USER'S GUIDE

LEONICS®

NB-xx31S series

True on-line Double Conversion
Sine Wave UPS

LEN.MAN.UPS.194 Rev.1.00/2015

CONTENT

SAFETY INSTRUCTIONS

Please read and follow this user's manual carefully and completely.

Important: Please keep this user's manual for reference in order to use LEONICS UPS and properly and safety. This user's guide consists of safety instruction, introduction, installation, operation, how to display recorded data, etc.

For product safety, please check this product annually by our service qualified personnel or if there are any symptoms of problems which are not mentioned in this guide or any queries about our products, please contact your LEONICS local distributors, LEONICS service center or send e-mail to support@leonics.com.

For your convenience and quick reference for LEONICS UPS service, please fill the requested information in the blanks below:

LEONICS UPS Model: _____

Serial Number: _____

Purchased date: _____

Purchased from: _____

1.1 Warning, Caution and Note

To reduce risk of electrical shock hazards, and to make sure the inverter is safety installed, special symbols of Warning, Catuions and Note are used in this guide to highlight potential safety hazards and important safety information as follow:

⚠ Warning: Indicates a potentially hazardous situation or safety information important for human safety. Violation of warnings may result in death or serious injury and damage to the unit or other equipment.

⚠ Caution: Indicates a potentially hazardous situation or the information important for the protection of property. Violation of caution may result in minor or moderate injury and damage to the unit or other equipment.

✍ Note: Indicates useful additional information that helps you make better use of product and system.

1.2 Electrical Safety

⚠ Warning: Risk of electric shock, **DO NOT** remove cover. No user serviceable parts inside, please refer servicing to qualified service personnel.

⚠ Warning: **DO NOT** work alone where there are electrically hazardous conditions.

⚠ Warning: Contact with live conductors will cause burns and dangerous electric shock. **DO NOT** touch any terminal or internal parts of the unit while the unit is operating.

- Only qualified electricians should install or service this unit, PV panel and batteries.
- Properly install and ground (⏚) the equipment in accordance with the instruction manual.
- Periodically check your cable, terminal and power source to make sure that they are in good condition.
- To reduce risk from electric shock, if you cannot find the electrical ground (⏚) of the building, disconnect the UPS from AC power source before connect loads to the UPS. Then, connect the UPS to AC power source.
- Use ONLY one hand when plugging or unplugging the loads in order to avoid electric shock from touching two surfaces with different potential.
- It is recommended to connect the UPS to a three wires AC power source (two live wires and an electrical ground) which connects to a protected circuit such as employs a fuse or circuit breaker.

1.3 Safety instruction for installation and operation

⚠ Caution: Before installing or using this unit, read all instructions and caution markings on the UPS, all connected loads and all sections of this user guide.

⚠ Caution: Install this unit in a temperature and humidity controlled indoor area with adequate air flow and away from chemical particles or flammable substances. Avoid installing the unit near radio transmission station, heat dissipation equipment and direct sunlight.

⚠ Caution: **DO NOT** use the UPS with life recovery instruments. The failure of UPS may cause life recovery instruments failure or effect to their performance or effect to the safety system of those instruments.

- This UPS has ventilation grills. Ensure that sufficient ventilation is provided. **DO NOT** block the ventilation grills. Install the UPS at least 80 cm free space around the UPS for adequate ventilation and easy access for installation, operation and maintenance.
- Use insulated tools to reduce your risk of electric shock.
- Remove all jewelry or other metal objects such as rings, necklace, bracelets and watches when installing this product.
- Verify correct terminal block connections to prevent the damage occurs.
- Before connecting the communication interface signal cable into computer, turn off the UPS and disconnect AC power supply from UPS.
- Turn on the UPS before turning on the computer or other appliances to prevent the surge from electrical appliances.
- **DO NOT** connect the AC input cable to the UPS output outlets or terminal blocks. This may cause the UPS damaged.
- **DO NOT** clean the UPS with benzene, thinner or any solvent, use only soft cloth to clean the UPS after it has been turned off.
- During a heavy rain storm, avoid using electrical appliances including the UPS to prevent damage from lightning strike.

1.4 Safety instruction for Battery

⚠ Warning: Even the UPS is disconnected from AC power source, the UPS OUTPUT outlets may have hazardous voltage because of battery inside the UPS may continue supply power.

⚠ Warning: **DO NOT** dispose of batteries in a fire. They may be exploded.

⚠ Warning: **DO NOT** disassemble batteries. They contains poisonous electrolyte which is harmful to your skin and eyes.

⚠ Warning: The battery that inside your UPS can be recycled. It contains LEAD, which is harmful to health and the environment. If it can not be disposed of properly. Please send back to our service center.

- Replace batteries with the same type and rating and follow the proper battery replacement procedure.
- When replacing battery, use tools with insulated handles and remove any watch, ring, or other metal objects that you wear in order to avoid electric shock.
- If you have to storage UPS for long period of time, be sure that battery is fully charged and it need to be recharged every three months to preserve the condition of the internal battery. Only connect the UPS to utility line and turn on, then leave the UPS connected to AC power source for at least 8 hours.

1.5 Safety instruction for transport

1.5.1 UPS has been fitted with casters to allow ease of transportation. UPS must be moved vertically.

1.5.2 Transport the UPS with its packaging until it arrive the installation location to avoid shipping damages.

INTRODUCTION

2.1 General

LEONICS NB-xx31S-series UPS is a True On-line Double conversion uninterruptible power supply which is the highest performance UPS system. It is controlled by microprocessor and provide high quality pure sine wave power. It is able to protect against all utility power problems such as blackout, brownout, sag, surge, spike or noise efficiently. With LED and LCD displays, user can view the UPS operating status anytime.

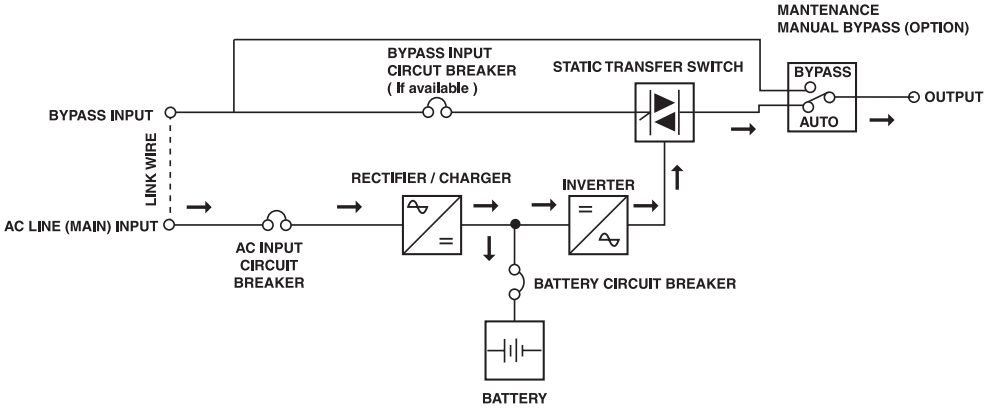
True On-Line Double conversion system has two operation steps. First, it convert alternative current (AC) to direct current (DC) Some of the direct current will flow to charge the battery to be backup power and the rest will invert to alternative current and then supply to load. If the AC input is disconnected, the UPS will invert the direct current from battery to alternative current and supply to load. UPS will supply AC power to load continuously.

2.2 Features

- Stable output frequency (Crystal controlled)
- Built-in output isolation transformer
- Load safe with new battery test scheme
- Zero time transfer full static switch
- Emergency Power Off (EPO)
- Over current and short circuit protection
- EMI/RFI and power line noise protection
- Automatic bypass overload protection
- Automatic detective and shutdown when no load
- Manual self-test
- RS-232 communication port

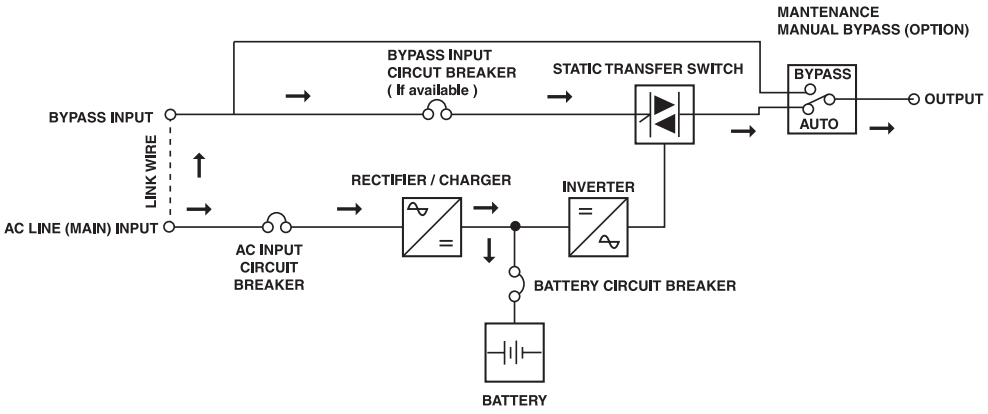
2.3 Operation

2.3.1 <u>When utility power and loads are normal</u>



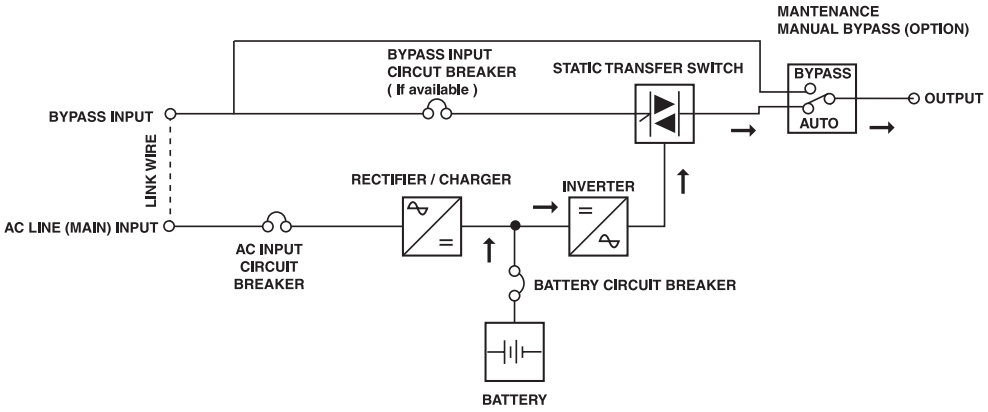
The RECTIFIER converts AC power from utility power to DC power. The CHARGER take some of the DC power to charge battery for storing as backup power and the rest flow directly to the INVERTER to invert power to high quality and stable AC power. Then, supply to load.

2.3.2 When utility power is normal but UPS is overloaded



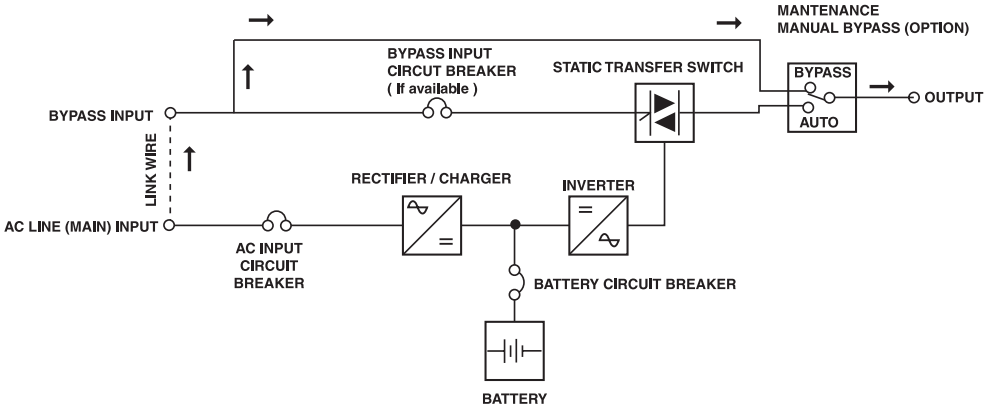
UPS converts AC power at RECTIFIER / CHARGER to DC pwer for charging battery only. All connected loads consume power from utility line directly.

2.3.3 When utility power fails (Backup Mode)



UPS operates in battery backup mode when it detects abnormal situations such as blackout, brownout, sag, surge, spike, frequency fault, etc. that might cause malfunction to your connected loads. UPS will immediately transfer to backup mode and draw DC power from battery to invert to AC power and supplies to connected load continuosly.

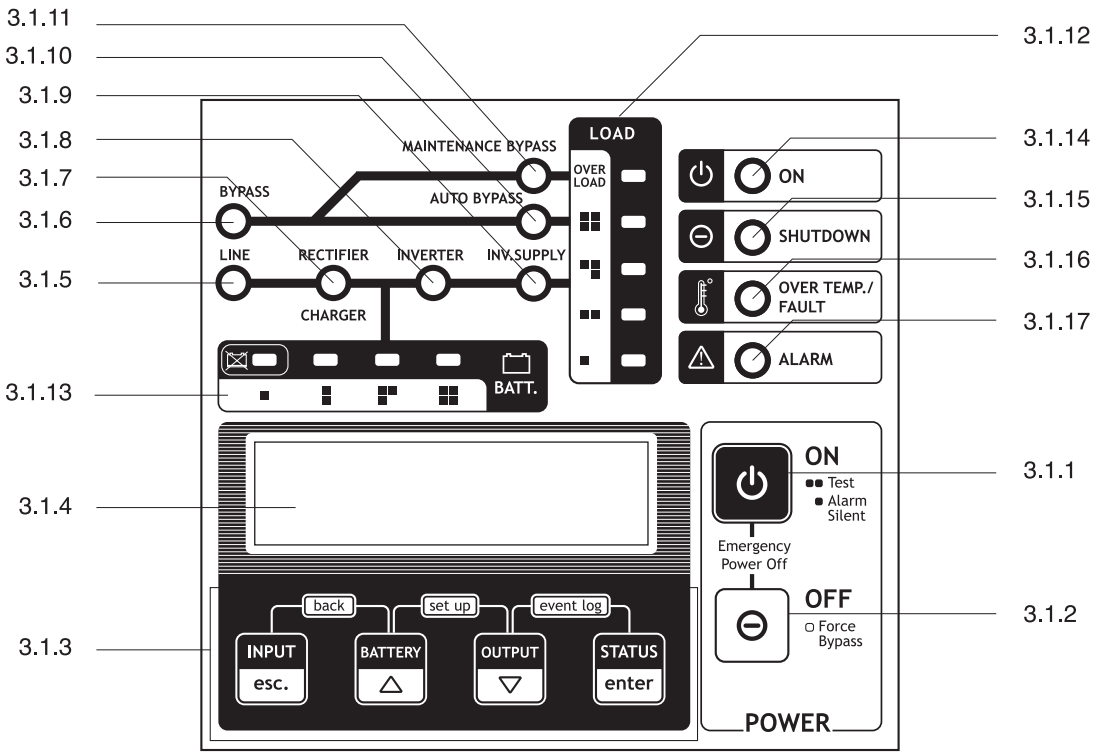
2.3.4 Manual bypass mode



When UPS is malfunction. User is allow to temporary run the system by turning the MAINTENANCE MANUAL BYPASS switch from AUTO to BYPASS or turning on MAINTENANCE MANAUAL BYPASS circuit breaker to ON position. All connected loads will be transfered to consume power from utility line directly. Then, contact us or our nearest service center.

FRONT PANEL AND INNER COMPONENTS

3.1 Display



3.1.1 ON button: The button to turn on the UPS, test the operation and mute alarm sound.

3.1.2 OFF button: The button to turn off the UPS and force the UPS to bypass the power source.

3.1.3 Buttons: The buttons to show the UPS parameters on LCD display.

3.1.4 LCD display: The screen to display parameter values.

3.1.5 LINE indicator: Indicate status of main power source.

- Lit means the input voltage is normal.
- Off means the input voltage of the main power source is out of range.

3.1.6 BYPASS indicator: Indicates status of bypass power source.

- Lit means the voltage and frequency of the bypass power source is in the range.
- Off means the voltage of the bypass power source is out of range or the frequency is out of synchronized range.

3.1.7 RECTIFIER/CHARGER indicator: Indicates status of RECTIFIER and CHARGER section.

- Lit means RECTIFIER and CHARGER operate normally.
- Blink means RECTIFIER and CHARGER are just starting the operation.
- Off means RECTIFIER and CHARGER stop operating.

3.1.8 INVERTER indicator: Indicates status of INVERTER section.

- Lit means INVERTER section is operating and synchronizing frequency with the bypass power source.
- Blink means INVERTER section is operating but does not synchronize frequency with the bypass power source.
- Off means INVERTER section stop operating.

3.1.9 INV. SUPPLY indicator: Indicates status of power from INVERTER section which supplies to loads.

- Lit means loads consume protected power from the UPS.
- Off means the protected power from the UPS does not supply to loads.

3.1.10 AUTO BYPASS indicator: Indicates status of bypass power source which is supplying to loads directly when UPS is overloaded, inverter fault or force bypass condition.

Lit	means loads consume power from bypass power source directly by press and hold OFF button to force bypass condition.
Slow blink	means loads consume power from bypass power source directly automatically.
Off	means there is no power from bypass power source supplying to load.

3.1.11 MAINTENANCE BYPASS indicator: Indicates status of bypass power source is supplying to loads directly when MAINTENANCE MANUAL BYPASS SWITCH is set at BYPASS (B) position.

Lit	means loads consume power from bypass power source directly.
Blink	means MAINTENANCE MANUAL BYPASS SWITCH is set at AUTO (A) position.

3.1.12 LOAD LEVEL indicator: Indicates the load quantity comparing to full capacity of the UPS. The indicator shows from 25% (bottom LED) to OVERLOAD (top LED).

1st (bottom) lamp is lit	means total load quantity is higher than no load condition level.
2 lamps are lit	means total load quantity is between 26-49%.
3 lamps are lit	means total load quantity is between 50-74%.
4 lamps are lit	means total load quantity is between 75-99%.
5 lamps are lit	means total load quantity is over 100%. The UPS is overloaded. Recommend to reduce some loads.

3.1.13 BATTEY LEVEL indicator: Indicates the level of battery power comparing to the full level. The indicator shows from replace battery (bar left LED) to full battery (bar right LED).

1st (left) lamp is lit	means the battery power is very low and blinks when the battery should be replaced.
2 lamps are lit	means the battery power is low and blinks to alarm.
3 lamps are lit	means the battery power is moderate.
4 lamps are lit	means the battery power is full.

3.1.14 ON indicator: Indicates the UPS operation normally.

Lit	means the UPS is operating normally.
Very slow blink	means loads consume power from the bypass power source directly by press and hold OFF button to force bypass condition.
Slow blink	means the UPS stop operating and waits to restart by startup schedule.
Fast blink	means the UPS is testing the operation.
Off	means the UPS stop operating.

3.1.15 SHUTDOWN indicator: Indicates the UPS stop operation or standby operation.

Lit	means the UPS stop operating or UPS is in standby mode.
Slow blink	means the UPS is going to shutdown due to a command from the computer.
Fast blink	means the UPS is going to shutdown due to low battery or overload.
Off	means the UPS does not standby or is not going to shutdown.

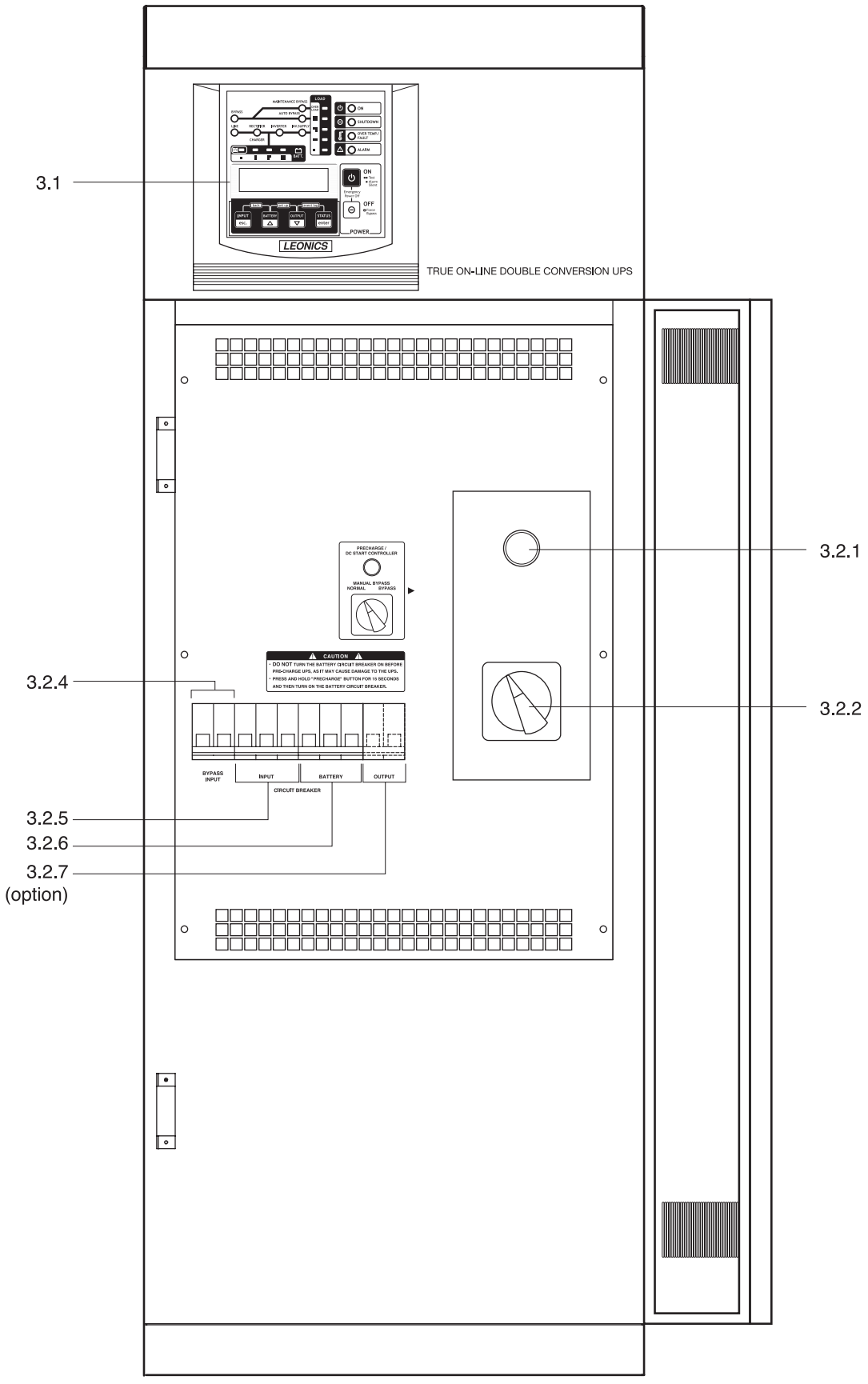
3.1.16 OVER TEMP./FAULT indicator: Indicates the UPS is over temperature or UPS is malfunction.

Lit	means the UPS operates abnormally.
Fast blink	means the UPS is over temperature.
Off	means the UPS operates normally or is normal temperature.

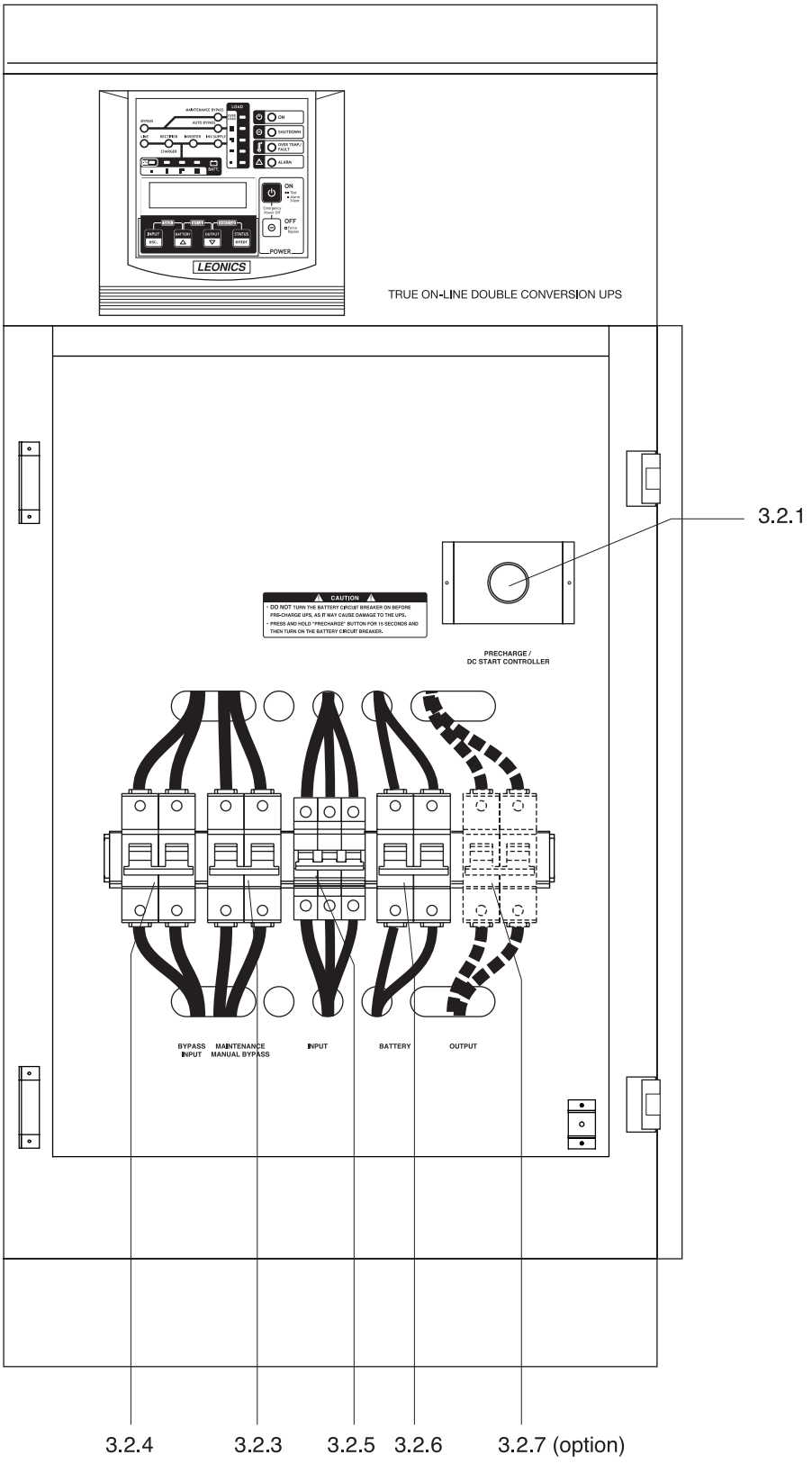
3.1.17 ALARM indicator: Indicates the UPS has fault.

Blink	means the UPS alarms fault.
Off	means the UPS operates normally.

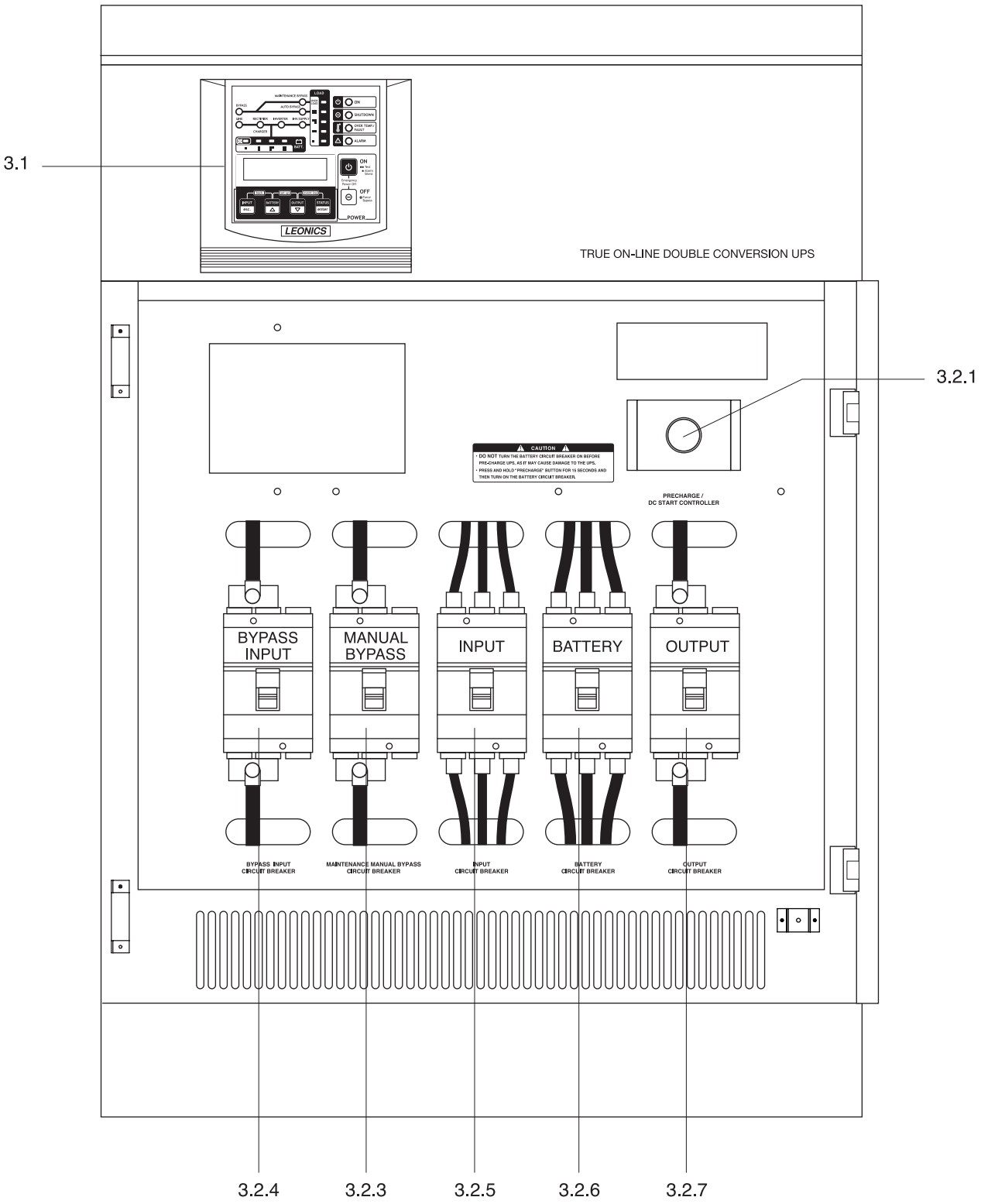
3.2 Inner components



Inner component of 8 kVA - 10 kVA model



Inner component of 20 kVA model



Inner component of 30 kVA - 40 kVA model

3.2.1 PRECHARGE / DC START CONTROLLER button: This button has 2 operation as follow.

- Pre-charging UPS when utility line is normal: Press this button before starting-up the UPS for your safety. The capacitor inside the UPS will first charge in order to protect surge or spark when turn on BATTERY circuit breaker. Press and hold this button for 5 seconds before turn on BATTERY circuit breaker.
- DC start the UPS when blackout: When blackout occurs or no AC power source, the UPS will cut power to control circuit in order to protect battery power runs out or deteriorate. To turn on the UPS when blackout or no AC power source can be done by press and hold this button for 10 seconds. The UPS will start supply power to control circuit again. After that verify the BATTERY circuit breaker is turned on, then press ON button at the front panel of the UPS.

3.2.2 MAINTENANCE MANUAL BYPASS switch (available in NB-0831S - NB-1531S): The selector switch to switch the AC power source for connected loads

NORMAL/AUTO: Select this position to tranfer loads to consume the protected power from UPS.
BYPASS: Select this position to transfer loads to consume power from bypass power source directly when the UPS need to maintenance.

3.2.3 MAINTENANCE MANUAL BYPASS circuit breaker (available in NB-2031S - NB-4031S): The circuit breaker to switch the AC power source for connected loads

OFF: To tranfer loads to consume the protected power from UPS.
ON: To transfer loads to consume power from bypass power source directly when the UPS need to maintenance.

3.2.4 BYPASS INPUT circuit breaker: The circuit breaker for protecting bypass power source from overload or short circuit current.

3.2.5 INPUT circuit breaker: The circuit breaker for protecting main AC power source from overload or short circuit current.

3.2.6 BATTERY circuit breaker: The circuit breaker for protecting battery from overload or short circuit.

3.2.7 OUTPUT circuit breaker (Optional for NB0831-NB2031): The circuit breaker for protecting loads from over load or short circuit.

3.3 Rear panel

3.3.1 INPUT terminal: The terminal for connecting input power from main AC power source to the UPS.

3.3.2 PE/EARTH terminal (⏚) : The terminal for connecting to ground system.

3.3.3 BYPASS INPUT terminal: The terminal for connecting input power from bypass power source to the UPS.

3.3.4 OUTPUT terminal: The terminal for connecting to loads.

3.3.5 BATTERY terminal (option): The optional terminal for connecting to battery extension module or external battery bank to extend backup time.

3.3.6 RS232-PC: The port for connecting RS-232 cable from UPS to computer.

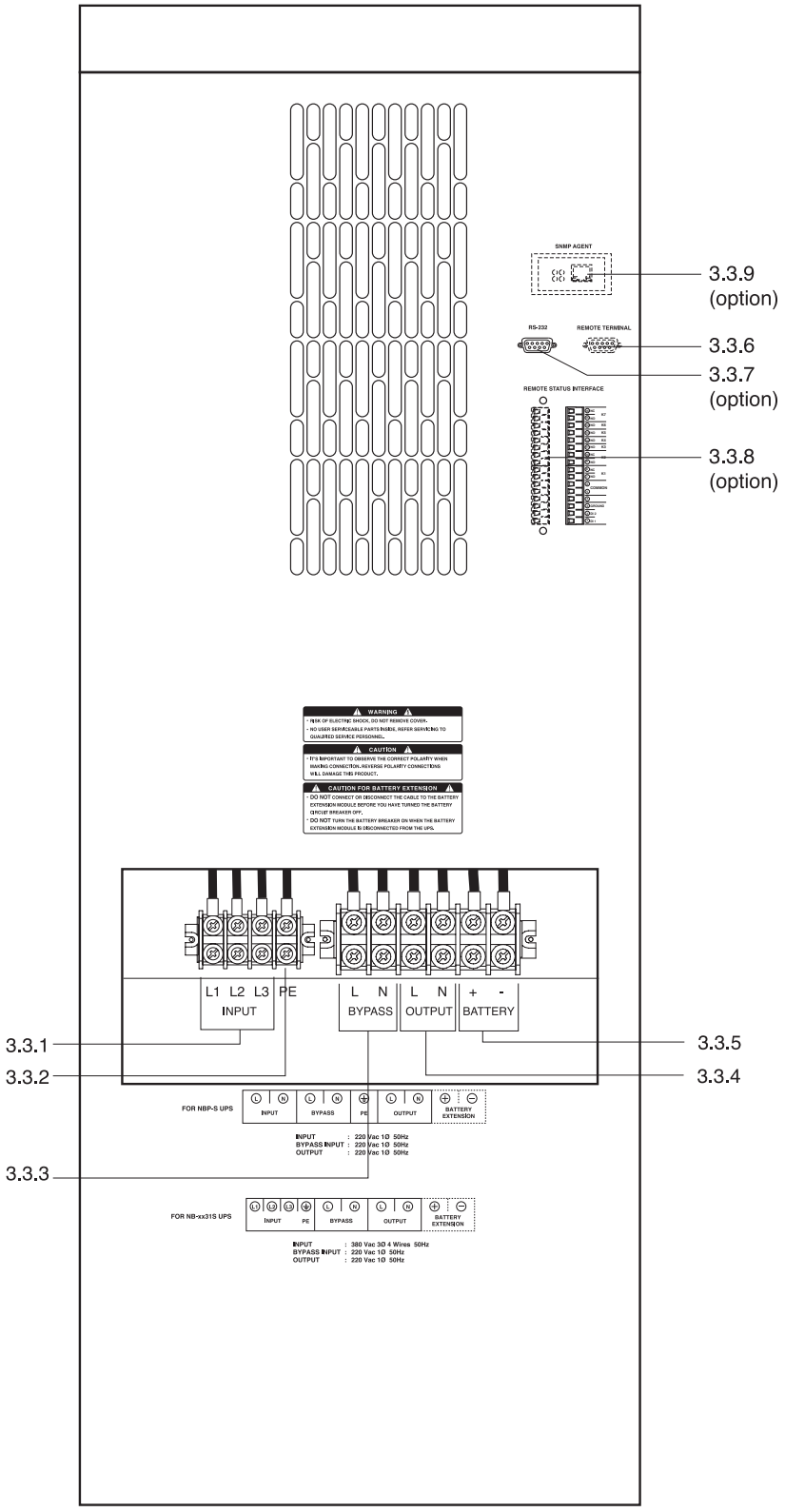
3.3.7 REMOTE TERMINAL (option): The optional port for sending and receiving remote signal to display the operation of the UPS via remote display or website.

3.3.8 REMOTE STATUS INTERFACE (option) : The terminal for sending remote contact signal; normally open (NO), normally close (NC) and common (COM) to display the operating status of the UPS. The descriptions of each signal pin are as follow.

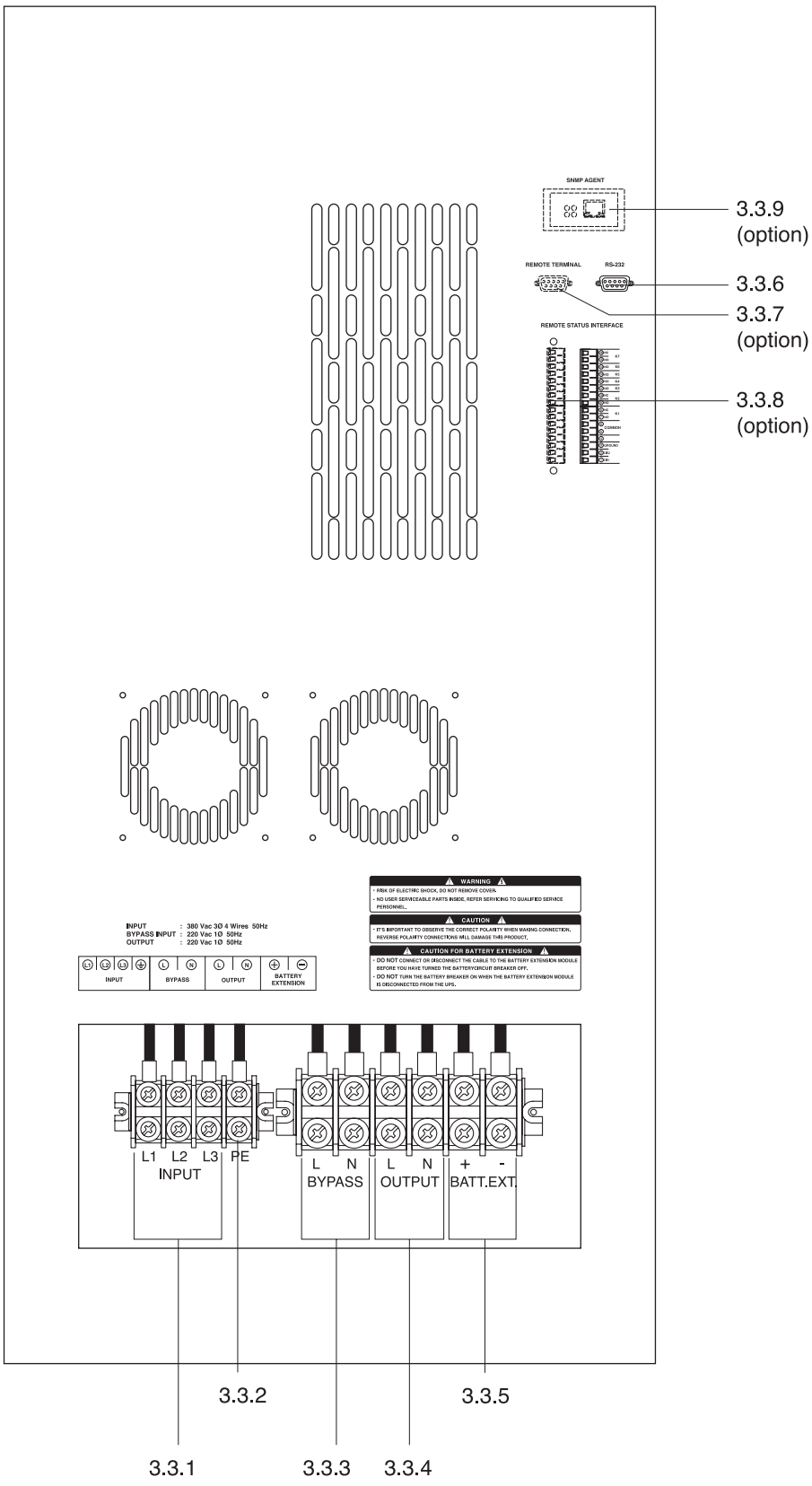
3.3.8.1	DI1:	Reserved.
3.3.8.2	DI1:	Reserved.
3.3.8.3	GROUND:	Ground of digital input signal.
3.3.8.4	COMMON:	COMMON pin of the contact signal.
3.3.8.5	K1 (NO, NC):	UPS Normal / Fault (NO and NC contacts of K1 relay).
3.3.8.6	K2 (NO, NC):	Loads are protected. (NO and NC contacts of K2 relay).
3.3.8.7	K3 (NO):	Run on battery signal (NO contact of K3 relay).
3.3.8.8	K4 (NO):	Bypass signal (NO contact of K4 relay).
3.3.8.9	K5 (NO):	Low battery signal (NO contact of K5 relay).
3.3.8.10	K6 (NO):	Overload signal (NO contact of K6 relay).

3.3.8.11 K7 (NO, NC): Alarm signal (NO and NC contacts of K7 relay).

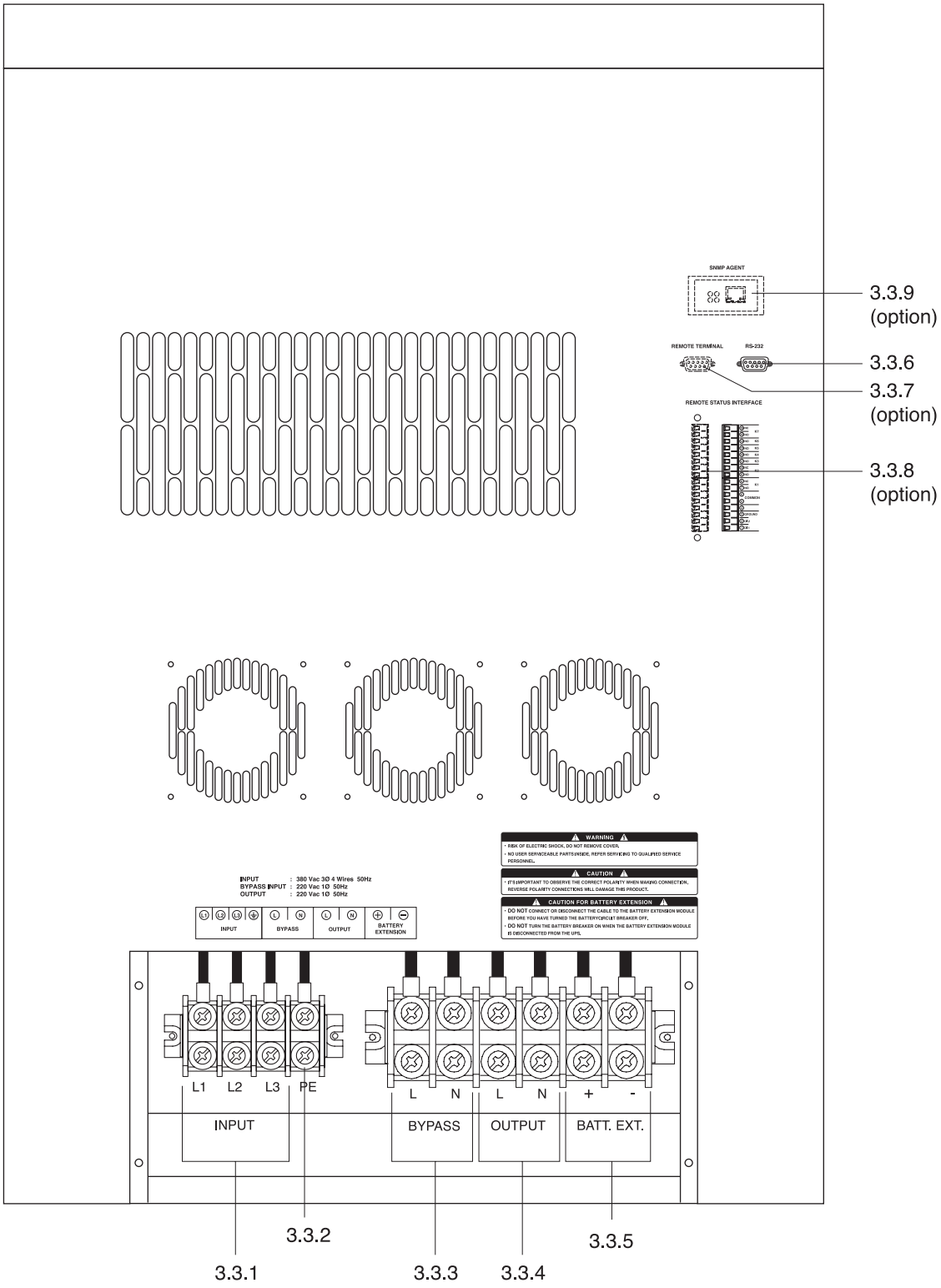
3.3.9 SNMP AGENT (option): The optional socket for connecting computer network LAN cable to view electricity data and UPS status via SNMP/HTTP (Read more details in Net Agent manual).



Rear panel of 8 kVA - 15 kVA model



Rear panel of 20 kVA model



Rear panel of 30 kVA - 40 kVA model

INSTALLATION

⚠ Caution: The warranty will be voided, if this product has been improper installation, not following the installation instruction that mentioned in this user's guide.

4.1 Preparation

4.1.1 Before you install the inverter, give it a through visual examination to ensure it has not been subjected to shipping damage. If it is not in perfect condition, please contact your local distributor or service center or e-mail to support@leonics.com.

4.1.2 Installation of the inverter must be done by professional technicians only. Before installing or using this unit, read all instructions, caution markings on the inverter, PV panel, system components, and all sections of this user guide.

4.1.3 Verify proper rating and sizing of PV array to meet the rate of maximum open circuit voltage (Voc) of the inverter.

4.1.4 Transportation

4.1.4.1 UPS has been fitted with casters to allow ease of transportation. UPS must be moved vertically.

4.1.4.2 Transport the UPS with its packaging until it arrive the installation location to avoid shipping damages.

4.1.5 Location

4.1.5.1 Install the UPS at least 80 cm free space around the UPS for adequate ventilation and easy access for installation, operation and maintenance.

4.1.5.2 Install the UPS at the floor that is capable of supporting the weight of the UPS.

4.1.5.3 The battery extension module must be installed near by the UPS.

4.1.6 Working with battery extension module

Batteries are connected in series which have hazardous voltage. Any battery connection must be done by qualified technician only.

⚠ Warning: **DO NOT** work with batteries when UPS is operating.

4.1.7 AC power source

AC power source requirement for three phase input UPS as follow.

4.1.7.1 380 Volt, 50 Hz, Three phase AC power source which its power is at least twice of UPS rated power, refers as MAIN 1

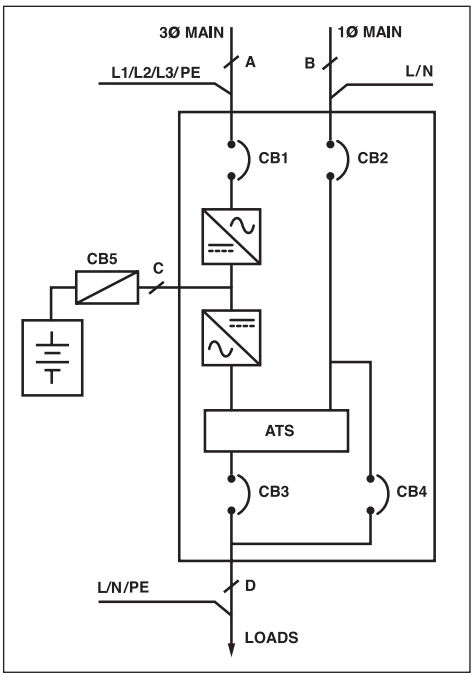
4.1.7.2 220 Volt, 50 Hz, Single phase AC power source which its power is at least 1.1 times of UPS rated power, refers as MAIN 2

When the generator use as a supplemental power supply for MAIN 1, the generator capacity should be at least 3 times of UPS rated power.

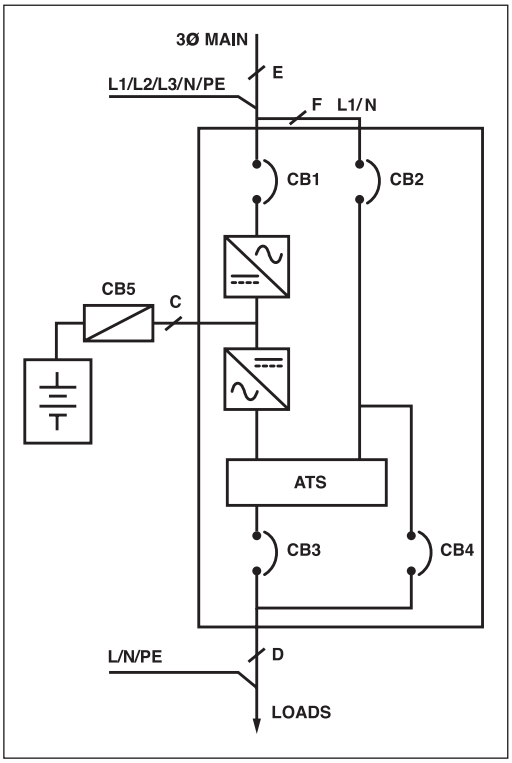
4.1.8 Wiring

4.1.8.1 For 3-phase input / 1-phase output UPS, there are 2 type of wiring as follow.

Type 1: Separate MAIN 1 and MAIN 2



Type 2: Combine MAIN 1 and MAIN 2



4.1.8.2 The cable sizes in the following table are calculated based on TIS. 11-2531 PVC insulated copper wire, 70 degree Celsius conductor temperature, 750 Volt 40 degree Celsius ambient temperature and maximum 3 wires per conduit.

	UPS rated power	**A**	**B = D = F**	**C**	**E**
Rated voltage of cable	8 - 40 kVA	750 V	750 V	750 V	750 V
Cable size when wiring in open space	8 - 10 kVA	(4 x 4) + 4 mm^2	2 x 10 mm^2	2 x 6 mm^2	(4 x 10) + 4 mm^2
	12 - 15 kVA	(4 x 6) + 4 mm^2	2 x 16 mm^2	2 x 10 mm^2	(4 x 16) + 10 mm^2
	20 kVA	(4 x 10) + 4 mm^2	2 x 25 mm^2	2 x 16 mm^2	(4 x 25) + 16 mm^2
	30 kVA	(4 x 16) + 10 mm^2	2 x 50 mm^2	2 x 25 mm^2	(4 x 50) + 35 mm^2
	40 kVA	(4 x 25) + 16 mm^2	2 x 70 mm^2	2 x 50 mm^2	(4 x 70) + 50 mm^2
Cable size when wiring in duct or multi-core cable.	8 - 10 kVA	(4 x 6) + 6 mm^2	2 x 16 mm^2	2 x 10 mm^2	(4 x 16) + 6 mm^2
	12 - 15 kVA	(4 x 10) + 6 mm^2	2 x 25 mm^2	2 x 16 mm^2	(4 x 25) + 16 mm^2
	20 kVA	(4 x 16) + 10 mm^2	2 x 35 mm^2	2 x 25 mm^2	(4 x 35) + 25 mm^2
	30 kVA	(4 x 35) + 25 mm^2	2 x 70 mm^2	2 x 35 mm^2	(4 x 70) + 50 mm^2
	40 kVA	(4 x 50) + 35 mm^2	2 x 95 mm^2	2 x 70 mm^2	(4 x 95) + 70 mm^2

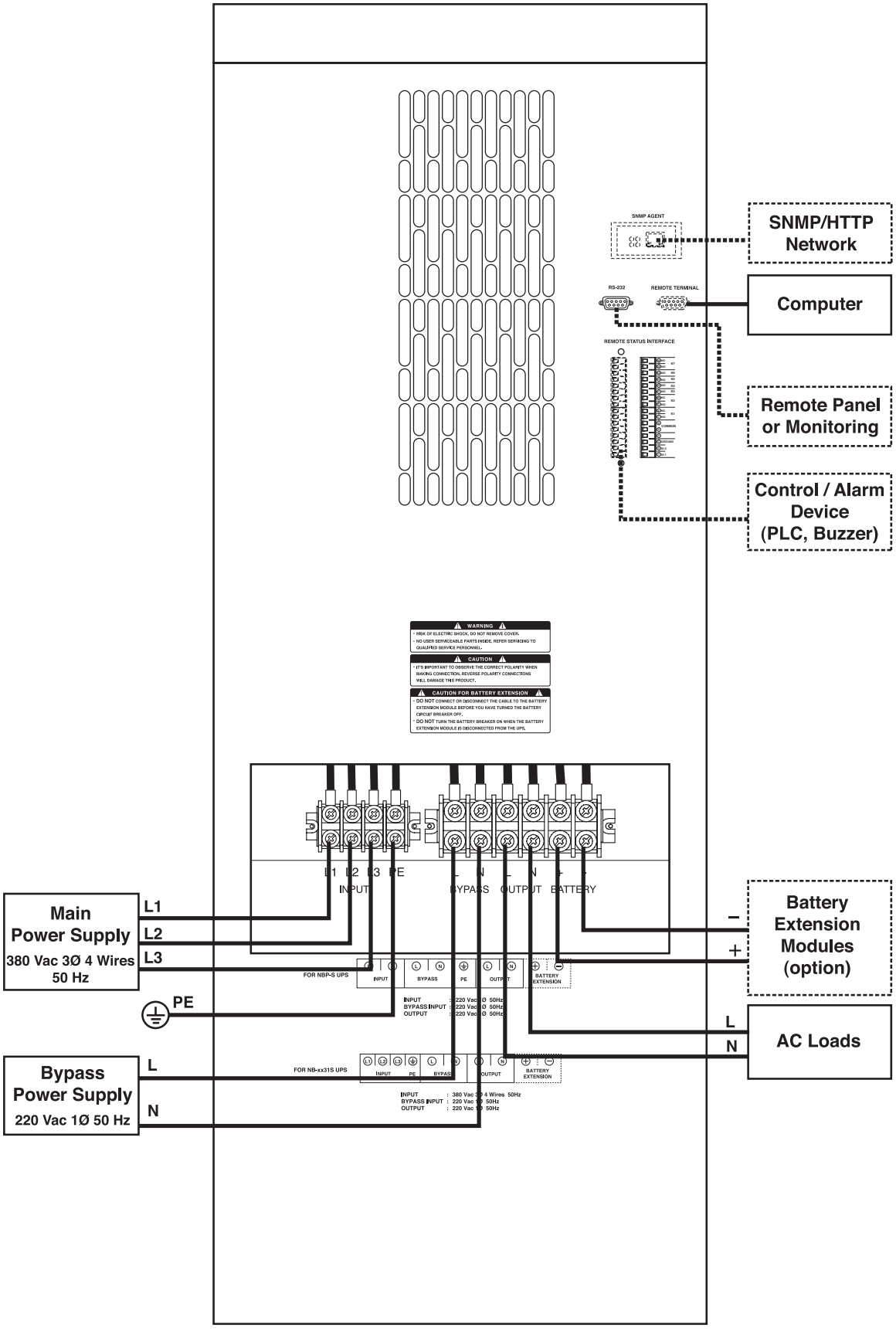
✍ Note:
- Maximum wire length must not exceed 5 metres. If in need of wire longer than 5 metres, properly increase wire size to accommodate excessive length.
- For your safety, all cables should be wired in the suitable size conduit.
- The above data is for standard product only.
- For the battery extension module installation, please contact service personnel.

4.1.9 Circuit breaker sizing

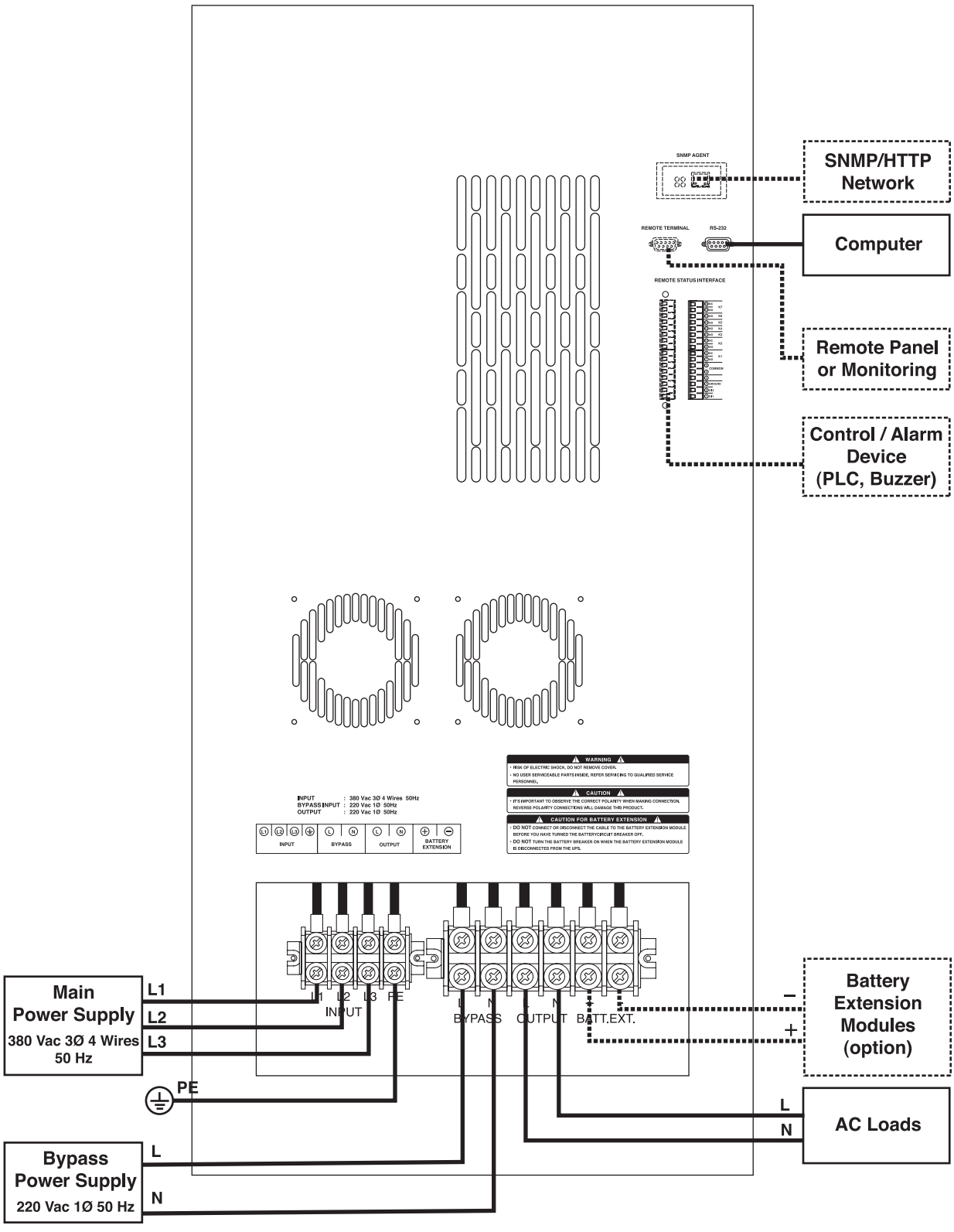
UPS rated power	**BYPASS INPUT circuit breaker**	**MANUAL BYPASS circuit breaker**	**INPUT circuit breaker**	**BATTERY circuit breaker**	**OUTPUT circuit breaker**
8 - 10 kVA	50 A 2P	-	25 A 3P	50 A 3P	50 A 2P
12 - 15 kVA	80 A 2P	-	40 A 3P	63 A 3P	80 A 2P
20 kVA	100 A 2P	-	50 A 3P	100 A 3P	100 A 2P
30 kVA	200 A 2P	200 A 2P	80 A 3P	160 A 3P	200 A 2P
40 kVA	250 A 2P	250 A 2P	100 A 3P	200 A 3P	250 A 2P

✍ Note:
- Phase of output voltage of the UPS must be same as phase of input votage of MAIN 2
- The circuit breaker wiring connection must be done by qualified technician only.
- Ensure correct polarity connection of MAIN 1 as L1, L2 and L3 respectively.

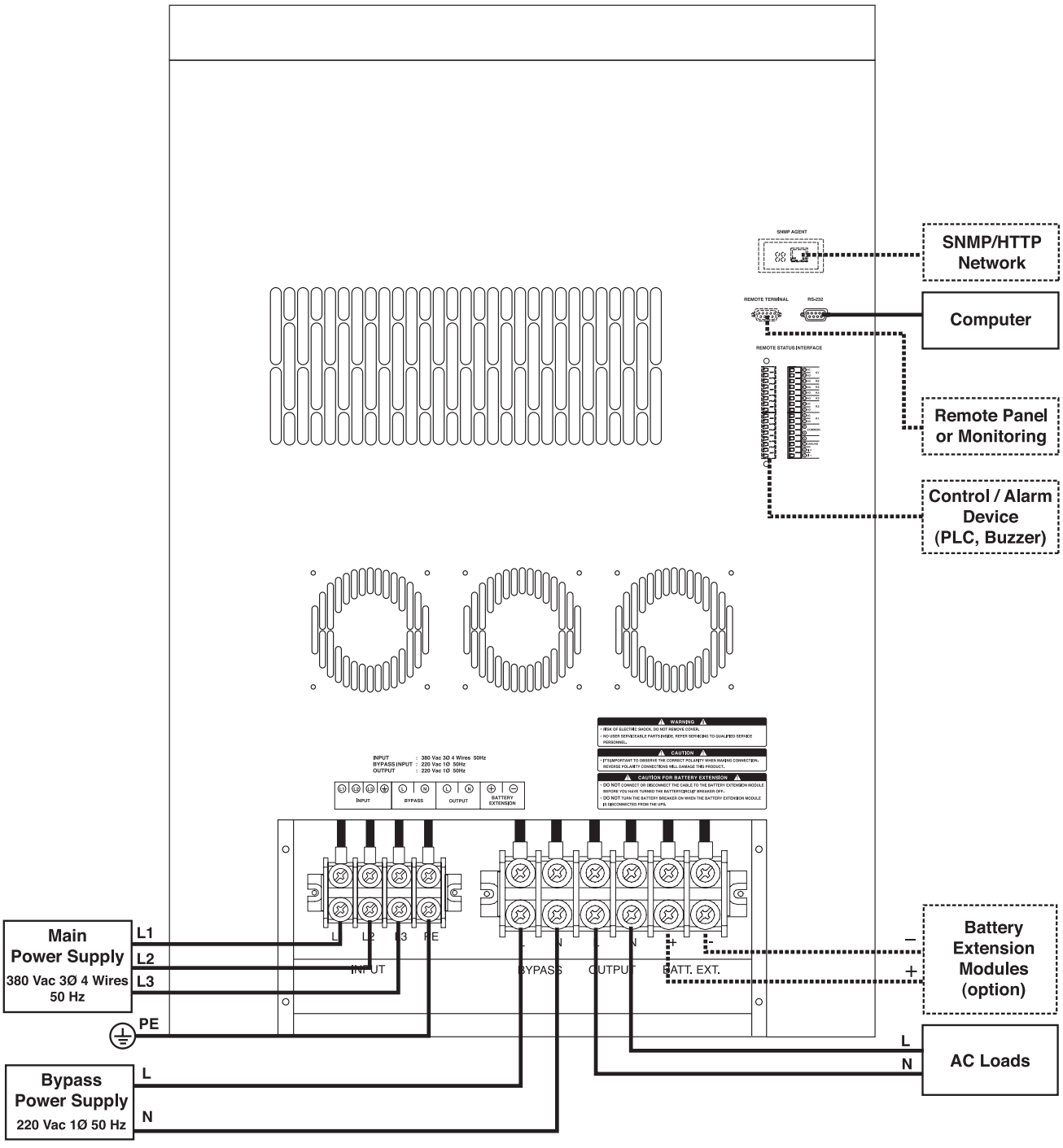
4.2 Installation



8 kVA - 15 kVA model


SNMP AGENT
SNMP/HTTP Network
REMOTE TERMINAL
RS-232
Computer
REMOTE STATUS INTERFACE
Remote Panel or Monitoring
Control / Alarm Device (PLC, Buzzer)
WARNING
CAUTION
CAUTION FOR BATTERY EXTENSION
INPUT : 380 Vac 3Ø 4 Wires 50Hz
BYPASS INPUT : 220 Vac 1Ø 50Hz
OUTPUT : 220 Vac 1Ø 50Hz
INPUT
BYPASS
OUTPUT
BATTERY EXTENSION
L1 L2 L3 PE
INPUT
L N
BYPASS
OUTPUT
BATT.EXT.
Main Power Supply
380 Vac 3Ø 4 Wires
50 Hz
L1
L2
L3
PE
Bypass Power Supply
220 Vac 1Ø 50 Hz
L
N
Battery Extension Modules (option)
AC Loads

20 kVA model



30 kVA - 40 kVA model

✍ Note: - For the single power source, it has to jump the cables between BYPASS INPUT terminal and MAIN INPUT terminal of the UPS as shown in the installation diagram figures.

- If there are two power sources, it has to disconnect the jumping cables between BYPASS INPUT terminal and MAIN INPUT terminal.

4.2.1 Turn off all connected loads.

4.2.2 Turn off all AC power source which supplies power to the UPS .

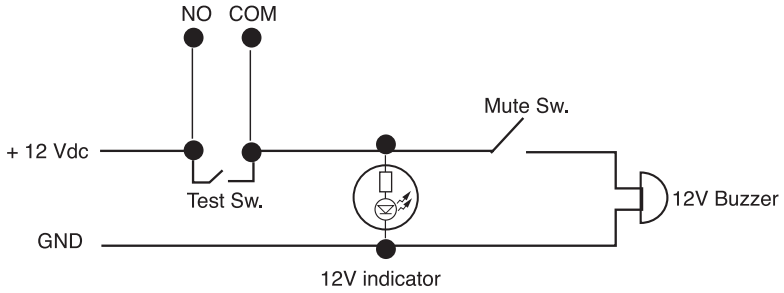
4.2.3 Turn off INPUT, BYPASS INPUT (if available), OUTPUT (if available) and BATTERY circuit breakers.

4.2.4 Connect RS-232 signal cable (if available) from the computer serial port to RS-232-PC port of the UPS.

4.2.5 Connect Remote terminal signal cable (if available) from remote panel or modem to REMOTE TERMINAL port of the UPS.

4.2.6 Connect interface signal cables (if available) at REMOTE STATUS INTERFACE terminal to send and receive remote contact signal (NO, NC, COM) for control or alarm such as PLC or buzzer.

Sample



✍ Note: Contact rating 5A 250Vac / 5A 30Vdc

4.2.7 Connect earth cable at PE / EARTH (⏚) terminal.

4.2.8 Connect input cable from Main AC power source to the N, L1(R), L2(S) and L3(T) of INPUT terminal of the UPS respectively.

4.2.8 Connect input cable from Main power sources to the N, L1(R), L2(S) and L3(T) of INPUT terminal of the UPS respectively.

4.2.9 Connect input cable from Bypass power source to the N, L1(R), L2(S) and L3(T) of BYPASS terminal of the UPS respectively.

✍ Note: If there is single power source, jump BYPASS input terminal to INPUT terminal.

4.2.10 Connect the cable from L and N of OUTPUT terminal to loads.

4.2.11 In case of battery extension, open fuse holder or turn off circuit breaker at the battery extension unit before connecting cable to the UPS. Then connect cable from the positive (+) of the battery extension unit to the positive (+) terminal of the UPS. And connect cable from the negative (-) of battery extension unit to the negative (-) terminal of the UPS.

⚠ Caution: Be careful when working with batteries, because of this UPS and battery cabinet will have hazadous voltage inside.

4.2.12 Check that all cables are connected to correct polarity and fastened.

OPERATION

5.1 Start-up the UPS

5.1.1 Ensure that all connected load and all circuit breaker of the UPS are turned off.

5.1.2 Turn on battery circuit breaker at the battery extension unit (if available) before press and hold the the PRECHARGE / DC START CONTROLLER button for 5 seconds or until the LCD is lit, then release button. Then, turn on the BATTERY circuit breaker at the UPS.

> ⚠ Caution: **DO NOT** turn on BATTERY circuit breaker at the UPS before precharge the UPS because the UPS may be damaged.

> ✍ Note: In case of battery extension, turn on the battery circuit breaker or fuse breaker (if available) of the battery extension unit before pressing PRECHARGE button and turning on BATTERY circuit breaker at the UPS.

5.1.3 Turn on INPUT circuit breaker and BYPASS INPUT circuit breaker (if available). The INPUT, BYPASS and RECTIFIER/CHARGER indicators are lit.

5.1.4 Turn on the UPS by press and hold ON button for 2 seconds or until alarm beep sound. The ON indicator blinks and UPS start up self-test automatically. After self test, if the UPS operates normally, the display will show the operating status

5.1.5 Turn on OUTPUT circuit breaker (if available).

5.1.6 Turn on all connected loads.

5.2 Turning on and off the UPS for the next time

After finished the start-up procedure, press and hold OFF button until alarm beep sound once then release to turn off the UPS. To turn on the UPS at the next time, Only press and hold ON button until alarm beep sound once then release.

5.3 Turning on when blackout occurs or no AC power souce

5.3.1 If all indicator lights on display extinguish, press and hold PRECHARGE / DC START CONTROLLER button for 10 seconds until the LCD is lit.

5.3.2 Verify that the BATTERY circuit breaker of the UPS is ON, then press and hold the ON button at the front panel for 2-3 seconds until alarm beep sound, then release button.

5.4 When blackout or power fails

When blackout or power fails, the UPS continuously supplies power to connected loads for 15-90 minutes (depending on connected loads and UPS power rating). UPS draw backup power from battery (INV. SUPPLY and ALARM indicators blink and alarm beep sound). When the backup power in the battery is low, LOW BATT. indicator (the 2nd from left) will blink and alarm sound rapidly to warn that the UPS will shutdown in a few minutes (Low Battery Shutdown status). If the power returns to normal before the UPS goes to Low Battery Shutdown mode, UPS will switch back to consume power from AC utility power and charge battery automatically.

5.5 When UPS is overloaded

When UPS is overloaded (OVERLOAD indicator lit, ALARM indicator blinks and alarm sound), the AUTOMATIC TRANSFER switch will transfer loads to consume power from bypass power source direclty (AUTO BYPASS indicator blinks and alarm sound) for preventing the UPS damage. User should reduce some loads until load quantity is about 75% and control the quantity not exceed 100% in order to make the loads consume power from the UPS all the time.

5.6 No load shutdown mode

In case of the Battery save / No Load Shutdown mode is set enabled, when the UPS is supplying backup power and detects only 5%-10% of connected loads, UPS will shutdown automatically after supplies backup power for 10 minutes in order to reserve the battery power.

✍ Note: This feature is set disabled in the standard product.

5.7 Economy mode

Economy mode is an energy saving mode. In this operating mode, UPS transfers all connected loads to consume power from bypass power source directly when the bypass power source is normal and UPS will run in the inverter operation as the backup source when the bypass power source fails.

5.8 Sleep mode

Sleep mode is an energy saving mode. In this operating mode, UPS transfer all connected loads to consume power from bypass power source and stop the INVERTER operation when UPS found no connected load or load consume power from the UPS is lower than no load condtion setting. During Sleep mode, If there are loads greater than set value, the UPS will restart automatically and exit from sleep mode.

When UPS is operating in bypass conditions and found bypass power source fails, UPS will start INVERTER operation and stand by to be the backup power source when there is load.

5.9 UPS self-test

UPS self-test includes with the stabilizer test, charger test and inverter and battery test (For more details, see indicator light and alarm). Here are 4 types of self-test.

5.9.1 Start-up self-test

When press ON button to start-up the UPS, it tests the operation automatically.

5.9.2 Manual self-test

When the UPS is operating, double click the ON button to start manual self-test.

5.8.3 Schedule self-test (option)

User can set UPS self-test schedule via Easy-Mon X (Read more details in Easy-Mon X user's guide in the CD-ROM or at www.leonics.com).

5.8.4 Auto self-test (option)

User can set UPS self-test automatically every 2 weeks or every day. This feature is disabled in the standard product.

Every test, if the battery is fully charged, the UPS will also check if the battery is still in good condition or need to be replaced.

5.10 Self-test cancellation

Before the UPS starts INVERTER section test, user can double click the ON button to cancel the self-test.

5.11 Mute alarm sound

Press the ON button once to mute the alarm sound. User can notice the alarm from ALARM indicator.

5.12 Force bypass

Press and hold OFF button for 8 seconds or until AUTO BYPASS indicator is lit and then release to force bypass. The UPS will alarm to inform the user that loads are consuming power directly from bypass power source. To transfer loads to consume protected power from the UPS again, press and hold ON button for 2 seconds or until alarm beep sound then release.

5.13 Manual maintenance bypass

5.13.1 Press and hold OFF button for 8 seconds or until AUTO BYPASS indicator is lit and then release to force bypass. The UPS will alarm to inform the user that loads are consuming power directly from bypass power source.

5.13.2 Turn the MAINTENANCE MANUAL BYPASS switch to BYPASS position or turn on MAINTENANCE MANUAL BYPASS circuit breaker. MAINTENANCE BYPASS indicator is lit.

5.13.3 Press and hold OFF button until alarm beep sound to turn off the UPS.

5.13.4 Turn off INPUT circuit breaker and BATTERY circuir breaker of the UPS, respectively.

5.13.5 Contact service center.

When finished the maintenance, turn off alll connected load, then turn the MAINTENANCE MANUAL BYPASS switch to AUTO position or turn off MAINTENANCE MANUAL BYPASS circuit breaker. Then, turn on the UPS by following the start-up procedure.

5.14 Emergency power off (EPO)

The Emergency Power Off is controlled by microprocessor. Press ON and OFF button simultaneously for 3 seconds. UPS will stop all operations include INVERTER, RECTIFIER and CHARGER operation, but the battery still supply power to microprocessor. To maintain battery power, turn off all circuit breakers by turn off the BATTERY circuit breaker at last.

HOW TO DISPLAY DATA

✍ Note: The data shown in this user's guide are sample only. The real data may be differ from these sample.

6.1 INPUT esc. button

Press 1st time	I/P Voltage (V) 380 380 380	Display main input voltage
Press 2rd time	Bypass 220 V Freq 50.0 Hz	Display bypass input voltage and frequency
Press 3nd time	HI Bypass= 242 V LO Bypass= 197 V	Display high and low bypass input voltage.
Press 4th time	MX Input = 475 V MN Input = 321 V	Display maximum and minimum acceptable inupt voltage.
Press 5th time	ECONOMY = NO SLEEP MODE = NO	Display economy mode and sleep mode setting.
Press 6th time	BATT SAVE = NO BREAK TRANF= NO	Display Battery save / No load shutdown function setting and break transfer setting (allow break transfer in not synchronize condition).
Press 7th time	BYPASS SW = YES BYPASS COND= YES	Display static bypass switch setting and bypass condition setting.
Press 8th time	I/P Voltage (V) 380 380 380	Returns to the first screen.

6.2 BATTERY △ button

Press 1st time	BATTERY CAP 100% Bat-Tempr ---˚C	Display battery capacity in percentage and battery temperature (option)
Press 2rd time	Battery V 404 V I battery 0.2 A	Display battery voltage and current.
Press 3nd time	ESTIMATE RUNTIME 0 Hr 30 Min	Display estimate backup time.
Press 4th time	Float CHG= 402 V Boost CHG= 406 V	Display Float charge voltage and boost charge voltage.
Press 5th time	CHGRMODE: FLOAT Battery 7.0 Ah	Display charging mode and battery capacity (Ah).
Press 6th time	BATTERY CAP 100% Bat-Tempr ---˚C	Returns to the first screen.

6.3 OUTPUT ▽ button

Press 1st time	UPS O/P 220 V Freq 50.0 Hz	Display UPS output voltage and frequency.
Press 2rd time	%Load 47% O/P I 8.8 A	Display load level in percentage and output current.
Press 3nd time	Power 1.90 kW Load Pf 1.00	Display load power and load power factor (option).
Press 4th time	Inverter 220 V INV-Tempr 37˚C	Display inverter voltage and inverter temperature.
Press 5th time	OP set = 220.5 V Fq set = 50.0 Hz	Display output voltage and frequency set points.
Press 6th time	Syn MX= 51.5 Hz Syn MN= 48.5 Hz	Display maximum and minimum acceptable frequency of bypass power source which UPS can synchronize.
Press 7th time	UPS O/P 220 V Freq 50.0 Hz	Returns to the first screen.

6.4 STATUS enter button

Press 1st time	System: RUNNING Status: NORMAL	Display present operation and UPS status.
Press 2rd time	INV. ON XFSW.ON CHG. ON RECT.ON	Display status of Inverter, Charger, Transfer switch and Rectifier operation.
Press 3nd time	INV. OK XFSW.OK CHG. OK RECT.OK	Display the condition of Inverter, Charger, Transfer switch and Rectifier opertion.
Press 4th time	LEONICS NB-S UPS Rev.1531.1.00.00	Display firmware version.

Press 5th time	THU 2 AUG 07 10:10:00	Display present date and time (option).
Press 6th time	UPS O/P 220 V Freq 50.0 Hz	Returns to the first screen.

6.5 OUTPUT ▽ and STATUS enter button (option)

Press and hold two buttons simutaneously for 3 seconds	0708/02 ^10:30:40 0, Load on Bypass	Displays date, time and fault event. Press BATTERY △ or OUTPUT ▽ button to view other events. ✍ Note: "^" means the latest event. "1" means present event. "0" means return to normal. "A" means UPS is operating automatically. "R" means UPS is receiving command from RS-232 or remote terminal "P" means UPS self-testing passed. "F" means UPS self-testing failed. "M" means UPS is operating by manual conrol from front panel display.
Press STATUS enter once	EVENT LOGGING RECORD# 000	Display event log (0 is the latest event. Maximum events are 256 records).

OPERATION SETTING

To enter the system control setting menu, press BATTERY △ and OUTPUT ▽ buttons once simultaneously for 3 seconds to access the password entry menu firstly. To confirm the accessing menu or confirm setting value, press STATUS enter button. To change menu or toggle the value, press BATTERY △ or OUTPUT ▽ button. To cancel setting value, press INPUT esc. button.

⚠ Caution: Please **DO NOT** change any setting by yourself. If you have to change the value or parameter setting, please consult LEONICS technicians before taking action because the changing may cause this unit to fail or malfunction.

✍ Note: The data shown in this user's guide are sample only. The real data may be differ from these sample.

To exit the system control setting menu, press BATTERY △ and STATUS enter buttons once simultaneously or leaves it for 30 seconds, the UPS will return to main screen automatically.

7.1 Password entry

User can enter the system control setting menu by pressing BATTERY △ and OUTPUT ▽ buttons once simultaneously for 3 seconds to access the password entry menu and confirm password by pressing BATTERY △ and STATUS enter buttons once simultaneously (Password is 2468)

7.1.1	Press BATTERY △ OUTPUT ▽ once simultaneously	EVENT PASSWORD 0000	Enter the password entry menu.

7.1.2	Press INPUT esc.	EVENT PASSWORD 2000	Enter the first digit of password.
7.1.3	Press BATTERY △	EVENT PASSWORD 2400	Enter the second digit of password.
7.1.4	Press BATTERY △	EVENT PASSWORD 2460	Enter the third digit of password.
7.1.5	Press STATUS enter	EVENT PASSWORD 2468	Enter the fourth digit of password.
7.1.6	Press OUTPUT ▽ STATUS enter once simultaneously	SYSTEM CONTROL SETTING	Confirm the password. If the password is correct, you can access the next menu.

7.2 System control setting

After user input the correct password, you can access the system control setting menu and can change any setting.

⚠ Caution: Please **DO NOT** change any setting by yourself. If you have to change the value or parameter setting, please consult LEONICS technicians before taking action because the changing may cause this unit to fail or malfunction.

7.2.1	Press OUTPUT ▽ STATUS enter once simultaneously	SYSTEM CONTROL SETTING	Enter the system control setting menu.
7.2.2	Press STATUS enter once	SET EQUALIZE CHG = NO	Confirm to access the system control setting menu. Set the equalize charging.
7.2.3	Press OUTPUT ▽ once	Daily auto Test = NO	Set daily automatic self-testing (option).
7.2.4	Press OUTPUT ▽ once	2-Week auto Test = NO	Set 2-week automatic self-testing (option).
7.2.5	Press OUTPUT ▽ once	Break Transfer = NO	Set break transfer (allow break during transfer in not synchronize condition).
7.2.6	Press OUTPUT ▽ once	Bypass Switch = YES	Set static bypass switch (enable/disable).
7.2.7	Press OUTPUT ▽ once	Bypass condition = YES	Set bypass condition check before transfer all connected loads from main input to bypass input.
7.2.8	Press OUTPUT ▽ once	SET ECONOMY MODE = NO	Set economy mode.
7.2.9	Press OUTPUT ▽ once	SET SLEEP MODE = NO	Set sleep mode.
7.2.10	Press OUTPUT ▽ once	BATT SAVE MODE = NO	Set battery saving mode (no load shutdown).

7.3 Time and date setting

7.3.1 Time setting

7.3.1.1	Press BATTERY △ OUTPUT ▽ once simultaneously	SYSTEM CONTROL SETTING	Enter the system control setting menu.
7.3.1.2	Press OUTPUT ▽ once	TIME/DATE SETTING	Select time and date setting menu.
7.3.1.3	Press STATUS enter once	EDIT TIME 10:30:40	Confirm to access the time and date setting menu. Then, display show time setting menu.
7.3.1.4	Press STATUS enter once	EDIT TIME 10:30:40	Confirm to access the time setting. Then, set hour.
7.3.1.5	Press STATUS enter once	EDIT TIME 10:30:40	Confirm new hour setting. Then, set minute.
7.3.1.6	Press STATUS enter once	EDIT TIME 10:30:40	Confrim new minute setting. Then, set second.
7.3.1.7	Press STATUS enter once	EDIT TIME 10:30:40	Confirm new second setting.

7.3.2 Date setting

7.3.2.1	Press BATTERY △ OUTPUT ▽ once simultaneously	SYSTEM CONTROL SETTING	Enter the system control setting menu.
7.3.2.2	Press OUTPUT ▽ once	TIME/DATE SETTING	Select time and date setting menu.
7.3.2.3	Press STATUS enter once	EDIT TIME 10:30:40	Confirm to access the time and date setting menu. Then, display show time setting menu.
7.3.2.4	Press OUTPUT ▽ once	EDIT DATE THU 2 AUG 07	Enter the date setting menu.
7.3.2.5	Press STATUS enter once	EDIT DATE THU 2 AUG 07	Confirm to access date setting menu. Then, set year.
7.3.2.6	Press STATUS enter once	EDIT DATE THU 2 AUG 07	Confirm year setting. Then, set month.
7.3.2.7	Press STATUS enter once	EDIT DATE THU 2 AUG 07	Confirm month setting. Then, set date.
7.3.2.8	Press STATUS enter once	EDIT DATE THU 2 AUG 07	Confirm date setting. Then, set day.
7.3.2.9	Press STATUS enter once	EDIT DATE THU 2 AUG 07	Confirm day setting.

7.4 System data setting

⚠ Caution: Please **DO NOT** change any setting by yourself. If you have to change the value or parameter setting, please consult LEONICS technicians before taking action because the changing may cause this unit to fail or malfunction.

✍ Note: The data shown in this user's guide are sample only. The real data may be differ from these sample.

7.4.1	Press BATTERY △ OUTPUT ▽ once simultaneously	SYSTEM CONTROL SETTING	Enter the system control setting menu.
7.4.2	Press OUTPUT ▽ twice	SYSTEM DATA SETTING	Select the system data setting menu.
7.4.3	Press STATUS enter once	Set Bypass LOW V = 197.5	Confirm to access the system data seting menu. Display shows low bypass input voltage setting.
7.4.4	Press OUTPUT ▽ once	SET BOOST TIME Minutes = 180.0	Set boost charging time in minute.
7.4.5	Press OUTPUT ▽ once	SELECT FREQUENCY = 50 Hz	Set output frequency.
7.4.6	Press OUTPUT ▽ once	FREQ SYNC RANGE +/- 1.5 Hz	Set output frequency range.
7.4.7	Press OUTPUT ▽ once	SET FLOAT CHARGE Voltage = 405.0	Set float charge voltage.
7.4.8	Press OUTPUT ▽ once	Inverter Output Voltage = 220.5	Set output voltage of inverter section.
7.4.9	Press OUTPUT ▽ once	SET Bypass HIGHV = 242.5	Set high bypass input voltage.

TROUBLESHOOTING

In case of any queries or concerns that are not mentioned in this guide, please contact to LEONICS service center, LEONICS local distributor or e-mail your queries to support@leonics.com

Symptoms	Possible causes	Solutions
Press and hold PRECHARGE / DC START CONTROLLER button for 5 - 8 seconds, but no any indicator light is lit.	Reverse battery polarity connection.	Reconnect battery system and verify correct polarity connection.
Once the UPS started, MAINTENANCE BYPASS indicator light is lit, ALARM indicator blinks with alarm beep sound.	MAINTENANCE MANUAL BYPASS switch or circuit is at BYPASS or ON position.	Turn the MAINTENANCE MANUAL BYPASS switch or circuit breaker to AUTO or OFF position.
Two BATTERY LEVEL indicator light are lit, ALARM indicator blinks with alarm beep sound.	Low battery power.	1. Press ON button once to mute alarm beep sound. 2. Turn off all connected loads. 3. Wait until the battery is fully charged. Then, turn on loads again.
UPS shuts down. The SHUTDOWN indicator is lit. 1-2 BATTERY LEVEL indicator are lit, ALARM indicator blinks with alarm beep sound.	UPS supplied backup power from battery until the battery power is very low and then UPS shuts down automatically.	1. Press ON button once to mute alarm beep sound. 2. Turn off all connected loads. 3. Restart the UPS. 4. Wait until the battery is fully charged. Then, turn on loads again.
One BATTERY LEVEL indicator is lit, ALARM indicator blinks with alarm beep sound.	Battery capacity is too low and need to be replaced.	1. Press ON button once to mute alarm beep sound. 2. Turn off all connected loads. 3. Turn off UPS. 4. Turn off OUTPUT (if available), INPUT, BYPASS INPUT (if available) and BATTERY circuit breakers 5. Replace new battery with same type and rating. 6. Turn on UPS again.
UPS operates normally, but the OVERLOAD indicator is lit and ALARM indicator blinks with alarm beep sound.	UPS is overloaded.	Disconnect some loads until the load quantity is less than the UPS rated power.
OVERLOAD SHUTDOWN indicator is lit and ALARM indicator blinks with alarm beep sound.	UPS is overloaded for long peroid of time until UPS shuts down automatically	1. Press ON button once to mute alarm beep sound. 2. Reduce non-essential loads. 3. Press ON button to turn on the UPS and reset the operation.

Symptoms	Possible causes	Solutions
SHUTDOWN indicator is lit, ALARM indicator blinks and OVERTEMP/FAULT indicator is lit or blinks with alarm beep sound.	UPS is over temperature.	1. Press ON button once to mute alarm beep sound. 2. Turn off all connected loads. 3. Turn off UPS. 4. Wait until the UPS cool down, then restart UPS again.
	UPS has fault.	1. Press ON button once to mute alarm beep sound. 2. Press STATUS enter button to view fault events. Then contact service center.
Once the UPS has started, UPS alarms a short beep sound periodically.	UPS has fault.	1. Press ON button once to mute alarm beep sound. 2. Press STATUS enter button to view fault events. Then contact service center.
UPS operates normally but sound a short beep periodically or the UPS supplies backup power for a short time and returns to normal operation.	A power sag occurred in too short a period for the user to sense. But the UPS can detect that abnormal condition.	No need to do anything.
Blackout occurred and UPS supplies backup pwer. But when utility power returns to normal, UPS still supplies backup power.	The input voltage is out of range which is too high or too low voltage.	Turn off all connected loads and wait until the input voltage is in the acceptable range, then turn on loads again.
		Use the backup power until the UPS warns battery power is too low. Then, turn off connected loads and UPS.
		If the utility power returns to normal and UPS still same symptoms, follow the first solution again.
Once start-up the UPS, any circuit breaker has tripped.	UPS is overloaded or short circuited or the circuit breaker is improper rating.	1. Turn off UPS. 2. Recalculate and verify the system. 3. Check circuit breaker rating. 4. If the circuit breaker trips again when restart the UPS, contact service center.
UPS operates normally but does not supply power to loads.	The OUTPUT circuit breaker (if available) is turned off.	Turn on the OUTPUT circuit breaker (if available).
AC power source is normal, but UPS supplies backup power.	The INPUT circuit breaker is turned off.	Turn on the INPUT circuit breaker.

STORAGE

Even the UPS battery is the maintenance free type, it need to be checked annually to ensure that it is in good working condition. It need to be discharged regularly and fully charged immediately when battery is low. If you have to storage UPS for long period of time, it need to be recharged at least 8 hours in every three months as follow.

9.1 Press PRECHARGE/DC START CONTROLLER at the rear panel for 5 seconds, then turn on the BATTERY circuit breaker.

9.2 Turn on INPUT and BYPAS INPUT circuit breaker.

9.3 Leave the UPS charging battery for 8 hours.

SOFTWARE INSTALLATION

10.1 Turn off computer and UPS before connecting RS-232 cable from the computer to the UPS.

10.2 Turn on the UPS and then turn on the computer. Then insert the Easy-Mon X Software CD into CD-ROM Drive or download at www.leonics.com.

10.3 The computer screen shows windows as figure below. Click "Run Easy_MonX.exe" for installing the Easy-Mon X.

10.4 Follow the instruction as shown on screen.

10.5 After finished the Easy-Mon X installation, restart the computer.

10.6 Start the "Easy-Mon X Setup" program and then click the "Auto Detect UPS" to search for the UPS model and communication port automatically.

10.7 Once you know the communication port, start the "Easy-Mon X Spy"program to monitor the UPS data.

✍ Note: - The values of input (Vin) and output (Vout) voltages read from the Easy-Mon X Software from many UPSs in the same network may be different, even though connected to the same power source. Possible causes of these happenings are the voltage over each branch circuit is not equal, or ± 1% accuracy of input and output voltage measuring circuit, or the UPSs are connected to different power phases of the same source.

- You can find more information about Easy-Mon X in the Easy-Mon X Software CD.