

TECHNICAL MANUAL

FOR

TRUE – ON – LINE UPS SYSTEM

ENERTECH UPS PVT. LTD.

Version 2



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REGD. OFF. : S. No. 399/1-2, Bharegaon, Pirangut Industrial Area, P.O.Ghotawade, Pune – 412 111
REGIONAL OFFICES : • Mumbai • Delhi • Bangalore • Hyderabad • Kolkata

Letter from the Chief Executive Officer,

Dear Sir,

We congratulate you on buying the ENERTECH system-popular for its performance & reliability

At ENERTECH we have established stringent Production & Q.C. procedures to manufacture a trouble free and totally reliable system.

ENERTECH enjoys a rich experience in Power Electronics and has a major presence in the Asian and African markets today. All our products are the outcome of a persistent endeavor to offer better technology and superior performance. Even in the future, we will strive to evolve the most effective products to meet your power problems & energy solutions.

At this juncture we would like to mention that a UPS system is meant to solve power problems at the site. Every product is a solution for the problems in the environment where the load is installed. The environment includes aspects like climatic conditions, local power conditions, connected & surrounding load, load-distribution, wiring & its rating, reversal of wiring and allied problems.

Although each system is functionally tested in the factory, final adjustment and tuning of the unit in your environment to solve the power problems is done by our engineer, at the site.

At this stage our engineer needs your co-operation for an initial period of few days, to get your operators acquainted with the UPS operation, to collect data on the working environment and to ensure that the product stabilizes & solves the power problems at your location. This co-operation is important since all site-related conditions do not get simulated on the first day of installation.

We also solicit your feedback on our products. It will greatly help us in fulfilling your requirements more accurately. We are sure you will get excellent performance from our systems and look forward to repeated orders from you.

We request you to read the chapter on "Precautions" before you start using our system.

With best wishes,

Signature

Date:

TABLE OF CONTENTS

SR.	DESCRIPTION	PAGE NO.
1.0	GENERAL INFORMATION	
	1.1 Your needs of clean power	2
	1.2 System Block Diagram	3
	1.3 Characteristics of System	3
	1.3 About this manual	4
2.0	TECHNICAL SPECIFICATION OF UPS	5
3.0	FUNCTION OF TRUE – ON –LINE (TOL) UPS	7
4.0	PRE-INSTALLATION INSTRUCTIONS	11
	4.1 Inspection	
	4.2 Placement	11
	4.3 Work instruction flow chart, before installations of UPS	11
		12
5.0	OPERATING INSTRUCTIONS	13
	5.1 Normal Working Conditions.	13
	5.2 Mains Fail Condition	13
	5.3 Battery Discharged Condition	14
6.0	FRONT PANEL / INDICATIONS	15
7.0	PRECAUTIONS	17
	7.1 Do's	17
	7.2 Don'ts	17
8.0	DIAGNOSTIC / TROUBLE SHOOTING	19
9.0	COMPANY PROFILE : ENERTECH UPS PVT. LTD.	21
	APPENDIX 'A'	22
	a) Test Certificate	
	b) Warranty Certificate	23
	c) Reply card	24
		25
	LIST OF REGIONAL OFFICES / SERVICE CENTRES	26

SECTION - I

GENERAL INFORMATION

Most of our equipment, application and household gadgets work on electricity. However quite often the supply of power is not well regulated and continuous. Although many of the equipment can cope up with erratic power, some can't. Hence the need for a reliable & cost-effective solution to erratic power can become critical.

1.1 Your needs of a clean power supply :

If you are using sensitive equipment like Computers, EPABX, Process Automation Systems, Medical Electronics System, CNC Machines etc you cannot afford to have a blackout (mains power failure) or a Brown –Out (low supply voltage) or other condition like spikes, surges, sags & frequency variations. These conditions could lead to

- a. Failure / Damage to your equipment.
- b. Frequent down – time, causing reduction in output.
- c. Corruption of the system software & other unpredictable problems.

There are various product solutions to the power problems existing at your site. We are summarizing the problems and solutions herewith. As a protection against these problems, the most powerful tool available is the

“TRUE – ON – LINE (TOL) UPS SYSTEM ”

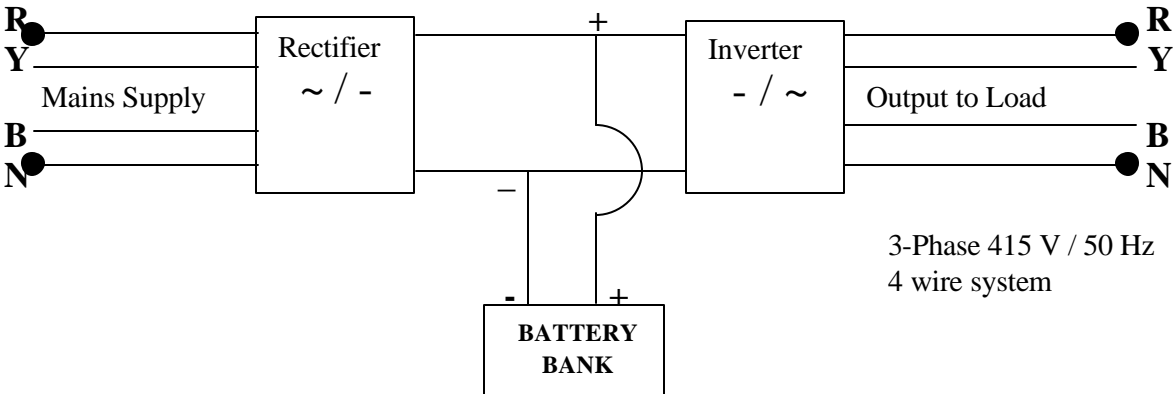
TOL UPS is indispensable for users sensitive electronic equipment. An Inverter can perform following functions:

1. Regulates the voltage being fed to the load.
2. Regulates the frequency being supplied.
3. Isolates the load from spikes, surges and sags.
4. Supply power to the load in case of mains failure.
5. Keeps the user informed about NORMAL and ERROR conditions.

The UPS is a system between the power supply and the load. It can also be called a “POWER PURIFIER” AND “POWER BACKUP” system.

1.2 System Block Diagram :

The simplest block diagram of a True On – line UPS System is as shown in figure.



There three blocks constitute the TOL UPS

- 1) Charger Section
- 2) Battery Section.
- 3) Inverter Section.

The charger supplies A.C. power rectified into D.C. power to the inverter & also keeps the batteries charged and ready for takeover in case of mains failure. The batteries supply D.C. power to the inverter whenever the mains input fails. The inverter supplies A.C. power to the load continuously. It takes D.C. input from the charger or the batteries, as the case may be. It is obvious that the amount of time the UPS can give backup power to the load (on mains failure) depends on the battery capacity & the total load.

Accordingly the UPS systems are available for different ratings of load which are normally expressed in KVA. The backup time varies from a few minutes to a few hours depending upon the number and A.H. capacity of the batteries connected and the charger provided in the UPS.

1.3 Characteristic of the system :

The system takes care of a number of erratic power situations :

1. It regulates the voltage.
2. It regulates the frequency.
3. It gives you indication on LCD of different error conditions like Overload, AC Over – Voltage, AC Under – voltage, DC Over-Voltage, DC under Voltage ,etc. so that corrective actions can be taken as required.

4. On mains failure, it automatically transfer on Battery without any interruption.
5. It isolates the output from the input totally i.e. giving total protection to your equipment from spikes, surges and sags.

In short the TOL UPS is the **ULTIMATE SOLUTION** to your problems.

1.4 About This Manual :

This manual is written in very simple and easy language. In this manual you will find a description of the system and its features.

Note : It is recommended that you read the complete manual and acquaint your self with our system.

- In Section 1 : General Information
- Section 2 : Technical Specifications
- Section 3 : Function of TOL UPS
- Section 4 : Pre - Installation Instructions
- Section 5 : Installation Instruction
- Section 6 : Front Panel / Indications
- Section 7 : Precautions
- Section 8 : Diagnostic Trouble Shooting
- Section 9 : Company Profile

‘Appendix A’ contains the test certificate, guarantee certificate, reply sheet. The test certificate and guarantee certificate can be filled by you for your record. It is absolutely essential that you send us the reply card duly filled. This will help us to serve you better. For your ready reference we have included the list of our regional offices. You can book mark your service center so that they can be contacted at short notice.

2.0 TECHNICAL SPECIFICATIONS FOR ON LINE UPS SYSTEMS

Model	Single -Phase Output	Three-Phase Output
Rating	6 KVA to 50 KVA	5 KVA to 100 KVA
AC Input	230 V + 15% -20% for Single Phase input 415 + 15% -20% for Three Phase input	
Frequency	50Hz + 6%	
DC VOLTAGE	180 V DC for single-Ph input 360 V DC for Three-Ph input	360 V DC
Charging Time	12 Hours for 90% of full capacity	
Charger Type	Internal Controlled Rectifier type	
INVERTER		
Technology	IGBT Double Conversion	
Output Voltage	230 V AC Single Phase	400 V / 415 V AC Three Phase
Voltage Regulation	± 1% for DC input variation & output load variation	
Frequency	a) 50 Hz ± 0.05 Hz b) 60 Hz ± 0.06 Hz c) Any optional Frequency	
Waveform	PWM Sine Wave	
Harmonic Distortion	Less than 3%	
Inverter Efficiency	>93% for 360 V DC and above >90% for 180 V DC	
Power Factor	0.8	
Overload	125% for 5 minutes 150% for 60 sec	
Crest Factor	3.1	
Transient Recovery	+ 4% under full load change and corrected within 60 msec.	
Phase Displacement		120° ± 1°
Audible Noise	Less than 45 db at 1 Meter	
METERING		
Microprocessor based Digital LCD Meter for	Output voltage, output current and Frequency, DC voltage and current, Battery and Load Percentage	R, Y, B, Output Voltage, Output current and Frequency, DC voltage, Battery and load Percentage
GENERAL		
Operating Temperature	0°C to 50°C	
Humidity	Max 95% Non-condensing	
PROTECTION		
Output Overload & short circuit, Output Under & Over Voltage , DC Under & Over Voltage Input Under and over voltage, Single Phasing and Phase unbalance (for 3-phase Input only)		

Model	Single -Phase Output	Three-Phase Output
INDICATION & ALARMS		
a) Mains on	Indication	
b) Mains Fail	Indication & Alarm	
c) DC Low	Indication & Alarm	
d) DC Over voltage	Indication & Alarm	
e) Output Under voltage	Indication & Alarm	
f) Output Over Voltage	Indication & Alarm	
h) Output Overload	Indication & Alarm	
BYPASS FACILITY		
a) Manual Bypass Switch	Provided as standard Feature	
b) Static Bypass Switch (optional)	Bi-directional	
ISOLATION OF POWER		
Input	MCB Provided	
Output	Switch, MCB (optional)	
Battery	HRC Fuse, MCB (Optional)	

SECTION – III

FUNCTION OF TRUE-ON-LINE UPS SYSTEM

3.0 Functional TOL UPS consists following Building Blocks:

Mains U/V , O/V and DC Over
Charger
DC to DC Converter
Protection + LCD Display and Power supply / Digital Panel Meter.
Inverter (PWM Card)
PWM Driver and Power Devices
Static Bypass

In single phase UPS, phase fail, Reversal and U/V, O/V blocks are not required.

Detailed working of functional block diagram :

3.1 Phase fail and Reversal:

The main principle of phase fail and phase reversal card is potential difference and phase shift angle when they are connected in star connection through any discrete passive component. When one of the phase fails, potential difference produced across primary of transformer by another two phases. Also when phase sequence interchanges, circuit detects the phase shifting mismatch and then a potential difference is developed across primary of phase control and phase reversal control transformer and supply generated at secondary of transformer. This supply is given to relay coil. When relay gets energised, it blocks the gate pulses of charger SCR

3.2 U/V, O/V and D.C Over Voltage :

In U/V, O/V card I/P voltages is checked. If input voltage not in range the U/V,O/V circuitry cuts the control supply of charger control If input voltage not in range the U/V,O/V circuitry blocks the charger SCR Pulses in three phase input UPS System.

For 1 Ph. I/P UPS System : I/P Range : 170 V to 270 V AC or 160 V to 260 V AC
For 3 Ph. I/P UPS System : I/P Range : 355 V to 475 V AC or 300 V to 450 V AC

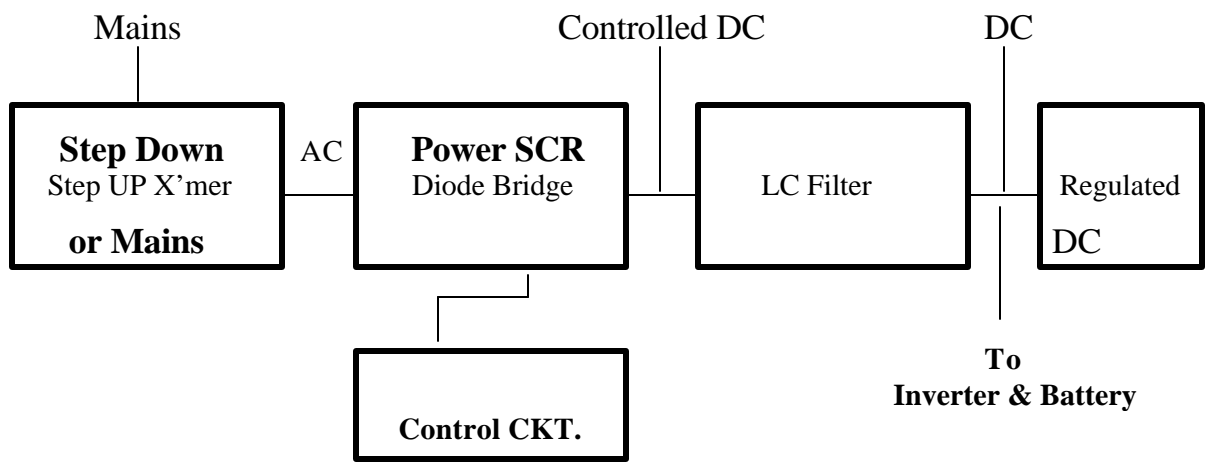
Charger trip protection available in the UV/OV card. If charger voltage increases beyond limit due to feedback open, charger trip protection blocks the charger SCR pulses.

3.3 Charger :

Charger is important building blocks in ON Line UPS System to provide DC power supply to inverter and battery at normal condition. There are number of types in rectifiers. The common method used is full bridge controlled rectifier. Rectifier consists of step down/ step up auto transformer or direct mains, Power SCR, Power Diode, Inductor and Capacitor.

See block diagram of Charger.

Fig No : 1



Efficiency and Reliability is most important factor to consider power and stability of the UPS System. According to UPS system rating is classified into two type :

- 1) Single Phase Rectifier.
- 2) Three Phase Rectifier.

Generally, single phase rectifier used in lower KVA UPS System rating (upto 7.5KVA) Three phase rectifier used in higher KVA UPS System rating (> 7.5 KVA).

Generally, in single phase rectifier, single phase controlled by using SCR control circuit.

3.4 Pulse Rectifier Card

The function of the pulses rectifier card is to provide firing pulses of correct polity to the rectifier thyristors. The signals being obtained from pulse transformer.

The card is normally mounted on top of the pulse transformer.

3.5 DC to DC Converter :

The function of this card is to convert from higher DC i.e. charger DC voltage to +15 & -15 Dc voltage. This DC is giving to all cards for operation.

The indications is provided on the card it indications the card is giving control DC voltage.

3.6 System Monitoring and Protections Card

The function of this card is to monitor the operation of the complete system continuously and initiate the necessary protective action by disabling operation of the faulted section.

The card is divided in the following five sections

- 1) Output under voltage detection circuit.
- 2) Output over voltage detection circuit.
- 3) DC low detection circuit .
- 4) DC over voltage detection circuit
- 5) The DC low and the output UV/OV outputs are connected to the inverter control card to shutdown the inverter, should these conditions occur

3.7 Inverter Control Card :

The Function of the card is to generate PWM pulses, to turn – ON and turn Off the Inverter bridge IGBT or MOSFET to produce sinusoidal output.

The card is provided regulated supply + 15 & -15 V from the converter card

A digitally generated Sine Wave is used as the modulating signal. This signal is compared to a triangular wave form, using a comparator stage. The output of the comparator stage is a sine weighted PWM signal.

The amplitude of the Sine-Wave is varied to control the modulation index and control the output voltage.

Increase in the amplitude of Sine Wave causes increase in the output voltage. In closed loop control the voltage is sent to the required value using preset P3. the card receives voltage feed back from feed back transformer. This feed back is rectified and filtered on the card to produce a DC voltage proportional to the inverter output voltage. This DC voltage is then compared to a fixed reference voltage and the control amplifier output changes continuously to adjust the Sine wave amplitude thereby maintaining tight regulation.

Current feed back is supplied to this card from current transformer. If the output current exceeds the set value to inverter trips after a certain delay. If a short circuit connection exist at the output, the inverter trip instantly protecting the power devices (IGBT & MOSFETs)

The inverter frequency and output sinusoidal wave form are factory– set and hence should not be changed by personal other than the authorized maintenance staff.

3.8 Driver Card :

The function of this card is to give driving pulse to IGBT for firing and also it protect device from over current and short circuit. The PWM signal from Inverter card is given to Driver card. Here PWM signals are isolated and amplified. The amplified signal is given to IGBT or Mosfet Bridge.

3.9 Static By-pass Card :

The function of this card is to give firing pulse for SCR-SCR, i.e. static power device. When UPS is on then UPS SCR-SCR Device conduct of not mains SCR-SCR will conduct.

3.10 Optional Features :

3.10.1 Static Switch :

Static switch provides bypass supply to load in case of failure in UPS System. If any tripping or failure in inverter section occurs the load goes through static bypass automatically without any interruption to Mains. Manual bypass to ‘ Load ON Mains ’ is a standard feature.

3.10.2 Shutdown Software :

It helps mains fail condition, back up status of battery in minutes, battery low warning and auto shutdown in Windows, and LAN File - Server system.

3.10.3 Remote Panel :

Remote Panel indicates working functions, back up status of battery in minutes, load status and fault conditions if any in your present work stations if UPS System is away from work station.

3.10.4 Power – Monitoring Software :

Power Monitoring of Ups system with various features like display of power parameters, event activation, history log etc. using SNMP and Internet

SECTION IV

4.0 PRE-INSTALLATION INSTRUCTIONS

Your TOL UPS system is handling very high amount of currents and voltages and also is a critical part of your setup. Proper use of the system will ensure a long and trouble free working life.

4.1 Inspection

Inspect the UPS upon receipt and check packing list. Notify the carrier and dealer if there is damage or shortage. The packaging is recyclable; save it for re-use or dispose it properly.

4.2 Placement

Install the UPS in a protected area with adequate flow of air and free of dust. Do not operate the UPS if the temperature and humidity are not within the specified limits. In colder territories allow the UPS to come to room temperature before operating.

Successful installation of every unit gets completed after it has acclimatized to various site conditions and covers aspects like:

- a) Variation in input voltage.
- b) Variation in load connected and variable nature of load.
- c) Loose connection in main board from where supply comes or at load end.
- d) Voltage between neutral to earth at input.
- e) Air circulation.
- f) Wiring on the load side to various sockets.
- g) Charge holding time of SMPS in the computers.
- h) Starting current of Monitors, especially color monitors.

4.3 WORK INSTRUCTIONS BEFORE INSTALLATION OF UPS SYSTEM

CHECK UPS SYSTEM FOR TRANSIT DAMAGES & CHECK FOR ANY ITEM BROKEN IN PRESENCE OF OUR ENGINEER

KINDLY ARRANGE FOR FOLLOWING BEFORE INSTALLATION

THE INPUT OUTPUT CABLES TO UPS & FROM UPS SHALL BE PROPERLY CONNECTED

THE RATING OF INPUT & OUTPUT CABLES SHALL BE PROPER WITH EARTHING WIRE

CHECK INPUT OUTPUT RATING OF BREAKERS SHOULD BE PROPER

OPEN UPS SYSTEM, CHECK ANY LOOSE CONNECTIONS OF PCB CONNECTORS & POWER CONNECTIONS, IF FOUND TIGHT IT

INSTALL BATTERIES ON BATT. RACK ENSURE PROPER POLARITY WHILE CONNECTING BATTERIES

ENSURE PHASE, NEUTRAL & EARTH SEQUENCE TO CHARGER INPUT & OUTPUT WITH COLOUR CODE, AS RED, YELLOW, BLUE & BLACK WIRES RESPECTIVELY

REFER WORK INSTRUCTIONS FOR POWERING UP OF UPS SYSTEM

SECTION – V

5.0 OPERATING INSTRUCTIONS FOR TOL UPS

This section gives you step by step instruction to be carried out under different conditions. The sequence of these steps carries great significance hence it is recommended that you religiously follow them :

5.1 Normal Working Conditions :

In this condition the mains supply is ON.

1. START mains to the UPS system
2. SWITCH ON the Battery MCB after some time.
3. Start the UPS by pressing START switch on front panel
4. After UPS output voltage reaches 230V, Start the LOAD step by step
5. Start your normal course of work, thereafter.

Note : Do not switch on or off high loads suddenly. Do it gradually, else the UPS may trip.

6. Always keep the mains switch ON. This ensures that the batteries are being charged, optimally.

5.2 Mains Fail Condition :

After mains failure, inverter automatically switches to battery for DC power and load gets the AC power continuously. In such a case nothing is required to be done by the user. After mains failure, the melody buzzer rings for 10 seconds and stops automatically. When the mains supply restarts, the system will switch to mains automatically and the batteries will start recharging.

Note : Kindly ensure that the UPS is not left ON under no load condition. In that case press `STOP' (Red) switch before going out of the UPS room.

5.3 Battery Discharged Condition:

If mains supply is not available for a long time, the batteries power will be utilized by the load. Meter/ Indication will then show the battery back up status at lowest. When the batteries get discharged to its minimum, the battery low message will be shown and the system will give a continuous audio alarm. This means the batteries are almost reaching towards its maximum depth of discharge.

In such a case :

1. If the load is ON, stop the work at earliest (e.g. you are working on computer system, save your work).
2. Switch off the load circuit one by one.
3. Stop the UPS by pressing ` STOP ' switch

After the mains resumes :

1. Press START switch.
2. The batteries will start charging automatically.
3. Switch on the load circuit one by one.

SECTION VI

6.0 INTERPRETATION OF INDICATION AND ALARMS

6.1 Front Panel : TOL UPS System with Digital Panel Meter

1. **Mains on** :

This indicates will turn on when Mains supply is normal.

2. **DC Low** :

This indication turn ON when the DC Voltage (input voltage to the inverter) is 1.8 V / Cell. When the inverter is turned off due to Dc low, the DC voltage is 1.75 V / Cell.

3. **DC Over voltage** :

This indication turns ON when the Dc voltage exceeds the SET limit. Annunciation is provided together with this indication.

4. **Output Under Voltage** :

This indication turns ON if the Inverter output voltage drops below the set limit. Annunciation is provided together with this indication.

5. **Output Over Voltage** :

This indication will turns ON if the Inverter output voltage exceeds the set limit. Annunciation is provided together with this indication.

6. **Inverter ON** :

When this indication turn ON it means that the Inverter is ON.

7. **Mains ON** :

This indication, shows failure of Mains supply or abnormal input supply. This indication will remain ON up to 10 seconds even after normal mains supply resumes. Annunciation is provided together with this indication.

8. Output Overload :

This indication will come on when the Inverter trips due to extra load or short circuit.

9. Battery Low Pre Alarm :

This indication turn on when the Battery Voltage goes to .8 V/ Cell. After this indication comes the system will trip by Dc low within a short period at 1.75 V / Cell.

Digital Meter : (Optional)

- a. Output Voltage
- b. Output Current
- c. Output Frequency
- d. DC Voltage
- e. DC Current

The display normally shows the output voltage. The other parameters can be seen sequentially using the arrow key. The display returns to output voltage after 30 seconds.

Load bar graph :

The bar graph display shows the approximate percentage of the load connected to the system.

Battery bar graph :

The bar graph display shows the approximate percentage of battery level.

Start Switch :

The switch is used to start the system output.

Stop Switch :

The switch is used to stop the system output

Reset Switch :

The reset Switch is used to Reset the indication and Buzzer

SECTION – VII

7.0 PRECAUTIONS

In this section we have listed a few instructions that will help you in maintaining your system.

Note : It will be a good idea to have a look at fault diagnosis along with this section. For any further information, please contact our nearest regional office.

7.1 Do's

1. Everyday take a careful look at the connections made to the system.
2. Before starting the UPS system check that all the load circuit (e.g. computers) are off.
3. After starting the UPS wait till the LED/Digital Meter shows normal output. Then start the load.
4. Before closing work ensure that mains supply to UPS is ON. This will keep the batteries charged and healthy.
5. Please understand the operational instructions thoroughly from the Engineer during installation and follow them carefully.
6. Please ensure the batteries are maintained periodically.
7. Please ensure the earthing is done properly and is maintained periodically.
8. Keep at least 6-inch clearance on both sides of the metal case to provide adequate ventilation.
9. Please check the charge holding capacity of SMPS, used in Computers. It should confirm to IBM standards of 20 Milli seconds, minimum.
10. Kindly switch off Mains once in a week for 10-15 minutes to ascertain healthy operations of battery.

7.2 DON'Ts

1. Do not disconnect batteries from UPS.
2. Do not turn the mains supply OFF if batteries are being charged, in the night.
3. Do not connect ELCB in the circuit of supply provided to UPS.
4. Please check the rating of wire giving supply to UPS and from UPS to load.

5. Do not overload the UPS or connect loads like tube lights, Fan, drilling Machine to UPS Output
6. Do not keep computer stationery or tea cups on the UPS System.
7. Do not press SET / ENTER key when LCD displays settings mode to disturb factory settings.
8. Do not drop the UPS or apply heavy shock
9. Do not insert items such as pins, wires Screwdriver etc through ventilation slots.
- 10 Do not dispose off the batteries in fire. They will explode. Do not open or mutilate the battery. The content is toxic and harmful to skin and eyes.

SECTION – VIII

8.0 DIAGNOSTIC / TROUBLE SHOOTING

1. As the mains is switched on with in a few seconds ‘DC Under’ or ‘DC Over’ or both alarms occur. This may happen in a normal operation also because the voltages take time to settle down to their normal values. Before the voltage settles down to the normal value it may go beyond the normal limits momentarily which is indicated by the alarm and LCD indications. In such a case, press alarm reset push button. The indication and the audible alarm will stop.
2. If the Inverter trip occurs immediately after pressing inverter start, it means the load connection is faulty. There may be a short circuit at the output or a loose connection. In such a case disconnect the load and check the working on UPS.
3. ‘AC Over’ trip may occur if the feedback to the inverter card is open. So System goes in an open loop condition, the AC voltage starts increasing till finally the system trips gives ‘AC Over’ alarm. This may also happen because of incorrect setting of the voltage waveform setting of the voltage waveform setting pots on the Inverter Card. Let the service engineer set it for you
4. ‘AC Over / DC Over / DC Under’ indications may occur if a large load is suddenly switched ON or OFF. This occurs as the ‘Inverter card AC corrective response on the inverter card or the DC corrective response on the charger card is not able to reply to the sudden load change. On application of a large load initially the output AC voltage and charger DC voltage drops: inverter and charger cards take corrective action to increase output voltage. This generates oscillations and hence ‘AC Over / DC Over / DC Under’ condition occur. In such a case switch off the Inverter, reduces the load & then restart inverter & check its performance. Avoid frequent switching of the load.
5. Corrective action of the inverter and the charger depends on the load transients and DC source (Mains or Battery). In mains fail condition with a little battery back
6. up remaining, if large load is switched ON or OFF, it leads to ‘AC Over / DC Over / DC Under’ conditions. Avoid frequent switching of the load. Do not drive high load when inverter is on battery back up.
- 7. Inverter overload occurs due to :**
 - a) If load on the inverter exceeds it’s rated value. In such a case, decrease the load and check the performance.
 - b) If there is a short circuit or a loose connection at the load terminals causing a high load current to flow. In such a case switch OFF the CONVERTER and disconnect the load and check the performance of CONVERTER.
 - c) If Inverter trips on extremely low loads it indicates that trip setting are disturbed. Let a service Engineer set it for you.

- 7). When start button is pressed, inverter fuse blows up making an abnormal sound. Check Inverter IGBTs bank for blown up or short circuited components. Let a service Engineer check output PWM waveform of driver cards. Always use fuse of proper rating. Incorrect rating may damage the system.

- 8) If the computer reboots a number of times automatically it means that you are switching ON or OFF large amounts of load. The correct procedure is to start the CONVERER first, then one by one the computers. Maximum step load switching allowed is 50% of the rated. If the rebooting problem occur even at lower load values it means the waveform settings are disturbed. Let a service engineer do it for you.

Section – IX

9.0 COMPANY PROFILE

ENERTECH UPS PRIVATE LIMITED is promoted by

Mr. G. K. Singh, B. Tech. (Hons) – I.I.T. Bombay, M. B. A. – I.I.M. Calcutta and Mr. K. Deshpande, B. E. – College of Engg. Pune, M. B. A., - Poona University, Pune. Both are having wide experience in field of R & D, Production, Quality Control and Marketing. The organization specializes in offering cost effective solutions to various power- related problems. For last five years, consistent growth in domestic and export markets has doubled the company's turn over every year. The company continues it's Growth through more value– added products. Its present list of products include:

- ✍ True – on – line UPS system
- ✍ Smart / UPS systems
- ✍ Constant Voltage Transformers
- ✍ Solid State Voltage Stabilizers
- ✍ Servo – Stabilizers
- ✍ Appliance – Protectors
- ✍ Sine – Wave Inverters
- ✍ Float – Chargers

For further details, you may visit our website :

www.enertechups.com

APPENDIX - A

APPENDIX A – 1

TEST CERTIFICATE

System Description : TRUE-ON-LINE UPS

Serial Number :

Rating :

Buyer :

(Quality Control Department)

(Production Department)

Date:

(Company Seal)

WARRANTY CERTIFICATE

System Description : True – On – Line UPS

Serial Number :

Rating :

Buyer :

This unit is warranty against all manufacturing and workmanship defects upto a period of 12 months from the date commissioning or 13 months from the date of supply, whichever is earlier.

This warranty is valid only if the unit is used to its electrical, mechanical and environmental specifications and no consequential damage are accepted under this warranty.

(Quality Control Department)

(Production Department)

Date :

(Company Seal)

APPENDIX A – 3

REPLY CARD

System Description :

Serial Number :

Rating :

Date of Dispatch :

Client Information

Name :

Address :

Contact Person :

Department :

Phone (with STD Code) : **Fax :**

Dealer's Information

Name :

Address :

Contact Persons :

Department :

Phone(with STD Code) : **Fax :**

(Dealer's Seal)

ENERTECH UPS PVT. LTD.

LIST OF REGIONAL OFFICES / SERVICE CENTERS

SR.	LOCATION	PHONE (S)	FAX (STD
1.	PUNE (Sales)	25282895 25282065	020-25282895
2.	PUNE (H.O & Works)	30947797 22923172	020-22922397
3.	MUMBAI	25791800 25790461 25790587	022-25774087
4.	DELHI	55705321 32548589	011-22022087
5.	HYDERABAD	27051318	040-27069029

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