UPS AGGREGAT *EFFEKTA NS3000*

(10-120kVA 3-fas/3-fas)

Grundprincipen
UPS NS3000 (10-120kVA) är dubbelkonverterande online UPS och spännings/frekvensoberoende enligt klass VFI-SS-111 vilket innebär att den anslutna lasten alltid är skyddad och aggregaten levererar en totalt ren och avbrottsfri spänning på utgången.

Presentation
Effekta NS3000 är en ny serie UPSer framtagna för att erbjuda effektivare, mer miljövänliga och energisnålare UPS lösningar.

Grön UPS kraft med hög verkningsgrad
Effekta NS3000 har tack vare den senaste tekniken en hög verkningsgrad på upp till 95 % i äkta dubbel-konverterande online drift.

Detta innebär mycket lägre energiförbrukning och värmeavgivning jämfört med traditionella UPSer.

I och med IGBT tekniken så behövs inga extra filter för att strömdistorsionen på ingången skall reduceras till ett minimum d.v.s. <3 % (THDi). Detta innebär att storleken är kompakt och vikten är låg.

Mer aktiv effekt för dagens utrustning
Effektfaktorn på utgången är 0,9 vilket ger 12 % mer aktiv effekt (kW) per kVA i jämförelse med UPSer med äldre teknik. Detta för att klara av den nya generationens krävande utrustningar med hög kapacitiv effektfaktor utan nedgradering.

Upp till sex enheter kan parallellkopplas vilket ger maximalt 720kVA.

Effekta NS3000 med interna batterier och kraftmodulen delvis utdragen.

Hög säkerhet
Tack vare sin smarta uppbyggnad så sitter i princip alla elektriska komponenter i en avtagbar modul vilket gör att service och eventuella reparationer kan utföras snabbt och enkelt. Detta sänker servicekostnaderna och MTTR tiden väsentligt.

Effekta NS3000 har ett precist system för självdiagnostik som konstant övervakar alla funktioner och interna komponenter men även generella parameter såsom omgivningstemperatur, nätets kvalitet, fläkthastighet m.m. Om en avvikelse hittas så skickar UPSen ett larm men den kan även ändra driftläge för att undvika ett problem. När problemet försvinner så känner UPSen av detta och ändrar tillbaka till normaldrift.

Förlängd livslängd på batterierna
NS3000 har innovativ och intelligent batteriladdning för att optimera livslängden på batterierna. Vid skiftningar i omgivningstemperaturen så ändrar UPSen även laddningen för optimal livslängd på batterierna. Alla normala batterityper kan användas såsom ventilreglerade- och fritt ventilerade blybatterier samt NiCd.

Vid parallellsystem 1+1 kan även UPSen arbeta med gemensamt batteri för att höja säkerheten och minska kostnaderna samtidigt.

Kommunikation
UPSerna har en kontrollpanel med lättöverskådlig LCD display samt RS232 & 485 som standard. Aggregaten har dessutom fack för ytterligare ”plug in” kommunikationskort för bl.a. relälarm samt LAN övervakning och nedstängning av datorer/servrar.

UPS	EFFEKTA NS3000					
Effekt	10kVA/9kW	20kVA/18kW	30kVA/27kW	60kVA/54kW	90kVA/81kW	120kVA/108kW
Teknologi	online dubbelkonverterande VFI med effektfaktorkorrigering och automatisk bypass					
Ingång	3-fas					
Spänning	380V/400V/415V (3-fas)					
Spänningstolerans	-10 % till +20 %			-25 % till +20 %		
Frekvens	50/60Hz (väljs automatiskt)					
Frekvenstolerans	40 till 70Hz					
Effektfaktor	>0,99					
Bypass						
Spänning	380V/400V/415V (3-fas)					
Spänningstolerans	-20 % till +15 % vid full last					
Överlastkapacitet, bypass	≤125 % kontinuerligt, 125 - 130 % i 1 timme, >130 - 150 % 6 i minuter, >1000 % i 100ms			≤110 % kontinuerligt, 110 - 125 % i 5 min, 125 - 150 % i 5 min, >400 % i 100ms		
Utgång	3-fas					
Spänning	380V/400V/415V (3-fas)					
Spänningsdistorsion	≤1 % vid linjär last / ≤6% vid olinjär last			≤1 % vid linjär last / ≤6% vid olinjär last		
Frekvens	50 eller 60Hz ± 0,02 %			51 eller 60Hz ± 0,02 %		
Vågform	Sinus					
Verkningsgrad i online/eco smart-mode	upp till 95% / upp till 99 %					
Överlastkapacitet	105 % i 1 timme, 110 % i 10 minuter, 125 % i 1 minut, 150 % i 5 sekunder, >150 % i 200ms			110 % i 60 minuter, 125 % i 10 minuter, 150 % i 1 minut, >150 % i 200ms		
Krestfaktor	3:1					
Kommunikation						
Övervakning standard	RS232 & 485			RS232, RS485, USB & larmrelä		
Övervakning tillval	Relälarm, webb/SNMP kort, Generatorinterface					
Allmän data						
Display	LCD+LED och tangenter					
Skyddsklass	IP20					
Kabelingång	Ovan eller underifrån					
Driftstemperatur	0 - 40°C					
Luftfuktighet (ej kondenserad)	0 - 90 %					
Ljudnivå	< 55 dB			< 65 dB		
Dimension (HxBxD)	1240x540x690mm			950x600x980mm	1400x600x980mm	
Vikt (kg)	106		116	176	231	266
Standarder						
Prestanda & topologi	IEC 62040-2 (VFI-SS-111)					
Säkerhet / EMC	IEC62040-2, IEC610000-4-2(ESD), IEC61000-4-3(RS), IEC61000-4-4(EFT), IEC61000-4-5 (surge)					
Produktcertifiering	CE					

UPS NS3000 10-20-30kVA

USER Manual

Empty Page

Safety Precautions

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

Please carefully read this manual before the 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.

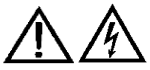
UPS is only used for commercial / industrial purpose and cannot be used as power of life support equipment.

APPLICABLE STANDARD

This product complies with 2014/35/EU -2006/95/EC - CE 73/23 & 93/68 (low voltage safety) and 2014/30/EU, 2004/108/EC 89/336 (EMC) , and EMC standards of Europe, Australia and New Zealand (C-Tick) , and the following UPS product standards:
*IEC62040-1-General and safety
*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
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 de-energized. 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 General and safety requirements 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.

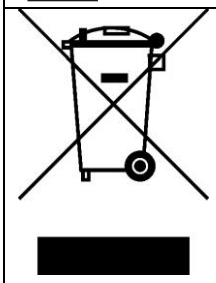
Battery Voltage Higher Than 400Vdc

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 LETHAL.
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.

Disposal

Warning	Dispose of used battery according to the local instructions

Warning	Dispose the packaging in the correct way
	The shipping materials are recyclable. After unpacking save them ore recycle as law disposal

Warning	End product life
	This product not be disposed of as urban waste: The product's components must be disposed of separately as a Weee. Any violations are punishable in accordance with the current regulations. Improper disposal of the product, or the improper use of the product or its parts, may be harmful to the environment and to human health. In the states of the European community or If is provided of local state disposal is possible return the product to the manufacturer, or ask a withdrawal when is purchasing an equivalent equipment.

CONTENTS

Chapter 1 Quick Start

1.1 Introduction

This chapter introduces the basic principles for the installation and operation of the UPS, so that service personnel can place the UPS in a place that ensure its safe and reliable operation over time.

The non-compliance with the requirements present in this manual will void the warranty.

The warranty is void if the interventions and/or modifications are executed by unauthorized personnel.

1.2 Initial Checking

Perform the following checking operations before the UPS installation.

1. Visually examine if there is any damp, water, or damage inside and outside the UPS packing, products and battery equipment 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, contact 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 equipment.

   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 directly or personnel coming in? If so, please add additional protection.
5. In the UPS operation environment, is there any dust, combustible or explosive gas or corrosive material? If so, please add additional protection.
6. Install the UPS in closed room.
7. Ensure that the capacity of the floor is greater than the weight of the UPS and the battery cabinet if present, and verify that the floor is flat.
8. During the installation of the UPS, the local regulations for the field of application have to be respected.
9. This is a category C3 UPS product for commercial and industrial application in the residential environment installation restrictions or additional measures may be needed to prevent disturbances.

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 check that all UPS external terminals are fastened, tightening must be comply with the requirements.
6. Please check that there are no screws, cables and other conductors left in the UPS. If is, please take out.

Chapter 2 INSTALLATION GUIDE LINE

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 must 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 4-wire.For IT system please contact us.

WARNING: battery hazard

SPECIAL CARE SHOULD BE TAKEN WHEN WORKING WITH THE BATTERIES ASSOCIATED WITH THIS EQUIPMENT.

When the batteries are connected, the battery terminals voltage will exceed 400Vdc and it is potentially lethal.

- Eyes protection should be worn to prevent injury from accidental electrical arcs.
- Remove rings, watches and all metal objects.
- Use only tools with insulated handles.
- Wear rubber gloves.
- If a battery leaks electrolyte, or is otherwise physically damaged, it must be replaced, stored in a container resistant to sulphuric acid and disposed of in accordance with local regulations.
- If electrolyte comes in contact with the skin, the affected area should be washed immediately with water.

2.2.1 UPS installation 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 in the front and exhausted through grills located in the rear part of the cabinet. Do not cover the ventilation holes.

An air filter (0ption???) should be used when the UPS operates 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 installation 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, the service life of the battery will be reduced by 50%. If the operating temperature of the battery is above 40ºC, 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.

(*): The standard EN 50272-2 for air change envisages that the minimum opening must satisfy the following equation:

$$\mathbf{A = 28 \times Q = 28 \times 0.05 \times n \times Igas \times C10\ (1/10^3)\ [cm^2]}$$

where: A = free opening for air intake and outlet
Q = flow of air to be removed [m^3/h]
n = number of battery elements;
C10 = battery capacity over 10 hours [Ah]
Igas = current that produces gas [mA//Ah]
in accordance with the standard: Igas = 1 VRLA type battery

When the equation is applied for 240 element (40 battery) hermetically-sealed lead batteries:

$$\mathbf{A = 336 \times C10 / 10^3\ [cm^2]}$$

When using 120Ah batteries, the minimum aperture should be approximately:

$$\mathbf{A = 41\ [cm^2]}$$

2.2.3 Storage

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 and check the equipment; report any such damage to the shipper immediately.

2.3.1 Packing system

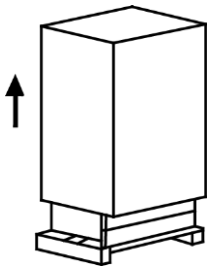
Remove the carton box and the plastic film first. Then follow the procedure under descripted. Be careful to not scratch the product.

REMOVING THE UPS FROM THE PALLET

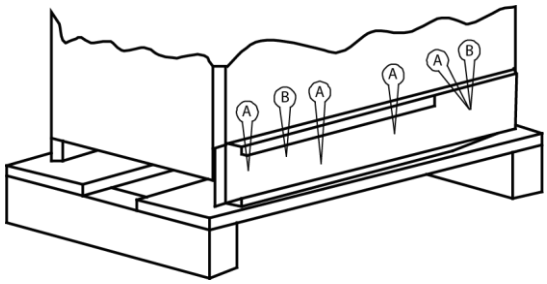
Fig 2-1 UPS Packing Diagram

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

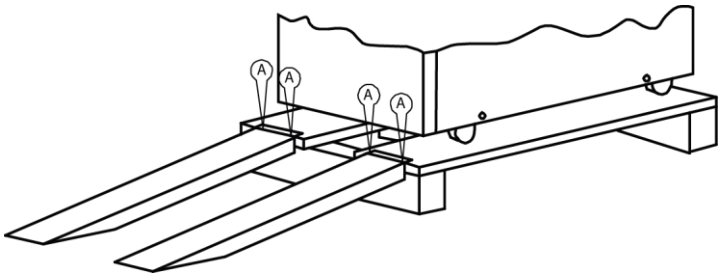
SOME OF THESE INSTRUCTIONS NEED TO BE CARRIED OUT BY TWO PEOPLE.



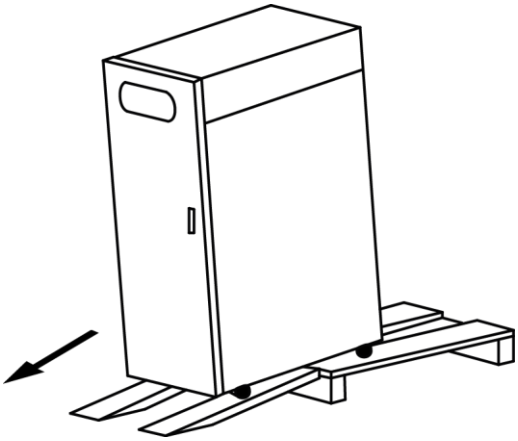
Cut the straps and remove the cardboard box by sliding it upwards.



- Remove the 2 brackets securing the UPS to the pallet (the screws are marked A and B in the figure) .



- Using 4 of the previously removed screws (type A) secure the slides to the pallet (as shown), Making sure that 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.

WARNING: 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 the following suggestion:

- 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
- Ambient 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)

  Remember: UPS is a IP20 protection, study to use in a normal internal ambient with not conductive dust and pollution. For others use contact us.

2.3.1.1 UPS Composition

CAUTION!

The wheels are only at the final station of the 'UPS must be handled only by shifts in the direction of rotation of the wheels.

2.3.2 UPS Composition

10KVA~30KVA cabinet description.

2.3.3 Operation Space

As UPS has no ventilation grills at either side, lateral clearances are not required.

To permit the commissioning it is recommended to leave clearance in the front and back of the UPS to allow free passage of personnel with the UPS's doors fully opened. 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 to make the selectivity with internal UPS protection and protect the UPS input line according national standard..

This section provides generic practical information for qualified installation engineers. The installation engineers 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. With 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 be:

- Sensitive to DC Class B 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.

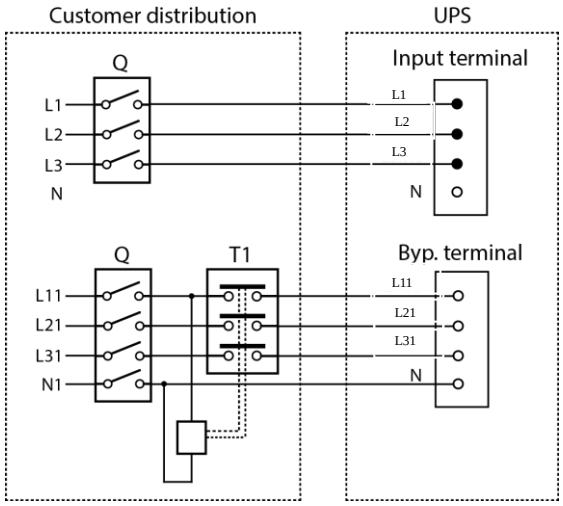
Put a label on all **primary power** isolators installed remote from the **UPS** area. One label is supply

Before working on this circuit

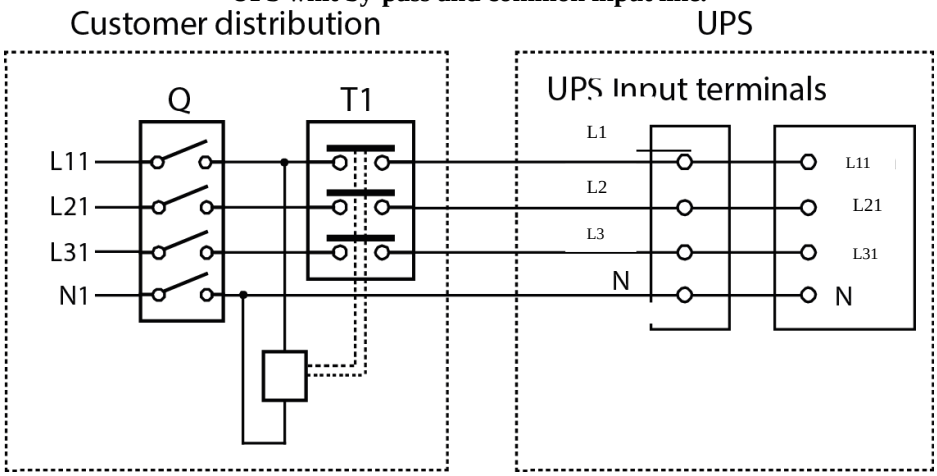
- Isolate Uninterruptible Power System (UPS)
- Then check for Hazardous Voltage between all terminals including the protective earth

Risk of Voltage Backfeed

UPS with by-pass and separate input line



UPS whit by-pass and common input line.



Pay attention: Neutral is common point inside UPS

T1: Breaker 3 poles with coil 230Vac 50-60 HZ. I nominal > o = 32 A to NS3010 e NS3020

And 63A to NS3030

2.4.3 Battery

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

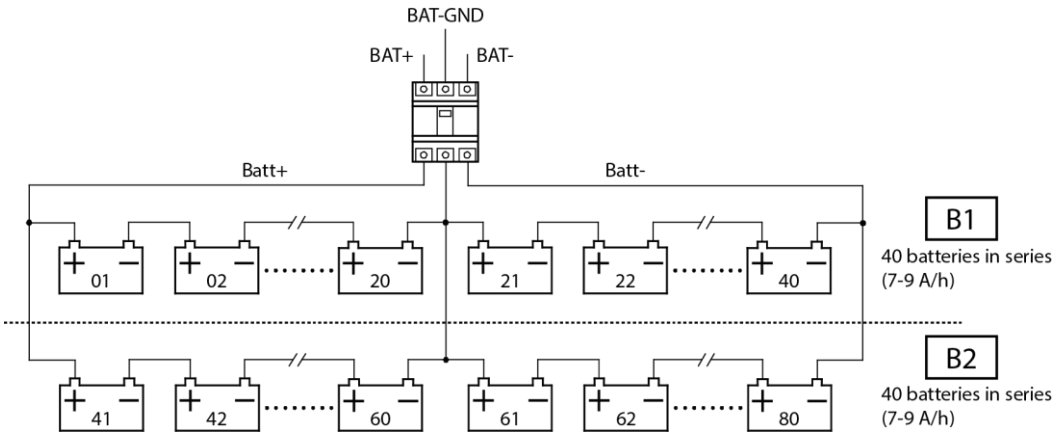


Fig 2-4 Diagram of batteries connected in series

DON'T OPEN THE FUSE HOLDER F1 UNDER LOAD (BATTERY MODE)

Protezione batterie interne

Modello Nome		NS3010	NS3020	NS3030
		A	A	A
Batterie	DC circuit breaker	25A	32A	50A
	Fuse 14x51 F1	25A	40A	--

2.4.3 UPS Output

UPS limited the output current according limited show in the chapter 8.6 and 8.7. 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

Before 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(nota1)	10(nota1)	16(nota1)
PE	Cable mm2	4	10	10

(nota1): For external battery cabinet use double insulated cables and protect the cable from mechanical dangerous

Warning

AN NOT CORRECT EARTHING CONNECTION CAN CAUSE ELECTRICAL RISK,SHOCK HAZARD , EMC PROBLEM, RISK OF FIRE.

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 see cap.2.7.
3. Connect the input earth wire to input earth terminal. Please note: the earth wire shall be connected in accordance with related local or national 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 L1 – L2 – L3 and the output load cables are connected with the output terminal of UPS (Output L12 - L22 - L32-N2). 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 L1 - L2 – L3 and the input terminal of the bypass,L11,L21,L31 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 external battery protections. **ENSURE CORRECT Polarity ,connect the battery cable with the battery protections open UPS and battery cabinet.**

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 of internal battery

On NS3000 series 10-30kVA there is an internal battery breaker into 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 internally one or two string of batteries: B1 or B1+B2. Each string is composed with 20+20 battery with common point (see tab.1). The method of build-in battery connection as shown fig. 2-5

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

Tab.1

 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 with battery shipped separately. Instructions for forty batteries:

1) Opened 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 have 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

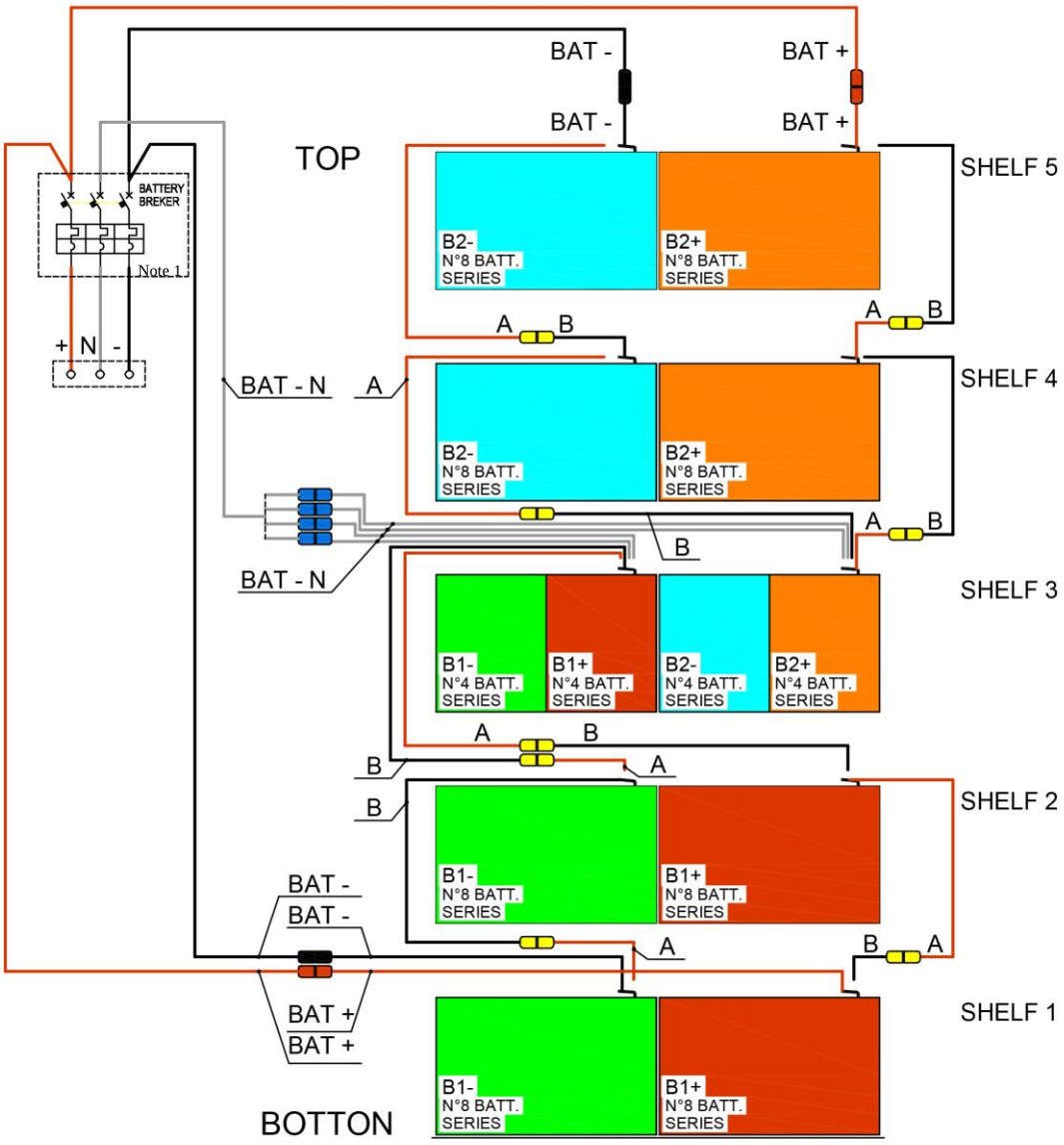
Important: with 80 batteries repeat the operation upper descript change layer1 with layer 5 and B1 with B2 , with B1 battery block don't connect

2.5.3.2 UPS shipped with internal batteries.

Start from point 6 of 2.5.3.1 instruction paragraph.

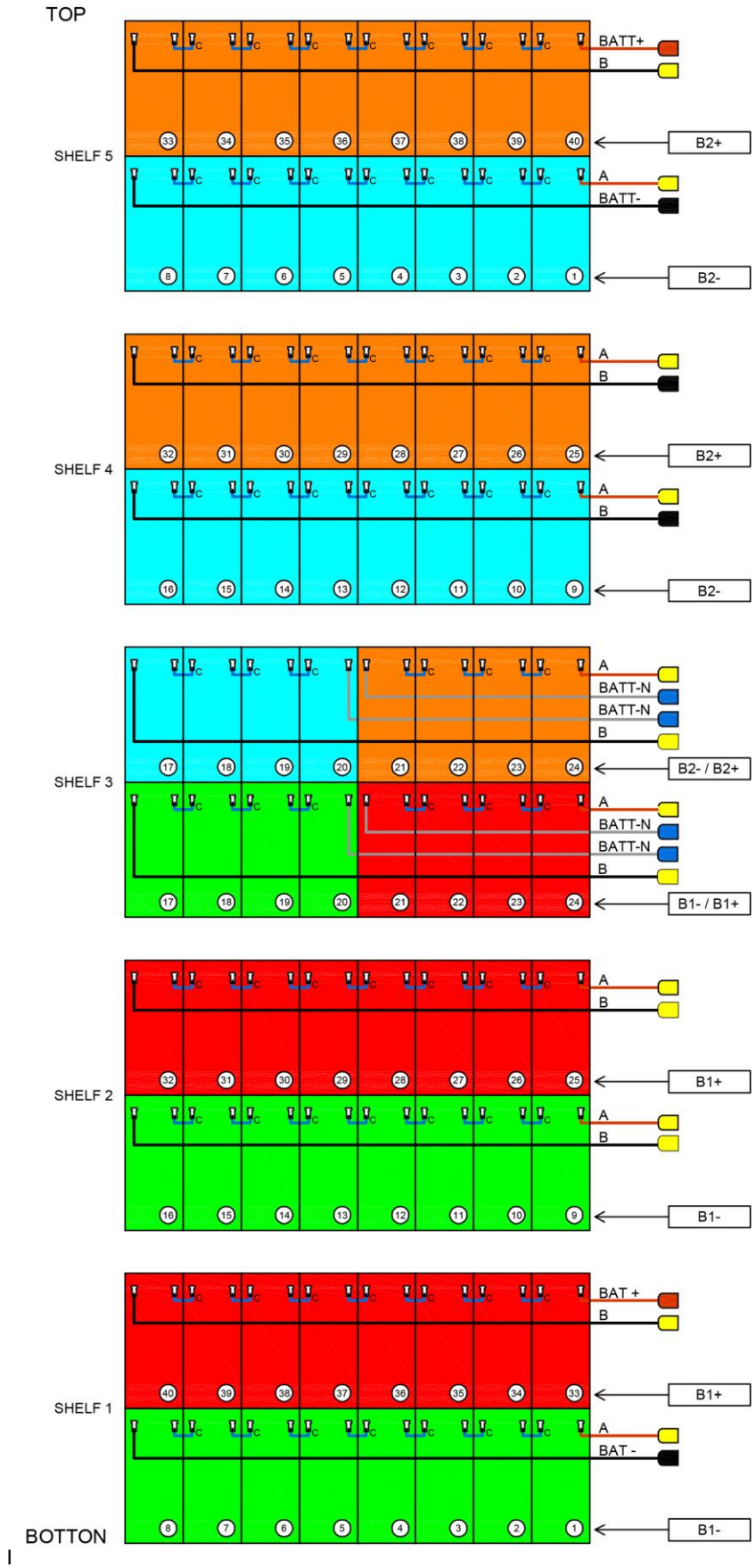
Legend fig. 2.5A	
B1	first string 40 battery with common point
B2	Second string 40 batteries with common point
BAT –	Mark NEGATIVE cable 40 battery series output
BAT+	Mark on POSITIVE cable 40 battery series output
BATT -.N	Common point 40 batteries series
C	Batteries cable
A	Mark on positive cable out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



Note 1: Battery breaker or fuse holder F1

FIG. 2.5B : TOP VIEW INTERNAL SHELF BATTERY POSITION



2.6 Control and Communication Cabling

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

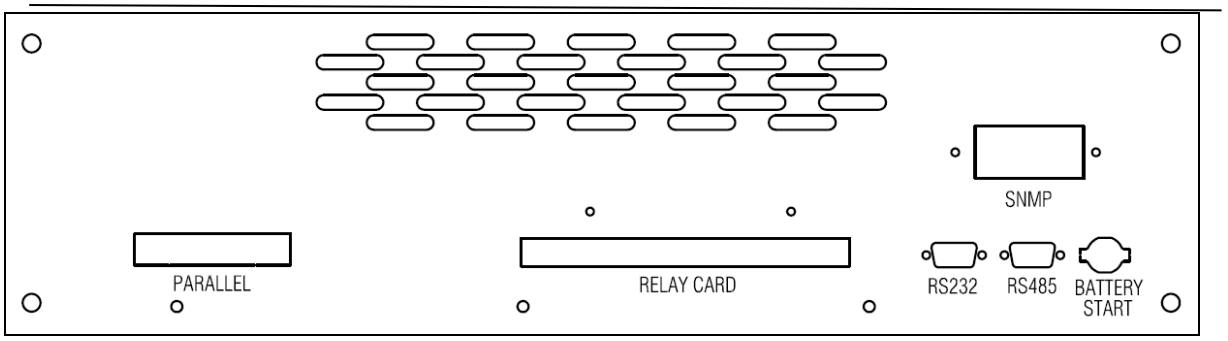


Fig 2-6 Dry contact interface and communication interface

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.

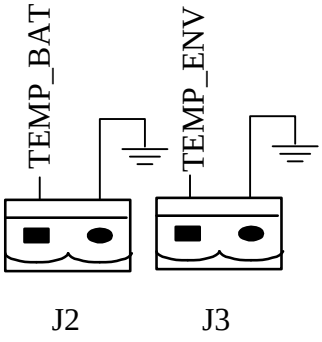


Fig 2-7 Diagram of J2 and J3 dry contact for temperature detecting

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 the 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.

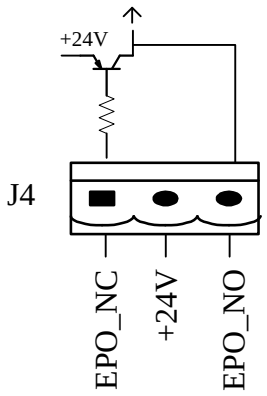


Fig 2-8 Diagram of input port for remote EPO

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 battery power supply. To disconnect ALL power to the UPS, open the upstream input circuit breaker(s) and battery breaker or battery fuse holder when the EPO is activated.
2. Remote epo is an optional . On pcb the epo is between 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

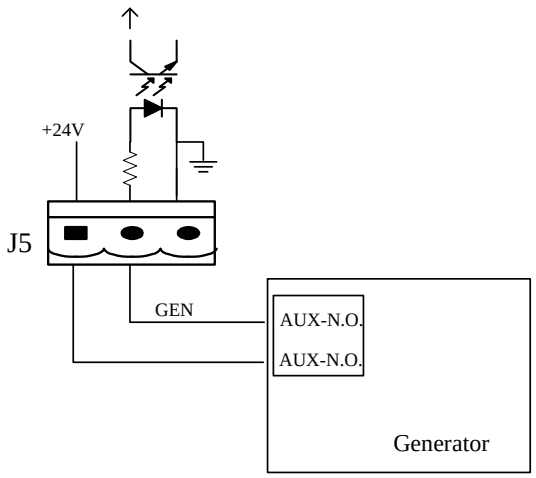


Fig 2-9 Diagram of status interface and connection of generator

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.

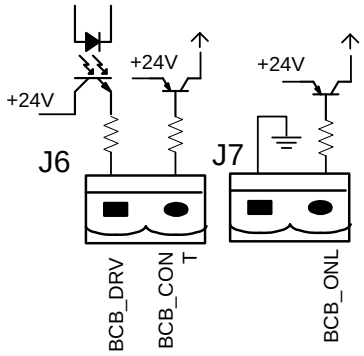


Fig 2-10 BCB Interface

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.

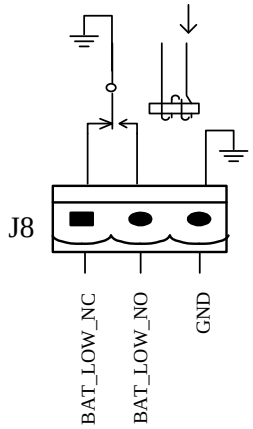


Fig 2-11 Battery warning dry contact interface diagram

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 general 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

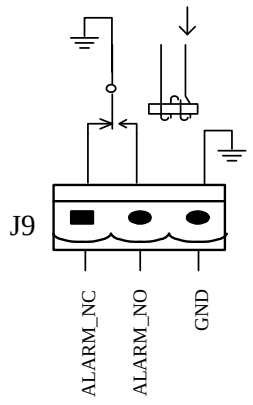


Fig 2-12 General warning dry contact interface diagram

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.

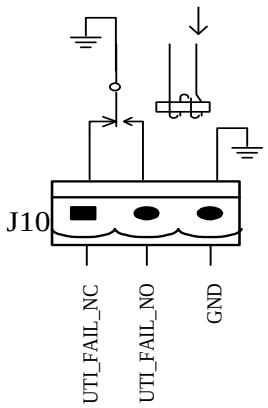


Fig 2-13 Mains failure warning dry contact diagram

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 UPSilon software

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 monitoring system.

UPSilon is a UPS monitoring software, which provides user-friendly interface to monitor and control UPS.

This unique software provides safely auto shutdown for multi-computer systems while power failure

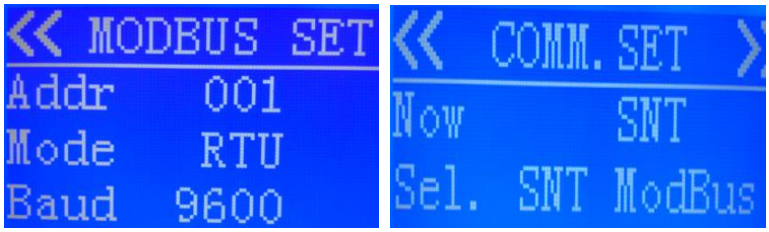
Free Software Download UPSilon instruction

http://www.megatec.com.tw/Upsilon2000v5.3.rar

License

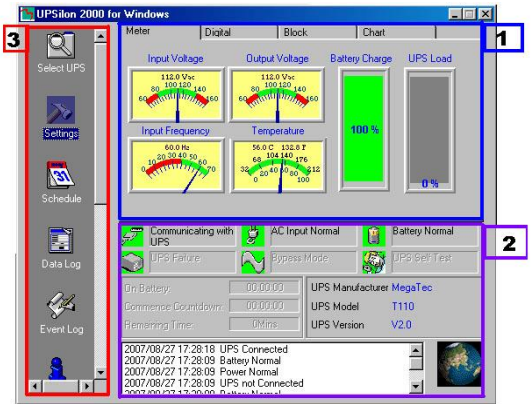
The license code is written in a label behind the the UPS door.

On ups mimic panel set



UPSilon use description

Functions UPSilon



2.6.8.1 SNMP Card Port

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

In the LCD display set in the key menu: COMM SET MENU

addr 001

MODE RTU

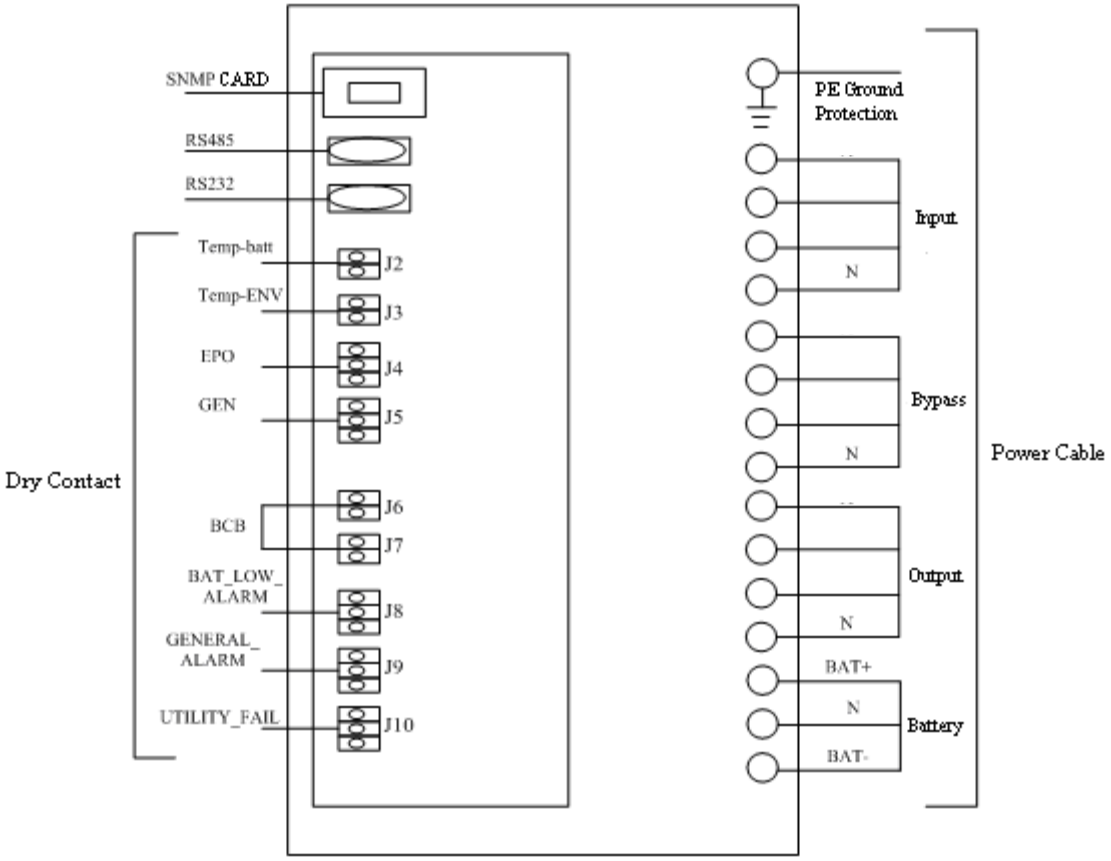
BAUD 9600

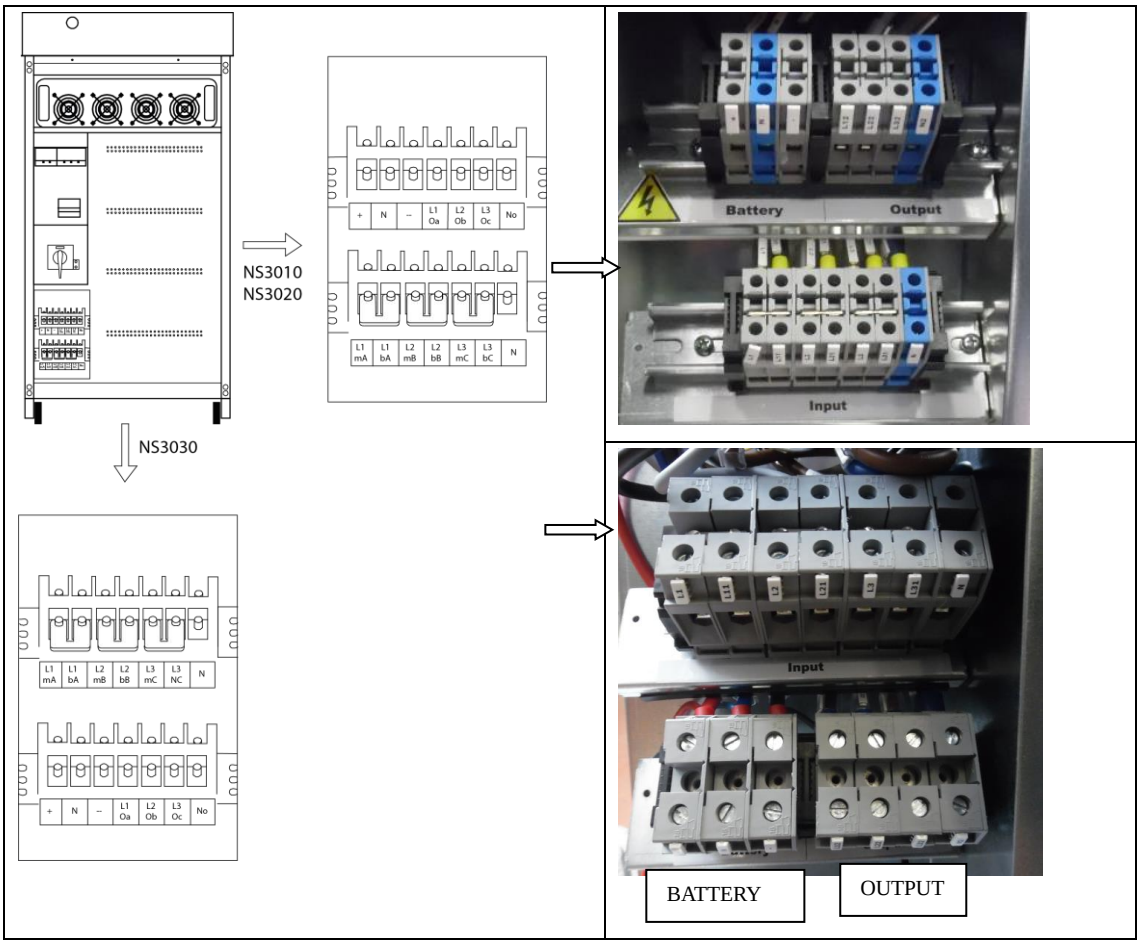
SNT **(note 1)**

Note 1: To use MTR program SET MODE BUS

Important: Install the card with the UPS off.

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 supply the load through the static bypass.

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

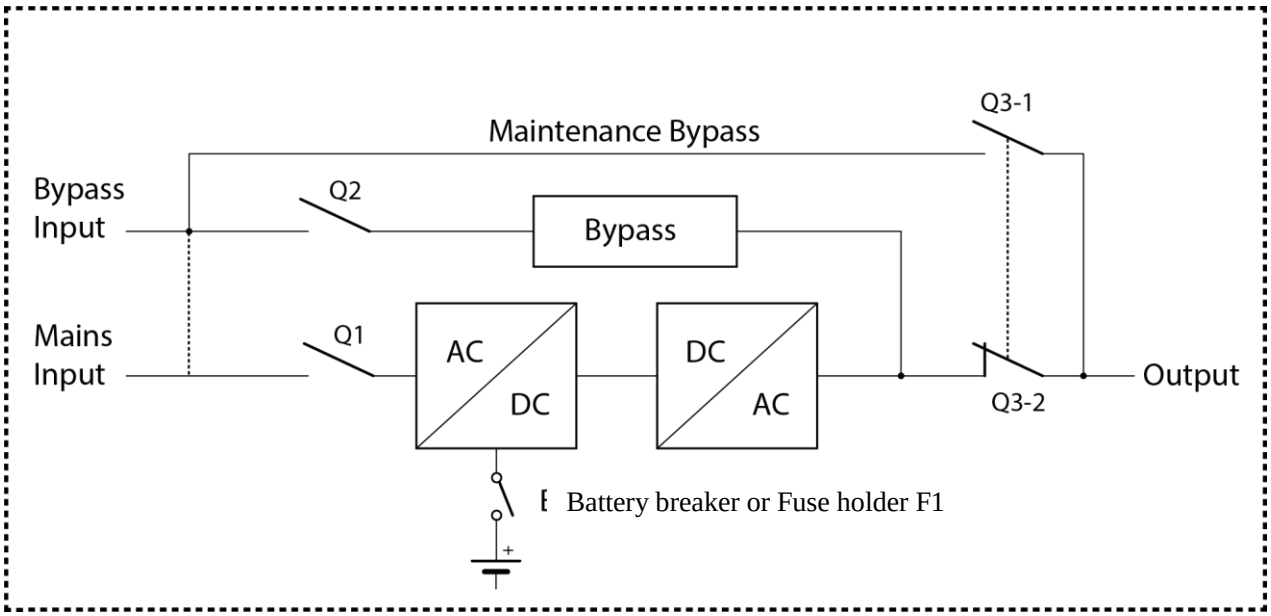


Fig 3-1 System principle framework

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 tracks with 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 be connected with a temperature sensor mounted into the external battery cabinet in order to reach battery management optimization.

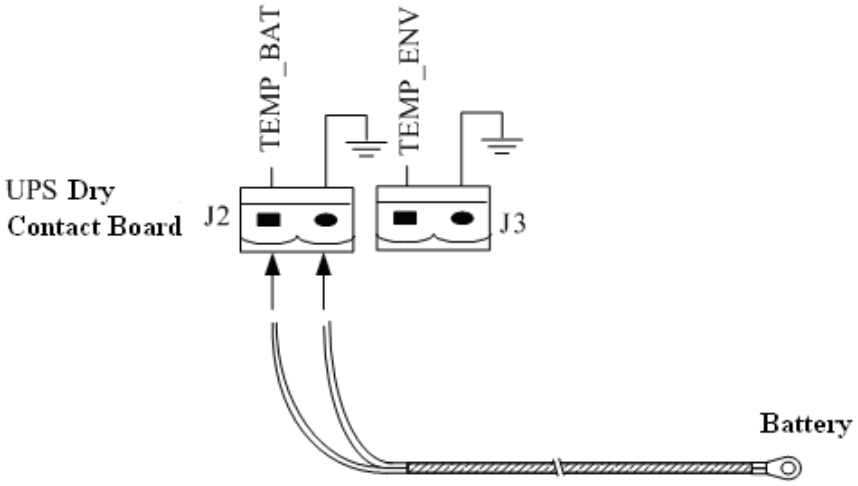


Fig 3-2 Temperature compensation diagram

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 service.)
- Frequency converters mode (Settable by service .)
- 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 this function is an optional (cod.KITNS-BATSTART).

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. The maintenance by-pass procedure is also in the label put near the switch Q3.

First to operate in the UPS is necessary open Q1-Q2 and the battery protection, The output is disconnect by Q3

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

3.2.6 ECO Mode

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

Eco mode have to set by customer service

3.2.7 Frequency Converters Mode

If the UPS is used in frequency converter mode, 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 Converter mode have to set by customer service.

	**Warning:**
With the same input and output frequency the UPS give available the static By-pass. Is possible disconnect by-pass Line take out in the UPS electrical terminal block. the connection between mains and by-pass see chapter 2.7. in this case the maintenance by-pass isn't available To use maintenance by-pass with the same input and output frequency open Q2.	

3.2.8 Parallel connection redundancy mode

NS3000 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.

For more detail see chapter 4.

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 (NiCd)

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 about minutes full load

2. *Battery discharge off (EOD) 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 is disconnected. 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 optional

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 in 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.

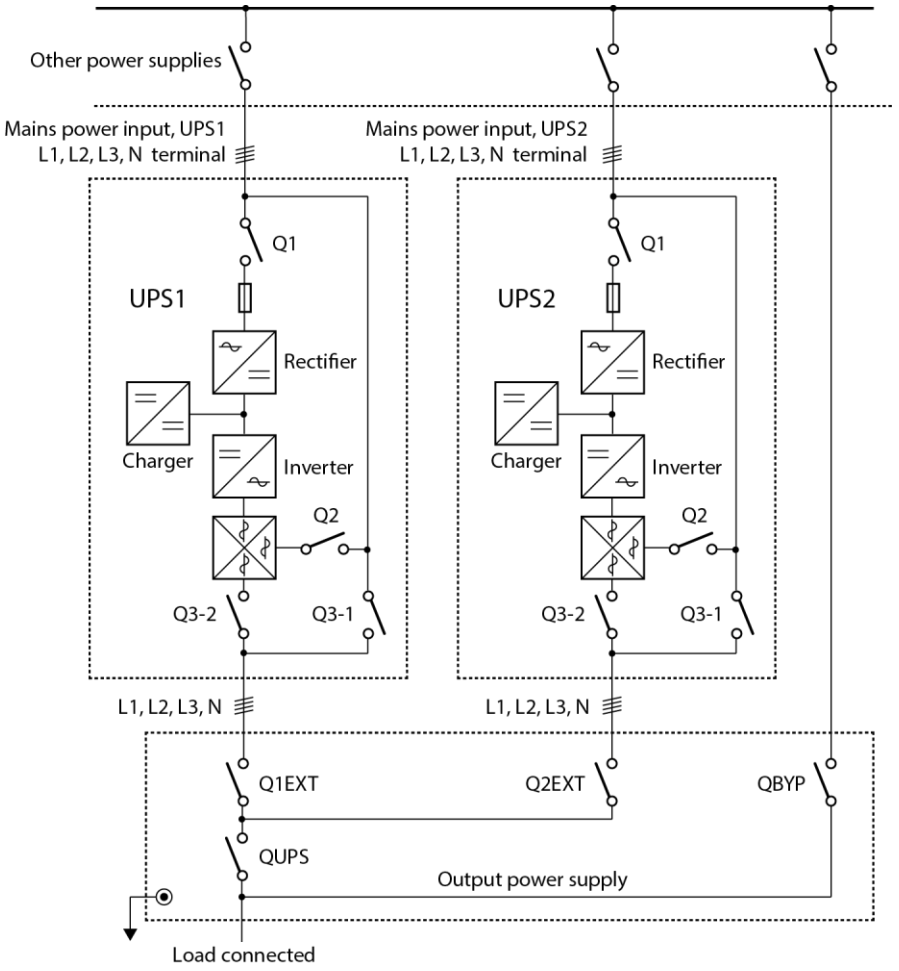


Fig. 4-1 Typical 1+N parallel operation system

Note: when the load exceeds the capacity of the single device, is necessary 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.

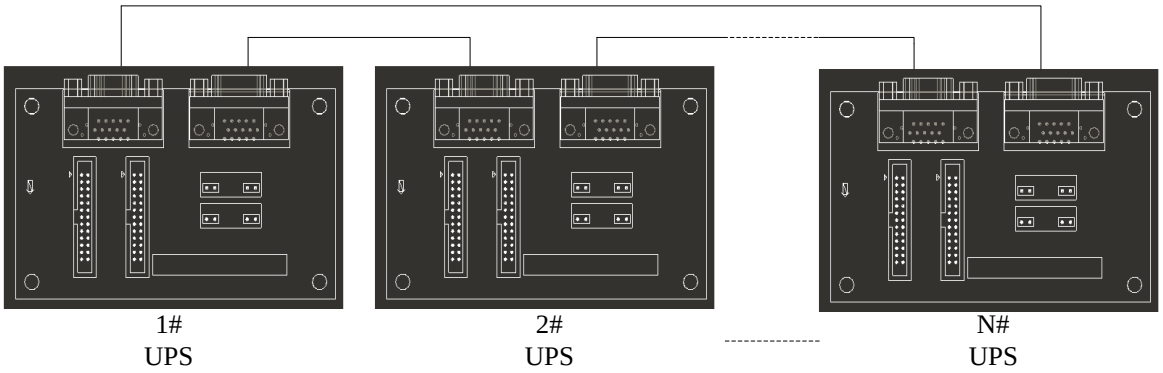


Fig.4-2 Parallel cables

UPS parallel start UP

The first parallel activation shall done by service person.

Switch on the UPSs inside one minute or connect the load step by step after parallel start up.

This to prevent UPS overload.

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, UPS open door view, the power switch is visible, which includes: input switch, output switch and maintenance bypass switch (with anti-operation stop plate)

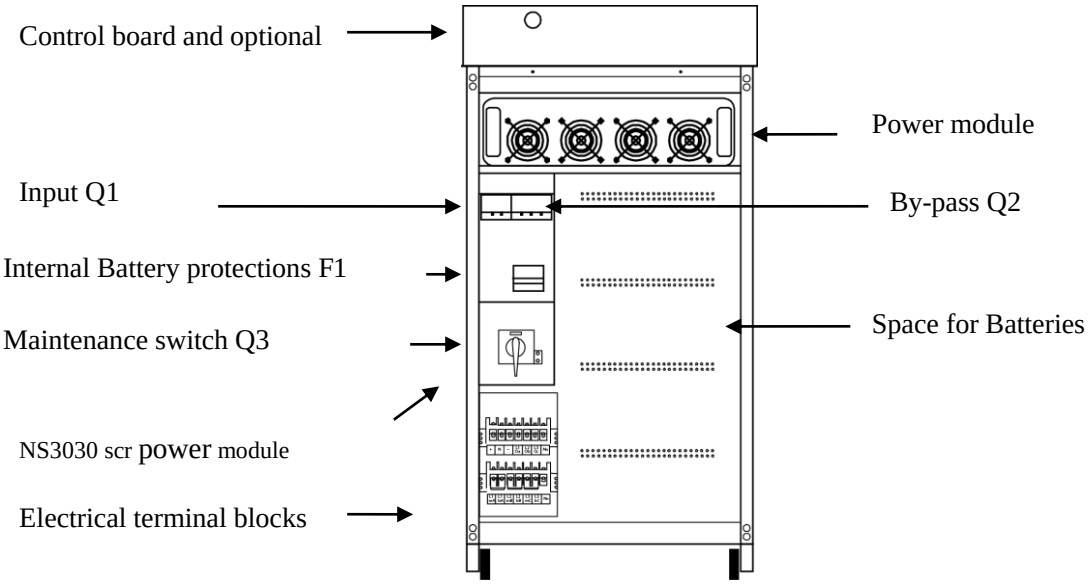


Fig. 5-1 10KVA~30KVA Vista UPS con porta aperta

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 switch if present, must be opened firstly and then the input 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

Nota1: Battery alarm present

If your UPS is with build-in battery type, please close internal battery DC protections. 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.

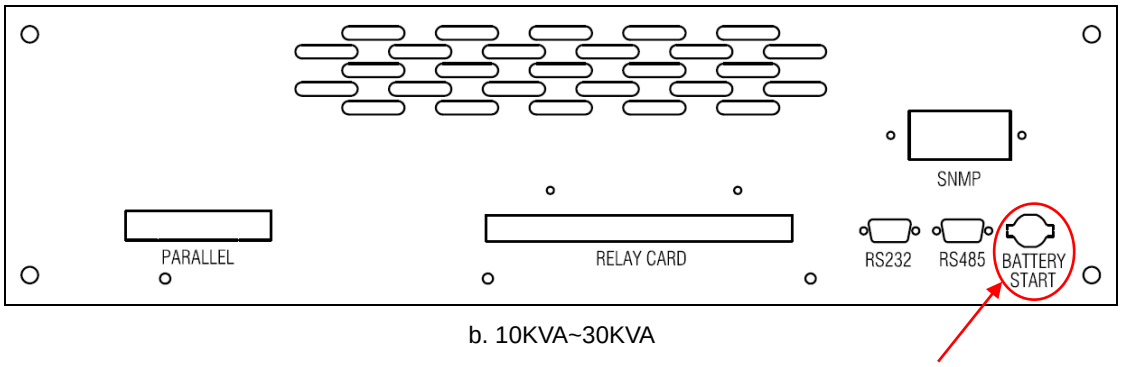
Warning
Please confirm battery connection right before closing external battery switch.

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 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”

UPS give an continuous beep alarm con the mimic panel show that the load is on manual bypasss

Note

In bypass mode, the load is supplied 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 inverter 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, in order to avoid the risk of 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 the mechanical block plate for Q3 then switch Q3 from Ups position to maintenance bypass position side in order that the load power supply is supplied by the maintenance bypass Q3. OPEN the mains switch Q1, the bypass switch Q2, OPEN all battery switches (the inverter output is open by Q3-2) .

Warning
If it is required to operate in the modules, the cabinet can be opened for internal maitenance after waiting for 5 minutes in order that the capacitor voltage in the internal DC bus automatically dischages. Warning: voltege is present in the input output e battery bloks and if presents in input and out put transformer or output distibutions

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 Q3 to “UPS ” 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 breaker 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 mechanical block plate stop plate for rotary switch.

5.4 Procedure for completely switch off the UPS

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

To stop complete the UPS and cut off power supply switch off the ups from mimic panel and open all battery, input protections-

Menu on/off Setting

Maintenance bypass command

Warning
For isolate the UPS from the AC power supply, you should open the external input switch. Otherwise in the input terminals compartment there is dangerous voltage.

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 4 languages: Italian-English – Polish – Spain –Catalan – French

The language can be selected through LCD prompt window.

5.7 Control Password

No password is present

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, battery status, 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.

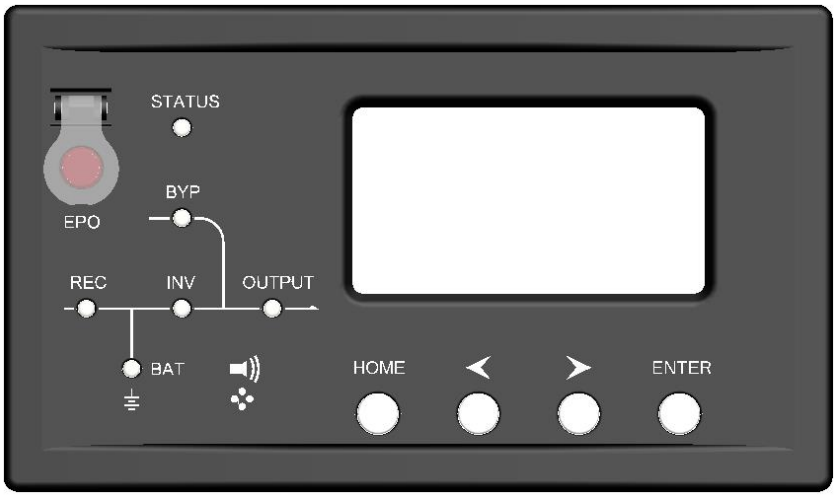


Fig 6-1 UPS operator control and display panel

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

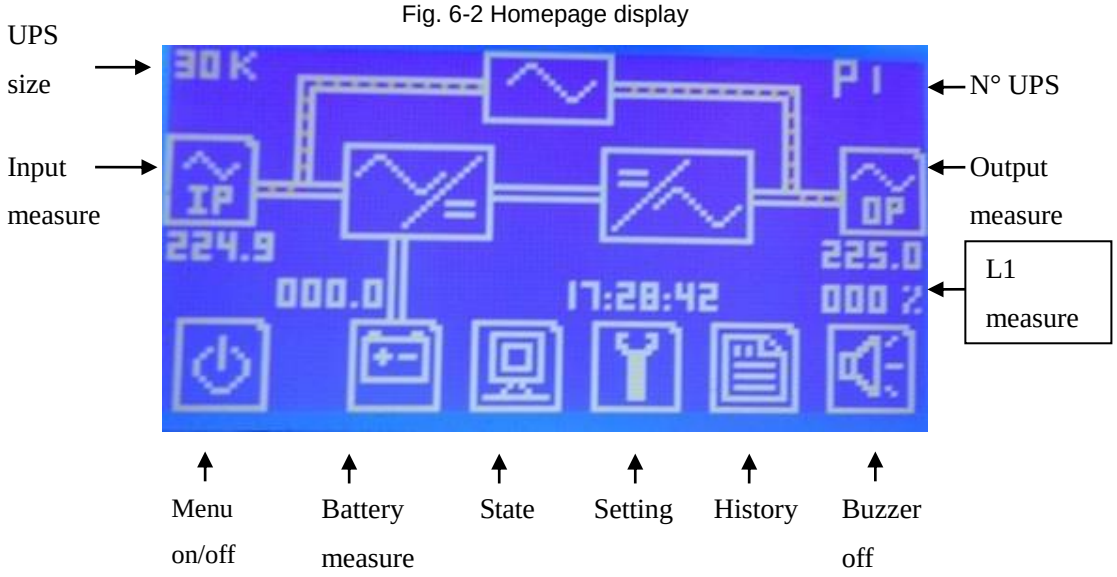
Table 6-4 Functions of functional key

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 main menu, switch over secondary menu pages, upward and downward roll the history log, add and subtract the entered 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 start, 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".):

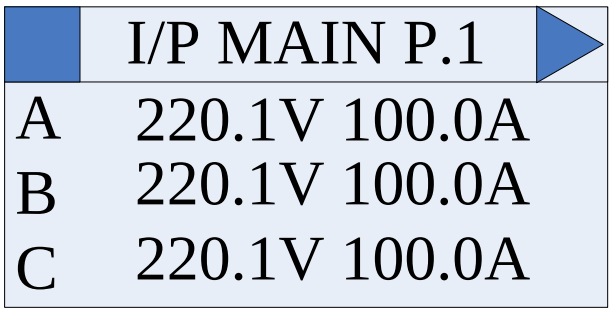


Fig.6-3 I/P data display for 10KVA~30KVA UPS

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”):

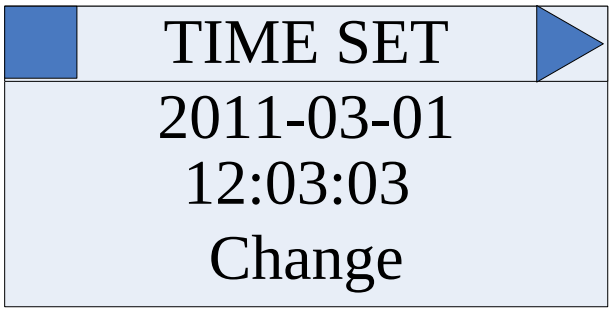


Fig.6-4 Time Setting for 10KVA~30KVA UPS

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):

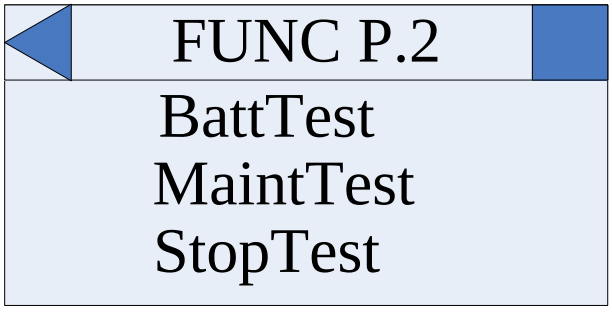


Fig.6-5 Function page.2 for 10KVA~30KVA UPS

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”):

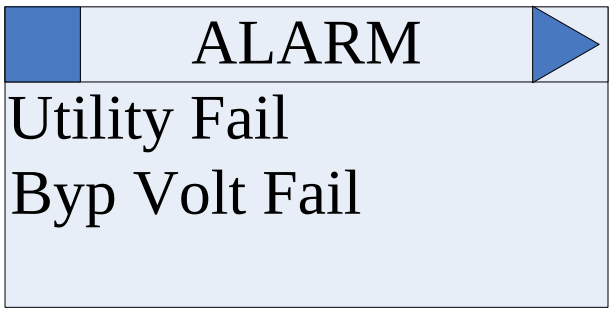


Fig.6-6 Alarm page for 10KVA~30KVA UPS

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):

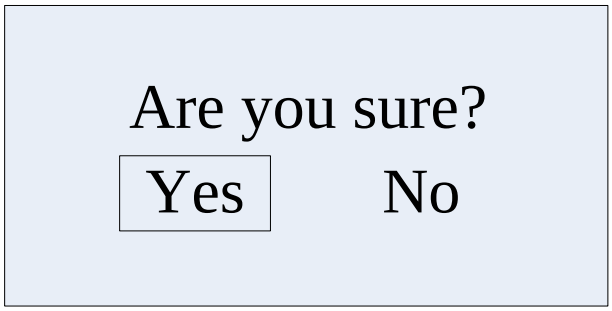


Fig.6-7 Confirm page for 10KVA~30KVA UPS

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 “history function in homepage and press “ENTER”):

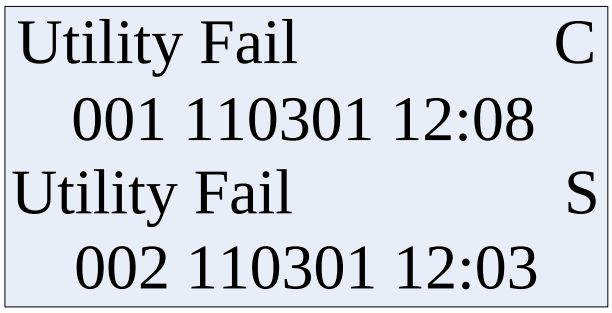


Fig.6-8 History record page for 10KVA~30KVA UPS

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 (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 reverse
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 must to be lower than 60Vdc, and AC maximum Voltage must to be 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

Condition 1: Programmed maintenance, UPS is working in normal mode

1. Select manual switch of bypass in LCD screen, the UPS power will be supplied by bypass.
2. Put Q3 in maintenance (1) position, the UPS power will be supplied by maintenance bypass.
3. Open UPS input switch Q1 e Q2.
4. Open external battery switch and internal battery switch.
5. After 5 minutes remove the protections parts.
6. Reinstall the corresponding components in the cabinet after maintenance.(warning in the battery and switch dedicate space there is dangerous voltage and energy)
7. Reinstall the internal panel , and complete the connection .
8. Close the bypass switch Q2
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.

   After 5 seconds, the indicator light of the operating control display panel works, which shows the power is normally supply by the bypass. (Verified measure ad alarm from display)
10. Close mains input switch Q1, Put Q3 in UPS (0) position bypass switch automatically starts, and UPS operates in the normal mode after 60 seconds.

Chapter 8 Product Specification

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	IEC62040-1/AS 62040-1:2009/ EN50091-1-1
Electromagnetic compatibility (EMC) requirements for UPS	IEC62040-2/AS 62040-2 /EN50091-2
Method of specifying the performance and test requirements of UPS	IEC62040-3/AS 62040-3(VFI SS 111)/ EN50091-3
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 , Note: Battery life is halved for every 10°C increase above 20°C.
UPS Storage-Transport Temperature	℃	－20 +60°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) 334Kg (with 80pcs 9A/h)	118Kg (Without battery) 346Kg (with 80pcs 9A/h)
Color	N/A	RAL 7016	
Protection Level, IEC(60529)	N/A	IP20 standard IP21 on request	

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% power derating between 60% to 100% (-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 voltage	Vdc	Nominal ±240V, range: 198V-288V	
Quantity of battery		120+120 (Tot. 240) cells [20+20 (Tot. 40) batteries 12V]	
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	kW	10%* UPS capacity (selectable from : 0-20%* UPS capacity)	
Battery Charging I max (40 battery)	A	NS3010	2,8 A settable according to battery capacity
		NS3020	5,6 A settable according to battery capacity
		NS3030	8,4 A settable according to battery capacity
Battery Charging Current Irch	A	NS3010	1,33 A (parameter *“ChgCurrLmt%”= 8%*)
		NS3020	1,33 A (parameter *“ChgCurrLmt%”= 5%*)
		NS3030	1.5A (parameter *“ChgCurrLmt%”= 3%*)

Note: the parameter *“ChgCurrLmt%”stable in MTR sw* with 40 battery set the charger power as formula:

ChgCurrLmt%”= (Irch/Imax)x20

Example

Rated power=20kVA with Battery capacity= 40A/h

We would like charge with 4A so Irch= 4A

Calculation: ChgCurrLmt%”= (Irch / Imax) x 20 = 4/5,8x20=14

8.6 Electrical Characteristics (Inverter Output)

Table 8-6

Items	Unit	Parameters	
Rated Power	kVA / kW	NS3010	10kVA – 9kW
		NS3020	20kVA – 18kW
		NS3030	30kVA – 27kW
Power factor		0,9	
Rated AC voltage[1]	Vac	380/400/415 (three-phase + Neutral)	
Freqency[2]	Hz	50/60Hz	
Overload With PF 0,9	%	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) (Note1)	
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.

Note1: In the version with output transformer see additional characteristics addendum

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. 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 and converter mode.

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%

General safety information for UPS 62040-2 CLASS 2-3:

	Italiano	English	Francais	Deutsch	Espanol
	Attenzione leggi per prima il manuale.	Warning: please read the manual first.	Attention, lire le manuel d'instruction.	Achtung: Zuerst die Bedienungsanleitungen durchlesen.	Cuidado! Leer el manual de el usuario antes de obrar
	Apparato per ambiente di lavoro interno con polveri e inquinanti normali.	Indoor equipment for environment with normal pollution and dust.	Equipements pour l'intérieur avec une pollution normale.	Gerät für interne Arbeitsräume mit normaler Schadstoff- und Staubentwicklung.	Equipo por el interior con polvo y poluciòn normal
 EMC	L'Apparato In ambienti residenziali può causare interferenze	In residential environments the equipment can cause interference	L'appareil peut provoquer des interférences dans une zone résidentielle.	Das Gerät kann in Wohngebäuden Interferenzen verursachen.	En el ambiente residencial el equipo puede causar interferencias
	Collegare il conduttore di terra al UPSE' consigliata la protezione differenziale	At first connect the Pe conductor.Differential protection is suggested.	En premier connecter le conducteur de terre (PE). Protection différentielle suggérée.	Das Erdungskabel an die USV abschließen. Ein Differentialschutz ist ratsam.	Conectar el cable de tierra a el SAE. Se aconseja la protecction con el interruptor diferencial
	Attenzione batterie interne non aprire pericolo	Warning: batteries inside, do not open for chemical and electrical risk	Attention, batteries internes, risques chimiques et électriques.	Achtung! Batterien im Inneren. Nicht öffnen! Gefahr!	Cuidado! Batteries en el interior, no abrir, peligro
	Attenzione la manutenzione è consentita solo al personale dell'assistenza tecnica scollegare rete e le batterie prima di operare	Warning, maintenance is allowed only to duly trained persons. Only technical assistance personnel can open and repair the UPS. Before working on the UPS disconnect mains and batteries.	Attention, seules les personnes autorisées peuvent ouvrir et intervenir dans l'onduleur. En premier, couper l'alimentation et le circuit des batteries.	Achtung: Die Wartung ist ausschließlich dem technischen Kundendienst vorbehalten! Das USV-Netz vor dem Eingriff abtrennen!	Cuidado! La asistencia tècnica debe ser hecha solamente para el personal tècnico especializado. Desconectar el SAE antes de operar
	Attenzione durante la manutenzione usare i DPI	Warning: during maintenance use protection devices	Attention, utilizer les EPI (équipements de protection individuels)	Achtung! Während der Wartungsarbeiten müssen die PSA verwendet werden.	Attencion utilizer los dispositivo de protection individual antes de obrar