UPS NS3000 10-20-30kVA

USER Manual

NS3000 Series User Manual Rev. 01

Safety Precautions

This manual is about the installation and operation of NS3000 Series UPS (Hereinafter referred to as UPS).

Please carefully read this manual prior to installation.

The UPS must be debugged and maintained by the engineer commissioned by the manufacturer or the agent. Otherwise, human safety may be endangered and the damage of UPS shall not belong to the warranty scope.

UPS is only used for commercial / industrial purpose and cannot be used as power of life support equipment.

APPLICABLE STANDARDS

This product complies with 2006/95/EC - CE 73/23 & 93/68 (low voltage safety) and 2004/108/EC 89/336 (EMC) , and EMC standards of Australia and New Zealand (C-Tick) , and the following UPS product standards:
*IEC62040-1-1-General and safety requirements for use in operator access area
*IEC/EN62040-2 EMC requirements CLASS C3
*IEC62040-3 Performance requirements and test methods
Continued compliance requires installation in accordance with these instructions and the use of manufacturer approved accessories only.

WARNING- High earth leakage current

Earth connection is critical before connecting the input supply (include both utility supply and battery) . This equipment must be earthed in accordance with local electrical authority codes of practice.
Earth leakage current exceeds 3.5 mA and is less than 1000 mA.
Transient and steady-state earth leakage currents, which may occur when starting the equipment, should be taken into account when selecting instantaneous RCCB or RCD devices.
Residual Current Circuit Breakers (RCCBs) must be selected insensitive to DC unidirectional pulses (class A) and transient current pulses (RCCBs) .
Note it that the earth leakage currents of the load will also flow across UPS RCCB or RCD.

Warning: Back feed Protection

Backfeed protection, (optional), is provided to isolate the static switch if excessive voltage is present at the bypass input when the bypass source is deenergized. If this function is not installed and enabled , there must be a warning label on the external bypass switch to remind the operator of the connection. The warning on label should be: Isolate the UPS before operating this part.

Components that can be maintained by user

All the equipment maintenance and servicing procedures involving internal access need special tools and should be carried out only by trained personnel. The components that can only be accessed by opening the protective cover with tools cannot be maintained by user.
This UPS full complies with “IEC62040-1-1-General and safety requirements for use in operator access area UPS”.Dangerous voltages are present within the battery box. However, the risk of contact with these high voltages is minimized for non-service personnel. Since the component with dangerous voltage can only be touched by opening the protective cover with a tool, the possibility of touching high voltage component is minimized. No risk exists to any personnel when operating the equipment in the normal manner, following the recommended operating procedures in this manual.

Battery Voltage Higher Than 400Vdc

All the battery maintenance and servicing procedures involving internal access need special tools or keys and should be carried out only by trained personnel.
SPECIAL CARE SHOULD BE TAKEN WHEN WORKING WITH THE BATTERIES ASSOCIATED WITH THIS EQUIPMENT. WHEN CONNECTED TOGETHER, THE BATTERY TERMINAL VOLTAGE WILL EXCEED 400Vdc AND IS POTENTIALLY LEATHAL.
Battery manufacturers supply details of the necessary precautions to be observed when working on, or in the vicinity of, a large bank of battery cells. These precautions should be followed implicitly at all times. Particular attention should be paid to the recommendations concerning local environmental conditions and the provision of protective clothing, first aid and fire-fighting facilities.

CONTENTS

Chapter 1 Quick Start

1.1 Introduction

This chapter introduces the basic principles for UPS installation and debugging, so that personal service can install and debug UPS quickly.

1.2 Initial Checking

Perform the following checking operations prior to the UPS installation.

1. Visually examine if there is any damp, water, or damage inside and outside the UPS packing, products and battery equipments due to the transportation. Report any such damage to the shipper immediately.
2. Verify the product label and confirm the correctness of the equipment. The equipment label is attached on the panel behind front door. The UPS model, capacity and main parameters are marked on the label.
3. Verify correctness of the accessories. If there is any mistake for accessories, contact with shipper or provider.

1.3 Environment Checking

Before installing UPS, please check these items as below:

1. Is the UPS operation environment temperature above 25°C? If so, please add cooling equipments.

   Note: Environment temperature above 20°C, battery life will reduce to half when environment temperature rise each 10°C.
2. Is the UPS operation environment temperature below 0°C? If so, please add heaters.
3. Is the UPS operation environment humidity is above 90% Is there any condensing? If so, please add additional protection.
4. In the UPS operation environment, is there any sunshine shining in directly or life-form coming in? If so, please add additional protection.
5. In the UPS operation environment, is there any dust, combustible or explosive gas? If so, please add additional protection.

1.4 Installation Checking

After finishing installation, please check these items as below:

1. Is UPS installed on the flame-retardant materials?
2. Are all cables connected exactly?
3. Are all grounded system connected according to the manual?
4. Is there enough operation space around UPS?
5. Please confirm all UPS external terminals are fastened, the moment should meet requirements.
6. Please confirm that there are no screws, cables and other conductor left in the UPS. If there is, please take out.

Chapter 2 Installation Guidance

2.1 Introduction

This chapter introduces UPS installation, it provide normal installation steps and ideas. Please installation engineers operate according to each place difference,

Warning-Installation can only be done by authorized engineers
1. Do not apply electrical power to the UPS equipment before the approval of commissioning engineer. 2. The UPS should be installed by a qualified engineer in accordance with the information contained in this chapter.

Note: 3-Phase 4-Wire Input Power is required
The standard UPS can be connected to TN, TT AC distribution system (IEC60364-3) of 3-phase 5-wire.For IT system please contact us.

WARNING: battery hazards
SPECIAL CARE SHOULD BE TAKEN WHEN WORKING WITH THE BATTERIES ASSOCIATED WITH THIS EQUIPMENT. When connecting the battery, the battery terminal voltage will exceed 400Vdc and is potentially lethal. l Eye protection should be worn to prevent injury from accidental electrical arcs. l Remove rings, watches and all metal objects. l Only use tools with insulated handles. l Wear rubber gloves. l If a battery leaks electrolyte, or is otherwise physically damaged, it must be replaced, stored in a container resistant to sulfuric acid and disposed of in accordance with local regulations. l If electrolyte comes into contact with the skin, the affected area should be washed immediately with water.

2.2.1 Distribution Room

The UPS is designed for indoor installation, which shall be located in a clean environment with adequate ventilation to keep the environmental temperature within the required specification. The UPS uses forced convection cooling by internal fans. Cooling air enters the module through ventilation grills located at the front part or in front and botton (NS3030) of the cabinet and exhausted through grills located in the rear part of the cabinet. Please do not block the ventilation holes.

If necessary, a system of extractor fans should be installed to aid cooling-air flow. An air filter should be used when the UPS is to operate in a dirty environment and should be regularly cleaned to maintain airflow.

Note: The UPS should be installed on a cement surface or other surface that is not combustible.

2.2.2 Battery Room

The battery will generate some amount of hydrogen and oxygen at the end of charging, so the fresh air volume of the battery installation environment must meet EN50272-2001 requirements. The ambient temperature of the battery must be stable. Ambient temperature is a major factor in determining the battery capacity and life. The nominal operating temperature of battery is 20°C. Operating above this temperature will reduce the battery life, and operation below this temperature will reduce the battery capacity. If the average operating temperature of battery is increased from 20ºC to 30ºC, then the service life of the battery will be reduced by 50%. If the operating temperature of the battery is above 40ºC, then the battery service life will be decreased in exponent rate. In a normal installation, the battery temperature is maintained between 15°C and 25°C. Keep batteries away from heat sources or air outlets.

If external batteries are to be used, a battery protection device (a DC circuit breaker) must be mounted as close as possible to the batteries, and the connecting cables should be as short as possible.

2.2.3 Storing

If the equipment not be installed immediately, it must be stored in a room so as to protect it against excessive humidity and heat sources. The battery needs to be stored in dry and cool place with good ventilation. The most suitable storage temperature is 20 ºC to 25ºC.

2.3 Disassembly, Initial Checking and Positioning

Check the packaging first upon the arrival of product to see if there is any damage; open the packaging to check the equipment; report any such damage to the shipper immediately.

2.3.1 System Packing

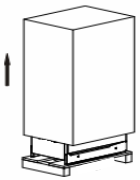
Remove the carton box and the plastic film first, thensee.Durig the procedure under descript Be careful not scratch the product.

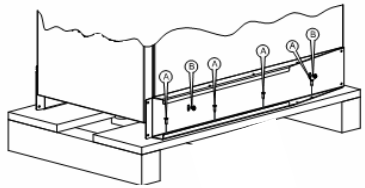
REMOVING THE UPS FROM THE PALLET

Fig 2-1 UPS Packing Diagram

CAUTION! TO AVOID HARMING PEOPLE AND/OR DAMAGING THE EQUIPMENT, FOLLOW CAREFULLY THE FOLLOWING INSTRUCTIONS.

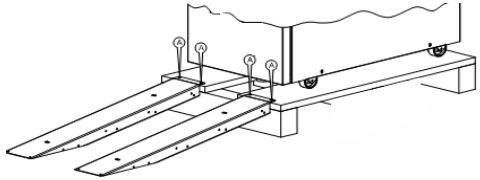
SOME OF THESE INSTRUCTIONS NEED TO BE CARRIED OUT BY TWO PEOPLE.



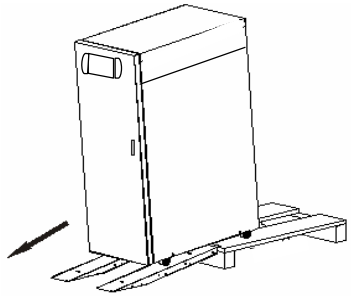


Cut the straps and remove the cardboard box by sliding it upwards.

§ Remove the 2 brackets securing the UPS to the pallet by unscrewing the screws.



§ The previously removed brackets can also be used as slides. Secure the slides to the pallet by using the type A screws, making sure they are aligned with the wheels.



§ Screw the brake rod completely, so to separate it from the pallet
§ Make sure that the door is firmly closed.
§ CAUTION! Push the UPS from the rear with great care. Given the weight of the equipment, **this operation needs to be carried out by two people***NOTE : It is recommended to keep all parts of the packaging for further use*

Tip: Dismantle the bolts that connect the cabinet and wooden pallet after disassembly, then lift the cabinet to installation position. The dismantlement should be careful so as not to scratch the body.

Verify the product label and confirm the correctness of the equipment. The equipment label is attached on the back of front door. The UPS model, capacity and main parameters are marked on the label.

Warm Tips: Please dispose the wasted materials in accordance with environmental protection requirements after disassembly.

To prolong the service life, the place chosen for the UPS must guarantee:

- Easy wiring
- Sufficient space for operation
- Air sufficient enough to dispel heat produced by UPS
- Against ambient corrosive gases
- Against excessive humidity and heat sources
- Against dust
- With the current fire prevention requirements
- The operating environment temperature is within 20 -25 . The batteries are at maximum efficiency in this temperature range (for information about the battery storage and transportation as well as the environment, please refer to table 8-2)

2.3.2 UPS Composition

10KVA~30KVA cabinet

2.3.3 Operation Space

As UPS has no ventilation grills at either side, no clearances are requi ed for the sides.

To enable routine tightening of power terminations within the cabinet it is recommended that clearance around the front and back of the equipment should be sufficient to enable free pass ge of personnel with the doors fully opened. The back door of the cabinet is more than 800mm from the wall or other ca inets.

Distance from the back ≥ 200mm

2.3.4 Front and Back Access

The component layout of the UPS supports front and back access for servicing, diagnosing and repairing the UPS, thus reducing the space requirement for side access.

2.3.5 Final Positioning

When the equipment has been finally positioned, ensure the adjustable feet is set so that the UPS will remain stationary and stable.

2.3.6 Cable Entry

A lower incoming line is used for 10KVA~30KVA UPS.

2.4 Protective Devices

For safety concerns, it is recommended to install external circuit breakers or other protective devices for the input AC supply of the UPS system.

We suggest to choose the input automatic break Bigger than internal automatic Breaker and D curve for the selectivity with internal UPS protection.

This section provides generic practical information for qualified installation engineers. The installation engineers should have the knowledge of the regulatory wiring standards, and of the equipment to be installed.

2.4.1.1 Rectifier and Bypass Input Supply of the UPS

Install suitable protective devices in the distribution unit of the incoming mains supply, considering the power cable current-carrying capacity and overload capacity of the system. Generally, the magnetic circuit breaker with IEC60947-2 tripping curve C (normal) at the 125% of the current listed in table 2-1 is recommended. Whith common input we suggest tripping curve d

Note
For IT power network system, 4-pole protective device must be installed on the external input distribution of the UPS.

Earth leakage current

If protection against earth faults (RCD devices) is required for the upstream of the input supply, the installed device should:

- Sensitive to DC Class B or class A in the network
- Insensitive to transient current pulses
- Have an average sensitivity that is adjustable between 0.3A-1A

2.4.1.2 Backfeed Protection.

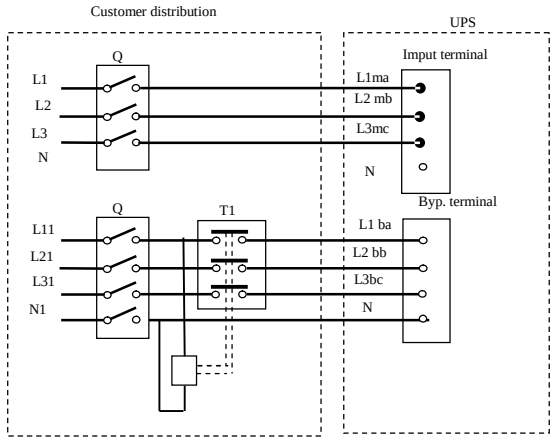
Put a label on all **primary power** isolators installed remote from the **UPS** area. One label is supply

Before working on this circuit

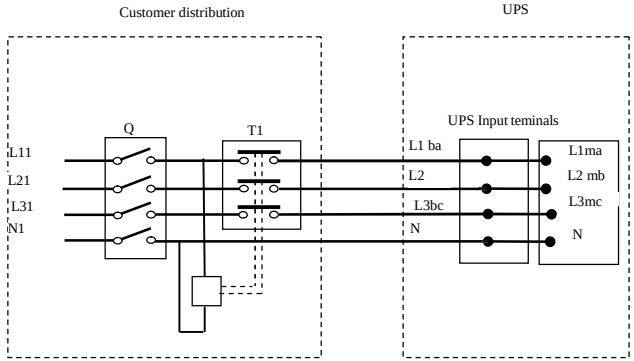
- Isolate Uninterruptible Power System (UPS)
- Then check for Hazardous Voltage between all terminals including the protective earth

Risk of Voltage Backfeed

UPS whit by-pass and line input separate



UPS whit by-pass and line input common



Pay attention Neutral is common point inside UPS.

2.4.3 Battery

A battery string is composed of 40 batteries connected in series, maximum is possible install 2 strings 40batteries (B1-B2 in this document). The positive, the negative and middle point (the joint part between the 20th and 21st battery) cable must push through a DC circuit breaker before connecting to corresponding UPS . For detailed wiring please refers to fig 2-4 below:

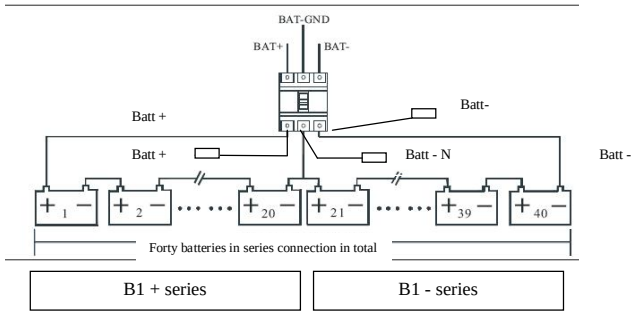


Fig 2-4 Diagram of batteries connected in series

2.4.3 UPS Output

A main output switch has been installed in UPS; the user shall install the overcurrent protective device on the bypass and on each output of the external distribution cabinet.

2.5 Power Cables

Design the cables according to the descriptions in this section and local regulatory wiring standards, and the environmental conditions should be taken into consideration. Refer to IEC60950-1 table 3B.

Warning
Prior cabling the UPS, confirm the status and positions of the switches of the UPS rectifier input power supply / bypass power supply and mains power distribution board. Ensure that these switches are opened and attached with WARNING label so as to prevent unauthorized operation to these switches.

2.5.1 Maximum stable state current and configuration of minimum cable system

Table 2-1

Model Name		NS3010	NS3020	NS3030
	UPS Power	10KVA	20KVA	30KVA
Main Input	Rated current A	15A	30A	45A
	Cable mm2	4	6	10
Output	Rated current A	15A	30A	45A
	Cable mm2	4	6	10
Battery	Rated current A	18A	36A	53A
	Cable mm2	6	10	16
PE	Cable mm2	4	10	10

Warning
FAILURE TO FOLLOW ADEQUATE EARTHING PROCEDURES CAN RESULT IN EMI, ELECTRIC SHOCK HAZARD OR RISK OF FIRE, SHOULD AN EARTH FAULT OCCUR.

2.5.2 Cable Connection

Important
The operations described in this section must be performed by authorized electricians or qualified technical personnel.. If you have any difficulties, do not hesitate to contact our Customer Service & Support department .

After the equipment has been finally positioned and secured, connect the power cables as described in the following procedures:

1. Verify that all the external input distribution switches of the UPS are completely opened (off position) and the UPS internal maintenance bypass switch is opened. Attach necessary warning signs to these switches to prevent unauthorized operation.
2. Open the door of the cabinet, remove the left bottom cover and then the input and output terminal, battery terminal and earth terminal are visible.
3. Connect the input earth wire to input earth terminal. Please note: the earth wire shall be connected in accordance with related local or state regulation
4. If in UPS, same electric supply input is used for the by-pass and main input AC input cables should be connected with the input terminal of UPS (Main input L1ma – L2mb – L3mc and the output load cables are connected with the output terminal of UPS (Output L1oa - L2oA - L3oC). If in UPS, two electric supply inputs are used for the rectifier and by-pass, the AC input cables should be respectively connected with the main input terminal of UPS (Main input L1ma - L2mb – L3mc and the input terminal of the bypass,L1ba,L2bb,L3bc and the short circuit copper bars between the main circuit and the bypass have to be removed; fastening moment of force is 30kg(M5), 50kg(M6), 180kg(M8). Attention is given to phase sequence and the short circuit at a joint between cable terminals. If the phase sequence is wrong UPS show an alarm
5. Connect the battery cables between the UPS battery terminals and battery switch. **ENSURE CORRECT Polarity.**

Warning-Hazardous battery terminal voltage ≥400Vdc
The operations described in this section must be performed by authorized electricians or qualified technical personnel. Ensure the correct polarity connection between the battery terminals and the UPS terminals: Positive terminal to positive terminal, negative terminal to negative terminal, The middle poin of the batteies is Neutral point in the UPS. Disconnect in the tray 1 and tray 5 the cable marked A and B. Do not connect the cables and close the battery circuit breakers before getting the approval from the commissioning engineer.

6. Re-install all the protective covers.

2.5.3 Connection for Battery

On NS3000 10-30kVA series UPS, there is an internal battery breaker in the UPS. Also, this type UPS offer external battery connection terminals. If customers want to use external battery, they have to install a battery breaker or fuse between the UPS and the external battery.

UPS can have one ore two string of batteries B1 or B1+B2 each string is composed with 20+20 Battery with common point see table 1.

UPS	B1	B1+B2
NS3010	40*7 or 9A/h	2*40*7 or 9A/h
NS3020	40*7 or 9A/h	2*40*7 or 9A/h
NS3030	----------	2*40*7 or 9A/h

Tab.1

The method of build-in battery connection as shown fig. 2-5:

⚠⚠ Warning-Hazardous battery terminal voltage ≥400Vdc
THE BATTERIES MUST BE INSTALLED WITH THE ORIGINAL MANUFACTORY KIT THAT INCLUDE THE DEDICATE PLASTIC BATTERY BOX. KIT CABLE cod. KITNS-CAVBATINT USE THE MANUFACTORY INSTRUCTION.

2.5.3.1 UPS arrives with out batteries Instructions for forty batteries

1) Opend the battery breaker
2) Insert the batteries in the plastic box and connect the batteries according fig. 2.5.B
3) Check with the multimeter the battery output cable correct polarity and voltage (8 battery have to be about 101-104V, 4 battery ave to be about 50-52V)
4) Fix the plastic battery box with hard tape at least in 2 positions.
5) Insert the plastic battery box according fig. 2.5.A. Pay attention all cable are marked and have different color.
6) Connect the battery according fig 2.5.A , don't connect A and B cable in the shelf 1
7) In shelf 1 on the left connect the cable mark **A** with the cable mark **B** on shelf 2
8) Check B1- negative battery voltage on battery breaker. Negative battery is on the battery breaker right lower terminal, the neutral is on the battery breaker central lower terminal.
9) With 20 batteries the voltage is NEGATIVE, about - 255 /-260V
10) In the shelf 1 (B1+) on the right connect the cable mark **A** with the cable mark **B** on shelf 2
11) Check B1+ positive battery voltage on battery breaker. Positive battery is on the battery breaker left lower terminal, the neutral is on the battery breaker central lower terminal.
12) With 20 batteries the voltage is POSITIVE about + 255 -260V

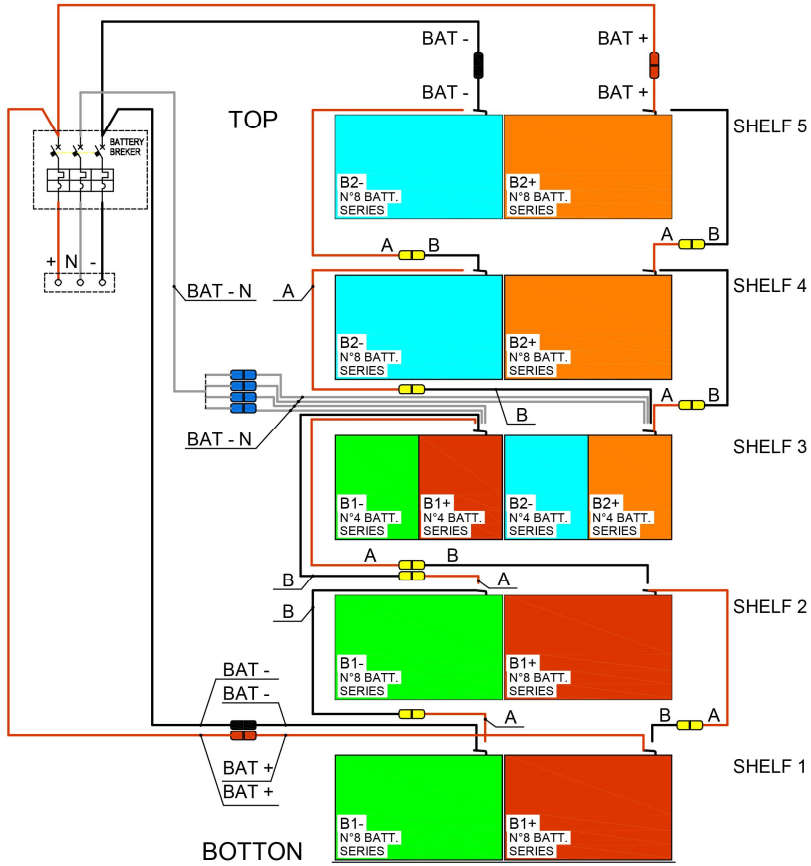
Impotant: with 80 batteries repeat the operation upper descript change layer1 with layer 5 and B1 with B2 , with B1 battery block don't connect

2.5.3.2 UPS arrived with batteries inside

Start from point 6 to to 2.5.3.1 UPS arrives with out batteries section.

Legend fig. 2.5A	
B1	first string 40 battery with common point
B2	Second string 40 batteries with common point
BAT –	Mark NEGATIVE cable 40 battery series output
BAT+	Mark on POSITIVE cable 40 battery series output
BATT -.N	Common point 40 batteries series
C	Batteries cable
A	Mark on positive cable out put 8 or 4 series batteries
B	Mark on negative out put 8 or4 series batteries

FIG.2.5.A FRONT VIEW AND BATTERY CONNECTION



TOP VIEW INTENAL SHELF BATTERY POSITION

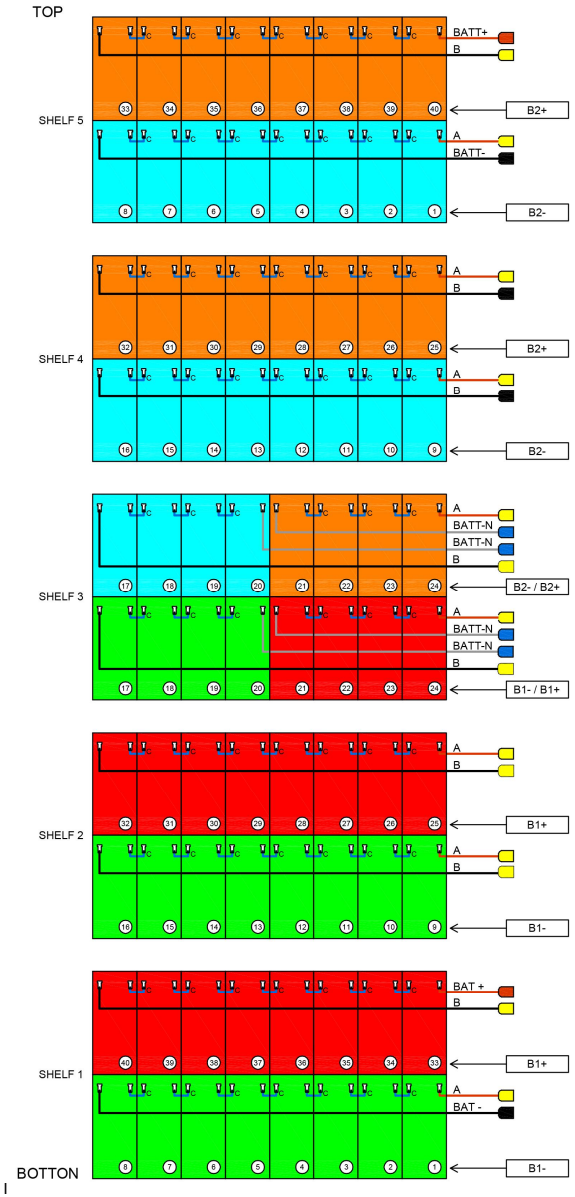


FIG.2.5.B

2.6 Control and Communication Cabling

fig. 2-6 shown, the Relay card dry contact interface (J2-J10), communication interface (RS232 interface, 485 interface and SNMP card interface) and parallel card position.

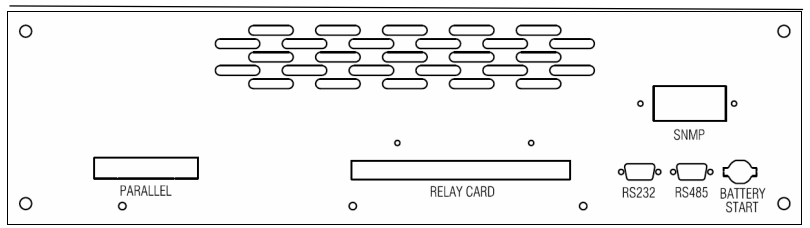


Fig 2-6 Dry contact interface and communication interface

The UPS accepts external signal from zero-voltage (dry) contacts connected through external dry contact terminals produced and phoenix terminals. Through software programming, these signals become active when these contacts connect to +24V to ground.The cables connected to DRY terminal must be separated from power cables. Moreover, these cables should be double insulated with a typical 0.5 to 1.5 mm^2 cross-section area for a maximum connection length between 25 and 50 meters.

2.6.1 Dry Contact Interface of Battery and Environmental Temperature Detection (Optional)

The input dry contact J2 and J3 can detect the temperature of batteries and environment respectively, which can be used in environment monitoring and battery temperature compensation 1.

J2 and J3 interfaces diagram are shown in fig 2-7, the description of interface is in table 2-2.

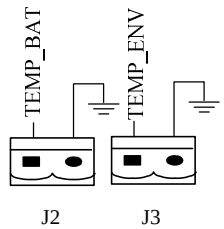


Fig 2-7 Diagram of J2 and J3 dry contact for temperature detecting

Table 2-2

Position	Name	Purpose
J2.1	TEMP_BAT	Battery temperature detection
J2.2	GND	Power ground
J3.1	TEMP_ENV	Environment temperature detection
J3.2	GND	Power ground
Note: Specified temperature sensor is required for temperature detection (R25=5kOhm, B25/50=3275), please confirm with the manufacturer, or contact local maintenance engineers when placing an order.		

2.6.2 Remote EPO Input Port (Optional)

The UPS has an Emergency Power OFF (EPO) function. This function can be activated by pressing a button on the control panel of the UPS or through a remote contact provided by the user. The EPO pushbutton is protected by a hinged plastic cover.

J4 is the input port for remote EPO. It requires shorting NC and +24v during normal operation, and the EPO is triggered when opening NC and +24v, or shorting NO and +24v. The port diagram is shown in Fig 2-8, and port description is shown in table 2-3.

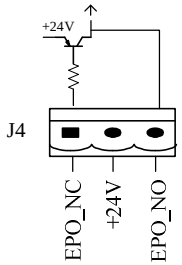


Fig 2-8 Diagram of input port for remote EPO

Table 2-3 Description of input port for remote EPO

Position	Name	Purpose
J4.1	EPO_NC	EPO is activated when disconnecting fromJ4.2
J4.2	＋24V	+24V, connect the common terminal of NC and NO
J4.3	EPO_NO	EPO is activated when shorting with J4.2

If an external emergency stop facility is required, it is connected via the reserved terminals of J10.The external emergency stop facility needs to use shielded cables to connect to the `normally open/closed remote stop switch between these two pins. If this facility is not used, then pin 2 and pin 3of J4 must be open, or pin 1 and pin 2 of J4 must be shorted.

⚠ Note

1. The emergency stop action within the UPS will shut down the rectifier, inverter and static bypass. However, it does not internally disconnect the mains input and batterypower supply. To disconnect ALL power to the UPS, open the upstream input circuit breaker(s) and battery breakerwhen the EPO is activated.
2. Pin 1 and 2 of J4 have been shorted before the UPS is delivered

2.6.3 Generator Input Dry Contact (Optional)

J5 is status interface for generator connection. Connect pin 2 of J5 with + 24V power supply, and it indicates that the generator has been connected with the system. The interface diagram is shown in fig 2-9 and interface description is shown in table 2-4

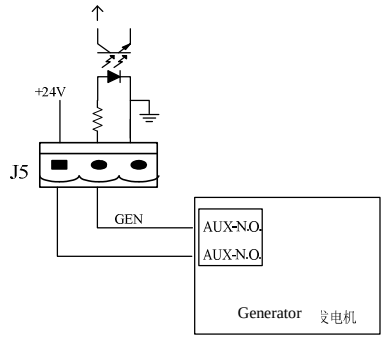


Fig 2-9 Diagram of status interface and connection of generator

Table 2-4

Position	Name	Purpose
J5.1	+24V	+24V power supply
J5.2	GEN	Connection status of generator
J5.3	GND	Power ground

2.6.4 BCB Interface (Optional)

J6 and J7 are battery circuit breaker (BCB) interface. The interface diagram is shown in fig 2-10 and interface description is shown in table 2-5.

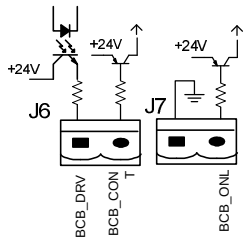


Fig 2-10 BCB Interface

Table 2-5

Position	Name	Purpose
J6.1	BCB_DRV	BCB drive signal: providing +24V, 20mA drive signal
J6.2	BCB_CONT	BCB contact status，connect to BCB’s normal open signal
J7.1	GND	Power ground
J7.2	BCB_ONL	BCB online input（normal open），it shows BCB is online when this signal connects to GND.

2.6.5 Battery Warning Output Dry Contact Interface (Optional)

J8 is the output dry contact interface, which indicate the battery warnings of low or excessive voltage, when the battery voltage is lower than set value, an auxiliary dry contact signal will be provided. The interface diagram is shown in fig 2-11, and description is shown in table 2-6.

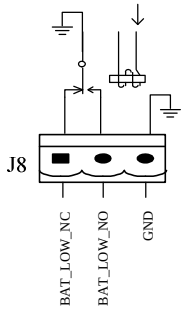


Fig 2-11 Battery warning dry contact interface diagram

Table 2-6

Position	Name	Purpose
J8.1	BAT_LOW_NC	Battery warning relay (normally closed) will be open during warning
J8.2	BAT_LOW_NO	Battery warning relay (normally open) will be closed during warning
J8.3	GND	Center of battery warning relay common

2.6.6 General Warning Output Dry Contact Interface (Optional)

J9 is the genera warning output dry contact interface, when one or more than one warning is triggered, the system will send integrated warning information, and provide an auxiliary dry. The interface diagram is shown in fig 2-12, and description is shown in table 2-7

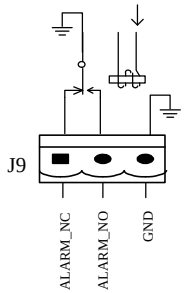


Fig 2-12 General warning dry contact interface diagram

Table 2-7

Position	Name	Purpose
J9.1	ALARM_NC	Integrated warning relay (normally closed) will be open during warning
J9.2	ALARM_NO	Integrated warning relay (normally open) will be closed during warning
J9.3	GND	Centre of integrated warning relay

2.6.7 Mains Failure Warning Output Dry Contact (Optional)

J10 is the output dry contact interface for mains failure warning, when the mains fails, the system will send a mains failure warning information.. The interface diagram is shown in fig 2-13, and description is shown in table 2-8.

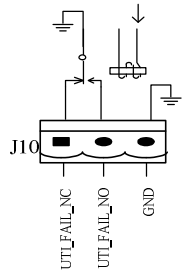


Fig 2-13 Mains failure warning dry contact diagram

Table 2-8

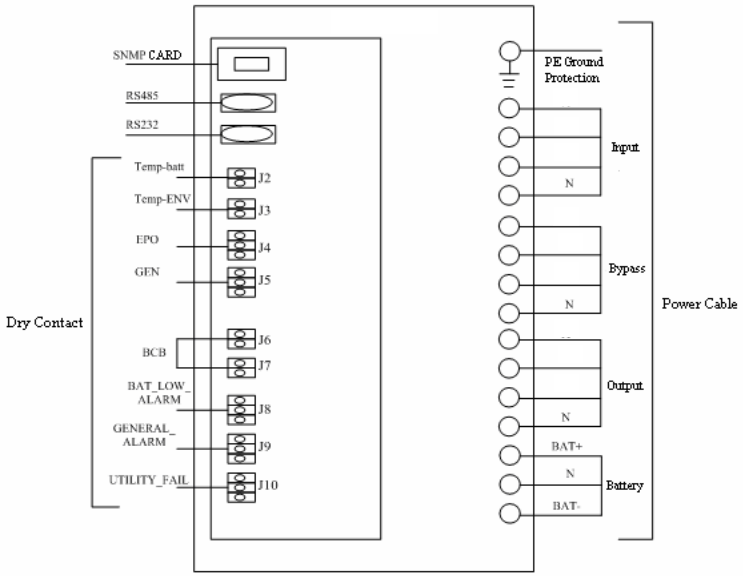
Position	Name	Purpose
J10.1	UTI_FAIL_NC	Mains failure warning relay(normally closed) will be open during warning
J10.2	UTI_FAIL_NO	Mains failure warning relay(normally open) will be closed during warning
J10.3	GND	Centre of mains failure warning relay common

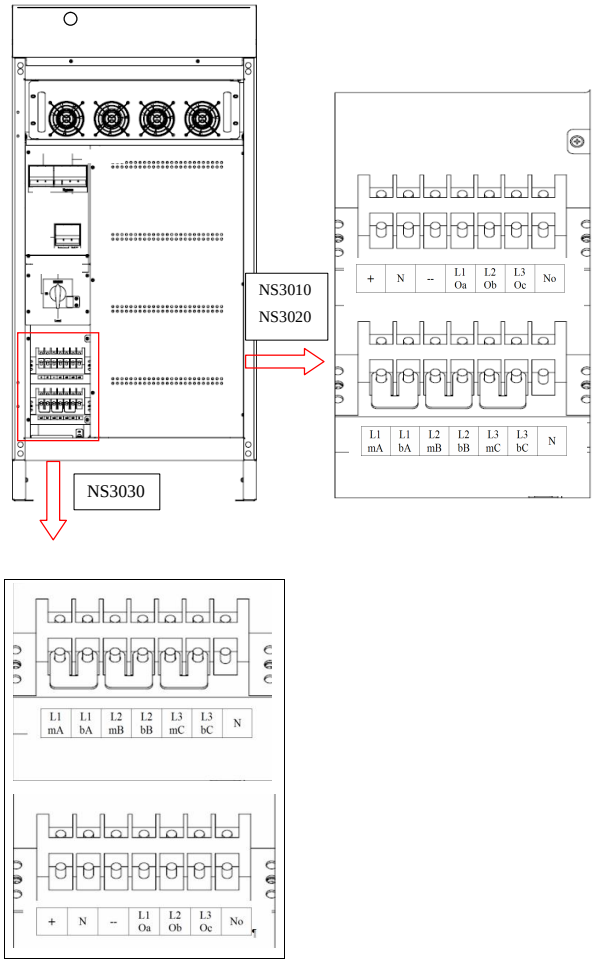
2.6.8 RS232-RS485 Port and SNMP Card Port

RS232 and RS485 Port: provide serial data which can be used for commissioning and maintenance by authorized engineers or maintainers, or can be used for networking or integrated monitoring system in the service room.

SNMP Card Port: used for field installation of the communication option card (SNMP card).

2.7 Installation Diagram





a. 10KVA~30KVA terminal block

Chapter 3 Operations

This chapter introduces the basic knowledge of UPS operations, including working principle, operation mode, battery management and protection.

Warning: Hazardous mains voltage and/or battery voltage present(s) behind the protective cover
1. The components that can only be accessed by opening the protective cover with tools cannot be operated by user. 2. Only qualified service personnel are authorized to remove such covers.

3.1 Introduction

UPS provides high quality uninterruptible AC power to your critical load. The power from UPS is free from voltage and frequency variations and disturbances (interruption and spike) experienced at the Mains AC input supply.

This is achieved through high frequency double conversion power pulse width modulation (PWM) associated with full digital signal processing control (DSP), which features high reliability and convenience for use.

3.1.1 Principle

As shown in fig 3-1, the AC input mains source is supplied at UPS input and converted into a DC source. This DC source feeds the Inverter that converts the DC source into a clean and input independent AC source. The battery powers the load through the inverter in case of an AC input mains power failure. The utility source can also power the load through the static bypass.

When the UPS needs maintenance or repair, the load can be transferred to maintenance bypass without interruption and the power module and bypass module can be removed for maintenance.

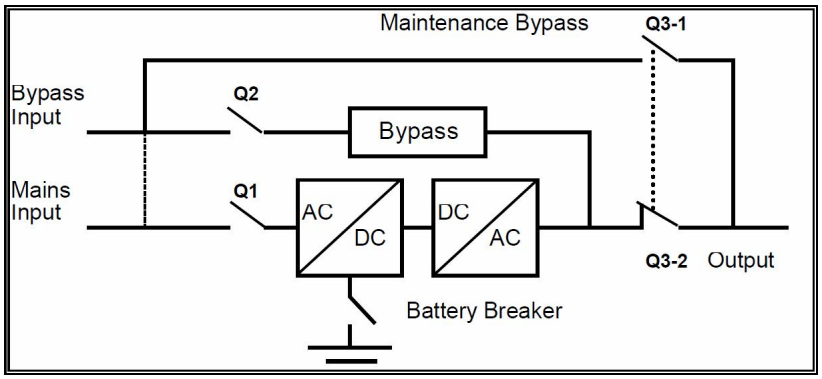


Fig 3-1 System principle framework

3.1.2 Bypass

. During normal system operation the load is connected to the inverter; but in the event of a UPS overload or inverter failure, the load is automatically transferred to the static bypass line.

To provide a clean (no-break) load transfer between the inverter output and static bypass line, the inverter output and bypass supply must be fully synchronized during normal operating conditions. This is achieved through the inverter control electronics, which makes the inverter frequency track that of the static bypass supply, provided that the bypass remains within an acceptable frequency window.

A manually controlled maintenance bypass supply is incorporated into the UPS design. It enables the critical load to be powered from the utility (bypass) supply while the UPS is shut down for routine maintenance.

Note
When the UPS is operating in bypass mode or on maintenance bypass, the connected equipment is not protected from power failures or surges and sags。

3.1.3 Battery Temperature Compensation

The UPS can connect temperature sensor which is in the battery cabinet to the UPS monitor unit through battery temperature interface in order to reach battery management optimization.

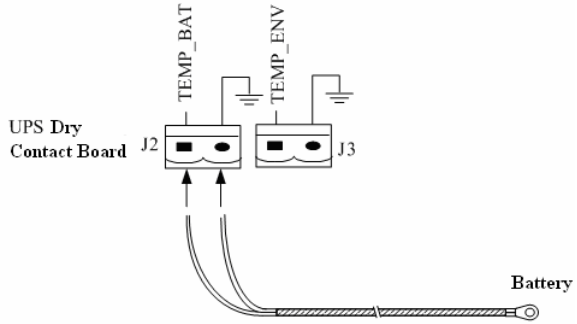


Fig 3-2 Temperature compensation diagram

3.2 Operation Mode

NS3000 is an on-line, double-conversion UPS that permits operation in these modes:

- Normal mode
- Battery mode
- Auto-Restart mode
- Bypass mode
- Maintenance mode (manual bypass)
- ECO mode (Settable by s.w.)
- Frequency converters mode (only to request)
- Parallel operation redundancy mode (Optional)

3.2.1 Normal Mode

The UPS inverter power modules continuously supply the critical AC load. The rectifier/charger derives power from the AC mains input source and supplies DC power to the inverter while simultaneously FLOAT or BOOST charging its associated backup battery.

3.2.2 Battery Mode

Upon failure of the AC mains input power; the inverter power modules, which obtains power from the battery, supplies the critical AC load. There is no interruption in power to the critical load upon failure. After restoration of the AC mains input power, the “Normal Mode” operation will continue automatically without the necessity of user intervention.

Note: UPS can also be started through battery mode via battery cold start function upon failure of the AC mains. Therefore, the battery power can be used independently to improve the utilization rate of UPS.

3.2.3 Auto-Restart Mode

The battery may become exhausted following an extended AC mains failure. The inverter shuts down when the battery reaches the End of Discharge voltage (EOD). The UPS may be programmed to “Auto Recovery after EOD” after a delay time if the AC main recovers. This mode and any delay time are programmed by the commissioning engineer.

During the process of delay time, the battery will be charged by UPS to prevent any risks to load equipment from future mains failure.

3.2.4 Bypass Mode

If the inverter overload capacity is exceeded under normal mode, or if the inverter becomes unavailable for any reason, the static transfer switch will perform a transfer of the load from the inverter to the bypass source, with no interruption in power to the critical AC load.

3.2.5 Maintenance Mode

A manual bypass switch is available to ensure continuity of supply to the critical load when the UPS becomes unavailable e.g. during a maintenance procedure.

It is noticed that after UPS system supplies the power with the bypass mode, the maintenance bypass rotary switch Q3, in this situation is closed Q1, Q2, Q3-2 out put contacts and battery switches are disconnected.

Warning: Hazard may occur after transferring to maintenance bypass
After UPS being transferred to maintenance bypass, UPS battery, input and output terminals and are charged.

3.2.6 ECO Mode

If economical (ECO) mode is selected, the double-conversion UPS will stop to work so as to save energy. During the operation of ECO mode, the load power will be supplied by bypass preferentially. When bypass power is within the range of normal frequency and voltage, load power will be supplied by bypass, or the system will transfer to inverter output, followed by load power interruption which extends within 3/4 of the period. E.g. when the frequency is 50Hz, the interruption time will be less than 15ms; when the frequency is 60Hz, the time will be less than 12.5ms.

Eco mode have to set by customer service

3.2.7 Frequency Converters Mode

If the frequency converter configuration is used by UPS, it will provide 50Hz or 60Hz stable output frequency. The range of output frequency is 40Hz-70Hz. Under this mode, static bypass is unavailable, but battery can be selected according to the actual requirements of battery mode.

Frequency Converte Mode have to set by customer service

3.2.8 Parallel connection redundancy mode

Several UPS devices may be parallel connected directly and the parallel operation control logic in single UPS devices ensures all single device automatically share the load to improve the capacity or reliability of the system, or both the capacity and reliability of the system. The capacity of a parallel operation system can be up to 6 units.

3.3 Battery Management

3.3.1 Normal Function

The following functions should be fitted by commissioning engineers with specified software.

1. Constant current boost charging

   Current can be set up

2. Constant voltage boost charging

   Voltage of boost charging can be set as required by the type of battery.

   For Valve Regulated Lead Acid (VRLA) batteries, maximum boost charge voltage should not exceed 2.4V / cell.

3. Float charge

   Voltage of float charging can be set as required by the type of battery.

   For VRLA, float charge voltage should be between 2.2V to 2.3V.

4. Float charge temperature compensation (optional)

   A coefficient of temperature compensation can be set as required by the type of battery.

5. End of discharge (EOD) protection.

   If the battery voltage is lower than the EOD, the battery converter will shut down and the battery is isolated to avoid further battery discharge. EOD is adjustable from 1.6V to 1.75V per cell (VRLA) or 0.9 to 1.1 V per cell

6. Battery low warning time

   It is adjustable between 3 and 60 minutes. The default is 5 minutes.

3.3.2 Advanced Functions (Battery Self-checking and Maintenance)

At periodic intervals, 20% of the rated capacity of the battery will be discharged automatically, and the actual load must exceed 20% of the rated UPS (KVA) capacity. If the load is less than 20%, auto-discharge cannot be executed. The periodic interval can be set from 30 to 360 days. The battery self-test can be disabled.

Conditions—Battery at float charge for at least 5 hours, load equal to 20~100% of rated UPS capacity

Trigger—Manually through the command of “Battery Maintenance Test” in LCD panel or automatically

3.4 Battery Protection

The following functions should be fitted by commissioning engineers with specified software.

1. Battery Low Pre-warning

The battery undervoltage pre-warning occurs before the end of discharge. After this pre-warning, the battery should have the capacity for 3 remaining minutes discharging with full load. The time is user configured from 3 to 60 minutes.

2. Battery discharge (EOD)off protection

If the battery voltage is lower than the EOD, the battery converter will be shut down. EOD is adjustable from 1.6V to 1.75V per cell (VRLA) or 0.9 to 1.1 V per cell (NiCd)

3. Battery Circuit Breaker (BCB) Alarm (Optional)

The alarm occurs when the battery disconnect device disconnects. The external battery connects to the UPS through the external battery circuit breaker. The circuit breaker is manually closed and tripped by the UPS control circuit. See relay card optionals

Chapter 4 Installation of Parallel Operation System

The parallel operation system is installed as required by the installation procedures of the single system and this chapter.

The single devices are put parallel and connected as shown in fig. 4-1, and the difference between the lengths of the output cables of the single devices is not more than 10m. It is recommended to use an external bypass cabinet to facilitate maintenance and system testing.

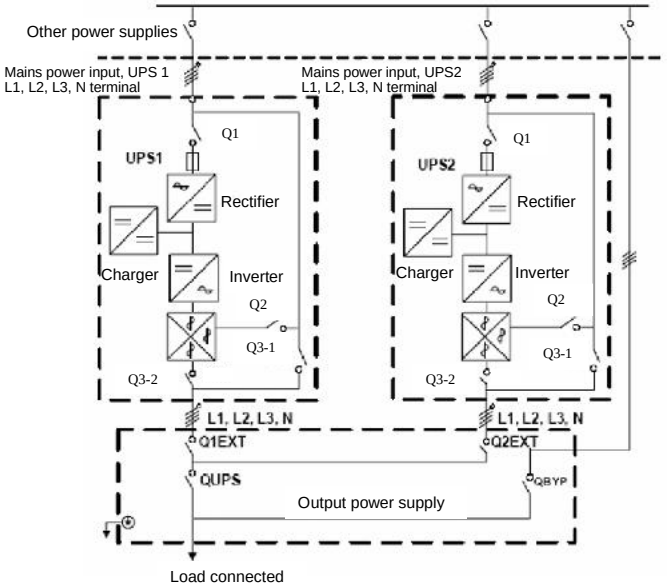


Fig. 4-1 Typical 1+N parallel operation system

Note: when the load exceeds the capacity of the single device, we recommended an external manual Bypass. The cables for the parallel operation provide double insulation shielding up to 30m long, the control cables for the parallel operation must be connected with all single devices to form a closed loop, as shown in fig.4-2.

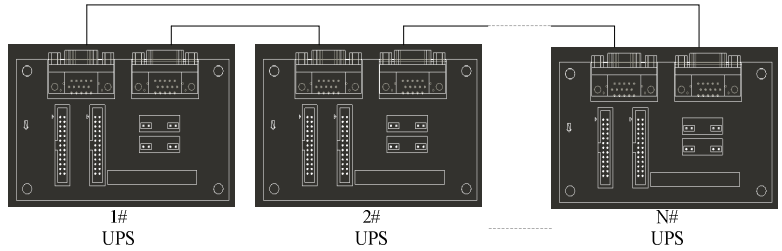


Fig.4-2 Parallel cables

Chapter 5 Operating Procedures

This chapter describes UPS operation instructions in detail.

All functional keys and LED display involved in operation instructions please refer to chapter 5. During operation, the buzzer alarm may occur at any time. Select “mute” on LCD to muffle the audible alarm.

Warning-Hazardous mains voltage and/or battery voltage present(s) behind the protective cover
1. The components that can only be accessed by opening the protective cover with tools cannot be operated by user. 2. Only qualified service personnel are authorized to remove such covers.

5.1 Power Switches

As shown in fig 5-1, open the front door of UPS, the power switch is visible, which includes: input switch, output switch and maintenance bypass switch (with anti-misoperation stop plate)

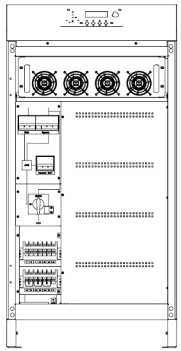


Fig. 5-1 10KVA~30KVA Mains switch location drawing

5.2 UPS Start-up

The UPS system only has a maintenance bypass isolating switch, and all the other transfers are processed automatically by internal control logics.

5.2.1 Normal Mode Start

This procedure must be followed when turning on the UPS from a fully powered down condition. The operating procedures are as follows:

Warning
This procedure results in mains voltage being applied to the UPS output terminals. If any load equipment is connected to the UPS output terminals please check with the load user that it is safe to apply power. If the load is not ready to receive power then ensure that the output switch of external distribution cabinet is opened.

Warning
Please confirm that UPS output rotating switch point to UPS, with anti-misoperation stop plate for rotating switch is fixed well.

1. Close UPS bypass input switch and input switch in turns

The LCD starts up at this time. The Rectifier indicator flashes during the startup of rectifier. The rectifier enters normal operation state, and after about 30s, the rectifier indicator goes steady green. After initialization, the bypass static switch closes. The UPS Mimic LEDs will indicate as shown in table 5-1:

Table 5-1 Indicator status

LED	Status
Rectifier indicator	Green
Battery indicator	Red
Bypass indicator	Green
Inverter indicator	Off
Load indicator	Green
Status indicator	Green

Warning
The bypass input air switch must be opened firstly and then the input air switch is opened, otherwise, the rectifier can not be started and the system can not control the power.

The inverter starts up at this time, the inverter indicator flashes. After the rectifier enters normal operation state, UPS power supply will transfer from bypass to inverter, then the bypass indicator turns off, and load indicator lights. The status of indicators is shown in table 5-2

Table 5-2 Indicator Status

LED	Status
Rectifier indicator	Green
Battery indicator	Red
Bypass indicator	Off
Inverter indicator	Green
Load indicator	Green
Status indicator	Green

If your UPS is with build-in battery type, please close internal battery DC switch. Battery indicator turns off, a few minutes later, the battery will be charged by UPS which will enter normal mode operation. The indicator status is shown in table 5-3.

If your UPS is without build-in battery type, please close external battery DC switch.

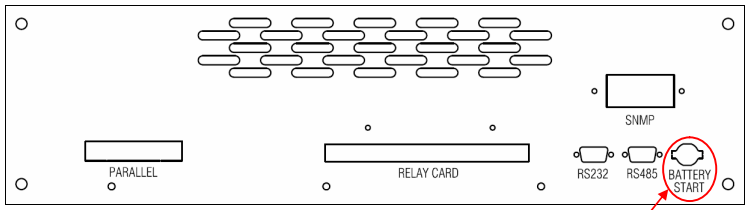
Warning
Please confirm battery connection right before closing external battery switch.

Table 5-3 Indicator status

LED	Status
Rectifier indicator	Green
Battery indicator	Green
Bypass indicator	Off
Inverter indicator	Green
Load indicator	Green
Load indicator	Green

5.2.2 Battery Module Start（Only Applicable for the UPS with Battery Cold Start Elements ）

1. Check if the batteries have been connected, close the external battery switch.
2. Press the red start-up button of battery on the back door panel.
3. The LCD starts up at this time, press battery cold start again for about 5 seconds. The green battery indicator flashes. The rectifier enters normal operation states and after about 30s, the battery indicator goes steady green.
4. The inverter starts up automatically, the green inverter indicator flashes. The inverter will output after 60s. Then UPS run in battery mode.



b. 10KVA~30KVA

Fig. 5-2 diagrammatic drawing for battery starting button location

5.3 Procedure for Switching between Operation Modes

5.3.1 Procedure for Switching the UPS into Battery from Normal Mode

Open input switch to cut off the mains, UPS enters the battery mode. If UPS should be switched to normal mode, wait for a few seconds before closing input switch, so as to supply the mains again. 10s later, the rectifier will start up automatically to supply power to the inverter.

5.3.2 Procedure for Switching the UPS into Bypass from Normal Mode

Select the manual bypass menu of "function 1" of "function/ setting"

> ⚠ Note
>
> In bypass mode, the load is directly fed by the mains power instead of the pure AC power from the inverter.

5.3.3 Procedure for Switching the UPS into Normal from Bypass Mode

Select "exit bypass mode" on the LCD, about 3 seconds later, UPS transfer to inverter mode automatically.

5.3.4 Procedure for Switching the UPS into a Maintenance Bypass from Normal Mode

In normal operation, this operation instruction will switch the load from inverted input to maintenance bypass.

> ⚠ Caution
>
> Before making this operation, read messages on display to be sure that bypass supply is regular and the inverter is synchronous with it, so as not to risk a short interruption in powering the load.

1. Switch UPS from normal mode to bypass mode according to 5.3.2.

The inverter indicator and status indicator go off, the buzzer alarms. The load will be transferred to static bypass, and the inverter is closed.

2. Remove anti-misoperation stop plate for rotary air switch, then the rotary air switch is switched to the maintenance bypass side in order that the load power supply is supplied by the maintenance bypass Q3, and the mains switch Q1, the bypass switch Q2, the output switch Q3-2 and the internal and external battery switches are disconnected.

> ⚠ Warning
>
> If it is required to mainten the modules, the cabinet is opened for internal maitenance after waiting for 5 minutes in order that the capacitor voltage in the internal DC bus automatically dischages.

5.3.5 Procedure for Switching the UPS into Normal from a Maintenance Bypass Mode

This procedure can transfer the load to normal main mode when the UPS is operating under the maintenance bypass mode.

1. Close the bypass switch Q2 and switch the rotary switch to "UPS output" side.

   The indicator light of the bypass become green and the power is supplied for the load by the bypass.
2. Close the mains input air switch Q1

   The power is supplied for the load by the bypass. At the same time, the rectifier begins to operate, the indicator light of the rectifier become green after 30 seconds, and the power is automatically supplied with the inverter after 2 minutes.
3. Close internal and external battery switches. If the indicator light of the battery does not work, please confirm the voltage of the LCD display battery is normal.
4. Replace the anti-misoperation stop plate for rotary switch.

5.4 Procedure for Completely Powering down a UPS

If you need to power down the UPS completely, follow the procedures in section 5.3.4 to transfer the UPS from normal mode to maintenance bypass mode.

If you need to isolate the UPS from the AC power supply, you should open the external input switch.

5.5 EPO Procedure

The EPO button on UPS operator control and display panel is designed to switch off the UPS in emergency conditions (e.g., fire, flood, etc.).To achieve this, just press the EPO button, and the system will turn off the rectifier, inverter and stop powering the load immediately (including the inverter and bypass output), and the battery stops charging or discharging.

If the input utility is present, the UPS control circuit will remain active; however, the output will be turned off. To completely isolate the UPS, you need to disconnect the external mains input supply to the UPS.

5.6 Language Selection

The LCD is available in two languages: Chinese and English.

The language can be selected through LCD prompt window.

5.7 Control Password

When the LCD displays “input control password 1”, the initial password is 12345678.

Chapter 6 Operator Control and Display Panel

This chapter introduces the functions and operation instructions of the parts on UPS operator control and display panel in detail, and provides LCD display information, including LCD display types, detailed menu information, prompt window information and UPS alarm list.

6.1 Introduction

The operator control and display panel is located on the front panel of the UPS. Through this LCD panel, the operator can operate and control the UPS, and check all measured parameters, UPS and battery status and event and alarm logs. The operator control panel is divided into three functional areas as shown in fig 6-1: mimic current path, LCD display & Menu keys, and Control and Operation Keys.

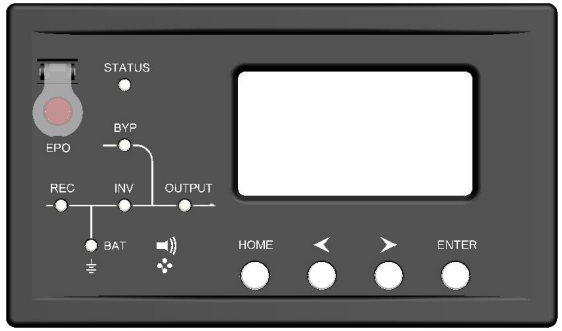


Fig 6-1 UPS operator control and display panel

Table 6-1 Description of UPS operator control and display panel

Part No.	Function	Button	Function
REC	Rectifier indicator	EPO	EPO switch
BAT	Battery indicator	HOME	Back to main menu
BYP	Bypass indicator	Left arrow Right arrow	Select main menu items; switch between submenu; increase or reduce for number input
INV	Inverter indicator		
OUTPUT	Load indicator	ENTER	Confirm
STATUS	Status indicator		

6.1.1 LED Indicator

The LEDs shown on the mini current path represent the various UPS power paths and show the current UPS operating status. The status description of indicators is shown in table 6-2.

Table 6-2 Status description of indicator

Indicator	State	Purpose
Rectifier indicator	Steady green	Rectifier normal
	Flashing green	Rectifier starting, mains normal
	Steady red	Rectifier fault
	Flashing red	Mains abnormal
	Off	Rectifier not operating
Battery indicator	Steady green	Battery charging
	Flashing green	Battery discharging
	Steady red	Battery abnormal (battery failure, no battery or battery reverse) or battery converter abnormal (failure, overcurrent or over temperature) , EOD
	Flashing red	Battery low voltage
	Off	Battery and battery converter normal, battery not charging
Bypass indicator	Steady green	Load power supplied by bypass
	Steady red	Bypass power abnormal or out of normal range, or static bypass switch fault
	Flashing red	Bypass voltage abnormal
	Off	Bypass normal
Inverter indicator	Steady green	Load power supplied by inverter
	Flashing green	Inverter On, start, synchronization of standby (ECO mode)
	Steady red	System power not supplied by inverter, inverter fault
	Flashing red	System power supplied by inverter, inverter fault
	Off	Inverter not operating
Load indicator	Steady green	UPS output ON and normal
	Steady red	UPS output overload and overtime, or output short, or output no power supply
	Flashing red	Overload output of UPS
	Off	No output of UPS
Status indicator	Steady green	Normal operation
	Steady red	Failure

6.1.2 Audible Alarm (buzzer)

There are two different types of audible alarm during UPS operation as shown in table 6-3.

Table 6-3 Description of audible alarm

Alarm	Purpose
Two short alarm with one long alarm	when system has general alarm (for example: AC fault), this audible alarm can be heard
Continuous alarm	When system has serious faults (for example: fuse or hardware fault), this audible alarm can be heard

6.1.3 Functional Keys

There are 4 functional keys on operator control and display panel, which are used together with LCD. The functions description is shown in table 6-4

Table 6-4 Functions of functional key

Functional key	Functions
EPO switch	To cut off the load power to shut down the rectifier, inverter, static bypass and battery
HOME	To return the main menu
Left arrow and righ arrow	Select options in the mian menu, switch over secondary meun pages, upward and downward roll the histrical log, add and subtract the intered number
Enter key	confirm

6.2 LCD Display Type

After UPS starting screen completes self-inspection, main display shown in fig. 6-2 appears. The main panel display for 10KVA~30KVA type is provided with six main menus, turn on/off UPS, mute or not button.

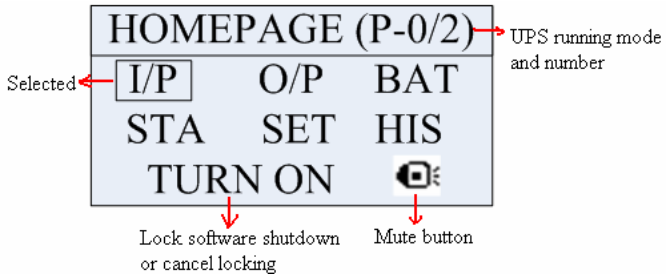


Fig. 6-2 Homepage display

6.2.1 Default Display

During the operation of system, if there's no alarm in 2 min, the system will display default. After a short delay, the backlight of LCD display goes off; press any key to reactivate the display. Default display is homepage or brand display.

6.2.2 Data Display

The Input Data display as below (Press left and right arrow to select "I/P" , then press "ENTER".):

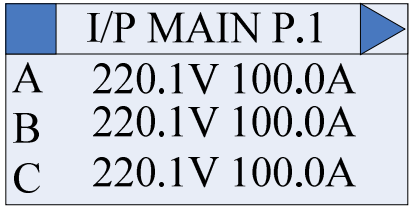


Fig.6-3 I/P data display for 10KVA~30KVA UPS

In I/P data interface, you can not input or modify data, just view them.

6.2.3 Setting Display

The time setting as below (press left and right arrow to select “set” in homepage, then press ”ENTER”):

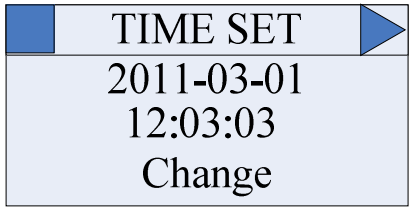


Fig.6-4 Time Setting for 10KVA~30KVA UPS

Press “ENTER” to confirm modifying, then you can set time: from year to second, you can change number through left and right arrow then press “ENTER”; after all of them have been changed, it will select “Sure” automatically, then press ”ENTER” to finish time set. Other settings are similar with time setting.

6.2.4 Function Display

The function page.2 as below (press left and right arrow to select “SET” in homepage and press ”ENTER”, then press right arrow several times):

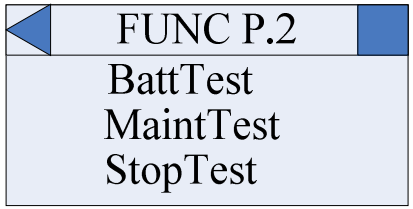


Fig.6-5 Function page.2 for 10KVA~30KVA UPS

In this interface, you can select each function and press “ENTER”, press “ENTER” again, it will display “Confirm” interface.

6.2.5 State Display

The alarm page as below (press left and right arrow to select “STA” in homepage and press “ENTER”):

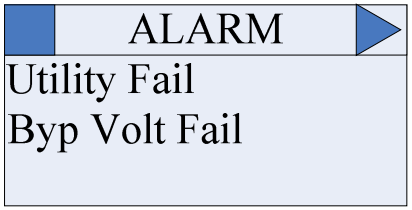


Fig.6-6 Alarm page for 10KVA~30KVA UPS

All alarm information scrolls in this page. If no alarm information, it is blank.

6.2.6 Confirm Display

The confirm page as below (for some important operation, it will appear to prevent mistake):

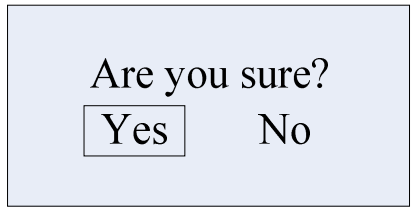


Fig.6-7 Confirm page for 10KVA~30KVA UPS

You can press left and right arrow to select “Yes” or “No”, and press “ENTER” to confirm your operation.

6.2.7 History Record Display

The history record page as below (press left and right arrow to select “HIS” in homepage and press “ENTER”):

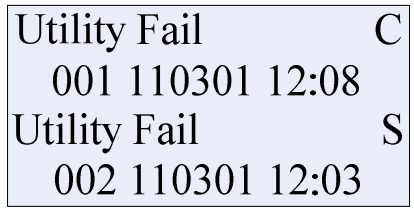


Fig.6-8 History record page for 10KVA~30KVA UPS

001——History record number;

110301——2011(Year).03(Month).01(Day);

12:08——12:08(time);

C——Events close;

S——Events start.

6.3 Detailed Description of Menu Items

UPS menu and data window

UPS menu window displays the menu name of data window, while the data window displays the related contents of selected menu in menu window. Select UPS menu and data window to browse related parameters of UPS and set related functions. The details are given in table 6-5

Table 6-5 Item description of UPS menu and data window

	Main menu	Secondary menu	Description
HOMEPAGE(Main screen)	I/P(Input)	I/P MAIN P.1	Input three-phase voltage and current
		I/P MAIN P.2	Main input power factors and frequency
		I/P BYP P.1	Bypass three-phase voltage and current
		I/P BYP P.1	Bypass input power factors and frequency
	O/P(Output)	O/P DATA P.1	Output three-phase voltage and current
		O/P DATA P.2	Output power factors and frequency
		O/P LOAD P.1	Apparent power and active power
		O/P LOAD P.2	Percentage load
		SYS LOAD	Parallel operation percentage load
	BAT(Battery)	BATTERY P.1	Battery voltage, current and status
		BATTERY P.1	Battery temperature, environment temperature and capacity
		BUS DATA	Plus-minus busbar voltage
	SET(Setting /function)	TIME SET	Time setting
		LANG SET	Language setting
		CONTRAST SET	Contrast setting for UPS display
		MODBUS SET	Modbus protocol setting: UPS address, baud rate, communication mode
		COMM SET	UPS Port RS232 communication protocol setting (SNT/Modbus)
		FUNC P. 1	Manual operation of the bypass, failure removal, alarm mute
		FUNC P. 2	Battery testing, maintenance testing, stop testing
	HIS(Record)		Two pieces history records will be displayed in one page, including records description, time (year, month, day, time), set /cancel. To press left or right arrow to change pages.
	STA(Status)	ALARM	Current UPS alarm information, automatically rolling
		SYS CODE	For maintenance engineers, automatically rolling
		VERSION	Rectifier version, and inverter versions and manufacturer series number
		RATE INFO	System input/output, rating power information

6.4 Alarm List

The table 6-6 gives the complete list of the UPS events displayed by history and current record window

Alarm	Explanation
UPS power supply	The system is in normal inverted power supply status
Bypass power supply	The system is in bypass power supply status
No power supply	System no output
Battery equalized charging	Battery is in boost charging
Battery float charging	Battery is in float charging
Battery discharging	The system is operating in battery discharging status.
Battery connected	Battery is connected
Battery disconnected	Battery is not connected
Maintenance breaker close	Maintenance circuit breaker is close
Maintenance breaker open	Maintenance circuit breaker is open
Emergency shutdown	System emergency shutdown, EPO
Generator connected	External generator is connected
Mains abnormal	Input mains abnormal
Bypass phase conversion	Bypass input phase converse
Bypass voltage abnormal	Bypass input voltage abnormal
Bypass fault	Bypass fault
Bypass overload	Bypass output is overload
Up to bypass overtime of overload	Bypass is overtime of overload
Bypass frequency tracing exceeds	Bypass frequency is out of the tracing range
Switch times up to in this hour	The times of switch between bypass & inverter exceeds 5 times in a hour.
Output short	System output short
Battery EOD	Battery voltage achieves shutdown point
Battery self-check	The system enters battery self-check mode
Battery self-check success	Battery normal during system self-check
Battery manual check failure	Battery fault during system self-check
Battery maintenance	The system is in battery maintenance status
Battery maintenance success	Battery maintenance status completes
Battery maintenance failure	Battery maintenance process is not normal
Stop testing	Battery self-check or battery maintenance status stops
Fault clearing	Clear the alarmed fault
Delete history record	Delete all history record
Inverter power supply ban	Inverter power ban supply
Manual switch of bypass	Switch the system to bypass output manually
Cancel manual switch of bypass	Switch the system from bypass to inverter output manually
Battery low voltage	Battery low voltage
Battery reversal	Battery polarity reversal
Input N line disconnected	System input N line is not connected
Bypass fan fault	Bypass module fan fault
ManualShutdown	Shut down UPS by manual
Note: if the alarm is caused by the set value of the software, to modify set value contact the service centre.	

Chapter 7 Maintenance

This chapter introduces UPS maintenance, including the maintenance instructions of power module, monitoring bypass module and the change method of dust filter.

7.1 Instruction of Maintenance Operation

7.1.1 Precautions

1. Only maintaining engineers can do this job.
2. In principle, the broken elements should be disassembled from top to bottom, so as to prevent any inclination from high gravity centre of the cabinet.
3. To ensure the safety before maintaining power module and bypass module, be sure to use a multimeter to measure the DC bus capacitor voltage and ensure the voltage is below 60V before operation, and use a multimeter to measure the voltage between operating parts and the earth to ensure the voltage is lower than hazardous voltage, i.e. DC voltage is lower than 60Vdc, and AC maximum Voltage is lower than 42.4Vac.
4. Only after 10 minutes removing the power components and bypass components, the maintenance can be carried out.

7.1.2 Instruction to Bypass Module

Suppose UPS were in normal mode, and the bypass were normal:

1. Select manual switch of bypass in LCD screen, the UPS power will be supplied by bypass.
2. Close maintenance bypass switch, the UPS power will be supplied by maintenance bypass.
3. Open UPS output switch and input switch.
4. Open external battery switch and internal battery switch.
5. Take the door sheet of UPS off, remove and repair the damage components,
6. Reinstall the corresponding components in the cabinet after maintenance, reinstall the internal door sheet, and complete connection of the flat cables at the front of the internal door.
7. Close the bypass switch of UPS and switch the rotary switch to UPS output.

   After 5 seconds, the indicator light of the operating control display panel works, which shows the power is normally supply by the bypass.
8. Open maintenance bypass switch and close mains input switch, the inverter automatically starts, and UPS operates in the normal mode after 60 seconds.
9. Close external battery switch or internal battery switch, the battery light on the panel turns off, which show connection with the battery; inspect the battery voltage is normal or not which is shown on the panel.

Chapter 8 Product Specification

This chapter describes the product specification of UPS

8.1 Applicable Standards

UPS design meets the European and national standards given in Table 8-1.

Item	Normative reference
General safety requirements for UPS used in operator access areas	EN50091-1-1/IEC62040-1-1/AS 62040-1:2009
Electromagnetic compatibility (EMC) requirements for UPS	EN50091-2/IEC62040-2/AS 62040-2
Method of specifying the performance and test requirements of UPS	EN50091-3/IEC62040-3/AS 62040-3(VFI SS 111)
Note: The above mentioned product standards incorporate relevant compliance clauses with generic IEC and EN standards for safety (IEC/EN/AS60950), electromagnetic emission and immunity (IEC/EN/ AS61000 series) and construction (IEC/EN/AS60146 series and 60950)	

8.2 Environmental Characteristics

Table 8-2

Items	Unit	Requirements
Acoustic noise level at 1 meter	dB	55
Altitude of Operation	m	≤1000m above sea level, derate power by 1% per 100m between 1000m and 2000m
Relative Humidity	%RH	0 to 95% non condensing
Operating Temperature	℃	0 to 40 deg , Battery life is halved for every 10°C increase above 20°C
UPS Storage-Transport Temperature	℃	－20 +70°C
Recommended Battery Storage Temperature	℃	－20 +30 (20°C for optimum battery storage)

8.3 Mechanical Characteristics

Table 8-3

Cabinet Specification	Unit	NS3010, NS3020	NS3030
Mechanical Dimension, W×D×H	mm	540x690x1240	
Weight	kg	106Kg (Without battery) 220Kg (with 40pcs 9A/h) 332Kg (with 80pcs 9A/h)	118Kg (Without battery) 344Kg (with 80pcs 9A/h)
Color	N/A	RAL 7016	
Protection Level, IEC(60529)	N/A	IP20	

8.4 Electrical Characteristics (Input Rectifier)

Table 8-4

Items	Unit	Parameter
Rated AC Input Voltage	Vac	380/400/415 (three-phase and sharing neutral with the bypass input)
Input voltage range	Vac	-40%-+20% (-10%+20% full Load)
Frequency	Hz	50/60Hz (range: 40-70Hz)
Power factor		0.99
THDI	%	3%

8.5 Electrical Characteristics (Intermediate DC Link)

Table 8-5

Items	Unit	Parameters	
Battery bus voltage	Vdc	OneSide: Nominal ±240V, range: 198V-288V	
Quantity of battery		240cell [40pcs 12V battery]	
Float charge voltage	V/cell(VRLA)	2.25V/cell(selectable from 2.2V/cell-2.35V/cell) Constant current and constant voltage charge mode	
Temperature compensation	mV/°C/cell	－3.0(selectable from : 0-－5.0, at 25°C or 20°C, or inhibit)	
Ripple voltage	% V float	≤1%	
Ripple current	% C_{10}	≤5%	
Boost charge voltage	VRLA	2.4V/cell(selectable from : 2.30V/cell-2.45V/cell) Constant current and constant voltage charge mode	
Final discharging voltage	V/cell(VRLA)	1.65V/cell(selectable from : 1.60V/cell-1.750V/cell) @0.6C discharge current 1.75V/cell (selectable from : 1.65V/cell-1.8V/cell) @0.15C discharge current (EOD voltage changes linearly within the set range according to discharge current)	
Battery Charge	V/cell	2.4V/cell(selectable from : 2.3V/cell-2.45V/cell) Constant current and constant voltage charge mode	
Battery Charging Power Max Current	kW	10%* UPS capacity (selectable from : 0-20%* UPS capacity)	
Battery Charging I max	A	NS3010	2,8 A settable according buttery capacity
		NS3020	5,6 A settable according buttery capacity
		NS3030	8,4 A settable according buttery capacity

8.6 Electrical Characteristics (Inverter Output)

Table 8-6

Items	Unit	Parameters
Rated AC voltage[1]	Vac	380/400/415 (three-phase + Neutral)
Freqency[2]	Hz	50/60Hz
Overload	%	105% load, 1 hour 110% load, 10min 125%, load 1min 150% load 5 sec. ＞150% load, 200ms
Fault current	%	340% short current limitation for 200ms
Non linear load capability[3]	%	100%
Neutral current capability	%	170%
Steady state voltage stability	%	±1(balanced load) ±1.5(100% imbalance load)
Transient voltage response[4]	%	±5
Voltage Distortion (THDV)	%	＜1(linear load) , ＜5(non linear load[3])
Synchronization - Window		Rated frequency ±3 Hz(selectable: ±1-±5Hz)
Frequency Speed (SlewRate	Hz/s	1: selectable: 0.5-5
Inverter voltage range	%V(ac)	±5

Note:

1. Factory setting is 400V. Commissioning engineers can set to 380V or 415V.
2. Factory setting is 50Hz. Commissioning engineers can set to 60Hz.
3. EN50091-3(1.4.58) crest ratio is 3: 1.
4. IEC62040-3/EN50091-3 including 0%-100%-0% load transient, the recovery time is half circle to within 5% of stable output voltage.

8.7 Electrical Characteristics(Bypass Mains Input)

Table 8-7

Items	Unit	NS3010	NS3020	NS3030
Rated AC Voltage[1]	Vac	380/400/415 Three-phase four-wire, sharing neutral with the rectifier input and providing neutral reference for the output		
Rated current	A	15@380V 14.5@400V 14@415V	30@380V 29@400V 28@415V	45@380V 43.5@400V 41.5@415V
Overload (FW)	%	125% load, long time 130% load, 1 hour 150% load, 6min 1000% load, 100ms		
Protection bypass line	N/A	Thermal-magnetic breaker, the capacity is 125% of rated current output. IEC60947-2 curve C		
Current rating of neutral cable	A	1.7×In		
Frequency[2]	Hz	50/60		
Switch time (between bypass and inverter)	ms	Synchronized switch: ≤1ms		
Bypass voltage tolerance	% Vac	Upper limit: +10,+15 or+20, default: +20% Lower limit: −10, −20, −30 or−40, default:−20% (acceptable stable bypass voltage delay: 10s)		
Bypass frequency tolerance	%	±2.5, ±5, ±10 or ±20, default: ±10%		
Synchronization-Window	Hz	Rated frequency±2Hz (selectable from ±0.5Hz-±5Hz)		

Note:

1. Factory setting is 400V. Commissioning engineers can set to 380V or 415V, 415V (Same as Inverter Setting).
2. Factory setting is 50Hz. Commissioning engineers can set to 60Hz.

8.8 Efficiency

Table 8-8

Items	Unit	10-30KVA
Efficiency		
Normal mode(dual conversion)	%	95%
ECO mode	%	99%
Battery discharging efficiency (DC/AC) (battery at nominal voltage 480Vdc and full-rated linear load)		
battery mode	%	95%