

Trinity 30-40kVA

User Manual

Specifications and operating guide for Trinity Series UPS systems, 30-40kVA.
Includes installation, operation, and maintenance instructions.

For models:

TRIO30B/C

TRIO40B/C

Tech Support

Need help? Our UK-based experts are available 9am–5pm, Monday to Friday.

Email: hello@neotec.co.uk **Website:** www.neotec.co.uk

Before You Begin

Thank you for choosing a Trinity Series 30–40kVA UPS to protect your electrical equipment.

Model numbers include a code at the end to indicate configuration:

- B - Unit supplied with batteries (eg TRI030B)
- C - Unit supplied with a charger, no internal batteries (eg TRI040C)

To get the best from your system, read this manual in full. It covers the UPS features, installation, operation, and maintenance.

Before installing your UPS, read the safety instructions booklet supplied with the unit. Then follow the guidance in this manual step-by-step.

Your UPS must be commissioned by a Neo Tec–approved engineer (or authorised agent) before it goes into service. Skipping this step could put people at risk, cause the system to malfunction, and void your warranty.

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1 Safety Precautions

Follow the instructions in this manual when installing or maintaining the UPS and its batteries.



This UPS is designed for commercial and industrial applications only. It must never be used in life-support devices or systems.

1.1 Certification and Standards

Safety: IEC/EN 62040-1

EMC: IEC/EN 62040-2

Performance: IEC/EN 62040-3

1.2 Safety and Information Symbols

Follow the instructions in this manual and observe all warning labels. Ignoring them may result in injury or equipment damage.

Three levels of safety information are used throughout this manual:



Danger – Risk of serious injury or death if instructions are ignored.



Warning – Risk of injury or equipment damage if instructions are ignored.



Attention – Risk of equipment damage, data loss, or poor performance if instructions are ignored.



Information – Provides useful information, advice, or help.



Surfaces marked with a hot-surface label may reach high temperatures during operation. Do not touch these areas to avoid burns.



The UPS contains ESD-sensitive components. Always use appropriate anti-static precautions before handling.



Lead Acid Battery Recycling (Pb) – Do not dispose of lead acid batteries with normal household waste. Collect and recycle separately in accordance with local regulations.



WEEE Mark – Do not dispose of waste electrical or electronic equipment with normal household waste. Collect and recycle separately in accordance with local regulations.

1.3 Safety of Persons

Dangerous voltages are present inside the UPS. Only qualified service personnel should open the unit, and the system must be properly grounded at all times. Installation, commissioning, and service work must be carried out by a Neo Tec Service Representative – an engineer approved by Neo Tec and trained within the last 12 months.

1.4 Battery Safety

All battery servicing that requires internal access must only be carried out by Neo Tec Service Representatives using the correct tools.



When connected, the battery terminal voltage can exceed 400Vdc and is potentially lethal.

- Always follow the safety instructions provided by the battery manufacturer. Pay particular attention to environmental conditions, protective clothing, and the availability of first aid and fire-fighting facilities.
- The nominal operating temperature is 20°C. Higher temperatures will reduce battery life. Replace batteries in line with the manufacturer's recommendations to maintain UPS backup time.
- Replace batteries only with the same type and quantity. Using other types can cause explosion or poor performance.
- Before installation, check batteries for physical damage such as broken casings, corrosion, dirt on terminals, deformation, or leakage. Do not use damaged batteries.
- Remove metal jewellery (rings, watches, necklaces, bracelets) before working on batteries.
- Wear rubber gloves.
- Wear eye protection to prevent damage from accidental electrical arcs.
- Batteries are heavy – use correct lifting techniques and equipment to avoid injury.
- Only use tools with insulated handles.
- Do not dismantle, modify, or damage the battery. This may cause short circuit, leakage, or injury.
- Batteries contain sulphuric acid. In the event of casing damage, acid may leak. Always wear protective glasses, gloves, and clothing when handling batteries. Acid contact can cause blindness or skin burns.
- At the end of service life, batteries may suffer internal short circuits, electrolyte loss, or plate erosion. This can lead to swelling, leakage, or thermal runaway. Replace batteries before these conditions occur.
- Damaged or leaking batteries must be stored in a sulphuric-acid-resistant container and disposed of in accordance with local regulations.
- If electrolyte comes into contact with skin, wash immediately with plenty of water.

1.5 Product Safety

Moving and Installation

- Keep the UPS away from heat sources and air outlets.
- In the event of fire, use a dry powder extinguisher only. Liquid extinguishers may cause electric shock.

- Do not start the UPS if any damage or abnormal parts are found.
- Do not touch the UPS with wet hands or conductive materials – this may cause electric shock.
- Use suitable lifting and handling equipment during installation. Wear protective clothing, including safety shoes, to avoid injury.
- Take care to prevent vibration or shock during positioning and installation.
- Install the UPS in a suitable environment. See Section 4 for detailed requirements.

Operation

- Always connect the grounding cable before connecting power cables. Ground and neutral connections must comply with national regulations.
- Before moving or reconnecting cables, disconnect all input power sources. Wait at least 10 minutes for internal capacitors to discharge, then confirm with a multimeter that terminal voltage is below 36V before working.
- The earth leakage current of the connected load will be carried by the RCCB or RCD.
- If the UPS has been in storage for an extended period, carry out initial checks and inspection before operation.

Maintenance and Replacement

- All internal maintenance and servicing must only be carried out by Neo Tec Service Representatives using the correct tools. Any components requiring the removal of protective covers are not user-serviceable.
- This UPS complies with IEC/EN 62040-1 safety requirements for systems intended for operator access areas. Dangerous voltages are present inside the UPS and battery boxes.
- For non-Neo Tec Service Representatives, the risk of contact with these voltages is minimised. Access to high-voltage components requires opening covers with tools. When operated in accordance with this manual, no risk exists to users during normal operation.

Disposal

- Dispose of used batteries in accordance with local regulations.

2 Introduction

2.1 Your UPS Product

The UPS models in the Trinity series protect sensitive electronic equipment from common power problems, including:

- Power failures
- Power sags and surges
- Brownouts
- Line noise and high voltage spikes
- Frequency variations
- Switching transients
- Harmonic distortion

2.2 Environmental Considerations

Our UPS products are developed using an eco-design approach to reduce environmental impact.

Product

- Primarily made from recyclable materials.
- Dismantling and disassembly must comply with local waste regulations.
- At the end of its service life, the UPS must be sent to an authorised recycling centre or WEEE (waste electrical and electronic equipment) treatment facility.

Battery

- Contains lead-acid batteries that must be processed in accordance with local battery regulations.
- The battery can be removed for correct disposal.

Substances

- This product contains no CFCs, HCFCs, or asbestos.

Packaging

- Cardboard contains over 50% recycled material.
- Sacks and bags are made from polyethylene.
- All packing materials are recyclable.
- Follow local regulations when disposing of packing materials.

3 Product Overview

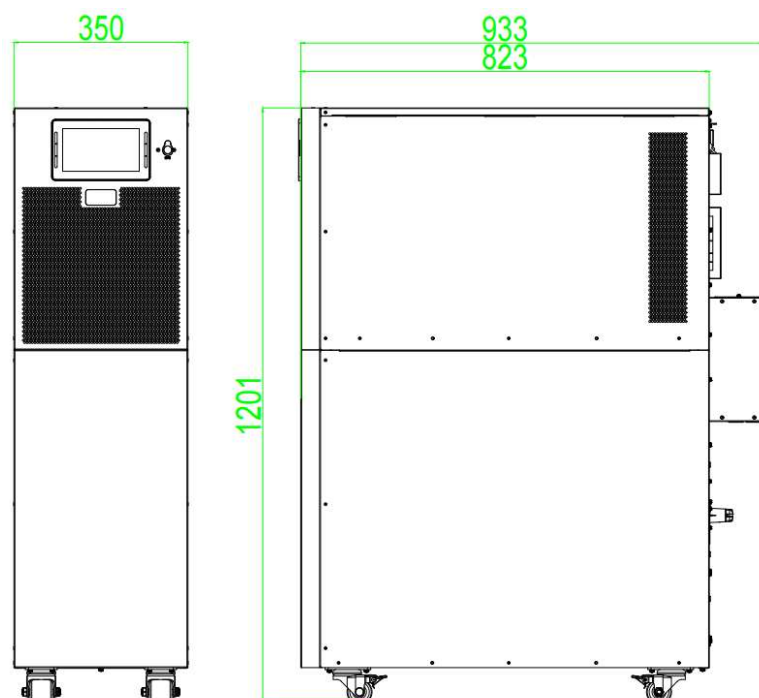
3.1 UPS Configuration

Both the Trinity 30kVA and 40kVA models are supplied as the standard backup type.

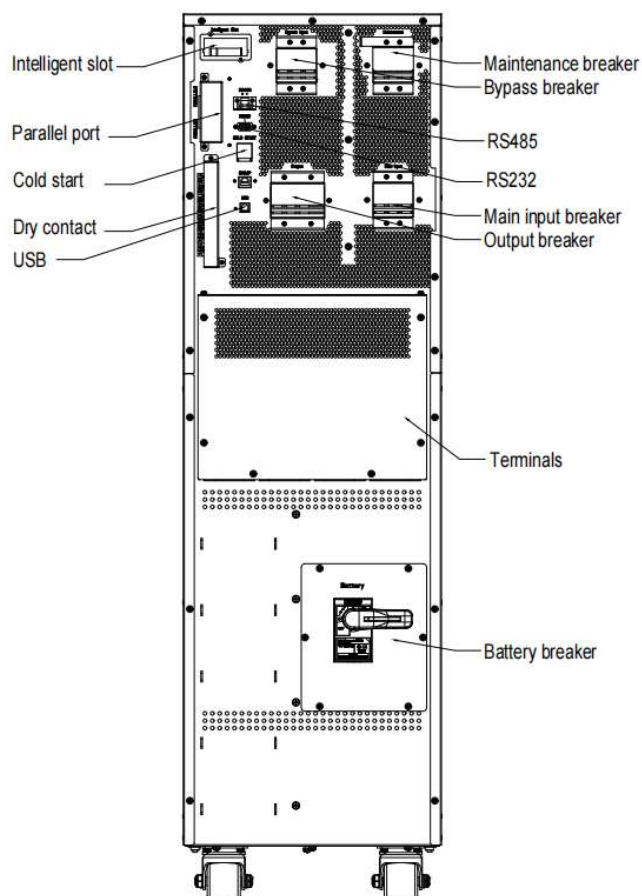
COMPONENTS	QUANTITY	NOTE
Circuit Breakers	5	Standard
Dual Input	1	Standard
Dry Contact Card	1	Standard
RS232/485, USB	1	Standard
Battery Cold Start	1	Standard
SNMP/Parallel Card	1	Optional

3.2 Appearance and Dimensions

The 30kVA and 40kVA Trinity UPS models weigh approximately 90kg not including the batteries. All measurements below are given in mm.



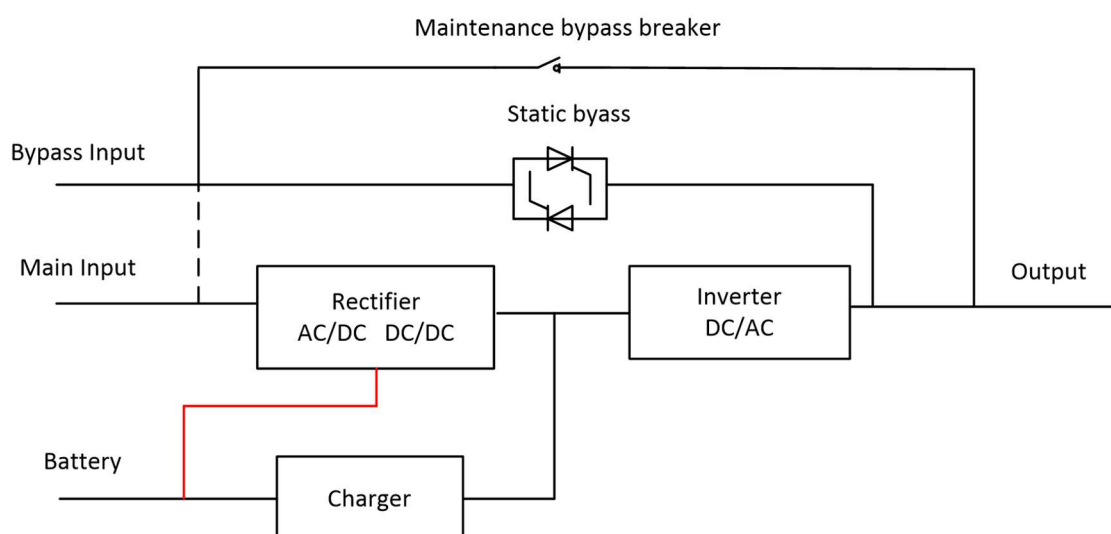
Rear view



3.3 UPS System Description

The Trinity UPS models include the following main parts: **rectifier, charger, inverter, and static bypass switch**. One or more external battery strings must be installed to provide backup power in the event of a mains failure.

The overall UPS structure is shown in the diagram below.



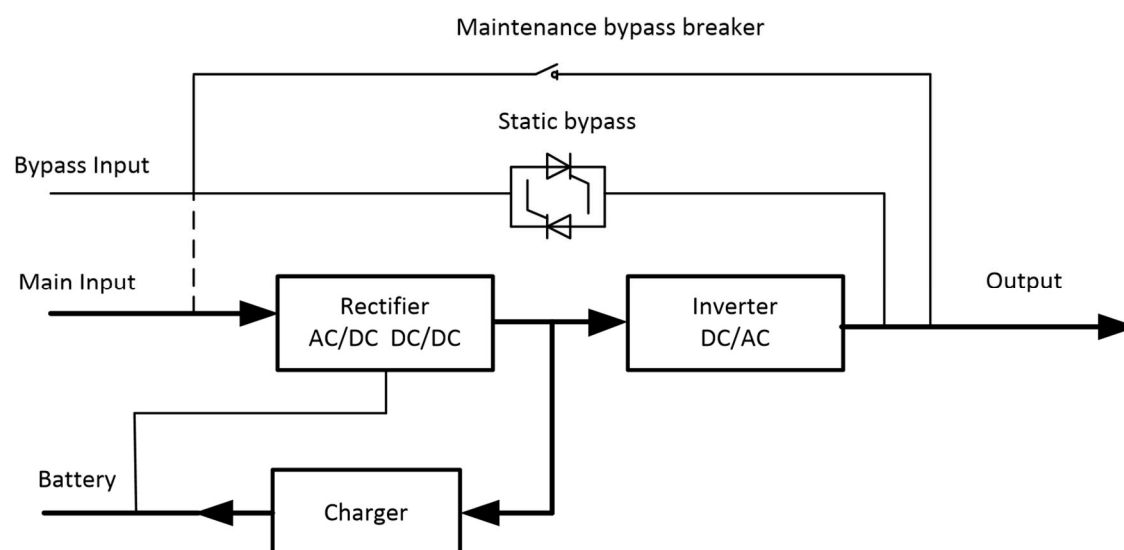
3.4 Operation Mode

The Trinity UPS models are on-line, double-conversion systems. They can operate in the following modes:

- Normal Mode
- Battery Mode
- Bypass Mode
- Maintenance Mode (Manual Bypass)
- ECO Mode
- Auto-Restart Mode
- Frequency Converter Mode

Normal Mode

The UPS turns the AC input into DC voltage (AC / DC) through the rectifier, and the DC voltage boost to the BUS voltage. When the system is connected to the external battery, part of the charger charges the battery (DC / DC), and the other part changes the inverter to the DC output (DC / AC) to provide high quality AC power for the load.

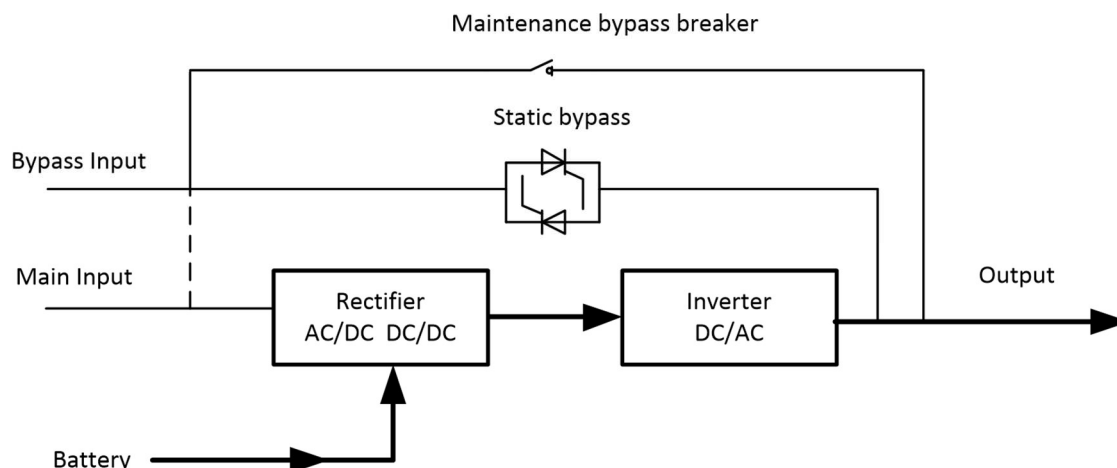


Battery Mode

Upon failure of the AC mains input power, the inverters will obtain power from the batteries, and supply AC power to the critical AC load. There is no interruption to the critical load. After restoration of the AC mains input power, UPS will transfer automatically to normal mode.

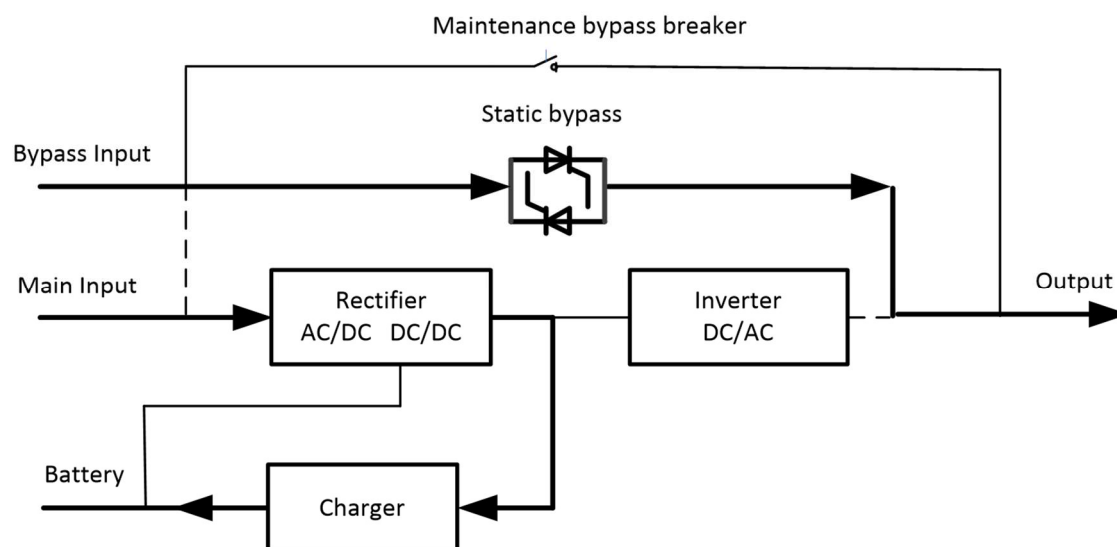


The Battery Cold Start function allows the UPS to start without mains power.



Bypass Mode

After the system is powered on, when the inverter is not turned on or the inverter is artificially turned off, the load is powered by the bypass. In the normal mode, if the UPS monitoring unit detects the system over temperature, overload or other shutdown failure of the inverter, the system will automatically switch to the bypass. In this condition, the mains directly supplies power to the load through the bypass static switch. In the bypass mode, the load power supply quality is not protected by UPS, and it is susceptible to power failure, voltage waveform or abnormal frequency conditions.

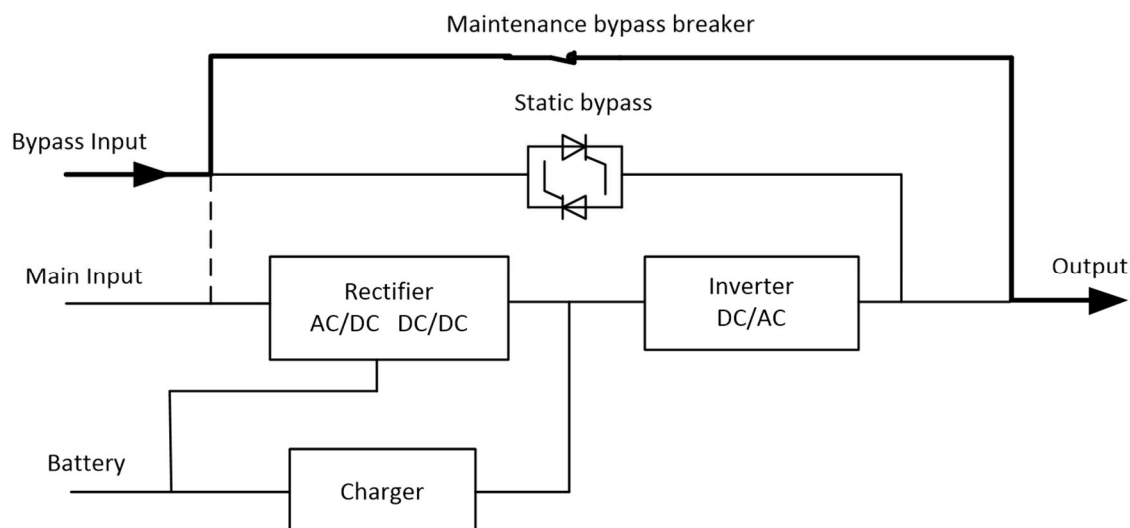


Maintenance Mode (Manual Bypass)

When repairing the UPS system and battery or repairing the equipment failure, manually close the manual bypass switch, and the load is directly supplied by the mains power through the manual bypass to realize the emergency power supply to the load.



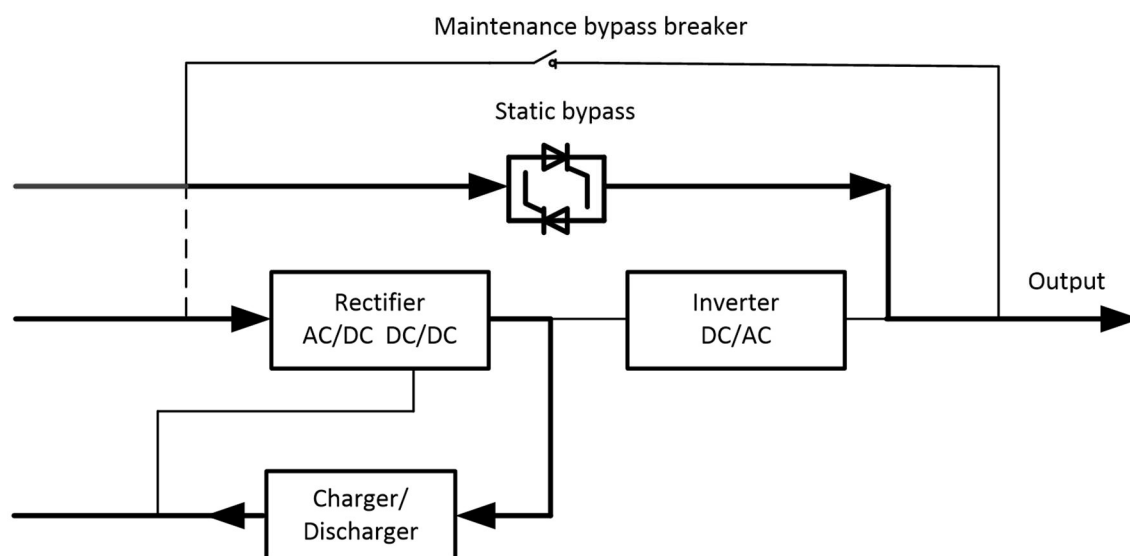
During Maintenance mode, dangerous voltages are present on the terminal of input, output and neutral.



ECO Mode

To improve system efficiency, UPS system works in Bypass Mode at normal time, and the inverter is standby, when the utility from the bypass fails, the UPS will transfer to Battery Mode and the inverter powers the load.

i There is a short interruption time (less than 10ms) when transferring from ECO mode to battery mode, it must be sure that the interruption has no effect on loads.



Auto-Restart Mode

UPS provides automatic power-on function, that is, the mains power outage time is too long, the battery discharge to the EOD voltage causes the inverter to shut down. If the mains power recovery, UPS will automatically start UPS. The mode and the delay time are programmed by the commissioning engineer.

Frequency Converter Mode

By setting the UPS to "Frequency Converter Mode", the UPS could present a stable output of fixed frequency (50 or 60HZ), and the bypass static switch is not available. The input frequency range ranged from 40 Hz to 70 Hz. In this mode, the static bypass is invalid and the battery is optional, as to determine whether to choose the battery according to whether to operate in battery mode.

4 Installation

4.1 Environmental Considerations

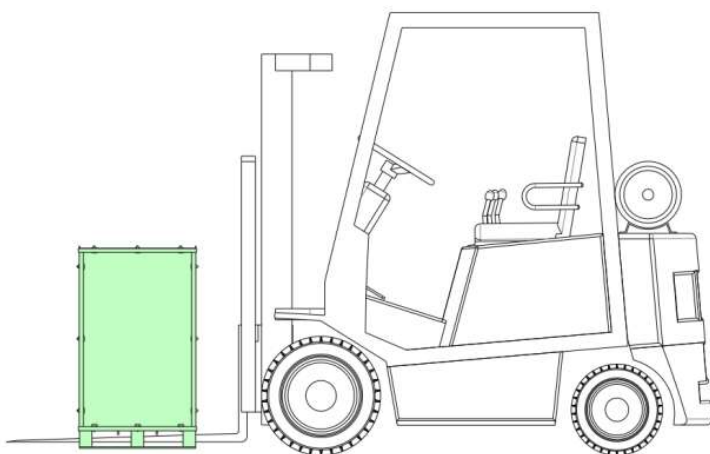
- The UPS is designed for indoor installation and uses forced-air cooling. Ensure adequate clearance for ventilation.
- Keep the UPS away from water, heat sources, flammable or explosive materials, and corrosive substances. Avoid areas with direct sunlight, excessive dust, volatile gases, or high salinity.
- Do not install the UPS in environments with conductive dust or dirt.
- The recommended battery operating temperature is 20–25°C. Higher temperatures shorten service life, while lower temperatures reduce capacity.
- During charging, batteries may release small amounts of hydrogen and oxygen gas. Ensure ventilation complies with EN50272-2001 requirements.
- When external batteries are used, install circuit breakers or fuses as close as possible to the battery terminals, and keep cable runs short.

Site Selection

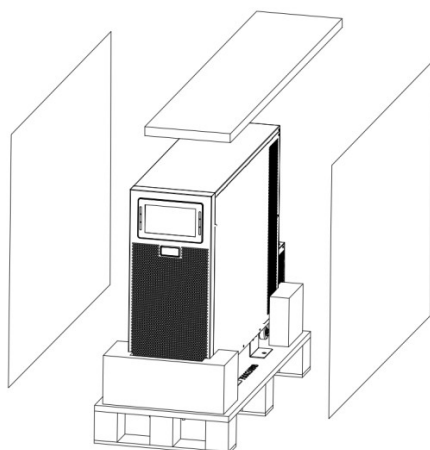
- Ensure the installation surface can safely support the combined weight of the UPS, batteries, and battery cabinets.
- Install on a stable surface with no vibration and a maximum horizontal inclination of 5°.

4.2 Unpacking and Inspecting

1. Check the packaging for damage. If damage is found, report it to the carrier immediately.
2. Transport the equipment to the installation site using a forklift.



3. Unpack the UPS and remove all protective foam.



4. Inspect the UPS:

- Visually check for any damage during transport. If damage is found, contact the carrier.
- Verify the contents against the packing list. If items are missing, contact your Neo Tec Service Representative.

5. Remove the bolts securing the cabinet to the wooden pallet.

6. Move the cabinet carefully to its final installation position.



If your equipment is damaged in transit, keep all cartons and packing materials. Report the issue to the carrier or place of purchase.

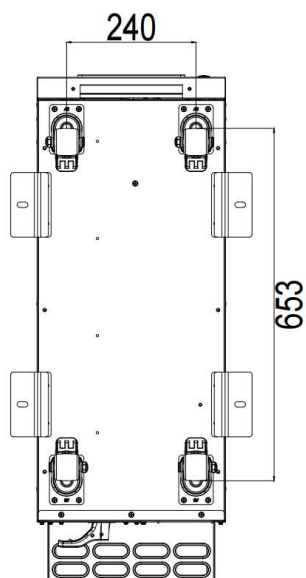
For damage found after delivery, submit a concealed damage claim.

To make a claim:

- Notify the carrier within 15 days of receiving the equipment.
- Send a copy of your claim to your Neo Tec service representative within the same 15-day period.

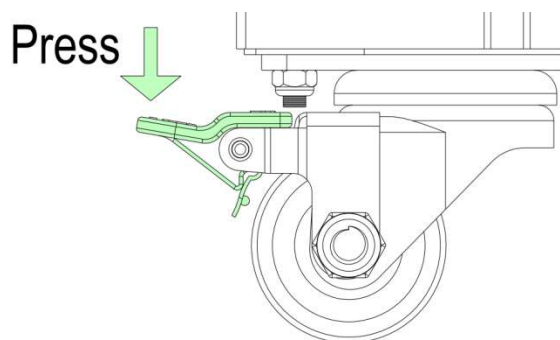
4.3 Positioning the Cabinet

Trinity UPS cabinets are fitted with four wheels at the base for ease of positioning and support.



To position the UPS cabinet:

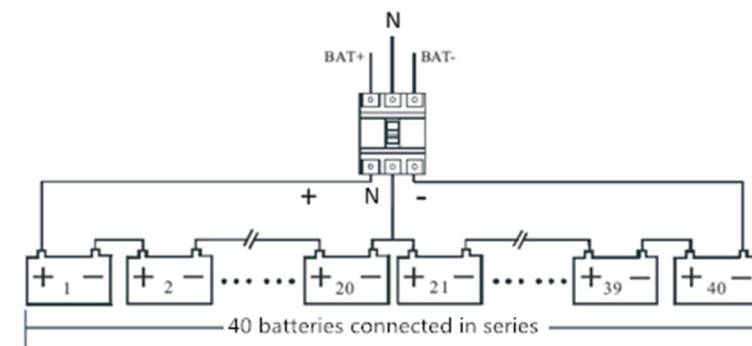
1. Ensure the supporting floor is smooth, level, and strong enough to bear the weight of the UPS.
2. Move the cabinet carefully into position using the wheels.
3. Lock the brake assemblies to secure the cabinet in place.



If the mounting floor cannot safely support the full weight of the cabinet, use auxiliary equipment to distribute the load. For example, place an iron plate beneath the cabinet or increase the supporting area with anchor bolts.

4.4 Installing the Batteries

The battery group connects to the UPS through three terminals: positive, negative, and neutral. The neutral line is taken from the midpoint of the series-connected batteries.

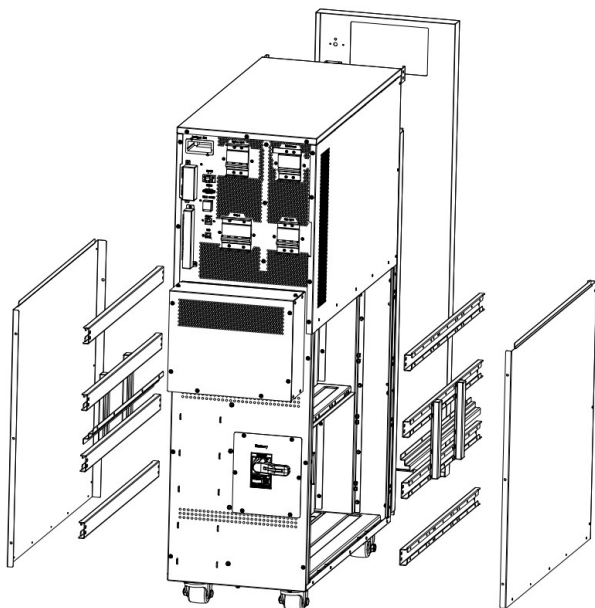


The battery terminal voltage exceeds 400Vdc. Follow all safety instructions to avoid electric shock. Ensure the positive, negative, and neutral connections are correctly wired from the battery terminals to the breaker, and from the breaker to the UPS.

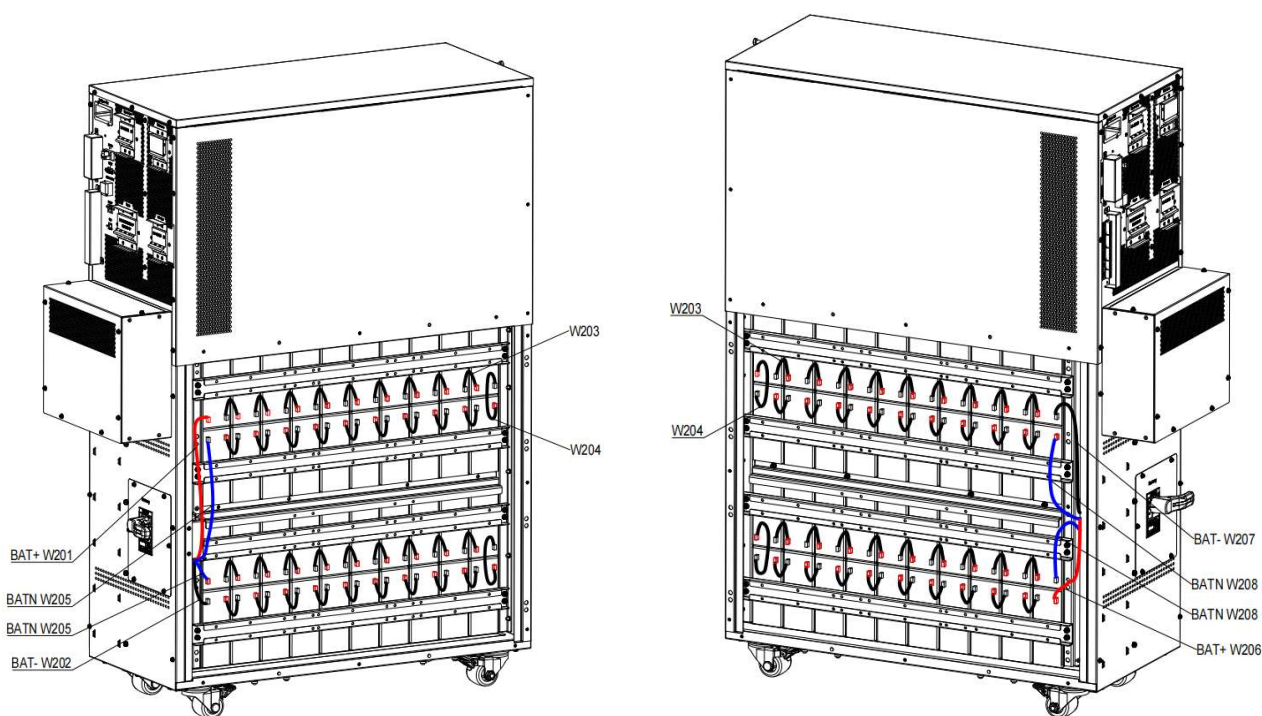
Installation of the Internal Batteries

Up to 80 7AH/9AH batteries can be installed:

1. Remove the left and right side panels, front panel, and battery fixing crossbeam.



2. Connect the internal battery cables to complete all battery strings.



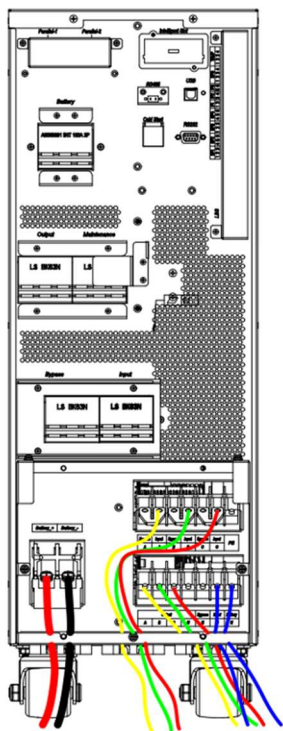
3. Refit the sheet metal components removed in Step 1.



Ensure battery polarity is correct before making connections. Measure and confirm the battery voltage before connecting to the main circuit.

4.5 Cable Entry

Cable entry is from the bottom of the rear side.



4.6 Power Cables

Recommended Power Cables

CONTENTS			30kVA	40kVA
Main Input	Main Input Current (A)		55A	70A
	Cable Section (mm ²)	A	16	25
		B		
		C		
		N		
Main Output	Main Output Current (A)		45A	60A
	Cable Section (mm ²)	A	16	20
		B		
		C		
		N		

CONTENTS			30kVA	40kVA
Bypass Input	Bypass Input Current (A)		45A	60A
	Cable Section (mm ²)	A	16	20
		B		
		C		
		N		
Battery Input	Battery Input Current (A)		70A	91A
	Cable Section (mm ²)	+	16	25
		-		
		N		
PE	Cable Section (mm ²)	PE	10	16



The recommended cable sections apply under the following conditions:

- Ambient temperature: 30°C.
- AC loss < 3%, DC loss < 1%. Maximum cable length: 50m (AC), 30m (DC).
- Based on 90°C copper conductor flexible cables. For other conditions, refer to IEC 60364-5-52 and local codes.
- Current values in the table are based on 380V. For 400V, multiply the current value by 0.95; for 415V, multiply by 0.92.
- When the main loads are non-linear, increase the neutral line cross-section to 1.5–1.7 times the listed value.

Specifications for Power Cable Terminals

PORT	CONNECTION	BOLT	BOLT APERTURE	TORQUE
Mains Input	Cables crimped OT terminal	M6/M8	7/9mm	4.9/12Nm
Bypass Input	Cables crimped OT terminal	M6	7mm	4.9Nm
Battery Input	Cables crimped OT terminal	M6/M8	7/9mm	4.9/12Nm
Output	Cables crimped OT terminal	M6	7mm	4.9Nm
PE	Cables crimped OT terminal	M6	7mm	4.9Nm

Recommended External Circuit Breakers

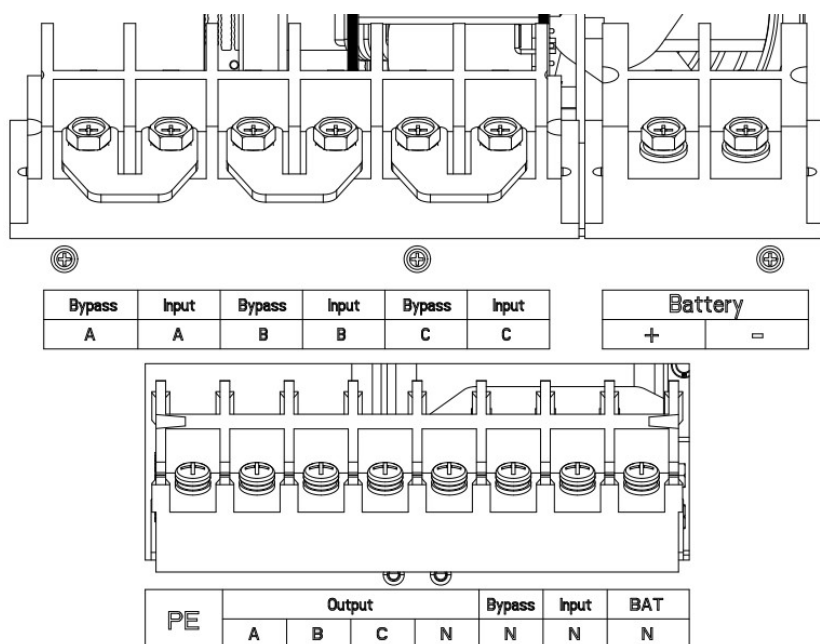
INSTALLED POSITION	30kVA	40kVA
Input CB	100A/3P	100A/3P
Bypass input CB	63A/3P	100A/3P
Output CB	63A/3P	100A/3P
External maintenance CB	63A/3P	100A/3P
Battery CB	DC100A	DC125A



An RCD (Residual Current Device) is not suggested as a suitable protection device.

Connecting Power Cables

1. Verify that all UPS switches are in the open position, including the internal maintenance bypass switch. Attach warning signs to prevent unauthorised operation.



2. Connect the protective earth (PE) wire to the earth terminal.
3. Connect the AC input supply cables to the main input terminal, and the AC output supply cables to the output terminal.
4. Connect the battery cables to the battery terminals.
5. Check all connections carefully, then re-install the protective covers.



mA, mB, mC standard for Main input phase L1, L2 and L3; bA, bB, bC standard for Bypass Input phase L1, L2 and L3.



The procedures in this section must only be carried out by authorised Neo Tec Service Representatives.

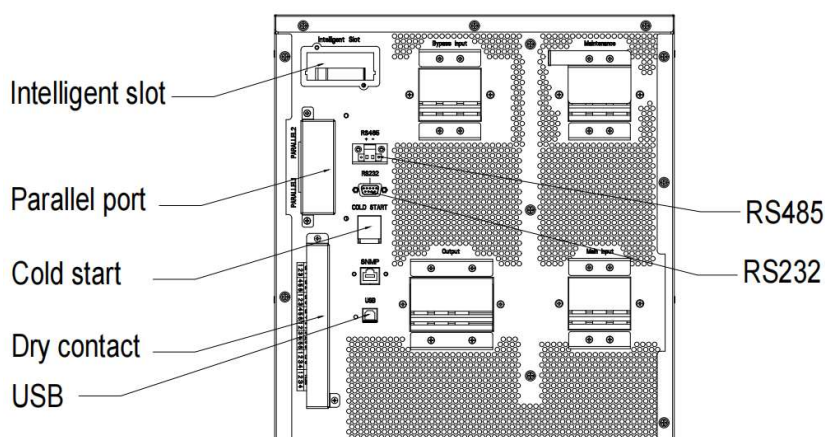


Before connecting the power cables:

- Confirm the position and status of the UPS input switch and the mains distribution switch. Ensure both are in the open position and attach warning signs to prevent operation.
- Tighten all wiring terminals to the torque values listed in the Specifications for Power Cable Terminals Table. This ensures secure connections and avoids potential safety hazards.

Control and Communication Cables

The rear panel of the cabinet includes a dry contact interface and communication ports: RS232, RS485, SNMP, Parallel card interface, and USB.



Dry Contact Interface

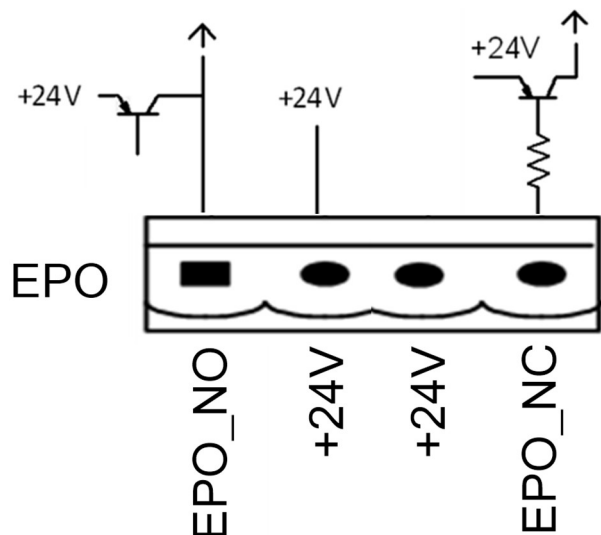
The UPS includes five dry contact interfaces. The default port definitions are shown below. These ports can be programmed using Neo Tec monitoring software.

PORT	NAME	FUNCTION
EPO-1	REMOTE_EPO_NO	Trigger EPO when connect with EPO-2
EPO-2	+24V_DRY	+24V
EPO-3	+24V_DRY	+24V
EPO-4	REMOTE_EPO_NC	Trigger EPO when disconnected with EPO-3
TEMP-1	ENV_TEMP	Detection of environmental temperature
TEMP-2	TEMP_COM	Common terminal for temperature detection
TEMP-3	TEMP_COM	Common terminal for temperature detection

PORT	NAME	FUNCTION
TEMP-4	TEMP_BAT	Detection of battery temperature
IP1-1	BCB_Status	Input dry contact, the function is settable. Default: BCB Status & BCB Online available (when BCB Status is invalid, it will report that the battery is empty)
IP1-2	GND_DRY	Ground for +24V
IP2-3	BCB_Online	Input dry contact, the function is settable.
IP2-4	GND_DRY	Ground for +24V
IP3-5	GEN_CONNECTED	Input dry contact, the function is settable. Default: Generator input
IP3-6	+24V_DRY	+24V
OP1-1	BAT_LOW_ALARM_NC	Output dry contact (Normally closed), the function is settable. Default: Battery voltage low.
OP1-2	BAT_LOW_ALARM_NO	Output dry contact (Normally open), the function is settable. Default: Battery voltage low.
OP1-3	BAT_LOW_ALARM_GND	OP1-1 and OP1-2 Common
OP2-4	GENERAL_ALARM_NC	Output dry contact (Normally closed), the function is settable. Default: General alarm
OP2-5	GENERAL_ALARM_NO	Output dry contact (Normally open), the function is settable. Default: General alarm
OP2-6	GENERAL_ALARM_GND	OP2-4 and OP2-5 Common
OP3-1	UTILITY_FAIL_NC	Output dry contact (Normally closed), the function is settable. Default: Mains power abnormal
OP3-2	UTILITY_FAIL_NO	Output dry contact (Normally open), the function is settable. Default: Mains power abnormal
OP3-3	UTILITY_FAIL_GND	OP3-1 and OP3-2 Common
OP4-4	BCB Drive	Output dry contact, the function is settable. Default: Battery BCB (In the EOD or EPO available)
OP4-5	GND_DRY	Ground for +24V
OP4-6	+24V_DRY	+24V

Remote EPO Input Port

EPO1-4 is the input port for remote EPO. It requires connecting NC (EPO-4) and +24V (EPO-3) and disconnecting NO (EPO-1) and +24V (EPO-2) during normal operations, and EPO is triggered when disconnecting NC (EPO-4) and +24V (EPO-3), or connecting NO (EPO-1) and +24V (EPO-2).



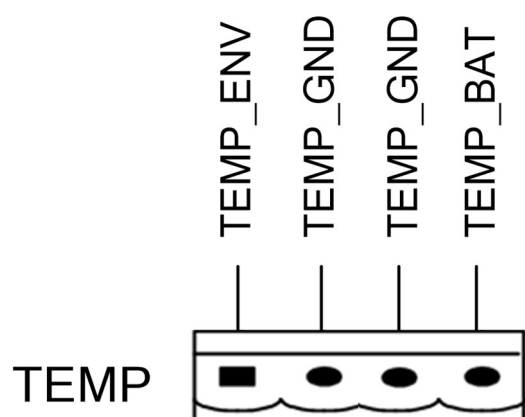
PORT	NAME	FUNCTION
EPO-1	REMOTE_EPO_NO	Trigger EPO when connect with EPO-2
EPO-2	+24V_DRY	+24V
EPO-3	+24V_DRY	+24V
EPO-4	REMOTE_EPO_NC	Trigger EPO when disconnected with EPO-3



EPO-1 and EPO-2 must be disconnected in normal operations.

Interface of Battery and Environmental Temperature Detection

The input dry contact can detect the temperature of batteries and environment respectively, which can be used in environment monitoring and battery temperature compensation.



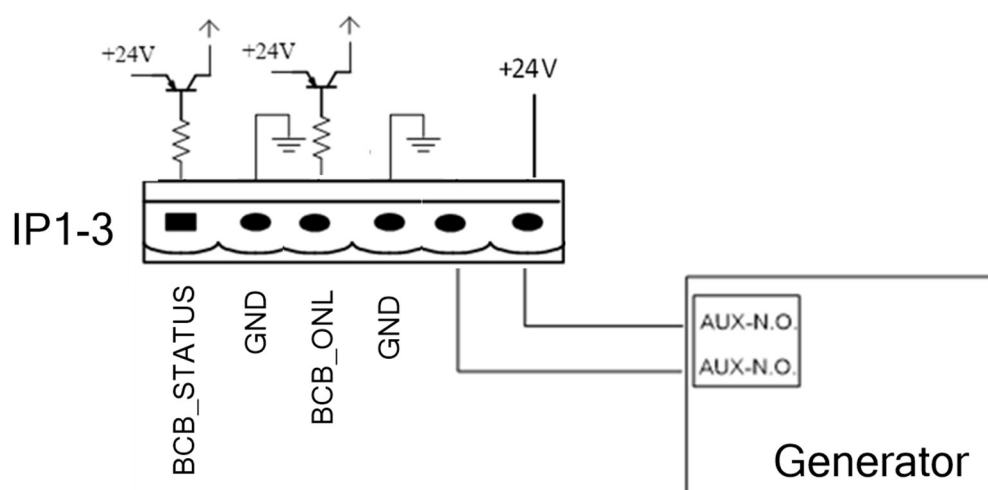
PORT	NAME	FUNCTION
TEMP-1	ENV_TEMP	Detection of environmental temperature
TEMP-2	TEMP_COM	Common terminal for temperature detection
TEMP-3	TEMP_COM	Common terminal for temperature detection
TEMP-4	TEMP_BAT	Detection of battery temperature



A specified temperature sensor is required for UPS temperature detection. This accessory is optional - confirm availability with your Neo Tec Service Representative.

Generator Input Dry Contact

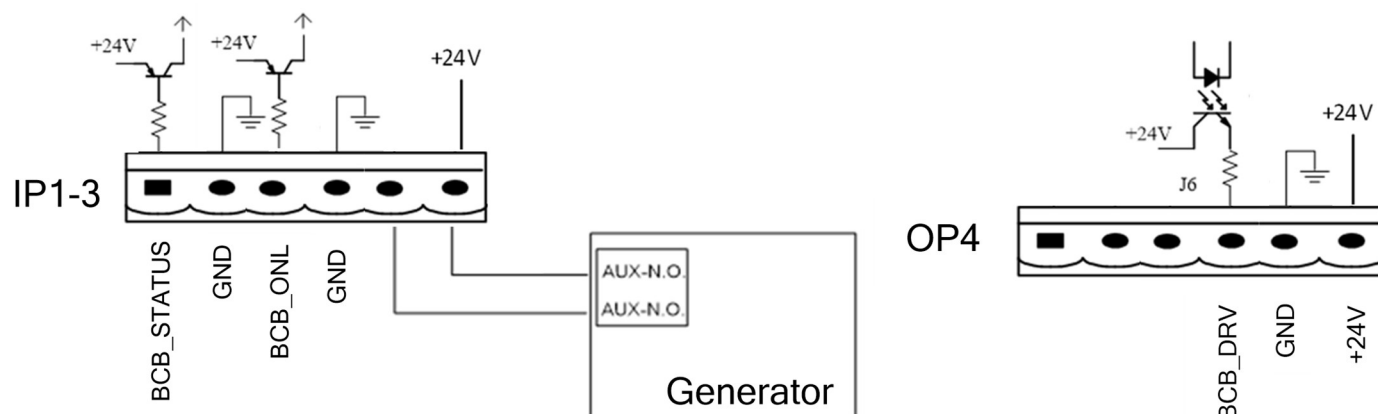
The default function of IP3 5-6 is the interface for generator input, when connecting IP3-5 with +24V (IP3-6), the UPS judges the generator has been connected in the system.



PORT	NAME	FUNCTION
IP3-5	GEN_CONNECTED	Input dry contact, the function is settable. Default: Generator input
IP3-6	+24V_DRY	+24V

BCB Input Port

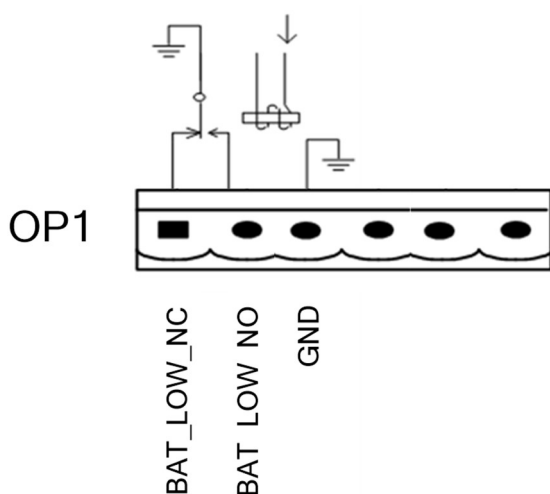
The default functions of OP4 4-6 are the ports for BCB tripping and BCB status, connect OP4-4 and OP4-6 to BCB tripper, the port OP4-4 can provide a driver signal (+24VDC, 100mA) to trip the battery breaker when EPO is triggered or EOD (end of discharge) happen. The UPS would detect the BCB status, when BCB is closed, it indicates batteries are connected, when open, it alarms batteries not connected.



PORT	NAME	FUNCTION
IP1-1	BCB_Status	BCB contact status, connect with the normally open signal of BCB
IP1-2	GND_DRY	Ground for +24V
IP2-3	BCB_Online	BCB contact status, connect with the normally open signal of BCB
IP2-4	GND_DRY	Ground for +24V
OP4-4	BCB_Drive	BCB trip signal output, +24V, maximum support of 100mA
OP4-5	GND_DRY	Ground for +24V
OP4-6	+24V_DRY	+24V

Battery Warning Output Dry Contact Interface

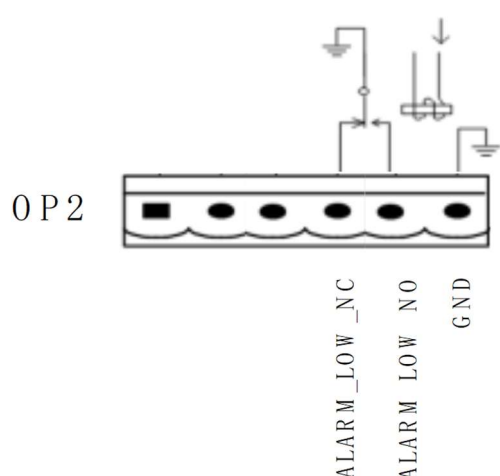
The default function of OP1 1-3 is the output dry contact interface for battery voltage low alarm, when the battery voltage is lower than the setting value, an auxiliary dry contact signal will be activated via the relay, before UPS alarms "Battery voltage low", OP1-1 and OP1-3 are connected by the relay, OP1-2 and OP1-3 are disconnected, when UPS alarms "battery voltage low", OP1-1 and OP1-3 are disconnected by the relay, OP1-2 and OP1-3 are connected.



PORT	NAME	FUNCTION
OP1-1	BAT_LOW_ALARM_NC	Battery warning relay (normally closed) will be open during warning
OP1-2	BAT_LOW_ALARM_NO	Battery warning relay (normally open) will be closed during warning
OP1-3	BAT_LOW_ALARM_GND	Common terminal

General Alarm Output Dry Contact Interface

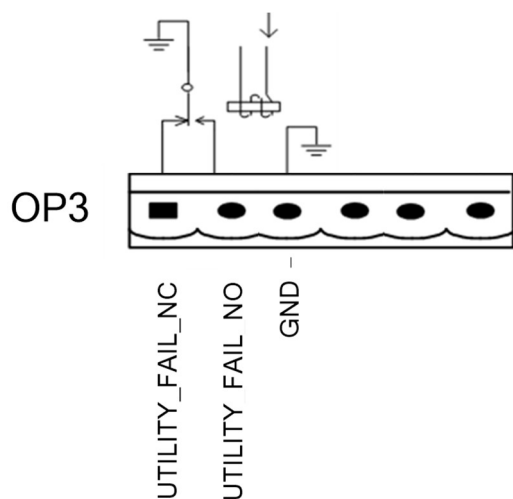
The default function of OP2 is the general alarm output dry contact dry interface. When one and more warnings are triggered, an auxiliary dry contact signal will be active via the isolation of a relay.



PORT	NAME	FUNCTION
OP2-4	GENERAL_ALARM_NC	Integrated warning relay (normally closed) will be open during warning
OP2-5	GENERAL_ALARM_NO	Integrated warning relay (normally open) will be closed during warning
OP2-6	GENERAL_ALARM_GND	Common terminal

Utility Fail Warning Output Dry Contact Interface

The default function of OP3 is the output dry contact interface for utility failure warning, when the utility fails, the system will send a utility failure warning information, and provide an auxiliary dry contact signal via the isolation of a relay.



PORT	NAME	FUNCTION
OP3-1	UTILITY_FAIL_NC	Mains failure warning relay (normally closed) will be open during warning
OP3-2	UTILITY_FAIL_NO	Mains failure warning relay (normally open) will be closed during warning
OP3-3	UTILITY_FAIL_GND	Common terminal

Communication Interface

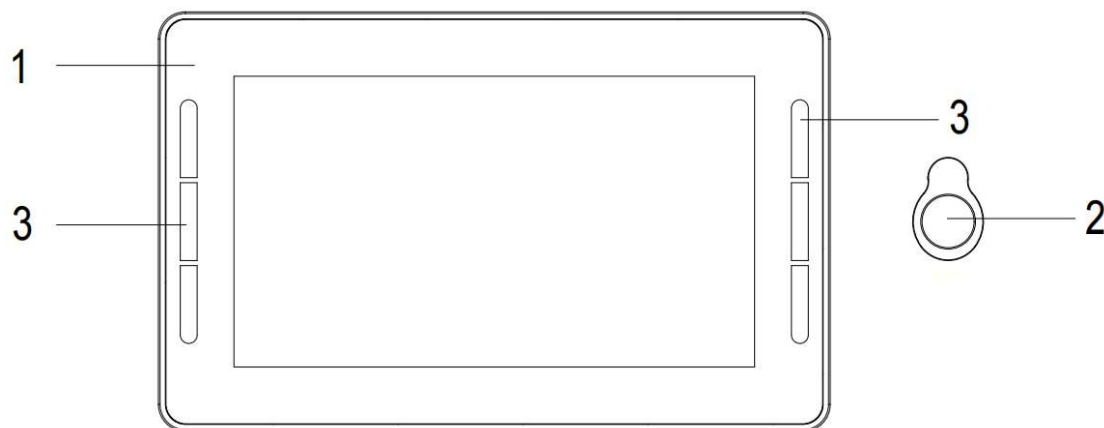
RS232, RS485 and USB ports can provide series data which can be used for commissioning and maintenance by authorised engineers or can be used for networking or integrated monitoring system in the service room.

- SNMP card: It is used on site for communication (optional).
- Intelligent card: It is used for extension dry contact interface (optional).

5 LCD Panel

5.1 LCD Panel Overview

The UPS LCD panel is divided into three areas: LED indicators, control keys, and a touchscreen display.



1. LCD touch screen
2. EPO switch
3. Status indicator

LED indicators on the panel show the operating status and any faults.

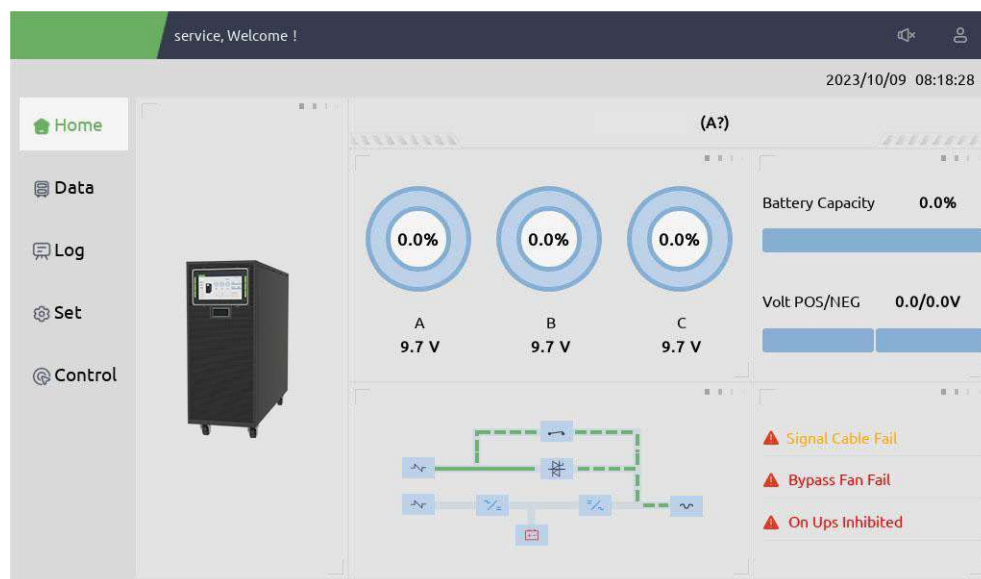
LED STATUS	DESCRIPTION
Green	Normal operation
Red	Fault alarm
Yellow	Warning alarm

The UPS uses two types of audible alarm to indicate operating conditions.

ALARM	DESCRIPTION
Two short beeps followed by a long beep.	When the system has general alarm (for example: AC fault)
Continuous alarm	When the system has serious faults (for example: blown fuse or hardware failure)

5.2 LCD Touch Screen

The LCD touchscreen allows users to browse system information, operate the UPS, and adjust parameters. After the monitoring system completes its self-test, the home page is displayed following the welcome screen.

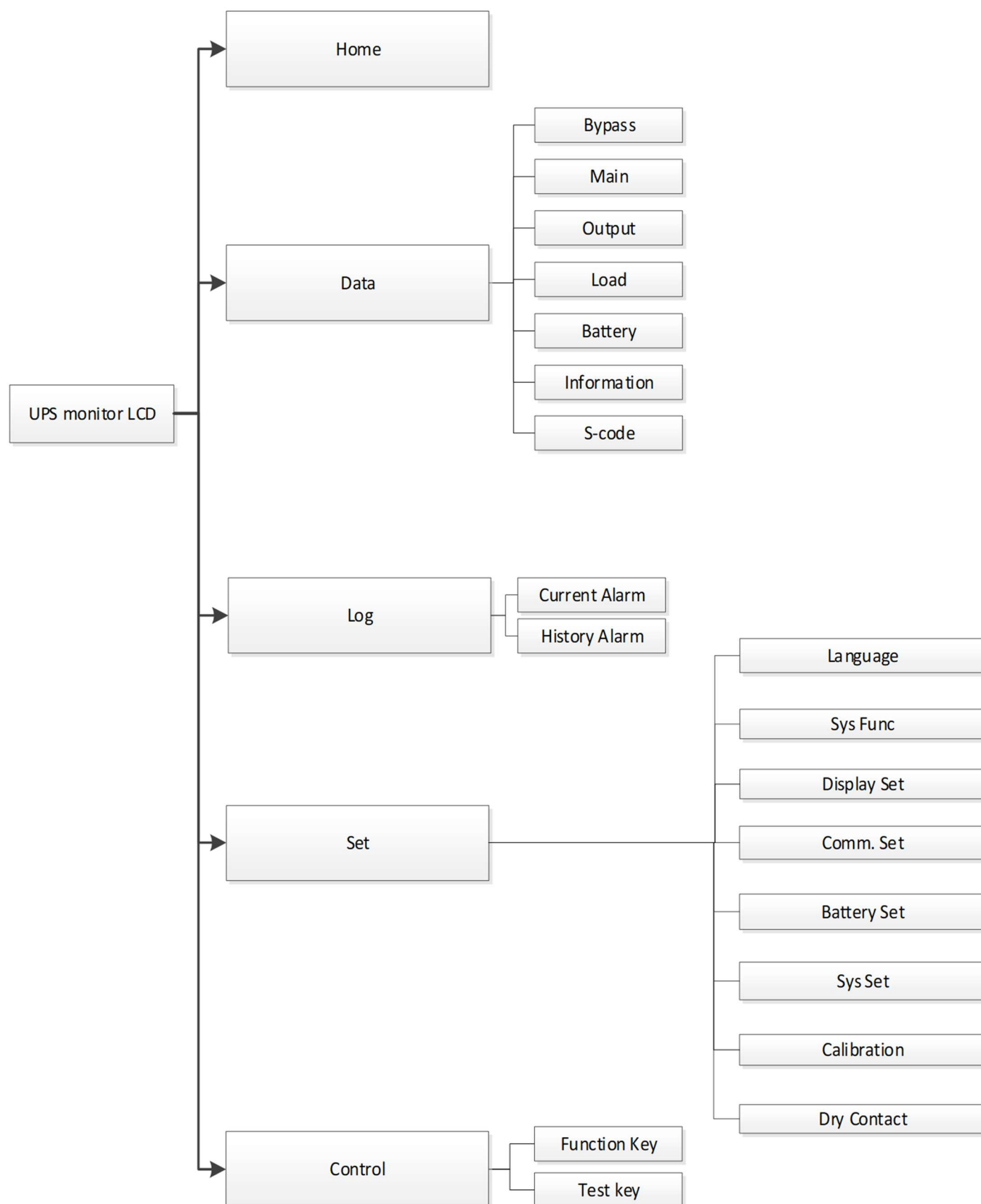


The home page includes the status bar, warning information, information display, and main menu.

- **Status Bar** – Shows the product model, capacity, operating mode, and system time.
- **Warning Information** – Displays UPS alarms. Red indicates a serious alarm; orange indicates a general alarm.
- **Information Display** – Provides key measurements including bypass voltage, mains input, battery voltage, and output voltages, shown as gauges with an energy flow diagram.
- **Main Menu** – Gives access to Data, Settings, Logs, and Control functions. From here, users can operate the UPS and view all parameters.

5.3 Menu Structure

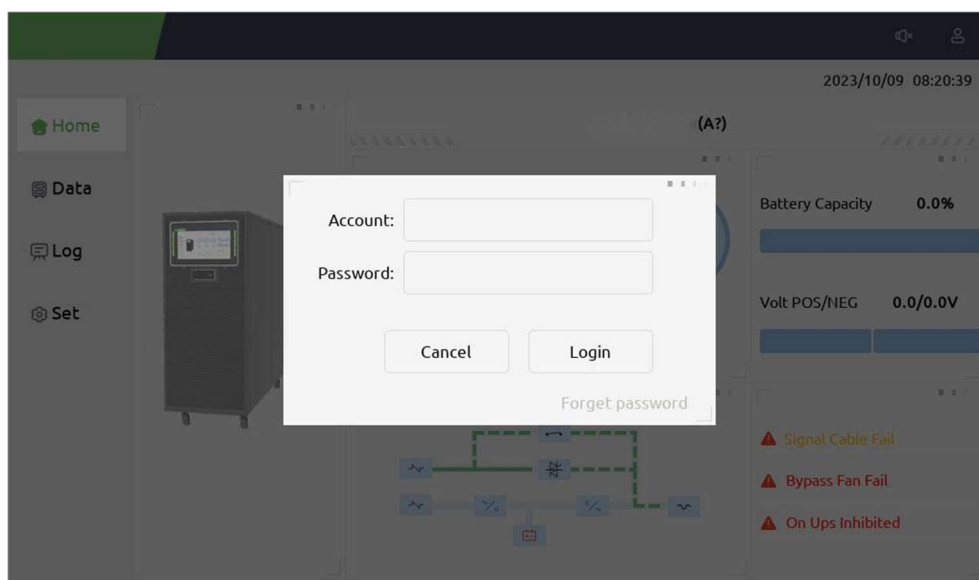
The main menu provides access to the Home page, Data, Settings, Logs, and Control functions.



5.4 Sub Menus

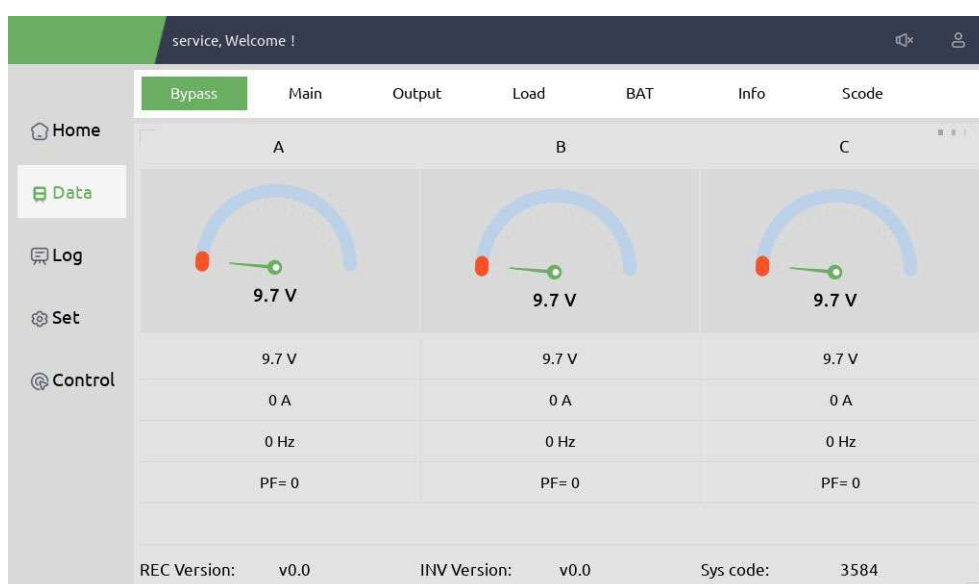
User Login

Click the user icon in the upper-right corner of the home page to open the login screen. Enter an authorised account and password to access system functions according to your permission level.



Data Menu

Touch the data icon on the left of the screen to enter the Data menu. The Data menu provides sub-menus for bypass, mains input, output, load, and battery, each showing real-time detection information. If additional pages are available, use the flip icon in the bottom-right corner to scroll through the data.

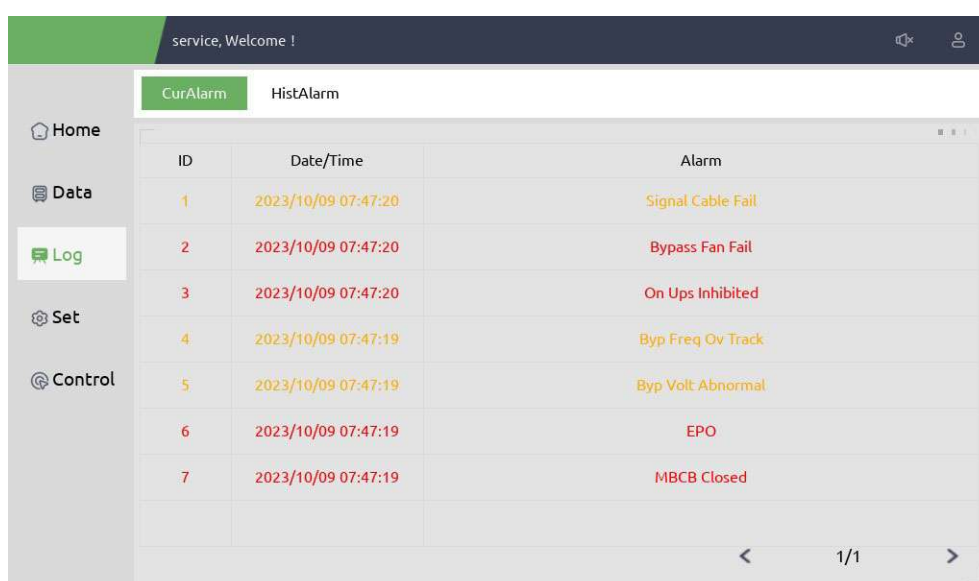


SUB-MENU	CONTENTS	MEANING
Bypass	V	Phase voltage
	A	Phase current
	Hz	Input frequency
	PF	Power factor
Main	V	Phase voltage
	A	Phase current
	Hz	Bypass frequency
	PF	Power factor
Output	V	Phase voltage
	A	Phase current
	Hz	Output frequency
	PF	Power factor
Load	kVA	Sout: Apparent Power
	kW	Pout: Active Power
	kVAr	Qout: Reactive power
	%	Load (The percentage of the UPS load)
Battery	Battery Number	Total number of battery connections per group
	Battery Status	Battery boost/float charging status
	Run time	Total battery run time
	V	Battery positive/negative Voltage
	A	Battery positive/negative Current
	Battery Capacity (%)	The percentage compared with new battery capacity
	Remain Time (Min)	Remaining battery backup time
	Battery Temp. (°C)	Battery temperature
	Ambient Temp. (°C)	Environmental temperature

SUB-MENU	CONTENTS	MEANING
Information	DC BUS +/- (V)	Bus voltage (positive & negative)
	Battery +/- (V)	Battery voltage (positive & negative)
	Charger (V)	Charger voltage (positive & negative)
	Charger (A)	Charger current (positive & negative)
	Discharger (A)	Discharger current (positive & negative)
	INV Voltage (V)	Inverter phase A/B/C voltage
	Fan Run Time (H)	Total fan's running time
	Capacitor Run Time (H)	Total capacitor running time
	Air Inlet Temp. (°C)	Air inlet temperature
	Air Outlet Temp. (°C)	Air outlet temperature
	REC IGBT Temp. (°C)	REC IGBT temperature of the phase A/B/C
	INV IGBT Temp. (°C)	INV IGBT temperature of the phase A/B/C
Scode	Fault Code	For the maintenance personnel

Log Menu

Click the icon on the left side of the LCD screen to enter the Log menu. This menu records events and alarms in time order, showing when they were set and cleared. Logs are divided into two categories: current alarms and historical alarms.



service, Welcome ! 🔊 🔍			
CurAlarm		HistAlarm	
ID	Date/Time	Alarm	
1	2023/10/09 07:47:20	Signal Cable Fail	
2	2023/10/09 07:47:20	Bypass Fan Fail	
3	2023/10/09 07:47:20	On Ups Inhibited	
4	2023/10/09 07:47:19	Byp Freq Ov Track	
5	2023/10/09 07:47:19	Byp Volt Abnormal	
6	2023/10/09 07:47:19	EPO	
7	2023/10/09 07:47:19	MBCB Closed	
< 1/1 >			

service, Welcome !

Home

Data

Log

Set

Control

CurAlarm

HistAlarm

ID	Date/Time	Alarm
1	2023/09/26 16:07:54	Ecs Manual Bypass
2	2023/09/26 16:07:54	Manual Transfer Inv
3	2023/09/25 14:36:47	EPO
4	2023/09/25 09:22:41	Battery Over Temp.-Disappear
5	2023/09/25 09:22:37	Ambient Over Temp.-Disappear
6	2023/09/25 09:12:59	Ambient Over Temp.
7	2023/09/25 09:10:01	Battery Over Temp.
8	2023/09/25 07:35:46	Battery Over Temp.-Disappear

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UPS EVENTS	DESCRIPTION
Fault Clear	Manually clear fault
Log Clear	Manually clear History log
Load On UPS	Inverter feeds load
Load On Bypass	Bypass feeds load
No Load	No load
Battery Boost	Charger is working in boost charging mode
Battery Float	Charger is working in float charging mode
Battery Discharge	Battery is discharging
Battery Connected	Battery is connected
Battery Not Connected	Battery is not connected.
Maintenance CB Closed	Manual maintenance breaker is closed
Maintenance CB Open	Manual maintenance breaker is opened
EPO	Emergency Power Off
Module On Less	Available power module capacity is less then the load capacity. Please reduce the load capacity or add extra power module to make sure that the UPS capacity is big enough.
Generator Input	Generator is connected and a signal is sent to the UPS.
Utility Abnormal	Utility (Grid) is abnormal. Mains voltage or frequency exceeds the upper or lower limit and results in rectifier shutdown. Check the input phase voltage of rectifier.

UPS EVENTS	DESCRIPTION
Bypass Sequence Error	Bypass voltage Sequence is reverse. Check if input power cables are connected correctly.
Bypass Volt Abnormal	This alarm is triggered by an inverter software routine when the amplitude or frequency of bypass voltage exceeds the limit. The alarm will automatically reset if the bypass voltage becomes normal. First check if relevant alarm exists, such as “bypass circuit breaker open”, “Byp Sequence Err” and “Ip Neutral Lost”. If there is any relevant alarm, first clear this alarm. 1. Then check and confirm if the bypass voltage and frequency displayed on the LCD are within the setting range. Note that the rated voltage and frequency are respectively specified by “Output Voltage” and “Output Frequency”. 2. If the displayed voltage is abnormal, measure the actual bypass voltage and frequency. If the measurement is abnormal, check the external bypass power supply. If the alarm occurs frequently, use the configuration software to increase the bypass high limit set point according to the user’s suggestions
Bypass Module Fail	Bypass Module Fails. This fault is locked until power off. Or bypass fans fail.
Bypass Module Over Load	Bypass current is over the limitation. If bypass current is under 125% of the rated current. The UPS alarms but has no action.
Bypass Over Load Tout	The bypass overload status continues and the overload times out.
Byp Freq Over Track	This alarm is triggered by an inverter software routine when the frequency of bypass voltage exceeds the limit. The alarm will automatically reset if the bypass voltage becomes normal. First check if relevant alarm exists, such as “Byp Sequence Err” and “Input Neutral Lost”. If there is any relevant alarm, first clear this alarm. Then check and confirm if the bypass frequency displayed on the LCD are within the setting range. Note that the rated frequency are respectively specified by “Output Frequency”. If the displayed voltage is abnormal, measure the actual bypass frequency. If the measurement is abnormal, check the external bypass power supply. If the alarm occurs frequently, use the configuration software to increase the bypass high limit set point according to the user’s suggestions
Exceed Tx Times Lmt	The load is on bypass because the output overload transfer and re-transfer is fixed to the set times during the current hour. The system can recover automatically and will transfer back to the inverter with 1 hour
Output Short Circuit	Output shorted Circuit. Fist check and confirm if loads have something wrong. Then check and confirm if there is something wrong with terminals, sockets or some other power distribution unit. If the fault is solved, press “Fault Clear” to restart UPS.
Battery EOD	Inverter turned off due to low battery voltage. Check the mains power failure status and recover the mains power in time

UPS EVENTS	DESCRIPTION
Battery Test	System transfer to battery mode for 20 seconds to check if batteries are normal
Battery Test OK	Battery Test OK
Battery Maintenance	System transfer to battery mode until battery voltage is down to 1.1*EOD voltage to maintain battery string
Battery Maintenance OK	Battery maintenance succeed
Module inserted	Power Module is inserted in system.
Module Exit	Power Module is pulled out from system.
Rectifier Fail	The N# Power Module Rectifier Fail, The rectifier is fault and results in rectifier shutdown and battery discharging.
Inverter Fail	The N# Power Module Inverter Fail. The inverter output voltage is abnormal and the load transfers to bypass.
Rectifier Over Temp.	The N# Power Module Rectifier Over Temperature. The temperature of the rectifier IGBTs is too high to keep rectifier running. This alarm is triggered by the signal from the temperature monitoring device mounted in the rectifier IGBTs. The UPS recovers automatically after the over temperature signal disappears. If over temperature exists, check: 1. Whether the ambient temperature is too high. 2. Whether the ventilation channel is blocked. 3. Whether fan fault happens. 4. Whether the input voltage is too low.
Fan Fail	At least one fan fails in the N# power module.
Output Over load	The N# Power Module Output Over Load. This alarm appears when the load rises above 100% of nominal rating. The alarm automatically resets once the overload condition is removed. 1. Check which phase has overload through the load (%) displayed in LCD so as to confirm if this alarm is true. 2. If this alarm is true, measure the actual output current to confirm if the displayed value is correct. Disconnect non-critical load. In parallel system, this alarm will be triggered if the load is severely imbalanced.

UPS EVENTS	DESCRIPTION
Inverter Overload Tout	N# Power Module Inverter Over Load Timeout. The UPS overload status continues and the overload times out. Note: The highest loaded phase will indicate overload timing-out first. When the timer is active, then the alarm “unit over load” should also be active as the load is above nominal. When the time has expired, the inverter Switch is opened and the load transferred to bypass. If the load decreases to lower than 95%, after 2 minutes, the system will transfer back to inverter mode. Check the load (%) displayed in LCD so as to confirm if this alarm is true. If LCD displays that overload happens, then check the actual load and confirm if the UPS has over load before alarm happens.
Inverter Over Temp.	The N# Power Module Inverter Over Temperature. The temperature of the inverter heat sink is too high to keep inverter running. This alarm is triggered by the signal from the temperature monitoring device mounted in the inverter IGBTs. The UPS recovers automatically after the over temperature signal disappears. If over temperature exists, check: Whether the ambient temperature is too high. Whether the ventilation channel is blocked. Whether fan fault happens. Whether inverter overload time is out.
On UPS Inhibited	Inhibit system transfer from bypass to UPS (inverter). Check: Whether the power module's capacity is big enough for load. Whether the rectifier is ready. Whether the bypass voltage is normal.
Manual Transfer Byp	Transfer to bypass manually
Esc Manual Bypass	Escape from “transfer to bypass manually” command. If UPS has been transferred to bypass manually, this command enable UPS to transfer to inverter.
Battery Volt Low	Battery Voltage is Low. Before the end of discharging, battery voltage is low warning should occur. After this pre-warning, battery should have the capacity for 3 minutes discharging with full load.
Battery Reverse	Battery cables are connected not correctly.
Inverter Protect	The N# Power Module Inverter Protect. Check: Whether inverter voltage is abnormal Whether inverter voltage is much different from other modules, if yes, please adjust inverter voltage of the power module separately.

UPS EVENTS	DESCRIPTION
Input Neutral Lost	The mains neutral wire is lost or not detected. For 3 phases UPS, it's recommended that user use a 3-poles breaker or switch between input power and UPS.
Bypass Fan Fail	At least one of bypass module Fans Fails
Manual Shutdown	The N# Power Module is manually shutdown. The power module shuts down rectifier and inverter, and there's on inverter output.
Manual Boost Charge	Manually force the Charger work in boost charge mode.
Manual Float Charge	Manually force the charger work in float charge mode.
UPS Locked	Forbidden to shutdown UPS power module manually.
Parallel Cable Error	Parallel cables error. Check: If one or more parallel cables are disconnected or not connected correctly If parallel cable round is disconnected If parallel cable is OK
Lost N+X Redundant	Lost N+X Redundant. There is no X redundant powers module in system.
EOD Sys Inhibited	System is inhibited to supply after the battery is EOD (end of discharging)
Battery Test Fail	Battery Test Fail. Check if UPS is normal and battery voltage is over 90% of float voltage.
Battery Maintenance Fail	Check: If UPS is normal and not any alarms If the battery voltage is over 90% of float voltage If load is over 25%
Ambient Over Temp	Ambient temperature is over the limit of UPS. Air conditioners are required to regulate ambient temperature.
REC CAN Fail	Rectifier CAN bus communication is abnormal. Please check if communication cables are not connected correctly.
INV IO CAN Fail	IO signal communication of inverter CAN bus is abnormal. Please check if communication cables are not connected correctly.
INV DATA CAN Fail	DATA communication of inverter CAN bus is abnormal. Please check if communication cables are not connected correctly.
Power Share Fail	The difference of two or more power modules' output current in system is over limitation. Please adjust output voltage of power modules and restart UPS.
Sync Pulse Fail	Synchronization signal between modules is abnormal. Please check if communication cables are not connected correctly.

UPS EVENTS	DESCRIPTION
Input Volt Detect Fail	Input voltage of N# power module is abnormal. Please check if the input cables are connected correctly. Please check if input fuses are broken. Please check if utility is normal.
Battery Volt Detect Fail	Battery voltage is abnormal. Please check if batteries are normal. Please check if battery fuses are broken on input power board.
Output Volt Fail	Output voltage is abnormal.
Bypass Volt Detect Fail	Bypass voltage is abnormal. Please check if bypass breaker is closed and is good. Please check if bypass cables are connected correctly.
INV Bridge Fail	Inverter IGBTs are broken and opened.
Outlet Temp Error	Outlet temperature of power module is over the limitation. Please check if fans are abnormal. Please check if PFC or inverter inductors are abnormal. Please check if air passage is blocked. Please check if ambient temperature is too high.
Input Curr Unbalance	The difference of input current between every two phases is over 40% of rated current. Please check if rectifier's fuses, diode, IGBT or PFC diodes are broken. Please check if input voltage is abnormal.
DC Bus Over Volt	Voltage of DC bus capacitors is over limitation. UPS shutdown rectifier and inverter.
REC Soft Start Fail	While soft start procedures are finished, DC bus voltage is lower than the limitation of calculation according utility voltage. Please check Whether rectifier diodes are broken Whether PFC IGBTs are broken Whether PFC diodes are broken Whether drivers of SCR or IGBT are abnormal Whether soft start resistors or relay are abnormal
Relay Connect Fail	Inverter relays are opened and cannot work or fuses are broken.
Relay Short Circuit	Inverter relays are shorted and cannot be released.
PWM Sync Fail	PWM synchronizing signal is abnormal

UPS EVENTS	DESCRIPTION
Intelligent Sleep	UPS works in intelligent sleep mode. In this mode, the power modules will be standby in turn. It will be more reliability and higher efficiency. It must be confirmed that remained power modules' capacity is big enough to feed load. It must be conformed that working modules' capacity is big enough if user add more load to UPS. It's recommended that sleeping power modules are waken up if the capacity of new added loads is not sure.
Manual Transfer to INV	Manually transfer UPS to inverter. It's used to transfer UPS to inverter when bypass is over tracking. The interrupt time could be over 20ms.
Input Over Curr Tout	Input over current timeout and UPS transfer to battery mode. Please check if input voltage is too low and output load is big. Please regulate input voltage to be higher if it's possible or disconnect some loads.
No Inlet Temp. Sensor	Inlet temperature sensor is not connected correctly.
No Outlet Temp. Sensor	Outlet temperature sensor is not connected correctly.
Inlet Over Temp.	Inlet air is over temperature. Make sure that the operation temperature of UPS is between 0-40°C.
Capacitor Time Reset	Reset timing of DC bus capacitors.
Fan Time Reset	Reset timing of fans.
Battery History Reset	Reset battery history data.
Byp Fan Time Reset	Reset timing of bypass fans.
Battery Over Temp.	Battery is over temperature. It's optional.
Bypass Fan Expired	Working life of bypass fans is expired, and it's recommended that the fans are replaced with new fans. It must be activated via software.
Capacitor Expired	Working life of capacitors is expired, and it's recommended that the capacitors are replaced with new capacitors. It must be activated via software.
Fan Expired	Working life of power modules' fans is expired, and it's recommended that the fans are replaced with new fans. It must be activated via software.
INV IGBT Driver Block	Inverter IGBTs are shutdown. Please check if power modules are inserted in cabinet correctly. Please check if fuses between rectifier and inverter are broken.
Battery Expired	Working life of batteries is expired, and it's recommended that the batteries are replaced with new batteries. It must be activated via software.
Bypass CAN Fail	The CAN bus between bypass module and cabinet is abnormal.
Dust Filter Expired	Dust filter need to be clear or replaced with a new one

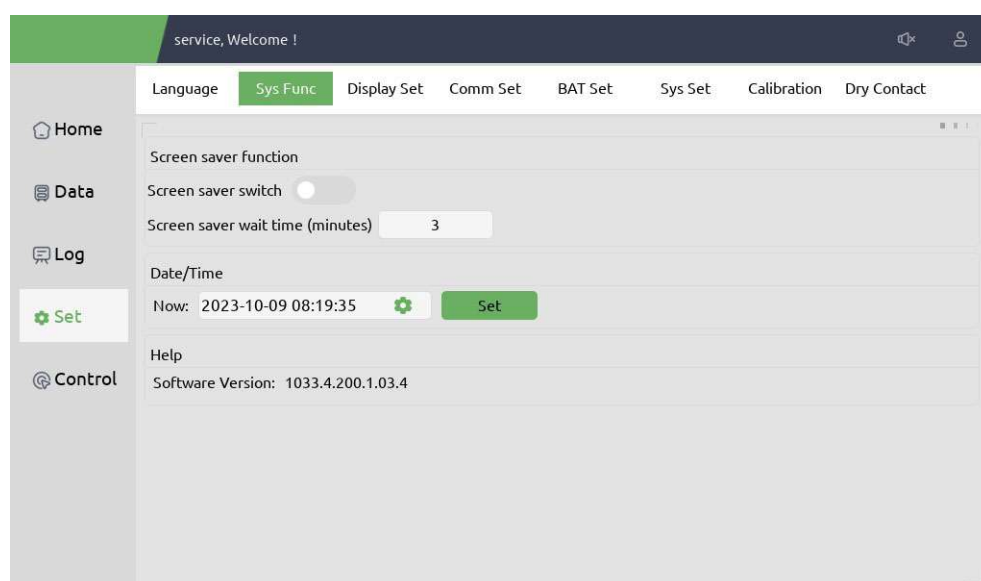
UPS EVENTS	DESCRIPTION
Stop Test	Manually stop battery test or battery maintenance, UPS transfer back to normal mode.
Wave Trigger	Waveform has been saved while UPS fail
Bypass CAN Fail	Bypass and cabinet communicate with each other via CAN bus. Check If connector or signal cable is abnormal. If monitoring board is abnormal.
Firmware Error	Manufacturer used only.
System Setting Error	Manufacturer used only.
Bypass Over Temp.	Bypass module is over temperature. Please check If bypass load is overload If ambient temperature is over 40°C If bypass SCRs are assembled correctly If bypass fans are normal
Module ID Duplicate	At least two modules are set as same ID on the power connector board, please set the ID as correct sequence



Event colours indicate severity level: green signifies an event has occurred or cleared, yellow indicates a warning, and red represents a fault.

Set Menu

Touch the set icon on the left of the screen to enter the Settings menu. This menu provides sub-menus for language, system functions, network, general settings, communication, user accounts, battery, system parameters, rating, system code, calibration, and dry contact configuration.



SUB-MENU	CONTENTS	MEANING
Language	Current language	Displays the currently selected language
	Optional language	English and other languages for choice
Sys Func	System function setting	Setting screensaver, system time, check memory and software version
Display Set	Display Setting	Homepage UPS model, screen horizontal and vertical display
Comm Set	Comm. interface	Include RS232, RS485, USB
	Protocol	Include MEGA protocol, ModBus_ASCII protocol, ModBus_RTU protocol
	Baud-rate	Setting the baud-rate
	Device Address	Setting the Device address
Battery Set	Battery Number	Setting the number of the battery (12V)
	Battery Capacity	Setting of the AH of the battery
	Float Charge Voltage/Cell	Setting the floating Voltage for battery cell (2V)
	Boost Charge Voltage/Cell	Setting the boost Voltage for battery cell (2V)
	EOD Voltage (0.6C)	EOD voltage for cell battery, at 0.6C current
	EOD Voltage (0.15C)	EOD voltage for cell battery, at 0.15C current
	Charge Current Percent Limit	Charge current (percentage of the rated current)
	Battery Temperature Compensate	Coefficient for battery temperature
Sys Set	System Mode	Setting the system mode: Single, parallel, Single ECO, parallel ECO, LBS, parallel LBS
	United Number	Set the number of UPS in parallel system
	Cabinet ID	For parallel system, the ID starts from 0
	Output Voltage Adjustment	Setting the Output Voltage
Calibration	Calibration product parameters	Calibration the UPS output voltage
Dry Contact	Configuration the dry contact	Configuration the dry contact



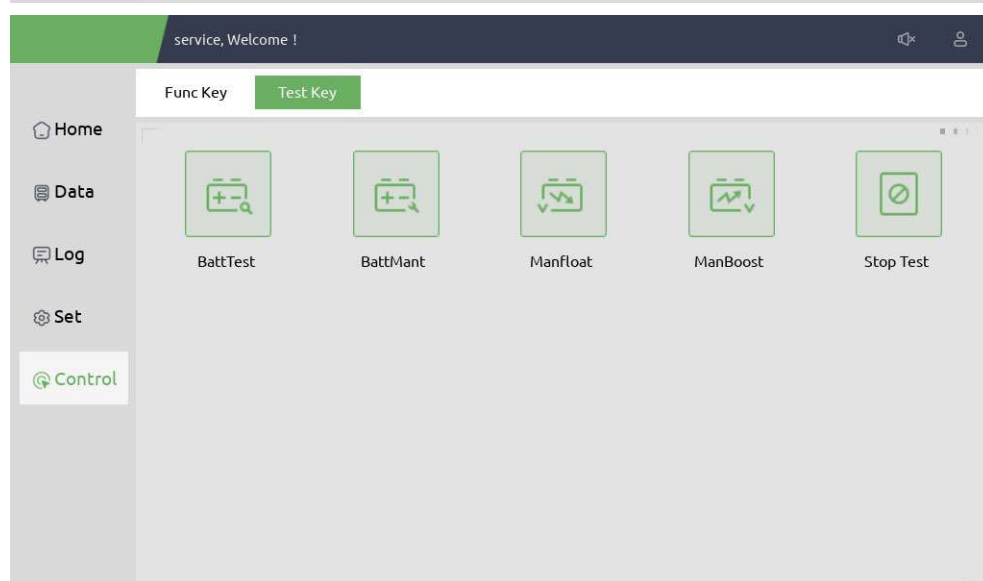
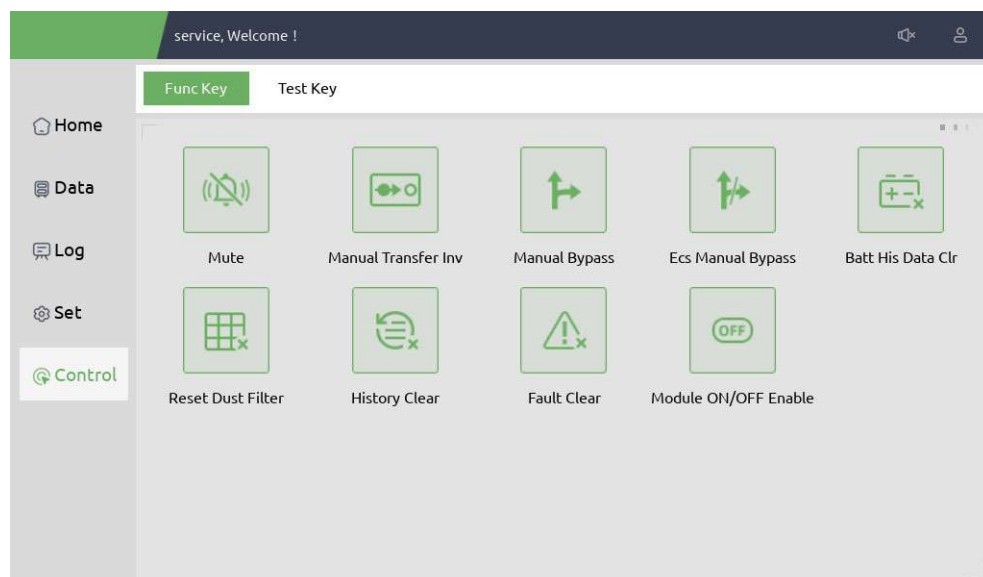
- Incorrect parameter settings may affect UPS performance. Only trained and authorised personnel should adjust settings.
- The battery “C” value represents the ampere-hour capacity (e.g. for a 100 Ah battery, C = 100 A).
- Available settings may vary depending on user permissions. For example, lithium battery parameters must be set by Neo Tec or an authorised representative.



The number of batteries set in the menu or monitoring software must exactly match the number of batteries installed. Incorrect settings can cause serious damage to the batteries or the UPS.

Control Menu

Touch the control icon on the left of the screen to enter the Control menu. This menu includes two sections: Function Key and Test Key.



SECTION	SUB-SECTION	ICON	DESCRIPTION
Func Key	Mute	 Mute	Mute or unmute alarm of the system
	Fault Clear	 Fault Clear	Clears the faults
	Manual Bypass and ESC Manual Bypass	 Manual Bypass OR  Ecs Manual Bypass	Transfers to bypass mode or cancels this command
Func Key	Manual Transfer Inv	 Manual Transfer Inv	Transfers the bypass mode to Inverter Mode
	Battery History Data Clear	 Batt His Data Clr	Clears the battery history data, the history data includes the times of discharge, days for running and hours of discharging.
	Reset Dust Filter	 Reset Dust Filter	Resets the time of dust filter, it includes the days of using and maintenance period.
Test Key	Battery Test	 BattTest	The system transfer to the battery mode to test the condition of the battery. Ensure the bypass is working normally and the capacity of the battery is no less than 25%.
	Battery Maintenance	 BattMant	The system transfer to the battery mode. This function is used for maintaining the battery, which requires the normality of the bypass and minimum capacity of 25% for the battery.
	Battery Boost	 ManBoost	The system starts boost charging.
	Battery Float	 Manfloat	The system starts float charging.
	Stop Test	 Stop Test	The system stops battery test or battery maintenance

6 Operations

6.1 UPS Start-up

Start-up in Normal Mode

The UPS must be started by a Neo Tec Service Representative once installation is complete. Follow these steps:

1. Ensure all circuit breakers are open.
2. Close the output breaker, input breaker, and bypass input breaker in sequence. The system will begin initialising.
3. The LCD panel will illuminate and display the home page.
4. Confirm that the energy flow diagram shows the rectifier starting.
5. After approximately 30 seconds, the rectifier startup is complete and the bypass static switch closes.
6. Once the bypass static switch is on, the inverter starts.
7. After a further 30 seconds, when the inverter is running normally, the UPS transfers from bypass to inverter.
8. Close the external or internal battery breaker. The batteries will begin charging, completing the startup process.

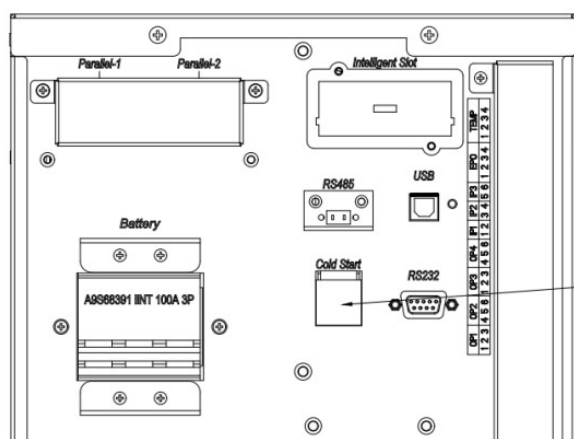


Language, date, and time can be set through the Settings sub-menu. Once configured, these parameters are stored and used as the system default at start-up. If parameters have already been set, the system will retain the existing values. During start-up, users can review all recorded events by checking the Log menu.

Start-up from Battery

A battery cold start allows the UPS to be powered on from the batteries when mains input is not available. Follow these steps:

1. Confirm the batteries are correctly connected. Close the output circuit breaker and the external or internal battery circuit breakers.
2. Press and hold the red battery cold start button. The batteries will supply power to the UPS.



Cold Start

3. The UPS will then start as in normal mode: the rectifier initialises, followed by the inverter. After approximately 60 seconds, the inverter is fully operational and the UPS runs in Battery Mode.



Press the battery cold start button at least one minute after the batteries have been connected.

6.2 UPS Shut Down

To shut down the UPS completely:

1. Ensure all connected loads have been safely powered down.
2. Switch off the battery breaker (internal or external).
3. Switch off the main input breaker (internal or external).
4. Switch off the bypass input breaker (if fitted). The display screen will power off once all breakers are open.



If the UPS is in Maintenance Bypass Mode, also switch off the maintenance bypass breaker.

6.3 Procedure for Switching Between Operation Modes

Switching the UPS from Normal Mode into Battery Mode

The UPS transfers to Battery Mode immediately if the mains power supply fails or falls below the defined voltage limit.

Switching the UPS from Normal Mode into Bypass Mode

In the Control menu, touch the “Transfer to Bypass” icon to switch the system into Bypass Mode.



Ensure the bypass supply is operating normally before transferring to Bypass Mode. Failure to do so may result in system error.

Switching the UPS into Normal Mode from Bypass Mode

In the Control menu, touch the “ECS Manual Bypass” icon to transfer the system to Normal Mode.



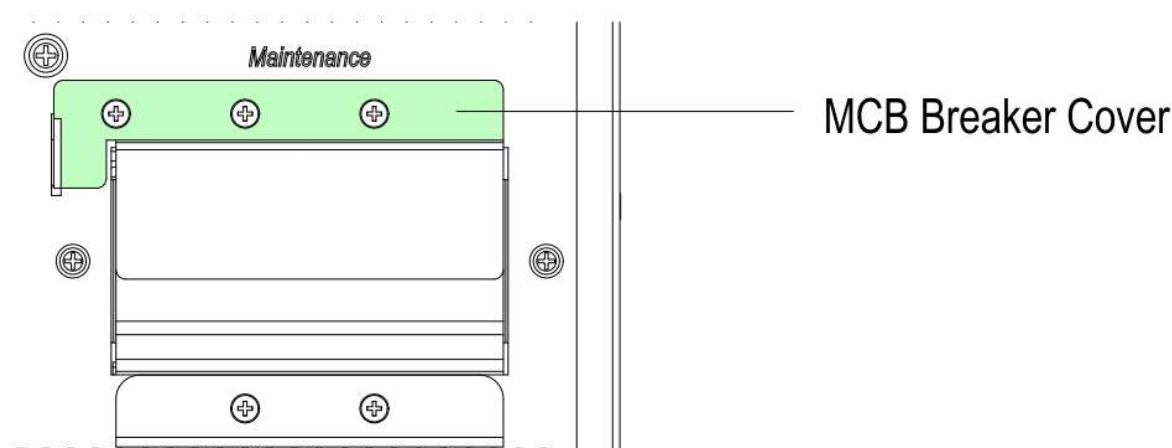
Normally, the UPS transfers automatically, but this function is used if the bypass frequency is outside tolerance and a manual transfer to Normal Mode is required.

Switching the UPS into Maintenance Bypass Mode from Normal Mode

The following procedure transfers the load from the UPS inverter output to the maintenance bypass supply, allowing safe servicing of the UPS:

1. Transfer the UPS into Bypass Mode.

2. Remove the cover of the maintenance bypass breaker.



3. Switch on the maintenance bypass breaker. The load will now be powered through both the maintenance bypass and static bypass.
4. Switch off the breakers in sequence: battery breaker, input breaker, bypass input breaker, and output breaker.
5. The load is then powered entirely through the maintenance bypass.



- In Manual Bypass Mode (where the load is powered directly from the bypass), dangerous voltages remain present at the terminals.
- The UPS requires external circuit breakers: external input breaker, external bypass input breaker, external output breaker, and external maintenance bypass breaker.



Before carrying out this operation, check the LCD display to confirm the bypass supply is stable and the inverter is synchronised with it. Otherwise, there is a risk of a short interruption to the load supply.



Even if the LCD is switched off, the input and output terminals may still be energised. Wait at least **10 minutes** for the DC bus capacitors to discharge fully before removing any covers.

Switching the UPS into Normal Mode from Maintenance Bypass Mode

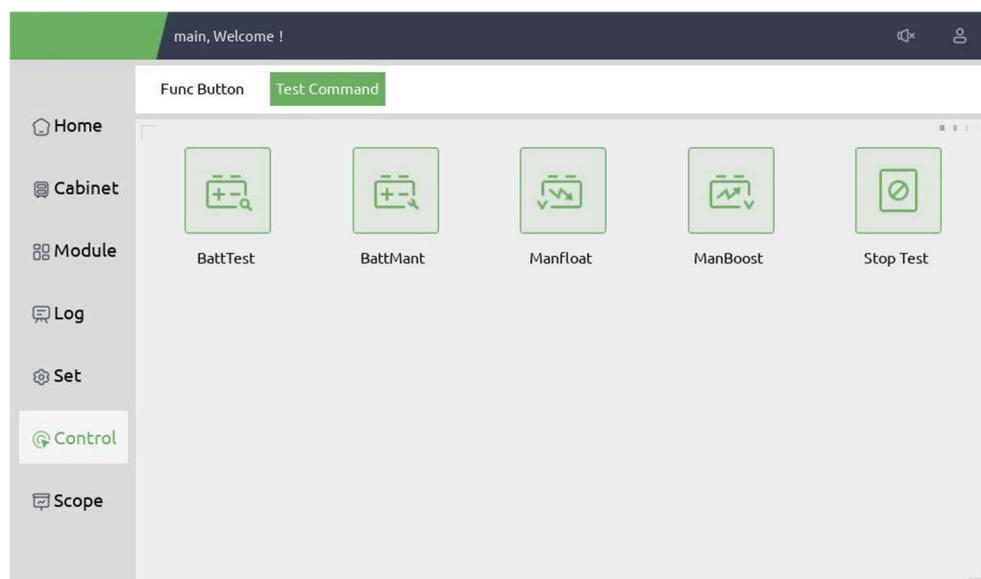
To return the load from Maintenance Bypass Mode to the inverter output:

1. After maintenance is complete, switch on the breakers in sequence: output breaker, bypass input breaker, input breaker, and then the external or internal battery breaker. After approximately 30 seconds, the bypass indicator LED will flash and the load will be powered through both the maintenance bypass breaker and static bypass.
2. Switch off the maintenance bypass breaker and refit the protective cover. The load will now be powered through the static bypass. The rectifier will start after 30 seconds, followed by the inverter. The inverter energy bar will flash during start-up.
3. After about 60 seconds, the system will transfer automatically to Normal Mode.

6.4 Battery Maintenance

If the batteries are not used for a long period, their condition should be tested. Two methods are available:

1. **Manual Discharge Test** - From the Control menu, select Battery Maintenance to place the UPS into Battery Mode for discharge. The test will stop automatically when the batteries reach 20% capacity or low voltage. The user can also stop the test manually by selecting Stop Test.



2. **Automatic Discharge Test** - The UPS can be set to discharge the batteries automatically at defined intervals. This setting must be carried out at the factory or via Neo Tec monitoring software.
 - Enable Battery Auto Discharge: in the Settings menu, select Battery Auto Discharge and confirm.
 - Set the discharge interval: in the Battery Settings menu, enter the required period in Auto Maintenance Discharge Period and confirm.

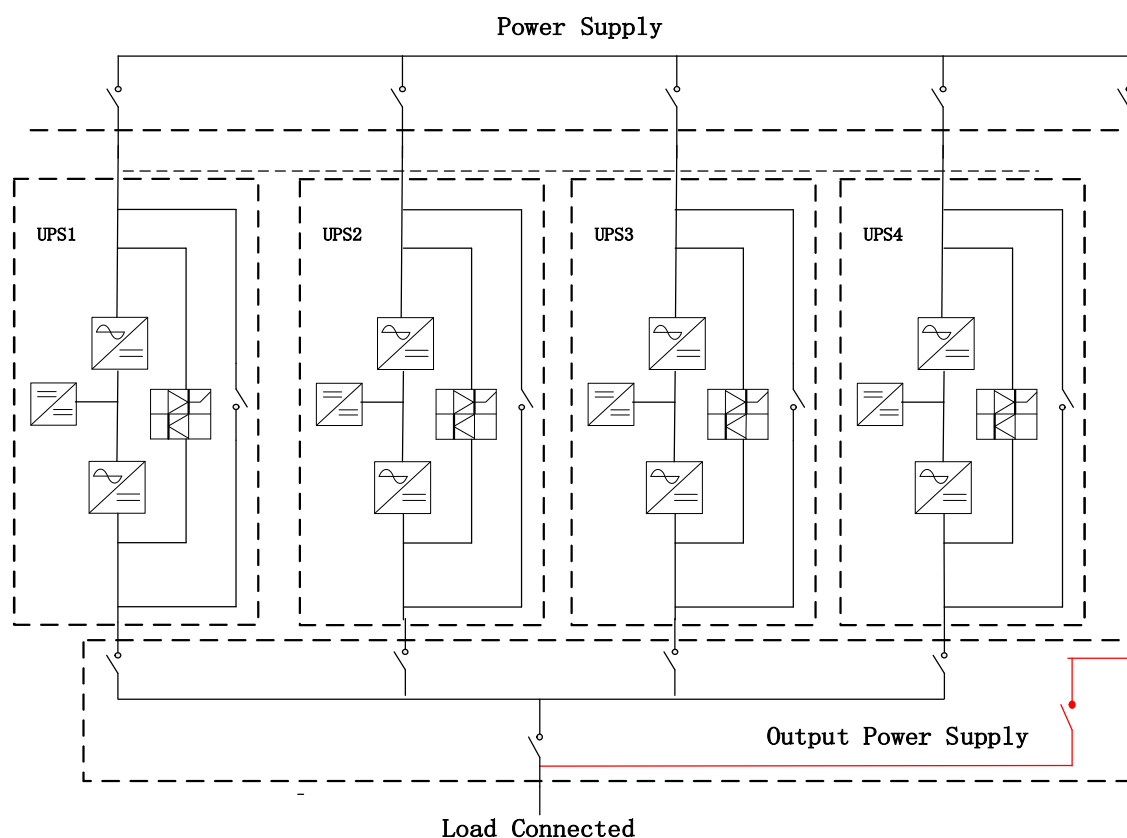


For automatic maintenance discharge to run, the connected load must be between **20% and 100%** of UPS capacity. If the load is outside this range, the process will not start

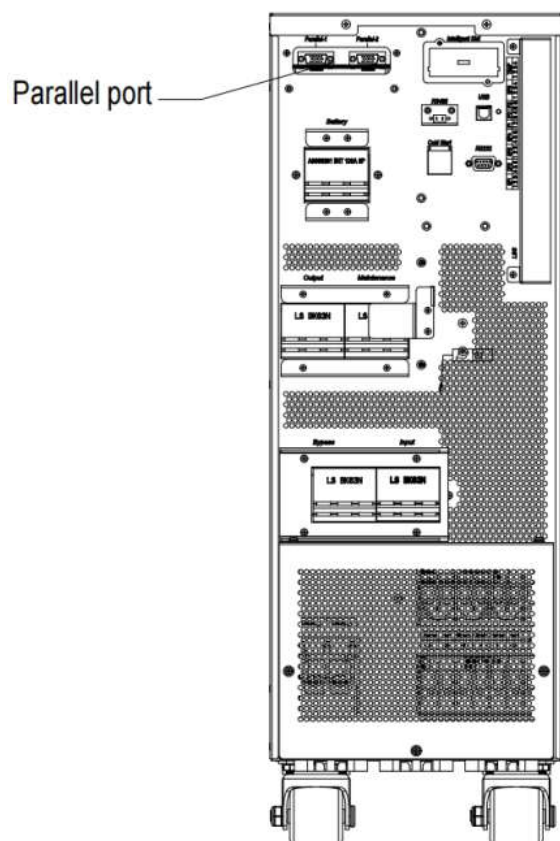
6.5 Parallel UPS

Diagram of the Parallel System

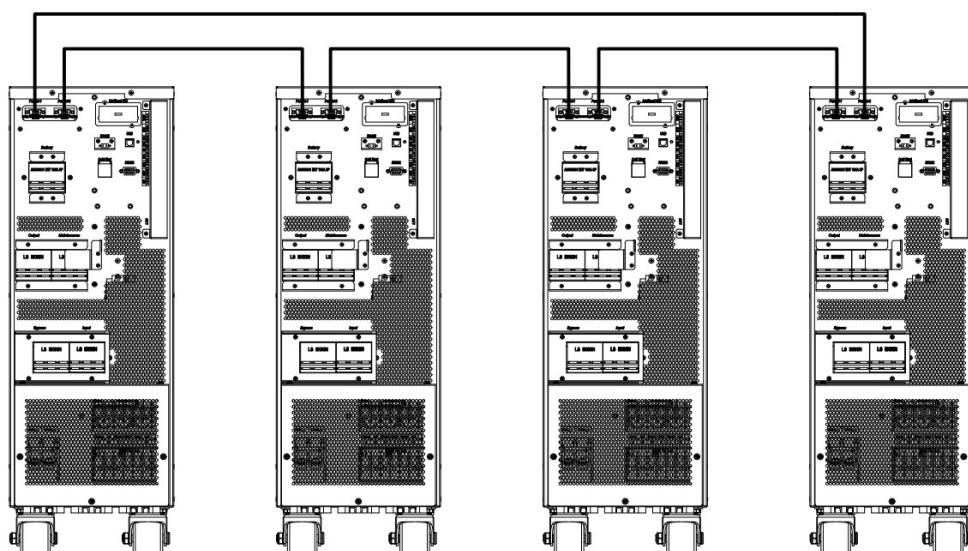
Up to four UPS cabinets can be connected in parallel, allowing the total capacity to scale to four times that of a single unit.



The parallel board is located on the rear of the UPS cabinet.



Open the cover of the parallel board and connect the terminals in sequence using the supplied cables, forming a closed ring.

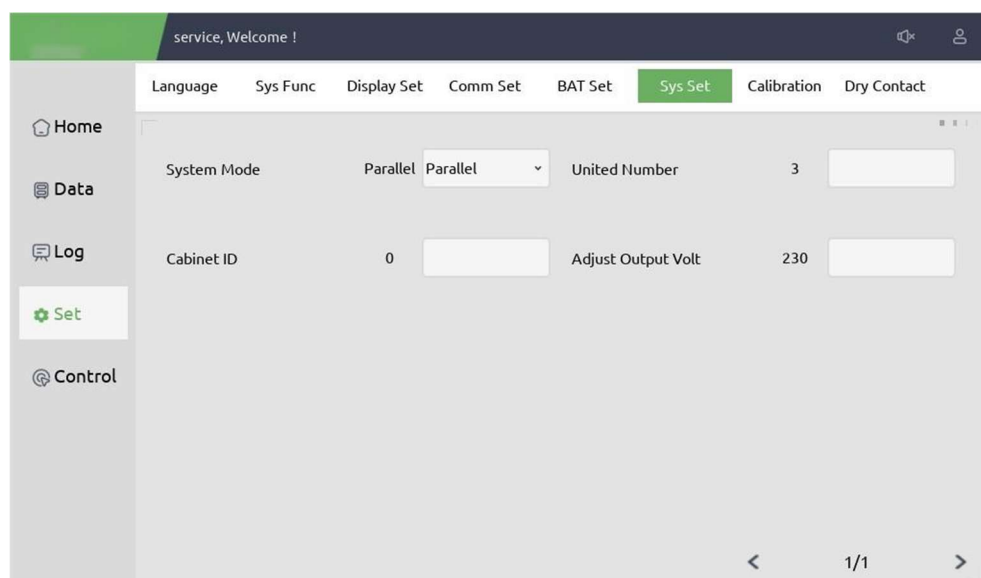


Parallel Operation Process

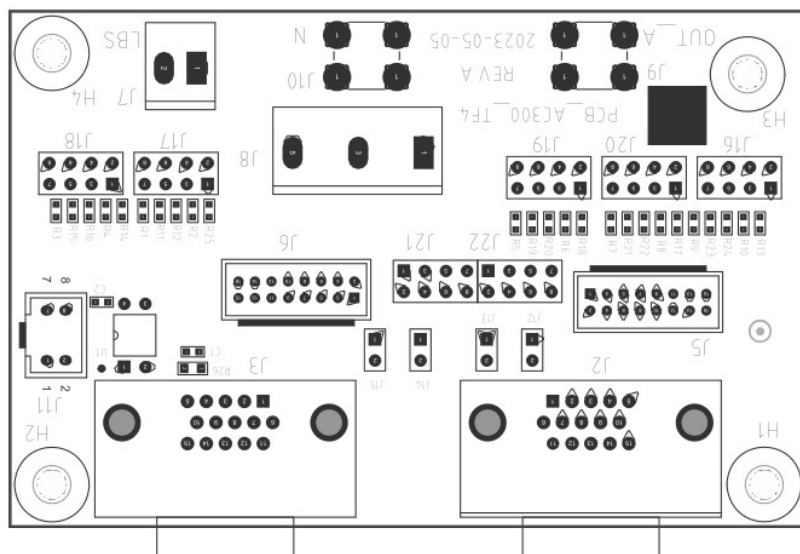
When operating UPS systems in parallel, the main and bypass inputs of each unit must be short-circuited together. If different mains sources are used, ensure that the main and bypass inputs of all UPS units are interconnected. To ensure correct bypass current sharing, the specifications and lengths of the input and output cables must be identical across all UPS units in the system.

To set the parallel parameters according to specific needs, following these steps:

1. Configure each UPS individually using the LCD screen or monitoring software. Navigate to Settings > System Settings, select Parallel, and assign a Cabinet ID.
 - Cabinet IDs must start from "0", be continuous, and not repeated.
 - Example: in a three-UPS system, set IDs to 0, 1, and 2.
 - UPS output parameters must be consistent across all units; otherwise, parallel operation is not possible.
 - Settings take effect after the UPS restarts.



2. The required short-circuit pin configuration on the parallel board depends on the number of units connected. Consult a Neo Tec Service Representative for details.



Contact a Neo Tec Service Representative for detailed guidance on parallel configuration and follow the parallel setting manual.

After confirming that each individual UPS has been commissioned correctly, debug the parallel system using the following steps:

1. Close the input and output breakers of the first UPS. The UPS will power on and enter Bypass Mode, then start the rectifier and inverter in sequence before switching to Online Mode. Verify that the output is normal.
2. Close the input and output breakers of the second UPS. Follow the same start-up sequence. The UPS will automatically join the parallel system. Check the LCD display to confirm no warnings and that the UPS is operating normally.
3. Repeat the process for the third and fourth UPS units, adding each one to the system once its inverter is running.
4. Apply a load to the system. Verify that each UPS shares the load equally.



During power-on of a parallel system, ensure the external output breakers of each UPS are closed and that all inverter outputs are operating in parallel.

7 Maintenance

7.1 Precautions

1. Only qualified Neo Tec Service Representatives may maintain the power modules.
2. Remove power modules from top to bottom to avoid cabinet instability caused by a high centre of gravity.
3. Before working on power or bypass modules, measure the voltage between live parts and earth with a multi-meter. Ensure voltages are below hazardous levels: DC <60Vdc AC <42.4Vac, and DC bus capacitor <60Vdc.
4. Wait at least 10 minutes after power-off before opening the cover of the power or bypass modules.

7.2 Maintaining the UPS

To service the UPS, transfer the load to Maintenance Bypass Mode. Remove the front panel and replace any damaged modules. Once maintenance is complete, refit the components and panel, then transfer the UPS back to Normal Mode (see section 6.3).

7.3 Maintaining the Battery String

For sealed lead-acid batteries, following proper maintenance procedures will extend service life. Battery life depends on several factors: installation, temperature, charging/discharging current, charging voltage, depth of discharge, and periodic checks.

- **Installation** – Place batteries in a cool, dry, well-ventilated location. Avoid direct sunlight and heat sources. Connect only batteries of the same type and rating.
- **Temperature** – The recommended storage temperature is approximately 25°C.
- **Charging/Discharging Current** – Optimal charging current is 0.1C (10% of rated capacity). The maximum charging current is 0.2C. Discharge current should remain between 0.05C and 3C.
- **Charging Voltage** – In Online Mode the system boost charges batteries until fully charged, then switches to float charge to extend life. Float voltage is approximately 13.7 V per battery. Overvoltage causes overcharging; undervoltage leaves batteries undercharged.
- **Discharge Depth** – Avoid deep discharge, which significantly reduces service life. Prolonged operation in Battery Mode with light or no load will cause deep discharge.
- **Regular Checks** – Inspect batteries periodically. Confirm balanced voltage across cells and look for abnormalities. Perform discharge tests regularly, even if mains power has not failed, to keep the batteries active. Long periods at full charge without discharge will reduce performance.



Daily inspection is essential. Check regularly that all battery connections are tight and that no abnormal heat is generated.



Any battery showing signs of leakage or damage must be replaced immediately. Store the defective unit in a sulphuric-acid-resistant container and dispose of it in accordance with local regulations.

Battery Disposal

Waste lead-acid batteries are classified as hazardous waste and are strictly controlled under environmental regulations. Their storage, transportation, use, and disposal must comply with all relevant national or local laws. Batteries must be recycled and reused; disposal by any other method is prohibited. Improper disposal of waste lead-acid batteries can cause severe environmental pollution and may carry legal consequences.

8 Product Specifications

8.1 UPS Full Specification

	TRI030B/C	TRI040B/C			TRI060C	TRI080C	TRI100C
POWER RATING							
kVA/kWatt	30kVA/kW		40kVA/kW		60kVA/kW	80kVA/kW	100kVA/kW
EFFICIENCY							
Normal mode (dual conversion)	96%					97%	
ECO mode	>99%						
Battery mode	Up to 96%						
GENERAL							
Acoustic noise level at 1 meter	65dB at 100% load, 62dB at 45% load						
Altitude of operation	≤1000m, load de-rated 1% per 100m from 1000m to 2000m						
Relative humidity	0-95% RH, non-condensing						
Operating temperature	0-40°C (for UPS only), battery life is halved for every 10°C increase above 20°C						
UPS storage temperature	-40 to 70°C						
PHYSICAL ATTRIBUTES							
Dimensions: W x D x H (mm)	350x823x1200				250x782x650	350x950x900	
Weight (kg)	300	92	303	95	72	91	
IP protection level	IP20						
Colour	Black						
INPUT RECTIFIER							
Grid system	3 Lines + Neutral + Ground						
Rated AC input voltage	380/400/415Vac (three-phase and sharing neutral with the bypass input)						
Rated frequency	50/60Hz						
Input voltage range	304V~478Vac (Line-Line), full load. 228V~304Vac (Line-Line), load decrease linearly from 100% to 50%						
Input frequency range	40~70Hz						
Input power factor	>0.99 kW/KVA, full load						
THDI	<3%, 100% Resistance load				<3%, 100% linear load	<2%, 100% linear load	
BATTERY							
Battery bus voltage	Rated : ±240V						
Quantity of lead-acid cells	480V=40x6 cell (12V) (Selectable 30-50pcs, derates at 34 blocks and under)						
Float charge voltage	2.25V/cell (selectable from 2.2V/cell~2.35V/cell) Constant current and constant voltage charge mode						
Temperature compensation	-3.0mV/°C/cl (selectable:0~-5.0)						
Ripple voltage	≤1% V float						
Ripple current	≤5% C ₁₀						

Boost voltage	2.4V/cell (selectable from : 2.30V/cell~2.45V/cell) Constant current and constant voltage charge mode	
End of discharge voltage	1.65V/cell (selectable from: 1.60V/cell~1.750V/cell) at 0.6C discharge current 1.75V/cell (selectable from: 1.65V/cell~1.8V/cell) at 0.15C discharge current (EOD voltage changes linearly within the set range according to discharge current)	
Battery charge	2.4V/cell (selectable from: 2.3V/cell~2.45V/cell) Constant current and constant voltage charging mode	
Battery charging power max current	10%* UPS capacity (selectable from: 1~20%* UPS capacity)	10%* UPS capacity (selectable from: 1~15%* UPS capacity)
INVERTER		
Rated AC voltage	380/400/415Vac (Three-phase four-line, with the bypass common middle line)	
Rated frequency	50/60Hz	
Frequency regulation	50/60Hz ±0.1%	
Voltage precision	±1% (0-100% Linear load)	
Overload	110%, 60min; 125%, 10min; 150%, 1min; >150%, 200ms	
Synchronised range	Settable, ±0.5Hz ~±5Hz, default ±3Hz	
Synchronised slew rate	Settable, 0.5Hz/S ~ 3Hz/S, default 0.5Hz/S	
Output power factor	1	
Transient response	<5% (20% - 80% -20% step load)	N/A
Transient recovery	<30ms (0% - 100% -0% step load)	N/A
Output Voltage THDu	<1%, 0-100%, linear load <6%, non-linear load	<1%, 0-100%, linear load; <5%, non-linear load <1%, 0-100%, linear load; <3%, non-linear load
Output short circuit current (Irms)	2.5 times rated current	
Output short circuit (Ipeak)	3 times rated current	
BYPASS		
Rated AC voltage	380/400/415Vac (three-phase four-wire and sharing neutral with the bypass)	
Rated current	45-60A	90-152A
Overload	125% Long term operation; 125%~130% for 10min; 130%~150% for 1min; 150%~400% for 1s; >400%, less than 200ms	N/A
Current rating of neutral cable	1.7A×In	
Frequency	50/60Hz	
Switch time (between bypass and inverter)	Synchronized transfer: 0ms	
Bypass voltage range (%Vac)	Settable: Upper limit: +10, +15, +20, default +15 Lower limit: - 10, - 15, - 30, - 40, default - 20	
Bypass frequency range	Settable, ±1Hz, ±3Hz, ±5Hz	
Synchronised range	Default: ±2Hz (Settable: ±0.5Hz~±5Hz)	