

# M-ELV BattBank

MS-16K-U & MS-SCU-RES-U

User Manual for Residential Applications



ATMOCE

# About This Document

## Corporate Contact Information

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## Disclaimer

- Product information is subject to change without prior notice. Every effort has been made in the preparation of this document to ensure accuracy of the content, but all statements, information, and recommendations in this document do not constitute a warranty of any kind, express or implied.
- For optimum reliability and to meet warranty requirements, this product must be installed in accordance with the instructions in this manual.

## Applicable Scope

- This manual is intended for professional installation and maintenance personnel only.
- This manual mainly describes the assembly, installation, configuration, maintenance and troubleshooting procedures for the following BattBank model: MS-16K-U & MS-SCU-RES-U.

# Revision History

|   | Date       | Version    | Description      |
|---|------------|------------|------------------|
| 1 | 07/08/2026 | Rev. 1.0.0 | 1. First release |

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# Safety Information

## 1.1 Statement

- Before installing or using the M-ELV BattBank, please carefully read the user manual, all instructions, safety labels on the product, and any available safety manuals. Failure to follow these safety instructions may result in personal injury, damage to the equipment, or invalidation of the warranty.
- DANGER, WARNING, CAUTION, and NOTE in this manual must be adhered to. You must also comply with relevant international, national, or regional standards and industry practices. M-ELV BattBank assumes no responsibility for any violation of safe operation requirements or safety standards regarding the design, manufacture, and use of the equipment.
- This equipment should only be used in environments that meet its design specifications; any failure, abnormal operation, or damage to components arising from non-compliance will not be covered by the warranty.
- All operations including transportation, storage, installation, operation, use, maintenance, etc., should comply with applicable laws, regulations, standards, and specifications.

## 1.2 Safety Labels

To minimize electric shock hazards and ensure safe installation and operation of the M-ELV BattBank system, this manual uses the following safety symbols to mark potential dangers and key safety notices:

|                                                                                                    |                                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <b>Danger</b>  | A label indicates a hazard with a high level of risk. Failure to avoid this hazard may result in serious personal injury or death.                                                                                    |
|  <b>Warning</b> | A label indicates a hazard with a medium level of risk. Failure to avoid this hazard may result in serious personal injury or death.                                                                                  |
|  <b>Caution</b> | A label indicates a hazard with a low level of risk. Failure to avoid this hazard may result in serious personal injury or death.                                                                                     |
|  <b>Note</b>    | A label indicates a safety hazard or risk of device damage. Failure to avoid this hazard may result in equipment damage, data loss, reduced performance, or other consequences, but does not involve personal injury. |

## 1.3 Personal safety instructions



### Danger

- **No live electrical work:** The installation process must never be performed with live electricity. It is prohibited to install or remove cables while the system is energized. If the cable core comes into contact with the conductor, it can cause electric arcs or sparks, which can lead to fire or personal injury.
- **Risk of Fire or Electric Shock:** When the equipment is powered on, improper or unregulated operation can result in fire, electric shock, or explosion, potentially causing injury, death, or property damage.
- **Work with Assistance:** Always have someone nearby when working with electrical equipment. They should be within earshot or close enough to assist in case of emergency. Remove any metal jewelry (rings, bracelets, necklaces, watches) when working with the M-ELV BattBank or any electrical components.
- **Power Off Before Installation:** Do not apply power to the equipment until installation is fully completed and verified by a qualified person.



### Warning

- **Use Personal Protective Equipment (PPE):** Ensure that all workers use appropriate protective gear, such as protective clothing, insulated footwear, goggles, helmets, and insulated gloves, during installation or maintenance operations.
- **Adhere to Warnings and Precautions:** Never ignore warnings, cautions, or precautionary measures indicated in the manuals or on the equipment itself.
- **Take Immediate Action in Case of Malfunction:** If any malfunction is detected during operation that could lead to personal injury or equipment damage, immediately stop the operation, report it to the supervisor, and implement the necessary safety measures.
- **Heavy equipment:** This equipment is heavy. Handle with care during transportation to prevent slipping or falling, which may cause personal injury.
- **Keep Out of Reach of Children:** This equipment is not intended for children. Ensure children are kept away from the equipment at all times to prevent personal injury or accidents.



### Note

- **Proper Installation by Qualified Personnel Only:** Installation and maintenance must only be performed by trained professionals. M-ELV BattBank is not liable for any loss or damage caused by improper use, installation, or misuse of the product.
- **Training Requirements:** Personnel responsible for the installation and maintenance of the M-ELV BattBank must undergo proper training to ensure they understand safe operation methods, relevant safety precautions, and local standards and regulations.

## 1.4 Battery Safety Instructions



### Danger

- **Unauthorized Repair Prohibited:** Do not attempt to repair the M-ELV BattBank without authorization, as it contains no user-repairable components. Unauthorized disassembly, repair, or destruction of the device will void the warranty. In case of malfunction, please contact Atmoce for technical assistance.
- **Authorized Use Only:** Only use the M-ELV BattBank as specified by Atmoce. Unauthorized use may result in equipment damage or personal injury.
- **Use Approved Accessories Only:** Only use accessories approved by Atmoce. The use of unauthorized accessories may cause equipment damage or personal injury.
- **Power Off Before Work:** Since the M-ELV BattBank is powered by multiple sources, ensure all circuit breakers are turned off before starting any installation, maintenance, or cleaning work.
- **Do Not Operate If Damaged:** Do not operate the M-ELV BattBank if its appearance or internal components are damaged. Ensure the device is intact before use.



### Warning

- **Inspect Cables and Connectors:** Regularly inspect cables and connectors to ensure they are in good condition. Do not operate the M-ELV BattBank with damaged or non-compliant cables or connectors.
- **Do Not Disassemble the Enclosure:** Do not disassemble the M-ELV BattBank enclosure or protective panels unless necessary for maintenance.



### Note

- **Compliance with Installation Regulations:** When installing the M-ELV BattBank, ensure compliance with all applicable installation standards and local electrical regulations.
- **Temperature Limitations:** The M-ELV BattBank is suitable for use in environments with a maximum ambient temperature of 55°C. Ensure the installation environment meets this temperature limit.
- **Use of Suitable Wiring:** When installing the M-ELV BattBank, use copper wiring with a temperature resistance of 90°C or higher. Ensure the wiring meets local electrical standards.
- **Cable and Connector Safety:** Choose cables that meet safety requirements based on circuit breaker parameters. Ensure cables and connectors are in good condition and operate within rated specifications.
- **Grid Connection:** Do not connect the M-ELV BattBank to the grid or AC circuit until all installation steps are completed and approval has been obtained from the utility company.

## 1.5 Cable Safety Instructions



### Danger

- **Disconnect Power Before Installation:** Do not attempt to install or work with cables unless the circuit is disconnected. Always ensure the power is off before working on any electrical connections.
- **Avoid Damaging the Cable:** Take care not to damage the copper conductor of the cable when stripping the sheath. Damaged wires may result in improper system functionality or failure.



### Warning

- **Check AC and DC Wiring:** Ensure that all AC wiring are correct and free of any pinches, shorts, or damage. Verify that all AC junction boxes are properly closed and secured.
- **Ensure Proper Cable Connections:** All cables must be securely connected, well-insulated, and meet the appropriate specifications for the system.



### Note

- **Compliance with Local Standards:** Cable selection and routing must comply with local laws, regulations, and industry standards.
- **Respect Cable Bending Radius:** When routing cables, ensure the minimum bending radius is 8x the cable's outer diameter (8xOD).
- **Replace Insufficient Cable Length:** If the power cable length is found to be insufficient, replace it with a properly sized cable. Joints or welding points in the power cable are strictly prohibited.
- **Avoid Tension on Cable Terminal:** Do not expose cable terminals to continuous tension. Avoid pulling or bending the cable at the connection points.
- **Smooth Cable Crossing Holes:** Ensure that cable crossing holes are free of sharp edges to prevent damage from burrs or other sharp objects.
- **Keep the Wire Cabinet Clean:** Always keep the wire cabinet free from dirt, debris, and contaminants. Prevent dirt or debris from entering the connectors during installation and operation.
- **Compliance with Local Regulations:** Ensure all installations and maintenance comply with national and local electrical regulations.

## 1.6 Environment Instructions



### Danger

- **Avoid Hazardous Environments:** Do not place the M-ELV BattBank in environments with flammable or explosive gases, vapors, or fumes. Never perform any operations in such environments.
- **Explosion Risk:** Do not install or use the M-ELV BattBank in a potentially explosive environment. Ensure the equipment is not exposed to conditions that could lead to combustion or detonation.
- **Heat and Ignition Sources:** Avoid placing the equipment near heat sources, such as fireworks, candles, heaters, or other devices that generate heat. The heat produced by the equipment may cause damage or create a fire hazard.
- **Avoid Direct Sunlight Exposure:** Do not expose terminals or connectors to direct sunlight, as this may lead to overheating or degradation of materials.



### Warning

- **Weather Conditions:** Do not attempt to install or use the M-ELV BattBank in adverse weather conditions, including rain, snow, or extreme temperatures. Ensure the equipment is installed in dry, stable conditions.
- **Protect from Pressurized Liquids:** Do not expose terminals or connectors to directed pressurized liquids (e.g., water jets). Ensure the equipment is shielded from water or other liquids.
- **Avoid Immersion in Liquids:** Never immerse the terminals, connectors, or any part of the M-ELV BattBank in liquid, as this could cause malfunction or permanent damage.
- **Corrosive and Volatile Environments:** Do not install the M-ELV BattBank in areas with volatile gases, corrosive substances, or organic solvents. Such environments could degrade the equipment or create safety hazards.
- **Avoid Harsh Environmental Factors:** Do not install the M-ELV BattBank in areas subject to strong vibrations, excessive noise, or strong electromagnetic field interference.
- **Sturdy Mounting Surface:** Ensure that the mounting surface for the M-ELV BattBank is stable and capable of bearing the equipment's weight. Proper installation on a secure surface prevents equipment malfunction or damage.
- **Remove Packing Materials:** After installation, ensure that all packaging materials such as cardboard boxes, foam, plastic, and cable ties are removed from the equipment area to maintain a clean and safe environment.

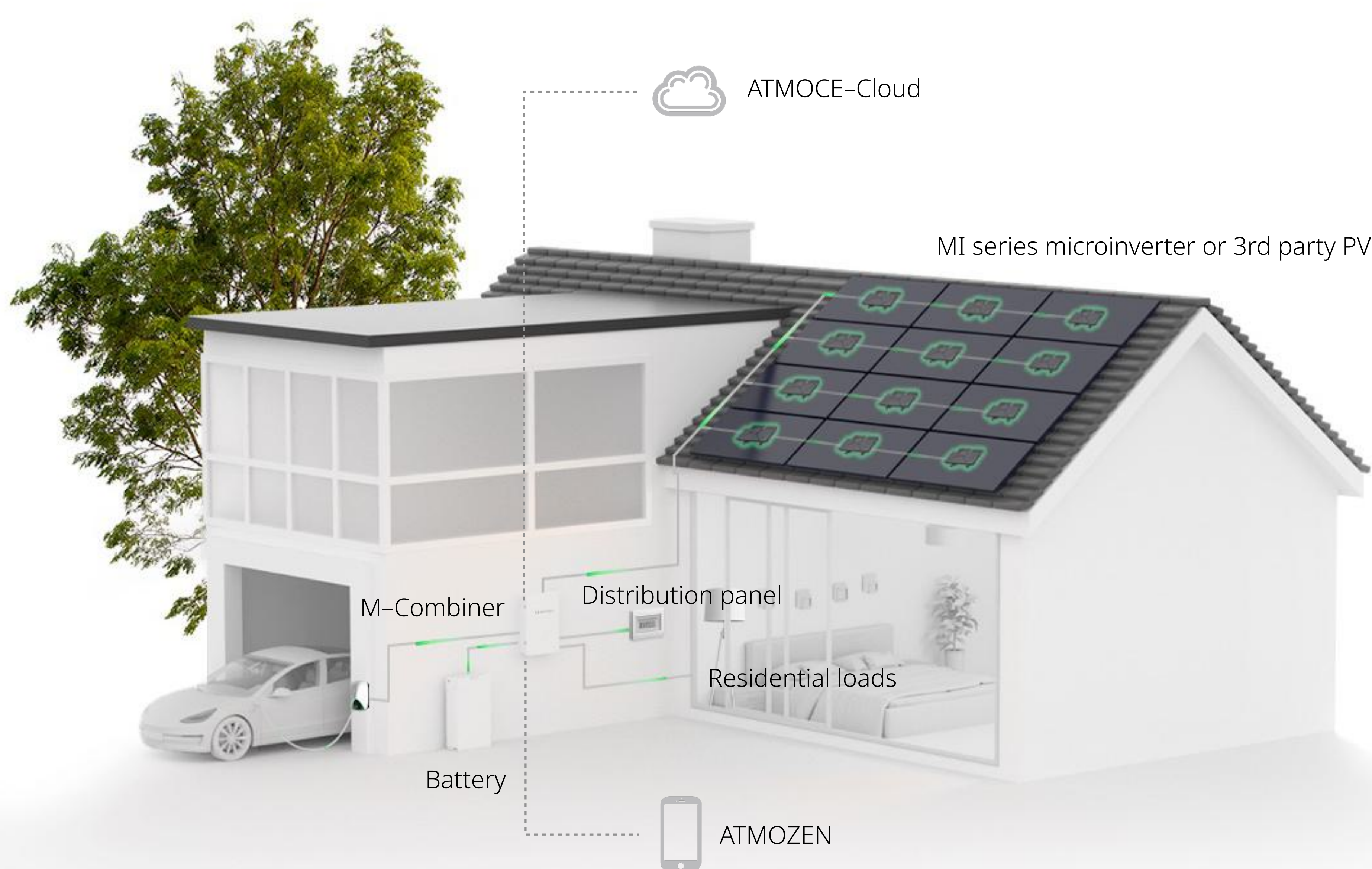
## Product Information

### 2.1 M-ELV BattBank Introduction

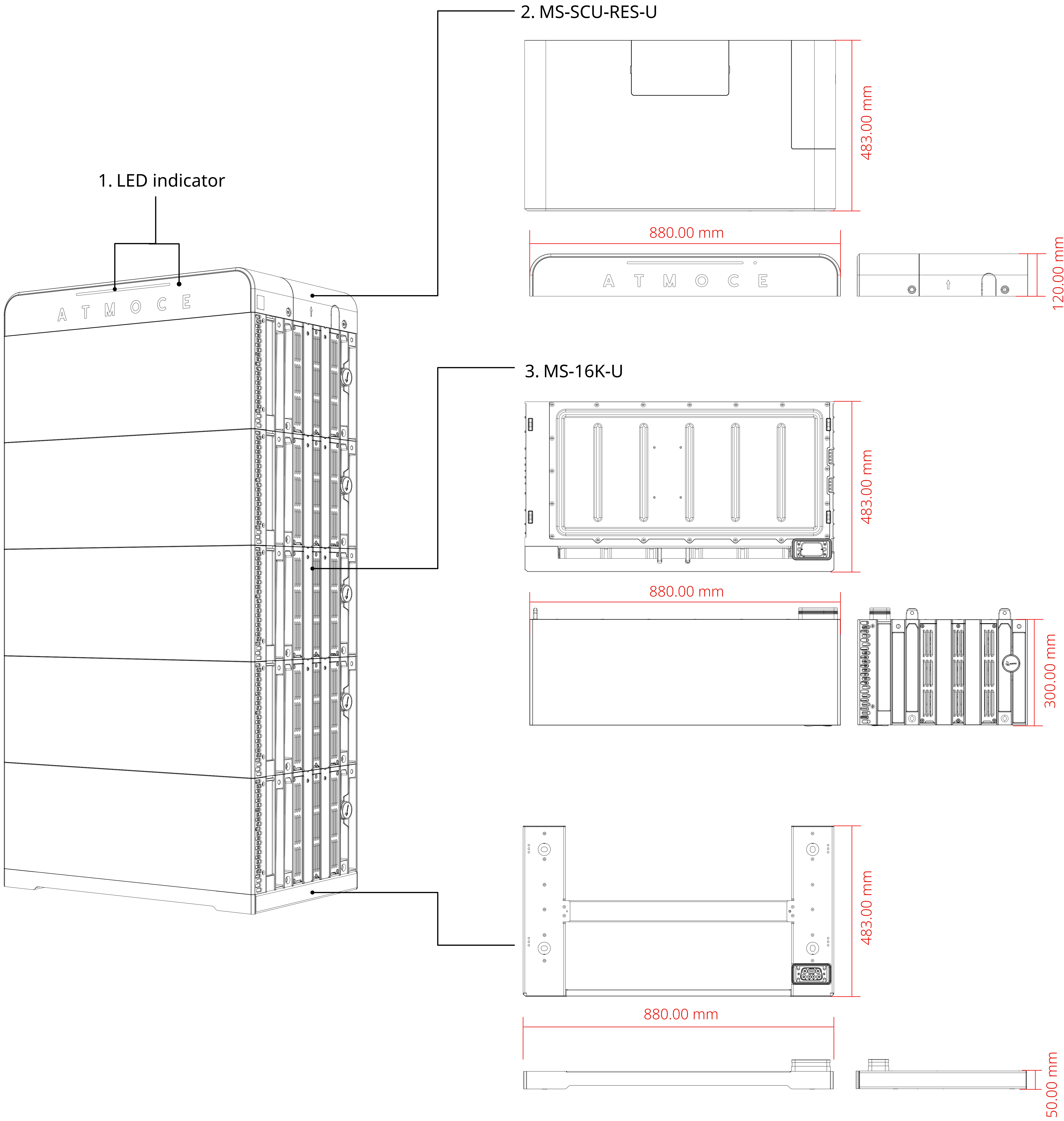
#### 2.1.1 Overview

The ATMOCE M-ELV BattBank is a modular, AC-coupled, stackable energy storage system with a usable energy capacity of 16.08 kWh per unit, scalable up to 80.4 kWh per cluster, and designed for residential applications.

It supports both on/off-grid system, and features multiple operating modes including self-consumption, time of use, storm guard, and AI mode. This helps enterprises reduce energy costs, improve energy supply reliability, and enable participation in grid services.

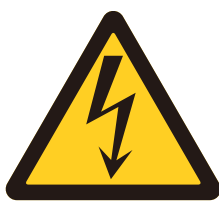


2.1.2 Structure dimension

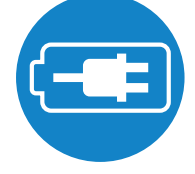
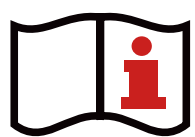


2.1.3 Label introduction

a. Warning label



Risks of electric shock/energy hazard and chemical hazard. Only certified professionals are allowed to install and maintain the battery. No user-serviceable parts inside.



Read the instructions carefully before performing any operations on the battery. Store and charge the battery strictly according to the manual.



OR



>55kg

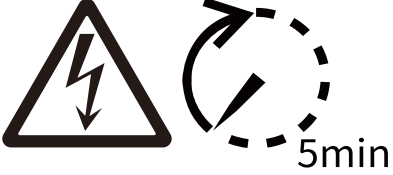
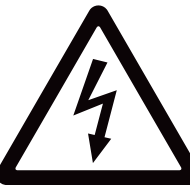
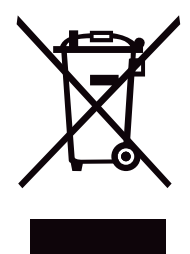
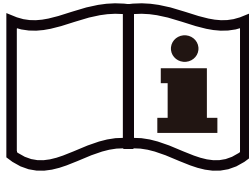
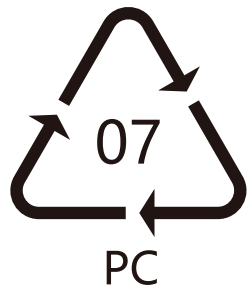
For safety, battery transportation requires multiple personnel.

b. QR code



c. Nameplate Label Instruction

The nameplate bears the following markings. Refer to the nameplate label instruction for details.

| Lable                                                                               | Description                                                                                                                                                                        |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | This product is certified by TÜV SÜD, indicating that it has passed type testing and production supervision to meet relevant international safety and quality standards.           |
|    | Delayed discharge. Wait 5 mins for the unit to fully discharge after it is powered off.                                                                                            |
|   | Caution.                                                                                                                                                                           |
|  | Risk of burn. Do not touch the enclosure of the BattBank, as its temperature will become high during operation.                                                                    |
|  | Risk of electric shock. Switch off the power to the circuit breaker(s) you're working with.                                                                                        |
|  | Waste electrical and electronic equipment (WEEE), which cannot be treated as household waste and should be returned to ATMOCE or disposed of in accordance with local regulations. |
|  | Exceeding 50 years may pollute the environment.                                                                                                                                    |
|  | The product has passed CE related certification.                                                                                                                                   |
|  | The device or component complies with AU relevant safety standards and is ready for use or operation.                                                                              |
| <b>RoHS</b>                                                                         | Restriction of Hazardous Substances (ROHS)-compliant.                                                                                                                              |
|  | Please read the user manual before using the equipment.                                                                                                                            |
|  | The product has passed quality control inspection and complies with relevant safety standards.                                                                                     |
|  | This product is made of Polycarbonate (PC) plastic, identified by the recycling code 07.                                                                                           |

## Storage Requirements

If the product is not to be used and installed immediately, it must be stored in accordance with the following requirements:

- Do not remove the outer packaging of the product.
- The storage temperature should be maintained within –30 °C to +60 °C.
- The relative humidity should be maintained between 4% RH and 100% RH.
- Store the product in a clean and dry place, away from dust and moisture.
- Do not stack MS-16K-U over 4 layers, MS-SCU-CNI over 5 layers. Place packaging boxes properly during stacking to avoid personal injury or equipment damage caused by tipping.
- Regular inspections are required during storage (once every three months recommended). If the product has been placed in storage for two years or longer, it must be inspected and tested by qualified personnel before use.
- Regular recharging are required during storage as the table below.

| Storage temperature | Storage time |
|---------------------|--------------|
| -20°C<T≤25°C        | 10 months    |
| 25°C<T≤35°C         | 6 months     |
| 35°C<T≤45°C         | 4 months     |
| 45°C<T≤55°C         | 2 months     |

**NOTE:**

- If it is within the storage time, the battery does not need to be recharged.
- If it has exceeded the storage time, the battery should be recharged as soon as possible.
- The maximum number of recharging is 3. If the maximum number of times is exceeded, it is recommended to discard the battery.
- The battery power must be recharged to 30% SOC.

# Installation

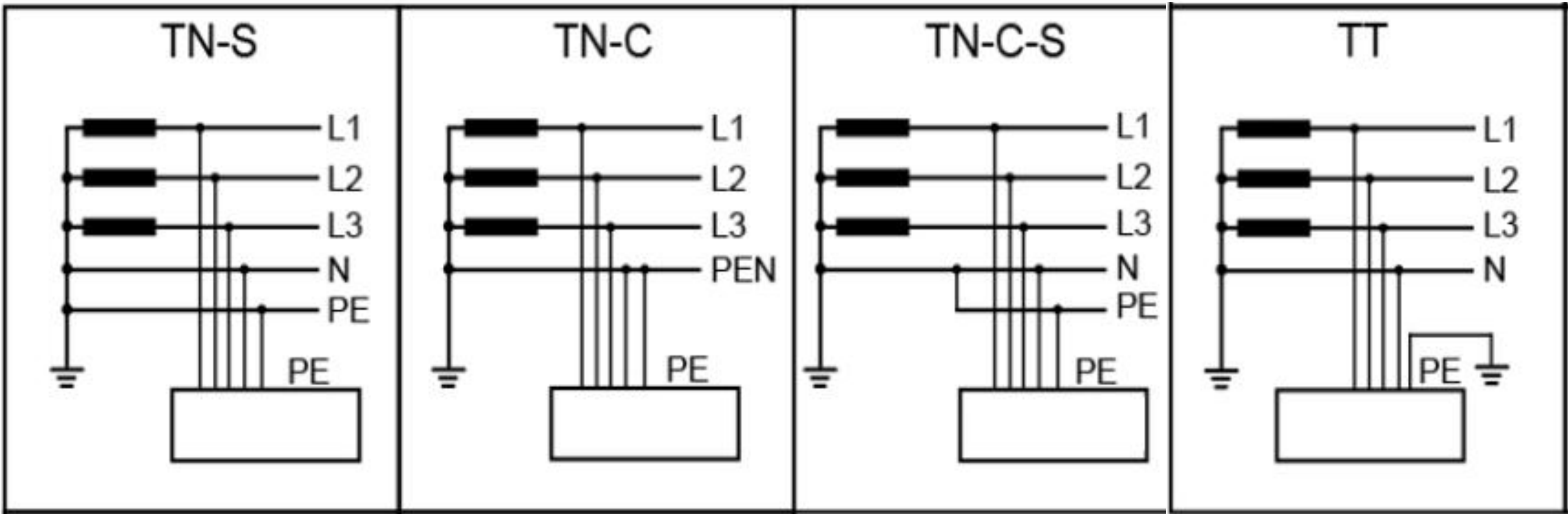
## 4.1 Pre-installation Requirements

### 4.1.1 Grid requirements

ATMOCE BattBank should connect to a three-phase grid. MS-16K-U is only applicable to the Wye grid type, and its line voltage only supports 380V, 400V, 415V.

**NOTE:**

- Support grid type:



**NOTE:**

- Installation must be carried out in strict compliance with official grid specifications and standards. Any non-compliant installation may cause irreversible equipment damage and shall not be covered by after-sales support.

### 4.1.2 Cable requirements

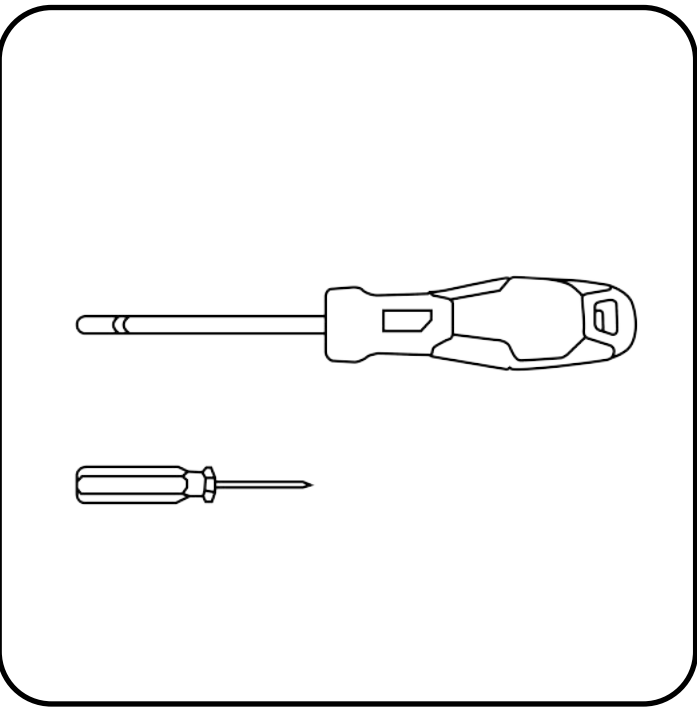
To properly set up the system, it is necessary to select the appropriate cables, and aluminum cable is not supported. The table below shows the recommended cable requirements.

| Function            | Recommendation                                                                   |
|---------------------|----------------------------------------------------------------------------------|
| Power cable         | 10 to 16 mm <sup>2</sup> (Single-phase)<br>4 to 16 mm <sup>2</sup> (Three-phase) |
| Communication cable | 0.25 to 1mm <sup>2</sup>                                                         |

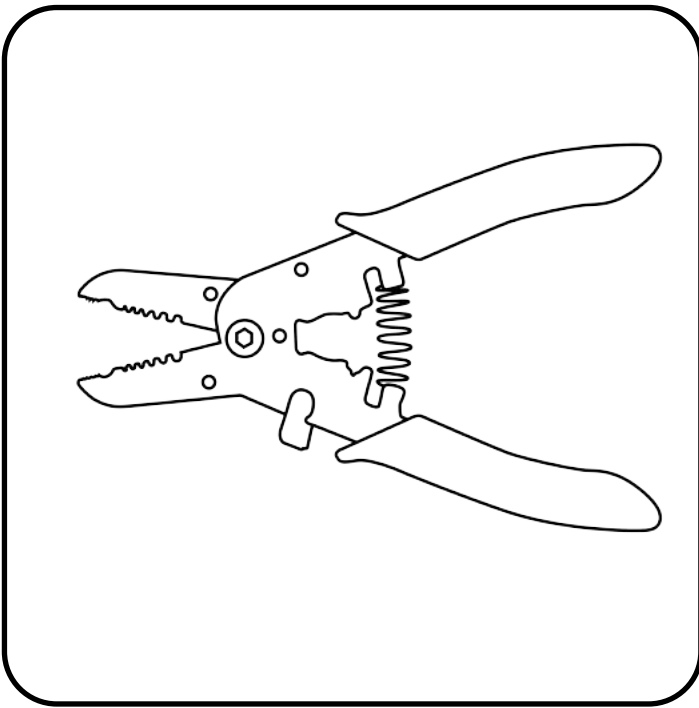
**NOTE:**

- When connecting the cables to the M-ELV BattBank, you must cover the cable ends by using the proper cold-press terminal provided in the package.
- When stripping the cable, remove approximately 25 mm of the insulation layer from the power cable, 18 mm of insulation layer from the PE cable, and 8 mm of insulation layer from the communication cable.
- It is recommended to adjust the cable size based on local regulation and the installation scenario.

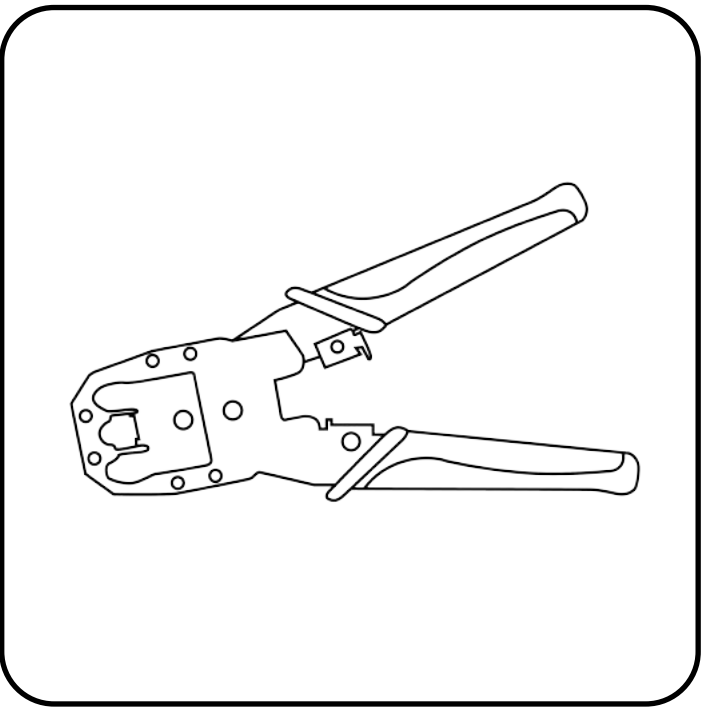
4.1.3 Prepare the Tools and Materials



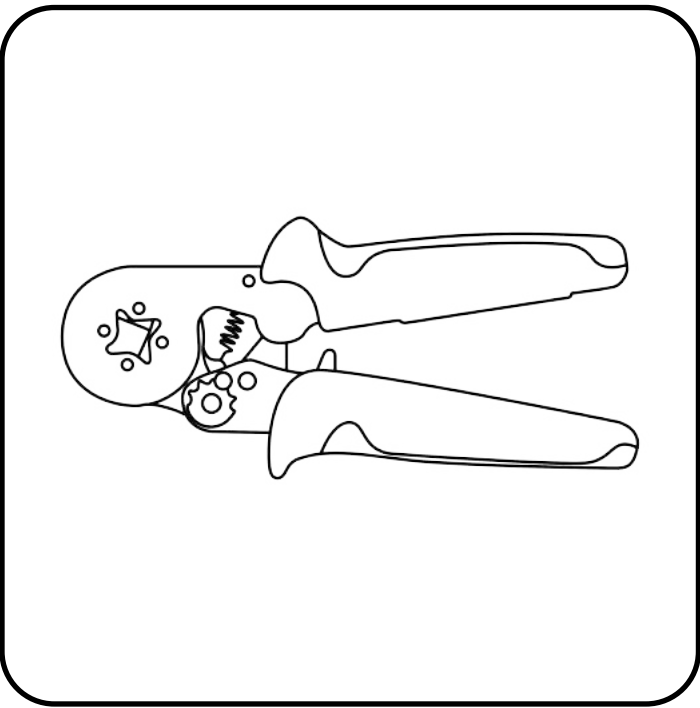
Screwdriver



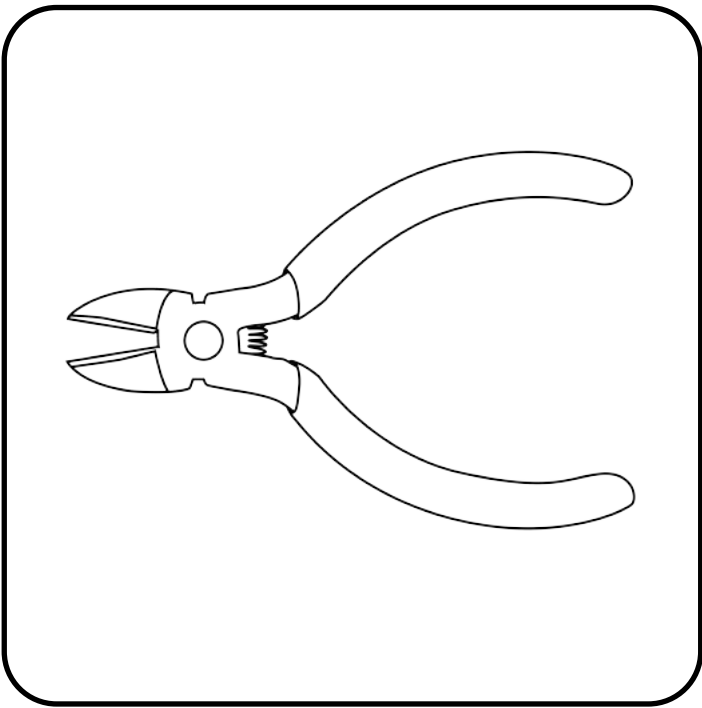
Wire stripper



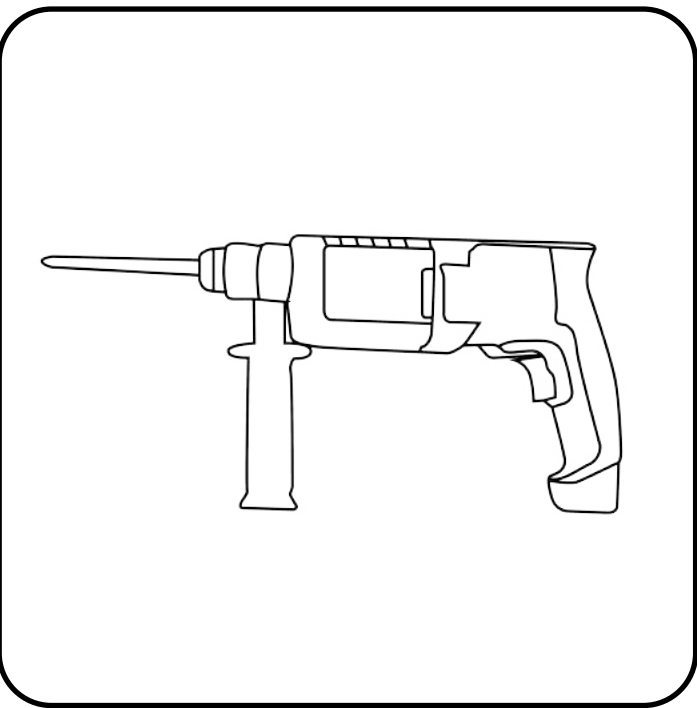
Power line crimper



Communication line crimper



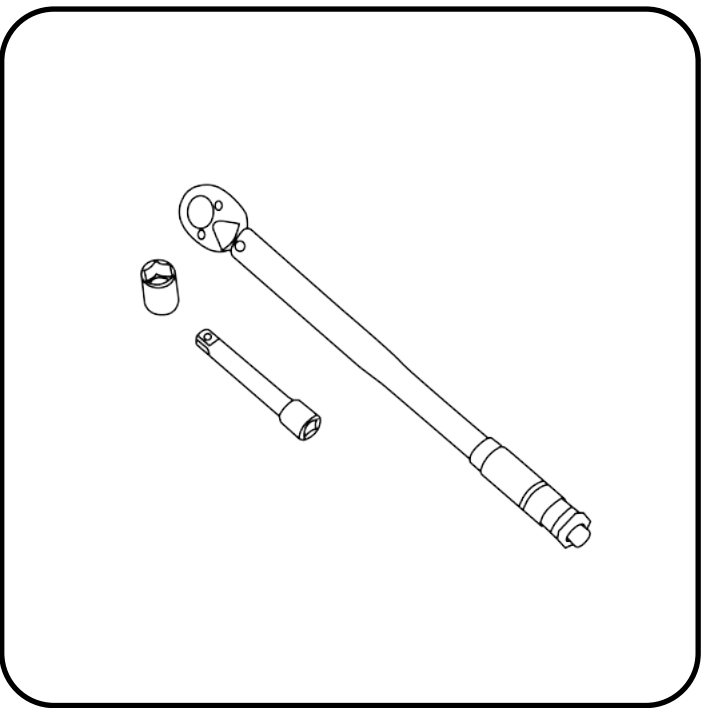
Diagonal cutter



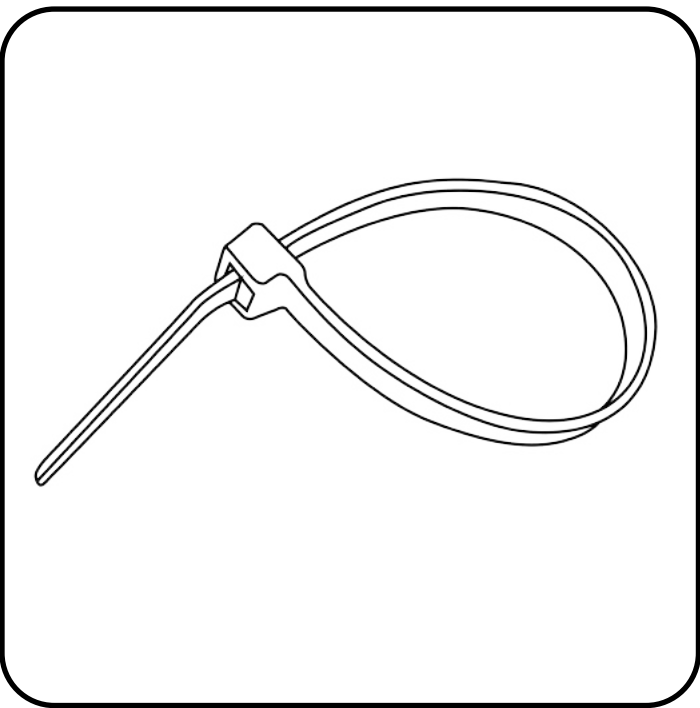
Drill



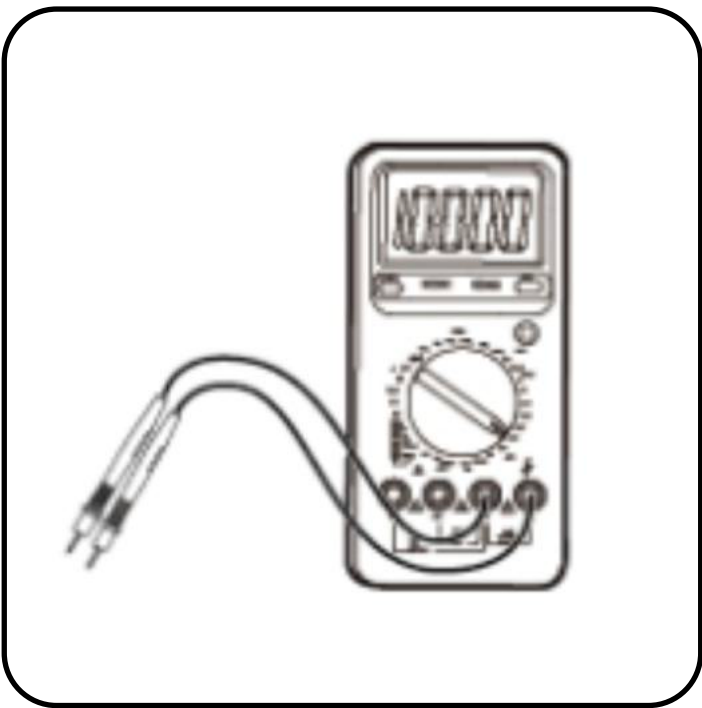
Hammer



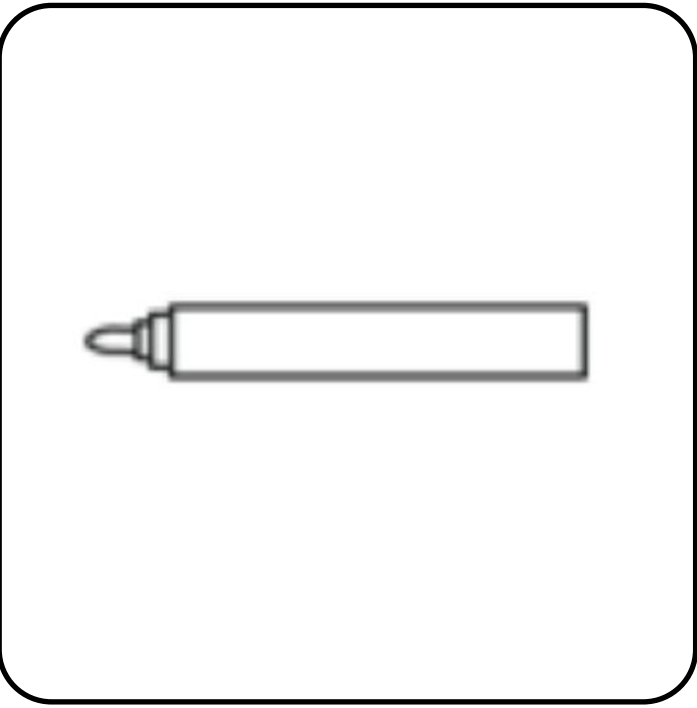
Torque wrench



Tie wrap



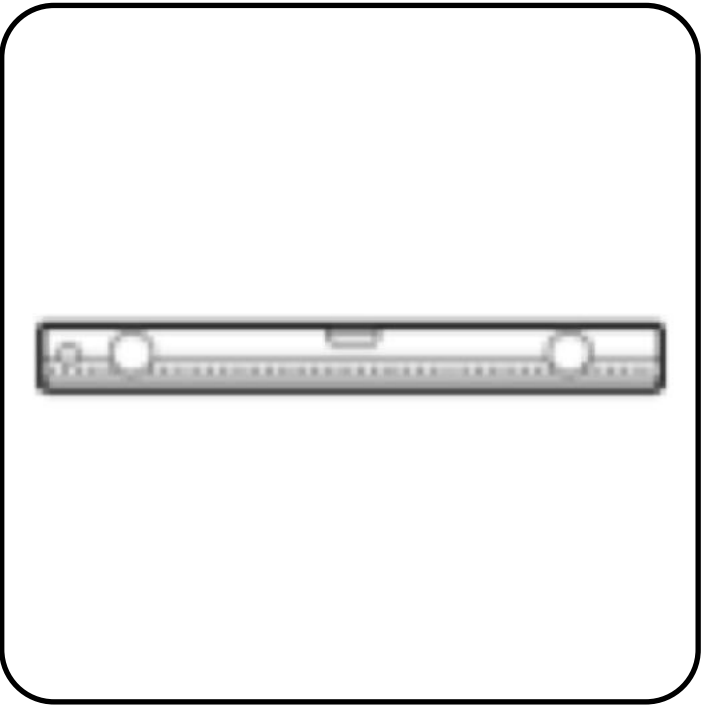
Multimeter



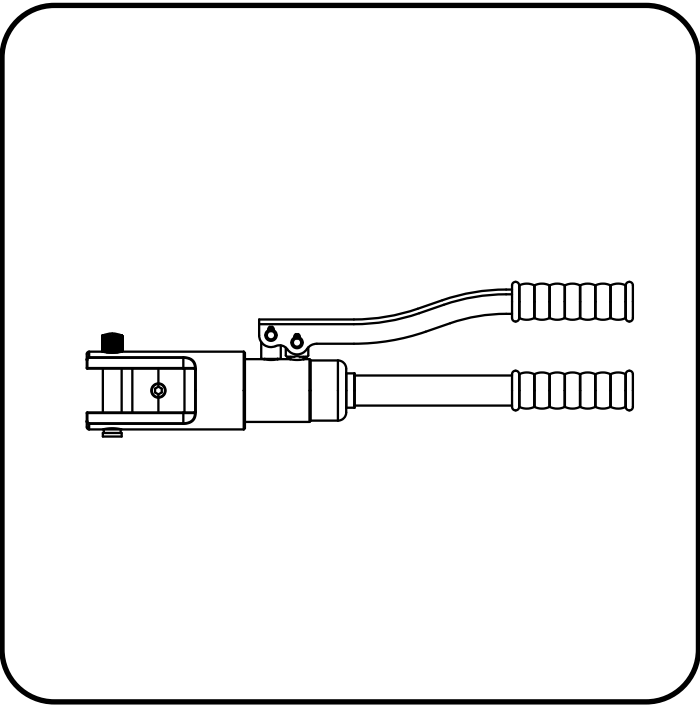
Marking pen



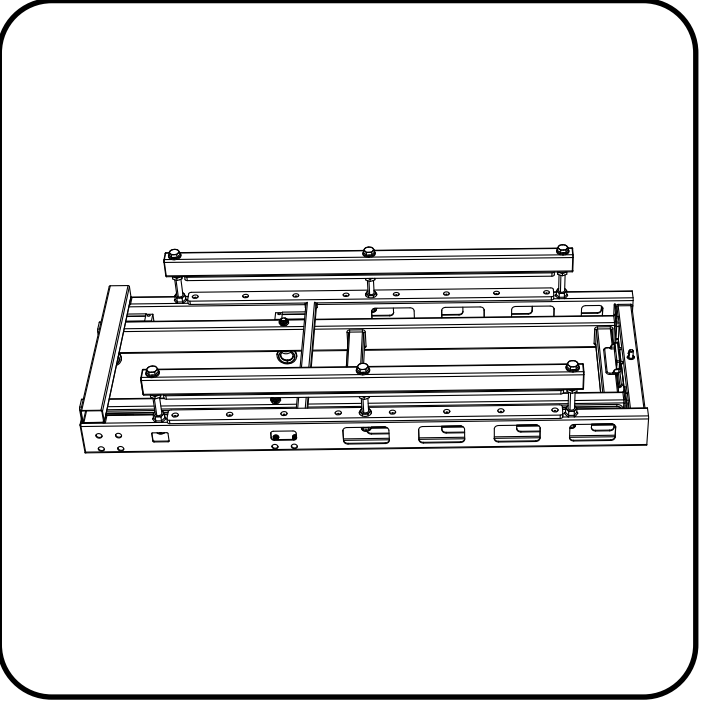
Tape measure



Spirit level



Hydraulic crimping tool

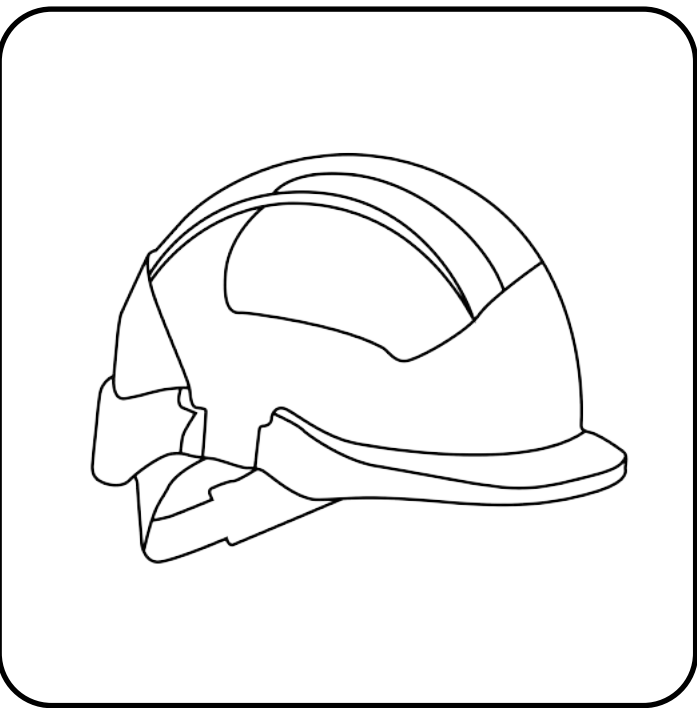


Lifting equipment  
MA-BattBankRail

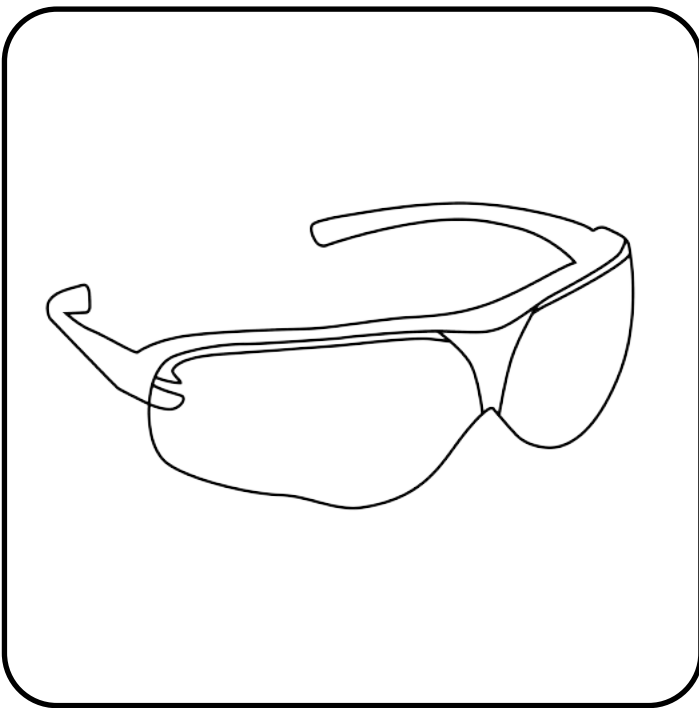


Forklift

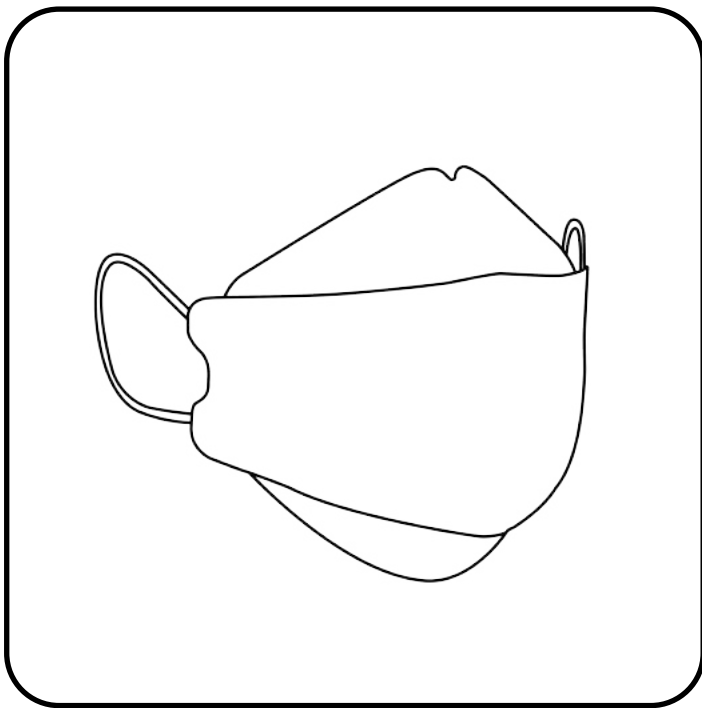
4.1.4 Prepare the Safety Equipment



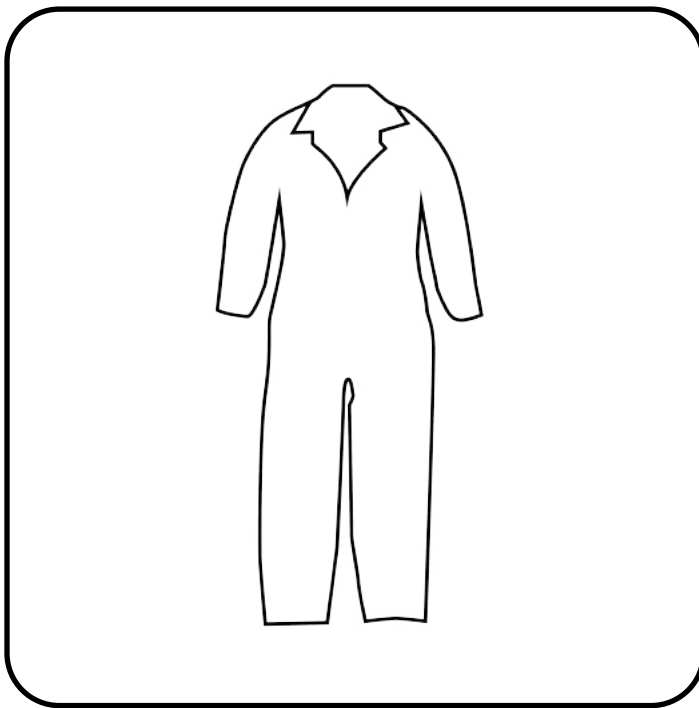
Safety helmet



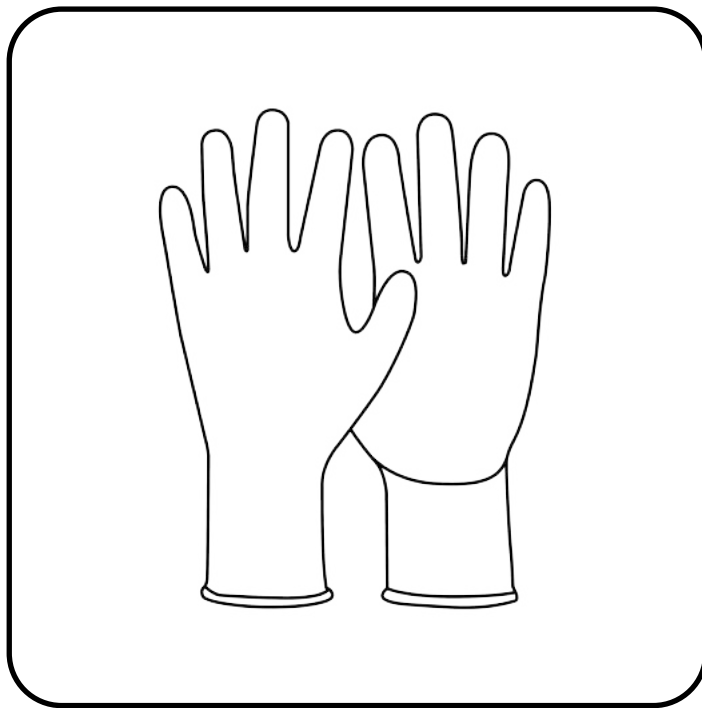
Protective goggles



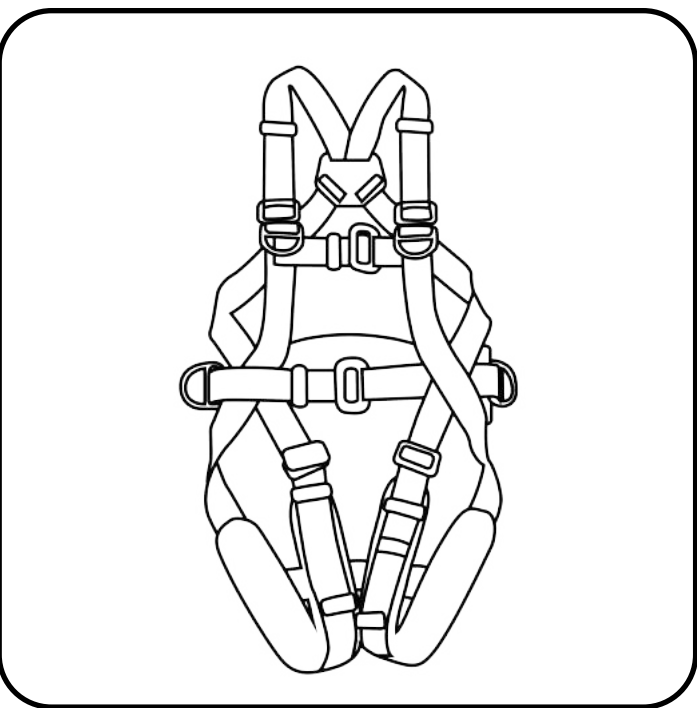
Mask



Safety clothing



Safety gloves



Safety belt



Safety shoes

4.1.5 Download the ATMOZEN APP

Download the latest version of the ATMOZEN APP. Open and log into your account. You can track the progress of system installation with this app.



4.1.6. Recommended installation environment and space

- The equipment must be installed on concrete or another non-combustible surface. The installation surface shall be level, stable, and flat, with sufficient load-bearing capacity. Settlement or tilting is strictly prohibited.
- The foundation must be capable of bearing the total weight of the equipment. If the load-bearing capacity of the foundation does not meet the requirement, it must be re-evaluated.
- The bottom surface of the foundation excavation must be compacted and level.
- The installation location shall be a solid brick masonry structure or concrete floor.
- If other types of floors are used, they shall be constructed from non-combustible materials and shall have sufficient load-bearing capacity to support the equipment (the weight of each battery module is 155 kg).
- When installing the BattBank, ensure that no other equipment (except ATMOCE-approved equipment and canopies), or any flammable or explosive materials, are located in the surrounding area.
- Adequate clearance shall be reserved around the equipment to ensure proper heat dissipation, safe isolation, and convenient installation and maintenance.

Environment requirements:

a. The installation environment should be:



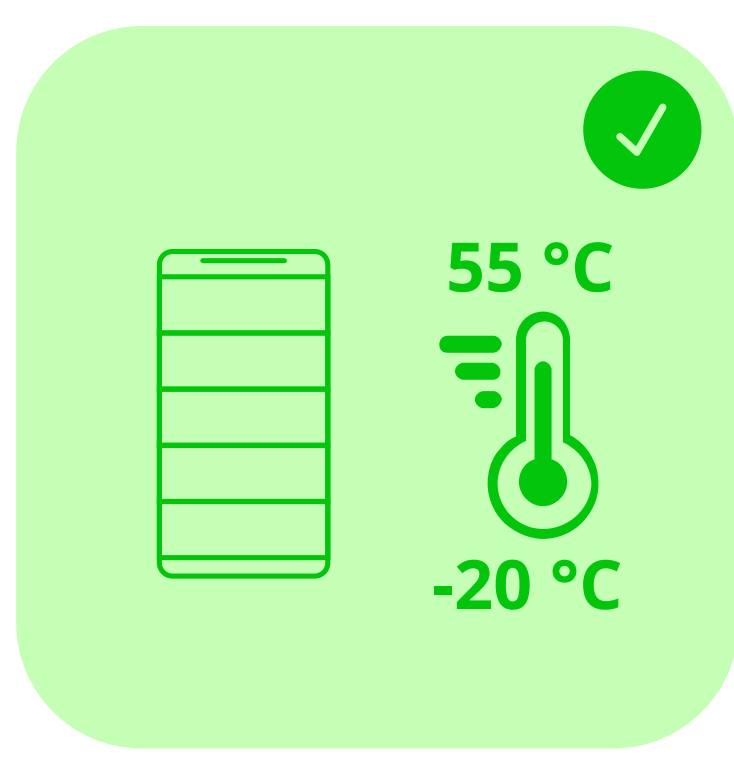
Install indoors



Install outdoors



Install under 3000m



Install from  
-20°C to 55°C



Outdoor: use awning  
recommended

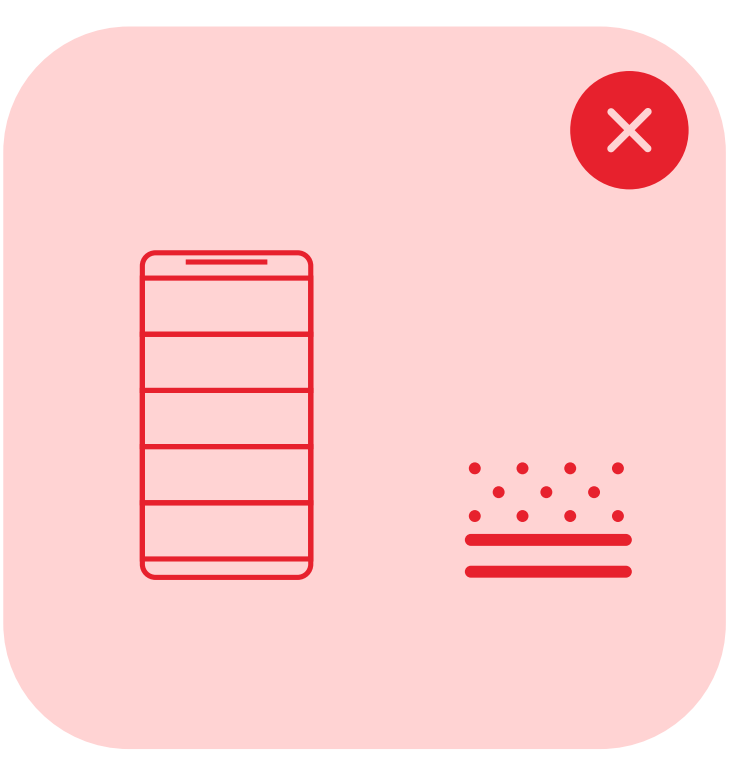
b. The installation environment should not be:



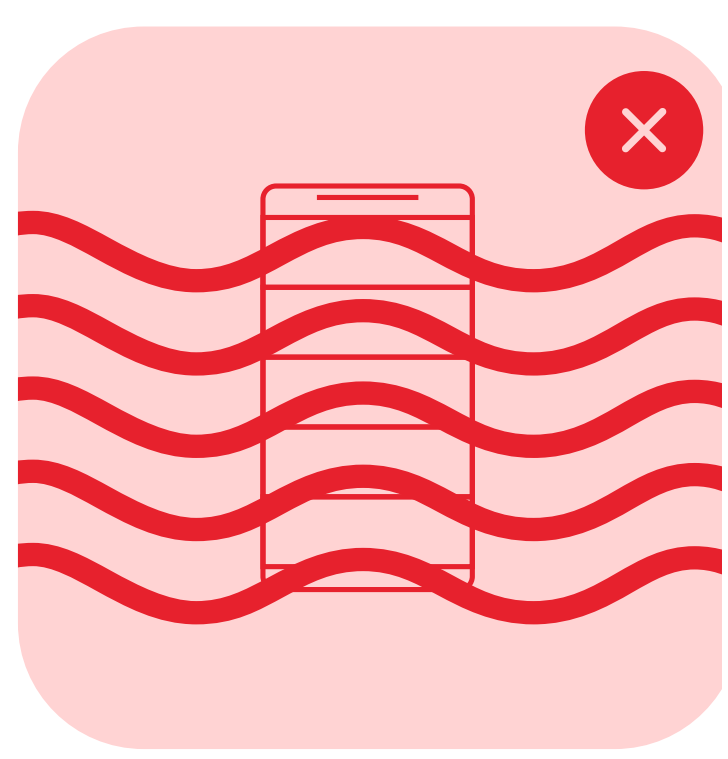
No flame



No crowded areas



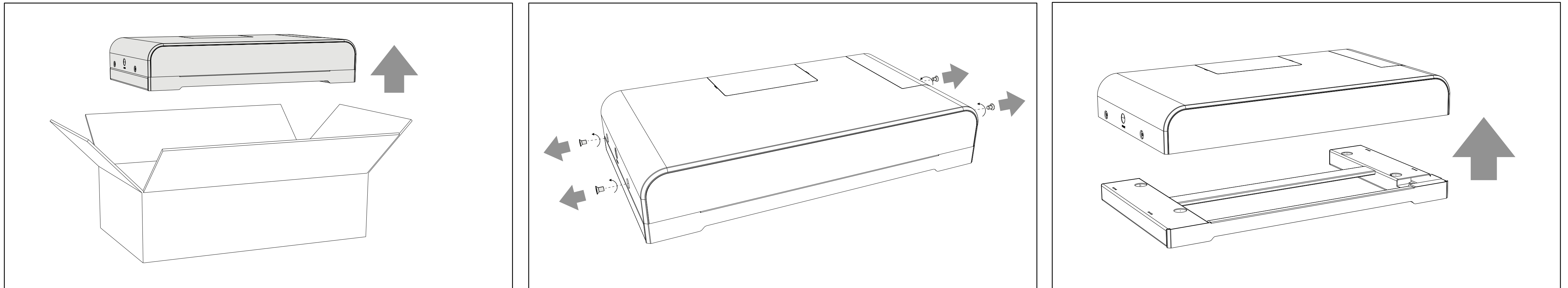
No dust



No immersion

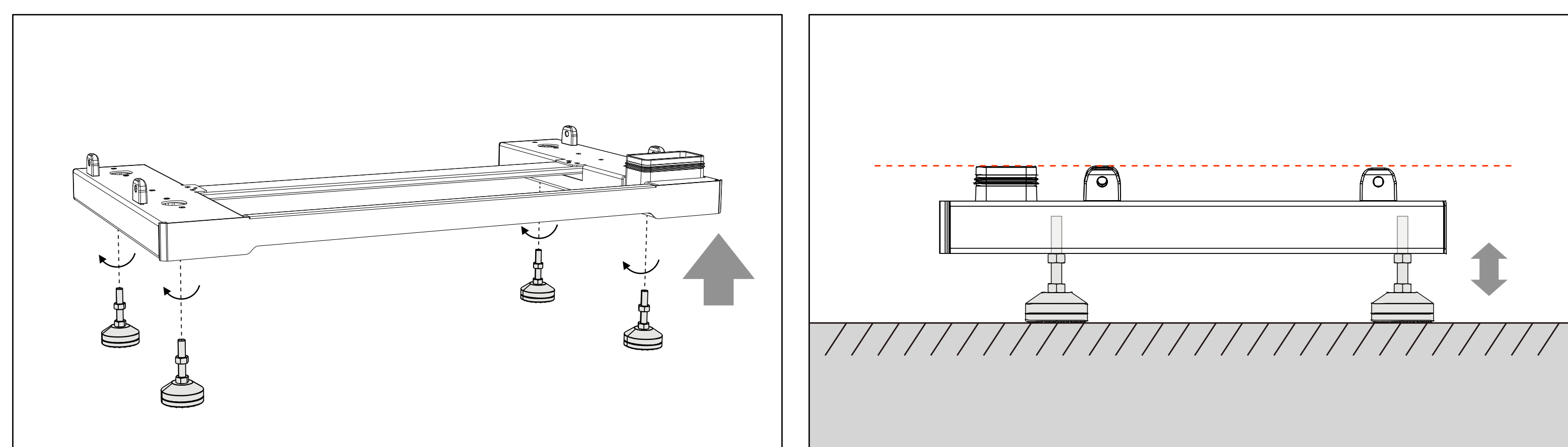
## 4.2 Mount the base on the floor

- a. Unscrew the fasteners as shown, then take the base off from MS-SCU-RES-U.



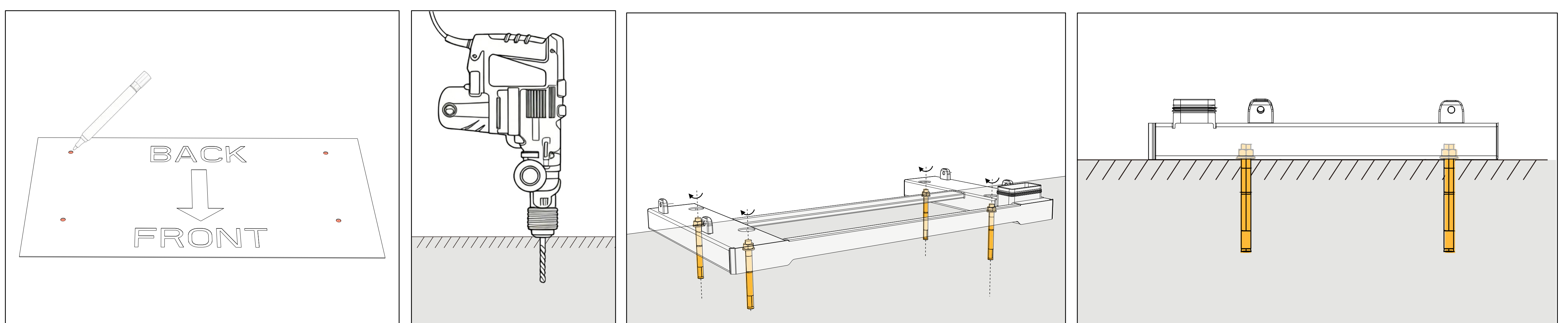
### 4.2.1 Mount with adjustable foot cups

- a. Install the base.  
b. Level the base using a spirit level. Adjust the leveling feet as required.



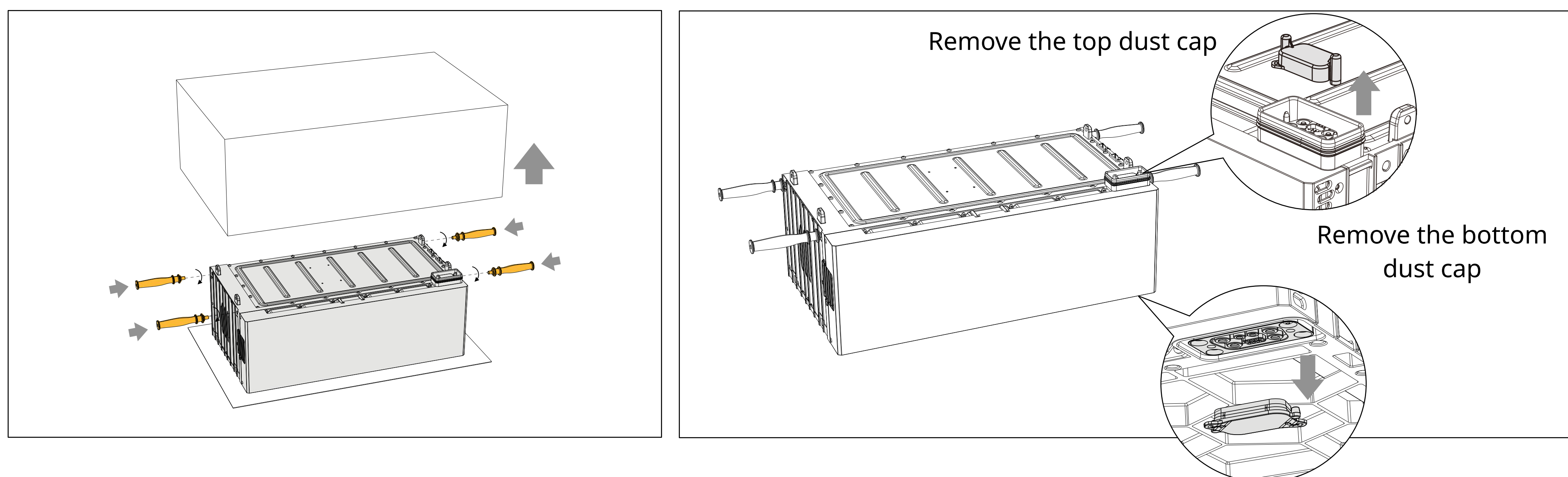
### 4.2.2 Mount using expansion screws

- a. Take out the marking plate and place it on the floor. Use the spirit level to check that the plate is level, make the marks.  
b. Drill at the four marks to a depth of 90 mm with a hole diameter of  $\Phi 12$  by using an electric drill with a bit.  
c. Refit the base into place, take out expansion bolts, align and insert into pre-drilled holes, then tighten with a socket wrench.

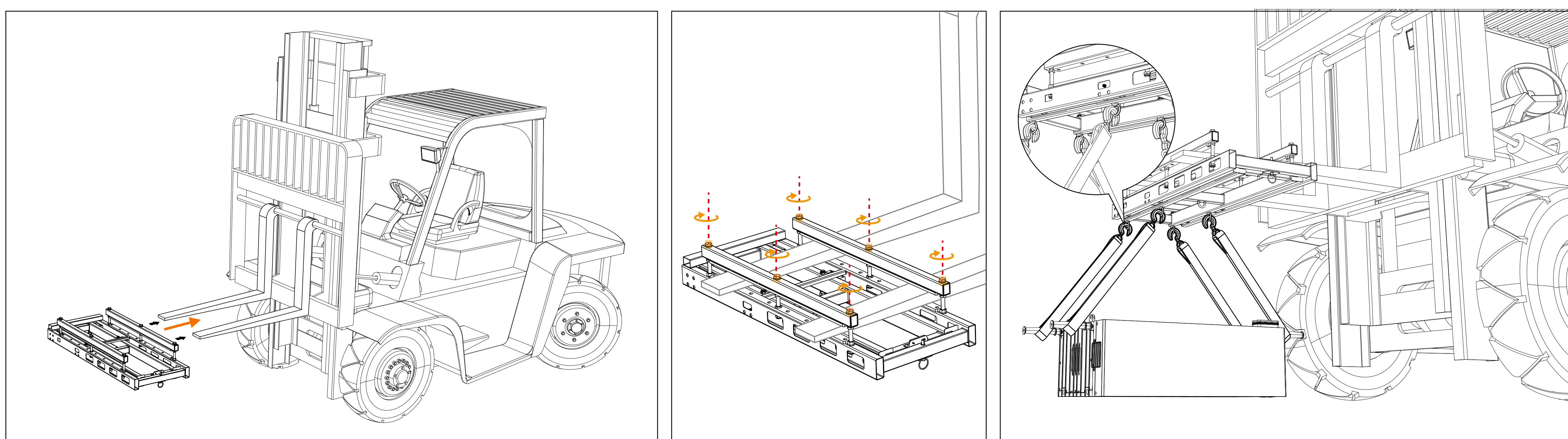


### 4.3 Mount the MS-16K-U and MS-SCU-RES-U

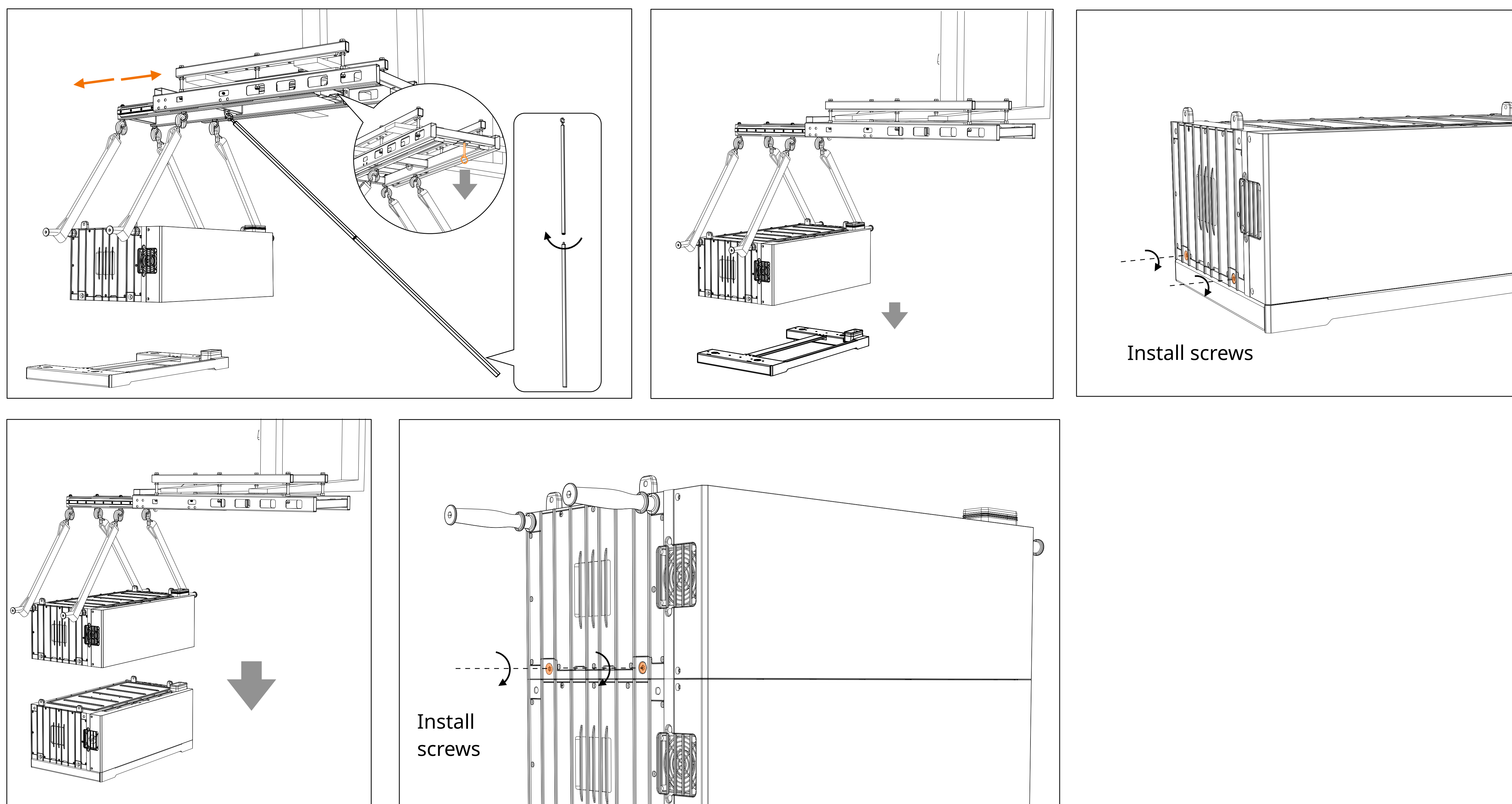
- Remove the MS-16K-U out of the box.
- Take out the handlebars from the box of MS-SCU-RES-U and screw them into the mounting holes on both sides of the MS-16K-U.
- Remove the dust caps from the plug before connection.



- Insert the lifting tool into the forklift fork pockets and push it fully into position.
- Install screws on the lifting tool frame and tighten them sequentially. Ensure the lifting tool is firmly and securely attached to the forklift with no looseness.
- Attach the sling between the battery pack handle and the lifting eye of the lifting tool. Adjust the sling position to ensure the battery pack is centered and evenly loaded (note the lifting eye latch as shown in the diagram).



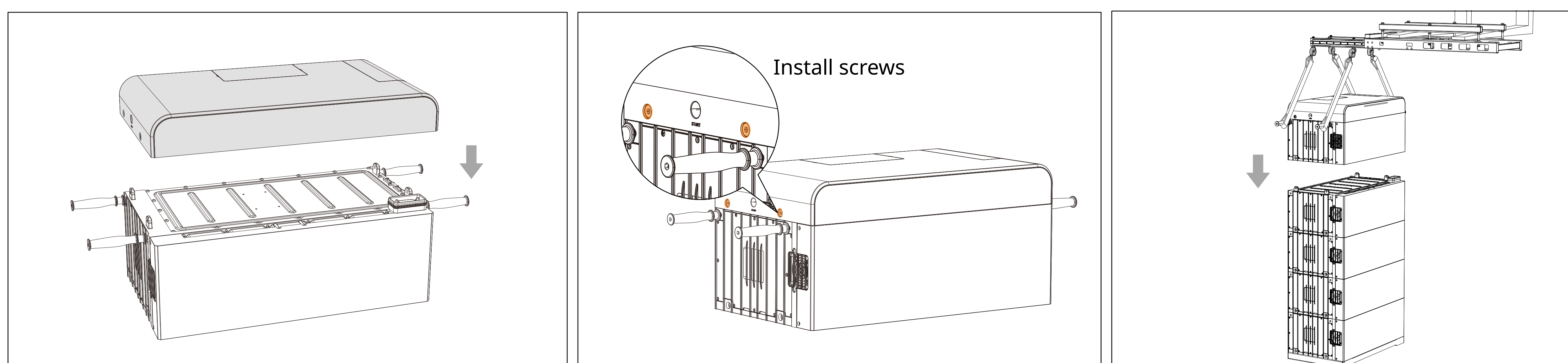
- g. Remove the pin from the lifting tool and lift the battery pack smoothly. Move the lifting tool to the installation position manually or with an assist rod. Then lower the battery pack slowly into place.
- h. Confirm the battery pack orientation to ensure proper plug connection. Install the screws at the locations and tighten them with a torque of 9–14 N·m.



## NOTE:

- Ensure the pack is correctly oriented to allow proper plug connection.
- Keep the battery stable during installation. Lifting equipment may slip, use hooks for assistance.
- Do not stand or walk underneath the lifting tool while it is being lifted.

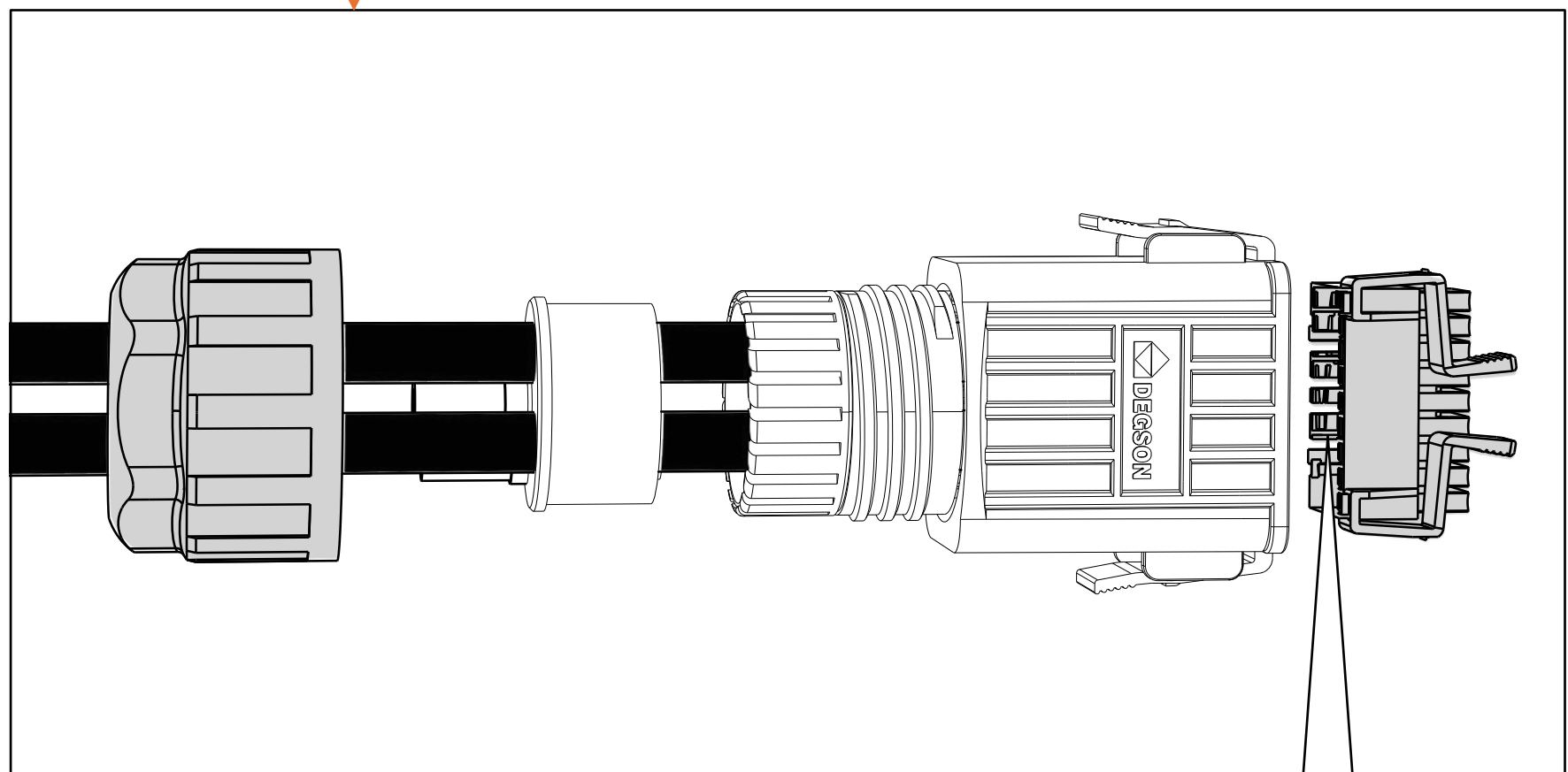
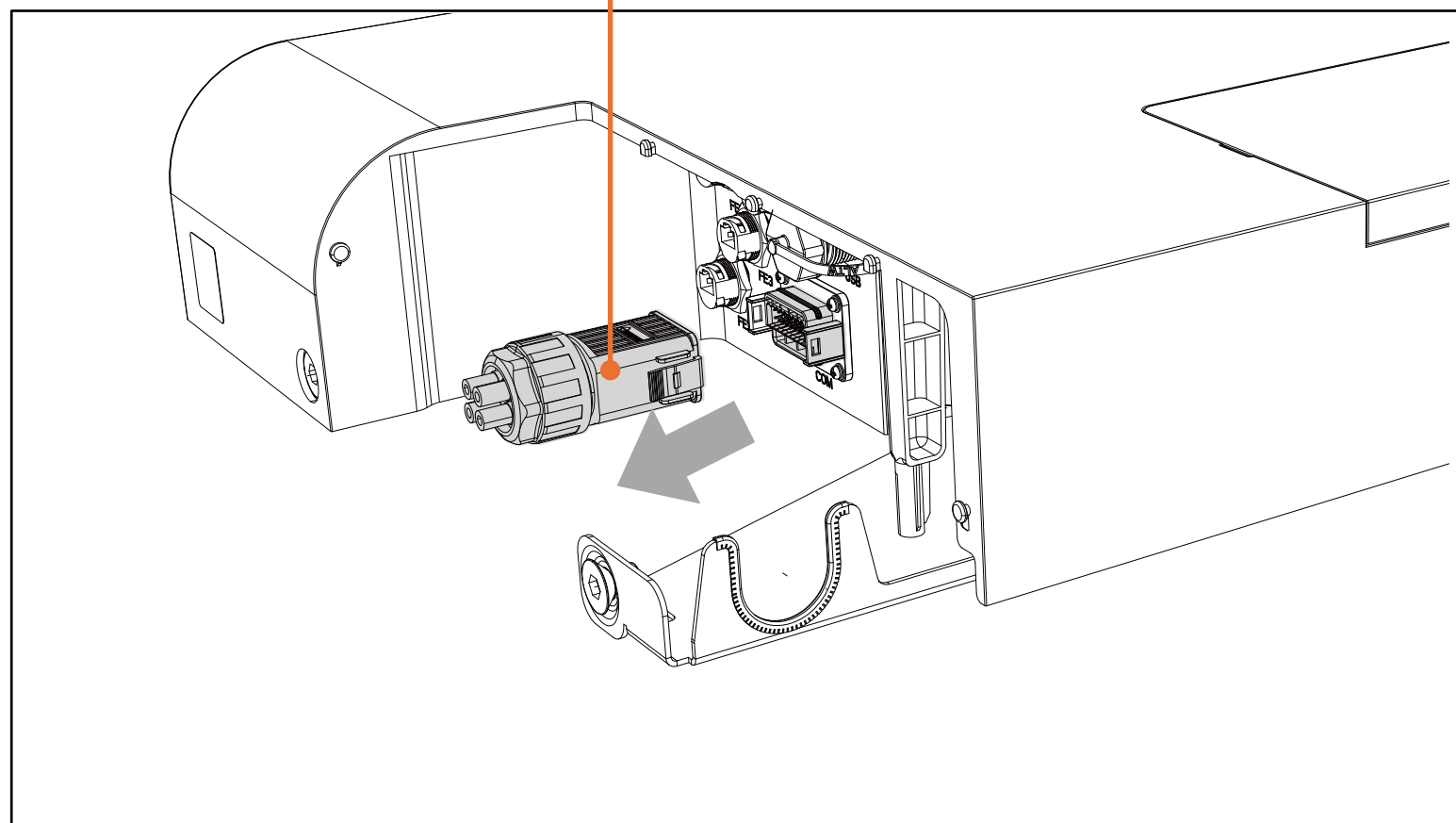
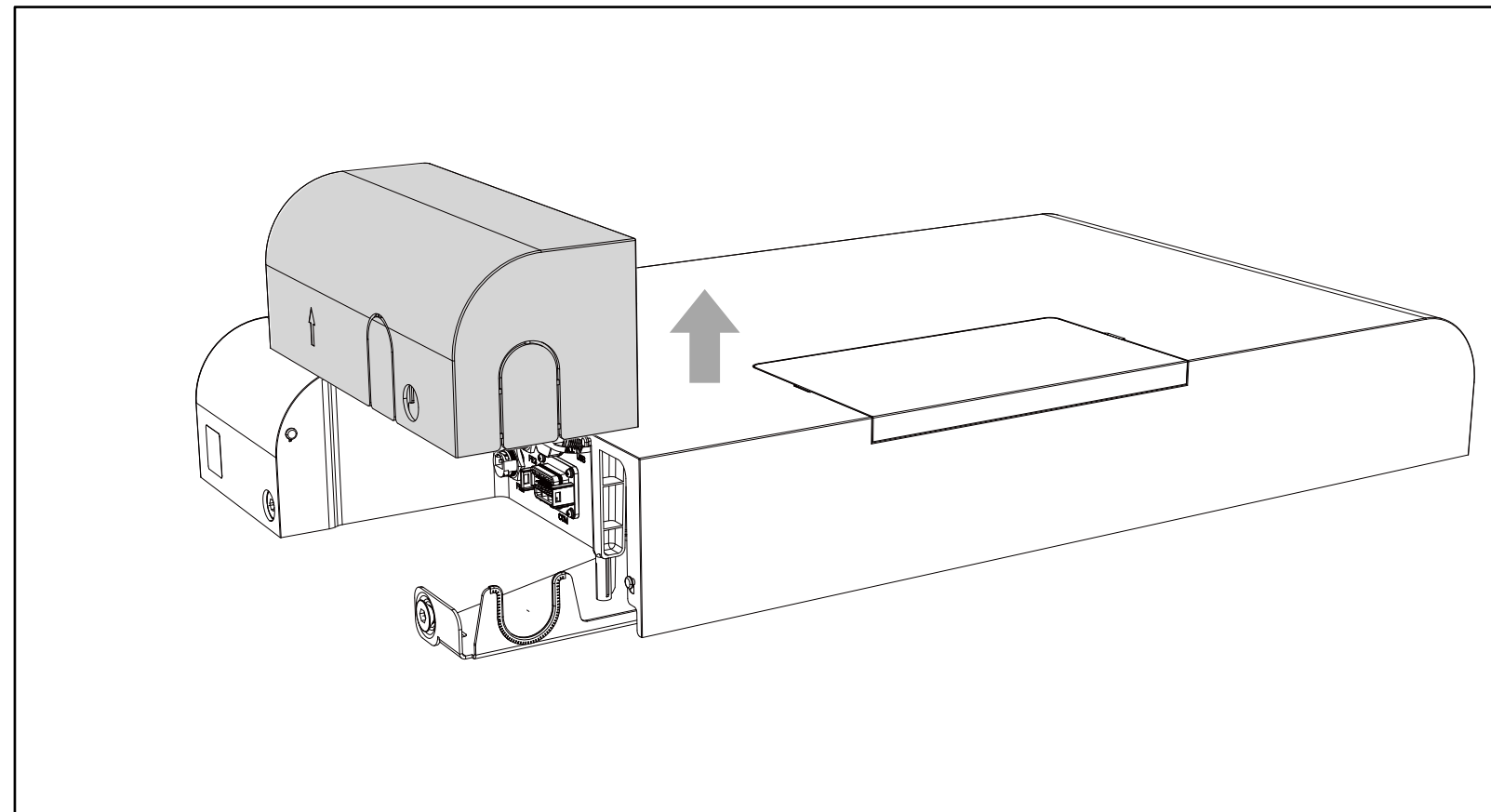
- i. Stack all required MS-16K-U in compliance with installation requirements.
- j. For the final MS-16K-U installation, mount the MS-SCU-RES-U on top first and tighten the screws.
- k. Lift and position the assembly onto the upper level using a forklift and lifting equipment. Install and tighten the screws with a torque of 9–14 N·m to secure the two stacked battery packs together.



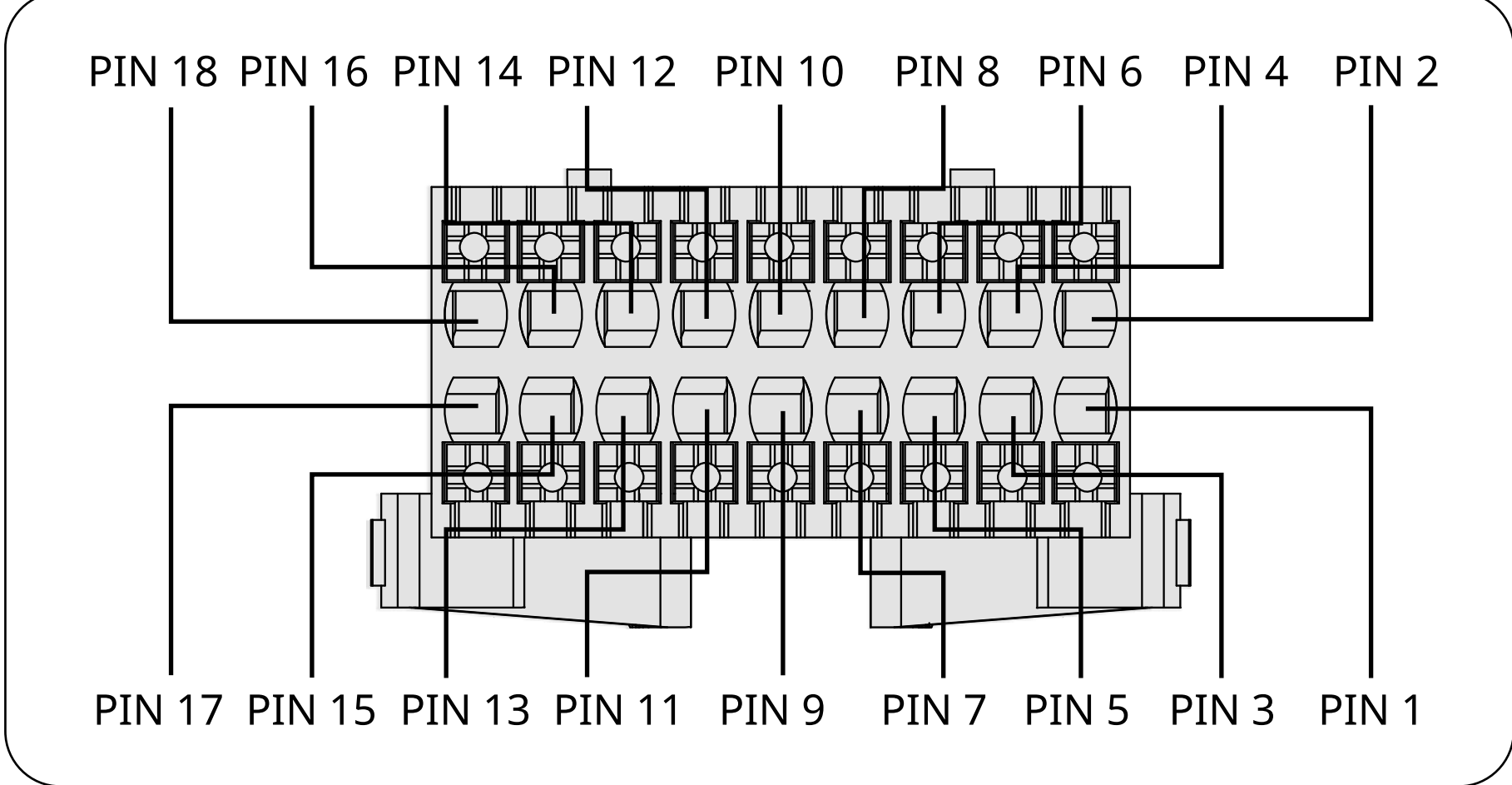
4.4 Wire the communication cable

4.4.1 Remove the cover plate

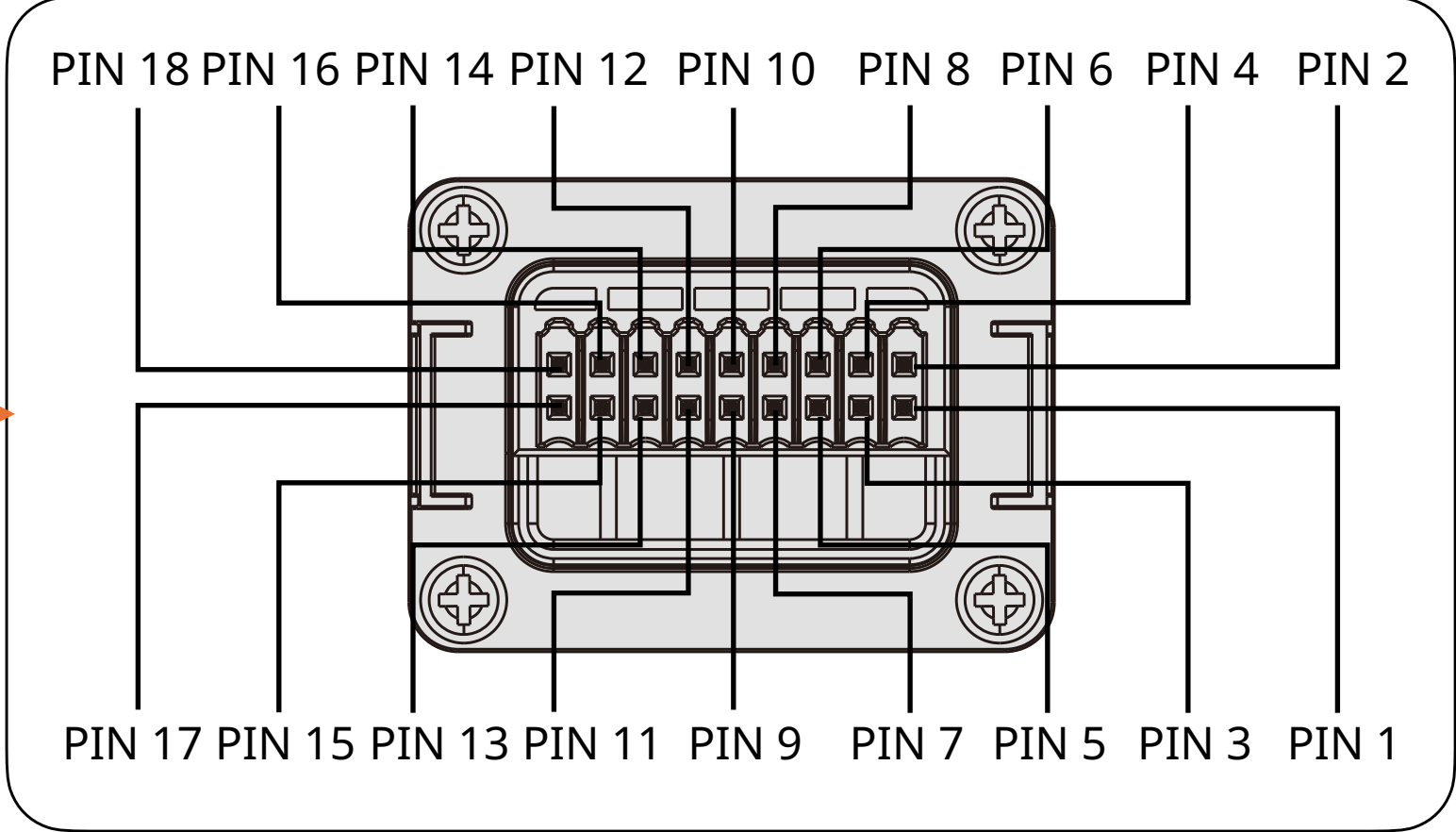
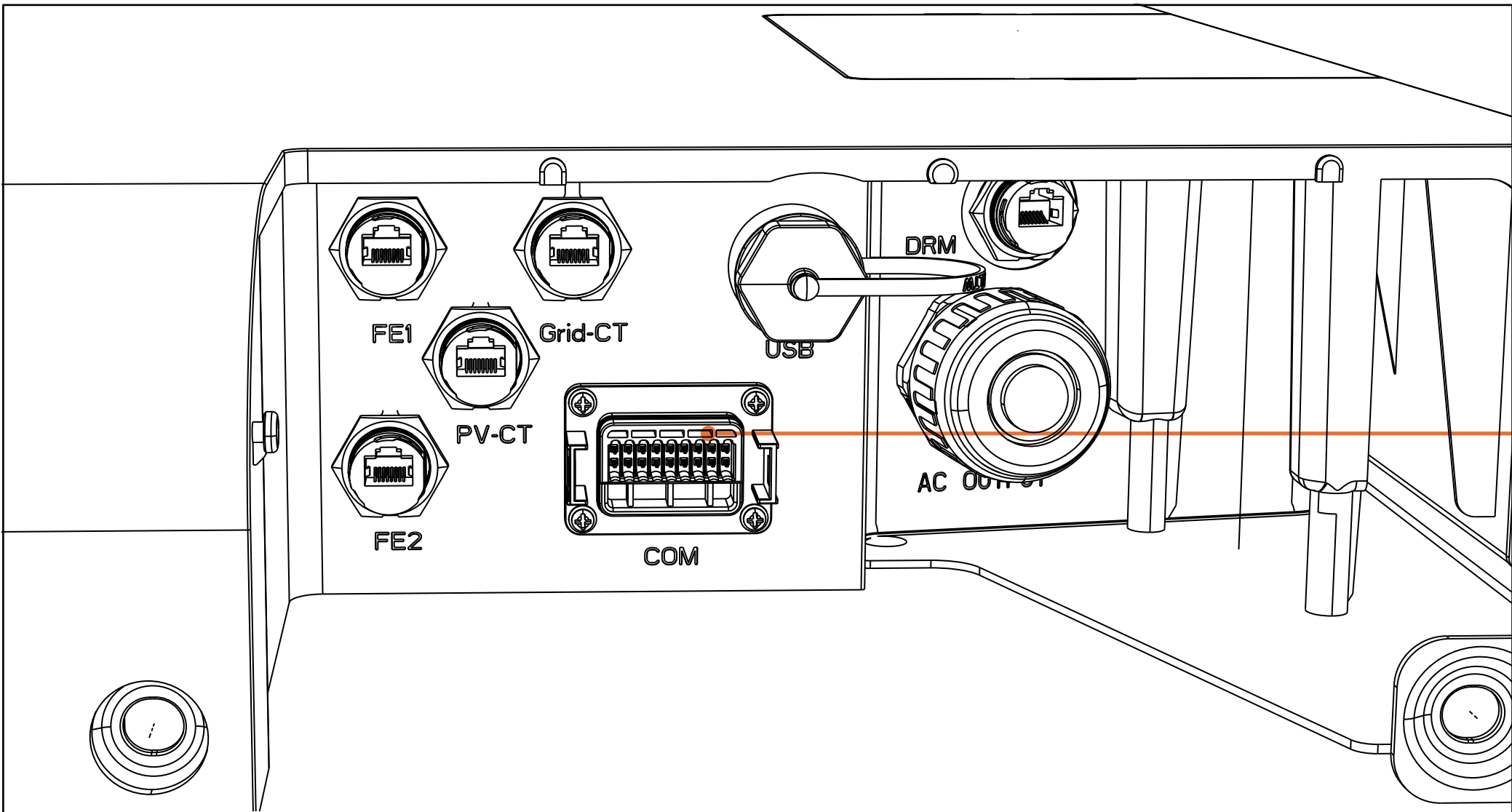
- a. Remove the cover plate of the MS-SCU-RES-U.
- b. Disconnect the COM connector.



| PIN 18 | PIN 16 | PIN 14 | PIN 12 | PIN 10 | PIN 8 | PIN 6  | PIN 4  | PIN 2 |
|--------|--------|--------|--------|--------|-------|--------|--------|-------|
| DO1    | DO2    | DO3    | -      | DI1    | CAN-H | 485_1+ | 485_1- | GND1  |
| GND    | GND    | GND    | GND    | GND    | CAN-L | 485_2+ | 485_2- | GND2  |
| PIN 17 | PIN 15 | PIN 13 | PIN 11 | PIN 9  | PIN 7 | PIN 5  | PIN 3  | PIN 1 |



- c. Assemble the wiring harness and connect the corresponding connectors.

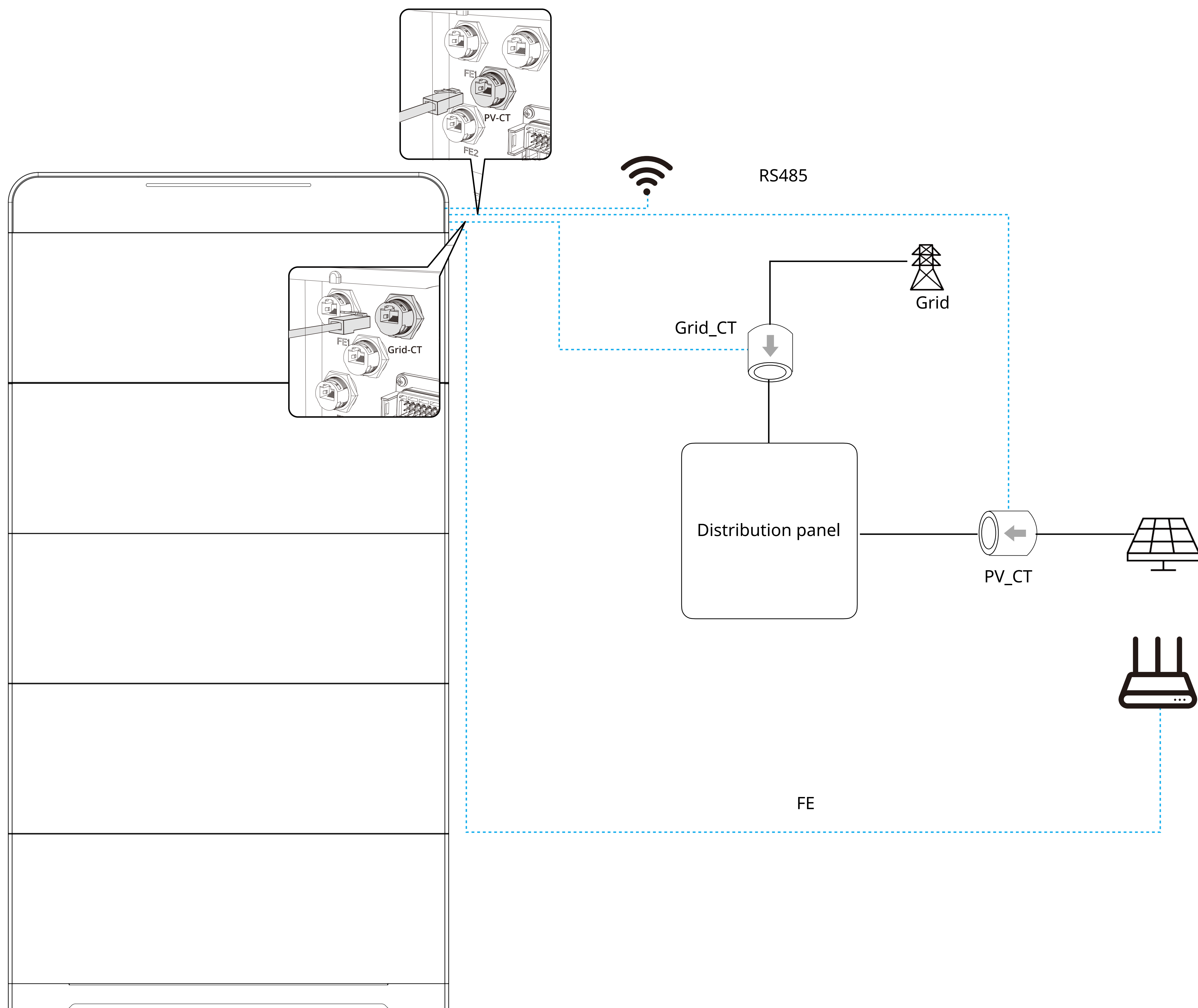


| PIN 18 | PIN 16 | PIN 14 | PIN 12 | PIN 10 | PIN 8 | PIN 6  | PIN 4  | PIN 2 |
|--------|--------|--------|--------|--------|-------|--------|--------|-------|
| DO1    | DO2    | DO3    | -      | DI1    | CAN-H | 485_1+ | 485_1- | GND1  |
| GND    | GND    | GND    | GND    | GND    | CAN-L | 485_2+ | 485_2- | GND2  |
| PIN 17 | PIN 15 | PIN 13 | PIN 11 | PIN 9  | PIN 7 | PIN 5  | PIN 3  | PIN 1 |

NOTE:

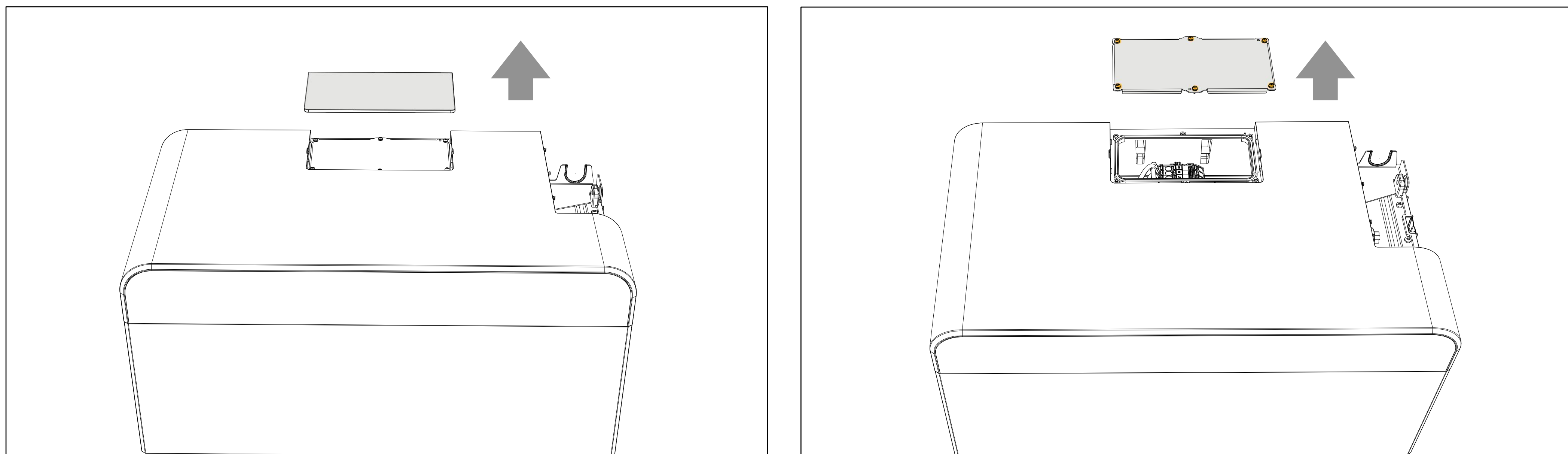
- FE1 connects to devices, FE2 connects to the router.
- USB: Support 4G-Dongle and Wi-Fi Dongle. DRM: Support Demand Respond Modes.

- d. Connect the CT to the grid interconnection point, and connect the other end to the Grid\_CT.
- e. Connect the CT to the PV access point, and connect the other end to the PV\_CT.
- f. The MS-SCU-RES-U supports cloud connection via either FE2 or Wi-Fi.



## 4.5 Wire the power cables

a. Unscrew the screws and remove the cable duct cover.

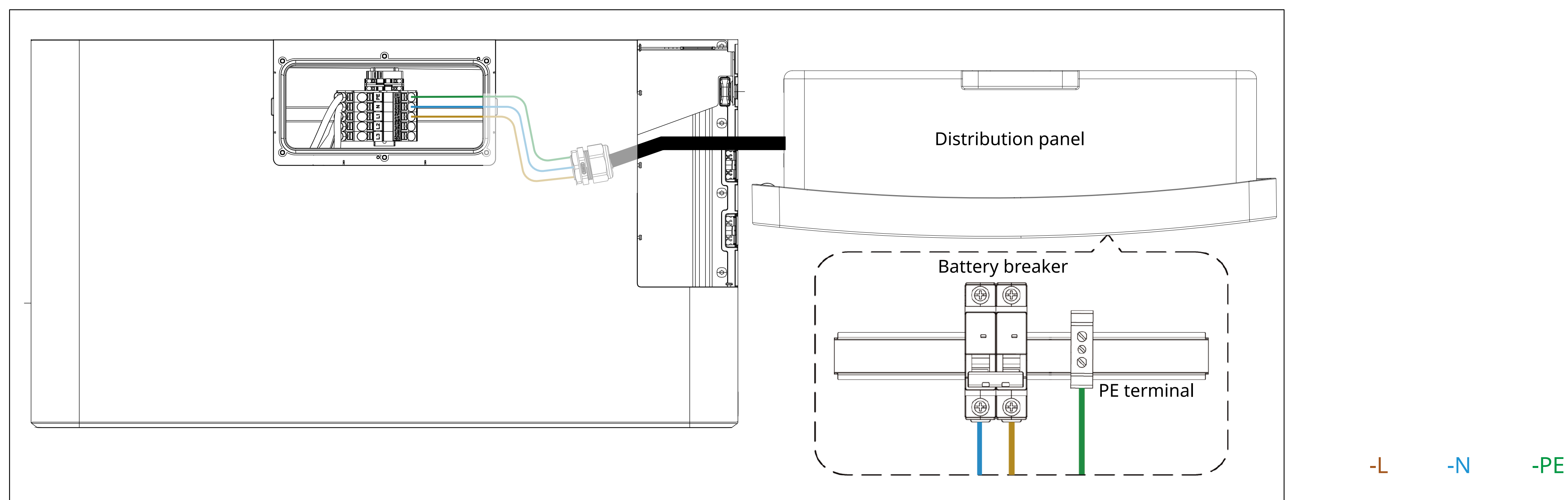


b. Connect the cables to the battery breaker and PE terminal block in the distribution panel.

c. Bring in the power cables from the distribution panel through the AC\_OUTPUT hole of the MS-SCU-RES-U.

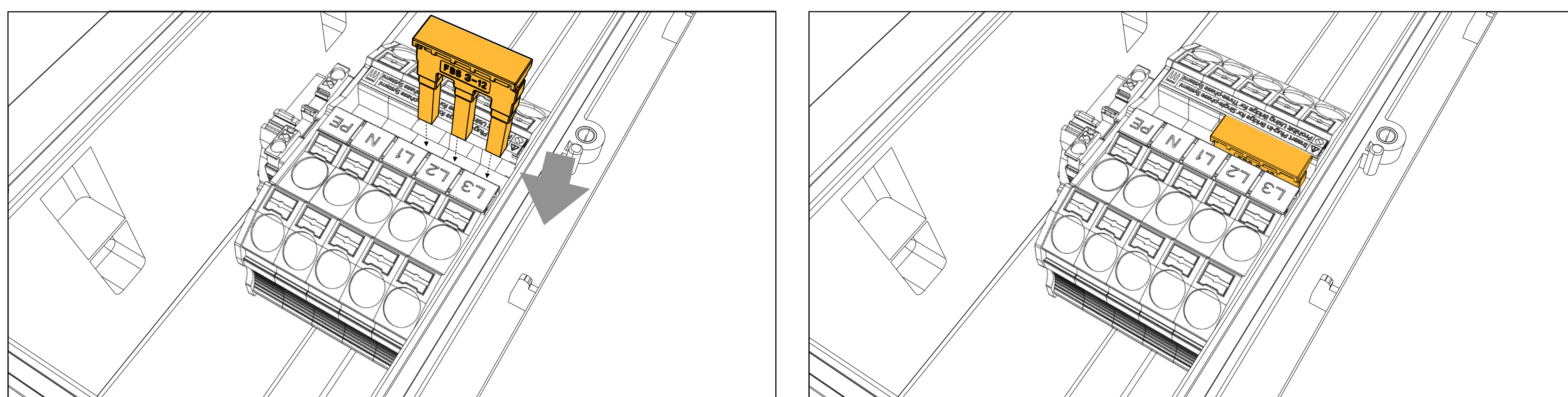
d. Connect the cables to the power and PE terminal block in the MS-SCU-RES-U.

### Single-phase application

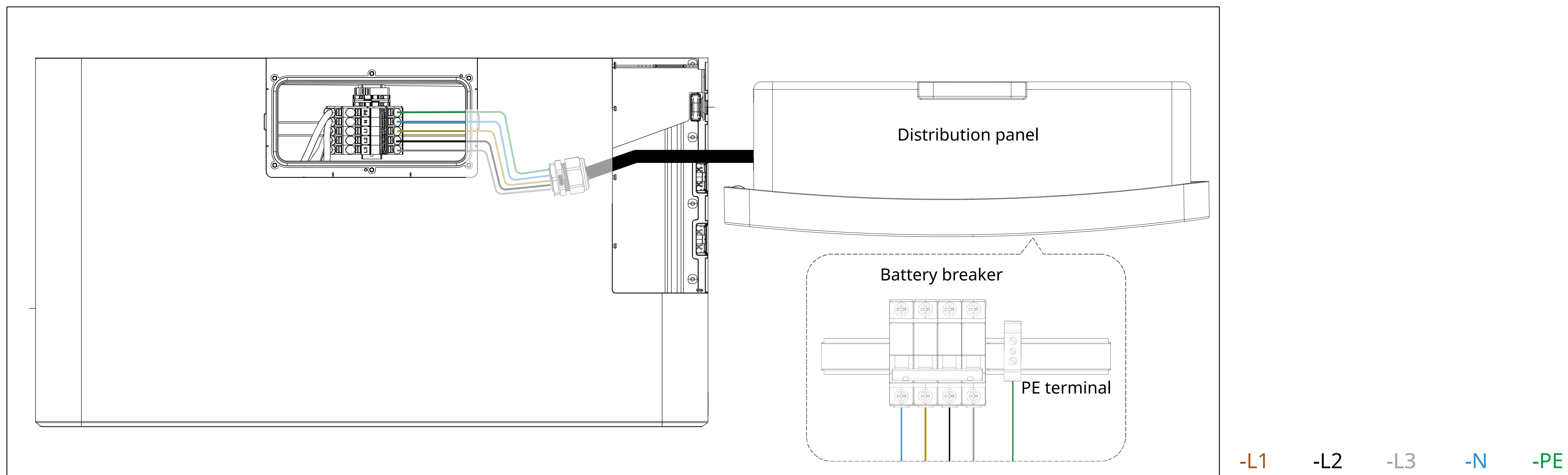


### NOTE:

- For single-phase system, the plug-in bridge must be fully inserted as shown.
- After the installation, confirm that the plug-in bridge is not loose.



## Three-phase application for Wye grid

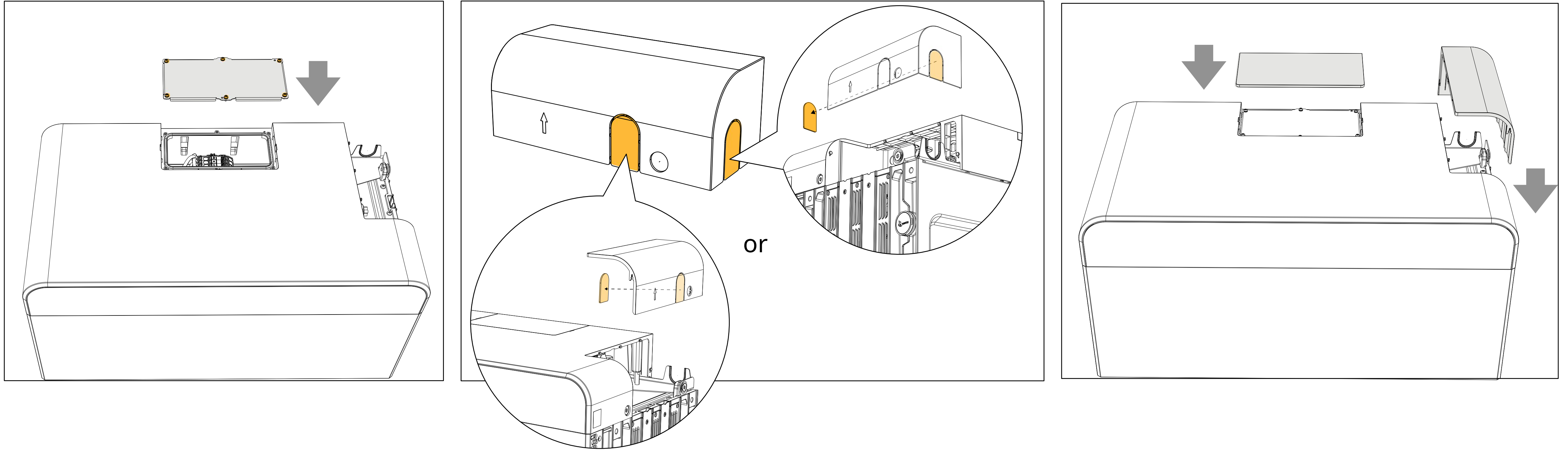


### NOTE:

- For three-phase system, the plug-in bridge is strictly prohibited.

## 4.6 Reinstall the front cover of the base

- Install the upper sealing cover and tighten the screws using a Phillips screwdriver.
- Remove the required cable entry knockout from the side cover according to the cable routing.
- Reinstall the upper cover and the side cover.



## 4.7 Power on the system

- Use the multimeter to measure the voltage between the N pole and L1 pole (and/or L2 pole, L3 pole) of the grid connection point. The voltage value should be approximately the nominal phase voltage, e.g. 220 V, 230 V, and 240 V.
- Switch on the battery breaker in the combiner and power on the system.

## 4.8 Activate the system

- Log into the ATMOZEN APP on your mobile phone and follow the deployment guide in the app to activate the system.

## Operation and Maintenance

### 5.1 M-ELV BattBank Working Mode

#### Self-consumption mode

##### Description:

This system prioritizes the consumption of green energy generated by household photovoltaic (PV) panels to reduce dependence on the grid. The M-ELV batteries store only excess solar power and discharge to supply the household when solar generation is insufficient. This solution is ideal for regions with high electricity prices and low or no feed-in tariff (FIT) subsidies.

##### Function:

- a. During periods of high solar generation:** The household loads consume solar power directly. Surplus energy is first used to charge the battery; any remaining energy is then exported to the grid.
- b. During periods of low solar generation (e.g., at night):** The system prioritizes battery discharge to power the home. If the household demand exceeds the battery's discharge power, the grid will supply the additional power required.

#### TOU (Time of use) mode

##### Description:

Users can configure the operating periods for each mode. By shifting energy usage from peak-price periods to off-peak periods, TOU mode helps homeowners improve energy cost efficiency, increase the value of stored energy, and achieve smarter day-to-day energy management.

##### Function:

- a. Charging period:** Prioritise charging the M-ELV battery from the grid and excess solar power generation, with the M-ELV battery not discharging.
- b. Discharging period:** Excess solar power generation can be used to charge the M-ELV battery, which can supply power to the load.
- c. Self-consumption period:** PV-generated energy is first used to meet the load demand. Any excess energy is stored in the battery, with grid export only occurring after the battery is fully charged.

### NOTE:

- In some countries and regions, grid charging of energy storage systems is not permitted, and this mode is prohibited.
- This mode requires at least one set of charging time periods or discharging time periods. (In off-grid mode, when the grid power fails, the energy storage system can discharge at any time.)

## Storm guard mode

### Description:

The battery is charged to the maximum level for use in the event of a grid power outage.

### Function:

- a. During the storm period:** The PV system and power grid charges the batteries to maintain a full state of charge. If the grid is disconnected due to a fault, the system maximizes backup power supply to ensure continuity.

## AI mode

### Description:

Based on deep learning and AI-powered forecasting optimization, AI Mode actively analyses historical electricity prices, weather conditions, PV generation, and user load profiles. It predicts future trends and dynamically generates an optimized energy scheduling strategy tailored to each household. The strategy can be adjusted in real time to help ensure stable returns and improve user benefits. In addition, during short-term network disconnection, AI Mode can continue operating according to the predefined strategy, enabling the system to keep following the original plan even when the network is temporarily unavailable.

### NOTE:

- The system aims to improve user benefits and reduce costs while ensuring priority for self-consumption.
- Compared with the traditional self-generation and self-consumption mode, it enables active control of the energy storage system and realizes the strategy of low-cost charging and high-cost discharging.
- The system supports dynamic electricity pricing, time-of-use (TOU) pricing, and fixed pricing.
- The system supports feeding excess photovoltaic power back to the grid, but does not support arbitrage by purchasing power from the grid for resale.
- The AI mode remains functional during peak shaving operation.
- AI Mode can only be enabled when the electricity pricing mode is set to TOU (Time-of-Use) or Dynamic.

## 5.2 Preconditioning

When temperatures are low, the charging capacity of the M-ELV BattBank decreases. To help the M-ELV BattBank address this issue, ATMOCE has implemented Preconditioning technology, which enables the M-ELV BattBank to operate at temperatures as low as -30°C.

When temperatures drop below freezing, preconditioning activates and heats the battery to enhance operational and charging performance. To heat itself, the M-ELV BattBank consumes a small amount of energy, enabling higher-power charging.

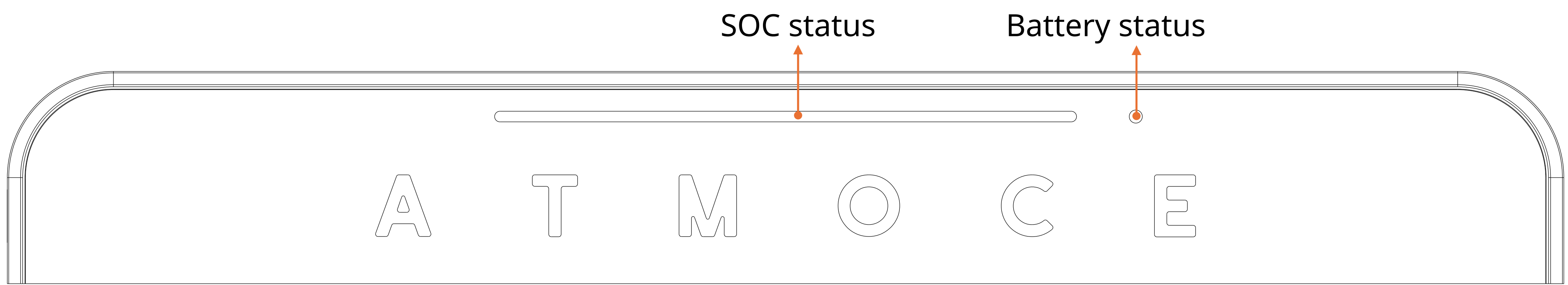
### NOTE:

- This mode cannot be customised, as the M-ELV BattBank detects internal temperature and automatically activates preconditioning.
- During preconditioning, the ATMOZEN APP and ATMOCE Cloud may display the amount of electricity flowing from solar or the grid to the M-ELV BattBank, but the battery is not in charging status. This is normal and this energy is used for heating.
- The battery will reserves 10% capacity in default value to protect the battery itself.

# Troubleshooting

## 6.1 LED Indicator Description

The M-ELV BattBank has five types of LEDs and the following table describes their status.



| Function       | Colour             |             | Description                         |
|----------------|--------------------|-------------|-------------------------------------|
| SOC status     | Solid blue         | <div></div> | Remaining battery energy percentage |
| Battery status | Quick flash red    | <div></div> | Environmental failure               |
|                | Slow flash red     | <div></div> | Grid failure                        |
|                | Solid red          | <div></div> | The battery has an internal fault   |
|                | Quick flash orange | <div></div> | Upgrading                           |
|                | Dim                | <div></div> | Normal operation                    |

### NOTE:

- The state of charge (SOC) accuracy may deviate if the battery is used for the first time, activated after long-term storage, or left in standby mode for a prolonged period. For calibration, please perform a full charge (to 100% SOC) at least once.

## 6.2 Alert Codes List

| Code | Issue                                | Cause                                                                                                                  | Solution                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | High Direct Current Input            | The open-circuit voltage of the solar panel is set to a value higher than the maximum operating voltage of the device. | Check whether the open-circuit voltage of the solar panel is higher than the maximum input voltage of the device specified in the user manual. If so, configure the solar panel according to the user manual to ensure the open-circuit voltage is within the allowed range. Then, the alert will be automatically recovered.                                                                                                 |
| 2    | Grid Power Outage                    | Grid power outage occurred.                                                                                            | 1. Check whether the grid is normally powered.<br>2. Check whether the alternating current cable or breaker is disconnected.                                                                                                                                                                                                                                                                                                  |
| 3    | Grid Undervoltage                    | The grid voltage is lower than the lower limit.                                                                        | 1. Check whether the grid voltage is within the allowed range. If not, contact your local electric system operator. If so, modify the grid undervoltage protection threshold after obtaining consent from your local electric system operator.<br>2. If the fault persists, check whether the alternating current breaker and cable are connected properly.                                                                   |
| 4    | Grid Overvoltage                     | The grid voltage is higher than the upper limit.                                                                       | 1. Check whether the grid voltage is within the allowed range. If not, contact your local electric system operator. If so, modify the grid overvoltage protection threshold after obtaining consent from your local electric system operator.<br>2. If the fault persists, check whether the alternating current breaker and cable are connected properly, or whether the cable complies with the recommended specifications. |
| 5    | Grid Underfrequency                  | The grid frequency is lower than the lower limit.                                                                      | Check whether the grid frequency is within the allowed range. If not, contact your local electric system operator. If so, modify the grid underfrequency protection threshold after obtaining consent from your local electric system operator.                                                                                                                                                                               |
| 6    | Grid Overfrequency                   | The grid frequency is higher than the upper limit.                                                                     | Check whether the grid frequency is within the allowed range. If not, contact your local electric system operator. If so, modify the grid overfrequency protection threshold after obtaining consent from your local electric system operator.                                                                                                                                                                                |
| 7    | High Output Direct Current Component | The output direct current component is higher than the upper limit.                                                    | 1. The device automatically monitors external working conditions in real time and returns to normal after the fault is resolved.<br>2. If the fault occurs frequently, contact your distributor or Customer Service.                                                                                                                                                                                                          |

| Code | Issue                                         | Cause                                                                                                                                                                                             | Solution                                                                                                                                                                                                                                                             |
|------|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8    | Low Direct Current-Side Insulation Resistance | The insulation between the solar panel and the ground is poor.                                                                                                                                    | Check the insulation between the solar panel and the ground. If there is a short circuit or poor insulation, rectify it.                                                                                                                                             |
| 9    | Internal Device Error                         |                                                                                                                                                                                                   | 1. Check whether the indicator of the M-Relay flashes in red or is off. If so, contact your distributor or Customer Service.                                                                                                                                         |
|      |                                               | The M-Relay is disconnected from the gateway.                                                                                                                                                     | 2. Power off and then repower the Gateway by using the Gateway breaker inside the combiner. If the fault persists, contact your distributor or Customer Service.                                                                                                     |
|      |                                               | The internal circuit of the inverter failed.                                                                                                                                                      | Wait for the inverter to power on again until the next day. If the fault persists, contact your distributor or Customer Service.                                                                                                                                     |
|      |                                               | The internal circuit of the gateway failed.                                                                                                                                                       | Power off and then repower the Gateway by using the Gateway breaker inside the combiner. If the fault persists, contact your distributor or Customer Service.                                                                                                        |
|      |                                               | The internal relay of MC100L is faulty.                                                                                                                                                           | Power off and then repower the generation system by using the breaker inside the combiner. If the fault persists, contact your distributor or Customer Service.                                                                                                      |
|      |                                               | The internal circuit of the M-Relay failed.                                                                                                                                                       | 1. Check whether the PV breaker is off. If the PV breaker is off, close it.<br>2. Power off and then repower the M-Relay. If the fault persists, contact your distributor or Customer Service.                                                                       |
|      |                                               |                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                      |
| 10   | Active Device Protection                      | The operating environment of the inverter is abnormal.                                                                                                                                            | 1. The device monitors external working conditions and returns to normal after the fault is resolved.<br>2. If this alert is reported frequently, contact your distributor or Customer Service.                                                                      |
| 11   | The software version is incompatible.         | Microinverter software upgrade error occurred.                                                                                                                                                    | Wait for the microinverter upgrade to complete or repeat the upgrade process. If the fault persists, contact your distributor or Customer Service.                                                                                                                   |
| 12   | High Device Temperature                       | 1. The working temperature of the gateway is high.<br>2. An internal gateway error occurred.                                                                                                      | 1. Please ensure that the working conditions of the device are within the allowed range;<br>2. If the alert is reported frequently, contact your distributor or Customer Service.                                                                                    |
|      |                                               | 1. The working temperature of the relay is high;<br>2. An internal relay error occurred.                                                                                                          | 1. Please ensure that the working conditions of the device are within the allowed range;<br>2. If the alert is reported frequently, contact your distributor or Customer Service.                                                                                    |
| 13   | Abnormal Grid Power Connection                | The single-/three-phase wiring in the battery is inconsistent with the single-/three-phase configuration in the combiner.                                                                         | 1. Please check whether the AC distribution wiring of the battery is consistent with the single-/three-phase configuration in the combiner.<br>2. If the alert persists, contact your distributor or Customer Service.                                               |
|      |                                               | 1. Abnormal phase in the single-phase system.<br>2. Phase loss in the three-phase system.<br>3. Reversed phase sequence in the three-phase system.<br>4. Short circuit in the three-phase system. | 1. For single-phase battery, check for a short circuit in the AC input.<br>2. For three-phase battery, check for phase loss, reversed phase sequence, or short circuits in the AC wiring.<br>3. If the alert persists, contact your distributor or Customer Service. |
|      |                                               | The neutral wire is not properly grounded, resulting in voltage on the PE wire.                                                                                                                   | 1. Ensure that the neutral wire is properly grounded.<br>2. If this alert persists, contact your distributor or Customer Service.                                                                                                                                    |
| 18   | High Output DC Voltage Component              | The output DC voltage component is higher than the upper limit.                                                                                                                                   | 1. The device automatically monitors external working conditions in real time and returns to normal after the fault is resolved.<br>2. If the fault occurs frequently, contact your distributor or Customer Service.                                                 |

| Code | Issue                                     | Cause                                                                                                                                                | Solution                                                                                                                                                                                                                                                                                                                        |
|------|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 50   | Battery Overvoltage                       | The total battery voltage or battery cell voltage exceeds the alert threshold.                                                                       | 1. In the app, shut down the battery and then power it on again;<br>2. Reset the system in the app;<br>3. If the battery is connected to the grid, disconnect the AC input, wait for the battery indicator to go out, and then restore the AC input;<br>4. If the alert persists, contact your distributor or Customer Service. |
| 51   | Battery Undervoltage                      | The voltage of a battery cell is too low.                                                                                                            | 1. If the battery is connected to the grid, disconnect the AC input, wait for the battery indicator to go out, and then restore the AC input;<br>2. Reset the system in the app;<br>3. If the alert persists, contact your distributor or Customer Service.                                                                     |
|      |                                           | The total battery voltage is below the alert threshold.                                                                                              | 1. If the battery is connected to the grid, disconnect the AC input, wait for the battery indicator to go out, and then restore the AC input;<br>2. Reset the system in the app;<br>3. If the alert persists, contact your distributor or Customer Service.                                                                     |
| 52   | Large Battery Cell Voltage Difference     | The voltage difference between battery cells exceeds the alert threshold.                                                                            | 1. If the battery is connected to the grid, disconnect the AC input, wait for the battery indicator to go out, and then restore the AC input;<br>2. Reset the system in the app;<br>3. If the alert persists, contact your distributor or Customer Service.                                                                     |
|      | Large Battery Cell Temperature Difference | 1. The temperature difference between battery cells exceeds the alert threshold.<br>2. The fan is not working normally.                              | 1. Shut down the battery and then power it on again;<br>2. Reset the system;<br>3. If the alert is reported frequently, contact your distributor or Customer Service.                                                                                                                                                           |
| 53   | Battery Overtemperature                   | 1. The battery temperature exceeds the alert threshold;<br>2. The ambient temperature is too high;<br>3. The fan is not working normally.            | 1. Wait for a while and check if the alert disappears automatically;<br>2. If the alert is reported frequently, please ensure that the working conditions of the device are within the allowed range;<br>3. If the alert persists, contact your distributor or Customer Service.                                                |
| 54   | Low Battery Temperature                   | 1. The battery temperature is below the alert threshold;<br>2. The ambient temperature is too low;<br>3. The heating system is not working normally. | 1. Please ensure that the working conditions of the device are within the allowed range;<br>2. If the alert persists, contact your distributor or Customer Service.                                                                                                                                                             |
| 56   | Battery Overcurrent                       | The battery current exceeds the alert threshold.                                                                                                     | 1. Wait for a while and check if the alert disappears automatically;<br>2. If the alert is reported frequently, reset the system in the app;<br>3. If the alert persists, contact your distributor or Customer Service.                                                                                                         |
| 57   | Low Battery SOH                           | The battery health metric is below the alert threshold.                                                                                              | 1. The battery lifespan has reached its end. Please stop using the battery;<br>2. Please follow the legal regulations in your country/region and contact local battery recycling services for disposal.                                                                                                                         |
| 58   | Battery Life Terminated                   | The battery lifespan has reached its end.                                                                                                            | 1. The battery lifespan has reached its end. Please stop using the battery;<br>2. Please follow the legal regulations in your country/region and contact local battery recycling services for disposal.                                                                                                                         |
| 59   | Battery Micro-Short Circuit               | The battery micro-short circuit fault occurred.                                                                                                      | Please contact your distributor or Customer Service.                                                                                                                                                                                                                                                                            |
| 60   | Battery Thermal Runaway                   | The battery thermal runaway fault occurred.                                                                                                          | 1. Please immediately disconnect the battery AC input and stop using the battery;<br>2. Please contact your distributor or Customer Service.                                                                                                                                                                                    |

| Code | Issue                                                        | Cause                                                                                                                                                   | Solution                                                                                                                                                                                                                                                                                                                                                 |
|------|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 61   | Low Insulation Resistance                                    | The insulation between the battery and the ground is poor.                                                                                              | 1. Please ensure that the system protection ground wire is correctly connected;<br>2. Reset the system in the app;<br>3. If the alert persists, contact your distributor or Customer Service.                                                                                                                                                            |
| 62   | Internal Device Error                                        | The internal circuit of the battery failed.                                                                                                             | 1. In the app, shut down the battery and then power it on again;<br>2. Reset the system in the app;<br>3. If the battery is connected to the grid, disconnect the AC input, wait for the battery indicator to go out, and then restore the AC input;<br>4. If the alert persists, contact your distributor or Customer Service.                          |
|      |                                                              | The internal circuit fault protection of the battery is triggered.                                                                                      | 1. In the app, shut down the battery and then power it on again;<br>2. Reset the system in the app;<br>3. If the battery is connected to the grid, disconnect the AC input, wait for the battery indicator to go out, and then restore the AC input;<br>4. If the alert persists, contact your distributor or Customer Service.                          |
|      |                                                              | 1. The device is shut down.<br>2. The CAN bus cable between the device and the gateway is abnormal.                                                     | 1. Ensure that the CAN bus cable between the gateway and battery module is securely connected.<br>2. Reset the system using the App.<br>3. Check the SOC indicator lights. If all the lights are off, press and hold the button for more than 30 seconds to start the system.<br>4. If the alert persists, contact your distributor or Customer Service. |
| 63   | Abnormal Communication Between Battery and Gateway           | 1. The device is shut down.<br>2. The FE cable between the device and the gateway or SCU is abnormal.                                                   | 1. Ensure that the FE cable between the device and the gateway or SCU is reliably connected.<br>2. Reset the system in the app.<br>3. Check the indicator lights. If all the lights are off, press and hold the button for more than 30 seconds to start the system.<br>4. If the alert persists, contact your distributor or Customer Service.          |
|      |                                                              | 1. The device is shut down.<br>2. The CAN bus cable between the device and the SCU is abnormal.                                                         | 1. Ensure that the CAN bus cable between the battery pack and the SCU is reliably connected.<br>2. Reset the system in the app.<br>3. If the alert persists, contact your distributor or Customer Service.                                                                                                                                               |
| 64   | Active Device Protection                                     | 1. The load power exceeds the off-grid rated power of the battery system.<br>2. The solar power exceeds the off-grid rated power of the battery system. | 1. Disconnect the minor loads to reduce the load power, and then power on the backup unit again.<br>2. Disconnect the grid-tied circuit breaker of the backup unit and the load-side circuit breaker, wait for 5 minutes, and power on the backup unit again. If the fault persists, contact your distributor or Customer Service.                       |
|      |                                                              | The operating environment of the battery is abnormal.                                                                                                   | 1. The device automatically monitors external working conditions and returns to normal<br>2. If the alert is reported frequently, contact your distributor or Customer Service.                                                                                                                                                                          |
| 65   | The software version is incompatible.                        | Battery software upgrade error occurred.                                                                                                                | Wait for the battery upgrade to complete or repeat the upgrade process. If the fault persists, contact your distributor or Customer Service.                                                                                                                                                                                                             |
| 66   | The software version is incompatible.                        | The Shelly Smart Control app is of an earlier version.                                                                                                  | 1. Please contact Shelly for app upgrade.<br>2. If the alert persists, contact your distributor or Customer Service.                                                                                                                                                                                                                                     |
| 67   | A connection error occurs between the meter and the gateway. | 1. The device is shut down.<br>2. The device network is abnormal.                                                                                       | 1. Please check the working indicator on your device and ensure that it indicates a normal status.<br>2. Please check the network indicator on your device and ensure that it indicates a normal status.<br>3. Reset your device.<br>4. If this alert persists, contact your distributor or Customer Service.                                            |

| Code | Issue                                                                 | Cause                                                                                                                                                               | Solution                                                                                                                                                                                                                                                                                                                                                         |
|------|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 68   | A connection error occurs between the secondary and primary gateways. | 1. The device is shut down.<br>2. The device network is abnormal.                                                                                                   | 1. Please check the working indicator on your device and ensure that it indicates a normal status.<br>2. Please check the network indicator on your device and ensure that it indicates a normal status.<br>3. Reset your device by connecting the app to the gateway via Bluetooth.<br>4. If this alert persists, contact your distributor or Customer Service. |
| 69   | Internal Device Error                                                 | The internal circuit fault protection of the backup unit is triggered.                                                                                              | Power off the battery and inverter, disconnect the AC breaker, wait for 1 minute, and power on the battery and inverter again. If the fault persists, contact your distributor or Customer Service.                                                                                                                                                              |
| 70   | High Device Temperature                                               | 1. The backup unit was operating under a high temperature, or the installation location is poorly ventilated.<br>2. The backup unit suffered an internal exception. | 1. Please ensure that the working conditions of the device are within the allowed range.<br>2. Disconnect the minor loads to reduce the load power.<br>3. If the alert is reported frequently, contact your distributor or Customer Service.                                                                                                                     |
| 71   | Abnormal Grid Power Connection                                        | 1. Abnormal closure of the backup unit bypass breaker.<br>2. Bypass breaker short circuit due to incorrect AC wiring.                                               | 1. Ensure that the AC wiring in the backup unit is correct according to our installation guide.<br>2. Disconnect the grid-tied circuit breaker of the backup unit and the load-side circuit breaker, wait for 5 minutes, and power on the backup unit again. If the fault persists, contact your distributor or Customer Service.                                |
|      |                                                                       | An error is detected for wiring of the backup unit and grid.                                                                                                        | 1. Ensure that the grid-side wiring is correct according to our installation guide.<br>2. If this alert persists, contact your distributor or Customer Service.                                                                                                                                                                                                  |
|      |                                                                       | PE wire is incorrectly connected.                                                                                                                                   | Please ensure the PE wire is correctly connected according to our installation guide.                                                                                                                                                                                                                                                                            |

| Code | Issue                                                    | Cause                                                                                                                                                   | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 72   | The backup unit is disconnected from the gateway.        | 1. The device is shut down.<br>2. The CAN bus cable between the device and the gateway is abnormal.                                                     | 1. Ensure that the working indicator on your device indicates a normal status.<br>2. Ensure that the CAN bus cable between the gateway and backup unit is reliably connected.<br>3. Reset the system in the app.<br>4. If the alert persists, contact your distributor or Customer Service.                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 73   | Active Device Protection                                 | 1. The load power exceeds the off-grid rated power of the battery system.<br>2. The solar power exceeds the off-grid rated power of the battery system. | 1. Disconnect the minor loads to reduce the load power, and then power on the backup unit again.<br>2. Disconnect the grid-tied circuit breaker of the backup unit and the load-side circuit breaker, wait for 5 minutes, and power on the backup unit again. If the fault persists, contact your distributor or Customer Service.                                                                                                                                                                                                                                                                                                                                                                          |
| 74   | Smoke Alert                                              | Smoke Detected in Battery                                                                                                                               | 1. Remotely monitor the battery for 30 minutes to check for any other issues (e.g., device internal faults). Do not approach the battery or open the compartment door during remote monitoring.<br>2. If no other issues are detected remotely, arrange for trained personnel to observe on-site from a safe distance for 30 minutes. If smoke or fire occurs, shut down the system remotely, ask on-site personnel to move away immediately, and call the fire department.<br>3. If no issues are detected during both remote monitoring and on-site observation, refer to the maintenance manual and replace the smoke sensor.<br>4. If the alert persists, contact your distributor or Customer Service. |
| 75   | Flood Alert                                              | Water Detected in Battery                                                                                                                               | 1. Check for water ingress in the battery.<br>2. Check whether the battery is intact. Replace it if damaged.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 256  | Abnormal Communication Between Microinverter and Gateway | 1. The device is shut down.<br>2. The alternating current cable between the device and the gateway is abnormal.                                         | 1. Check whether the AC breaker is disconnected. If the AC breaker is disconnected, close the AC breaker.<br>2. Wait for the inverter to be powered on again the next day and confirm the communication status. If the fault still exists, check whether the AC line is disconnected and whether the AC wiring and mating terminals are abnormal, or contact your distributor or Customer Service for assistance.                                                                                                                                                                                                                                                                                           |

| Code                                                                                            | Issue                                                   | Cause                                                                                                                              | Solution                                                                                                                               |                                   |
|-------------------------------------------------------------------------------------------------|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| 257                                                                                             | Abnormal Communication Between Gateway and Atmoce-Cloud | 1. The device is shut down.                                                                                                        | 1. Observe the indicator of the gateway to check whether it is shut down.                                                              |                                   |
|                                                                                                 |                                                         | 2. Device network settings are incorrect.                                                                                          | 2. Ensure that the router is connected to the internet.                                                                                |                                   |
|                                                                                                 |                                                         | 3. There is no network communication between the Gateway and the Atmoce-Cloud.                                                     | 3. If the gateway is connected to the internet via Wi-Fi:                                                                              |                                   |
|                                                                                                 |                                                         |                                                                                                                                    | 3.1 Check whether the Wi-Fi name and password are changed.                                                                             |                                   |
|                                                                                                 |                                                         |                                                                                                                                    | 3.2 Check whether Wi-Fi signals are strong.                                                                                            |                                   |
|                                                                                                 |                                                         |                                                                                                                                    | 3.3. If a dongle is used, make sure it is reliably connected.                                                                          |                                   |
|                                                                                                 |                                                         |                                                                                                                                    | 4. If the gateway is connected to the internet via a network cable:                                                                    |                                   |
|                                                                                                 |                                                         |                                                                                                                                    | 4.1 Check whether the router network and cable are normal.                                                                             |                                   |
|                                                                                                 |                                                         |                                                                                                                                    | 4.2 DHCP mode: Check whether DHCP mode is enabled for the router.                                                                      |                                   |
|                                                                                                 |                                                         |                                                                                                                                    | 4.3 Manual mode: Check whether the IP address, gateway, and DNS are properly configured for the router.                                |                                   |
|                                                                                                 |                                                         |                                                                                                                                    | 5. If the gateway is connected to the internet via a mobile network:                                                                   |                                   |
|                                                                                                 |                                                         |                                                                                                                                    | 5.1 Check whether the dongle is connected properly.                                                                                    |                                   |
| 258                                                                                             | Upgrade Failure                                         | 2. M-Relay upgrade failed.                                                                                                         | Try to upgrade again. If the fault persists, contact your distributor or Customer Service.                                             |                                   |
|                                                                                                 |                                                         | 3. Gateway upgrade failed.                                                                                                         |                                                                                                                                        |                                   |
|                                                                                                 |                                                         | 4. Battery upgrade failed.                                                                                                         |                                                                                                                                        |                                   |
|                                                                                                 |                                                         | The limited power value of the grid connection point cannot be adjusted to the target value within the specified adjustment cycle. |                                                                                                                                        |                                   |
|                                                                                                 |                                                         |                                                                                                                                    |                                                                                                                                        |                                   |
|                                                                                                 |                                                         | 259                                                                                                                                |                                                                                                                                        | Abnormal Limited Power Adjustment |
| 2. Ensure that the load does not exceed the imported current limit.                             |                                                         |                                                                                                                                    |                                                                                                                                        |                                   |
|                                                                                                 |                                                         |                                                                                                                                    | 3. Check whether other devices in the system, such as a 3rd-party PV system or a battery, have supplied excessive current to the grid. |                                   |
|                                                                                                 |                                                         |                                                                                                                                    | 4. If this alert is reported frequently, contact your distributor or Customer Service.                                                 |                                   |
| 260                                                                                             | Abnormal power control command.                         | No configured strategies match the received DI power control command.                                                              | 1. Ensure that the DI power control command is correct.                                                                                |                                   |
|                                                                                                 |                                                         |                                                                                                                                    | 2. Ensure that the DI power control cabling is correct.                                                                                |                                   |
|                                                                                                 |                                                         |                                                                                                                                    | 3. If this alert persists, contact your distributor or Customer Service.                                                               |                                   |
|                                                                                                 |                                                         |                                                                                                                                    | Overcurrent is detected in the split-phase transformer neutral wire.                                                                   |                                   |
|                                                                                                 |                                                         |                                                                                                                                    |                                                                                                                                        |                                   |
|                                                                                                 |                                                         |                                                                                                                                    | 262                                                                                                                                    | Abnormal Grid Power Connection    |
| 2. During off-grid operation, please ensure reasonable distribution of single-phase load power. |                                                         |                                                                                                                                    |                                                                                                                                        |                                   |
|                                                                                                 |                                                         |                                                                                                                                    | 3. If this alert persists, contact your distributor or Customer Service.                                                               |                                   |
|                                                                                                 |                                                         |                                                                                                                                    | Reduce the installed capacity on the PV side or adjust the connection point of the third-party PV system.                              |                                   |
| 263                                                                                             | Abnormal Communication Between Gateway and Battery      | 1. CAN connection between the gateway and battery is unstable.                                                                     | 1. Ensure that the CAN bus cable between the gateway and battery module is securely connected without looseness or poor contact.       |                                   |
|                                                                                                 |                                                         | 2. The CAN matching resistor between the gateway and battery is not correctly installed.                                           | 2. Check and correctly install the matching resistor for the battery CAN terminal following the Quick Installation Guide.              |                                   |

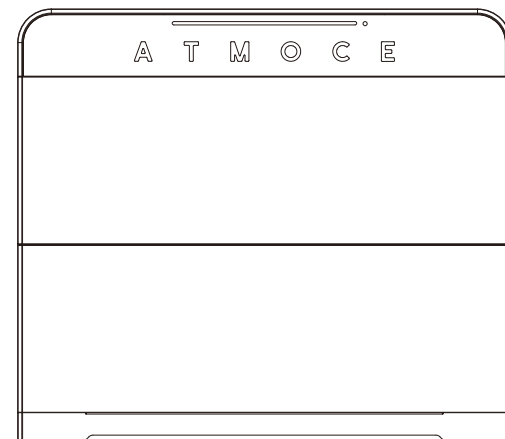
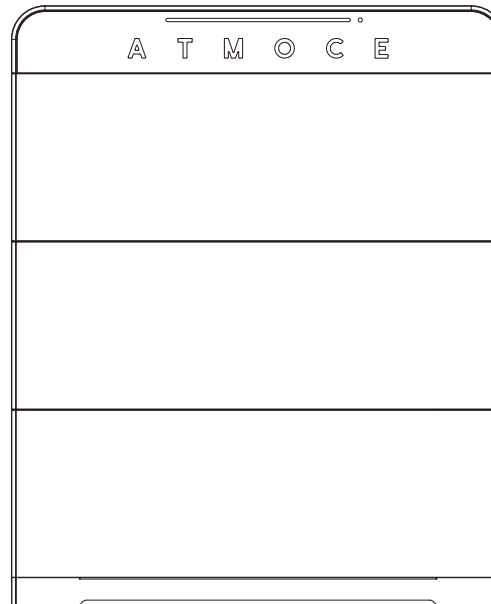
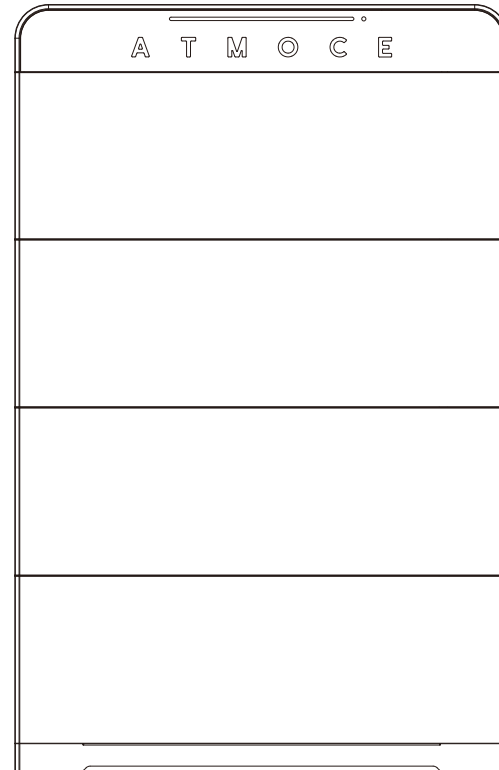
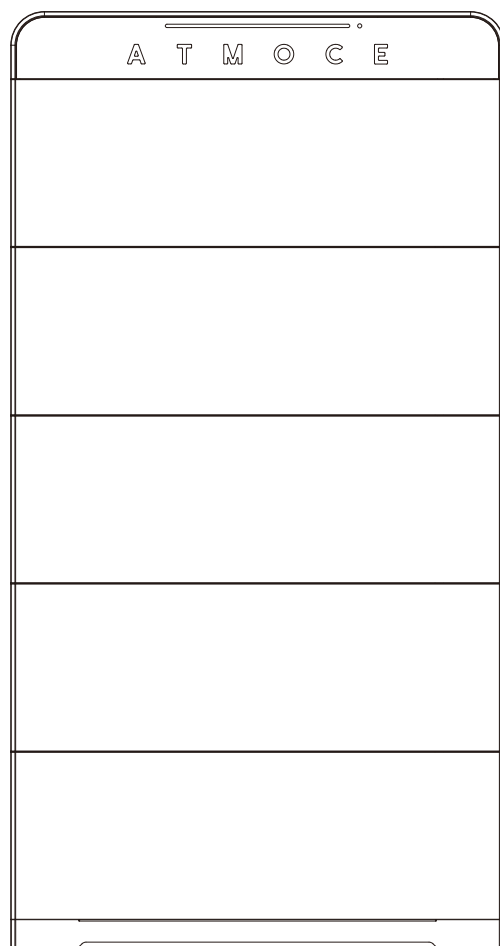
# Technical Data

## 7.1 MS-16K-U & MS-SCU-RES-U Data Sheet

| Items                     | Unit | MS-SCU-RES-U <sup>a</sup>              |
|---------------------------|------|----------------------------------------|
| General Data              |      |                                        |
| Indicator                 |      | LEDs for SOC & Status                  |
| Communication mode        |      | FE, RS485, WLAN, Bluetooth, DI/DO, CAN |
| Cloud Service             |      | ATMOCE Cloud & ATMOZEN APP             |
| AC Output                 | A    | 63                                     |
| Communication interface   |      |                                        |
| FE                        |      | 2 x RJ45                               |
| DRM                       |      | 1 x RJ45                               |
| PV CT                     |      | 1 x RJ45                               |
| Grid CT                   |      | 1 x RJ45                               |
| USB                       |      | 1 x USB                                |
| COM                       |      | 2 x RS485, 1x DI, 3 x 12V DO           |
| CAN                       |      | Support                                |
| Mechanical Data           |      |                                        |
| Weight                    | kg   | 9.7                                    |
| Dimensions                | mm   | 880 × 120 × 483 (W x H x D)            |
| Weight including base     | kg   | 16.5                                   |
| Dimensions including base | mm   | 880 × 170 × 483 (W x H x D)            |

| Items                          | Unit  | MS-16K-U <sup>b</sup>                    |                                                      |
|--------------------------------|-------|------------------------------------------|------------------------------------------------------|
|                                |       | Single Phase                             | Three Phase                                          |
| Performance Specification      |       |                                          |                                                      |
| Rated Output Apparent Power    | kVA   | 6                                        | 8                                                    |
| Max. Output Apparent Power     | kVA   | 7                                        | 10                                                   |
| Rated Input Apparent Power     | kVA   | 6                                        | 8                                                    |
| Nominal Voltage                | Va.c. | 1/N/PE ~ 220, 1/N/PE ~ 230, 1/N/PE ~ 240 | 3/N/PE~220/380, 230/400, 240/415                     |
| Nominal Frequency              | Hz    | 50 / 60                                  | 50 / 60                                              |
| Frequency Range                | Hz    | 45 to 55 @50 Hz, 55 to 65 @60 Hz         | 45 to 55 @50 Hz, 55 to 65 @60 Hz                     |
| Max. Input Current             | A     | 27.3 @220V, 26.1 @230V, 25.0 @240V       | 12.2 @ 380 Va.c., 11.6 @ 400 Va.c., 11.1 @ 415 Va.c. |
| Max. Output Current            | A     | 31.8 @220V, 30.4 @230V, 29.2 @240V       | 15.2 @ 380 Va.c., 14.4 @ 400 Va.c., 13.9 @ 415 Va.c. |
| Peak Output Current (Off grid) | A     | 36.4 (10s)                               | 18.2 (10s)                                           |
| Power Factor (On grid)         |       | 0.8 leading...0.8 lagging                | 0.8 leading...0.8 lagging                            |
| Power Factor (Off grid)        |       | 1 leading...1 lagging                    | 1 leading...1 lagging                                |
| AC Round-Trip Efficiency       | %     | 90 <sup>c</sup>                          | >90 <sup>c</sup>                                     |
| THDi                           | %     | <3.0                                     | <3.0                                                 |
| Battery Data                   |       |                                          |                                                      |
| Total Battery Capacity         | kWh   | 16.08                                    |                                                      |
| Nominal Battery Capacity       | Ah    | 314                                      |                                                      |
| Nominal DC Voltage             | V     | 51.2                                     |                                                      |
| Max. DC Voltage                | V     | 57.6                                     |                                                      |
| Chemistry                      |       | Lithium Iron Phosphate (LFP)             |                                                      |
| DC Round-Trip Efficiency       | %     | 96 <sup>d</sup>                          |                                                      |
| BMS                            |       | YES                                      |                                                      |

| Items                               | Unit | MS-16K-U <sup>b</sup>                                                                                                                                                  |             |
|-------------------------------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
|                                     |      | Single Phase                                                                                                                                                           | Three Phase |
| System General Data                 |      |                                                                                                                                                                        |             |
| Weight                              | kg   | 155                                                                                                                                                                    |             |
| Stack Dimensions                    | mm   | 880 × 300 × 483 (W x H x D)                                                                                                                                            |             |
| Mounting                            |      | Floor                                                                                                                                                                  |             |
| Max. Stackbale Amount               |      | 5                                                                                                                                                                      |             |
| Ambient Operating Temperature Range | °C   | -30 to 55                                                                                                                                                              |             |
| Optimum Operating Temperature Range | °C   | 0 to 30                                                                                                                                                                |             |
| Storage Temperature                 | °C   | -30 to 60                                                                                                                                                              |             |
| Protection Class                    |      | I                                                                                                                                                                      |             |
| Ingress Rating                      |      | IP66                                                                                                                                                                   |             |
| Cooling                             |      | Intelligent Air Cooling                                                                                                                                                |             |
| Operating Humidity (RH)             | %    | 4 to 100, Condensing                                                                                                                                                   |             |
| Altitude                            | m    | Up to 3,000                                                                                                                                                            |             |
| Protection                          |      |                                                                                                                                                                        |             |
| AC Port Overvoltage Class           |      | III                                                                                                                                                                    |             |
| AC Surge Protection                 |      | TYPE II                                                                                                                                                                |             |
| Galvanic Isolation                  |      | YES                                                                                                                                                                    |             |
| Insulation Resistance Monitor       |      | YES                                                                                                                                                                    |             |
| Anti-Islanding Protection           |      | YES                                                                                                                                                                    |             |
| Standard Compliance                 |      |                                                                                                                                                                        |             |
| Compliance                          |      | UN38.3, IEC 62619, IEC 61000-6-1/-2/-3/-4, IEC 63056, IEC 62477-1, IEC 62040-1, VDE- AR-E 2510-50, ISO 13849, DIN VDEV0124-100, VDE-AR-N 4105/4110, EN 50549-1, AS4777 |             |

| Items                                              | Unit |  |  |  |  |  |
|----------------------------------------------------|------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Number of Battery Modules                          | pcs  | 1                                                                                    | 2                                                                                     | 3                                                                                     | 4                                                                                     | 5                                                                                     |
| Total Energy Capacity                              | kWh  | 16.08                                                                                | 32.16                                                                                 | 48.24                                                                                 | 64.32                                                                                 | 80.4                                                                                  |
| Rated Single-Phase Input and Output Apparent Power | kVA  | 6                                                                                    | 12                                                                                    | 13.8 <sup>e</sup>                                                                     | 13.8 <sup>e</sup>                                                                     | 13.8 <sup>e</sup>                                                                     |
| Max Single-Phase Output Apparent Power             | kVA  | 7                                                                                    | 13.8 <sup>e</sup>                                                                     | 13.8 <sup>e</sup>                                                                     | 13.8 <sup>e</sup>                                                                     | 13.8 <sup>e</sup>                                                                     |
| Rated Three-Phase Input and Output Apparent Power  | kVA  | 8                                                                                    | 16                                                                                    | 24                                                                                    | 32                                                                                    | 40                                                                                    |
| Max Three-Phase Output Apparent Power              | kVA  | 10                                                                                   | 20                                                                                    | 30                                                                                    | 40                                                                                    | 41.5                                                                                  |
| Total Weight                                       | kg   | 171.5                                                                                | 326.5                                                                                 | 481.5                                                                                 | 636.5                                                                                 | 791.5                                                                                 |
| Total Height                                       | mm   | 470                                                                                  | 770                                                                                   | 1070                                                                                  | 1370                                                                                  | 1670                                                                                  |
| Total Width                                        | mm   | 880                                                                                  |                                                                                       |                                                                                       | 1370                                                                                  |                                                                                       |
| Total Depth                                        | mm   | 483                                                                                  |                                                                                       |                                                                                       |                                                                                       |                                                                                       |

a. MS-SCU-RES-U: Stack Control Unit (SCU) Cap & Base Kit of M-ELV BattBank for Residential Application.  
b. MS-16K-U: 16 kWh M-ELV BattBank.  
c. Measured under the following conditions: Single battery pack charged and discharged at a constant power of 5 kW at ambient temperature.  
d. Measured under the following conditions: Single battery pack charged and discharged at a constant power of 0.2C.  
e. Limited by the maximum output current of 63 A at AC output port

# Appendix 1: Terms and Abbreviations

|         |                                  |
|---------|----------------------------------|
| AC      | Alternating current              |
| APP     | Application                      |
| .....   |                                  |
| AI      | Analog input                     |
| AI mode | Artificial Intelligence Mode     |
| .....   |                                  |
| DC      | Direct current                   |
| DI      | Digital input                    |
| DO      | Digital output                   |
| .....   |                                  |
| NTC     | Negative temperature coefficient |
| DN_S    | Emergency stop                   |
| .....   |                                  |
| EMS     | Energy management system         |
| SCU     | Stack Control Unit               |
| .....   |                                  |
| PE      | Protective earthing              |
| .....   |                                  |

# Appendix 2: M-ELV BattBank Layout Requirements

Front View

Load-Bearing Capacity Table for per M-ELV BattBank

|                          |                       |                       |                       |                       |                       |
|--------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Pack Stacking Quantity   | 1                     | 2                     | 3                     | 4                     | 5                     |
| Foundation Load Capacity | 1500kg/m <sup>2</sup> | 1500kg/m <sup>2</sup> | 2500kg/m <sup>2</sup> | 2500kg/m <sup>2</sup> | 2500kg/m <sup>2</sup> |

Note:

1. The installation base should be flat, and the installation area should meet the installation space requirements.
2. No plumbing or electrical alignments should be inside the installation base to avoid potential drilling hazards during equipment installation.
3. minimum overhead clearance of 300 mm shall be reserved on the top.
4. Minimum foundation thickness: 200 mm.
5. The lateral spacing between adjacent BattBanks is 350 ~450mm.
6. The clearance between the outer edge of the battery bank and foundation boundary shall be minimum 100 mm.
7. Where a wall exists at the rear side, the back clearance shall be more than 100 mm.
8. For multi-row arrangement, the row-to-row clearance shall be determined in accordance with actual on-site maintenance aisle requirements, with a minimum distance of 350 mm.
9. When installed back-to-back, no mandatory clearance is required.M-ELV BattBank may be placed in direct contact.
10. Foundation concrete shall merely meet the bearing capacity specified in the table.

Detailed construction works shall conform to site conditions and local codes.

11. Prior to your installation, select the mounting location in strict accordance with your local building, fire protection, environmental protection regulations and specifications, including but not limited to GB 51048 Design Code for Electrochemical Energy Storage Station, GB 50016 Code for Fire Protection Design of Buildings, and NFPA 855 Standard for the Installation of Stationary Energy Storage Systems. The final planning of the mounting location should be determined by the installer or EPC (Engineering, Procurement, Construction).

Single-row/Wall Mounting Space (top view)

Row-to-row mounting Space (top view)

Back-to-back Mounting Space (top view)

TITLE: M-ELV BattBank Layout Requirements

# ATMOCE

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