TECNOWARE EVO DSP PLUS 6.0 Rack Mount – PF 1 Uninterruptible Power Supply User Manual

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Contents

⚠ Safety Warnings

- Read this manual carefully and completely before installing and using the TECNOWARE EVO DSP PLUSPLUS Uninterruptible Power Supply, which, from here after, will also be referred to as UPS.
- This manual should be kept close to the UPS and read before the UPS is installed and used.
- The UPS must be used only by properly trained personnel. To ensure correct and safe operations, it is necessary that operators and maintenance personnel observe the general safety Standards as well as the specific instructions included in this manual.
- Risk of electric shock: do not remove the cover. The UPS contains internal parts which are at a high Voltage and are potentially dangerous, capable of causing injury or death by electric shock.
- The electric installation has to be done by qualified personnel. Follow all the Safety Standards (CEI Standards in Italy or IEEE elsewhere) for the Input/Output connections and for the right section of Input/Output cables.
- There are no internal parts in the UPS which are user serviceable. Any repair or maintenance work must be performed exclusively by qualified technical personnel authorized by TECNOWARE. TECNOWARE declines any responsibility if this warning is disregarded.
- Warning to the technical personnel authorized for Service: since internal components are connected to the batteries, they will remain powered, and therefore dangerous, even after the UPS has been disconnected from AC power mains. Before any repair or maintenance work to the UPS unit, turn off the Battery circuit breaker on the rear side of Battery Box unit and then disconnect the Battery cable.
- **CAUTION** – HIGH BATTERY VOLTAGE AND RISK OF ELECTRIC SHOCK – the battery pack nominal voltage is 192 Vdc (there are 16 batteries series-connected inside the Battery Box unit).
- It is compulsory to ground the UPS according to Safety Standards.
- Risk of electric shock at the Output lines when the UPS is ON.
- Risk of electric shock at the Output lines while the unit is connected to the AC utility line.
- We record to use a dedicate AC Input/Output power line for the UPS.

- Do not obstruct ventilation slots or holes and do not rest any object on top of the UPS.
- Do not insert objects or pour liquids in the ventilation holes.
- Install the UPS indoors, in a protected, clean and moisture-free environment.
- Do not expose to the direct sun light.
- ⚠ Do not keep liquids, fable gases or corrosive substances near the UPS.

Introduction

UPS EVO DSP PLUSPLUS RM (UPS means Uninterruptible Power Supply) is the result of constant technological research aimed at obtaining the best performance at the lowest cost.
UPS EVO DSP PLUSPLUS RM is an advanced ON-LINE UPS built specifically to protect your computer from any irregularities in the AC line (for example blackouts, brownouts, over voltages, micro-interruptions) which often cause damage to hardware and software.
All that is possible because UPS EVO DSP PLUSPLUS RM is a Double-Conversion ON-LINE UPS.
Under normal AC line conditions UPS EVO DSP PLUSPLUS RM provides an automatic Output Voltage regulation from the Rectifier and Inverter blocks and filters out frequently occurring electrical disturbances (high Voltage transients, spikes, interferences, etc.), thus protecting the devices connected to its outlets. During a power failure, UPS EVO DSP PLUSPLUS RM continues supplying adequate AC power (with a true sine wave) to all connected devices through its internal batteries and by its DC/AC converter (Inverter).
UPS EVO DSP PLUSPLUS RM protects the devices from accidental overload or Inverter fault by an Automatic Bypass that directly connects the AC Input line with its outlets.
The RM models are factory-equipped with RS-232 and USB interfaces, which may be used for notify to a computer a power failure or a Low Battery condition: this allows automatic data backup during an extended blackout with the most coon operating systems (Windows, Linux, Unix, etc). Thanks to Interfaces, UPS DSP RM can counite the several made measurements (Input/Output Voltage, batteries, absorption, Frequency, etc.), and can also be prograde in order to start-up or shutdown automatically at fixed times.

⚠ This manual is a guide that enables you to correctly install and use your UPS. This manual includes important SAFETY instructions for the operator, for the UPS correct installation, and gives useful advice on the product and battery maintenance. For any type of problem, please refer to this manual before calling the customer service.

EVO DSP PLUSPLUS RM is constantly being developed and improved: consequently, your unit may differ somewhat from the description contained in this manual.
This manual includes the following models:

- EVO DSP PLUSPLUS 6.0 RM (6 KVA – PF 1)
- EVO DSP PLUS 10.0 RM (10 KVA – PF 1)

In this manual EVO DSP PLUS RM will simply be referred to as UPS.
EVO DSP PLUS RM models are made of 2 separate units: the UPS unit (containing the control and power electronics) and the Battery Box unit containing the batteries and batteries charger. The 2 units must be connected together as explained into chapter 6 “Electrical Installation” All models can be placed in 19” rack cabinets. Optional accessory kits are available for the installation in rack cabinets.
EVO DSP PLUS6.0 RM has a 2U height and EVO DSP PLUS10.0 RM or Battery Box unit have a 3U height (1U is equal to 1 Rack unity, about 44,5 millimetres).

General Characteristics

UPS EVO DSP PLUS RM has all the advanced features which guarantee maximum reliability and safety:

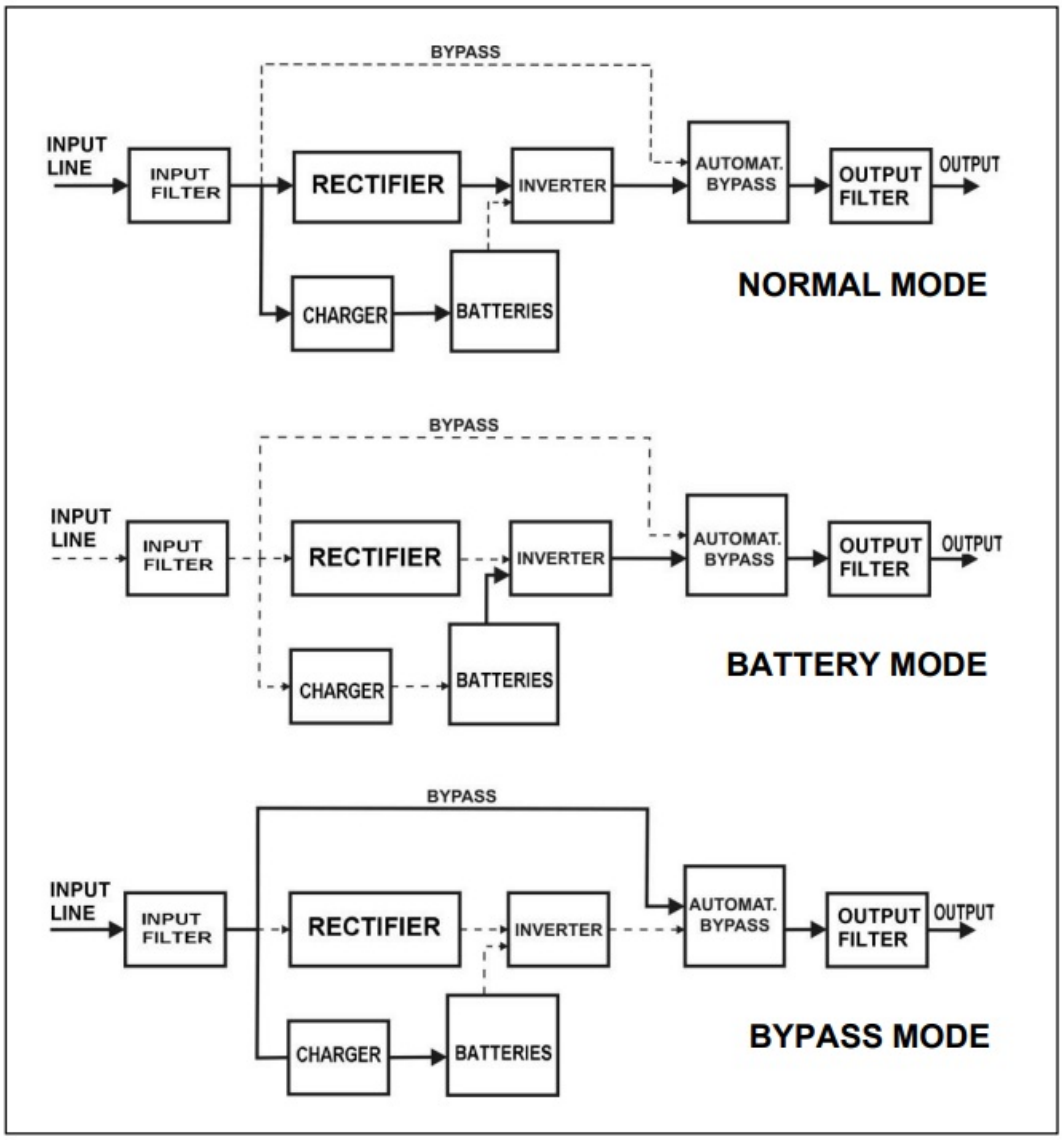
- Double-Conversion ON-LINE Transformer less technology
- Sinusoidal wave generated by an IGBT Inverter
- Output Voltage regulation ±1%
- Protection from overload and short circuits
- Automatic Bypass to protect from accidental overload or Inverter fault
- Automatic protection when Battery is low
- Automatic restart, following an automatic shut-down due to Low Battery, once AC utility power comes back on
- Selectable Input Frequency (50/60 Hz)
- Graphic LCD panel for visualization of the Input and Output Voltage measurements, batteries Voltage, percentage of load, Frequency, alarms, overload, fault and path of energy flow
- Acoustic signals of various kinds indicating alarm situations
- Available settings of all the UPS parameters by user through front panel pushbuttons and graphic LCD panel
- SNMP Adapter (optional)
- EPO (Emergency Power OFF)
- Counication with the computer through RS-232 and USB interfaces
- Available extended autonomy by adding external Battery Boxes
- Frequency Converter functioning mode (selectable)
- High efficiency
- Maximum reliability
- Can be fitted in a 19” rack cabinet through optional kits
- Smart design and easy to use

Receipt And Site Selection

Carefully remove the UPS from its packaging, and carry out a meticulous inspection. We record keeping the original packaging in a secure place, in case you need to send the UPS for maintenance purposes.
In case of transport damage, notify the carrier and dealer immediately.
We record paying attention to the below points in order to choose a correct placement for your UPS:

- The UPS is designed to operate in a protected environment (e.g. offices). We therefore record installing it in a place with very little or no humidity, dust or smoke.
- When the UPS is brought from a cold place to a warmer place, humidity in the air may cause condensation in the UPS. In this case, allow UPS to stand for two hours in the warmer place before beginning with the installation.
- In all circumstances, see the “Technical Characteristics” chapter for environmental specifications and check that the selected area meets these criteria.
- During normal operation the UPS discharges a minimal amount of heat. So it is necessary to leave at least 10 cm of unobstructed space all around the UPS in order to keep it properly ventilated.
- Do not obstruct ventilation holes.
- Do not insert objects or pour liquids in the ventilation holes.
- Do not rest any object on top of the UPS.
- Do not keep liquids, flaable gases or corrosive substances near the unit.
- Install the UPS on a properly tiled floor. Avoid the installation on a floor that is not tiled flat.

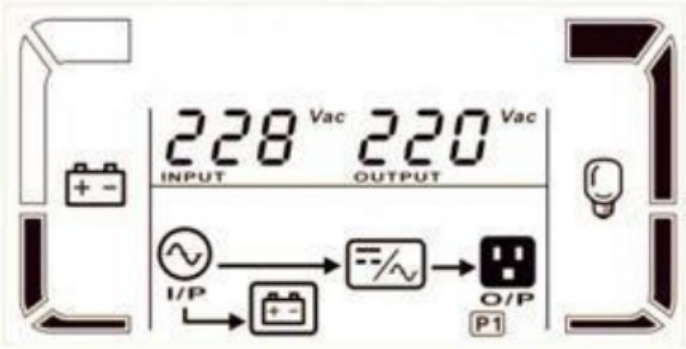
Operating Modes



NORMAL Mode

The UPS typically works in Normal mode: Input mains power is available and its amplitude is within specifications. Please refer to figure 1.
After the filter has eliminated any high Frequency interference present on the mains, the AC Input line is rectified and conditioned in the Rectifier block (AC/DC conversion); the continuous power now enters into the Inverter block and is then reconverted into alternated power (DC/AC conversion), overcoming the Automatic Bypass and feeding the load after an extra filtration. At the same time the UPS recharges the batteries through the Battery Charger block.
Please refer to figure 2, which describe the UPS front panel.
The Normal mode is identified by:

- Line led is ON.
- The graphic LCD panel shows the path of energy flow during Normal mode.



BATTERY Mode

During operation in Normal mode, if the UPS finds the Mains OFF condition (due to a Blackout or Overvoltage/Brownout), it then switches into Battery mode. In this case, the batteries supply the required Output power thanks to the DC/AC conversion carried out by the Inverter. The UPS switches back to Normal mode a few seconds after AC Input power is restored or Voltage comes back to internal specifications.
Please refer to figure 1.
The Battery mode is identified by:

- Battery led is ON.
- The graphic LCD panel shows the path of energy flow during Battery mode.
- An acoustic signal every 4 seconds.

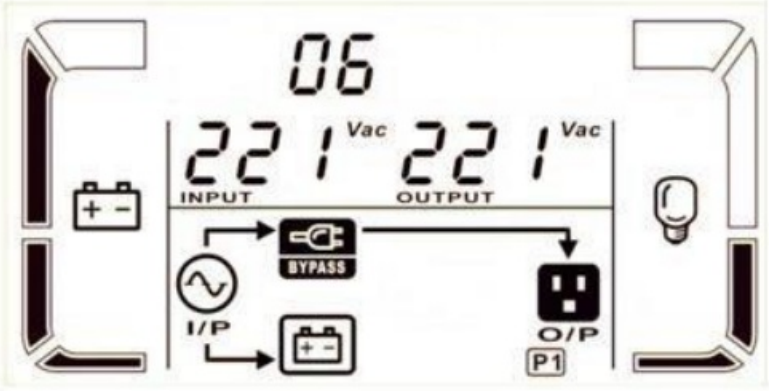
BYPASS Mode

In Bypass mode, the AC Input line is directly connected with the UPS outlets by an Automatic Bypass.
As indicated in figure 1, in Bypass mode the UPS recharges the batteries.
If you connect the AC Input line to the UPS and the Input line breaker on the rear is “ON”, the UPS will go to Bypass mode.
The Bypass mode is an idle mode for the UPS: then by pressing ON button, the UPS turns ON completely, activating the Inverter block.
When the UPS works in Bypass mode it can be considered as “not active”, since the Inverter block is not active.
The UPS is considered “active” when the Inverter block is ON (in Normal mode and in Battery mode).
Furthermore the UPS switches automatically to Bypass mode as a consequence of accidental overload or Inverter fault thus protecting the supplied devices.

The Bypass mode is identified by:

- Bypass led is ON.
- The graphic LCD panel shows the path of energy flow during Bypass mode.

- An acoustic signal every 2 minutes.

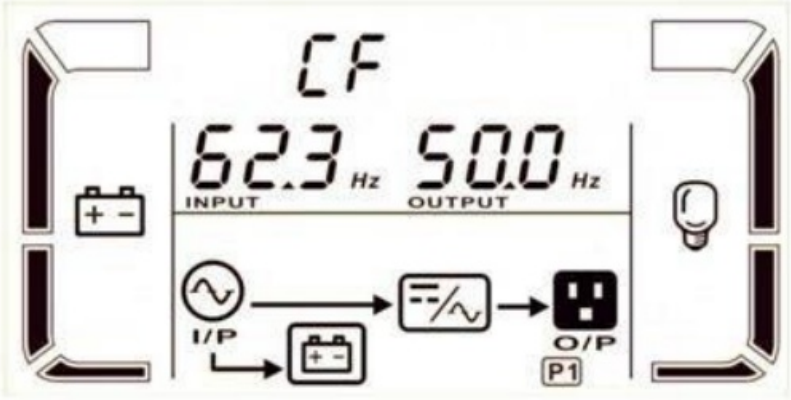


⚠ During Bypass mode, loads are fed directly from AC Input line. Therefore no protection against AC Input line disturbances or interruptions is present.

CONVERTER FREQUENCY Mode

It is possible to select the Converter Frequency mode to work with the Output Frequency different from the Input Frequency. For example it is possible to work with 60 Hz Input Frequency and 50 Hz Output Frequency or 50Hz Input Frequency and 60 Hz Output Frequency.
Please contact Technical Service for the instruction to enable the Converter Frequency mode; by default Converter Frequency mode is disable, and the Output Frequency will synchronize automatically with the Input Frequency.
The Converter Frequency mode is identified by:

- Line led is on.
- The graphic LCD panel shows the path of energy flow during Bypass mode.
- The “CF” characters are ON.



EXTERNAL DESCRIPTION

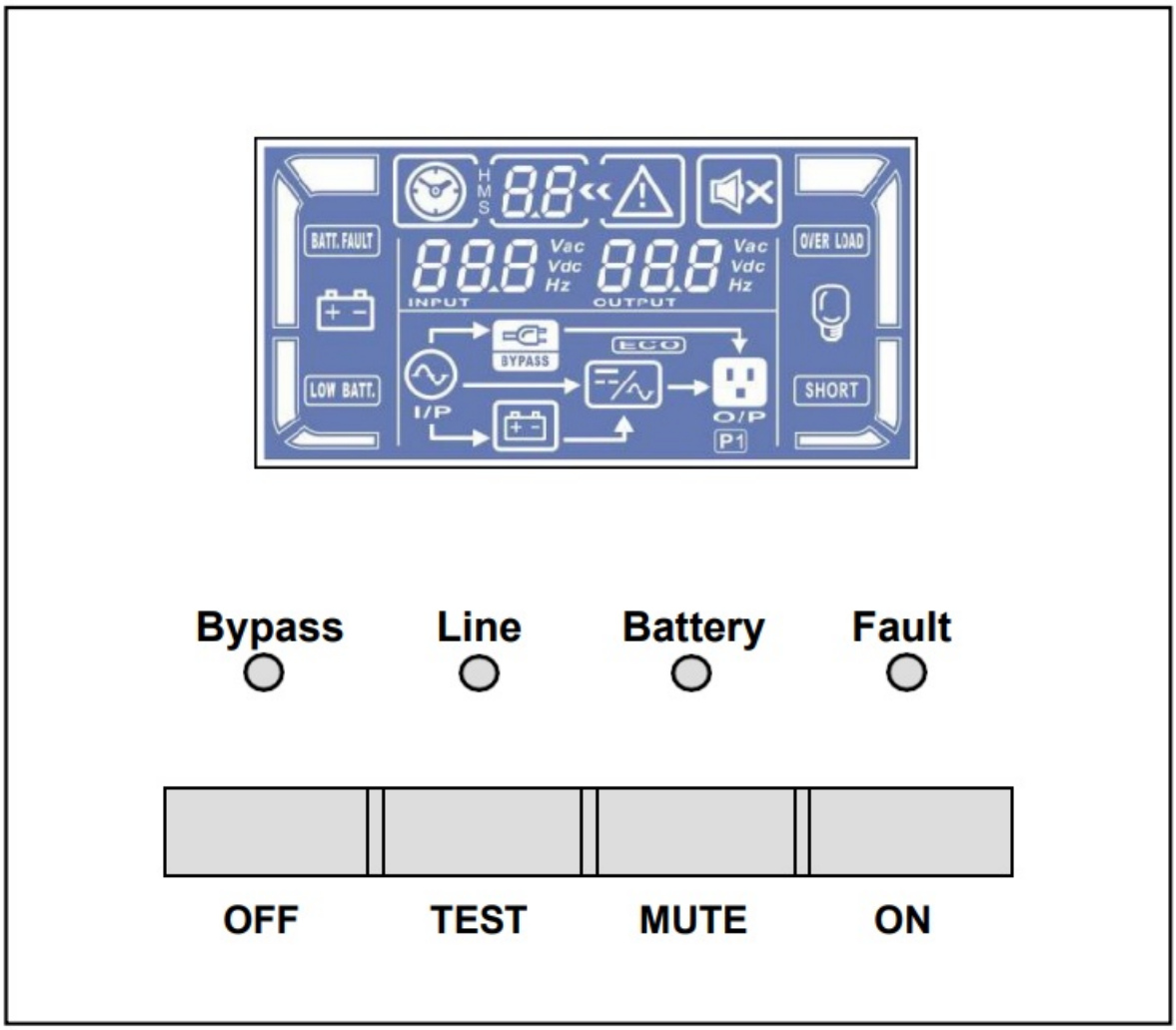
Front Panel

The front panel informs the user about operating status, alarm conditions and measurements. It also provides access to controls and configuration parameters.
Front panel shown below consists of three parts:

1. Graphic LCD panel provides complete information about the energy flow path and existing alarms, Load and Battery level, Input, Output and Battery measurements.

2. 4 LED’s when illuminated indicate UPS status.
3. 4 buttons enables the user to turn ON/OFF the UPS and to make selections of the functioning parameters.

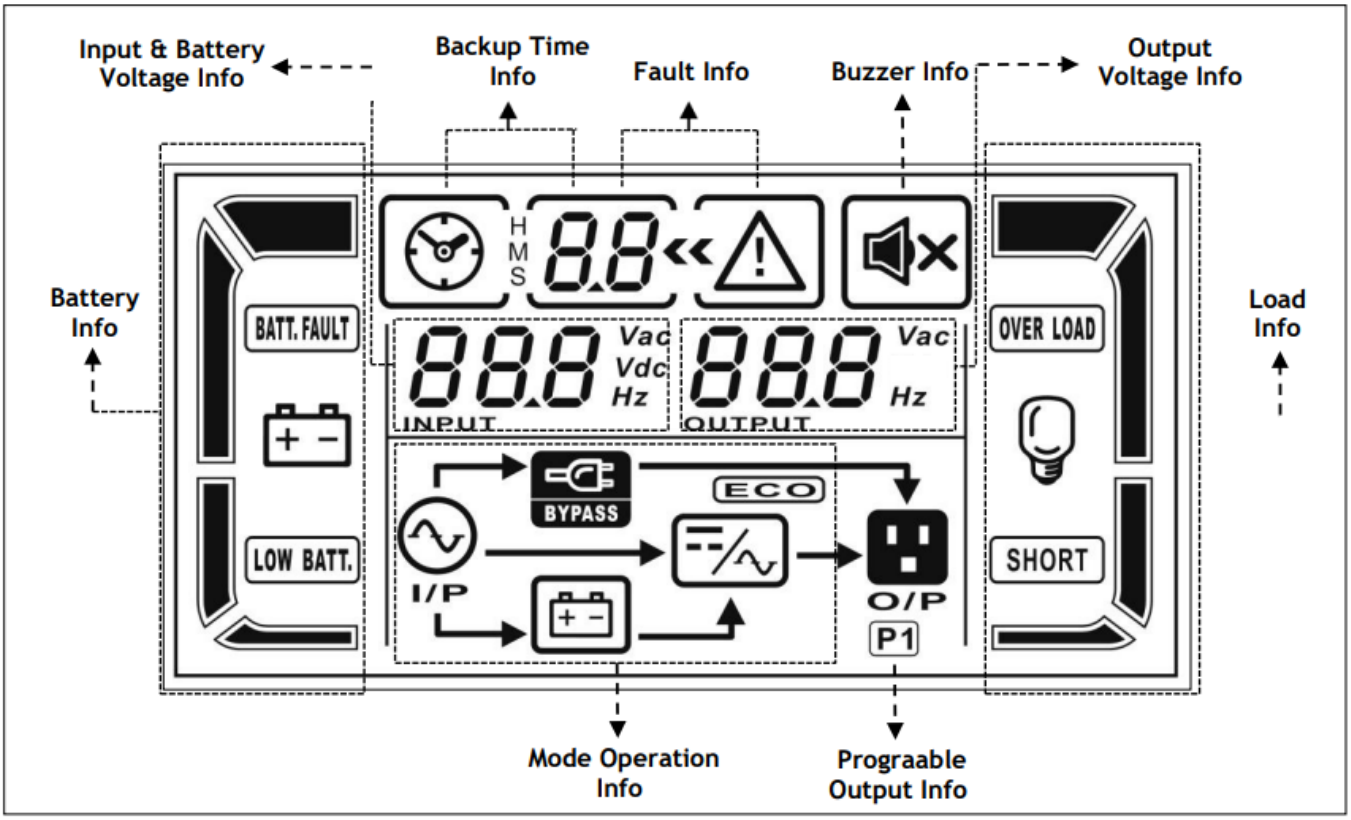
Figure 2 – Front panel



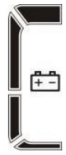
Graphic LCD Panel

<u>Please refer to figure 3.</u>

Figure 3 – Graphic LCD Panel



Graphic LCD Panel	Function
Backup time information	
H M S 8.8	Indicates how much time has passed in Battery mode. H: hours, M: minutes, S: seconds
Fault information	
« ⚠	Indicates the warning that a fault has occurred.
8.8	Indicates the Fault codes, and the codes are listed in the “Fault Table” of chapter 8.
Mute operation	
🔇	Indicates that the UPS alarm is disabled (muted).
Output Voltage information	
88.8 Vac Vdc Hz OUTPUT	Indicates the Output Voltage or Frequency. Vac: Output Voltage, Hz: Output Frequency
Graphic LCD Panel	**Function**
Load information	

	Indicates the load level by 0-25%, 26-50%, 51-75%, and 76-100%.
	Indicates Overload.
	Indicates the load or the Output is short-circuited
Mode operation information	
	Indicates the UPS connects to the mains.
	Indicates the Battery is working.
	Indicates the Bypass circuit is working.
	Indicates the Inverter circuit is working.
	Indicates the Output is working.
Battery information	
	Indicates the Battery capacity by 0-25%, 26-50%, 51-75%, and 76-100%.
	Indicates the Battery is faulty or defective.
	Indicates Low Battery level and Low Battery Voltage.
Input and Battery Voltage information	
	Indicates the Input Voltage or Frequency or Battery Voltage. Vac: Input Voltage, V dc: Battery Voltage, Hz: Input Frequency

Buttons

Functions of the buttons are given below:

Button	Function
ON	Turn ON: press and hold the button more than 0.5 sec to turn the UPS ON.
OFF	Turn OFF: press and hold the button more than 0.5 sec to turn the UPS OFF.
TEST	Battery Test: press and hold the button more than 0.5 sec to test the Battery while in Normal m ode.
MUTE	Mute the alarm: press and hold the button more than 0.5 sec to mute the buzzer. If you press it again after the buzzer is muted, the buzzer will beep again.

LED Indicators

There are 4 LED's on the front panel to show the UPS working status:

Status LED	Bypass	Line	Battery	Fault
UPS Start Up	●	●	●	●
Bypass Mode	●	○	○	○
Normal Mode	○	●	○	○
Battery Mode	○	○	●	○
Battery Test	●	●	●	○
Fault Mode	○	○	○	●

Note: ● means LED is lit (ON) and ○ means LED is not lit (OFF).

Acoustic Alarm

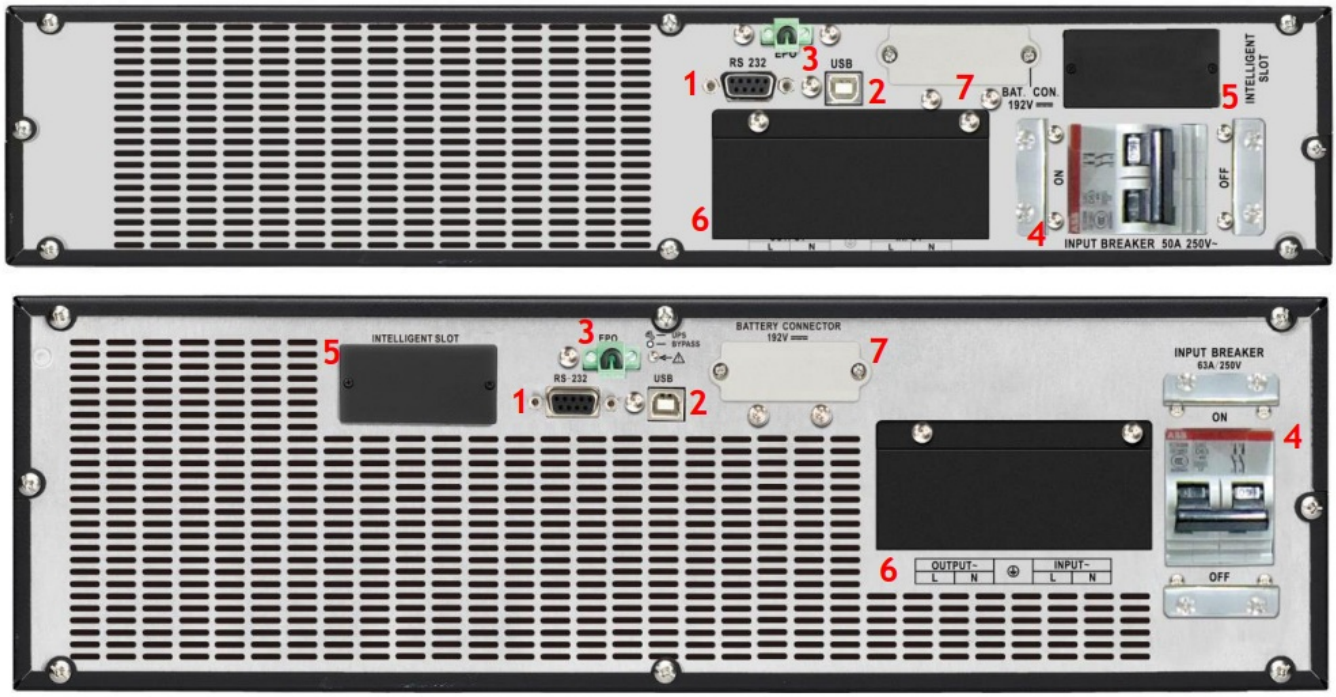
Description	Buzzer Status	OFF
UPS status		
Bypass Mode	Beeping once every 2 minutes	YES
Battery Mode	Beeping once every 4 seconds	
Fault Mode	Beeping continuously	
Warning		
Overload	Beeping twice every second	
Low Battery		
Battery Unconnected		
Over Charge		

EPO condition	Beeping once every second	NO
Fan failure/Over Temperature		
Charger failure		
Input Circuit failure		
Overload (3 times in 30 min)		
Fault		
Vdc Bus Start failure	Beeping continuously	YES
Vdc Bus Over		
Vdc Bus under		
Vdc Bus Unbalance		
Vdc Bus short-circuit		
Inverter Soft Start failure		
High Inverter Voltage		
Low Inverter Voltage		
Inverter Output short-circuit		
Power Fault		
Battery SCR short-circuit		
Inverter short-circuit		
Battery Voltage Loss		
Parallel Counication failure		
Output short-circuit		
Over Temperature		
CPU Counication failure		
Overload		

Note:
OFF = YES means that the buzzer can be muted or stopped
OFF = NO means that the buzzer can NOT be muted or stopped

Rear Side

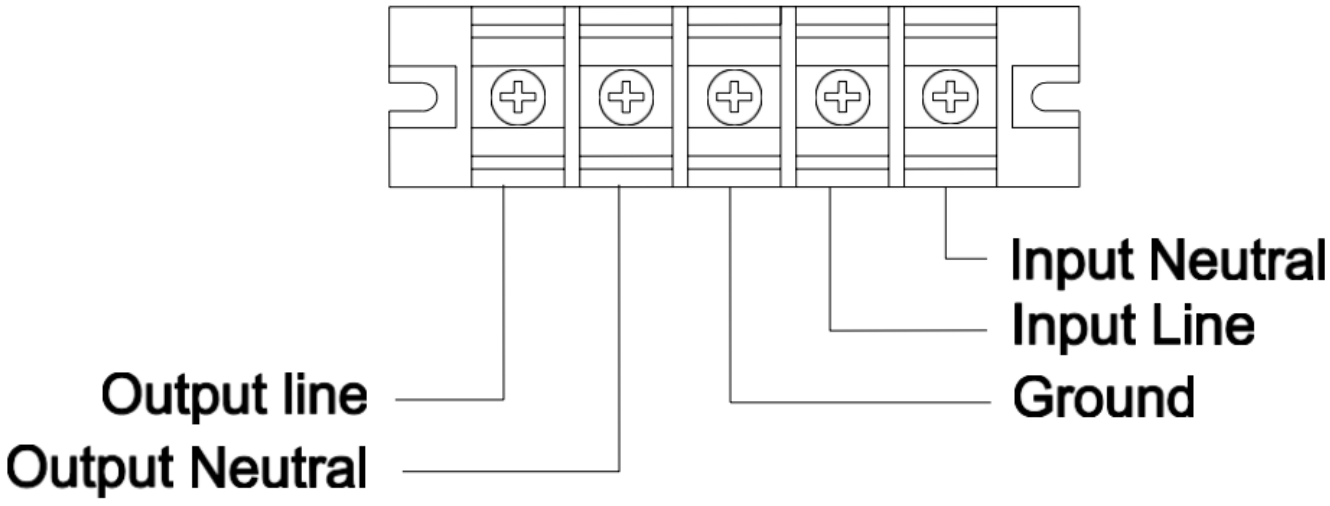
Figure 4 – Rear Side [EVO DSP PLUS6.0 RM (above) – EVO DSP PLUS10.0 RM (below)]



1. Computer Interface (DB9 female connector): it is the counication RS-232 port.
2. Computer Interface (USB connector): it is the counication USB port.
3. EPO (Emergency Power OFF) connector
4. Input circuit breaker
5. Slot for SNMP Interface (optional)
6. Metallic panel for access to the Input/Output terminals: upon removal, it is possible to access the Input/Output terminals (see figure 5).
7. Metallic cover of Battery connector (UPS unit): remove the metal cover to access to the Battery connector and to connect the UPS unit to the Battery Box unit by the included Battery cable.

Input/Output Terminals

Figure 5 – Input/Output Terminals

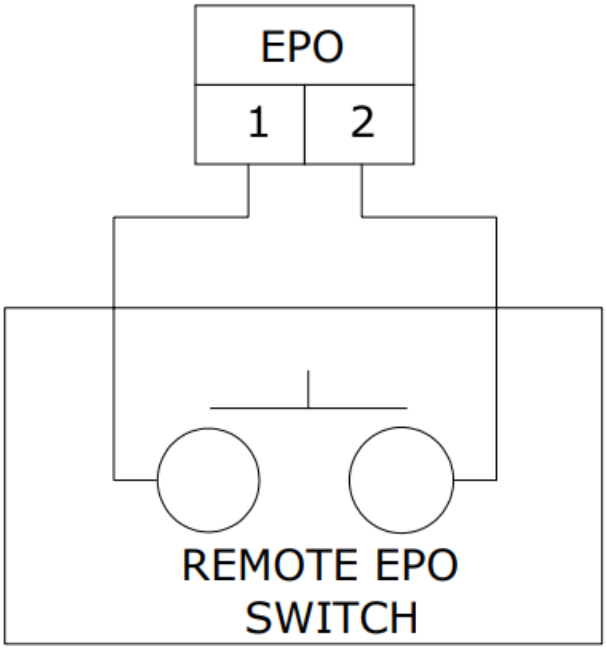


- INPUT terminals: to connect AC Input line.
- OUTPUT terminals: to connect OUTPUT line.
- GROUND terminal: to connect INPUT and OUTPUT GROUND cables.

EPO (Emergency Power Off)

EVO DSP PLUS RM models have the EPO (Emergency Power OFF) connector on the rear side, (see figure 6). This permits to iediately switch the UPS Output OFF from a distance in case of emergency.
The UPS is supplied with EPO short-circuited terminals and in this case the product works normally.
If you want to use an external switch to turn OFF the UPS by EPO, then remove the short-circuit from the EPO terminals and connect the switch to the EPO terminals as described in the figure 6.

Figure 6 – EPO (Emergency Power OFF)



⚠ If the switch is CLOSED the UPS works normally; if, on the contrary, the switch becomes OPEN then the UPS Output turns OFF iediately.

To switch the UPS Output ON again after an EPO, it is necessary to close again the EPO switch.
The EPO terminals do not need an external feeding Voltage and are isolated from the dangerous voltages that are present inside the UPS.

Electrical Installation

⚠ The electrical installation has to be done by qualified personnel. Follow all the Safety Standards (CEI Standards in Italy or IEEE elsewhere) for the Input/Output connections and for the right selection of Input/Output cables.
We record to use dedicate AC Input/Output power lines for the UPS.
For safety we record using external circuit breakers between Input mains and UPS AC Input line and between UPS Output lines and the loads. The circuit breakers should be qualified with leakage current protective function (leakage current < 30 mA).

EVO DSP PLUS RM models are made of 2 separate units: the UPS unit (containing the control and power electronics) and the Battery Box unit containing the batteries and the batteries charger.

⚠ Before starting the installation procedure, be sure that:

1. The Input circuit breaker of UPS unit is “OFF” (see figure 4).
2. The Battery circuit breaker of Battery Box unit is “OFF” (see figure 4).
3. The AC Input Voltage for the UPS has been removed.
4. The UPS is completely OFF (only if graphic LCD panel is OFF).

The following table shows the recorded size for Input, Output and Battery wires.

Model	Wiring spec (cross section)			
	Input	**Output**	**Battery**	**Ground**
EVO DSP PLUS 6.0 RM	4 2	4 2	4 2	4 2
EVO DSP PLUS 10.0 RM	6 2	6 2	6 2	6 2

⚠ The cables for EVO DSP PLUS 6.0 RM should be able to withstand until 40A current. It is recorded to use 4 2 or thicker wire for safety and efficiency.
The cables for EVO DSP PLUS 10.0 RM should be able to withstand until 63A current. It is recorded to use 6 2 or thicker wire for safety and efficiency.
We record using only flexible TRI-RATED cables. Otherwise if you use rigid cables, it will be difficult to move the UPS from initial positioning.
We record to use dedicate AC Input/Output power Lines for the UPS.

Installation

⚠ Connect the GROUND wire first when making wire connection. Disconnect the GROUND wire last when making wire disconnection.
Make sure that the wires are connected tightly to the terminals.

We advise you to follow the steps below explained:

1. Remove the metallic panel that covers the Input/Output terminals, see figure 4. The terminals are shown in figure 5. All the cables have to reach the terminals from the rear side using the proper holes in the metallic panel.
2. Connect the INPUT line (LINE, NEUTRAL and GROUND), paying attention to the right polarity, in accordance with figure 5, as explained below:
    - Connect INPUT GROUND wire to the GROUND terminal.
    - Connect INPUT LINE wire to the INPUT L terminal.
    - Connect INPUT NEUTRAL wire to the INPUT N terminal.
3. Connect the OUTPUT line (LINE, NEUTRAL and GROUND) as follow:
    - Connect OUTPUT GROUND wire to the GROUND terminal.
    - Connect OUTPUT LINE wire to the OUTPUT L terminal.
    - Connect OUTPUT NEUTRAL wire to the OUTPUT N terminal.
4. Reassemble the metallic panel that gives access to the UPS terminals.
   The instructions below describe the operations to correctly connect the UPS unit to the Battery Box unit.

ATTENTION: the UPS unit doesn't work without Battery Box unit because the batteries are inside the Battery Box unit.

We suggest to use ONLY Battery Box unit supplied by TECNOWARE. TECNOWARE declines any responsibilities if this rule is not followed.

5. Proceed with the connection of Battery Box unit through the following operations:
   - Remove the metallic cover of Battery connector on the UPS unit (# 9 figure 4)
   - Remove the metallic cover of Battery connector on the Battery Box unit (# 15 or #16, figure 4)
   - Connect the Battery connectors of UPS unit and Battery Box unit by the included Battery cable.
   - Screw the GROUND terminal of Battery cable on the case of UPS unit by using a screw of metallic cover.
   - Screw the GROUND terminal of Battery cable on the case of Battery Box unit by using a screw of metallic cover.
   - Connect the AC Input power socket of the Battery Box unit (# 13 figure 4) to an AC utility line for recharging batteries.

     CAUTION – HIGH BATTERY VOLTAGE AND RISK OF ELECTRIC SHOCK – the battery pack nominal voltage is 192Vdc (there are 16 batteries series-connected inside the UPS).
6. Restore the AC Input mains Voltage to the UPS.

It is compulsory to ground the UPS according to the Safety Standards.
The case of the UPS is internally connected to the ground terminal (GND) of the IN/OUT terminals, in order to guarantee safety to the user. To guarantee safety it is necessary to be sure that the local electric plant is supplied with GROUND (in compliance with the Safety Standards), and that a valid connection is guaranteed between the GROUND of the UPS and the GROUND of the local electric plant.
Any interruption of the GROUND conductor is absolutely prohibited.
We record to use dedicate AC Input/Output power Lines for the UPS.
Risk of electric shock at the Output lines if the UPS is ON, even when the UPS is not connected to AC utility line.
Risk of electric shock at the Output lines while the unit is connected to the AC utility line.
Risk of electric shock: do not remove the cover. The UPS contains internal parts which are at a high Voltage and are potentially dangerous, capable of causing injury or death by electric shock.
There are no internal parts in the UPS which are user serviceable. Any repair or maintenance work must be performed exclusively by qualified technical personnel authorized by TECNOWARE. TECNOWARE declines any responsibility if this warning is disregarded.
Disregard for these warnings may lead to a risk of electric shock to operators.

First Start Up

Turning the UPS ON is very easy. Nevertheless we record that, on First Start Up, the following procedure is observed for greater safety.

1. Turn "ON" the Battery circuit breaker of the Battery Box unit (see figure 4).
2. Check if the Input circuit breaker the rear side of UPS unit is in "OFF" position (see figure 4).
3. Check that no load is connected to the UPS Outputs.
4. Check that the AC Input Voltage is within Input specifications.
5. Turn "ON" the Input circuit breaker. All the led's are on for some seconds; in the same time the UPS performs a functioning SELF-TEST. Then the UPS starts to work in Bypass mode: the Bypass led is ON and the graphic LCD panel shows the path of energy during Bypass mode.
6. Press the ON button on front panel until the UPS emits an acoustic signal: after approximately 4 seconds the Inverter turns ON and the UPS starts to work in Normal mode: the Line led will be ON, the Bypass led will be OFF and the graphic LCD panel will show the path of energy during Normal mode.

7. Simulate a black-out by removing the AC Input. The UPS starts working in Battery mode: the Battery led will be on, the Line led will be off and the graphic LCD panel will show the path of energy during Battery mode. Moreover UPS emits a brief acoustic signal every 4 seconds. When Battery level is ending the acoustic signal will be emitted every 1 second.
8. Restore the AC Input: after few seconds the UPS turns back in Normal mode.
9. The UPS has passed first start up check: now connect the loads to be supplied to the UPS Output and turn them ON, checking UPS doesn't report Overload information on the graphic LCD panel. By LCD display check if the Output load percentage is less than 100%; otherwise it is necessary to remove part of the loads at the Output lines.

Before using the UPS normally, leave it in Normal mode and feed the Battery Box for at least 10 hours in order to charge Battery completely (the UPS charges Battery also in Bypass mode). The batteries reach the 90% of their capacity after about 10 hours of recharge.

Functioning

Turning ON and OFF

Let's see carefully the consequences of the pressure of ON and OFF buttons.
The UPS is in Bypass mode (the Inverter is OFF); if the ON button is pressed, after few seconds the Inverter starts and the UPS switches in Normal mode.
The UPS is in Normal mode (the Inverter is ON); if the OFF button is pressed, the Inverter turns OFF and the UPS switches in Bypass mode.

⚠ To turn completely OFF the UPS please do the following steps:

- Put the UPS in Bypass mode by pressing the OFF button
- Place the Battery circuit breaker of Battery Box unit in "OFF" position
- Place the Input circuit breaker in "OFF" position

The graphic LCD panel and the leds on the front panel are OFF only when the UPS is completely OFF.

If UPS is used daily, it is recorded to leave the Input circuit breaker always "ON" and use the ON and OFF buttons on the front panel to activate/deactivate the Inverter.
If the UPS has to be turn OFF for several days, it is recorded to turn OFF the Input circuit breaker and to turn OFF the Battery circuit breaker of the Battery Box unit.
If the ON button is pressed when AC Input is not present, the UPS switches ON even, and works in Battery mode after about 4 seconds.
If the OFF button is pressed when AC Input is not present, then the Inverter switches OFF and consequently there will be no Output power.

⚠ In Bypass mode, the Inverter is NOT ACTIVE and the UPS doesn't work as an UPS, but only as a Bypass between Input and Output power lines.
In Bypass mode, the UPS supplies the load only if AC Input is present. In Bypass mode the Output load isn't protected in case of black-out.

Low Battery and Automatic Restart

The UPS reaches the Low Battery condition whenever, during working in Battery mode, the batteries reach a charge level allowing the connected devices to operate for few minutes more.
The UPS warns operators of Low Battery by lighting of the LOW BATT. icon on the graphic LCD and by emitting an acoustic signal every second.
If AC Input does not come back on within few minutes, the UPS shuts-down automatically thus preventing the batteries from discharging excessively; the UPS stops supplying Output power, deactivates control panel indication and goes to a waiting state. Once AC Input comes back on, the UPS restarts automatically and after 4 seconds it goes back to work in Normal mode.
After a complete discharge, the UPS needs 10 hours to recharge completely the batteries. The UPS recharges batteries automatically if it works in Normal mode or in Bypass mode.

Load Testing

The UPS indicates the Output Load level by graphic LCD (on the right side as described in the chapter 5).
When the Output load is higher then nominal value the UPS warns of Overload condition by graphic LCD and by acoustic alarm as described in the “Warning Table” and in the “Troubleshooting” chapter.
The UPS has the capability to accept an Overload less than 110% for 10 minutes.
An Overload between 110% and 130% is accepted for about 1 minute and after UPS switches automatically to the Bypass mode.
An Overload higher than 130% is accepted for 1 second and after the UPS switches automatically to the Bypass mode.
Once the requested power is back within range, the UPS switches automatically to the Normal mode.

⚠ Make sure that the UPS never indicates Overload condition.
Do not connect a load greater than rated value to the UPS (see POWER specifications in the chapter “Technical Characteristics”), as this may damage the unit. In this case the warranty is void.

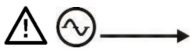
Battery Test

If you need to check the Battery Status when the UPS is running in Normal mode, you could press the TEST button to let the UPS do the Battery Test.
The Battery Test starts iediately and it finishes after some seconds. If the batteries pass the test, no alarm will be shown.
During the Battery Test, the graphic LCD and buzzer indication will be the same as at Battery mode except that the Battery led is flashing.
To keep the system reliable, the UPS will perform the Battery Test automatically once per week.
User also can set Battery Test through monitoring software.

Operation in Warning Status

When Fault led flashes and the buzzer beeps once every second, it means that there are some problems for UPS operation. Users can get the Fault code from graphic LCD panel. Please check the “Troubleshooting” chapter for details.
Below you can see the “Warning Table”, with the correspondence between each warning and the relative signals (icons on graphic LCD and acoustic alarm) for the user.
Some acoustic alarms can’t be muted unless the error is fixed. Please refer to chapter 5 for the details.

Warning Table

WARNING	ICON (flashing)	ACOUSTIC ALARM
Low Battery		Beeping every second
Overload		Beeping twice every second
Battery Unconnected		Beeping every second
Over Charge		Beeping every second
EPO enable		Beeping every second
Fan failure/Over temperature		Beeping every second
Battery Charger failure		Beeping every second
Input Circuit failure		Beeping every second
Overload 3 times in 30 min		Beeping every second

Operation in Fault Mode

When Fault led illuminates and the buzzer beeps continuously, it means that there is a fatal error in the UPS. Users can get the Fault code from display panel. Please check the “Troubleshooting” chapter for details. Please check the loads, wiring, ventilation, mains supply, Battery and so on after the fault occurs. Don’t try to turn ON the UPS again before solving the problems. If the problems can’t be fixed, please contact Technical Service iediately.

⚠ In case of emergency, please iediately disconnect the UPS unit from mains supply, disconnect the Box Battery cable and the Output lines to avoid further risk or danger.

Below you can see the “Fault Table”, with each Fault event and the relative FAULT code/icon on graphic LCD for the user’s information.

Fault Table

FAULT EVENT	FAULT CODE	ICON	FAULT EVENT	FAULT CODE	ICON
Vdc Bus Start failure	01	None	Low Inverter Voltage	13	None
Vdc Bus Over	02	None	Inverter Output short-circuit	14	
Vdc Bus under	03	None	Battery SCR short-circuit	21	None
Vdc Bus Unbalance	04	None	Over Temperature	41	None
Inverter Soft Start failure	11	None	Overload	43	
High Inverter Voltage	12	None			

Counication Interfaces

The UPS is factory-equipped with RS232 and USB Counication Interfaces. On the UPS rear side there are the connections of the Interfaces.
Only one of the RS232/USB counications can be activated at one time. To activate RS232 counication it is sufficient to connect the RS232 cable only; to activate USB counication it is sufficient to connect the USB cable only.
The RS-232 and USB signals are all isolated through photo-couplers from the dangerous voltages that are present inside the UPS.
Connecting to the Web site **www.tecnoware.com**, it is possible to download, free of charge, the update UPS management Software, compatible with the most popular Operative Systems.
It is possible to use a SNMP (Single Network Management Protocol) Interface to connect the UPS to a LAN (Local Area Network). The SNMP interface is optional.
We advise you to follow the steps below explained to install the interface correctly:

1. Remove the metallic panel (#6, figure 4) that covers the slot for SNMP interface.
2. Put the SNMP Interface into the slot and fix it with screws.
3. Connect the LAN cable to SNMP interface and follow the included instruction to make the interface working well.

Technical Characteristics

UPS EVO DSP PLUS Rack Mount Model	**6.0**	**10.0**
Power	**6000 VA**	**10000 VA**
Nominal Active Power	6000 W	10000 W
Power Factor	1	
Technology	On-Line Double Conversion Transformer less	
Dimension (W x H x D) – UPS unit	43.8 x 8.8 x 50 cm	43.8 x 13.3 x 58 cm
Dimension (W x H x D) – Battery Box unit	43.8 x 13.3 x 66.8 cm	43.8 x 13.3 x 66.8 cm

Net Weight – UPS unit		15 kg	18 kg
Net Weight – Battery Box unit		57 kg	65 Kg
INPUT			
Nominal Voltage		Single Phase 208/220/230/240 Vac	
Voltage Range for Normal mode	Lower Limit	110 Vac ± 3% (at 50% Load)	
		176 Vac ± 3% (at 100% Load)	
	Upper Limit	300 Vac ± 3%	
Nominal Frequency		50/60 Hz (selectable)	
Frequency Range (Normal mode)		± 7%	
Input Power Factor		0.99 (at 100% Load)	
OUTPUT			
Nominal Voltage		Single Phase 208/220/230/240 Vac (selectable)	
Voltage Regulation		±1%	
Inverter Waveform		True Sinewave	
Nominal Frequency		50/60 Hz (selectable)	
Free Running Frequency (Battery mode)		(50 Hz ± 0.1%) or (60 Hz ± 0.1%)	
Total Harmonic Distortion (THD)		< 3% (100% Linear Load); < 6% (100% Non-Linear Load)	
Crest Factor		3:1 max	
Overload (Normal mode)		(100÷110) % for 10 min; (110÷130) % for 1 min; > 130% 1 sec	
Overload (Battery mode)		(100÷110) % for 30 sec; (110÷130) % for 10 sec; > 130% 1 sec	
Transfer	(Normal <–> Battery)	0 ms	

Time	(Battery <–> Bypass)	0 ms
BATTERIES (In External Battery Box gettable separately)		
Battery Type		Lead acid, sealed, free maintenance
Number of batteries		16
Nominal Battery Voltage		192 Vdc
Battery Charge Time (typical)		8 hours
Expandable Autonomy		Available, through external Battery Box (optional)

ENVIRONMENTAL CONDITIONS		
Storage Temperature Range	-15°C to +40°C (15°C to 25°C recoended for longer Battery life)	
Operating Temperature Range	0°C to +40°C (20°C to 25°C recoended for longer Battery life)	
Relative Humidity Range	0% – 95% (non condensing)	
Max. Altitude without Derating	3000 m	
Protection level	IP 20	
Cooling	Fan cooling	
Audible Noise (at 1 meter)	< 55 dBA	< 58 dBA
STANDARDS		
Safety	Low Voltage (Safety) Directive 2014/35/EU	
Performance	IEC 62040-3	
EMC	EMC (Electro-Magnetic Compatibility) Directive 2014/30/EU – categ ory C3	
Product certification	CE	
COUNICATIONS		
Computer Interface	1 RS232 port and 1 USB port	
Software	Included software compatible with: Windows, Linux, Novell	
SNMP Interface	Optional	
OTHERS		
EPO (Emergency Power OFF)	Included	

Maintenance

UPS Cleaning

⚠ Before starting any cleaning operation, be sure that:

1. The Input circuit breaker of UPS unit is “OFF” (see figure 4).
2. The Battery circuit breaker of Battery Box unit is “OFF” (see figure 4).
3. The AC Input Voltage for the UPS has been removed.
4. The UPS is completely OFF (only if graphic LCD panel is OFF).

Use only a cloth dampened with water to clean the unit.
If UPS works in an environmental unusually dusty or dirty, remove the dirty from the ventilation holes.
Before restarting the UPS be sure it is completely dry. If any liquid gets inside the UPS, do not start the unit and contact Technical Service iediately.

Battery

If the UPS is NOT going to be used for a long period of time, ensure that the batteries are left fully charged. If the UPS has not been used for more than three months, go through the procedure described in the chapter 7 “First Start Up” before using it again.
Please keep in mind that the batteries must be recharged at least once a month. Take in mind that batteries are recharged automatically (if the UPS is ON and working in Normal or in Bypass mode) for after approximately 10 hours with AC Input line present.
Battery life strongly depends on the ambient temperature. There are also other factors like the number of charge discharge cycles, the discharge depth, humidity and altitude.
The recorded environmental specifications for a correct use of batteries are listed in the “Technical Specifications” section.
Performing Battery Test can provide you with information about Battery condition (see “Battery Test” section for more information on Battery Test).

Battery replacement must be performed exclusively by qualified technical personnel authorized by TECNOWARE. TECNOWARE declines any responsibility if this warning is disregarded.
When replacing batteries, replace with the same type and number.
To remove the batteries, firstly you have to turn off the UPS unit and disconnect the AC
Input Line, then turn off the Battery circuit breaker of the Battery Box unit, disconnect the Battery cable and disconnect the Input cable for recharging batteries. Then disconnect batteries one to each other and take them off from their housing one by one.

⚠ **CAUTION** – A battery can present a risk of electrical shock and high short circuit current.
The following precautions should be observed when working on batteries:

- ⚠ a) Remove watches, rings or other metal objects;
- b) Use tools with insulated handles;
- c) Wear rubber gloves and boots;
- d) Do not lay tools or metal parts on top of batteries;
- ⚠ e) Disconnect the charging source prior to connecting or disconnecting battery terminals;
- f) Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground.

CAUTION – Do not dispose of batteries in a fire. The batteries may explode.
CAUTION – Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.

Operator Safety

Whenever the UPS is not responding anymore to original characteristics, the UPS must be made non operative

and every usage not authorised must be avoided. After it will be necessary to refer to qualified technical personnel.
Original safety characteristics might not be if, for example, the UPS has visible damage or irregular operation.

Troubleshooting

This section gives information about the procedures which shall be performed in case of abnormal operation.
If you fail to fix the problem consult authorized Technical Service with the following information:

- Model and serial number of the UPS, which can be found on the nameplate on the rear of the UPS.
- Description of abnormal operation and Fault code displayed on graphic LCD.

If you have noticed an abnormality in operation; check the Protective Ground/Earth connections, examine the circuit breakers positions, read alarms code from the graphic LCD and refer to the table below. Apply all suggestions corresponding to each anomaly.
If your issue is excluded or the suggested actions do not solve your problem, consult the Technical Service.

Risk of electric shock: do not remove the cover. The UPS contains internal parts which are at a high Voltage and are potentially dangerous, capable of causing injury or death by electric shock.
There are no internal parts in the UPS which are user serviceable. Any repair or maintenance work must be performed exclusively by qualified technical personnel authorized by TECNOWARE.

 TECNOWARE declines any responsibility if this warning is disregarded.
Warning to the technical personnel authorized for service: since internal components are connected to the batteries, they will remain powered, and therefore dangerous, even after the UPS has been disconnected from AC power mains. Before any repair or maintenance work to the UPS unit, turn off the Battery circuit breaker on the rear side of Battery Box unit and then disconnect the Battery cable.

SYMPTOM	POSSIBLE CAUSE	ACTION TO SOLVE
No indication and/or alarm on the front panel even though the main is normal. The graphic LCD is OFF.	The AC Input line cable is not connected well. The Input circuit breaker is “OFF”.	Check if Input cable is firmly connected to the Input mains. Check the Input circuit breaker: if it is “OFF” please switch it “ON”.
The icon ⚠ and the warning code EP flash on LCD display and alarm beeps every second.	EPO function is enabled.	Set the EPO circuit in closed position to disable EPO function.
The icon ⚠ and BATT. FAULT flash on LCD display and alarm beeps every second.	The external or internal batteries are incorrectly connected.	Check if all batteries are connected correctly.
The icon ⚠ and OVER LOAD flash on LCD display and alarm beeps twice every second.	UPS is overloaded.	Remove excessive loads from UPS Output.
	UPS is overloaded. Devices connected to the UPS are fed directly by the mains via the Bypass.	Remove excessive loads from UPS Output.
	After repetitive overloads, the UPS is locked in the Bypass mode. Connected devices are fed directly by the mains via the Bypass	Remove excess loads from UPS Output first. Then shut down the UPS and restart it.
Fault code is shown as 43. The icon OVER LOAD lights on LCD display and alarm beeps continuously.	UPS is overloaded too long and becomes faulty. Then UPS shuts down automatically.	Remove excess loads from UPS Output and restart it.
Fault code is shown as 14, the icon SHORT lights on LCD display, and alarm beeps continuously.	The UPS shuts down automatically because short circuit occurs on the UPS Output.	Check Output wiring or if connected devices are in short circuit status.
Fault code is shown as 1, 2, 3, 4, 11, 12, 13, 1A, 21 or 41 on LCD display and alarm beeps continuously.	A UPS internal fault has occurred. There are two possible results: 1. The load is still supplied, but directly from AC power via Bypass. 2. The load is no longer supplied by power.	Contact Technical Service.
Battery backup time is shorter than nominal value	Batteries are not fully charged.	Charge the batteries for at least 8 hours and then check capacity. If the problem still persists, consult Technical Service.
	Batteries are defective/faulty.	Contact Technical Service to replace the batteries.
The icon ⚠ and ⚠ flash on LCD display and alarm beeps every second.	Fan is locked or not working; or the UPS temperature is too high.	Check fans and contact Technical Service.

If the described anomalies should continue despite the advised troubleshooting, or should they manifest in any other form, please contact:
TECNOWARE SERVICE
www.tecnoware.com

CE Conformity to the European Directives

TECNOWARE S.r.l. confirms that EVO DSP PLUS RM models comply with the requirements set out in: the Low Voltage (Safety) Directive 2014/35/EU and following amendments, the EMC (Electro-Magnetic Compatibility) Directive 2014/30/EU and following amendments.
WARNING – EVO DSP PLUS RM is a category C3 UPS product. This is a product for coercial and industrial application in the second environment. Installation restrictions or additional measures may be needed to prevent disturbances.

Product Disposal


UPS EVO DSP PLUS RM cannot be disposed as an urban waste, but must be treated as a separate waste. Any violation is indictable with financial sanctions as per in force regulations.
An incorrect waste disposal or an improper use of the same or of any parts can be damaging for the environment and for human health.
A correct waste disposal of products having the dustbin symbol marked by a cross help to avoid negative consequences to the environment and to human health.

Lead Batteries


Pb EVO DSP PLUS RM models contain lead acid, sealed, maintenance free batteries.
This kind of batteries, if handled by non-experienced personnel, can cause electric shock or short- circuit.
For this reason the batteries can be removed only by qualified technical personnel, specialized and authorized by Tecnoware. Tecnoware declines any responsibilities if this rule is not followed.
The batteries cannot be disposed as an urban waste, but must be treated in conformity with 2006/66/CE European Directive; any violation is indictable with financial sanctions as established into 2006/66/CE European Directive.

Customer Support

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Documents / Resources

	TECNOWARE EVO DSP PLUS 6.0 Rack Mount - PF 1 Uninterruptible Power Supply [pdf] User Manual EVO DSP PLUS 6.0 Rack Mount PF 1 Uninterruptible Power Supply, EVO DSP PLUS 6.0 Rack Mount PF 1, Uninterruptible Power Supply, Power Supply, Supply

References

- User Manual