Low Voltage Battery System
LV M05 - LV M30

User Manual

Thank you for purchasing our product.
Before using the unit, please read this manual carefully and keep it for future reference.

Version 2.0

About This Document

This document describes the installation, electrical connection, operation, commission, maintenance and troubleshooting of nRuiT Low Voltage Battery System. Before installing and operating nRuiT Low Voltage Battery System, ensure that you are familiar with product features, functions, and safety precautions provided in this document.

Symbol	Description
 WARNING	Indicates a potentially hazardous situation, if not avoided, could result in serious injury or death.

Contents

1. Product Overview

1.1 Intended Use

The entire nRuiT Low Voltage Battery System includes a PDU LV-PDU (Low Voltage Controller) and multiple Battery modules LV M05 (Battery Pack).
Each battery pack LV M05 consists of 100Ah cells which form 51.2 V voltage battery pack via 1 parallel and 16 serial connection (1P16S). Two to Six LV M05 can be connected in serial to extend the capacity and power of energy storage system.

nRuiT Low Voltage Battery System can be connected to hybrid inverter.

1.2 Appearance

1.2.1 LV-PDU (Low Voltage Controller)

The Low Voltage Controller is composed of DC breaker, Fuse and Communication Terminals. The appearance of the product is shown below.

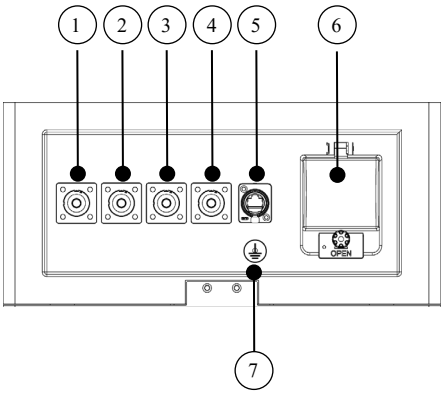


Fig 1.1: Schematic diagram of power panel

Location	Component	Function
1	Negative Terminal	Negative terminal to PCS (Max Current 125A)
2	Negative Terminal	Negative terminal to PCS (Max Current 125A)
3	Positive Terminal	Positive terminal to PCS (Max Current 125A)
4	Positive Terminal	Positive terminal to PCS (Max Current 125A)
5	Communication Port	RS485/CAN COM to PCS.
6	Power Breaker	Turn on / off PDU
7	⏚	Ground terminal

1.2.2 LV M05 (Battery Pack)

nRuiT Battery pack LV M05 consists of battery module (including cell and mechanical parts), Battery management system(BMS) as well as power and communication terminals. The product appearance is shown below.

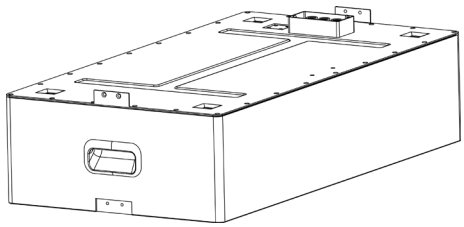


Fig 1.2: Dimension of LV M05
Dimension (unit: mm) 700*370*165

1.2.3 LV-PDU Battery Base

LV-PDU Battery Base consists of Mechanical base and connectors. The product appearance is shown below.

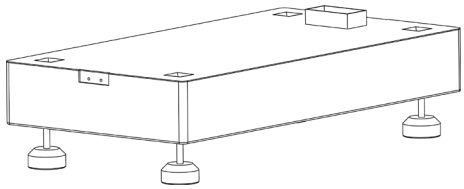


Fig 1.3: LV-PDU Battery Base
Dimension (unit: mm) 700*370*100

1.3 Working Principle and Function

The nRuiT Low voltage battery system is composed of a PDU LV-PDU and stackable LV M05 modules in parallel. It contains electrochemical batteries, battery modules, battery management system, power and signal terminals, and mechanical parts.

Compared with other battery systems, the nRuiT Low voltage battery system has better charging and discharging performance, more accurate status monitor, longer cycle life and less self-discharge loss.

A single cluster system can connect 2 to 6 packs in parallel to increase the capacity and power of the battery system. The entire battery system communicates with the inverter through CAN /RS485 communication, which ensures high operation stability.

- Monitoring: voltage, current and temperature detection of both single cells and battery system.
- Protection and Alarm: protect and alarm when over voltage, under voltage, over current, over temperature or under temperature occurs. See Appendix I for the details.

- Report: report all alarm and status data to PCS.
- Parallel connection: support two to six stackable battery packs with parallel connection.

2. Safety

When installing or using a battery system, the safety information contained in this section must always be followed. For safety reasons, it is the installer's responsibility to be familiar with this manual and all warnings before installation.

2.1 Basic Security

The battery system has been designed and tested in accordance with strict rules with international safety certification requirements. Before any installation or use of the battery system, please read all safety instructions carefully and always follow the relevant rules. nRuiT is not responsible for any consequences resulting from violation of the following regulations:

- Damage occurred during transportation.
- Incorrect transportation, storage, installation and use, or customer fails to convey the correct information about transportation, storage, installation.
- Non-professional installation.
- Failure to obey the rules of this operation instructions and safety precautions in this document.
- Unauthorized modifications or removal of the software package.
- The product's tamper label is damaged or the product lacks any parts (except authorized disassembly parts).
- Operation in extreme environments which are not allowed in this document.
- Repair, disassemble, or change packs without authorization and cause failure.
- Damage to shell labels or modifies date of production.
- Packs fail to be charge for more than six months.
- Damages due to force majeure (such as lightning, earthquakes, fire, and flood).
- Warranty expiration.

2.2 Safety Precautions

2.2.1 Environment Requirements

- Do not expose the battery to temperature above 50℃or heat sources.
- Do not install or use the battery in wet locations, area with moisture, corrosive gases or liquids, such as bathroom.
- Do not expose the battery to direct sunlight for extended periods.
- Place the battery in a safe place away from children and animals.
- Battery power terminals shall not touch conductive objects such as wires.
- Do not dispose of batteries in a fire, which may cause an explosion.
- The battery system shall not come in contact with liquids.

2.2.2 Operation Precautions

- Do not touch the battery system with wet hands.
- Do not disassemble the battery system without permission.
- Do not crush, drop or pierce the battery pack and PDU.
- Dispose of batteries according to local safety regulations.
- Store and recharge battery in accordance with this manual.
- Ensure the connection of ground wire reliable.
- Remove all metal objects such as watches and rings that could cause a short-circuit before installation, replacement and maintenance.
- The pack shall be repaired, replaced or maintained by skilled personnel that has been authorized.
- When storing or handling batteries, do not stack batteries without package.
- Do not break the battery. The released electrolyte may be toxic and harmful to the skin and eyes.
- Packaged batteries should not be stacked more than the specified number stipulated on the packing case.
- Do not use damaged, failed or deformed batteries, which may lead to high temperature or even dangerous accidents. Continued operation of the damaged battery may result in electrical shock, fire or even worse.

2.3 Warning Labels

Symbols	Description
	Do not dispose in trash
	Lithium-ion battery can be recycled
	Electric shock hazard
	May leak corrosive electrolyte
	Heavy enough to cause severe injury
	Keep the Pack away from children
	Do not expose to fire
	Operate as the Manual

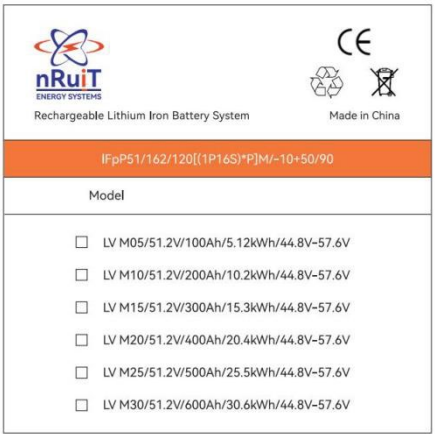


Fig 2.1: Nameplate

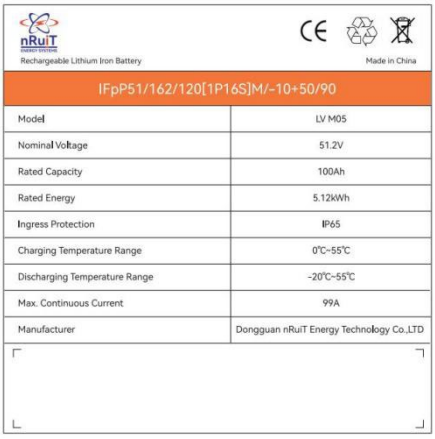


Fig 2.2: Nameplate

Fig 2.3: Label

NOTICE

The performance will be limited when the temperature is below 0 ℃.

2.4 Emergency Responses

The manufacturer takes foreseeable risk scenarios into consideration during the design process to minimize hazards and dangers. However, if any of the following situation occurs, please follow the instruction provided.

Situation Occurs	Description and action need
Leakage	Avoid touching any leaking liquid or gas. If you come into contact with the leaking electrolyte, please follow the instructions immediately. Inhalation: Evacuate the contaminated area and seek medical help. Eye contact: Rinse eyes with flowing water for 15 minutes and seek medical help. Skin contact: Rinse contacted area thoroughly with soap and water and seek medical help. Ingestion: Vomiting and seek medical help.
On fire	It's highly unlikely for the battery system to ignite spontaneously. If the battery has caught a fire, do not try to extinguish the fire but evacuate people immediately.
Wet Packs	If the battery system is soaked or submerged in water, do not access it. Contact your supplier for technical assistance.
Damaged shell	Damage to the shell is very dangerous, so special attention must be paid. They are no longer suitable for use and may be dangerous to personnel. If the battery case is damaged, please stop using it and contact your supplier for technical assistance.

3. Storage and Transportation

3.1 Storage Requirements

- Place the product following the identification on the packing case during storage.
- Do not put the product upside down or sidelong.
- The defective product needs to be separated from other products.
- The storage environment requirements are as follows:
  - Place the product in a dry, clean and well-ventilated place.
  - The storage temperature for a short period (7 days) is between -20℃ to 50℃.
  - If you store the product over a long period of six months, the storage temperature is between -20℃ to 40℃, relative humidity: 5%~95%RH.
  - Place the product away from corrosive and organic substances (including gas exposure).
  - Avoid direct exposure to sunlight and rain.
  - Maintain a minimum distance of two meters from heat sources (such as a radiator).
  - Avoid exposure to intensive infrared radiation.
- If the battery is stored for more than six months, the battery pack shall be recharged to 50% SOC every six months using a charger.


NOTICE

If not follow the above instructions for long-term storage, the battery cycle life will be reduced or even damaged.

3.2 Transportation Requirement

Battery pack has been certified in UN38.3.

Battery pack is classified as category 9 dangerous goods.

- The battery pack shall not be transported with other inflammable, explosive or toxic substances.
- Ensure the original Package and label complete and recognizable.
- Prohibit direct exposure to sunlight, rain, condensing water caused by temperature difference and mechanical damages.
- Prohibit to pile up more than six battery packs.
- There will be a drop in capacity during transportation and storage.
- Transportation temperature should be between -20℃ to 40℃, relative humidity: 5%~95%RH.

4. Installation

WARNING

- The installation and use of batteries involve a lot of expertise. Therefore, please ensure that technicians have obtained relevant technical certificates before operation.
- Ensure to read the Guidance before installation in order to understand product information and safety cautions.
- Operators should be well-trained technicians and fully understand the whole photovoltaic system, grid network, battery system, working principle as well as national and regional standards.
- Installers must use insulating tools and wear safety equipment.
- Device damages caused by failure to comply with storage, transportation, installation and use requirements specified in Guidance are not covered by Warranty.
- Do not install or use batteries near explosive or inflammable substances.
- Use battery in well-ventilated environment with temperature ranging from -10℃to 50 ℃.
- Maintain a minimum level of dust and dirt in the environment.
- Do not install battery in highly humid area such as bathroom.
- Please make sure that all battery packs connected in parallel are from the same batch, the same model and the same manufacturer. Do not mix old batteries with new batteries. A battery pack that does not exceed 300 cycles is defined as a new battery.

NOTICE

- Before installing the battery packs in parallel, make sure the battery pack has two LEDs on with SOC 50% or all the battery has been charged to 100% with 4 LEDs on.
- When installing the batteries, we recommend that the manufacturing date of batteries in the same system should be within 3 months. The manufacturing date of batteries can be interpreted through the bar code. (Refer to Appendix 1)

4.1 Installation Environment

The battery system can be installed indoors or outdoors. The battery system should be installed on the ground. The following conditions are allowed:

Do not place the battery pack upside down. Please note the distance between batteries.

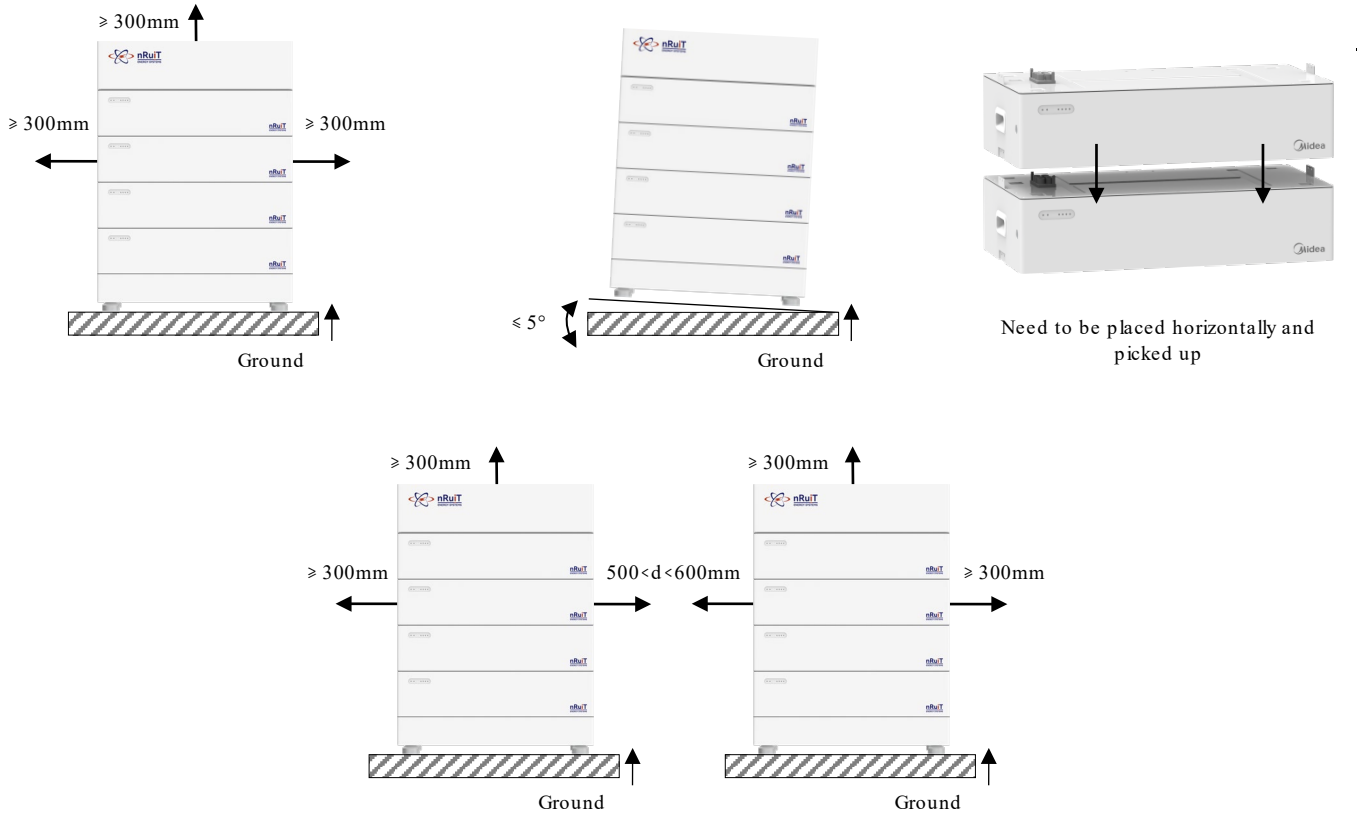


Fig 4.1: Acceptable floor standing installation

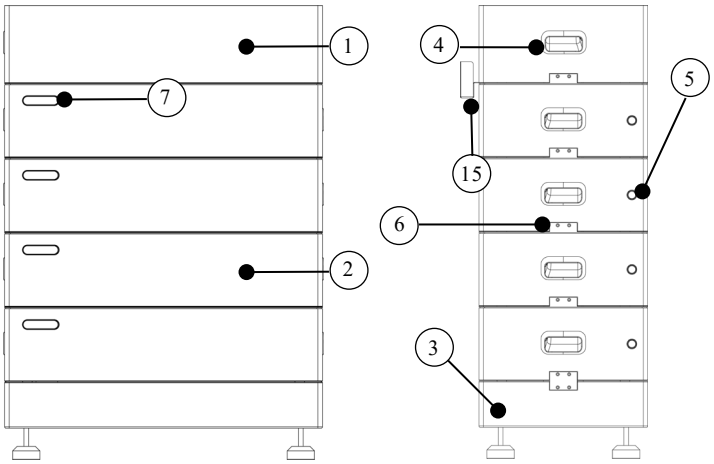
When installing outdoors, it is necessary to install sunshades and rain shelters to avoid direct exposure to sunlight and rain.

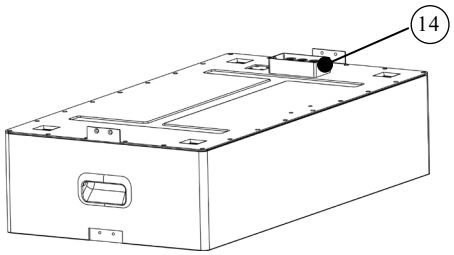
Fig 4.2: Sunshades and rain shelters

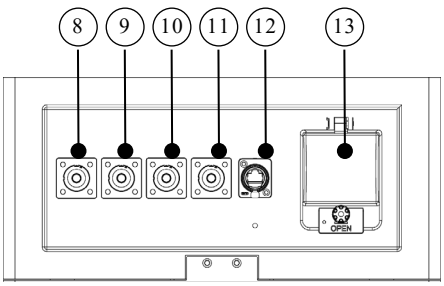
NOTE

- Due to product version upgrades or other reasons, the content of this document will be updated from time to time. Please contact your supplier for the latest user manual version.
- Before installing the device, please read the user manual carefully to understand product information and safety precautions.
- All installation operations of the equipment must be carried out by well-trained professional electrical technicians. Operators must wear personal protective equipment.
- Before installing the equipment, please check whether the delivery is complete, and whether there is any obvious external damage according to the "Package List". If anything is missing or damaged, please contact your supplier.
- Equipment damage caused by failure to operate according to the document is not covered by the equipment warranty.

4.2 Product Introduction







① LV - PDU

② LV - Battery Module

③ LV - Base

④ Module handle

⑤ Module Power Switch

⑥ Module Connecting PAD

⑦ LED Light

⑧ PCS negative interface (BAT-) 1

⑨ PCS negative interface (BAT-) 2

⑩ PCS positive interface (BAT+) 1

11 PCS positive interface (BAT+) 2

12 PCS Communication Port (CAN/RS485)

13 DC Master Switch

14 Module connection interface (BAT+/BAT-)

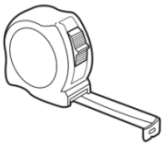
15 Wall fix bracket

4.3 Installation Tools and Precautions

WARNING

Before drilling, please make sure to avoid the pre-buried water pipe and electricity lines in the wall to avoid danger.

The following tools are required to install the battery system.

 Drill	 Screwdriver	 Wrench
 Pencil	 Tap Measure	 Multimeter

It is recommended to wear the following safety gear when dealing with the battery system.

 Insulated Glove	 Safety Goggle	 Safety Shoes

NOTE

- The package is delivered with M6×60 expansion bolts. If the length or quantity cannot meet the installation requirements, please prepare M6 stainless steel expansion bolts.
- The expansion bolts provided with the box are mainly used for solid brick-concrete structure walls. If you choose other types of installation walls, please ensure that the load-bearing requirements of the battery are met, and choose installation bolts yourself.
- In residential areas, do not install the battery on plasterboard walls or similar poorly sound-insulated walls, so as to avoid disturbing the residents in the living area by the noise it emits during operation.

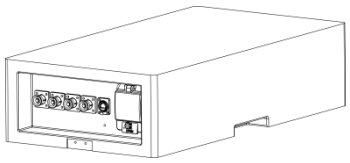
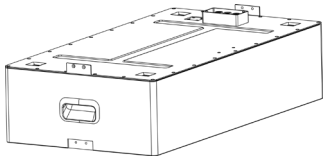
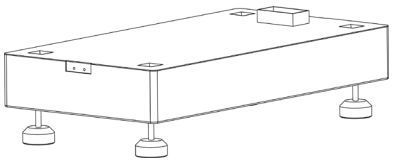
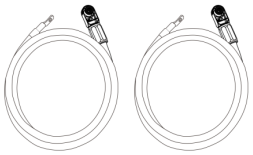
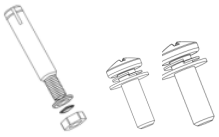
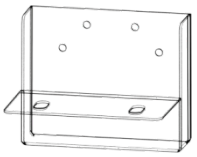
- Just loosen the nut, flat washer and spring washer of the lower expansion bolt properly, and there is no need to unscrew them all.

4.4 Installation Procedures

4.4.1 Pre-installation Check

- Check the PACK package before opening it. If any abnormity is detected, do not open the Package and contact your supplier.
- Check the Power. Check and confirm the pack is powered off before installation.
- Check the quantity of all parts inside according to the package list. If there is any part missing or damaged, please contact your supplier.

4.4.2 Check the list of ME LV ESS

 LV - PDU	 LV - Battery Module	 LV - Base
 Support Feet ×4	 Power Cable x2 (Battery to PCS - 1.5m)	 COM Cablex1
 Package List ×1 Operation Manual ×1 Warranty Card ×1	 M6 Explosive screw ×2 M6×10 Combination screw ×2	 Wall fix bracket ×1

4.4.3 Installation Environment

The ambient temperature for the installation of the battery system shall be above -10℃, below 50℃, and the humidity shall between 5% and 95%.

Max.+50℃

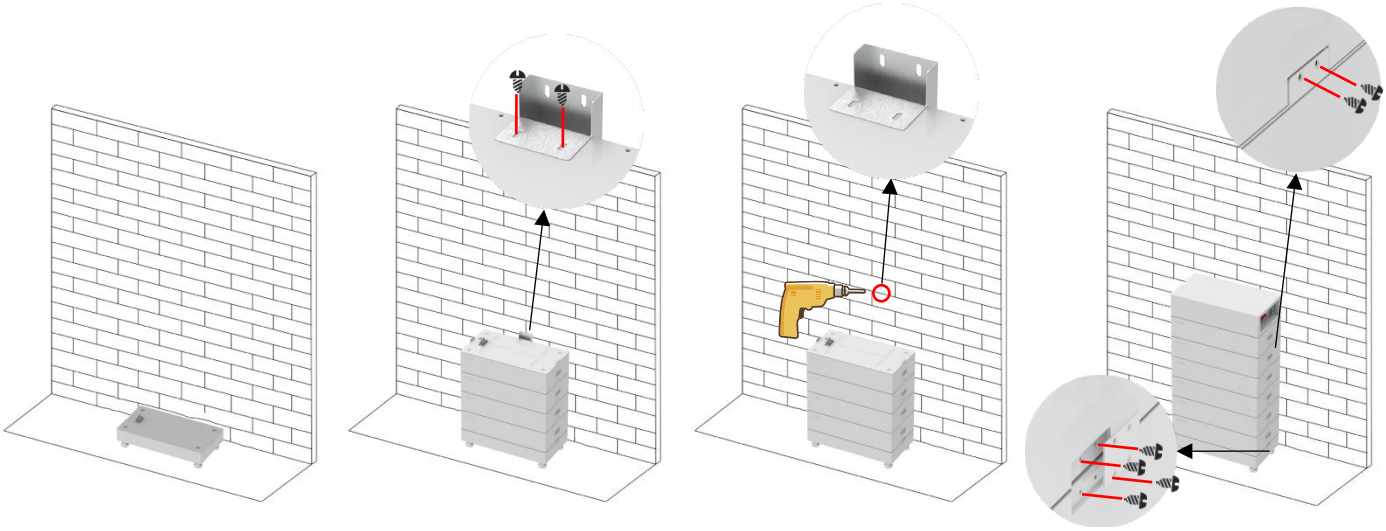
Min.- 10℃

RH.+5%~+95%

4.4.4 Floor Standing Installation

WARNING

Before drilling, please make sure to avoid the pre-buried water pipe and electricity lines in the wall to avoid danger.



WARNING

Need to be placed horizontally and picked up

Step 1: Connect the 4 supporting feet to the base, place the base in the area to be installed.
Step 2: Stack the battery modules on the base one by one. Pay attention to the connection between the modules need to be inserted horizontally.
Step 3: Choose an alloy drill with a diameter of 10mm, and drill a mounting hole at least 60mm deep on the wall. Insert the expansion tube into the hole and tighten the screws to fix the wall fix bracket.
Step 4: Place the PDU on top.
Step 5: Connect the connecting pieces between all the modules and lock the screws.
Step 6: Check all the screws to make sure the battery does not shake.

WARNING

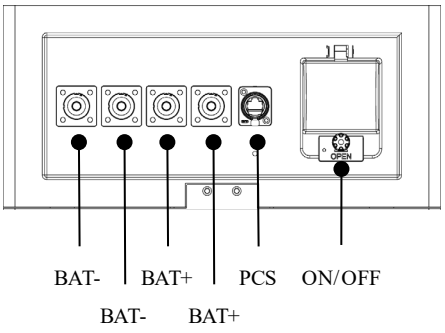
- The module base needs to be installed to use more than one battery.
- The PDU needs to be installed on the top module. Once the number of battery modules exceeds 6, a new base and PDU need to be added to form a new cluster.
- Do not forget to wear ESD wrist strap and gloves, safety gloves and goggles.

4.5 Electric Wiring Connection

- The battery is not allowed to be installed in the running state. Turn off the system power before installation.
- To ensure system security, do not forget to install ground wire.
- Don't forget to connect the communication plug of the last battery pack, otherwise it will cause system failure.
- When installing in two rows, please purchase the extended serial cable and RJ45 HUB box.

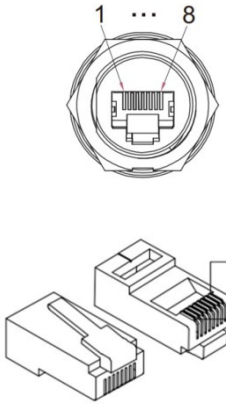
WARNING

Do not forget to wear ESD wrist strap and gloves, safety gloves and goggles.



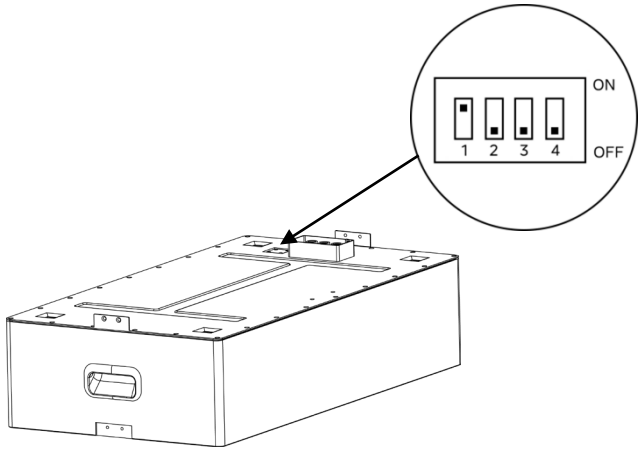
- When the power wiring harness is connected, please pay attention to the positive and negative terminals. The red terminals are connected to the positive terminals and the black terminals to the negative terminals.
- The PCS communication terminal is used to communicate to the PCS.
- For the breaker between PCS and LV ESS, we recommend using molded case circuit breaker with rated working voltage greater than 100V and rated working current greater than 250A.

4.5.1 Definition of RJ45 Communication Port Pin

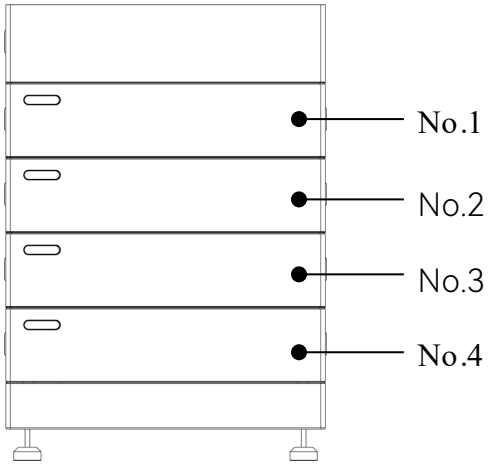
Item	Crystal head picture	Serial no.	Definition
PCS		1	RS232_RX
		2	RS232_TX
		3	RS232_GND
		4	CAN_H
		5	CAN_L
		6	RS485_GND
		7	RS485_A
		8	RS485_B

4.5.2 Address Button Setting

- When install the stackable battery packs, please set the address button as below.
- Open the cover and set the address and put back the plate with screws.
- Then put the No.1 battery pack with address '1' on the top. Then No.2 battery pack with address '2', No.3 battery pack with address '3', and No.4 battery pack with address '4' with LV Base as below.



The address sequence as below. The battery pack with address '1' should be on the top.



Address	Switch Position			
	#1	#2	#3	#4
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

4.5.3 System Connection Diagram

NOTE

- When connecting the power line, it must be the same color terminal to connect, otherwise there may be dangers such as short circuit.
- A DC circuit breaker has been installed in the PDU. If you want to install a DC circuit breaker between the battery system and the PCS, you need to purchase it yourself according to the following specifications:
  a. Voltage: 100Vdc
  b. Current: 250A

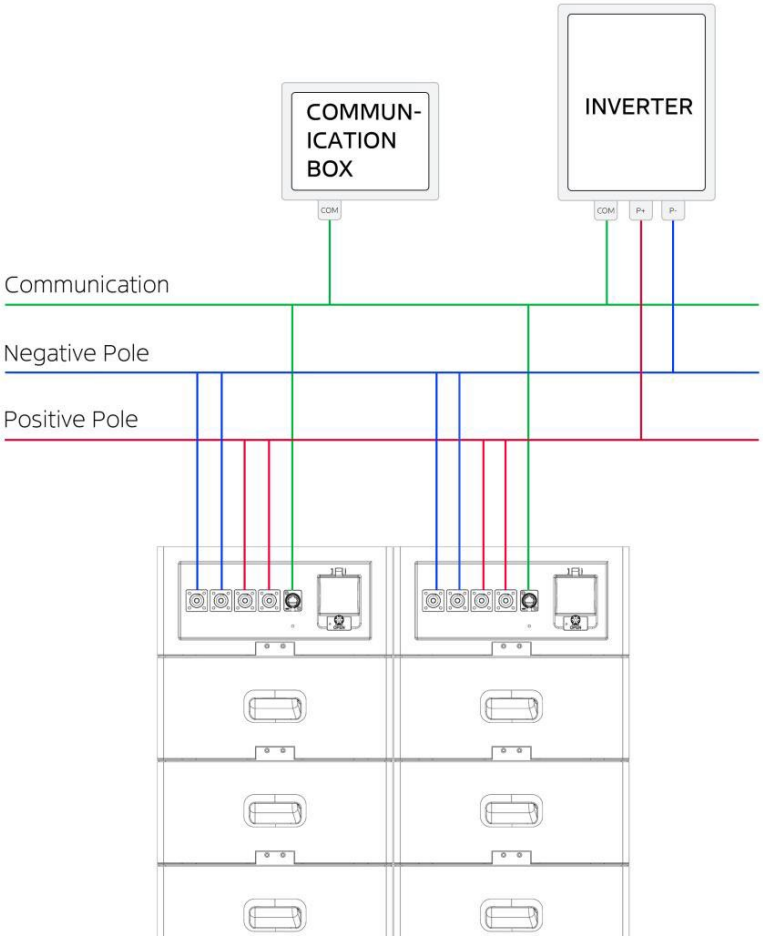


Fig 4.3: Two lines installation

NOTE

- The battery is not allowed to be installed in the running state. Turn off the system power before installation.
- To ensure system security, do not forget to install ground wire.
- Do not forget to connect the communication plug of the PDU, otherwise it will cause system failure.
- When installing in two rows, please purchase the extended serial cable and junction HUB box.
- The cable connecting PCS can be purchased from supplier.

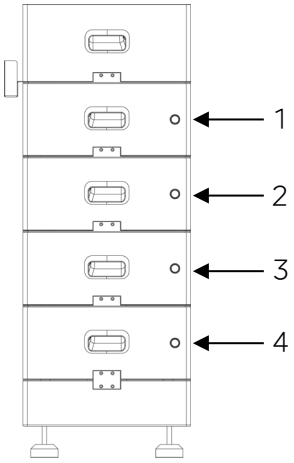
5. Power On/Off Battery System

WARNING

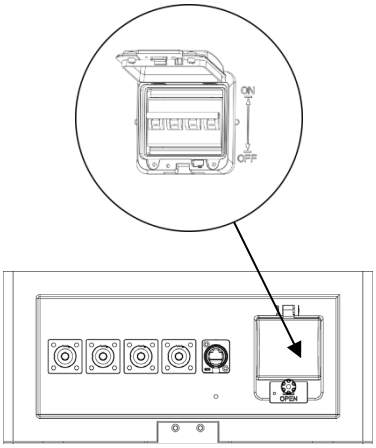
Before turning on the battery, please check if the cable is properly connected.

- The installation and use of batteries need to be operated by professional technicians.

- Do not contact any positions with potential difference.
- Prohibition sign should be hung on the battery: "non-professionals, do not touch".
- If any abnormalities occur during the startup phase, power off the system immediately. After problem confirmed, proceed again.
- Make sure the inverter is turned off before checking the battery system.



Open from top to bottom (1-6) according to the number of battery modules.



Turn the DC breaker to "On/Off" to turn On/Off the entire battery system.

Power on the battery system by pressing breaker to ON		
Serial no.	Procedures	Acceptation criteria
1	Power cable	Make sure the power cable is well connected and not loose.
2	Communication Line	Make sure the communication cable is connected and not lo ose.
3	On/off battery system	Switching sequence: Turn on the independent switch of each battery module, and turn it on from top to bottom. Turn on the main switch of the PDU module.
4	Make sure all the breaker is ON	1. If both RUN and SOC lights turn on normally, the system is powered on successfully. 2. If ALM light turns red, there is a failure and should solve it before power on again.

6. Maintenance Guide

6.1 Preparation

Before maintenance, please make sure that the battery system is powered off with the DC circuit breaker in off.

6.2 Battery Pack or PDU Replacement

- Wear safety gloves.
- Turn off the breaker and power off the battery system.
- Disconnect power lines and CAN communication lines of the battery system.
- Uninstall the safety screws on both sides of the battery pack or PDU. Lift up the battery pack or PDU.
- Put the battery pack or PDU into the packing box according to the repair procedure and transport the battery pack or PDU to the designated repair site.
- Install new battery pack or PDU based on procedure specified below:

NOTICE

- Before replacing the battery, use the charger to charge the new battery and the existing battery to full (SOC 100%).
- If the battery is not used, it is recommended to charge and discharge the battery every 3 months to activate the chemical characteristics, and the maximum interval shall not exceed 6 months.

6.3 System Failure Information and Troubleshooting Suggestions

Error Indication ALM	Error Description	Error cause	Suggested actions
● (ALM Light Flickers)	Discharge under voltage protection	Single cell voltage below the threshold for under - voltage protection	There is over discharge risk. User should stop discharging and arrange recharge.
	Charge over voltage protection	Single cell voltage exceeding threshold for protection threshold	1. There is no safety threat. 2. User should stop charging. Wait for the battery system to automatically resolve the fault.
	High temperature protection	The temperature exceeds the protection value	It is dangerous. Please stop using the battery immediately, and wait for the battery temperature to drop. The fault will be automatically resolved.
	Low temperature protection	The temperature is below the protection value	No safety risk. Wait for the temperature to rise, the fault will be automatically resolved.
	Discharge short circuit	External short circuit of battery system	There is safety risk and user should stop using battery. User should contact installer to repair PCS and battery.
	Precharge short circuit		

	Precharge overtime		
	Voltage sampling anomaly protection	BMS Voltage sampling failure	There is safety risk and user should stop using battery. User should contact installer to repair battery.
	Current sampling fault	BMS Current sampling failure	
	Main circuit fault	BMS Main power circuit failure	There is safety risk and user should stop using battery. User should contact installer to repair battery.
	Interior Communication failure	Communication loss between two packs	1. Check whether the communication and battery pack are connected OK. 2. Check whether the communication line between the PDU and the battery pack is connected OK.
	External CAN Communication failure	Communication loss between PCS and battery system	1. There is no safety threat and user should stop using battery. 2. Check if PCS and battery communication terminal is well connected. 3.If PCS and battery system cannot communicate when the communication wire is confirmed well connected, user should contact installer to repair battery.

7. Technical Specification

7.1 System Data

System Model	LV M05	LV M10	LV M15	LV M20	LV M25	LV M30
Module Number	1	2	3	4	5	6
Nominal Energy	5.12kWh	10.2kWh	15.3kWh	20.4kWh	25.5kWh	30.6kWh
Max Power	5kW	10kW	10kW	10kW	10kW	10kW
Rated Capacity	100Ah @25℃	200Ah @25℃	300Ah @25℃	400Ah @25℃	500Ah @25℃	600Ah @25℃
Nominal Voltage	51.2V					
Voltage Range	44.8V~57.6V					

Dimensions (mm)	700/370/478	700/370/651	700/370/824	700/370/997	700/370/1170	700/370/1343
Weight	74.9kg	124.2kg	173.5kg	222.8kg	272.1kg	321.4kg
Rated current	50A	100A	150A	200A	200A	200A
Max continuous current	99A	198A	200A	200A	200A	200A
DoD	90%					
Operating ambient temperature	-10℃~50℃					
RTE	≥95%					
Battery pack in parallel	Maximum support 6 units in parallel, parallel voltage difference △V≤0.5V					
Humidity	5%~95%					
Storage temperature	- 20℃~50℃/7 days; -20℃~40℃/6 months; 95%RH					
Cooling method	Natural cooling					
Installation	Floor stacking installation					
Altitude	≤2000m					
Communication method	CAN (to PCS)					
Certified product	IEC62619 / IEC60730 / UKCA / CE					
Transport certification	UN38.3					
IP rating	IP65					
Environmental requirements	RoHS, Reach					

7.2 LV-PDU

No.	Items	Specification
1	Model	LV-PDU
2	Input/output voltage range	40~58.4V
3	Max continuous current	200A
4	Operating ambient temperature	-10~50℃
5	IP rating	IP65
6	Communication method	CAN2.0 / RS485
7	Dimensions (W/D/H)	W700*D370*H170mm ±2mm
8	Weight	10.7±0.2kg
9	Certification	CE-EMC
10	Environmental requirements	RoHS, Reach


NOTICE

- Method for calculating rated capacity
  Rated capacity of the measured module: 100 Ah
  Number of modules connected in parallel: 2~6
  Calculated rated capacity (Ah) = 100 Ah *1 =100Ah

- The performance will be limited when the temperature is below 0℃.

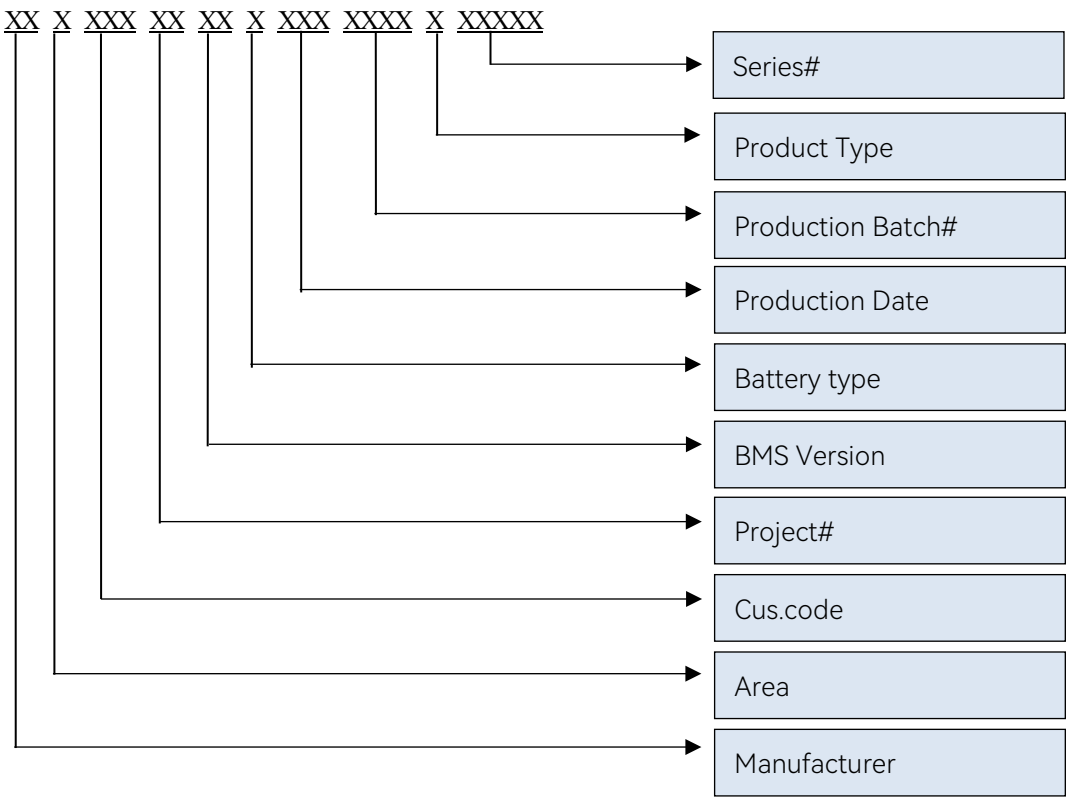
7.3 LV M05

No.	Items	Specification
1	Battery pack module	LV M05
2	Rated Capacity/Energy	100Ah/5.12kWh
3	Nominal voltage	51.2V
4	Operating voltage	44.8V – 57.6V
5	Max continuous current	99A
6	Battery type	Cobalt Free Lithium Iron Phosphate (LFP)
7	Operating ambient temperature	-10~50℃
8	Storage conditions	-20℃~50℃/7 days, -20℃~40℃/6 months, 95%RH
9	Cooling	Natural cooling
10	Dimension (W/D/H)	W700*D370*H165 mm ±2mm
11	Weight	49±1kg
12	Installation	Floor standing installation with Base
13	Ingress protection	IP65
14	Cell safety certification	IEC62619/IEC60730
15	safety certification	IEC62619/IEC60730/CE/UKCA
16	Transportation test standard	UN38.3
17	Environmental requirements	RoHS/REACH
18	Battery designation	IFpP51/162/120[1P16S]M/-10+50/90

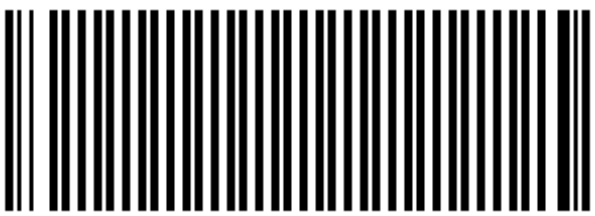
Appendix I

Barcode coding rules

Bar code number position:



1. The 1st and 2nd digits indicate the nRuiT Manufacturer code.
2. The 3rd digit indicates the Area code.
3. The 4th to 6th digits indicate the Cus. code.
4. The 7th and 8th digits indicate the Project#.
5. The 9th and 10th digits indicate the BMS Version.
6. The 11th digit indicates the Battery type code.
7. The 12th to 14th digits indicate the Production Date.
8. The 15th to 18th digits indicate the Production Batch#.
9. The 19th digit indicates the Product Type.
10. The 20th to 24th digits indicate the Series#.



NROA110103BD22NR1A000000

Appendix II

LED indication Control Mechanism

<table>
<tr><th colspan="8">LED light definition</th></tr>
<tr><td rowspan="2">Status</td><td rowspan="2">Items</td><td>ALM</td><td>RUN</td><td colspan="4">SOC indication</td><td rowspan="2">Remark</td></tr>
<tr><td>LED1</td><td>LED2</td><td>LED3</td><td>LED4</td><td>LED5</td><td>LED6</td></tr>
<tr><td rowspan="4">Charge SOC</td><td>0%-25%</td><td></td><td rowspan="4">RUN light is always on</td><td>(Blink 2)</td><td></td><td></td><td></td><td></td></tr>
<tr><td>26%-50%</td><td></td><td>●</td><td>(Blink 2)</td><td></td><td></td><td></td></tr>
<tr><td>51%-75%</td><td></td><td>●</td><td>●</td><td>(Blink 2)</td><td></td><td></td></tr>
<tr><td>76%-100%</td><td></td><td>●</td><td>●</td><td>●</td><td>(Blink 2)</td><td></td></tr>
<tr><td rowspan="4">Discharge SOC</td><td>100%-76%</td><td></td><td rowspan="4">RUN light is blink 3</td><td>●</td><td>●</td><td>●</td><td>●</td><td></td></tr>
<tr><td>75%-51%</td><td></td><td>●</td><td>●</td><td>●</td><td></td><td></td></tr>
<tr><td>50%-26%</td><td></td><td>●</td><td>●</td><td></td><td></td><td></td></tr>
<tr><td>25%-0%</td><td></td><td>●</td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="6">Protection</td><td>Over charge protection</td><td>OFF</td><td>●</td><td>●</td><td>●</td><td>●</td><td>●</td><td></td></tr>
<tr><td>Over current protection</td><td>●</td><td rowspan="5">OFF</td><td colspan="4" rowspan="5">OFF</td><td></td></tr>
<tr><td>Over-temperature protection</td><td>●</td><td></td></tr>
<tr><td>Lose efficacy protection</td><td>●</td><td></td></tr>
<tr><td>Short circuit protection</td><td>●</td><td></td></tr>
<tr><td>Reversed protection</td><td>●</td><td></td></tr>
</table>

	Under voltage protection	OFF			
	Charge alarm	(Blink 3)		Indicator by power (The highest power indicator LED blinks 2)	
	Discharge alarm	(Blink 3)	(Blink 3)	Indicator by power	
	Charge normal	OFF		Indicator by power (The highest power indicator LED blinks 2)	
	Discharge normal	OFF	(Blink 3)	Indicator by power	

LED Flashing Specification		
Flashing Mode	Blink	Extinguish
blink 1	0.25S	3.75S
blink 2	0.5S	0.5S
blink 3	0.5S	1.5S

nRuiT Warranty Policy

nRuiT LV Residential ESS

This Limited Warranty (hereinafter referred to as "Warranty") specified below is applicable to nRuiT LV residential ESS (Models: nRuiT LV M05, LV M10, LV M15, LV M20, LV M25, LV M30) provided by Dongguan nRuiT Energy Technology Co, Ltd. (hereinafter referred to as "nRuiT" or "Seller") to End-user (hereinafter referred to as "Buyer") through nRuiT or Authorized Reseller.

1. Purpose

"The main objective of this warranty policy is to provide a clear understanding of the matters related to the warranty of our products."

2. Warranty Condition

nRuiT warrants that, under normal use, the Product will be free from defects in material and workmanship in accordance with its applicable technical specifications.

2-1. Warranty Start Date

Generally, Warranty Start Date is the installation date, which is written on the warranty card. Alternatively, the buyer can provide written documents such as a receiving note to indicate the Delivery Date - the time when the product was delivered to the installation site and operated for the first time.
If the buyer cannot provide the above documents to prove the "Installation date" or "Delivery Date", the Warranty Start Date will be the first day after six (6) months from the Production Date of the Product (date written on the product SN label).

2-2. Limited Product Warranty

nRuiT warrants that the Product will be free from defects in materials or workmanship for five (5) years from Warranty Start Date, subject to the exclusions and limitations set out below.

2-3. Limited Performance Warranty

A. nRuiT warrants that the Product will (i) retain sixty percent (70%) of its Usable Energy for ten (10) years from the Warranty Start Date, or (ii) reach the Minimum Throughput Energy, whichever comes first, on the condition that the Product is operated in a normal manner that adheres to the manual guidelines provided by nRuiT.

B. The Minimum Throughput Energy means the total output energy of the product recorded in the control module of the Product.

C. The Usable Energy and Minimum Throughput Energy for each product Model are set in the table below.

Product Model	Usable Energy (kWh)	Minimum Throughput Energy (MWh)
LV M05	5.12	15.87
LV M10	10.24	31.74
LV M15	15.36	47.61
LV M20	20.48	63.48
LV M25	25.6	79.36
LV M30	30.72	95.23

D. For this Limited Warranty,the remaining Usable Energy is as measured and calculated using the following testing method and values, while the ambient temperature is between 25 to 28℃.

1. Discharge the battery with constant current until the battery reaches End of Discharge Voltage of its self-protective voltage.
2. Wait for 10 minutes.
3. Charge the battery with constant current and constant charge voltage to its full capacity.
4. Wait for 10 minutes.
5. Discharge the battery with constant current until it reaches End of Discharge Voltage of its self-protective voltage. Record the current, voltage, and time.
6. The remaining Usable Energy is the integral of discharge time and current multiplied by voltage. Test Value list as below:

Product Model	End of Discharge Voltage (V)	Constant Charge voltage (v)	Constant Current (A)
LV M05	44.8	57.6	20
LV M10	44.8	57.6	20
LV M15	44.8	57.6	20
LV M20	44.8	57.6	20
LV M25	44.8	57.6	20
LV M30	44.8	57.6	20

nRuiT provides two methods of Warranty if the product operation does not meet the technical specifications during the free Warranty period: (I) Repair the nonconforming or defective products, or (II) provide the buyer with replacement parts. nRuiT shall be responsible for all reasonable repair or replacement costs associated with such non-conforming or defective products, however, the buyer shall bear the cost of removing the defective products and re-installing the repaired or replacement products.

2-4. Limitation of Warranty Scope

nRuiT's liability under this Warranty shall be limited to replacement, repair, refund and compensation. Replaced or repaired Products shall be warranted for the remainder of the original Term of Warranty. In any event, the replacement shall not justify the automatic renewal or extending of the term of Warranty.

2-5. Exclusion of Warranty

Damage to the Products resulting from any of following activities is NOT covered by this Limited Warranty:

- The warranty period has expired.
- Improper transportation, storage, installation or wiring of the product.
- Modification, alteration, disassembly, repair works or replacements by someone other than personnel certified by nRuiT.
- Noncompliance with nRuiT's official installation, user guide and / or maintenance instructions.
- External influences, such as power failure surge, lightning, flood, fire, accidental damage or other events beyond nRuiT's control.
- Use of non-specified and / or incompatible components like batteries, inverters, rectifiers or PCS.

- Any damage to the product caused by goods / other products (including any part) incorporated, installed or used together with the products.
- No report to nRuiT or nRuiT authorized service partners within 2 weeks after product failure.
- Product defects due to the updating of national or regional laws and regulations.
- When the product is sold to the end user, the defects cannot be overcome under the technical conditions.
- The user fails to provide the correct product serial number or the product serial number cannot be decoded or modified without nRuiT's permission.
- When the product is turned off, it does not meet the storage requirements.

2-6. Warranty Service

The buyer shall contact the installer directly to avoid additional problems with the product.
Note: in shutdown mode, the product cannot protect itself from self-discharge.

3. Out of Warranty Policy

Products damage which is not caused by seller, nRuiT shall provide charged service, including all the expenses of such as material cost, labor cost, warehouse cost, transportation cost, customs duties, analysis cost, management overheads, disposal expense (If necessary) and so on.

4. About Service Products/Parts

Service products/parts are able to be used as new or refurbished condition which performance is equal to or higher than defective Products and guaranteed by nRuiT.
In the event the Products are not available in the market anymore, nRuiT, at its option, ma y replace it with different kind of product with equivalent functions and performances.

5. Product Recycling Service

Customers are provided with product recycling services after the end of product life cycle by nRuiT. The judgment condition at the end of the life cycle is that the existing maximum capacity of the product is less than or equal to 70% of the nominal capacity of the product.

6. Claim Payment Policy

Returns of any products will not be accepted unless nRuiT authorizes them in writing in advance. The written authorization shall include the product model name, defect and / or fault description, serial number on the product label on the back of the product and the installation date.

Buyers who are unable to contact the local authorized reseller f rom whom the Product was purchased should contact nRuiT by send mail to service@nruit-power.com
Note: Before returning any product to nRuiT please contact nRuiT by email.

7. Contact nRuiT

nRuiT Service Email : service@nruit-power.com
nRuiT Service Hotline:
Headquarters (China): +86 0769 28823662

8. Applicable Law

The Warranty is subject to the law of the region sold. Products come with guarantees that cannot be excluded under the local Law. The Buyer is entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. The Buyer is also entitled to have the goods repaired or replaced if the Products fail to be of acceptable quality and the failure does not amount to a major failure. The benefits to the consumer given by the warranty are in addition to any other rights and remedies of the consumer under a law in relation to the goods or services to which the warranty relates. This Warranty only applies to the Buyer who have purchased the Products for their own use.

S/N Code:

The installation date: _____
User's Signature: _____
Installation contractors: _____

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