TOSHIBA
Power Electronics Division

UNINTERRUPTIBLE POWER SYSTEM (UPS)

# 5000 SERIES 3P1 INDUSTRIAL UPS

## 3-Phase, 480Vin - Single Phase, 120Vout

## INSTALLATION AND OPERATION MANUAL

15, 30, 50 KVA

Part # 92973-001
December 2018
Manufactured in the USA

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# Product Use and Warranty Restrictions

The Toshiba products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These Toshiba products are neither intended nor warranted for usage in certain applications outlined in Section 3.3 Unintended Usage on page 6 of this manual.

**NOTICE**
**PLEASE INFORM TOSHIBA INTERNATIONAL CORPORATION OR AUTHORIZED REPRESENTATIVE IN CASE OF INCONSISTENCIES, OMISSIONS, OR QUESTIONS.**
Contact us at: *TIC-UPS-AppEngr@toshiba.com* or visit us at:
*www.toshiba.com/tic/industrial/uninterruptible-power-systems*

The instructions contained in this manual are not intended to cover all of the details or variations in equipment, or to provide for every possible contingency concerning installation, operation, or maintenance. Should further information be required or if problems arise which are not covered sufficiently, contact your Toshiba sales office or call Toshiba Power Electronics Division at 855-803-7087

The contents of this instruction manual shall not become a part of or modify any prior or existing agreement, commitment, or relationship. The sales contract contains the entire obligation of Toshiba International Corporation Power Electronics Division. The warranty contained in the contract between the parties is the sole warranty of Toshiba International Corporation Power Electronics Division and any statements contained herein DO NOT create new warranties or modify the existing warranty.

Any electrical or mechanical modifications to the equipment discussed herein, without prior written consent of Toshiba International Corporation, will void all warranties and may void the UL/CUL/CE/ETL listing. Unauthorized modifications can also result in personal injury, loss of life, or destruction of the equipment.

**QUALIFIED PERSONNEL ONLY**
Only qualified persons are to install, operate, or service this equipment according to all applicable codes and established safety practices. The definition of Qualified Personnel is detailed in Section 2.3

# UNINTERRUPTIBLE POWER SYSTEM (UPS)

Please complete the following information and retain for your records.

Unless otherwise specified, the warranty period for the UPS or UPS part is 36 months from the shipment date (see Toshiba International Corporation bill of lading).

Unless otherwise specified, the warranty period for a UPS battery or battery system is 36 months from the shipment date (see Toshiba International Corporation bill of lading).

JOB NUMBER _____

MODEL NUMBER _____

SERIAL NUMBER _____

APPLICATION _____

SHIPMENT DATE _____

INSTALLATION DATE _____

STARTUP
PERFORMED BY _____

# Purpose

This manual provides information on how to safely install your Toshiba International Corporation power electronics product. This manual includes a section of general safety instructions that describes the warning labels and symbols that are used throughout the manual. Read the manual completely before installing, operating, or performing maintenance on this equipment.

This manual and the accompanying drawings should be considered a permanent part of the equipment and should be readily available for reference and review. Dimensions shown in the manual are in metric and/or the English customary equivalent.

Toshiba International Corporation reserves the right, without prior notice, to update information, make product changes, or discontinue any product or service identified in this publication. (See *https://www.toshiba.com/tic/industrial/uninterruptible-power-systems. )*



# Toshiba Customer Support Center

Contact the Toshiba Customer Support Center for assistance with application information or for any problems that you may experience with your Toshiba Uninterruptible Power System (UPS).

**Toshiba Customer Support Center**
8 a.m. to 5 p.m. (CST) – Monday through Friday
USA Toll Free (855) 803-7087
Tel (713) 466-0277 Fax (713) 466-8773
E-mail – *TIC-UPSService@toshiba.com*
Web – *www.toshiba.com/tic/industrial-systems/uninterruptible-power-systems*

You may also contact Toshiba by writing to:

**TOSHIBA INTERNATIONAL CORPORATION**
**SOCIAL INFRASTRUCTURE SYSTEMS GROUP**
**POWER ELECTRONICS DIVISION**
13131 West Little York Road
Houston, Texas 77041-9990
Attn.: 5000 Series UPS Product Manager

For further information on Toshiba products and services, please visit our website at:
*www.toshiba.com/tic/industrial-systems/uninterruptible-power-systems*

# Contents

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# 1 Introduction

This manual provides information on how to safely operate your 5000 Series Industrial 3-Phase Input -Single Phase Output Uninterruptible Power System (UPS). This manual includes a section of general safety instructions that describes the warning labels and symbols that are used throughout the manual. Read the manual completely before installing, operating, or performing maintenance on this equipment.

Qualified personnel should read this manual carefully before transporting, installing, and wiring the UPS. In addition they have a thorough understanding of the information provided in the chapters titled:

- General Safety Instructions
- Important Safety Instructions
- Safety Precautions
- Installation Precautions

Read this 5000 Series Operation Manual for important instructions on operating the UPS. This manual and the accompanying drawings should be considered a permanent part of the equipment and should be readily available for reference and review.

Keep the Installation Manual and the Operation Manual near the UPS for necessary reference.

Dimensions shown in the manual are in metric and/or the English customary equivalent.

**SAVE THESE INSTRUCTIONS**

# 2 General Safety Instructions

DO NOT attempt to transport, install, operate, maintain or dispose of this equipment until you have read and understood all of the product safety information provided in this manual.

## 2.1 Symbols

The symbols listed below are used throughout this manual. When symbols are used in this manual they will include important safety information that must be carefully followed.

**Safety Alert Symbol** indicates that a potential personal injury hazard exists.

**Prohibited Symbol** indicates **DO NOT** take action.

**Mandatory Symbol** indicates that the following instruction is required.

**Ground Symbol** indicates the location of the equipment grounding conductor.

**Electrical – Voltage & Shock Hazard Symbol** indicates parts inside may cause electric shock.

**Explosion Hazard Symbol** indicates parts may explode.

## 2.2 Signal Words

The signal words listed below are used throughout this manual. When the words DANGER, WARNING, CAUTION and ATTENTION are used in this manual they will include important safety information that must be carefully followed.


The word **DANGER** in capital letters preceded by the safety alert symbol indicates that an **imminently hazardous** situation exists, and if not avoided **will result in loss of life or serious injury to personnel.**


The word **WARNING** in capital letters preceded by the safety alert symbol indicates that a **potentially hazardous** situation exists, and if not avoided **may result in loss of life or serious injury to personnel.**


The word **CAUTION** in capital letters preceded by the safety alert symbol indicates that a **potentially hazardous** situation exists, and if not avoided **may result in minor or moderate injury.**


The word **NOTICE** in capital letters without the safety alert symbol indicates a **potentially hazardous** situation exists, and if not avoided **may result in equipment and property damage.**

## 2.3 Qualified Personnel

Installation, operation, and maintenance shall be performed by Qualified Personnel Only. A Qualified Person is one that has the skills and knowledge relating to the construction, installation, operation, and maintenance of the electrical equipment described herein and has received safety training on the hazards involved (Refer to the latest edition of NFPA 70E for additional safety requirements).

Qualified Personnel shall:

- Have read the entire operation manual.
- Be familiar with the construction and function of the 5000 UPS, the equipment being driven, and the hazards involved.
- Be trained and authorized to safely energize, de-energize, ground, lockout/tagout circuits and equipment, and clear faults in accordance with established safety practices.
- Be trained in the proper care and use of protective equipment such as safety shoes, rubber gloves, hard hats, safety glasses, face shields, flash clothing, etc., in accordance with established safety practices.
- Be trained in rendering first aid.

For further information on workplace safety visit www.osha.gov.

## 2.4 Factory Authorized Personnel

Factory authorized personnel have been factory trained and certified to service and repair the UPS. Contact the Toshiba Customer Support Center for assistance in locating the factory 5000 Series-authorized personnel nearest you.

# 3 Important Safety Instructions

The following contains important instructions that should be followed during the installation, operation, and maintenance of the 5000 Series UPS.

**⚠ CAUTION**

Misuse of this equipment could result in personal injury and/or equipment damage. In no event will Toshiba Corporation be responsible or liable for either indirect or consequential damage or injury that may come from the use of this equipment.

**The UPS system output is equipped with four (4) internal breakers:**

1) 3 Phase Primary Input
2) 1 Phase Static Bypass
3) 1 Phase Maintenance Bypass
4) 1 Phase Output

The maximum ambient operating temperature for the UPS is 104 °F (40 °C) at 100% load and 0.9 PF.

If the UPS is exposed to the same ambient temperature as the DC backup supply, the maximum operating ambient temperature is:

- Battery backup: 90 °F (32 °C) at 100% load and 0.9 PF. **Table 3.1** lists the nominal battery voltage.

**TABLE 3.1: UPS NOMINAL BATTERY VOLTAGE**

| Capacity | Nominal Voltage | Float Voltage |
|---|---|---|
| 15kVA | 120 VDC | 135 VDC |
| 30kVA | 120 VDC | 135 VDC |
| 50kVA | 120 VDC | 135 VDC |

## 3.1 Unintended Usage

**DANGER**

Never use this UPS System in any of the following applications:

a. Medical Operation Room Equipment

b. Life Support Equipment

c. Fire Prevention or Suppression Equipment

Use of this Energy Storage System in any of the above applications will result in serious personal injury or death.

**WARNING**

Always read all applicable regulations and standards for the specific application of this Energy Storage System.

Special precaustions must be undertaken when this Energy Storage System is used in the following applications:

a. Nuclear Power Plants

b. Communications Equipment

c. Transportation Equipment

Always consult highly trained and qualified technicians in these applications.

Improper use of the Energy Storage System in any of the above applications may result in serious personal injury or death.

## 3.2 Disclaimer

IN NO EVENT WILL TOSHIBA CORPORATION BE RESPONSIBLE OR LIABLE FOR EITHER INDIRECT OR CONSEQUENTIAL DAMAGE OR INJURY THAT MAY COME FROM THE MISUSE OF THIS EQUIPMENT. ANY MODIFICATIONS WITHOUT AUTHORIZATION BY TOSHIBA COULD RESULT IN PERSONAL INJURIES, DEATH OR DESTRUCTION OF THE UPS.

TOSHIBA RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. TOSHIBA DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR UPS DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

## 3.3 General Maintenance

**⚠ WARNING**

**DO NOT remove the rear/side panels, or any sheet metal not designed to be removed.**

Removing rear/side panels may result in electric shock, burns, personal injuries or UPS failure.

**Keep the area around the UPS clean.**

Use a vacuum cleaner to clean dust and foreign material the UPS. Keep the exterior clean.

**Only factory authorized personnel should perform internal general maintenance on the UPS.**

**Contact the authorized Toshiba Customer Support Center or an authorized Toshiba representative for information on proper disposal of UPS components.**

It is illegal to dispose of certain components without conforming to environmental regulations for industrial/commercial waste.

## 3.4 Transporting

**⚠ WARNING**

**DO NOT tilt the UPS more than 10° from upright position.**

Tilting the UPS more than 10° may cause crushing, trapping or other personal injuries.

**⚠ CAUTION**

**DO NOT transport, move, store, or place the UPS on its side.**

Excessive force applied from heavy components inside may damage the UPS.

**Avoid vibration or shock exceeding 0.5 g.**

Failing to observe this precaution may cause damage to the UPS.

**DO NOT allow the UPS to suffer shock or impact when unpacking.**

Tools used to remove packaging materials may cause damage to the UPS.

**DO NOT install the UPS in environments unsuitable for a NEMA 1 enclosure.**

Submersion may cause electrical shock, personal injury or UPS failure.

**DO NOT push or pull on the sides of the packaging or the UPS to move it. Always use a crane, forklift, or pallet jack for transporting and positioning the UPS.**

Pushing/pulling on the sides of the unit to move it may result in damage to the UPS.

# 4 Unpacking

## 4.1 General Instructions

The UPS should be as close as possible to its final location. Allow enough space for forklift/crane operations to unpack the UPS from the packing crate. Then remove the crate. Properly dispose of the crate.

**Points to observe:**

- Retain all small articles during unpacking and installation.
- Make sure that exterior paint is not scratched and that the UPS cabinet is not damaged before uncrating.
- DO NOT damage the UPS when using tools to remove packaging materials.
- If provided, DO NOT remove the protective plastic sheet cover until installation.
- Do not remove the protective fan covers over the fans until UPS start up. The fan covers should be removed by factory authorized personnel. Packing materials should be disposed by the appropriate means.
- Immediately report any abnormalities to Toshiba Customer Support Center or an authorized representative.
- Locate and retain box labeled “Additional Parts Inside.” It contains bus bars and hardware required to connect the UPS and Bypass cabinets together.

## 4.2 Inspection/Storage

### Inspection

Upon receipt of the UPS, perform an inspection for shipping damage should be performed. Use caution when removing the unit from the pallet. Refer to labels or documentation attached to packing material.

### Unpacking

Check the unit for loose, broken, bent or otherwise damaged parts. If damage has occurred during shipping, keep all original crating and packing materials for return to the shipping agent.

**NOTE: The factory warranty does not apply to damage incurred during shipping!**

Ensure that the rated capacity and the model number specified on the nameplate and Bill of Lading conform to the order specifications.

### Storage

During periods of non-use, the following guidelines are recommended for storage.

These instructions apply to installations that have already been through initial Start-up with Toshiba Service. For installations that have not been through Start-up, arrange the intial power up with Toshiba Service.

### Storage Preparation

1) Follow battery manufacturer storage recommendations for any batteries in the UPS system.
2) Stop the UPS.
3) Place the UPS Main Circuit Breaker and Bypass Circuit Breaker switch in the “OFF” position.

### Storage Conditions

- For best results, store the UPS in the original shipping container.
- Storage temperature range: -4 to 104 °F (-20 to 40 °C)
- The optimum storage temperature is 70 °F (21 °C). At higher ambient temperature backup batteries will require recharging more frequently during storage (refer to battery manufacturer recommendations for details).

**Avoid the following storage locations:**

- Locations that are subject to extreme temperature changes or high humidity
- Locations that are subject to high levels of dust or metal particles
- Locations that are subject to excessive vibration
- Locations that are subject to inclement weather or exposure to water.
- Inclined floor surfaces
- Falling Particles

## 4.3 Unpack the 5000 Series UPS

**⚠ CAUTION**

**TOP HEAVY EQUIPMENT. THIS EQUIPMENT WILL TIP OVER EASILY UNTIL FIXED IN PLACE.**
Lift and move carefully, and only with adequate equipment and trained personnel.
IMPROPER LIFTING CAN RESULT IN INJURY OR DEATH.

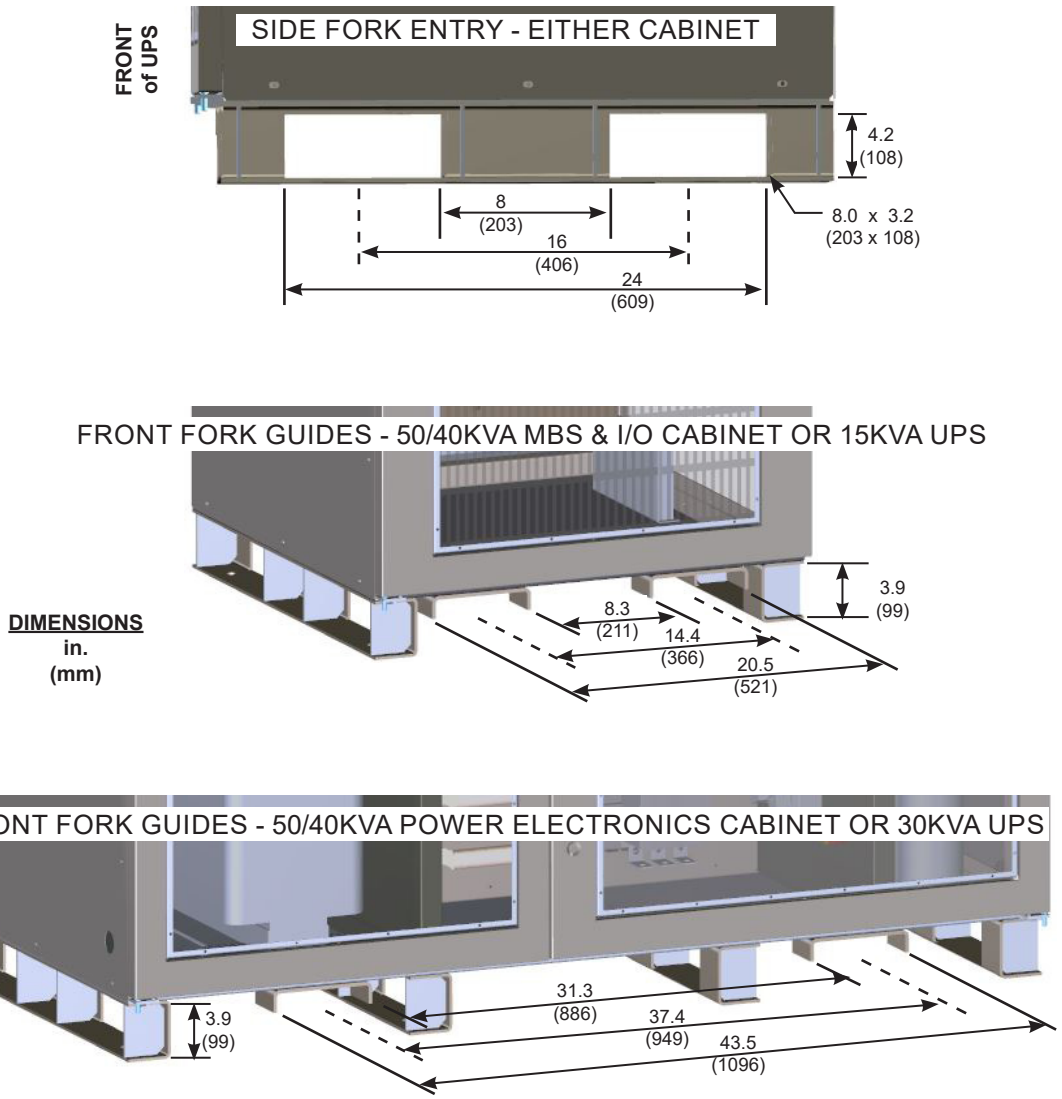



**FIGURE 4.1: FORK GUIDE DIMENSIONS FOR LARGE AND SMALL ENCLOSURES**

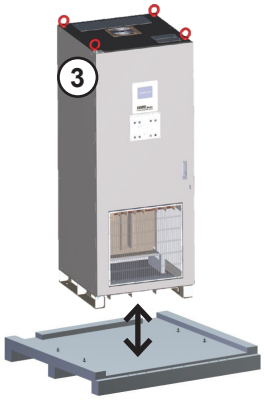
The 5000 Series Industrial Duty UPS has a C-channel skids base with fork guides for font/back forklift access, Fork Slots in the C-Chanel skids alowing forklift access from the side, and four lifting eyes for hoisting. The skids are bolted to the shipping pallet to secure the UPS during shipping. Follow the directions below to unpack the UPS. Note that the 50kVA 5000 Series 3P1 consists of two sperate pallets with one large section and one smaller section. The 30kVA and 15kVA units consist of only one pallet. 30kVA is the same size as the large section and 15kVA is the same size as the small section.

**⚠ CAUTION**

**TOP HEAVY EQUIPMENT. THIS EQUIPMENT WILL TIP OVER EASILY UNTIL FIXED IN PLACE.**
Lift and move carefully, and only with adequate equipment and trained personnel.
IMPROPER LIFTING CAN RESULT IN INJURY OR DEATH.

Carefully inspect the UPS for shipping damage.

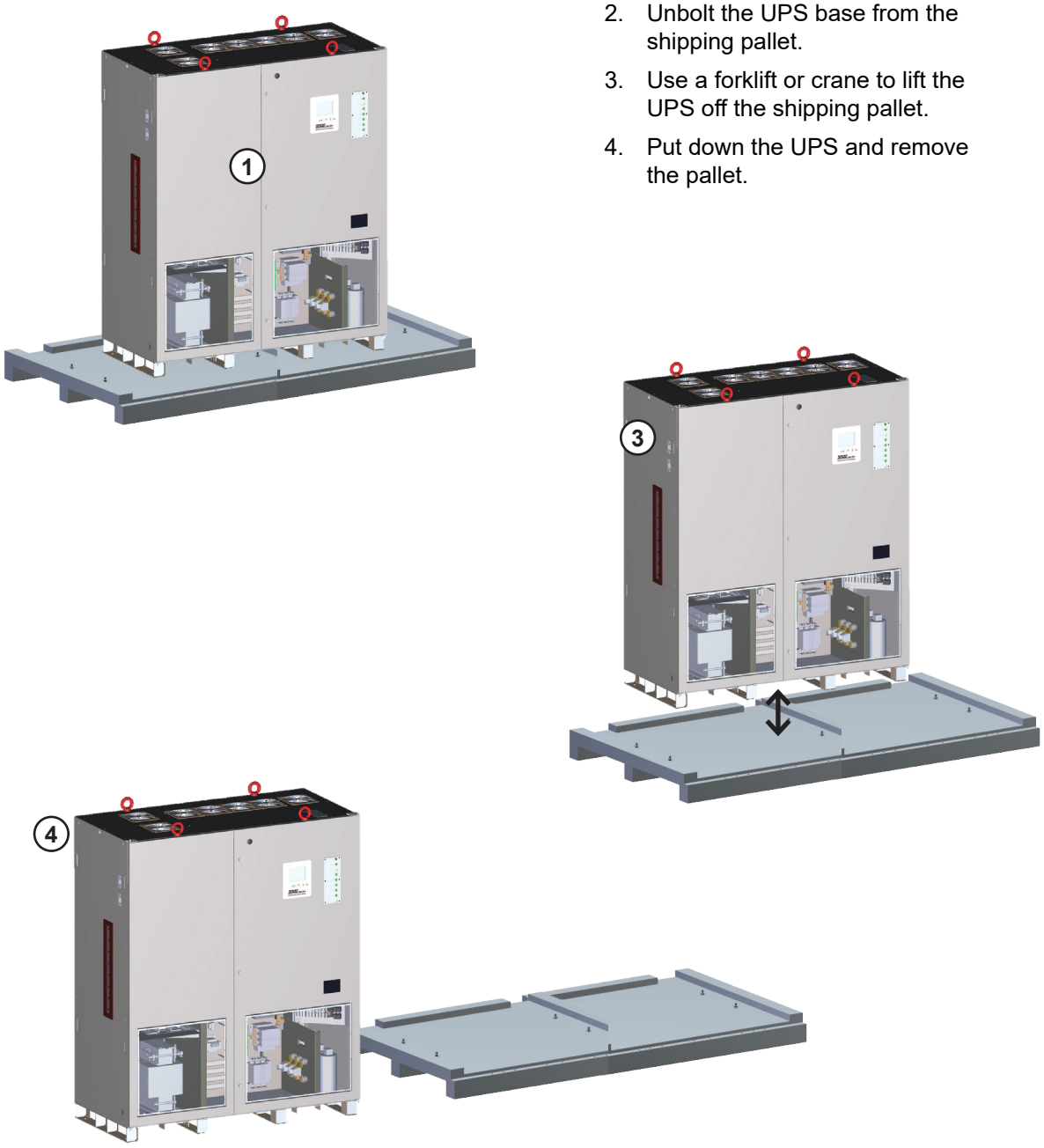

1. Remove shrink wrap.
2. Unbolt the UPS base from the shipping pallet.
3. Use a forklift or crane to lift the UPS off the shipping pallet.
4. Put down the UPS and remove the pallet.




5. Use a forklift or crane to transport the UPS to it's installation location. See **Section 8**.


**FIGURE 4.2: UNPACKING SMALL ENCLOSURE – 50/40KVA MBS & I/O CABINET OR 15KVA UPS**

1. Remove shrink wrap.
2. Unbolt the UPS base from the shipping pallet.
3. Use a forklift or crane to lift the UPS off the shipping pallet.
4. Put down the UPS and remove the pallet.




5. Use a forklift or crane to transport the UPS to it's installation location. See **Section 8**.

**FIGURE 4.3: UNPACKING LARGE ENCLOSURE – 50/40KVA POWER ELECTRONICS CABINET OR 30KVA UPS**

## 4.4 Transporting By Crane

Crane should be operated by personnel familiar and qualified with movement of equipment like the UPS.Cables should have sufficient load ratings and be of the same length. Ensure the suspension cables are hooked at eyebolts. See **Figure 4.4**

Use a spreader bar between the Front and rear pair of lifting eye cables as needed to avoid bending or damaging the fan exhaust hood(s). Use spreader bars where determined to be necessary. Keep the angle less than 60° between cables. **Figure 4.5** and **Figure 4.6** show unacceptable lifting practices.

**Refer to Appendix A - Weight and Dimension for UPS cabinet.**

Keep UPS leveled when lifting. DO NOT swing or tilt the UPS. Minimize the impact when lowering the UPS to the floor. **Figure 4.7** and **Figure 4.8** show examples of acceptable and unacceptable operations.


**FIGURE 4.4: CABLES AND EYEBOLTS TO LIFT THE UPS**


**FIGURE 4.5: ANGLE MORE THAN 60°**


**FIGURE 4.6: UNEVEN CABLES**

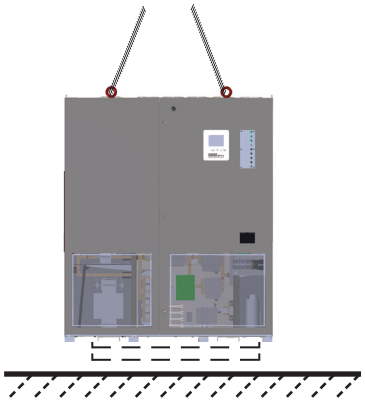


**FIGURE 4.7: UNACCEPTABLE OPERATION**

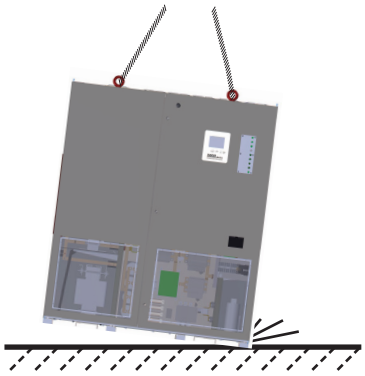


**FIGURE 4.8: ACCEPTABLE OPERATION**

# 5 Warning Labels

Below are representative warning labels and their location on the UPS.

**NOTICE**

**Make sure all the warning labels are installed in the appropriate locations.**

If a label is missing or illegible, contact Toshiba Customer Support Center or an authorized representative.

### A – 40308

**DANGER**

**HAZARDOUS VOLTAGES**
Hazardous voltages are used in the operation of this equipment and could cause severe personal injury or loss of life.
The following precautions should be observed to reduce the risk of injury or death.

Only qualified technicians familiar with this equipment and the information supplied with it should be permitted to install and operate this equipment.

Installation of electrical equipment must be done in accordance with National Electrical Code and any other state or local codes. Proper grounding and conductor sizing must be installed for safe operation.

During operation, keep all covers in place and cabinet doors shut.

When performing visual inspections and maintenance, if possible, be sure the UPS is turned off and the incoming AC feed is turned off and locked out.
**The UPS and Battery Cabinet will have hazardous voltages present even after the AC feed is turned off.**

If it is necessary to make measurements with the power on, do not touch any electrical connection points. Remove all jewelry from wrists and fingers. Make sure test equipment is in good, safe operating condition.

While servicing, stand on some type of insulation, and be sure not to be grounded.

Follow the safety instructions given in the equipment manual carefully and observe all danger, warning and caution notices.

40308

### A1 – 90638

**DANGER**

**TENSIONS DANGEREUSES**
Des tensions dangereuses sont utilisées dans l´opération de cet appareil et pourraient causer des blessures graves ou des pertes de vie.
Les mesures de sécurité suivantes doivent être observées pour réduire le risque de blessure ou de mort.

Seulement des techniciens qualifiés et familiarisés avec ce matériel, ainsi que la documentation fournie avec elle, devraient être autorisés à installer et à utiliser cet équipement.

L´installation de l´équipement électrique doit être effectuée selon les normes électriques reconnues par les organismes nationaux ou provinciaux accrédités. Une bonne mise à la terre et un calibre de câble approprié doivent être installés pour un fonctionnement sécuritaire.

Pendant le fonctionnement, maintenir tous les couvercles en place et les portes de l´armoire fermées.

Lors des inspections visuelles et d´entretien, si possible, vérifier que l´UPS soit éteinte et que l´alimentation AC est éteninte et verrouillée.

**L´UPS et l´armoire de batterie auront des tensions dangereuses présentes même après avoir coupé l´alimentation AC.**

Si des mesures sur l´appareil sous tension doivent être effectuées, ne toucher à aucun point de connexion électrique. Retirer tous les bijoux des poignets et des doigts. S´assurer que l´équipement de test est en bon état de fonctionnement.

Lors des opérations de maintenance, l´opérateur doit se tenir sur une surface isolée non reliée à la mise à la terre.

Suivre attentivement les consignes de sécurité indiquées dans le manuel d´opération et respecter tous les avis de danger, les avertissements et les mises en garde.

90638

### B – 48082

**DANGER**

**AC VOLTAGE**

This UPS receives power from more than one source. Disconnect all AC sources before performing any service or testing inside this unit

48082

### B1 – 90630

**DANGER**

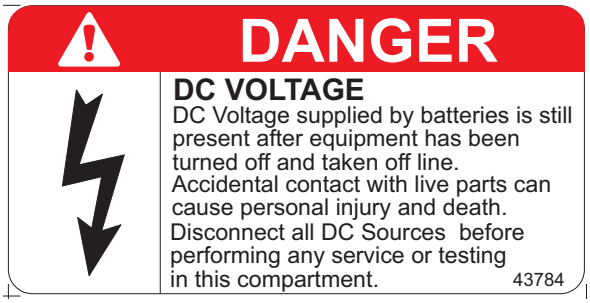
**TENSION AC**

Cette UPS est alimentée par plus d´une source. Débrancher toutes les sources AC avant d´effectuer des entretiens ou des tests à l´intérieur de cette unité.

90630

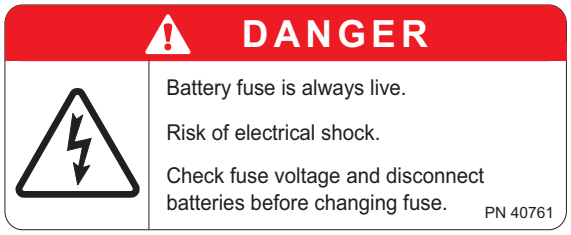
**FIGURE 5.1: WARNING LABELS**

**C – 43784**

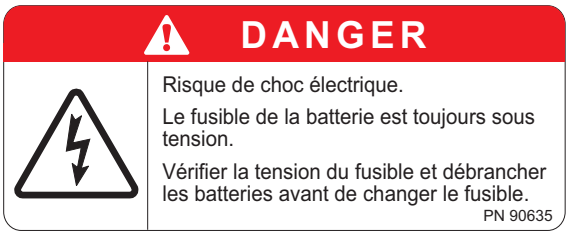



**C1 – 90632**

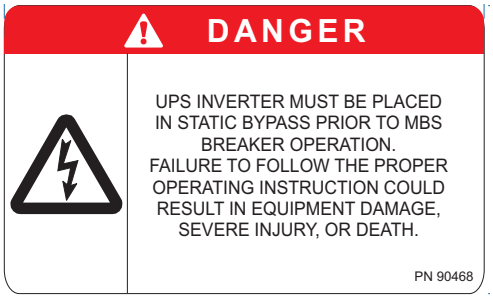

**D – 40761**




**D1 – 90635**




**E – 90468**




**G – 94046**

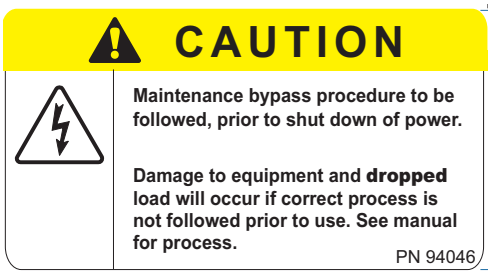



**FIGURE 5.2: WARNING LABELS (CONT.)**

**H – 94045**

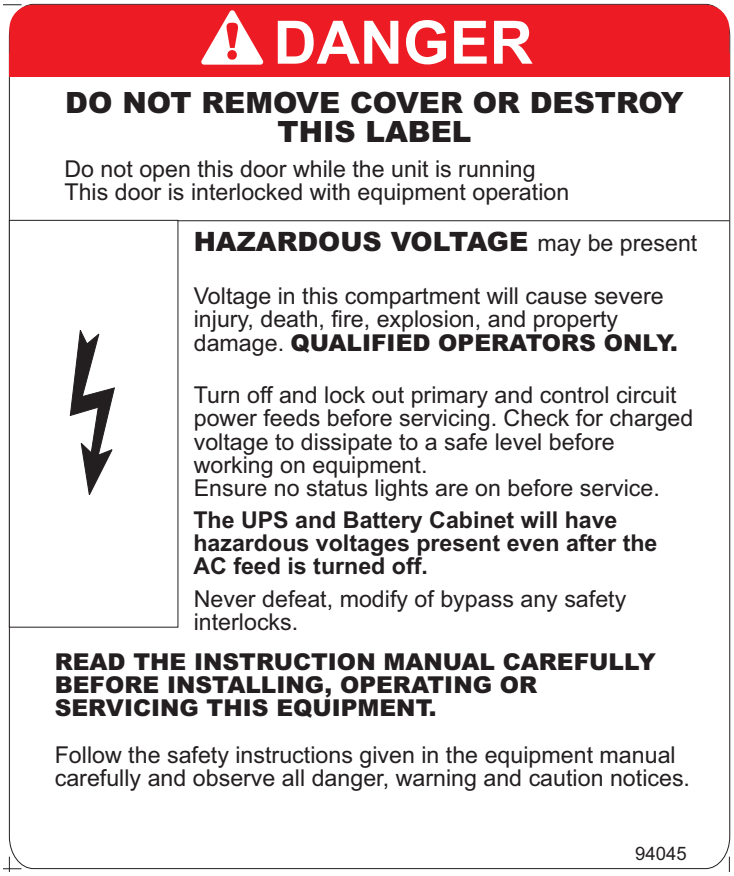
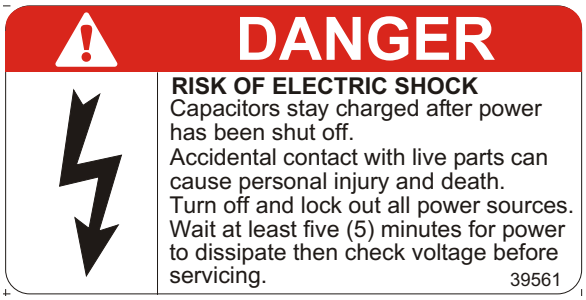


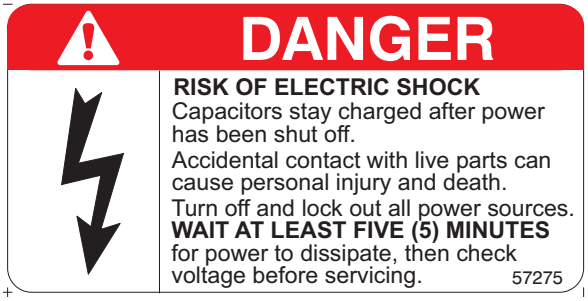

**FIGURE 5.3: WARNING LABELS (CONT.)**

**J – 39561**

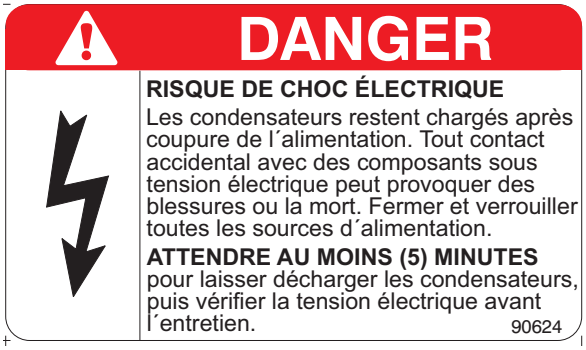



**J1 – 39561F**

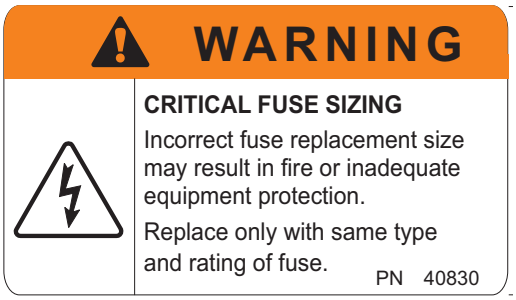

**K – 57275**




**K1 – 90624**




**L – 40830**




**L1 – 91348**


**M – 48231**


**M1 – 906314**


**N1 – 46232**

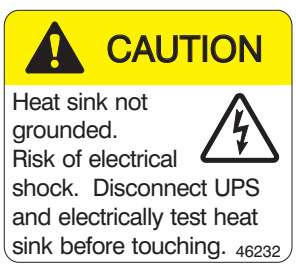



**FIGURE 5.4: WARNING LABELS (CONT.)**

# 6 Storage/Operating Environment

## 6.1 Storage Environment

Observe the following when storing the UPS.

- Store UPS indoors.
- Maximum storage time for the UPS between powered operation cycles is three years. If the UPS has been stored for a period exceeding 36 months, contact your factory authorized representative for guidance in starting the unit.
- Temperature fluctuations should be minimized.
- The optimal storage temperature range is 68 – 77 °F (20 – 25° C).
- A maximum storage temperature range of -4 to 104 °F (-20 to 40 °C) should be observed.
- The optimal relative humidity at the storage location should be between 50 – 60%.
- Humidity must not exceed 90%.
- Avoid locations where UPS may be exposed to corrosive gas.
- Avoid locations with dirt and/or dust.

**TABLE 6.1: UPS STORAGE/OPERATING ENVIRONMENT STANDARDS**

| Item | Environment standard | |
|---|---|---|
| Storage Location | Indoors | |
| Ambient Temperature | Minimum storage temperature: -4 °F (-20 °C) | |
| | Maximum storage temperature: 104 °F (40 °C) | |
| Relative Humidity | The relative humidity must be between 30% and 90% and without condensation due to temperature changes. | |
| Altitude | This equipment is rated for installations up to 3280 ft. (1000 m) above sea level. Consult with the factory to determine the derating factor for installations above 3280 ft. (1000 m). | |
| Dust | Dust must not exceed normal atmospheric levels and must not include conductive particles, silicone or oils. | |
| Flammable Gas | No flammable and/or explosive gas. | |
| | Hydrogen sulfide ($H_2S$) | Less than or equal to 0.0001 PPM |
| | Sulfurous acid gas ($SO_2$) | Less than or equal to 0.05 PPM |
| | Chlorine gas ($Cl_2$) | Less than or equal to 0.002 PPM |
| | Ammonia gas ($NH_3$) | Less than or equal to 0.1 PPM |
| | Nitrous acid gas ($NO_2$) | Less than or equal to 0.02 PPM |
| | Nitrous oxides (NOx) | Less than or equal to 0.02 PPM |
| | Ozone ($O_3$) | Less than or equal to 0.002 PPM |
| | Hydrochloric acid mist (HCl) | Less than or equal to 0.1 mg/$m^3$ |

## 6.2 Operating Precautions

Initial startup/commissioning of the UPS should be performed by factory authorized personnel.

1. The UPS should not be powered up until the entire operation manual has been read.
2. The voltage of the input power source must be within the rated input voltage range.
3. The input frequency must be within the rated input frequency range.
4. The UPS should not be used with a load that has a rated input that is greater than the rated output of the

UPS.

5. If using the UPS to provide power to motors that require high starting current or with motors that require a long starting time, call Toshiba support for guidance in oversizing the UPS for locked rotor current.
6. The maximum ambient operating temperature at 100% load and 0.9 PF is 104 °F (40 °C).
7. DO NOT insert metal objects or combustible materials in the ventilation slots of the UPS.
8. DO NOT place, hang, or paste any objects on the exterior surfaces of the UPS.
9. The capacitors in the UPS maintain a residual charge for a while after turning the UPS off. Wait five (5) minutes before opening cabinet. This allows the system capacitors to fully discharge.
10. DO NOT attempt to disassemble, modify, or repair the UPS. Call your Toshiba sales representative for repair information.
11. Turn the power on only after securing ALL of the bay access doors.
12. DO NOT open any Power Electronics bay access doors to a system with 30/40/50kVA capacity when power is on. 15kVA systems include a dead front to protect operators from energized power electronics.
13. If the UPS should emit smoke or an unusual odor or sound, turn the power off immediately.
14. Warning signs should be placed on or near the load as a notification that the load is being powered by the UPS.
15. Additional warnings and notifications shall be posted at the equipment installation location as deemed required by Qualified Personnel.

**⚠ WARNING**

**While operating in the inverter mode, placing the input breaker in the "OFF" position will switch the UPS to the DC supply backup mode.**

The output of the UPS will continue uninterrupted to the load. The unit must be in the bypass mode at the time that the breaker is placed in the "OFF" position for the UPS to shutdown power to the load.

**⚠ CAUTION**

**After an Emergency Power Off (EPO), DO NOT reset the breaker until the UPS internal circuits have been fully discharged.**

The UPS could be damaged if the unit is not fully discharged before the breaker is reset.

## 6.3 Maintenance Precautions

All internal maintenance should be performed by factory authorized personnel.

1. Turn off, lockout, and tagout ALL power sources before connecting the power wiring to the equipment or when performing maintenance.
2. Operate the internal maintenance bypass unit in accordance with **Section 13.3** and **Section 13.4**.
3. Only factory authorized personnel should service the UPS. Contact Toshiba for the nearest authorized service center.
4. Battery system service should be performed by factory authorized personnel only.

Note: Contact your nearest factory authorized service center for battery replacement.

**Qualified Personnel ONLY!**

**Qualified Personnel** have the skills and knowledge relating to the construction, installation, operation, and maintenance of the electrical equipment and has received safety training on the hazards involved (Refer to the latest edition of NFPA 70E for additional safety requirements).

**Qualified Personnel shall:**

1. Have read the entire operation manual.
2. Be trained and authorized to safely energize, de-energize, ground, lockout and tag circuits and equipment, and clear faults in accordance with established safety practices.
3. Be trained in the proper use and care of protective equipment such as safety shoes, rubber gloves, hard hats, safety glasses, face shields, flash clothing, etc., in accordance with established safety practices.
4. Be trained in rendering first aid.
5. Be knowledgeable of the DC backup supply system and the required handling and maintenance precautions.

**For further information on workplace safety visit www.osha.gov.**

**⚠ WARNING**

**Misuse of equipment could result in injury and equipment damage.**

In no event will Toshiba Corporation be responsible or liable for either indirect or consequential damage or injury that may result from the misuse of this equipment.

# 7 Enclosure Layout

## 7.1 LCD Display and Status Indicators

The following table identifies the major components of the LCD Display and Status Indicators.

**TABLE 7.1: LCD SCREEN STATUS INDICATORS LOCATION AND IDENTIFICATION**

| No. | Description |
|---|---|
| 1 | **ONLINE/Fault** Indicator<br>• GREEN - ONLINE<br>• RED - Fault Occurred |
| 2 | **WARNING** LED Indicator<br>• OFF - No Warnings<br>• AMBER - Warning Occurred |
| 3 | **AC Input** LED Indicator<br>• OFF - No Input to UPS<br>• GREEN - Power to UPS Input |
| 4 | **SCREEN RESET** (To reset screen, insert thin probe, such as a paper clip, and press gently) |
| 5 | LCD Touch Screen Display |

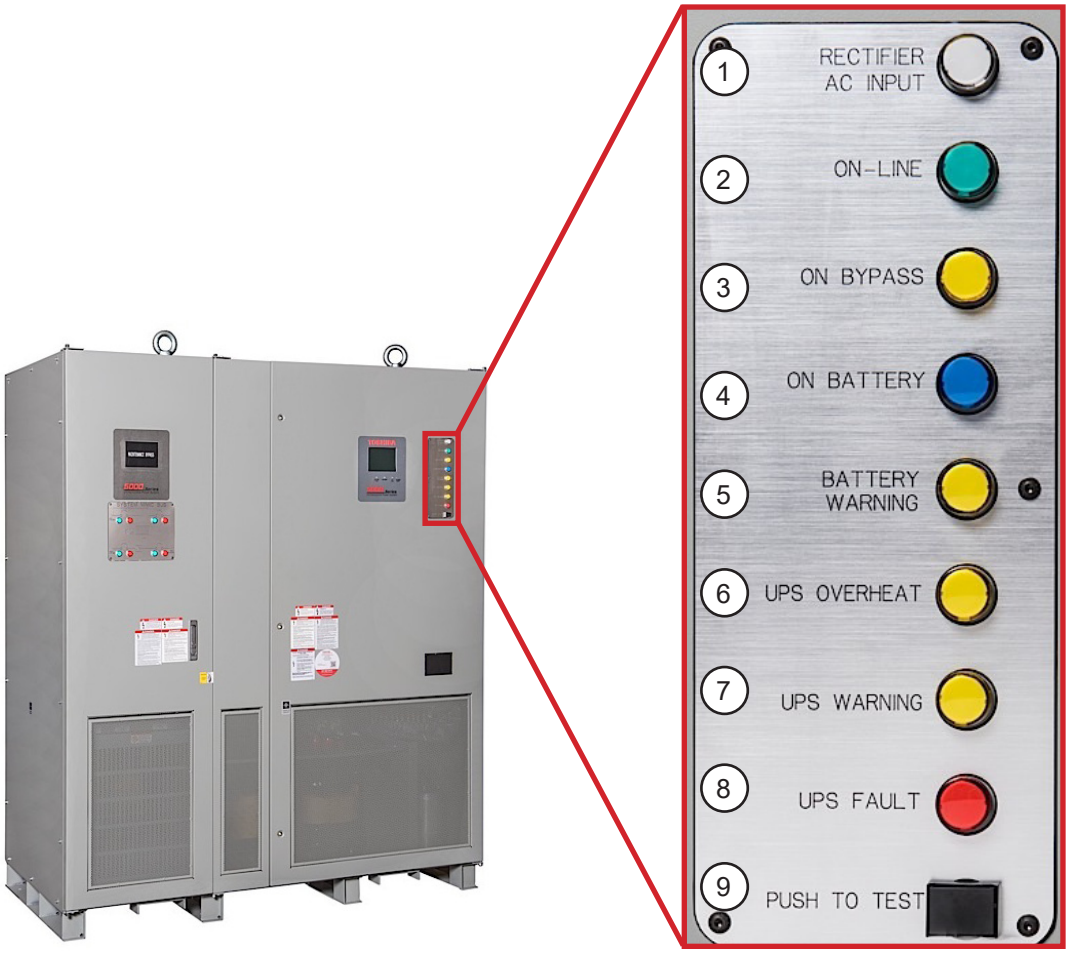

**UPS CABINET FACEPLATE**

## 7.2 UPS Status Indicators

The following table identifies the different UPS Status Indicators on the Power Electronics Bay.

**TABLE 7.2: UPS STATUS INDICATORS LOCATION AND IDENTIFICATION**

| No. | Name | Description | Function |
|---|---|---|---|
| 1 | Rectifier AC Input | Lit if input power is supplied to the UPS. | Solid |
| 2 | On Line | Lit if UPS is in Inverter Operation mode. Power is supplied to the load via the inverter. | Solid |
| 3 | On Bypass | Lit if UPS is in Static Bypass Operation mode. Power is supplied to the load via the static bypass. | Blink |
| 4 | On Battery | Lit if UPS is in Battery Operation mode. Power is supplied to the load via the inverter and the UPS batteries are discharging. | Blink |
| 5 | Battery Warning | Battery Warning or Fault has occurred. | Blink |
| 6 | UPS Overheat | UPS temperature has reached an unsafe level. | Solid |
| 7 | UPS Warning | UPS currently has triggered a warning state. | Blink |
| 8 | UPS Fault | UPS currenlty has triggered a fault. | Solid |
| 9 | Push to Test | Tests the Status Indicator LEDs. Press and hold to verify LEDs illuminate. Release to end test. | N/A |



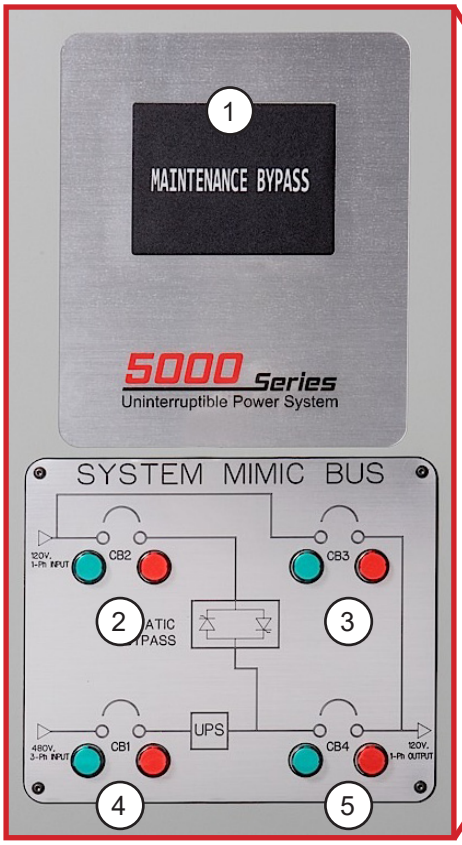

**5000 SERIES 3P1 UPS** **LED STATUS INDICATORS**

## 7.3 MBS Mimic Display

The following table identifies the location and components of the MBS Mimic Display on the MBS Cabinet.

**TABLE 7.3: MBS MIMIC DISPLAY LOCATION AND IDENTIFICATION**

| No. | Function | Description |
|---|---|---|
| 1 | Maintenance Bypass On LED | **On** – UPS is in Maintenance Bypass Operation.<br>**Off** – UPS is in Inverter or Static Bypass Operation |
| 2 | CB2 (Bypass Breaker) LEDs | **Green** – CB2 is Closed<br>**Red** – CB2 is Open |
| 3 | CB3 (Maintenance By-pass Breaker) LEDs | **Green** – CB3 is Closed<br>**Red** – CB3 is Open |
| 4 | CB1 (UPS Input Breaker) LEDs | **Green** – CB1 is Closed<br>**Red** – CB1 is Open |
| 5 | CB4 (UPS Output Breaker) LEDs | **Green** – CB4 is Closed<br>**Red** – CB4 is Open |




MBS MIMIC PANEL

5000 SERIES 3P1 UPS

# 8 Installation

## 8.1 Installation Safety

| ⚠ WARNING | |
|---|---|
|  | **Keep the SPECIFIED CLEARANCE around the UPS.**<br>Inadequate space around the UPS makes it difficult to perform maintenance/ inspections, lead to insufficient ventilation, and/or will cause malfunctions.<br>*See* |
|  | **DO NOT tilt the UPS more than 10° from upright position.**<br>Tilting the UPS more than 10° may cause crushing, trapping or other personal injuries and cause physical damage to internal components. |
|  | **Install anchor bolts to secure the UPS to the installation floor.**<br>The UPS may fall during an earthquake if the anchor bolts are not installed and secured. |
|  | **DO NOT transport, move, store, or place the UPS on its side.**<br>Forces due to heavy components inside may damage the UPS. |
|  | **DO NOT allow the UPS to suffer shock or impact when unpacking.**<br>Tools used to remove packaging materials may cause damage to the UPS. |
|  | **DO NOT push or pull on the sides of the packaging, or the UPS to move it. Always use a crane, forklift, or pallet jack for transporting and positioning the UPS.**<br>Pushing/pulling on the sides of the unit to move it may result in damage to the UPS. |
| ⚠ CAUTION | |
|  | **Install the UPS in an appropriate environment.**<br>Improper storage and installation environment may deteriorate insulation, shorten component life and cause malfunctions.<br>***See Table 6.1: UPS Storage/Operating Environment Standards*** |

1. The UPS generates and can radiate radio-frequency energy during operation. Although RFI noise filters are installed inside of the unit, there is no guarantee that the UPS will not influence some sensitive devices that are operating near by. If such interference is experienced, the UPS should be installed further away from the affected equipment and/or powered from a different source than that of the installed equipment.
2. The 3P1 System comes with internal output MCCB. If additional protection is needed, the user should provide over-current protection for hardwired UPS systems between the UPS output and the load input.
3. After ensuring that all power sources are turned “OFF” and isolated in accordance with established lockout/tagout procedures, connect the power source wiring of the correct voltage to the input terminals of the UPS.

***NOTE: Ensure the input phasing is connected in clockwise rotation (CW). UPS internal circuitry is designed to disable further UPS operation if the input phasing is installed in counter-clockwise rotation (CCW).***

4. Connect the output terminals of the UPS to the load (refer to NEC Article 300 – Wiring Methods and Article 310 – Conductors For General Wiring). Size the branch circuit conductors in accordance with NEC Table 310.16 as published 9/2008.

**⚠ WARNING**

**METAL CONDUIT IS NOT AN ACCEPTABLE GROUND.**

**Conductor Routing and Grounding**

1. Use separate metal conduits for routing the input power, output power, and control circuits.
2. Follow the wire size and tightening torque specifications.
3. Always ground the unit to reduce the potential for electrical shock and to help reduce electrical noise.
4. A separate ground cable should be run inside the conduit with the input power, output power, and control circuits.

## 8.2 Unpacking

The UPS should be as close as possible to its final storage location. Allow enough space for forklift operations to unpack the UPS crate. Then remove the crate.

Points to observe

- Retain all small articles during unpacking and installation.
- Make sure that exterior paint is not scratched and that the UPS cabinet is not damaged.
- DO NOT damage the UPS when using tools to remove packaging materials.
- If provided, DO NOT remove the plastic sheet cover, until installation.
- Do not remove the fan covers until UPS start up. The fan covers should be removed by factory authorized personnel. Packing materials should be disposed by the appropriate means.
- Immediately report any abnormalities to Toshiba Customer Support Center or an authorized representative.

## 8.3 UPS Clearance

Maintain the indicated clearance during installation.

*NOTE: Minimum front clearance when physically accessing the UPS must be at least the width of the front door of the UPS, or per NEC 110.34(A)(36 in./900 mm) and local requirements, whichever is greater.*

The 5000 Series 3P1 is front-access for installation, operation, and maintenance, wiring and cable installation. The clearance around the UPS is listed in **Table 8.1**.

**TABLE 8.1: 5000 SERIES CLEARANCE REQUIREMENTS**

| 5000 SERIES CLEARANCE REQUIREMENTS | | | | | |
|---|---|---|---|---|---|
| **CONFIGURATION** | **FRONT** | **LEFT SIDE** | **RIGHT SIDE** | **BACK** | **TOP** |
| UPS & MBS | 36 in. (914 mm) | 3 in. (76.25 mm) | 0 in. (0 mm) | 0 in. (0 mm) | 23 in. (584 mm) |

## 8.4 UPS Anchorage

### Anchorage Bolts

Use 5/8” (16 mm) diameter anchor bolts. There are two (2) x 0.63 in. (16 mm) diameter holes provided in each of the four (4) the Electronics Cabinet base skids, and two (2) x 0.63 in. (16 mm) diameter holes in in each of the two (2) the Landing Cabinet base skids. See **Figure 8.1, Figure 8.2, and Figure 8.3** for the hole locations and dimensions.

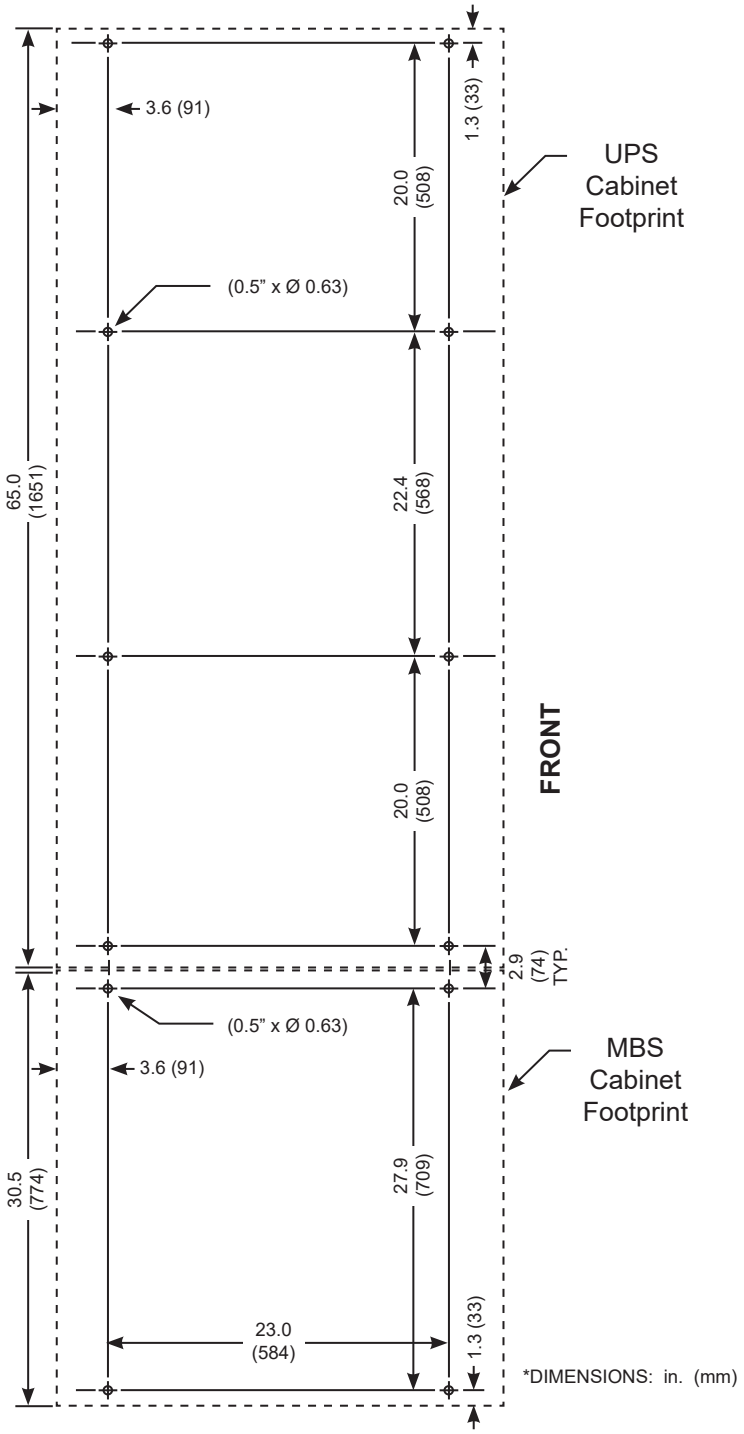



**FIGURE 8.1: 50/40KVA ANCHORAGE AND FOOTPRINT**

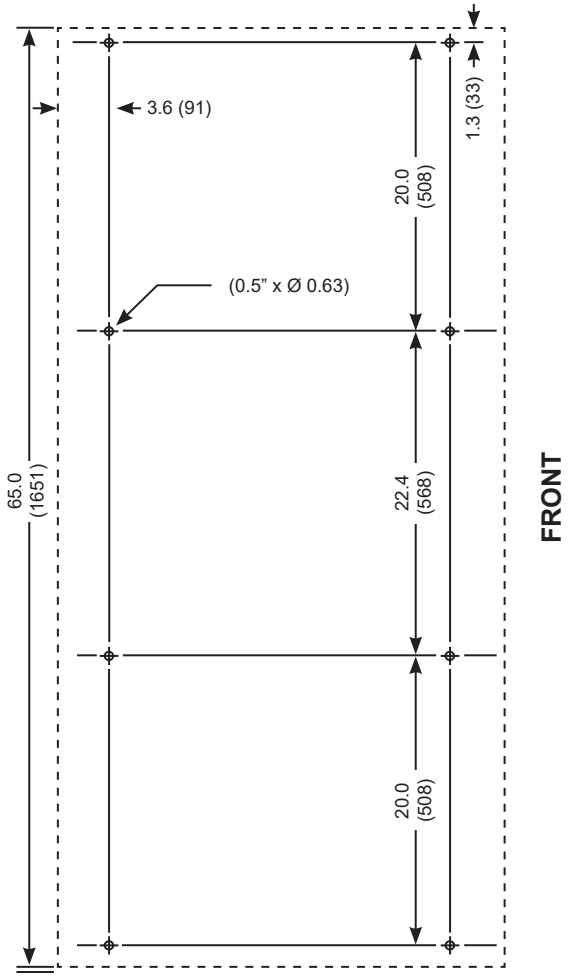
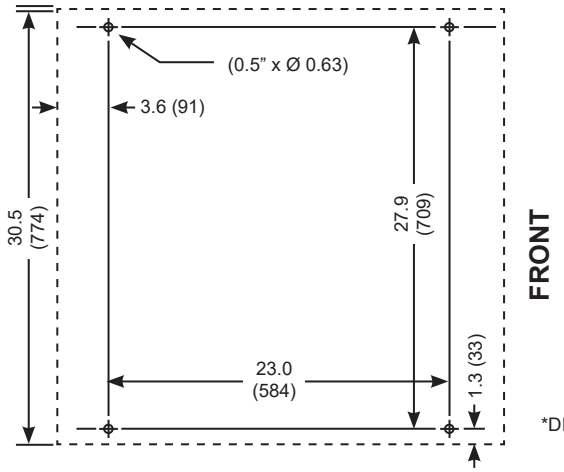



**FIGURE 8.2: 30KVA ANCHORAGE AND FOOTPRINT**




*DIMENSIONS: in. (mm)

**FIGURE 8.3: 15KVA ANCHORAGE AND FOOTPRINT**

## 8.5 Conduit Landing Plates

Conduit landing plates are located On the Top and bottom of the UPS. **Figure 8.4** through **Figure 8.9** show the location of the conduit landing plates with respect to the UPS as viewed from the top looking down.

Do not run the power and instrumentation cables through the same conduit.

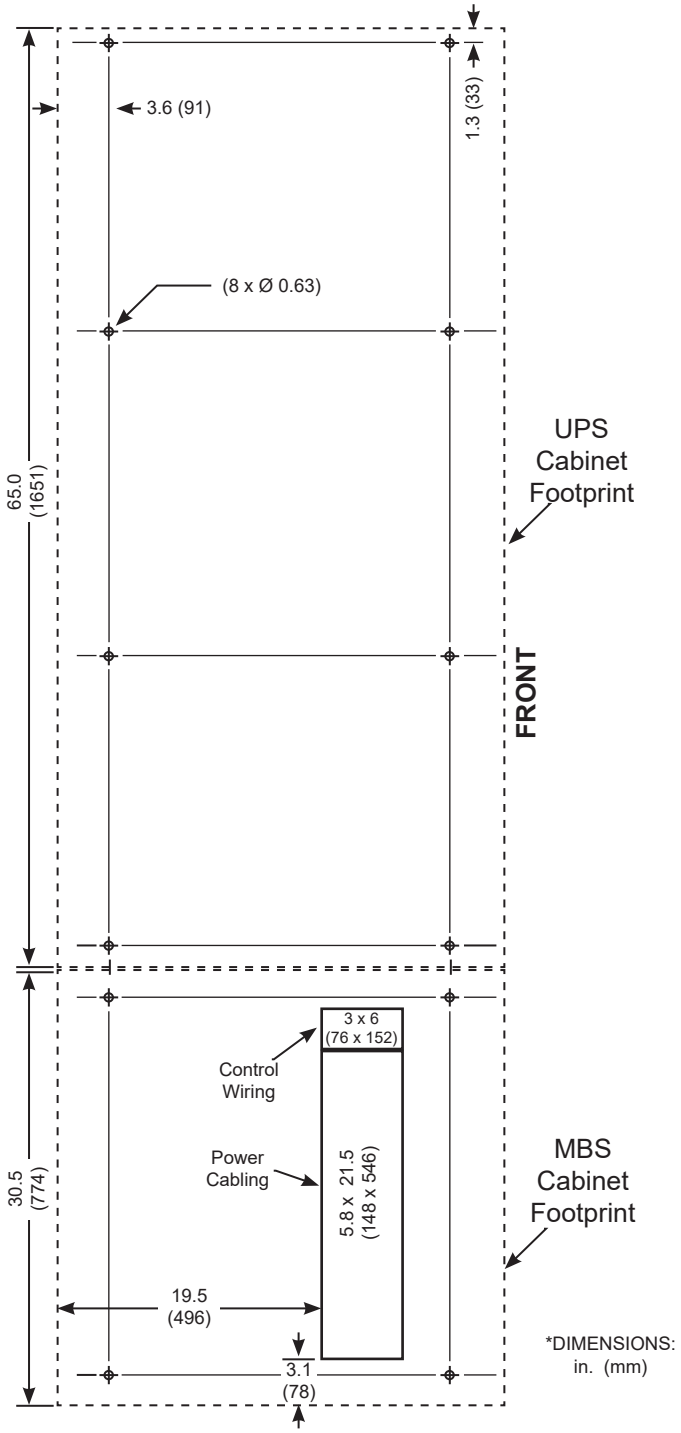



**FIGURE 8.4: 50/40KVA CONDUIT LANDING PLATE DIMENSIONS - BOTTOM**

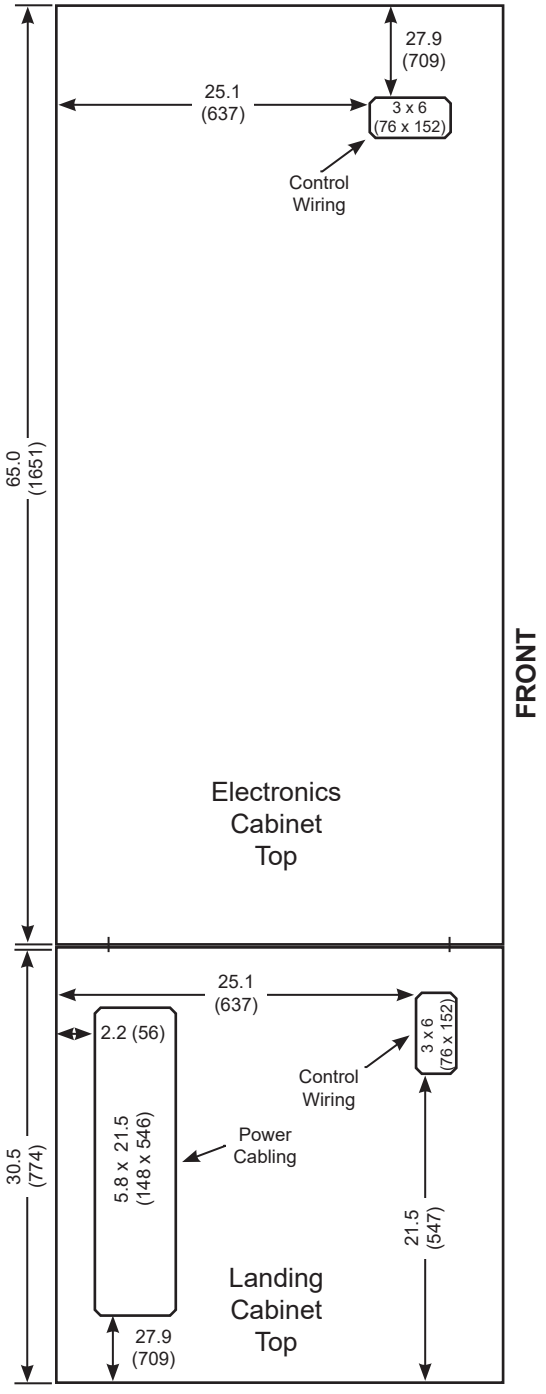



**FIGURE 8.5: 50/40KVA CONDUIT LANDING PLATES DIMENSIONS- TOP VIEW**

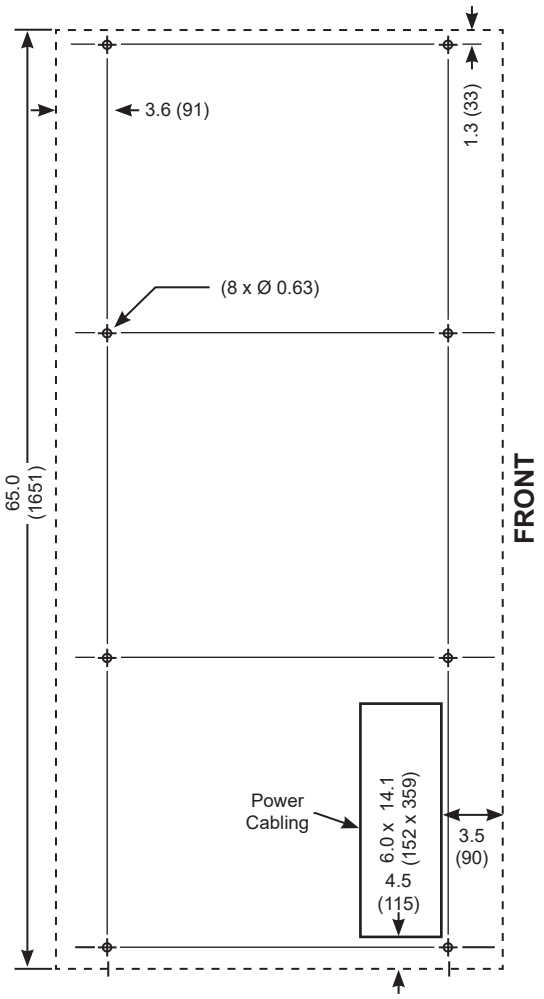



**FIGURE 8.6: 30KVA CONDUIT LANDING PLATES DIMENSIONS- BOTTOM**

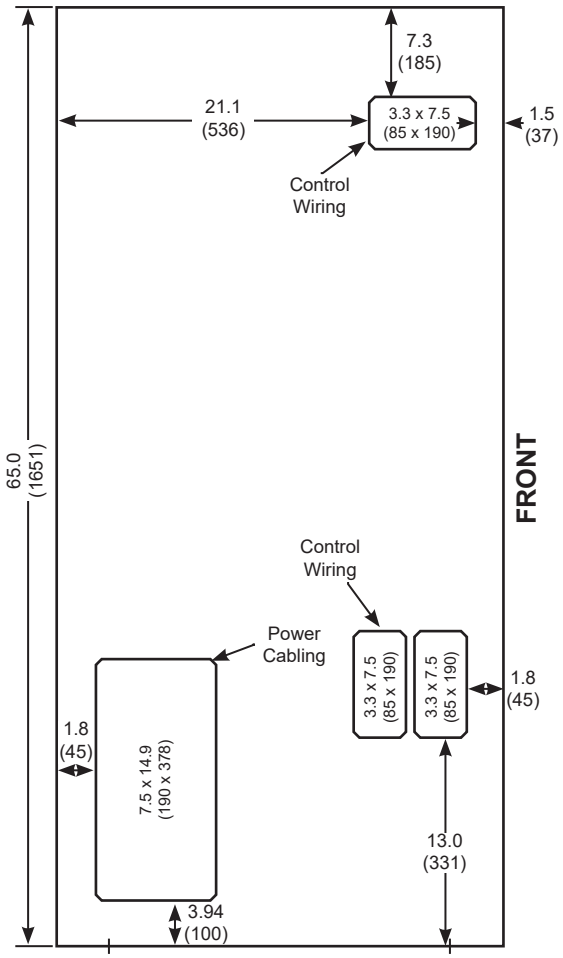



**FIGURE 8.7: 30KVA CONDUIT LANDING PLATE DIMENSIONS - TOP VIEW**

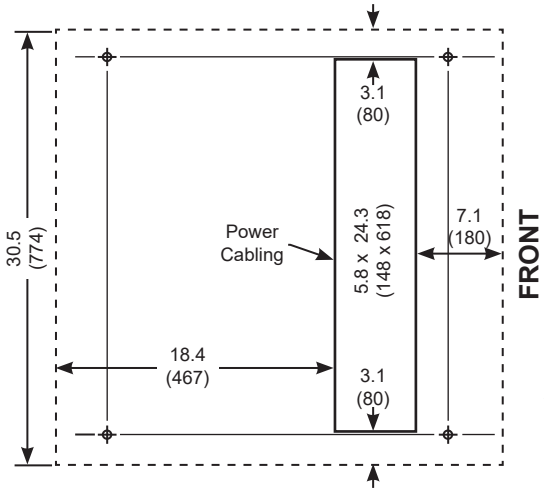



**FIGURE 8.8: 15KVA CONDUIT LANDING PLATES DIMENSIONS- BOTTOM**

*DIMENSIONS:
in. (mm)

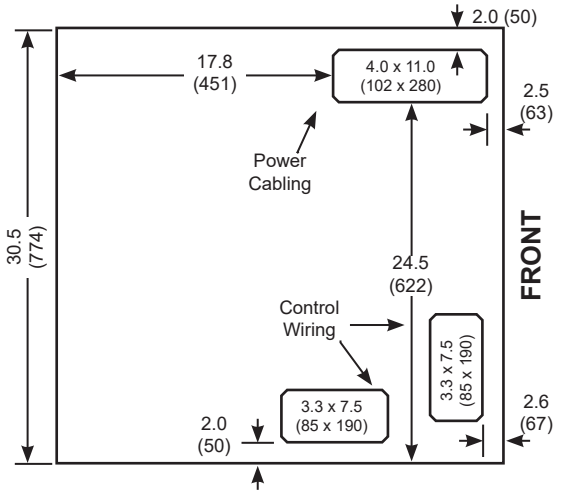



**FIGURE 8.9: 15KVA CONDUIT LANDING PLATE DIMENSIONS - TOP VIEW**

# 9 UPS Wiring

## 9.1 Wiring Safety

**⚠WARNING**

**Perform wiring and connections with correct polarity.**

Be careful when connecting the UPS to the DC backup system. A wrong connection may cause damage to the UPS, DC backup system, or charger.

**Connect ONLY one (1) ground wire to the earth ground terminal.**

A missing ground wire may cause an electrical shock hazard. Connecting to more than one ground may cause a ground loop.

**DO NOT force, bend, or pull wires.**
**DO NOT damage wire insulation.**
**DO NOT place heavy objects on top of UPS.**

Observe the above precautions when making wire connections or handling the wires. Failing to observe these precautions may damage the insulation of the wires or may cause a fire or an electric shock hazard.

***NOTICE***

**Follow the torque criteria for tightening screws.**

Loose connections may cause fire due to heating.

## 9.2 Power Cable Access

See **Section 8** diagrams for power and control cable landing plate layouts for each capacity of UPS.

The UPS is designed for bottom and top entry.

Conduit Landing: Control and Ethernet wiring conduit should be landed on the Control conduit landing plate. Power conduit should be landed on either the top or bottom MBS Bay conduit landing plate See **Section 8** for positioning relative to UPS dimensions.

**TABLE 9.1: 50/40KVA CONDUIT LANDING PLATES**

| Function | Landing Plate Location | Landing Plate Dimensions W x D x Thickness |
|---|---|---|
| Control Wiring | **Top:** Front left side of MBS Bay and Front left side of Magnetics Bay<br>**Bottom:** Left of Power Landing Plate | 3 in x 6 in (76 mm x 152 mm) x 16 Gauge Steel |
| Power Cables | **Top:** Rear of MBS Bay<br>**Bottom:** Front of MBS Bay. | 5.8 in x 21.5 in (148 mm x 546 mm) x 16 Gauge Steel |

**TABLE 9.2: 30KVA CONDUIT LANDING PLATES**

| Function | Landing Plate Location | Landing Plate Dimensions W x D x Thickness |
|---|---|---|
| Control Wiring | **Top:** Front left of enclosure | 3.3 in x 7.5 in (85 mm x 190 mm) x 16 Gauge Steel |
| Power Cables | **Top:** Front left of enclosure<br>**Bottom:** Front left of enclosure | **Top:** 7.5 in x 14.9 in (190 mm x 378 mm) x 16 Gauge Steel<br>**Bottom:** 6.0 in x 14.1 in (152 mm x 359 mm) x 16 Gauge Steel |

**TABLE 9.3: 15KVA CONDUIT LANDING PLATES**

| Function | Landing Plate Location | Landing Plate Dimensions W x D x Thickness |
|---|---|---|
| Control Wiring | **Top:** Front left and front right of enclosure | 3.3 in x 7.5 in (85 mm x 190 mm) x 16 Gauge Steel |
| Power Cables | **Top:** Rear left of enclosure<br>**Bottom:** Front of enclosure | **Top:** 4.0 in x 11.0 in (102 mm x 280 mm) x 16 Gauge Steel<br>**Bottom:** 5.8 in x 24.3 in (148 mm x 618 mm) x 16 Gauge Steel |

## 9.3 50/40kVA Power and Ground Cable Routing

The Input/Output bus stubs for the UPS are shown in **Figure 9.2.**

Route the power and ground cables as shown in **Figure 9.1**, below.

The Ground wiring should be routed through the MBS, Transformer, and PE (Power Electronics) Bay bulkhead penetrations, and fastened to the Ground Bus located on the bottom front of the PE Bay.

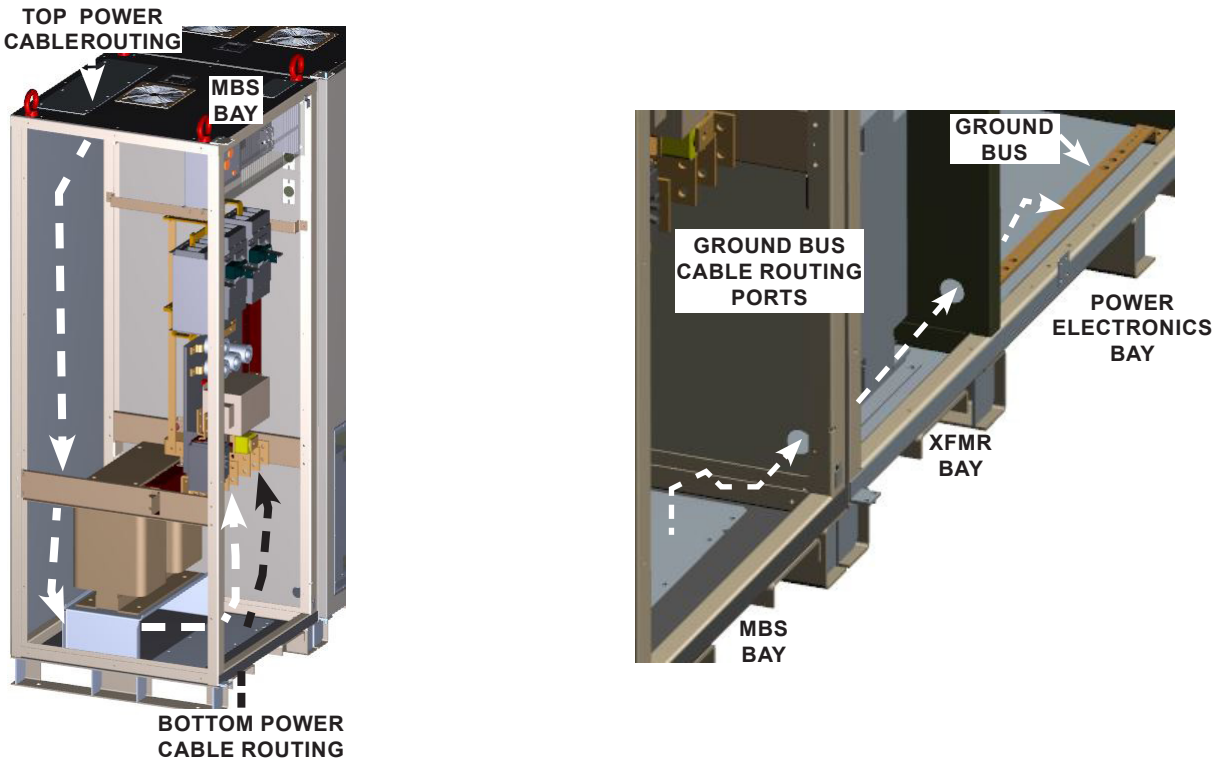



**FIGURE 9.1: UPS POWER AND GROUND CABLE ROUTING**

## 9.4 Power Terminals and Cable Sizing

*Note: Always consult your site specific, local, state, and NEC electrical codes for wiring, cabling, and circuit protection device requirements.*

The Input/Output bus stubs for the 30-50kVA UPS are shown in **Figure 9.2**. The bus stubs have been pre drilled to accommodate NEMA 2-Hole terminal lugs with 0.56 in dia. holes on 1.75 in Centers. Thepower terminal block for the 15kVA UPS is shown in **Figure 9.3**.

Use only copper wires for external cables.

The tables below show the recommended cable sizing for the 3-Phase, 3-Wire, 480Vin and Single-Phase,120Vout.

**TABLE 9.4: RECOMMENDED TIGHTENING TORQUE FOR 5000 SERIES POWER LUGS**

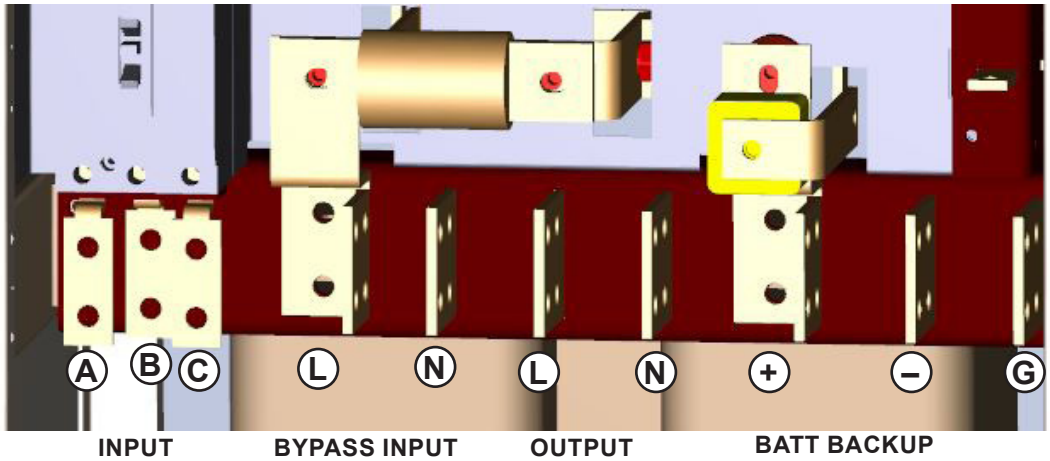
| Bus Stub | Fastener | Tightening Torque |
|---|---|---|
| All power and neutral cable lugs | 1/2 in. bolt | 40 Lb-Ft (54.2 Nm) |

**TABLE 9.5: RECOMMENDED CABLE SIZE FOR 480V IN, 120/V OUT** @ 84 °F (40 °C) AMBIENT

| Bus Stub | Cable Size (Min) 75 °C Copper Wire in Conduit | | |
|---|---|---|---|
| | 15kVA | 30kVA | 50kVA |
| 480V Input A, B, C | #10 AWG | #6 AWG | #4 AWG |
| 120V Output A, B | 2 x #3 – #1/0 AWG | 2x #3/0 – 300 kcmil | 2 x 300 kcmil |
| 120V Bypass Input A, B | 2 x #3 – #1/0 AWG | 2x #3/0 – 300 kcmil | 2 x 300 kcmil |
| 120V Battery Terminals +/- [1] | 2 x #4 – 1 x #2/0 | 2 x #2/0 | 2 x 300 kcmil |

[1] One battery string. (Consult factory if using more than one battery string.)

**NOTE: Cable sizing for ambient operating temperatures other than 84 °F (40 °C) will require derating per the correction factors in the NEC Handbook Table 310.16**




NOTE: The INPUT, SECONDARY INPUT, DC INPUT, and OUTPUT bus stubs are all drilled to accept NEMA 2-Hole terminal lugs with 3/8 in. bolt holes on 1.75 in. centers.

**FIGURE 9.2: 50/40 & 30KVA POWER BUS DETAIL**

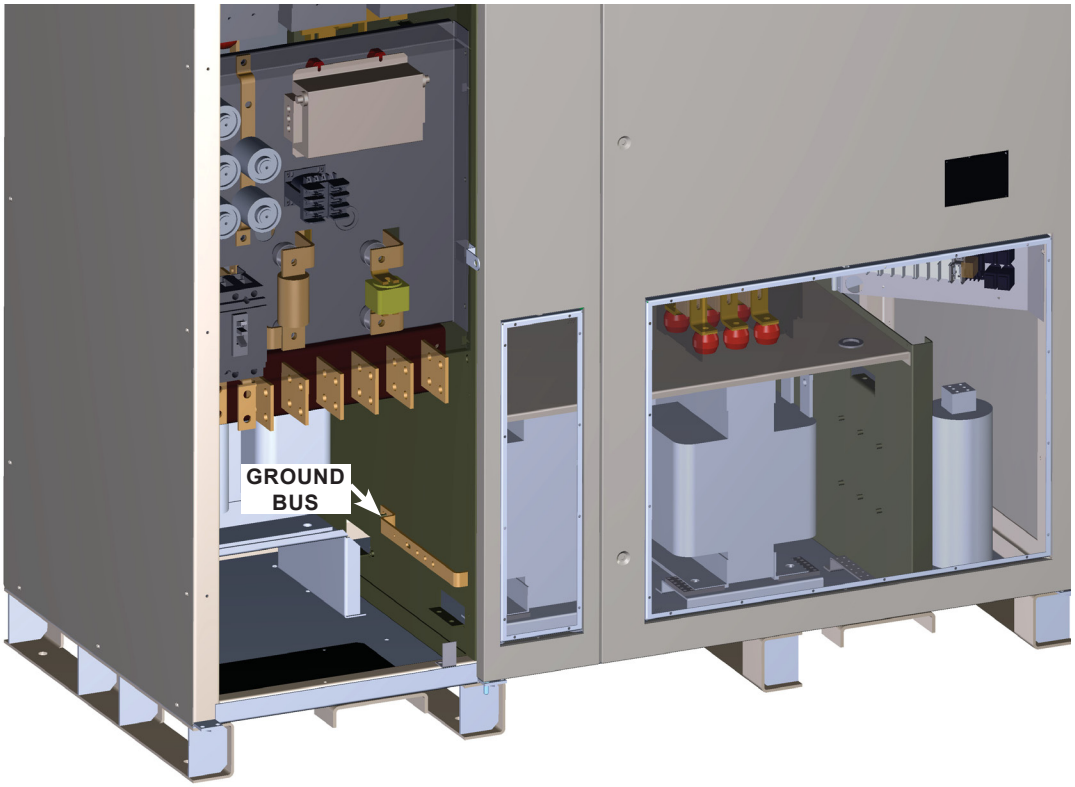
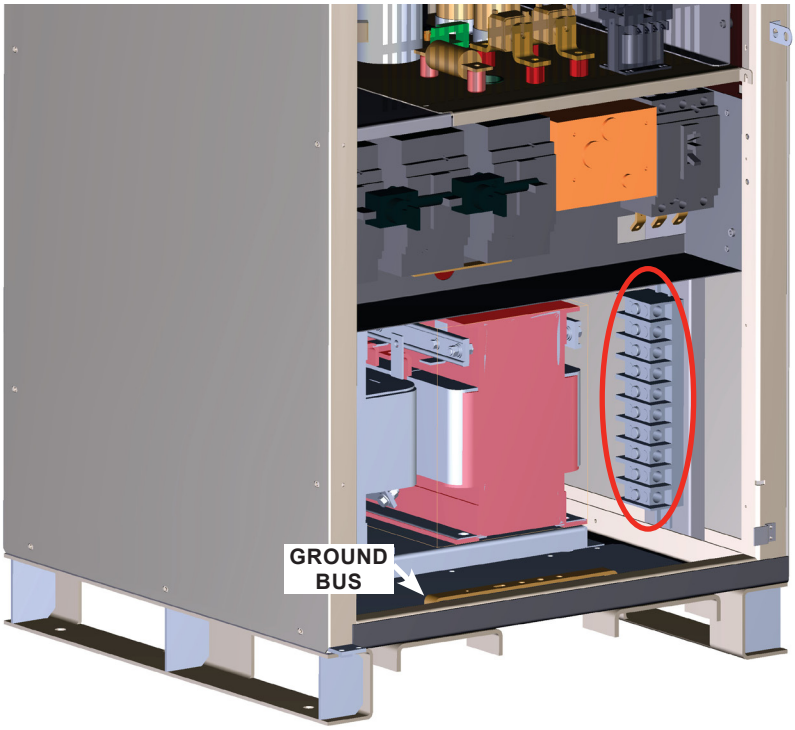



**FIGURE 9.3: 30KVA UPS CONNECTION BAY**




| Terminal | Description |
|---|---|
| 1 | Battery–Negative |
| 2 | Battery–Positive |
| 3 | Not Used |
| 4 | Output–Neutral |
| 5 | Output–Line |
| 6 | Bypass Input–Neutral |
| 7 | Bypass Input–Line |
| 8 | A Phase Input |
| 9 | B Phase Input |
| 10 | C Phase Input |

**FIGURE 9.4: 15KVA UPS POWER TERMINAL DETAIL**

## 9.5 Grounding Wire

**⚠WARNING**

**Be sure to ground the UPS as specified.**

Using the UPS without a proper ground will deteriorate the insulation, cause leakage of currents and electric shock. The resistance to ground should be less than or equal to 10 ohms.

**Figure 9.1**, **Figure 9.3**, and **Figure 9.4** show the locations of the grounding bus for the 50/40kVA, 30kVA, and 15kVA UPS respectively. Connect the grounding wire to the earth ground bus.

The UPS has a bus strip with 6 (six) embedded nuts: 5/16" - 18. Use an AWG 2 (or 38 $mm^2$) or larger cable for the grounding wire. Connect the crimp terminal and ground bus together using a 5/16" - 18 bolt.

**TABLE 9.6: RECOMMENDED CABLE SIZE & TIGHTENING TORQUE FOR 50KVA UPS GND BUS**

| Bus Stub | Cable Size (Min-Max) 75 °C Copper Wire in Conduit (AWG) | Fastener | Tightening Torque [2] |
|---|---|---|---|
| Ground Bus | #3 – #1 | 3/8 bolt | 18 - 22 Lb-in (24.4 - 71.9 Nm) |

## 9.6 External Breakers

**TABLE 9.7: DC (BATTERY) MINIMUM BREAKER RATINGS***

| Voltage Capacity (Min.) | 15kVA | 30kVA | 50kVA |
|---|---|---|---|
| 200 VDC | 200 A | 400 A | 600 A |

* Toshiba supplied battery systems are UL-approved and come pre-installed circuit breakers

## 9.7 One-Line Diagram

*Note: Always consult your local and NEC electrical codes for wiring, cabling, and circuit protection device requirements.*

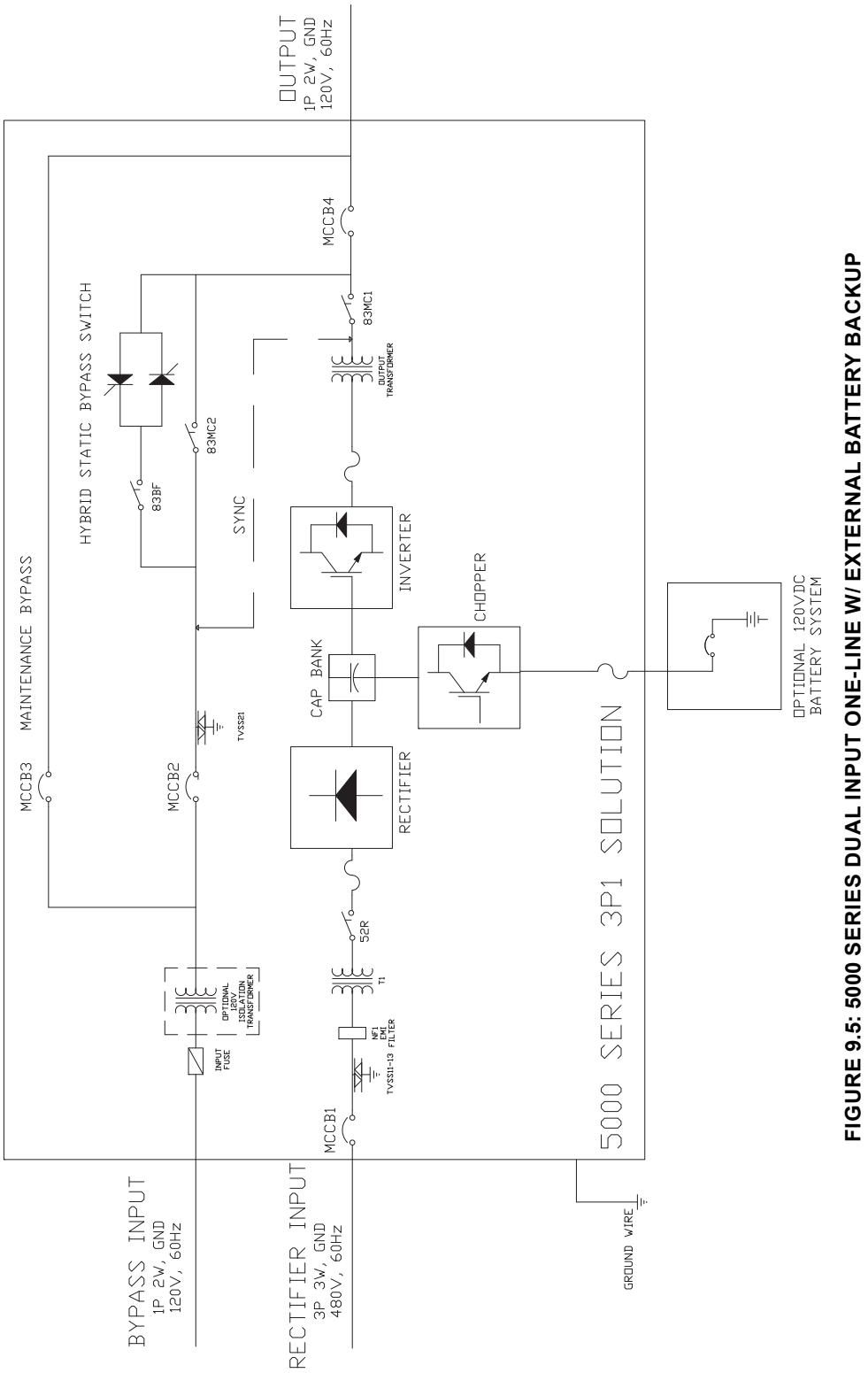



**FIGURE 9.5: 5000 SERIES DUAL INPUT ONE-LINE W/ EXTERNAL BATTERY BACKUP**

# 10 Communication Interfaces

## 10.1 Remote Contacts

The remote contacts interface is provided as a set of solid state switching devices. The switches are available through an I/O Switching Interface board located in the Instrumentation compartment of the I/O Bay on the right side of the UPS. The following chart shows the pin assignment for each signal.

**TABLE 10.1: TERMINAL BLOCK SPECIFICATIONS**

| Specifications | Value |
|---|---|
| TB1, TB3: SPDT (1NO/1NC)<br>DC Volt / DC Amp Rating | 30 Vdc / 3 A, 125Vac / 3A |
| TB2, TB4: SPDT (1NO/1NC)<br>DC Volts / DC Amp Rating | 24Vdc / 8.3 mA |
| Wire Capacity | #18 AWG - #12 AWG |
| Torque | 4.4 - 5.3 in.-lb (0.5 - 0.6 N·m) |

**TABLE 10.2: TERMINAL BLOCK SIGNAL MAP**

| TB | Lug | SIGNAL | OPERATION |
|---|---|---|---|
| TB1 | -1 | COM | OUT1: LOAD ON BYPASS |
| | -2 | NC | |
| | -3 | NO | |
| | -4 | COM | OUT2: LOAD ON INVERTER |
| | -5 | NC | |
| | -6 | NO | |
| | -7 | COM | OUT3: BATTERY OPERATION |
| | -8 | NC | |
| | -9 | NO | |
| | -10 | COM | OUT4: WARNING OCCURRED |
| | -11 | NC | |
| | -12 | NO | |
| | -13 | COM | OUT5: BATTERY SHUTDOWN WARNING |
| | -14 | NC | |
| | -15 | NO | |
| | -16 | COM | OUT6: OVERLOAD |
| | -17 | NC | |
| | -18 | NO | |
| | -19 | COM | OUT7: BATTERY LOW WARNING |
| | -20 | NC | |
| | -21 | NO | |
| | -22 | COM | OUT8: FAULT OCCURRED |
| | -23 | NC | |
| | -24 | NO | |

| TB | Lug | SIGNAL | OPERATION |
|---|---|---|---|
| TB2 | -1 | Switch 1-A (GND) | IN1: STOP CHARGER |
| | -2 | Switch 1-B | |
| | -3 | Switch 2-A (GND) | IN2: USER FAULT |
| | -4 | Switch 2-B | |
| | -5 | Switch 3-A (GND) | IN3: USER WARNING TYPE 2 |
| | -6 | Switch 3-B | |
| | -7 | Switch 4-A (GND) | IN4: USER WARNING TYPE 3 |
| | -8 | Switch 4-B | |
| | -9 | Switch 5-A (GND) | IN5: EQUALIZE/FLOAT CHARGE |
| | -10 | Switch 5-B | |
| | -11 | Switch 6-A (GND) | IN6: SPARE |
| | -12 | Switch 6-B | |
| | -13 | Switch 7-A (GND) | IN7: SPARE |
| | -14 | Switch 7-B | |
| | -15 | Switch 8-A (GND) | IN8: SPARE |
| | -16 | Switch 8-B | |
| TB3 | -1 | BYP - Bypass Acive | Closed if UPS in Bypass Operation |
| | -2 | LB - Battery Low | Closed if battery voltage has dropped below 10% of the nominal value. |
| | -3 | INV - Inverter Supply | Closed if UPS in Inverter Operation |
| | -4 | ALM - Warning | Closed if UPS is in an Alarm condition |
| | -5 | BATT - Battery Operation | Closed if UPS in Battery Operation |
| | -6 | FLT - Fault | Closed if UPS is in a Fault condition |
| | -7 | COM - Common | Common for Pins #1-6 |
| | -8 | 52C Trip - Bypass Breaker Trip | Bypass Breaker Shunt Tip signal by EPO Closing external switch trips Bypass Breaker. |
| | -9 | 52C Trip - Bypass Breaker Trip | |
| | -10 | 72B Trip - Battery System Breaker Trip | Battery Breaker Shunt Trip by EPO or Shutdown. Closing External switch trips Battery System Breaker. |
| | -11 | 72B Trip - Battery System Breaker Trip | |
| | -12 | P24 | Closing external switch between Pin 12 &13 will switch UPS to Online. Closing external switch between Pin 12 & 14 will switch UPS to to Bypass. |
| | -13 | RRUN - Remote Run | |
| | -14 | RSTOP - Remote Stop | |
| | -15 | P24 | External switch closure from battery panel will cause Battery Temperature High Alarm. |
| | -16 | BTFLT - Battery Temperature High | |
| TB4 | -1 | P24 | Battery Breaker's Auxiliary A-Contact Closed when Breaker is Closed. |
| | -2 | 72B Aux Contact | |
| | -3 | P24 | Closing external switch will switch UPS to Emergency Power Off. |
| | -4 | Remote EPO | |

* NOTE: The Output terminal strip TB3 provides eight (OUT1 thru OUT8) Form "C" NO (Normally Open) / NC (Normally Closed) dry type programmable contacts to drive annunciation signals sourced, or "wetted", by external monitoring devices.
See Table 10.1 for wiring and cabling details

## 10.2 Programmable Output Relay

Refer to the below steps to set up the user programmable relay.

1. Required UPS Software
Display Software: 1.00 (U50DFV01000) or later
Make sure 5000 UPS has the correct software for Display before proceeding. Display software version can also be checked at Settings > DISP / REYE > 801 DFW Ver.

2. Log in as a Administrator (ADM on display)

At the far left of the display, there should be 4 quick access buttons. Press the button, 

, to change the security level. You will be prompted to enter a password. Enter Administrator password “ADMIN” as factory default. If successful, press **Quit** to exit the password screen.

3. Set Output Relay
From Settings tab, go to Ctrl/Cfg button > 641 Output Relay 1. Choose a value between 1 and 23. Detail information for each value can be found in table below. One the value has been selected, choose **Write** on the display to save. Set corresponding Output Relay 2 – 8 in command 642 – 648. To disable the relay, set the value to 0.

4. Log off

Press Bitmap Key button, 

on the display. Enter USER. Execute **Write** and if successful, **Quit**.

Please see **Table 10.3** for details regarding the functions that are available for programming on the output relay board.

**TABLE 10.3: OUTPUT RELAY FUNCTIONS & DESCRIPTIONS**

| Code | Function | Description |
|---|---|---|
| 0 | None | |
| 1 * | FAULT OCCURRED | Activated when any fault occurs. This is the default setting on OUT8. |
| 2 * | WARNING OCCURRED | Activated when any warning occurs. |
| 3 | AC INPUT ABNORMAL | Activated when the input voltage or frequency is abnormal. |
| 4 | BYPASS ABNORMAL | Activated when the bypass voltage or frequency is abnormal. |
| 5 | BATTERY ABNORMAL | Activated when the battery is abnormal. One or more of the following three items will be indicated on the display when a Battery Abnormal condition occurs: BATT_OH warning, BATT_SD warning or BATT_DEP fault. |
| 6 | BATTERY LOW WARNING | Activated when the battery voltage drops below voltage Low Battery Detection level defined by Cmd#530 during inverter operation. A LOW_BATT warning will be indicated on the display when this warning occurs. This level is set in the display's Setup tab by an Authorized Toshiba Service Provider. |
| 7* | BATTERY SHUTDOWN WARNING | Activated when the battery voltage drops below Battery Shutdown detection level voltage defined by Cmd#528 during inverter operation. A BATT_SD warning will be indicated on the display when this warning occurs. This level is set in the display's Setup tab by an Authorized Toshiba Service Provider. This is the default setting for OUT5. |

| Code | Function | Description |
|---|---|---|
| 8 | BATTERY DEPLETED FAULT | Activated when the battery voltage drops below the Battery Breaker Trip Voltage defined by Cmd#526 while a Battery Shutdown warning (BATT_SD) exist during inverter operation. A BATT_DEP fault will be indicated on the display when this fault occurs. |
| 9* | OVERLOAD | Activated when an overload of 105% or more had occurred to the system. This is the default setting on OUT6. |
| 10 | OVERLOAD PREALARM | Activated when the load goes over 100%. This level is adjustable by an Authorized Toshiba Service Provider. |
| 11 | BYPS.SYNCHRONOUS | Activated when the inverter voltage and bypass voltage are synchronous. |
| 12 | BYPS.ASYNCHRONOUS | Activated when the inverter voltage and bypass voltage are asynchronous. |
| 13 | REMOTE OPE.ENABLE | Activated when any remote operation occurs (Stop/Start Inverter, etc.) |
| 14* | LOAD ON INVERTER | Activated when the power is supplied from the inverter. This is the default setting on OUT2. |
| 15* | LOAD ON BYASS | Activated when the power is supplied by the bypass. This is the default setting on OUT1. |
| 16 | LOAD ON AC | Activated when the power is supplied from the input via the UPS's rectifier - inverter. |
| 17* | BATTERY OPERATION | Activated when the battery is supplying power to the load following an AC power failure. This is the default setting on OUT3. |
| 18 | INVERTER OPERATION | Activated when the inverter is operating. |
| 19 | 52R CLOSED | Activated when 52R (Input Contactor) is commanded to closed. |
| 20 | 72B CLOSED | Activated when 72B (Battery Breaker) is closed. |
| 21 | EQUALIZING CHARGE | Activated when the UPS is charging the batteries at the equalizing charge level defined by Cmd#518. Unless commanded to float charge by using external input IN6 or Cmd#508=Float Charge, equalizing charge will last for duration in minutes defined by Cmd#532. |
| 22 | OverHeat | Activated when Device Overheat (Chopper or Inverter IGBT) or UPS Overheat occurs. |
| 23 | Fuse Blown | Activated when fuse blown fault occurs |

*Default Output Settings

## 10.3 RemotEye Network Card Option

The optional RemotEye network card for the Toshiba UPS permits network monitoring and control of the UPS. This card is located on the upper right corner of the Transformer and Power Electronics Bay (Refer to Table 7.3). The card provides a network, or LAN-based communication interface for the UPS. When installed, the UPS can be managed remotely using the common SNMP, HTTP, BACnet, or Modbus
RS-232/RS-485 or web-based network protocols. The following diagram shows the flow of the Network Management Station.

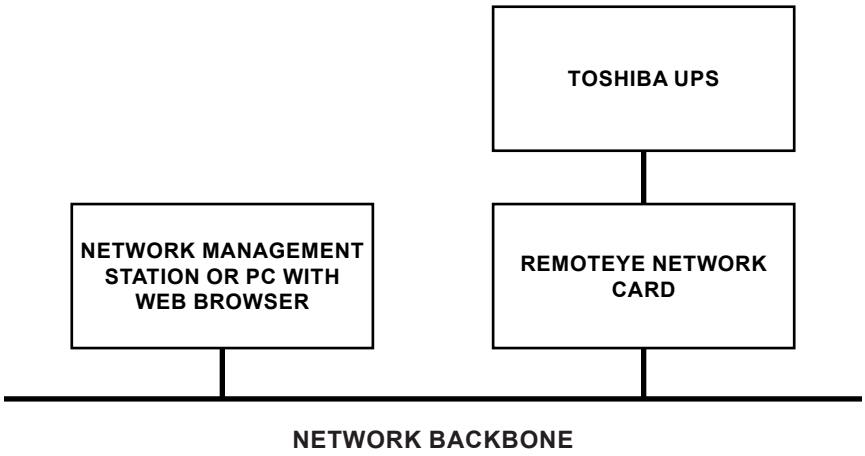



**FIGURE 10.1: NETWORK INTERFACE**

## 10.4 Human Machine Interface (HMI) Option

The HMI provides an upgraded interface which replaces the standard LCD Display. The HMI allows for the following additional features:

1. Real-time updated graphs for monitoring of UPS parameters.
2. Capability to interface with the customer through different communication options and ports.
3. Expanded display to view all normally available LCD screen menus.
4. Pluggable interface modules with analog and digital contacts for additional inputs and outputs that can be configured to meet additional customer requirements.

Please contact the factory for more information on the HMI option and the additional HMI modules that go with it.

# 11 Specifications

## 11.1 Specifications – 5000 Series UPS 3P–3W 480V$_{in}$, 1P–2W 120V$_{out}$

**TABLE 11.1: % 5000 SERIES 3P1 SPECIFICATIONS**

| 5000 Series Industrial Duty 3-Phase In/1-Phase Out | | | |
|---|---|---|---|
| **Specifications** | **Value** | | |
| **Input** | | | |
| KVA rating | 15kVA | 30kVA | 50 kVA |
| Phase/Line | 3PH-3W + Ground | | |
| Voltage | 480 V (+10% to -10%)<br>(-15% with Batteries in Parallel) | | |
| Frequency | 60 Hz (±5 Hz) | | |
| Input power factor | >0.95 | | |
| THD | < 6% @ 100% Load | | |
| **Output** | | | |
| Phase/Line | 1PH-2W + Ground | | |
| Voltage | 120 V | | |
| Voltage adjustable range | ±5% of Rated Voltage in Increments of 1 V | | |
| Frequency | 60 Hz | | |
| Rated load power factor | 0.9 lagging | | |
| Admissible output crest factor | 3.0 | | |
| Frequency Regulation | ±0.01% in free running mode | | |
| Frequency Slew Rate | 1.0 Hz/sec | | |
| Frequency Synchronous Range | ±0.5 Hz, ±1 Hz, ±1.5 Hz | | |
| Voltage Regulation | ±3% (100% Linear Load) | | |
| Regulation time | Regulation time to +/-1 % <60 msec<br>Regulation time to +/-3 % <20 msec | | |
| Voltage distortion rate / THD | 100% Linear load: ≤3%<br>100% Non-linear load: ≤5% | | |
| Overload | 110-125% for 10 min.,<br>150% for 60 sec | | |
| Transient Response | ±2% Max with a 100% Step Loads,<br>±1.5% Max with Loss/Return AC input,<br>±2% Max when load transfers To/From Bypass | | |
| System Efficiency | 84.3% @ 100% Load | 82.6% @ 100% Load | 83.1% @ 100% Load |
| **Battery** | | | |
| Battery Nominal Voltage | 120 Vdc | | |
| Battery Minimum Voltage | 105 Vdc (@1.75V/Cell) (Default)<br>96 Vdc (@1.6V/Cell) | | |
| Battery Float Voltage | 135 Vdc | | |
| Ripple Voltage w/o Batteries | < 0.2% of DC Voltage | | |
| Maximum Re-charge Current | 30 A | | |

| 5000 Series Industrial Duty 3-Phase In/1-Phase Out | | | |
|---|---|---|---|
| **Specifications** | **Value** | | |
| **Bypass** | | | |
| Configuration | 1PH-2W + Ground | | |
| Voltage | 120 V | | |
| Frequency | 60 Hz (+/-5 Hz) | | |
| Bypass Overload Capacity | 500% for 2 Cycles<br>1000% for 1 Cycle | | |
| Bypass Disable | No | | |
| **Mechanical** | | | |
| Cables entry | Top & Bottom | | |
| Dimensions | W x D x H (in.) | | |
| System | 31” x 31.5” x 78.7” | 65” x 31.5” x 78.7” | 96” x 31.5” x 78.7” |
| System Weight | 1,380lbs (621 kg) | 2,310lbs (1040 kg) | 3,218lbs (1460 kg) |
| Shipping Weight | 1,770lbs (803 kg) | 2,700lbs (1,220 kg) | 3,608lbs (1640 kg) |
| Cooling | Forced Air | | |
| Paint Color | ANSI GRAY 61 | | |
| **Environmental** | | | |
| Operating temperature | 32 to 104 °F (0 to 40 °C) | | |
| Storage temperature | -4 to 158 °F (-20 to 70 °C) | | |
| Humidity | 30% to 90% Non-Condensing | | |
| Full Load Heat Loss (BTUs/Hr) | 8,579 BTUs/Hr | 19,407 BTUs/Hr | 31,226 BTUs/Hr |
| Audible noise | <70 dBA @ 1 m Typical | | |
| Operating Altitude | No Load Derating: 3280 ft. (1000m)<br>Consult Factory for Elevations Above 1000m | | |
| Degree of Protection | NEMA 1 | | |
| **Communication** | | | |
| Communication | RemotEye 4, Modbus RTU, Modbus TCP, BACNET, RS232 Port | | |
| Dry Contacts | Included (I/O Board) | | |
| Emergency Power Off (EPO) | (User-provided remote contact) | | |
| **Other** | | | |
| Compliance | UL 1778, cUL 22.2, No. 107.1 UL17025, NFPA 70; NEC, ISO9001, IEC298 IP20 | | |

## 11.2 Efficiency vs. Load (Typical)

**TABLE 11.2: % EFFICIENCY AT VARIOUS LOADS 480V$_{IN}$, 120V$_{OUT}$***

| UPS Load Capacity | Efficiency at Percent Full Load* | | | |
|---|---|---|---|---|
| | 25% | 50% | 75% | 100% |
| **15kVA** | 71.5% | 79.2% | 82.8% | 84.3% |
| **30kVA** | 70.1% | 76.6% | 79.6% | 82.6% |
| **50kVA** | 75.8% | 80.3% | 83.6% | 83.1% |

* Subject to change without notice.

## 11.3 Thermal Loss vs. Load (Typical)

**TABLE 11.3: THERMAL LOSS AT VARIOUS LOADS 480V$_{IN}$, 120V$_{OUT}$***

| UPS Load Capacity | BTU/hr. Loss at Percent Full Load* | | | | |
|---|---|---|---|---|---|
| | 0% | 25% | 50% | 75% | 100% |
| **15kVA** | 1028 | 4,590 | 6,049 | 7,177 | 8,579 |
| **30kVA** | 2047 | 9,824 | 14,072 | 17,708 | 19,407 |
| **50kVA** | 3412 | 12,255 | 18,835 | 22,591 | 31,226 |

* Subject to change without notice.

# 12 Operator Interface

## 12.1 Operator Controls

Figure 12.1 shows the function and location of the LED lights and operating button on the graphic display panel. The exterior indicator lights location and function are shown in **Section 7.2**.

**NOTICE**

**Press the reset button for at least 2 seconds to reset the display.**

The display may not respond if the button press is too short.

Touch Screen Display and Control Panel

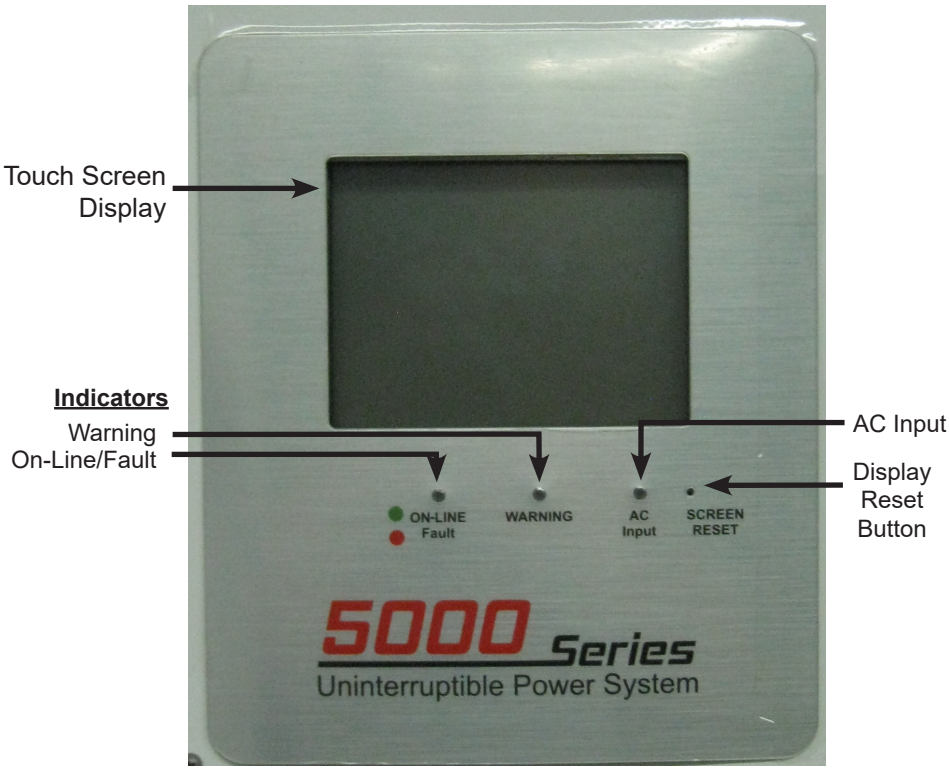



**FIGURE 12.1: UPS DISPLAY PANEL**

NOTE: On-Line/Fault LEDs – Appear Amber if Green and Red flash concurrently.

## 12.2 LED Status Indicators

| Function | LED Color | Description |
|---|---|---|
| Rectifier AC Input | White | Lit if input power is supplied to the UPS. |
| On Line | Green | Lit if UPS is in Inverter Operation mode. Power is supplied to the load via the inverter. |
| On Bypass | Yellow | Lit if UPS is in Static Bypass Operation mode. Power is supplied to the load via the static bypass. |
| On Battery | Blue | Lit if UPS is in Battery Operation mode. Power is supplied to the load via the inverter and the UPS batteries are discharging. |
| Battery Warning | Yellow | Lit if any Battery related Fault or Warning occurs. |
| UPS Overheat | Yellow | UPS temperature has reached an unsafe level. |
| UPS Warning | Yellow | UPS currently has triggered a warning state. |
| UPS Fault | Red | UPS currenlty has triggered a fault. |
| Push to Test | N/A | Tests the Status Indicator LEDs. Press and hold to verify LEDs illuminate. Release to end test. |

## 12.3 Touch Screen Display

The various components of the touchscreen display are identified in Figure 12-3.

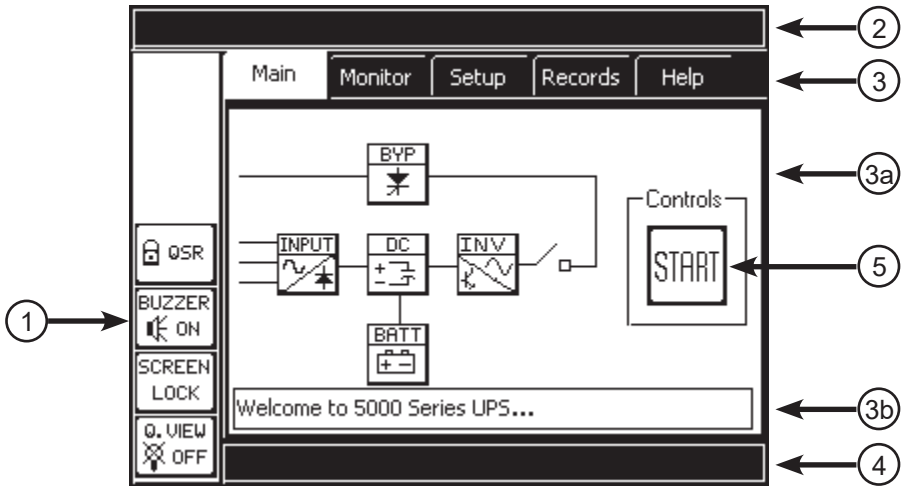
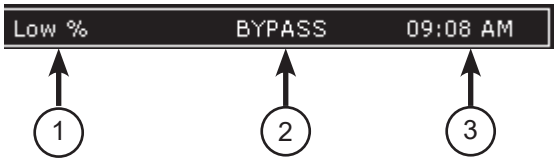



**FIGURE 12.2: TOUCHSCREEN DISPLAY COMPONENTS (INITIAL MAIN DISPLAY)**

| Touchscreen Layout | |
|---|---|
| **No.** | **Function** |
| 1 | **Quick Access Toolbar** – Interface/Status Switches (push-button icon changes to reflect current status) (See Section 12.6) |
| 2 | **Header Bar** – Displays system load, status, and time. |
| 3 | **Menu TABS** – Top level menu. Touch a Tab to activate the display mode |
| 3a | Data display area |
| 3b | Update – Displays current status and operation hints. |
| 4 | **Footer Bar** – Displays Faults, Warnings, and UPS Operating Mode. |
| 5 | **UPS Control** – Toggles between On-Line (**UPS**) and bypass (**BYP**) modes. (See Sections 13.2, 13.3)<br>Press **UPS:** UPS switches to On-Line mode, label changes to **BYP**.<br>Press **BYP:** UPS switches to Bypass mode, label changes to **UPS**. |

## 12.4 Header Bar

The Header Bar on the graphic display panel displays three system parameters: the System Load, Current Status, and System Time.

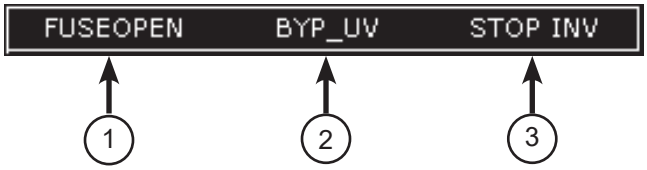



| Header Bar Components | |
|---|---|
| **No.** | **Function** |
| 1 | **System Load** – Load as percent of full load. **Low** – Less than 15% Load. |
| 2 | **Current Status** – UPS status at the moment. (Status is delayed by a few seconds) |
| 3 | **System Time** – Current time in AM-PM format |

**FIGURE 12.3: HEADER BAR DISPLAY COMPONENTS**

## 12.5 Footer Bar

The Footer Bar on the graphic display panel displays three system parameters:



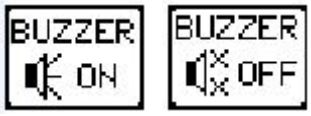
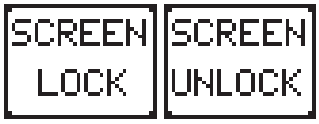
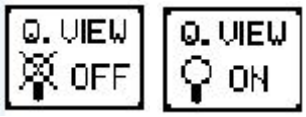

| Footer Bar Components | |
|---|---|
| **No.** | **Function** |
| 1 | **Fault** – Displays last fault sensed by UPS. A Fault causes the UPS to switch to bypass and it will not automatically reset. |
| 2 | **Warning** – Displays last warning sensed by UPS. Multiple frequent warnings of the same type may induce a fault condition. |
| 3 | **UPS Mode** – Current state of UPS. |

**FIGURE 12.4: FOOTER BAR DISPLAY COMPONENTS**

## 12.6 Quick Access Toolbar

The Quick Access Toolbar allows the operator easily perform routine commands. The Quick Access Toolbar buttons and their function are listed below.

**TABLE 12.1: QUICK ACCESS TOOLBAR CONTROLS**

| Quick Access Toolbar Controls | |
|---|---|
| **Icon** | **Function** |
|  | Security/Access Level – Access levels are: USR, ADM |
|  | Warning Buzzer mute. Press to silence buzzer. Buzzer will sound again at next fault event. (To silence buzzer for all fault events set to “Disable”.) |
|  | Touch Screen LOCK/UNLOCK button. Press to toggle between states.<br>• UNLOCK enables all touchscreen active areas.<br>• LOCK disables all touchscreen areas except the TOUCH button. |
|  | Quick View On/Off Selector – Press to toggle between Normal view and Quick view. Quick view displays a simultaneous summary of the Input/Output/Bypass/DC Voltages and Currents<br>**See Section 12.13**. |

## 12.7 5000 Menu Tree

Below is a menu tree for the 5000 display.

- Quick Access Toolbar buttons allow immediate control of important functions.
- Menu Tabs allow access to varying degrees of detailed information concerning the UPS operation, performance and parameters. The degree of information available is determined by the Security mode, which can be changed pressing the top Quick Access Toolbar button and entering the appropriate password.

***(Quick Access Toolbar Buttons)***

**ADM –** Security Mode: USR and ADM

**BUZZER ON** – Toggles between BUZZER ON, BUZZER OFF

**SCREEN LOCK** – Toggles between enabling and disabling the touchscreen.

**Q. VIEW ON** – Toggles between Quick View and standard view (Q. VIEW OFF)

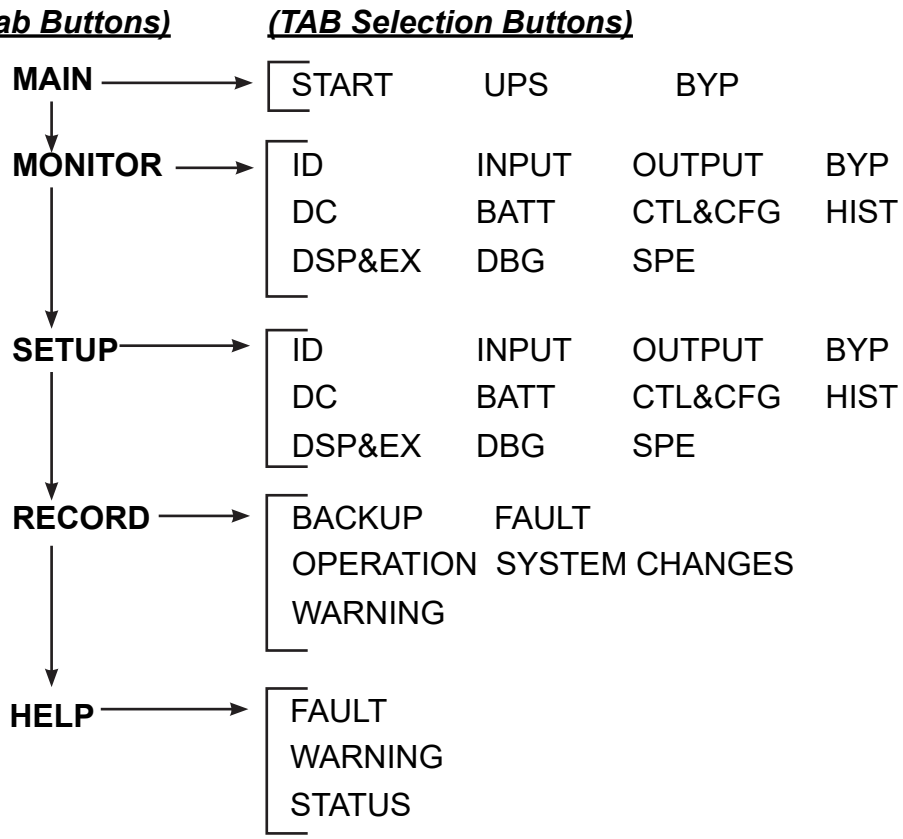



**FIGURE 12.5 – MENU TREE**

## 12.8 Toolbar: Security

The UPS initializes in the USR, or lowest security mode. To change the display security level, press the Security button.

The screen displays an alpha/numeric keypad to enter the appropriate password for the desired security level. The UPS ships with a default ADM password of ADMIN.

In the example below, to change the security level from USR to ADM:

1. Press the Security button. The alpha/numeric keypad is displayed.
2. Type in the ADM password “ADMIN” – Press the ABC button once for A, twice rapidly for B, etc.
3. After entering the password, press WRITE.
4. If the password is accepted the display will show “Successful”. Press QUIT to return to the Main display, and the Security button will display the ADM security level.

If the password is not accepted, you can retry submitting the password as many time as desired. Press QUIT to exit the Change Password without changing the password and return to the main screed.

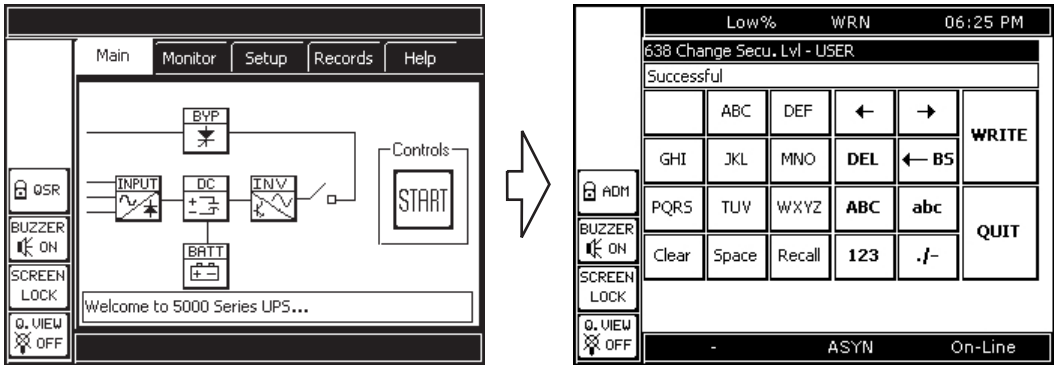



**FIGURE 12.5: CHANGING SECURITY LEVEL**

## 12.9 Toolbar: Buzzer ON/OFF

The UPS Buzzer sounds when a fault occurs or when the UPS switched to backup mode. The Toolbar allows the user to turn on/off the buzzer.

The buzzer can also be enabled or disabled through the setup menu. If the Buzzer is disabled through the setup menu, the Toolbar Buzzer button will be disabled.

## 12.10 Toolbar: SCREEN LOCK/ SCREEN UNLOCK

The touchscreen can be turned locked by pressing the SCREEN LOCK button. When locked, only the SCREEN UN-LOCK button is active, the rest of the display will not respond to touch.

## 12.11 Toolbar: QUICK VIEW ON/OFF

At anytime while using the tabs to view system details, the summary of the UPS Input, Output, and DC Bus can be viewed by pressing the Q. VIEW button (Button will display Q. VIEW ON). The illustration below highlights the critical features of the Quick View display.

Exit Quick View by pressing the Q. VIEW button again. (Button will display Q. VIEW OFF)

**TABLE 12.3 – QUICK VIEW DISPLAY**

| No. | Description |
|---|---|
| 1 | Displays Vin, Vout, and Vbyp |
| 2 | Displays output current for all three phases. |
| 3 | Changes current display mode: Press repeatedly to display alternately the current in Amps (A), or as a % of rated current (%).<br>The highlighted icon indicates the current display mode. |
| 4 | Displays DC Bus voltage, Battery voltage, and Battery Charge/Discharge current. |

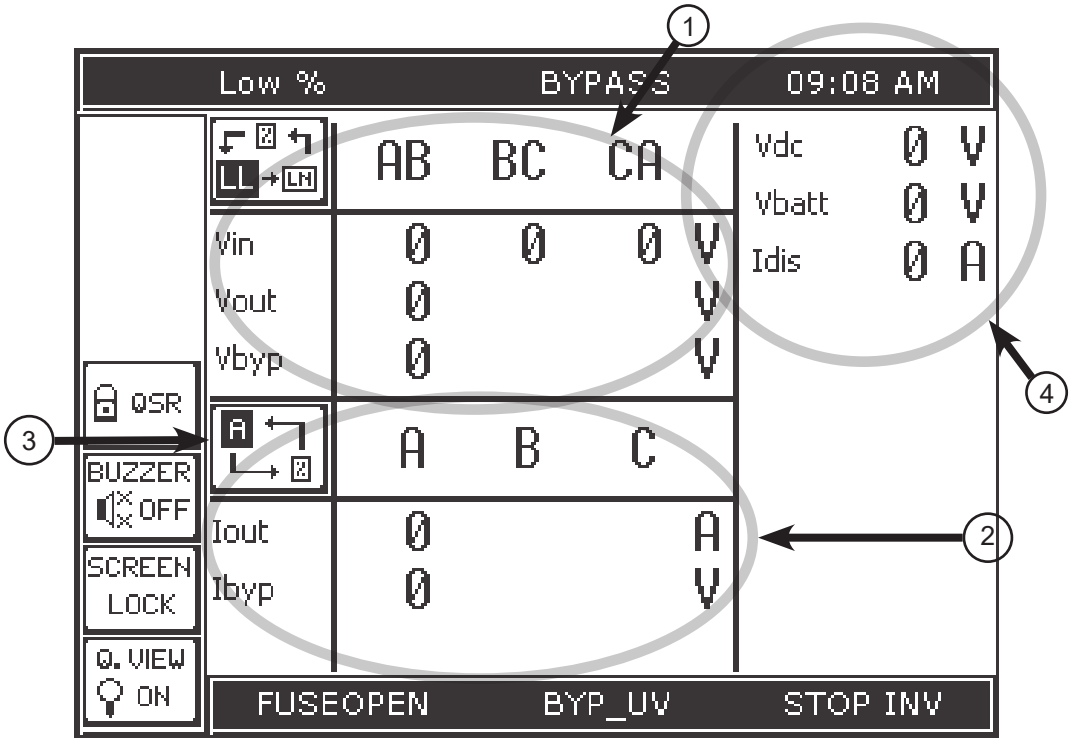
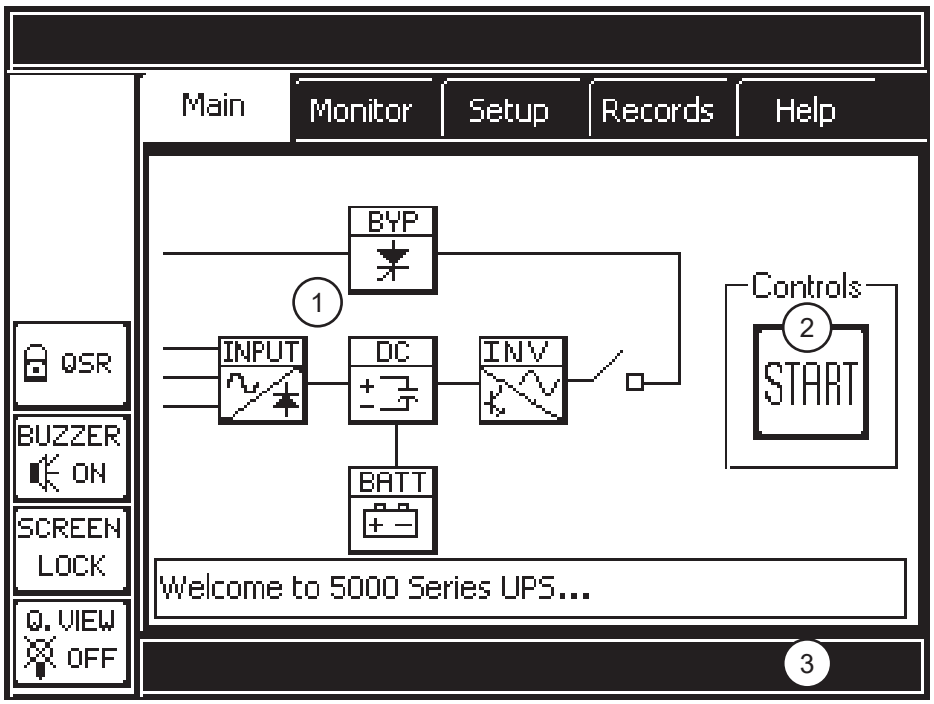



**FIGURE 12.6: QUICK VIEW DISPLAY**

## 12.12 Tab: Main – RUN/STOP

The Main tab displays the UPS Mimic Diagram and Controls button.

The middle of the display contains five buttons arranged in a diagram representing the functional model of the UPS. The lines connecting the mimic buttons represent the power flow from input to output. A thin line indicates no current flow, and a thick or bold line indicates current flow. See the Mimic Display current Flow Indicator illustration in Figure 12.11.




| Main Tab Components | |
|---|---|
| **No.** | **Function** |
| 1 | **UPS Mimic Diagram** – Displays current status of the various UPS sub-systems |
| 2 | **UPS Control** – Toggles between On-Line (**UPS**) and bypass (**BYP**) modes.<br>(See Sections 13.2, 13.3)<br>Press **START:** UPS starts rectifier and inverter. Enables **UPS** and **BYP** options.<br>Press **UPS:** UPS switches to On-Line mode, label changes to **BYP**.<br>Press **BYP:** UPS switches to Bypass mode, label changes to **UPS**. |
| 3 | **Information Bar** – Displays status, helpful hints, acronym definitions updated every two seconds. |

**FIGURE 12.7: MAIN TAB COMPONENTS**

## UPS/BYP Button Operation

Below outlines the operation of the **UPS**/**BYP** button. Note: the button must first be pressed when **START** is displayed for the following options to be available.

When the UPS is in BYPASS mode, the **UPS** button is displayed.

1. To switch the UPS to Online operation, press the **UPS** button.

2. The **UPS** icon changes to an Hourglass for 3 seconds. The control button is disabled while the hourglass is displayed.

   The same delay occurs when switching from UPS to BYP.

3. After the hourglass icon clears the **BYP** icon is displayed. The UPS is in Online mode.

4. To put the UPS back into Bypass mode, press the **BYP** button. The hourglass will display as in step 2, then the button will display the **UPS** icon.

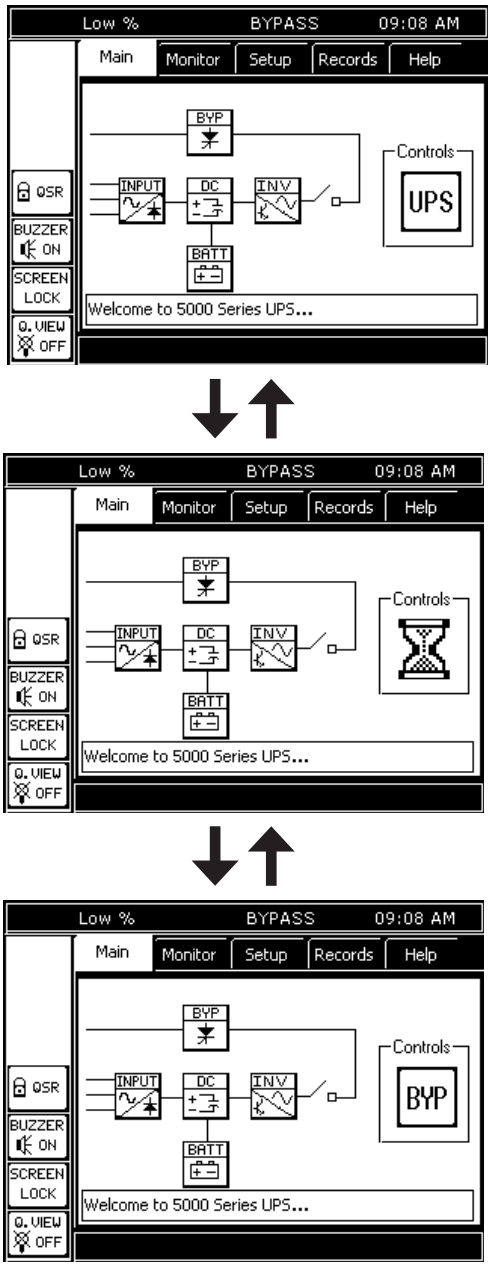



**FIGURE 12.8: UPS/BYP BUTTON OPERATION**

## 12.13 Tab: Monitor

The MONITOR tab allows the user to select a specific group of performance parameters to view. The tab shows 12 buttons. Inactive buttons are indicated with a “x” in the lower right-hand corner of the button.

The left side of the display is a vertical stack of four buttons.

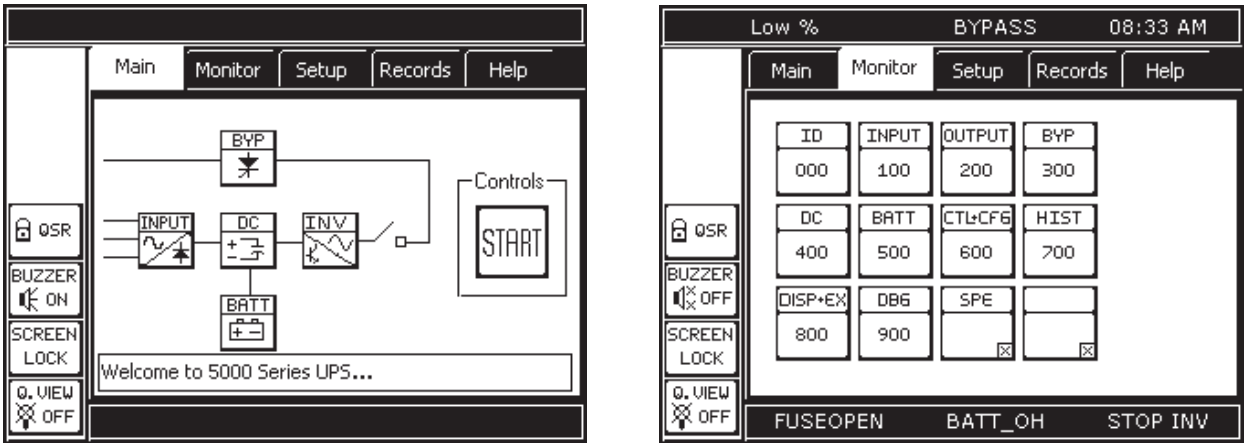



**FIGURE 12.9: MONITOR TAB DISPLAY OPTIONS**

The mimic display indicates the power flow through, or around, the UPS. There are four primary modes the UPS operates in: Off, Bypass, Online, and Backup. The figure below illustrates the display for each of these modes.

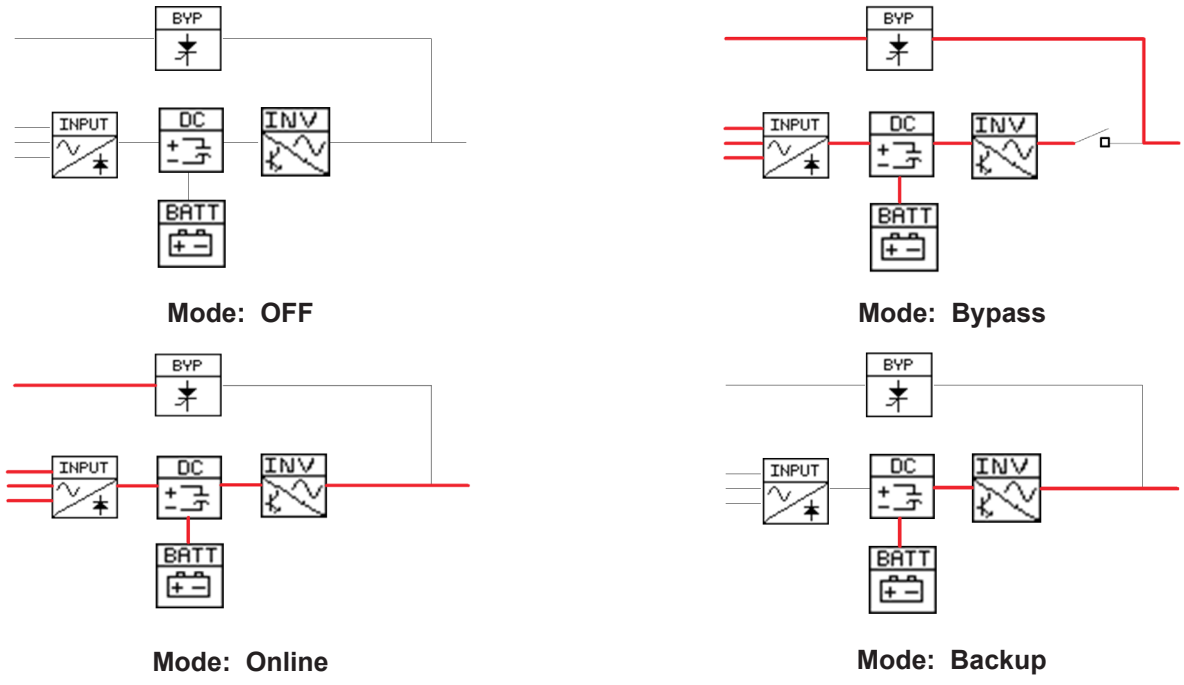
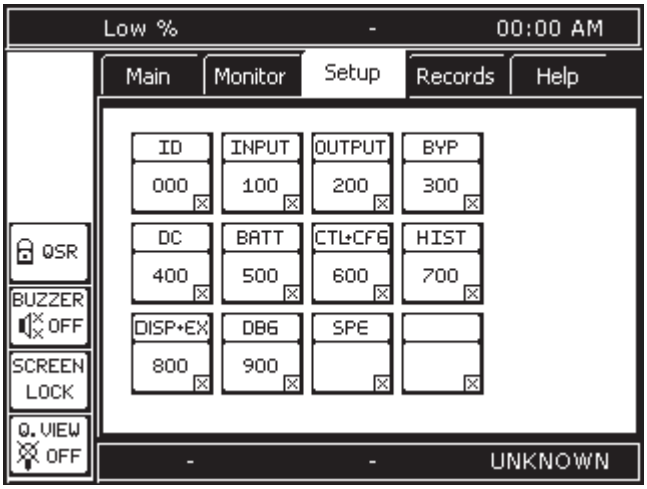



**FIGURE 12.10: MIMIC DISPLAY CURRENT FLOW INDICATOR**

## 12.14 Tab: Setup

The SETUP tab allows the user to adjust certain UPS parameters. The setup tab shows 12 buttons. Inactive buttons are indicated with a “x” in the lower right-hand corner of the button. The table below, right, shows a typical SETUP button.




| Typical Button | Significance |
|---|---|
| | No “x” in the lower right corner indicates the button is active. Pressing the button will open a data page displaying the parameters available at the current security level. |
| | A button that has an “x” in the lower right corner is inactive and cannot be accessed at the current security level. |

| Param. Prefix | Parameter Category |
|---|---|
| 0 | UPS Identification, Serial number, Start-up Date, software version |
| 1 | Input line-line V/I values, V/I percent of rated value, and frequency |
| 2 | Output line-neutral V/I values, V/I percent of rated value, and frequency |
| 3 | Bypass line-neutral V/I values, V/I percent of rated value, and frequency |
| 4 | DC Bus Voltage, DC Over Voltage Level, Over current detection Level, DC Bus Boost Level |
| 5 | Battery Voltage/Current and Shutdown Voltage |
| 6 | Control and Configuration – UPS time/date/status, faults, warnings, password management |
| 7 | History – UPS Operation time, Number of Faults, Backup, Operations. |
| 8 | Display and Ext Comm. – Disp. S/W version, buzzer status, display calibration values. RemotEye I/P address, data and network status. |

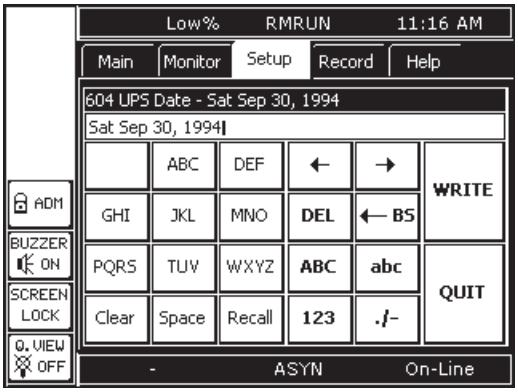
**FIGURE 12.11: PARAMETER CATEGORIES**

**Tab: SETUP (cont.)**

Pressing an active button will cause a list of parameters to be displayed (See previous page). Pressing a listed parameter will activate a display appropriate to the parameter selections available If the parameter cannot be edited at the current security level, the display will not change. If the parameter can be edited or changed, an appropriate keypad will dis-played as shown below. Either a alpha/numeric keypad, a multiple choice, or binary choice display will appear.

After entering data or selecting an options, press WRITE to save the selections, or QUIT to leave the current value un-changed.

Example 1 – Alpha/numeric display.




Example 2 – Multiple Choice Display with Default value Marked (*)

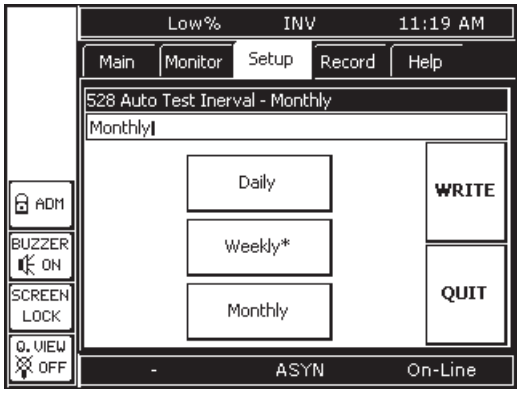
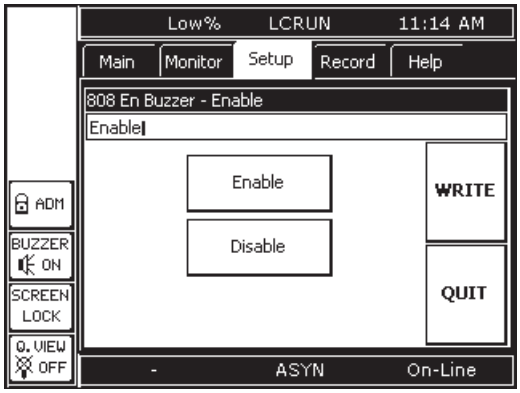



**TABLE 12.2: TOUCHSCREEN KEYPAD IDENTIFICATION**

| Button | Action |
|---|---|
| Clear | Delete all characters on input line |
| Space | (Space bar) |
| Recall | Restores previous entered value |
| ← → | Move cursor one space left or right |
| DEL | Delete character to right of cursor |
| ← BS | Back Space – Delete character to left of cursor |
| ABC | Set Keypad to capital letters (A,B, C...) |
| abc | Set Keypad to lower case letters (a, b, c...) |
| 123 | Set Keypad to numbers (1, 2, 3...) |
| ./- | Set Keypad to write Special Characters ( . , – : / ) |
| Write | Write information (Enter) (Pressing Quit without first press-ing Write will cause the newly entered data to be lost.) |
| Quit | Exit keypad. |

Example 3 – Binary choice (On/Off, Enable/Disable, Contact A/Contact B)



## 12.15 Tab: Record

The tab Record offers three types of records: Operation, Backup, and Fault.

| Backup Record | Description | Max. Number of Records |
|---|---|---|
| Operation | Every change in operating mode is recorded by time, date, and mode. | 16 records before overwrite (First In, First Out) |
| Fault | Every time a fault occurs, the date, time and fault are recorded. | 16 records before overwrite (First In, First Out) |
| Warning | Every time a warning occurs, the date, time and warning are recorded. | 16 records before overwrite (First In, First Out) |
| Backup | When Backup is executed, all records at that time are stored and kept in this location. | 16 records before overwrite (First In, First Out) |
| System Changes | Every time parameters of the system are edited, the date, time, and change are recorded. | 16 records before overwrite (First In, First Out) |

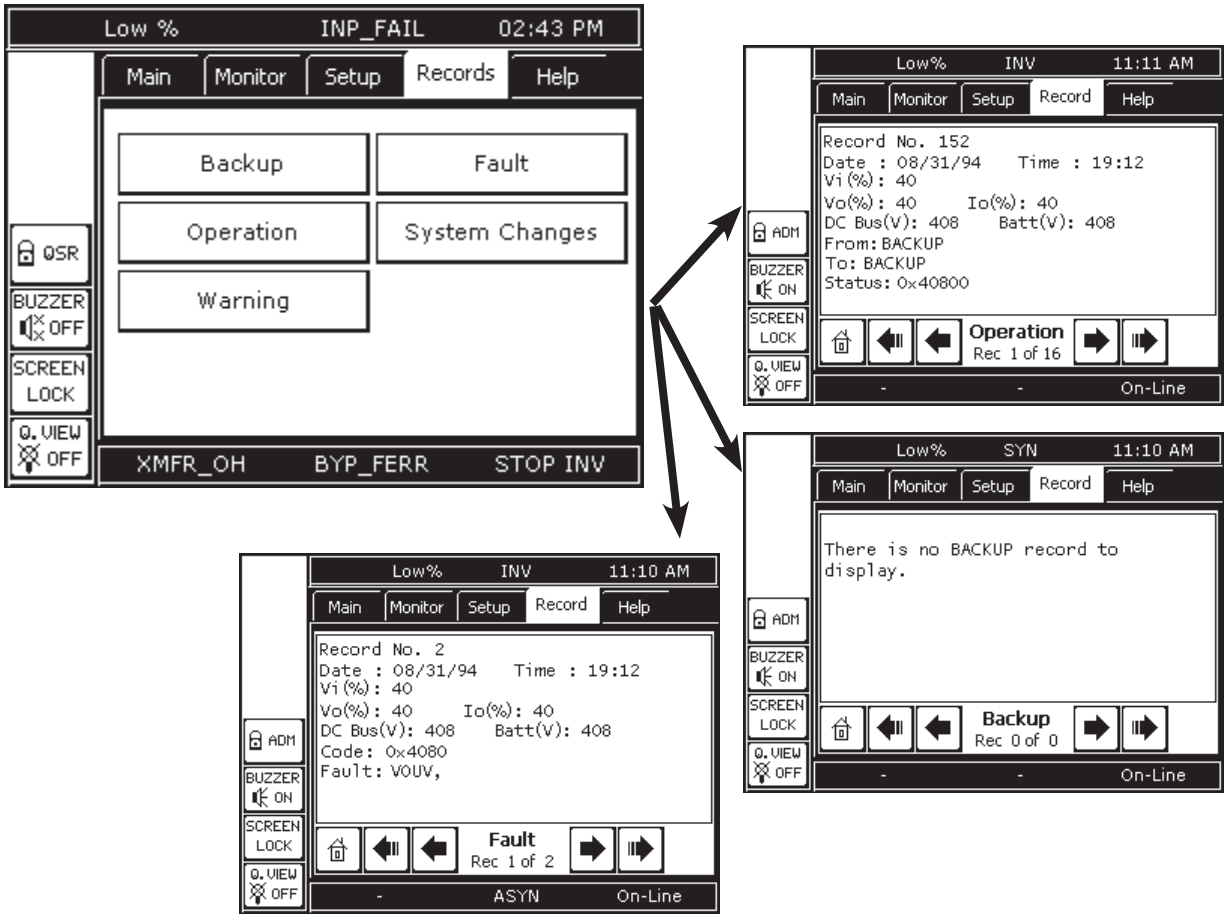



**FIGURE 12.12: RECORDS**

## 12.16 Tab: Help

This on-line help provides ready definitions of the Acronyms displayed on the touchscreen and their definitions. Each acronym and accompanying definition is displayed on a single page.

The navigation bar has an additional button in Record and Help called Auto-Page. Pressing Auto-Page will cause the records to auto-page every 2 seconds. The button will alternately blink in black-on-white/ white-on-black while in Auto-Page mode. Press the button again to exit Auto-Page mode.



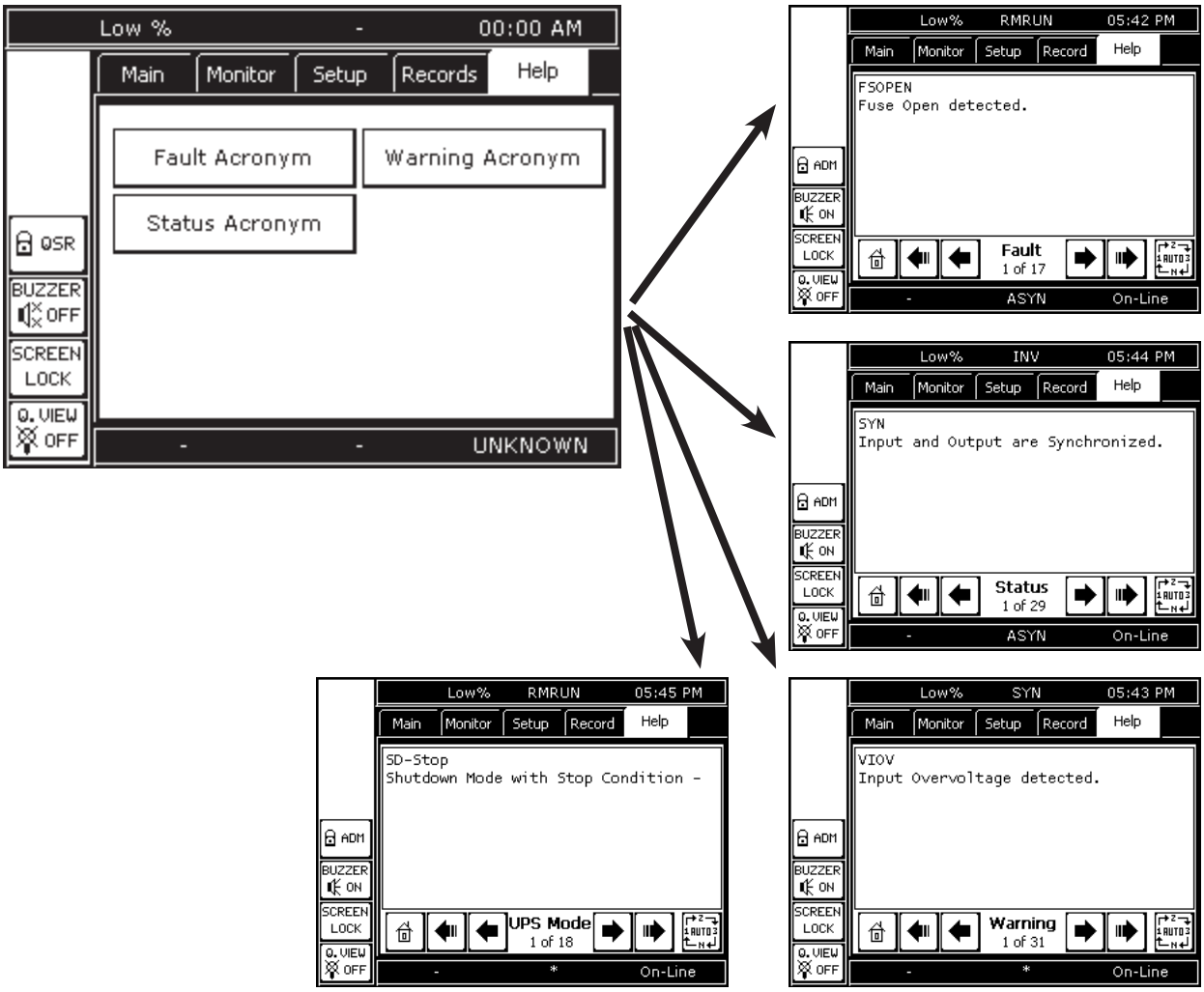



**FIGURE 12.14: HELP CATEGORIES**

## 12.17 5000 Series Parameter Definitions

See Appendix A for a list of the definitions and functions of the Command Parameters accessable in the USR and ADM modes..

## 12.18 System Fault Messages

A Fault message is generated when either a fault condition occurs, or a warning condition occurs three times within ten minutes. The table below shows the possible fault messages and what actions need be taken.

If the input voltage is normal when the fault occurs then the UPS will switch immediately to the bypass mode to continuously feed power to the load.

If the fault condition occurs while the input power is outside of specification and the UPS is in Bypass mode, the UPS will shut down the output to prevent load equipment damage.

When a Fault condition exists, the red LED on the UPS display panel will illuminate until the fault is cleared. A reset of the system after the source of the fault is eliminated is required to turn off the fault LED.

**TABLE 12.3: SYSTEM FAULT MESSAGES**

| System Fault Messages | | |
|---|---|---|
| **Fault Code** | **Meaning** | **Action** |
| FUSEOPEN | Fuse open | Contact nearest Toshiba Authorized service representative. |
| USERFLT | USERFLT External I/O input indicates a User Fault has occurred. | If possible, correct the fault condition that caused the fault condition. Otherwise, Contact nearest Toshiba Authorized service representative. |
| INV_UV | Inverter Undervoltage During Startup | Contact nearest Toshiba Authorized service representative. |
| EPO | Emergency Power Off. | Reset EPO switch to start. |
| CTL_PWR | Control Power Supply Fault | Contact nearest Toshiba Authorized service representative. |
| DCBUS_OC | DC Bus Overcurrent | Contact nearest Toshiba Authorized service representative. |
| BATT_DEP | Battery Depleted Fault | Charge the batteries. If this persists, contact nearest Toshiba Authorized service representative |
| MULTIWRN | Frequent Errors (Warnings Occuring Frequently) | Contact nearest Toshiba Authorized service representative |
| XFMR_OH | Unit Overheat | Reduce equipment load to 100% or less and try restarting. |
| DCBUS_UV | DC Bus Undervoltage During Startup | Contact nearest Toshiba Authorized service representative. |
| DEFAULTS | The Control Board EEPROM Loaded Default Parameters. | Contact nearest Toshiba Authorized service representative. |
| WD_RESET | UC Watchdog Reset Occurred | Contact nearest Toshiba Authorized service representative. |

## 12.19 System Warning Messages

Warning messages are generated when a noncritical abnormal operating condition occurs. The following tables shows possible messages and their meaning.

When a Warning condition exists, the amber LED on the UPS display panel will flash for the duration of the Warning condition.

**TABLE 12.4: SYSTEM WARNING MESSAGES**

| System Warning Messages | | |
|---|---|---|
| **Display** | **Meaning** | **Action** |
| CHOP_OC | Chopper Overcurrent | Contact nearest Toshiba Authorized service representative. |
| INV_UV | Inverter Undervoltage | Contact nearest Toshiba Authorized service representative. |
| INV_OV | Inverter Overvoltage | Contact nearest Toshiba Authorized service representative. |
| INV_OC | Inverter Overcurrent | Contact nearest Toshiba Authorized service representative. |
| DCBUS_OV | DC Bus Overvoltage | DC Capacitor bank voltage is above set limits. Possibly due to back feed into unit. Check load and try restarting the UPS. If condition persists, contact nearest Toshiba Authorized service representative. |
| INV_OL | Inverter Overload | Contact nearest Toshiba Authorized service representative. |
| STARTERR | AC Input Undervoltage During Startup | Contact nearest Toshiba Authorized service representative. |
| BATT_SD | Battery Voltage Went Below the Shutdown Level in Backup | Contact nearest Toshiba Authorized service representative. |
| BYP_OV | Bypass Overvoltage | Contact nearest Toshiba Authorized service representative |
| DEVICEOH | Chopper or Inverter Overheat | Reduce equipment load to 100% or less and try restarting. |
| BYP_UV | Bypass Undervoltage | Contact nearest Toshiba Authorized service representative. |
| BYP_FERR | Bypass Frequency Error | Contact nearest Toshiba Authorized service representative. |
| LOW_BATT | Battery Undervoltage | Contact nearest Toshiba Authorized service representative. |
| BYPASS | Bypass Supplying Power to Load | No action needed. |
| INPUT_OV | Input Overvoltage | Contact nearest Toshiba Authorized service representative. |
| INPUT_UV | Input Undervoltage | Contact nearest Toshiba Authorized service representative. |
| PHASEROT | Input Phase Rotation Error | Input phase rotation is reversed. Contact nearest Toshiba Authorized service representative. |
| INP_FERR | Input Frequency Error | Contact nearest Toshiba Authorized service representative. |
| BATT_OH | Battery Overheat | Contact nearest Toshiba Authorized service representative. |
| ASYNC | Input and Output are Asynchronous | Contact nearest Toshiba Authorized service representative. |
| 72BOPEN | 72B Battery Breaker Open | Close battery breaker. If warning persists. Contact nearest Toshiba Authorized service representative. |

| System Warning Messages | | |
|---|---|---|
| **Display** | **Meaning** | **Action** |
| USERWRN2 | User Warning Type 2 (Will cause transfer from online to bypass and then automatic re-transfer to online) | Contact nearest Toshiba Authorized service representative. |
| USERWRN3 | User Warning Type 3 (Will only log warning) | Contact nearest Toshiba Authorized service representative. |

## 12.20 System Mode Messages

A UPS Mode message is generated when the UPS changes operating mode. The following tables list the possible operating modes for the UPS.

**TABLE 12.5: SYSTEM MODE MESSAGES**

| Display | Meaning |
|---|---|
| Backup | No input, power is being supplied by the battery. |
| BypassOnly | UPS is offline, power is being provided directly from UPS input. |
| Byp-InvOn | Input converter and inverter are running (Double conversion mode). |
| On-Line | Input converter and inverter are running (Double conversion mode). |
| StopInv | No output, UPS is in the process of stopping the Inverter and discharging the DC Bus. |
| StartInv | UPS is starting up the Inverter. |

## 12.21 System Status Messages

A UPS Status message is generated when the UPS changes its status (from inverter to bypass mode, for example). The table below shows the possible Status messages and their meaning.

**TABLE 12.6: SYSTEM STATUS MESSAGES**

| 5000 System Status Messages | | |
|---|---|---|
| **Display** | **Meaning** | **Action** |
| SYNC | Bypass and Output are Synchronous | No action needed. |
| INV_ON | Inverter Running | No action needed. |
| BYPASS | Bypass Supplying Power to the Load | No action needed. |
| INP_FAIL | Input Power is out of specified parameters, eg. overvoltage, undervoltage, outside of frequency window. | Inspect input power quality and connections. If normal, contact nearest Toshiba Authorized service representative. |
| FAULT | One or more Faults Occurred | Contact nearest Toshiba Authorized service representative. |
| WARNING | One or more Warnings Occurred | See warning records. |
| EPO | EPO Tripped | No action needed. |
| GATECHK | UPS in Gate Check Test Mode | No action needed. |
| PRE_CHRG | UPS in Precharge Test Mode | No action needed. |
| EQ_CHRG | Equalize Charge Occurring | No action needed. |
| 72BCLOSE | 72B Battery Breaker Closed | See warning records. |
| PROTCHRG | Protection Charge Occurring | No action needed. |
| BACKUP | Batteries Supplying Power to the Load | No action needed. |
| ONLINE | Inverter Supplying Power to the Load | No action needed. |
| OVERLOAD | Ups Is In Overload Condition (Output Current >100%) | Reduce load to prevent transfer to bypass. |
| REMOTEOP | Remote Operation Occurred (Remote Stop Or Remote Run) | No action needed. |
| 52ROPEN | 52R Contactor Has Not Been Commanded To Close Or Has Been Commanded To Open | No action needed. |
| CHP_DIS | User Has Disabled Chopper Through External I/O | No action needed. |
| EPROMDIS | EPROM Writes To The Control Board Were Disabled. The User Will Not Be Able To Change Any Control Board Parameters. | No action needed. |

# 13 UPS Operation

The 5000 Series UPS is hardwired to both utility power and the critical loads. The four main operating states are:

1. On-Line Mode: The UPS converts utility power to charge batteries and provides clean power to the load from the inverter output.
2. Bypass Mode: The unconditioned utility power is routed around the converter-inverter of the UPS and fed directly to the load.
3. Maintenance Bypass Mode: Unconditioned utility power is wrapped around the entirety of the UPS and fed directly to the load.
4. Battery Backup Mode: Batteries are discharged to provide power to the load via inverter output.
5. Emergency Power Off (EPO: For emergency use only. Reference Section 13.4 for details.

The UPS can be switched between On-Line and Bypass by pressing and momentarily pressing the RUN/STOP button on the touchscreen display.

## 13.1 Start the UPS On-Line Mode

1. Turn ON 3-Phase Main input circuit breaker (MCCB1) and 1-Phase Bypass input breaker (MCCB2) on the front of the UPS to power up the unit. **15kVA Only:** Verify that the status of the control circuit breaker located on the front door is closed.
2. Verify that the **AC Input** LED on the front panel lights green. All LED's on the front panel may light for a moment when the input breaker is turned on. This is normal. The UPS will now be supplying power in the bypass mode.
3. Close Output Breaker (MCCB4) to supply Bypass voltage to the load. Alternatively, wait until the unit is in UPS/Online mode and then close MCCB4 to provide clean power to the load
4. Press and hold the **START** button to begin UPS
5. If the UPS is equipped with an External Battery System, switch the cabinet breaker **ON** when prompted on the UPS screen. **Note: do not close battery system breaker before UPS has been started up or before prompted on the UPS screen.**

**NOTICE**

**When running the UPS for the first time or after the power failure backup operation, The batteries will not be fully charged and battery backup times maybe lower than expected,**
**Charge the batteries per the battery manufacturers recommendations in order to receive expected run times.**
**Using the UPS without charging the battery shortens the battery backup operation time, and may result in unexpected dropped load in case of a power failure.**

6. Press and hold the **UPS** button on the touchscreen for 2 seconds to begin UPS operation.
7. Press the **Quick View** button on the Quick Access Toolbar and verify the UPS has input/output power. If the UPS has backup batteries, verify the batteries are being charged.

## 13.2 Stop the UPS (Switch to Bypass Mode)

To stop the UPS inverter, press and hold, for 2 seconds, the **BYP** button on the touchscreen display. The **On-Line** LED changes from green to off. The UPS is now in Bypass mode.

**NOTICE**

**If the primary input breaker is turned off while UPS is in the bypass state, display on the unit will turn off but power will still be provided to the load. If both primary and bypass input breakers are turned off while UPS is in the bypass state, output power will be lost and any load devices will lose power.**

Ensure that all sensitive loads have been previously shut down.

To take the UPS completely offline, open the input breaker MCCB, the secondary Input breaker , and the External Battery System breaker (if available).

## 13.3 Switch the UPS from Online to Maintenance Bypass

The UPS is equipped with a 3-breaker Maintenance Bypass System in the I/O & MBS Cabinet.
Refer to the following steps to switch the UPS to Maintenance Bypass. Follow these in conjunction with the component layout of the MBS Bay on page 20 as well as the system one-line drawing on page 35. Failure to follow the correct sequence can result in loss of power to the critical load.

1. Press the touchscreen MAIN Tab.
2. Press the "**BYP**" icon on the touchscreen MAIN display. This sets the UPS in Bypass Mode. Output power is now provided through the bypass circuit. ***While in this mode, if a power failure occurs on the commercial power source, the UPS will lose power. Power to the critical load will be interrupted.*** The battery charging circuit and chopper circuit remain active.
3. Verify the "**ONLINE/FAULT**" LED is OFF.

   ***DO NOT physically place the UPS in Maintenance Bypass with the Maintenance Bypass Switch until the touchscreen indicates the unit is in BYPASS Mode.***
4. If an external Battery System is attached, switch the battery system MCCB to "**OFF**".
5. Open the doors to the I/O & MBS Bay.
6. Extract the key from the SKRU in the I/O & MBS Bay.
7. Insert the key in the lock on MCCB-3, and unlock MCCB-3.
8. Close MCCB-3 (Maintenance Bypass Breaker)
9. Open MCCB-4 (UPS Output Isolation Breaker)
10. Lock MCCB-4. Remove the key from the lock on MCCB-4, and insert it in the SKRU.
11. At this time, MCCB-2 (Bypass Input Breaker) may now be opened.
12. Open MCCB1 (UPS Input Breaker).

**The unit is now in Maintenance Bypass mode and may be serviced.**

## 13.4 Switch the UPS from Maintenance Bypass to Online

Refer to the following steps to switch the UPS to from Maintenance Bypass to Online.

1. Verify that the UPS is in Bypass via the mimic panel.
2. Verify that the Bypass and Inverter LED's are on. If so, the key in the SKRU can now be removed.
3. Open the doors to the I/O & MBS Bay. Ensure Power Electronics Bay doors remain closed.
4. Close MCCB-1 (UPS Input Breaker) and MCCB-2 (Bypass Input Breaker).
5. Wait until the UPS turns ON. Touch START button on main screen.
6. Close all Battery breakers.
7. Extract the key from the SKRU. Insert it in the lock on MCCB-4, and unlock MCCB-4.
8. Close MCCB-4 (UPS Output Isolation Breaker).
9. Open MCCB-3 (Maintenance Bypass Breaker).
10. Lock MCCB-3. Remove key from MCCB-3, and insert it in SKRU.
11. Close and secure the doors on the I/O & MBS Bay.
12. Touch and hold the **UPS** button for 2 seconds (this will transfer the UPS to inverter operation.)

**The unit is now in Inverter Operation Mode and the load is protected.**

## 13.5 Restore System Power after an EPO Shutdown

After shutting down the UPS by pressing the EPO switch, restore system power as follows:

1. Ensure the cause of the EPO action has been resolved.
2. Reset the UPS Input Breaker (MCCB-1) and Bypass Input Breaker (MCCB-2), located within the MBS Bay, by first switching the breaker OFF, then ON.
3. Follow the startup procedure as given in **Section 13.2**.
4. Reset the Battery System (if any) circuit breaker(s) by first switching the breaker OFF, then ON.

## 13.6 Battery Backup Time and Discharge Process

The optional battery system provides some period of back-up time depending on the UPS kVA rating, battery size, and system load. The exact length of these times will depend on the UPS model used, condition of the batteries, amount and type of load, temperature and other variables.

Figure 13.1 graphically illustrates the battery discharge process under full load conditions.

The UPS battery voltage to drops as the battery discharges. The chart in Figure 13.1 lists the voltage level at which each UPS low-voltage alarm will sound and at what level the low-voltage condition will cause the unit to automatically shut down.

| | |
|---|---|
| Nominal voltage ($V_{nom}$) | 120 Vdc |
| Alarm voltage ($V_{low}$) | 111 Vdc |
| Shutdown voltage ($V_{min}$) | 105 Vdc |

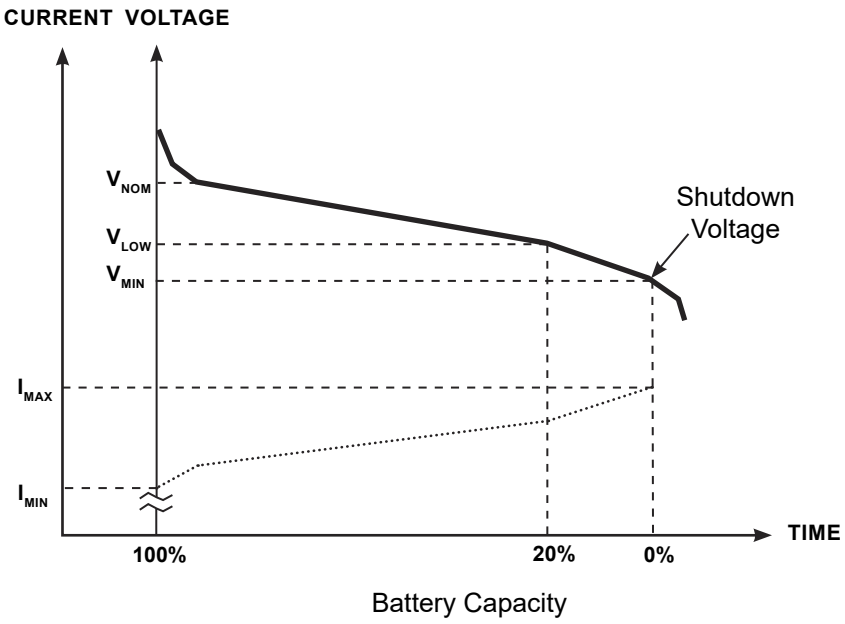



**FIGURE 13.1: TYPICAL BATTERY DISCHARGE CURVE**

## 13.7 Battery Recharge

The battery charging period varies depending on the amount of discharge during backup.

| Charging Period | Explanation |
|---|---|
| Period 1 | Initial charging at maximum current (limited by charger). $V_{min}$ is minimum voltage at which the UPS will shut down power to the load. |
| Period 2 | Charging rate drops as battery voltage increases. |
| Period 3 | Battery cells are at maximum voltage, UPS continues to provide a “trickle charge” to keep the batteries a maximum charge capacity. |

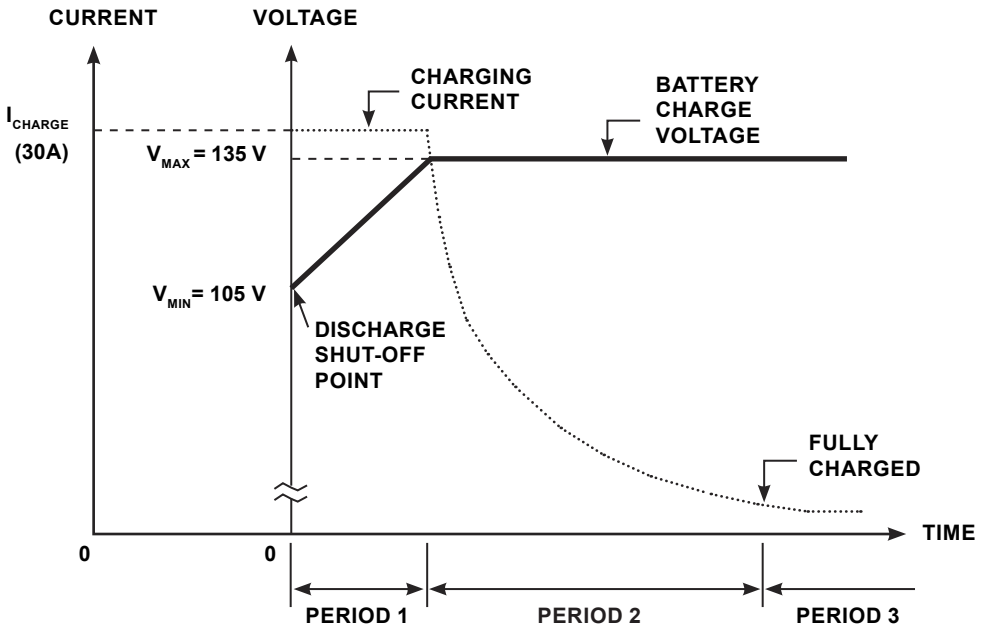
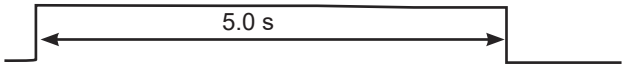
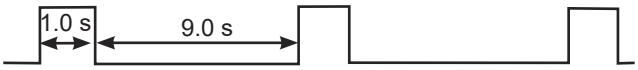
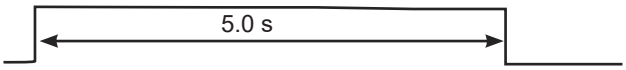
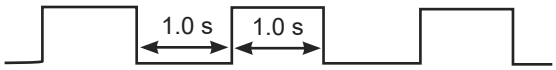
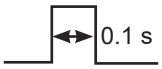



**FIGURE 13.2: TYPICAL BATTERY CHARGING CURVE**

## 13.8 Audible Alarm Functions

An audible alarm (buzzer) will sound when the UPS is in the battery backup mode, has a fault, has low battery voltage, or is in an overload condition. The buzzer will also beep each time an effective item is touched on the touchscreen. The following chart shows the buzzer pattern durations for each condition. Time units are shown in seconds.

**TABLE 13.1: AUDIBLE ALARMS**

| Condition | Audible Pattern |
|---|---|
| Any Fault (Intermittent buzz until fault clears) |  |
| Switch to Backup (Single five-second buzz) |  |
| Backup Operation (Intermittent buzz once every ten seconds) |  |
| UPS Battery Shutdown Voltage (Batt. Voltage 79% Normal) |  |
| Warnings:<br>BATT_OC, INV_UV, INV_OV, INV_OC, DCBUS_OV, INV_OL, STARTERR, BATT_SD, BYP_OV, DEVICEOH, BYP_UV, BYP_FERR, LOW_BATT, BYPASS, INPUT_OV, INPUT_UV, PHASEROT, ERROR, INP_FERR, BATT_OH, ASYNC, 72BOPEN, USERWRN2, USERWRN3 |  |
| Touching Effective Item on Touchscreen |  |

The buzzer can be silenced most easily by pressing the Buzzer Silent button on the Quick Access Toolbar.

Alternatively, the buzzer can also be silenced by selecting the Settings tab, then set the Buzzer Silent parameter to Disable. This will turn off the buzzer for the current alarm status, but the buzzer will still sound when the next Fault/Warning condition occurs.

The buzzer can be disabled permanently by selecting the Settings tab then setting the parameter **Buzzer Disable** to Disable. This will disable the alarm so that no alarm sounds for any Fault or Warning condition.

# 14 Options

## 14.1 Remote Monitoring System – RemotEye 4

The 5000 Series can be monitored and controlled remotely via. the optional RemotEye 4 10/100 Base-T network card with embedded software that allows network administrators to monitor and control the UPS via any of the following protocols:

- Hypertext Transfer Protocol (HTTP/HTTPS)
- SNMP (Simple Network Management Protocol)
- Modbus TCP/RTU (Transmission Control Protocol/Remote Terminal Unit)
- BACnet IP/MSTP (Internet Protocol /Master Slate Token Passing)

## 14.2 Remote System Monitoring – Remote Radar

A network of Toshiba UPS's equipped with the RemotEye network cards can be viewed and monitored using the optional RemotRadar application software on any MS-Windows machine.

- Real-Time Monitoring & Management of up to a combined total of 5,000 RemotEye® II, III, 4, & Remote-D® Devices.
- SNMP-Based UPS Monitoring & Management Across Global Locations
- Customizable Alarm Management System to Meet Location Requirements
- Auto-Detects RemotEye® II & III & Remote-D® Presence on a Network with a Click of a Button
- Auto-Track & Report UPS Status & Events
- Sends Fault/Incident Alerts via Text Message (SMS) and/or E-mail.
- Notify Fault/Incident Alerts up to 8 Recipients via E-mail & Text Message (SMS) (for a Total of 16 Recipients Combined)
- Provides Remote Control Capability
- Compatible with GSM Modems to Send Text Messages (SMS)
- Import/Export Network Settings via csv text file.

# 15 External Layouts/Dimensions/Shipping Weights

## Dimensional Data

**TABLE 15.1: DIMENSIONAL DATA**

| EXTERNAL DIMENSIONS | | | | SHIPPING DIMENSIONS[1] | | |
|---|---|---|---|---|---|---|
| **Unit** | **Width** | **Depth** | **Height[2]** | **Width** | **Depth** | **Height** |
| **50kVA MBS Cabinet** | 30.5 in (776 mm) | 31.3 in (796 mm) | 78.9 in (2003 mm) | 44 in (1120 mm) | 48 in (1220 mm) | 84 in (2135 mm) |
| **50kVA Power Electronics Cabinet** | 65.0 in (1651 mm) | 31.3 in (796 mm) | 78.9 in (2003 mm) | 89 in (2260 mm) | 48 in (1220 mm) | 84 in (2135 mm) |
| **30KVA UPS** | 65 in (1651 mm) | 31.3 in (796 mm) | 78.9 in (2003 mm) | 85 in (2160 mm) | 48 in (1220 mm) | 96 in (2440 mm) |
| **15KVA UPS** | 30.5 in (776 mm) | 31.3 in (796 mm) | 78.9 in (2003 mm) | 46 in (1170 mm) | 48 in (1220 mm) | 96 in (2440 mm) |

1 - Subject to change without notice.
2 - Add 3.6 in. (91 mm) for lifting eyes

## Unit and Shipping Weights

**TABLE 15.2: UNIT AND SHIPPING WEIGHTS**

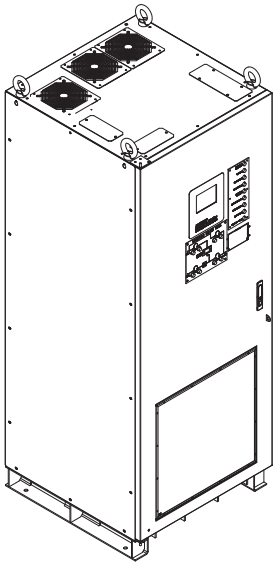
| Model | Unit Weight [1] | | Shipping Weight [1,2] | |
|---|---|---|---|---|
| | **Pounds** | **Kilograms** | **Pounds** | **Kilograms** |
| 50kvA I/O & MBS Cabinet | 792[3] | 359 | 915 | 415 |
| 50kVA Power Electronics Cabinet | 2426 | 1100 | 2700 | 1225 |
| 30kVA UPS | 2310[3] | 1040 | 2700 | 1225 |
| 15kVA UPS | 1380 | 621 | 1500 | 680 |

1. Subject to change without notice.
2. Shipping weights include 120 lbs. (54.4 kg) for I/O & MBS shipping pallet and 270 lbs. (121.5 kg) for PEC Pallet.
3. Optional Isolation Transformer accounts for approximately 350 lbs. of the IO & MBS Weight. Subtract weight accordingly if transformer is not included.

# Appendix A – Dimensional Drawings

| PARAMETERS | 15KVA |
|---|---|
| APPROX. WEIGHT (LBS/KGS) | 1380/621 |
| SUGGESTED CABINET CLEARANCE | FRONT: 42"; LFT/RHT/BACK: 0; TOP: 23" |
| FINISH | ANSI GRAY 61 |

NOTE: SEE MANUAL FOR COMPLETE SPECIFICATIONS



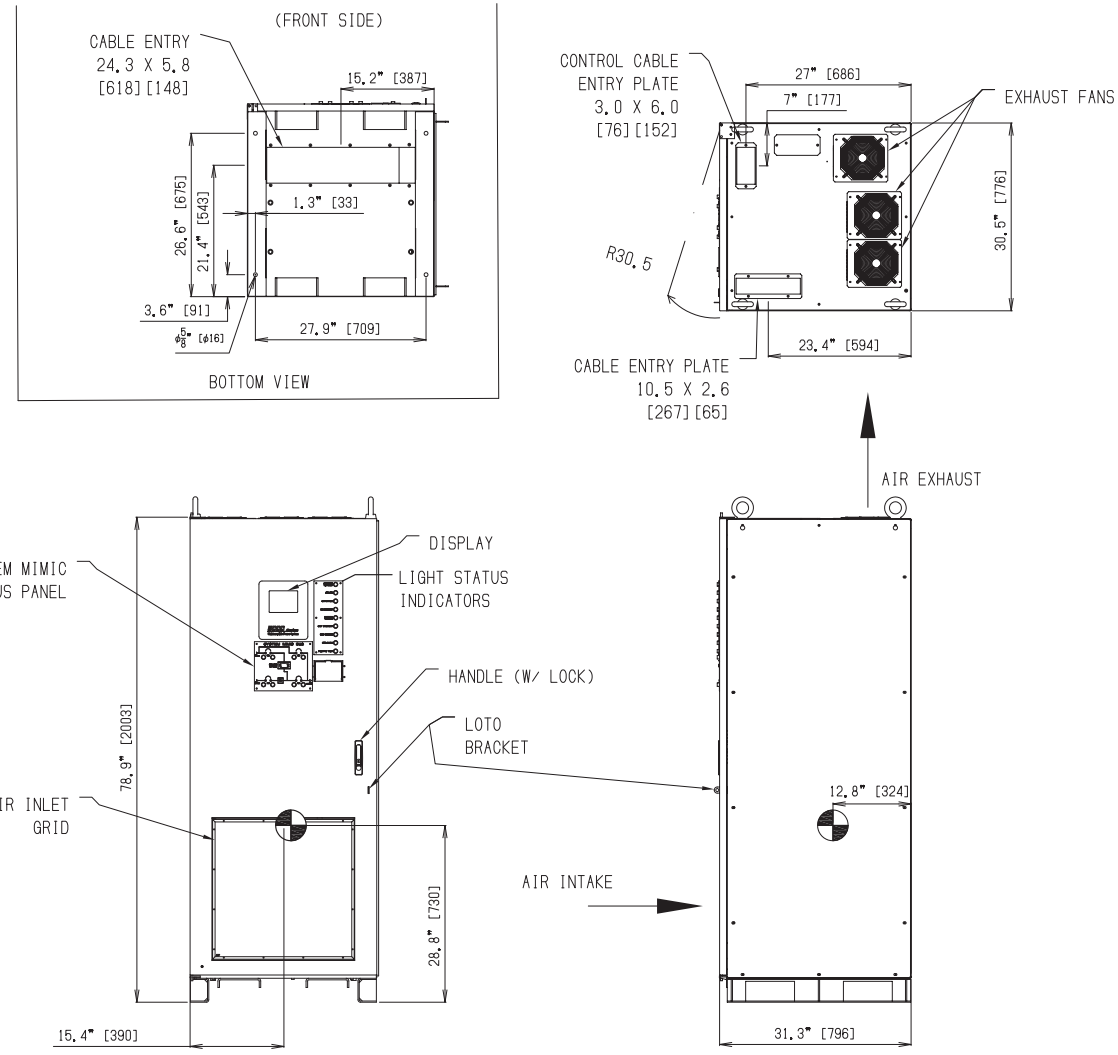



**FIGURE A.1 – 5000 SERIES UPS 15 KVA CABINET OUTLINE**



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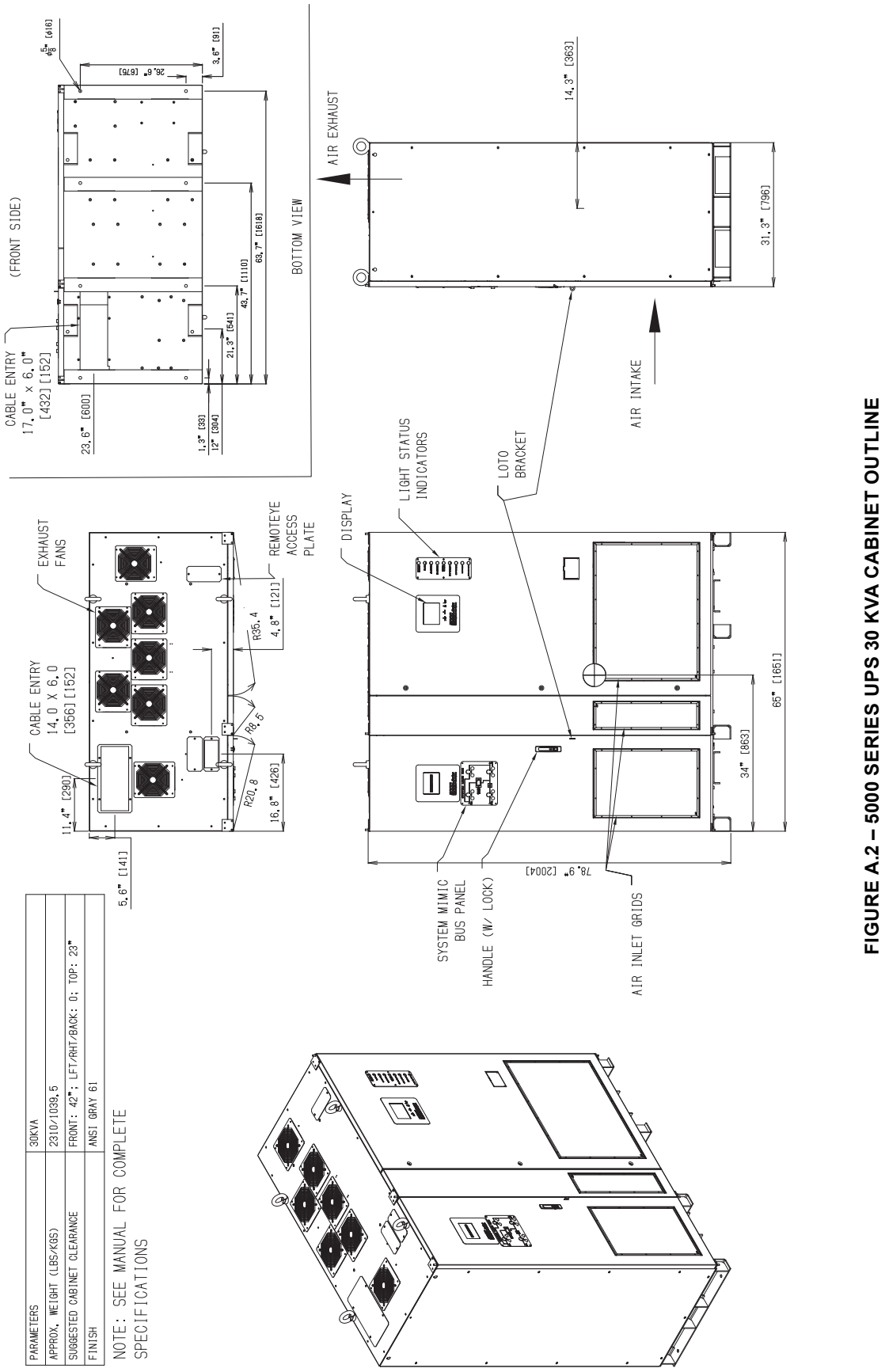



| PARAMETERS | 30KVA |
|---|---|
| APPROX. WEIGHT (LBS/KGS) | 2310/1039.5 |
| SUGGESTED CABINET CLEARANCE | FRONT: 42"; LFT/RHT/BACK: 0; TOP: 23" |
| FINISH | ANSI GRAY 61 |

NOTE: SEE MANUAL FOR COMPLETE SPECIFICATIONS

**FIGURE A.2 – 5000 SERIES UPS 30 KVA CABINET OUTLINE**

| PARAMETERS | 50KVA |
|---|---|
| APPROX. WEIGHT (LBS/KGS) | MBS & LANDING CABINET: 792/359* ; UPS CABINET: 2426/1100 |
| SUGGESTED CABINET CLEARANCE | FRONT: 42"; LEFT SIDE 3" (MIN.); BACK: 0; TOP: 23" |
| FINISH | ANSI GRAY 61 |

* - WITH OPTIONAL XFMR

NOTE: SEE MANUAL FOR COMPLETE SPECIFICATIONS

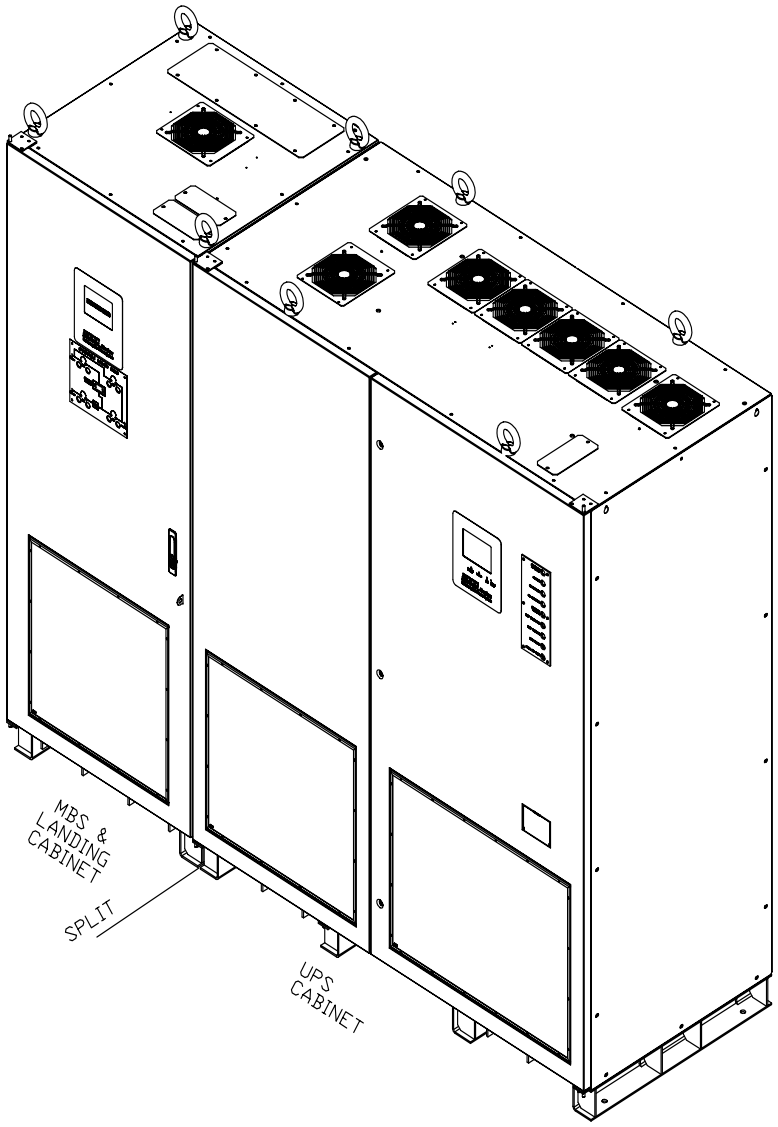



**FIGURE A.3 – 5000 SERIES 50 KVA PHYSICAL DIMENSIONS**

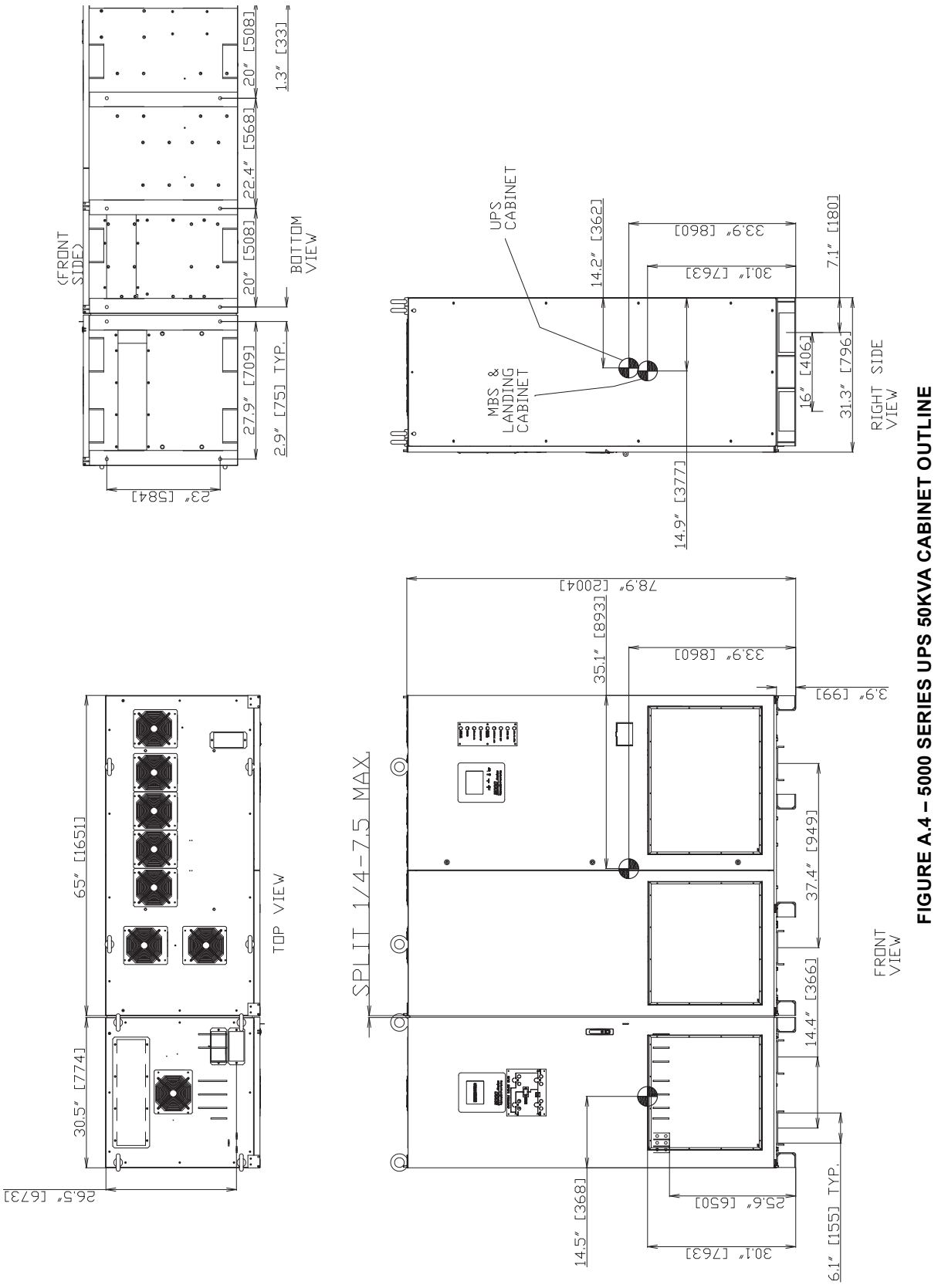



**FIGURE A.4 – 5000 SERIES UPS 50KVA CABINET OUTLINE**

NOTES:
1. POSITION THE CABINETS ON A LEVEL FLOOR. MBS CABINET SHOULD BE ON THE LEFT SIDE.
2. WHEN READY TO CONNECT THE CABINETS, THE UPS CABINET SHOULD BE IN ITS FINAL INSTALLATION POSITION.
3. LIFT THE MBS CABINET (3/4" MAX) & MOVE IT CLOSER TO THE UPS CABINET CAREFULLY GUIDING THE ALIGNING TABS INTO THE SLOTS IN THE UPS CABINET.

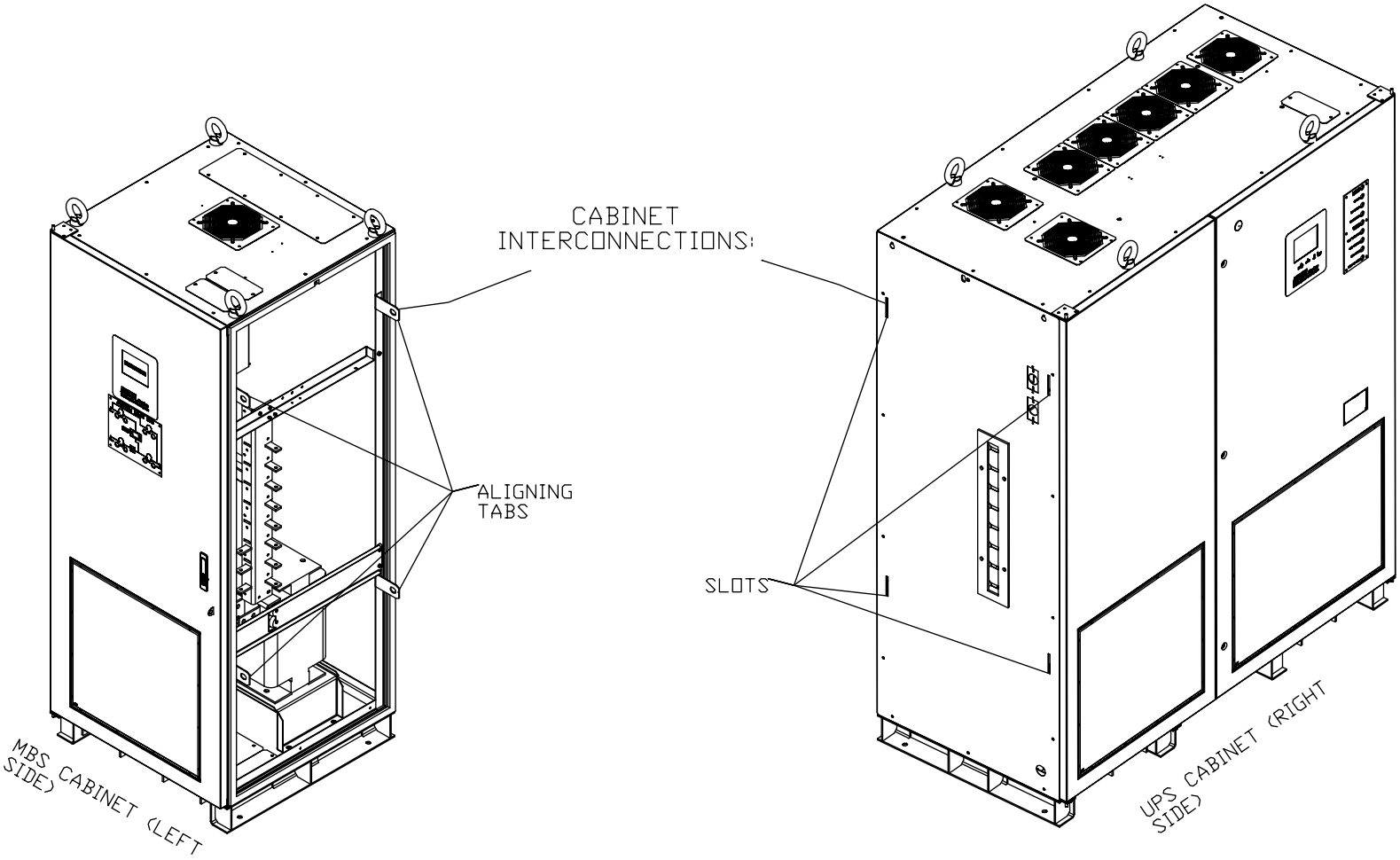
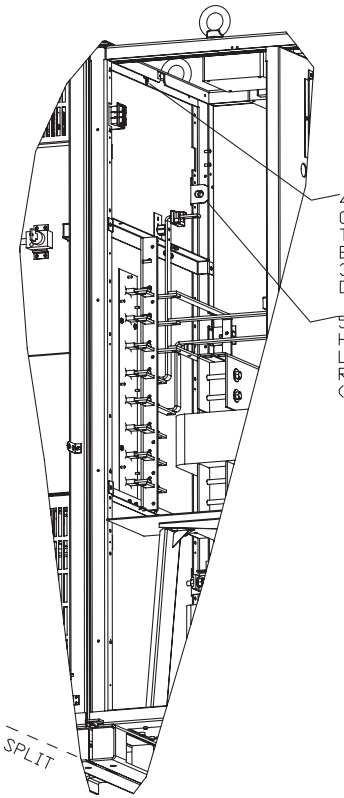



**FIGURE A-5 – 5000 SERIES UPS 50KVA INTERCONNECTIONS OUTLINE**

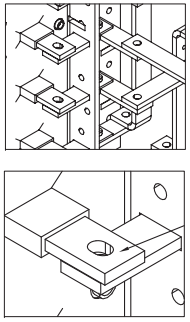
MECHANICAL
CONNECTIONS:



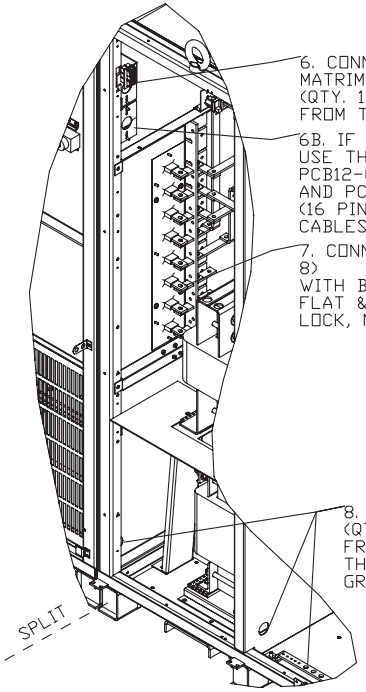

4. CLOSE THE GAP FURTHER BY CONNECTING THE TOP BOLT (1/2" x 1.5L) FIRST. ENSURE THE GAP IS BETWEEN 1/4" TO 3/8" (MAX) ON ALL (FRONT, TOP AND BACK) FACES.

5. ENSURE ALL THE REMAINING FOUR HOLES LINE UP AND CONNECT THE REMAINING BOLTS (1/2" x 1.5L).

ISO VIEW - UPS CABINET (DOORS HIDDEN)



ELECTRICAL
CONNECTIONS:




6. CONNECT THE CONTROL MATRIMATE CONNECTOR (QTY. 1) FROM THE MBS CABINET.

6B. IF PCB12 IS EQUIPPED, USE THIS HOLE TO CONNECT PCB12-CN1 TO PCB11-CN4 AND PCB12-CN2 TP PCB11-CN5 (16 PIN MULTI-CONDUCTOR CABLES)

7. CONNECT THE BUS BARS (QTY. 8) WITH BOLTS (5/16" x 1.25L), FLAT & LOCK, NUT.

8. CONNECT THE GROUND CABLE (QTY. 1) FROM MBS CABINET BY PASSING THRU THESE HOLES AND ONTO THE GROUND BUS IN THE UPS CABINET.

ISO VIEW - UPS CABINET (DOORS HIDDEN)

Note: Refer to Section 9.4 Power Terminals and Cable Sizing on Page 33

**FIGURE A.6 – 5000 SERIES MECHANICAL CONNECTIONS**

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# Appendix B – Command Parameter Definitions Table

## 5000 Series Parameter Definitions

**The following table lists those parameters that can viewed and/or changed at the User and Admin security level. Parameters are identified as a three digit number composed of the Block and Item number. E.g. Parameter 003 is the UPS serial Number. The Short Descriptions is the labeling shown in the UPS display. All parameters can viewed with RemotEye 4.**

| Blk | Item | Long Description | Short Description | Units | Permissions | |
|---|---|---|---|---|---|---|
| | | | | | User | Admin |
| 0 | 01 | UPS Manufacturer | Manufacturer | | R | R |
| 0 | 02 | UPS Part Number | Typeform | | R | R |
| 0 | 03 | UPS Serial Number | Serial No. | | R | R |
| 0 | 08 | UPS System Name | System Name | | R | R/W |
| 0 | 09 | UPS Attached Devices | Attached Device | | R | R/W |
| 0 | 10 | UPS Installation Date | Installed Date | | R | R/W |
| 0 | 11 | UPS Control Board Software Version | Software Vers. | | R | R |
| 1 | 01 | Input Line to Line Voltage (AB) | Voltage (AB) | 1V | R | R |
| 1 | 02 | Input Line to Line Voltage (BC) | Voltage (BC) | 1V | R | R |
| 1 | 03 | Input Line to Line Voltage (CA) | Voltage (CA) | 1V | R | R |
| 1 | 10 | Input Frequency | Frequency | 0.01Hz | R | R |
| 1 | 13 | Input Voltage in % (A) | Voltage % (A) | % | R | R |
| 1 | 14 | Input Voltage in % (B) | Voltage % (B) | % | R | R |
| 1 | 15 | Input Voltage in % (C) | Voltage % (C) | % | R | R |
| 1 | 20 | Rated Line to Line Input Voltage | Rated Voltage* | 1V | R | R |
| 1 | 23 | Rated Input Frequency | Rated Frequency | 0.01Hz | R | R |
| 2 | 01 | Output Voltage | Voltage | V | R | R |
| 2 | 07 | Output Current | Current | A | R | R |
| 2 | 10 | Output Frequency | Frequency | 0.01Hz | R | R |
| 2 | 13 | Output Power VA (Total) | Power VA (Total) | VA | R | R |
| 2 | 14 | Output Voltage % | Voltage % | % | R | R |
| 2 | 17 | Output Current % | Current % | % | R | R |
| 2 | 21 | Output Power VA % (Total) | Power VA % (Total) | % | R | R |
| 2 | 25 | Rated Output Voltage | Rated Voltage* | V | R | R |
| 2 | 27 | Rated Output Current | Rated Current* | A | R | R |
| 2 | 28 | Rated Output Frequency | Rated Frequency | 0.01Hz | R | R |
| 2 | 30 | Rated Output Power (VA) | Rated Power(VA)* | VA | R | R |

| Blk | Item | Long Description | Short Description | Units | Permissions | |
|---|---|---|---|---|---|---|
| | | | | | User | Admin |
| 2 | 42 | Fine Output Voltage Adjustment (Customer) | Vout CusAdj(Fine)* | % | R | R/W |
| 2 | 48 | Output Overload Prealarm Percentage Value | OL PreAlarmLevel* | % | R | R/W |
| 3 | 01 | Bypass Voltage | Voltage | V | R | R |
| 3 | 07 | Bypass Current (A) | Current | A | R | R |
| 3 | 10 | Bypass Voltage % | Voltage % | % | R | R |
| 3 | 13 | Bypass Current % | Current % | % | R | R |
| 3 | 16 | Bypass Frequency | Frequency | 0.01Hz | R | R |
| 3 | 19 | Rated Bypass Voltage | Rated Voltage L-N* | V | R | R |
| 3 | 21 | Rated Bypass Current | Rated Current* | A | R | R |
| 3 | 22 | Rated Bypass Frequency | Rated Frequency | 0.01Hz | R | R |
| 4 | 02 | DC Bus Voltage | DC Bus | 1Vdc | R | R |
| 5 | 01 | Battery Voltage | Battery Voltage | Vdc | R | R |
| 5 | 02 | Battery Current | Battery Current | A | R | R |
| 5 | 03 | Time in Battery Backup (Seconds) | Time in Backup | Sec | R | R |
| 5 | 04 | Charger Status | Charger Status | | R | R |
| 5 | 05 | Battery Capacity | Battery Capacity | % | R | R |
| 5 | 06 | Rated Battery Voltage | Rated Voltage | V | R | R |
| 5 | 07 | Rated Battery Discharge Current | Rated DisChg Current* | A | R | R |
| 5 | 08 | Charger Mode Request | Charger Mode Req. | | | R/W |
| 5 | 10 | Number of Batteies in Series | No Batt(Series) | | R | R/W |
| 5 | 11 | Number of Batteries in Parallel | No Batt(Paral) | | R | R/W |
| 5 | 12 | Battery Installed Date | Batt Ins. Date | | R | R/W |
| 5 | 20 | Equalize Charge Enable/Disable after BackUp | EQChrg AftBackup | | | R/W |
| 6 | 01 | UPS Date* | UPS Date* | | R | R/W |
| 6 | 02 | UPS Time* | UPS Time* | | R | R/W |
| 6 | 03 | Current State | Current State | | R | R |
| 6 | 04 | Requested State | Requested State | | R/W | R/W |
| 6 | 05 | Faults | Faults | | R | R |
| 6 | 06 | Warnings | Warnings | | R | R |
| 6 | 07 | UPS Status | UPS Status | | R | R |
| 6 | 08 | Allow Forced Transfer To Online | "AllowForcedOnline*<br>" | | | R/W |
| 6 | 19 | Run/Stop Enabled | Enable RUN/STOP | | | R/W |
| 6 | 20 | Remote Run/Stop Enabled | EnRmt RUN/STOP SW* | | | R/W |

| Blk | Item | Long Description | Short Description | Units | Permissions | |
|---|---|---|---|---|---|---|
| | | | | | User | Admin |
| 6 | 27 | Allow Fault Reset | Enable Flt Reset* | | | R/W |
| 6 | 28 | Generate Fault Reset | Gen. Flt Reset | | | R/W |
| 6 | 33 | Stop Inverter | Stop Inverter | | R/W | R/W |
| 6 | 38 | Change Secu. Lvl | Change Secu. Lvl | | R/W | R/W |
| 6 | 39 | Manage Admin Password | Manage Admin PW | | | R/W |
| 6 | 40 | Reset Admin Password | Reset Admin Password | | | R/W |
| 6 | 41 | Output Relay 1 | Output Relay 1 | | R | R/W |
| 6 | 42 | Output Relay 2 | Output Relay 2 | | R | R/W |
| 6 | 43 | Output Relay 3 | Output Relay 3 | | R | R/W |
| 6 | 44 | Output Relay 4 | Output Relay 4 | | R | R/W |
| 6 | 45 | Output Relay 5 | Output Relay 5 | | R | R/W |
| 6 | 46 | Output Relay 6 | Output Relay 6 | | R | R/W |
| 6 | 47 | Output Relay 7 | Output Relay 7 | | R | R/W |
| 6 | 48 | Output Relay 8 | Output Relay 8 | | R | R/W |
| 7 | 09 | System Operation Time (Minutes) | System Op Time | | R | R |
| 7 | 10 | Backup Op Time (Seconds) | Backup Op Time | | R | R |
| 7 | 11 | Total Number of Fault Records | Total Faults | | R | R |
| 7 | 12 | Fault Record | Fault Record | | R | R |
| 7 | 13 | Total Number of Warnings Records | Total Warning | | R | R |
| 7 | 14 | Warning Record | Warning Record | | R | R |
| 7 | 15 | Total Number of Operation Records | Total Operations | | R | R |
| 7 | 16 | Operation Record | Operation Record | | R | R |
| 7 | 17 | Total Number of System Records | Total Sys Change | | R | R |
| 7 | 18 | System Record | Sys Change Record | | R | R |
| 7 | 21 | Total Number of Backup Records | Total Backups | | R | R |
| 7 | 22 | Backup Record | Backup Record | | R | R |
| 8 | 01 | DFW Ver | | | R | R |
| 8 | 02 | DFW BDate | | | R | R |
| 8 | 03 | DFW Btime | | | R | R |
| 8 | 04 | DSP EEPROM Ver | | | R | R |

**Permissions Legend: R- Read Permission Only, R/W - Read and Write Permissions**

## Appendix C – Installation Planning Guide

# TOSHIBA 5000 Series UPS

## Installation Planning Guide for 5000 Series Industrial UPS 3-Phase 480 V Input, 1-Phase 120 V Output

Important Notes:

1. Maximum Current required at Primary AC Input based on full load output and maximum battery charging current.
2. Output load conductors are to be installed in separate conduit from input conductors.
3. Control wires and power wires are to be installed in separate conduits.
4. Recommended AC input and output overcurrent protection based on continuous full load current per NEC.
5. Wiring shall comply with all applicable national and local electrical codes.
6. Grounding conductors to be sized per NEC Article 250-122. Neutral conductors to be sized per NEC Article 310.15.
   - Primary AC Input: 3Φ , 4-wire + ground.
   - AC Output: 3Φ, 4-wire + ground.
   - DC Input: 2-wire (Positive/Negative) + ground.
7. Nominal battery voltage based on the use of VRLA type batteries (2.0 volts / cell nominal).
8. Maximum battery discharge current based on lowest permissible discharge voltage of 1.6 VPC.
9. DC Circuit Breaker size based on breakers external to Toshiba-supplied Battery System(s) or UPS(s). (Toshiba-supplied Battery Systems come equipped with internal circuit breakers sized to meet specific operating conditions)
10. DC wires should be sized to allow not more than a 2-volt drop at maximum discharge current.
11. Weights do not include batteries or other auxiliary equipment external to the UPS.
12. Sizing calculations based on the following assumptions:
    - Not more than 6 current-carrying conductors installed in steel conduit in ambient temperature of 30°C.
    - Temperature rating of copper conductors and terminals: 75°C.
    - Feeder distance calculations based on NEC Chapter 9, Tables 8 and 9 data, allowing for 2% AC voltage drop.
    - Reference: 2014 NEC Handbook, Table 310.16.

NOTE: Consult latest edition of applicable national and local codes for possible variations.
Ratings of wires and overcurrent devices are suggested minimums. Local conditions may vary. Consult with a registered Professional Engineer within your local area for proper size selections.

TOSHIBA INTERNATIONAL CORPORATION
SOCIAL INFRASTRUCTURE SYSTEMS GROUP
POWER ELECTRONICS DIVISION
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Houston, TX 77041
Telephone: 855-803-7087
Fax: 713-896-5212
Web Site: https://www.toshiba.com/tic/industrial/uninterruptible-power-systems

# TOSHIBA 5000 Series UPS

## Installation Planning Guide for 5000 Series Industrial UPS 3-Phase 480 V Input, 1-Phase 120 V Output

| GENERAL MECHANICAL INFORMATION | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| UPS kVA/kW Rating | Config | Dimensions W x D x H | Weight | Est. Heat Loss | Mechanical Clearance for Ventilation and Maintenance Access | | | | |
| | | Inches (mm) | Lbs. (kg) | kBTU/Hr | Front | Left Side | Right Side | Back | Top |
| 15kVA/ 13.5kW | Normal | 30.5 x 31.3 x 78.9 (776 x 796 x 2003) | 1380 (621) | 10.1 | 36 in. (914 mm) | 3 in.* (76 mm) | 0 in. (0 mm) | 0 in. (0 mm) | 20 in. (508 mm) |
| 30kVA/ 27kW | Normal | 65 x 31.3 x 78.9 (1651 x 796 x 2003) | 2310 (1040) | 20.2 | 36 in. (914 mm) | 3 in.* (76 mm) | 0 in. (0 mm) | 0 in. (0 mm) | 20 in. (508 mm) |
| 50kVA/ 45kW | Normal | 95.5 x 31.3 x 78.9 (2425 x 796 x 2003) | 3218 (1459) | 31.4 | 36 in. (914 mm) | 3 in.* (76 mm) | 0 in. (0 mm) | 0 in. (0 mm) | 20 in. (508 mm) |

*Left Side clearance only necessary during installation. No clearance necessary for operation or maintenance.

| PRIMARY AC INPUT (480V 3-PHASE / 3-WIRE) | | | | |
|---|---|---|---|---|
| Maximum Input Power Demand (with Charging Current) | | | Suggested Minimum Feeder Wire Size per Phase / Neutral | Suggested Max. Feeder Length for Min. Wire Size in Steel Conduit |
| kVA | PF | Amps | AWG or kcmil a 75 °C Temp. Rating | Feet |
| 16.9 (20.8) | >0.95 | 20 (25) | #10 / #6 | 380 |
| 34.4 (37.6) | >0.95 | 41 (45) | #6 / #2 | 380 |
| 57.0 (59.8) | >0.95 | 68 (72) | #4 / #2/0 | 380 |

| BYPASS AC INPUT (120V 1-PHASE / 2-WIRE) | | | | |
|---|---|---|---|---|
| Maximum Input Power Demand | | | Suggested Minimum Feeder Wire Size per Phase | Suggested Max. Feeder Length for Min. Wire Size in Steel Conduit |
| kVA | PF | Amps | AWG or kcmil a 75 °C Temp. Rating | Feet |
| 15 | >0.99 | 125 | 2 x #3 – #1/0 | 380 |
| 30 | >0.99 | 250 | 2x #3/0 – 300 kcmil | 380 |
| 50 | >0.99 | 417 | 2 x 300 kcmil | 380 |

| BATTERY BACKUP (120 VDC NOMINAL) | | | | | |
|---|---|---|---|---|---|
| Battery Capacity Required for Full Load Output | | Maximum Discharge at Full Load Output | Suggested External Feeder Breaker [1] | Suggested Minimum Feeder Wire Size[2] | Suggested Max. Feeder Length for Min. Wire Size in Steel Conduit |
| kVA | kWB | Amps | Amps | AWG or kcmil a 75 °C Temp. Rating | Feet |
| 15 | 15.4 | 147 A | 200 A | 2 x #4 – 1 x #2/0 | 70 |
| 30 | 30.7 | 293 A | 400 A | 2 x #2/0 | 70 |
| 50 | 51.2 | 488 A | 600 A | 2 x 300 kcmil | 70 |

1 - External overcurrent overprotection not needed if battery system(s) are each equipped with an appropriate internal circuit breaker.
2 - External feeder cables may change depending on number of battery systems placed in parallel.

| AC OUTPUT (120V 1-PHASE / 2-WIRE) | | | | |
|---|---|---|---|---|
| Maximum Output Power Demand | | | Suggested Minimum Feeder Wire Size per Phase | Suggested Max. Feeder Length for Min. Wire Size in Steel Conduit |
| kVA | PF | Amps | AWG or kcmil a 75 °C Temp. Rating | Feet |
| 15 | 0.9 | 125 | #1/0 | 380 |
| 30 | 0.9 | 250 | 300 kcmil | 380 |
| 50 | 0.9 | 417 | 2 x 300 kcmil | 380 |

TOSHIBA

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