

TOSHIBA

5000 SERIES 3P1 INDUSTRIAL UPS

INSTALLATION AND OPERATION MANUAL

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

15, 30, 50 KVA



Part # 92973-001
March 2020
Manufactured in the USA



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3-PHASE, 480V IN, SINGLE-PHASE, 120V OUT
INSTALLATION AND OPERATION MANUAL

15, 30, 50 KVA

Part # 92973-001

March 2020



Please complete the following information and retain for your records.

JOB NUMBER

MODEL NUMBER

SERIAL NUMBER

APPLICATION

SHIPMENT DATE

INSTALLATION DATE

STARTUP

PERFORMED BY

Toshiba International Corporation

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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

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.

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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).

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Houston, Texas 77041-9990
Attn.: 5000 Series UPS Product Manager

For further information on Toshiba products and services, please visit our website at:
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1 Introduction

Thank you for your purchase of a Toshiba Uninterruptible Power System device. This manual provides information to assure safe installation, operation, and disposal of your 5000 Series 3P1 Uninterruptible Power Supply (UPS). It also contains information regarding how and where to install the UPS equipment, how to safely operate the equipment and its different modes of operation, detailed layouts of the connection terminals and wiring requirements, a breakdown of the menus on the operator interface, and specifications, drawings, and other relevant equipment data.

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.

2.5 Unintended Usage



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 UPS system in any of the above applications will result in serious personal injury or death.



Always read all applicable regulations and standards for the specific application of this UPS system.

Special precautions must be undertaken when this UPS 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 UPS system in any of the above applications may result in serious personal injury or death.

3 Important Safety Instructions

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



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 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.

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3.2 General Maintenance

WARNING

	<p>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.</p>
	<p>Keep the area around the UPS clean. Use a vacuum cleaner to clean dust and foreign material the UPS. Keep the exterior clean.</p>
	<p>Only factory authorized personnel should perform internal general maintenance on the UPS.</p>
	<p>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.</p>

3.3 Transporting

WARNING

	<p>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.</p>
--	---

CAUTION

	<p>DO NOT transport, move, store, or place the UPS on its side. Excessive force applied from heavy components inside may damage the UPS.</p>
	<p>Avoid vibration or shock exceeding 0.5 g. Failing to observe this precaution may cause damage to the UPS.</p>
	<p>DO NOT allow the UPS to suffer shock or impact when unpacking. Tools used to remove packaging materials may cause damage to the UPS.</p>
	<p>DO NOT install the UPS in environments unsuitable for a NEMA 1 enclosure. Submersion may cause electrical shock, personal injury or UPS failure.</p>
	<p>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.</p>

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, 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 initial 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.

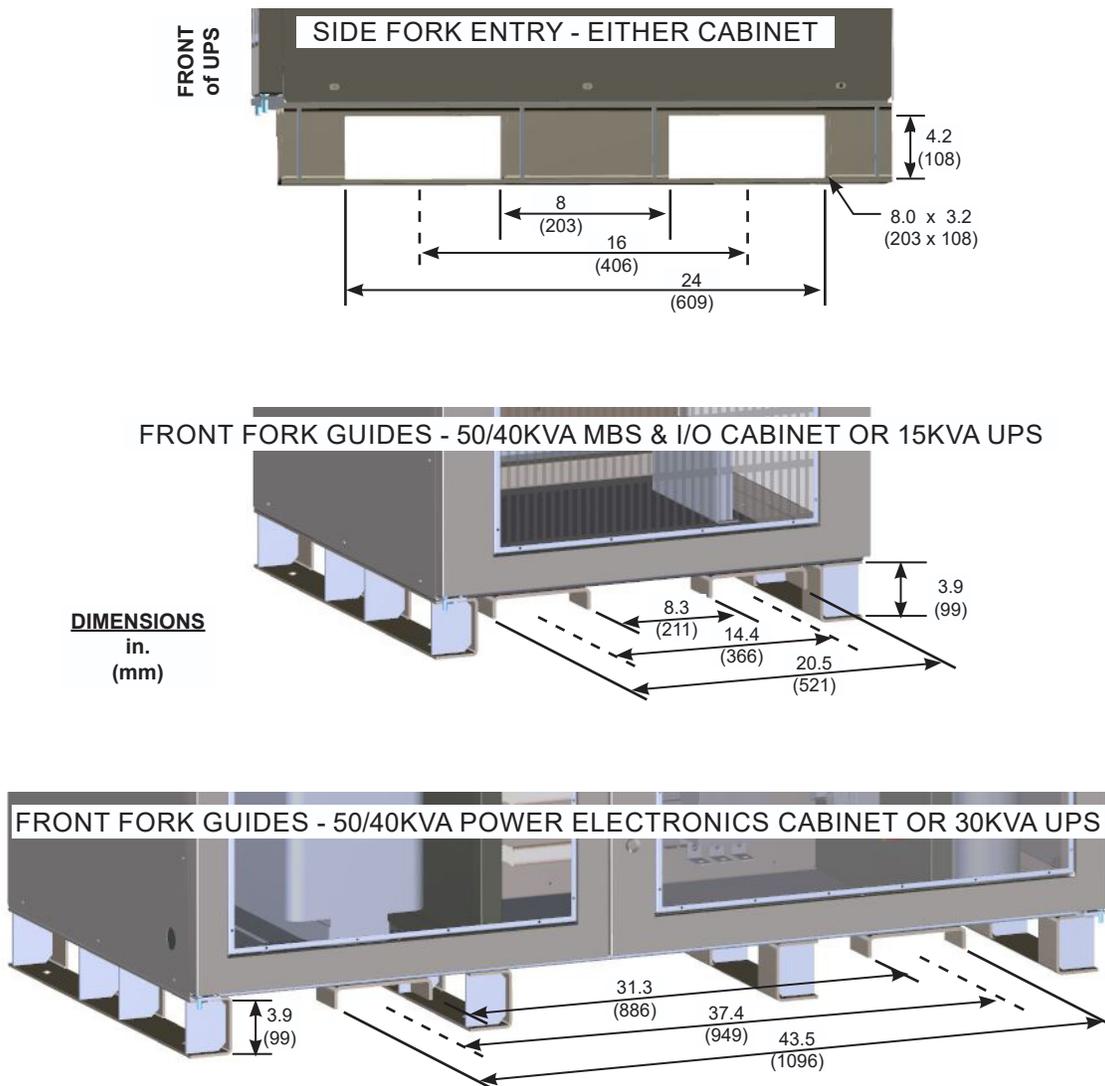


FIGURE 4.1: FORK GUIDE DIMENSIONS FOR LARGE AND SMALL ENCLOSURES

The 5000 Series Industrial Duty UPS has a C-channel skids base with fork guides for front/back forklift access, Fork Slots in the C-Channel skids allowing 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 separate 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 its 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 its 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°

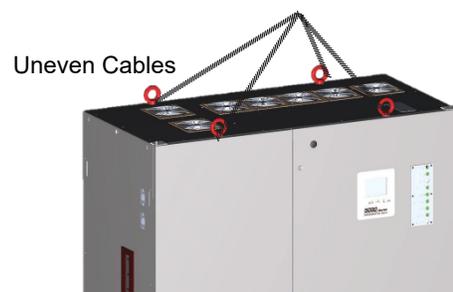


FIGURE 4.6: UNEVEN CABLES



FIGURE 4.7: UNACCEPTABLE OPERATION

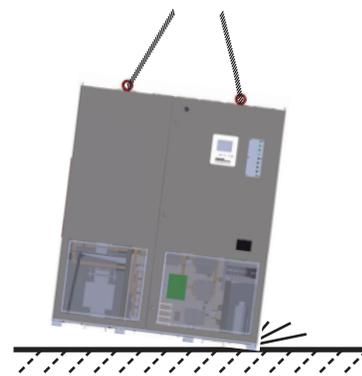


FIGURE 4.8: ACCEPTABLE OPERATION

5 Warning Labels

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

NOTICE
<p>Make sure all the warning labels are installed in the appropriate locations.</p> <p>If a label is missing or illegible, contact Toshiba Customer Support Center or an authorized representative.</p>

A – 40308

⚠ DANGER	
	<p>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.</p>
<p>Only qualified technicians familiar with this equipment and the information supplied with it should be permitted to install and operate this equipment.</p> <p>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.</p> <p>During operation, keep all covers in place and cabinet doors shut.</p> <p>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.</p> <p>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.</p> <p>While servicing, stand on some type of insulation, and be sure not to be grounded.</p> <p>Follow the safety instructions given in the equipment manual carefully and observe all danger, warning and caution notices.</p> <p style="text-align: right; font-size: small;">40308</p>	

A1 – 90638

⚠ DANGER	
	<p>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.</p>
<p>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.</p> <p>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.</p> <p>Pendant le fonctionnement, maintenir tous les couvercles en place et les portes de l'armoire fermées.</p> <p>Lors des inspections visuelles et d'entretien, si possible, vérifier que l'UPS soit éteinte et que l'alimentation AC est éteinte et verrouillée.</p> <p>L'UPS et l'armoire de batterie auront des tensions dangereuses présentes même après avoir coupé l'alimentation AC.</p> <p>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.</p> <p>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.</p> <p style="text-align: right; font-size: small;">90638</p>	

B – 48082

⚠ DANGER	
	<p>AC VOLTAGE This UPS receives power from more than one source. Disconnect all AC sources before performing any service or testing inside this unit</p> <p style="text-align: right; font-size: small;">48082</p>

B1 – 90630

⚠ DANGER	
	<p>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.</p> <p style="text-align: right; font-size: small;">90630</p>

FIGURE 5.1: WARNING LABELS

C – 43784

 DANGER	
	<p>DC VOLTAGE DC Voltage supplied by batteries is still present after equipment has been turned off and taken off line. Accidental contact with live parts can cause personal injury and death. Disconnect all DC Sources before performing any service or testing in this compartment. 43784</p>

C1 – 90632

 DANGER	
	<p>TENSION DC Tension DC fournie par des batteries est encore présente après que le matériel a été éteint et mis hors ligne. Tout contact accidentel avec des composants sous tension peut causer des blessures et la mort. Débrancher toutes les sources DC avant d'effectuer des réparations ou des tests dans ce compartiment. 90632</p>

D – 40761

 DANGER	
	<p>Battery fuse is always live. Risk of electrical shock. Check fuse voltage and disconnect batteries before changing fuse. PN 40761</p>

D1 – 90635

 DANGER	
	<p>Risque de choc électrique. Le fusible de la batterie est toujours sous tension. Vérifier la tension du fusible et débrancher les batteries avant de changer le fusible. PN 90635</p>

E – 90468

 DANGER	
	<p>UPS INVERTER MUST BE PLACED IN STATIC BYPASS PRIOR TO MBS BREAKER OPERATION. FAILURE TO FOLLOW THE PROPER OPERATING INSTRUCTION COULD RESULT IN EQUIPMENT DAMAGE, SEVERE INJURY, OR DEATH. PN 90468</p>

G – 94046

 CAUTION	
	<p>Maintenance bypass procedure to be followed, prior to shut down of power. Damage to equipment and dropped load will occur if correct process is not followed prior to use. See manual for process. PN 94046</p>

FIGURE 5.2: WARNING LABELS (CONT.)

H – 94045

 DANGER	
DO NOT REMOVE COVER OR DESTROY THIS LABEL Do not open this door while the unit is running This door is interlocked with equipment operation	
	HAZARDOUS VOLTAGE may be present Voltage in this compartment will cause severe injury, death, fire, explosion, and property damage. QUALIFIED OPERATORS ONLY.
	Turn off and lock out primary and control circuit power feeds before servicing. Check for charged voltage to dissipate to a safe level before working on equipment. Ensure no status lights are on before service. The UPS and Battery Cabinet will have hazardous voltages present even after the AC feed is turned off.
	Never defeat, modify or bypass any safety interlocks.
READ THE INSTRUCTION MANUAL CAREFULLY BEFORE INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT. Follow the safety instructions given in the equipment manual carefully and observe all danger, warning and caution notices.	
94045	

FIGURE 5.3: WARNING LABELS (CONT.)

J – 39561

 DANGER	
	RISK OF ELECTRIC SHOCK Capacitors stay charged after power has been shut off. Accidental contact with live parts can cause personal injury and death. Turn off and lock out all power sources. Wait at least five (5) minutes for power to dissipate then check voltage before servicing.
	39561

J1 – 39561F

 DANGER	
	RISQUE DE CHOC ÉLECTRIQUE Les condensateurs restent chargés après que l'alimentation a été coupée. Un contact accidentel avec des pièces sous tension peut entraîner des blessures personnelles et la mort. Couper et verrouiller toutes les sources d'alimentation. Attendre au moins cinq (5) minutes que le courant soit dissipé et vérifier ensuite la tension avant de faire l'entretien.
	39561F

K – 57275

 DANGER	
	RISK OF ELECTRIC SHOCK Capacitors stay charged after power has been shut off. Accidental contact with live parts can cause personal injury and death. Turn off and lock out all power sources. WAIT AT LEAST FIVE (5) MINUTES for power to dissipate, then check voltage before servicing.
	57275

K1 – 90624

 DANGER	
	RISQUE DE CHOC ÉLECTRIQUE Les condensateurs restent chargés après coupure de l'alimentation. Tout contact accidentel avec des composants sous tension électrique peut provoquer des blessures ou la mort. Fermer et verrouiller toutes les sources d'alimentation. ATTENDRE AU MOINS (5) MINUTES pour laisser décharger les condensateurs, puis vérifier la tension électrique avant l'entretien.
	90624

L – 40830

 WARNING	
	CRITICAL FUSE SIZING Incorrect fuse replacement size may result in fire or inadequate equipment protection. Replace only with same type and rating of fuse.
	PN 40830

L1 – 91348

 AVERTISSEMENT	
	CALIBRAGE DE FUSIBLE CRITIQUE le remplacement incorrect du calibre de fusible pourrait provoquer un incendie ou une protection inadéquate de l'équipement. Remplacer seulement par un fusible de même type et de même calibre.
	91348

M – 48231

 CAUTION	
HOT SURFACE. Contact may result in burn injury. Allow equipment to cool before servicing.	
PN 46231	

M1 – 906314

 ATTENTION	
SURFACE CHAUDE Risque de se brûler au contact. Laisser l'équipement se refroidir avant l'entretien.	
PN 90631	

N1 – 46232

 CAUTION	
Heat sink not grounded. Risk of electrical shock. Disconnect UPS and electrically test heat sink before touching.	
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 ₂ S)	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	
	<p>While operating in the inverter mode, placing the input breaker in the “OFF” position will switch the UPS to the DC supply backup mode.</p> <p>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.</p>

 CAUTION	
	<p>After an Emergency Power Off (EPO), DO NOT reset the breaker until the UPS internal circuits have been fully discharged.</p> <p>The UPS could be damaged if the unit is not fully discharged before the breaker is reset.</p>

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	
	<p>Misuse of equipment could result in injury and equipment damage.</p> <p>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.</p>

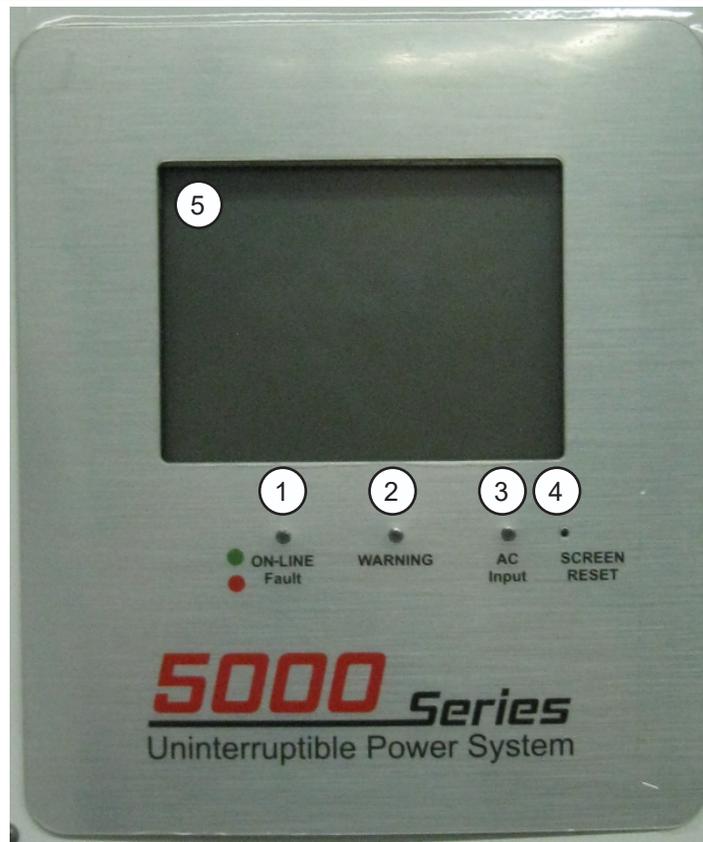
7 Enclosure Layout

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 <ul style="list-style-type: none"> • GREEN - ONLINE • RED - Fault Occurred
2	WARNING LED Indicator <ul style="list-style-type: none"> • OFF - No Warnings • AMBER - Warning Occurred
3	AC Input LED Indicator <ul style="list-style-type: none"> • OFF - No Input to UPS • 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



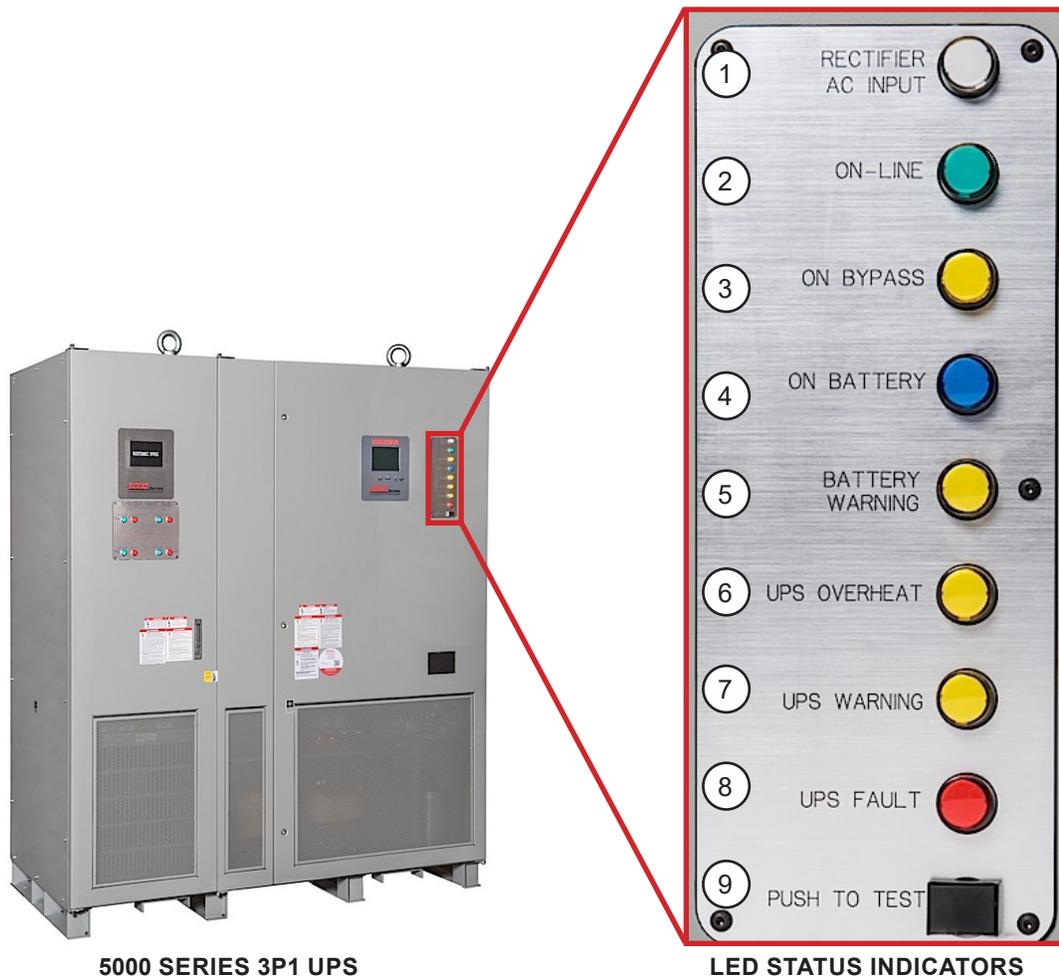
UPS CABINET FACEPLATE

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 currently 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

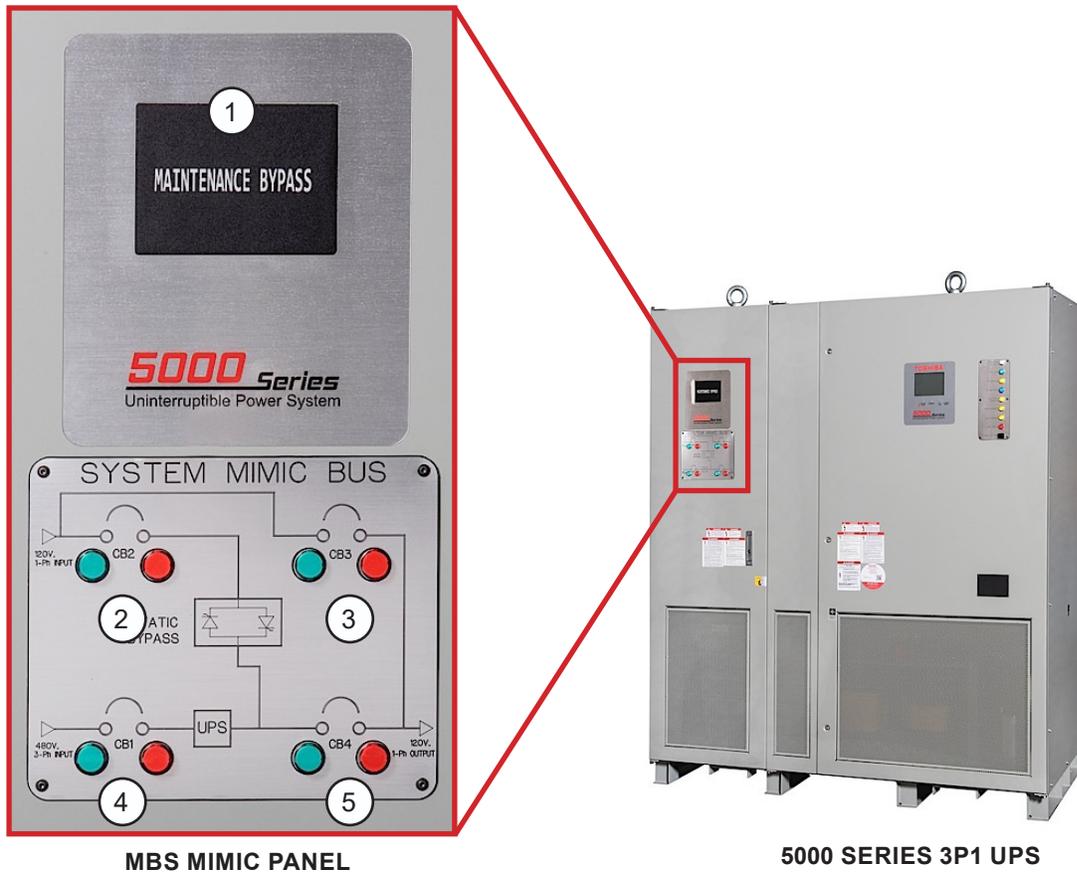
LED STATUS INDICATORS

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. Off – UPS is in Inverter or Static Bypass Operation
2	CB2 (Bypass Breaker) LEDs	Green – CB2 is Closed Red – CB2 is Open
3	CB3 (Maintenance Bypass Breaker) LEDs	Green – CB3 is Closed Red – CB3 is Open
4	CB1 (UPS Input Breaker) LEDs	Green – CB1 is Closed Red – CB1 is Open
5	CB4 (UPS Output Breaker) LEDs	Green – CB4 is Closed Red – CB4 is Open



8 Installation

8.1 Installation Safety

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

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.



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 skirts, and two (2) x 0.63 in. (16 mm) diameter holes in in each of the two (2) the Landing Cabinet base skirts. See **Figure 8.1**, **Figure 8.2**, and **Figure 8.3** for the hole locations and dimensions.

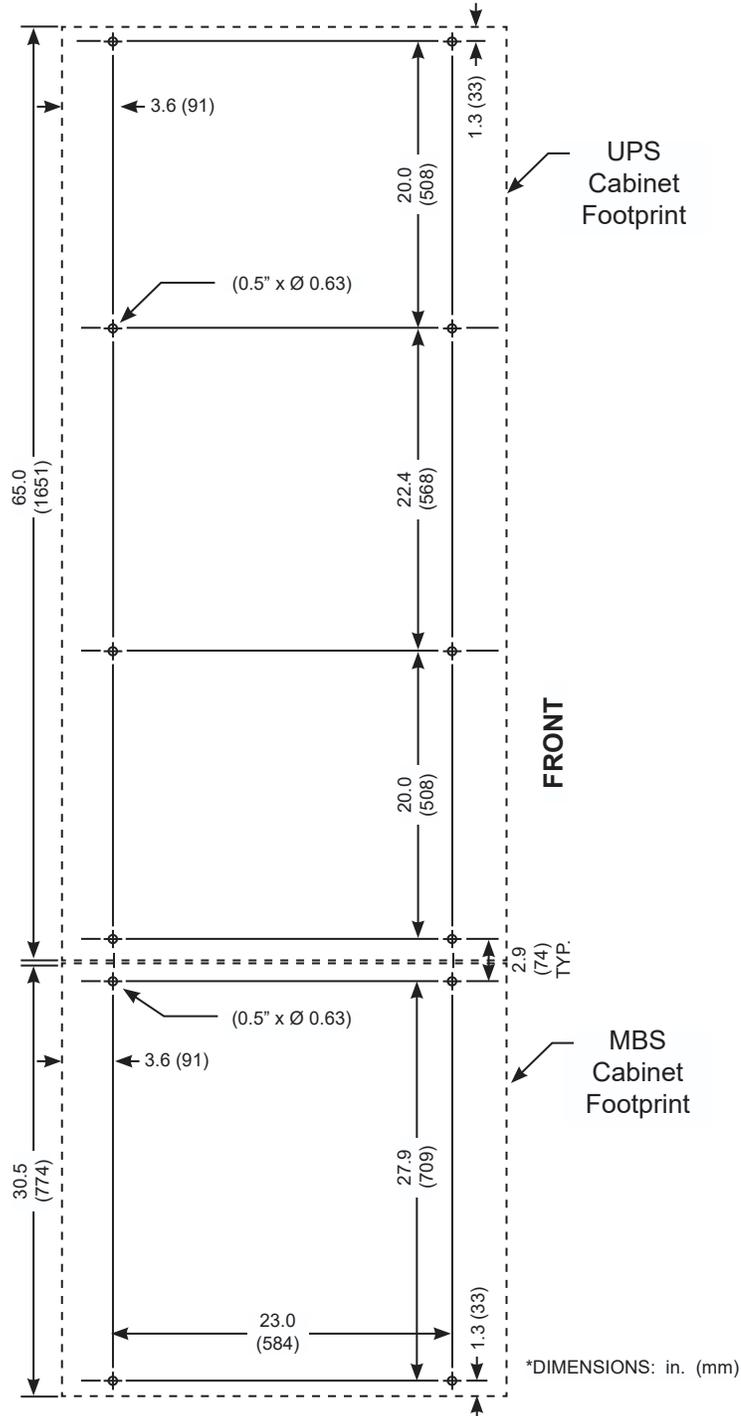


FIGURE 8.1: 50/40KVA ANCHORAGE AND FOOTPRINT

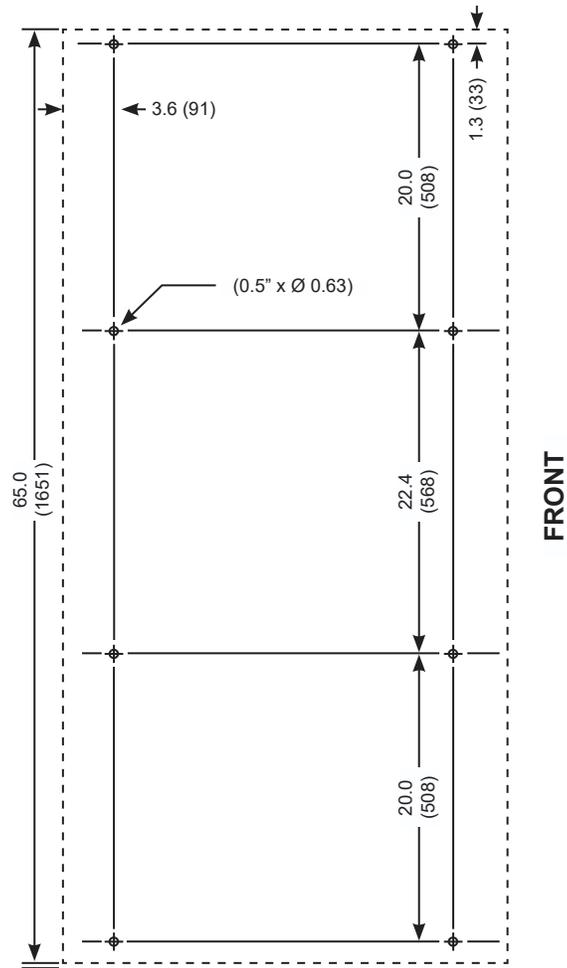


FIGURE 8.2: 30KVA ANCHORAGE AND FOOTPRINT

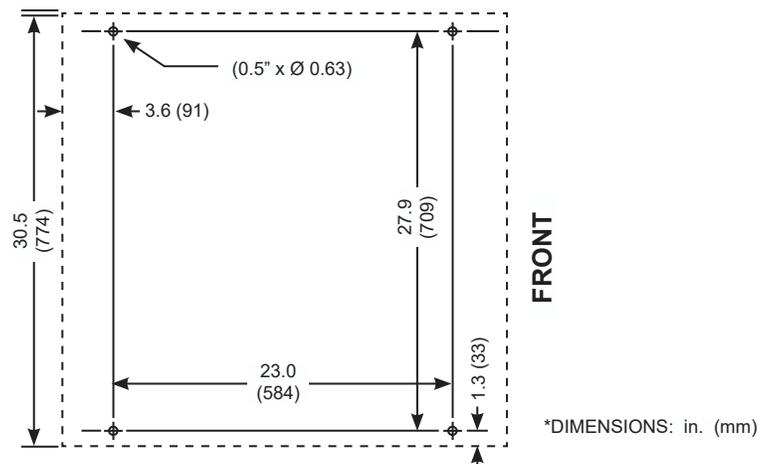


FIGURE 8.3: 15KVA ANCHORAGE AND FOOTPRINT

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.

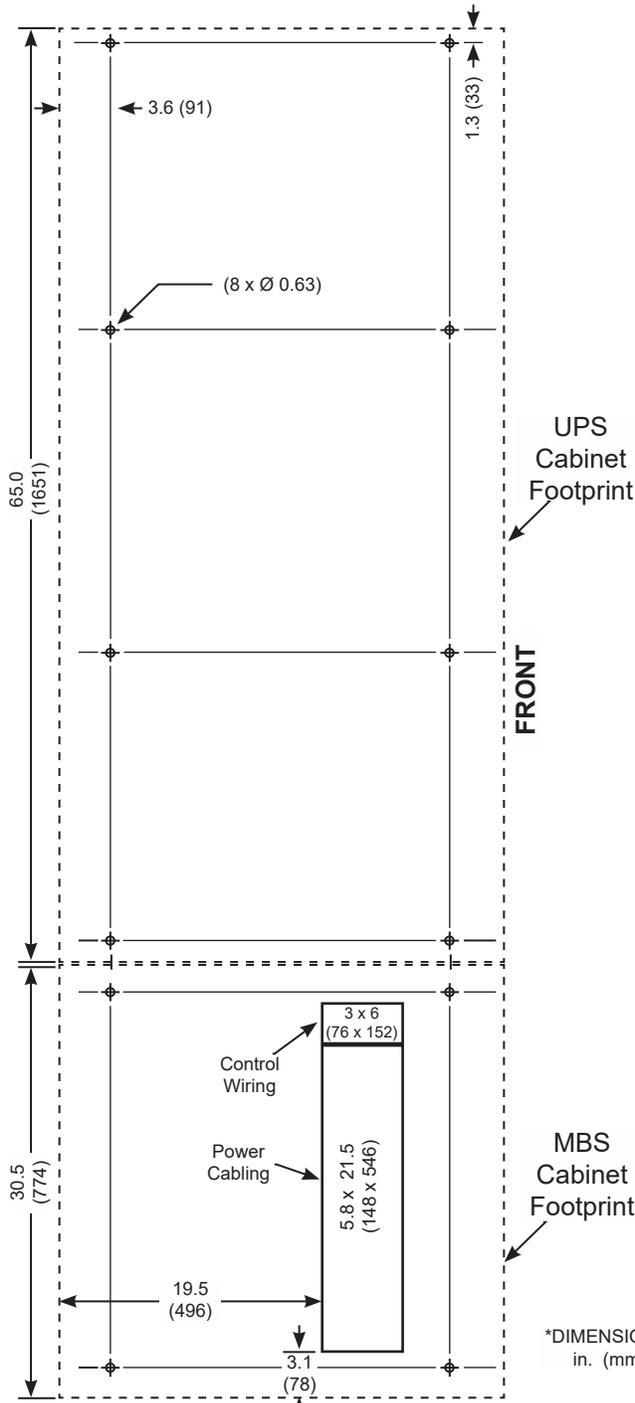


FIGURE 8.4: 50/40KVA CONDUIT LANDING PLATE DIMENSIONS - BOTTOM

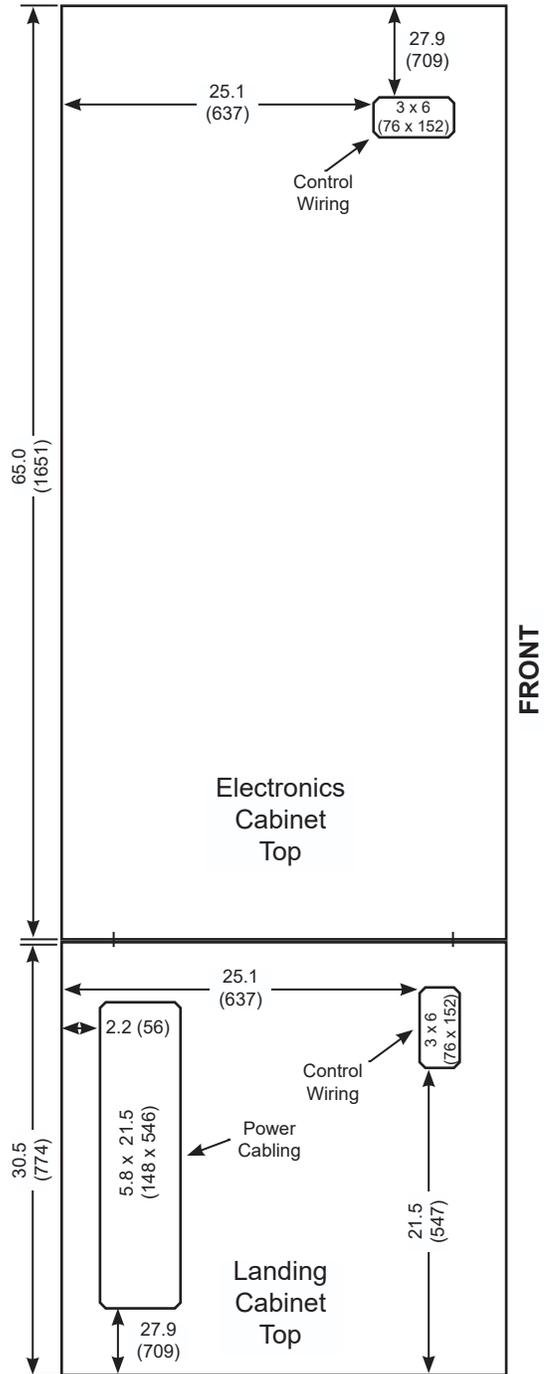


FIGURE 8.5: 50/40KVA CONDUIT LANDING PLATES DIMENSIONS- TOP VIEW

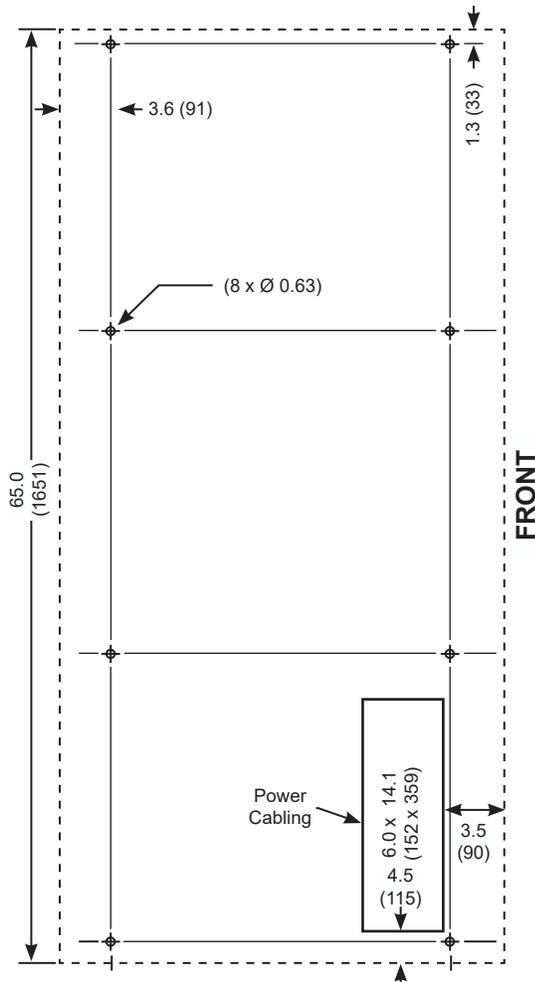


FIGURE 8.6: 30KVA CONDUIT LANDING PLATES DIMENSIONS- BOTTOM

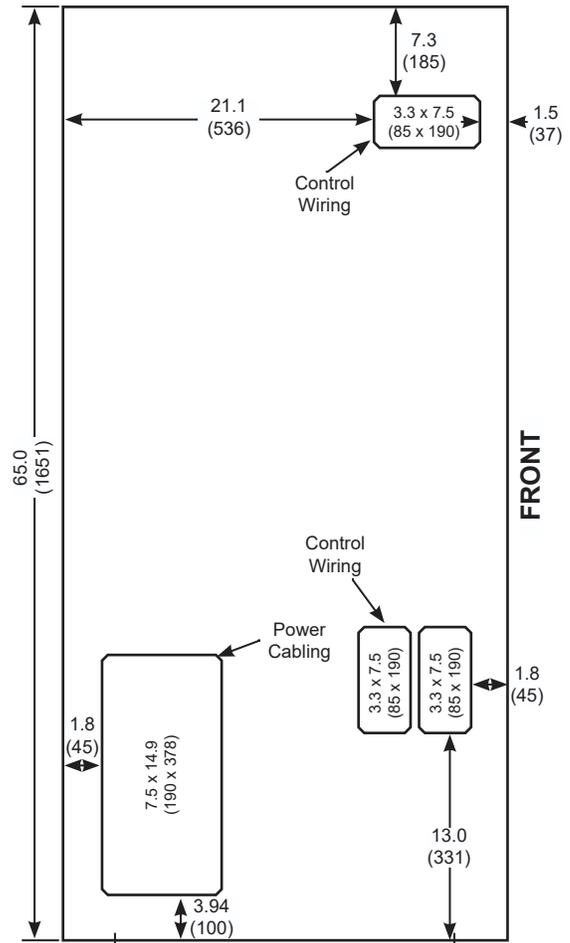


FIGURE 8.7: 30KVA CONDUIT LANDING PLATE DIMENSIONS - TOP VIEW

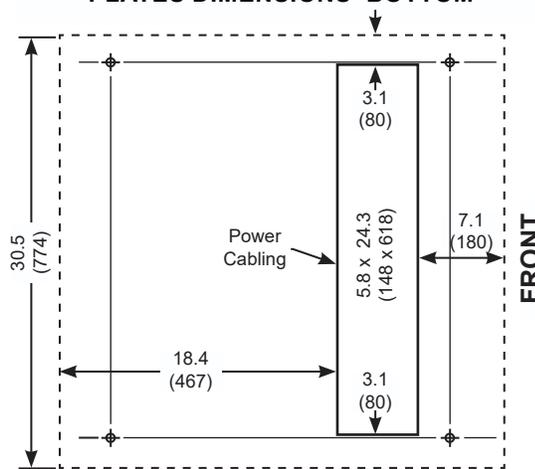


FIGURE 8.8: 15KVA CONDUIT LANDING PLATES DIMENSIONS- BOTTOM

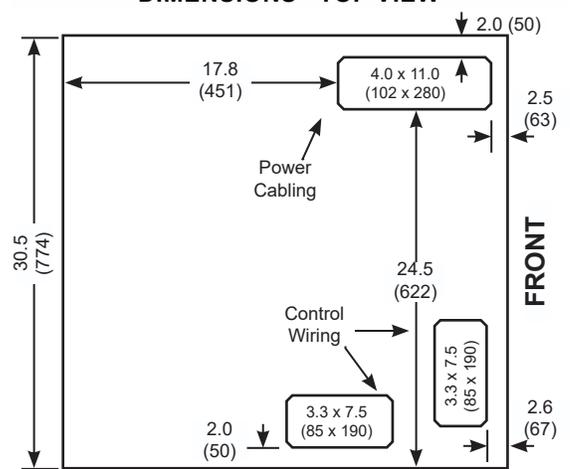


FIGURE 8.9: 15KVA CONDUIT LANDING PLATE DIMENSIONS - TOP VIEW

*DIMENSIONS:
in. (mm)

9 UPS Wiring

9.1 Wiring Safety

WARNING

	<p>Perform wiring and connections with correct polarity.</p> <p>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.</p>
---	--

	<p>Connect ONLY one (1) ground wire to the earth ground terminal.</p> <p>A missing ground wire may cause an electrical shock hazard. Connecting to more than one ground may cause a ground loop.</p>
---	---

	<p>DO NOT force, bend, or pull wires.</p> <p>DO NOT damage wire insulation.</p> <p>DO NOT place heavy objects on top of UPS.</p>
---	---

	<p>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.</p>
---	---

NOTICE

<p>Follow the torque criteria for tightening screws.</p> <p>Loose connections may cause fire due to heating.</p>

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	<p>Top: Front left side of MBS Bay and Front left side of Magnetics Bay</p> <p>Bottom: Left of Power Landing Plate</p>	3 in x 6 in (76 mm x 152 mm) x 16 Gauge Steel
Power Cables	<p>Top: Rear of MBS Bay</p> <p>Bottom: Front of MBS Bay.</p>	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 Bottom: Front left of enclosure	Top: 7.5 in x 14.9 in (190 mm x 378 mm) x 16 Gauge Steel 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 Bottom: Front of enclosure	Top: 4.0 in x 11.0 in (102 mm x 280 mm) x 16 Gauge Steel 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.

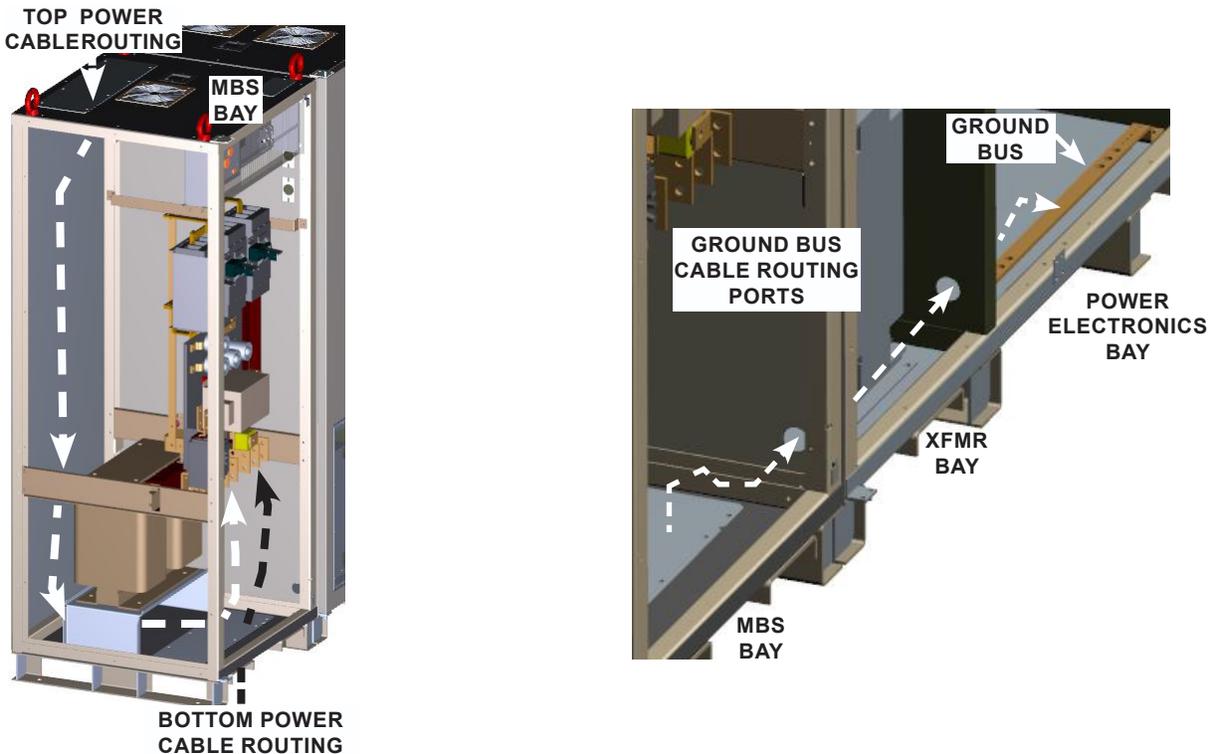


FIGURE 9.1: UPS POWER AND GROUND CABLE ROUTING

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. The power terminal block for the 15kVA UPS is shown in **Figure 9.4**.

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

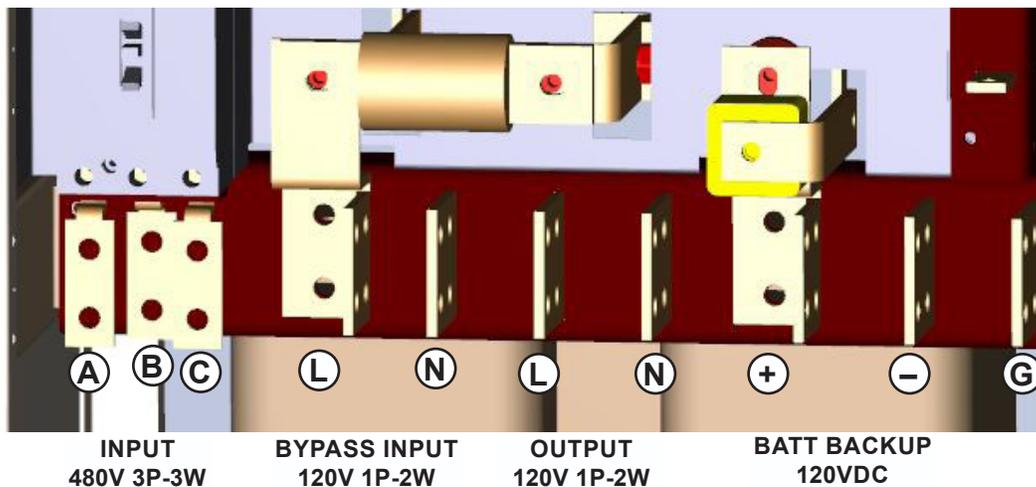
Bus Stub	Fastener	Tightening Torque
All power and neutral cable lugs	1/2 in. bolt	40 Lb-Ft (54.2 Nm)

TABLE 9.5: RECOMMENDED CABLE SIZE FOR 480V IN, 120V 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

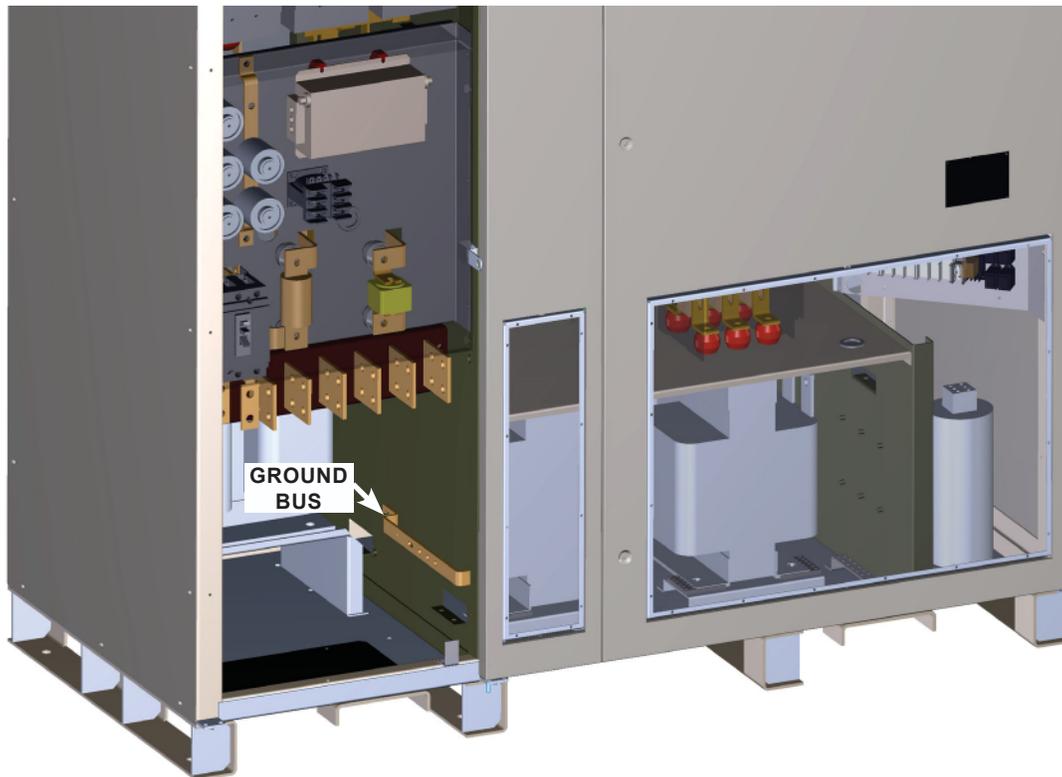
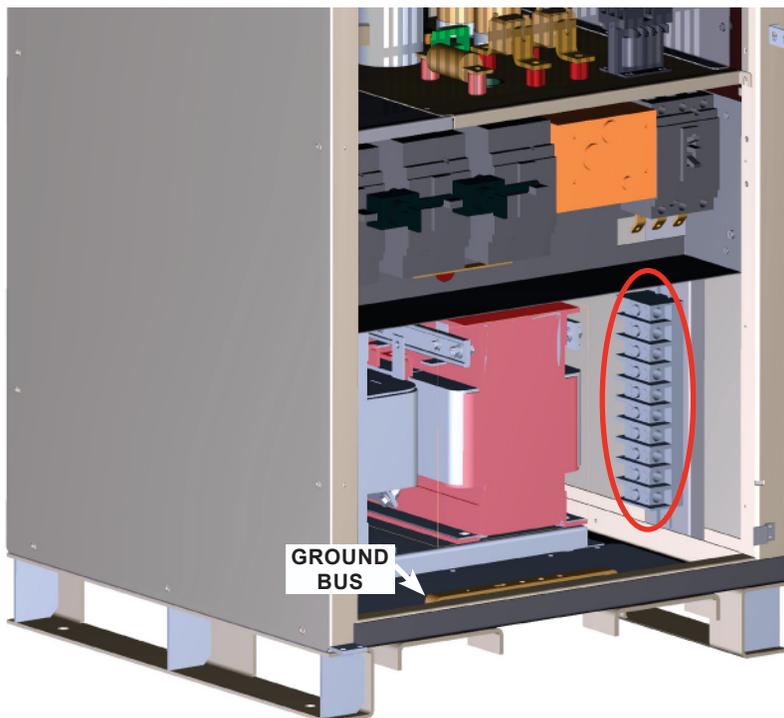


FIGURE 9.3: 30KVA UPS CONNECTION BAY



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	
	<p>Be sure to ground the UPS as specified.</p> <p>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.</p>

Figure 9.1, **Figure 9.4**, and **Figure 9.3** 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 mm²) 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.

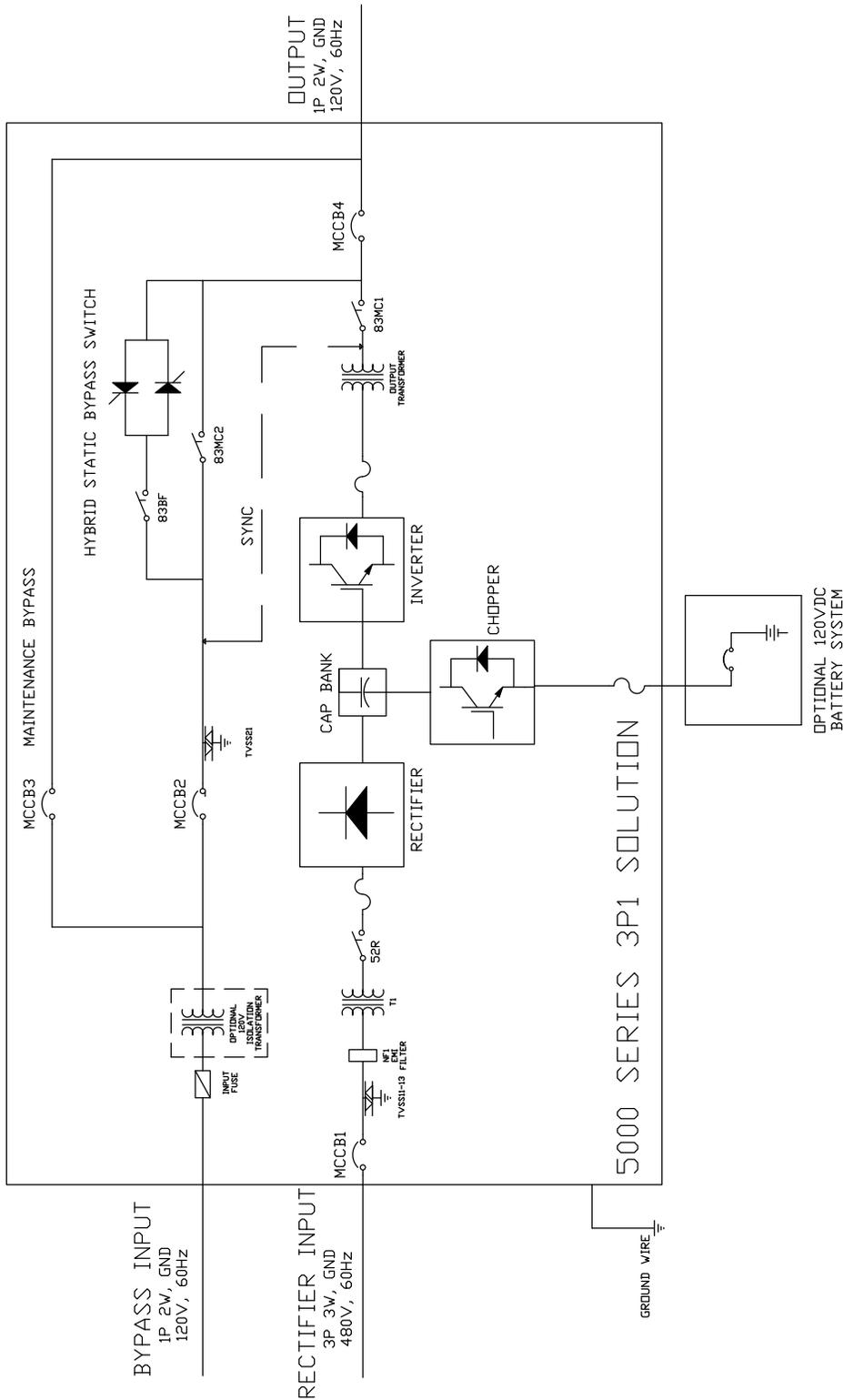


FIGURE 9.5: 5000 SERIES DUAL INPUT ONE-LINE W/ EXTERNAL BATTERY BACKUP

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) DC Volt / DC Amp Rating	30 Vdc / 3 A, 125Vac / 3A
TB2, TB4: SPDT (1NO/1NC) 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 Active	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 Trip 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. Once 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.

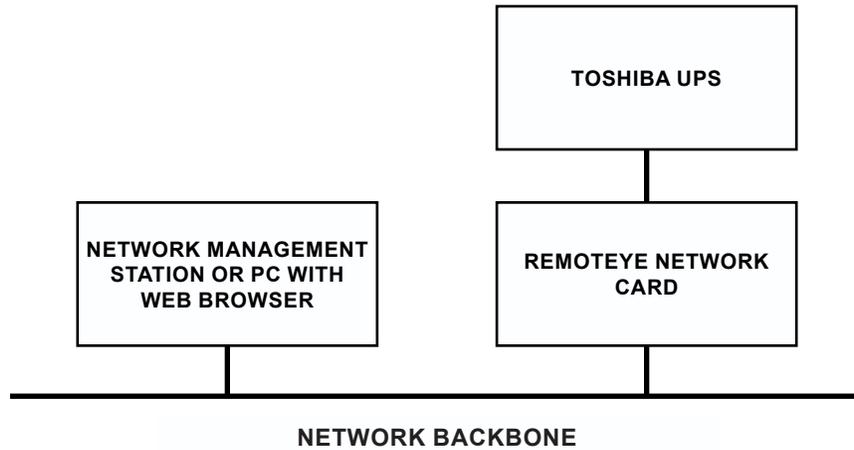


FIGURE 10.1: NETWORK INTERFACE

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%) (-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 Regulation time to +/-3 % <20 msec		
Voltage distortion rate / THD	100% Linear load: ≤3% 100% Non-linear load: ≤5%		
Overload	110-125% for 10 min., 150% for 60 sec		
Transient Response	±2% Max with a 100% Step Loads, ±1.5% Max with Loss/Return AC input, ±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) 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 (+/-10%)		
Frequency	60 Hz (+/-5 Hz)		
Bypass Overload Capacity	500% for 2 Cycles 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) 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.

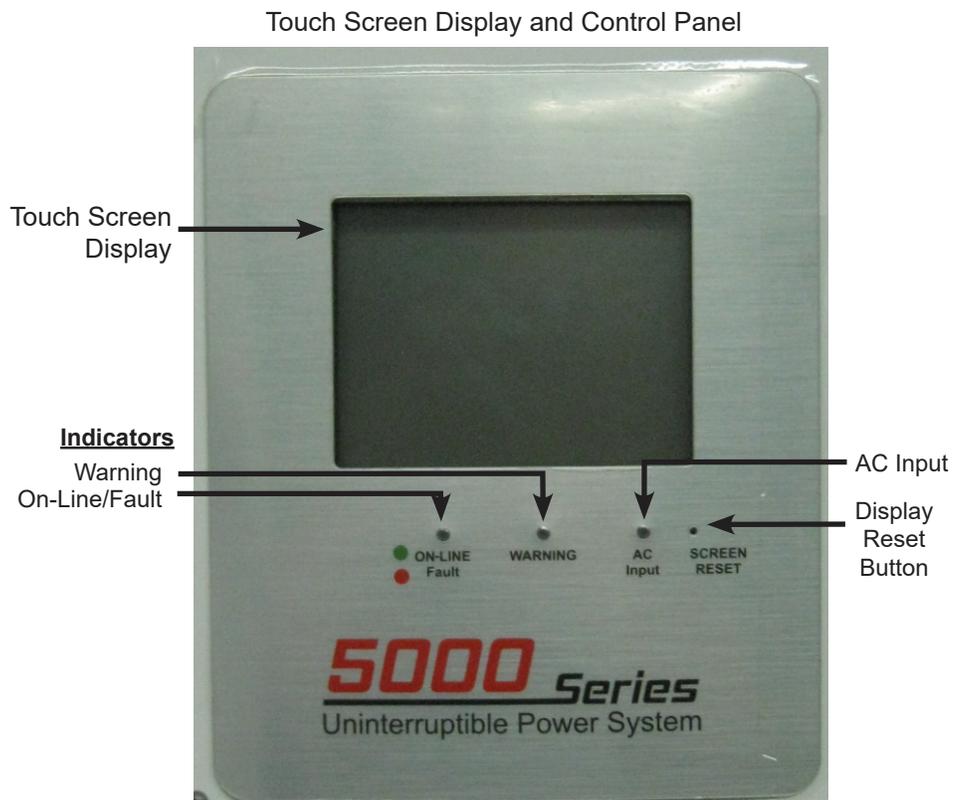


FIGURE 12.1: UPS DISPLAY PANEL

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 currently 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.

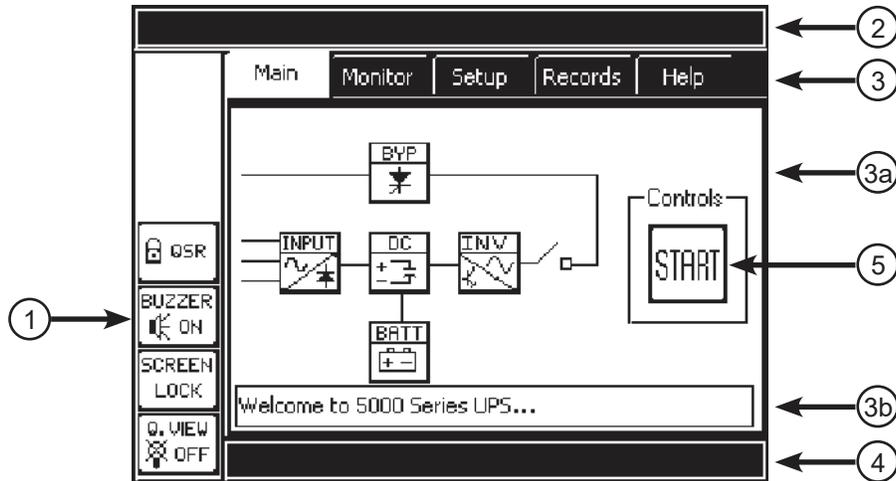
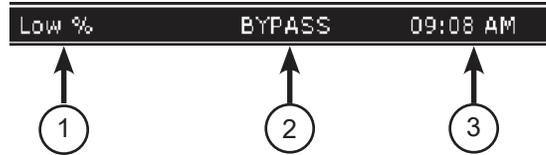


FIGURE 12.2: TOUCHSCREEN DISPLAY COMPONENTS (INITIAL MAIN DISPLAY)

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) Press UPS : UPS switches to On-Line mode, label changes to BYP . 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.

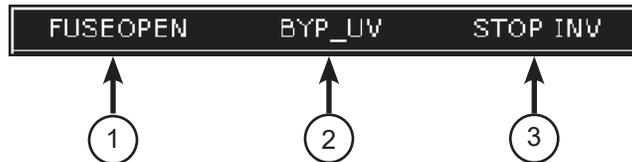


Header Bar Components	
No.	Function
1	System Load – Load as percent of full load. Low – Less than 15% Load.
2	Current Status – UPS status at the moment. (Status is delayed by a few seconds)
3	System Time – Current time in AM-PM format

FIGURE 12.3: HEADER BAR DISPLAY COMPONENTS

12.5 Footer Bar

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



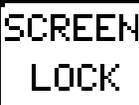
Footer Bar Components	
No.	Function
1	Fault – Displays last fault sensed by UPS. A Fault causes the UPS to switch to bypass and it will not automatically reset.
2	Warning – Displays last warning sensed by UPS. Multiple frequent warnings of the same type may induce a fault condition.
3	UPS Mode – Current 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. <ul style="list-style-type: none"> • UNLOCK enables all touchscreen active areas. • 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 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)

(Tab Buttons)

MAIN

MONITOR

SETUP

RECORD

HELP

(TAB Selection Buttons)

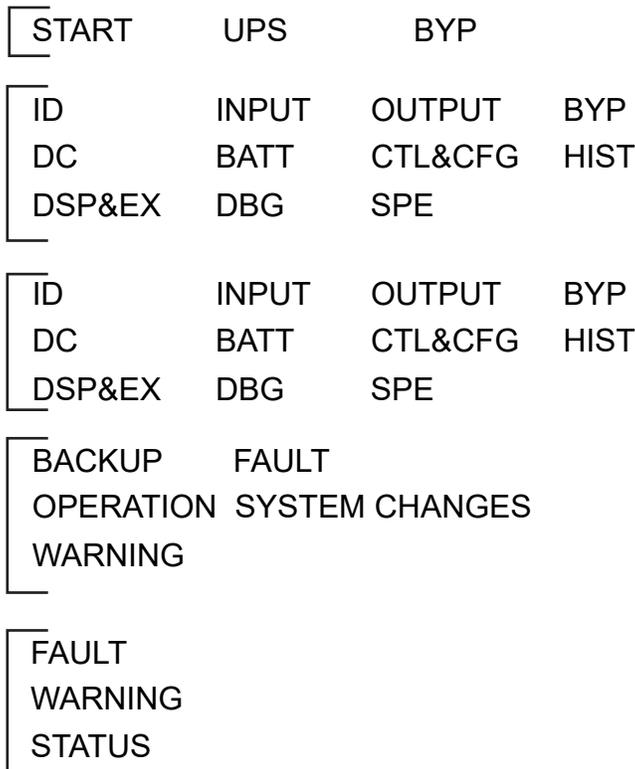


FIGURE 12.5 – MENU TREE

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.

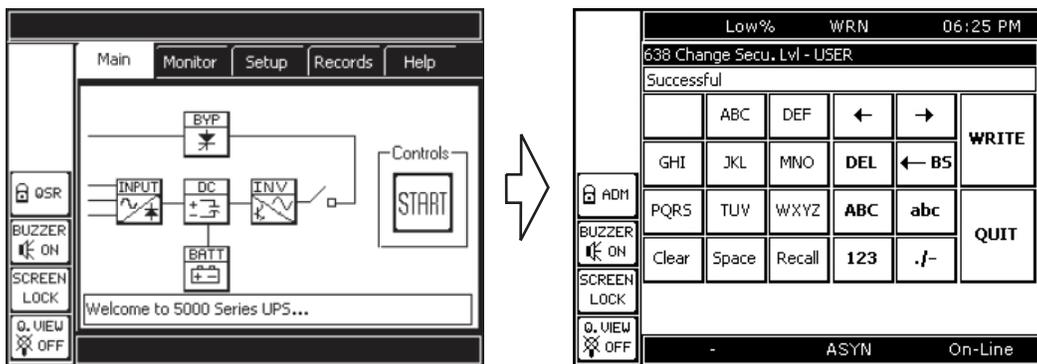


FIGURE 12.5: CHANGING SECURITY LEVEL

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 UNLOCK 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 (%). The highlighted icon indicates the current display mode.
4	Displays DC Bus voltage, Battery voltage, and Battery Charge/Discharge current.

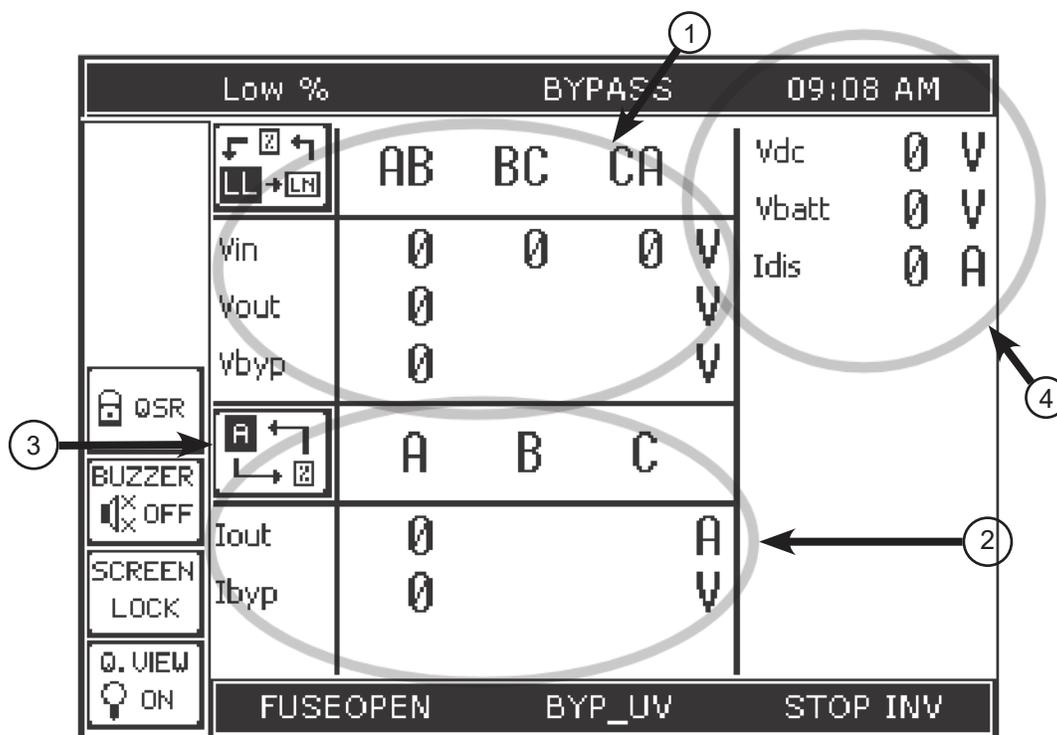
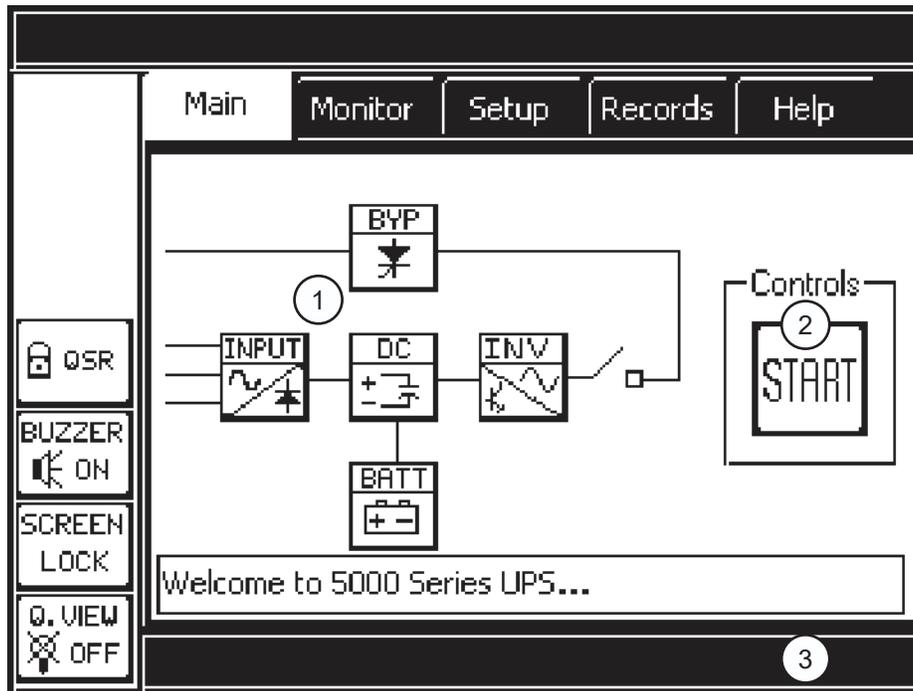


FIGURE 12.6: QUICK VIEW DISPLAY

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. (See Sections 13.2, 13.3) Press START : UPS starts rectifier and inverter. Enables UPS and BYP options. Press UPS : UPS switches to On-Line mode, label changes to BYP . Press BYP : UPS switches to Bypass mode, label changes to UPS .
3	Information Bar – Displays status, helpful hints, acronym definitions updated every two seconds.

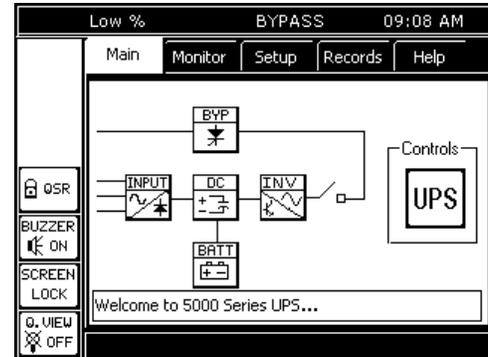
FIGURE 12.7: MAIN TAB COMPONENTS

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.

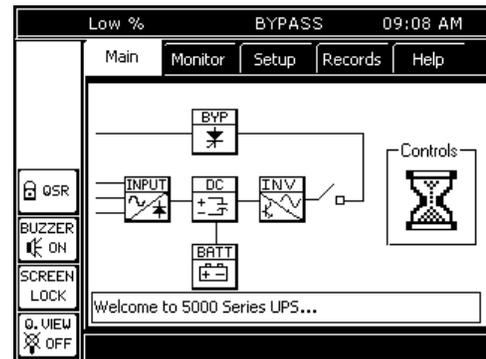
When the UPS is in BYPASS mode, the **UPS** button is displayed.

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.

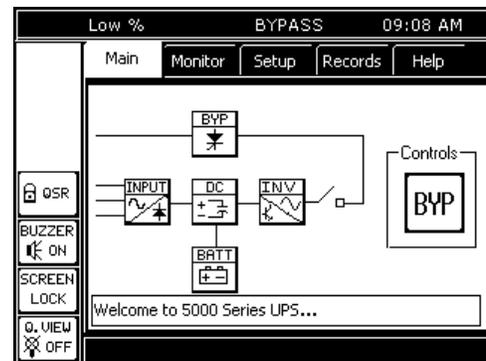


FIGURE 12.8: UPS/BYP BUTTON OPERATION

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.

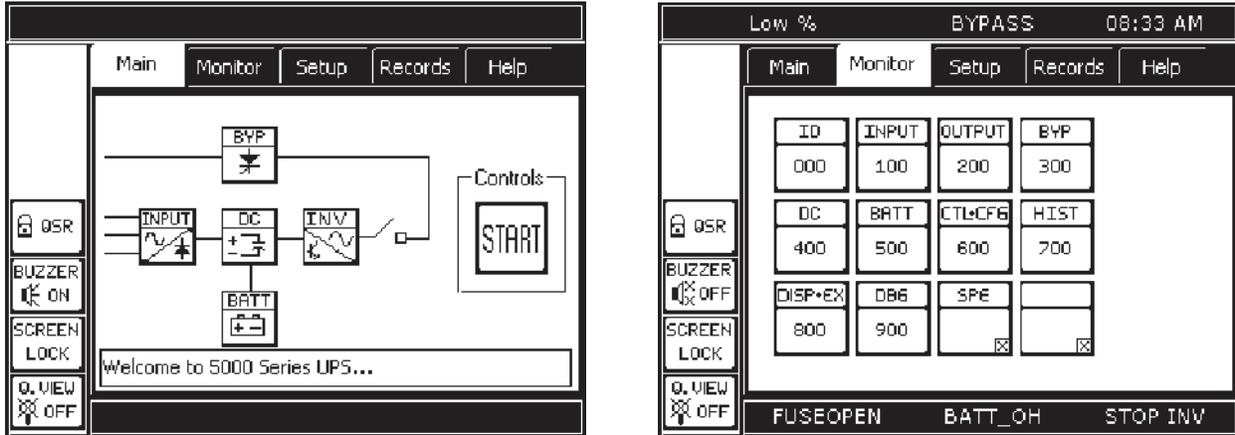


FIGURE 12.9: MONITOR TAB DISPLAY OPTIONS

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.

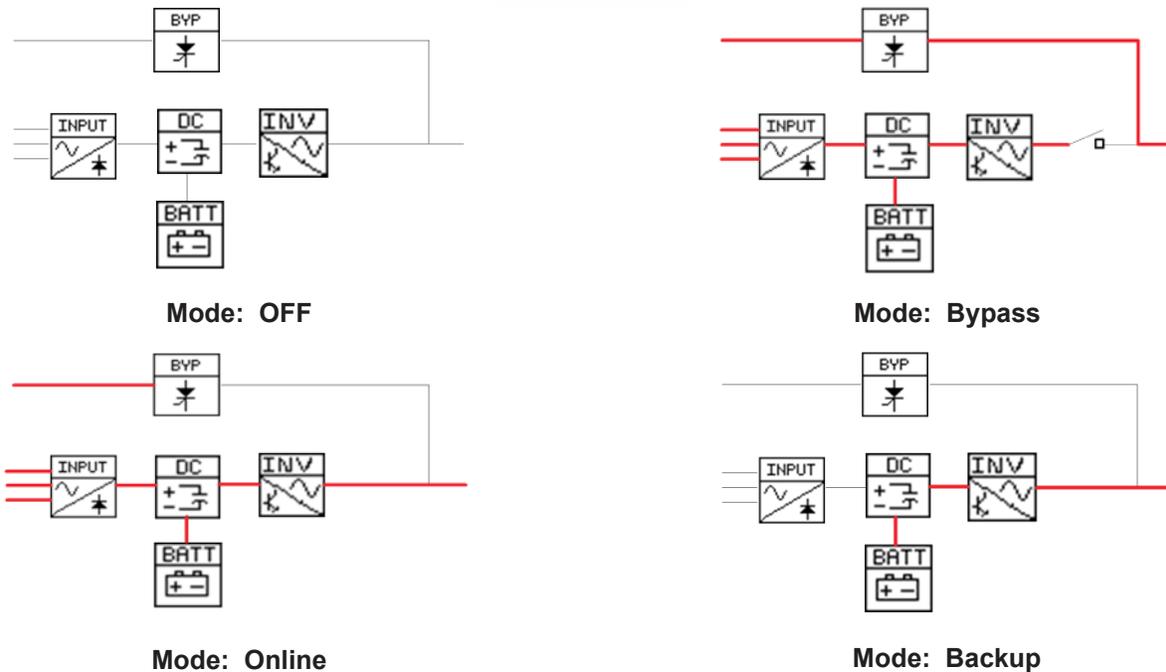
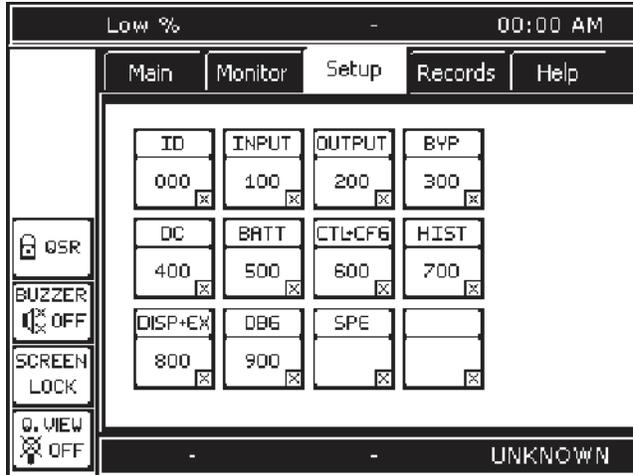


FIGURE 12.10: MIMIC DISPLAY CURRENT FLOW INDICATOR

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.

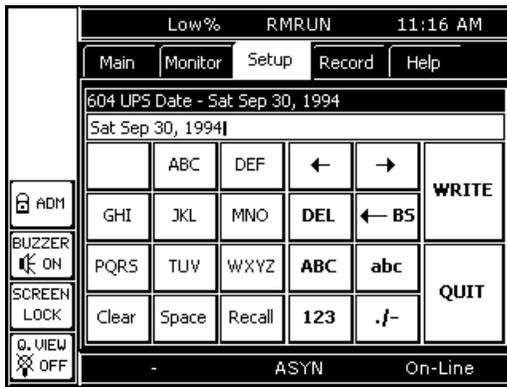
FIGURE 12.11: PARAMETER CATEGORIES

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 be displayed as shown below. Either an alpha/numeric keypad, a multiple choice, or binary choice display will appear.

After entering data or selecting an option, press WRITE to save the selections, or QUIT to leave the current value unchanged.

Example 1 – Alpha/numeric display.



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

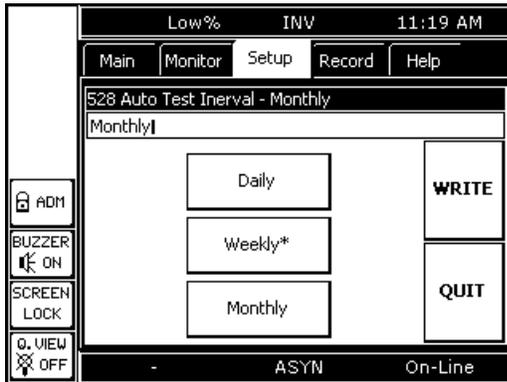
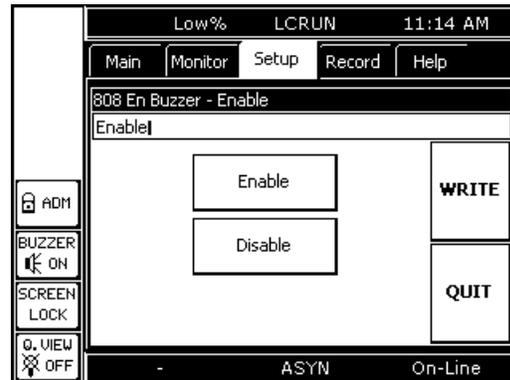


TABLE 12.2: TOUCHSCREEN KEYPAD IDENTIFICATION

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 pressing 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)

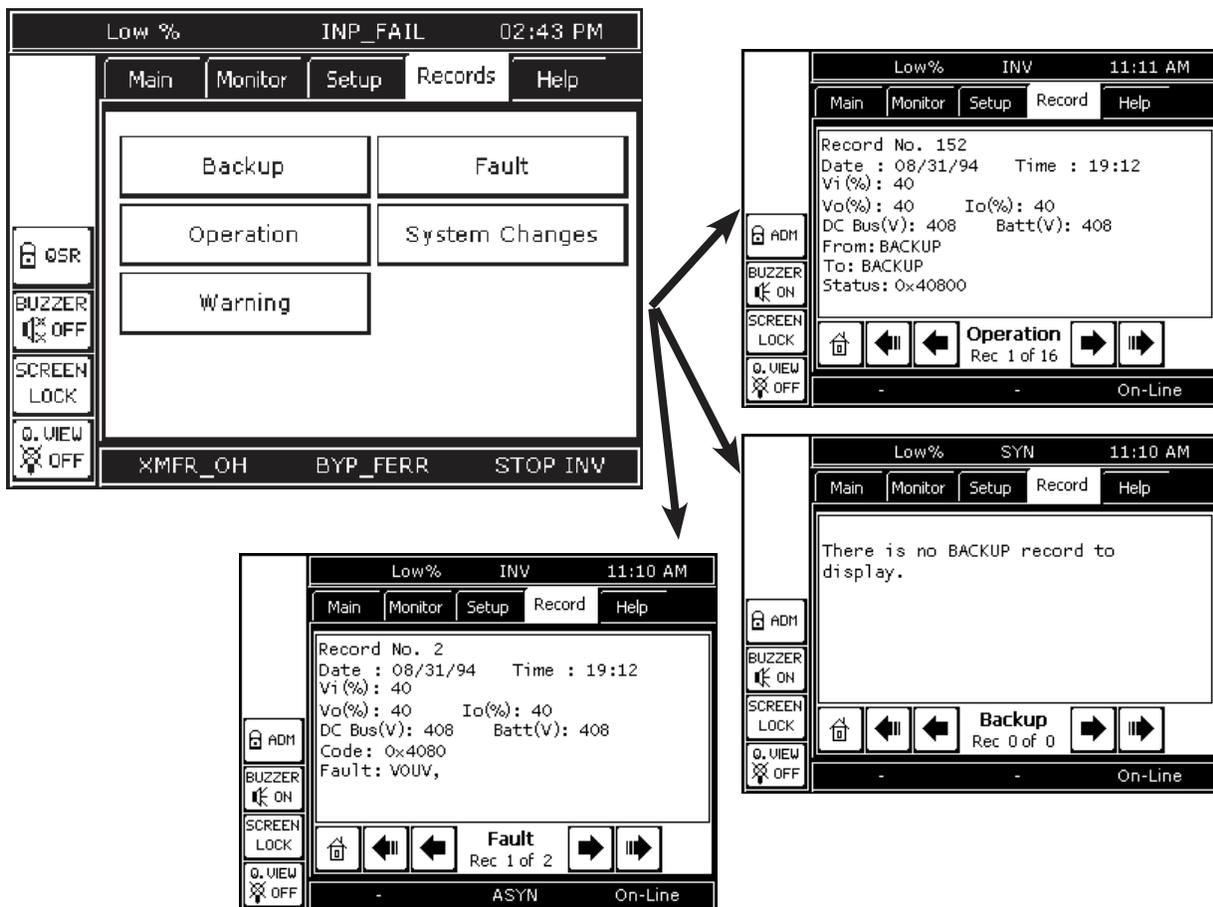


FIGURE 12.12: RECORDS

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/black while in Auto-Page mode. Press the button again to exit Auto-Page mode.

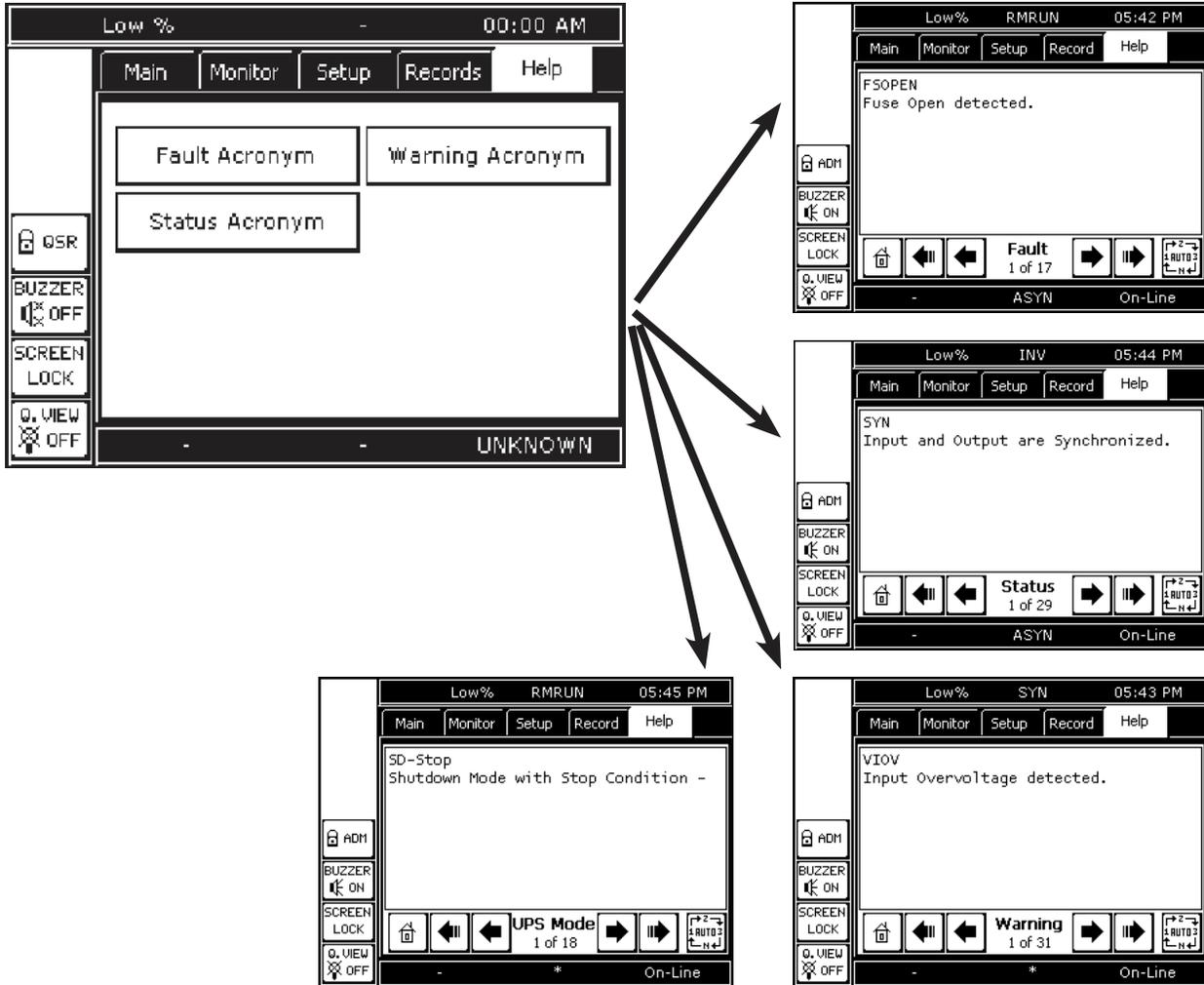


FIGURE 12.14: HELP CATEGORIES

12.17 5000 Series Parameter Definitions

See Appendix A for a list of the definitions and functions of the Command Parameters accessible 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 **13.5** 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 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

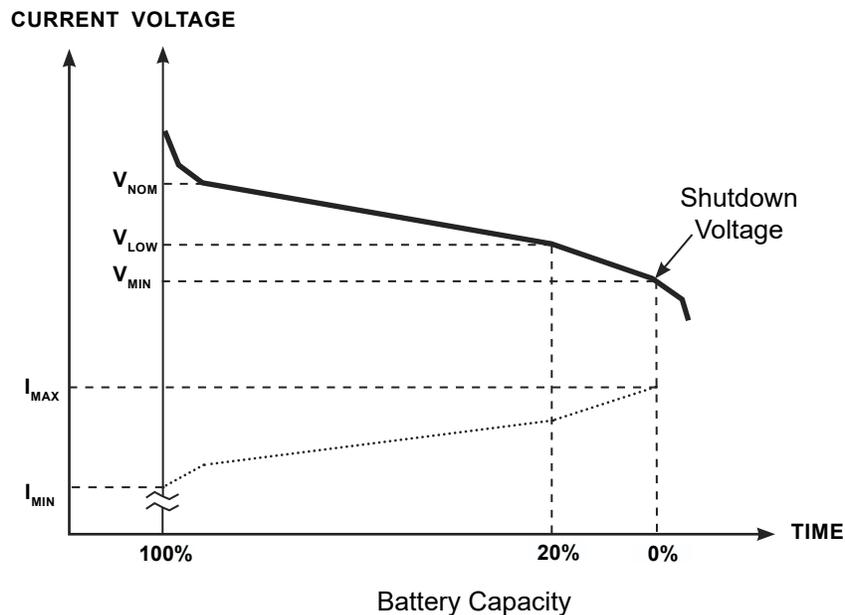


FIGURE 13.1: TYPICAL BATTERY DISCHARGE CURVE

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.

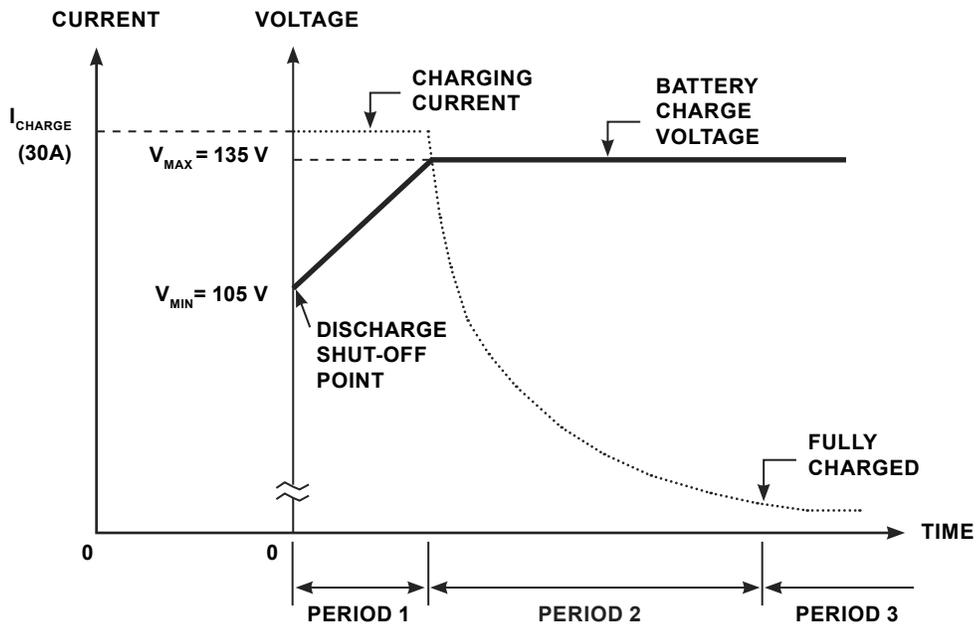
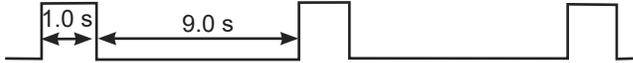
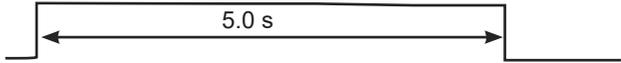
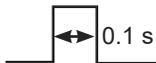


FIGURE 13.2: TYPICAL BATTERY CHARGING CURVE

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: 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 Slave 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

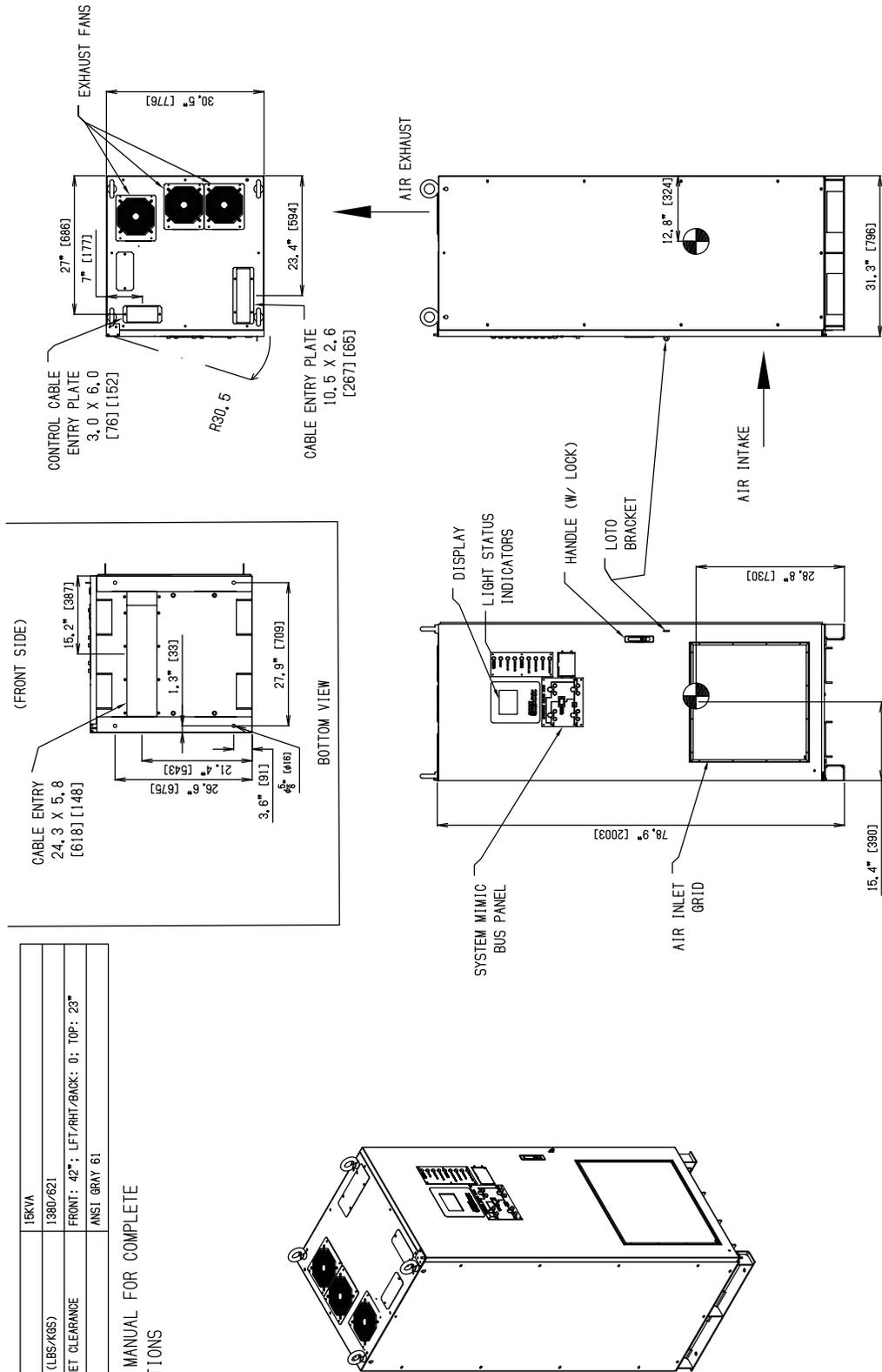


FIGURE A.1 – 5000 SERIES UPS 15 KVA CABINET OUTLINE

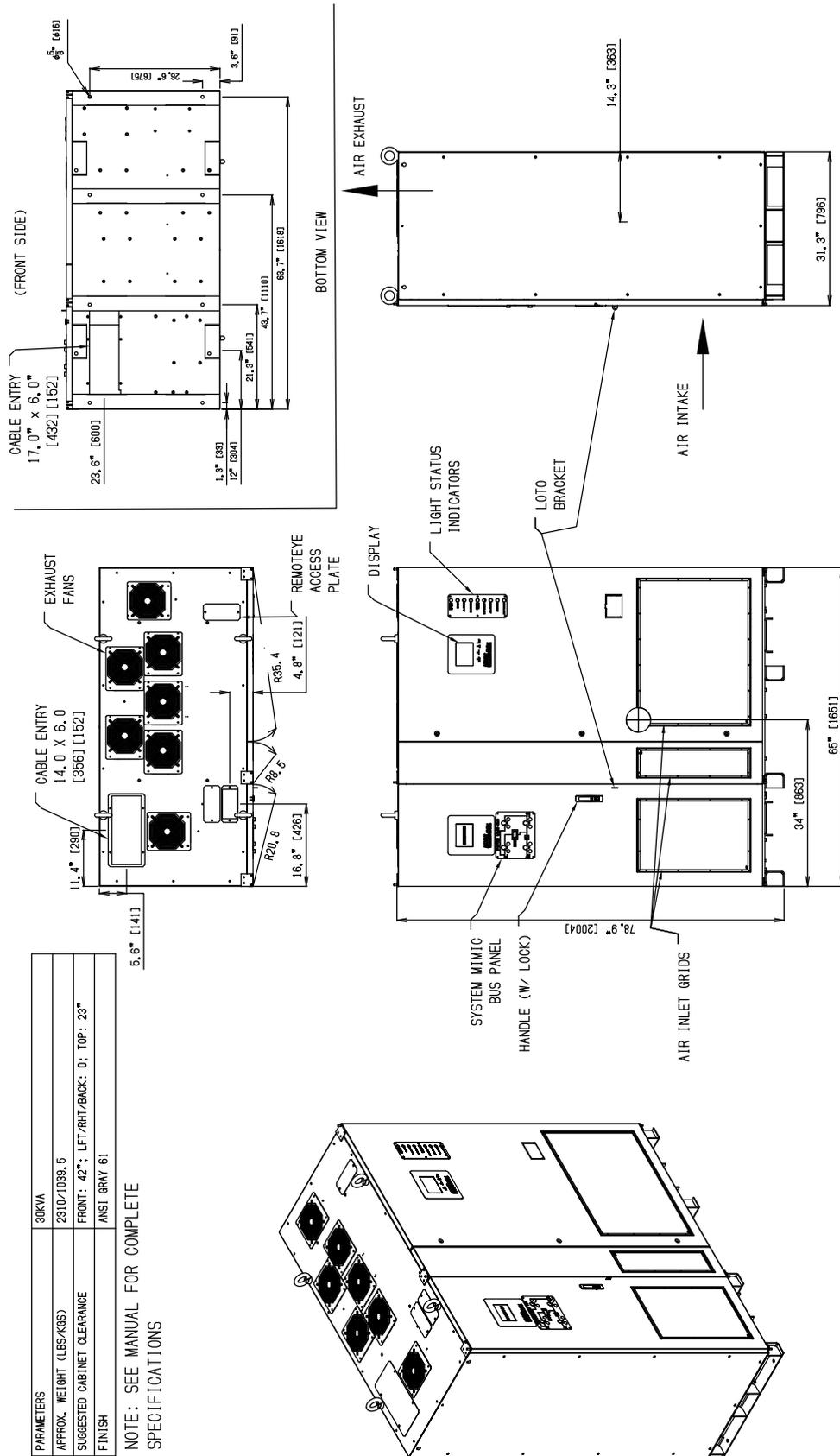


FIGURE A.2 – 5000 SERIES UPS 30 KVA CABINET OUTLINE

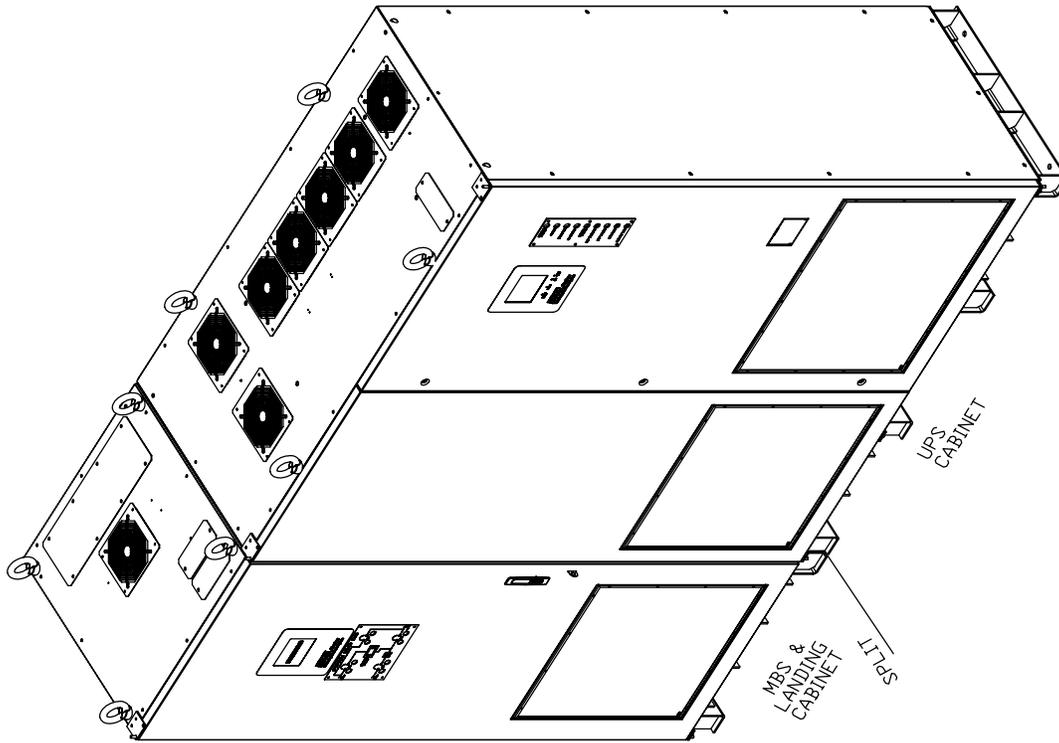


FIGURE A.3 – 5000 SERIES 50 KVA PHYSICAL DIMENSIONS

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

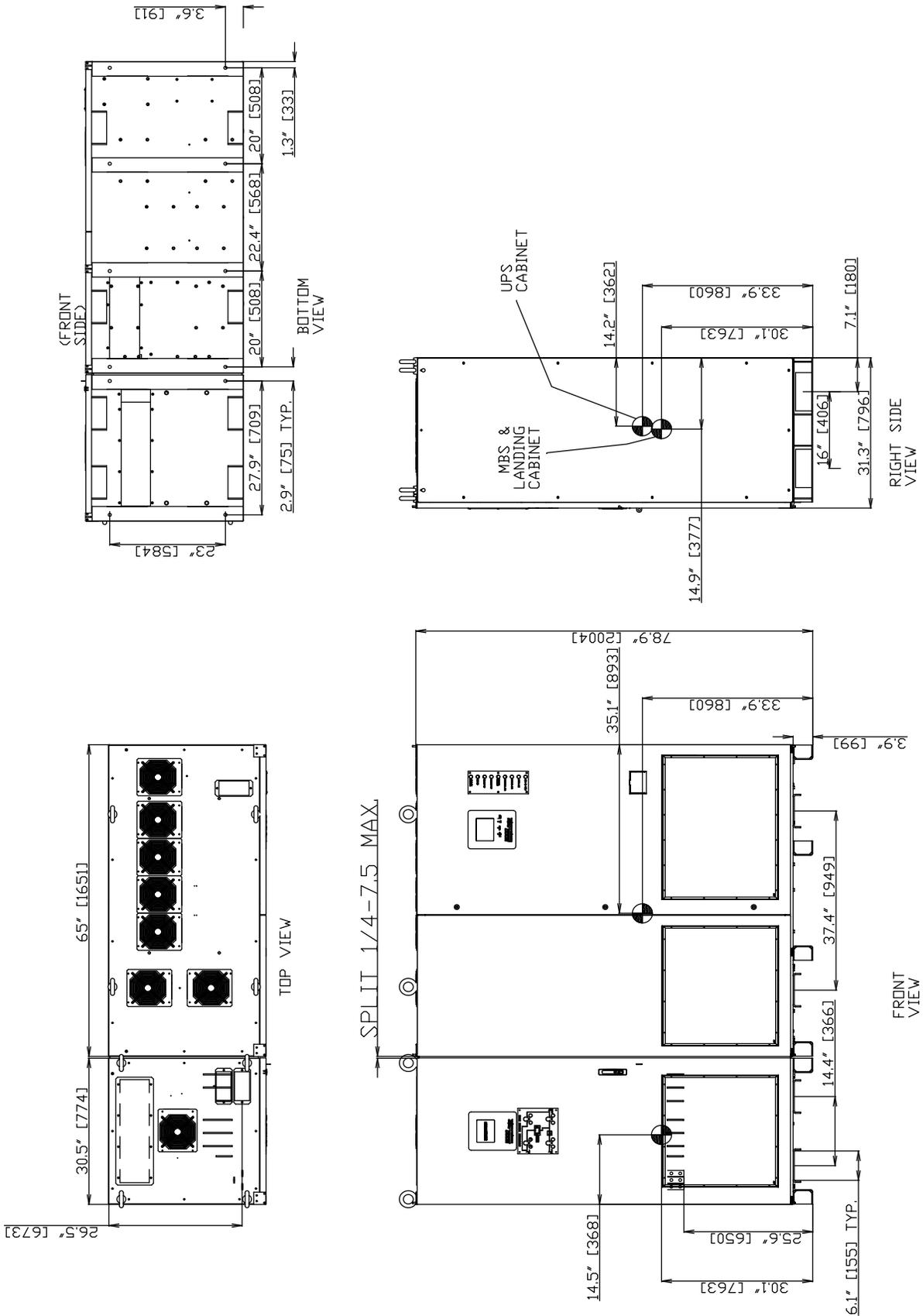


FIGURE A.4 – 5000 SERIES UPS 50KVA CABINET OUTLINE

- 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.

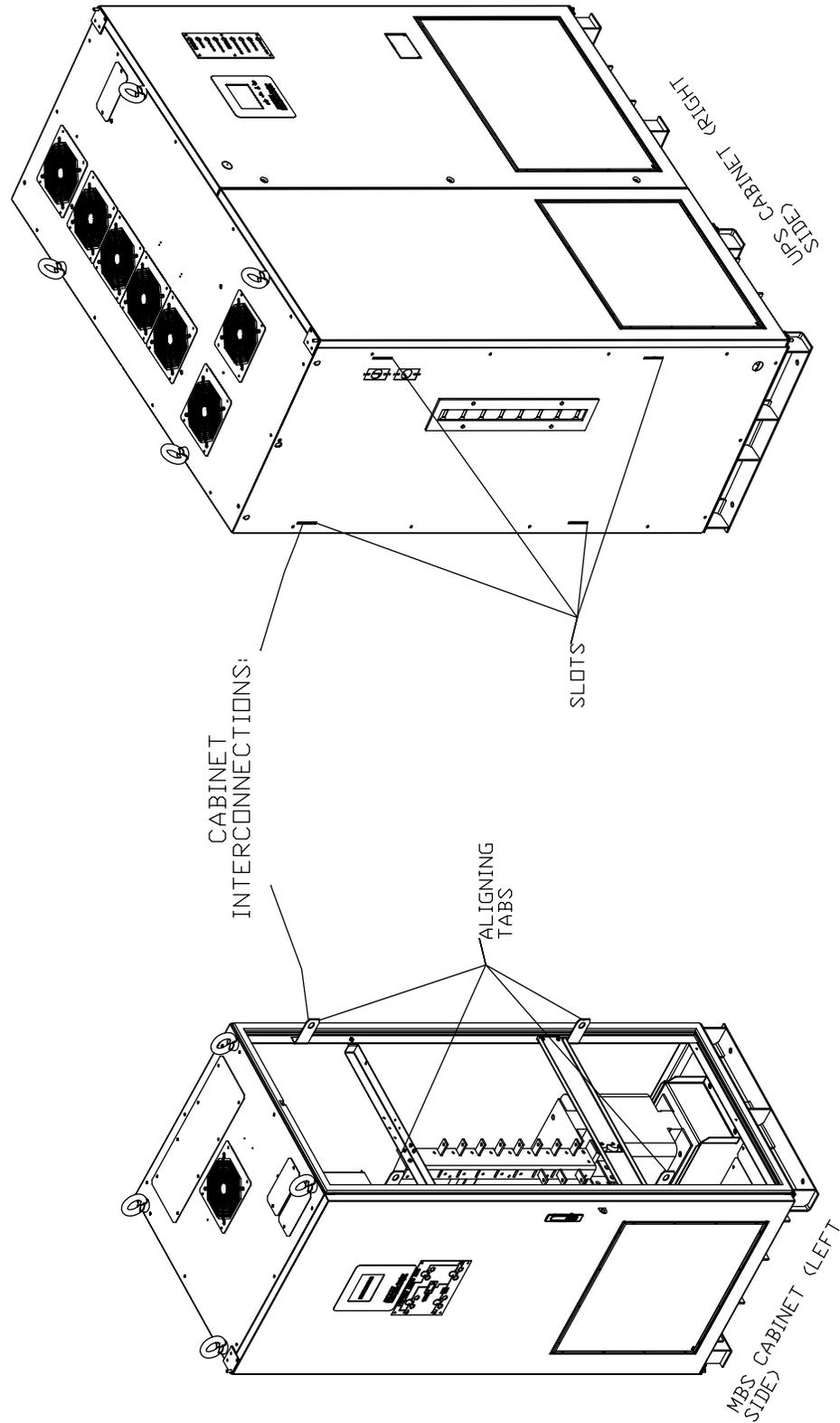
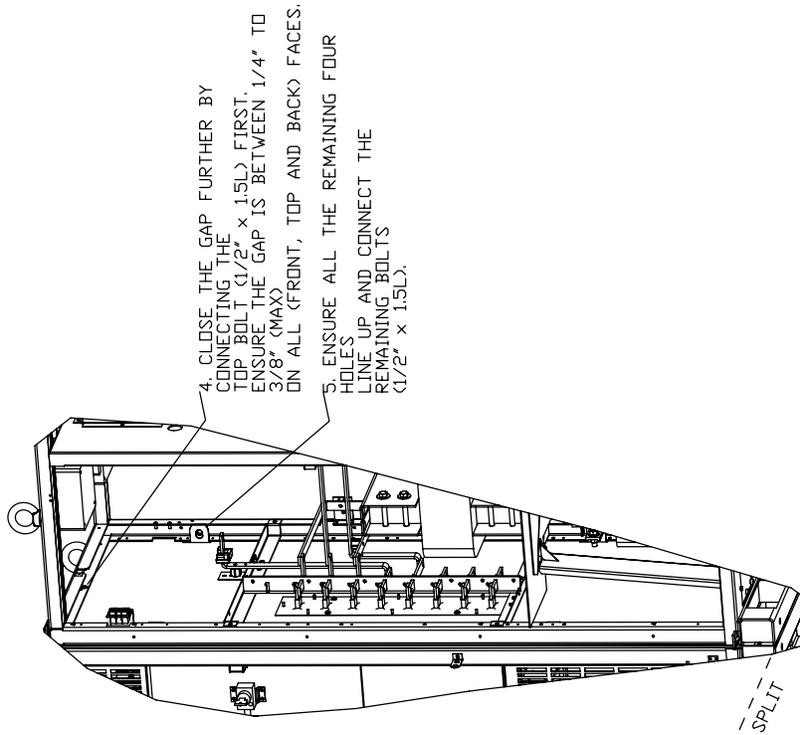


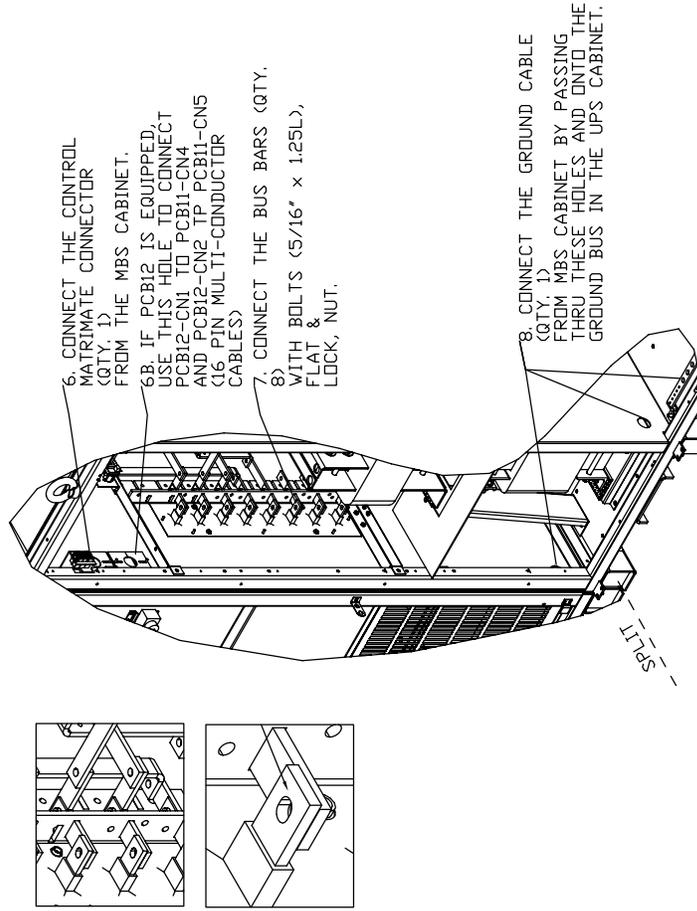
FIGURE A-5 – 5000 SERIES UPS 50KVA INTERCONNECTIONS OUTLINE

MECHANICAL CONNECTIONS:



ISD VIEW - UPS
CABINET
(DOORS HIDDEN)

ELECTRICAL CONNECTIONS:



ISD 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

Appendix B – Command Parameter Definitions Table

5000 Series Parameter Definitions

The following table lists those parameters that can be 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 be 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 Batteries 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* "			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
6	38	Change Secu. Lvl	Change Secu. Lvl			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: 3 Φ , 4-wire + ground.
 - AC Output: 3 Φ , 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.

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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

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