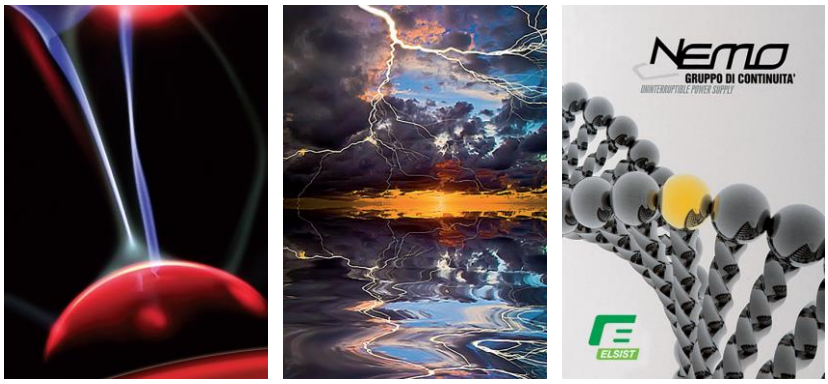
Tri-One 10K-15K-20K

Three-phase in/Single-phase out UPS



USER MANUAL

Uninterruptible Power Supplies

Contents

Thank you for purchasing this UPS.
This series is an intelligent, three phase in single phase out, high frequency on-line UPS. With excellent electrical performance, perfect intelligent monitoring and network functions, smart appearance, complying with EMC and safety standards, the UPS meets the world's advanced level.
Read this manual carefully before installation
This manual provides technical support to the operator of the equipment.

Information included in this document may chage without any notification.

1. Safety

This section will introduce you to the symbols and to considerations about safety of Tri-One series.
Pay attention to the contents of this section before each operation on the equipment. Contact your reseller or distributor beforehand in case Ups should be used for particular applications that have direct contact with people's lives, such as medical equipment, elevators, or similar, and he will advise you in the proper way.

1.1 Safety Instructions

Within the UPS there are dangerous voltages and high temperatures. During installation, maintenance, and normal operation, please comply with local safety instructions and local safety laws, otherwise they may result in personal injury or damage to UPS. The safety instructions in this manual are an addition to local safety regulations. Our Company does not assume any responsibility for damage caused by non-compliance with the safety regulations..

- There is a high risk of electric shock from the UPS inside, so please do not open or remove the casing or front panel unless it is operated by authorized technicians; otherwise, the warranty becomes void as well.
  - The output of standard UPS with internal batteries may be energized even if the UPS input is not connected to the utility.
  - Do disconnect the UPS input and make sure the UPS is completely off before moving the UPS
  - For the sake of human being' safety, please well earth the UPS before starting it.
  - Working environment and storage way will affect the lifetime and reliability of the UPS. Avoid having the UPS work under following environment for a long time:
    - Area where the humidity and temperature is beyond the specified range(temperature from 0℃ to 40℃, relative humidity 5%-95%).
    - Direct sunlight and location nearby heat
    - Area which can be crashed easily
    - Area with corrosive gas, flammable gas, excessive dust...etc.
  - Keep the ventilations in good conditions otherwise the temperature of components inside UPS will be high and the component and UPS life will be affected..
  - It is forbidden to pour liquid or put any objects into the UPS.
  - Don’t use liquid extinguisher if there is a fire, a dry powder extinguisher is recommended.
  - Battery life cycle will be shorter as environment temperature rise. Replacing battery periodically can help to keep the UPS in normal status and assure backup time required. Battery replacement should be done by authorized technician.
  - Keep the UPS in a dry area or environment if it will not be free of operation for a long time. Storage temperature of UPS with internal battery is -20℃~+55℃,and extended backup model without internal battery is -40℃~+70℃.
  - Don’t open the battery, electrolyte inside will do harm to eyes and skin. Please use plenty of clean water to wash if touching then go to see a doctor..
  - Don’t dispose of the battery with fire so as to avoid explosion.

1.2 Symbol Description

The safety symbols included in this manual are shown in the table below, which are used to inform users of safety issues that should be obeyed when installation, operation and maintenance.

SIMBOLO	INDICAZIONE	SIMBOLO	SPIEGAZIONE	SIMBOLO	SPIEGAZIONE
	Attention		Warning – High attention		Direct current (DC)
	Static discherge sensitive		Warning High voltage		Ground connection
	Electric shock		Switch On or Switch Off the Ups		Recycle material
			Alternate current (AC)		Don't dispose

There are three levels of safety grade: Dangerous, Warning, Attention. Remarks on the right side of the safety symbol, the detailed comments are shown as following:

 **Dangerous:** Indicate risk of serious injury or death or seriously damage of the equipment.

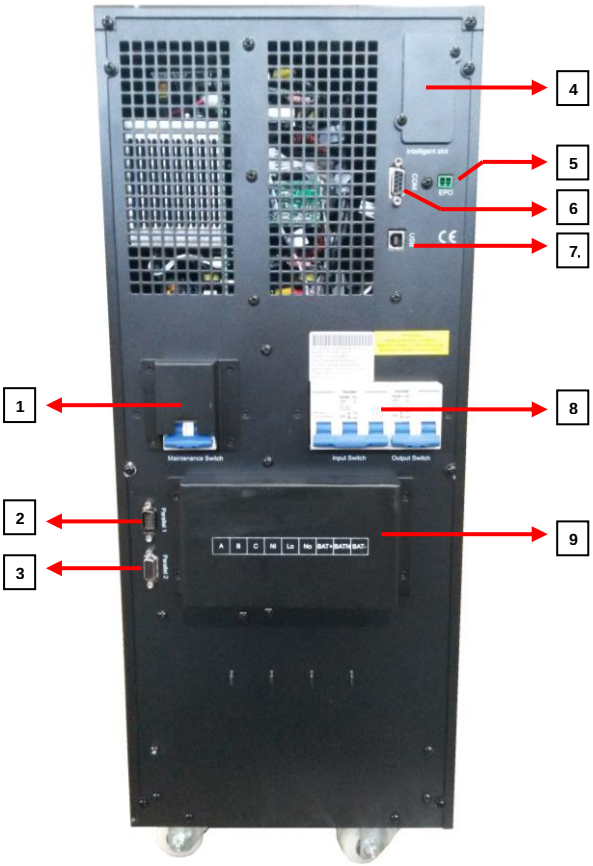
 **Warning:** Indicate risk of serious injury or damage of the equipment.

 **Caution:** Indicate risk of injury or damage of the equipmen.

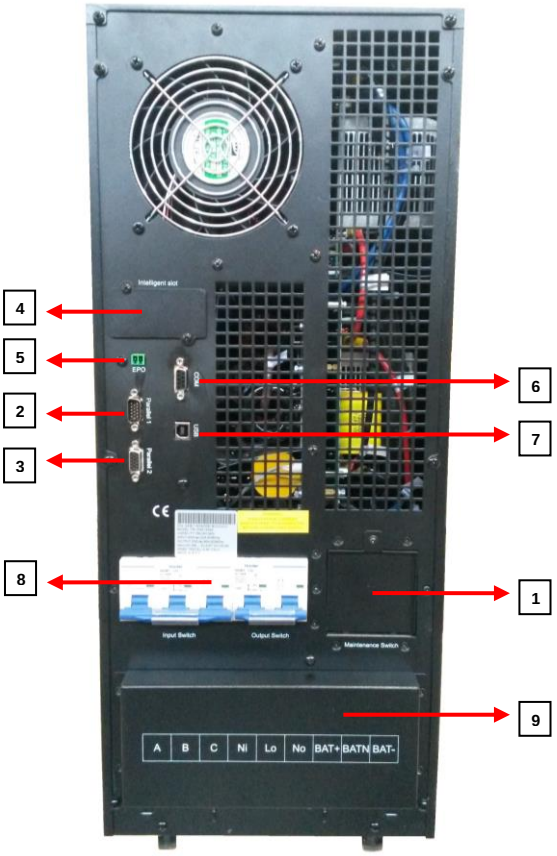
2. Product Introduction

2.1 UPS view

UPS front view (all models)



10KVA – Rear view

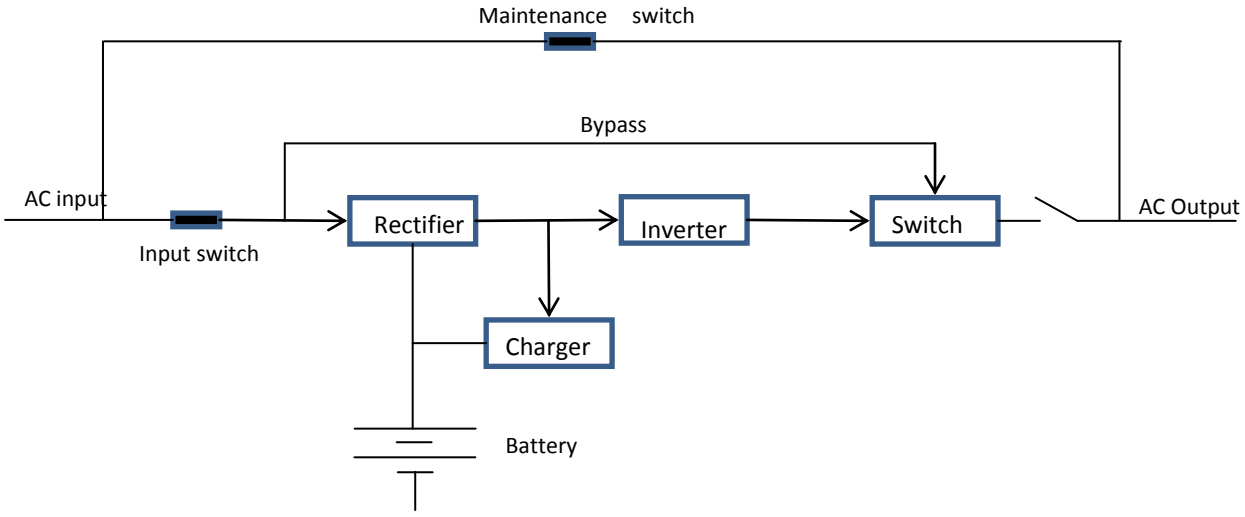


15-20KVA – Rear view

1) Manual By-Pass
2) Parallel Port #1 (disabled)
3) Parallel Port #2 (disabled)
4) Intelligent Slot for Relay / SNMP card (cards are optional)
5) EPO connector
6) COM port (RS232)
7) USB port
8) Input/Output switches
9) Terminal blocks (Input/Output/Batteries)

2.2 UPS operating principles

The system can work as a single unit or parallel one, so as to enhance its reliability



1. AC input filter for filtering input disturbances.
2. Rectifier. To convert AC input voltage into a DC voltage and to increase (boost) the DC voltage at Inverter.
3. DC/DC Converter (booster): When UPs operates in battery mode, it increase the DC voltage and supply the inverter.
4. Inverter: to convert the DC voltage into an AC filtered voltage at the output.
5. Bypass: When UPS face an overload or a failure on the inverter, the load is automatically transferred to Bypass line without any interruption of power to the load.
6. Battery charger: The standard charger feeds the batteries with 1A current. For longer autonomy times, an optional battery charger at 10A max. is available
7. Battery: VRLA Lead-acid, maintenance-free.
8. Output Filter: to filter the output voltage in order to feed the load with a clean voltage.
9. Maintenance bypass switch is provided so the supply to load will not be interrupted during repair or maintenance.

2.3 Applications

This series UPS, providing reliable AC power to various equipment, can be used for computer center, network management center, auto control system, telecom systems, etc

2.4 Characteristics

- This series is an intelligent online sine wave UPS.
    - High frequency, double conversion, high input power factor, wide input voltage range, the output will not be disturbed by power network, suitable for area with poor power supply condition.
    - DSP technology for all-digital control, high reliability, self-diagnostics and protections are featured.
    - Intelligent battery management which extends battery life.
    - LCD panel and LED indicators clearly indicate the system status and parameters such as input/output voltage, frequency, load, temperature inside UPS, etc.
    - Perfect network power management can be achieved by using UPS monitoring software.
    - Maintenance bypass switch is provided so the power supply to load will not be interrupted during repair.

2.5 UPS Models

MODEL UPS		**DESCRIZIONE**
Standard Unit With internal battery	10KVA (S)	16 (standard) 18-20 (optional)
Standard Unit With external battery	15KVA (H)	16-18-20
	20KVA (H)	

3. Installation

3.1 Unpack checking

1) Don’t lean the UPS when moving it out from the packaging.
2) Check the appearance to see if the UPS is damaged during transportation, do not switch on the UPS if any damaged is found and please contact the dealer.
3) Check the accessories according to the packing list and contact the dealer if any parts missing
4) Verify that UPS is suitable for your application, by checking the characteristics of the model written on the label placed on rear panel of the device.

3.2 Installation Procedure

* Put the UPS at flat place next to the equipment.
* Keep the UPS at least 20cm from wall or equipment or other object. Don’t block the ventilation holes of the UPS located in the front panel and the bottom part, so as to keep the ventilation in good condition & avoid temperature of components inside getting high.
* Keep the UPS away from high temperature, water, flammable gas, corrosive gas, dust, direct sunlight and explosive things
* Don't lay the UPS outdoor.
* PDU is required to connect to the UPS output so as to weaken the affection between loads
* In order to fix the UPS, please lock its wheels by shifting the sheet on each wheel.
* RCD load like computer ,linear load and small inductive load can be connected with the UPS. Please contact dealer if other types of loads is required to be connected with.
* For the safety sake of user and equipment, please betake correct power configuration (Fig. 1, 2).

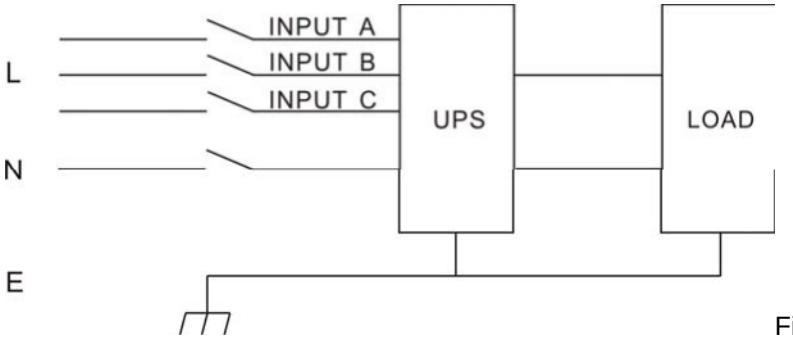


Fig.1 Correct connections

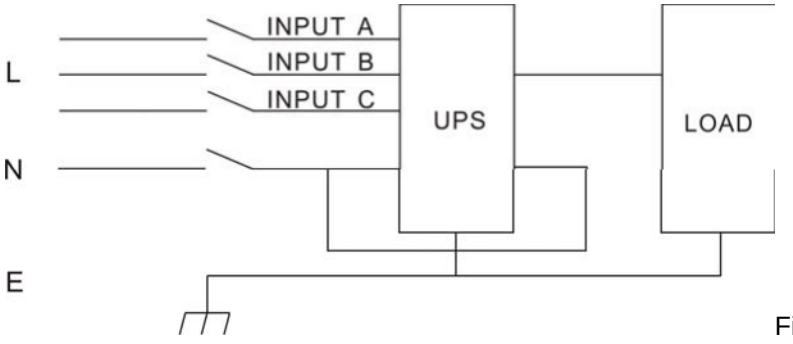


Fig.2 Wrong connection

3.3 UPS input and output connections

Sizing of the cables at input, output and battery, please refer to the below table:

1) Switch Off all breakers before connecting cables..
2) Remove the cover of terminal blocks and connect the cables correspondingly.
3) Connect the UPS output L, N, E to L, N, E of load via a PDU. Tighten the screws and shelter the terminals.

UPS	CABLES DIMENSION (mm^2)			
	INPUT	OUTPUT	BATTERIES	GND
10KVA	4 x 10	2 x 10	3 x 16	10
15KVA	4 x 10	2 x 16	3 x 25	16
20KVA	4 x 16	2 x 25	3 x 25	25

CAUTION!

Cables need terminal to ensure correct connection.
Don't reverse input phase (L) and Neutral (N).
Don't connect the UPS to a wall outlet because may get burnt. Connect to an electrical panel.

A/B/C/Ni	INPUT section
Lo-No section	OUTPUT
BAT+/BATN/BAT- section	BATTERY
GND CONNECTION	GROUND

Fig.3 Connections on terminal block

3.4 Connection of UPS communication cables

1) For local monitoring of UPS, a USB cable provided in accessories can be used to connect the UPS with PC in order to install UPSilon2000 software.

2) For remote monitoring of UPS an SNMP card (optional) must be installed.
A. Remove the cover of SNMP slot at UPS rear panel and keep it for further use.
B. Insert the SNMP card and tighten the screws
C. Connect the UPS with internet by network cable.
D. Refer to the SNMP manual provided to do SNMP setting.

3.5 External battery connection (for extended autonomy time only)

Make sure that battery quantity complies with the spec. (16/18/20 blocks at 12V in series). Make sure that the voltage of battery bank is 192/216/240Vdc.

CAUTION:

1) Don't mix batteries with different capacity & brands and don't mix brand new and old batteries.
2) Standard configuration is made by 16 blocks with a max. capacity of 65Ah (battery charger at 6A). When using a configuration with 18 or 20 blocks, then switch On the UPS with mains is present and configure the exact number of blocks in order to split correctly the charging current.
3) The breaker on battery cabinet should be off.
4) Take out the connection box and remove the cover of terminals, make sure there is no DC voltage at the battery terminals of UPS.
5) Connect battery pole with positive pole, common pole and negative pole to battery connector (BAT+,BATN,BAT-）, don't reverse battery connection (Fig. 5).

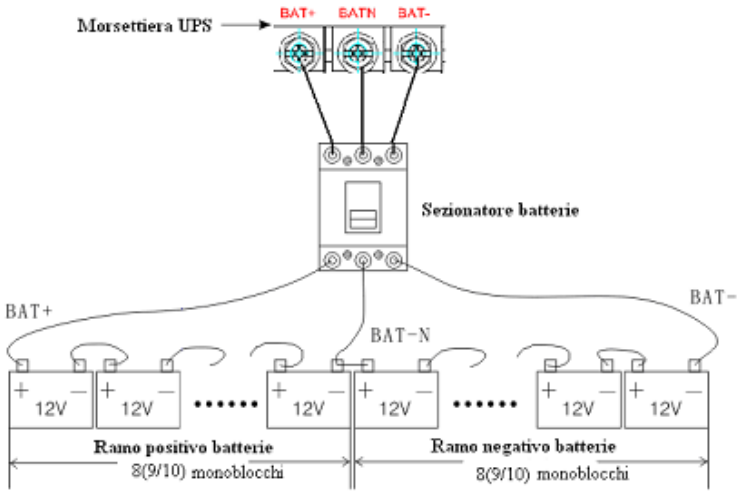


Fig.5 External battery cabinet connection

CAUTION:

- Make sure the UPS is Off and battery breaker is Off before installing the batteries..Don't wear any watch, rings or similar, to avoid any accidental shortcircuit.
- Don't reverse nor shortcircuit the cables. Red cable must be connected to "+" positive pole and black cable must be connected to "-".negative pole
- Use tools with isolated handle. don't put any object on top of batteries.

CAUTION:

- Connection cables section must be compliant to the Standard when using an external battery cabinet.
- When connecting the load to the UPS, make sure that UPS and load are Off. In case of multiple loads, then connect them once a time.
- Don't connect to Ups load such as copier machine, inductive load (engine), fluorescent lamps, to avoid any damage to UPS.
- It is recommended to connect the UPS to the mains by means of an input breaker. Make sure that ground connection is implemented.

- UPS may have voltage at its output even when mains is not present. Switch Off the input breaker and then switch Off the UPS, to avoid any voltage to the load.
- If a laser printer must be connected to the output of UPS, select a device with an output power suitable to handle the current peak of the printer.

4. Control panel, configuration and operation

4.1 Operating mode

4.1.1 AC Mode

If the AC input and load capacity are in normal ranges, the load will be powered by inverter output, battery will be charged at the same time. AC and inverter indicators on LCD control panel will be on (green).

CAUTION: Please note below if the UPS input power is provided by a genset.

1) Don't switch on the loads before starting UPS. After the UPS has been started and works steadily, switch on the loads one by one. Suggest that the total capacity of the loads should be lower than 30% of capacity of the genset.

2) It is suggested that the rating of generator should be 1.5-2 times of the capacity of the UPS..

4.1.2 Bypass Mode

When the AC power is connected and the UPS has not been switched on, or the UPS is overloaded after switching on the UPS, it will go to bypass mode. The Loads will be powered by AC, battery will be charged, and the bypass indicator on the LCD control panel will be on (yellow). But, if the bypass is beyond normal range or absent, the UPS will not go to bypass mode and no power will be supplied to the loads.

4.1.3 Battery Mode

In AC mode, if the AC is absent or beyond normal range, the rectifier and charger will stop working, the loads will be powered by battery bank of which energy goes through inverter circuit. The Inverter's and battery's indicators on LCD control panel will be on (green) and the alarm will beep every 2 seconds. In battery mode, if the battery voltage becomes low and reaches the setting value, the system will give low battery voltage alarm, beep once every second and the LCD will give low battery alarm, too

WARNING:

1. Charge batteries for at least 8 hours when the UPS is used at the first time, as battery has self-discharge characteristics even though the UPS has been fully charged by manufacturer before shipping

4.1.4 ECO Mode

In AC mode, the UPS can be set to work in ECO mode if the load does require strict power purity and it can be sustained in bypass mode normally. If the AC is beyond normal range, the UPS will transfer back to inverter mode. The Efficiency for the UPS in ECO mode is much higher.

4.2 Start up and Turn off the UPS

4.2.1 Start up operation

1) Turn on the UPS in Line mode:
   Once AC Power Cord is plugged in, the UPS will start automatically and the LCD display of the UPS will be lit on. You may view the data and set parameters on the LCD display as well as the LED display showing the status of the UPS (NOR Cod. 5) and Green LED will be On.
2) Turn on the UPS in Battery Mode (cold start):

Press “On” on the front panel to start the UPS and in the meantime, the LCD display will light up. You may view the data and set parameters on the LCD display and the LED display of the UPS will show the latest status of the UPS. Display will show NOR Cod. 6 message, Yellow LED will be on and an acoustic signal will be emitted every 2 sec. (Battery will be discharging).

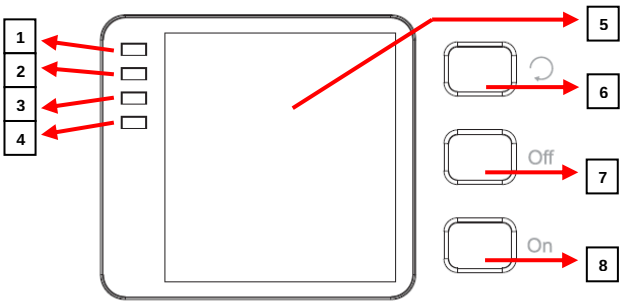
4.2.2 Turn Off operation

1) Turn off the UPS in line mode:
   a) Press and hold the OFF key for 2 seconds to turn off the inverter and the UPS is in Bypass mode now; on the contrary, you may press the hold the OFF key for 2 seconds in order to Change over back to inverter mode).
   b) To shut down (turn off) the UPS completely, you need to turn off the input switch.
2) Turn off the UPS with connecting batteries (no mains):
   a) Press and hold the OFF key for 2 seconds to turn off the UPS.
   b) After UPS is turned off, all LED and LCD will be extinguished and there is no output.

Nota: When the UPS is turned off from the inverter mode, it will discharge DC Bus and then shut down completely; therefore, sometimes, it takes more several seconds to complete.

4.3 Control Panel

4.3.1 LED and control panel display



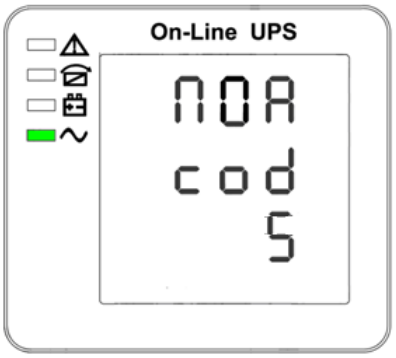
1) ALARM LED (red)
2) BYPASS LED (yellow)
3) BATTERY LED (yellow)
4) INVERTER LED (green)
5) Display LCD
6) ENTER (Scroll button)
7) OFF button
8) ON button

4.3.2 LCD display

NOTE! The display provides more functions than those described in this manual. There are 11 interface available in the LCD display:

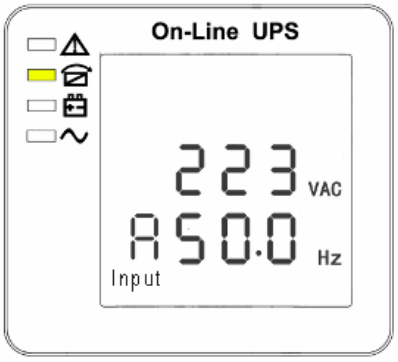
ITEM	DESCRIPTION	CONTENT DISPLAYED
01	Code	Operational mode and status
02	Input Phase A	Voltage and Frequency
03	Input Phase B	Voltage and Frequency
04	Input Phase C	Voltage and Frequency
05	Battery +	Voltage and Current
06	Battery -	Voltage and Current
07	Output	Voltage and Frequency
08	Load	Load
09	Temperature	PFC/Internal temperature and Ambient temperature
10	DC Bus Voltage	± DC Bus Voltage
11	Software version & model	DSP verson of inverter software version and UPS model

When UPS is supplied by the mains the message on display is the following:

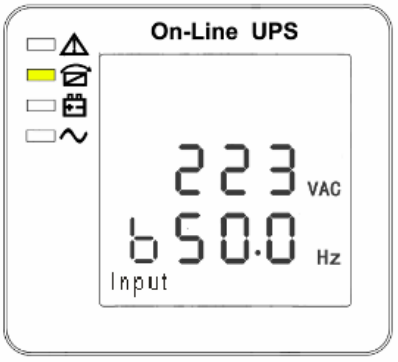


01 – Status and operating mode

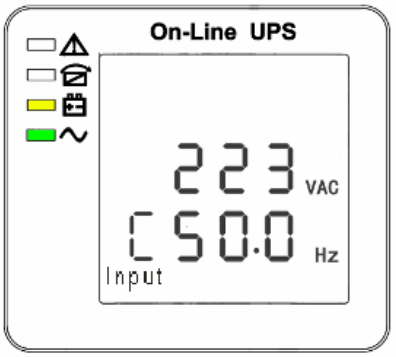
1) Operating mode are “NOR” or “ECO”.
2) Press “scroll” button, the UPS goes to next page and the display will show the following:



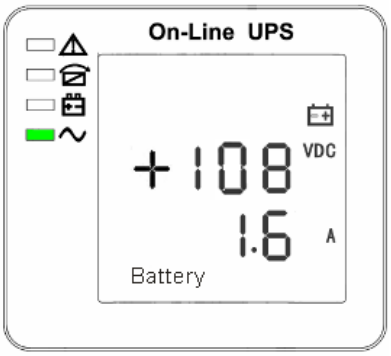
02 – Input phase A



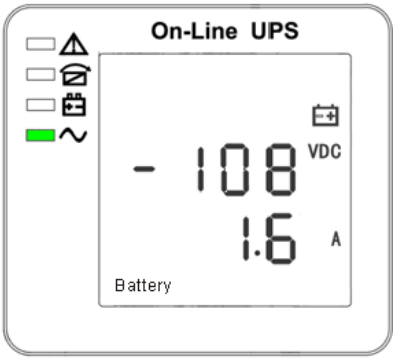
03 – Input phase B



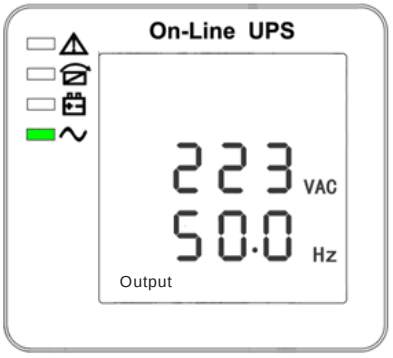
04 – Input phase C



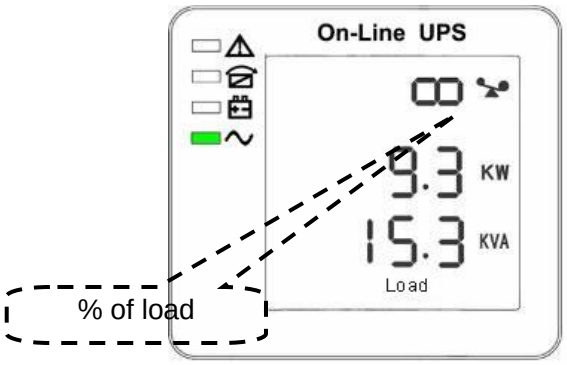
05 - V Bat + / Current



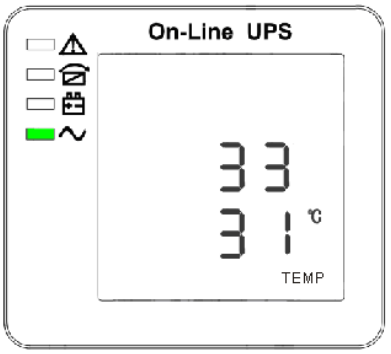
06 - V Bat - / Current



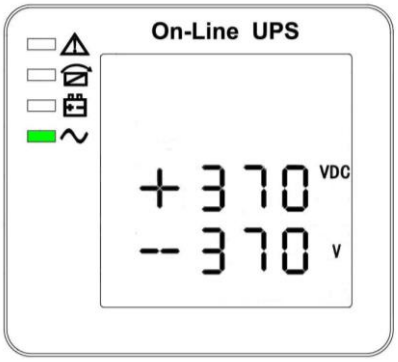
07 - Output



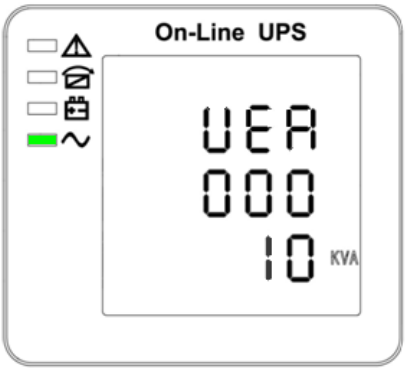
08 - Load



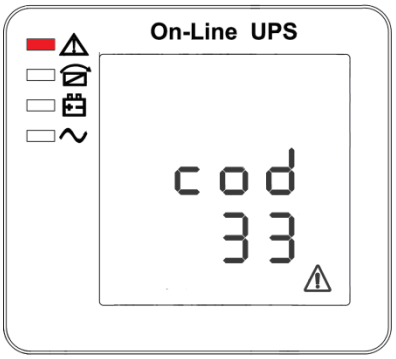
09 - PFC/Internal temp. (up) and ambient temp. (down)



10 - DC Bus voltage

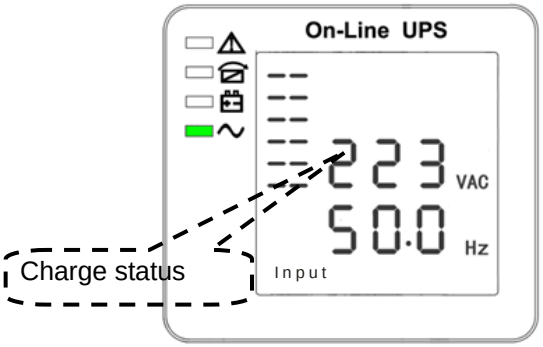


11 – DSP software version and UPS model

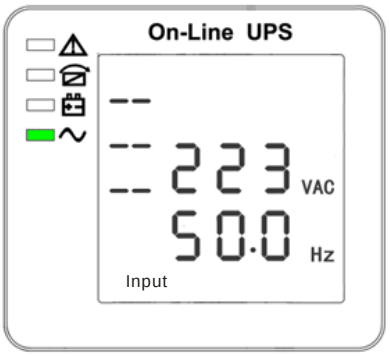


Alarm code (see section 4.6.2)

3) When UPS is charging the battery, the following information are displayed:



Boost charging



Floating charging

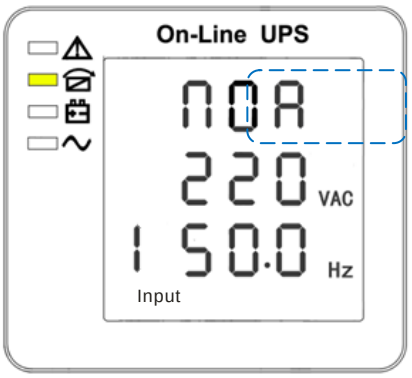
4) Pressing “scroll” button, you may circulate all messages from the first one to the last one then returns back to the first one.

5) All alarm codes are present when abnormal behavior(s) occur(s).
The display value of the above parameter will update within 0.2s.

4.4 Parameters setting

The setting function is controlled by 3 buttons (Enter (, Off ▲, On ▼):
Enter (---goes into the setting page and value adjustment;
Off ▲ & On ▼---for choosing different pages.
After the UPS turn ON, press buttons (& ▲ for 3 seconds and then goes into the setting interface page. After finishing setting the parameter, press “ON” until exiting out of the current interface.
Note: After entering the setting interface, it will exit when without operation in 30s.

4.4.1 Mode setting



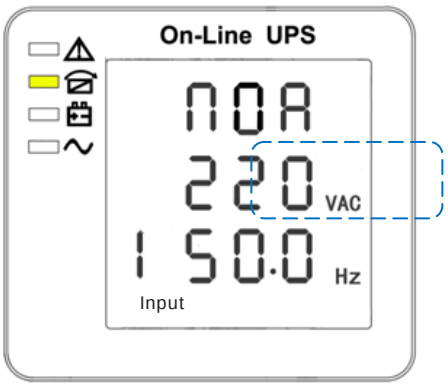
Mode setting
(Note: Inside the broken-line is the flashing part)

After entering the setting menu, it’s mode setting defaulted, and the mode setting line flashing as in above picture.

①Use button Enter↻ to choose different mode. There are 3 different modes for setting: ECO, PAL, NOR ;

②Press▲ or ▼ to exit the mode setting
(save the mode setting), and goes to output voltage setting or parallel redundancy quantity setting

4.4.2 Output voltage setting



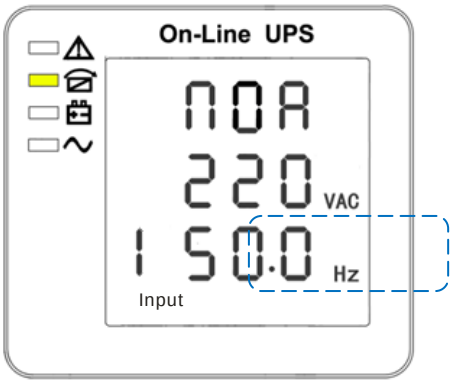
Output voltage setting
(Note: Inside the broken-line is the flashing part.)

When under the mode setting press On▼ or when under frequency setting press Off▲, it goes to the output voltage setting. The output voltage line flashes as in above picture.

- Use button Enter↻ to choose the different output voltage. There are 3 different voltages---220, 230, 240.
- Press▲ or ▼ to exit the output voltage setting (save the output voltage setting) and goes to mode setting or frequency setting.

NOTE: When powered by inverter, it is requested to turn off the inverter before setting voltage and frequency level.

4.4.3 Input/Output frequency setting



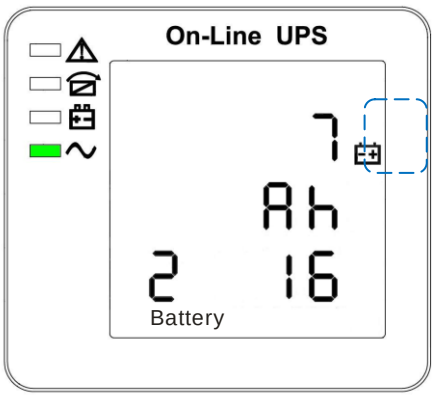
Frequency setting
(Note: Inside the broken-line is the flashing part.)

When under the output voltage setting press On▼ or when under battery capacity setting press Off▲, it goes to the frequency setting. The frequency line flashes as in above picture.

- Use button Enter to choose the different frequency. There are 2 different frequency---50/60Hz.
- Press▲ or ▼ to exit the frequency setting (save the frequency setting) and goes to output voltage setting or battery capacity setting.

Note: When powered by inverter, it is necessary to turn off the inverter before setting voltage and frequency level.

4.4.4 Battery capacity setting

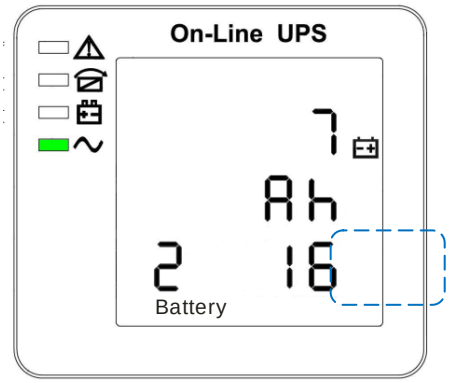


Battery capacity setting
(Note: Inside the broken-line is the flashing part.)

When under the frequency setting press On▼ or when under battery quantity setting press Off▲, it goes to the battery capacity setting. The battery capacity line flashes as in above picture.

- Use button Enter to choose the different battery capacity. Battery capacity range is 1-200Ah. (Note: long-press of Enter can adjustment battery capacity quickly.)
- Press▲ or ▼ to exit the battery capacity setting (save the capacity setting) and goes to frequency setting or battery quantity setting.

4.4.5 Battery quantity setting

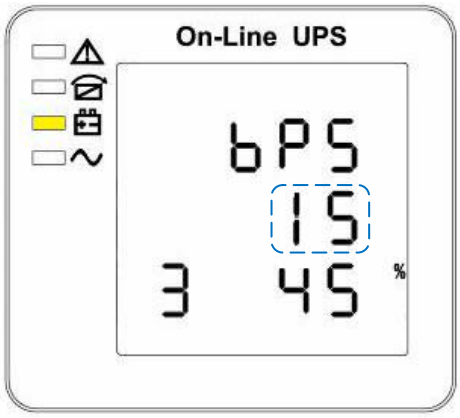


Battery quantity setting
(Note: Inside the broken-line is the flashing part.)

When under the battery capacity setting press On▼ or when under bypass voltage upper limit setting press Off▲, it goes to the battery quantity setting. The battery quantity line flashes as in above picture.

- Use button Enter↻ to choose the different battery quantity. Battery quantity range is 16,18, 20.
- Press▲ or ▼ to exit the battery quantity setting (save the battery quantity setting) and goes to battery capacity setting or bypass voltage upper limit setting.

4.4.6 Bypass upper voltage level setting



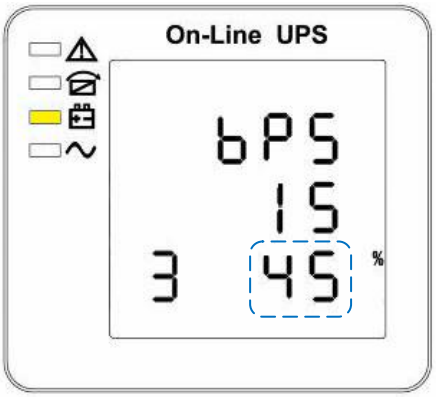
Bypass upper voltage level setting

(Note: Inside the broken-line is the flashing part.)

When under the battery quantity setting press On▼ or when under bypass voltage lower setting press Off▲, it goes to the bypass upper limit setting. The bypass upper limit line flashes as in above picture.

- Use button Enter to set the different bypass voltage upper limit. The bypass voltage upper limit range is 5%,10%,15%,25%(25% .
- Press▲ or ▼ to exit the bypass voltage upper limit setting (save the bypass voltage upper limit setting) and goes to battery quantity setting or bypass voltage lower limit setting.

4.4.7 Bypass lower voltage level setting



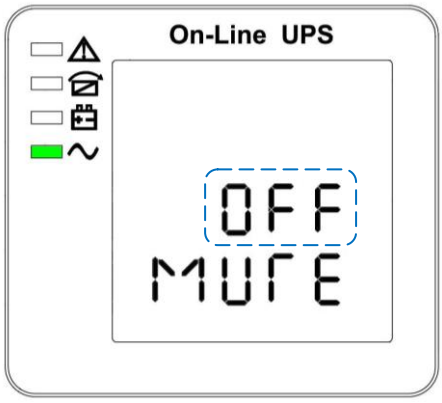
Bypass lower voltage level setting

(Note: Inside the broken-line is the flashing part.)

When under the bypass voltage upper limit setting press On▼ or when under parallel ID setting press Off▲, it goes to the bypass lower limit setting. The bypass lower limit line flashes as in above picture. (“-” for negative, positive does not have any symbol.)

- • Use button Enter (to set the different bypass voltage lower limit. The bypass voltage lower limit range is 20%,30%,45%.
- • Press▲ or ▼ to exit the bypass voltage lower limit setting (save the bypass voltage lower limit setting) and goes to bypass upper limit setting or parallel ID setting..

4.4.8 Buzzer mute setting



Buzzers mute setting
(Note：flashing part in dashed box)

Press ON under bypass voltage lower limit setting or press OFF under the parallel ID setting can enter the buzzer setting. Now the setting status is flashing as the Figure 14 shows (note: on=mute; off= no mute). When press, it shows the mute cycle setting, the selection includes ON and OFF. (Press the up button or down button can exit the mute setting (save the mute setting status) and switch to bypass voltage lower limit setting or parallel ID setting (note: when in stand-alone mode, press down button to exit and save the settings, then the settings is completed for stand-alone unit).

4.5 Working mode and switching

Usually, the UPS should be set to work in AC mode, so it will transfer to battery mode automatically without interruption when AC fails. When the UPS is overloaded, it will transfer to bypass mode without interruption. When the inverter is defective or over temperature occurred inside the UPS, the UPS will transfer to bypass mode if the bypass is normal.

4.5.1 Transfer to Bypass when overload

When the load of UPS is beyond normal range and lasts for the time set, it will transfer to bypass mode and beeps twice every second, then the load is powered by AC directly. Please decrease the load immediately until the alarm is eliminated. The UPS will start the inverter after 5 minutes.

4.5.2 Normal Mode to Battery Mode

The UPS will go to battery mode if the AC is failed. The UPS will shut down automatically if batteries are drained. When AC recovers, the UPS will start the inverter automatically.

4.5.3 Transfer to Bypass when overtemperature

The temperature inside UPS may be high if ambient temperature is high or the ventilation is poor, then the UPS will go to Bypass mode, fault indicator will be on (red), the LCD will display that the inner temperature is high, long beeps will come. If so, please cut off the input power of the UPS, move objects that affecting the ventilation far from the UPS if any or increase the distance between the UPS and the wall. Wait until the UPS temperature becomes normal then restart it..

4.5.4 Output shortcircuit

When the UPS output is in short circuit, the UPS will cut off the output, fault indictor will be on (red), the LCD will display output is in short circuit, long beeps come. If so, please disconnect the load in short circuit, cut off the UPS input power and wait for
10mins, the UPS will shut down automatically or press the off button to shut down in after10s. Before restarting the UPS, please make sure that the short circuit problem has been solved.

4.6 LED and messages on display

This section lists the event and alarm messages that the UPS might display. This section is listed with each alarm message to help you troubleshoot problems

4.6.1 Operating status

CODE	STATUS	LED			
		ALARM	BY-PASS	BATTERY	INVERTER
1	Initialized	OFF	OFF	OFF	OFF
2	Standby Mode	OFF	OFF	X	OFF
3	No Output	OFF	OFF	X	OFF
4	By-Pass Mode	OFF	ON	X	OFF
5	Mains Mode	OFF	OFF	X	ON
6	Battery Mode	OFF	OFF	ON	OFF
7	Battery Self-diagnostic	OFF	OFF	ON	OFF
8	Inverter in start-up	OFF	X	X	OFF
9	ECO Mode	OFF	X	X	X
10	EPO Mode	ON	OFF	X	OFF
11	Maintenance by-pass Mode	OFF	OFF	OFF	OFF
12	Fault Mode	ON	X	X	X

Nota: “X” shows that it will determined by other conditions

4.6.2 Alarms Information

CODE	UPS ALARM WARNINGS	BUZZER ALARM	LED ALARM
1	Rectifier Fault	Continuous beep	Fault LED On
2	Inverter fault		
3	Inverter Thyristor short		
4	Inverter Thyristor broken		
5	Bypass Thyristor short		
6	Bypass Thyristor broken		
7	Fuse broken (Reserved)		
8	Parallel relay fault		
9	Fan fault		
10	Reserved (EPO)		
11	Auxiliary power fault		
12	Initialization fault		
13	P-Battery Charger fault		
14	N-Battery Charger fault		
15	DC Bus over voltage		
16	DC Bus under voltage		
17	DC bus unbalance		
18	Soft start failed		
19	Rectifier Over Temperature	Beep twice per second	
20	Inverter Over temperature		
21	Input N loss		
22	Battery reverse		
23	Cable connection error		
24	CAN comm. Fault		
25	Parallel load sharing fault		
26	Battery over voltage	Beep one per second	Fault LED blinking
27	Mains volt. reverse		
28	Bypass reverse		
29	Output Short-circuit		
30	Rectifier over current		
31	Bypass over current		Bypass LED blinking
32	Overload		Inverter or Bypass LED blinking
33	No battery		Battery LED blinking
34	Battery under voltage		
35	Battery low pre-warning		
36	Internal Communication Error		Bypass LED on
37	DC component over limit.	Beep one per 2 seconds	Inverter LED blinking
38	Parallel Overload		
39	Mains volt. Abnormal		Battery LED on
40	Mains freq. abnormal		
41	Bypass Not Available	-	Bypass LED blinking
42	Bypass unable to trace	-	
43	Boot is invalid	-	-
44	EPO	Continuous beep	Alarm LED on

CAUTION:
The following procedure must be implemented if UPS is connected to a genset, which should have a power twice the UPS minimum:

- Start up the genset and when its voltage is stable connect the UPS to genset output. Then start up the UPS and connect its load gradually.

5. Maintenance

Once installed, the UPS requires few maintenance..

5.1 Battery Maintenance

There are sealed lead acid maintenance free batteries inside this series. Battery lifetime depends on environment temperature and discharge/charge cycles, it will be shortened if temperature raised or deep discharged. Periodical maintenance is required so as to keep battery in good condition.

1) The most proper working temperature is 15 to 25 Celsius degree.
2) Avoid small discharging current. Don't let UPS work in battery mode continuously for 24 hours.
3) Charge battery for at least 12 hours every 3 months if it is free of operation. If the environment temperature is high, charge it once every 2 months..
4) In normal operating conditions, battery lifetime is about 2-3 years. If any problem occurs in autonomy time or a battery alarm is detected on the display, then contact the technical assistance for replacement.
5) In case of battery replacement (must be done by a technician), all battery blocks must be replaced.

WARNING:

- Before replacing batteries, first turn off the UPS and the mains. Remove your metallic adornment such as finger rings, watch and so on..
- When replaces batteries, please use a screwdriver with insulating handle. Don't lay any tools or metallic goods on the battery.
- Never reverse or shortcircuit between battery anode and chatode..

5.2 Fan maintenance

Please check the fan periodically. Regularly check that the ventilation grids on the UPS panels are not blocked and, if necessary, remove dirt with a cloth or vacuum cleaner.
If you encounter foreign objects blocking the ventilation contact the technical assistance.

6. Trouble shooting and UPS features

1. If the UPS is not operating properly, it may be due to an installation problem, a wrong connection or to a failure on the UPS itself. Please, check all these conditions before contacting the technical assistance.
   Then provide the technical support of the following information in order to solve the problem:
   - UPS model, serial number and purchase date.
   - Detailed description of the problem, including the list of messages on LCD panel.

6.1 Troubleshooting

In case of failure, check the table below. If problem cannot be solved please contact your Distributor or technical assistance.

FAILURE	PROBABLE CAUSE	SOLUTION
No display on the LCD, no self-diagnostics	A Input power absent B Low input	Use Multi-meter to measure the input to see if it is normal or not.

AC norm l but AC indicator off, the UPS is in battery mode	A Input circuit breaker off. B Input power connection problem	A Switch on the input breaker B Check the connection and re-do
No alarm but no outpu	Output connection problem	Check the connection and re-do
The UPS doesn't start after pushing On button.	A pressing ON button time is insufficient B Overload	A Press and hold On button for 1s B Disconnect all loads and restart
AC indicator blinking	Input AC is beyond normal range	Pay attention to the backup time if the UPS is in battery mode
Abnormal backup time	A Battery not fully charged B Battery Bad	A Charge battery for 8 hours when AC is normal, then test the backup time again B Contact distributor to replace battery
Abnormal sound or smell	Fault inside UPS	shut down the UPS immediately and Contact distributor or assistance

6.2 UPS Features

MODEL		TRI-ONE10000	TRI-ONE15000	TRI-ONE20000
NOMINAL POWER		10KVA / 8KW	15KVA / 12KW	20KVA / 16KW
INPUT	Input	Three-phase		
	Power factor	≥ 0.99		
	Nominal Voltage	220VAC / 230VAC / 240VAC auto selection)		
	Nominal requency	50Hz/60Hz (Selectable)		
	Voltage Range	208 ~ 478Vac		
	Frequency Range	45 ~ 55Hz (50Hz) - 55 ~ 65Hz (60Hz)		
	Bypass voltage range	220Vac max：default +25% (+10%, +15%, +20%) optional 230Vac max：default +20% (+10%, +15%) optional 240Vac max：default +15% (+10%) optional		
		min：default -45%(-20%, -30%) optional		
	Bypass frequency range	±1% - ±2% - ±4% - ±5% - ±10%		
BATTERY	Number of battery	16 Standard 18/20 optional (embedded)	16/18/20 (in external cabinet)	
	Battery type	12V - 9Ah		
		Maintenance-free, Lead-acid (VRLA)		
	Charge mode	Boost charge or float charge auto switch		
	Charge time	Boost charge up to 20h (Max)		
	Max. charge current	1A	10A	
OUTPUT	Output type	Single-phase		
	Voltage regulation	±1.0%		
	Voltage distortion (THD)	Less than 2% with 100% linear load		
		Less than 5% with 100% non-linear load		
	Nominal voltage	220V/230V/240Vac ±1.0%		
	Frequency regulation	±0.1% (single unit)		
		±0.25% (parallel units)		
	Frequency	Mains mode: tracking phase frequency (Phase A)		
		In battery mode: 50Hz / 60Hz ±0.1Hz		
	Frequency	1Hz/s (single unit)		

	synchronization	0.5Hz/s (units in parallel)	
	Overload with mains	105 % ~ 110 %，lasts max 1h	
		110% ~ 125%,lasts max 10 min	
		125% ~ 150%, lasts max 1 min	
		＞150% switch to bypass	
	Bypass overload	Load for a long time when rated output current under 125%	
		Bypass load capacity is controlled by bypass circuit breaker, tripping when circuit breaker operating current.	
	Crest factor	3:1	
	AC efficiency	≥93.5%	≥94.5%
	Dynamic response	± 5.0%	
		40ms	
	DC component	≤100mV	

MODEL		TRI-ONE10000	TRI-ONE15000	TRI-ONE20000
NOMINAL POWER		10KVA / 8KW	15KVA / 12KW	20KVA / 16KW
SWITCH TIME	From Mains to battery mode	0ms		
	From Inverter to bypass	0ms (synchronous) <15ms (50Hz), <13.33ms (60Hz) (asynchronous)		
Noise		<55dB (1m)		
Display		LED + LCD		
Safety		Compliant to IEC62040-1		
EMI		Conduction：IEC 62040-2		
		Radiation：IEC 62040-2		
		Harmonics：IEC 62040-2		
EMS		IEC 62040-2		
MTBF		250,000 hours		
Isolation resistance		> 2MΩ (500Vdc)		
Isolation in voltage		2820Vdc, <3.5mA, 1min		
Surge		Compliant IEC60664-1 1.2/50uS+8/20uS 6KV/3KA		
IP Protection		IP20		

6.3 Environment

MODEL	TRI-ONE10000	TRI-ONE15000	TRI-ONE20000
Temperature	0°C ~ 40°C (Battery not included)		
Relative humidity	0 ~ 95% non condensing		
Altitude	<1500m se >1500m output power reduced		

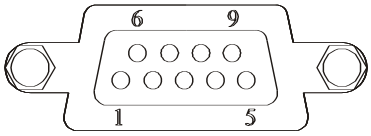
6.4 Mechanical

MODEL	TRI-ONE10000	TRI-ONE15000	TRI-ONE20000
Height (mm)	655	616	
Width (mm)	250	250	

Depth (mm)	597	502
Weight (Kg)	76	45
Color	Black	

7. Communication interface

This UPS has a DB9 standard interface on rear panel, with the following pinout:



PIN	DEFINITION
1-4-6-7-8-9	Not used
2	TX
3	RX
5	GND

When connection the UPS to a PC via a RS232 cable, please use a standard cable with the following connections:

CONNECTOR 1 (female) on serial port of computer	**CONNECTOR 2** (male) on serial port of UPS
2	2
3	3
5	5

Available functions with RS232

- Monitoring of UPS status.
- Monitoring UPS alarms.
- Monitoring of UPS parameters

RS232 communication parameters:

- Transmission speed: 2400bps
- Byte length: 8bit
- Stop bit: 1bit
- Parity control: none

8. Optional boards

NAME	DESCRIPTION	NOTE
Parallel board (Parallel cable)	For UPS parallel connection	Not available on this model
SNMP board	Remote monitoring of UPS status	
Clean contacts board (Relay board)		

9. Packaging contents

MODEL		
Instruction manual	●	
Software (CD-ROM)	●	
RS232 cable	1	
USB cable	1	
EPO connector	1	

● present O optional

WARRANTY

Dear Customer,
Thank you for purchasing a NAICON product. We hope that you be satisfied. If the product fails in warranty period, please contact your dealer or call +39 02 950031 or go to www.naicon.com/elsist. Before contacting your dealer or authorized service network, we recommend that you read the operating and maintenance manual carefully.

With this warranty, NAICON warrants the product to be defective in materials or workmanship for 2 years on hardware and 1 year for battery, as of the original delivery date.
If there are material or manufacturing defects during the warranty period, ELSIST affiliates, Authorized Service Centers or authorized resellers located in the EEC will repair or (at ELSIST discretion) replace the defective product or components under the terms and conditions below, without any charge for labor or spare parts costs. ELSIST reserves the right (in its sole discretion) to replace the components of defective products or low cost products with assembled parts or new or refurbished products.
Conditions.

1. This warranty will only be valid if the defective product is returned together with the sales invoice.
   ELSIST reserves the right to refuse warranty service in the absence of such documents or if the information contained therein is incomplete or illegible.
2. This warranty does not cover the costs and / or any damages and / or defects resulting from any modifications or adjustments made to the product, without prior written permission from ELSIST, in order to adapt the product to local technical or safety standards in countries other than those for which the product was originally designed and manufactured.
3. This warranty will be void if the model or serial number indicated on the product has been modified, deleted, removed or otherwise illegible.
4. Are excluded by the warranty:

- Periodic maintenance and repair or replacement of parts subject to normal wear and tear.
- Any modification or modification to the product, without prior written permission from ELSIST to enhance performance than those described in the User and Maintenance Manual
- • All costs of technical staff support and any transport from the customer's adress to Assistance Center and vice versa as well as all the risks involved.
- Damages due to:
  a. Improper use, including but not limited to: (a) the use of the product for any purpose other than the intended use or failure to observe the ELSIST instructions for correct use and maintenance of the product, (b) installation or use of the product not complying with the Technical or Safety standards in the country in which it is used.
  b. Repairs by unauthorized personnel or by the Customer himself.
  c. Accidental events, lightning, floods, fires, incorrect ventilation or other causes not attributable to ELSIST.
  d. Defects of the equipment or equipment to which the product was connected.

5. This warranty does not affect the buyer's rights established by applicable national laws nor the Customer's rights to the reseller arising out of the sales contract.

Unless authorized by the manufacturer, reproduction of any part of this manual is prohibited. Our equipment, built with the utmost care and with selected components, is controlled by ELSIST Quality Services. However, if you notice any anomalies, please inform us by calling 02-950031 specifying serial number and model of the devide, which are printed on the identification plate at the rear side of the UPS. ELSIST Assistance Service is also available to collect requests, comments, suggestions, if any.

In case of failure:
Contact our Customer Service Center at +39 02 95 0031, and verify the UPS malfunction.

If the products returned to NAICON were OPERATING or if they were delivered without our permission or for out-of-warranty products, they will be returned to the customer by charging a cost that will depend on the country where will be shipped.

END OF DOCUMENT