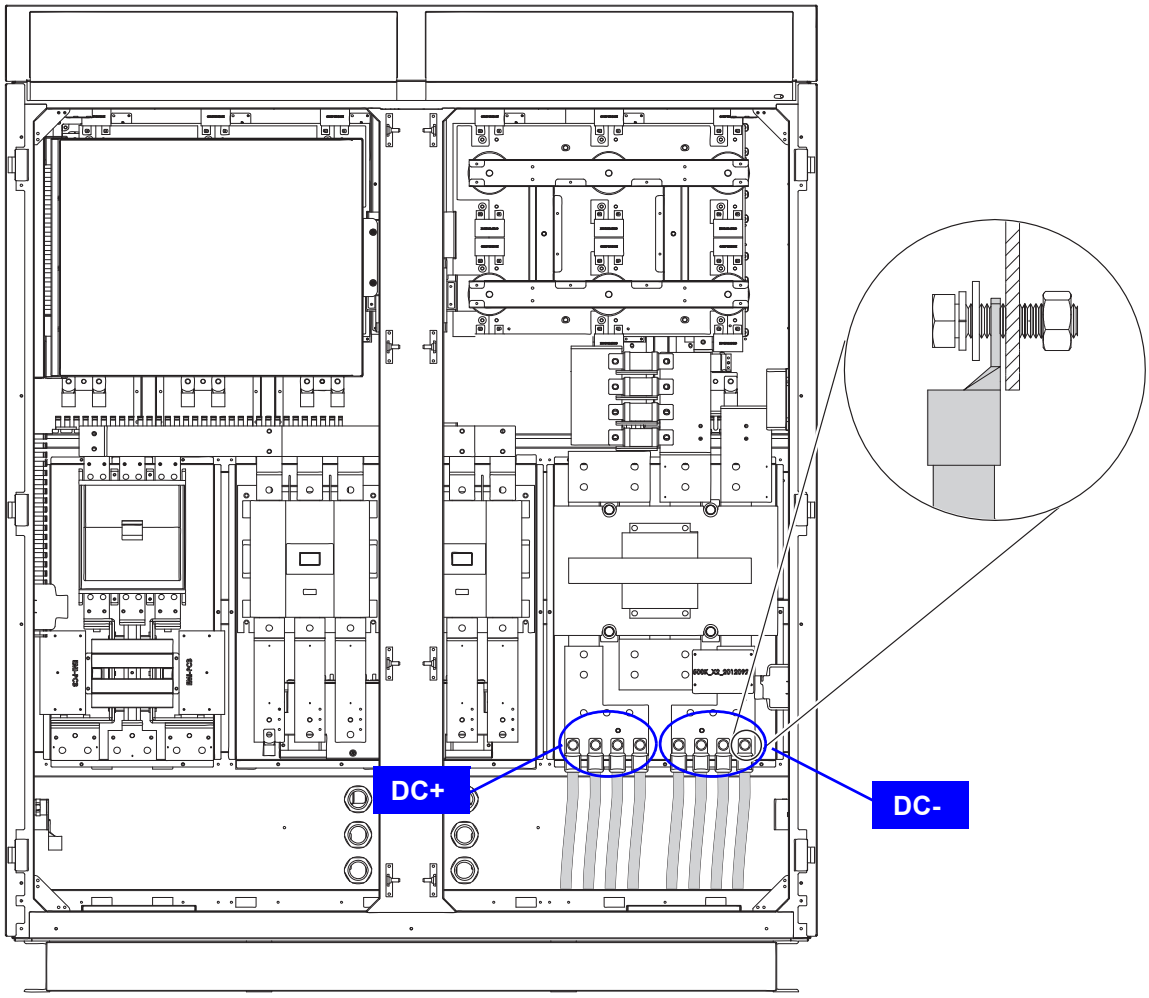


Figure 5-3. DC Connection

5.4. AC Connection

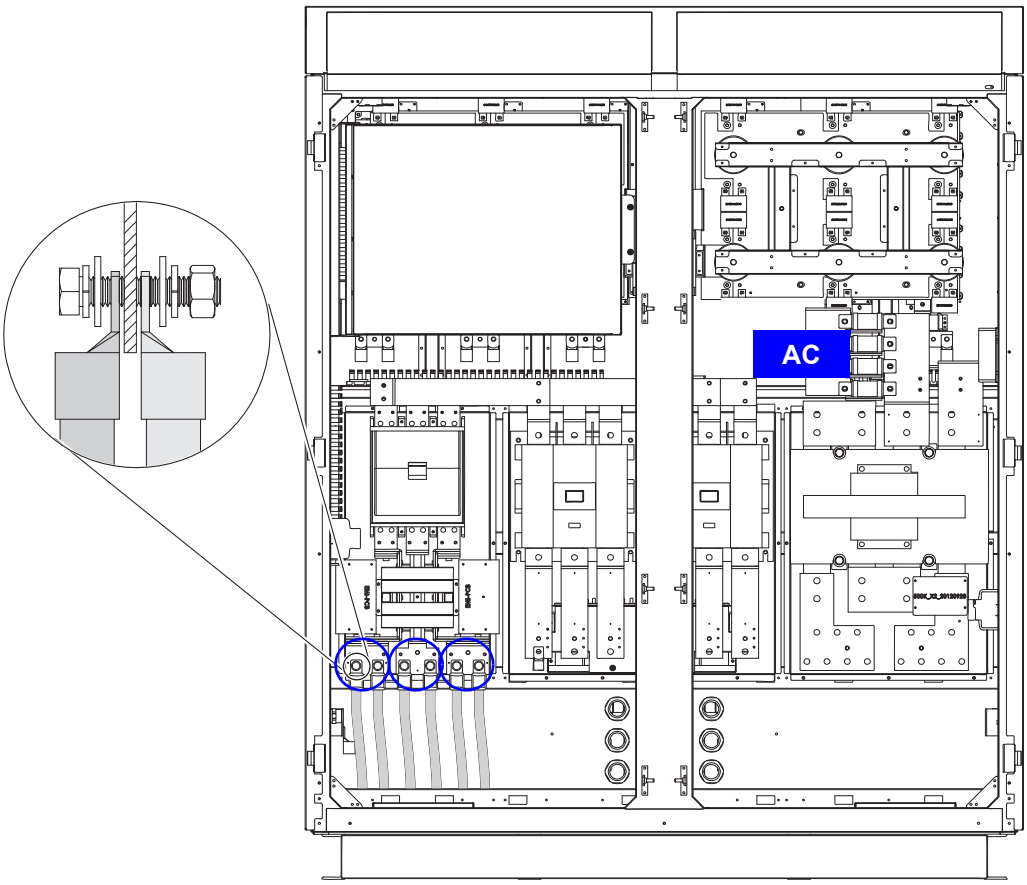


Figure 5-4. AC Connection

5.5. PE Connection

PE connection point can be accessed to the bus bar by either the AC or DC side.

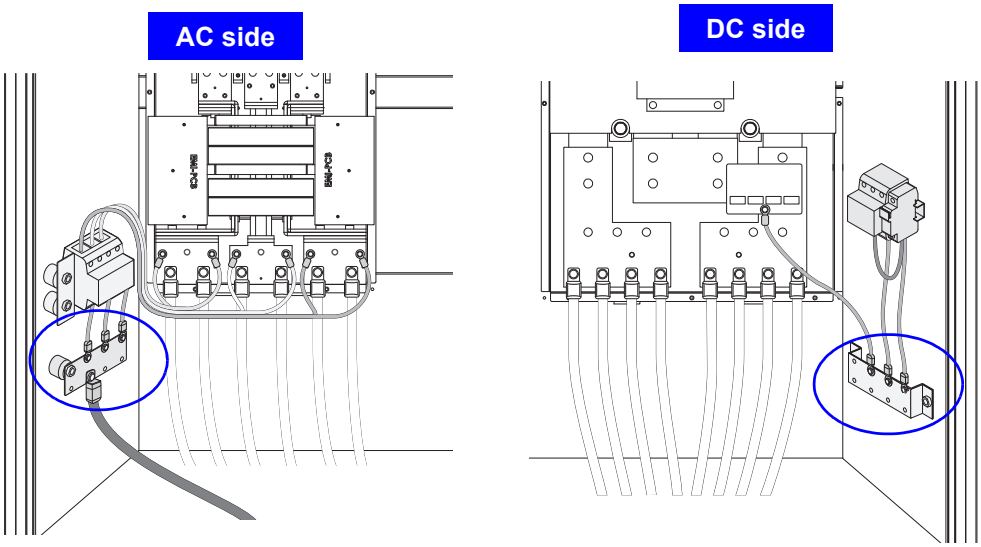


Figure 5-5. PE Connection

5.6. Connection of Communication Modules

The Communication Module provide the function of communication with 2-port RS-485 and 2-port dry contacts.

5.6.1. RS-485 Connection

The pin definition of RS-485 is shown as in Table 5-1. Installer should switch **ON** the terminal resistor when single inverter is installed. The cable wire position and wiring of multi-inverter connection is shown as Figure 5-6 & Figure 5-7. Installer must switch **ON** terminal resister at the first and last devices on the RS-485 chain as Figure 5-7. The other terminal resisters must be switch **OFF**. Please refer to Table 5-3 for the terminal resister setting.

Table 5-1: Definition of RS-485 PIN

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

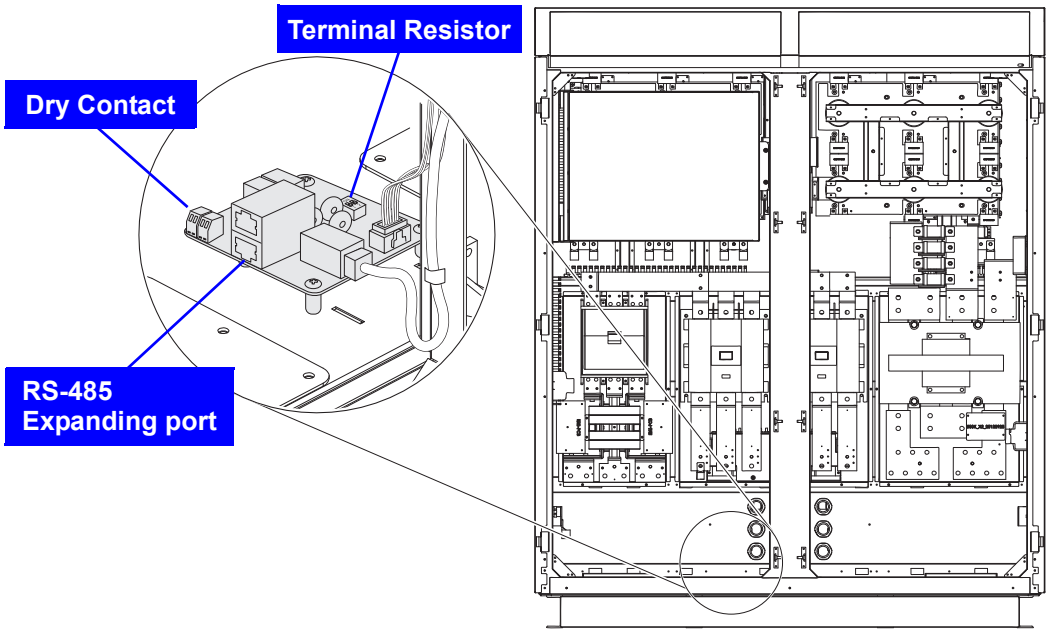


Figure 5-6. Cable Wire Position for Multi-inverter Connection

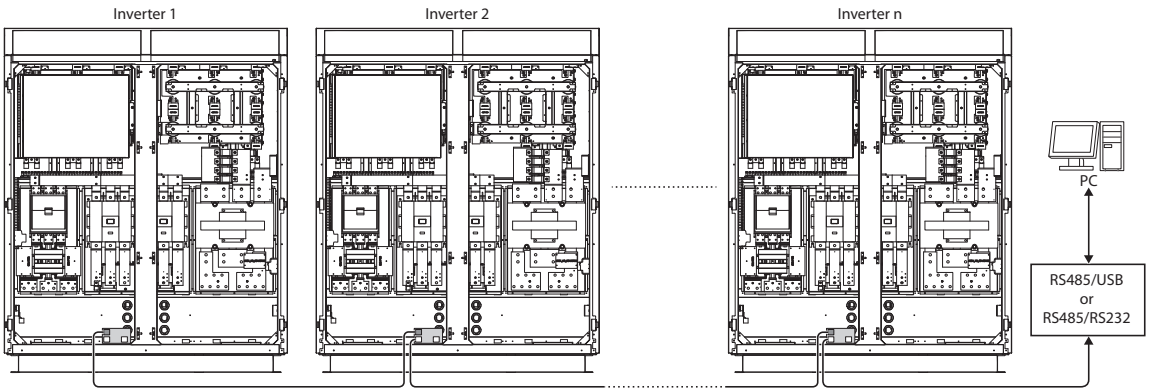
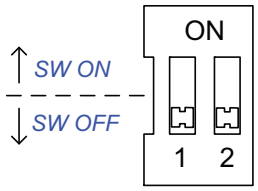


Figure 5-7. Multi-inverter Connection Illustration

Table 5-2: RS-485 Data Format

Baud ratey	9600
Data bit	8
Stop bit	1
Parity	N/A

Table 5-3: Terminal Resister Setting



SW / Terminal Resistor	1	2
OFF	OFF	OFF
ON	ON	OFF
	OFF	ON
	ON	ON

5.6.2. Dry Contact Connection

Provide 2 set of Dry Contact function for gird and fault respectively. When inverter is on grid, COM & NO2 will be shorted. When the Hardware Fail is detected, COM & NO1 will be shorted. This might be programmable according to the request of customer.

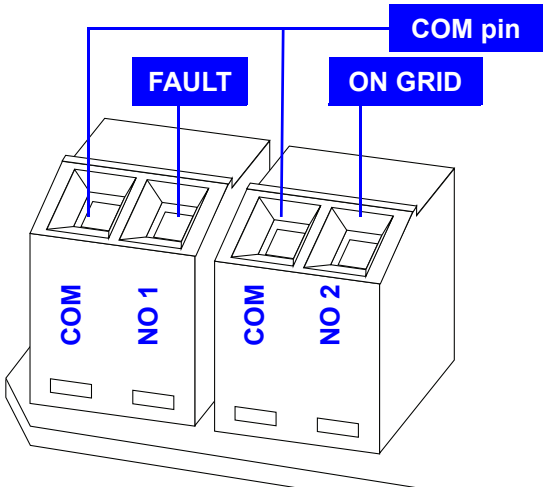


Figure 5-8. Dry Contact Port & Assignments

5.6.3. Auxiliary Power from External Source

If the power source of AC Aux Power is changed from internal to external source, please follow the below steps:

1. Loosen the internal wiring (solid line in figure).
2. Power cable of external source is connected to AC Aux Power Terminal Block (dotted line in figure).

3. The requirement of external source is 3P3W - 270Vac ±15% and the capacity is at least 2KW. Other voltage required should consult with Delta.

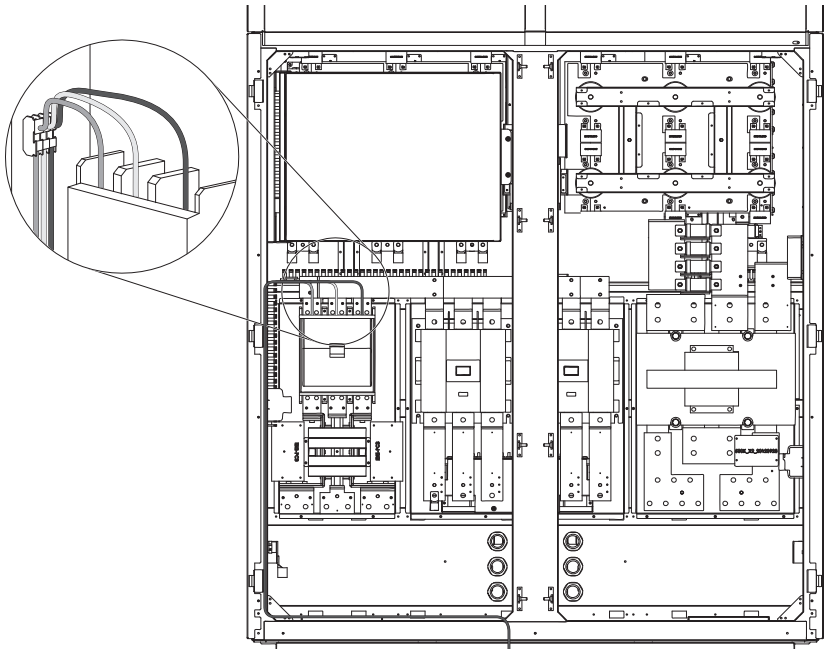


Figure 5-9. Auxiliary Power from External Source

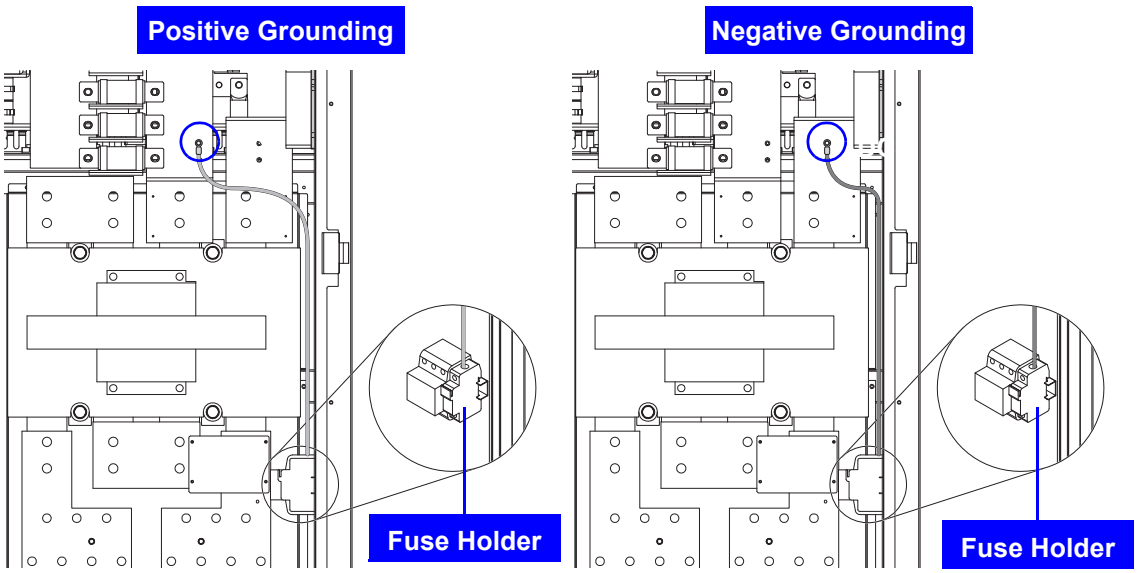


Figure 5-10. Configure to Positive (DC+)/Negative (DC-) Grounding

5.7. First Time Powering Up

5.7.1. Before Powering Up

1. Check the PV array.

Note:

The PV array open circuit DC voltage must be greater than 500Vdc and less than 1000Vdc.

   a. Measure the PV array open circuit DC voltage across the DC positive (+) and negative (-) terminals in DC distribution.

2. Check the AC utility voltage.

   Use an AC voltmeter to measure the AC utility voltage. The voltage level should be at the nominal value of 270 Vac Line-Line.

5.7.2. Powering Up the Inverter and Self-test

1. Configure the PV inverter settings.

   To provide power to the inverter, switch on the DC switch. The LCD display would be worked normally after 40seconds.

   a. For the first time start-up, the `Select Country` screen is displayed. Highlight a country in the list by pressing the up ▲ or down ▼ buttons and press ***ENT*** to select or ***EXIT*** to cancel.

   b. Verify the language you selected is correct by pressing ***ENT*** for `Yes` or ***EXIT*** for `No`. Select `No` to return to the previous screen.

   c. The `Select Language` screen is displayed. Highlight a language by pressing the up ▲ or down ▼ buttons and press ***ENT*** to select or ***EXIT*** to cancel and return to the first screen.

   d. The `Main Menu` screen is displayed. Highlight `E-Today` by pressing the up ▲ or down ▼ buttons and press ***ENT*** to select or ***EXIT*** to cancel.

   e. The `E-Today` screen is displayed while the inverter performs a self-test. If the self-test passes. the `System Boot Countdown` screen is displayed. If the self-test fails, the test is performed again.

   f. The `System Boot Countdown` screen is displayed and the countdown begins. Press ***EXIT*** to return to the `Main Menu` screen.

   g. The `Main Menu` screen is displayed. Highlight `Power Meter` by pressing the up ▲ or down ▼ buttons and press ***ENT*** to select.

   h. The `Power Meter` screen is displayed. Confirm input and output information and press ***EXIT*** to return to the main menu screen.

i. The `Main Menu` screen is displayed and the setup is complete.

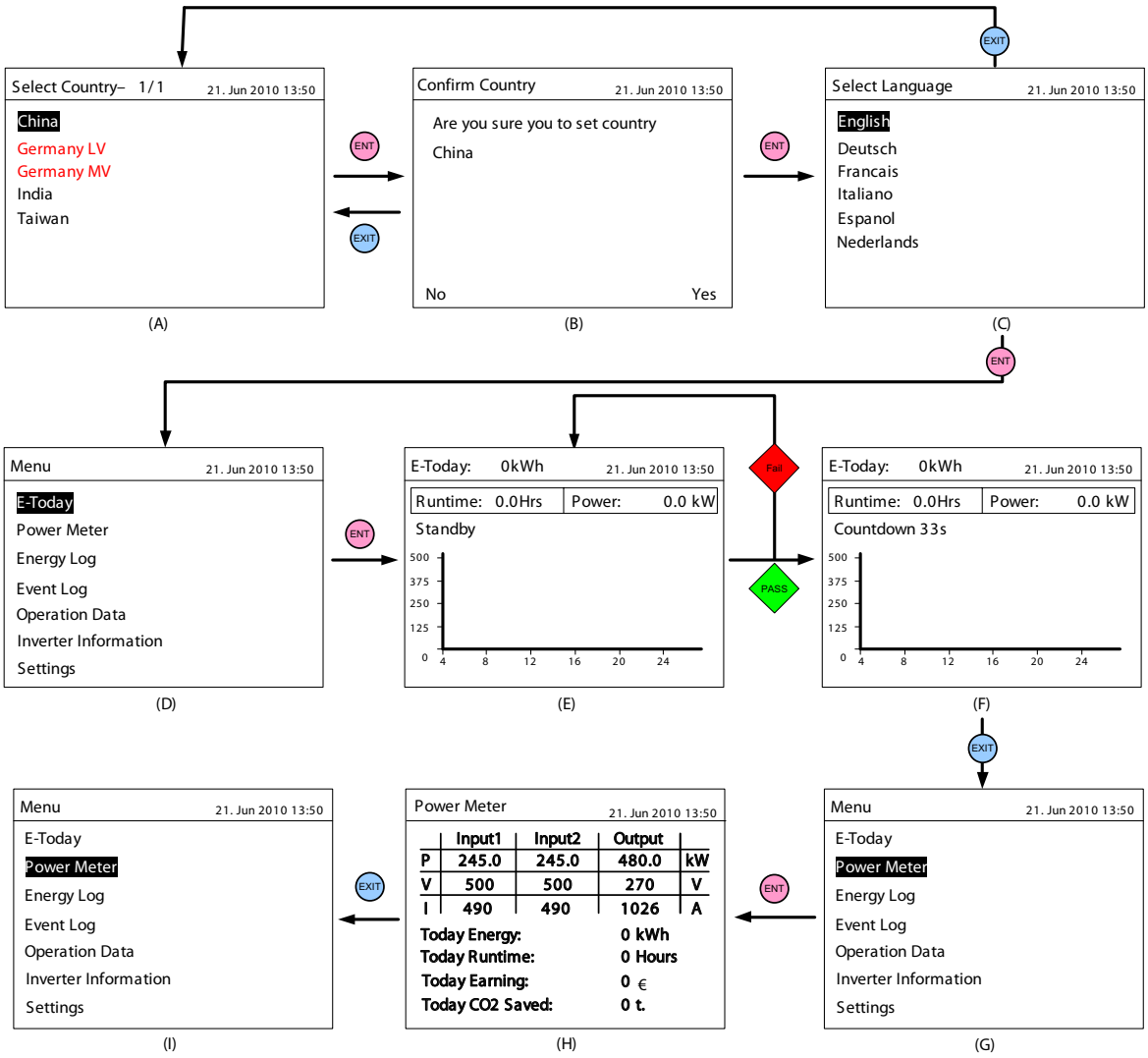


Figure 5-11. Configuration Screens

Note:

If Auxiliary Power is powered externally, the LCD display should be turn on before inverter working. Refer to *Auxiliary Power from External Source*.

5.8. LCD Flowchart

Press ***EXIT*** button will enter menu page (Figure 5-12), E-today is the home page for the following items in this section.

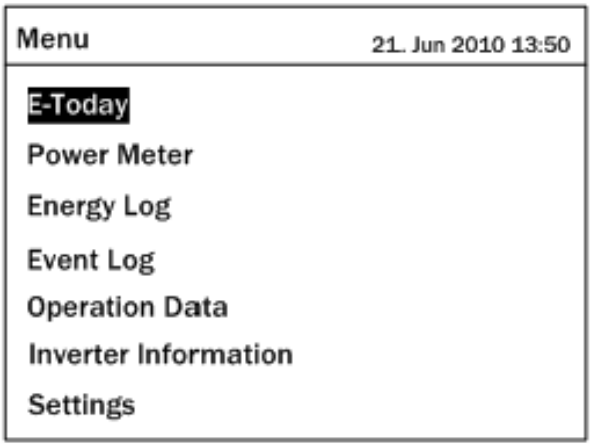


Figure 5-12. Menu Page

5.8.1. Home Page

When inverter is operating normally, LCD will show home page as Figure 5-13, user can get the information of output power, inverter status, E-today, date and time.

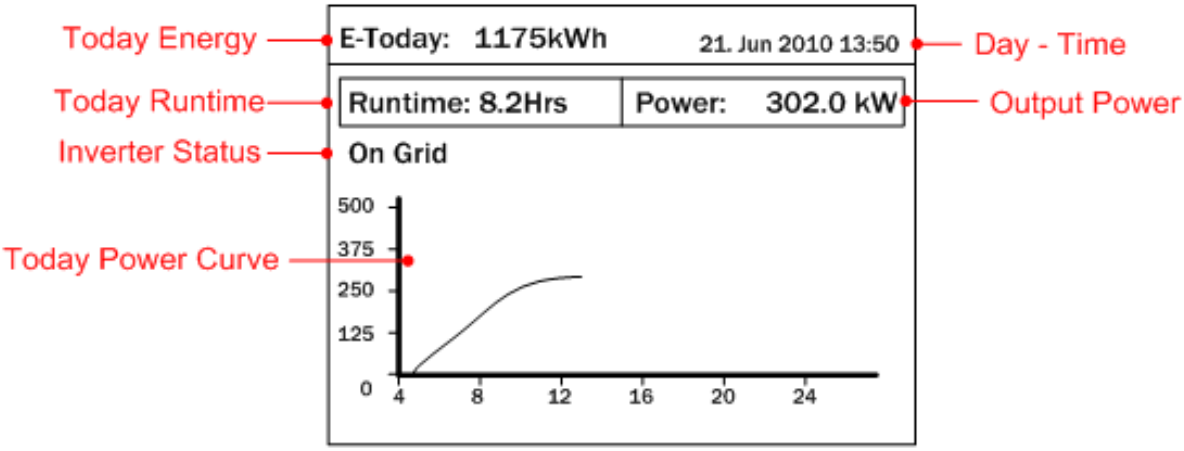


Figure 5-13. Home Page

5.8.2. Power Meter

This page shows the information about input and output power.

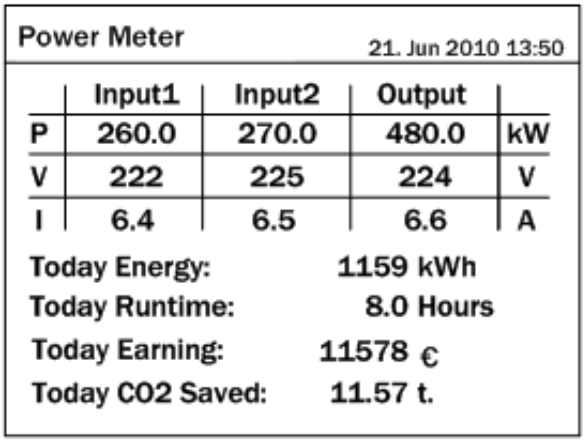


Figure 5-14. Power Meter Page

5.8.3. Energy Log

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

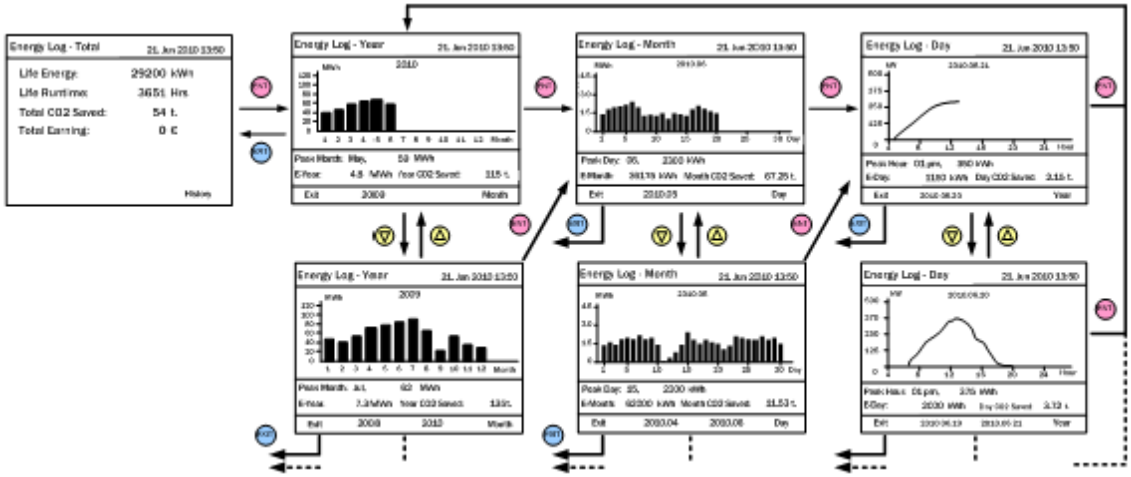


Figure 5-15. Energy Log Flow Chart

5.8.4. 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.

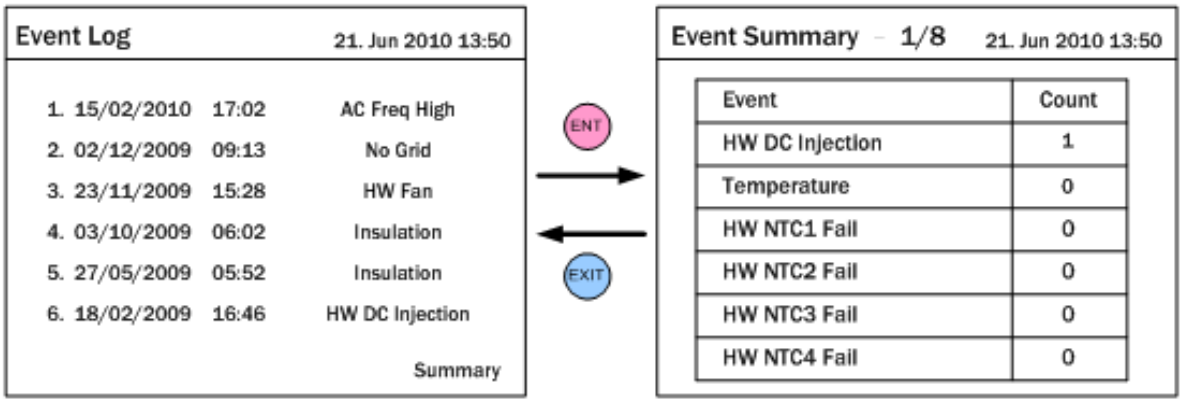


Figure 5-16. Event Log Flow Chart

5.8.5. Operation Data

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

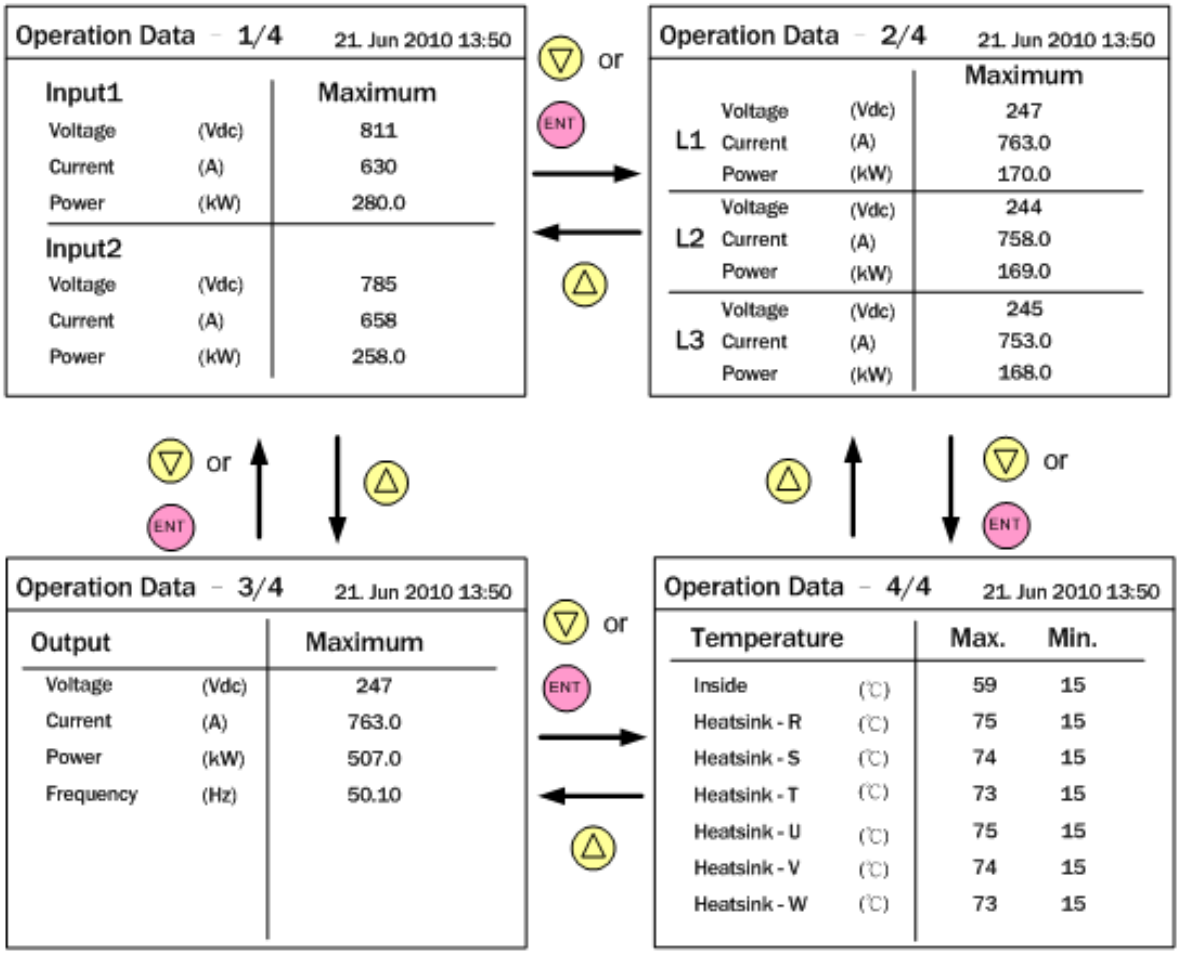


Figure 5-17. Operation Data Flow Chart

5.8.6. 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 *Settings*.

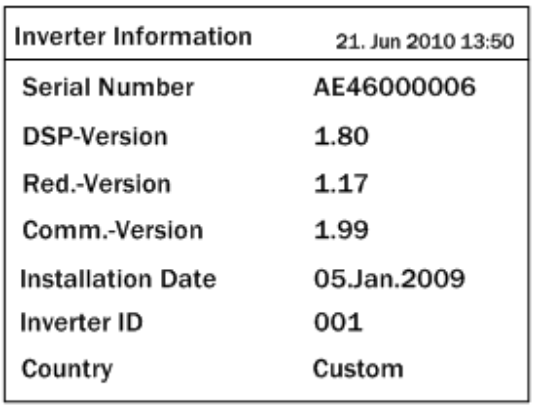


Figure 5-18. Inverter Information Page

5.8.7. Settings

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

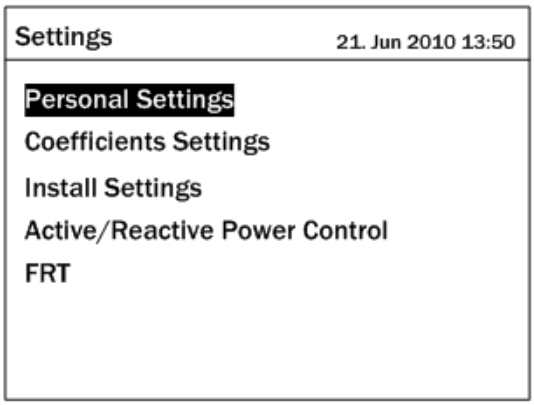


Figure 5-19. Setting Page

5.8.7.1. Personal Settings

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

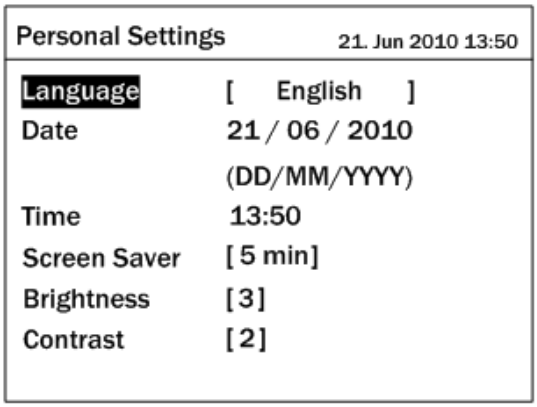


Figure 5-20. Personal Settings Page

5.8.7.2. Coefficient Settings

Users can set the following parameters according their needs.

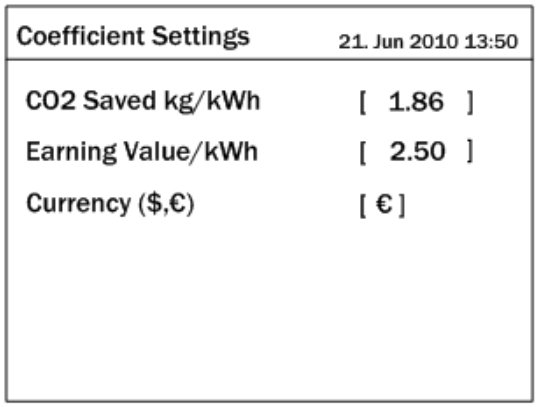


Figure 5-21. Coefficient Settings Page

5.8.7.3. Install Settings

Correct passwords are requested when entering Install Settings. Install Settings 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, and Insulation.

CAUTION!

CAUTIONS APPEAR BEFORE THE TEXT IT REFERENCES. CAUTIONS APPEAR IN CAPITAL LETTERS TO EMPHASIZE THAT THE MESSAGE CONTAINS VITAL HEALTH AND SAFETY INFORMATION.

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 4 modes users can select in Insulation settings: ON, Positive Ground, Negative Ground, or Disable. Installer can also select different impedance according to the actual situation.

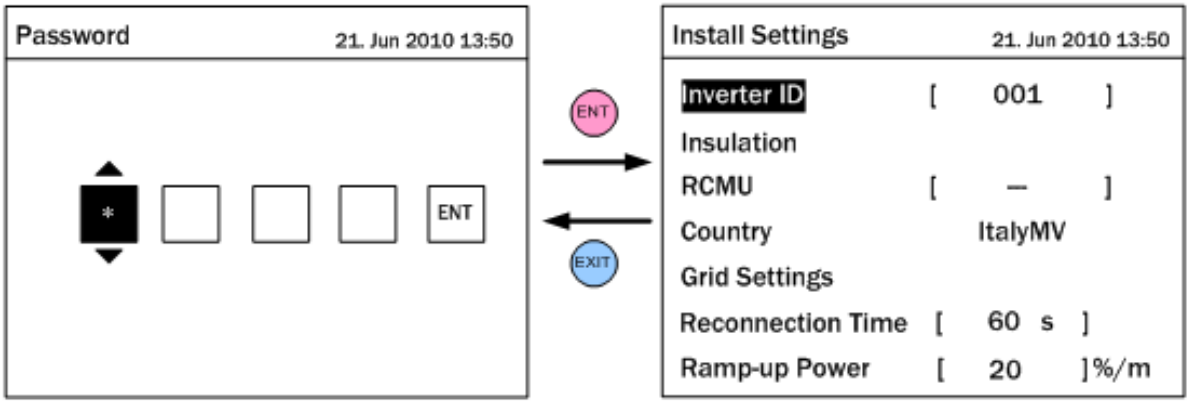


Figure 5-22. Install Setting Page -User Mode

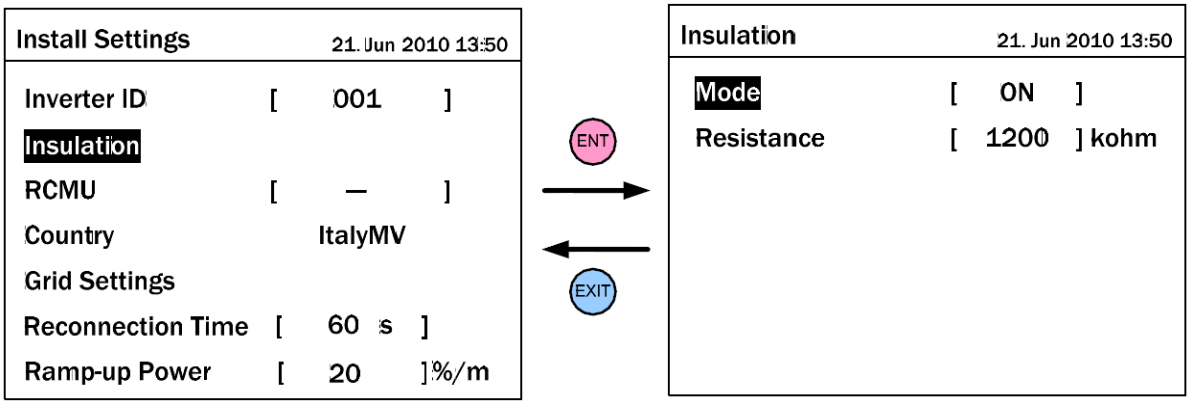


Figure 5-23. Insulation Setting

After confirmation as the installation technician passwords, system will add setting optionsof 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.

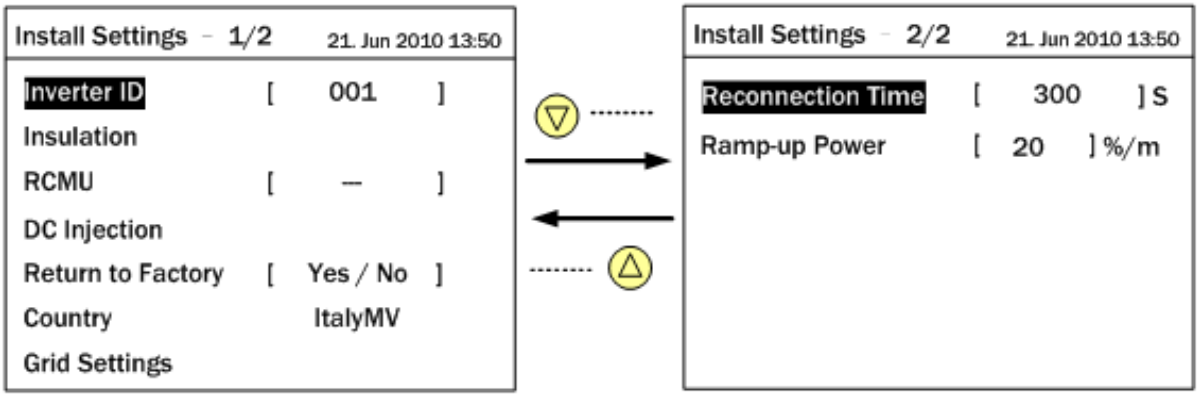


Figure 5-24. Install Setting Page -Installer Mode

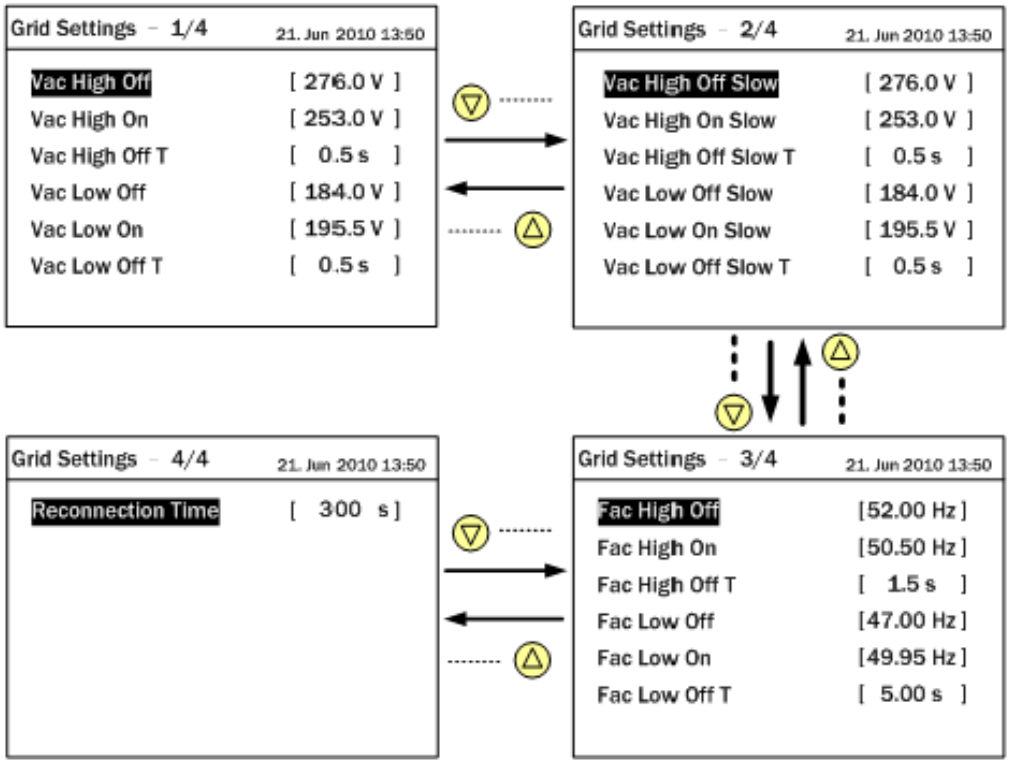


Figure 5-25. Grid Setting Page

There are 19 parameters in Grid Settings page. User can refer to Table 5-4. for the function of each parameter.

Table 5-4: 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.

Table 5-4: Grid Setting Parameters (Continued)

Parameter	Description
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.

Note:

Once you change any item listed above, the country will be turn to "Custom".

You can go back the original country via re-selecting the country in the page "Install settings" - "Country".

6. Troubleshooting

6.1. Measurement Index

Please refer to the following tables for definition of Measurement Index.

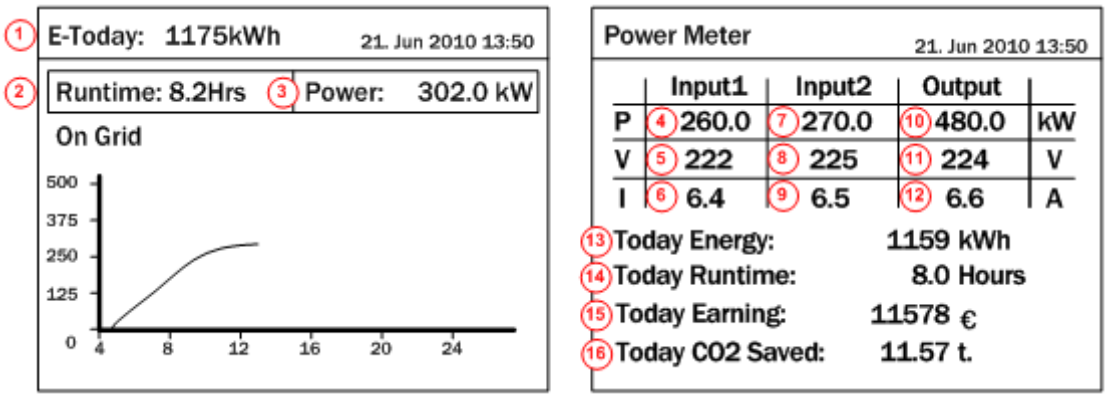


Figure 6-1. Measurement Index (1 of 3)

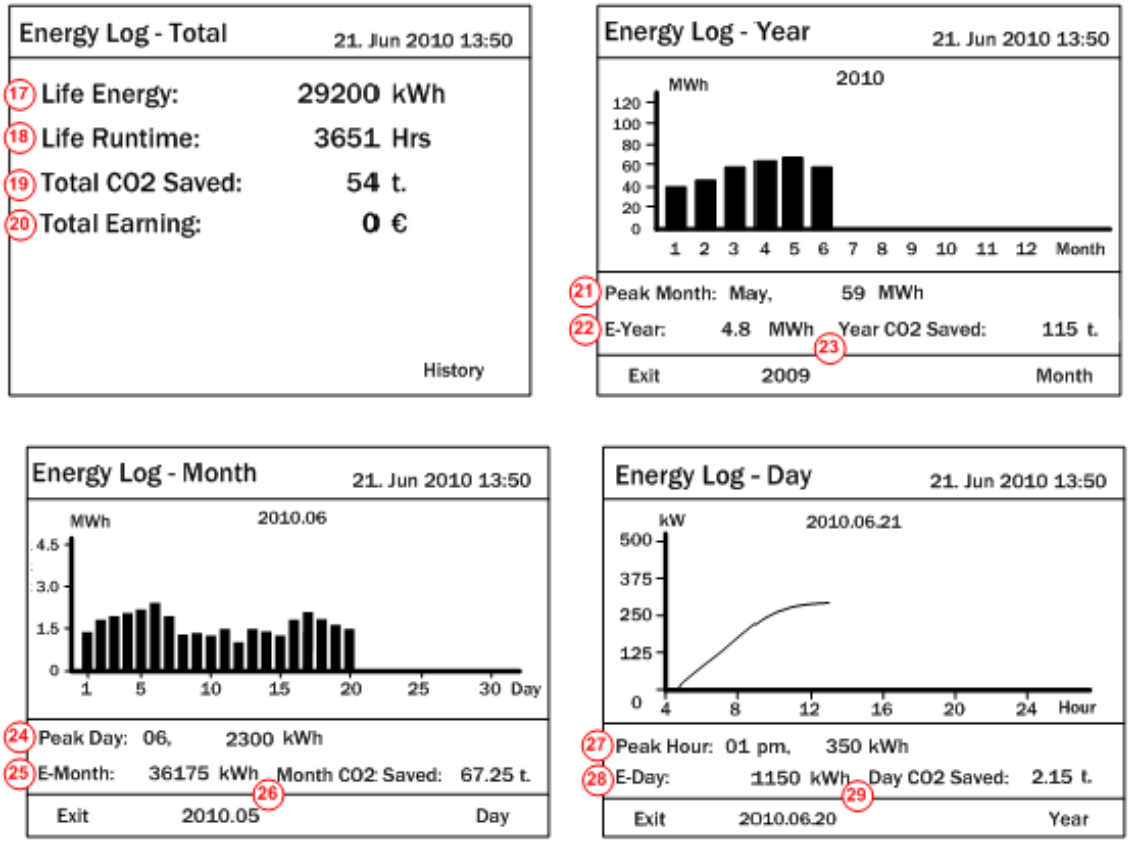


Figure 6-2. Measurement Index (2 of 3)

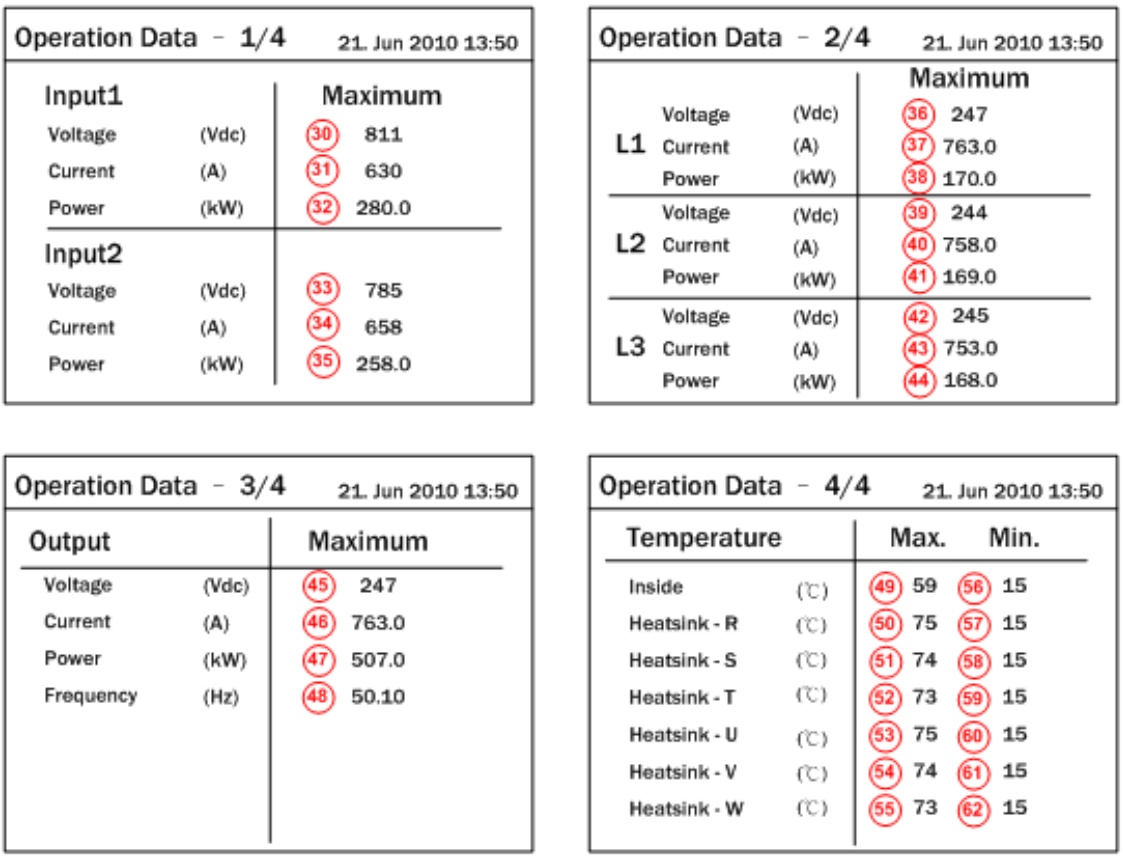


Figure 6-3. Measurement Index (3 of 3)

Table 6-1: Measurement Index

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

Table 6-1: Measurement Index (Continued)

No.	Measurement	Meaning
16	Today CO_2 saved	Accumulated CO_2 emission retrenched today
17	Life Energy	Total energy generated to present time
18	Life Runtime	Accumulated operation time to present time
19	Total CO_2 saved	Accumulated CO_2 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 CO_2 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 CO_2 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 CO_2 saved	Accumulated CO_2 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

Table 6-1: Measurement Index (Continued)

No.	Measurement	Meaning
48	Output Frequency Maximum	The maximum Grid frequency from history
49	Inside Max.	The maximum inverter inner temperature value
50	Heatsink-R Max.	The maximum Heatsink-R temperature value
51	Heatsink-S Max.	The maximum Heatsink-S temperature value
52	Heatsink-T Max.	The maximum Heatsink-T temperature value
53	Heatsink-U Max.	The maximum Heatsink-U temperature value
54	Heatsink-V Max.	The maximum Heatsink-V temperature value
55	Heatsink-W Max.	The maximum Heatsink-W temperature value
56	Inside Min.	The minimum inverter inner temperature value
57	Heatsink-R Min.	The minimum Heatsink-R temperature value
58	Heatsink-S Min.	The minimum Heatsink-S temperature value
59	Heatsink-T Min.	The minimum Heatsink-T temperature value
60	Heatsink-U Min.	The minimum Heatsink-U temperature value
61	Heatsink-V Min.	The minimum Heatsink-V temperature value
62	Heatsink-W Min.	The minimum Heatsink-W temperature value

6.2. Error Message and Trouble-shooting

Ones can check the Error Message on LCD then make simple and quick trouble shooting according to the following table.

Table 6-2: Error Messages

Message on LCD	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 inverterterminal 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 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
Grid Quality	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 Connect Fail	1. Wrong AC connection 2. Detection circuit malfunction	1. Check the AC connection based on the manual 2. Check the detection circuit inside the inverter
No Grid	1. AC breaker is OFF 2. Grid is disconnected	1. Switch on AC breaker 2. Check the connection in AC 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 AC connections 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 4. 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 country & Grid setting 3. Check the detection circuit inside the inverter

Table 6-2: Error Messages (Continued)

Message on LCD	Possible cause	Action
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
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 6-3: Warning Message

Message on LCD	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 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 discon-nected 4. 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
EPO	EPO button is activated	1. Replease the EPO (Release with N.C) 2. Check the connection of EPO
DC Surge	SPD on DC Side damaged	1. Contact the connections of DC SPD 2. Check the DC SPD if damaged
AC Surge	SPD on AC Side damaged	1. Contact the connection of AC SPD 2. Check the AC SPD if damaged

Table 6-4: Fault Message

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	1. The ambient is over 60°C (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 >105°C or <-40°C 2. Detection circuit malfunction	1. Check the installation ambient and environment 2. Check the detection circuit inside the inverter (RTM1)
Temperature	1. Ambient temperature is <-30°C 2. Detection circuit malfunction	1. Check the installation ambient and environment 2. Check the detection circuit inside the inverter (RTM1, RTDR1, RTDS1, RTDT1, RTDU1, RTDV1 and RTDW1)
HW NTC2 Fail	1. Ambient temperature >125°C or <-30°C 2. Detection circuit malfunction	1. Check the installation ambient and environment 2. Check the detection circuit inside the inverter
HW NTC3 Fail	1. Ambient temperature >125°C or <-30°C 2. Detection circuit malfunction	1. Check the installation ambient and environment 2. Check the detection circuit inside the inverter
HW NTC4 Fail	1. Ambient temperature >125°C or <-30°C 2. Detection circuit malfunction	1. Check the installation ambient and environment 2. Check the detection circuit inside the inverter
HW DSP ADC1	1. Insufficient input power 2. Auxiliary power circuitry malfunction 3. Detection circuit malfunction	1. Check the input voltage, must > 450Vdc 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 > 450Vdc 2. Check the auxiliary circuitry inside the inverter 3. Check the detection circuit inside the inverter

Table 6-4: Fault Message (Continued)

Message	Possible cause	Action
HW Red ADC1	1. Insufficient input power 2. Auxiliary power circuitry malfunction 3. Detection circuit malfunction	1. Check the input voltage, must > 450Vdc 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 > 450Vdc 2. Check the auxiliary circuitry inside the inverter 3. Check the detection 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
HW Connect Fail	1. Power line is disconnected inside the inverter 2. Driver or switching device malfunction in inverter stage 3. Current feedback circuit is defective	1. Check the power lines inside the inverter 2. Check driver & switching device in inverter stage 3. Check the current feedback circuit inside the inverter
Relay Test Short	1. Contactor coil is abnormal 2. The driver circuit for the contactor malfunction 3. The detection accuracy is not correct for Vgrid and Vout	1. Replace the defective contactor coil 2. Check the driver circuit inside the inverter 3. Check the Vgrid and Vout voltage detection accuracy
Relay Test Open	1. Driver circuit for Contactor is defective 2. Contactor coil is defective 3. Detection circuit malfunction (Inverter Voltage) 4. The detection accuracy is not correct for Vgrid and Vout	1. Check the driver circuit for contactor 2. Replace the defective contactor coil 3. Check the detection circuit inside the inverter 4. Check the Vgrid and Vout voltage detection accuracy
HW Bus OVR	1. Power BackFeed Occured (DC Power < AC Power) 2. Something wrong with AC Frequency PLL	1. Check the connection between Solar Panel and Inverter 2. Check the Vgrid and Vout voltage detection accuracy

Table 6-4: Fault Message (Continued)

Message	Possible cause	Action
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. Detection circuit malfunction	1. Check CT Sensor Wire 2. Check the detection circuit inside the inverter
HW CT B Fail	1. Test current loop is broken 2. Detection circuit malfunction	1. Check CT Sensor Wire 2. Check the detection circuit inside the inverter
HW CT C Fail	1. Test current loop is broken 2. Detection circuit malfunction	1. Check CT Sensor Wire 2. 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
AC Aux Fail	AC AuxPower offer incorrect output voltage	1. Check the connection between Inverter and AC side 2. Check the output voltage of AC AuxPower (output voltage : 49.5V)
DC Current High	Input current detection circuit malfunction	Check input current detection circuit

7. Maintenance

7.1. Replacing components

7.1.1. Replacing a Fan Module

1. Loosen the screws securing the rear panel door to the chassis and then open the door.

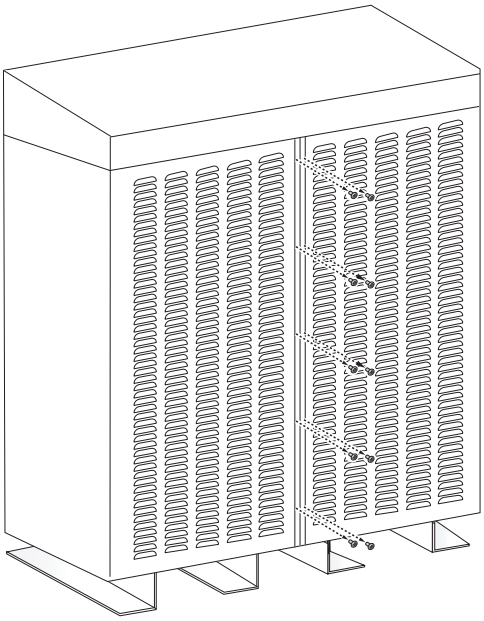


Figure 7-1. Loosening Rear Panel Door Screws

2. Disconnect the power and signal cables from the PV Inverter connectors.

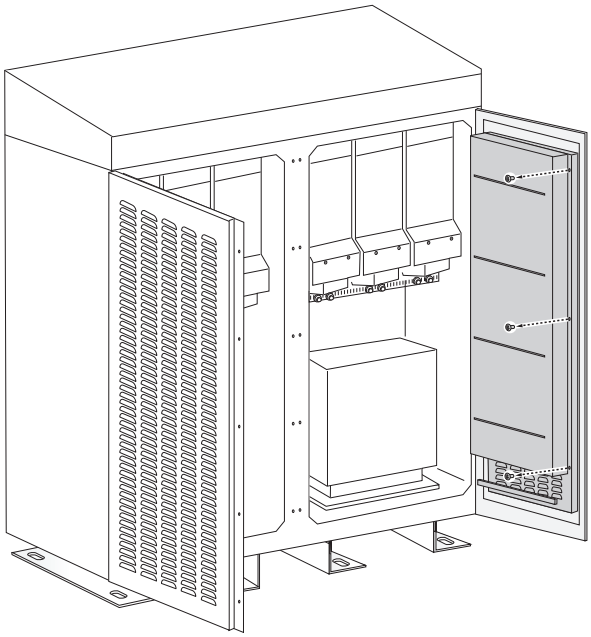


Figure 7-2. Disconnecting Power and Signal Cables

3. Loosen the screws securing the bottom front cover of the fan ventilation shaft and then remove the cover.

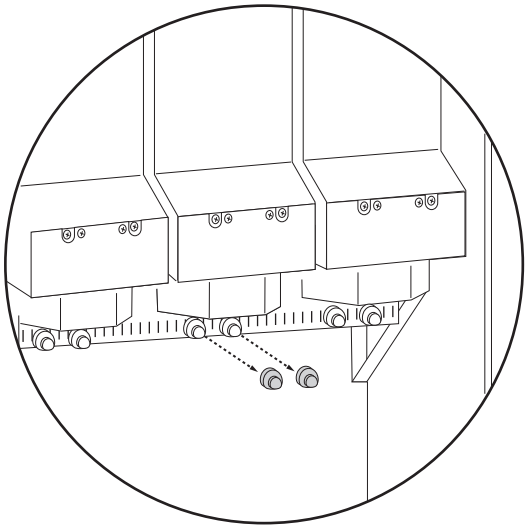


Figure 7-3. Loosening Bottom Front Cover Screws

4. Remove the screws securing the fan module to the chassis and then remove the module.

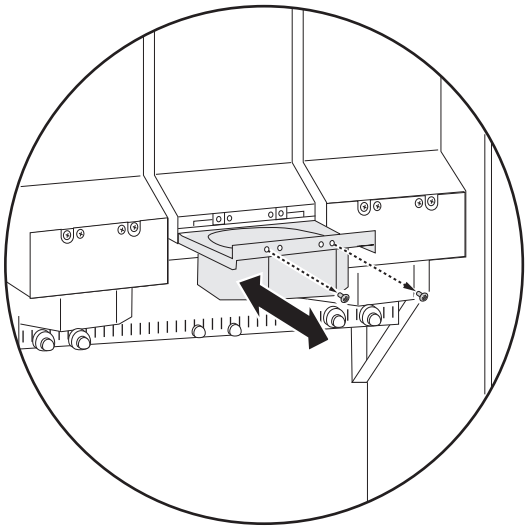


Figure 7-4. Loosening Fan Module Screws

7.1.2. Replacing an Air Filter

1. Loosen the screws securing the rear panel door to the chassis and then open the door.

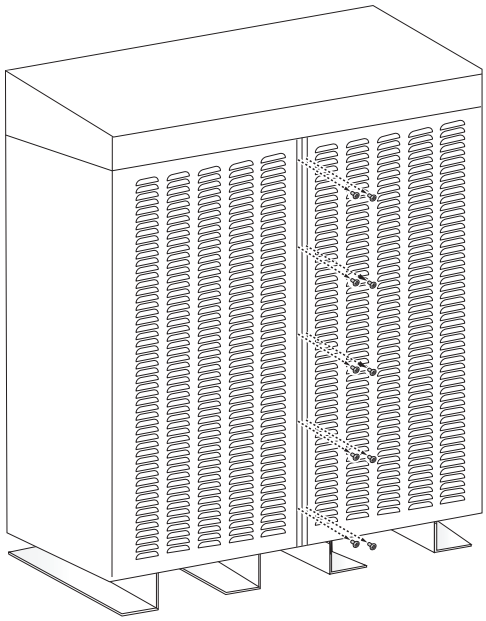


Figure 7-5. Loosening Rear Panel Door Screws

2. Loosen the screws securing the air filter cover to the rear panel door and then open the cover.

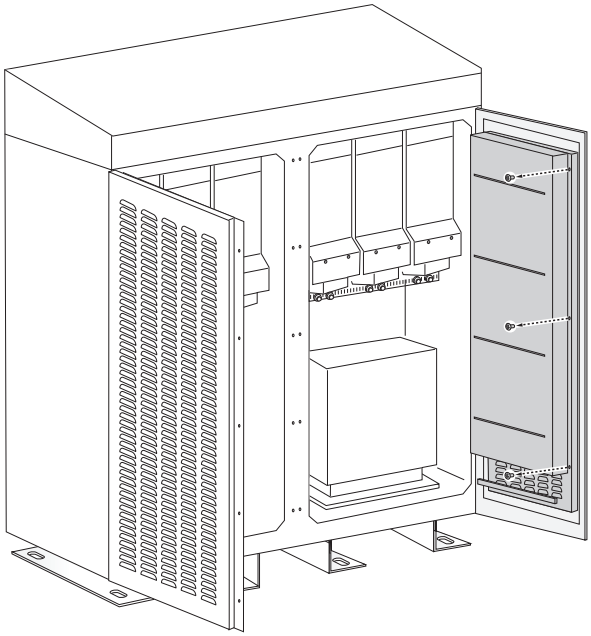


Figure 7-6. Loosening Air Filter Cover Screws

3. Loosen the screws securing the air filter to the rear panel door.

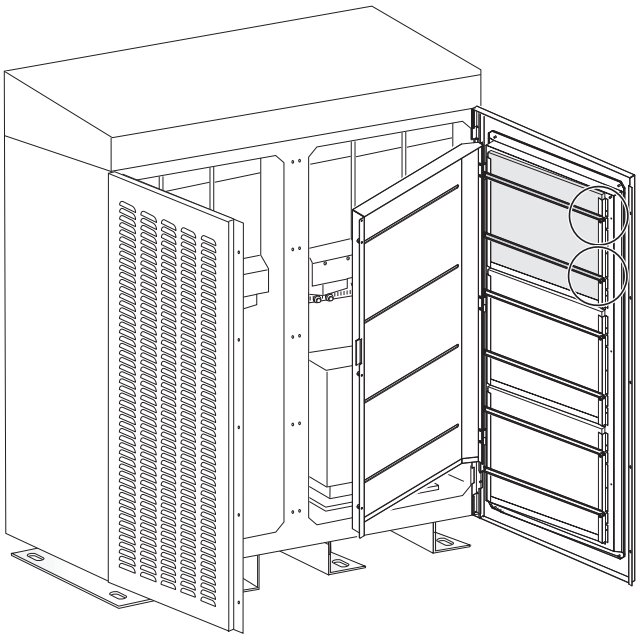


Figure 7-7. Loosening Air Filter Screws

4. Loosen the filter.

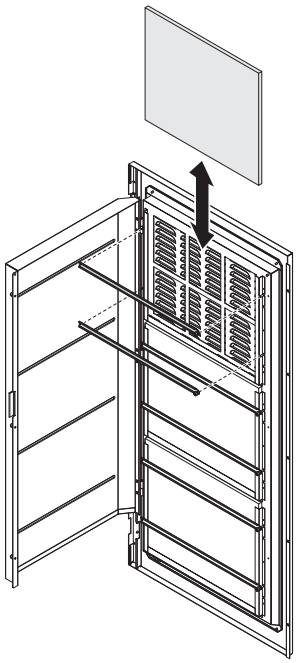


Figure 7-8. Loosening the Air Filter

Appedix A. Technical Data

Type of Equipment

Grid tied PV inverter	
Outdoor enclosure	

Input

Absolute maximum PV input voltage	1000Vdc
Operation voltage range	450Vdc – 1000Vdc
Maximum power MPPT range	450Vdc - 820Vdc
MPPT accuracy	> 99.9% at rated power
Inverter wake up voltage	< 200Vdc (Aux-power on)
Startup voltage	500Vdc
MPP tracker	1
Input current limitation	1200A
Peak efficiency	98.5%
European efficiency	98%
Input detection tolerance	Input voltage deviation < 2%
DC Switch	1000V/1250A *1
Input protection	● DC over voltage_ electronic shutdown ● DC current limitation_ current control ● Surge arrestor_ 1000V/40KA Type 2 ● Fuse 630A×4

Output

Output capacity	500KVA
Grid	Three phase 3P3W
Utility voltage (Normal)	270VΔ
Utility frequency	50/60Hz
Utility frequency range	Domestic regulation (Max 50/60Hz ±5Hz)
Output current limitation	● 1175A@25°CVin <550VDC ● 1070A@45°C ● 963A@60°C
Anti-islanding	Domestic regulation
Output reconnect	Connect to utility after utility recover and countdown finished
Reconnect time	Domestic regulation
Output current DC component	< 0.5% at rated current
Output current harmonic distortion	< 3% at rated power
Reactive power control	0.8 leading to 0.8 lagging
Active power control	1% each step
Nighttime power consumption	< 50 watts (without optional transformer)
Detection tolerance	● Utility voltage deviation < 2% ● Utility frequency deviation < 0.03 Hz ● Countdown timer deviation < 1.0 sec ● Output power deviation < 3% at full power
Power limitation	Temperature sensor depend on heatsink & internal air temperature.
AC Circuitry Breaker	690V/1250A
Protection	● AC Circuitry Breaker & Thermal protection ● Surge arrestor_ 600V/30kA Type 2

Information

Table A-1: Information

Communication Port	RS-485 Delta Protocol
LED	• Operation: Green (flashing during countdown) • Alarm: Red
LCD display	5” Graphic, 320*240 pixels
Display buttons	4 operational buttons
Energy log	Day/Month/Year
Event Log	• 30 events recently • Event times for each event
EPO (Emergency power off)	1 set
Dry Contact	1 set

Regulatory

Electrical safety	• IEC 62109 • CE compliance
Grid interface	BDEW
Emission	EN61000-6-4
Immunity	EN61000-6-2
Harmonic	BDEW

Operation

Operating temperature	-20°C~ 60°C (full power -20°C~ 45°C)
Storage temperature	-30°C~60°C
Relative humidity	5%~95%
Audible noise	< 80dB
Operating elevation	0 to 3000 m

Environment

Vibration	ISTA 1E
Shock	ISTA 1E
Drop	ISTA 1E
MTBF	> 100,000 Hrs

Mechanical

Dimension	
Width	1600 mm
Depth	800 mm
High	1950mm
Weight	1350 kg
Cooling	Air cooling with Fans with inlet filter
Enclosure rating	IP-54 (Electrics parts)/NEMA 3R

Appedix B. Contact Information

Delta Power Solutions India Pvt Ltd

Ozone Manay Tech Park, "A" Block, 3rd Floor, Hosur Road, Hongasandra Village, Bangalore-560068.

Tel: +91 80 6716 4777, Fax: +91 80 6716 4784.

Website: www.deltaelectronicsindia.com / www.solar-inverter.com

Sales Contact (All India) :

Email: invertersales@delta.co.in

Landline: +91 80 6716 4777 (Ask for Inverter Sales contact)

Inverter Service Support Center (All India):

Customer to register faults by calling +91-80-6716 4716 (Monday to Friday from 9:30 to 18:00 HRS)

or

Service Mobile Number: +91 76762 54716 (After Office Hours & other days)

Email: invertersupport@delta.co.in