

# HTD Series 10–40 kVA Intelligent Tower UPS User Manual



# Preface

## Overview

Thank you for purchasing the INVT HTD series 10–40 kVA intelligent tower uninterruptible power supply (UPS). (Unless otherwise specified in this manual, "UPS" refers to the HTD series 10–40 kVA intelligent tower UPS.)

This manual primarily covers the safety precautions, product overview, models, electrical installation, control, and operation of the HTD series 10–40 kVA intelligent tower UPS. Read the manual carefully before installing and using the UPS.

## Readers

Personnel with professional electrical knowledge (such as qualified electrical engineers or personnel with equivalent knowledge).

## Change history

The manual is subject to change irregularly due to product version upgrades or other reasons.

| Version | Release date | Change description                                                                                                                           |
|---------|--------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| V2.0    | August 2026  | <ul style="list-style-type: none"><li>● Updated chapter 1 Safety precautions.</li><li>● Updated the figures throughout the manual.</li></ul> |
| V1.0    | May 2026     | First release.                                                                                                                               |

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# 1 Safety precautions

## 1.1 Safety level definition

This manual uses the following safety symbols to classify risk levels, defined as follows:

| Safety level                                                                                     | Description                                                                                                 |
|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
|  <b>DANGER</b>  | Indicates a high-risk hazardous situation which, if not avoided, will result in death or serious injury.    |
|  <b>WARNING</b> | Indicates a medium-risk hazardous situation which, if not avoided, could result in death or serious injury. |
|  <b>CAUTION</b> | Indicates a low-risk hazardous situation which, if not avoided, could result in minor or moderate injury.   |

## 1.2 Symbol description

This manual uses the following symbols, defined as follows:

| Symbol                                                                                   | Description                                                                                    |
|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
|        | Electric shock hazard. Indicates a risk of electric shock.                                     |
|       | Alerts to potential personal injury hazards.                                                   |
|  Note | Not a safety alert message. Used to highlight, emphasize, or supplement important information. |

## 1.3 Safety statement

### 1.3.1 Personnel requirements

- UPS installation, operation, repair, and maintenance must be performed by qualified professionals.
- These professionals must meet the following requirements:
  - Possess basic electrical knowledge and be familiar with the UPS operating principles and structure.
  - Have relevant experience in installing and operating the UPS.
  - Have received systematic safety training to identify hazards and take appropriate measures.
  - Be capable of recognizing and avoiding associated hazards.
- The UPS (including batteries) must be inspected, installed, and maintained by skilled personnel.
- Specialized tasks, such as electrical work, working at heights, or operating special equipment, must be performed by licensed or certified personnel in accordance with local laws and regulations.
- Replacement of the UPS or its components (including software) must be performed by authorized professionals.

### 1.3.2 Preparation before operation

- Before installing, operating, repairing, or maintaining the equipment, carefully read the safety precautions and operating instructions in this manual.

- Be familiar with the relevant equipment and read all safety precautions marked on the equipment.
- When installing, operating, or maintaining the equipment, comply with local laws, regulations, and codes.
- The "DANGER", "WARNING", and "CAUTION" statements in this manual do not cover all safety precautions to be followed. All applicable international, national, and local standards and codes must also be followed.
- During all operations, including transportation, storage, installation, operation, use, and maintenance, comply with applicable laws, regulations, standards, and codes.

### 1.3.3 Liability statement

Any equipment failure, component damage, personal injury, or property and economic loss resulting from failure to follow the safety operating guidelines in this manual, or failure to comply with the applicable safety standards for equipment design, manufacture, and usage, is not covered by the product warranty. The company assumes no liability for compensation or joint and several liability for such consequences.

The manufacturer shall not be liable for any damages or consequences arising from the following circumstances:

- **Force majeure and natural disasters**
  - Natural disasters such as earthquakes, tsunamis, floods, volcanic eruptions, mudslides, lightning strikes, fires, typhoons, hurricanes, or tornadoes.
  - Social disturbances such as wars, armed conflicts, riots, or terrorist attacks.
  - Other unforeseeable, unavoidable, and insurmountable force majeure factors.
- **Improper use and unauthorized actions**
  - Operation of the equipment beyond the conditions specified in the product technical specifications or manual.
  - Installation or operation of the equipment in an environment that fails to meet applicable international, national, or industry safety standards.
  - Installation, wiring, commissioning, or maintenance of the equipment by personnel without appropriate qualifications or professional training.
  - Failure to follow the operating instructions, safety warnings, and precautions marked on the product or provided in the accompanying documentation.
  - Disassembly or modification of the product's hardware structure without written permission from the manufacturer.
  - Unauthorized modification of or tampering with the equipment's firmware or software code.
  - Use of non-original or uncertified spare parts, accessories, or replacement parts.
- **Transportation and storage**
  - Equipment damage caused during customer-arranged transportation or transportation by third-party logistics providers.
  - Equipment storage in an environment where the temperature, humidity, dust protection, moisture protection, or other conditions fail to meet the technical specifications specified in the product documentation.
- **Other causes not attributable to the manufacturer**
  - Accidents caused by operator negligence, intentional misconduct, gross negligence, or incorrect operation.

- Damage caused by factors beyond the manufacturer's control (such as power grid fluctuations, external electromagnetic interference, or impact from other equipment failures).

## 1.4 Personal safety

### 1.4.1 Basic safety



#### DANGER

- **Do not install or remove cables while energized:** The moment the cable core contacts a conductor, it can generate electric arcs or sparks, potentially causing fire or personal injury.
- **Do not wear metal jewelry:** Remove all conductive items such as watches, bracelets, rings, or necklaces during equipment operation to prevent electric shock and burns.
- **Use dedicated insulated tools:** To prevent electric shock or short circuits, the insulation voltage rating must comply with local laws, regulations, standards, and codes.



#### WARNING

- **Wear dedicated personal protective equipment (PPE):** Such as protective clothing, insulated shoes, safety goggles, hard hats, and insulated gloves.

### 1.4.2 Operating requirements

- The equipment must be installed, operated, and maintained by qualified professionals.
- Do not disable equipment protective devices or ignore the warnings, cautions, and precautions in the manual and on the equipment.
- Do not directly touch energized equipment: It is prohibited to touch energized equipment directly, by bridging with conductive materials, or indirectly via damp objects.
- Before touching any conductor surface or terminal, measure the voltage at the contact point to verify there is no risk of electric shock.
- Do not insert fingers or tools into running fans to prevent equipment damage or personal injury.
- Do not allow fingers, components, screws, tools, or boards to come into contact with running fans.

## 1.5 Equipment safety

### 1.5.1 UPS safety

 **Note:** This UPS is a Category C3 product. In a residential environment, it may cause radio interference, in which case additional measures must be taken.

- Ensure that the climatic conditions, temperature, humidity, and altitude of the deployment site comply with the technical requirements of the equipment.
- Avoid deploying the equipment in open or semi-open areas within 0 to 3.7 km of a coastline, as the high salt mist concentration in these areas will accelerate equipment corrosion.
- The UPS is also not suitable for use in locations where temperature and humidity cannot be precisely controlled, including but not limited to temporary prefabricated buildings, residential buildings, open garages, public corridors, cabinets without enclosed air ducts, structures without wall enclosure, station platforms, sports stadiums, and aquariums.

- After unpacking, power on and operate the equipment as soon as possible to prevent components from becoming damp or oxidized due to long-term exposed storage.
- Prohibited application scenario: Do not use regenerative loads that can feed energy back into the UPS.
- This product is intended for commercial and industrial power supply applications and must not be used as the power supply for medical life-support systems or systems intended to protect human life.
- For critical power supply applications that support national economic operations or public safety, including national data centers, disaster emergency command centers, rail transit signaling control hubs, air traffic control towers, airport operations centers, and securities and futures trading and clearing platforms, it is recommended to adopt a TIA-942 Tier 3 or Tier 4 power distribution topology. In such a topology, critical loads are supplied through 2 independent power paths, so that a failure of one path does not affect normal load operation.
- The upstream power supply system must comply with the electric shock protection clauses in IEC 60364-4-41.
- It is not recommended to use circuit breakers with residual current protection (RCD) in the distribution circuit, as leakage current produced during normal UPS operation may cause nuisance tripping.
- When the RMS phase voltage of the input utility exceeds 320 VAC, internal power devices are at risk of breakdown, which may result in equipment damage.

### 1.5.2 Battery safety



#### DANGER

- Battery installation, wiring, testing, and replacement must only be performed by qualified professionals with relevant electrical and battery expertise.
- Unqualified personnel are prohibited from operating or handling the batteries.
- Follow the battery documentation for all wiring, installation, and removal.
- Always disconnect power to the charging circuit before connecting or disconnecting any cables.
- Do not short the positive and negative terminals of a single battery or the battery string, as this will cause a short circuit.
- Do not dispose of batteries in a fire, as this may cause an explosion.
- Do not disassemble, modify, or damage the batteries.
- Keep the battery string away from heat sources, such as direct sunlight, open flames, power transformers, and electric heaters.
- Do not subject batteries to severe vibration, drops from a height, impact by hard objects, puncture by sharp objects, or crushing, as this may cause internal short circuits, thermal runaway, or even fire.



#### WARNING

- Remove all metal jewelry, such as watches, rings, and bracelets, before performing any operation.
- Use only dedicated electrical tools with insulated handles.
- Wear all required PPE, including safety goggles, acid- and alkali-resistant rubber gloves, a respirator, and insulated rubber boots or a full set of insulating protective clothing.
- Never place metal tools, fasteners, or other conductive objects on battery cases or terminals.
- Inspect the batteries upon delivery. Do not install any battery with damaged packaging, oxidized/corroded terminals, or a cracked, bulged, or leaking case.
- Use batteries of the same brand, model, and quantity within a single string and across parallel strings.
- Mixing batteries of different specifications or different states of aging may cause charge/discharge imbalance, posing safety risks such as fire due to overcharge or explosion due to overdischarge.

- 
- Tighten all battery connections (bolts, copper bars, and cable terminals) to the specified torque.
  - Recharge the battery string immediately after discharging. Prolonged storage in a depleted state will damage the batteries.
  - Ensure the UPS charging circuit parameters match the battery string specifications. Contact technical support if you have any questions.
  - The electrolyte is highly corrosive and toxic. Promptly absorb and neutralize any spilled electrolyte.
  - Beware of hazards posed by electrolyte.
  - Lead-acid batteries continuously release a mixture of hydrogen and oxygen during charging. Keep the battery installation area well ventilated and take proper fire prevention measures to prevent fire.
- 

## 1.6 Electrical safety



### DANGER

- 
- Only qualified personnel may install, operate, repair, and maintain the equipment.
  - Before touching any internal conductive parts, check for hazardous voltages between all terminals, including protective earth (PE).
  - Internal capacitors may retain hazardous voltage even after disconnecting the AC utility and batteries. Wait at least 5 minutes after disconnecting all power sources to allow the capacitors to discharge before opening the equipment enclosure.
  - Install a disconnect device (such as a circuit breaker or disconnect switch) in the upstream distribution circuit to ensure reliable electrical isolation from the utility.
  - The UPS must be properly grounded. Always connect the PE conductor first as the UPS has a high leakage current.
- 



### DANGER

- 
- Backfeed protection is not included in the standard system configuration. Install an automatic disconnect device equipped with a trip function, such as a circuit breaker, disconnect switch, contactor, or other device compliant with the applicable local standards, to prevent hazardous voltage or energy from being present at the input of the disconnect device.
- 

## 1.7 Operation and maintenance safety

### 1.7.1 Operation safety



### DANGER

- 
- Do not energize the equipment until the installation is complete and verified by qualified personnel.
  - Do not touch any terminals or components while the equipment is operating.
-

## 1.7.2 Maintenance safety



- Use dedicated insulated tools during operation.
  - Use dedicated PPE during operation.
  - Only qualified personnel may remove protective devices and maintain the equipment.
- 

## 1.8 Transportation and storage requirements

### 1.8.1 Transportation requirements

- Transport damage caused by the customer is not covered by the warranty.
- Comply with all applicable laws, regulations, and standards during transportation.
- Ensure the battery packaging remains intact during transport. Always orient the batteries according to the labels; improper placement is strictly prohibited.

### 1.8.2 Storage requirements

- Store the equipment under conditions that meet the specified temperature and humidity requirements.
- Do not store batteries for more than 3 months. If this period is exceeded, recharge the batteries according to the maintenance charging requirements.
- Avoid impacts or drops during storage and transit.

## 2 Product overview

### 2.1 Product introduction

The HTD series intelligent tower UPS (10–40 kVA) adopts a double-conversion online design with 3-phase input and 3-phase output, based on full digital DSP control. It provides stable, uninterrupted power for critical loads, eliminating utility power disturbances such as surges, voltage spikes, sags, line noise, and frequency deviations. With high efficiency and power density, it ensures a reliable and robust power supply, thus becoming a preferred choice for small- and medium-sized data centers, telecom base stations, and financial institutions.

### 2.2 Product models and configurations

Table 2-1 lists the models of the HTD series 10–40 kVA intelligent tower UPS.

Table 2-1 Product models

| Rating | Model     | Remarks                |
|--------|-----------|------------------------|
| 10 kVA | HT33010DL | 3-phase input & output |
| 15 kVA | HT33015DL | 3-phase input & output |
| 20 kVA | HT33020DL | 3-phase input & output |
| 30 kVA | HT33030DL | 3-phase input & output |
| 40 kVA | HT33040DL | 3-phase input & output |

Table 2-2 lists the UPS configurations.

Table 2-2 UPS configurations

| Name                                      | Quantity | Remarks                                      |
|-------------------------------------------|----------|----------------------------------------------|
| Disconnect device                         | 4        | Standard configuration                       |
| Copper bar for common input configuration | 4        | Standard configuration                       |
| Dry contact card                          | 1        | Standard configuration, 4 inputs & 4 outputs |
| Parallel card                             | 1        | Standard configuration                       |
| Cold start                                | 1        | Optional                                     |
| SNMP card                                 | 1        | Optional                                     |
| AS400 card                                | 1        | Optional                                     |
| Parallel cable                            | 1        | Optional                                     |
| NTC cable                                 | 1        | Optional                                     |
| USB cable                                 | 1        | Optional                                     |



## 2.3 Product specifications

| Item       |                                                                                                                                                                                                           | Specification                                                                                                                                                                                                                                                                                                                                 |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Main input | Input wiring                                                                                                                                                                                              | 3Ph+N+PE 3P5W                                                                                                                                                                                                                                                                                                                                 |
|            | Rated input voltage                                                                                                                                                                                       | 380/400/415 VAC                                                                                                                                                                                                                                                                                                                               |
|            | Rated frequency                                                                                                                                                                                           | 50/60 Hz                                                                                                                                                                                                                                                                                                                                      |
|            | Input voltage range                                                                                                                                                                                       | 304–477 VAC (L-L) @ full load<br>304–228 VAC (L-L), with linear derating from 100% to 75% load                                                                                                                                                                                                                                                |
|            | Input frequency range                                                                                                                                                                                     | 40–70 Hz                                                                                                                                                                                                                                                                                                                                      |
|            | Input power factor (PF)                                                                                                                                                                                   | > 0.99                                                                                                                                                                                                                                                                                                                                        |
|            | Total harmonic distortion of current (THDi)                                                                                                                                                               | < 3%                                                                                                                                                                                                                                                                                                                                          |
| Battery    | Battery rated voltage                                                                                                                                                                                     | 288–480 VDC                                                                                                                                                                                                                                                                                                                                   |
|            | Number of batteries                                                                                                                                                                                       | 24–40 batteries<br>(12 V per battery; derating applies for 24–30 batteries. See Table 4-10 for derating factors.)                                                                                                                                                                                                                             |
|            | Float charge voltage                                                                                                                                                                                      | 2.25 V/cell (setting range: 2.10–2.35 V/cell)<br>Constant-current and constant-voltage charging                                                                                                                                                                                                                                               |
|            | Boost voltage                                                                                                                                                                                             | 2.25 V/cell (setting range: 2.20–2.45 V/cell)<br>Constant-current and constant-voltage charging                                                                                                                                                                                                                                               |
|            | Temperature compensation                                                                                                                                                                                  | 0–5 mV/°C (default: 0 mV/°C) @ 15 °C ≤ T ≤ 25 °C<br>–5–0 mV/°C (default: 0 mV/°C) @ 25 °C ≤ T ≤ 35 °C<br> <b>Note:</b> For temperatures below 15 °C or above 35 °C, the compensation values at 15 °C and 35 °C apply, respectively.                        |
|            | Ripple voltage                                                                                                                                                                                            | ±1%                                                                                                                                                                                                                                                                                                                                           |
|            | Ripple current                                                                                                                                                                                            | < 5% C10                                                                                                                                                                                                                                                                                                                                      |
|            | End of discharge (EOD) voltage                                                                                                                                                                            | 1.65 V/cell (setting range: 1.60–1.85 V/cell) @0.6C discharge current<br>1.75 V/cell (setting range: 1.65–1.90 V/cell) @0.15C discharge current<br> <b>Note:</b> The EOD voltage varies linearly within the setting ranges based on the discharge current. |
|            | Charging power                                                                                                                                                                                            | Default: 10%<br>(max. charge current: 7.4 A for 10–20 kVA; 14.8 A for 30–40 kVA)                                                                                                                                                                                                                                                              |
|            |  <b>Note:</b> This UPS supports lithium-ion batteries. Contact technical support for lithium-ion battery applications. |                                                                                                                                                                                                                                                                                                                                               |
| Output     | Output wiring                                                                                                                                                                                             | 3Ph+N+PE 3P5W                                                                                                                                                                                                                                                                                                                                 |
|            | Rated Output Voltage                                                                                                                                                                                      | 380/400/415 VAC                                                                                                                                                                                                                                                                                                                               |
|            | Rated Output Frequency                                                                                                                                                                                    | 50/60 Hz                                                                                                                                                                                                                                                                                                                                      |
|            | Frequency accuracy                                                                                                                                                                                        | 50/60 Hz ±0.1% (free-running)                                                                                                                                                                                                                                                                                                                 |
|            | Voltage accuracy                                                                                                                                                                                          | ±1.0% (balanced load)<br>±3.0% (unbalanced load)                                                                                                                                                                                                                                                                                              |
|            | Output Overload                                                                                                                                                                                           | ≤ 110% for 60 min<br>≤ 125% for 10 min<br>≤ 150% for 1 min<br>> 150% for > 200 ms                                                                                                                                                                                                                                                             |
|            | Slew rate                                                                                                                                                                                                 | Configurable: 0.1–2.0 Hz/s (default: 2.0 Hz/s)                                                                                                                                                                                                                                                                                                |

| Item                       |                                             | Specification                                                                                                    |
|----------------------------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------|
|                            | Output PF                                   | 1                                                                                                                |
|                            | Output dynamic response                     | < 5% (0%–100%–0% step load)                                                                                      |
|                            | Dynamic recovery time                       | < 20 ms (0%–100%–0% step load)                                                                                   |
|                            | Total harmonic distortion of voltage (THDu) | < 1%, 100% linear load; < 5%, 100% non-linear load                                                               |
|                            | Load crest factor                           | Max. 3:1                                                                                                         |
|                            | Load PF                                     | 0.7 leading to 0.7 lagging                                                                                       |
| Bypass                     | Bypass wiring                               | 3Ph+N+PE 3P5W                                                                                                    |
|                            | Rated bypass voltage                        | 380/400/415 VAC                                                                                                  |
|                            | Bypass voltage range                        | Upper limit: +10%, +15%, +20%, +25% (default: +15%)<br>Lower limit: -10%, -15%, -20%, -30%, -40% (default: -20%) |
|                            | Frequency                                   | 50/60 Hz                                                                                                         |
|                            | Synchronous transfer time                   | 0 ms                                                                                                             |
|                            | Bypass frequency range                      | Configurable: $\pm 1$ Hz, $\pm 3$ Hz, $\pm 5$ Hz (default: $\pm 3$ Hz)                                           |
| Efficiency                 | Overall efficiency                          | Normal mode (Double conversion): $\geq 96\%$<br>ECO mode: $\geq 99\%$                                            |
|                            | Battery discharge                           | Battery mode (at nominal voltage 480 VDC): $\geq 95.0\%$                                                         |
| Display & interfaces       | Display                                     | 5-inch color LCD touchscreen + LED indicators                                                                    |
|                            | Communication interfaces                    | USB, RS485, CAN, parallel interface, dry contacts, intelligent slot                                              |
| Environment & compliance   | Noise level (@ 1 m)                         | 10–20 kVA: < 60 dB<br>30–40 kVA: < 65 dB                                                                         |
|                            | Altitude                                    | $\leq 1000$ m: no derating<br>1000–2000 m: derate by 1% for every increase of 100 m                              |
|                            | Relative humidity                           | 0–95% RH, no condensation                                                                                        |
|                            | Operating temperature                       | 0–50 °C (Derate to 70% within 40–50 °C)                                                                          |
|                            | Storage temperature                         | -25–+55 °C (excluding batteries)                                                                                 |
|                            | Recommended battery storage temperature     | -20–+30 °C (20 °C is optimal)                                                                                    |
|                            | IP rating                                   | IP20                                                                                                             |
|                            | Pollution degree                            | PD2                                                                                                              |
|                            | Safety standard                             | IEC 62040-1                                                                                                      |
|                            | EMC                                         | IEC 62040-2                                                                                                      |
|                            | Performance                                 | TLC: YD/T 1095-2018                                                                                              |
|                            | Overvoltage category                        | OVC III                                                                                                          |
|                            | Protection class                            | Class I                                                                                                          |
| Mechanical characteristics | Color                                       | Black (RAL 9004)                                                                                                 |

## 2.4 Product weight

Table 2-3 Product weight

| Model     | Net weight (kg) | Gross weight (kg) |
|-----------|-----------------|-------------------|
| HT33010DL | 38              | 49                |
| HT33015DL | 38              | 49                |
| HT33020DL | 38              | 49                |
| HT33030DL | 55              | 67                |
| HT33040DL | 59              | 71                |

## 2.5 Product dimensions

Table 2-4 Product dimensions

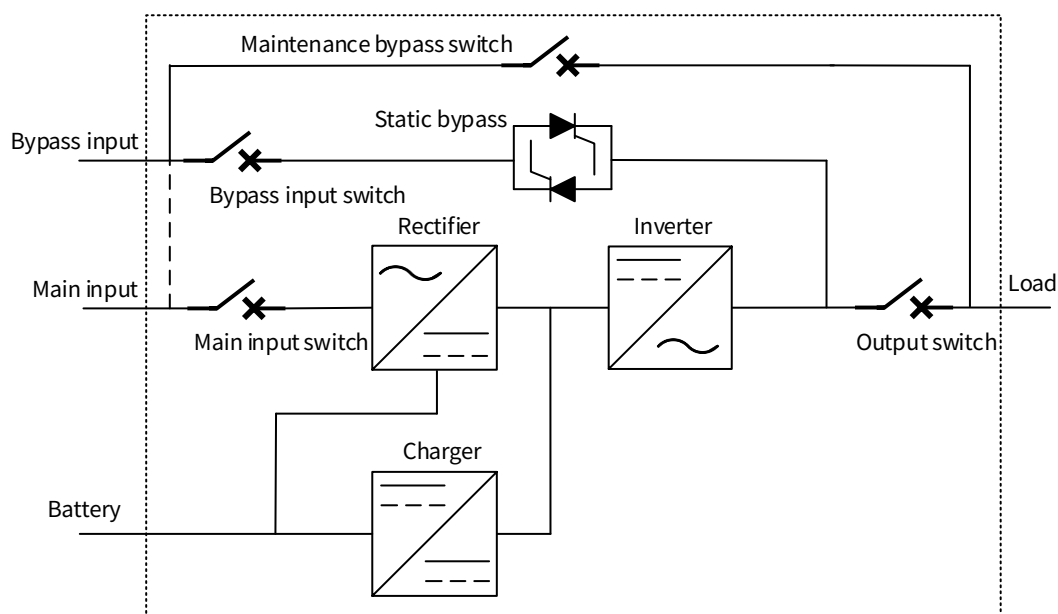
| Model     | Dimensions with packaging<br>(W × H × D) | Dimensions<br>(W × H × D) |
|-----------|------------------------------------------|---------------------------|
| HT33010DL | 370 mm × 807 mm × 770 mm                 | 250 mm × 629 mm × 663 mm  |
| HT33015DL |                                          |                           |
| HT33020DL |                                          |                           |
| HT33030DL | 370 mm × 955 mm × 976 mm                 | 250 mm × 799 mm × 919 mm  |
| HT33040DL |                                          |                           |

## 2.6 Product configuration

The HTD series 10–40 kVA intelligent tower UPS system mainly consists of the main power conversion circuit, static bypass switch, main input switch, bypass input switch, maintenance bypass switch, output switch, and external battery string. The configuration is shown in Figure 2-1. The components inside the dashed box form a simplified diagram of the UPS system configuration.

The UPS incorporates a main conversion circuit and a static bypass. The main conversion circuit consists of the rectifier (AC/DC), inverter (DC/AC), and charger (DC/DC). The utility power can directly supply the load through the bypass static switch. For internal UPS maintenance, the maintenance bypass switch can be used to ensure an uninterrupted power supply to the load.

Figure 2-1 Product configuration



## 2.7 Product structure

Figure 2-2 shows the appearance and structure of the UPS.

Figure 2-2 Product structure (Left: 10–20 kVA models; Right: 30–40 kVA models)

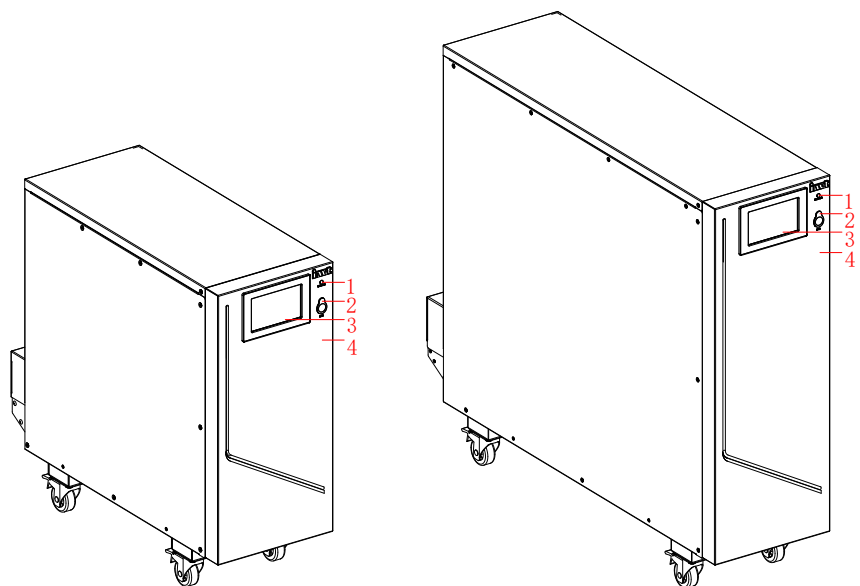


Table 2-5 Front panel layout description

| No. | Name             | No. | Name                   |
|-----|------------------|-----|------------------------|
| 1   | Status indicator | 3   | 5-inch LCD touchscreen |
| 2   | EPO button       | 4   | Front panel            |

The standard switches, wiring terminals, and communication interfaces for this series are all located at the rear of the product, as shown in Figure 2-3.

Figure 2-3 Rear layout (Left: 10–20 kVA models; Right: 30–40 kVA models)

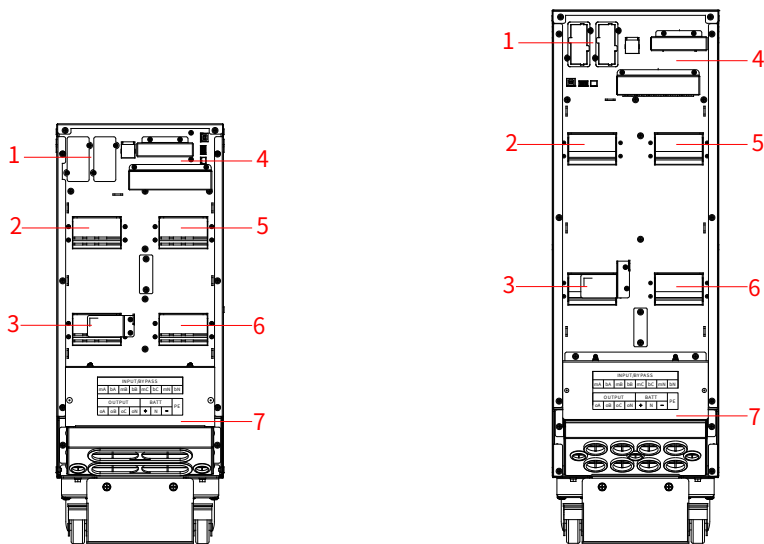


Table 2-6 Rear layout description

| No. | Name                                      | No. | Name                |
|-----|-------------------------------------------|-----|---------------------|
| 1   | Intelligent slot                          | 5   | Main input switch   |
| 2   | Output switch                             | 6   | Bypass input switch |
| 3   | Maintenance bypass switch                 | 7   | Wiring terminals    |
| 4   | Dry contacts and communication interfaces | -   | -                   |

## 2.8 Operating modes

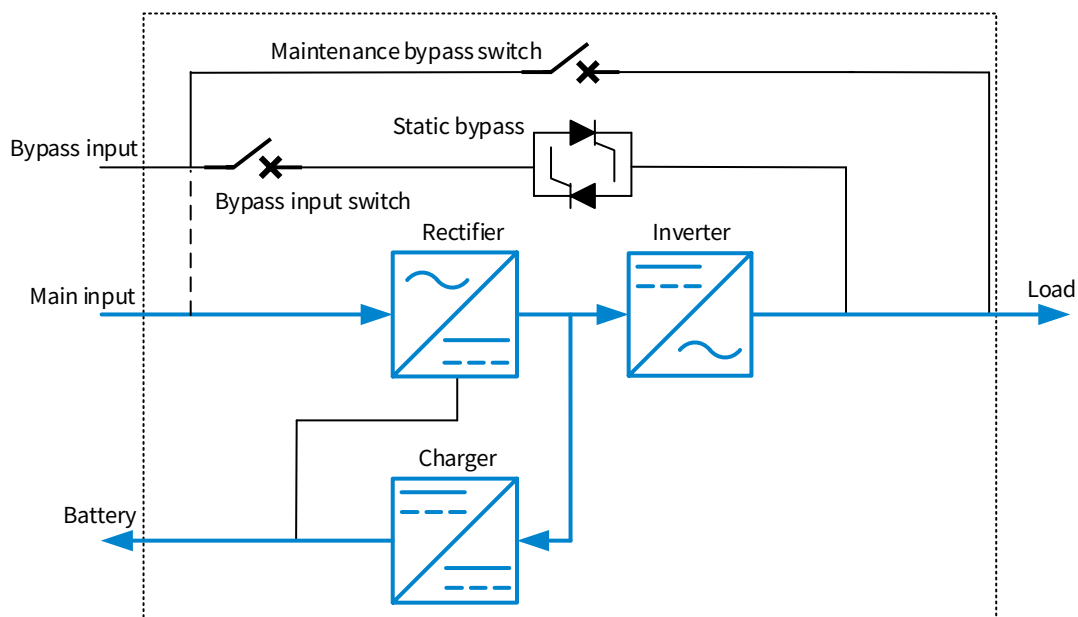
The UPS system adopts an online double-conversion design. It can operate in various modes depending on the operating conditions, including normal mode, battery mode, bypass mode, maintenance bypass mode, ECO mode, automatic restart mode, and frequency converter mode.

**Note:** The arrows in the figures within this section indicate the direction of power flow.

### 2.8.1 Normal mode

In normal mode, the utility power is converted by the UPS rectifier and inverter to provide high-quality AC power to the load. Simultaneously, the charger charges the batteries as shown in Figure 2-4.

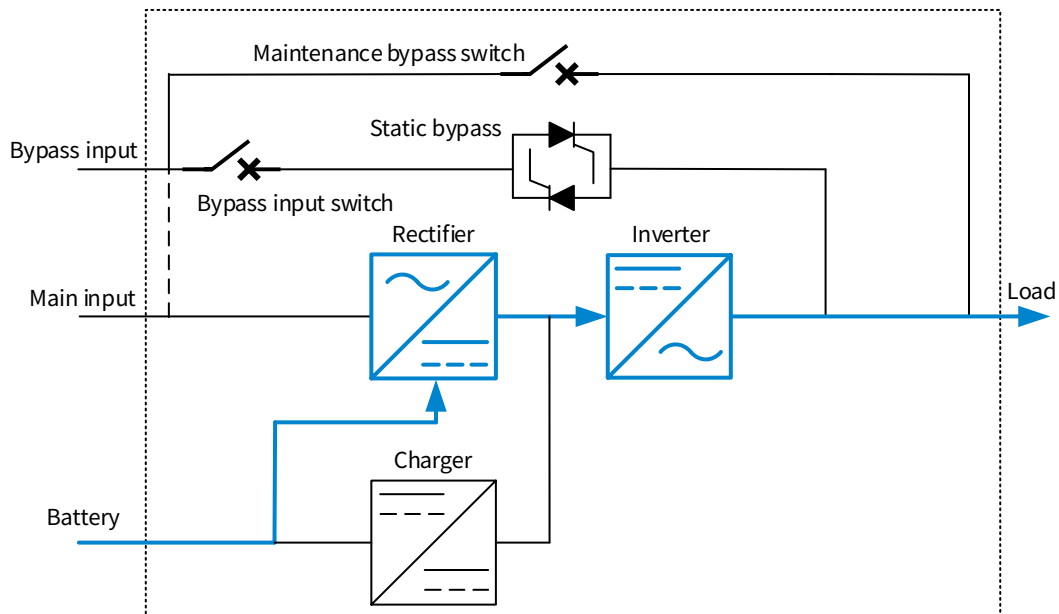
Figure 2-4 Normal mode



### 2.8.2 Battery mode

When the utility power fails or its voltage exceeds the acceptable range, the UPS automatically transfers to battery mode. The batteries supply power to the load through the rectifier and inverter, ensuring an uninterrupted power supply. When the utility power is restored, the UPS automatically transfers from battery mode back to normal mode, as shown in Figure 2-5.

Figure 2-5 Battery mode



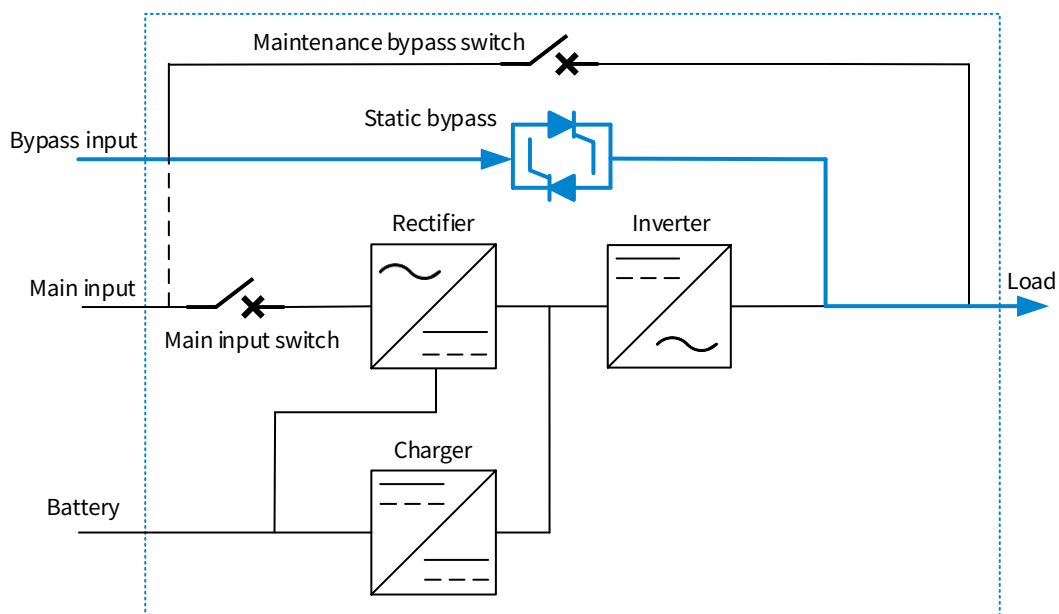
**Note:** The battery cold start function allows the UPS to be powered on directly from the batteries (if charged) without utility power. For details, see section 5.1.2 Starting the UPS in battery mode.

### 2.8.3 Bypass mode

After the system powers on, if the inverter is not started or is manually turned off, the load is supplied by the bypass. In normal mode, if an overload or another fault occurs that causes the inverter to turn off, the system automatically transfers to bypass mode. In bypass mode, utility power is supplied directly to the load through the bypass. Power to the load is not protected by the UPS and is susceptible to utility voltage or frequency fluctuations and power outages, as shown in Figure 2-6.

If the rectifier is functioning normally in bypass mode, the UPS simultaneously charges the batteries.

Figure 2-6 Bypass mode

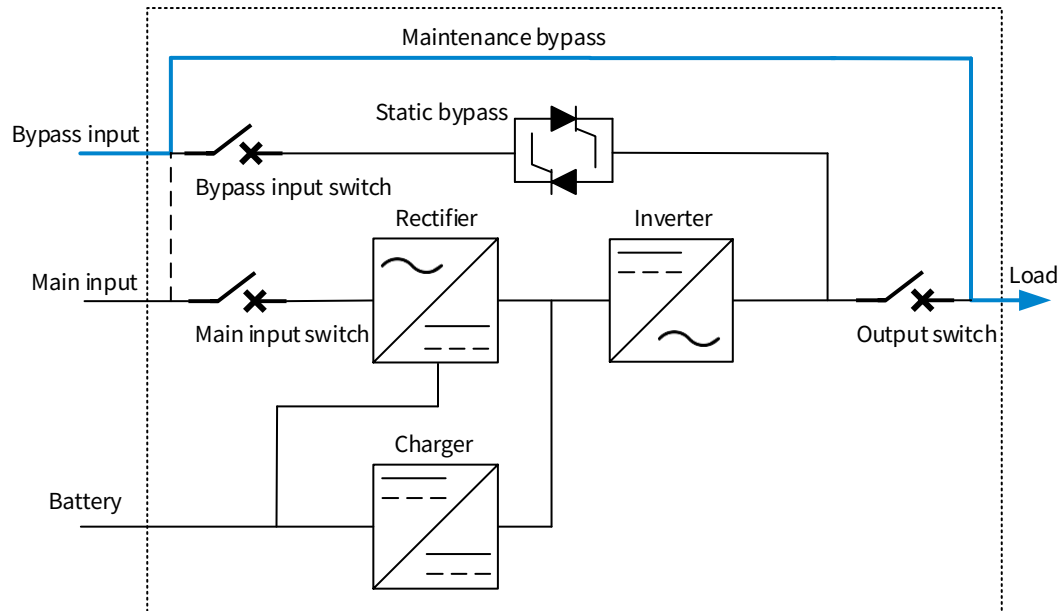


**Note:** In bypass mode, if utility power failure occurs or the utility voltage goes out of range, the UPS will shut down, and the output will be interrupted.

## 2.8.4 Maintenance bypass mode

When UPS maintenance or repair is required, the UPS can be transferred to maintenance bypass mode by following the steps in section 5.3.3 From normal mode to maintenance bypass mode. The load is supplied directly by the utility power through the maintenance bypass switch, enabling uninterrupted power to the load during maintenance, as shown in Figure 2-7.

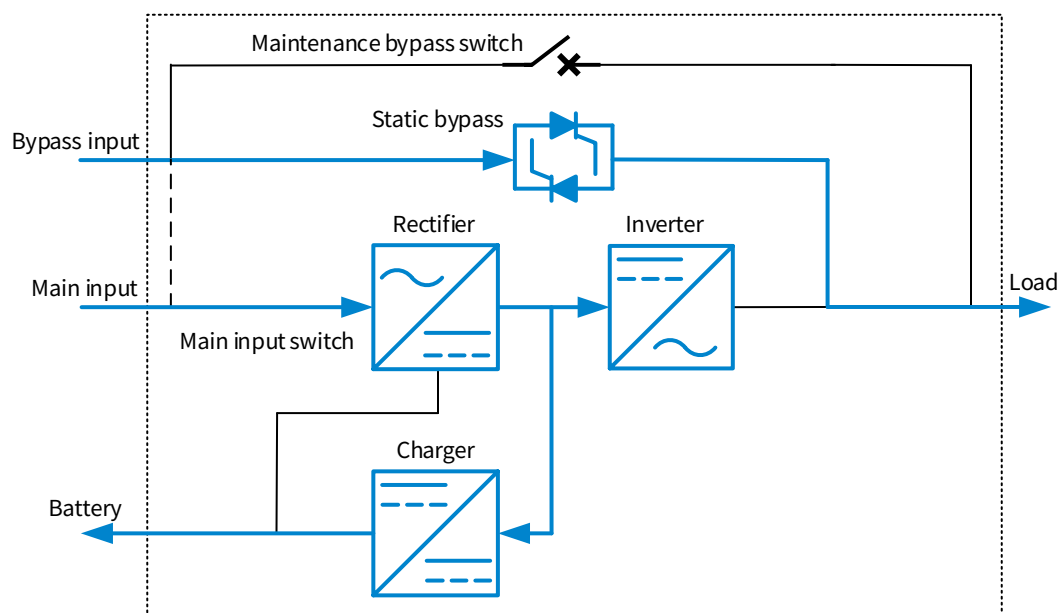
Figure 2-7 Maintenance bypass mode



## 2.8.5 ECO mode

ECO mode refers to the UPS economy mode, which can be set via the HMI interface or service software. When the system is set to ECO mode and the bypass input voltage is within the ECO input voltage range, the load is supplied directly through the static bypass switch while the inverter remains in standby mode. When the bypass input voltage falls outside the ECO input voltage range, the UPS transfers from bypass to inverter to supply the load. ECO mode is shown in Figure 2-8.

Figure 2-8 ECO mode



**Note:**

- In ECO mode, if a bypass power failure or abnormal bypass voltage occurs during an output overload, the UPS will not transfer to normal mode; instead, it will disable the bypass.
- In ECO mode, the UPS efficiency exceeds 99%.

## 2.8.6 Automatic restart mode

If the UPS shuts down after the batteries discharge to the EOD voltage, the UPS will automatically restart when utility power is restored.

**Note:** This requires the **System startup mode after EOD** in the section 4.4.6 SERVICE to be set to **Normal mode**.

## 2.8.7 Frequency converter mode

In frequency converter mode, the UPS provides a stable output frequency of 50 Hz or 60 Hz. In this mode, the bypass mode is disabled. The battery is optional (configured based on whether battery mode is required).

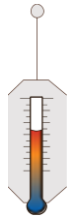


## 3 UPS installation

### 3.1 Installation preparation

#### 3.1.1 Installation environment and site

##### ■ Environmental requirements

| Environment | Requirement                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature |   | <ul style="list-style-type: none"> <li>• The normal operating temperature of the UPS is 0–40 °C.</li> <li>• The optimal operating temperature for batteries is 20–30 °C.</li> <li>• Operating in temperatures above 30 °C will reduce battery service life, while operating below 20 °C will reduce battery backup time.</li> <li>• No sudden temperature change.</li> <li>• When the UPS is installed in an enclosed space, such as a control cabinet, use a cooling fan or air conditioner to control the temperature if necessary.</li> <li>• At low ambient temperatures, if the UPS is powered up after a prolonged power-off period, add an external heating device to eliminate internal freezing. Failure to do so may result in equipment damage.</li> <li>• The UPS is designed for indoor installation and uses forced-air cooling with internal fans. Ensure sufficient clearance around the cabinet for proper ventilation and heat dissipation.</li> <li>• Batteries produce small amounts of hydrogen and oxygen near the end of charging. Provide adequate ventilation in accordance with EN 50272-2001.</li> </ul> |
| Altitude    |  | <ul style="list-style-type: none"> <li>• Maximum 2000 m (derating applies in accordance with IEC 62040-3 between 1000 m and 2000 m).</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Humidity    |  | <ul style="list-style-type: none"> <li>• Less than 95% RH, no condensation</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

##### ■ Site requirements

| Site   | Requirement                                                                         |                                                                                                                                                                                  |
|--------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Indoor |  | Free from sources of electromagnetic radiation and direct sunlight.<br><b>Note:</b> Install the UPS in a clean and well-ventilated environment based on the housing IP rating.   |
|        |  | Free from foreign matter such as oil mist, metal powder, conductive dust, and water.<br><b>Note:</b> Do not install the UPS in environments containing conductive metallic dust. |
|        |  | Free from radioactive, corrosive, hazardous, flammable, or explosive substances.<br><b>Note:</b> Do not install the UPS on a flammable surface.                                  |
|        |  | Low salinity.                                                                                                                                                                    |

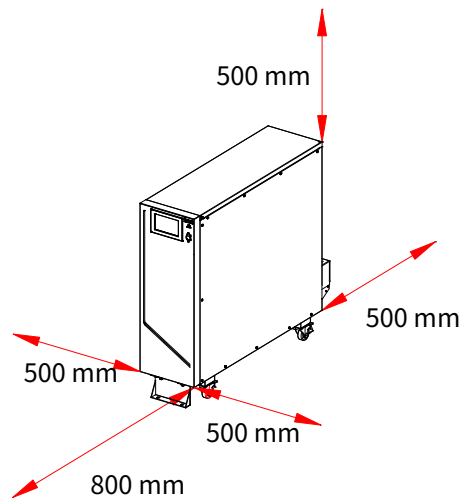
### 3.1.2 Installation space

Ensure that the floor or mounting platform can support the combined weight of the UPS, batteries, and battery racks. The site must be free from vibration and shock, with a tilt not exceeding 5°.

If immediate installation is not required, store the UPS indoors in an environment free from high humidity and excessive heat. Store batteries in a dry, cool, and well-ventilated environment. The optimal storage temperature is 20–25 °C. Batteries should not be stored for more than 3 months. Otherwise, supplementary charging is required.

The operating environment must comply with the requirements in section 2.3 Product specifications. Since the UPS uses forced air cooling for internal heat dissipation, reserve sufficient clearances to ensure adequate air circulation. The required installation clearances are shown in Figure 3-1.

Figure 3-1 Cabinet clearance requirements (unit: mm)

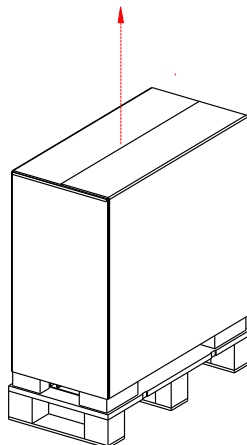


**Note:** A rear clearance of 500 mm is recommended. To ensure proper ventilation, the minimum rear clearance should be 150 mm.

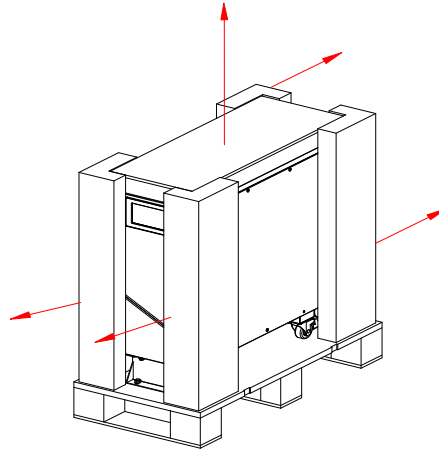
## 3.2 Transportation and unpacking

Follow these steps for moving and unpacking the UPS:

- Step 1 Before unpacking, inspect the external packaging for damage. (In case of any damage, immediately notify the shipping company.)
- Step 2 Use a forklift to move the equipment to the final installation area.
- Step 3 Cut the packing straps and lift the outer carton upward to remove it.



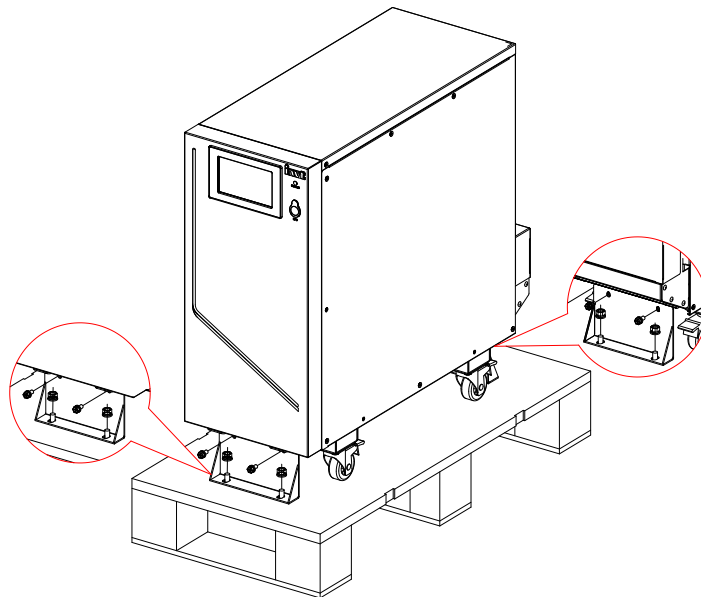
Step 4 Remove the cushioning paper and moisture-proof bag around the UPS.



Step 5 Inspect the UPS and check that all items are complete.

- After unpacking, inspect the UPS exterior for transportation damage. (In case of any damage, immediately notify the shipping company.)
- Check the supplied accessories against the packing list to verify that all required items are included and that their models are correct. If any items are missing or incorrect, record the issue at the site and contact the local supplier.

Step 6 Remove the front and rear shipping brackets from the UPS.



**Note:** Retain the removed shipping brackets, as they will be used to secure the UPS to the floor during installation.

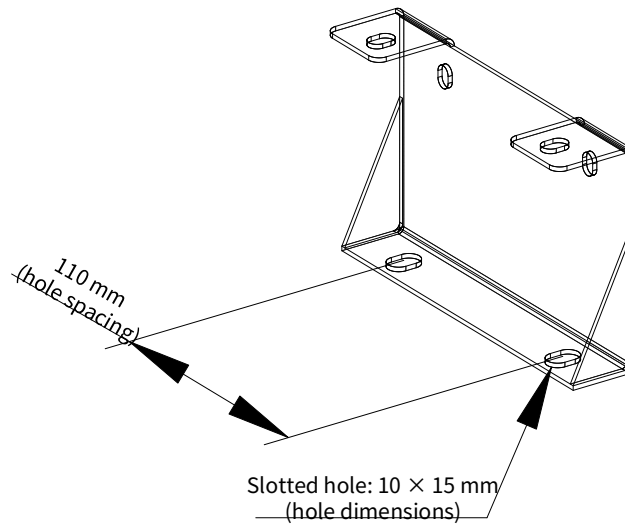
Step 7 Move the UPS from the pallet to the floor.

**Note:**

- Do not use excessive force when unpacking the equipment to avoid damage.
- After unpacking, dispose of all packaging materials in accordance with local environmental protection requirements.

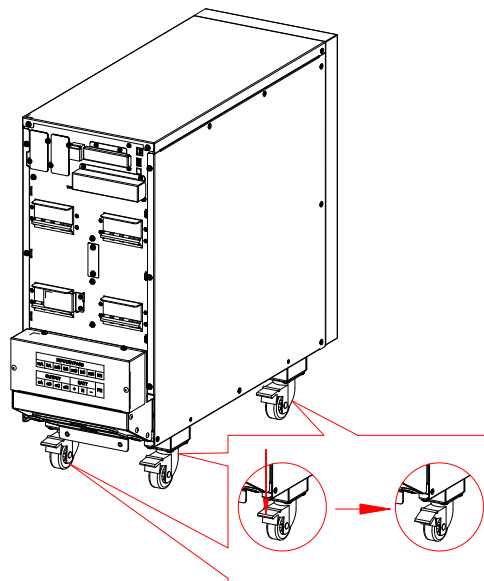
### 3.3 Mechanical installation

Step 1 Place the front or rear shipping bracket removed in Step 6 of section 3.2 Transportation and unpacking on the floor at the installation site to mark the fixing locations. (The figure below uses the front shipping bracket as an example.)

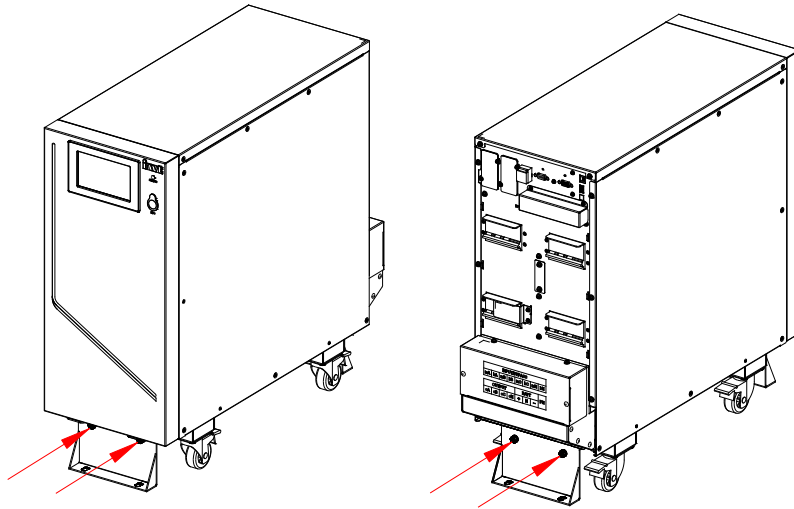


Step 2 Drill holes at the marked locations in accordance with national and local codes. The front or rear shipping bracket has Ø10 mm holes.

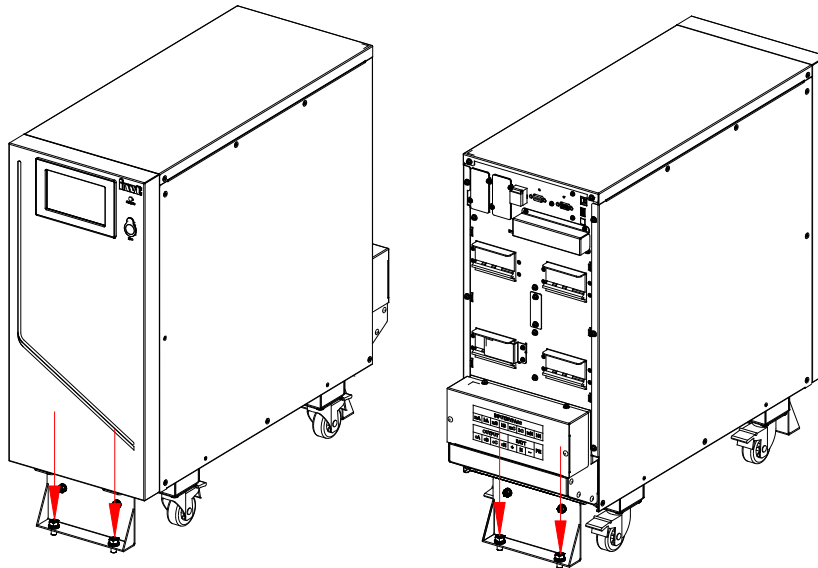
Step 3 Move the UPS into place and lock the casters.



Step 4 Reinstall the front or rear shipping bracket onto the UPS (only 1 shipping bracket is required).



Step 5 Select appropriate fasteners according to the floor type, and secure the front or rear shipping bracket to the floor through the holes (ø10 mm) drilled in Step 2. Use grade 8.8 M8 fasteners. (only 1 shipping bracket is required).



## 3.4 Electrical connection

### 3.4.1 Power cable preparation

#### **WARNING**

- All cable sizing, routing, and wiring must comply with applicable national and local electrical codes and mandatory standards.
- Do not exceed the maximum allowable cable cross-sectional area specified in this manual. Cables with an excessive cross-sectional area may cause terminal overheating, insulation failure, and short circuits.
- Heat-shrink tubing must be installed over the crimped area of each cable terminal. It must completely cover the crimped area and extend securely onto the cable insulation.

The cable recommendations in the following table are based on Tables B.52.3 and B.52.5 of IEC 60364-5-52 and apply only under the following conditions:

- Installation method: On a wall or floor (Method C in IEC 60364-5-52).
- Copper-conductor cables with a maximum operating temperature of 90 °C.
- Ambient temperature: 30 °C.
- The voltage drop in AC cables is less than 3%. For DC cables, the maximum cable length is 15 m and the voltage drop is less than 1%.

**Note:**

- If the installation method, ambient temperature, or other conditions change, verify the cable sizing according to IEC 60364-5-52 or local codes.
- The neutral conductor size accounts for a current multiplier of 1.5–1.7 under nonlinear load conditions.
- The PE conductor size is based on Table 54.2 of IEC 60364-5-54.

Table 3-1 Recommended power cable sizes

| Rated capacity    |                                           |           | 10 kVA |     |     | 15 kVA |     |     | 20 kVA |     |     |
|-------------------|-------------------------------------------|-----------|--------|-----|-----|--------|-----|-----|--------|-----|-----|
| Rated voltage (V) |                                           |           | 380    | 400 | 415 | 380    | 400 | 415 | 380    | 400 | 415 |
| Main input        | Max. current (A)                          |           | 21     | 20  | 19  | 31     | 29  | 28  | 41     | 39  | 38  |
|                   | Recommended cable size (mm <sup>2</sup> ) | Phase     | 6      | 6   | 6   | 6      | 6   | 6   | 10     | 10  | 10  |
|                   |                                           | N         | 6      | 6   | 6   | 6      | 6   | 6   | 10     | 10  | 10  |
|                   |                                           | PE        | 6      | 6   | 6   | 6      | 6   | 6   | 10     | 10  | 10  |
| Bypass input      | Max. current (A)                          |           | 16     | 15  | 15  | 24     | 22  | 22  | 31     | 30  | 29  |
|                   | Recommended cable size (mm <sup>2</sup> ) | Phase     | 6      | 6   | 6   | 6      | 6   | 6   | 10     | 10  | 10  |
|                   |                                           | N         | 6      | 6   | 6   | 6      | 6   | 6   | 16     | 16  | 16  |
|                   |                                           | PE        | 6      | 6   | 6   | 6      | 6   | 6   | 10     | 10  | 10  |
| Output            | Max. current (A)                          |           | 16     | 15  | 14  | 23     | 22  | 21  | 31     | 29  | 28  |
|                   | Recommended cable size (mm <sup>2</sup> ) | Phase     | 6      | 6   | 6   | 6      | 6   | 6   | 10     | 10  | 10  |
|                   |                                           | N         | 6      | 6   | 6   | 6      | 6   | 6   | 16     | 16  | 16  |
|                   |                                           | PE        | 6      | 6   | 6   | 6      | 6   | 6   | 10     | 10  | 10  |
| Battery input     | Nominal discharge current (A)             |           | 27     |     |     | 41     |     |     | 55     |     |     |
|                   | Max. discharge current (A)                |           | 34     |     |     | 51     |     |     | 68     |     |     |
|                   | Recommended cable size (mm <sup>2</sup> ) | DC+ /- /N | 6      | 6   | 6   | 6      | 6   | 6   | 16     | 16  | 16  |
|                   |                                           | PE        | 6      | 6   | 6   | 6      | 6   | 6   | 16     | 16  | 16  |

| Rated capacity    |                                           |           | 30 kVA |     |     | 40 kVA |     |     |
|-------------------|-------------------------------------------|-----------|--------|-----|-----|--------|-----|-----|
| Rated voltage (V) |                                           |           | 380    | 400 | 415 | 380    | 400 | 415 |
| Main input        | Max. current (A)                          |           | 60     | 57  | 55  | 81     | 77  | 74  |
|                   | Recommended cable size (mm <sup>2</sup> ) | Phase     | 16     | 16  | 16  | 25     | 25  | 25  |
|                   |                                           | N         | 16     | 16  | 16  | 25     | 25  | 25  |
|                   |                                           | PE        | 16     | 16  | 16  | 16     | 16  | 16  |
| Bypass input      | Max. current (A)                          |           | 47     | 44  | 43  | 62     | 59  | 57  |
|                   | Recommended cable size (mm <sup>2</sup> ) | Phase     | 16     | 16  | 16  | 25     | 25  | 25  |
|                   |                                           | N         | 25     | 25  | 25  | 35     | 35  | 35  |
|                   |                                           | PE        | 16     | 16  | 16  | 16     | 16  | 16  |
| Output            | Max. current (A)                          |           | 46     | 44  | 42  | 61     | 58  | 56  |
|                   | Recommended cable size (mm <sup>2</sup> ) | Phase     | 16     | 16  | 16  | 25     | 25  | 25  |
|                   |                                           | N         | 25     | 25  | 25  | 35     | 35  | 35  |
|                   |                                           | PE        | 16     | 16  | 16  | 16     | 16  | 16  |
| Battery input     | Nominal discharge current (A)             |           | 82     |     |     | 109    |     |     |
|                   | Max. discharge current (A)                |           | 102    |     |     | 136    |     |     |
|                   | Recommended cable size (mm <sup>2</sup> ) | DC+ /- /N | 25     | 25  | 25  | 35     | 35  | 35  |
|                   |                                           | PE        | 16     | 16  | 16  | 16     | 16  | 16  |

**Note:**

- Nominal battery discharge current: The discharge current at the rated voltage (384 VDC, 2 V/cell) of thirty-two 12 V batteries.
- Max. battery discharge current: The discharge current at the EOD voltage (308 VDC, 1.6 V/cell) of thirty-two 12 V batteries.

### 3.4.2 Power cable terminal specifications

Table 3-2 Recommended power cable terminals

| Model     | Cable cross-sectional area (Unit: mm <sup>2</sup> ) | Terminal model | Bolt size | Fastening torque |
|-----------|-----------------------------------------------------|----------------|-----------|------------------|
| 10–20 kVA | 6                                                   | GTNR 6-5       | M6        | 5 N • m          |
|           | 10                                                  | GTNR 10-6      | M6        | 5 N • m          |
|           | 16                                                  | GTNR 16-6      | M6        | 5 N • m          |
| 30–40 kVA | 16                                                  | GTNR 16-6      | M6        | 5 N • m          |
|           | 25                                                  | GTNR 25-6      | M6        | 5 N • m          |
|           | 35                                                  | GTNR 35-6      | M6        | 5 N • m          |

### 3.4.3 Recommended external circuit breakers

The UPS system requires external power distribution circuit breakers, including the main input breaker, bypass input breaker (for dual input configuration), output breaker, and battery breaker. The recommended circuit breaker specifications are listed in Table 3-3.

Table 3-3 Recommended circuit breaker specifications

| Model  | Main input circuit breaker | Bypass input circuit breaker | Output circuit breaker | Battery circuit breaker |
|--------|----------------------------|------------------------------|------------------------|-------------------------|
| 10 kVA | 32 A                       | 32 A                         | 32 A                   | 40 A                    |
| 15 kVA | 40 A                       | 40 A                         | 40 A                   | 63 A                    |
| 20 kVA | 63 A                       | 63 A                         | 63 A                   | 80 A                    |

| Model  | Main input circuit breaker | Bypass input circuit breaker | Output circuit breaker | Battery circuit breaker |
|--------|----------------------------|------------------------------|------------------------|-------------------------|
| 30 kVA | 80 A                       | 80 A                         | 80 A                   | 100 A                   |
| 40 kVA | 100 A                      | 100 A                        | 100 A                  | 125 A                   |

**Note:**

- The recommended circuit breaker specifications in this table are for reference only.
- Circuit breakers with leakage protection function are not recommended to prevent nuisance tripping.
- The circuit breakers are recommended based on IEC 60364-4-43, with the primary objective of protecting cables and loads.
- The battery circuit breaker must meet the requirements for DC applications and battery voltage.

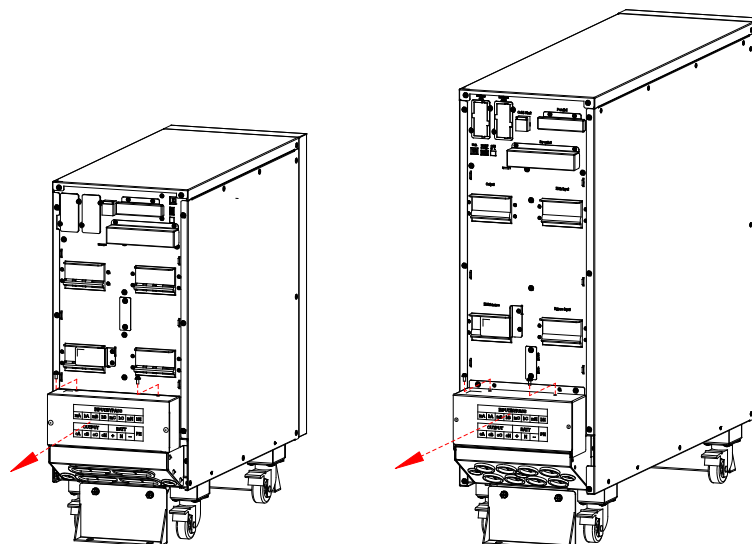
### 3.4.4 Connecting the power cables

To connect the power cables, follow these steps:

Step 1 Ensure that all external and internal power switches of the UPS are open.

Step 2 Remove the wiring cover from the rear of the UPS.

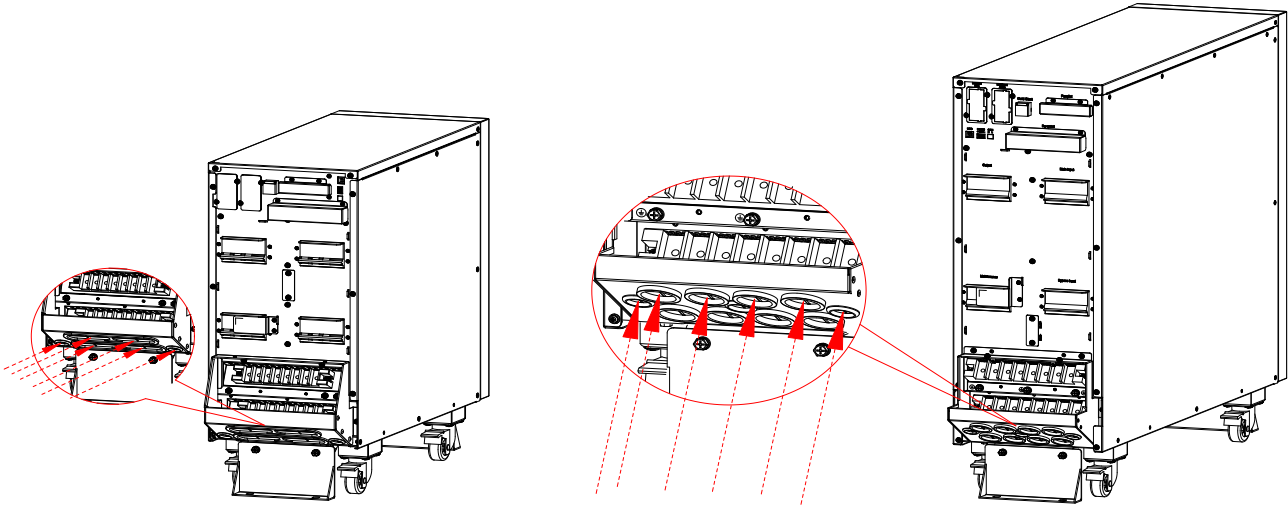
Figure 3-2 Wiring cover (Left: 10–20 kVA models; Right: 30–40 kVA models)





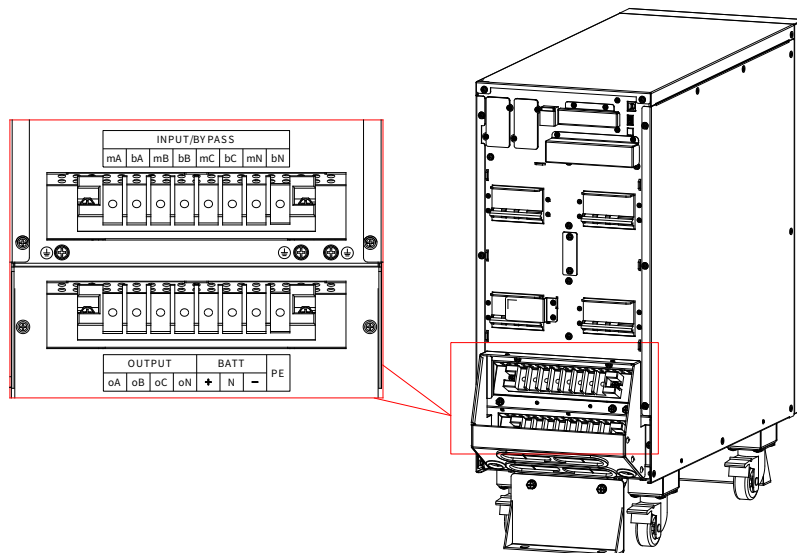
Step 3 Cut openings in the cable grommets.

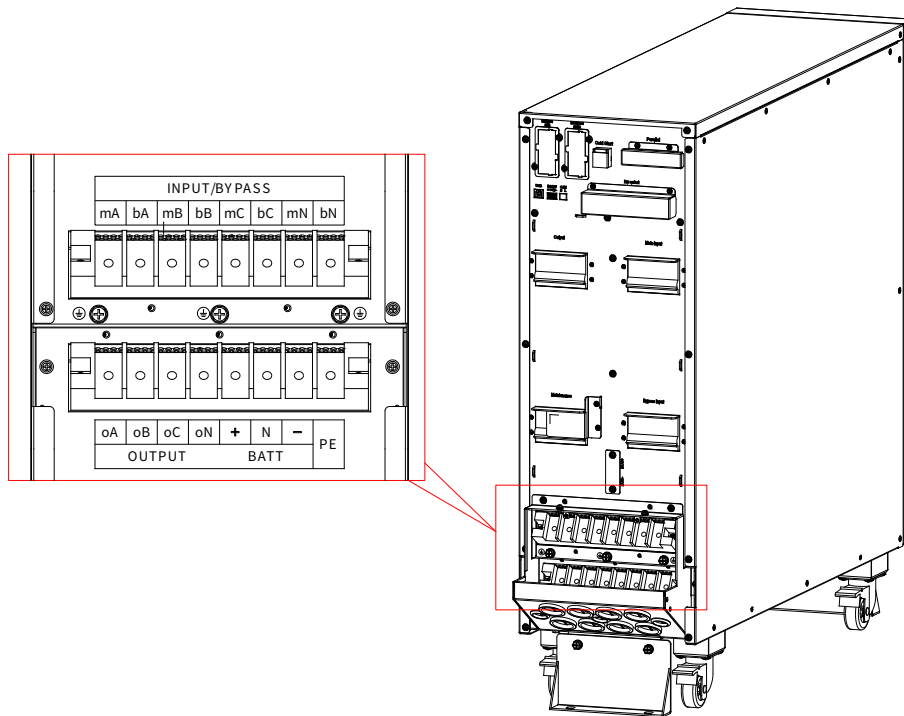
Figure 3-3 Cable grommets (Left: 10–20 kVA models; Right: 30–40 kVA models)



Step 4 Route the power cables through the grommets and install them in place.

Figure 3-4 Wiring terminals (Top: 10–20 kVA models; Bottom: 30–40 kVA models)





**Note:** The maximum wiring space for each terminal block pin is 13 mm for 10–20 kVA models and 18 mm for 30–40 kVA models.

Step 5 Connect the PE cable to the PE terminal on the UPS.

Step 6 Connect the battery and output cables

As shown in Figure 3-4, connect the battery cables to the UPS battery terminals (BATT+, BATT N, and BATT-), and connect the output cables to the UPS output terminals (oA, oB, oC, and oN).

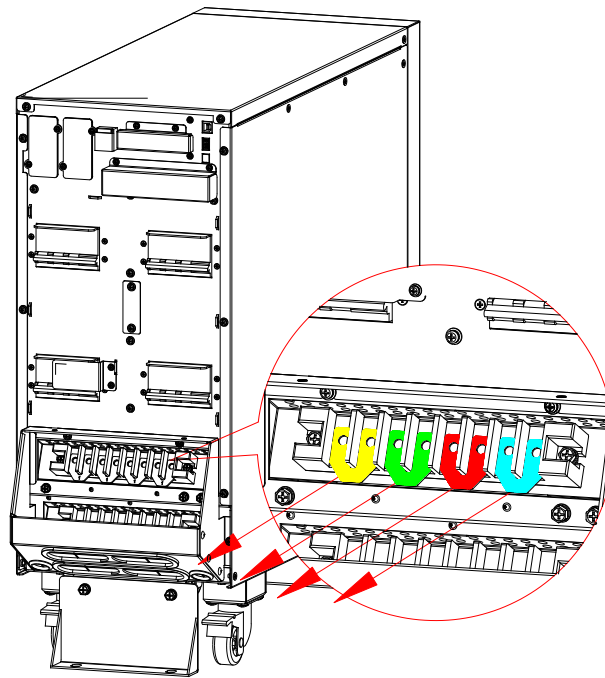
Step 7 Connect the input and bypass cables.

➤ Common input configuration

According to Figure 3-4, connect the input cables to the UPS main input terminals (mA, mB, mC, mN).

➤ Dual input configuration

Remove the 4 shorting copper bars for common input configuration, as shown in the following figure.



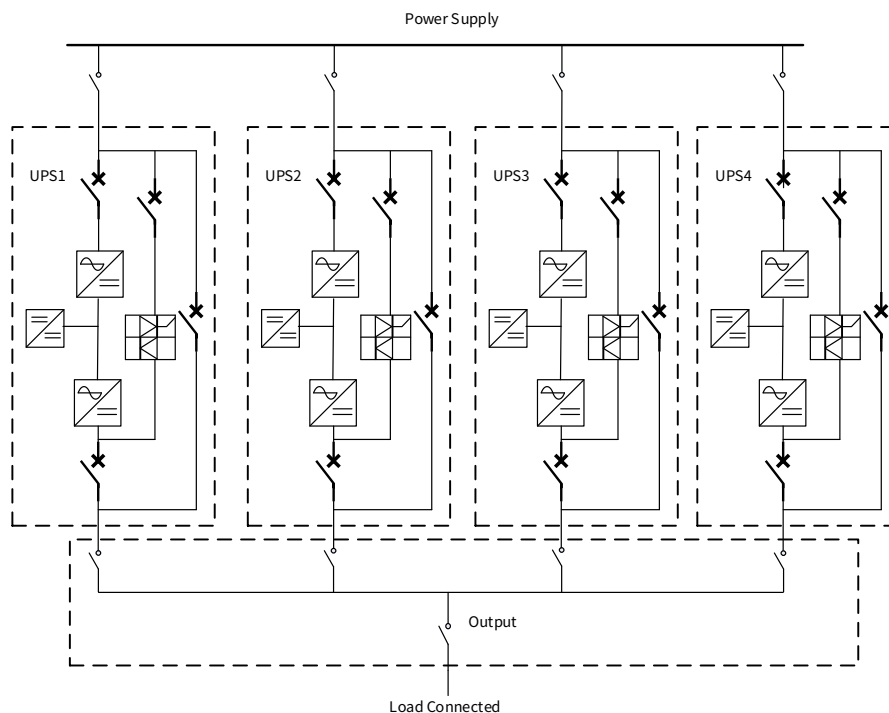
As shown in Figure 3-4, connect the main input cables to the UPS main input terminals (mA, mB, mC, and mN), and connect the bypass input cables to the UPS bypass input terminals (bA, bB, bC, and bN).

Step 8 After verifying that the wiring is correct, reinstall the wiring cover on the rear of the UPS.

### 3.4.5 Wiring the parallel system

Up to 4 UPS units can be connected in parallel, expanding the system capacity to 4 times that of a single UPS. Figure 3-5 shows the block diagram of the parallel system.

Figure 3-5 Parallel system block diagram



Step 1 Connect each UPS to the same utility power system by following the wiring procedure in 3.4.4 Connecting the power cables.

Step 2 Connect the output of each UPS to the load.

**Note:**

- In a parallel system, the bypass and output cables for all UPS units should have the same length and specifications.
- For all UPS units connected to the same utility power system, the input cables should have the same lengths and specifications.
- Comply with all cable routing requirements.

Failure to comply with the above requirements will result in uneven load sharing during bypass operation, which may cause a single UPS unit to become overloaded.

Step 3 Remove the protective cover from the parallel board of each UPS.

Step 4 Following the procedure in 3.5.3 Parallel interface, connect the parallel cables to the parallel interfaces of each UPS and install the appropriate jumpers.

**Note:** This UPS supports a common battery string function in a parallel system. Contact technical support to enable this function using the service software.

## CAUTION

- Each UPS in the common battery string system must have a separate battery circuit breaker.
- The battery and charger parameter settings must be consistent across all UPS units in the common battery string system.

## 3.5 Signal cable connection

Figure 3-6 shows the signal interfaces on the rear of the UPS.

Figure 3-6 Signal interfaces (Left: 10–20 kVA models; Right: 30–40 kVA models)

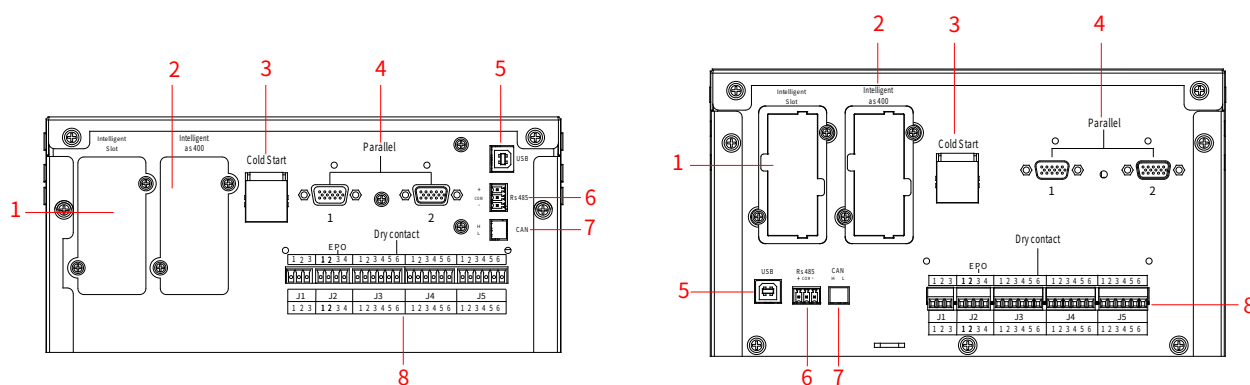


Table 3-4 Signal interface descriptions

| No. | Name               | No. | Name                  |
|-----|--------------------|-----|-----------------------|
| 1   | SNMP card slot     | 5   | USB port              |
| 2   | AS400 card slot    | 6   | RS485 interface       |
| 3   | Cold start button  | 7   | CAN interface         |
| 4   | Parallel interface | 8   | Dry contact interface |

### 3.5.1 Dry contact interfaces

The UPS provides 5 dry contact interfaces that support dry contact input and output, 24 VDC power, EPO, and NTC functions, as shown in Figure 3-7. The interface functions can be configured using the service software or HMI. Table 3-5 lists the interface definitions.

Figure 3-7 Dry contact interfaces

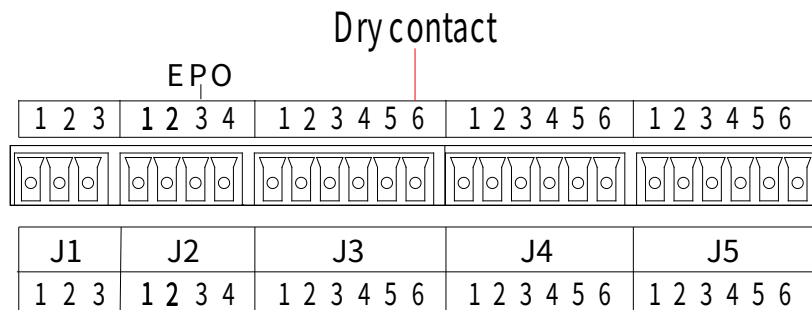


Table 3-5 Dry contact interface definitions

| Interface | Name     | Description                                                                                                                         | Diagram |
|-----------|----------|-------------------------------------------------------------------------------------------------------------------------------------|---------|
| J1-1      | NC       | Configurable dry contact output (30 VDC/3 A), with NO and NC contacts                                                               |         |
| J1-2      | NO       |                                                                                                                                     |         |
| J1-3      | COM      |                                                                                                                                     |         |
| J2-1      | Input_1  | Configurable dry contact input (24 VDC/1 mA), active low                                                                            |         |
| J2-2      | GND      |                                                                                                                                     |         |
| J2-3      | EPO NC   | EPO dry contact input (shorted), NC (non-configurable)                                                                              |         |
| J2-4      | +24 V    |                                                                                                                                     |         |
| J3-1      | +24_DRY  | Configurable NO dry contact output. When activated, the output is internally pulled up to 24 VDC, with a maximum current of 400 mA. |         |
| J3-2      | GND      |                                                                                                                                     |         |
| J3-3      | Input_2  | Configurable dry contact input (24 VDC/1 mA), active low                                                                            |         |
| J3-4      | GND      |                                                                                                                                     |         |
| J3-5      | Temp 1   |                                                                                                                                     |         |
| J3-6      | Temp_COM |                                                                                                                                     |         |
| J4-1      | Temp 2   | Battery temperature NTC input                                                                                                       |         |
| J4-2      | Temp_COM |                                                                                                                                     |         |
| J4-3      | Input_3  | Configurable dry contact input (24 VDC/1 mA), active high                                                                           |         |
| J4-4      | +24 V    |                                                                                                                                     |         |
| J4-5      | +24 V    |                                                                                                                                     |         |
| J4-6      | GND      | Reference ground                                                                                                                    |         |

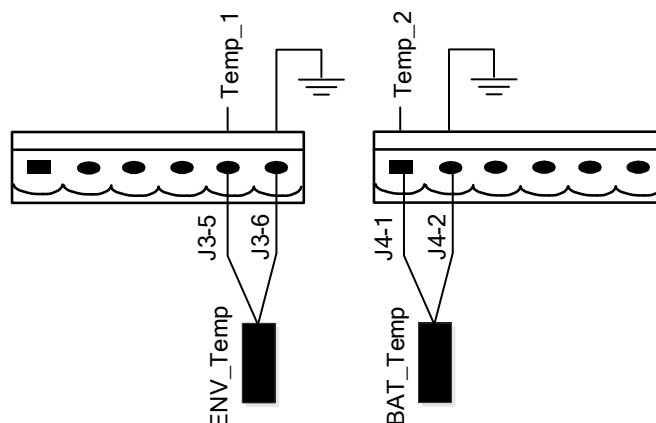
| Interface | Name | Description                                                           | Diagram |
|-----------|------|-----------------------------------------------------------------------|---------|
| J5-1      | NC   | Configurable dry contact output (30 VDC/3 A), with NO and NC contacts | J5-1    |
| J5-2      | NO   |                                                                       | J5-2    |
| J5-3      | COM  |                                                                       | J5-3    |
| J5-4      | NC   | Configurable dry contact output (30 VDC/3 A), with NO and NC contacts | J5-4    |
| J5-5      | NO   |                                                                       | J5-5    |
| J5-6      | COM  |                                                                       | J5-6    |

The default function of each dry contact is described as follows:

#### ■ Battery and ambient temperature detection interfaces

J3-5/6 and J4-1/2 can be used to detect the ambient temperature (ENV\_TEMP) and battery temperature (BAT\_TEMP), respectively. Figure 3-8 shows the wiring.

Figure 3-8 Temperature detection dry contact interfaces

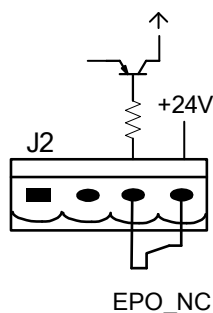


**Note:** Temperature detection requires the use of a specific temperature sensor ( $R_{25}=5\text{ k}\Omega$ ,  $B_{25}/50=3275$ ). Verify with the manufacturer or contact the local office when placing an order.

#### ■ EPO interface

J2-3 is the remote EPO input. During normal operation, J2-3 must be shorted to J2-4 (+24 V), as configured at the factory. By connecting an external controllable NC contact, remote EPO control can be achieved. Figure 3-9 shows the wiring.

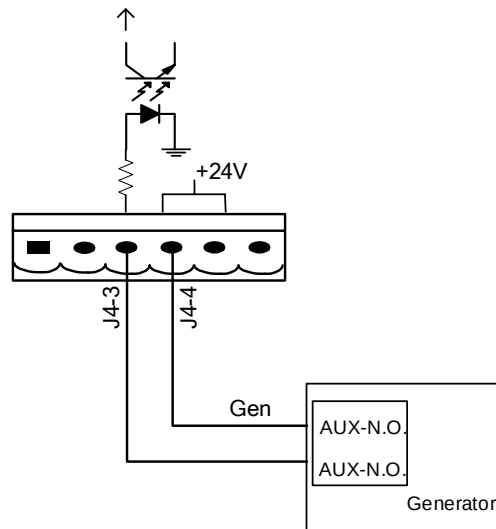
Figure 3-9 EPO input interface



### ■ Generator connection status dry contact input

By default, J4-3 is configured as the generator connection status input. With the 24 V supply from J4-4 or J4-5, J4-3 can indicate that the generator is connected to the system. Figure 3-10 shows the wiring.

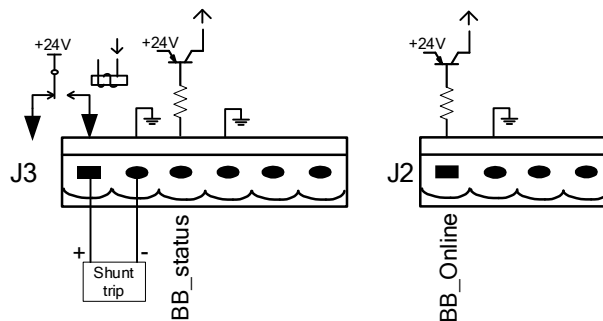
Figure 3-10 Generator connection status wiring



### ■ Battery BB dry contact interfaces

By default, J3-1 is configured as the BB shunt trip interface, J3-3 as the BB status dry contact input, and J2-1 as the BB online dry contact input. When a BB trip signal is issued, the internal 24 V supply drives the external shunt trip coil through the interface. When the BB online input is enabled, the BB status input can be used to indicate the current status of the BB. Figure 3-11 shows the wiring.

Figure 3-11 BB shunt-trip interface



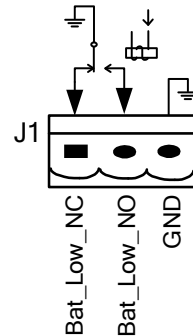
#### Note:

- The shunt trip coil can be powered by an external 24 VDC power supply or by the UPS itself.
- The 24 V power supplied by the UPS itself can provide a maximum current of 400 mA. The current required by the shunt trip coil must not exceed 400 mA.

### ■ Battery alarm dry contact output

J1 is configured by default for the low battery voltage alarm and can be configured for the battery overvoltage alarm. When the battery voltage falls below or rises above the set value, a relay-isolated potential-free auxiliary contact signal is generated. Figure 3-12 shows the wiring.

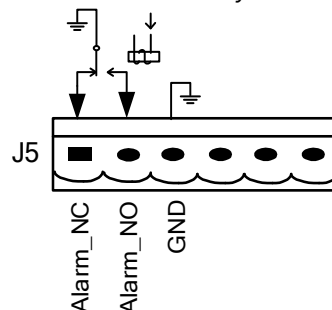
Figure 3-12 Battery alarm dry contact output



#### ■ General alarm dry contact output

J5-1/2/3 are configured by default as a general alarm dry contact output. When one or more alarms are triggered, a relay-isolated potential-free auxiliary contact signal is generated. Figure 3-13 shows the wiring.

Figure 3-13 General alarm dry contact output



#### ■ Backfeed protection



- Backfeed protection is not included in the standard system configuration. Install an automatic disconnect device equipped with a trip function, such as a circuit breaker, disconnect switch, contactor, or other device compliant with the applicable local standards, to prevent hazardous voltage or energy from being present at the input of the disconnect device.

Figure 3-14 and Figure 3-15 show the backfeed protection wiring for common input and dual input configurations.

#### 🔗Note:

- For a common input configuration, set the function of J5-5 to bypass backfeed through the HMI or service software.
- For a dual input configuration, set the function of J5-5 to bypass backfeed and the function of J5-2 to main input backfeed through the HMI or service software.
- The shunt trip coil can be powered by either an external 24 VDC power supply or the UPS.
- The UPS 24 V supply can provide a maximum current of 400 mA. The current required by the shunt trip coil must not exceed 400 mA.



Figure 3-14 Backfeed protection wiring (common input)

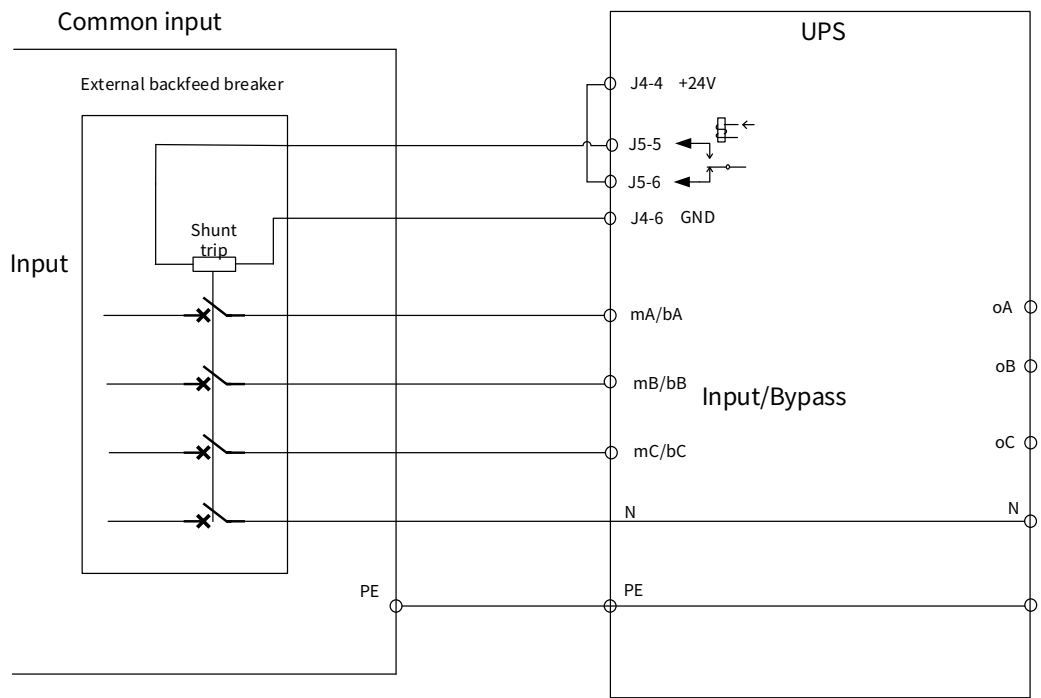
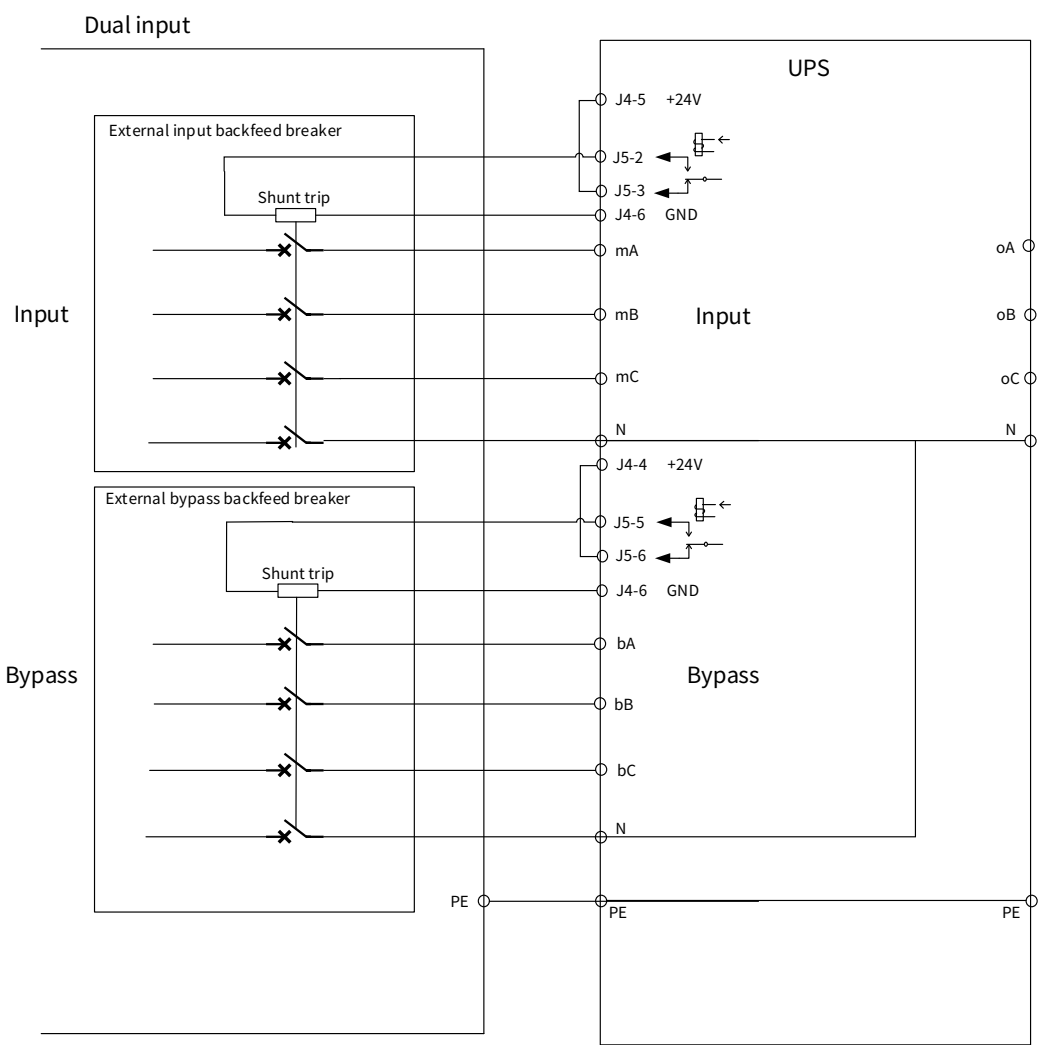


Figure 3-15 Backfeed protection wiring (dual input)



### 3.5.2 Communication interfaces

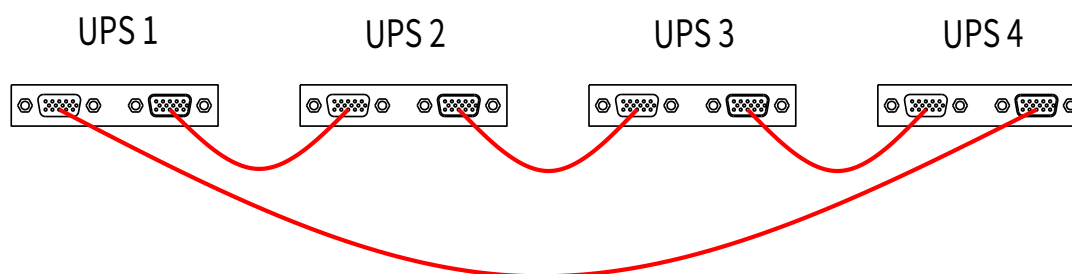
- RS485 and USB: Provide serial communication for authorized personnel to commission and maintain the UPS. Also support networking for integration into the DCIM system.
- CAN: Used for communication with the lithium-ion battery BMS.
- SNMP card slot: Used to install an optional SNMP card.
- AS400 card slot: Used to install an optional dry contact expansion card.

Table 3-6 Optional card models

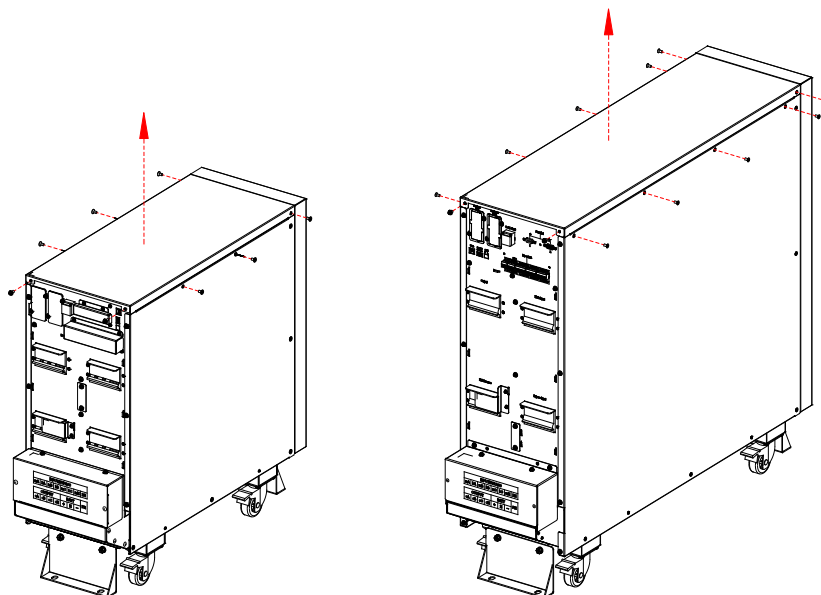
| Optional card | Model            | Function                       |
|---------------|------------------|--------------------------------|
| SNMP card     | PIS301-SNMP      | Intelligent communication card |
| AS400 card    | SP-UL-PS1202_TF1 | Dry contact expansion          |

### 3.5.3 Parallel interface

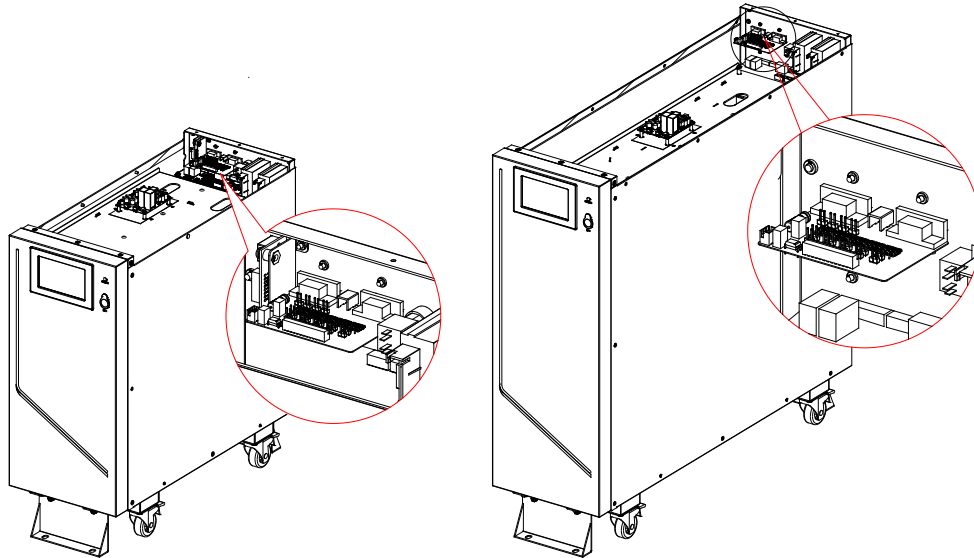
Step 1 Connect the parallel cables to the parallel interfaces of the UPS units in the parallel system, as shown in the following figure.



Step 2 Remove the top cover of the UPS. (Left: 10–20 kVA models; Right: 30–40 kVA models)



Step 3 The location of the parallel board is shown in the following figure. (Left: 10–20 kVA models; Right: 30–40 kVA models)



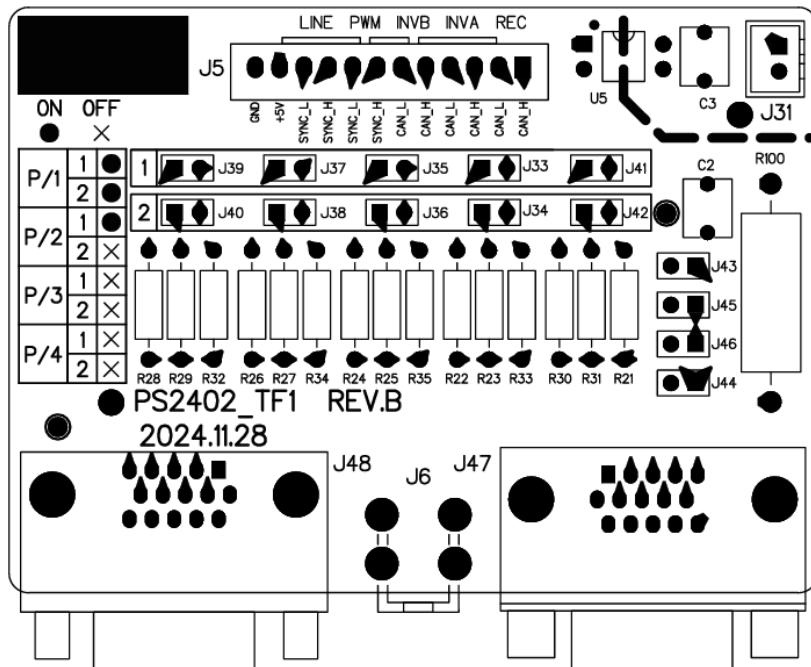
Step 4 Set the jumpers on the parallel boards according to the number of UPS units in the parallel system.

➤ 2 UPS units in parallel

Remove the jumpers from positions J34, J36, J38, J40, and J42 on the parallel board of each UPS.

➤ 3 or 4 UPS units in parallel

Remove the jumpers from positions J33, J34, J35, J36, J37, J38, J39, J40, J41, and J42 on the parallel board of each UPS.



## 4 Display and control

### 4.1 Control panel

The UPS control panel includes a 5-inch LCD touchscreen, a status indicator, a buzzer, and an EPO button, as shown in Figure 4-1.

Figure 4-1 Control panel

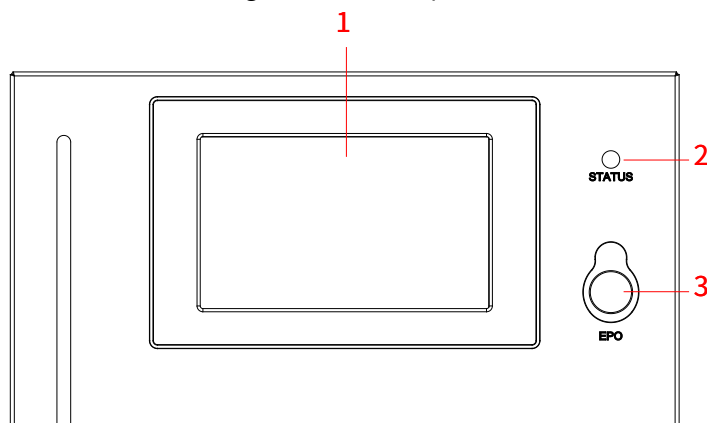


Table 4-1 Front panel description

| No. | Name                   |
|-----|------------------------|
| 1   | 5-inch LCD touchscreen |
| 2   | Status indicator       |
| 3   | EPO button             |

#### 4.1.1 Status description

During UPS operation, the status indicator changes color and the buzzer emits different audible patterns according to the alarm severity, as listed in Table 4-2.

Table 4-2 Status description

| Indicator                              | Buzzer                        | Description                                           |
|----------------------------------------|-------------------------------|-------------------------------------------------------|
| Green (steady)                         | No sound                      | No alarm                                              |
| Red (flashing at 1.5-second intervals) | 2 short beeps and 1 long beep | General alarm (yellow), such as battery disconnection |
| Red (steady)                           | Continuous beeping            | Critical alarm (red), such as a rectifier fault       |

#### 4.1.2 EPO button

Table 4-3 Button description

| Control button | Description                                                                                        |
|----------------|----------------------------------------------------------------------------------------------------|
| EPO            | Press and hold to shut down the rectifier and inverter and to disconnect the load and the battery. |

### 4.1.3 HMI main screen

After the UPS starts, the HMI automatically displays the main screen (home screen), as shown below.

Figure 4-2 Main screen (Home)

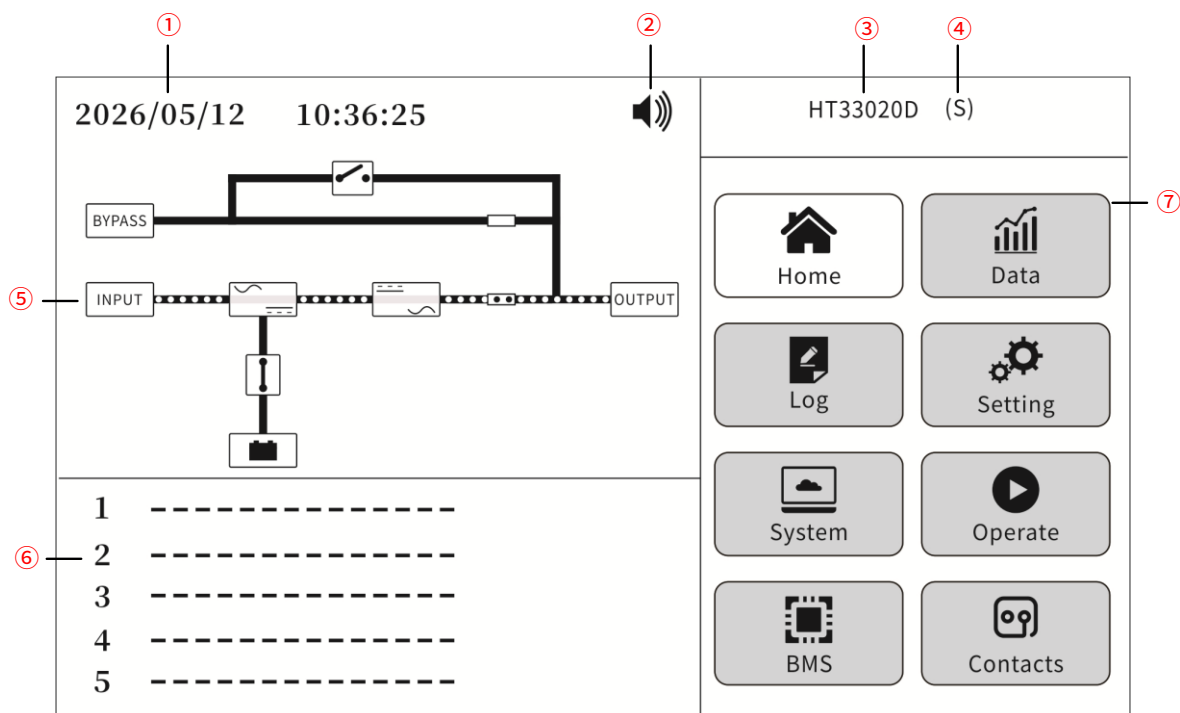


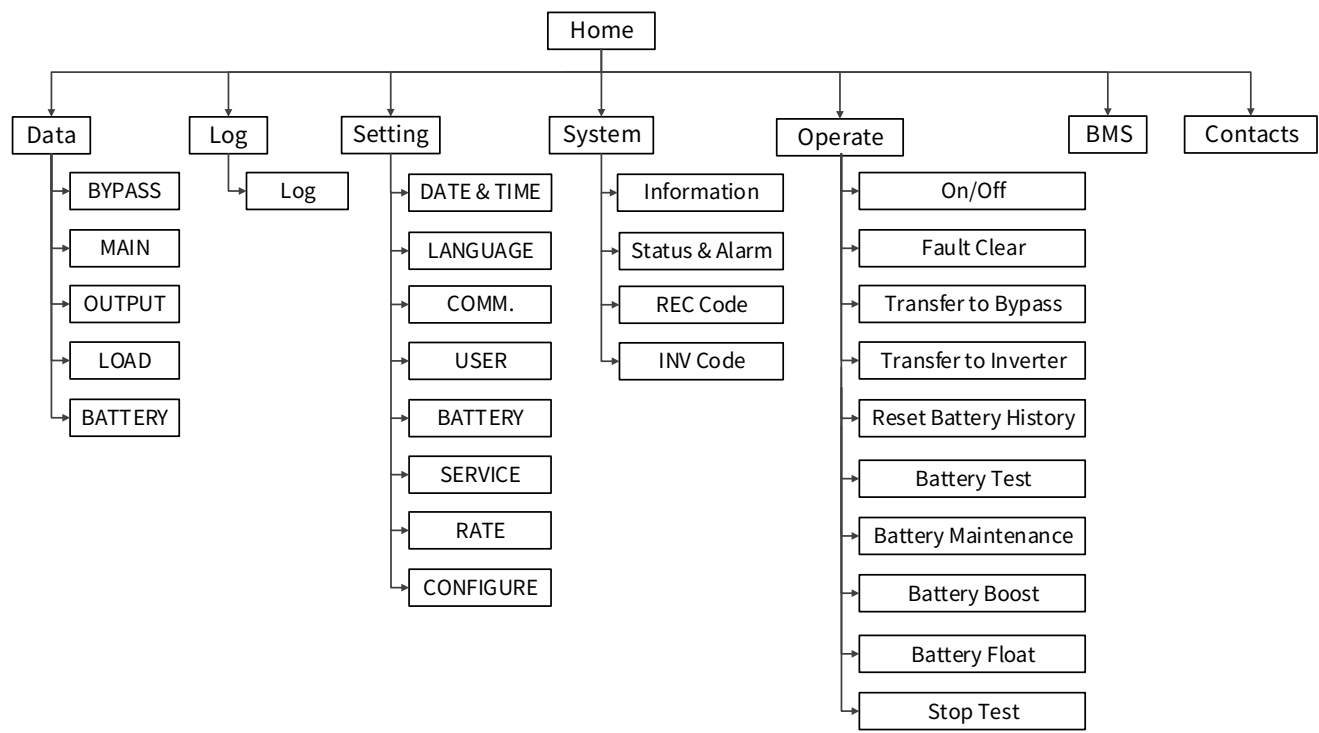
Table 4-4 Main screen descriptions

| No. | Area               | Description                                                                                                                                                                                            |
|-----|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ①   | Time bar           | Displays the current date and time.                                                                                                                                                                    |
| ②   | Buzzer             | Buzzer control button. In single-unit mode, tap to turn the buzzer on or off.                                                                                                                          |
| ③   | Model bar          | Displays the current UPS model.                                                                                                                                                                        |
| ④   | Mode bar           | Displays the current UPS operating mode.<br>S: Single-unit mode;<br>P: Parallel mode;<br>F: Frequency converter mode;<br>E: ECO mode;<br>PE: Parallel ECO mode;<br>A: Self-aging mode;<br>L: LBS mode. |
| ⑤   | Power flow diagram | Displays the current UPS power flow.                                                                                                                                                                   |
| ⑥   | Event log          | Displays the 5 latest UPS status or alarm messages.                                                                                                                                                    |
| ⑦   | Menu bar           | Tap a button in this area to open the corresponding submenu.                                                                                                                                           |

4.1.4 HMI menu tree

Figure 4-3 shows the HMI navigation structure.

Figure 4-3 Menu tree



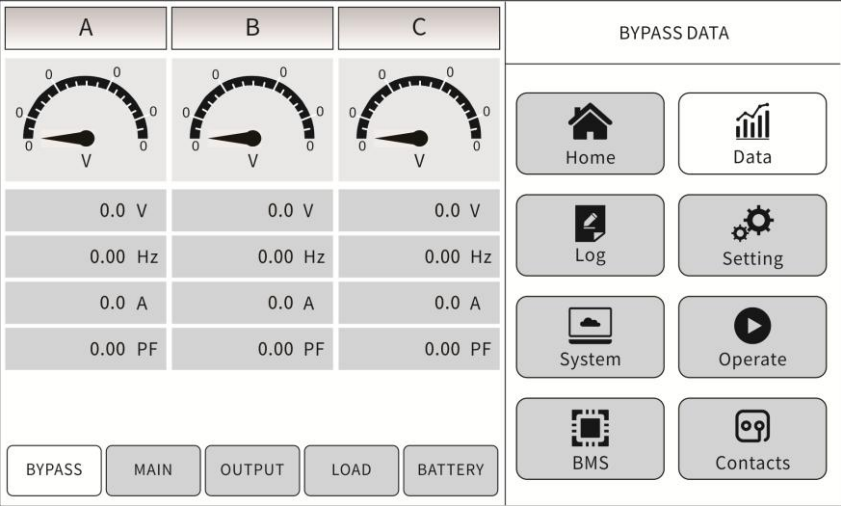
4.2 Real-time data

Tap **Data** on the menu bar. The HMI displays the real-time data screen, where you can view key data for the bypass, main input, output, load, and battery. Tap the buttons at the bottom of the screen to switch between data screens.

4.2.1 BYPASS

The **BYPASS** screen is displayed by default when the **Data** screen is opened, as shown in Figure 4-4. It shows the bypass voltage, frequency, current, and PF.

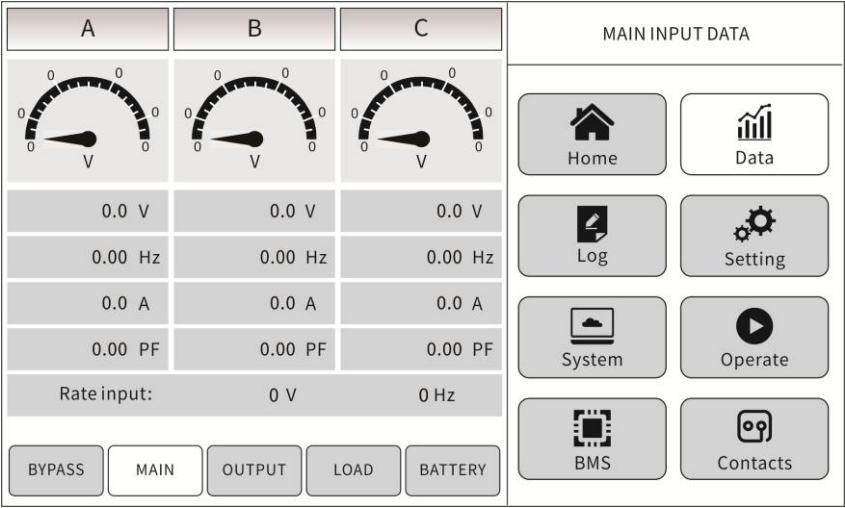
Figure 4-4 BYPASS



4.2.2 MAIN

Figure 4-5 shows the main input data, including the main input voltage, frequency, current, and PF, as well as the configured rated input voltage and frequency.

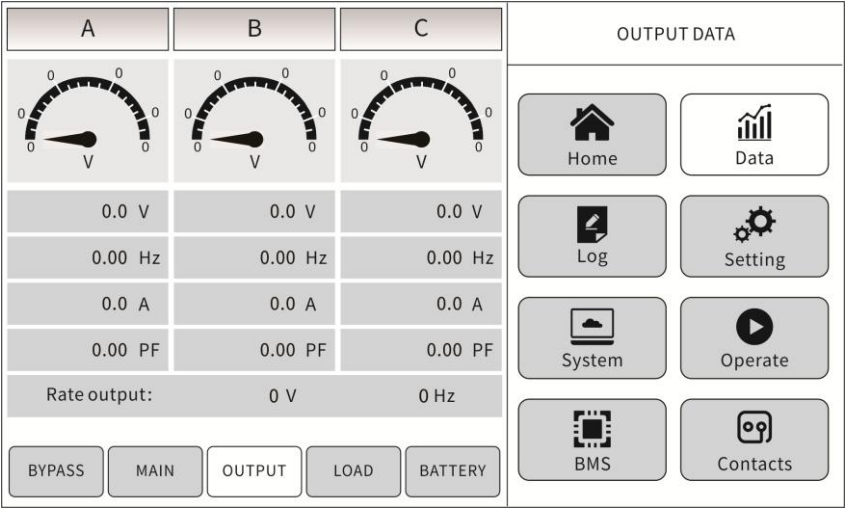
Figure 4-5 MAIN



4.2.3 OUTPUT

Figure 4-6 shows the output data, including the output voltage, frequency, current, and PF, as well as the configured rated output voltage and frequency.

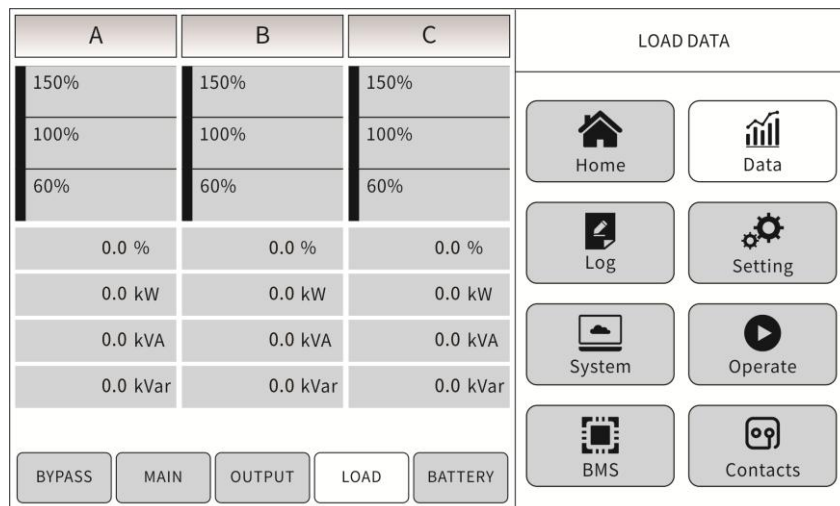
Figure 4-6 OUTPUT



## 4.2.4 LOAD

Figure 4-7 shows the load data, including the load percentage, active power, apparent power, and reactive power.

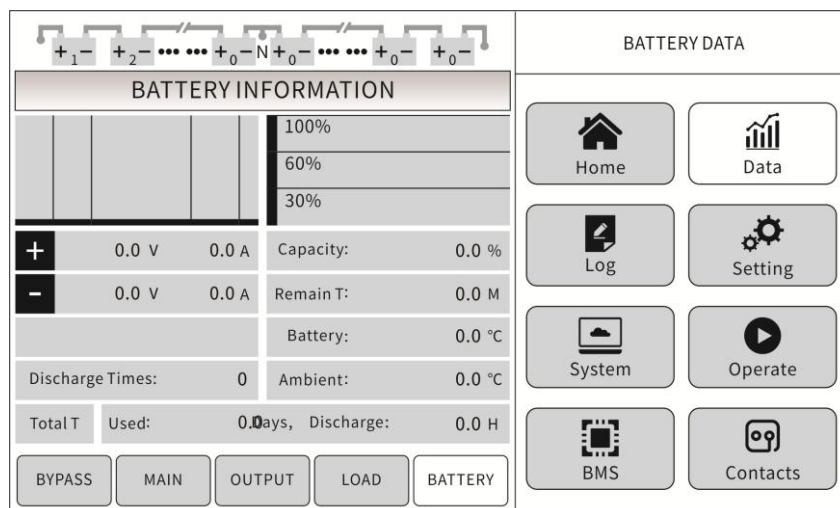
Figure 4-7 LOAD



## 4.2.5 BATTERY

Figure 4-8 shows the battery data, including the battery voltage, current, capacity, remaining runtime, and the battery and ambient temperatures detected through the temperature NTC inputs.

Figure 4-8 BATTERY





## 4.3 Log

Tap **Log** on the menu bar to open the event log screen, as shown in Figure 4-9.

Figure 4-9 Log

| NO.             | EVENTS                      | TIME               | HISLOG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |
|-----------------|-----------------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 1               | Load On None-Set            | 2026/5/13 10:50:55 |  Home  Data  Log  Setting  System  Operate  BMS  Contacts |  |
| 2               | Battery Boost-Set           | 2026/5/13 10:50:43 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
| 3               | Float Charging-Set          | 2026/5/13 10:50:32 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
| 4               | Battery Disconnect-Set      | 2026/5/13 10:50:11 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
| 5               | EPO-Clr                     | 2026/5/13 10:49:44 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
| 6               | Bypass Volt Detect Fail-Set | 2026/5/13 10:49:34 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
| 7               | Bypass Overload Tout-Set    | 2026/5/13 10:49:25 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
| 8               | Bypass Overload Tout-Clr    | 2026/5/13 10:49:23 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
| Total Log Items |                             | 500                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |

The **Log** screen lists alarm and fault information recorded during UPS operation in chronological order.

**Note:** The event log can display up to 2,000 alarms. When the number of alarms exceeds 2,000, the oldest records are automatically overwritten.

Table 4-5 lists the alarm messages.

Table 4-5 Alarm message list

| No. | Alarm                  | Description                                                          |
|-----|------------------------|----------------------------------------------------------------------|
| 1   | Utility Abnormal       | Main input voltage abnormal                                          |
| 2   | Input Neutral Lost     | Input neutral conductor missing or disconnected                      |
| 3   | Input Over Curr Tout   | RMS input current at the current limit for the software-set duration |
| 4   | Rectifier Fail         | Rectifier abnormal                                                   |
| 5   | DC Bus Over Volt       | DC bus overvoltage                                                   |
| 6   | Rectifier Over Temp    | Rectifier heatsink temperature above the software-set value          |
| 7   | REC Soft Start Fail    | Rectifier soft start failure                                         |
| 8   | Input Curr Unbalance   | 3-phase input currents unbalanced                                    |
| 9   | Fan Fail               | DC fan failure                                                       |
| 10  | BusPosUdVolt           | DC bus undervoltage                                                  |
| 11  | Inlet Over Temp        | UPS air inlet temperature too high                                   |
| 12  | No Inlet Temp. Sensor  | UPS air inlet NTC sensor abnormal                                    |
| 13  | No Outlet Temp. Sensor | UPS air outlet NTC sensor abnormal                                   |
| 14  | Rated KVA Set OvRange  | UPS rated capacity setting out of allowable range                    |
| 15  | Firmware Error         | Software version incompatible                                        |
| 16  | Bypass Module Fail     | Bypass open circuit, short circuit, or backfeed                      |
| 17  | Bypass Sequence Error  | Bypass phase sequence incorrect                                      |
| 18  | Bypass Volt Abnormal   | Bypass input voltage abnormal                                        |
| 19  | Byp Freq Over Track    | Bypass input frequency outside the tracking range (0.5–5 Hz)         |
| 20  | Bypass Overload        | UPS operating in bypass mode with load percentage above 105%         |

| No. | Alarm                   | Description                                                                                              |
|-----|-------------------------|----------------------------------------------------------------------------------------------------------|
| 21  | Bypass Overload Tout    | UPS operating in bypass mode with bypass overload timer exceeding the specified limit                    |
| 22  | Output Overload         | Output current exceeding the rated current by more than 10%                                              |
| 23  | Inverter Overload Tout  | UPS operating in normal mode with inverter overload timer exceeding the specified limit                  |
| 24  | Output Short Circuit    | UPS output short circuit                                                                                 |
| 25  | Inverter Protect        | Inverter protection activated with the UPS shutting down the inverter                                    |
| 26  | Inverter Fail           | Inverter failure                                                                                         |
| 27  | Inverter Over Temp      | Inverter heatsink temperature above the software-set value                                               |
| 28  | INV Bridge Fail         | Inverter IGBT open circuit                                                                               |
| 29  | Relay Connect Fail      | Inverter output relay open circuit                                                                       |
| 30  | Relay Short Circuit     | Inverter output relay short circuit                                                                      |
| 31  | Ambient Over Temp       | Ambient temperature detected through the NTC input above the set value                                   |
| 32  | Battery Over Temp       | Battery temperature detected through the NTC input above the set value                                   |
| 33  | Battery Volt Low        | Battery voltage too low                                                                                  |
| 34  | Battery EOD             | Battery voltage below the EOD value                                                                      |
| 35  | EOD System Inhibited    | Output disabled or bypass output only after EOD, depending on the setting                                |
| 36  | Battery Not Connected   | Battery not connected                                                                                    |
| 37  | Battery Wiring Error    | Battery positive and negative terminals connected incorrectly                                            |
| 38  | Battery or Charger Fail | Battery or charger failure                                                                               |
| 39  | Manual Shutdown         | Manual shutdown signal active                                                                            |
| 40  | Manual Transfer Byp     | Manual transfer to bypass via the HMI or service software                                                |
| 41  | Exceed Tx Times Lmt     | More than 5 transfers to bypass mode within 1 hour                                                       |
| 42  | EPO                     | EPO activated                                                                                            |
| 43  | Maintenance CB Closed   | Maintenance breaker auxiliary contact activated                                                          |
| 44  | On UPS Inhibited        | Inverter overload timeout or inverter overtemperature detected                                           |
| 45  | Sync Pulse Fail         | Line-frequency synchronization signal abnormal                                                           |
| 46  | PWM Sync Fail           | PWM synchronization signal abnormal                                                                      |
| 47  | Parallel Cable Error    | Parallel cable connection fault                                                                          |
| 48  | Power Share Fail        | Load percentages of UPS units in the parallel system unbalanced                                          |
| 49  | INV IO CAN Fail         | Inverter signal CAN communication abnormal                                                               |
| 50  | INV DATA CAN Fail       | Inverter data CAN communication abnormal                                                                 |
| 51  | Dust Filter Expired     | Dust filter service time reaching or exceeding the configured maintenance interval                       |
| 52  | Fan Expired             | Fan operating time reaching or exceeding the configured maintenance interval                             |
| 53  | System Setting Error    | EEPROM checksum error during power-on initialization, or an external attempt to tamper with UPS settings |

| No. | Alarm                                | Description                                                                                              |
|-----|--------------------------------------|----------------------------------------------------------------------------------------------------------|
| 54  | Module ID Duplicate                  | Duplicate parallel IDs in the parallel system                                                            |
| 55  | SPI Comm Fail                        | No SPI communication data received by the rectifier control board                                        |
| 56  | Rectifier overload                   | High rectifier input current with low DC bus voltage                                                     |
| 57  | Main power voltage exceeds limit     | Transient overvoltage at the input                                                                       |
| 58  | Battery self-test not meet condition | Conditions required for the battery self-test not satisfied                                              |
| 59  | Dry input contact turns off charger  | Charger shutdown triggered by an external signal via a dry contact input                                 |
| 60  | Dry contact_battery over discharge   | Battery overdischarge alarm triggered by an external signal via a dry contact input                      |
| 61  | Dry contact_battery over charge      | Battery overcharge alarm triggered by an external signal via a dry contact input                         |
| 62  | Generator Input                      | Generator connection indicated by an external signal via a dry contact input                             |
| 63  | N+X Redundant Lost                   | With redundancy enabled, load percentage in an N-unit parallel system exceeding $[(N-1)/N] \times 100\%$ |
| 64  | Output Volt Fail                     | Difference between the detected output voltage and inverter voltage too large                            |
| 65  | Inconsistent number of parallel      | Configured number of parallel UPS units inconsistent with the actual number of connected units           |
| 66  | Inconsistent parallel settings       | Rated parameters inconsistent among UPS units in the parallel system                                     |
| 67  | Load On UPS                          | UPS operating in normal mode                                                                             |
| 68  | Load On Bypass                       | UPS operating in bypass mode                                                                             |
| 69  | No Load                              | No output from the system                                                                                |
| 70  | Battery Boost                        | Charger operating in boost charge mode                                                                   |
| 71  | Battery Float                        | Charger operating in float charge mode                                                                   |
| 72  | Battery Discharge                    | UPS operating in battery discharge mode                                                                  |
| 73  | Battery Connected                    | Battery connected to the UPS                                                                             |
| 74  | Battery Test                         | Battery discharging for 20 s                                                                             |
| 75  | Battery Test OK                      | Battery self-test completed                                                                              |
| 76  | Battery Maintenance                  | Battery discharging until the low battery voltage threshold is reached                                   |
| 77  | Batt Maintenance OK                  | Battery maintenance test completed                                                                       |
| 78  | Stop Test                            | Battery self-test or maintenance test terminated immediately                                             |
| 79  | Fault Clr                            | Fault status cleared                                                                                     |
| 80  | Log Clr                              | Event logs cleared                                                                                       |
| 81  | Esc Manual Bypass                    | Manual transfer to bypass mode canceled via the HMI or service software                                  |
| 82  | Manual Boost Charge                  | Charger switched to boost charge mode via the HMI or service software                                    |
| 83  | Manual Float Charge                  | Charger switched to float charge mode via the HMI or service software                                    |
| 84  | Manual Transfer to INV               | Manual transfer to normal mode via the HMI or service software                                           |
| 85  | REC CAN Fail                         | Rectifier CAN data transmission/reception abnormal                                                       |

| No. | Alarm                      | Description                                                                         |
|-----|----------------------------|-------------------------------------------------------------------------------------|
| 86  | Electrolyte leakage        | Battery electrolyte leakage indicated by an external signal via a dry contact input |
| 87  | Save settings              | Modified settings saved                                                             |
| 88  | Rectifier firmware upgrade | Rectifier control board firmware upgrade in progress                                |
| 89  | Inverter firmware upgrade  | Inverter control board firmware upgrade in progress                                 |

## 4.4 Setting

Tap **Setting** on the menu bar to enter the system settings screen, where you can configure basic HMI parameters, rated UPS parameters, and battery management.

### 4.4.1 DATE & TIME

The **Date & Time** screen appears by default in **Setting** (Figure 4-10), allowing the date format and UPS system time to be configured.

Figure 4-10 DATE & TIME

Table 4-6 DATE & TIME settings

| Setting      | Default             | Setting range                               | Remarks                                                                                                                                                                                                                                                                               |
|--------------|---------------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date format  | YY-MM-DD            | YY-MM-DD, MM-DD-YY, DD-MM-YY                | -                                                                                                                                                                                                                                                                                     |
| Time Setting | 2000/00/00 00:00:00 | 2000/00/00 00:00:00—<br>9999/12/31 23:59:59 | The timestamps in the UPS event log are affected by this setting: <ul style="list-style-type: none"> <li>Set the time according to the local time at first startup.</li> <li>Recalibrate the time after the UPS has been powered off for an extended period and restarted.</li> </ul> |

**Note:**

- After completing the settings, tap the check mark next to **Please Confirm Settings** in the lower-right corner of the screen to apply the changes. Unconfirmed changes will not take effect. This step is not repeated in the following sections.
- Tap the buttons at the bottom of the screen to switch to other parameter setting screens.

4.4.2 LANGUAGE

Figure 4-11 shows the **LANGUAGE** screen for changing the HMI display language.

Figure 4-11 LANGUAGE

Current LanguageEnglish

DATE&TIMELANGUAGECOMM.USERBATTERYSERVICERATECONFIGURE

LANGUAGE SETTING

HomeDataLogSettingSystemOperateBMSContacts

Table 4-7 LANGUAGE settings

| Setting          | Default            | Setting range                                                                                       | Remarks |
|------------------|--------------------|-----------------------------------------------------------------------------------------------------|---------|
| Current Language | Simplified Chinese | English, Simplified Chinese, Spanish, Portuguese, Russian, French, Polish, German, Turkish, Italian | -       |

4.4.3 COMM.

Figure 4-12 Shows the **COMM.** screen for configuring communication parameters.

Figure 4-12 COMM.

COMM. Port:USB    SNMP    CAN

Protocol:Modbus    Modbus    Disable

COMM.Mode:RTU    RTU

BaudRate:1200    1200    0

Dev Addr.:0    0

Please Confirm Settings✔

DATE&TIMELANGUAGECOMM.USERBATTERYSERVICERATECONFIGURE

COMMUNICATION SETTING

HomeDataLogSettingSystemOperateBMSContacts

Table 4-8 COMM. settings

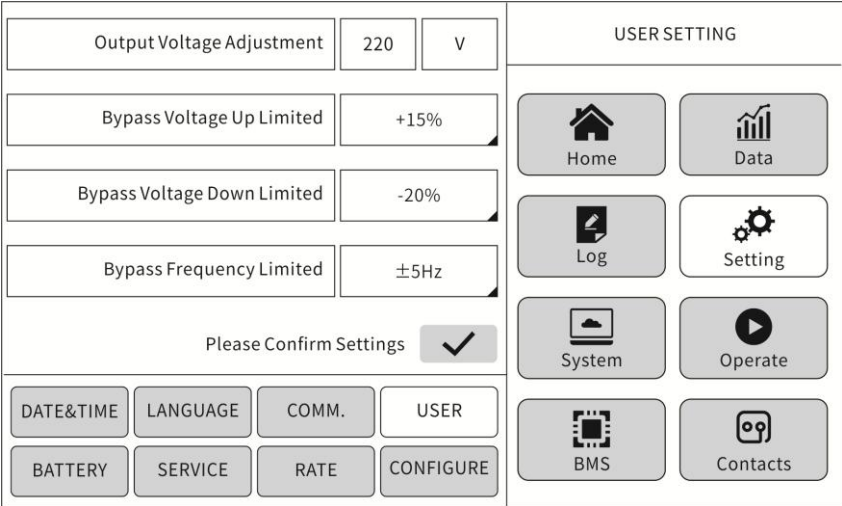
| Setting    |      | Default   | Setting range                        | Remarks |
|------------|------|-----------|--------------------------------------|---------|
| Protocol   | USB  | Modbus    | Modbus                               | -       |
|            | SNMP | SNT       | Modbus, SNT                          | -       |
|            | CAN  | VisionBms | VisionBms, Disable                   | -       |
| COMM. Mode | USB  | ASCII     | ASCII, RTU                           | -       |
|            | SNMP | ASCII     | ASCII, RTU                           | -       |
| Baud Rate  | USB  | 9600      | 1200, 2400, 4800, 9600, 14400, 19200 | -       |
|            | SNMP | 9600      | 1200, 2400, 4800, 9600, 14400, 19200 | -       |
|            | CAN  | 625       | 625                                  | -       |
| Dev Addr.  | USB  | 1         | 1                                    | -       |
|            | SNMP | 1         | 1                                    | -       |

#### 4.4.4 USER

Figure 4-13 shows the **USER** screen, where you can configure the output voltage, bypass voltage range, and bypass frequency range within the allowable limits.

 **Note:** The HMI level-1 password is required to access the **USER** screen.

Figure 4-13 USER



The screenshot shows the USER screen interface. On the left, there are four adjustable settings: Output Voltage Adjustment (220 V), Bypass Voltage Up Limited (+15%), Bypass Voltage Down Limited (-20%), and Bypass Frequency Limited (±5Hz). Below these is a 'Please Confirm Settings' button with a checkmark icon. At the bottom left, there are eight menu buttons: DATE&TIME, LANGUAGE, COMM., USER, BATTERY, SERVICE, RATE, and CONFIGURE. On the right, there is a 'USER SETTING' panel with eight icons: Home, Data, Log, Setting, System, Operate, BMS, and Contacts.

Table 4-9 USER settings

| Setting                     | Default    | Setting range                      | Remarks |
|-----------------------------|------------|------------------------------------|---------|
| Output Voltage Adjustment   | 220 V      | Rated voltage $\pm 10$ V           | -       |
| Bypass Voltage Up Limited   | +15%       | +10%, +15%, +20%, +25%             | -       |
| Bypass Voltage Down Limited | -20%       | -10%, -15%, -20%, -30%, -40%       | -       |
| Bypass Frequency Limited    | $\pm 3$ Hz | $\pm 1$ Hz, $\pm 3$ Hz, $\pm 5$ Hz | -       |

#### 4.4.5 BATTERY

Figure 4-14 and Figure 4-15 show the **BATTERY** screens. Tap  or  to switch between the screens. You can configure the battery type, battery parameters, charging parameters, and other settings.

 **Note:** The HMI level-2 password is required to access the **BATTERY** screen.

Figure 4-14 BATTERY-1

|                                                   |                   |       |                                                                                                                                           |  |
|---------------------------------------------------|-------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------|--|
| BATT Type                                         | lead-acid battery |       | BATTERY SETTING                                                                                                                           |  |
| Battery Number                                    | 32                | ---   | <div>Home</div> <div>Data</div> <div>Log</div> <div>Setting</div> <div>System</div> <div>Operate</div> <div>BMS</div> <div>Contacts</div> |  |
| Battery Capacity                                  | 12                | AH    |                                                                                                                                           |  |
| Float Charge Voltage/Cell                         | 2.25              | V     |                                                                                                                                           |  |
| Boost Charge Voltage/Cell                         | 2.25              | V     |                                                                                                                                           |  |
| Charge Current Percent Limit                      | 10                | %     |                                                                                                                                           |  |
| <div>↓</div> Please Confirm Settings <div>✓</div> |                   |       |                                                                                                                                           |  |
| DATE&TIME                                         | LANGUAGE          | COMM. | USER                                                                                                                                      |  |
| BATTERY                                           | SERVICE           | RATE  | CONFIGURE                                                                                                                                 |  |

Figure 4-15 BATTERY-2

|                                                   |          |       |                                                                                                                                           |      |
|---------------------------------------------------|----------|-------|-------------------------------------------------------------------------------------------------------------------------------------------|------|
| EOD Voltage/Cell,@ 0.6C Current                   | 1.65     | V     | BATTERY SETTING                                                                                                                           |      |
| EOD Voltage/Cell,@ 0.15C Current                  | 1.75     | V     | <div>Home</div> <div>Data</div> <div>Log</div> <div>Setting</div> <div>System</div> <div>Operate</div> <div>BMS</div> <div>Contacts</div> |      |
| Charger sleep time                                | 3        | min   |                                                                                                                                           |      |
| Charge current limitation by Ah                   | 0.25     | C     |                                                                                                                                           |      |
| <div>↑</div> Please Confirm Settings <div>✓</div> |          |       |                                                                                                                                           |      |
| DATE&TIME                                         | LANGUAGE | COMM. |                                                                                                                                           | USER |
| BATTERY                                           | SERVICE  | RATE  | CONFIGURE                                                                                                                                 |      |

Table 4-10 BATTERY Settings

| Setting                   | Default           | Setting range                      | Remarks                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------|-------------------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BATT Type                 | Lead-acid battery | Lead-acid battery                  | -                                                                                                                                                                                                                                                                                                                                                                                    |
| Battery Number            | 40                | 24, 26, 28, 30, 32, 34, 36, 38, 40 | Relationship between the number of batteries and the output PF: <ul style="list-style-type: none"> <li>32–40 batteries: Output PF = 1</li> <li>30 batteries: Output PF = 0.9</li> <li>28 batteries: Output PF = 0.8</li> <li>24–26 batteries: Output PF = 0.7</li> </ul> If the number of batteries is increased from 24–30 to 32–40, restart the UPS to restore the output PF to 1. |
| Battery Capacity          | 20 Ah             | 1–30000 Ah                         | -                                                                                                                                                                                                                                                                                                                                                                                    |
| Float Charge Voltage/Cell | 2.25 V/cell       | 2.10–2.35 V/cell                   | -                                                                                                                                                                                                                                                                                                                                                                                    |
| Boost Charge Voltage/Cell | 2.25 V/cell       | 2.20–2.45 V/cell                   | -                                                                                                                                                                                                                                                                                                                                                                                    |

| Setting                           | Default     | Setting range              | Remarks |
|-----------------------------------|-------------|----------------------------|---------|
| Charge Current Percent Limit      | 10%         | 1–26%                      | -       |
| EOD Voltage/Cell, @ 0.6C Current  | 1.65 V/cell | 1.6–1.85 V/cell            | -       |
| EOD Voltage/Cell, @ 0.15C Current | 1.75 V/cell | 1.65–1.90 V/cell           | -       |
| Charger sleep time                | 3 min       | 3–3600 min                 | -       |
| Charge current limitation by Ah   | 0.25C       | 0.10C, 0.15C, 0.20C, 0.25C | -       |

## 4.4.6 SERVICE

Figure 4-16 and Figure 4-17 show the **SERVICE** screens. Tap  or  to switch between the screens. You can configure the system mode, parallel parameters, frequency tracking parameters, and other settings.

 **Note:** The HMI level-2 password is required to access the **SERVICE** screen.

Figure 4-16 SERVICE-1

|                                                                                                                                                                                                 |          |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| System Mode                                                                                                                                                                                     | Single   |       | SERVICE SETTING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| Parallel Number                                                                                                                                                                                 | 1        | ---   |  Home<br> Data<br> Log<br> Setting<br> System<br> Operate<br> BMS<br> Contacts |  |
| Parallel ID                                                                                                                                                                                     | 1        | ---   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| Slew Rate                                                                                                                                                                                       | 1.2      | Hz/S  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| Synchronization Window                                                                                                                                                                          | 1.2      | Hz    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| System Auto Start Mode After EOD                                                                                                                                                                | Normal   |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
|  Please Confirm Settings  |          |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| DATE&TIME                                                                                                                                                                                       | LANGUAGE | COMM. | USER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
| BATTERY                                                                                                                                                                                         | SERVICE  | RATE  | CONFIGURE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |

Figure 4-17 SERVICE-2

|                                                                                                                                                                                                 |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| LBS                                                                                                                                                                                             | Master   | SERVICE SETTING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |
|  Please Confirm Settings  |          |  Home<br> Data<br> Log<br> Setting<br> System<br> Operate<br> BMS<br> Contacts |           |
|                                                                                                                                                                                                 |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |
|                                                                                                                                                                                                 |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |
|                                                                                                                                                                                                 |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |
|                                                                                                                                                                                                 |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |
| DATE&TIME                                                                                                                                                                                       | LANGUAGE | COMM.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | USER      |
| BATTERY                                                                                                                                                                                         | SERVICE  | RATE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | CONFIGURE |



Table 4-11 SERVICE settings

| Setting                          | Default  | Setting range                                       | Remarks |
|----------------------------------|----------|-----------------------------------------------------|---------|
| System Mode                      | Single   | Single, parallel, single ECO, parallel ECO, and LBS | -       |
| Parallel number                  | 1        | 1, 2, 3, 4                                          | -       |
| Parallel ID                      | 0        | 0, 1, 2, 3                                          | -       |
| Slew rate                        | 2.0 Hz/s | 0.1–2.0 Hz/s                                        | -       |
| Synchronization Window           | 3.0 Hz   | 0.5–5.0 Hz                                          | -       |
| System Auto Start Mode After EOD | Normal   | Normal operation, bypass only, output prohibited    | -       |
| LBS                              | Slave    | Master, slave                                       | -       |

#### 4.4.7 RATE

Figure 4-18 shows the **RATE** screen, where you can configure the rated power, voltage, and frequency.

 **Note:** The HMI level-3 password is required to access the **Rate** screen.

Figure 4-18 RATE

|                                                             |          |       |                                                                                                                                           |  |
|-------------------------------------------------------------|----------|-------|-------------------------------------------------------------------------------------------------------------------------------------------|--|
| Rated Power                                                 | 40       | kVA   | RATE SETTING                                                                                                                              |  |
| Rated Input Voltage                                         | 220      | V     | <div>Home</div> <div>Data</div> <div>Log</div> <div>Setting</div> <div>System</div> <div>Operate</div> <div>BMS</div> <div>Contacts</div> |  |
| Rated Input Frequency                                       | 50       | Hz    |                                                                                                                                           |  |
| Rated Output Voltage                                        | 220      | V     |                                                                                                                                           |  |
| Rated Output Frequency                                      | 50       | Hz    |                                                                                                                                           |  |
| System Code                                                 | 0        | ---   |                                                                                                                                           |  |
| Please Confirm Settings <input checked="" type="checkbox"/> |          |       |                                                                                                                                           |  |
| DATE&TIME                                                   | LANGUAGE | COMM. | USER                                                                                                                                      |  |
| BATTERY                                                     | SERVICE  | RATE  | CONFIGURE                                                                                                                                 |  |

Table 4-12 RATE settings

| Setting                | Default                | Setting range       | Remarks                                                                  |
|------------------------|------------------------|---------------------|--------------------------------------------------------------------------|
| Rated Power            | 10, 15, 20, 30, 40 kVA | -                   | Automatically detected by the software; cannot be configured via the HMI |
| Rated Input Voltage    | 220 V                  | 220 V, 230 V, 240 V | UPS restart required for the setting to take effect                      |
| Rated Input Frequency  | 50 Hz                  | 50 Hz, 60 Hz        | UPS restart required for the setting to take effect                      |
| Rated Output Voltage   | 220 V                  | 220 V, 230 V, 240 V | UPS restart required for the setting to take effect                      |
| Rated Output Frequency | 50 Hz                  | 50 Hz, 60 Hz        | UPS restart required for the setting to take effect                      |
| System Code            | 19968                  | -                   | -                                                                        |

### 4.4.8 CONFIGURE

Figure 4-19 shows the configuration settings, where you can adjust the HMI display parameters.

Figure 4-19 CONFIGURE

|                                                             |                |       |
|-------------------------------------------------------------|----------------|-------|
| Display Mode                                                | Landscape Mode |       |
| Back Light Time (1~30min)                                   | 0              | min   |
| Contrast                                                    |                | - +   |
| Filter Check                                                |                |       |
| Alert Time Set                                              | 0              | Days  |
| Used Days                                                   | 0              | Reset |
| Please Confirm Settings <input checked="" type="checkbox"/> |                |       |
| DATE&TIME                                                   | LANGUAGE       | COMM. |
| BATTERY                                                     | SERVICE        | RATE  |
| USER                                                        | CONFIGURE      |       |

CONFIGURE

Home

Data

Log

Setting

System

Operate

BMS

Contacts

Table 4-13 CONFIGURE settings

| Setting                     | Default               | Setting range | Remarks |
|-----------------------------|-----------------------|---------------|---------|
| Display Mode                | Landscape Mode        | -             | -       |
| Back Light Time             | 10 min                | 1–30 min      | -       |
| Contrast                    | 100%                  | 0–100%        | -       |
| Filter Check Alert Time Set | 360 days              | 30–3000 days  | -       |
| Used Days                   | Automatically counted | -             | -       |

### 4.5 Contacts

Tap **Contacts** on the menu bar to open the configuration screen for dry contact inputs and outputs, as shown in Figure 4-20. You can configure all configurable dry contact functions on this screen.

 **Note:** The HMI level-1 password is required to access the **Contacts** screen.

Figure 4-20 Contacts

|                     |  |          |  |
|---------------------|--|----------|--|
|                     |  | Contacts |  |
| Input contact J4-3  |  | Home     |  |
| Input contact J3-3  |  | Data     |  |
| Input contact J2-1  |  | Log      |  |
|                     |  | Setting  |  |
| Output contact J3-1 |  | System   |  |
| Output contact J1   |  | Operate  |  |
| Output contact J5-2 |  | BMS      |  |
| Output contact J5-5 |  | Contacts |  |

### 4.5.1 Dry contact inputs

Tap the dry contact input to be configured, as shown in Figure 4-21, and select its function.

Figure 4-21 Contacts (inputs)

Table 4-14 Contacts (inputs) settings

| Setting             | Description                                                                                                        | Setting              | Description                                                                                                              |
|---------------------|--------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------|
| Generator input     | The generator is connected to the system.                                                                          | Mute                 | Mutes the buzzer.                                                                                                        |
| BCB status          | Indicates whether the battery breaker is open or closed.                                                           | Transfer inverter    | Transfers the UPS to normal mode.                                                                                        |
| BCB on              | Enables battery breaker status monitoring.                                                                         | Transfer bypass      | Transfers the UPS to bypass mode.                                                                                        |
| Turn off charger    | Disables the battery charger.                                                                                      | Alarm cleared        | Clears the current alarms.                                                                                               |
| BMS allows charge   | Charging is allowed when the signal is active. If the signal is inactive, a battery overcharge alarm is triggered. | BMS allows discharge | Discharging is allowed when the signal is active. If the signal is inactive, a battery overdischarge alarm is triggered. |
| Electrolyte leakage | Indicates electrolyte leakage.                                                                                     | Stop boost charge    | The charger exits boost charge mode.                                                                                     |
| MBB contact NC      | The maintenance bypass switch is closed (NC contact).                                                              | MBB contact NO       | The maintenance bypass switch is closed (NO contact).                                                                    |

### 4.5.2 Dry contact outputs

Tap the dry contact output to be configured, as shown in Figure 4-22, and select its function.

Figure 4-22 Contacts (outputs)

| Settings            |                      |
|---------------------|----------------------|
| BB shunt trip       | Bypass backfeed trip |
| Overload            | General alarm        |
| Output lost         | Battery mode         |
| Utility Fail        | On inverter          |
| Battery charge      | Normal mode          |
| Battery voltage low | On bypass            |

↑ ↓ Please Confirm Settings ✓

Contacts

Home
 Data

Log
 Setting

System
 Operate

BMS
 Contacts

Table 4-15 Contacts (outputs) settings

| Setting              | Description                                                                                                       | Setting           | Description                                                                          |
|----------------------|-------------------------------------------------------------------------------------------------------------------|-------------------|--------------------------------------------------------------------------------------|
| Battery charge       | The dry contact output activates when the battery enters boost charge or float charge mode.                       | Battery discharge | The dry contact output activates when the UPS operates in battery discharge mode.    |
| Battery voltage low  | The dry contact output activates when the battery voltage is low.                                                 | Battery mode      | The dry contact output activates when the battery voltage is low.                    |
| BB shunt trip        | When a battery-related alarm occurs, the UPS drives the external shunt trip coil through this dry contact output. | UPS fail          | The dry contact output activates when a rectifier, inverter, or bypass fault occurs. |
| Bypass backfeed trip | When bypass backfeed occurs, the UPS drives the external trip coil through this dry contact output.               | Boost charge      | The dry contact output activates when the charger operates in boost charge mode.     |
| General alarm        | The dry contact output activates when one or more alarms occur.                                                   | Utility fail      | The dry contact output activates when utility power is abnormal.                     |
| Main backfeed trip   | When main input backfeed occurs, the UPS drives the external trip coil through this dry contact output.           | Normal mode       | The dry contact output activates when the UPS operates in normal mode.               |
| On bypass            | The dry contact output activates when the UPS operates in bypass mode.                                            | On inverter       | The dry contact output activates when the UPS operates in inverter mode.             |
| Overload             | The dry contact output activates when the UPS is overloaded.                                                      | Output lost       | The dry contact output activates when the load is disconnected.                      |
| Rectifier ready      | The dry contact output activates when the rectifier is turned on.                                                 | -                 | -                                                                                    |

## 4.6 Control functions

Tap **Operate** on the menu bar to open the **Operate** screen, as shown in Figure 4-23. On this screen, you can start up or shut down the UPS, switch operating modes, and perform battery self-tests and battery maintenance.

Figure 4-23 Operate

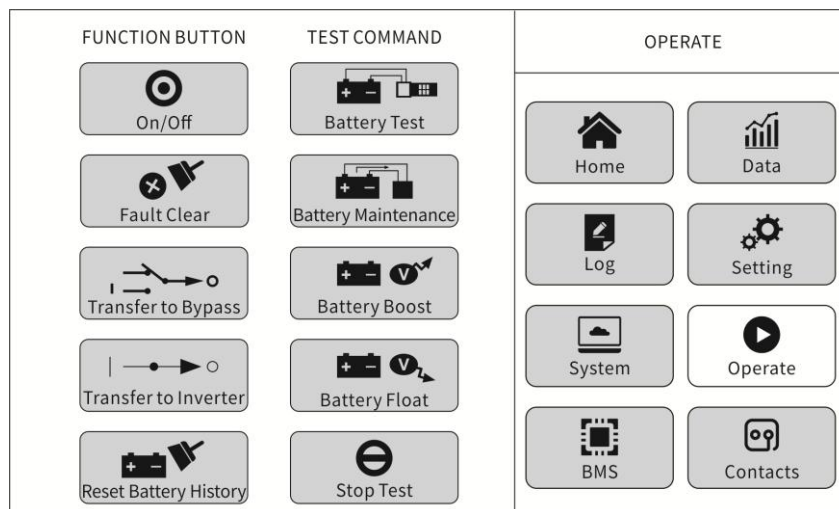


Table 4-16 Operate settings

| Function              | Description                                                                                                     | Remarks                                                                                                                                                                                                  |
|-----------------------|-----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| On/Off                | Shuts down the rectifier and inverter and transfers the UPS to bypass mode.                                     | -                                                                                                                                                                                                        |
| Fault Clear           | Clears the current fault status.<br><b>Note:</b> This operation requires the HMI level-1 password.              | -                                                                                                                                                                                                        |
| Transfer to Bypass    | Transfers the UPS to bypass mode.<br><b>Note:</b> This operation requires the HMI level-1 password.             | After the UPS is manually transferred to bypass mode, the <b>Transfer to Bypass</b> button changes to <b>Esc Bypass</b> . Tap the button to exit bypass mode and transfer the UPS back to inverter mode. |
| Transfer to Inverter  | Transfers the UPS to inverter mode. Interrupted transfer is supported.                                          | -                                                                                                                                                                                                        |
| Reset Battery History | Clears battery history.<br><b>Note:</b> This operation requires the HMI level-1 password.                       | -                                                                                                                                                                                                        |
| Battery Test          | Manually starts the battery self-test.<br><b>Note:</b> This operation requires the HMI level-1 password.        | -                                                                                                                                                                                                        |
| Battery Maintenance   | Manually starts the battery maintenance test.<br><b>Note:</b> This operation requires the HMI level-2 password. | -                                                                                                                                                                                                        |
| Battery Boost         | Manually starts boost charge mode.                                                                              | -                                                                                                                                                                                                        |
| Battery Float         | Manually starts float charge mode.                                                                              | -                                                                                                                                                                                                        |
| Stop Test             | Stops the battery self-test or maintenance test.                                                                | -                                                                                                                                                                                                        |

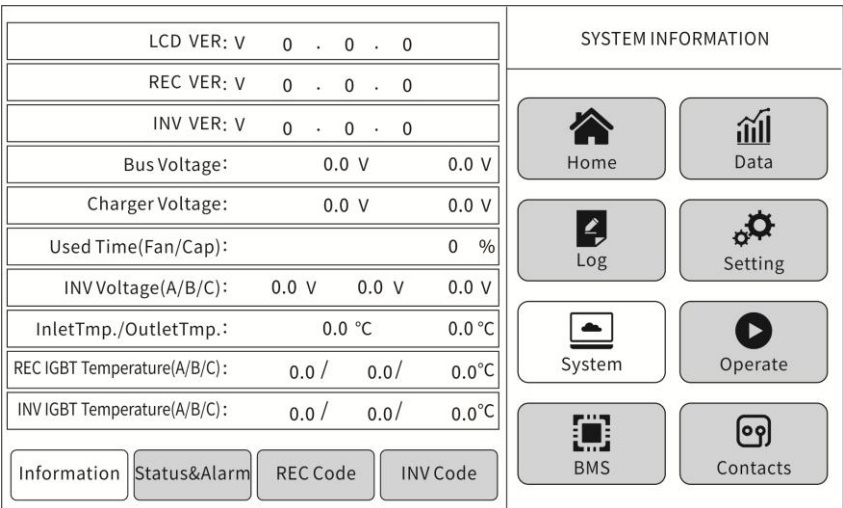
## 4.7 System

Tap **System** on the menu bar to access the **Information** and **Status & Alarm** screens.

### 4.7.1 Information

The **Information** screen is displayed by default when the **System** screen is opened, as shown in Figure 4-24. It shows the software versions, key voltages, fan speeds, and temperatures.

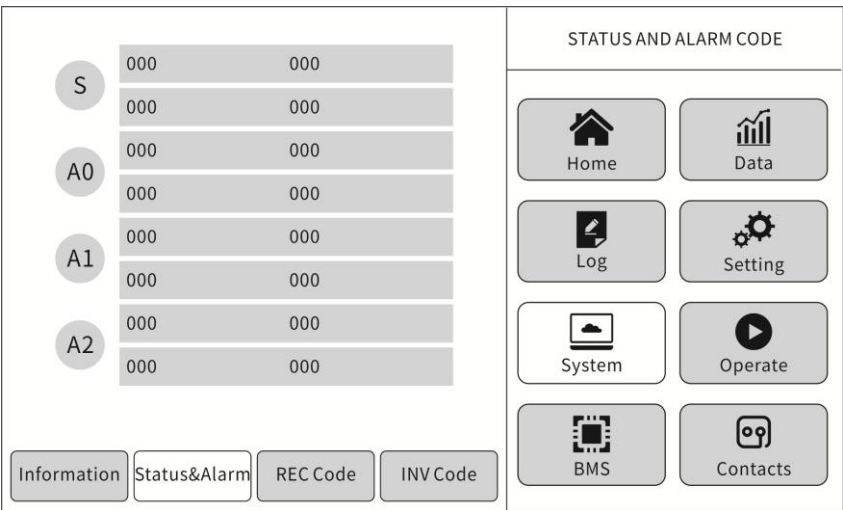
Figure 4-24 Information



### 4.7.2 Status & Alarm

Figure 4-25 shows the **Status & Alarm** screen. It can be used to analyze UPS status and alarm information.

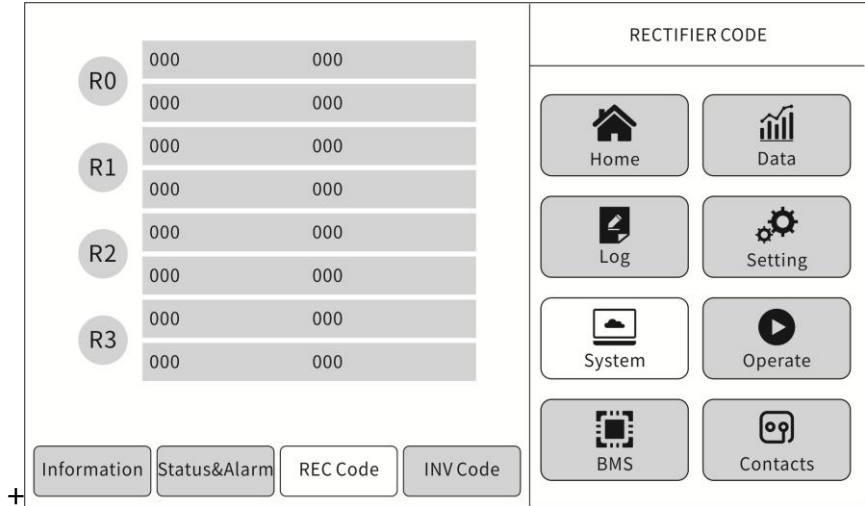
Figure 4-25 Status & Alarm



### 4.7.3 REC Code

Figure 4-26 shows the **REC Code** screen. It can be used to analyze the rectifier status.

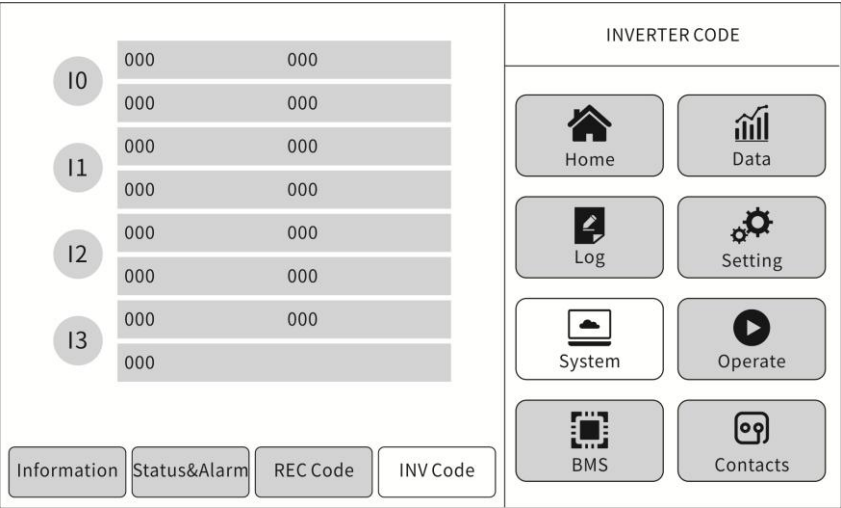
Figure 4-26 REC Code



4.7.4 INV-CODE

Figure 4-27 shows the **INV-CODE** screen. It can be used to analyze the inverter status.

Figure 4-27 INV-CODE



# 5 System operation

## 5.1 Single unit operation

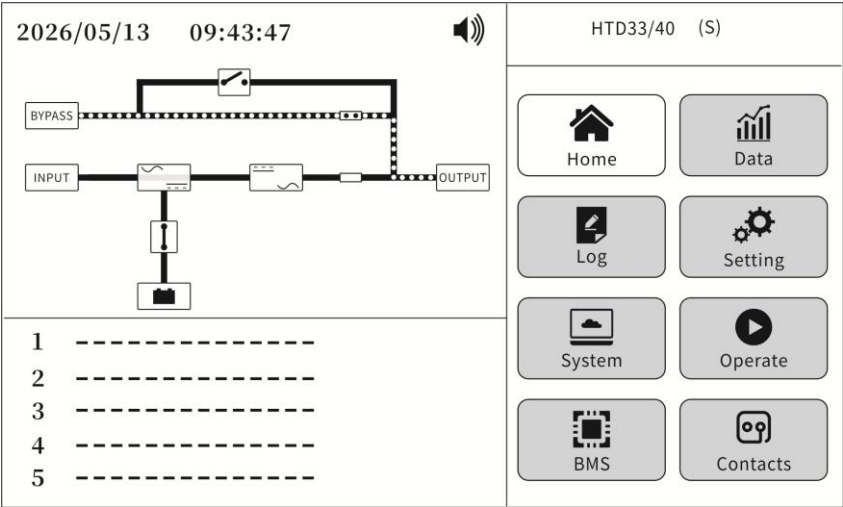
### 5.1.1 Starting the UPS

Step 1 Ensure that all switches are in the open (OFF) position.

Step 2 Close the bypass input switch (Bypass Input).

The HMI powers on. After approximately 30 s, the UPS automatically enters bypass mode. The power flow diagram is shown in Figure 5-1.

Figure 5-1 Power flow diagram in bypass mode

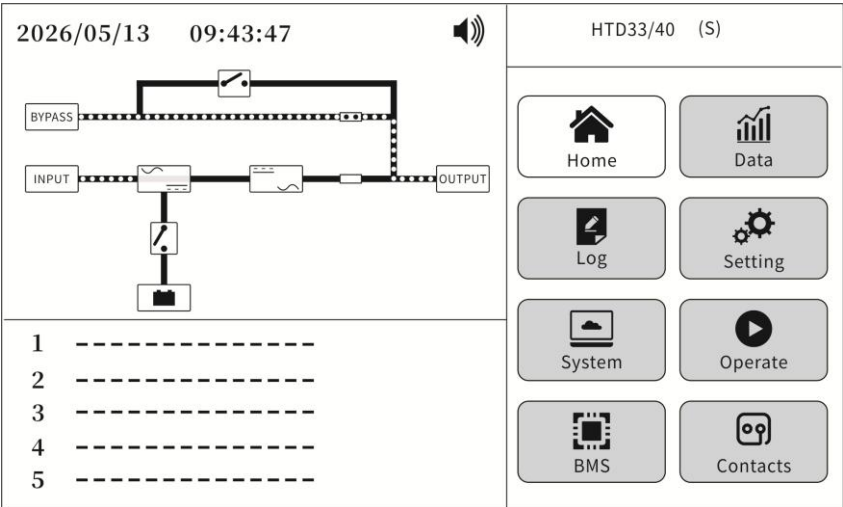


Step 3 Close the output switch (Output).

Step 4 Close the main input switch (Main Input).

After approximately 10 s, the UPS rectifier starts automatically. The power flow diagram is shown in Figure 5-2.

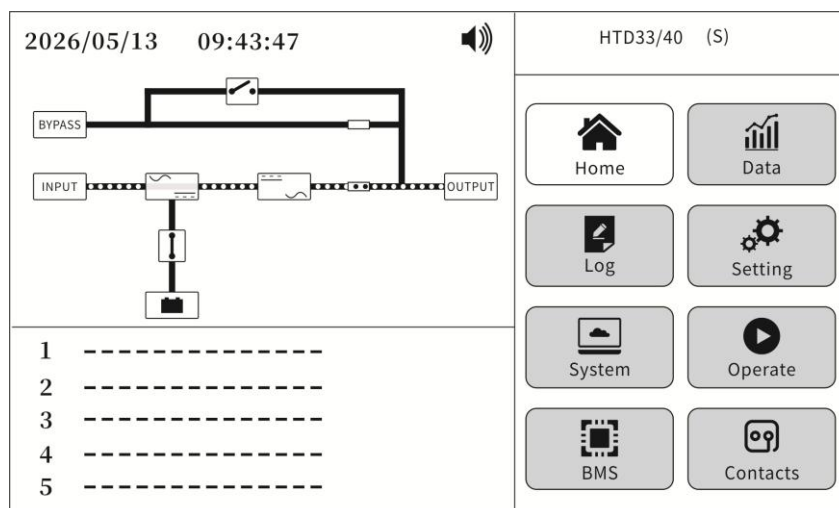
Figure 5-2 Rectifier on



Step 5 After approximately 100 s, the UPS automatically transfers from bypass mode to normal mode, with the load supplied by the inverter, as shown in Figure 5-3.

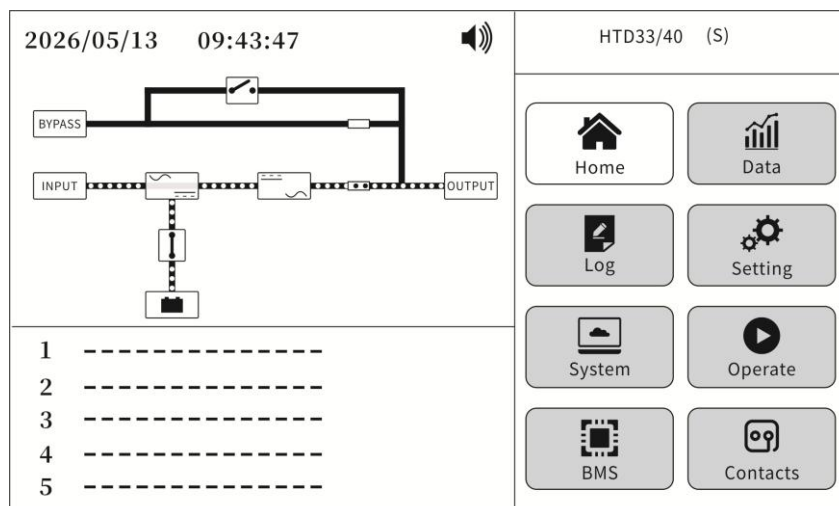


Figure 5-3 Normal mode



Step 6 Close the external battery switch. After approximately 30 s, the charger starts charging the battery, completing the UPS startup process, as shown in Figure 5-4.

Figure 5-4 Charger on



**Note:**

- After the initial startup, you can configure the date, language, and system settings as described in section 4.4 Setting.
- During startup, various events that occur can be reviewed through the History Log.

### 5.1.2 Starting the UPS in battery mode

Starting the UPS in battery mode is also known as a battery cold start. To perform a battery cold start, follow these steps:

**Note:** To ensure proper battery cold start, the positive and negative battery voltages must be within the range of 140–270 V.

Step 1 Ensure that the optional battery cold start kit is properly installed, and close the external battery switch.

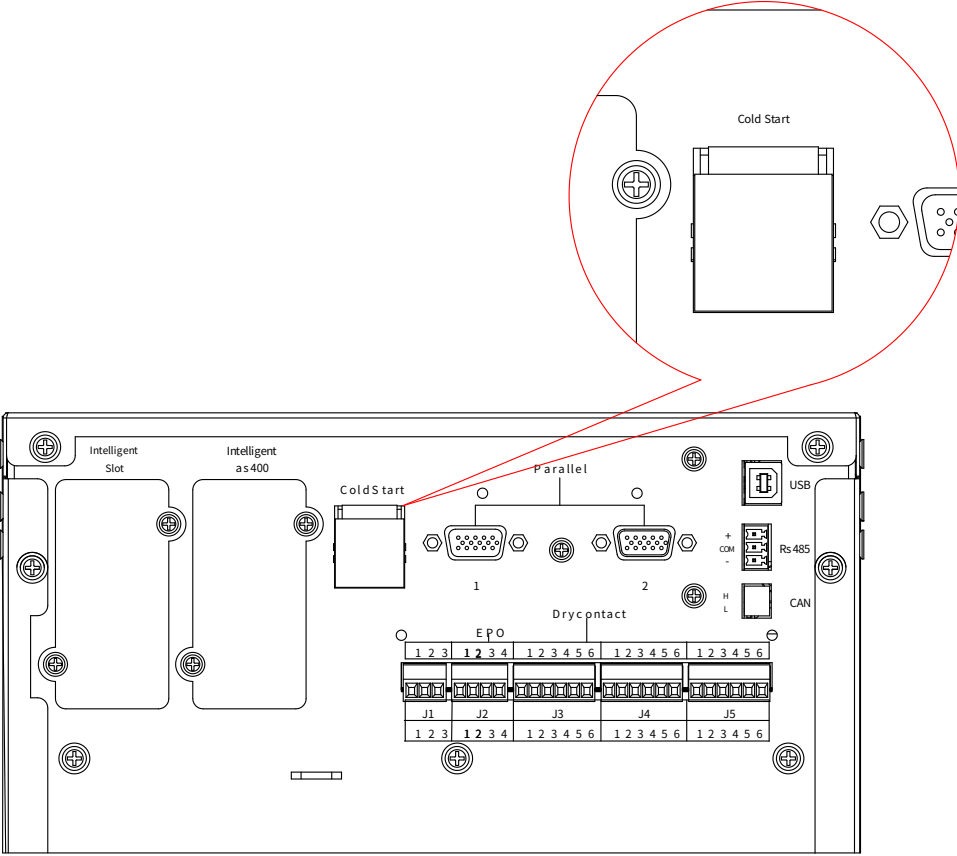
**Note:** After closing the battery switch, wait approximately 5 min to allow the capacitors in the battery cold start kit to charge.

Step 2 Press and hold the red battery start button on the rear of the UPS for 3–10 s until the HMI powers on.

The location of the button is shown in Figure 5-5.

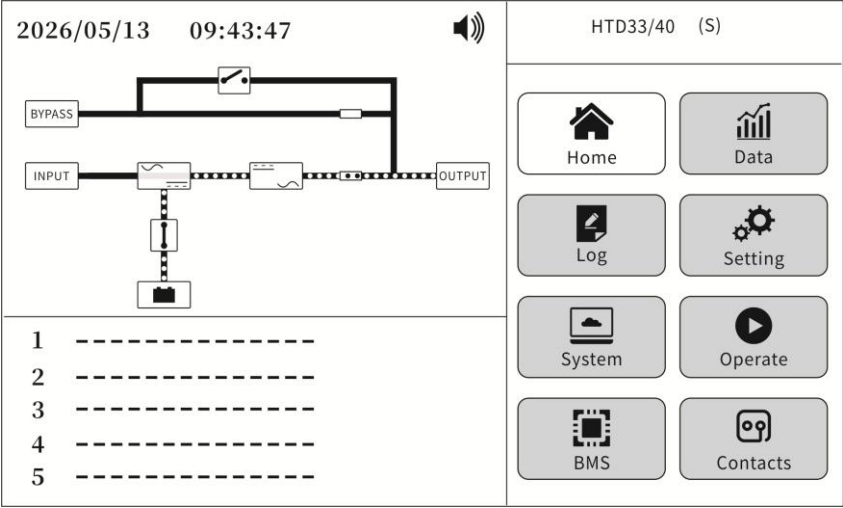
**Note:** Do not hold the button for more than 30 s.

Figure 5-5 Battery cold start button location



**Step 3** The UPS starts as described in Steps 4 and 5 of section 5.1.1 Starting the UPS. The rectifier and inverter start, and the UPS completes startup in battery mode, with the load supplied by the inverter. The entire startup process takes approximately 60 s, as shown in Figure 5-6.

Figure 5-6 Power flow diagram in battery mode

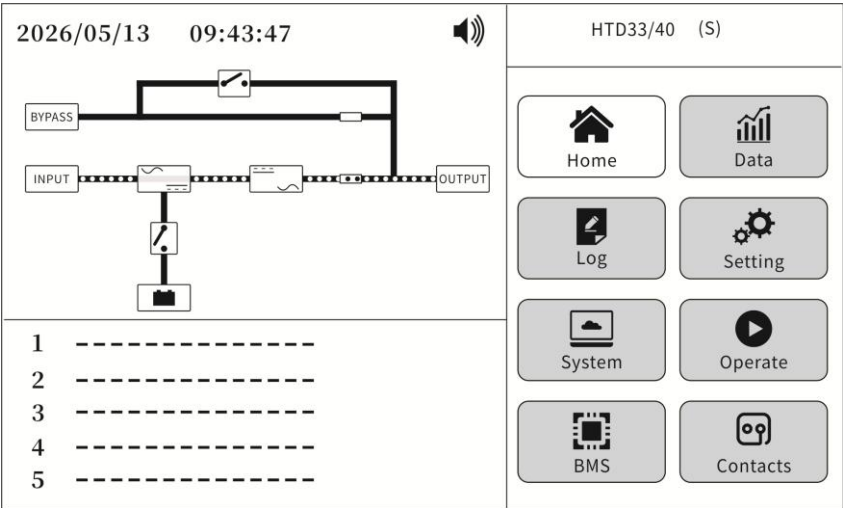


### 5.1.3 Shutting down the UPS

Step 1 Open the external battery switch.

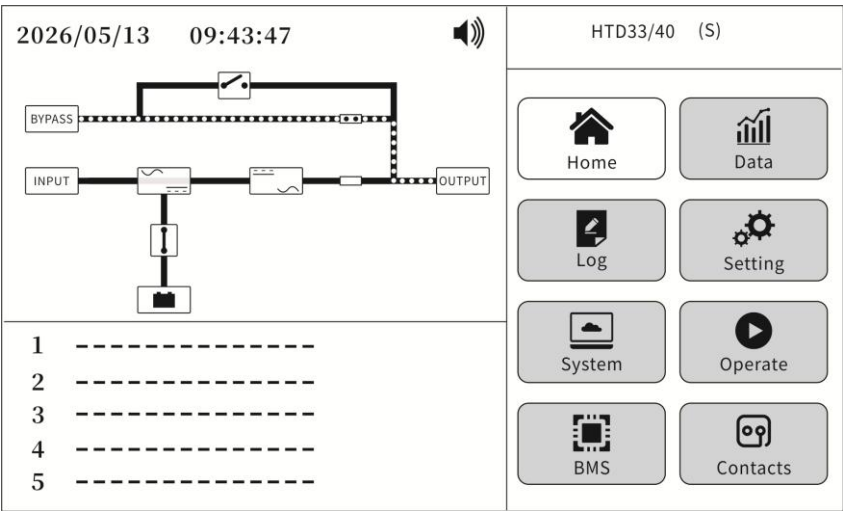
- After approximately 10 s, the charger automatically shuts down. The power flow diagram is shown in Figure 5-7.

Figure 5-7 Charger off



Step 2 On the HMI main screen, tap **Operate > On/Off**. The UPS displays the **Manual Shutdown** alarm, shuts down the rectifier and inverter, and transfers to bypass mode, as shown in Figure 5-8.

Figure 5-8 Power flow diagram in bypass mode



Step 3 Open the main input switch (Main Input) and the bypass input switch (Bypass Input).

Step 4 Open the output switch (Output).

### 5.1.4 Performing an EPO

Press the EPO button on the UPS control panel, as shown in Figure 5-9, or remove the jumper connecting dry contact terminals J2-3 and J2-4, as shown in Figure 5-10. The HMI displays an **EPO** alarm. The UPS immediately shuts down the rectifier and inverter, disconnects power to the load from both the inverter and bypass, and stops battery charging or discharging.

Figure 5-9 EPO button

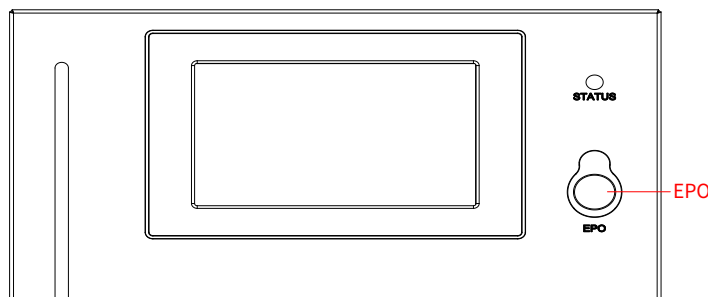
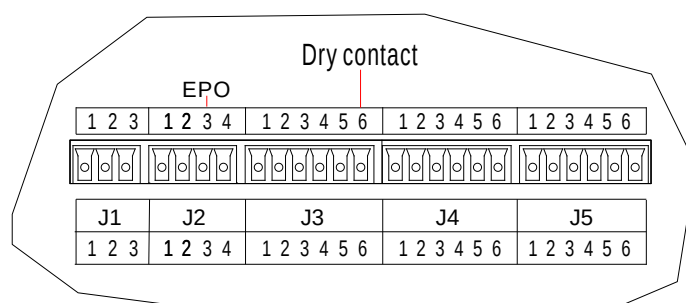


Figure 5-10 EPO dry contact jumper



 **Note:** Do not activate the EPO function unless an emergency occurs.

## 5.2 Parallel system operation

### 5.2.1 Starting the parallel system

Step 1 Before starting the parallel system, start each UPS and configure the parallel parameters.

A On the HMI of each UPS, tap **Setting** > **Service**, and configure the following parameters.

Table 5-1 Parallel setting descriptions

| Item            | Setting                                                                                                                                             |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| System Mode     | Parallel                                                                                                                                            |
| Parallel Number | Select 2, 3, or 4 according to the number of UPS units in the parallel system                                                                       |
| Parallel ID     | Set according to the number of UPS units in the parallel system:<br>2 units: IDs 0 and 1<br>3 units: IDs 0, 1, and 2<br>4 units: IDs 0, 1, 2, and 3 |

B On each UPS, tap **Setting** > **Rate**, and configure the rated parameters. Ensure that the rated parameters are identical for all UPS units.

C After completing the settings, power down each UPS.

Step 2 Ensure that all switches in the parallel system are in the open position.

Step 3 Close the output switches (Output) of all UPS units in the parallel system.

Step 4 Close the bypass input switches (Bypass Input) of all UPS units in the parallel system.

Step 5 Close the main input switches (Main Input) of all UPS units in the parallel system.

Step 6 Close the external battery switches of all UPS units in the parallel system.

## 5.2.2 Shutting down the parallel system

Step 1 Open the external battery switches of all UPS units in the parallel system.

Step 2 Open the main input switches (Main Input) of all UPS units in the parallel system.

Step 3 Open the bypass input switches (Bypass Input) of all UPS units in the parallel system.

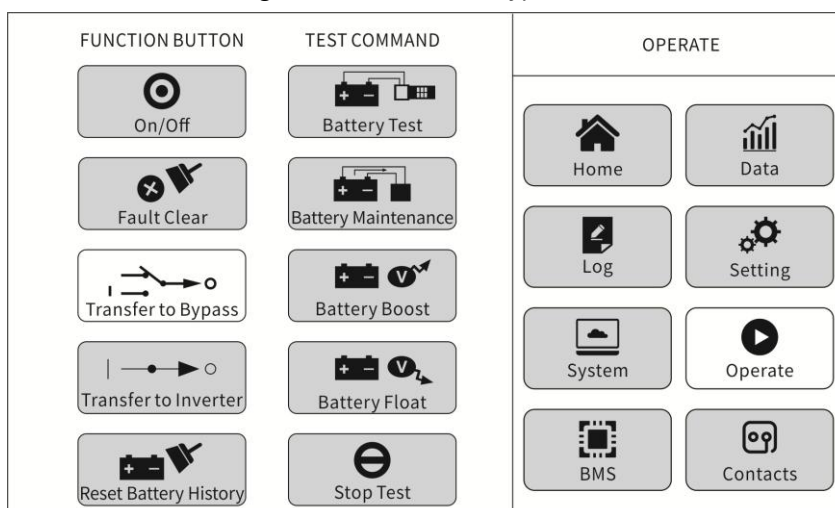
Step 4 Open the output switches (Output) of all UPS units in the parallel system.

## 5.3 Transferring between operating modes

### 5.3.1 From normal mode to bypass mode

On the HMI main screen, tap **Operate> Transfer to Bypass**. The UPS transfers to bypass mode, as shown in Figure 5-11.

Figure 5-11 Transfer to Bypass

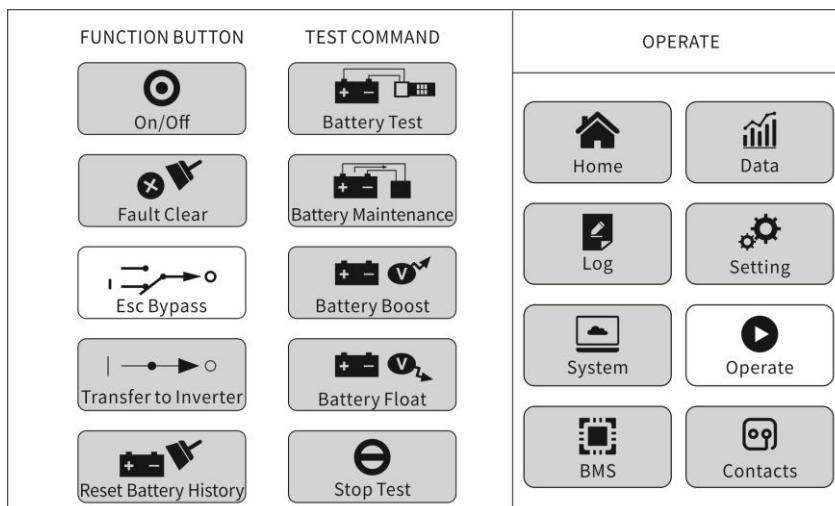


**Note:** Before performing a manual bypass transfer, ensure that the bypass is normal. If the bypass is abnormal, the transfer may fail.

### 5.3.2 From bypass mode to normal mode

On the HMI main screen, tap **Operate > Esc Bypass**. The UPS transfers to normal mode, as shown in Figure 5-12.

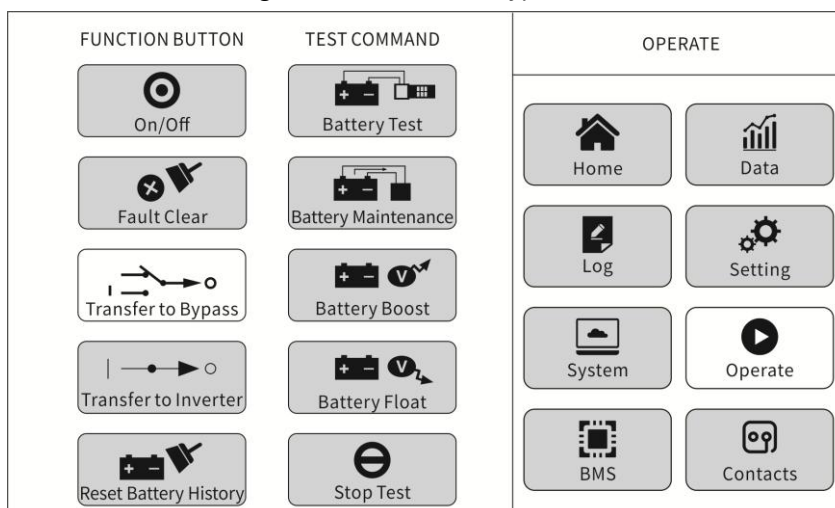
Figure 5-12 Esc Bypass



### 5.3.3 From normal mode to maintenance bypass mode

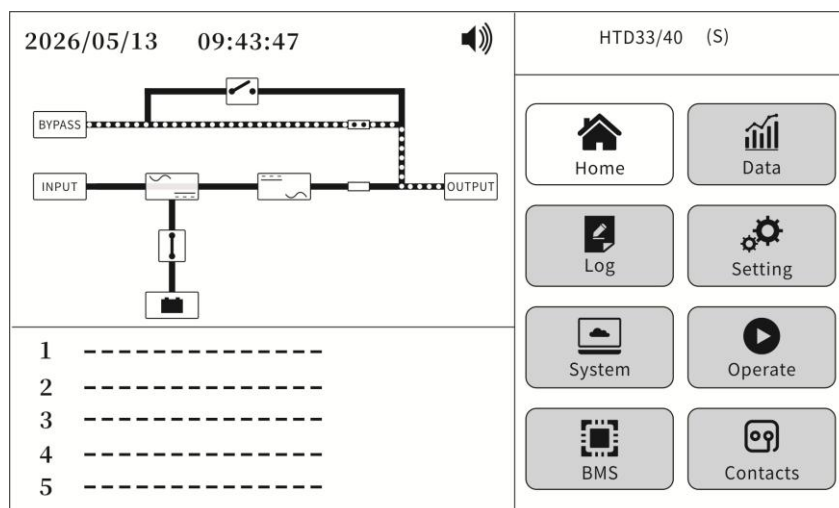
Step 1 On the HMI main screen, tap **Operate > Transfer to Bypass**. The UPS transfers to bypass mode, as shown in Figure 5-13.

Figure 5-13 Transfer to Bypass



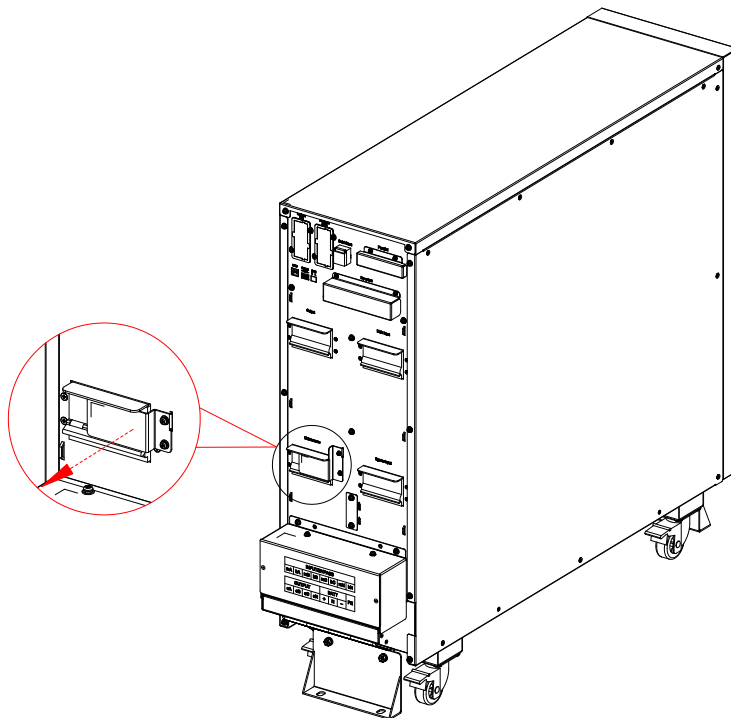
Step 2 Verify on the HMI home screen that the UPS is operating in bypass mode, as indicated by the power flow diagram in Figure 5-14.

Figure 5-14 Power flow diagram in bypass mode



Step 3 Remove the protective cover from the maintenance bypass switch (Maintenance), as shown in Figure 5-15. The HMI displays the **Maintenance CB Closed** alarm.

Figure 5-15 Maintenance bypass switch protective cover



Step 4 Close the maintenance bypass switch (Maintenance).

Step 5 Open the external battery switch.

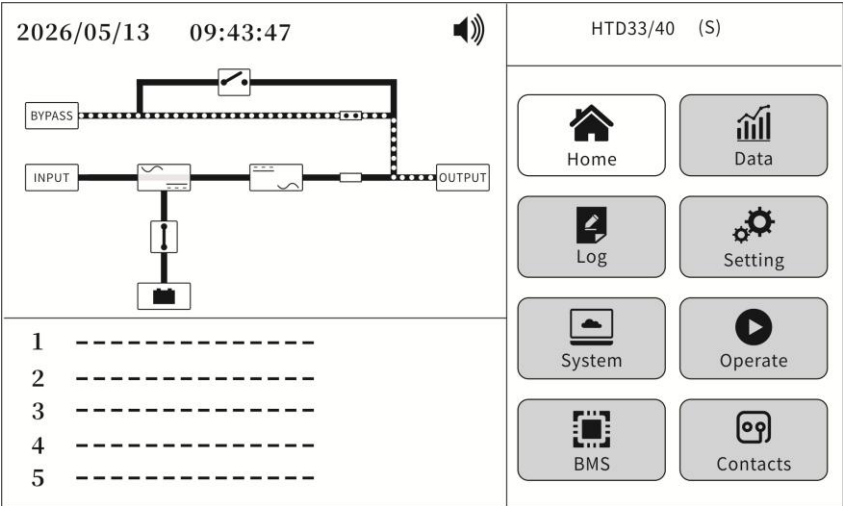
Step 6 Open the output switch (Output), the main input switch (Main Input), and the bypass input switch (Bypass Input).

### 5.3.4 From maintenance bypass mode to normal mode

Step 1 Ensure that the output switch (Output), main input switch (Main Input), bypass input switch (Bypass Input), and external battery switch are all in the open position.

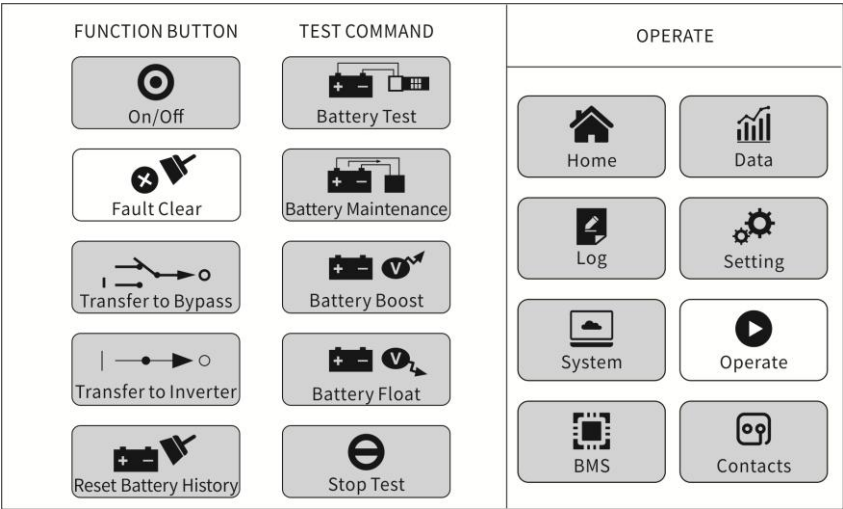
Step 2 Close the bypass input switch (Bypass Input). The HMI powers on and displays the **Maintenance CB Closed** alarm. The power flow diagram is shown in Figure 5-16.

Figure 5-16 Power flow diagram in bypass mode



- Step 3 Close the output switch (Output). The UPS operates in bypass mode.
- Step 4 Open the maintenance bypass switch (Maintenance).
- Step 5 Reinstall the protective cover on the maintenance bypass switch (Maintenance).
- Step 6 Close the main input switch (Main Input).
- Step 7 Close the external battery switch.
- Step 8 On the HMI main screen, tap **Operate > Fault Clear**, as shown in Figure 5-17. The UPS restarts and automatically transfers to normal mode after approximately 100 s.

Figure 5-17 Fault Clear



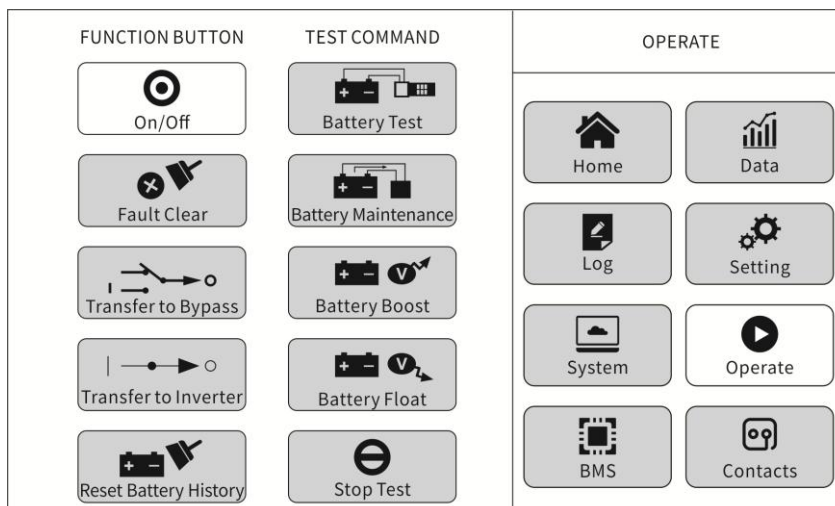
### 5.3.5 Removing a UPS from the parallel system

**Note:** Before performing this operation, ensure that the remaining UPS units can support the entire load.

- Step 1 On the HMI main screen of the UPS to be removed from the parallel system, tap **Operate > On/Off**, as shown in Figure 5-18.



Figure 5-18 On/Off



Step 2 Open the output switch (Output) of this UPS.

Step 3 Open the main input switch (Main Input) and bypass input switch (Bypass Input) of this UPS.

Step 4 Open the external battery switch of this UPS.

### 5.3.6 Adding a UPS to the parallel system

**Note:** Before performing this operation, ensure that all UPS units have been configured with the parallel parameters specified in section 5.2.1 Starting the parallel system.

Step 1 Ensure that all switches of this UPS are in the open position.

Step 2 Close the output switch (Output) of this UPS.

Step 3 Close the bypass input switch (Bypass Input) of this UPS.

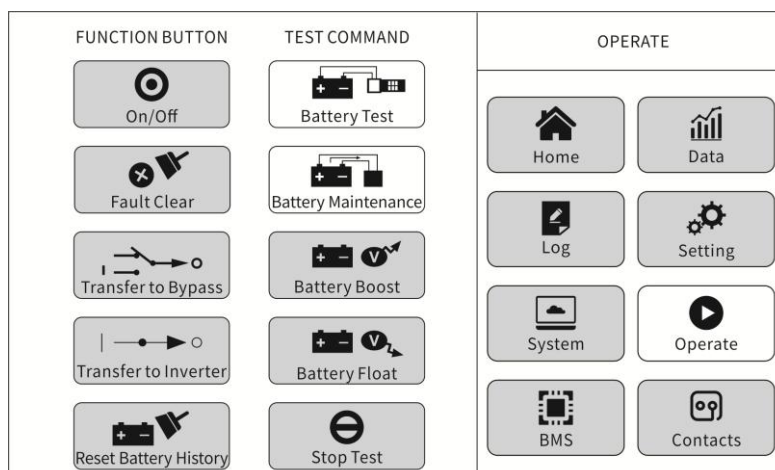
Step 4 Close the main input switch (Main Input) of this UPS.

Step 5 Close the external battery switch of this UPS.

## 5.4 Battery tests

If the battery has not been used for an extended period, perform a manual discharge test. As shown in Figure 5-19, 2 test methods are available: battery self-test and battery maintenance.

Figure 5-19 Battery tests



### ■ Battery Test

On the HMI main screen, tap **Operate > Battery Test**. The UPS transfers from normal mode to battery discharge mode and continues discharging until the **Battery Volt Low** alarm occurs. To stop battery discharging during the test, tap **Stop Test** on this screen.

### ■ Battery Maintenance

On the HMI main screen, tap **Operate > Battery Maintenance**. The UPS transfers from normal mode to battery discharge mode, discharges for approximately 20 s, and then automatically transfers back to normal mode. To stop battery discharging during the test, tap **Stop Test** on this screen.

#### Note:

- The battery test interval is 30 to 120 days. The test is disabled by default.
- During a battery self-test or maintenance, the load must remain between 20% and 100% of the UPS rated capacity. If the load is below 20% of the UPS rated capacity, automatic discharge maintenance cannot be performed.

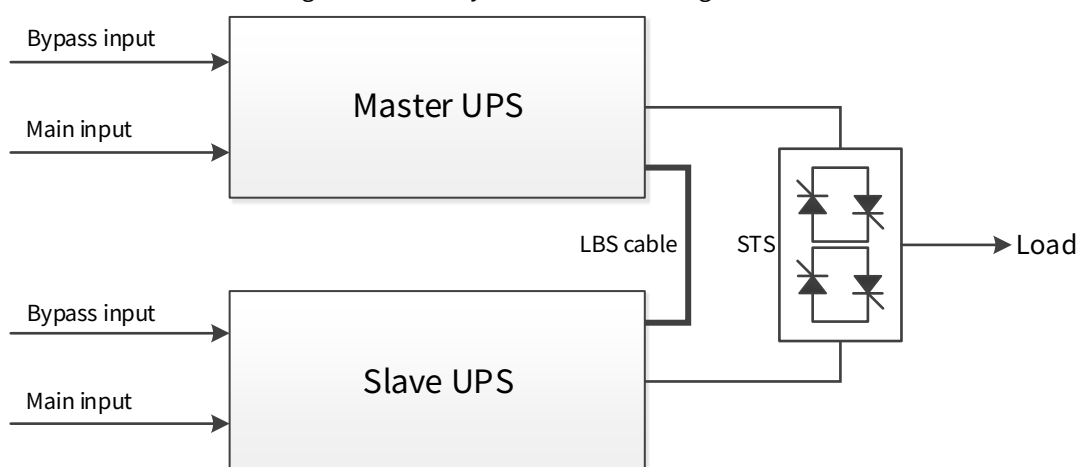
## 5.5 LBS function

### 5.5.1 Description

A dual bus system consists of 2 independent UPS units. This high-reliability configuration is suitable for loads with multiple input terminals. For single-input loads, a static transfer switch (STS) can be added to implement the dual bus function.

The LBS function is used to synchronize the outputs of the 2 UPS units. One UPS acts as the master and the other as the slave. The LBS system allows the master and/or the slave to operate independently in either normal mode or bypass mode. Figure 5-20 shows a schematic diagram of the LBS system.

Figure 5-20 LBS system schematic diagram



### 5.5.2 Wiring the LBS System

- Step 1 Connect each UPS to the utility power system and the load by following the wiring procedure in section 3.4.4 Connecting the power cables.
- Step 2 Connect the output of each UPS to the STS and the load, as shown in Figure 5-20.
- Step 3 Remove the protective cover from the parallel board of each UPS.
- Step 4 Connect the 2 UPS units using parallel cables by following the procedure in section 3.5.3 Parallel interface, and set the jumpers on the parallel boards as specified for 2 UPS units in parallel.

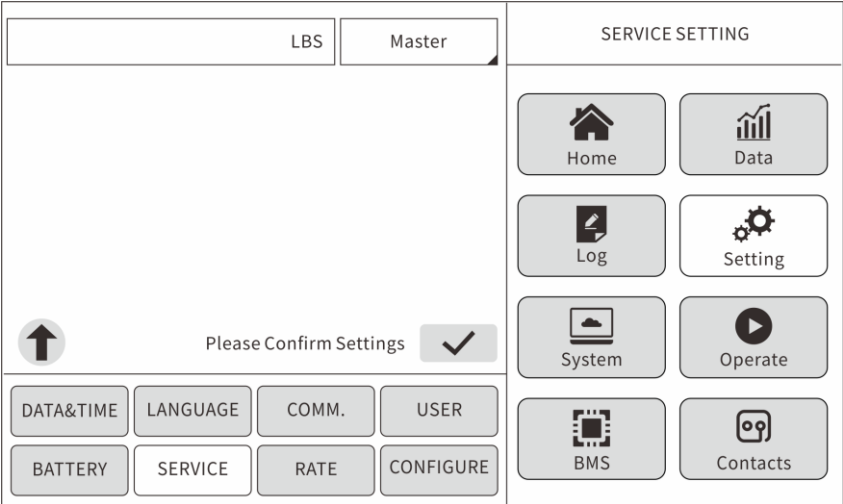
 **Note:** The LBS system uses the parallel cables and parallel interfaces.

### 5.5.3 Configuring the LBS System

- Step 1 Start the 2 UPS units in the LBS system by following the procedure in section 5.1.1 Starting the UPS.
- Step 2 On the HMI main screen of each UPS, tap **Setting** > **Service**. Then tap  to switch to the LBS settings screen, as shown in Figure 5-21. Select **Master** or **Slave** as required.

 **Note:** The UPS configured as the LBS master sends a synchronization signal based on its inverter voltage phase to the LBS slave. After receiving this synchronization signal, the slave adjusts its inverter voltage phase to achieve phase synchronization with the master.

Figure 5-21 LBS configuration



# 6 Maintenance

## 6.1 System maintenance

### DANGER

- The UPS can be transferred to maintenance bypass mode using the maintenance bypass switch so that components can be replaced. If maintenance bypass mode cannot be used, completely shut down and de-energize the UPS before repairing or replacing any components.

### WARNING

- Use dedicated insulated tools when maintaining the equipment.
- Use dedicated PPE when maintaining the equipment.
- Only qualified personnel may remove protective devices and maintain the equipment.

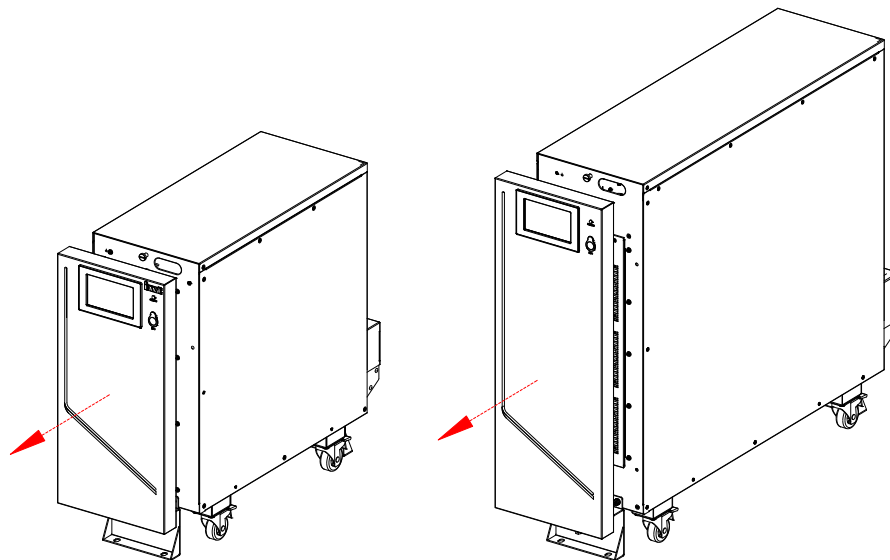
### 6.1.1 Replacing the filter

If the UPS has been operating for an extended period or is installed in a dusty environment, clean or replace the filter on the front panel as follows:

Step 1 Remove the magnetically attached front panel from the UPS, as shown in Figure 6-1.

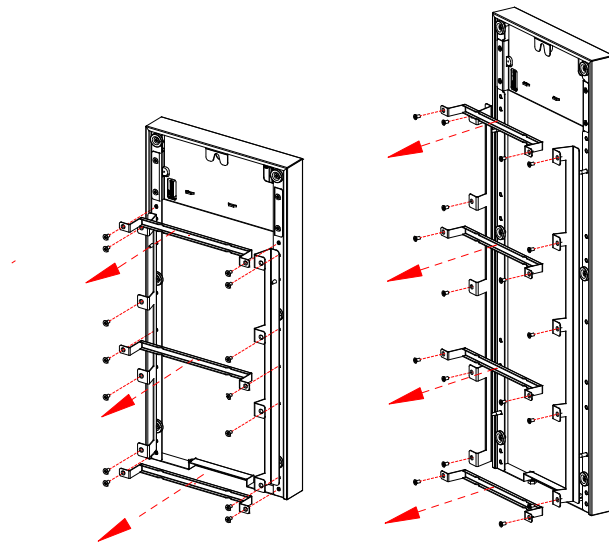
 **Note:** The front panel is connected to the HMI cable. Exercise care when removing the front panel.

Figure 6-1 Front panel removal (Left: 10–20 kVA models; Right: 30–40 kVA models)



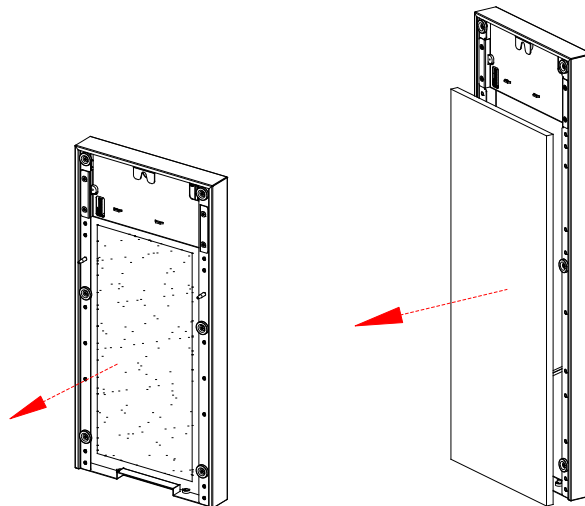
Step 2 Remove the filter fasteners from the front panel, as shown in Figure 6-2.

Figure 6-2 Filter fasteners (Left: 10–20 kVA models; Right: 30–40 kVA models)



Step 3 Remove the filter from the front panel, as shown in Figure 6-3.

Figure 6-3 Filter (Left: 10–20 kVA models; Right: 30–40 kVA models)

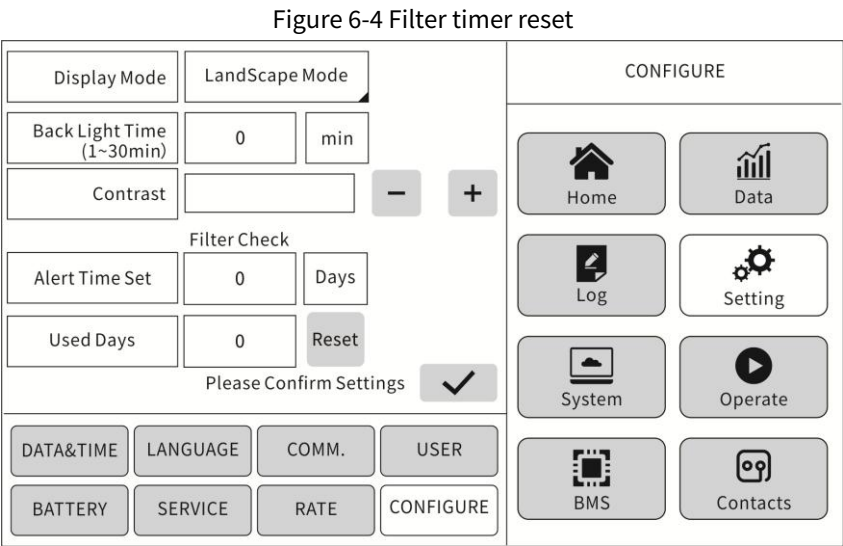


Step 4 Install a new dust filter.

Step 5 Reinstall the screws and filter fasteners removed earlier.

Step 6 Reinstall the front panel.

Step 7 On the HMI main screen, tap **Setting** > **CONFIGURE** to reset the **Used Days**, as shown in Figure 6-4.



### 6.1.2 Replacing the fan



#### **WARNING**

- Do not insert fingers or tools into the fan until it has come to a complete stop.
- Before replacing the fan assembly, ensure that the UPS is in maintenance bypass mode or is completely de-energized.

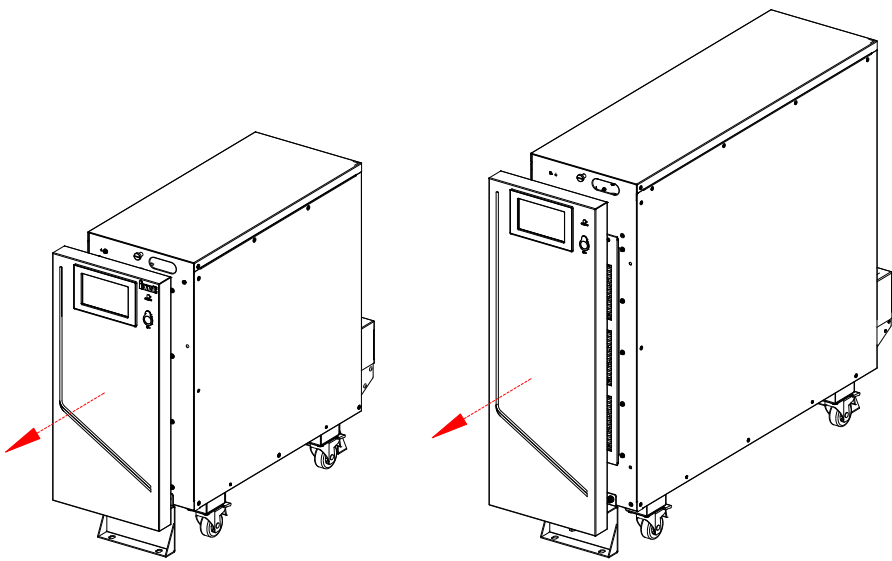
Under continuous operation, the UPS fans have an expected service life of 20,000–40,000 hours. Higher ambient temperatures shorten fan service life.

During UPS operation, inspect all fans every 6 months to ensure they are functioning properly and verify that air is flowing out from the ventilation holes on the rear panel of the UPS.

Step 1 Remove the magnetically attached front panel from the UPS, as shown in Figure 6-5.

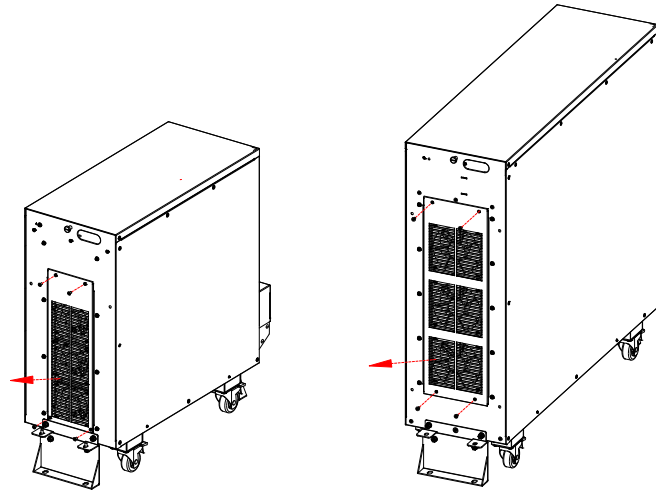
**Note:** The front panel is connected to the HMI cable. Exercise care when removing the front panel.

Figure 6-5 Front panel removal (Left: 10–20 kVA models; Right: 30–40 kVA models)



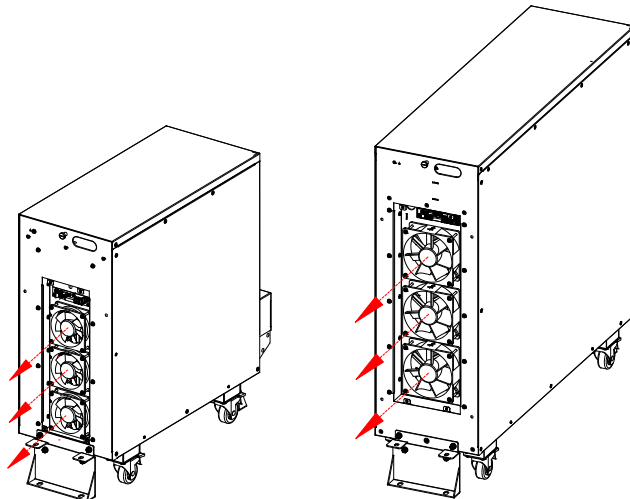
Step 2 Remove the fan cover, as shown in Figure 6-6.

Figure 6-6 Fan cover (Left: 10–20 kVA models; Right: 30–40 kVA models)



Step 3 Disconnect the fan cable and remove the fan, as shown in Figure 6-7.

Figure 6-7 Fan (Left: 10–20 kVA models; Right: 30–40 kVA models)



Step 4 Install the new fan. Then reinstall the removed components in the reverse order.

## 6.2 Battery string maintenance

Under normal operating conditions, Valve-Regulated Lead-Acid (VRLA) batteries do not require special maintenance. However, perform periodic inspections after a certain period of use to check for abnormalities such as an abnormal appearance, uneven voltage across batteries, or electrolyte leakage. If the batteries remain continuously charged for a long time, their activity may decline. Therefore, even if utility power is uninterrupted, perform periodic discharge tests to maintain battery health.

Strict adherence to standardized operating procedures during use can extend the service life of the batteries.

Key factors impacting battery lifespan:

| Item                     | Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Installation conditions  | Batteries must be installed in a clean, cool, ventilated, and dry environment. Avoid direct sunlight and any sources of radiant heat.<br> <b>Note:</b> Verify battery specifications, capacity, and quantity during installation. Do not mix batteries of different models or batches.                                                                                                                                                                                                                               |
| Ambient temperature      | The operating temperature for batteries should be maintained at approximately 25 °C.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Charge/discharge current | The discharge current range is typically 0.05C–3C. The optimal charge current for VRLA batteries is around 0.1C. The charge current should not exceed 0.3C. Excessive or insufficient charge currents will shorten battery service life.                                                                                                                                                                                                                                                                                                                                                              |
| Charge voltage           | Since UPS batteries operate in standby mode, they remain charged when utility power is normal and only discharge during a power outage. To extend battery life, the UPS charger typically uses constant-voltage and current-limiting control. Once fully charged, the batteries switch to float charge, with the float voltage set to approximately 13.5 V per battery.<br> <b>Note:</b> If the charge voltage is too high, the batteries will be overcharged; if it is too low, the batteries will be undercharged. |
| Depth of discharge       | Battery cycle life is closely related to the Depth of Discharge (DoD). The deeper the battery is discharged, the fewer charge-discharge cycles it can sustain. Avoid deep discharge, especially under light-load or no-load conditions.                                                                                                                                                                                                                                                                                                                                                               |

 **Note:**

- Daily battery inspections are critical. Regularly check the battery terminals for tightness and monitor for any abnormal heating during operation.
- Replace any leaking or damaged battery. Dispose of damaged components in acid-resistant containers and follow local regulations for proper disposal.



# Appendix A Dimensions

The dimensions of the UPS cabinet are shown in Figure A-1 and Figure A-2 (unit: mm).

Figure A-1 Dimensions (10–20 kVA models)

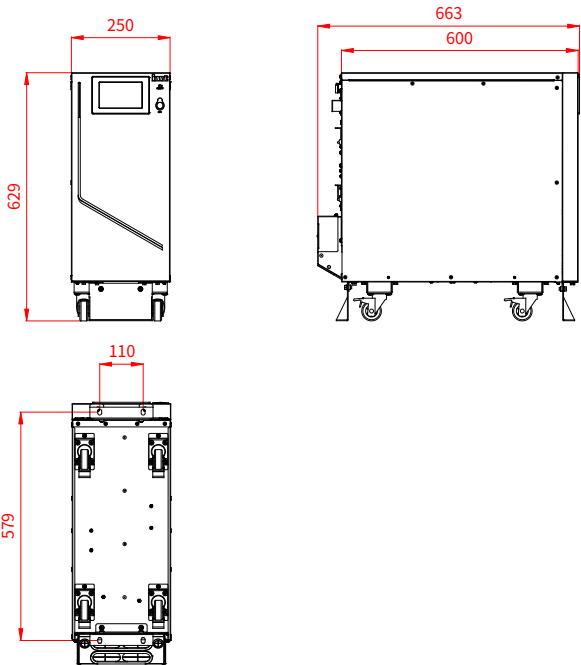
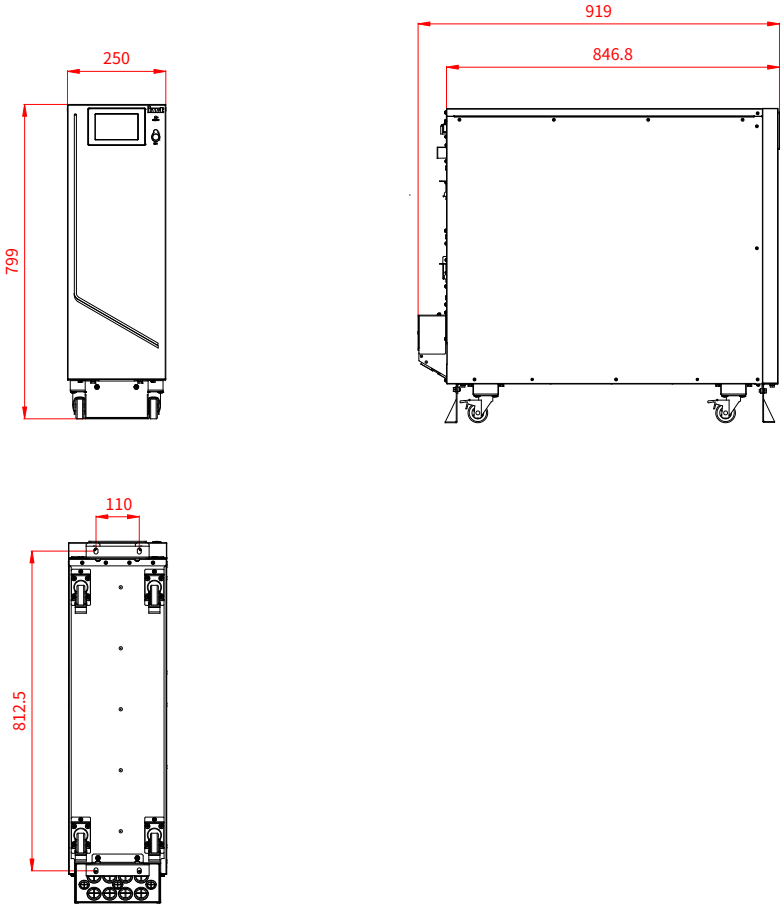


Figure A-2 Dimensions (30–40 kVA models)



# Leading Smart Industry Shaping Net-Zero Future



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