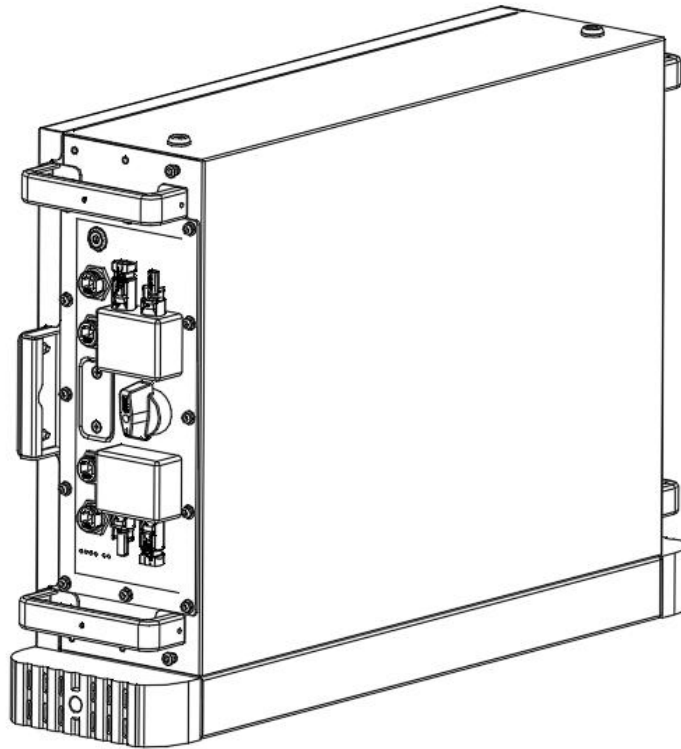




High Voltage Energy Storage Battery



Model#MID-HV5

User Manual

V1.0

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1 Overview

1.1 Application Scope

This user manual offers you the relevant informations about MidTeQ MID-HV5 battery, including product specifications, operation precautions, product maintenance and other related informations. For details on the operations, installation and use of the product, please refer to this user manual.

1.2 Applicable People

This manual is used for professional and technical staff who install, operate and maintain the MID-HV5 battery, as well as for the end-user who may need to view the relevant technical parameters. Anyone who operates must be qualified for electrical work.

1.3 User Manual

Before operating the battery module, the operator should be better trained and read the manual carefully, to ensure that the person using the product is fully understood. After reading the manual, please keep it in a safe place for future reference. You can also download this user manual in your language by scanning the QR code below:



1.4 Disclaimers

Failing to operate the battery properly may cause serious injury to yourself or others, or result in damage to the product or property. Once get started, you will be deemed to have understood, acknowledged and accepted all the terms and conditions in this user manual. Users who undertakes the operations should be responsible for their own actions and all the consequences arising therefrom. Midcosta shall not be liable for any damages caused by the user's failure in accordance with the provisions of this user manual.

The information in this user manual is subject to change without prior notice. Every effort has been made in the preparation of this document to ensure accuracy of the contents, but all statements, information, and recommendations in this document do not constitute a warranty of any kind, express or implied.

2 Product Brief Introduction

Lithium-ion batteries are new generation of green energy batteries. In recent years, with the rapid development of Lithium-ion battery technology, the pace of Lithium-ion batteries to replace the traditional lead-acid batteries are also gradually accelerating in various power fields.

MidTeQ MID-HV5 battery, which is suitable for medium-sized energy storage system applications. MidTeQ batteries adopt Lithium iron phosphate cells with outstanding safety performance, with a high-precision battery management system (BMS), which can monitor and collect voltage, current and temperature of each cell in the module in real time. The BMS also has a passive balance function, advanced battery control strategy, which can further improve the performance of the battery pack.

MidTeQ MID-HV5 battery consists of LFP battery module, BMS, DCDC module, housing and wire. The product has a complete protection function and can establish communication with external devices through CAN /RS485.

3 Safety Instructions

3.1 Labels/Symbols Descriptions











In order to ensure the user's personal safety when using this product, this manual provides relevant identification information and uses appropriate symbols to alert the user, who should carefully read the following list of symbols used in this manual.

Table 3-1 Label/Symbols Descriptions

	Potentially low risk: may result in mild or moderate impairment if not avoided
	High Risk: may result in serious injury or death if not avoided
	The battery terminals must be disconnected before commencing on the battery
	The battery could explode and/or be severely damaged if dropped or crushed
	The battery may explode if exposed to open flames or other extreme sources of heat
	Grounding: The system must be firmly grounded for operator safety
	This side should be up
	Handle with care to avoid damage
	Keep dry
	Keep the battery away from kids
	Do not short circuit
	Do not reverse connect the positive and negative
	Please read the instructions in the operation manual

3.2 Installation Tools

Table 3-2 Installation Tools Required

Tools	Multi-meter 	Protective gloves 	Insulated anti-smashing shoes 
	Protective suit 	Safety glasses 	ESD wrist strap 
Installation Tools	Electric screwdriver 	Cross screwdriver 	Socket spanner 
	Slotted screwdriver 	Wire stripper 	

3.3 Basic Attentions

3.3.1 User Manual Keeping

This manual contains important information about MidTeQ MID-HV5 battery. A careful reading of this manual will help you become familiar with the product, and this manual should be kept in a safe place so that it can be easily accessible to maintenance personnel at any time when needed.


3.3.2 Product Identity Protection

Warning labels, back panels and front doors of cabinet contain important and safety precaution information and are strictly forbidden to be torn and damaged.


3.3.3 Operator Requirements

Only trained and qualified professionals should perform various operations on the product: the product operator should be fully familiar with the product, components and operating procedures, as well as understanding the product's user manual.


3.3.4 Safety Warning

 During the installation, daily maintenance, overhaul and other operations of MID-HV5 battery, the following conventions should be observed in order to prevent the accidental operation, proximity or occurrence of accidents by unrelated personnel: the front and rear switches of the products should be clearly marked to prevent accidents caused by wrong switches; warning signs or safety warning zones should be set near the operation area to prevent the proximity of unrelated personnel.


3.3.5 Electric Measurement

 Due to the high voltage of the battery that may endanger personal safety, accidental contact may cause serious injury, so when performing measurement operations, please make sure you have good insulation protection (such as insulating gloves).

3.3.6 Measuring Instrument

 In order to ensure that the electrical installation meets the requirements, please use the relevant electrical measuring equipment, such as multi-meter, power meters, etc.

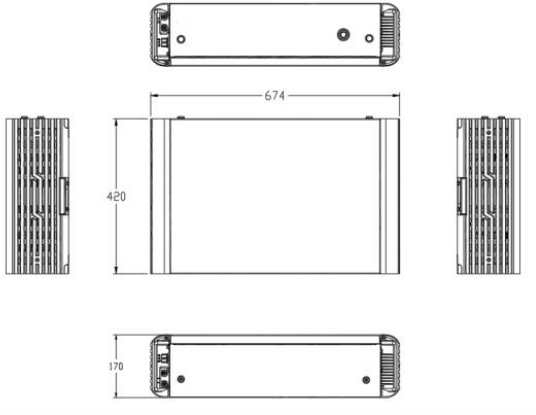
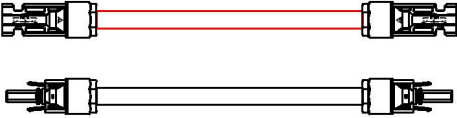

3.3.7 Maintenance

 During maintenance and repair operations, it should be ensured that the energy storage battery cabinet is not accidentally charged; a multi-meter, should be used to ensure that there is no electricity in the energy storage battery cabinet; insulating materials should be used to insulate the possible electrical parts of the system; ensure that the system has necessary grounding connections.

4 Main Components

The main components of the battery module are shown in Table 4-1 below:

Table 4-1 Main Components List

No	Item	Picture
1	MidTeQ MID-HV5 battery	
2	Power Cable	
3	Communication Cable	

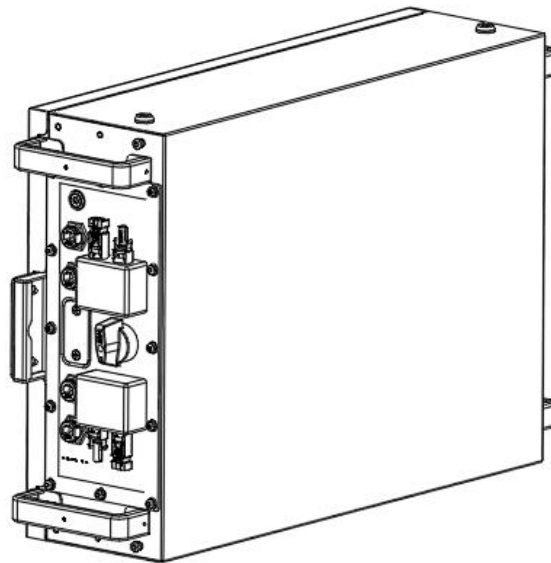
5 Product Description

5.1 Product Description

MidTeQ MID-HV5 expandable batteries are modular products designed for energy storage applications, and are widely used in small and medium-sized energy storage systems. A single module consists of cells, BMS, DCDC module and housing, and the BMS in each module has independent voltage, current, temperature detection and protection functions.

5.2 Product Diagram

Figure 5-1 MID-HV5 Battery Diagram



6 Product Details

6.1 Battery Specification

MidTeQ MID-HV5 battery is made of Lithium iron phosphate battery modules with outstanding safety performance. The battery modules are available in 5.12KWh/3KW. The following table describes related parameters.

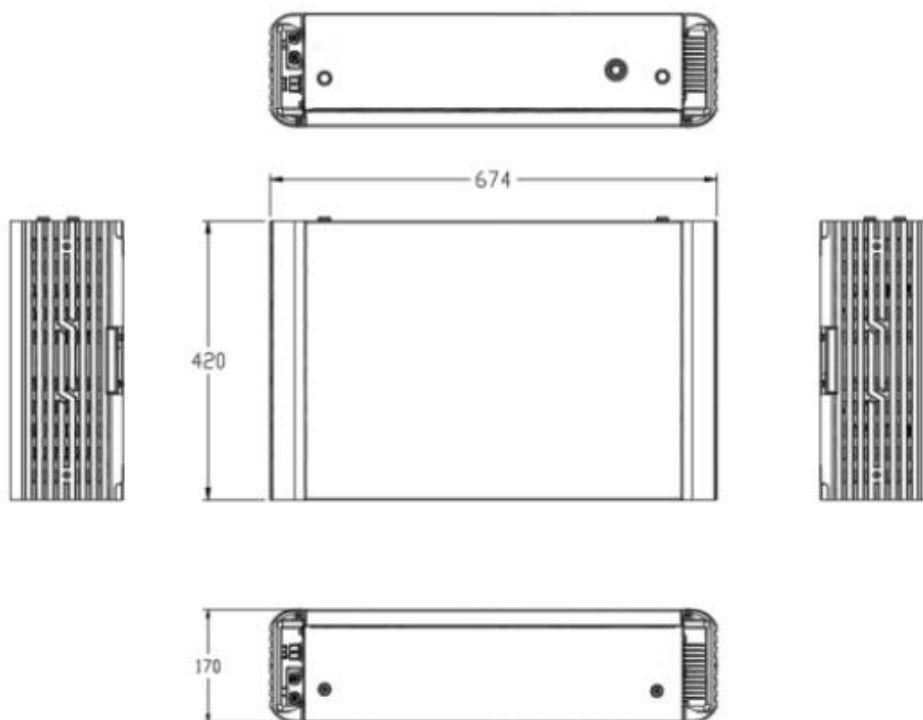
Table 6-1 MidTeQ MID-HV5 Battery Specifications

Type	Voltage	Power	Energy	Width	Depth	Height	Weight
MID-HV5 Battery	400V	3KW	5120Wh	570mm	170mm	420mm	55±2kg

6.2 Battery Illustration and Front Panel Description

6.2.1 Battery Appearance & Dimension Schematic

Figure 6-1 MID-HV5 Battery Appearance & Dimension Drawing(sizes are in mm)



6.2.2 Battery Side View

Figure 6-2 MID-HV5 Battery Side Panel Diagram

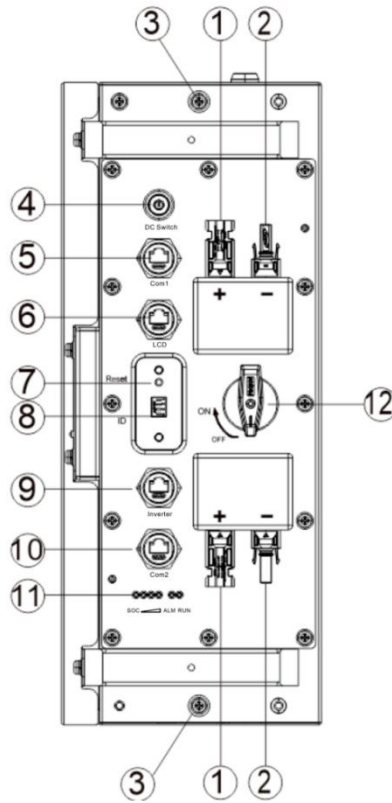
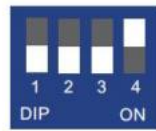


Table 6-2 MID-HV5 Battery Side Interface Descriptions

No.	Item	Function Description	Remarks
1	Bat+	Battery positive	
2	Bat-	Battery negative	
3	GND	Ground point	
4	Bat Power	Power switch ON/OFF	
5	Comm port 1	Communication port	
6	LCD	LCD Communication	
7	Reset	Reset button	
8	ID	Battery address	
9	INV - BMS	Inverter Communication port	
10	Comm port 2	Communication port	
11	SOC	Battery SOC	
12	Bat Output Switch	Battery output power ON/OFF	

6.3 ID Setting Description

Figure 6-3 ID Dialing Code Address Assignment Instructions



ID:1


ID code bits correspond to binary digits, down represents "ON", up represents "OFF", the right side of the code bit is the low bit, the left side is the high bit.

NOTE: The battery pack ID connected to the hybrid inverter must be set to ID1, indicating that it is the host, other batteries do not need to be set, and the ID1 host will automatically assign an address to the slave.

7 System Installation

7.1 Handling, Transportation, Storage

7.1.1 Handling

 Rough handling practices may cause short-circuit or damage to the battery pack, resulting in battery leakage or fire. Forklifts or carts should be used for handling, and tools used for transporting should not exceed the width and height of aisles and doors, and should be transported at a moderate speed. Avoid the phenomenon of inverting and laminating battery packs when unloading.

7.1.2 Transportation




 Due to the heavy weight of the battery module, in order to guarantee safety, it is recommended to use a forklift that meets the requirements for moving and transporting, and should avoid dropping and throwing; the batteries should be prevented from collision and strong vibration during transportation.

Figure 7-1 Handling tool diagram







7.1.3 Storage

 Short-term storage (within 3 months): If the battery won't be used in a short period of time, the battery can be fully charged and stored in an environment of dry, cool, non-corrosive gas, temperature 10-45°C, relative humidity 60±30%, no strong electromagnetic fields and no direct sunlight.

 Long-term storage (over 3 months): If the battery won't be used for more than 3 months, keep the battery SOC at 50%~70%, store it in an environment of dry, cool, non-corrosive gas, temperature 20-35 °C, relative humidity 50 ± 15 %, without strong electromagnetic fields and direct sunlight, and ensure to charge once every 6 months to avoid irreversible capacity loss caused by long-term storage.

7.2 Open-box Inspection

Table 7-1 Unpacking Tools Required

Item	Tools		
Tools	Slotted screwdriver 	Protective gloves 	Stripper 
	Hammer 		



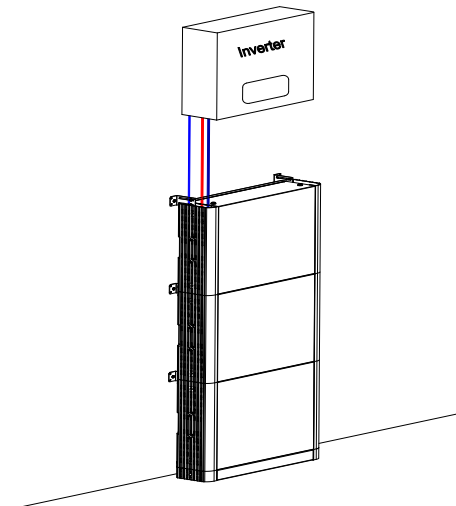
MidTeQ MID-HV5 battery has been strictly tested before shipment. Please sign your receipt after inspection. If the product is damaged, please contact our local distributor. Please open the box to check whether the outer packaging is intact or damaged and whether the product inside is damaged.

7.3 Mechanical Installation

7.3.1 Installation Requirements

The installation of the battery packs has a direct impact on its safety, service life and performance. Make sure the wiring of the system is convenient, easy to maintain and operate, and should avoid placing the battery mounting base in a high temperature and high humidity environment. Make sure the installation floor is flat. As shown in the following diagram.

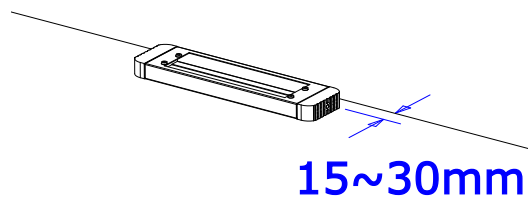
Figure 7-2 Installation Diagram



7.3.2 Mounting Base Installation

Take out the mounting base from the box and place it on flat ground. Our special design for the mounting base eliminates the need for screws to secure the base to the floor.

Figure 7-3 Mounting Base Installation

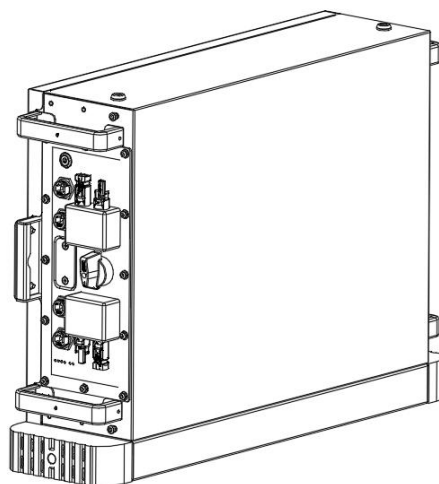


7.3.3 Battery Module Installation



According to the situation of the installation site, use manual or machine to move the battery pack; it is recommended that at least two people lift the battery pack, and wear anti-smashing shoes and non-slip gloves during installation.

Figure 7-4 Battery Module Installation Diagram



7.3.4 Whole System Installation


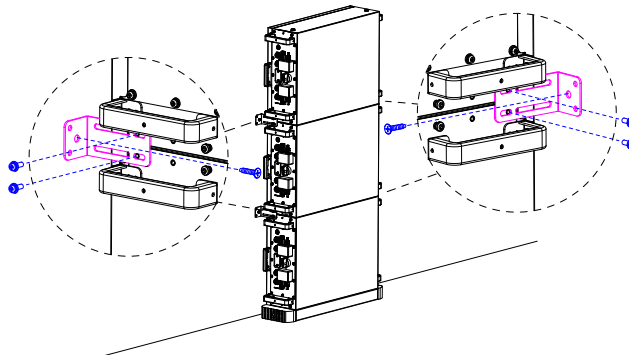
 Considering that our mounting base adopts non-traditional screw fixing method, the battery system is at risk of tipping off if not handled properly, so we need to install a fixed mounting ear on the wall to ensure the stability of the battery system.

Figure 7-6 Mounting lug Installation









7.4 Electrical Installation

7.4.1 Tools Introduction

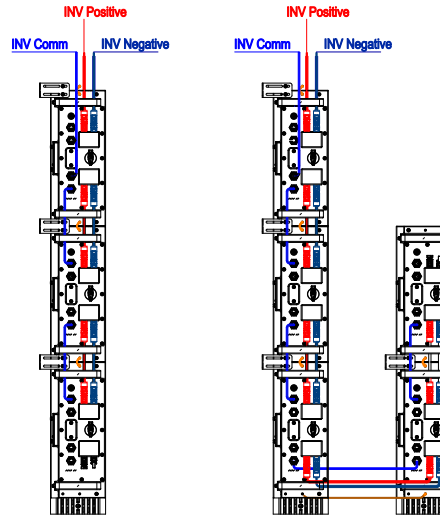
The following tools are required for electrical connections, as shown in Table 7-2:


Table 7-2 Electrical Installation Tools Required


Item	Tools Required		
Tools	Multi-meter 	Protective gloves 	Screwdriver 
	Electric batch 	Cross screwdriver 	Socket wrench 


7.4.2 MID-HV5 Battery Cable Connection


Figure 7-7 MID-HV5 Battery System Connection Schematic



 (1) Grounding. One end of the grounding cable (PVC 25mm²) is screwed to the grounding point at the end of the chassis (M5), and the other end is connected to the grounding copper strip to ensure a solid connection.

 (2) Communication cable installation. Finally, connect the RS485/CAN interface of the No.1 battery to the inverter via communication cable.

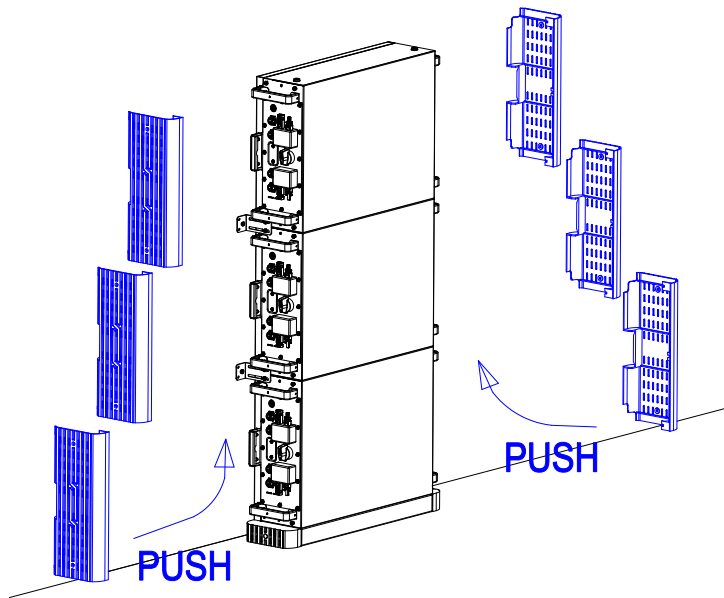
 (3) Power cable installation. Use the power cable to connect each battery in parallel as the above picture shows. Avoid short circuit and reverse connection of positive and negative terminal.

 (4) Connect the inverter. Make sure the battery and inverter are powered off before connecting. Clearly identify the location of the positive and negative terminals of the system, red to the positive terminal, black to the negative terminal, to ensure no connection errors.

7.4.3 Side Panel Installation


After all wiring harnesses are installed (power cables, communication cables), use power tools to complete the side panel installation.

Figure 7-8 Side Panel Installation




7.5 System Starting Up

7.5.1 Start Up Checking

 After installation or maintenance, the lithium battery system needs to be started up. Before starting up, please check the following precautions carefully to make sure there are no errors.

All electrical connections must be made in accordance with the electrical diagrams in the manual; the cables are properly distributed, without mechanical damage, and connected and fastened correctly; No excess parts or conductive material remains.

7.5.2 System Turn On

 After completing the above steps, press the ON/OFF switch on the control panel to turn on the system, then turn on the miniature circuit breaker and turn on the power of the whole system to complete the installation.

Steps to turn on the system:

- (1) Double check all cables are connected correctly, and make sure the grounding is proper.
- (2) Turn on the switch at inverter's battery side or between inverter and battery.
- (3) Turn on the battery system.
- (4) Turn on the inverter.

7.5.3 Turn off system

Battery system has to be turned off when failure or before service, the procedures to switch off are:

- (1) Switch off the inverter;
- (2) Switch off the battery;
- (3) Switch off the battery switch between the battery and the inverter if there is any.

7.5.4 System Charge



When the battery system is transported or stored for a long time, the battery SOH may be low due to self-discharge of the cells and system consumption, and the lithium battery needs to be charged after normal start-up and before use.

8 Maintenance

8.1 Common Faults (Phenomenon) and Solutions

The LED indicators on the front cover provide information about the error status of the battery.

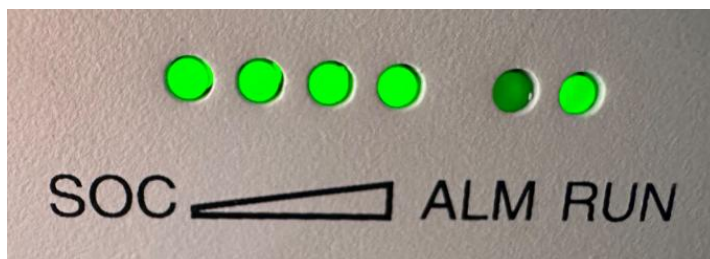


Table 8-1 Common faults(phenomenon) and solutions




Battery Error Description:

NO.	Fault phenomenon	Analysis	Solution
1	Communication failure with inverter	Communication port connection error or battery ID setting error	Check communication connection or ID settings
2	No DC output	Unclosed breaker or low voltage	Close breaker or charge the battery
3	Power supply time is too short	Battery capacity lack or not fully charged	Maintenance or replacement
4	Battery can't be fully charged	Power system DC output voltage falls below the minimum charge voltage	Regulating DC output voltage of power supply to battery suitable charging voltage
5	ALM LED always lights	Power cable connection short-circuited	Disconnect the power cable and check all cables
6	The battery output voltage is unstable	DCDC system does not operate normally	Press the reset button to reset the system, then reboot the system
7	ALM LED flash 2 second and Green LED off	Can't be charged and discharged	Check DCDC status
8	RUN LED flash 0.5 second and ALM LED off	Can be charged and can't be discharged	Charged mode
9	RUN LED flash 2 second and ALM LED off	Can be discharged and can't charged	Discharged mode
10	Different SOC value of batteries in parallel	Normal phenomenon	No operation

8.2 Daily Maintenance

Routine maintenance are shown in Table 8-2 below.

Table 8-2 Routine Maintenance

Item	Maintenance Method	Maintenance Intervals
Power Cables 	<ol style="list-style-type: none"> 1. Check whether there is mechanical damage to the power cable and whether the terminal insulation sleeve has fallen off; if there is such a phenomenon, please turn off the machine and carry out maintenance or replacement. 2. Check whether the power cable is loose; if there is any sign of looseness, please use a standard torque wrench to tighten it. 3. Check the system for loose screws or discoloration of the copper bus bar; if the screws are loose, please tighten them with a standard torque wrench; if the copper bus bar is discolored, please contact the manufacturer for after-sales replacement. 	Once every 6 month
Communication Cables 	<ol style="list-style-type: none"> 1. Check whether the parallel communication cable terminal is loose, if it is loose, fix it. 2. Check whether the color of the communication cable has obvious discoloration, if discoloration, please shut down the machine to replace the communication cable 	Once a year
Cleanliness	Check the cleanliness of the front battery module, if there is obvious dusty, please clean up in time.	Once 6-12 month
System Running Status 	<ol style="list-style-type: none"> 1. Check if all parameters are normal when the system is running (system voltage, current, temperature, etc.) 2. Check whether the main core components of the system are normal, including system switches, contactors etc. are normal 3. Check whether the system air inlet and outlet, air ducts are normal, if there is blockage and congestion, need to clean up in time 	Once every 6 month
Charge and Discharge Maintenance	Check whether the status of battery SOC and SOH is normal; it is recommended that charge/discharge power should not exceed 20% of the rated value.	Once every 6 month

9 Cautions and Warranty

9.1 Cautions



Please read below precautions and follow them during installation and use of the battery, incorrect installation and using of the battery may cause personal injury or damage to the product.

- (1) DO NOT throw the battery into water. Store batteries in cool and dry environment.
- (2) DO NOT put the battery into fire or heat the battery, so as to avoid explosion.
- (3) Use specialized charger, and follow the correct procedures.
- (4) DO NOT reverse positive and negative terminals, do not connect the battery directly to AC power.
- (5) DO NOT combine different kinds of batteries together from different manufacturers, do not mix old and new batteries.
- (6) DO NOT use the battery when it is hot, bulged, deformed or leaked.
- (7) DO NOT puncture the battery with a nail or other sharp objects; Do not throw, stamp on or hit the battery.
- (8) DO NOT open or try to repair the battery. Warranty is invalid if the battery has been repaired or disassembled.
- (9) Batteries are half charged before shipment, don't use the battery if it's hot, bulging, or smell abnormal and so on, and report to after-sales dept. immediately.
- (10) If you need to store the battery for a long time, please charge and discharge the battery every three months to ensure the best performance, and the best state of battery power for storage is Between 50%~60%.
- (11) Please use the battery in the temperature range which is defined in the manual.
- (12) The state of charge of batteries is 50% before shipment, please charge the battery before using.

9.2 Description of Warranty

During the valid warranty period of the product, any warranty issues such as non-human or unintentional product damage or functional failure will enjoy our free repair and replacement services. Customers need to provide a valid purchase invoice or related product warranty information. For more details of warranty, please refer to the warranty document which is provided with the product.

10 Technical Specifications

The product technical specifications are shown in Table 10-1 below:

Table 10-1 Product Technical Specifications

Model No.	MID-HV5
Nominal Capacity	100Ah
Nominal Input/Output Voltage	350-435VDC
Normal Operating Voltage	360-435VDC
Nominal Energy	5.12kWh
Nominal Output Power	3KW
Maximum Output Current	10A
Maximum Discharge Depth	≤90%
Voltage Range of Battery	45-57V
Maximum Charging Current	62.5A
Charging Temperature Range	0°C ~ 55°C
Discharge Temperature Range	-20°C ~ 55°C
Optimum Operating Temperature Range	20~30 °C
Storage Humidity	60±25% R.H.
Cooling mode	Natural cooling
Communication Mode	CAN Bus or RS485
Efficiency	Charge 98%; Discharge 97%
Protection Level	IP65
Product Weight	~55kg
Product Size	674*420*170mm

11 Applicable Standards

MidTeQ MID-HV5 battery pack is confirmed to comply with the essential requirements of EU standards when used as intended.

The following relevant harmonized European standards were used for the assessment, the references of which were published in the Official Journal of the European Communities:

IEC 62619: 2022
EN 62477-1: 2012+A11:2014+A1:2017+A12:2021
EN IEC 61000-6-1: 2019
EN IEC 61000-6-2: 2019
EN IEC 61000-6-3: 2021
EN IEC 61000-6-4: 2019

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