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Manual



Growatt New Energy

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## Residential Energy Storage User Manual

### ARK LV HUB-A1 Low Voltage Battery Hub

# Contents

## About this Document

This document describes the installation, electrical connection, operation, commission, maintenance and troubleshooting of ARK LV HUB-A1 Low Voltage Battery Hub (hereafter simply put ARK LV HUB-A1). Before installing and operating ARK LV HUB-A1, 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.

## 1 Product Overview

- 1.1 Intended Use
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- 1.3 Working Principle and Function

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# 1 Product Overview

## 1.1 Intended Use

The ARK LV HUB-A1 is designed to be applied to multiple batteries in parallel. It supports the information collection of 8 groups of parallel batteries and sends to the energy storage unit, summarize the temperature, current and other communication functions of the batteries. The following specifically introduces the content of ARK LV HUB-A1.

## 1.2 Appearance

ARK LV HUB-A1 consists of information summary module, busbar and mechanical parts. Product appearance is shown as below.

Dimension (unit: mm)

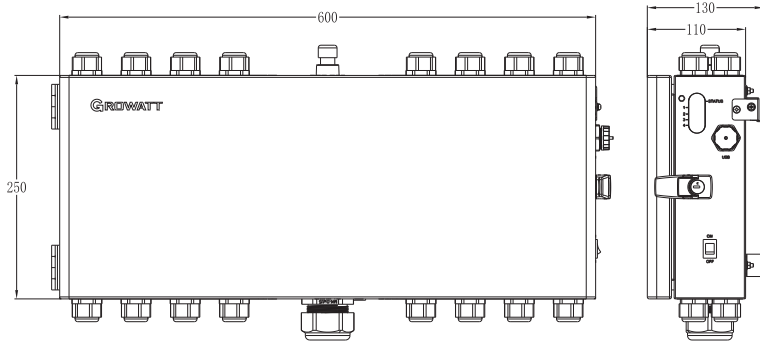


Fig 1.1: Dimension

## 1.3 Working Principle and Function

ARK LV HUB-A1 is a battery group parallel control unit, composed of control module, busbar, power button and mechanical parts. A maximum of 8 battery groups connected in parallel to increase the capacity and power of the battery system. It real-time communication with PCS (Power Conversion System) and BMS (Battery Management System) via CAN.

- Monitoring : battery voltage, temperature, current detection.
- Protection and Alarm: protection and alarm when overvoltage, under voltage, over current, over-temperature or under temperature occurs. See Appendix I for details.
- Report: report all alarm and status data to PCS.
- Parallel connection: support up to 8 battery groups in parallel.
- Passive balance function.

# Safety 2

Safety information contains in this section must be observed at all times when working on or with this product. For safety, installers are responsibility to familiarize themselves with this manual and all warnings before installation.

## 2.1 Basic security

The product has been designed and tested in strict rules with international safety certification requirements. Read all safety instructions carefully before any work and obey the rules at all times when working on or with the product. Growatt shall not be liable for any consequence caused by the violation of the following:

- Damage occurred during transportation.
- Incorrect transportation, storage, installation and use, or customer fails to convey the correct information about transportation, storage, installation and use to terminal customers.
- 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.
- Product tamper label is damaged or product with any part missing (except the authorized disassemble parts).
- Operation in extreme environments which are not allowed in this document.
- Repair, disassemble, or change product without authorization and cause failure.
- Damage to shell labels or modifies date of production.
- Damages due to force majeure (such as lightning, earthquakes, fire, and storms).
- Warranty expiration.

## 2.2 Safety Precautions

### 2.2.1 Environment requirements




Do not expose the ARK LV HUB-A1 to temperature above 50°C or heat sources.  
Do not install or use the ARK LV HUB-A1 in wet locations, moisture, corrosive gases or liquids, such as bathroom.  
Please install indoors, outdoor installation is not supported.  
Place ARK LV HUB-A1 in safe place away from children and animals.  
Power terminals shall not touch conductive objects such as wires.  
Pack should not be in contact with liquid.

### 2.2.2 Operation Precautions

Do not touch the ARK LV HUB-A1 with wet hands.  
Do not disassemble the ARK LV HUB-A1 without permission.  
Do not crush, drop or puncture the ARK LV HUB-A1.  
Store ARK LV HUB-A1 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 ARK LV HUB-A1 shall be repaired, replaced or maintained by skilled personal that has been recognized.

When storing or handling ARK LV HUB-A1, do not stack ARK LV HUB-A1 without package.  
Packaged ARK LV HUB-A1 should not be stacked more than specified number stipulated on the packing case.

### 2.3 Warning Labels

Symbols	Description
	Do not dispose in trash
	Lithium ion battery can be recycled
	Certification in European union area

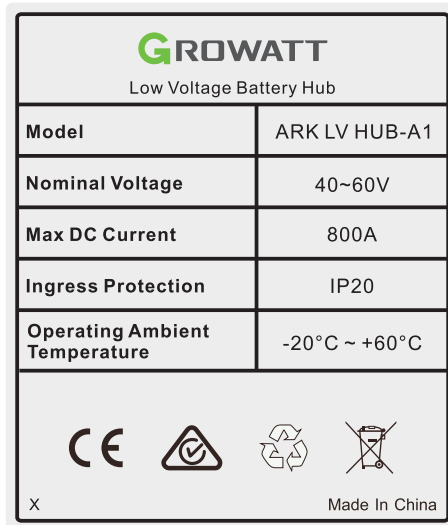



Fig 2.1: Nameplate

### 2.4 Emergency Responses

Manufacturer takes foreseeable risk scenarios into consideration and is designed to reduce hazards and dangers. However, if the following situation occurs, do as below:

Situation Occurs	Description and action need
Wet Packs	If ARK LV HUB-A1 is flooded or submerged, do not access it. Contact Growatt or distributor for technical assistance immediately.
Damaged ARK LV HUB-A1	Damaged ARK LV HUB-A1 is dangerous and must be handled with special attention. They are no longer suitable for use and may cause danger to people. If the ARK LV HUB-A1 damaged, stop use it and contact Growatt or distributor.

## Storage and Transportation 3



**WARNING**

- 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, working principle and national 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.

### 3.1 Installation environment

➤ The ambient temperature for the installation of the battery system shall be above -10°C, below 50°C, and the humidity shall between 5% and 95%. Indoor installation, do not install outdoors.

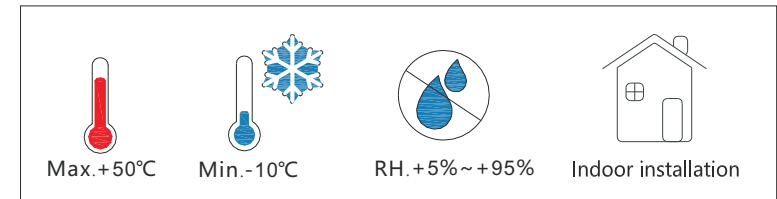


Fig 3.1: Installation environment requirements

### 3.2 Basic Installation Requirements

➤ ARK LV HUB-A1 can only be installed indoors. The following conditions are allowed:

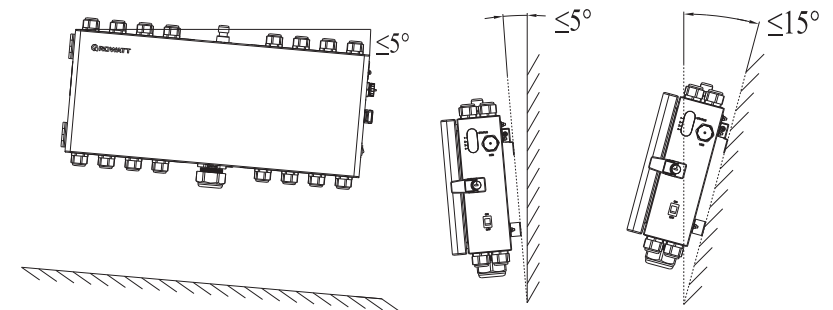
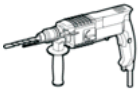








Fig 3.2: Acceptable wall mounted installation

### 3.3 Installation Required Tools

The following tools are required to install the ARK LV HUB-A1:

			
Drill	Screw Driver	Wrench	Pencil
			
Tap Measure	Multimeter	5mm Allen key	

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

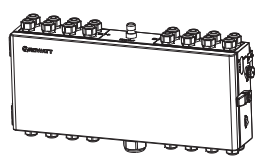


		
Insulated Glove	Safety Goggle	Safety Shoes







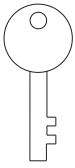
### 3.4 Installation Procedures

#### Pre-installation Check

Check the package	Check the ARK LV HUB-A1 package before open it. If any abnormality is detected, do not open the Package and contact your distributor.
Check deliverable	Check the quantity of all parts inside according to the package list. If there is any part missing or damaged, please contact your distributor.

#### Check Packing List

		
ARK LV HUB-A1	Wall Hangers X1	Communication line to PCS

						
Operation manual	Quick installation manual	Warranty Card	Terminal X32	M6 explosive screw X2	M4 X14 combination screw X2	Key X2

#### Installation

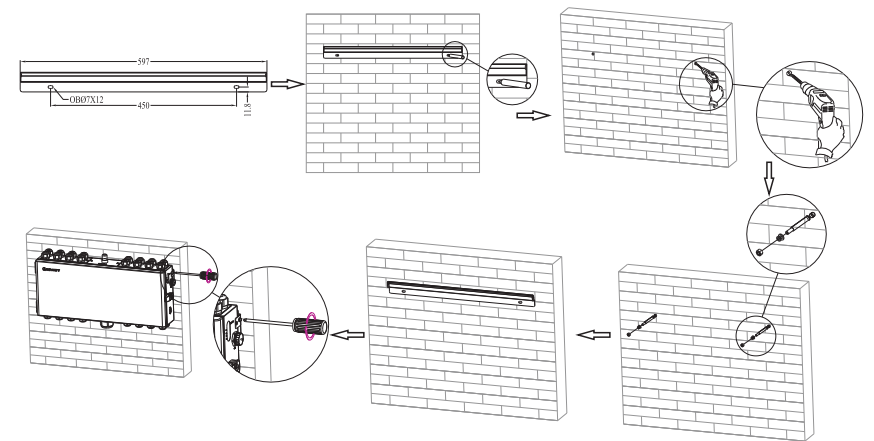



Fig 3.3: Multiple ARK LV HUB-A1 installation process

- Step 1: Please make sure that the thickness of the wall for ARK LV HUB-A1 installations more than 120mm.
- Step 2: Place the wall hangers on the wall and mark the holes that need to be punched. Each wall hanger has two fixed positions. After mark the holes, put down the wall hangers.
- Step 3: Drill a hole at the marked point with a depth of 55mm at the mark with a drill of  $\phi 8$ . Place the wall hangers and expand the bolt with a hammer into the hole in the wall, install the nut (including elastic flat pad) and tighten the nut with a wrench.
- Step 4: Hang the ARK LV HUB-A1 on the wall hangers and install the safety screws (M4x10 Combination screw) on both sides of ARK LV HUB-A1.

### 3.5 Electrical Connection

 <b>WARNING</b>	Do not forget wear ESD wrist strap and gloves, safety gloves and goggles.
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#### Terminal Definition:

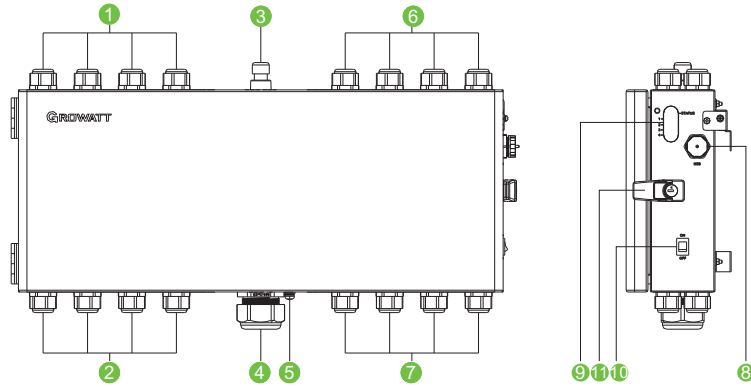




Fig 3.4: Terminal Definition

Serial number	Item	Specifications	Symbol
1	Positive terminal	IP67-Red connector	BAT+
2	Positive terminal	IP67-Red connector	BAT+
3	Communication Port	IP67 RJ45water proof connector	COM OUT
4	Communication Port	IP67 RJ45water proof connector	COM IN
5	Grounding terminal	M6 Screw	
6	Negative terminal	IP67 -Black connector	BAT-
7	Negative terminal	IP67 -Black connector	BAT-
8	USB interface	USB interface for Program Upgrade	USB
9	LED interface	Five leds	Status
10	POWER button	IP20-Button to turn on or off the ARK LV HUB-A1	POWER
11	LOCK	TURN OFF	KEY

#### Communication interface definition:

#### RS485&CAN crystal plug definition :

Item	Crystal head picture	Serial no.	Definition
COM OUT		1	RS485_B
		2	RS 485_A
		3	GND_COM
		4	CANH
		5	CANL
		6	GND_COM
		7	WAKE-
		8	WAKE+

#### System connection diagram

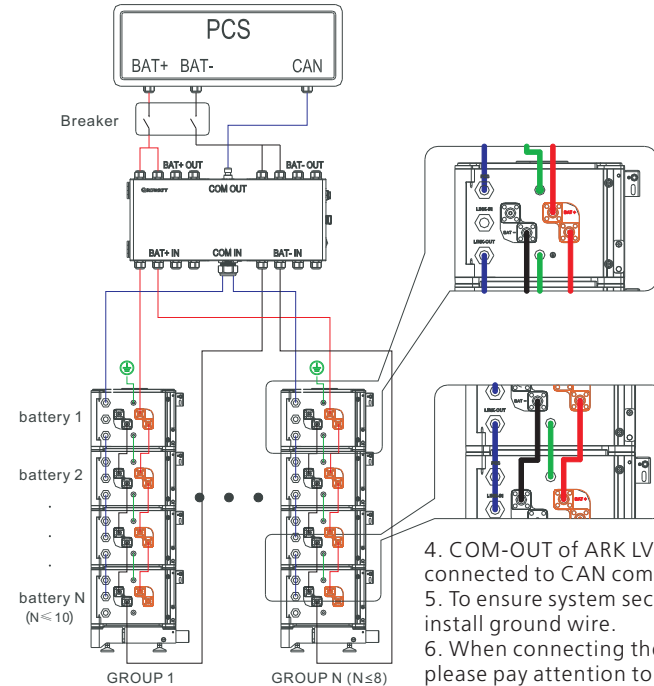



Fig 3.5: System connection diagram

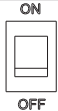

- Note:
- Each battery group can configure maximum 10 pcs batteries.
  - When the power wiring harness is connected, please pay attention to the positive and negative, configures maximum 8 battery groups.
  - The top battery of each group is master battery, and the PCS CAN communication port of each master battery should be connected to COM-IN of ARK LV HUB-A1.

- COM-OUT of ARK LV HUB-A1 should be connected to CAN communication port of PCS.
- To ensure system security, do not forget to install ground wire.
- When connecting the power wiring harness, please pay attention to the positive and negative.

## 4 Power on and off the ARK LV HUB-A1


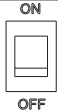
 <b>WARNING</b>	<ul style="list-style-type: none"> <li>➤ The installation and use of ARK LV HUB-A1 involve much specialized knowledge. Therefore, technicians should be given appropriate technical training and obtain operational certificates in compliance with local laws and regulations. Please ensure technicians have obtained training certificate before operation.</li> <li>➤ Please stand on dry insulating objects and do not wear conductive material such as watches and necklace during operation. Insulated tools should be used.</li> <li>➤ Do not contact any positions with potential difference.</li> <li>➤ Prohibition sign should be hung on the ARK LV HUB-A1: " Non - professionals, do not touch."</li> <li>➤ If any abnormalities occur during the startup phase, power off the battery and PCS immediately. After problem confirmed, proceed again.</li> <li>➤ Make sure the breaker and battery are turned off before checking the ARK LV HUB-A1.</li> </ul>
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### 4.1 Power On

Serial	Procedures	
1	Turn on the Rocker switch.	
2	Press the battery power button for three to eight seconds.	Press → 

1. If both RUN/ALM and quantity lights turn on normally, ARK LV HUB-A1 is powered on successfully.  
 2. If RUN/ALM light turns red, there is a failure and should solve it before power on again.

### 4.2 Power off

Serial	Procedures	
1	Press once the battery power button.	Press → 
2	Turn off the Rocker switch.	

Turn off the batteries, the five LED lights are off, indicating that the ARK LV HUB-A1 has been powered off.  
 Note: Turning the switch button of the ARK LV HUB-A1 to OFF does not turn off the power in the ARK LV HUB-A1 but only communication.

## System Failure Information List 6 and Troubleshooting Suggestions

Error Indication	Error description	Error cause	Suggested actions
ALM	COM OUT Communication failure	Communication loss between ARK LV HUB-A1 and PCS	1. There is no safety threat, and the user should stop using the battery system. 2. Check whether the communication terminals of ARK LV HUB-A1 and PCS are connected correctly. 3. If the ARK LV HUB-A1 and PCS cannot communicate after confirming that the communication line is connected correctly, the user should contact the installer to repair the ARK LV HUB-A1.
* ( ALM Light Flickers )	COM IN Communication failure	Communication loss between ARK LV HUB-A1 and PACK.	1. There is no safety threat, and the user should stop using the battery system. 2. Check whether the communication terminals of ARK LV HUB-A1 and PACK are connected correctly. 3. If the ARK LV HUB-A1 and PACK cannot communicate after confirming that the communication line is connected correctly, the user should contact the installer to repair the ARK LV HUB-A1.
	Battery group power line is not wired.	The battery groups starts normally but the power line is not connected.	1. Check whether the power line of ARK LV HUB-A1 and PACK are connected correctly. 2. If the ARK LV HUB-A1 still reports the fault after confirming that the power cord is connected correctly, the user should contact the installer to repair the ARK LV HUB-A1.
	Large load pressure difference between groups.	The voltage difference between the maximum load voltage and the minimum load voltage of the battery group is greater than 2V.	1. Check whether the power line of ARK LV HUB-A1 and PACK are connected correctly. 2. Check whether the voltage difference between the maximum load voltage and the minimum load voltage of the battery group is greater than 2V. 3. If the ARK LV HUB-A1 still reports the fault after confirming that the power cord is connected correctly, the user should contact the installer to repair the ARK LV HUB-A1.

# 6 Technical Specifications

Functional parameters of ARK LV HUB-A1 Energy Storage System are as shown below:

No.	Items	Specification
1	Module	ARK LV HUB-A1
2	Operating Voltage	40 - 60VDC
3	Max charging current	800A
4	Max. discharging current	800A
5	Operative temperature range	-20~+60°C
6	Storage conditions	Temperature: -10°C ~ +50°C Humidity : 5%~95%RH
7	Cooling	Natural cooling
8	Dimension (W/D/H)	600/250/130mm
9	Weight	3kg
10	Installation	Wall-mounted installation
11	Warranty	15 Years
12	Ingress protection	IP20
13	Safety certification	IEC61000/ EN61000
14	Communication port	CAN/RS485(Optional)
15	Parallel connection	Max 8 Battery groups

# Appendix I

LED indication Control Mechanism

LED light definition							
Status	Items	SOC indication				RUN/ALM	Remark
		LED1	LED2	LED3	LED4	LED5	
Number of battery group in parallel	1	●				●	One group online
	2		●			●	Two groups online
	3	●	●			●	Three groups online
	4			●		●	Four groups online
	5	●		●		●	Five groups online
	6		●	●		●	Six groups online
	7	●	●	●		●	Seven groups online
	8				●	●	Eight groups online
Parallel connection	Parallel connection succeeds	✱	✱	✱	✱	●	RUN/ALM light flicker green
Fault, personnel handling required	Number of battery group connected in parallel are reduced.	LED1-LED4 indicate the current number of battery groups in parallel.				✱ (t=1S)	RUN/ALM light flicker green
	Battery group power line is not wired.					✱ (t=1S)	RUN/ALM light flicker red
	COM OUT communication abnormal.					✱ (t=1S)	RUN/ALM light flicker red
	COM IN communication is abnormal.					✱ (t=1S)	RUN/ALM light flicker red