BSL NEW ENERGY TECHNOLOGY CO., LTD

USERS MANUAL

Low Voltage Integrated ESS

PowerNest Series

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Versions

Edition	Date	Version update records	Approval
V1.0.0	2024-12-17	First editions	

Catalogue

01 Safety Note

1.1 Safety Symbol Description

Please read this manual first and follow all safety precautions indicated on the equipment and in this manual when installing, operating and maintaining the equipment. To ensure better use of this product and personal and property safety, please read carefully the following symbol prompts.

Danger: indicates a high potential risk that will result in death or serious injury if not avoided.

Warning: indicates moderate potential danger, if not avoided, could result in death or serious injury.

Note: indicates a low potential hazard that, if not avoided, could result in moderate or minor injury to personnel.

Explain: Emphasis and supplementation of content may also provide techniques for optimizing the use of products.

1.2 General Safety

Explain:

This equipment should be used in an environment that meets the design specifications, otherwise it may cause equipment failure, and the resulting abnormal equipment function or damage to parts, personal safety accidents, property damage, etc. are not covered by the equipment quality warranty. Local laws, regulations and codes should be observed when installing, operating and maintaining the equipment. The safety precautions in this manual are only supplementary to local laws, regulations, and codes. The Company shall not be liable in the event of any of the following.

1. Installation and use of the environment beyond the provisions of the relevant international, national and regional standards.
2. Do not run in the use conditions described in this manual.
3. Unauthorized disassembly, change the product or modify the software code.
4. Failure to operate the product in accordance with the operating instructions and safety warnings in the product and documentation.

5. Damage to the equipment caused by abnormal natural environment (force majeure, such as earthquakes, fires, windstorms, floods, mudslides, etc.).
6. The customer did not follow the transportation and installation requirements resulting in damage.
7. Storage conditions do not meet the product documentation requirements caused by damage.
8. Due to customer negligence, incorrect operation or intentional damage to the equipment hardware or data damage.
9. Damage to the system caused by a third party or the customer, including damage caused by relocating and installing the system that does not meet the requirements of this manual, as well as adjusting, changing or removing identification marks that do not meet the requirements of this manual.
10. Defects, failures or damages caused by acts, events, negligence or accidents beyond the Seller's reasonable control, including power outages or electrical failures, theft, war, riots, civil commotion, terrorism, willful or malicious damage.

 **Danger:**

The equipment has a high voltage, and non-standard operation may cause electric shock or fire, resulting in death, serious personal injury or serious property loss. Please comply with the operation sequence and safety precautions given in this manual and other relevant documents, and operate in a standardized manner:

1. Please check the cable connections of the pre-installed equipment. Check if the equipment is damaged, such as holes, dents or other signs of possible internal damage. Check that the internal components of the equipment are not displaced, and do not change the structure, installation sequence of the equipment without authorization.

2. Do not clean the electrical parts inside the equipment with water. If you find that liquid enters the equipment, press the emergency stop switch immediately, and notify the on-site management personnel.

3. Installation, wiring, maintenance and replacement operations shall be prohibited while energized. Before contacting any conductor surface or terminal, the voltage of the contact point shall be measured, and the protective ground of the equipment or parts requiring maintenance shall be reliably grounded to confirm no electric shock hazard.

4. Except for the personnel who operate the equipment, other personnel should not

approach the equipment. Do not power on the equipment without completion of installation or confirmation by professional personnel. When the equipment is powered on for the first time or the main circuit is energized for operation, at least two personnel must be on site.

Explain

1. The operation behavior and operation tools of users in the process of transportation, handling, installation, wiring and maintenance shall comply with the laws, regulations and relevant standards of the countries and regions where they are located.

2. Reverse engineering, decompiling, disassembling, adapting, implanting or other derivative operations of the equipment software are prohibited. No research on the internal implementation of the equipment, acquisition of the source code of the equipment software, theft of intellectual property rights or disclosure of any results of performance testing of the equipment software are allowed in any way.

1.3 Personal Safety

Danger:

1. During the operation of the equipment, appropriate personal protective equipment should be worn. If you find a fault that may lead to personal injury or equipment damage, you should immediately terminate the operation, report to the person in charge, and take effective protection measures.

2. Before using tools, please master the correct use of tools to avoid injury and damage to equipment.

3. During the operation of the equipment, part of the internal shell temperature is high, there is a danger of burns, please do not touch.

4. To ensure personal safety and normal use, it should be reliably grounded before use.

5. When the battery module malfunctions, the temperature may exceed the burn threshold of the touchable surface, and contact should be avoided.

6. Do not open or damage the battery module, the released electrolyte is harmful to skin and eyes, contact should be avoided.

7. Do not place extraneous objects on the top of the device or insert them anywhere in the device.

8. Do not place flammable objects around the equipment.

9. the battery is strictly prohibited to be placed in the fire, so as not to explode, endangering personal safety.

10. Do not place the battery module in water or other liquids.

11. Do not short the battery module docking terminals, battery shorting will cause combustion.

12. The battery may cause electric shock and the danger of large short-circuit current.

13. Do not use water or detergent to clean the internal and external electrical parts of the device.

14. Do not stand or lean on or sit on the equipment.

15. Do not damage the modules of the device.

16. When installing the battery module, if the battery module is dropped or strongly impacted, it will cause damage to the equipment, and it is strictly prohibited to continue using the equipment, otherwise, it will be a safety risk (there may be liquid leakage from the battery cell, electric shock injury, etc.).

Warn:

1. Remove watches, rings or other metal objects.

2. Use tools with insulated handles.

3. Wear rubber gloves and boots.

4. Do not place small tools or metal parts on top of the battery module.

5. Disconnect charging power before connecting or disconnecting battery terminals.

6. Determine if the battery is accidentally grounded. If accidentally grounded, remove power from the ground. Contact with any part of a grounded battery may result in electric shock. This possibility of electric shock can be reduced if these grounds are removed during installation and maintenance.

1.4 Battery Leakage Treatment Measures

Note:

In case of electrolyte leakage, the following emergency measures can be taken

according to the severity of leakage.

1. Ensure adequate ventilation and remove all ignition sources.

2. Quickly evacuate the personnel to a safe area, away from the leakage area and in the direction of the upwind.

3. Use personal protective equipment to avoid inhalation of steam, smoke, gas or dust.

4. Take measures to prevent further leakage or overflow in the event of safety.

5. When there is a small amount of leakage, dry sand or inert adsorption materials can be used to absorb the leakage. When there is a large amount of leakage, embankment control is required.

6. Attachments or collected materials should be stored in appropriate sealed containers and disposed of according to local relevant laws and regulations.

7. Remove all ignition sources and use fire extinguishing tools and anti-violence equipment.

 **Danger:**

In the event of a leak, avoid contact with the leaking liquid or gas. The electrolyte is corrosive and contact may cause skin irritation and chemical burns. If contact with the battery electrolyte is made, the following measures need to be taken.

1. Inhalation: Evacuate the contaminated area, immediately transfer to fresh air, keep breathing; if breathing difficulties, give oxygen; if the patient ingested or inhaled the substance, shall not be mouth-to-mouth artificial respiration; if breathing stops. Immediately perform cardiopulmonary resuscitation; and immediately seek medical help.

2. Eye: Immediately flush eyes with plenty of water for at least 15 minutes, do not rub, and seek medical help immediately.

3. Skin: Remove contaminated clothing immediately, wash skin contact area with plenty of water and soap, and seek medical help immediately.

4. Ingestion: Prohibit induced vomiting, do not feed the unconscious person anything from the mouth, and seek medical help immediately.

5. Protection of First Aiders: Ensure that healthcare workers understand the hazardous properties of the product and take their own protective measures to protect themselves and prevent the spread of contamination.

1.5 Electrical Safety

1.5.1 Conventional Requirements

Explain:

1. All electrical connections must meet the electrical standards of the country/region where it is located.

2. must obtain the permission of the power department of the country / region to be connected to the grid to generate electricity.

3. The user's own cable should meet the requirements of local laws and regulations.

4. Please use special insulated tools for high voltage operation.

Danger: Before making electrical connections, please make sure the equipment is not damaged, otherwise it may cause electric shock or fire.

1.5.2 Wiring Requirements

1. Please choose the cable that meets the requirements of local laws and regulations. Similar cables should be tied together, different types of cables should be laid separately, and they should not be wound or crossed with each other.

2. The cables used in the cabinet must be firmly connected, well insulated and in good specification. The cable passing through the pipe or through the line hole must be protected to avoid damage by sharp edges, burrs and so on.

3. Cable use in a high temperature environment may cause insulation layer aging and damage. The distance between cable and heat generating device or heat source area peripheral should be at least 30mm.

4. In order to ensure the safety of construction, all cables should be laid and installed above 0℃, and should be handled gently when moving cables, especially in a low temperature environment.

Danger: Do not install or remove power lines while they are energized. The power line core will produce electric arc or spark when it comes into contact with the conductor, which can cause fire or personal injury.

1.5.3 Grounding Requirements

1. When installing equipment that needs to be grounded, the protective ground wire must be installed first; when removing equipment, the protective ground wire must be removed last.

2. Do not damage the grounding conductor.

3. Do not operate the equipment without installing the grounding conductor.

4. The equipment should be permanently connected to the protective ground. Before operating the equipment, the electrical connection of the equipment should be checked to ensure that the equipment has been reliably grounded.

1.5.4 Maintenance Requirements

1. Before connecting or removing the cable, the protection switch of the corresponding circuit must be disconnected first.

2. Use the multi-meter of corresponding voltage level to check whether it is energized and ensure that the equipment has been completely powered off.

3. If there are charged objects nearby, use insulating board or insulating tape to shield or wrap.

4. After the grounding line is used to reliably connect the circuit to be repaired with the grounding circuit, operation and maintenance shall be carried out.

Explain:

1. Before connecting the cable, you must first confirm that the cable label is correct before connecting.

2. If the equipment has multiple input channels, all the input channels of the equipment should be disconnected, and the equipment can be operated after the equipment is completely powered off.

3. After the overhaul is completed, remove the grounding wire between the overhaul circuit and the grounding circuit.

1.6 Mechanical Safety

1. When carrying equipment by hand, you should prepare for bearing weight, wear

protective gloves, wear anti-shock shoes and other safety protective equipment.

2. Move the equipment carefully during the equipment transportation process to avoid impact or fall. Avoid scratching the surface of the equipment, damaging parts or cables.

3. When transporting equipment, the volume of equipment may cover the sight of the operator, so auxiliary personnel should be arranged to assist in completing the task.

1.7 Maintenance and Replacement

Please maintain the equipment under the condition of familiarizing and understanding the contents of this manual and having appropriate tools and test equipment.

1. Before maintenance, please power off the equipment, and then wait for the corresponding time according to the instructions of the delayed discharge label to ensure that the equipment has been powered off, and then operate the equipment.

2. During the maintenance process, please try to avoid irrelevant personnel entering the maintenance site, and temporary warning signs or fences must be erected for isolation.

3. If the equipment fails, please contact your dealer in time to deal with it.

4. The equipment can only be re-powered after the fault is handled, otherwise it may cause the fault to expand or damage the equipment.

5. Unauthorized persons should not open the cover plate without authorization, otherwise there is a risk of electric shock, and the resulting failure is not covered by warranty.

6. Operation and maintenance personnel and professional technicians should be trained in safe use and equipment maintenance, and should operate under sufficient preventive measures and personal protective equipment.

7. When it is necessary to move or reconnect the wiring, the power input must be cut off and the machine must be waited for 5 minutes before the energy inside the machine is released. After using the multimeter to confirm that there is no dangerous voltage on the DC bus and inside the machine to be repaired, maintenance can begin.

8. Battery maintenance shall be performed or supervised by personnel familiar with the battery and the preventive measures required for it.

9. When replacing the battery, please replace the same type of battery module.

10 After maintenance operation, check immediately to ensure that no tools or other parts are left in the equipment.

11. If the equipment is not used for a long time, the battery and recharging need to be stored according to this manual.

Danger:

During the operation of the equipment, there is a risk of electric shock which may result in death, serious personal injury or severe property damage. Therefore, before performing any maintenance work, the equipment must be powered off and the safety precautions listed in this manual and other relevant documents must be strictly followed.

02 Product Introduction

2.1 Product Overview

The PowerNest series cabinet-type photovoltaic storage system includes 4 models, each of which is matched with a specific inverter. This design installs inverters and batteries inside the cabinet, enabling flexible connection to photovoltaic arrays, diesel generators, and the power grid, thus providing stable power to AC loads. Its primary objective is to maximize solar power generation, reduce dependence on grid power, and ensure continuous power supply even in the event of a power outage.

2.2 Model Description

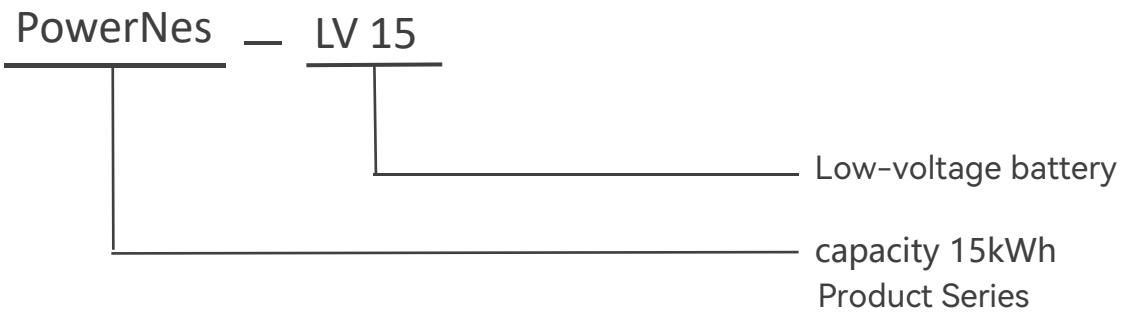


Figure 2.2 Model description

Note: The PowerNest series cabinet optical storage system can be freely matched according to the number of battery PACKS and the power of specific inverters, so as to achieve flexible configuration of rated output power on the AC side.

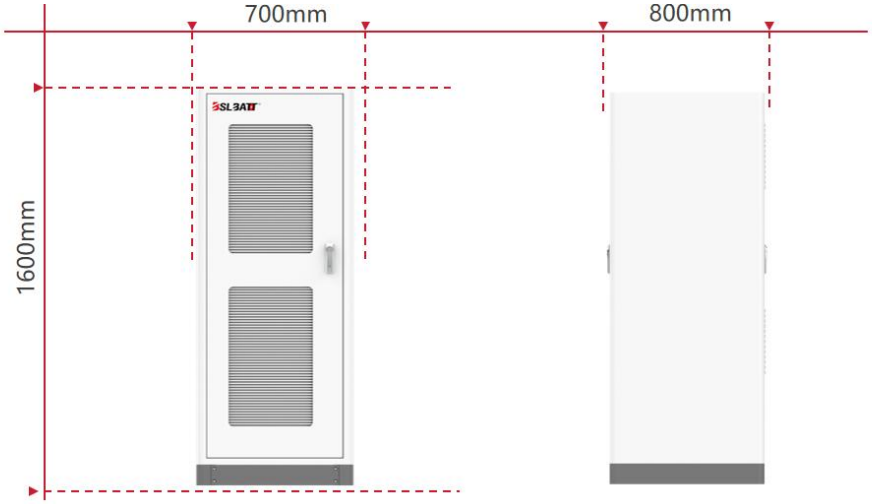
2.3 Product Function

1. The PowerNest series cabinet optical storage system integrates the Deye inverter and rack battery module, which can store and release electric energy according to the energy management system instructions of the inverter;

2. The system has automatic grid connection and off-grid functions, which can ensure that the power supply of key loads is uninterrupted when the state of the power grid changes, so as to ensure the continuous operation of important equipment;

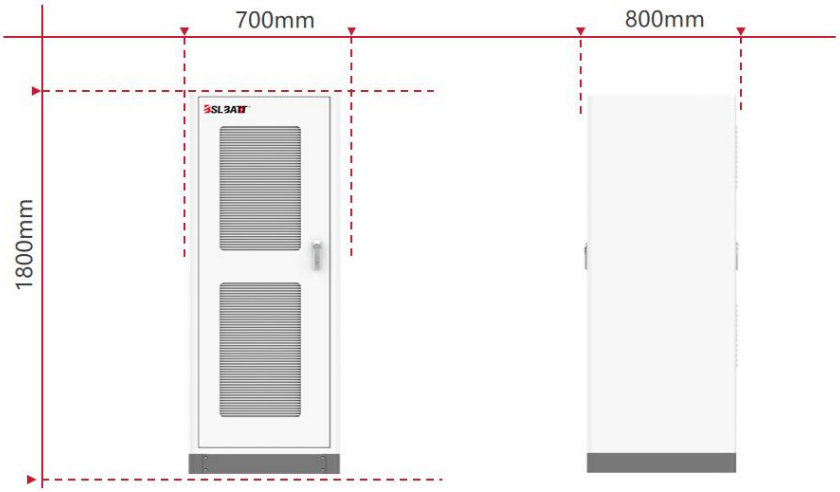
2.4 Product Appearance

PowerNest LV15



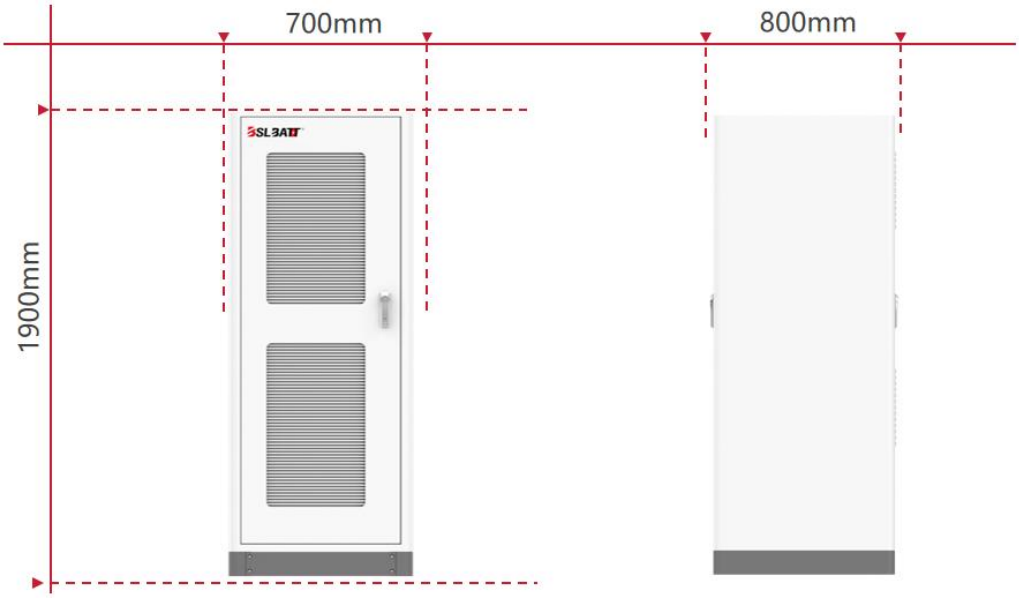
Graph 2.4-1

PowerNest LV20



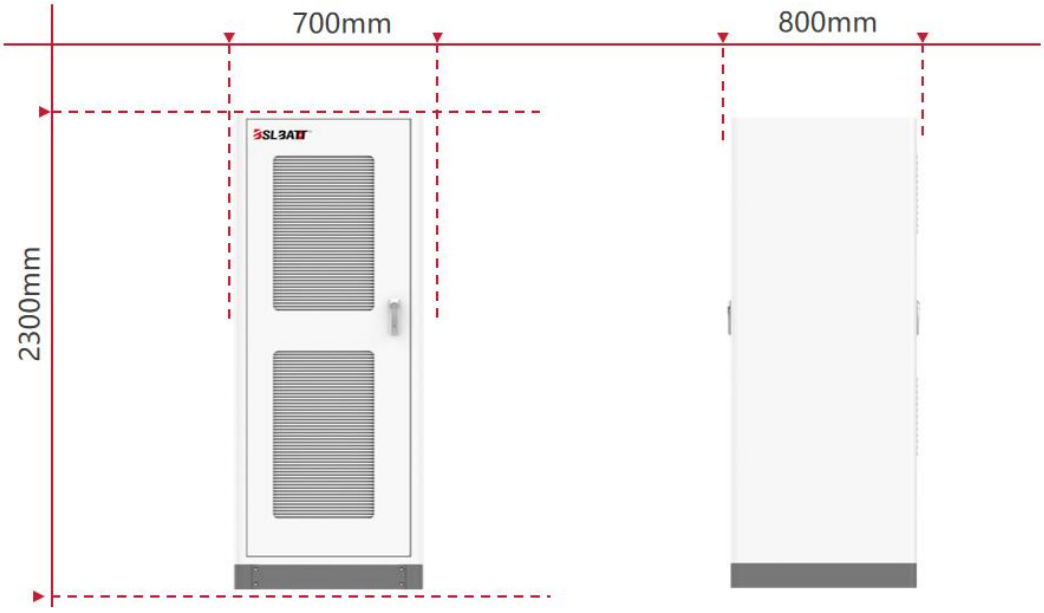
Graph 2.4-2

PowerNest LV25



Graph 2.4-3

PowerNest LV35



Graph 2.4-4

Note: Different projects have different configurations, so the actual shipment is subject to the actual shipment.

2.5 Product Parameters

PowerNest Technical Data Sheet

Model	LV15	LV20	LV25	LV35
Battery Side Parameters				
Cell	3.2V100Ah			
Battery Model	B-LFP48-100E			
Compound Mode	3P*16S1P	4P*16S1P	5P*16S1P	7P*16S1P
Rated Voltage	51.2V			
Voltage Range	46.4V~56V			
Rated Energy	15.36kWh	20.48kWh	25.6kWh	35.84kWh
Photovoltaic Side Parameters				
Maximum Input Power	6.5kW	10.4kW	13kW	22.5kW
Maximum Input Voltage	500V		800V	
Mppt Voltage Range	150V-425V	150V-425V	200V-650V	160V-650V
Mppt Full Load Voltage Range	300V-425V	200V-425V	350V-650V	350V-650V
Starting Voltage	125V		160V	
Rated Input Voltage	370V		550V	
Maximum Input Current For Each Mppt	13A+13A	26A+26A	26A+13A	36A+20A
Maximum Short Circuit Current For Each Mppt	17A+17A	44A+44A	34A+17A	54A+30A

Model	LV15	LV20	LV25	LV35
Mppt Quantity	2/1+1	2/2+2	2/2+1	2/2+1
Communication Side Parameters				
Rated Ac Side Power	5kW	8kW	10kW	15kW
Maximum Ac Side Power	5.5kW	8.8kW	11kW	16.5kW
Rated Ac Input Current On The Side	22.7A	36.4A	15.2A	22.8A
Rated Ac Side Output Current	21.7A	34.8A	14.5A	21.8A
Rated Ac Side Voltage	220V/230V0.85Un-1.1Un		220/380V,230/400V0.85Un-1.1Un	
Grid Connection	L+N+PE		3L+N+PE	
Voltage Frequency	50Hz/60Hz			
Power Factor	-0.8~ 0.8			
Total Current Waveform Distortion Rate	<3%			
System Parameter				
Operating Temperature Range	-20~55℃			
Relative Humidity	≤ 60%			
Maximum Working Altitude	2000m			
Cooling-Down Method	Smart air cooling			
Human-Computer	LED+LCD			

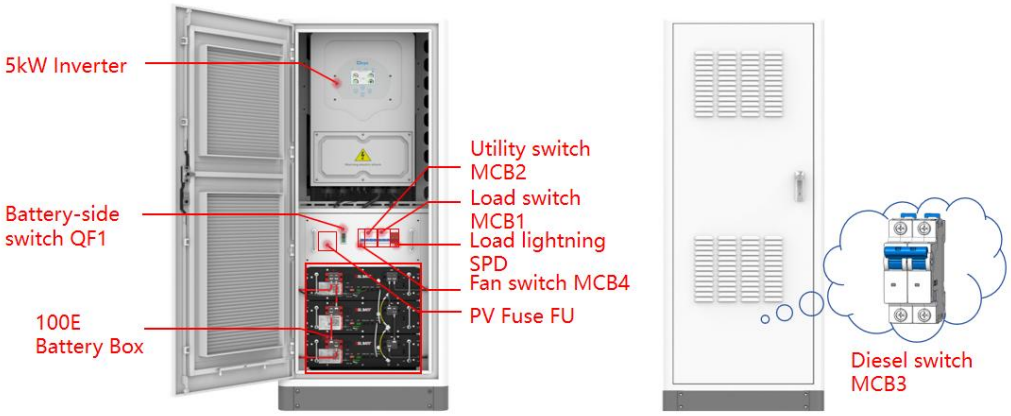
Interaction

Model	LV15	LV20	LV25	LV35
Communication Mode	RS232,RS485,CAN			
Cycle Index	> 6000 times, 25℃			
Levels Of Protection	IP54			
Size (Mm)	1600*700*800	1800*700*800	1900*700*800	2300*700*800
Weight (Approximately)	311kg	384kg	451kg	587kg

Table 2.5

2.6 Product Details

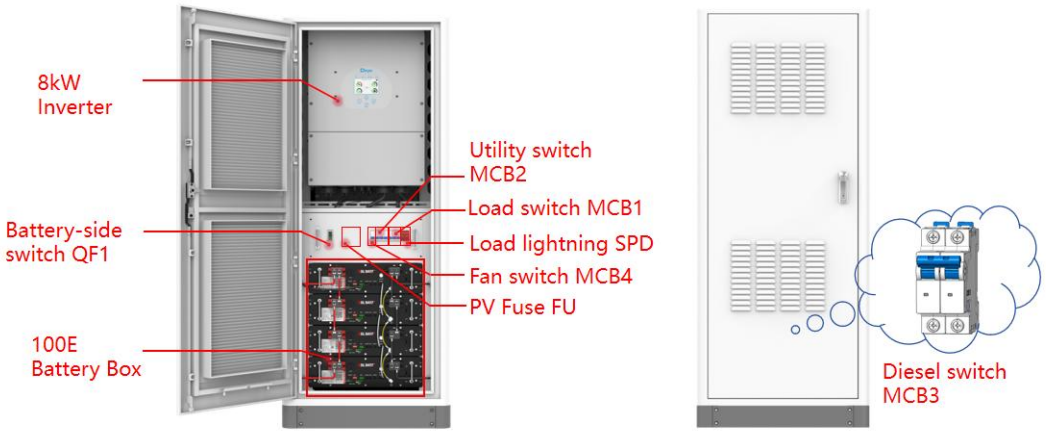
PowerNest LV15



Graph 2.6-1

Note: The PowerNest LV15 cabinet is designed to connect 2 photovoltaic lines.

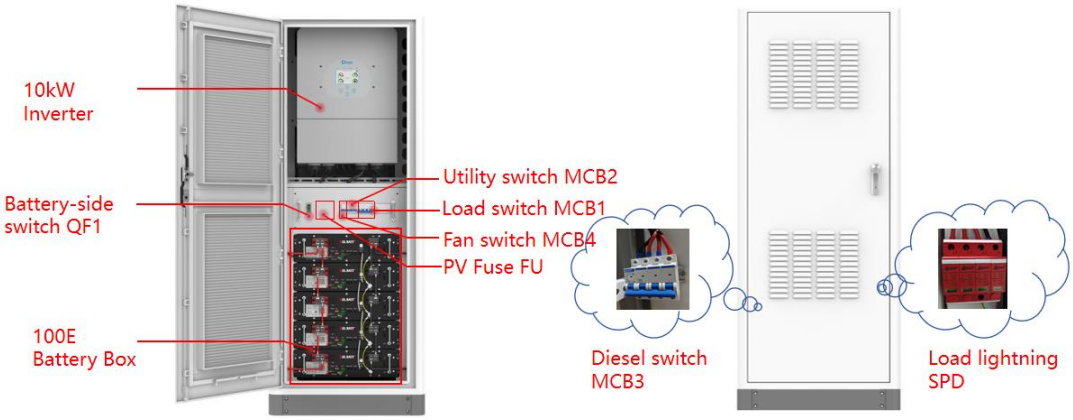
PowerNest LV20



Graph 2.6-2

Note: The PowerNest LV20 cabinet is designed to connect 4 photovoltaic circuits, and the power switch (MCB3) of the diesel engine is located on the back door side of the cabinet, which is the same side as the cooling fan, so as to facilitate maintenance and repair.

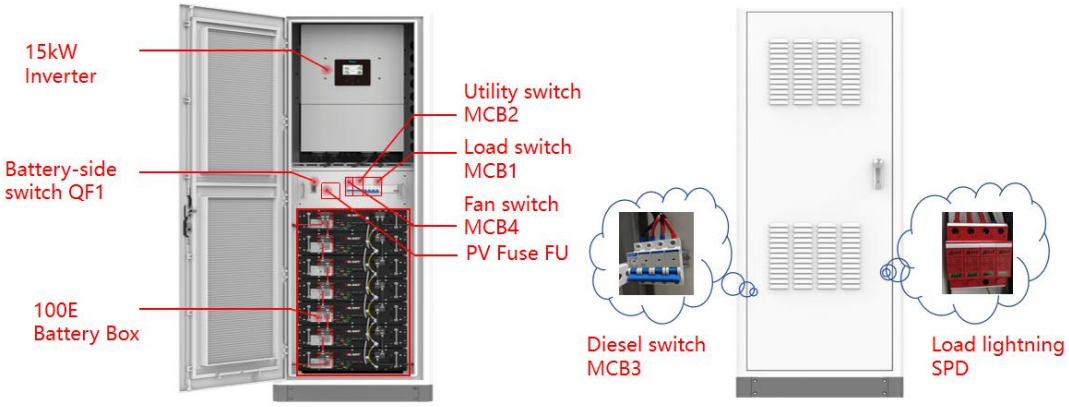
PowerNest LV25



Graph 2.6-3

Note: The load lightning protection (SPD) and diesel generator power switch (MCB3) for the PowerNest LV25 and LV35 cabinets are also located on the back side of the cabinet.

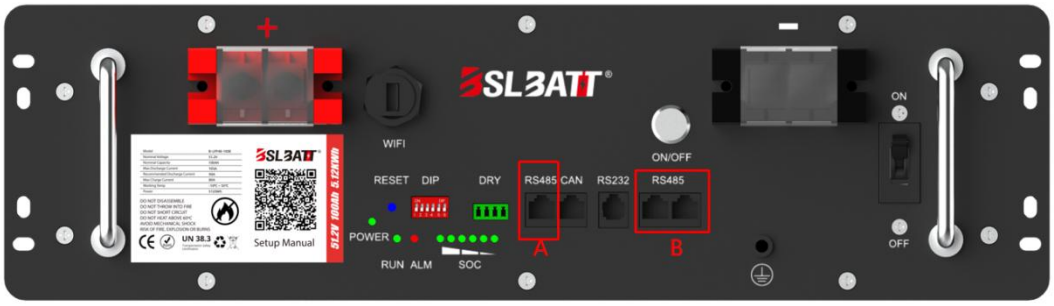
PowerNest LV35



Graph 2.6-4

Note: Different projects have different configurations, and the actual shipment is subject to the actual shipment.

2.6.1 Battery Box



Graph 2.6.1

Battery Box Panel Interface Definition Table

Name	Function	Remarks
+	Battery positive terminal	Recommended 35mm² cable
-	Negative terminal of the battery	Recommended 35mm² cable
RESET	Reset button	Replace the battery

DIP	Number dial switch	Battery address setting
DRY	Dry joints	Pin 3 and 4 are normally disconnected and closed in low power alarm
RS485	RS485 A PORT	Rs485 communication, can connect to monitoring equipment
RS485	RS485 B PORT	Rs485 parallel communication
RS232	RS232 PORT	Rs232 communication
CAN	CAN BUS PORT	Battery and inverter connection port
POWER	Power light	After startup, the led green light is always on
RUN	Operation indicator light	After startup, the led green light flashes
ALM	Alarm indicator	When the fault occurs, the led red light is on
SOC	Battery capacity indicator light	Six led lights, the light on state represents the percentage of capacity
0N/OFF	Circuit breaker	Control the output of battery power

Table 2.6.1

2.6.2 Inverter

The PowerNest series cabinet optical storage system uses the DEYE brand inverter as its core component. When delivered, the system comes with the DEYE inverter user manual for customers to refer to and maintain.

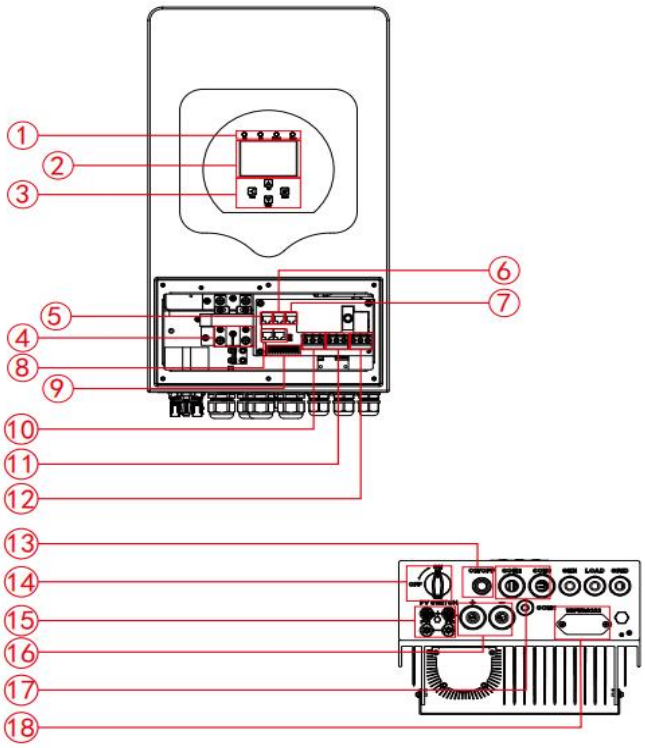
Inverter Model Table

Serial No.	Model	Explain	Remarks
1	SUN-5K-SG03LP1	5kW single phase hybrid	L+N;220/230V

		inverter	
2	SUN-8K-SG01LP1	8kW single phase hybrid inverter	L+N,220/230V
3	SUN-10K-SG04LP3	10kW three-phase hybrid inverter	3L+N;220/380V,230/400V
4	SUN-15K-SG05LP3	15kW three-phase hybrid inverter	3L+N;220/380V,230/400V

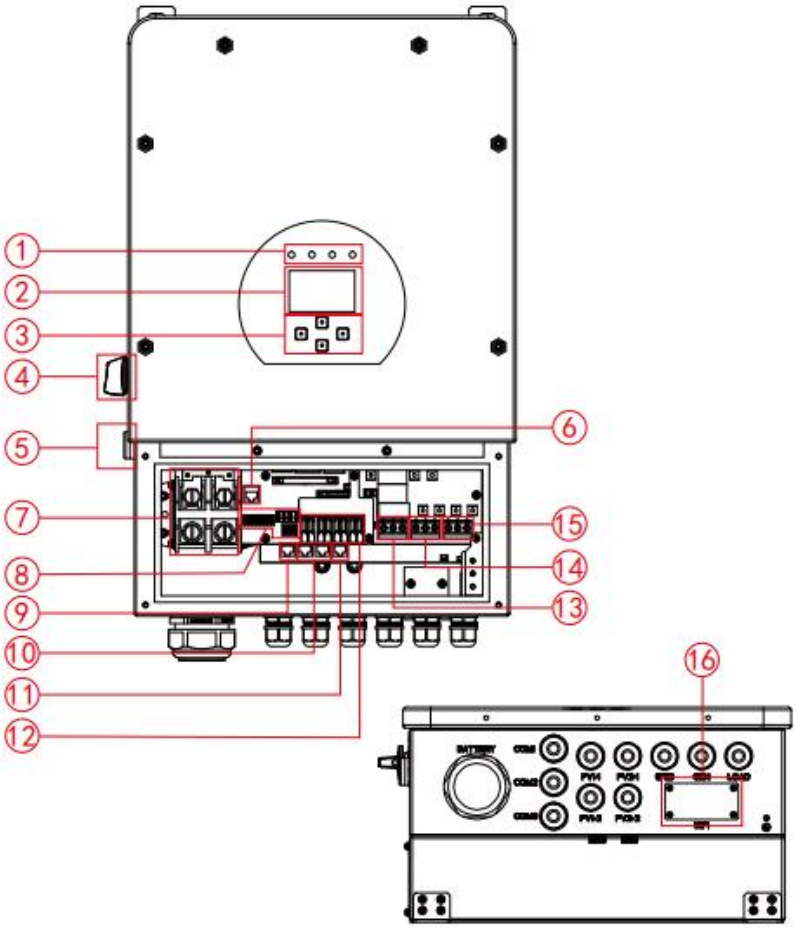
Table 2.6

SUN-5K-SG03LP1-EU



Graph 2.6.2-1

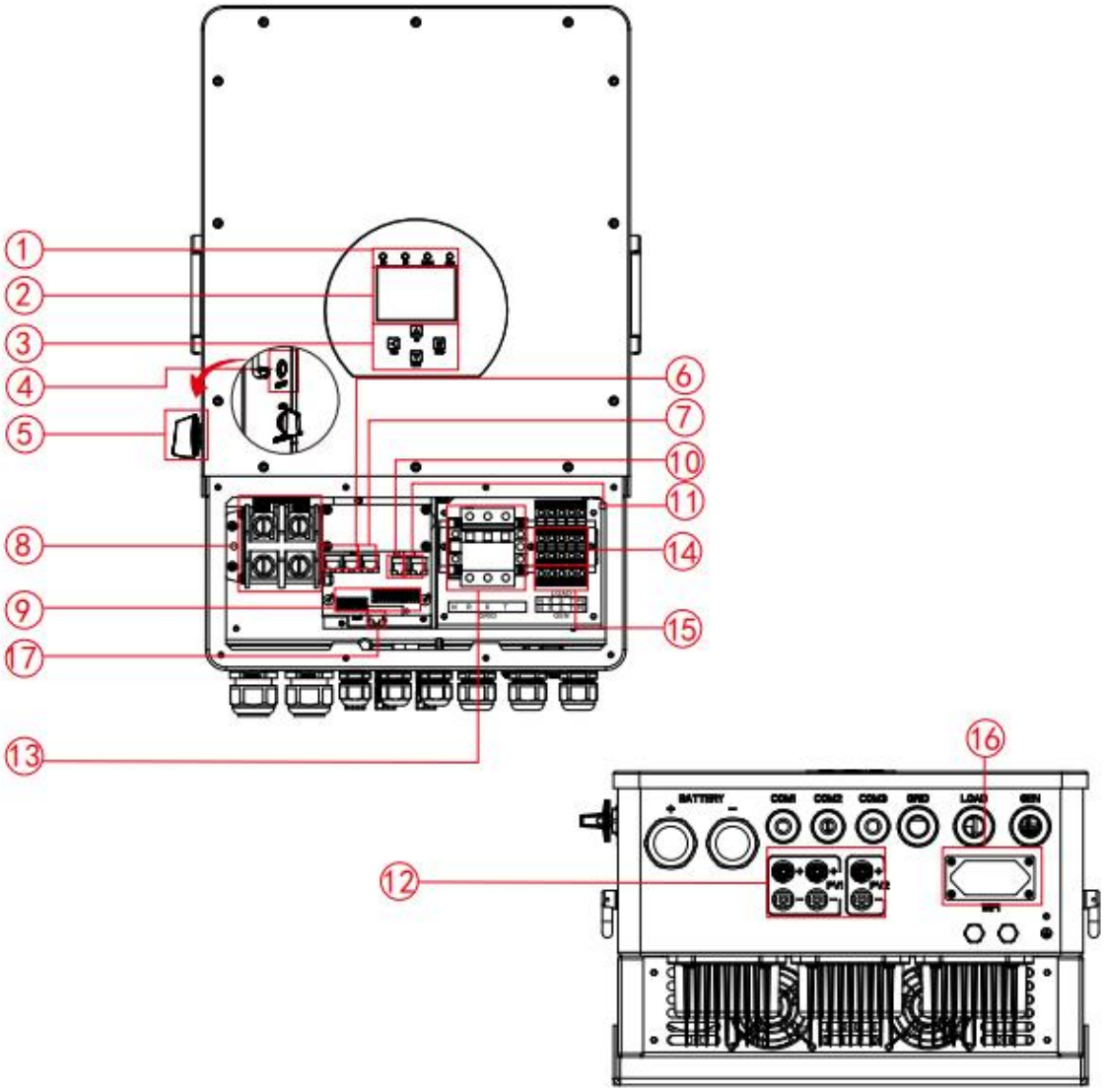
SUN-8K-SG03LP1-EU



1: Inverter Indicators
2: LCD display
3: Function Buttons
4: DC Switch
5: Power on/off button
6: BMS port
7: Battery input connectors
8: Function Port
9: Meter_CON port
10: Parallel port
11: DRM Port
12: PV input
13: Grid
14: Generator input
15: Load
16: WiFi Interface

Graph 2.6.2-2

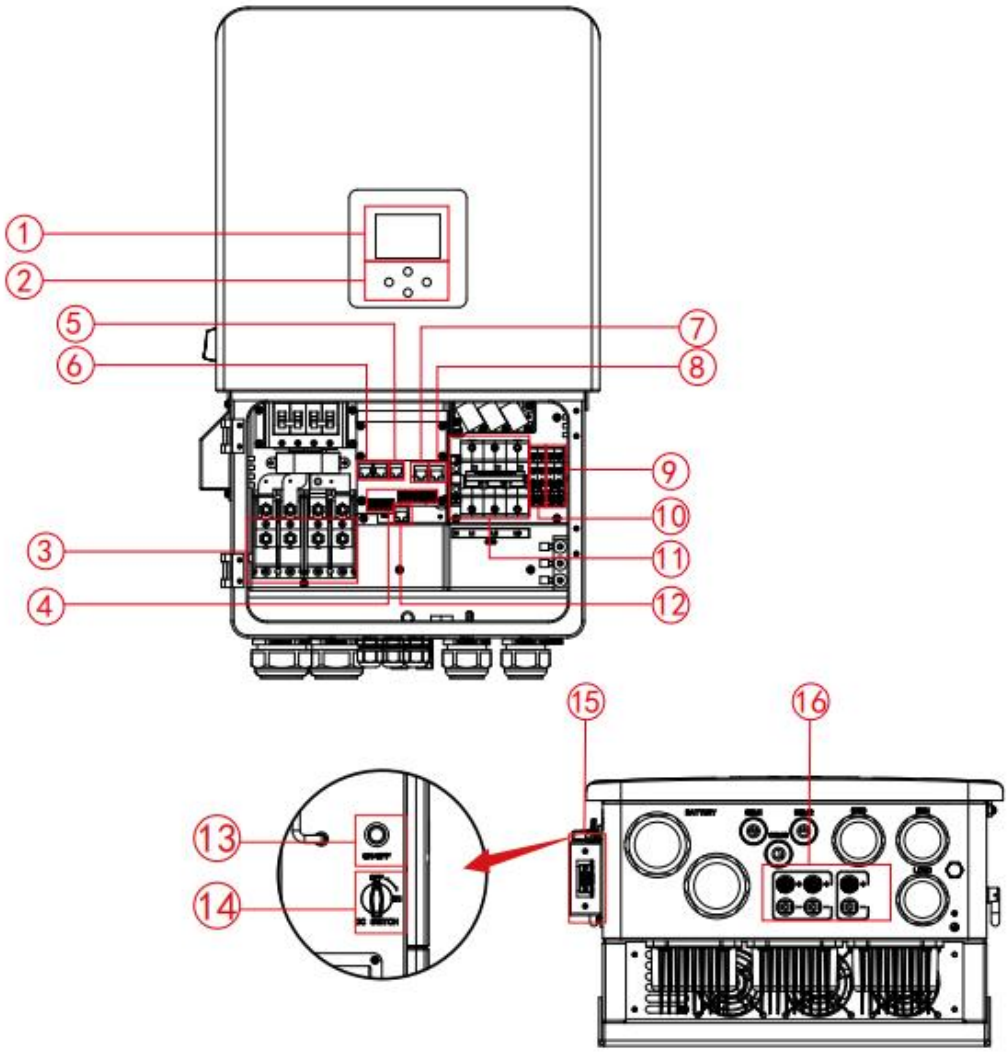
SUN-10K-SG04LP3-EU



1: Inverter indicators
2: LCD display
3: Function buttons
4: Power on/off button
5: DC switch
6: Parallel port
7: Meter-485 port
8: Battery input connectors
9: Function port
10: Modbus port
11: BMS port
12: PV input with two MPPT
13: *Circuit breaker of Grid
14: Load
15: Generator input
16: WiFi Interface
17: DRM port

Graph 2.6.2-3

SUN-15K-SG05LP3-EU-SM2

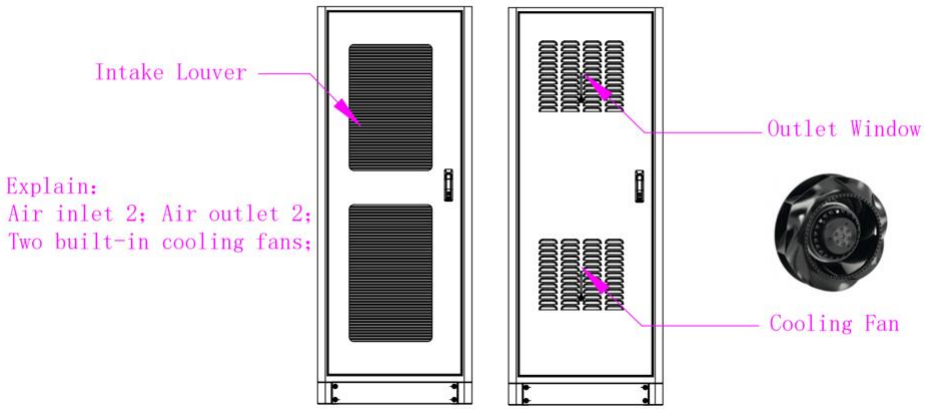


1: LCD display	6: ParallelModbus port	11: Grid
2: Function buttons	7: Modbus port	12: DRM port
3: Battery input connectors	8: BMS port	13: Power on/off button
4: Function port	9: Generator input	14: DC switch
5: Meter-485 port	10: Load	15: WiFi Interface
		16: PV input

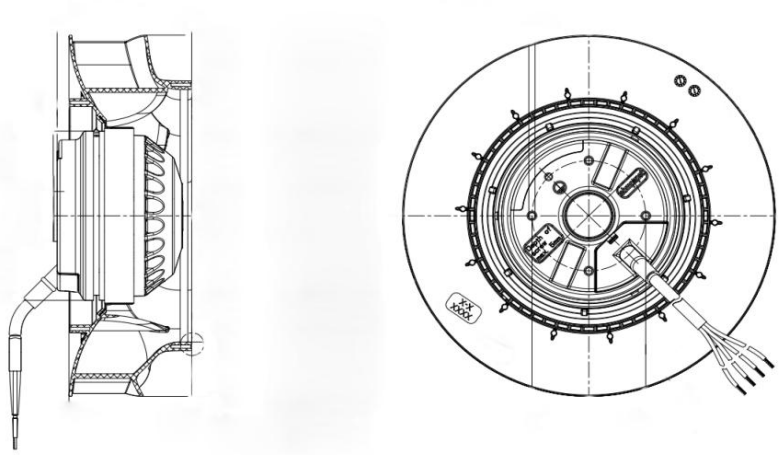
Graph 2.6.2-3

Note: For specific information about the inverter, please refer to the user manual of "DeYe".

2.6.3 Air Cooling System



Graph 2.6.3-1



Graph 2.6.3-2

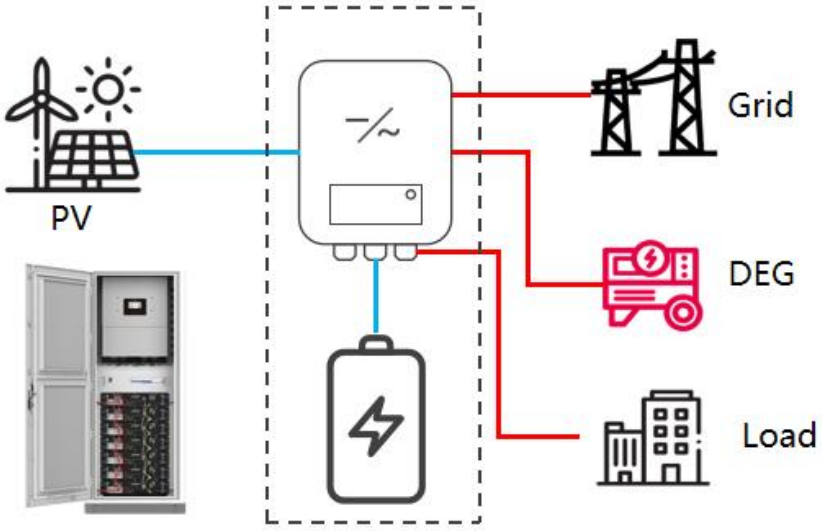
Explain:

The cooling system of the cabinet is based on the principles of air flow and heat exchange, consisting of an intake louver, an exhaust window, and a centrifugal cooling fan. The louver changes the direction of airflow, extends the path, and increases the contact area, effectively filtering out dust and guiding uniform cold air into the system. The exhaust port guides hot air out, preventing back flow. The centrifugal fan creates forced convection through the rotation of its blades, accelerating the expulsion of hot air and the intake of cold air.

2.7 Product Application

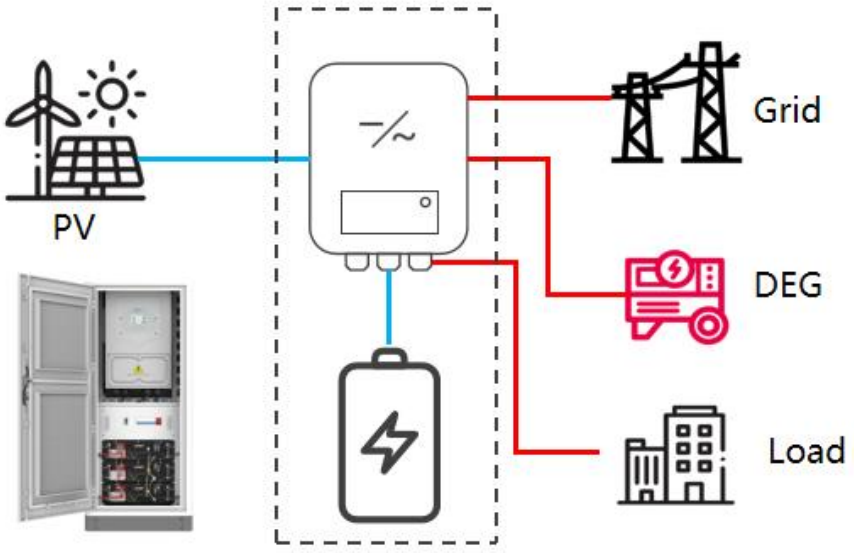
PowerNest series cabinet optical storage system can be divided into four working modes according to the inverter: grid connected mode, off-grid mode, backup mode and economy mode.

PowerNest LV35 and LV25 (Three-phase)



Graph 2.7-1

PowerNest LV20 and LV15 (Single phase)



Graph 2.7-2

Grid connection mode:

1. Photovoltaic power generation is prioritized for load supply, and the remaining electricity is used to charge the battery; if there is still surplus power, it can be selected to be connected to the grid.

2. When the power generated by photovoltaic is not enough to support the load, the rest of the required energy is provided by the battery first, and if it is still insufficient to support the load, the power is supplied to the load through the grid.

Off-grid mode:

1. Photovoltaic and battery constitute a pure off-grid system, suitable for areas without power grid;

2. Photovoltaic power generation is prioritized for load supply, and the remaining electricity is used to charge batteries.

Backup mode:

The diesel generator only works when the power grid is abnormal, photovoltaic failure or battery power is low, and supplies the load first, and the rest of the electricity is used to charge the battery.

Economic model: (peak shaving and valley filling)

The charging price is the valley price and the discharging price is the peak price; the charging and discharging time and power can be set by the human-computer interaction screen on the inverter.

Note: The operating modes are described in the user manual of “DEYE”.”

03 Product Installation

3.1 Installation Environment

Note:

1. It should be installed in a dry and well-ventilated environment to ensure good heat dissipation.

2. The surrounding environment is clean, and there is no large amount of infrared radiation, organic solvent and corrosive gas.

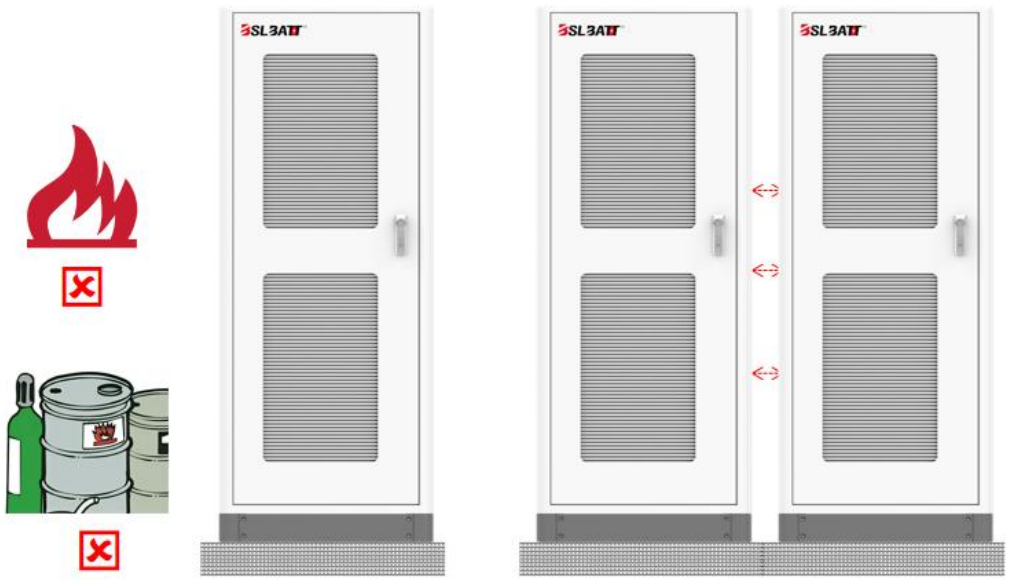
3. Install the location away from fire source, water source, etc.

4. The installation location is not accessible to children.

5. The equipment should be away from strong magnetic field environment to avoid electromagnetic interference.

6. The equipment needs to be on a firm and flat support surface, and there are heat dissipation and safety isolation requirements between cabinets.

7. Do not place flammable and explosive items around the equipment.



Graph 3.1

3.2 Pre-installation Preparation

1. Before installing the product, check whether the product is intact. If any damage is found, please keep the evidence and contact the equipment manufacturer.

2. If there is no abnormality in the product, please check according to the delivery list to see whether the accessories are complete.

3. Before installation, users need to prepare relevant installation tools.

Installation Checklist

Serial No.	Inspection item	Treatment measure
1	Whether the fastener is tightened.	If it is loose, tighten the screw again.

2	Whether the space environment meets the installation size requirements.	If there is not enough space, it is recommended to redesign and reinstall.
3	Whether there is no obstruction or foreign matter between the cabinets.	If there is any foreign body, please clean it up, if not smooth, find out the reason.

Table 3.2-1

Installation Tool List

Serial No.	Tool name	Legend
1	Insulating gloves	
2	Eye shield	
3	Insulant shoe	
4	Coverall	
5	Safety helmet	
6	Bolt driver	
7	Connection cover cutting pliers	
8	Hydraulic clamp	
9	Heat gun	
10	Multimeter	
11	Torque spanner	
		

12	Marker pen

Table 3.2-2

Note: This table is for reference only. The actual tool should be based on local installation standards.

3.3 Mechanical Installation

Note:

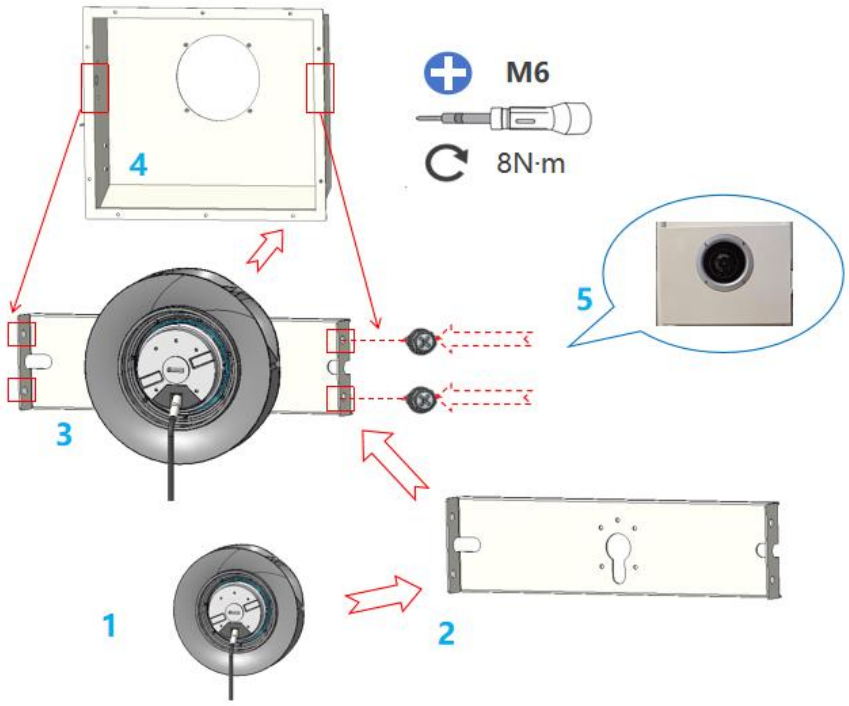
1. When installing the inverter and battery, take care to handle it gently, do not knock or bump, and pay attention to personal safety;

2. Before installing the battery, confirm that the power supply circuit breaker must be placed in OFF;

3. Pay attention to the positive and negative electrodes during battery installation, and do not short circuit the positive and negative electrodes of a single battery pack.

Note: "Factory completed".

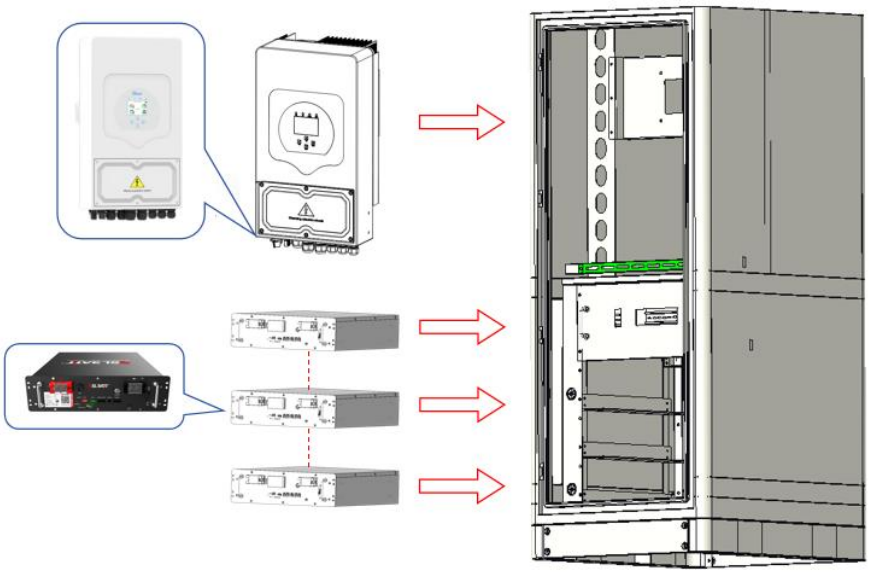
Heat dissipation fan installation:



Graph 3.3-1

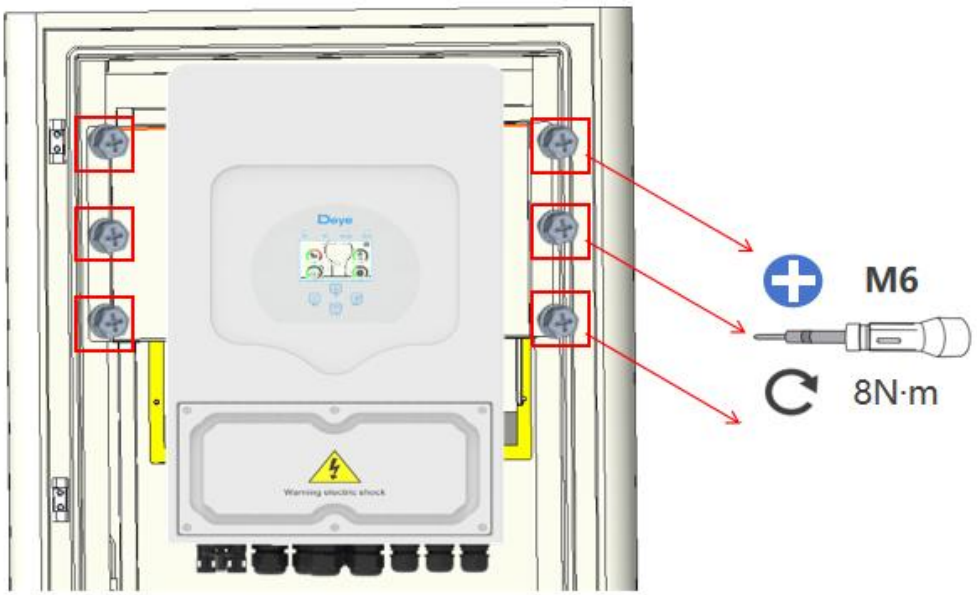
Note: This fan is a single-phase AC drive model.

PowerNest LV15 Cabinet-Inverter and battery installation:

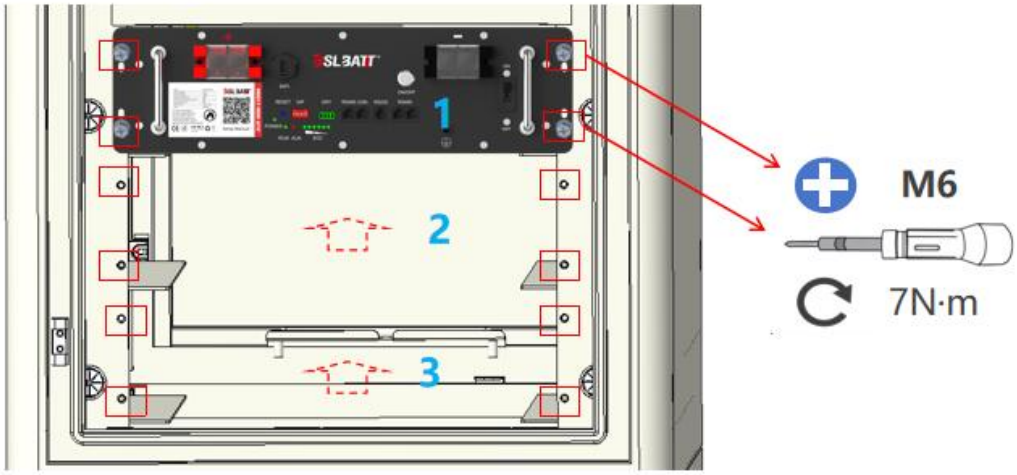


Graph 3.3-2

Note: Other models of PowerNest series cabinets can also be referred to.



Graph 3.3-3



Graph 3.3-4

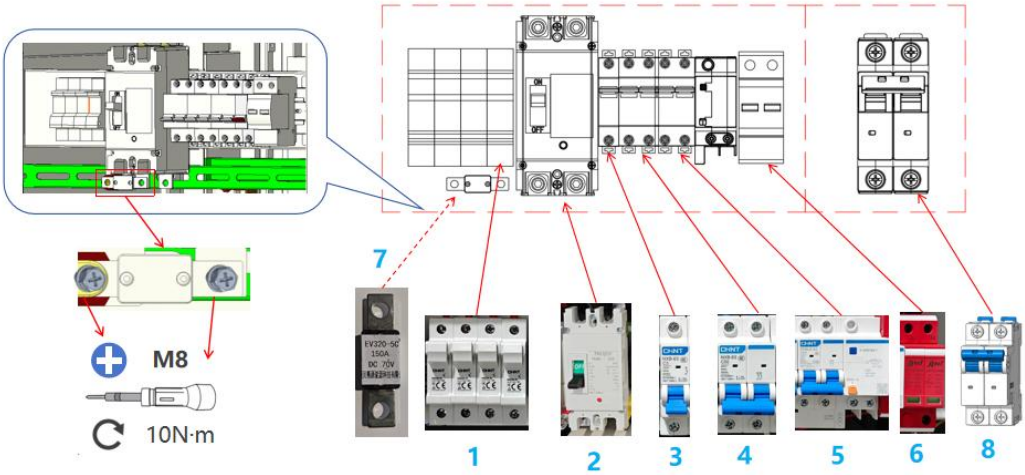
Note: "Factory completed"

1. In the communication process between the battery and the inverter, the configuration address of the "dial switch" needs to be found on the panel of each battery box so that the inverter can distinguish different battery PACKs.

2. Please refer to "B-LFP48-Rackmount Battery General Brochure" for specific information on battery box.

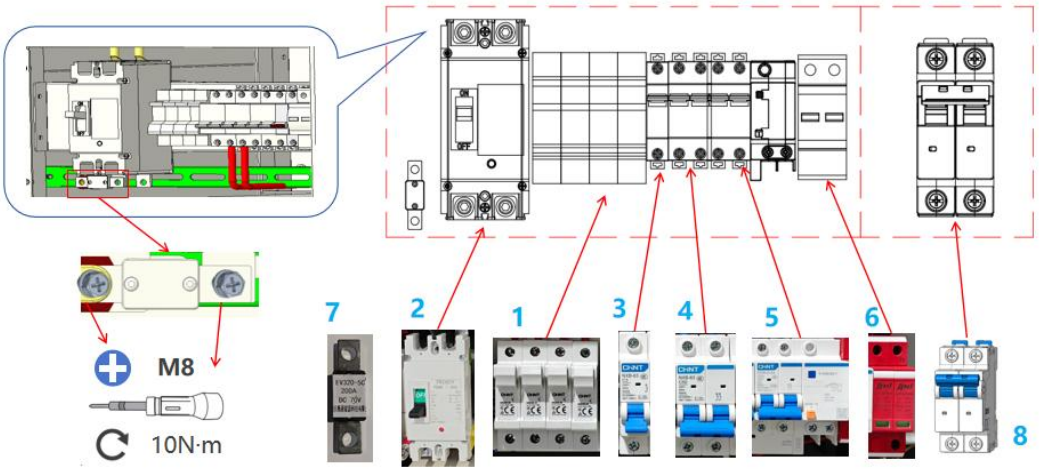
3.4 Electrical Installation

PowerNest LV15:



Graph 3.4-1

PowerNest LV20:

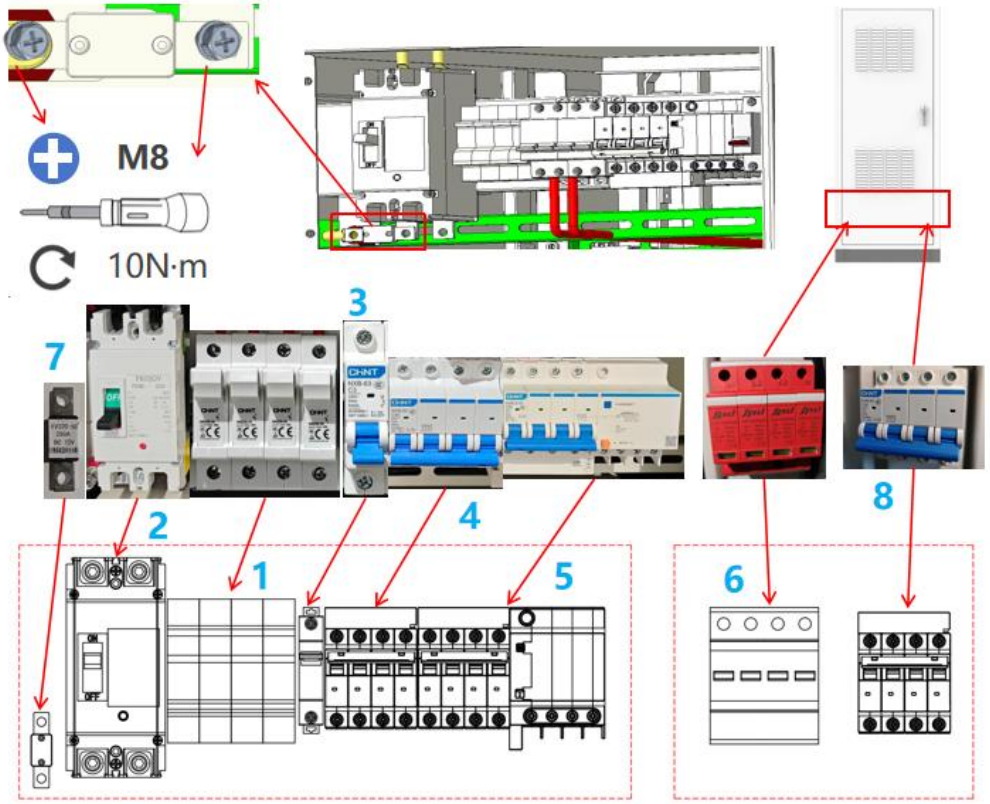


Graph 3.4-2

Note: "Factory completed"

In the PowerNest series cabinets, the LV15 and LV20 distribution panels are designed for 220V/230V single-phase AC systems; therefore, both the mains side and load side switches are 2 pole (2P) types.

PowerNest LV25 and LV35:



Graph 3.4-3

Note: "Factory completed"

1. In the PowerNest series cabinet, the LV25 and LV35 distribution panels are designed as a 380V/400V three-phase AC system;

2. In the LV25 and LV35 cabinet, the mains switch, load switch and SPD lightning protection device are all 4 pole (4P) types to meet the higher level of power protection and distribution requirements;

3. LV25 model: the rated current of the mains/load/chair switch is 40A, the DC fuse on the battery side is 250A, and the switch on the battery side is 160A;

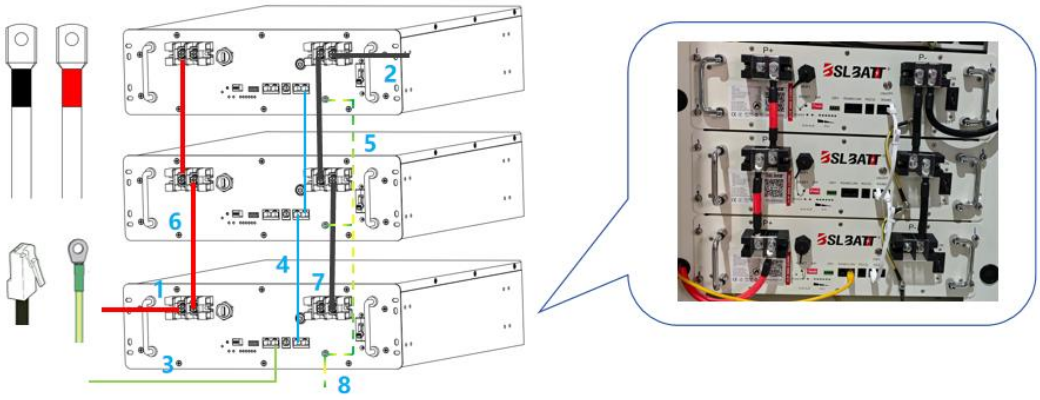
4. LV35 model: the rated current of the mains/load/chair switch is 50A, the DC fuse on the battery side is 350A, and the switch on the battery side is 250A.

Serial No.	Name	Explain
1	Photovoltaic fuse	Protect photovoltaic modules and inverters
2	DC circuit breaker	Battery side switch QF1
3	1P AC circuit breaker	Fan switch MCB3
4	2P/4P AC circuit breaker	City power switch MCB2
5	Leakage protection switch	Load switch MCB1
6	2P/4P AC surge	SPD lightning protection switch
7	Direct current fuse	Protect batteries and inverters
8	2P/4P AC circuit breaker	Charging switch MCB4

Table 3.4

3.5 Battery Connection

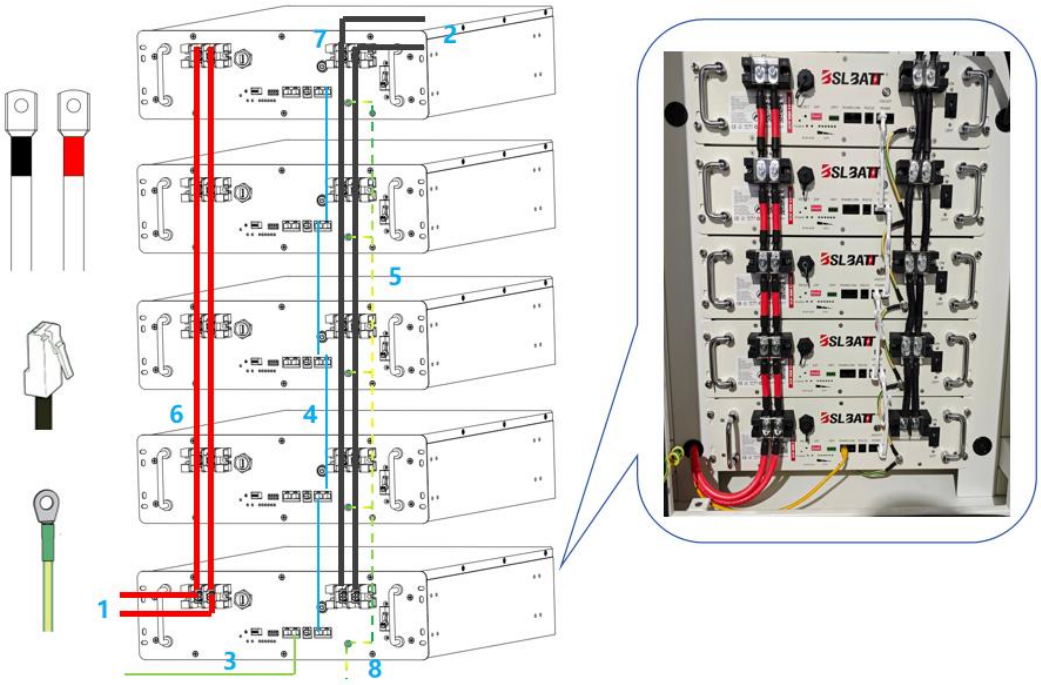
PowerNest LV15:

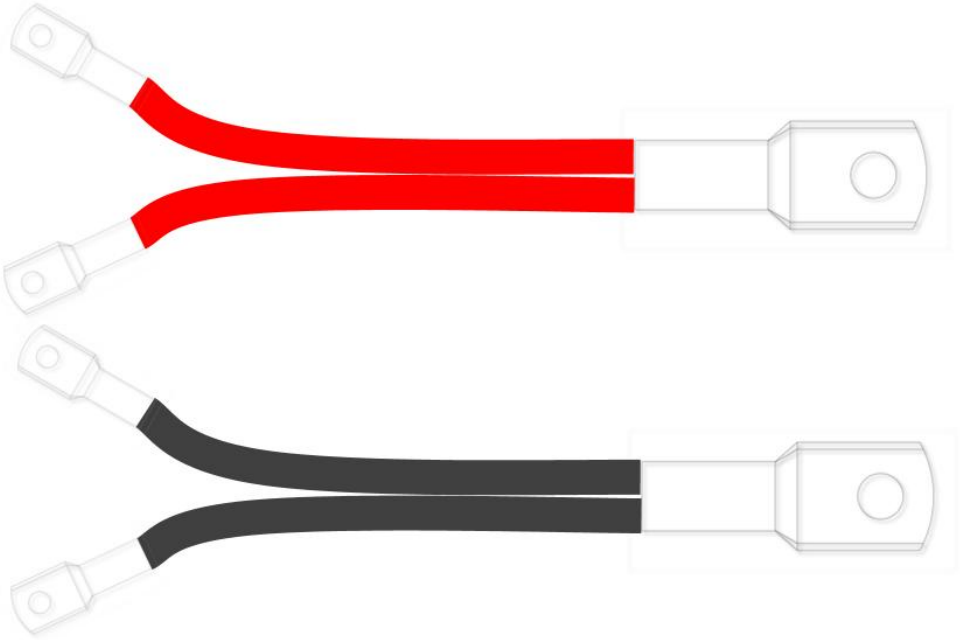


Graph 3.5-1

Note: The LV15 cabinet contains three B-LFP48-100E battery packs inside.

PowerNest LV25:





Graph 3.5-2

Note: "Factory completed"

1. The battery connection of LV20 and LV35 can refer to Figure 3.5-2;

2. In the PowerNest series, there are differences in the connection processes for the battery connection sections between LV15 and LV20, LV25, and LV35 models. Given that the battery PACKs are connected in parallel within the cabinet, changes in connection processes are directly related to the number of battery PACKs configured inside the cabinet;

3. The total positive and negative of the battery side in LV20, LV25 and LV35 are "two-in-one power cable", that is, two 35mm2 cables are pressed together with one "70-8" copper terminal at one end, and two "35-6" copper terminals are pressed together with two 35mm2 cables at the other end.

Serial No.	Explain	Remarks
1	The connection line between the total positive side of the battery and the DC fuse	Recommended 35mm2
2	The connection line between the total negative on the battery side and the battery side switch QF1	Recommended 35mm2

3	Communication connection line between battery and inverter	CAN
4	Communication connection line between battery PACK	RS485
5	Grounding protection connection line between battery PACK	Recommended 6mm2
6	The power connection line between the positive terminals of the battery PACK	Recommended 35mm2
7	Power connection line between the negative electrode of battery PACK	Recommended 35mm2
8	The connection line between battery PACK and PE rack	Recommended 6mm2

Table 3.5

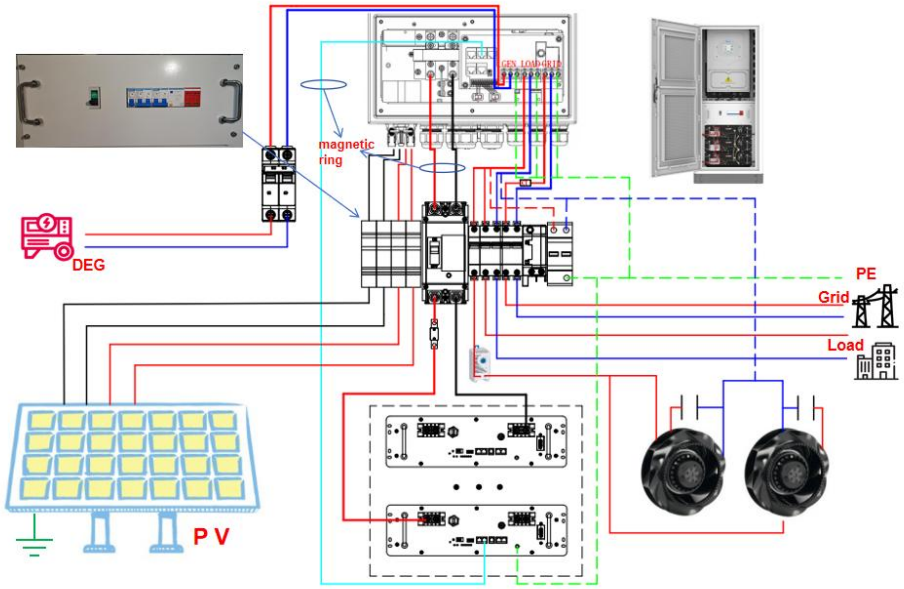
3.6 System Connection

Note:

1. All system wiring shall comply with national standards and local regulations;

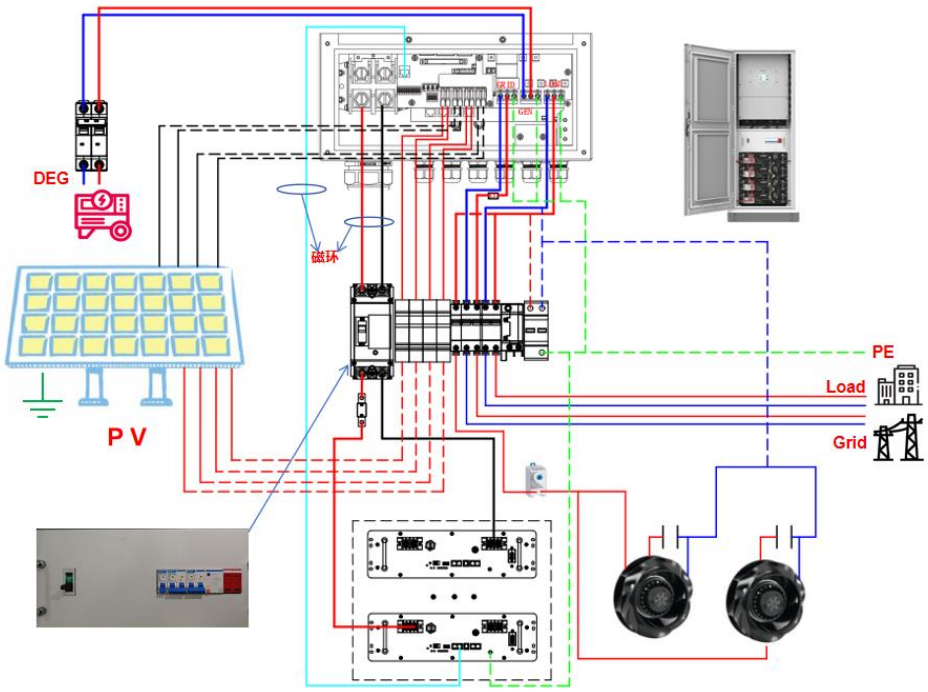
2. Please use special protective equipment and special insulating tools to avoid electric shock or short circuit fault.

PowerNest LV15:



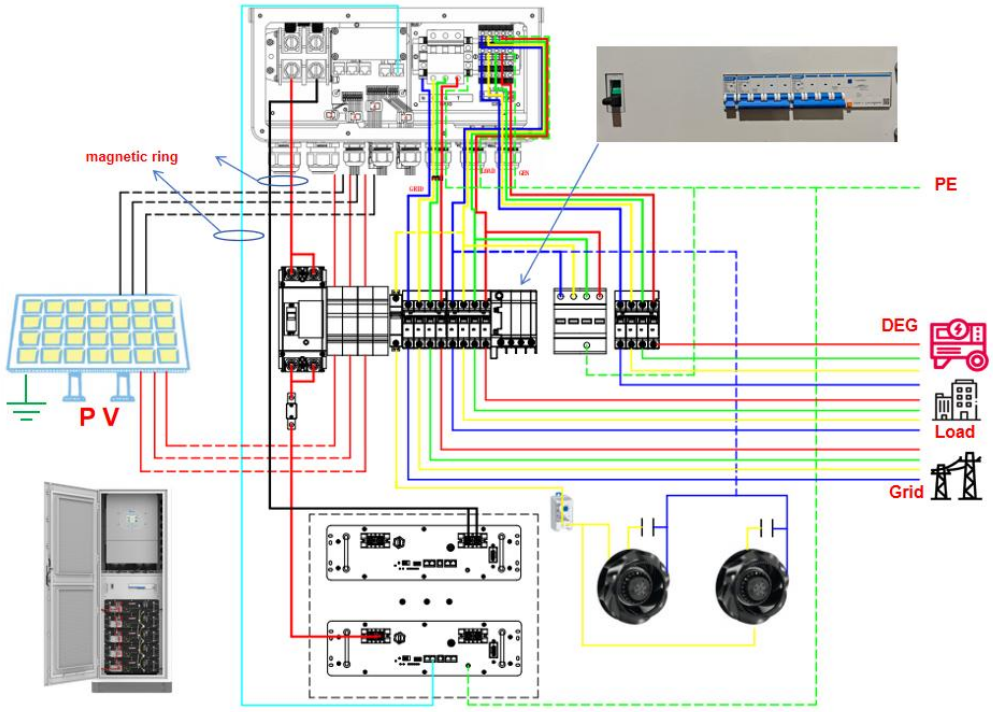
Graph 3.6-1

PowerNest LV20:



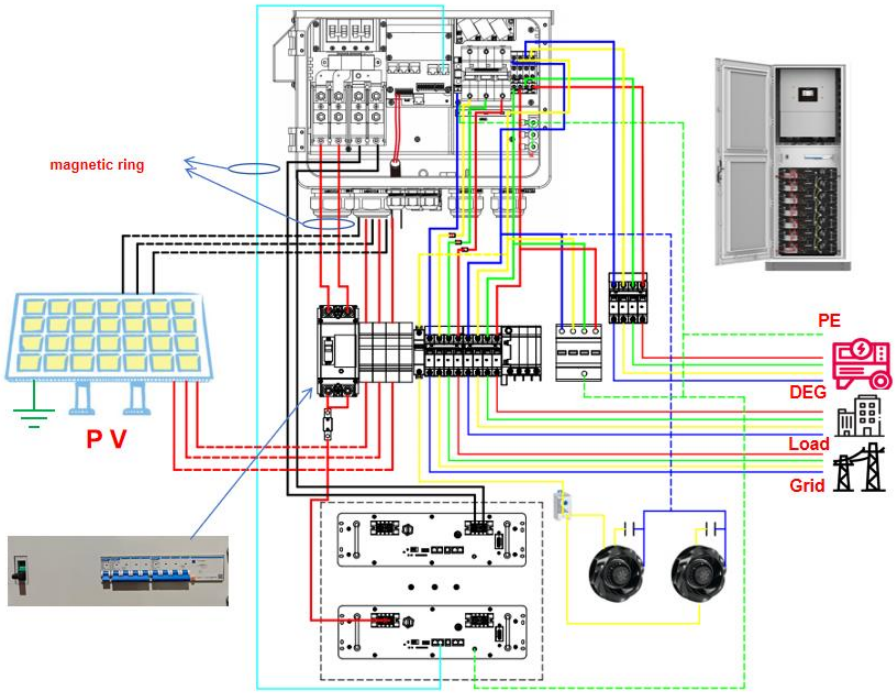
Graph 3.6-2

PowerNest LV25:



Graph 3.6-3

PowerNest LV35:



Graph 3.6-4

Explain:

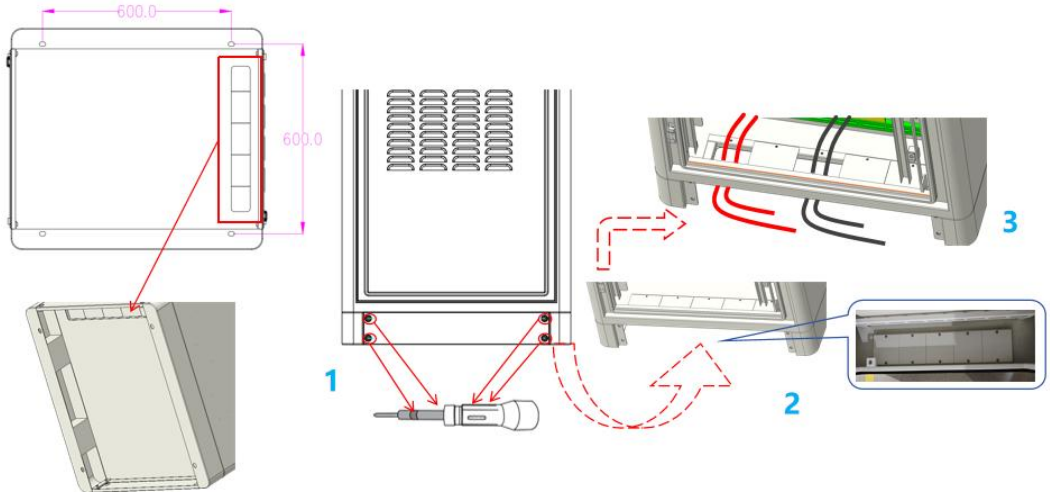
1. In the PowerNest series cabinets, the built-in cooling fans use single-phase AC motors. Since the magnetic field generated by a single-phase power source is pulsating, the motor cannot generate sufficient starting torque on its own. Therefore, a starting capacitor needs to be connected in parallel to solve this problem. The function of the capacitor is to produce a magnetic field in the auxiliary winding that has a phase difference of about 90 degrees with the main windings magnetic field, thereby forming a rotating magnetic field inside the motor, providing the necessary starting torque to ensure the smooth startup of the fan motor.

2. In LV25 and LV35 cabinets, switch QF1 on the battery side is only connected to the total positive pole of the battery pack, while the total negative pole of the battery pack is directly connected to the "Deye" brand inverter without passing through switch QF1.

3. In LV20, LV25 and LV35 cabinets, the photovoltaic fuse only protects the positive lead wire between the photovoltaic array and the MPPT converter.

4. Be careful when connecting the photovoltaic array to avoid electric shock or arc danger.

System line external outlet:



Graph 3.6-5

Note: In order to improve energy and heat dissipation efficiency, the PowerNest series cabinet design allows all external connections including load, photovoltaic, grid and diesel motor wires to be connected through the bottom outlet of the rear door heat dissipation area to achieve centralized management and optimized heat dissipation.

04 Operation and Maintenance

Danger:

Please use special protective equipment and special insulating tools to avoid electric shock injury or short circuit fault.

Note:

1. During the process of power supply, we should observe it while power is off. If any abnormal phenomenon is found, we should immediately turn off the battery and find out the cause. Only after solving the problem can we continue to turn on the battery.

2. After the battery installation and adjustment, or after the battery discharge is completed, please recharge the battery in time, otherwise it may lead to the damage of the battery due to over-discharge.

4.1 Pre-power-on Check

Inspection Items and Acceptance Standards

Serial No.	Inspection item	Check criteria
1	The system is installed	Install correctly and firmly
2	The cable layout is reasonable	The cable layout is reasonable to meet the requirements of users
3	The binding tape is beautiful	The line should be even and there should be no sharp corners at the cut
4	Reliable grounding	The ground connection is correct and reliable
5	Disconnect the switch	The inverter and all switches connected to the battery are in the "OFF" state
Serial No.	**Inspection item**	**Check criteria**

6	The cable is connected properly	The DC line, AC line and communication line are correctly connected and firmly and reliably
7	Seal unused terminals and ports	Unused terminals and interfaces are covered with waterproof covers
8	The installation environment meets the requirements	The installation space is reasonable and the environment is clean and tidy

Table 4.1

4.2 Startup Steps

Step 1:

Use the multimeter to confirm that the grid voltage is within the predetermined range (400V±10%);

Step 2:

Press the "circuit breaker" on the battery box inside the switch cabinet and press the "start" button on the panel;

Graph 4.2-1

Note: To ensure the normal operation of the PowerNest series cabinets, the "circuit breaker" and "start button" of the battery PACK in each cabinet must be in "ON" state.

Step 3:

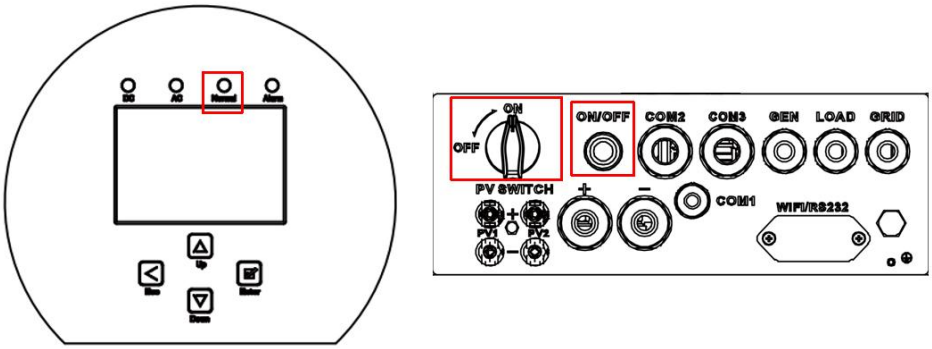
On the cabinet distribution board, the battery side switch QF1 is closed and in "ON"

state;

Graph 4.2-2

Step 4:

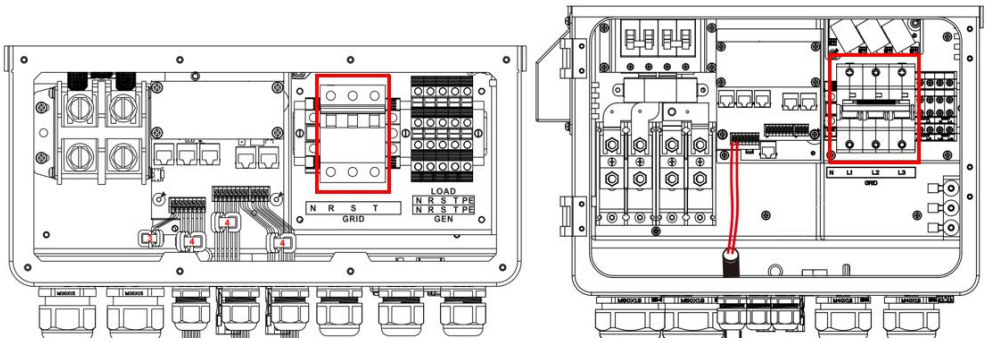
After pressing the "ON/OFF" button on the inverter, wait for the inverter communication to be completed, "Normal" indicator lights up;



Graph 4.2-3

Step 5: (LV25 and LV35 only)

The grid-side switch inside the 10kW and 15kW three-phase inverter;



Graph 4.2-4

Step 6:

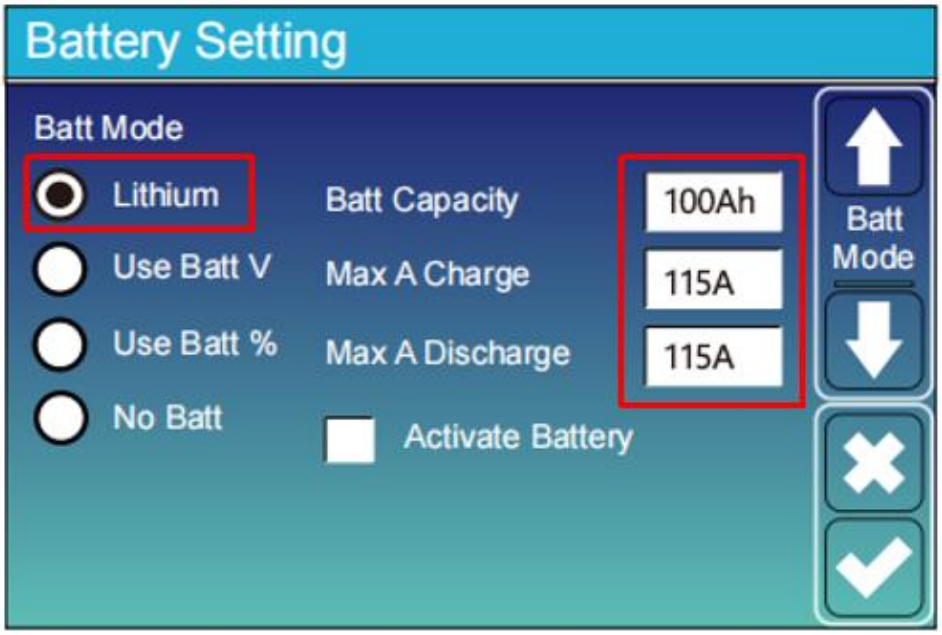
Close the mains switch MCB2, load switch MCB1, fan switch MCB4 and (in standby mode) generator switch MCB3 in sequence, and rotate the photovoltaic switch on the inverter to the "ON" position;

Step 7:

Perform the inverter status check to confirm whether the PV "DC", grid "AC", and communication "Normal" status indicator lights are stably displayed in green, and whether the "Alarm" warning indicator light is in hibernation state to verify that the inverter communication is abnormal and the system has no fault indication.

Step 8:

In the human-machine interaction interface of the inverter, after entering "System Settings", select the "Battery Settings" submenu. Given that the cabinet is equipped with a B-LFP48-100E model lithium battery, adjust the battery capacity to 100Ah in the "Batt Capacity" column under the "Lithium" option. At the same time, to protect the inverter, set the maximum charge-discharge parameters for the battery: LV15 not exceeding 115A, LV20 not exceeding 185A, LV25 not exceeding 210A, and LV35 not exceeding 280A.



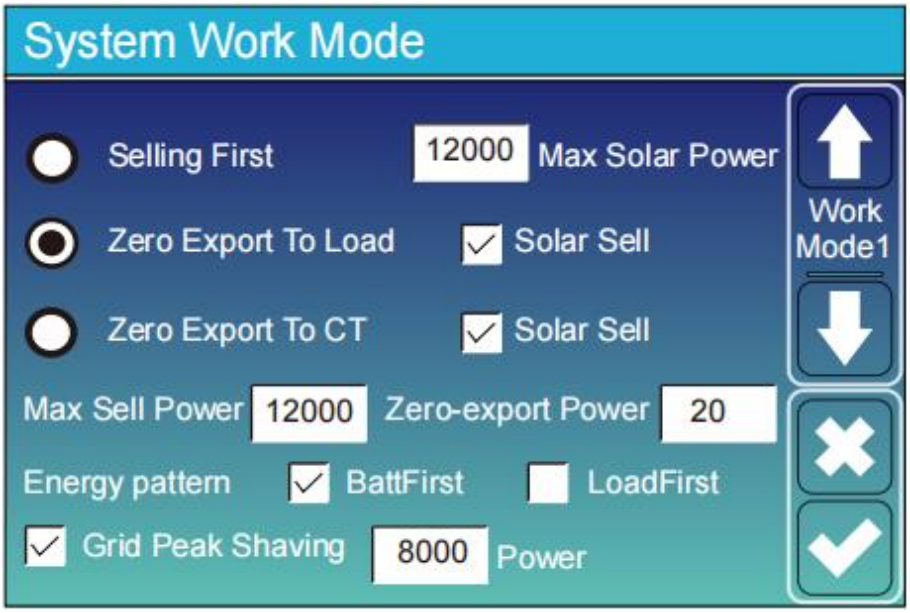
Graph 4.2-5

Note: In the inverter battery Settings interface shown in Figure 4.2-5, check whether the system is locked before modifying the battery parameters. If the system is locked, unlock it first.

Step 9:

In the "System Settings " -> " System Working Mode" sub-menu of the inverter human-computer interaction interface, select the appropriate system operation

strategy (off-grid, peak shaving, backup power supply, etc.);



Graph 4.2-6

Note: After confirming that the working mode and battery settings are correct, please perform the parameter save operation.

4.3 Shutdown Steps

Step 1:

Disconnect the mains switch MCB2, load switch MCB1, fan switch MCB4 and (in standby mode) generator switch MCB3 in sequence, and rotate the photovoltaic switch on the inverter to "OFF" position;

Step 2:

Wait for the system to be powered off; observe whether the "DC" and "AC" status indicator lights on the inverter are off, and the "Alarm" warning indicator light is normal;

Step 3:

Press the "ON/OFF" button on the inverter, wait for the inverter to stop working, the screen goes out;

Step 4:

First, the "start button" of each batteryPACK in the cabinet should be switched to

"OFF", and then the corresponding "circuit breaker" should be placed in the "open" state;

Step 5:

The battery side switch QF1 on the cabinet distribution board is disconnected and in "OFF" state;

Step 6: (LV25 and LV35 only)

The grid side switch inside the 10kW and 15kW three-phase inverter.

Note: For parallel battery systems, the circuit breaker of each battery PACK should be disconnected first, and then the main circuit breaker should be disconnected to prevent unbalanced current flow between battery packs.

4.4 Operation Interface

The operation interface of the PowerNest series cabinets serves as the human-machine interaction interface for inverters. This series includes the following models of Deye inverters: LV15 model is a 5kW single-phase inverter, LV20 model is an 8kW single-phase inverter, LV25 model is a 10kW three-phase inverter, and LV35 model is a 15kW three-phase inverter.

Please refer to the user manual of "Dee Energy Inverter" for specific information on the operation interface.

4.5 Inspection and Maintenance

In order to ensure the long-term stable operation of the system, corresponding maintenance plans should be formulated according to different environmental conditions.

1. Patrol cycle

- For energy storage systems installed in industrial parks with serious dust, high salt spray or heavy industrial parks, it is recommended that the inspection cycle be once a month due to the great influence of environmental factors on equipment.
- For energy storage systems in areas with good climate environment, environmental factors have relatively small impact on equipment, and inspection cycle can be extended to once every three months.

2. Patrol content

Maintenance personnel shall conduct regular inspections according to the contents listed in Table 4.5, mainly including the following aspects:

- Environmental inspection: check the environmental temperature, humidity and dust conditions to ensure that the equipment operates in a suitable environment.
- Equipment inspection: check the internal components of the inverter, observe whether there is aging phenomenon, and find potential problems in time; refer to the "Deer Inverter" user manual.
- Vibration monitoring: Monitor the vibration of the equipment during operation to ensure stable operation of the equipment.
- Fault handling: When problems are found, they should be handled in time to ensure the normal operation of the system.

Note:

- Maintenance personnel should have relevant professional knowledge and skills to ensure the effectiveness of inspection and maintenance work.
- Adjust maintenance cycle and inspection content according to different environmental conditions to ensure stable operation of equipment.
- Establish a complete maintenance record to facilitate analysis and improvement of maintenance work.

Inspection and Treatment Form

Maintenance object	Movement	Reference standard
Cabinet	1. Check the appearance of the whole machine 2. Check the ventilation port 3. Check the door lock	1. No obvious coating peeling, scratches or rust; 2. No obvious leakage marks; 3. No dust accumulation in the ventilation port; 4. The door lock is undamaged

Electric fan	1. Check noise and vibration 2. Check the air side	1. The fan rotates normally without jamming or abnormal noise. 2. The surface of the air outlet side is clean and there is no blockage
DC-to-AC converter	1. Check noise and vibration. 2. Check the ventilation ports on both sides of the board.	1. The left and right plate fans rotate normally without jamming or abnormal noise. 2. The surface of the left and right plate ventilation ports is clean and there is no blockage.
Electrical	1. Check the lightning arrester. 2. Check the circuit breaker and fuse.	1. The surge arrester, circuit breaker and fuse are normal. 2. The screw socket connection wire is not loose or fallen off.

Table 4.5

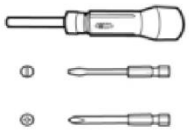
Note: Do not operate with electricity, pay attention to personal safety.

4.6 Cleaning and Maintenance

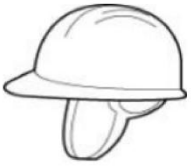
Note:

Please prepare at least the following tools, if not enough tools may be unable to complete maintenance; the tools used, such as cross screwdrivers, need to be insulated protection treatment, or use insulated tools.

Cleaning tools:

 Phillips Screwdriver	 Multimeter	 Rubber Hammer	 Insulator
 Dust Collector	 High-pressure Water Gun		

Protective Equipment:

 Safety Gloves	 Protective Mirror	 Protective Mask	 Safety Footwear
 Reflective Sheath	 Safety Helmets	 Medical Case	

Graph 4.6

Note:

It is recommended to clean once after each sandstorm in sandy areas; clean once before entering summer; other regions should ensure that the filter or condenser is not blocked according to the actual situation; dust-proof cotton can be used for up to 2 years.

Cleaning and Maintenance Sheet

Class	Movement	Reference standard	Whether the system is powered off
Cabinet	Clean the ventilation port	1. No dust accumulation in the ventilation port	Yes
Cabinet	Clean the dust-proof cotton	1. No insects, rats and snakes and other animals enter	Yes
Cabinet	Rinse appearance	1. Dust-proof cotton has no obvious color change and debris	Yes
Exhaust hood	Clean the fan	1. The surface of the air outlet hood is clean and unblocked; 2. The fan rotates normally without jamming or abnormal noise	Yes
Distributing Region	Check for any foreign objects in the distribution area	1. Clean and free of foreign objects in the area	Yes

Table 4.6

Step 1: Power down and shut down the system

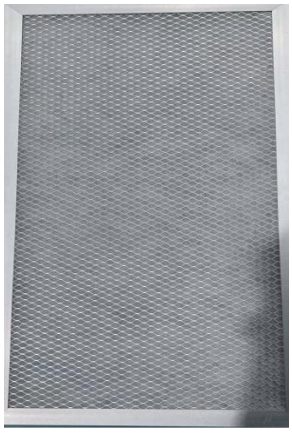
Step 2: Use special tools and keys to open the system cabinet door

Step 3: Disconnect the circuit breaker of the upper distribution box of the municipal power supply circuit breaker and hang a "Do not close" maintenance sign

Use the multimeter to measure whether the equipment is still energized, and wait until the equipment is no longer energized before proceeding to the next step;

Step 4: Open the cabinet door, loosen the dust-proof cotton frame buckle, remove the dust-proof cotton, and place the aluminum alloy frame and dust-proof cotton flat in the safe place area

Step 5: Use a high-pressure water gun to rinse the dust-proof cotton, and use a cleaner if it is too dirty



Step 6: After drying the dust-proof cotton after cleaning, use the buckle and hex key to fix it again

Step 7: Reboot and check

05 Warranty service

5.1 Warranty Period

In the case of correct use of the product, the warranty period agreed in the business contract shall prevail.

5.2 Warranty scope

During the warranty period, if any fault is caused by quality issues of the product itself, our company will provide free repair or replacement services for the customer. The customer should allow a reasonable response time for our companies repairs, and the replaced product will be handled by our company. The customer must present relevant proof of the purchased product and ensure that the product trademark is clearly visible; otherwise, our company reserves the right to not provide warranty guarantees.

5.3 Exemption statement

In the following cases, we have the right not to carry out the warranty, but can still provide paid repair services.

1. The warranty period has been exceeded;

2. Can not provide product purchase related proof;

3. Damage caused during transportation, loading and unloading;

4. Damage caused by incorrect installation, modification or dismantling by non-authorized personnel;

5. Damage caused by operation under abnormal use conditions or environment;

6. Machine failure or damage caused by the use of non-Natone parts or software;

7. Failure caused by fire, earthquake, flood and other irresistible factors.