Delta UM Series Off-grid Inverter

Instruction Manual

Ver 1.0

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Please adhere to the actual products in case of any discrepancies in this user manual.
If you encounter any problem on the inverter, please find out the inverter S/N
and contact us, we will try to respond to your question ASAP.

Master Battery, S.L.

Contents

1.1 Product Description

Delta UM series inverter is designed for residential off-grid systems in the countries without stable grid power, which can work with batteries to supply power to load and can also charge the batteries through PV plants, grid or generator.

This manual covers the Delta UM inverter model listed below:

Delta UM 4K-48, Delta UM 4K-48 Top, Delta UM 5K-48, Delta UM 5K-48 Top

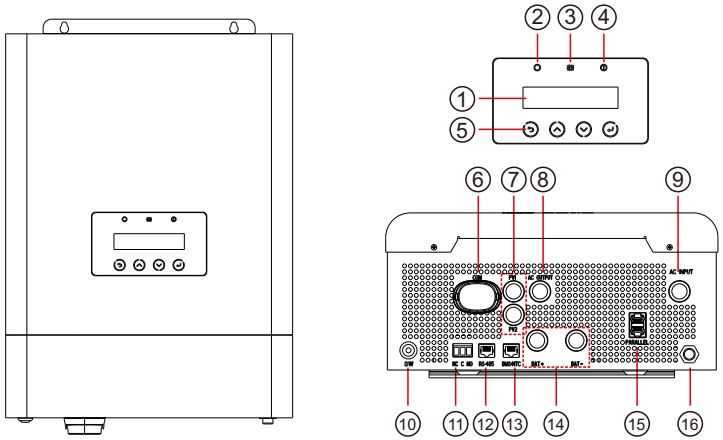


Figure 1.1 Product Description

NO.	Description	NO.	Description
1	LCD display	9	AC input
2	Status indicator	10	Battery awaken switch
3	Charging indicator	11	Dry contact
4	Fault indicator	12	RS-485 Communicaton Port
5	Function buttons	13	Battery Communication Port
6	COM port	14	Battery Connection
7	PV input	15	Parallel communication ports
8	AC output	16	Circuit Breaker

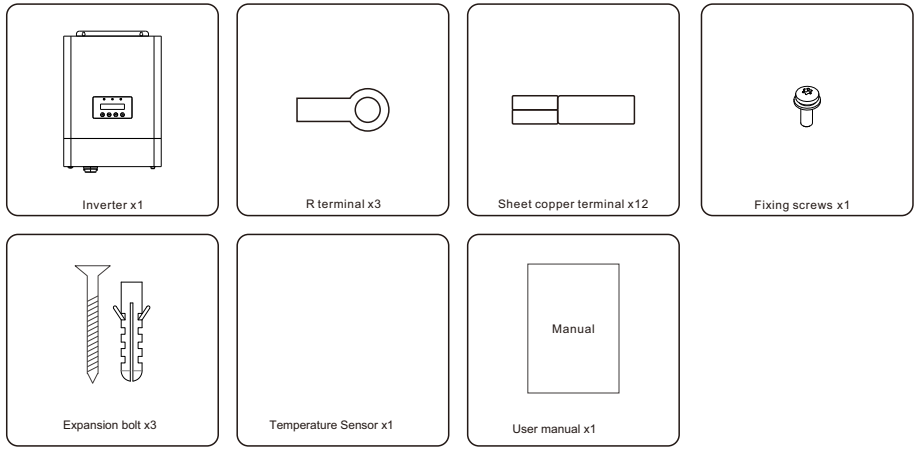
Table 1.1 Product Description

NOTE:
Please refer to the specification of the battery before configuration.

1. Introduction

1.2 Packaging

Please ensure that the following items are included in the packaging with your machine:



If anything is missing, please contact your local MasterPower distributor.

2.1 Safety

The following types of safety instructions and general information appear in this document as described below:

DANGER:
"Danger" indicates a hazardous situation which if not avoided, will result in death or serious injury.

WARNING:
"Warning" indicates a hazardous situation which if not avoided, could result in death or serious injury.

CAUTION:
"Caution" indicates a hazardous situation which if not avoided, could result in minor or moderate injury.

NOTE:
"Note" provides tips that are valuable for the optimal operation of your product.

2.2 General Safety Instructions

WARNING:
Only devices in compliance with SELV (EN 69050) may be connected to the RS485 and USB interfaces.

WARNING:
Please don't connect PV array positive (+) or negative (-) to ground, it could cause serious damage to the inverter.

WARNING:
Electrical installations must be done in accordance with the local and national electrical safety standards.

WARNING:
Do not touch any inner live parts until 5 minutes after disconnection from the utility grid and the PV input.

2. Safety & Warning

WARNING:
To reduce the risk of fire, over-current protective devices (OCPD) are required for circuits connected to the inverter.
The DC OCPD shall be installed per local requirements. All photovoltaic source and output circuit conductors shall have isolators that comply with the NEC Article 690, Part II.

CAUTION:
Risk of electric shock, do not remove cover. There is no user serviceable parts inside, refer servicing to qualified and accredited service technicians.

CAUTION:
The PV array supplies a DC voltage when they are exposed to sunlight.

CAUTION:
Risk of electric shock from energy stored in capacitors of the Inverter, do not remove cover for 5 minutes after disconnecting all power sources (service technician only). Warranty may be voided if the cover is removed without authorization .

CAUTION:
The surface temperature of the inverter can reach up to 60℃ (140 ℉).
To avoid risk of burns, do not touch the surface of the inverter while it's operating.
Inverter must be installed out of the reach of children.

NOTE:
PV module used with inverter must have an IEC 61730 Class A rating.

WARNING:
Operations below must be accomplished by licensed technician or MasterPower authorized person.

WARNING:
Operator must put on the technicians' gloves during the whole process in case of any electrical hazards.

WARNING:
For PV system, between the PV string and PV input of the inverter, it is required to install a DC isolator to meet local installation regulations.

WARNING:
Thus according to IEC60634-7-712 (VDE100-712) ,if the PV inverter isn't able toinject direct current to ground (i.e isn't able to leak direct current),
it is not required toinstall a B-type RCD at the output of a MasterPower inverter. MasterPower require using amagneto-thermic automatic switch with an RCD module (with adequate voltage andcurrent rating basing on the grid characteristics and on the output current of theinverter) with a sensitivity of 30mA, A-type. This switch with the RCD module need to be installed on the AC input side.

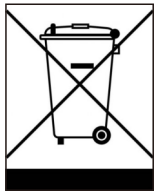
2.3 Notice For Use

The inverter has been constructed according to the applicable safety and technical guidelines. Use the inverter in installations that meet the following specifications ONLY:

1. Permanent installation is required.
2. The electrical installation must meet all the applicable regulations and standards.
3. The inverter must be installed according to the instructions stated in this manual.
4. The inverter must be installed according to the correct technical specifications.

2.4 Notice for Disposal

This product shall not be disposed of with household waste. They should be segregated and brought to an appropriate collection point to enable recycling and avoid potential impacts on the environment and human health. Local rules in waste management shall be respected .



3.1 Select a Location for the Inverter

To select a location for the inverter, the following criteria should be considered:

- Exposure to direct sunlight may cause the output power to decrease. It is recommended to install the inverter indoors， avoid direct sunlight and rain.
- It is recommended that the inverter is installed in a cooler ambient which doesn't exceed 131℉/55℃.

WARNING: Risk of fire
Despite careful construction, electrical devices can cause fires.
- Do not install the inverter in areas containing highly flammable materials or gases.
- Do not install the inverter in potentially explosive atmospheres.

- Install on a wall or strong structure capable of bearing the weight of the machine (13.3kg).
- Install vertically with a maximum incline of +/- 5 degrees, exceeding this may cause output power derating.
- To avoid overheating, always make sure the flow of air around the inverter is not blocked. A minimum clearance of 200mm should be kept between inverters or objects and 500mm clearance between the bottom of the machine and the ground.

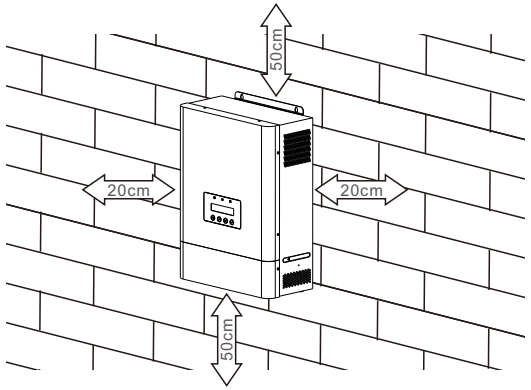


Figure 3.1 Inverter Mounting clearance

- Visibility of the LEDs and LCD should be considered.
- Adequate ventilation must be provided.

NOTE:
Nothing should be stored on or placed against the inverter.

3.2 Mounting the Inverter

WARNING:
The inverter must be mounted vertically.

Select the mounting height of the inverter and mark the mounting holes. It's recommended to install the inverter tighten by using two M5 screws.

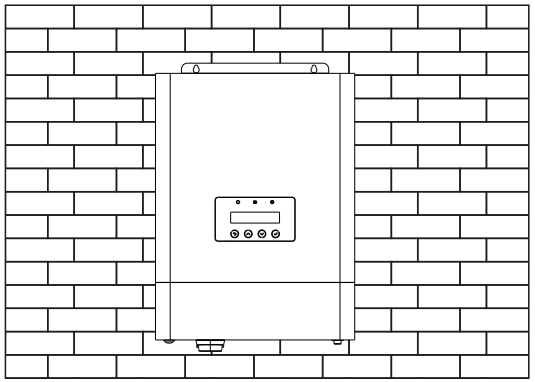


Figure 3.2 Wall Mount inverter

Fix the two holes on the top of the machine and one hole in the box with screws.

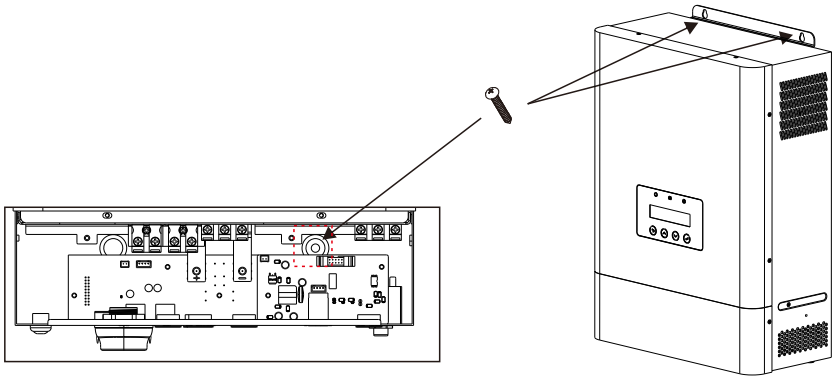


Figure 3.3 Fix inverter on the wall

3.3 Preparation

Before connecting all wiring, please take off bottom cover by removing screws as shown below.

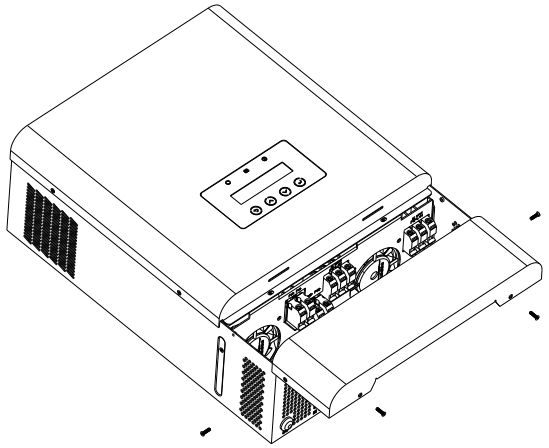


Figure 3.4 Remove the junction box cover

3.4 PV Input Terminal Assembly

Please ensure the following before connecting the inverter:

- Make sure the voltage of the PV string will not exceed the max DC input voltage (550Vdc). Violating this condition will void the warranty.
- Make sure the polarity of the PV connectors are correct.
- Make sure the battery, AC Input, and AC Output are all in their off-states.
- Make sure the PV resistance to ground is higher than 20K ohms.
- Before connecting to PV modules, please install separately a DC circuit breaker between inverter and PV modules.

PV wire diameter requirements:12AWG.

1. Remove insulation sleeve 10 mm for positive and negative conductors.
2. Insert the wire into the sleeve and use a suitable crimping tool for crimping.

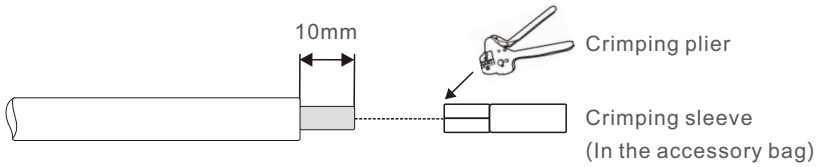


Figure 3.5

3. Please ensure the secure and correct polarity connection between PV modules and PV input connectors, or the system will be damaged. Connecting positive pole (+) of connection cable to positive pole (+) of PV input connector. Connecting negative pole (-) of connection cable to negative pole (-) of PV input connector.

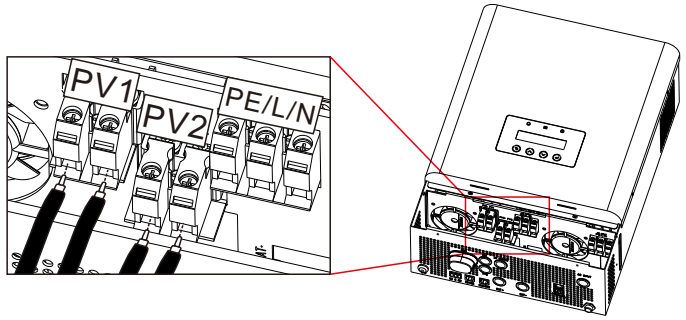


Figure 3.6 PV Input terminals

3.5 Assembling the AC Connector

To protected from over current of AC input, MasterPower recommends installing a separate AC breaker between inverter and AC input power source. (At least 32A)

1. Ensure the cables within the suitable specifications as shown in the table below.

	ITEM	CABLESIZE	TORQUE
AC Input	PE	12AWG	1.0-1.2Nm
	L	10AWG	1.2-1.6Nm
	N	10AWG	1.2-1.6Nm
AC Output	L	12AWG	1.0-1.2Nm
	N	12AWG	1.0-1.2Nm

Table 3.1 AC wire specification

2. Remove insulation sleeve 10 mm for positive and negative conductors.
3. Insert the wire into the sleeve and use a suitable crimping tool for crimping. (see Figure 4.6)
4. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Make sure that the PE protective conductor is connected firstly, and the connection sequence should be PE/L/N.

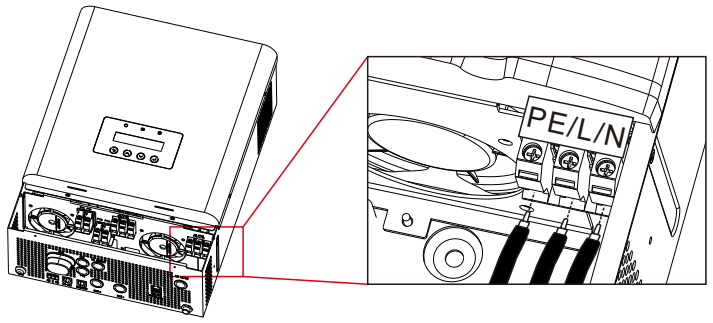


Figure 3.7 AC Input terminals

5.The Dry Contact is used to be one AC source of Generator.

Description	Signal Name	Pin
NC	RELAY1_NC	1
COM	RELAY1_COM	2
NO	RELAY1_NO	3

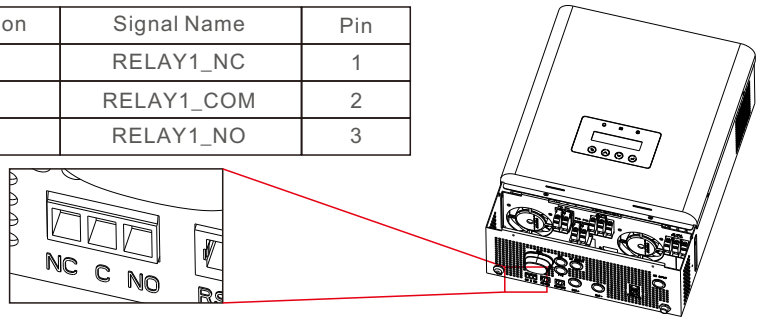


Figure 3.8 Dry Contact

6.Insert AC output wires according to polarities indicated on terminal block and tighten terminal screws with the torque of 1.0-1.2Nm. The connection sequence should be L-N.

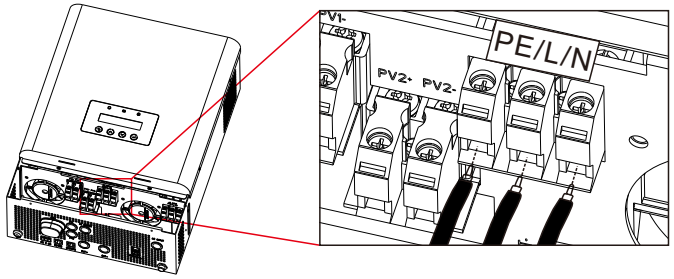


Figure 3.9 AC Output terminals

7.Make sure the wires are securely connected.

WARNING:
Be sure to connect AC wires with correct polarity. If L and N wires are connected reversely, it may cause utility short-circuited when these inverter are working in the parallel operation.

NOTE:
MasterPower recommends to install a 230V/40A single-phase dual-channel normally open AC contactor on the external of the grid input , when grid is avaliable, the contractor will stay 'on' , when the grid is off, the contractor will automatically disconnect itself from the grid.
Recomended Type: Chint NCH8 series 40A2P

3.6 Grounding

To effectively protect the inverter, a grounding methods must be performed.
Connect the external grounding terminal.

To connect the grounding terminal on the heat sink, please follow the steps below:

1. Remove insulation sleeve 10 mm for positive and negative conductors.
2. Insert the wire into the sleeve and use a suitable crimping tool for crimping.

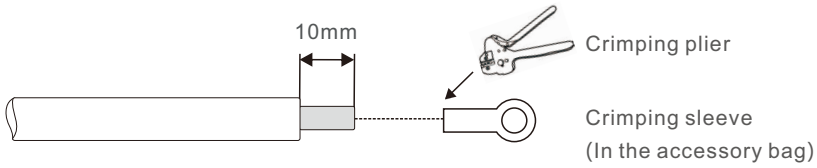


Figure 3.10

3. Connect the grounding cable to the grounding point on the heat sink, and tighten the grounding screw, Torque is 3Nm.

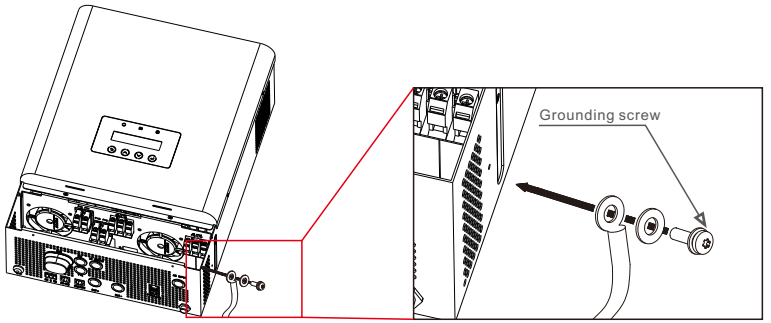


Figure 3.11 Grouding

Important:
For improving anti-corrosion performance, after ground cable installed, apply silicone or paint is preferred to protect.

3.7 Battery Terminal Components

3.7.1 Lead-acid Battery

If you choose lead-acid battery, you are allowed to use AGW-type, flooded-type and Gel-type. It is necessary to consider that the battery voltage to connect with the inverter is 48V.

Considering the installation environment and operation safety, please pay attention to the following points:

- The natural surrounding ventilation of Lead-acid battery should be well and the environment temperature is better around 25±10℃.
- Fix the bolts of wire terminal to prevent the battery from sparking and poor connection.
- The battery should avoid direct sunlight, DON'T put the batteries in the environment with lots of radiation, infrared radiation, ultraviolet radiation, organic solvent gas and corrosive gas.
- The different batteries with different capacity and functionality can't be interconnected with each other, check the total voltage, polarity of positive and negative port before the installation of end connection device and turning on the battery system.
- Ensure the installation site has enough carrying capacity to support the battery system.

3.7.2 Lithium Battery

If you choose a lithium battery, you are allowed to use Pylontech, BYD and Dyness.

Considering the installation and operation safety, please pay attention to the following points:

- Before compeleting the final DC connection or closing DC breaker, please ensure the correct polarity of battery connection and positive (+) must be connected to BAT (+) and negative (-) must be connected to BAT (-).
- Please carefully read the user manual of the battery and strictly follow the precautions in the battery manual.

3. Installation

3.7.3 Battery Connection

To avoid DC Arc, MasterPower recommends installing DC switch between batteries and Inverter. Ensure the cables within the suitable specifications as shown in the table below.

	ITEM	COLOUR	CABLESIZE	TORQUE
Battery	BAT+	RED	6AWG	1.2-1.6Nm
	BAT-	BLACK	6AWG	1.2-1.6Nm

Table 3.2 Battery power cable requirement

Insert the ring terminal of battery cable flatly into battery connector of inverter and make sure the bolts are tightened with torque of 1.2-1.6Nm.

Make sure polarity at both the battery and the inverter is correctly connected and ring terminals are tightly screwed to the battery terminals.

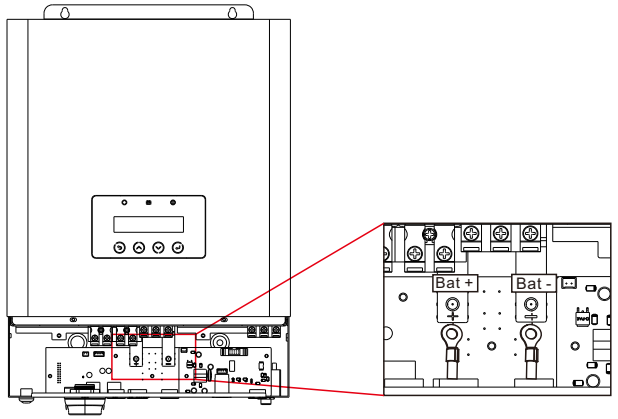


Figure 3.12 Connected to the battery fuse terminals

Note:

Before connecting the battery, please carefully read the user manual of the battery and perform the installation exactly as the battery manufacturer requests.

3.8 Battery communication and external communication

The Delta UM series inverter uses RS485 cable to communicate with BMS/NTC port to communicate with the BMS of Lithium and NTC of Lead-acid battery. The image below shows the assembly of the communication cables. RS-485 is one standard communication interface which can transmit the real data from inverter to PC or other monitoring equipments.

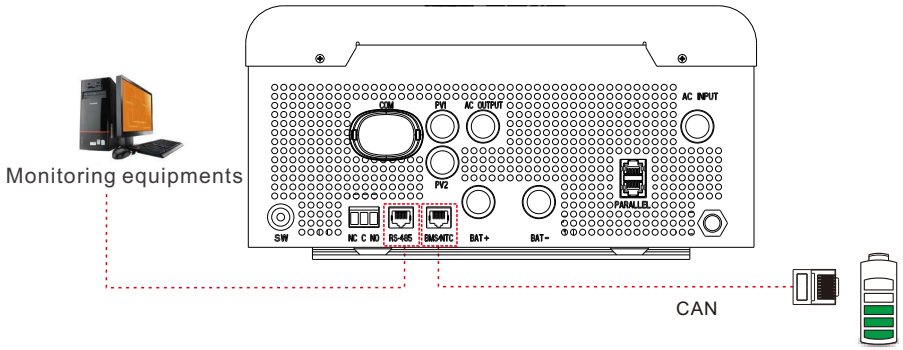


Figure 3.13

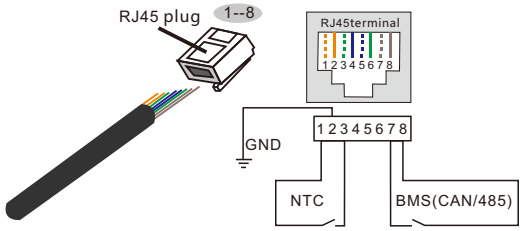
NOTE:
NTC temperature sensor should be attached to the surface of lead-acid battery for detecting the temperature in the real time.

Procedure for connecting the BMS cable:

1. Take out the CAN cable (terminal marks 'CAN' on one end and 'to Battery' on the other end).
2. Unscrew the swivel nut from BMS/NTC port.
3. Insert the RJ45 terminal with CAN label into the BMS/NTC port, then fasten the swivel nut.
4. Connect the other end to the battery.

NOTE:
Lead-Acid and other older-technology battery types require experienced and precise design, installation and maintenance to work effectively. For lead-acid battery , battery SOC calculation may not be accurate according to battery inconformity between cells, battery aging or other specifications of lead-acid battery etc.

Note:
Before connecting the battery, please carefully read the user manual of the battery and perform the installation exactly as the battery manufacturer requests.



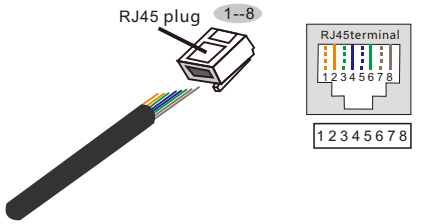
Correspondence between the cables and the stitches of plug are as below:
Pin 1: RT1; Pin 2: ⏚
Pin 3: RT2; Pin 4: CAN_H
Pin 5: CAN_L; Pin 6:NC
Pin 7: BMS485_A; Pin 8: BMS485_B

Figure 3.14 Strip the insulation layer and connect to RJ45 plug

NOTE:
For CAN/485 cable pin 4 (blue) and pin 5 (white-blue) are used for the communication.

Procedure for connecting the RS485 cable:

1. Take out the RS485 cable.
2. Unscrew the swivel nut from RS485 port.
3. Insert the RJ45 terminal with RS485 label into the RS485 port, then fasten the swivel nut.
4. Connect the other end to PC or other monitoring equipments.



Correspondence between the cables and the stitches of plug are as below:
Pin 1: GND; Pin 2: WIFI_B
Pin 3: WIFI_A; Pin 4: RS485_A
Pin 5: RS485_B; Pin 6: NC
Pin 7: +5V_RS485; Pin 8: +5V_WIFI

Figure 3.15 RS485 serial communication pin definition

3.9 Parallel Connection

The "-P" type in the Delta UM series inverter has the parallel capability and can be operated in parallel.
This inverter can be used in parallel with two different operation modes.
1.Parallel operation in single phase with up to 10 units.

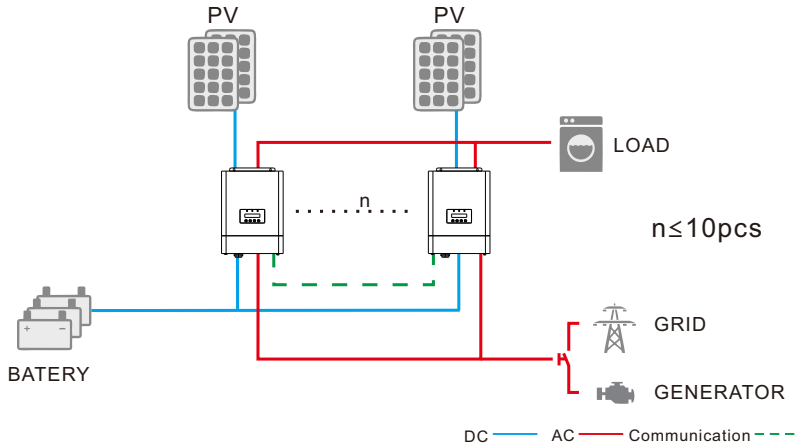


Figure 3.16 Parallel operation in single phase

2.Maximum 10 units work together to support 3-phase equipment.

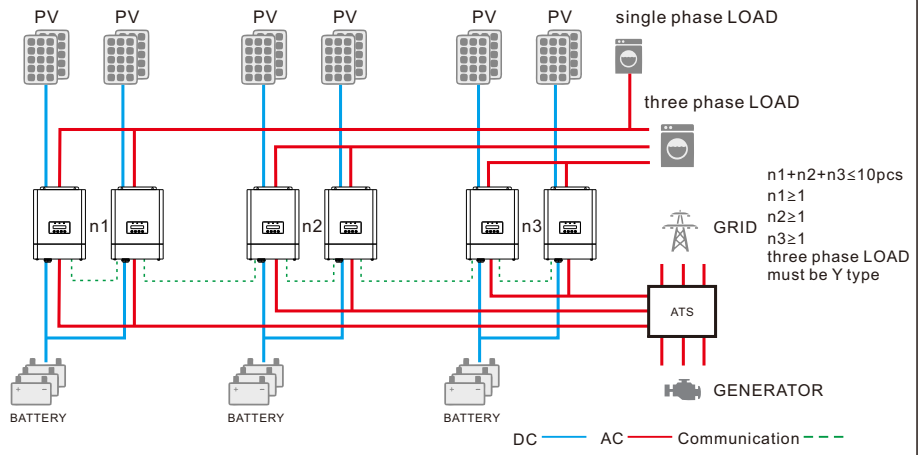


Figure 3.17 Parallel operation in three phase

Please refer to《parallel quick installation guide》.

3.10 LED Indicates

There are three LED indicators on the Delta UM series inverter which indicate the working status.

Light	Color	Status	Description
STATUS	Green	FLASHING	The inverter is in standby (Slow flashing for 3S).
			The inverter is in self-test (Fast flashing for 3S).
		ON	The inverter is normally operational.
		OFF	No power to the inverter system.
BATTERY	Green/Yellow	GREEN FLASHING	Battery is charging.
		GREEN CONSTANT	Battery is discharging.
		OFF	Battery is not working.
		YELLOW CONSTANT	Battery failure.
ALARM	Yellow/Red	YELLOW CONSTANT	There is an alarm but system working normally.
		RED CONSTANT	There is an alarm but system stops.
		OFF	No Alarm.

Table 3.3 Status Indicator Lights

3.11 Power-on instructions

1. The LCD screen can light up with only PV, battery or grid connected to it.
2. If it is required to support the loads with backup power ,battery must be installed. After the backup port starts to output, turn off the battery, and the loads can continue to be supported by the grid power.
3. MasterPower suggestion on powering on the inverter: Firstly turn on the battery, then turn on PV and grid in turns.

4.1 Startup guide

Please follow the steps to complete the initial setup process. steps are as followed:

Start up Wizard Language > Time > Connect battery? > Battery Type >

Connect generator? > Back up setting > Setting successfully

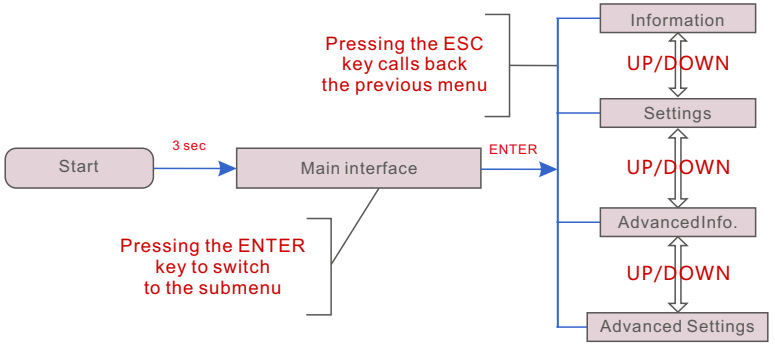


Figure 4.1 Operation Overview

4.2 Main Menu

There are four submenu in the Main Menu (see Figure 4.1):

1. Information
2. Settings
3. Advanced Info.
4. Advanced Settings

4. Operation

4.3 Information

In the information section, operating data and information data can be viewed.

Sub-sections include:

1. General Information
2. System Information
3. Energy Records
4. BMS information

4.3.1 General Information

The example displays are shown in the following figures.

The user can view it by pressing the up and down keys.

Values are for reference only.

Display	Description
Inverter SN: 000000000000000	Shows the inverter serial number.
Model. : S5-E01P5K-48	Shows the model of the device.
SoftVer. : 040000	Shows the DSP and ARM version of the inverter.
Mute State: OFF	Show the mute status of the device.

Figure 4.2 General Information

4.3.2 System Information

The example displays are shown in the following figures.

The user can view it by pressing the up and down keys.

Values are for reference only.

Display	Description
V_DC: 000.0V I_DC: 000.0A	Shows the voltage on DC side. Shows the current on DC side.
V_AC: 000.0V I_AC: 000.0A	Shows the voltage on AC side. Shows the current on AC side.
Grid Frequency: 00.00Hz	Shows the grid frequency value.
Battery V: 000.0V Battery I: 000.0A	Shows the battery voltage. Shows the battery current.
Backup V: 000.0V Backup P: 00.0kW	Shows the voltage on backup. Shows the power on backup.
Charge P: 00.0kW DisCharge P: 00.0kW	Shows the charging power. Shows the discharging power.

Figure 4.3 System Information

4.3.3 Energy Records

Sub-sections of the Yield information section include:

1. Battery Yield

2. Grid Yield

3. Load Yield

The example displays are shown in the following figures.

Values are for reference only.

Display	Description
BattChgE Total: 0000000kWh	Shows the total battery charged energy.
BattChgE Today: 000.0kWh	Shows todays' battery charged energy.
BattChgE Lastday: 000.0kWh	Shows yesterdays' battery charged energy.
BattDisChgE Total: 0000000kWh	Shows the total battery discharged energy.
BattDisChgE Today: 0000000kWh	Shows todays' battery discharged energy.
BattDisChgE Lastday: 0000000kWh	Shows yesterdays' battery discharged energy.

Figure 4.4 Battery Yield

Display	Description
GridGetE Total: 0000000kWh	Shows the total energy received from the grid.
GridGetE Today: 000.0kWh	Shows todays' energy received from the grid.
GridGetE Lastday: 000.0kWh	Shows yesterdays' energy received from the grid.

Figure 4.5 Grid Yield

Display	Description
PV E Total: 000.0kWh	Shows total energy received from PV side.
PV E Today: 000.0kWh	Shows todays' energy receive from PV side.
PV E Lastday: 000.0kWh	Shows yesterday's energy received from PV side.

Figure 4.6 PV Yield

Display	Description
LoadE Total: 0000000kWh	Shows total load energy.
LoadE Today: 000.0kWh	Shows todays' load energy.
LoadE Lastday: 000.0kWh	Shows yesterdays' load energy.

Figure 4.7 Load Yield

4.3.4 BMS Information

The example displays are shown in the following figures.

The user can view it by pressing the up and down keys.

Values are for reference only.

Display	Description
Battery V: 00.00V Battery I: +00.00A	Battery V: Shows battery voltage(From BMS). Battery I: Shows battery current(From BMS).
ChargeILmt: 000.0A DischargILmt: 000.0A	ChargeILmt: Shows battery charge limit(Current). DischargeILmt: Shows battery discharge limit(Current).
ChargeVLmt: 000.0A DischargVLmt: 000.0A	ChargeILmt: Shows battery charge limit(Voltage). DischargeILmt: Shows battery discharge limit(Voltage).
SOC Value: 000% SOH Value: 000%	SOC value: Shows battery state of charge. SOH value: Shows battery state of health..
BMS Status: CAN Fail	Shows that Battery BMS communication status.
BMS Version: 0.0	Shows that Battery BMS version.

Figure 4.8 BMS Information

BMS ONLY support CAN communication not RS485, and all the data will display “0" when the battery has been selected as Lead-acid battery which is monitored by NTC in CAN/NTC port.

4.4 Settings

The following submenus are displayed when the Settings menu is selected:

1. Set Time/Date
2. Set Address
3. Set Mute
4. Mode Settings

4.4.1 Set Time/Date

This function allows time and date setting. When this function is selected, the LCD will display a screen as shown in Figure 4.9.

Figure 4.9 Set Time

4.4.2 Set Address

This function is used to set 1. Modbus address 2. Inverter parallel address 3 to connect other devices like data logger etc.

Figure 4.10 Set Address

4.4.3 Set Mute

This function allows you to turn on/ off the keypad tone and buzzer sound.
Choose' ON' to disable the sounds and choose 'OFF' to enable the sounds. Default is 'OFF'.

Figure 4.11 Set Mute

4.4.4 Mode Settings

Mode Settings explain different kinds of work modes.

Figure 4.12 Mode Settings

4.4.4.1 Work Mode

This unit allows Output source priority setting, The specific setting are shown in the following figures.

Display	Description
Work Mode: Batt Reserve	PV will give priority to the load, and the excess energy will charge the battery. When the PV energy supply is insufficient for the load, battery energy will supply loads at the same time. Grid will supply the loads when battery reached the low-level voltage or the setting point or PV is not available.
Work Mode: Back up	Grid will provide power to the loads as first priority. PV and battery will provide power to the loads only when Grid is not available.
Work Mode: Self Use	PV provide power to the loads as first priority. If PV is not sufficient to power all connected loads, battery will supply power to the loads at the same time. If battery reached the low-level voltage or the setting point, PV will provide power to the battery and Grid will supply load .

Figure 4.13 Work Mode

4.4.4.2 Charger Source Priority

If this off grid inverter is working in Line, Off or Fault mode, this unit will allow charger source priority setting, The specific setting are shown in the following figures.

Display	Description
Charger Src. Pri. PV&Grid	PV and Grid will charge battery at the same time.
Charger Src. Pri. PV Only	PV will be the only charger source no matter grid is available or not.

Figure 4.14 Charger Source Priority

4.5 Advanced Information

NOTE:
To access to this area is for fully qualified and accredited technicians only.
Enter menu “Advanced Info.”(Initial password “1000").

After enter the correct password 1000 access to the following information

1. Alarm Message
2. Warning Message
3. Running Status
4. Communication data
5. Yield Profile

Figure 4.15 Enter password

The screen can be scrolled by pressing the UP/DOWN keys.
Pressing the ENTER key gives access to a submenu.
Press the ESC key to return to the Main Menu.

4.5.1 Alarm Message

The display shows the 20 latest alarm messages.
Screens can be scrolled by pressing the UP/ DOWN keys.

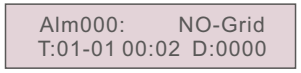


Figure 4.16 Alarm Message

Press the ESC key to return to the previous menu.
Press the ENTER key to return to the next menu.
The example displays are shown in the following figures.
Values are for reference only.

4.5.2 Warning Message

The display shows the latest warning message.
Press the ESC key to return to the previous menu.

Figure 4.17 Warning Message

4.5.3 Running Status

This function is for maintenance person to get running message such as Heat sink temperature, Standard NO. etc.(Values are for reference only).

Figure 4.18 Running Status

Display	Description
DC Bus Voltage: 0.0V	Shows DC bus voltage.
Power Factor: +0.000	Shows power factor of the inverter.
Power Limit%: 000%	Shows the power output percentage of the inverter.
Inverter Temp: +0.0degC	Shows heat sink temperature of the inverter.
Grid Standard:	Shows current effective grid standard.
Flash State: 11111111	Shows the data migration time.

Figure 4.19 General Status

NOTE:
The advanced status is reserved for MasterPower technicians.

Display	Description
Ground Voltage: 000.0V	Shows the voltage to the ground.
Relay-Fault Func.: RUN	Shows the status of the replay.
GRID-INTF.02 Func.: RUN	Shows the interference status from the grid.

Figure 4.20 Advanced Status

4.5.4 Communication data

This section shows the communication Data between HMI and DSP. For MasterPower Software engineer ONLY.

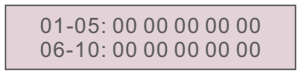


Figure 4.21 Communication data

4.5.5 Yield Profile

4.5.5.1 Energy Battery

Shows the battery charged &discharged energy.

Display	Description
Battery Charge	Shows the energy battery charged.
Battery Discharge	Shows the energy battery discharged.

Figure 4.22 Battery Charge

4.5.5.2 Energy Grid

Energy get from the grid.

Display	Description
Get Energy	Shows the energy received from the grid.

Figure 4.23 Get Energy

4.5.5.3 Energy Backup

Energy generated from backup port.

Display	Description
Daily Energy	Shows the daily energy.
Monthly Energy	Shows the monthly energy.
Yearly Energy	Shows the yearly energy.

Figure 4.24 Energy Backup

4.6 Advanced Settings

NOTE:
To access to this area is for fully qualified and accredited technicians only.
Enter menu “Advanced settings” (Initial password"1000").

After enter the correct password 1000 access to the following information

1. Output Settings
2. Battery Settings
3. Special Settings
4. Equalizer Settings
5. Password Settings

Figure 4.25 Enter password

The screen can be scrolled by pressing the UP/DOWN keys.
Pressing the ENTER key gives access to a submenu.
Press the ESC key to return to the Main Menu.

4.6.1 Output Settings

This function is to control the output power on the load port.
On Backup ON/OFF , when choose ON, power can be allowed to export.
When choose OFF, power can't be allowed to export, default is ON.

Figure 4.26 Set Backup

Backup setting needs to be set according to the connected load. Please set the backup voltage (can be set from 220V-230V) and Backup frequency (can be set to 220V or 230V) according to the actual situation of the connected load.

Display	Description
Buckup Voltage: 230.0V	Shows the backup voltage.
Buckup Frequency: 50.0Hz	Shows the backup frequency.
Voltage Droop: Disable	Shows the voltage droop.

Figure 4.27 Backup Settings

4.6.2 Battery Settings

The section has 4 parts:

1. Battery Select
2. Battery Wakeup
3. Quick Charge
4. Battery detailed settings

4.6.2.1 Battery Select

This model of inverter can work compatible with both lithium-ion and lead acid batteries
Below is the compatibility list.

Brand	Model	Setting
BYD	PREMIUM LVS, PREMIUMLVL, Box Pro 2.5-13.8	Select "B-BOX"
Pylontech	US2000/US3000	Select "Pylon"
Dyness	Powerdepot/Powerbox/B4850	Select "Dyness"

Table 4.1 Battery Select

It can work with several kinds of lead acid batteries such as flooded type, AGM type, GEL Type.
When it works with lead acid batteries, please set Capacity Type accordingly.

Figure 4.28 Battery Select

4.6.2.2 Battery Wakeup

Press wake up button then a low voltage will be generated on the battery port to wake up the battery. After the wake-up command succeeds, the battery will continue to be charged according to the normal charging logic.

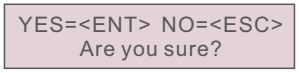


Figure 4.29 Battery Wakeup

4.6.2.3 Quick Charge

This function can meet the demand to quickly charge up the battery.
It only takes effect when the grid is valid, and the grid and PV will quickly charge the battery with the maximum current.
For lead-acid batteries, the charging stops when the float voltage stops, and exits from force charge.
For lithium batteries, the charging stops at the maximum SOC, and exits from force charge.

Figure 4.30 Quick Charge

4.6.2.4 Battery Detailed Settings

The following is the setting of battery parameters. For different lithium batteries, the inverter has been set with the optimal battery configuration, and it is recommended that customers do not modify it without authorization.
For lead-acid batteries, the installer should set it according to the battery type.

4. Operation

For lithium batteries, these are the following settings:

Display	Description
Max Charge Curr	Max charge current set.
Max Grid Chg Cur	Max charge current set to be charged from grid.
Force Curr.Set	When the battery is discharged to the force SOC, the inverter will continue to be force charged with this value.
Min SOC Set	The minimum SOC, the default is 20%, when there is grid power, the battery will stop discharging when it is set to this value. If there is a load, PV will charge the battery, and the grid will supply power to the load. If the charge form PV+GRID is set, the grid power will also charge the battery at the same time. The battery has been charged until it reaches max.SOC. After reaching max SOC, if there is a discharge trigger condition, it can be discharged. If there is no discharge trigger condition, it will keep charging.
Max SOC Set	Max discharge SOC set.
Force SOC Set	The value is less than Min SOC Set, and the default is 10%. When the value is set, the force charge will be automatically activated, and the battery will be forcely charged according to the maximum charging current, until it reaches the MIN SOC, and then the force charge will be exited.
Batt under Volt	The lowest discharge voltage. In the case of off-grid, if the PV does not drive the load, the PV+ battery has been placed in Batt_under. After reaching under, if there is PV, the PV is loaded enough, and the PV is loaded. If the PV is not enough to load, an error will be reported. If there is no PV, the battery will provide screen/communication, knowing that the cut-off voltage of deep discharge is reached, and trigger the mechanical deep discharge protection.
Batt over Volt	Protect the maximum charging voltage value. When this value is reached, stop charging the battery.

Figure 4.31 For lithium batteries

4. Operation

For lead acid batteries, these are the following settings:

Display	Description
Max Charge Curr	Max charge current set.
Max Grid Chg Cur	Maximum current setting for charging from grid.
Force Curr.Set	When the battery is discharged to the force SOC, the inverter will continue to be force charged with this value.
Batt Low Volt	When there is grid power, the battery discharges to Batt_low, and the battery stops discharging. If there is a load, PV will charge the battery, and the grid will supply power to the load. If the charge form PV+GRID is set, the grid power will also charge the battery at the same time. The battery is charged until batt-high. After charging to batt-high, if there is a discharge trigger condition, it can be discharged. If there is no discharge trigger condition, it will keep charging.
Batt High Volt	Maximum charge cut-off voltage. When the battery starts charging from low to high, the battery will not be discharged to supply power to the load.
Force Volt Set	This value is less than Batt low Volt ,default value is 10% , When the value is reached, the force charge will be automatically activated, and the battery will be charged according to the force charge current value until it reaches Batt_low.
Floating Chg.Volt	Three-stage charging: Float value constant voltage charging, you can exit when you meet any charging needs.
Bulk chg. Volt	Three-stage charging: from the beginning of charging to charging to the Bulk voltage value (the time period is T), the system keeps charging at this value for a duration of 10T, after 10T, the voltage drops to the Float voltage value, and the Float value is constant voltage charging. You can exit when you meet any charging demand.

Figure 4.32 For lead acid batteries

Display	Description
Batt under Volt	The lowest discharge voltage. In the case of off-grid, if the PV does not drive the load, the PV+ battery has been placed in Batt_under.After reaching under, if there is PV, the PV is loaded enough, and the PV is loaded. If the PV is not enough to load, an error will be reported. If there is no PV, the battery will provide screen/communication, knowing that the cut-off voltage of deep discharge is reached, and trigger the mechanical deep discharge protection.
Batt over Volt	Protect the maximum charging voltage value. When this value is reached, stop charging the battery.
Temp Compensation	Lead acid battery temp compensation logic, to compensate 1 degree every 72mv.

Figure 4.33 For lead acid batteries

4.6.3 Special Settings

This function is applicable by maintenance personnel only, wrong operation will prevent the inverter from reaching maximum power.

The section has 7 parts:

1. Power Switch
2. Batt Line ZO
3. Mppt CV Mode
4. ISO Set
5. AC Input Type Set
6. On-Grid PV Gen.
7. No-Batt PV Gen.
8. Clear Energy
9. Restore Settings

4.6.3.1 Power Switch

Power switch is the switch to activate inverter generation. Default is On. Means the inverter is producing.

If choose Off , inverter stops working ,showing Off mode on HMI.

Figure 4.34 Power switch setting

4.6.3.2 Batt Line ZO

Batt Line ZO is the battery line impedance setting. The purpose is to compensate the resistance loss of the battery line. The default value is 10mΩ, 0-99mΩ can be set.

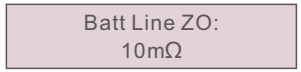


Figure 4.35 Battery Line ZO setting

4.6.3.3 MPPT CV Mode

MPPT CV Mode is MPPT constant voltage setting. The inverter can keep allowing DC input at the PV end with a fixed voltage value. The voltage value can be set.

The range is 100-450V.

Choose enable to turn on the function, choose disable to turn off the function.

The default is disable.

Figure 4.36 MPPT CV Mode

4.6.3.4 ISO Set

ISO set is the monitoring of insulation resistance to ground. The PV+\- input has an equivalent impedance value to ground, and ISO limit is the protection threshold setting of the impedance value.

Choose enable to turn on the detection function. When it detects that the actual impedance value is less than the limit setting value, the inverter will report error protection and stop working.

Choose disable to turn off the detection function.

The default is enable. ISO limit can be set to 20KΩ-1000KΩ

Figure 4.37 ISO Setting

4.6.3.5 AC Input Type Set

This section is to select the AC input type, can choose from grid or generator..

Figure 4.38 AC Input Type Set

4.6.3.6 On-Grid PV Gen

This function applies for back up mode settings

When choose disable, PV charges the batteries, loads are supported by grid power.

When choose disable, when there is surplus power after charged the battery, PV will support loads together with grid power.

Default is disable.

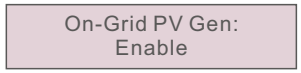


Figure 4.39 On-Grid PV Generation setting

4.6.3.7 No-Batt PV Gen

This function allows PV to support loads when there is no battery.
When choose disable, loads are supported fully by grid power when battery is not present. PV not working.
When choose enable, loads are supported by both PV and by grid power, when there is no battery.
Default is disable.

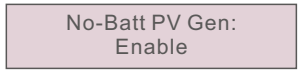


Figure 4.40 No-Batt PV Generation setting

4.6.3.8 Clear Energy

Clear Energy can reset the history yield of inverter

This function is applicable by maintenance personnel only, wrong operation will prevent the inverter from working properly.

4.6.3.9 Restore Settings

This section allows you to reset all the settings and bring the settings back to default values.

Figure 4.41 Restore Settings

4.6.4 Equalizer Settings

This function is designed to equalize the battery , the battery terminal voltage is unbalanced due to individual differences in batteries, temperature differences and other reasons.
In order to avoid the deterioration of this unbalance trend, it is necessary to increase the charging voltage of the battery pack and activate the battery.
The inverter has a higher voltage to charge the battery to balance the acid concentration.

In the floating charge state, when the interval condition is reached, the inverter issues a command to start equalization function, then raise the voltage to charge between bulk and over, and charge to equalized volt within'time' period then equalization condition ends.
If the charge for 'time' is reached, but the volt value is not reached, it will enter the timeout and re-equalize.
If the timeout time is exceeded and the volt value has not been reached, equalization failed.

Display	Description
Batt equalization	Whether to turn on this function, default is off.
Equalized volt.	Settings of equalize the voltage.
Equalized time	Settings of balance the time.
Equalized timeout	Second time equalization time setting.
Equalized interval	Interval between equalizations.
Active immediately	To immediately activate the equalization function.

Figure 4.42 Equalizer Settings

4.6.5 Password Settings

Figure 4.43 Password Settings

5. Commissioning

5.1 Preparation of Commissioning

- Ensure all the devices are accessible for operation, maintenance and service.
- Check and confirm that the inverter is firmly installed.
- Space for ventilation is sufficient for one inverter or multiple inverters.
- Nothing is left on the top of the inverter or battery module.
- Inverter and accessories are correctly connected.
- Cables are routed in safe place or protected against mechanical damage.
- Warning signs and labels are suitably affixed and durable.

5.2 Commissioning Procedure

If all the items mentioned above meet the requirements, proceed as follows to start up the inverter for the first time.

5.2.1 Switch on the AC-Output and AC-Input.

5.2.2 Refer to “Part 4” to configure the parameters.

5.2.3 Switch on the DC circuit breaker between inverter and battery.

5.2.4 When the battery equipped is Pylon Li-ion Battery, turn on the switch on the battery manually.

5.2.5 The relay will make 'clicking' sounds and it will take a short-time to work automatically.

5.2.6 The system will work properly.

6. Maintenance

Delta UM Series inverter does not require any regular maintenance. However, cleaning the heatsink will help inverter dissipating heat and increase the lifetime of inverter. The dirt on the inverter can be cleaned with a soft brush.

CAUTION:
Do not touch the surface when the inverter is operating. Some parts may be hot and cause burns.

The LCD and the LED status indicator lights can be cleaned with cloth if they are too dirty to be read.

NOTE:
Never use any solvents, abrasives or corrosive materials to clean the inverter.

The inverter has been designed in accordance with international grid tied standards for safety, and electromagnetic compatibility requirements. Before delivering to the customer the inverter has been subjected to several test to ensure its optimal operation and reliability.

In case of a failure the LCD screen will display an alarm message. The alarm descriptions and their corresponding alarm messages are listed in Table 7.1:

When faults occur, the “Fault” state will be shown on the main screen.
Follow the steps below to check what fault occurs.

Steps: Enter → Down → Advanced Information→ Enter password → Enter → Down →Warning Message.

Step1: Press ENTER.

Step2: Press DOWN to select Advanced Information, then enter password.

Figure 7.1 Advanced Information

Figure 7.2 Enter password

Step3: Press DOWN to select Warning Message, the press ENTER.

Figure 7.3 Warning Messages

7. Troubleshooting

Alarm Message	Failure description	Solution
G_AB Over Volt G_BC Over Volt G_CA Over Volt G_AB Over Volt2 G_BC Over Volt2 G_CA Over Volt2 G_AB Trans Ov_V G_BC Trans Ov_V G_AB 10min Ov_V G_BC 10min Ov_V G_CA 10min Ov_V Grid Trans Ov_V	Gird Overvoltage	1. Resistant of AC cable is too high, Change AC cable for larger size. 2. Adjust the protection limit if it's allowed by electrical company.
G_AB Under Volt G_BC Under Volt G_CA Under Volt G_AB Under Volt2 G_BC Under Volt2 G_CA Under Volt2	Grid Undervoltage	1. Adjust the protection limit In user define setting if it's allowed by electrical company.
Grid Over Freq. Grid Over Freq.2	Grid Overfrequency	1. Adjust the protection limit In user define setting if it's allowed by electrical company.
Grid Under Freq. Grid Under Fre.2	Grid Underfrequency	1. Adjust the protection limit In user define setting if it's allowed by electrical company.
Grid Over Imp.	Grid Impedance is too large	1. Adjust the protection limit In user define setting if it's allowed by electrical company.
No Grid	NO Grid Voltage	1. Check connection and grid switch. 2. Check grid voltage ofinside terminal of inverter .
Grid Unbalance	Grid voltage is unbanlance	
Grid Freq. Spark	Grid frequency is sparking	1. Check whether Grid is abnormal. 2. Confirm connnection of AC cable is normal. 3. Restart System and ensure whether the fault is existing.
Grid A Over Curr Grid B Over Curr Grid C Over Curr Phase Over Curr	Grid overcurrent	1. Restart inverter. 2. Change power board.
Ig Tracking Err	Grid current tracking fail	1. Restart inverter or contact installers.
Pv1 Over Volt PV2 Over Volt PV3 Over Volt PV4 Over Volt	DC Overvoltage	1. Reduce the module number in series.
Bus Over Volt	DC Bus overvoltage	1. Check inductor connection of inverter. 2. Check driver connection.
Vbus Unbalance	DC Bus is unbalanced voltage	1. Restart System and ensure whether the fault is existing.

Alarm Message	Failure description	Solution
Bus Under Volt	DC Bus is undervolgage	1. Restart System and ensure whether the fault is existing.
Vbus Unbalance2	DC Bus is unbalanced voltage 2	1. Restart System and ensure whether the fault is existing.
Pv1 Over Curr	Pv1 overcurrent	1. Restart inverter. 2. Identify the fault and remove the strings from fault MPPT. 3. Change power board.
Pv2 Over Curr	Pv2 overcurrent	
PV Input Disturb	DC input disturbs	1. Restart inverter. 2. Change power board.
PV Connect Err	DC polarity reverse fault	1. Check whether the polarity of PV cable has reversed connection.
PV Mid Iso	PV midpoint grounding fault	1. Check whether PV strings have trouble in insulation.
Pv1 Under Volt	Pv1 undervoltage	1. Check whether the DC cable is damaged. 2. Restart system and ensure whether the fault is existing.
Pv2 Under Volt	Pv2 undercurrent	1. Check whether the DC cable is damaged. 2. restart system and ensure whether the fault is existing.
Vbus Sample Err	Bus voltage sampling fault	1. Restart System and ensure whether the fault is existing.
Boost Over Curr	Boost overcurrent	1. Restart System and ensure whether the fault is existing.
Grid Disturb	Gird disturbing	1. Restart inverter. 2. Change power board.
Dsp Init Err	DSP initializing protection	1. Restart inverter or contact installers.
Module Over Temp System Over Temp	Over temperature protection	1. Check whether the environment around inverter is poor heat dissipation. 2. Confirm whether inverter installation is satisfied with requirements.
PV Iso Pro	PV isolation protection	1. Remove all DC input then restart and reconncect inverter onr by one. 2. Identify the fault caused by which string and check the string isolation.
Ig Leak Pro1 Ig Leak Pro2 Ig Leak Pro3 Ig Leak Pro4	Leakage current protection	1. Check AC and DC connection. 2. Check the inside conncetion of inverter.
Input Relay Err	Realy fault	1. Restart inverter or contact installers.
Dsp B Fault	Communication fault betweent main DSP and slave DSP	1. Restart inverter or contact installers.
Ig DC Err	DC component fault	1. Restart inverter or contact installers.

7. Troubleshooting

Alarm Message	Failure description	Solution
12V Power Err	12V power undervoltage	1. Restart System and ensure whether the fault is existing.
Leak Sensor Err	Leakage self-detection fault	1. Restart System and ensure whether the fault is existing.
Under Temp	Undertemperature protection	1. Check the environment temperature around inverter. 2. Restart System and ensure whether the fault is existing.
AFCI Check Err	Arc self-detection fault	1. Check whether there is arc in PV connection and restart inverter.
AFCI Err	Arc protection	1. Restart inverter or contact installers.
Dsp Ram Err	Abnormal SRAM of DSP board	1. Restart inverter or contact installers.
Dsp Flash Err	Abnormal FLASH of DSP board	1. Restart inverter or contact installers.
Dsp PC Err	Abnormal PC pointer of DSP board	1. Restart inverter or contact installers.
Dsp Reg Err	Abnormal key register of DSP	1. Restart inverter or contact installers.
Grid Disturb2	Grid disturbing 02	1. Restart inverter. 2. Change power board.
Ig AD Err	Abnormal sampling of Grid current	1. Restart inverter or contact installers.
Output Short Circuit	IGBT overcurrent	1. Restart inverter. 2. Change power board.
Grid Resonance	Grid resonance	1. Restart inverter or contact installers.
Trans Ov-Ig	Transient overcurrent of AC side	1. Restart inverter. 2. Return to factory for repairing.
Hw Ov-Vbatt	Battery overvoltage and firmware fault	1. Restart the battery and contact battery manufacture for handling if the fault still exists.
LLC Over Curr	LLC firmware overcurrent	1. Restart inverter. 2. Return to factory for repairing.
Batt Over Volt	Battery overvoltage detection	1. Check whether battery breaker has tripped. 2. Check whether battery is damaged. 3. Check whether battery parameter settings are reasonable.
Batt Under Volt	Battery undervoltage detection	1. Check whether battery breaker has tripped. 2. Check whether battery is damaged. 3. Check whether battery parameter settings are reasonable.
No Battery	Battery module is not connected	1. Check whether the power line of battery is connected correctly. 2. Check whether the output voltage of battery is correct.

Alarm Message	Failure description	Solution
Buckup Over Volt	Bypass overvoltage fault	1. Check whether Backup port wire is normal. 2. Restart system and comfirm whether the fault is existing.
Dsp SelfCk Err	Abnormal self-detection of DSP	
Buckup Over Curr	Bypass overcurrent fault	
Soft Start Err	Soft start failure	1. Restart inverter. 2. Return to factory for repairing.
Nbus Earthing Err	Impedance of N-Ground fault	1. Check whether the Grounding line is connected correctly.
Pbus Earthing Err	Impedance of L-Ground fault	1. Check whether the Grounding line is connected correctly.
Eeprom Init Err	Eeprom initializing fault	1. Restart inverter or contact installers.
Bus & Batt Over Volt	Overvoltage fault of Bus and battery	1. Restart System and ensure whether the fault is existing.
Ig AD Check Err	Abnormal self-detection of Grid current	
BMS Over Volt	Battery overvoltage of BMS	1. Restart the battery and contact battery manufacture for handling if the fault still exists.
BMS Under Volt	Battery undervoltage of BMS	
BMS Over Temp	Battery overtemperature of BMS	
BMS Under Temp	Battery undertemperature of BMS	
BMS Dischg. Ov_C	Discharge overcurrent of BMS	
BMS Chg. Ov_C	Charge overcurrent of BMS	
BMS Internal	External fault of BMS	
BMS Imbalance	Battery unbalance of BMS	
Fail safe	CT or Meter failure	1. Confirm whether connection of meter or CT is correct.
Meter Comm Fail	Meter communication fault	1. Check whether the communication cable of meter is damaged. 2. Confirm whether DRM cable connection is realiable. 3. Check whetehr meter is damaged.
Can Comm Fail	Battery communication fault	1. Check whether the communication cable of meter is damaged.

Alarm Message	Failure description	Solution
Dsp Comm Fail	DSP communication fault	1. Restart DSP to ensure whether the fault is existing.
BMS Alarm	Alarm fault of BMS	1. Restart the Battery to ensure whether the fault is existing.
Batt Name Err	Uncorrespondence of battery select	1. Confirm whether selection of battery brand in inverter is consistent with the actual using battery.
Batt Name Err	Uncorrespondence of battery select	1. Confirm whether selection of battery brand in inverter is consistent with the actual using battery.
Heatsink Ntc Err	External temperature sensor failure	1. Check whether temperature sensor has been installed in the Laed-acid battery. 2. Check whether the NTC cable is connected to inverter correctly. 3. Restart system and comfirm whether the fault still exists.
Buck Boost Ov_C	Buckboost overcurrent	1. Restart system and comfirm whether the fault still exists.
AC Reverse	AC connected reversely	1. Check the cable polarity of AC side.
Lead-acid batt UTP	Undertemperature of lead-acid battery	1. Check whether the environment temperature of Lead-acid is in the normal range.
Lead-acid batt OTP	Overtemperature of lead-acid battery	1. Check whether the environment temperature of Lead-acid is in the normal range.

Table 7.1 Fault message and description

NOTE:
If the inverter displays any alarm message as listed in Table 7.1; please turn off the inverter and wait for 5 minutes before restarting it . If the failure persists, please contact your local distributor or the service center.

Please keep ready with you the following information before contacting us.

1. Serial number of MasterPower Inverter;
2. The distributor/dealer of MasterPower Inverter (if available);
3. Installation date.
4. The description of problem (i.e. the alarm message displayed on the LCD and the status of the LED status indicator lights. Other readings obtained from the Information submenu (refer to Section 3.10) will also be helpful.);
5. The PV array configuration (e.g. number of panels, capacity of panels, number of strings, etc.);
6. Your contact details.

8. Specifications

Model	S5-EO1P4K-48	S5-EO1P4K-48-P
Parallel Capability	No	Yes,10 units
Battery		
Rated Battery Voltage	Lithium/ Lead-acid	
Battery Type	40-60V	
Max. Charge / Discharge Current	100A	
Inverter Output		
Rated Output Power	4kVA/4kW	
Max. Output Power	4kVA/4kW	
Rated Output Voltage	230V±1%	
Rated Frequency	50Hz/60Hz±0.1%	
Max. Output Current	20A	
Surge Capacity	8kVA	
Output Voltage Waveform	Pure sine wave	
Transfer Time	10ms typical, 20ms Max	
THDv (@linear load)	<3%	
Peak Efficiency(PV-AC)	93%～95%	
Solar Charger		
Solar Chager Type	MPPT	
Recommended Max. PV Power	5kW	
Max. Input Voltage	500V	
MPPT Voltage Range	90-480V	
Full Load MPPT Voltage Range	171-480V	
MPPT Number / Max. Input Strings Number	1/2	
Max. Input Current per MPPT	26A*	
Max. Solar Charge Current	100A	
AC Charger		
Rated Input Voltage	230V	
Selectable Voltage Range	90-280V	
AC Frequnence Range	50Hz/60Hz(Auto sensing)	
Max. Input Current	26A	
Max. Input Power	6000W	
Max. AC Charge Current	60A	

8. Specifications

Model	S5-EO1P4K-48	S5-EO1P4K-48-P
Protection		
Output Over Voltage Protection	Yes	
Outout Over Current Protection	Yes	
Short Circuit Protection	Yes	
Surge Protection	Yes	
Temperature Compensation Protection	Yes	
Gerneral Data		
Dimension(H*W*D)	450*335*160mm	
Net Weight	TBD	
Relative Humidity	5% to 95% (Non-condensing)	
Operation Temperature Range	-10℃-60℃	
Storage Temperature Range	-25℃-60℃	
Ingress Protection	IP21	
Max. Operation Altitude	3000m	
Features		
DC Connection	Terminal Connectors	
AC Connection	Terminal Connectors	
Display	LCD	
Communication Interface	CAN, BMS, RS485, Dry-contact, Bluetooth, Optional: Wifi/GPRS	

8. Specifications

Model	S5-EO1P5K-48	S5-EO1P5K-48-P
Parallel Capability	No	Yes,10 units
Battery		
Rated Battery Voltage	Lithium/ Lead-acid	
Battery Type	40-60V	
Max. Charge / Discharge Current	100A	
Inverter Output		
Rated Output Power	5kVA/5kW	
Max. Output Power	5kVA/5kW	
Rated Output Voltage	230V±1%	
Rated Frequency	50Hz/60Hz±0.1%	
Max. Output Current	25A	
Surge Capacity	10kVA	
Output Voltage Waveform	Pure sine wave	
Transfer Time	10ms typical, 20ms Max	
THDv (@linear load)	〈3%	
Peak Efficiency(PV-AC)	93%～95%	
Solar Charger		
Solar Chager Type	MPPT	
Recommended Max. PV Power	5.5kW	
Max. Input Voltage	500V	
MPPT Voltage Range	90-480V	
Full Load MPPT Voltage Range	215-480V	
MPPT Number / Max. Input Strings Number	1/2	
Max. Input Current per MPPT	26A*	
Max. Solar Charge Current	100A	
AC Charger		
Rated Input Voltage	230V	
Selectable Voltage Range	90-280V	
AC Frequnence Range	50Hz/60Hz(Auto sensing)	
Max. Input Current	30A	
Max. Input Power	7000W	
Max. AC Charge Current	80A	

8. Specifications

Model	S5-EO1P5K-48	S5-EO1P5K-48-P
Protection		
Output Over Voltage Protection	Yes	
Outout Over Current Protection	Yes	
Short Circuit Protection	Yes	
Surge Protection	Yes	
Temperature Compensation Protection	Yes	
Gerneral Data		
Dimension(H*W*D)	450*335*160mm	
Net Weight	TBD	
Relative Humidity	5% to 95% (Non-condensing)	
Operation Temperature Range	-10℃-60℃	
Storage Temperature Range	-25℃-60℃	
Ingress Protection	IP21	
Max. Operation Altitude	3000m	
Features		
DC Connection	Terminal Connectors	
AC Connection	Terminal Connectors	
Display	LCD	
Communication Interface	CAN, BMS, RS485, Dry-contact, Bluetooth, Optional: Wifi/GPRS	

9. Appendix

9.1 System Description

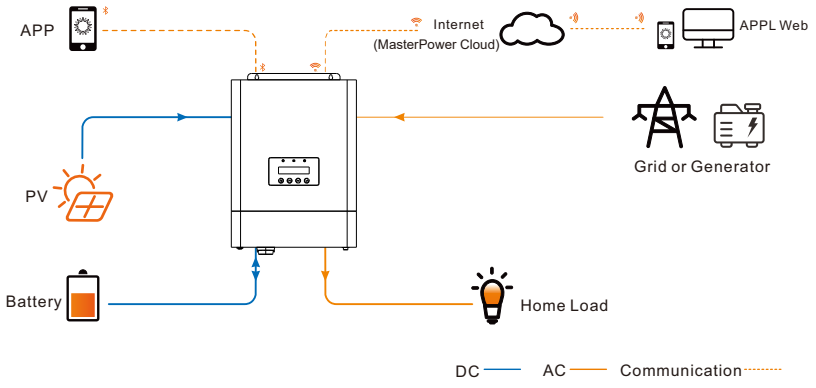


Figure 9.1 System connection diagram