TOSHIBA
Leading Innovation

G8000MM SERIES

INSTALLATION AND OPERATION MANUAL

100/150/225/300/375/500/625/750 kVA

480/480 V and 600/600 V

Document: GBH0015 Rev. 1.10
Part No. 62013-001
October 2009

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IMPORTANT NOTICE

The Instructions contained in this manual are not intended to cover all of the details or variations in equipment or to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be required or should particular problems arise which are not covered sufficiently the matter should be referred to the local TOSHIBA sales office.
The contents of this instruction manual shall not become a part of or modify any prior or existing equipment, commitment, or relationship. The sales contract contains the entire obligation of TOSHIBA INTERNATIONAL CORPORATION. The warranty contained in the contract between the parties is the sole warranty of TOSHIBA, and any statements contained herein do not create new warranties or modify the existing warranty.

Any Electrical or mechanical modifications to this equipment without prior written consent of the TOSHIBA will void all warranties and may void UL/CUL listing. Unauthorized modifications may also result in equipment damage, personal injury, or loss of life.

UNINTERRUPTIBLE POWER SYSTEM

If additional information or technical assistance is required call TOSHIBA Customer Support Center toll free at 1- 800-231-1412, or write to: Toshiba International Corporation, 13131 West Little York Road, Houston, TX 77041-9990 Attn: UPS Product Manager.

Please complete the following information for your records. Unless otherwise specified on the warranty card, the warranty period for the UPS or UPS part is 36 months from the shipment date (see bill of lading).

Unless otherwise specified on the warranty card, the warranty period for a UPS battery is 24 months from the shipment date (see bill of lading).

Keep this manual with the UPS equipment.

Job Number:_____

Model Number: _____

Serial Number:_____

Application:_____

Shipping Date:_____

Date of Installation:_____

Inspected By:_____

Purpose and Scope of Manual

This manual provides information on how to safely install, operate, and maintain your TOSHIBA power electronics product. This manual includes a section on 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 equivalent.

TOSHIBA reserves the right, without prior notice, to update information, make product changes, or to discontinue any product or service identified in this publication.

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Printed in the U.S.A.

Contacting TOSHIBA Customer Support Center

The TOSHIBA Customer Support Center can be contacted to obtain help in resolving any **Uninterruptible Power System** problem that you may experience or to provide application information.

The center is open from 8 a.m. to 5 p.m. (CST), Monday through Friday. The Support Center's toll free number in USA is (800) 231-1412.

You may contact TOSHIBA by writing to:

TOSHIBA INTERNATIONAL CORPORATION.
INDUSTRIAL DIVISION
13131 West Little York Rd.
Houston, TX 77041-9990
Attn: UPS Product Manager

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How to use this Manual

This manual is designed for ease of use, giving the user easy and quick reference to information. This manual uses notice icons to draw attention to the user important information regarding the safe operation and installation of the UPS. The notice icons used in this manual are explained below, and should be taken into account and adhered to whenever they appear in the text of this manual.

WARNING

Warning: A warning notice icon conveys information provided to protect the user and service personnel against hazards and/or possible equipment damage.

CAUTION

Caution: A caution notice icon conveys information provided to protect the user and service personnel against possible equipment damage.

NOTE

Note: A Note notice icon indicates when the user should make a reference of information regarding the UPS operation, load status and display status. Such information is essential if Toshiba field service group assistance and correspondence is required.

PROHIBIT

Prohibit: A prohibit symbol shows the act the user or the service personnel should NEVER perform during the UPS installation, operation or service work.

Safety Recommendations: If any problems are encountered while following this manual, Toshiba field service group assistance and correspondence is recommended.

1 INTRODUCTION

Your Toshiba Uninterruptible Power System (UPS) is designed to provide many years of reliable protection from power failure, brown-outs, line noise, and voltage transients. To ensure optimum performance of the equipment, follow the manufacturer's instructions. This manual contains descriptions required to operate the UPS. Please read this manual carefully and retain it for future reference.

CAUTION

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important instructions for the G8000MM SERIES Uninterruptible Power Systems that should be followed during installation and maintenance of the UPS and batteries.

WARNING

WARNING 1

Lethal voltages exist within the equipment during operation. Observe all warning and cautions in this manual. Failure to comply may result in serious injury or death. Obtain qualified service for this equipment as instructed.

CAUTION

WARNING 2

In no event will TOSHIBA be responsible or liable for either indirect or consequential damage or injury that may come from the use of this equipment.

PROHIBIT

Don't modify the UPS entirely or partially.
Any modifications without authorization by TOSHIBA could result in personal injuries, death or destruction of the UPS.

1.1 SAFETY PRECAUTIONS

APPLICATION

This UPS shall NOT be applied to support equipment (*) that could affect human lives.

PROHIBIT

*
- Medical operation room equipment
- Life support equipment (artificial dialysis, incubators, etc.)
- Toxic gas or smoke eliminators
- Equipment that must be provided under fire laws, construction standards or other ordinances
- Equipment equivalent to the above

Special considerations are required when applying this UPS to the equipment (**) that affect human safety and/or maintain public services.
Be sure to contact/inform TOSHIBA if it is such a case. The application without special consideration may cause serious accidents.

NOTE

**
- Equipment to supervise or control airways, railways, roads, sea-lanes or other transportation.
- Equipment in nuclear power plants.
- Equipment to control communications.
- Equipment equivalent/similar to the above mentioned.

NOTE

WARNING 3

The UPS is to be installed in a controlled environment.

Improper storage and installation environment may deteriorate insulation, shorten component life and cause malfunctions.

Keep the installation environment per standard described as follows:

Table 1.1 UPS Installation Environment

No.	Item	Environment standard	
1	Installation location	Indoors	
2	Ambient temperature	Minimum temperature: 0°C, Maximum temperature: 40°C The average temperature over any 24-hour period must be in the range 5 to 35°C.	
3	Relative humidity	The relative humidity must be held between 5 and 95%. There must be no condensation due to temperature changes.	
4	Altitude	This equipment must not be applied at altitude that exceeds 2700 m (9000 ft.) above seal level.	
5	Dust	Dust in the room where the UPS is installed must not exceed normal atmospheric dust levels. In particular, that dust should not include iron particles, oils or fats, or organic materials such as silicone.	
6	Inflammable gas	There should be no inflammable/explosive gas.	
		Hydrogen sulfide (H_2S)	No more than 0.0001 PPM
		Sulfurous acid gas (SO_2)	No more than 0.05 PPM
		Chlorine gas (Cl_2)	No more than 0.002 PPM
		Ammonia gas (NH_3)	No more than 0.1 PPM
		Nitrous acid gas (NO_2)	No more than 0.02 PPM
		Nitrous oxides (NO_x)	No more than 0.02 PPM
		Ozone (O_3)	No more than 0.002 PPM
		Hydrochloric acid mist (HCl)	No more than 0.1 mg/m^3

NOTE

WARNING 4

This UPS does not include a Bypass input circuit breaker to protect bypass circuit. The Bypass input circuit breaker is to be field supplied and installed. Recommended Breaker's Specifications are as follows:

TABLE 1.2 Rating of Bypass Input Circuit Breaker

Capacity (kVA)	Bypass Voltage (Vac)	Bypass Rating (Aac)	Breaker (A)
100	480	120	150
	600	96	125
150	480	180	225
	600	144	200
225	480	271	350
	600	217	300
300	480	361	500
	600	289	400
375	480	451	600
	600	361	500
500	480	602	800
	600	481	700
625	480	752	1000
	600	601	800
750	480	903	1200
	600	722	1000

AC input and AC output overcurrent protection and disconnect devices shall be field supplied and installed. The DC output breaker shall be field supplied and installed. The overcurrent protection device should be installed in the Battery cabinet and rated as indicated in TABLE 1.6.

1.2 GENERAL

The Toshiba G8000MM SERIES UPS is designed to provide continuous and clean electrical power to a critical load. Additionally the UPS monitors power conditions affecting the load. In the event of an input power failure, the UPS will supply power to the critical load for the specified battery time.

If the input power is not restored promptly, back up power from the UPS battery permits the orderly shutdown of equipment supported by the UPS. The UPS is simple to start-up, operate and maintain.

The G8000MM SERIES UPS is available in eight kVA sizes-100, 150, 225, 300, 375, 500, 625, and 750kVA. Specifications for each kVA model appear in Section 1.5. The principles of operation described herein are applicable to all models.

This manual provides an overview of the G8000MM SERIES components and their functions. The appearance and purpose of operator controls and indicators is described with procedures for operation, start-up, shutdown and basic maintenance included.

1.3 Definitions

UNINTERRUPTIBLE POWER SUPPLY SYSTEM (UPS) - All components within the UPS Module Cabinet and associated batteries that function as a system to provide continuous, conditioned AC power to a load. This is sometimes referred to as the "System".

UPS MODULE CABINET - The metal enclosure which contains the Rectifier, the Inverter, the Chopper, the Static Transfer Switch, the Internal Bypass line, the operator controls, and the internal control system required to provide specified AC power to a load.

UPS MODULE - The Rectifier and Inverter assemblies which, under the direction of the internal control system and operator controls, provide specified AC power to a load.

RECTIFIER - The UPS components which contain the equipment and controls necessary to convert input AC power to regulated DC power required for battery charging and for supplying power to the Inverter.

INVERTER - The UPS components which contain the equipment and controls necessary to convert DC power from the Rectifier, or the battery, to AC power required by the critical load.

CHOPPER - The UPS components which contain the equipment and controls necessary to charge the battery and supply power to the Inverter from battery.

STATIC TRANSFER SWITCH - The device which connects the critical load to the bypass line when the UPS module cannot supply continuous power.

BYPASS LINE - The line which conducts electricity directly from the input power source to the critical load during Maintenance or whenever the UPS is not completely operational.

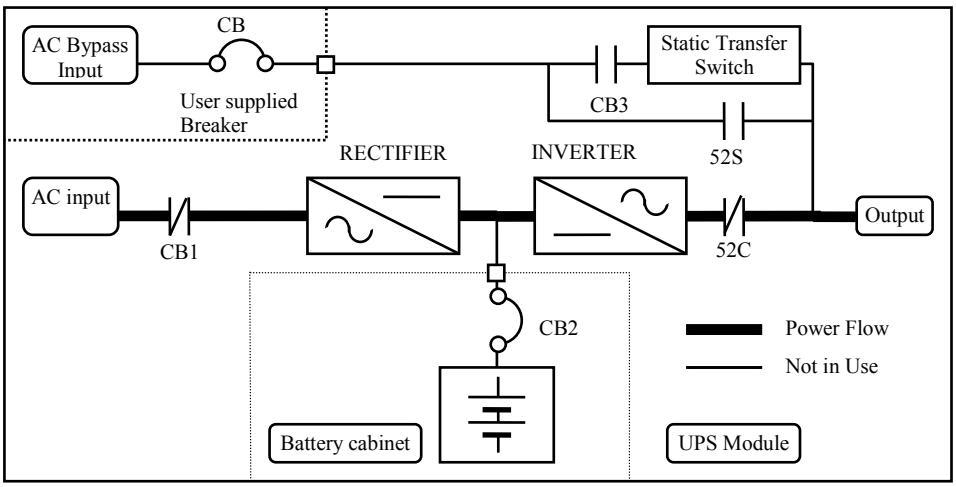
INPUT POWER - Power provided by the electrical utility company, or auxiliary generator, which is connected to the UPS for supplying the critical load.

1.4 Operation Overview

The UPS provides two power paths between the utility source and the critical load.
Figure 1.1 shows the path for normal operation, with the load powered from the inverter. Figure 1.2 shows the path for bypass operation, with the load supplied through the static bypass line.

A) Normal operation: Load power supplied by each system UPS inverter.

Figure 1.1 Single Line Diagram - Normal Operation: Load powered by UPS inverters



During normal operation, the path through the UPS inverters is used to power the load.

In Figure 1.1 for each system UPS, the Input AC power is converted to DC by the Rectifier. DC power is utilized to charge the UPS battery and to provide power to the Inverter. The Inverter converts the DC power to clean AC power to supply the critical load.

The conversion - inversion process eliminates any voltage transients or fluctuations existing in the input power before it reaches the critical load.

In a parallel system the power drawn by the critical load is equally shared between all system UPS. In the event of a UPS module failure, the critical load power will be continually supplied and shared by all other system UPS.

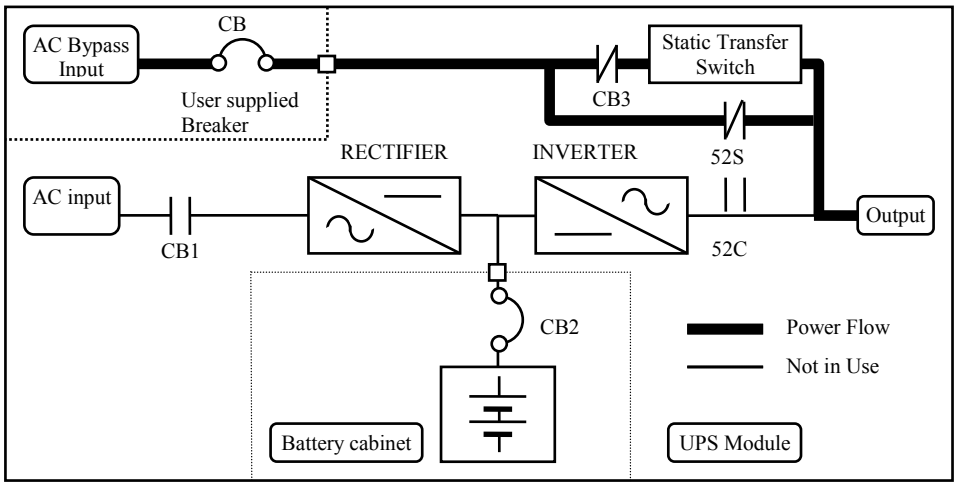
In the event of a load overcurrent, all system UPS will transfer to bypass without interruption to the critical load.

NOTE

The Bypass Input circuit breaker for protection of the UPS and cables are field supplied and field installed. (See WARNING 4 on page 5)

B) Bypass Operation: Load Power supplied through each system UPS internal static bypass line.

FIGURE 1.2 Single Line Diagram - Bypass Operation: Load fed through Internal static bypass line.



In Figure 1.2, the Internal Static Bypass line is a Hard wired line through CB3 and contactor 52S which supplies the critical load with unconditioned input power.

In parallel operation each system UPS internal static bypass line will equally share the power supplied to the critical load.

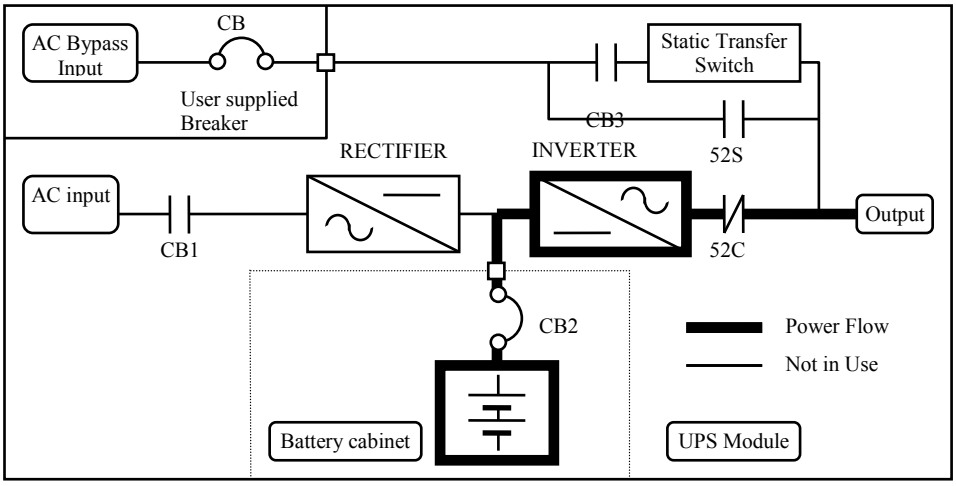
The internal static bypass line will route power to the critical load while the UPS module is de-energized during Start-up and before the system is fully operational.

Bypass operation will occur In the event of a load overcurrent, with all system UPS transferring to bypass without interruption to the critical load.

The internal control system determines the operation of the two paths, with the load powered from the inverter being the normal operation.

C) Battery operation: Load Power supplied by each system UPS battery and inverter.

FIGURE 1.3 Single Line Diagram - Battery Operation



Referring to Figure 1.3: In the event of AC input source failure or interruption, each system UPS rectifier will de-energize and each UPS battery will immediately discharge and supply DC power to the Inverter to maintain continuous AC power to the load. This operation will continue until:

a) The battery capacity expires and the inverter turns off, or
b) Input power is restored after which the rectifier will power the inverter and critical load and simultaneously recharge the batteries.

A fully charged battery will provide power for the specified time at the rated load, or longer, at a reduced load.

When power is restored after a low battery shutdown, each system UPS Rectifier automatically restarts operation, recharges the batteries and the Inverter is automatically restarted without operator intervention. Load is automatically assumed by the inverter without operator intervention.

For parallel operation power drawn by the load is equally shared between all system UPS during battery operation.

FIGURE 1.4.a UPS Parts Location (100kVA, 150kVA, 225kVA)

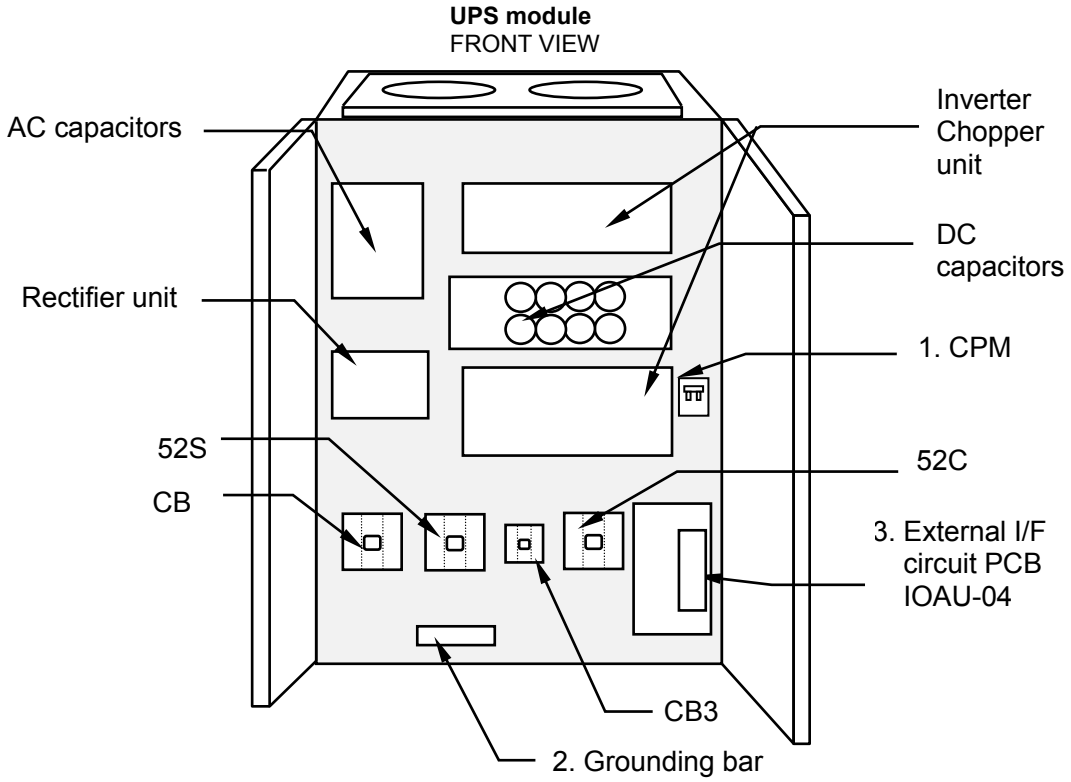


FIGURE 1.4.b UPS Parts Location (300kVA,375kVA)

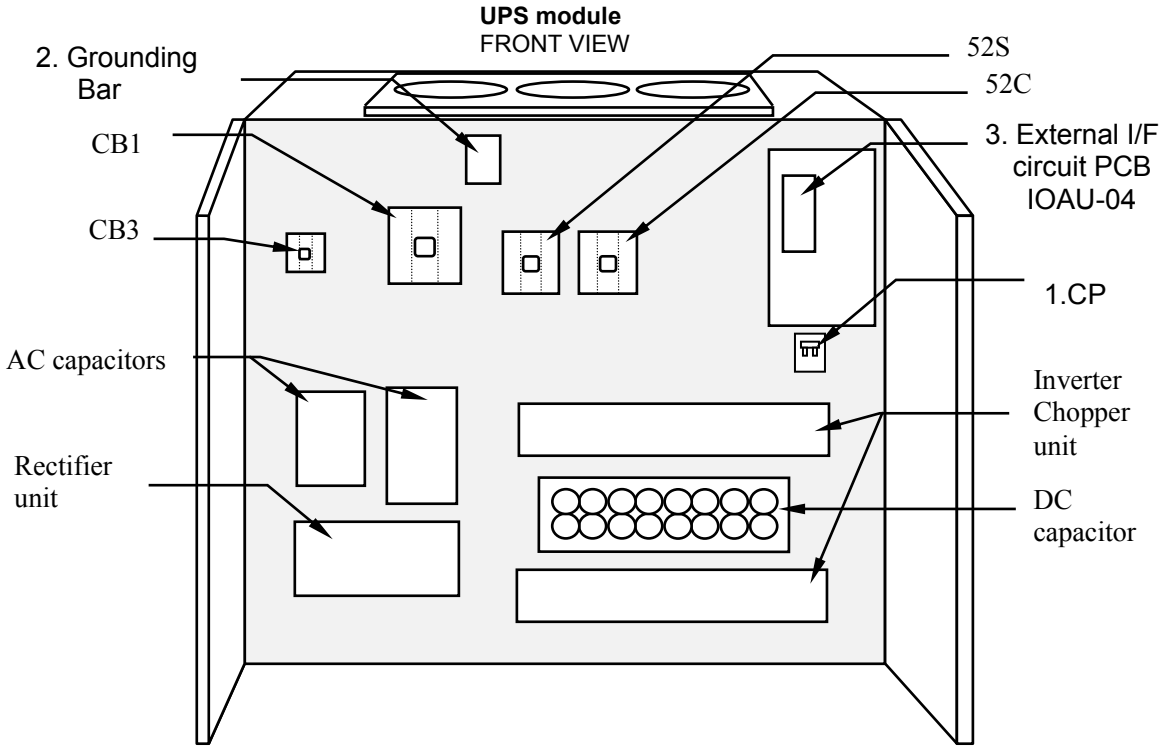


FIGURE 1.4.c UPS Parts Location (500kVA)

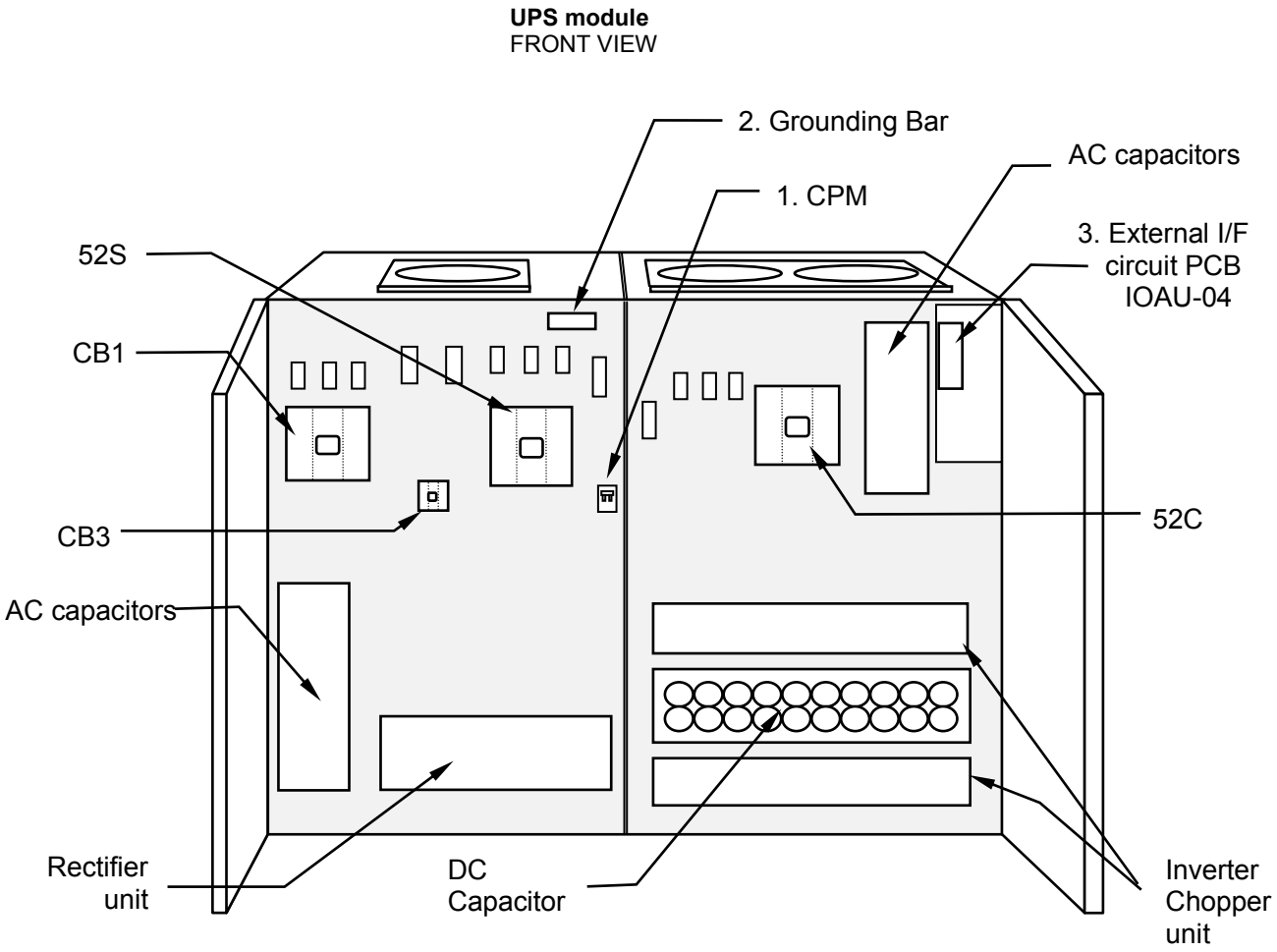


FIGURE 1.4.d UPS Parts Location (625kVA, 750kVA)

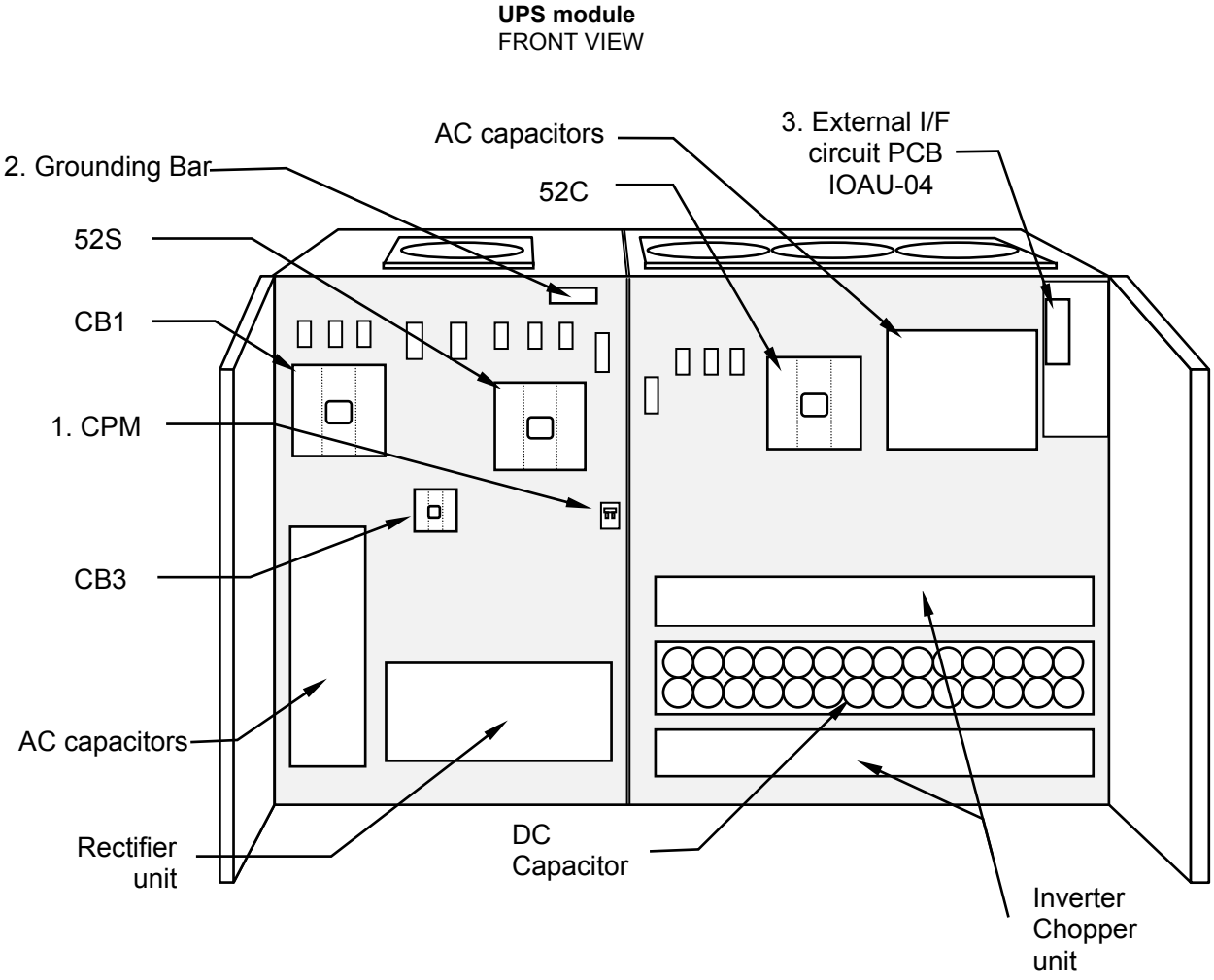


FIGURE 1.5 UPS Parts Location (Continued)

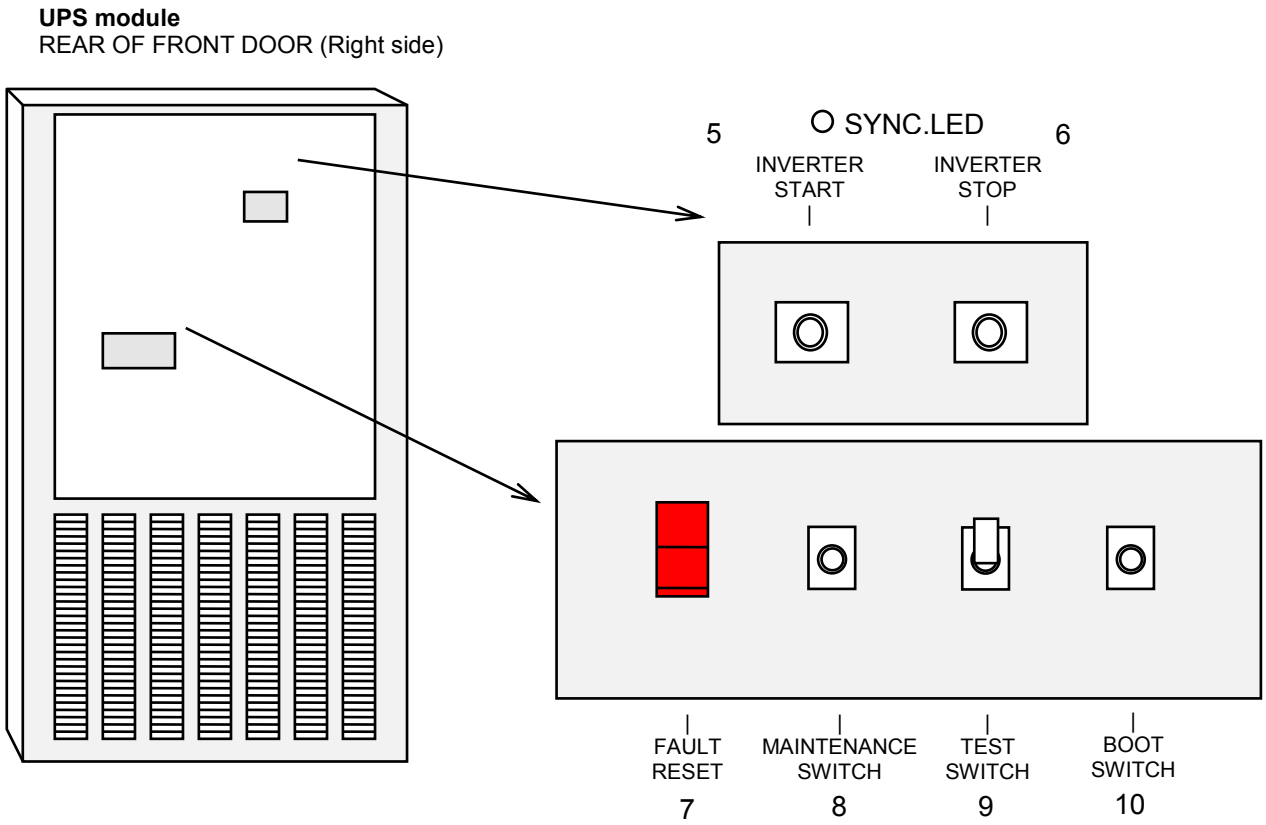
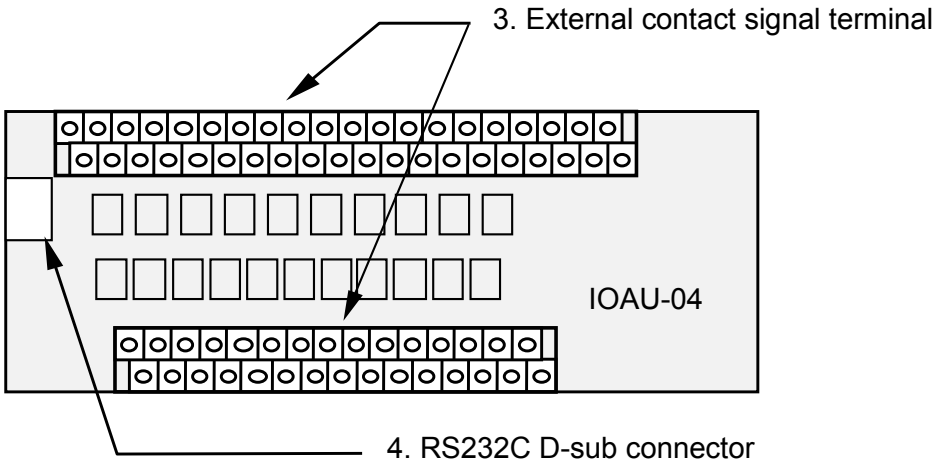


FIGURE 1.6 External I/F circuit PCB IOAU-04



Description of Figures 1.4, 1.5, and 1.6:

1. **CPM** - Circuit protector for control power supply.
2. **Grounding bar (G)**
3. **External contact signal terminal block** (FIGURE 1.6) **-** Terminal block to connect contact signal input/output lines to and from the external devices. Refer to Figure 2.15, Section 2.4 for details.
4. **RS232C communication connector** (FIGURE 1.6) **-** Refer to Figure 2.18 Section 2.5 for details.
5. **Inverter start switch -** This switch is used to transfer the UPS from static bypass to inverter during maintenance purposes. Transfers will lock-out if the bypass voltage is more than +12%,-12% of nominal.

   ** Uninterrupted switching is made at the time of synchronous operation. Switching is impossible at the time of asynchronous operation.*
6. **"INVERTER STOP" switch** - This switch is used to transfer the UPS from inverter to static bypass during maintenance purposes. Do not operate it under normal operation. Transfers will lock-out if the bypass voltage is more than +12%,-12% of nominal.

   ** Uninterrupted switching is made at the time of synchronous operation. Switching is impossible at the time of asynchronous operation.*
7. **"FAULT RESET" switch (FOR SERVICE PERSONNEL ONLY) -** This switch resets errors resulting from alarm conditions. (Do not operate this switch while inverter and converter are in operation.)
8. **Maintenance (Set) button (FOR SERVICE PERSONNEL ONLY) -** This switch sets the UPS menu parameters.
9. **"Test mode" switch (FOR SERVICE PERSONNEL ONLY) -** This switch changes system operation to the test-mode. (This switch should not be operated by personnel other than an Authorized Service Engineer).
10. **"BOOT" switch (FOR SERVICE PERSONNEL ONLY)** - This switch reloads firmware to the main board. (Do not operate this switch while inverter and converter are in operation).

1.5 Specifications

The UPS name plate displays the rated kVA as well as nominal voltages and currents. The name plate is located on the inside of the UPS front door.

TABLE 1.3 Power Specifications

Rated output Power	Input voltage 3 phase / 3 wire	Bypass input voltage 3 phase / 4 wire	Output voltage 3 phase / 3 or 4 wire
100kVA / 80kW	480V or 600V	480V or 600V	480V or 600V
150kVA / 120kW	480V or 600V	480V or 600V	480V or 600V
225kVA / 180kW	480V or 600V	480V or 600V	480V or 600V
300kVA / 270kW	480V or 600V	480V or 600V	480V or 600V
375kVA / 338kW	480V or 600V	480V or 600V	480V or 600V
500kVA / 450kW	480V or 600V	480V or 600V	480V or 600V
625kVA / 562.5kVA	480V or 600V	480V or 600V	480V or 600V
750kVA / 675kW	480V or 600V	480V or 600V	480V or 600V

TABLE 1.4 UPS Module Information

a) Cabinet Dimensions

UPS [kVA]	Cable Knockout	Width [in / mm]	Depth [in / mm]	Height [in / mm]	Weight [lb./ kg]	Heating [BTU / h]
100	BOTTOM	43.3 / 1100	29.8 / 758	79.7 / 2025	2061 / 935	18,353
150	BOTTOM	47.2 / 1200	29.8 / 758	79.7 / 2025	2579 / 1170	28,465
225	BOTTOM	55.1 / 1400	29.8 / 758	79.7 / 2025	3263 / 1480	44,105
300	TOP	76.8 / 1950	37.7 / 958	79.7 / 2025	4564 / 2070	60,894
375	TOP	76.8 / 1950	37.7 / 958	79.7 / 2025	4916 / 2230	76,117
500	TOP	114.2 / 2900	37.7 / 958	79.7 / 2025	6293 / 3140	96,271
625	TOP	129.9 / 3300	49.5 / 1258	79.7 / 2025	9193 / 4170	120,339
750	TOP	129.9 / 3300	49.5 / 1258	79.7 / 2025	9193 / 4170	144,407

b) Packing Dimensions

UPS [kVA]	Width [in / mm]	Depth [in / mm]	Height [in / mm]	Shipping Wt [lb./ kg]
100	43.3 / 1100	37 / 940	87.0 / 2200	2205 / 1000
150	47.2 / 1200	37 / 940	87.0 / 2200	2734 / 1240
225	55.1 / 1400	37 / 940	87.0 / 2200	3472 / 1575
300	76.8 / 1950	45.3 / 1150	87.4 / 2220	4916 / 2230
375	76.8 / 1950	45.3 / 1150	87.4 / 2220	5269 / 2390
500*	58.3 / 1480 70.1 / 1780	45.3 / 1150 45.3 / 1150	87.4 / 2220 87.4 / 2220	2833 / 1285 4663 / 2115
625*	58.3 / 1480 86.2 / 2190	57.1 / 1450 57.1 / 1450	87.4 / 2220 87.4 / 2220	3527 / 1600 6427 / 2915
750*	58.3 / 1480 86.2 / 2190	57.1 / 1450 57.1 / 1450	87.4 / 2220 87.4 / 2220	3527 / 1600 6427 / 2915

* These units are shipped in two sections.

TABLE 1.5 Detail of Specifications

Rated Output kVA	100	150	225	300	375	500	625	750
Rated Output kW	80	120	180	270	337.5	450	562.5	675
AC INPUT								
Configuration	3 Phase, 3 Wire							
Voltage	480 V (600 V Optional) +15% to -15%							
Power Factor	>0.98 Lagging							
Input kVA	87	131	197	294	367	488	610	732
Max Input kVA	93	140	211	312	391	519	654	776
Input Current (with charging)	105 A (112 A)	158 A (169 A)	237 A (254 A)	353 A (376 A)	442A (470 A)	587 A (624 A)	734 A (787 A)	880 A (934 A)
Input Current Limiter	110% Input Current							
Current THD	6% max. at 100% load; 9% max. at 50% load							
Frequency	60 Hz +/-5%							
DSP Sampling Freq.	30 kHz							
Walk-in	5 to 30 seconds (Selectable in 1 sec. Increments)							
Conv. Start-up Delay	0 to 3600 sec. (Selectable in 1 sec. Increments)							
STATIC BYPASS INPUT								
Configuration	3 Phase, 4 Wire							
Voltage	480/277 V (600/346 V Optional) +/-10%							
Frequency	60 Hz							
Bypass Overload Capacity	1000% for 1 cycle			500% for 1 cycle				
BATTERY								
Type	Lead Acid (VRLA or Flooded)							
Number of Cells	240							
Nominal Voltage	480 Vdc							
Minimum Voltage	400.8 Vdc							
Float Voltage	545 Vdc							
DC Ripple Current	5.8 A	8.7 A	11 A	19.5 A	24.3 A	28.9 A	32.4 A	38.9 A
Ripple Current as percent of Full Load	2.7%	2.7%	2.3%	2.7%	2.7%	2.4%	2.2%	2.2%
Max DC Charging Current	13 A	19.5 A	29.3 A	39 A	48.75A	65 A	92.5 A	92.5 A
Max Discharge	215 A	322A	483A	720A	900A	1194A	1493A	1791A
Battery Capacity for Full Load Output	86 kWB	129 kWB	194 kWB	289 kWB	361 kWB	479 kWB	598 kWB	718 kWB
Ride Through	Application Specific							
AC OUTPUT								
Configuration	3 Phase, 4 Wire							
Voltage	480/277 V (600/346 V Optional)							
Voltage Regulation	+/-1% for 100% Balanced Loads							
Voltage Adjustment Range	+/- 5% (Selectable in Increments of 1 V)							
Voltage Unbalance	+/-1% for 100% Unbalanced Loads							
Frequency	60 Hz							
Frequency Synchronous Range	+/- 5% (Selectable in 1% Increments)							
Frequency Stability	+/-0.05% in Free-running Mode							
Frequency Slew Rate	1 -10 Hz/sec (Selectable in 1 Hz/sec. Increments)							
Phase Displacement	+/- 1° for 100% Balanced Loads +/- 3° for 100% Unbalanced Loads							
Power Factor	0.8 lagging			0.9 lagging				
Power Factor range	0.8 to 1.0 lagging (within output kW rating)							
Output Current	120 A	180 A	271 A	361 A	451 A	601 A	752 A	902 A

Voltage THD	2% maximum THD at 100% Linear Load 5% maximum THD at 100% Non-Linear Load
Transient Response	+/-2% maximum at 100% load step +/-1% maximum at Loss/Return of AC power +/-5% maximum at Load Transfer to/from Static Bypass
Transient Recovery	Less than 16.7 ms
Overload Capacity	125% for 10 minutes; 150% for 1 minute
Output Current Limit	150% Full Load Current
Crest Factor	2.3
Withstand Rating	65kA (with optional fuse)
Reliability	3,000,000 Hr. with Bypass/ 140,000 without Bypass

ENVIRONMENTAL								
Cooling	Forced Air							
Operating Temperature	32° F to 104° F (0° C to 40° C). Recommended : 68° F to 86° F (20° C to 30° C)							
Relative Humidity	5% – 95% Non Condensing							
Heat Rejection (kBTU/h)	18,353	28,465	44,105	60,894	76,117	96,271	120,339	144,407
Efficiency (AC-AC)	93.7%	93.5%	93.3%	93.8%	93.8%	94.1%	94.1%	94.1%
Audible Noise	68 dB @ 1m	72 dB @ 1m	76 dB @ 1m	78 dB @ 1m			80 dB @ 1m	
Altitude	0 to 9000 feet (No Derating)							
Location	Indoor (free from corrosive gases and dust)							
Enclosure	NEMA 1							
Paint Color	Munsell 2.8Y7.7/0.3 (Mist White)							
Standards	UL1778; CUL22.2, No. 107.1; ANSI C62.41 (IEEE 587 Cat B); NFPA 70, OSHA, ISO9001,							

Typical UPS AC-AC Efficiencies at Various Loads

UPS	25% Load	50% Load	75% Load	100% Load
100 kVA	90.6%	93.5%	93.8%	93.7%
150 kVA	91.2%	93.3%	93.8%	93.5%
225 kVA	90.0%	92.7%	93.4%	93.3%
300 kVA	89.2%	92.9%	93.6%	93.8%
375 kVA	89.2%	92.9%	93.5%	93.8%
500 kVA	91.0%	93.7%	94.3%	94.1%
625 kVA	91.5%	93.5%	93.8%	94.1%
750 kVA	91.5%	93.5%	93.8%	94.1%

TABLE 1.6 Rating of Contactors and Fuses

	NUMBER	APPLICATION	OUTPUT CAPACITY OF EQUIPMENT															
			100kVA		150kVA		225kVA		300kVA		375kVA		500kVA		625kVA		750kVA	
			480V	600V	480V	600V	480V	600V	480V	600V	480V	600V	480V	600V	480V	600V	480V	600V
Contactor, Breaker	CB1	AC input contactor	135A		200A		350A		450A		660A		660A		910A			
	CB2	Battery disconnect breaker	225		350A		500A		800A		900A		1200A		1600A		2000	
	CB3	STS contactor	135A												260A			
	52C	Inverter output contactor	135A		200A		350A		450A		450A		660A		910A			
	52S	Bypass contactor	135A		200A		350A		450A		450A		660A		910A			
	88RC	Control circuit contactor	90A															
Fuses	FCU, FCV, FCW	AC input fuse	200A-690V		250A-690V						315A-690V							
	FDU,FDV,FDW FDX,FDY,FDZ FDP,FDN	DC arm fuse	450A-690V		450A-690V		630A-690V		900A-550V		900A-550V		630A-690V		900A-550V			
	FUA, FUB, FUC	Control power fuse	30A-600V															
	(OPTION) FSU, FSV, FSW	Bypass input fuse	200A-690V	-	315A-690V	-	250A-690V	-	250A-690V	-	315A-690V	-	315A-690V	-	315A-690V	-	315A-690V	-
	FZS1, 2, 3	Bypass input ZNR fuse	5A- 500V															
	FBS1, 2, 3	Control power fuse	10A-600V															
	FZR1, 2, 3	AC input ZNR fuse	5A- 500V															
	FPU, FPV, FPW	Parallel control circuit fuse	3A- 600V															

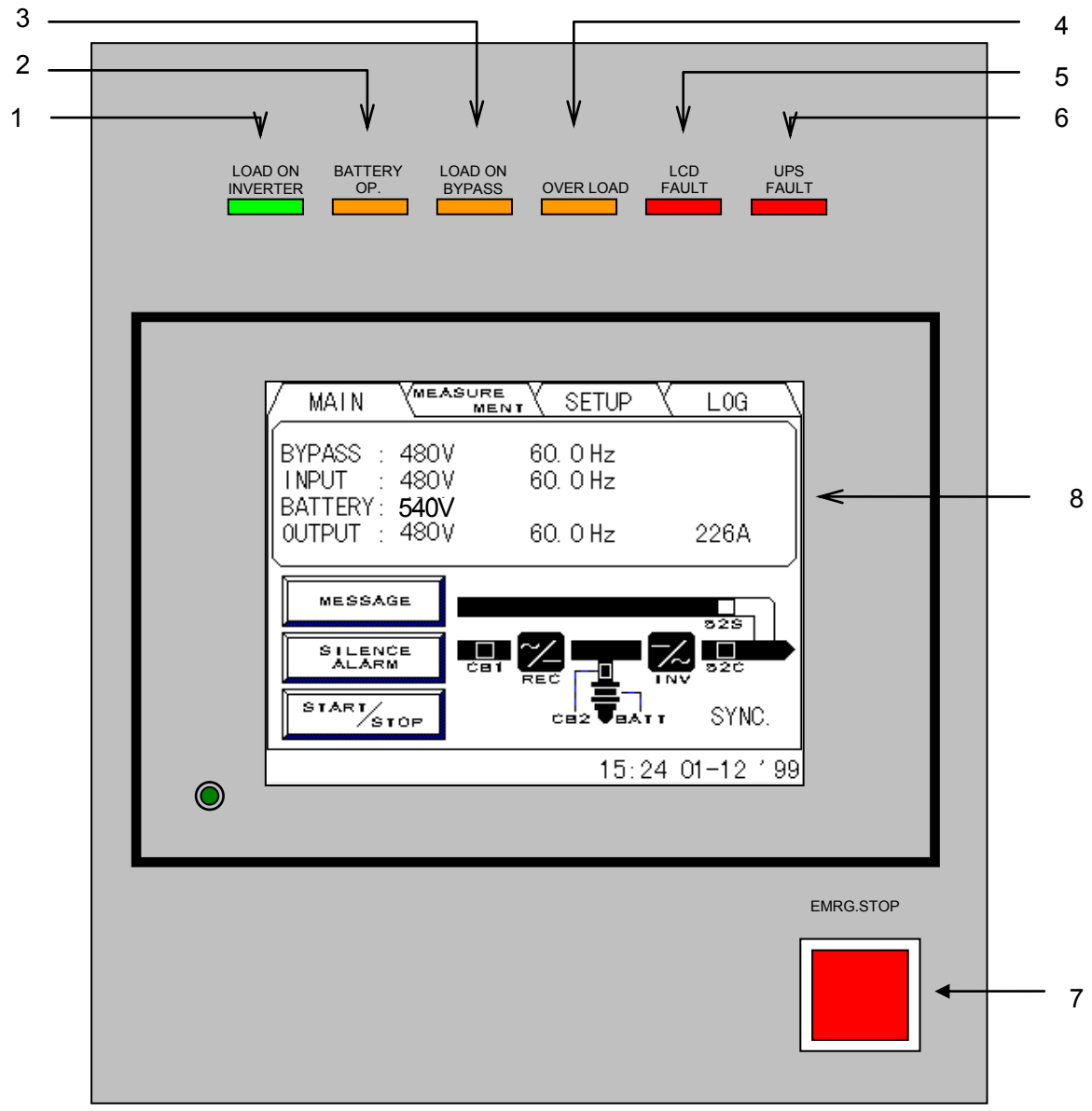
**Rating would be changed.*

2 OPERATOR CONTROLS AND INDICATORS

The G8000MM Series operator controls and indicators are located as follows:

Circuit breakers and contactors:	Inside the module
UPS status indicators:	Outside of front door

FIGURE 2.1 Operation/Display Panel (Front panel)



2.1 LED Display

1) **Load on inverter [LOAD ON INVERTER](green)**
   Illuminates when power is supplied from inverter to the critical load.
   (Indicates the state of inverter transfer switch "52C".)
2) **Battery operation [BATTERY OP.](orange)**
   Illuminates when power is supplied from batteries following a power failure.
3) **Load on bypass [LOAD ON BYPASS](orange)**
   Illuminates when power is supplied to load devices by static bypass.
   (Indicates the state of bypass transfer switch "52S".)
4) **Overload [OVERLOAD](orange)**
   Illuminates in overload condition.
5) **LCD fault [LCD FAULT](red)**
   Illuminates when an error occurs.
6) **UPS fault [UPS FAULT](red) [Annunciator: intermittent or constant tones]**
   Illuminates when an error occurs in the system. In this case, the details of the error are indicated on the display panel.

2.2 EPO button (Emergency Power Off button) (7)

When activated, the Emergency Power Off (EPO) function shuts down the UPS module. The critical load will lose power and also shutdown. The EPO function can be performed both locally or remotely.

2.3 Liquid Crystal Display (8)

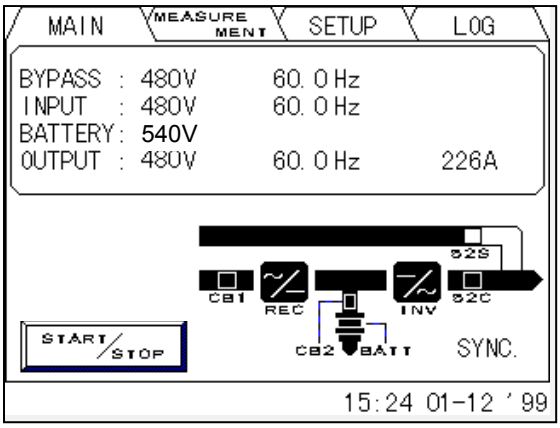
The Liquid Crystal Display (LCD) panel indicates power flow, measured values, operational guidance, data records and error messages. The LCD panel has a back-light which facilitates viewing in different ambient lighting conditions. The LCD will automatically clear and turn off, if the screen is not activated within 3 minute period. The LCD is turned back on when it is touched again. The LCD Display ERROR indicator is cleared after 24 hours and can be reproduced by pressing any key on the panel.

2.3.1 Menu

A) MAIN MENU (FIGURE 2.2)

The LCD panel indicates power flow and measured values, while also operating the start/stop function. The LCD panel also allows the user to verify the status and operation of the UPS Module.

FIGURE 2.2 Main screen



The following will be displayed when the START/STOP key on the LCD panel is pressed:

1) Start/Stop screen (FIGURE 2.3)

The display indicates the start and stop operations for the UPS system. If this operation is PIN protected, the user is required to enter the security PIN before the screen can be accessed. Refer to (FIGURE 2.4).

When in remote mode, the message “REMOTE operating model” will appear on this Screen. The user cannot operate the start and stop functions without changing the setup from remote mode to local mode.

When bypass voltage is abnormal, the message “Bypass voltage abnormal” will appear.

-Start: When the bypass voltage is abnormal, the LCD asks the operator if an interrupted transfer is acceptable (Load may be lost). (FIGURE 2.5)

-Stop: When the bypass voltage is abnormal, the user cannot transfer from inverter to bypass line.

FIGURE 2.3 Start/Stop screen

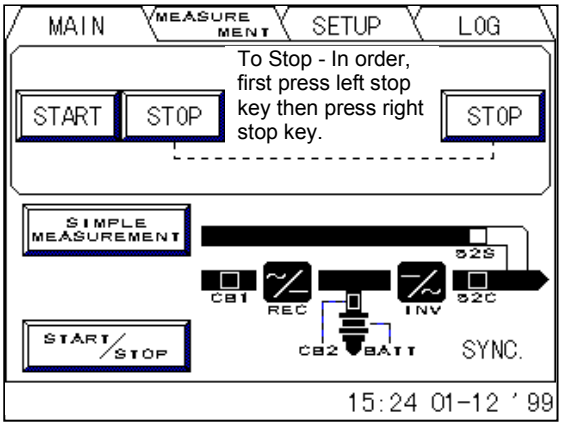


FIGURE 2.4 PIN protection screen

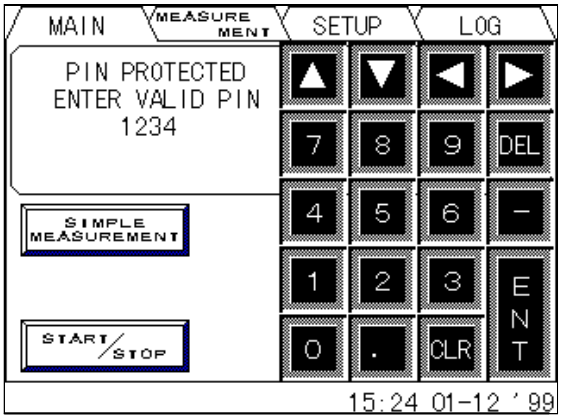
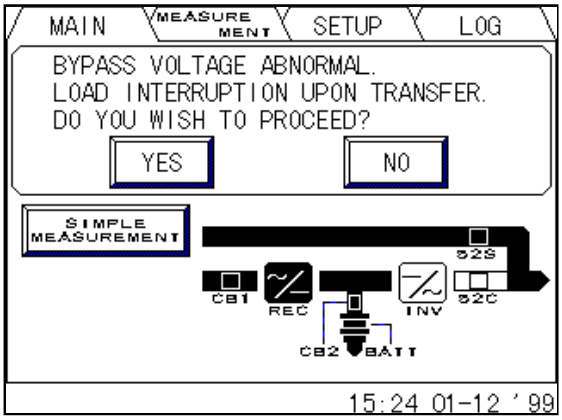


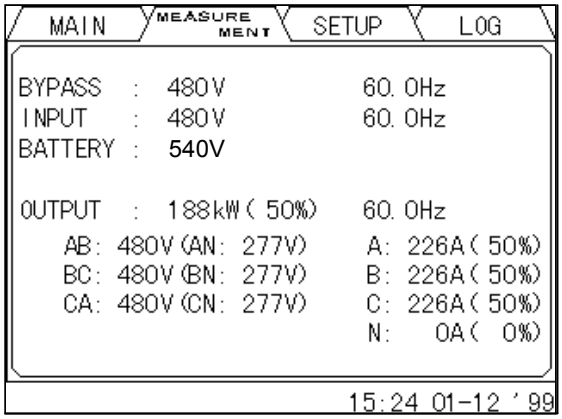
FIGURE 2.5 Bypass voltage abnormal message screen



B) MEASUREMENT MENU (FIGURE 2.6)

This screen shows details of measured values. Bypass voltage, input voltage, output line to line voltage and output frequency are displayed. Output currents are displayed as RMS values.

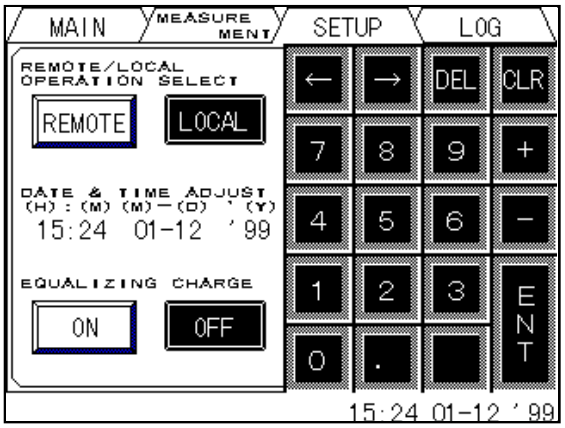
FIGURE 2.6 Measurement screen



C) SETUP MENU (FIGURE 2.7)

This screen prompts the user to select: (a) whether the start & stop operation will be performed by local or remote operation; (b) date & time adjustment; (c) battery equalizing charge. The battery equalizing charge operation key will appear when battery equalizing charge is set up (Setup is based on battery type).

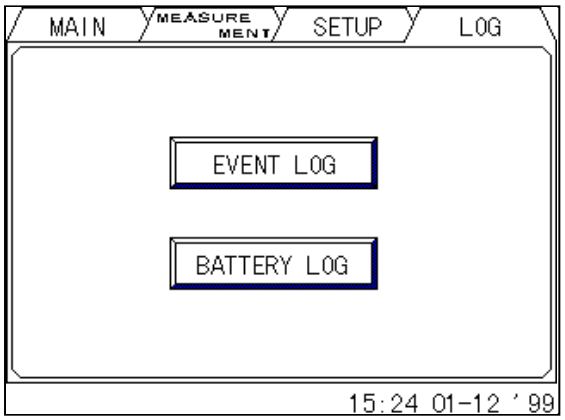
FIGURE 2.7 Setup screen



D) LOG MENU (FIGURE 2.8)

This menu shows operation / failure and battery discharge records.

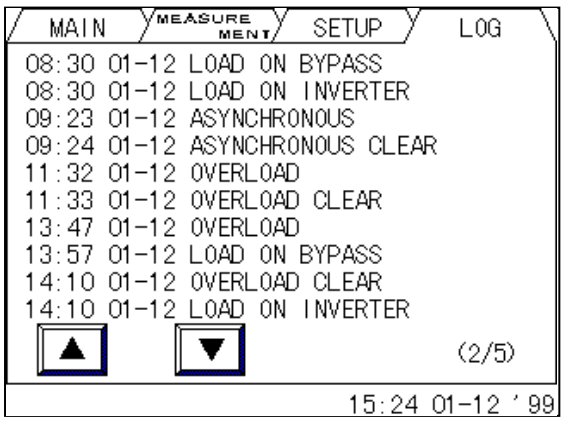
FIGURE 2.8 Log select screen



1.) Event log (FIGURE 2.9)

Operation and failure records are indicated. Maximum of 50 events are displayed.

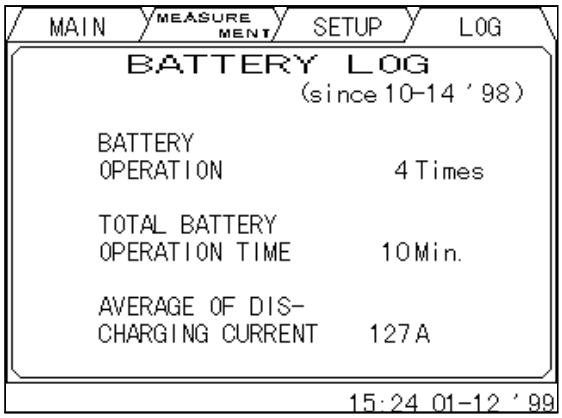
FIGURE 2.9 Event log screen



2.) Battery log (FIGURE 2.10)

This screen displays the cumulative battery discharging record.

FIGURE 2.10 Battery log screen



2.3.2 INPUT POWER FAILURE

During an Input Power Failure, the UPS inverter will be powered by the UPS batteries. The following will be displayed on the main and measurement screen (Indication of battery operation and remaining battery life).

FIGURE 2.11 Main screen (Battery operation)

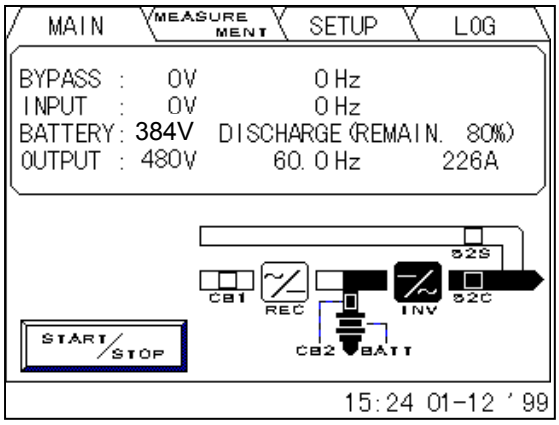
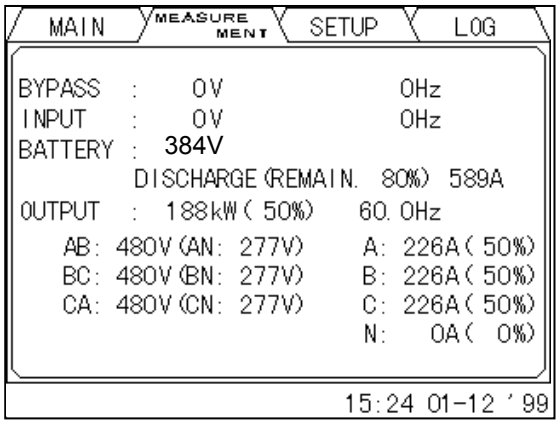


FIGURE 2.12 Measurement screen (Battery operation)

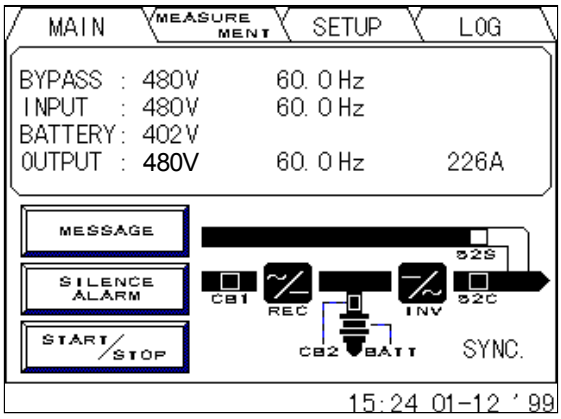


The LCD will display a battery low voltage message when the battery capacity is near depletion. The End of Battery Discharge announcement is displayed when the battery end voltage is reached. At this time, the inverter will perform an electronic shutdown to prevent battery loss of life typical from extreme deep discharge conditions. When the input power is restored, the inverter will automatically restart to power the load, and the batteries will be simultaneously recharged. The End of Battery announcement is shown at the bottom of the screen.

2.3.3 FAULT INDICATION (FIGURE 2.13)

"MESSAGE" and "SILENCE ALARM" buttons will appear on the main menu when UPS failure condition has occurred.

FIGURE 2.13 Main screen (Fault indication)

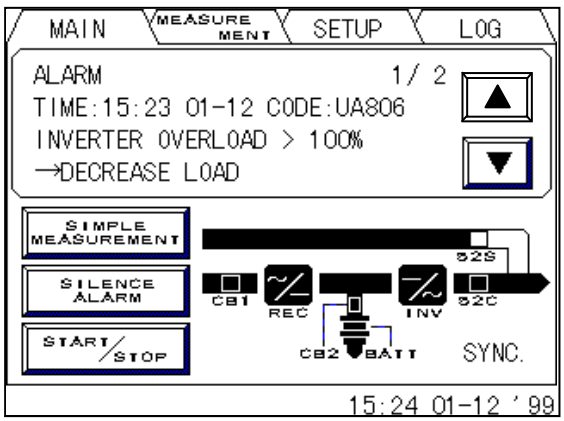


The following will be displayed when the message key on the LCD panel is pressed.

1) Message (FIGURE 2.14)

The display shows a fault code, the description of the fault and a guidance of what action is to be taken by the user. A maximum of 10 faults is displayed at one time. If an input power failure occurs during a fault condition, the fault indication and input power failure announcement are alternatively displayed at 5 second intervals.

FIGURE 2.14 Message screen



2) Silence alarm

This key will appear when a failure occurs. The audible alarm (announcing the failure) can be silenced by pressing this key.

2.4 External Signal Terminal Block

The UPS is equipped with a series of input/output terminals for external annunciation of alarms and for remote access of certain UPS functions. The layout of terminals is shown in Figure 2.15. with a functional description of the input/output port presented. OUT1 to OUT6 are user programmable, but are factory default set being also shown in Figure 2.15.

FIGURE 2.15.a External Signal Terminal Block (NEC Class2)

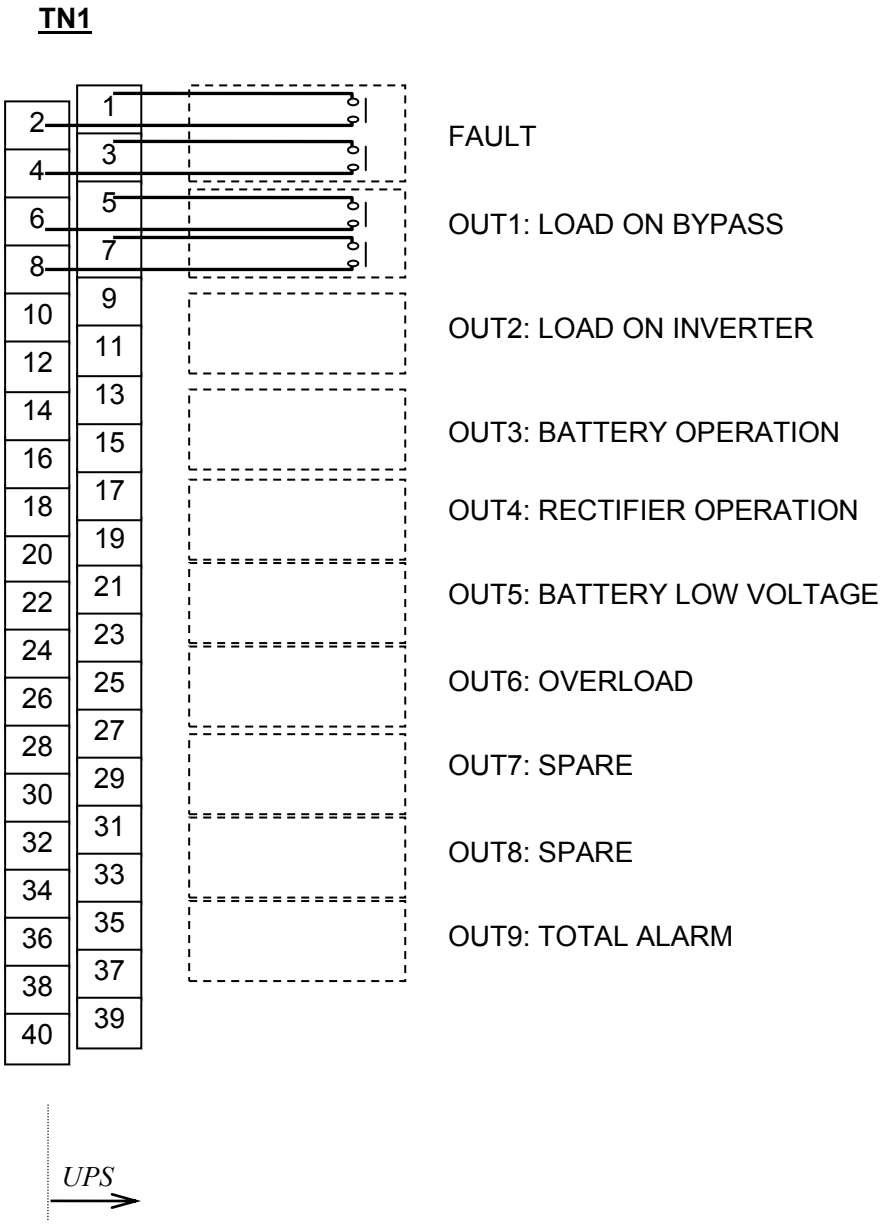
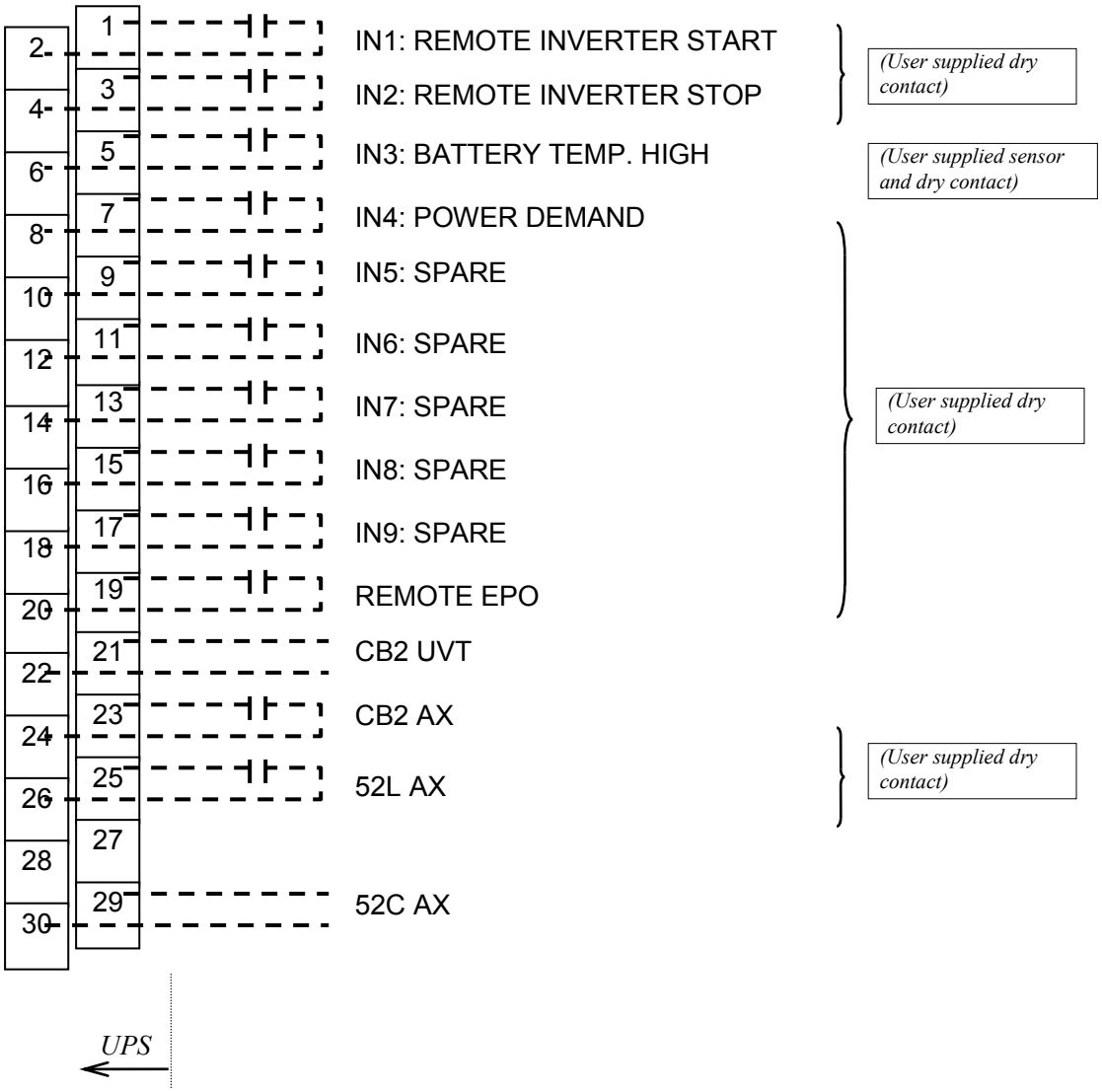


FIGURE 2.15.b External Signal Terminal Block (NEC Class2)

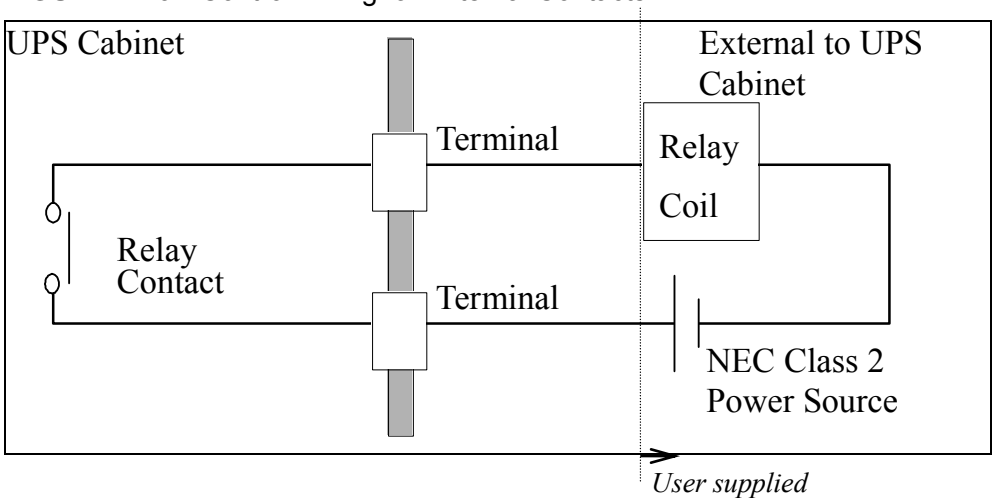
TN2



A) Output Contacts (for external alarm annunciation)

Output contacts consist of form "A" dry type contacts. Rated capacity of all output contacts is NEC Class2 (30Vdc/1Adc). All dry contacts should be operated at their rated values or lower. Figure 2.16 illustrates a typical installation. The external relay can also be a lamp, LED, computer, etc.

FIGURE 2.16 Control Wiring for External Contacts



Details of output alarm contacts : TN1

Terminals 1 to 2, 3 to 4 **"UPS failure" contact**
Activated when a major fault has occurred with the system.

Terminals 5 to 6, 7 to 8 **"Load on Bypass" contact (OUT1)**
Activated when the power is supplied from the static bypass input.

Terminals 9 to 10, 11 to 12 **"Load on Inverter" contact (OUT2)**
Activated when the power is supplied by the inverter.

Terminals 13 to 14, 15 to 16 **"Battery Operation" contact (OUT3)**
Activated when the battery is operating following an AC power failure.

Terminals 17 to 18, 19 to 20 **"Rectifier Operation" contact (OUT4)**
Activated when the rectifier is operating.

Terminals 21 to 22, 23 to 24 **"Battery Low Voltage" contact (OUT5)**
Activated when the battery voltage drops below discharge end voltage level during inverter operation (i.e. During AC fail condition).

Terminals 25 to 26, 27 to 28 **"Overload" contact (OUT6)**
Activated when an overload has occurred to the system.

Terminals 29 through 36 **"Spare" contact (OUT7 through OUT8)**

Terminals 37 to 38, 39 to 40 **"Total Alarm" contact (OUT9)**
Activated when an alarm has output to the system.

NOTE

The UPS is equipped with a selectable output contact feature.
The above alarms are the default settings.
Contact Toshiba International Corporation for setup information.

B) Input Contacts (for remote access of UPS)

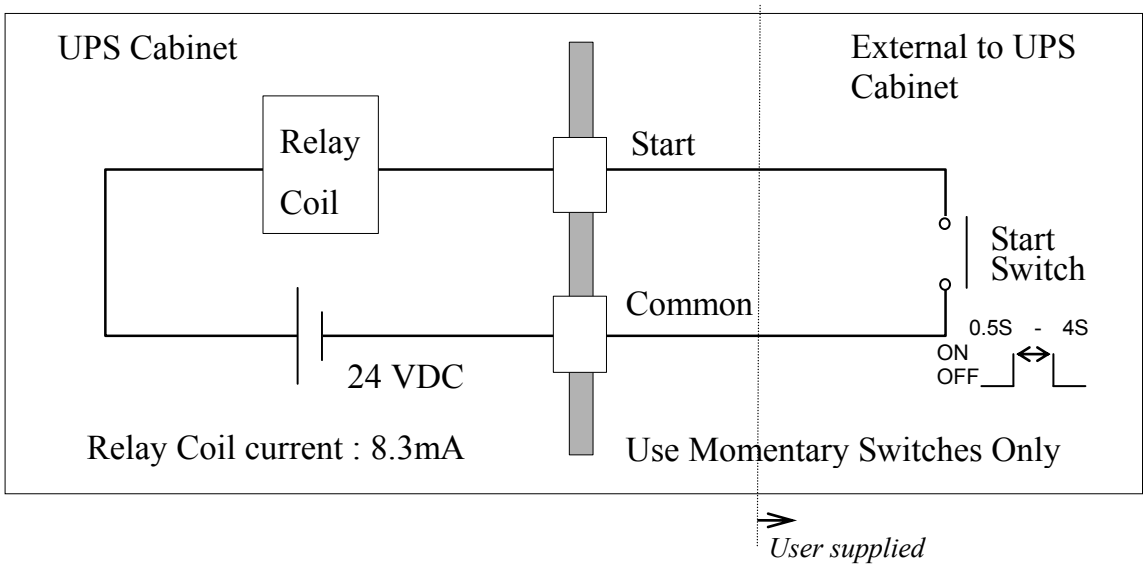
External contacts are provided by the user of the UPS system. Terminal voltage at the UPS is 24Vdc. Provide external dry contact accordingly.

CAUTION

Do not apply voltages to remote access input terminals.
Damage to UPS may result.

Refer to Figure 2.17 for a typical wiring configuration. Although this figure applies to the remote start/stop terminals, the same wiring arrangement is used for emergency stop; battery liquid low; and battery temperature high.

FIGURE 2.17 Remote "Start" Contact Connections



Details of input contacts for remote access : TN2

Terminals 1 to 2 **Remote "Inverter Start" input terminal (IN1)**

Used to start inverter from a remote location. UPS must be programmed for remote operation. Refer to Operations Menu for procedure.

Terminals 3 to 4 **Remote "Inverter Stop" input terminal (IN2)**

Used to stop inverter from a remote location. UPS must be programmed for remote operation. Refer to Operations Menu for procedure.

Terminals 5 to 6 **"Battery Temp. High" contact input (IN3)**

Input fed by a thermocouple that monitors battery temperature. The converter float voltage level is reduced for battery over-temperature conditions. External thermocouple is user supplied

Terminals 7 to 8 **"Power Demand Command" contact input (IN4)**

This contact is used to control the input power. Power demand is turned ON when the contact is closed, and power demand is turned OFF when the contact is open.

Terminals 9 to 18 **"Spare" contact input (IN5 through IN9)**

Terminals 19 to 20 **"Remote EPO" contact input**

Used to perform a remote UPS Emergency Power Off (EPO).

The load will be dropped.

NOTE

The UPS is equipped with a selectable output contact item.
The above items are the default settings.
Contact Toshiba International Corporation for setup information.

CAUTION

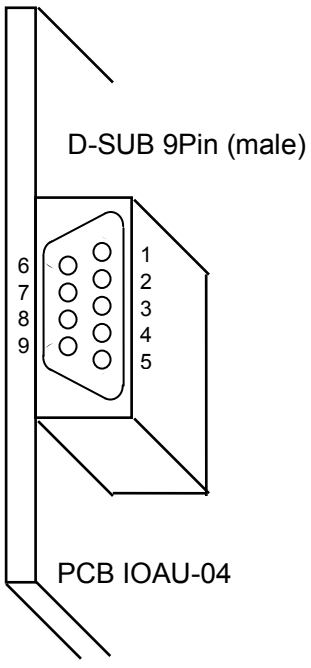
In all cases, a switch having a protective cover is recommended in order to reduce the possibility of accidental operation.

2.5 External communication connector

This is an RS232C port for "RemotEyeII"* monitoring software.

The layout of connector is shown in Figure 2.18.

FIGURE 2.18 External communication connector (NEC Class2)



Pin 1. : Not used
Pin 2. RXD : Receive data
Pin 3. TXD : Transmit data
Pin 4. : Not used
Pin 5. GND : Signal ground
Pin 6. : Not used
Pin 7. : Not used
Pin 8. : Not used
Pin 9. : Not used

** Consult Toshiba International Corporation for details on "RemotEyeII" monitoring software and its capabilities.*

3 INSTALLATION AND OPERATION

3.1 Transportation and Installation

TABLE 3.1 How to transport and install the system

Transportation	Installation
Transport unit with forklift. Carry with overhead crane using eyebolts provided.	Using the pre-drilled holes (4 - 24) in the UPS channel base, anchor the unit using appropriate hardware. (Not provided)

CAUTION

Do not transport in a horizontal position. Cabinets must be maintained upright within +/- 15° of the vertical during handling.

3.2 Installation Procedure

A) Note the load tolerance of the floor

Refer to Table 3.2 for list of UPS weights.

TABLE 3.2 List of UPS weights

UPS Capacity (kVA)	100	150	225	300	375	500	625	750
Weight (lb.)	2,061	2,579	3,263	4,564	4,916	6,923	9,193	9,193

B) Minimum clearance required for ventilation

Right side ..... 1 in. (25 mm) (not required when sidecars are used)
Left side ..... 1 in. (25 mm) (not required when sidecars are used)
Back side ..... 0.0 in. (0.0 mm)
Top side ..... 24 in. (600 mm) (for air flow)

C) Space requirement for routine maintenance

Allow for the following space at the time of installation.
Front ..... 40 in. (1000 mm) for 100kVA, 150kVA, 225kVA
43 in. (1075 mm) 300kVA, 375kVA, 500kVA, 625kVA, 750kVA
Sides ..... 0.0 in. (0.0 mm)
Rear ..... 0.0 in. (0.0 mm)

D) External Battery Supply

Please refer to the following when installing and maintaining batteries:

1. The customer shall refer to the battery manufacturer's installation manual for battery installation and maintenance instructions.
2. The maximum permitted fault current from the remote battery supply, and the DC voltage rating of the battery supply over-current protective device are shown in Table 3.3.

TABLE 3.3 Maximum Permitted Fault Current

UPS Capacity (kVA)	DC Voltage Rating (V)	Maximum Fault Current Permitted (A)
100	480	25,000
150	480	25,000
225	480	25,000
300	480	25,000
375	480	25,000
500	480	25,000
625	480	25,000
750	480	25,000

3.3 Procedure for Cable Connections *

1. Confirm the capacity of the UPS being installed. Identify the input/output power Terminal blocks as shown in the appropriate Figures 3.1 through 3.2-a~g, Figure 3.3.

2. Connect the internal control wire and power cables.

   (1) Control wire Inter-connect from DC Breaker Box to UPS.

      1. CB2 NO Auxiliary to terminal TN2- 23, 24.
      2. CB2-UVT to terminal TN2- 21, 22.

   (2) Power wire Inter-connect (600V Input Only) from input transformer to UPS.

      a.) From user's distribution panel.

      1. X1 (A-phase) to A (A phase) bus bar in UPS rectifier section.
      2. X2 (B-phase) to B (B phase) bus bar in UPS rectifier section.
      3. X3 (C-phase) to C (C phase) bus bar in UPS rectifier section.

   (3) Input cables from DC Breaker Box to UPS.

      1. Positive cable to BP bus bar in UPS rectifier section.
      2. Negative cable to BN bus bar in UPS rectifier section.

3. Connect the grounding conductor from the input service entrance to the UPS ground bar.
4.

5. Two (2) sources feeding the UPS:
   (1) Connect the rectifier input power cables from the input service entrance to the rectifier input power terminals, identified as A, B, C in Figures 3.2-a~g. Input cables must be sized for an ampere rating larger than the maximum input drawn by the rectifier. (Refer to equipment nameplate for current ratings.) Confirm that an external bypass input circuit breaker is installed (refer to WARNING 2, page 3). Connect the bypass input power cables from the input service entrance to the bypass input power terminals, identified as A40, B40, C40 and N40 in Figures 3.2-a~g. Bypass input cables must be sized for an ampere rating larger than the maximum output current capacity of the UPS. Refer to Table 3.4 for recomended cable sizes.

   (2) Connect the external signal terminal block as desired. Refer to Section 2.4 and Figure 2.15 for functional description. 14 AWG ($2mm^2$), or less, shielded conductor is recommended.

6. One (1) source feeding the UPS:
   (1) Confirm that an external input circuit breaker sized to protect both the rectifier input and the bypass line is installed. (Refer to equipment nameplate for current ratings.) Connect the bypass input power cables from the input service entrance to the bypass input power terminals, identified as A40, B40, C40 and N40 in Figures 3.2-a~g Input cables must be sized for an ampere rating larger than the maximum current capacity of the UPS. Refer to Table 3.4 for recommended cable sizes.

   (2) Using adequately sized conductors and referring to the appropriate figure identified in Figures 3.2-a~g, jumper bypass terminals A40, B40, and C40 to rectifier input power terminals A, B, and C respectively, as identified in Figures 3.2-a~g.

(3) Connect the external signal terminal block as desired. Refer to Section 2.4 and Figure 2.15 for functional description. 14 AWG (2mm^2), or less, shielded conductor is recommended.

1. ***Confirm that all UPS internal contactors (breakers) "CB1", "CB2", and "CB3" are open before energizing UPS.***
2. ***UPS power terminals are supplied with stud type fittings.***
   It is recommended that compression lugs be used to fasten all input/output power cables.

7. Procedure for Cable Connections for Parallel System

(1) Confirm the number of units to be connected in parallel. Identify the input/output power terminal blocks and control wire connections for parallel systems as shown in the appropriate Figures 3.4a~c.

(2) Connect the external control wire and power wire.

a.) Control wire connection

Parallel configuration Wiring (Refer to Figure 3.4a~c)

- Tie Cabinet TB1 to UPS-n IOAU-04,TN2.
- Parallel Control CN92, CN93, In, Out cables between UPS modules

b.) Power wire connection

From UPS AC Output Terminals to Tie Cabinet (Refer to Figure 3.4a~c)

TABLE 3.4 Recommended Cable Sizes (AWG or kcmil)

kVA Capacity	Input Voltage	Output Voltage	Input Side * 1, 2		Output Side * 1, 2		Bypass Side * 1, 2		DC Input Side * 1, 2	
			Cable Size	Torque in. lbs	Cable Size Phase (Neutral)	Torque in. lbs	CableSize Phase (Neutral)	Torque in. lbs	Cable Size	Torque in. lbs
100kVA	480V	480V	1/0 - 2/0	100 - 135 in. lbs	1/0 - 2/0 (250 – 300)	100 - 135 in. lbs	1/0 - 2/0 (250 – 300)	100 - 135 in. lbs	4/0 – 250	100 - 135 in. lbs
	600V	600V	#1 – 1/0	100 - 135 in. lbs	#1 – 1/0 (4/0 – 250)	100 - 135 in. lbs	#1 – 1/0 (4/0 – 250)	100 - 135 in. lbs	4/0 – 250	100 - 135 in. lbs
150kVA	480V	480V	4/0 - 250	100 - 135 in. lbs	4/0 – 250 ((2)x3/0 – (2)x4/0)	100 - 135 in. lbs	4/0 – 250 ((2)x3/0 – (2)x4/0)	100 - 135 in. lbs	(2)x2/0 – (2)x4/0	100 - 135 in. lbs
	600V	600V	3/0 - 4/0	100 - 135 in. lbs	3/0 - 4/0 (500 – (2)x3/0)	100 - 135 in. lbs	3/0 - 4/0 (500 – (2)x3/0)	100 - 135 in. lbs	(2)x2/0 – (2)x4/0	100 - 135 in. lbs
225kVA	480V	480V	500 – (2)x3/0	100 - 135 in. lbs	500 – (2)x3/0 ((2)x300 – (2)x350)	100 - 135 in. lbs	500 – (2)x3/0 ((2)x300 – (2)x350)	100 - 135 in. lbs	(2)x250 – (2)x350	100 - 135 in. lbs
	600V	600V	350 – (2)x2/0	100 - 135 in. lbs	350 – (2)x2/0 ((2)x300 – (2)x350)	100 - 135 in. lbs	350 – (2)x2/0 ((2)x300 – (2)x350	100 - 135 in. lbs	(2)x250 – (2)x350	100 - 135 in. lbs
300kVA	480V	480V	(2)x250 – (2)x300	347 - 469 in. lbs	(2)x250 – (2)x300 ((2)x500 – (3)x300)	347 - 469 in. lbs	(2)x250 – (2)x300 ((2)x500 – (3)x300)	347 - 469 in. lbs	(3)x250 – (3)x350	347 - 469 in. lbs
	600V	600V	(2)x3/0 – (2)x4/0	347 - 469 in. lbs	(2)x3/0 – (2)x4/0 ((2)x500 – (3)x250)	347 - 469 in. lbs	(2)x3/0 – (2)x4/0 ((2)x500 – (3)x250)	347 - 469 in. lbs	(3)x250 – (3)x350	347 - 469 in. lbs
375kVA	480V	480V	(3)x3/0 – (2)x350	347 - 469 in. lbs	(3)x3/0 – (2)x350 ((3)x350 – (3)x400)	347 - 469 in. lbs	(3)x3/0 – (2)x350 ((3)x350 – (3)x400)	347 - 469 in. lbs	(3)x350 – (4)x4/0	347 - 469 in. lbs
	600V	600V	(2)x250 – (2)x300	347 - 469 in. lbs	(2)x250 – (2)x300 ((3)x350 – (3)x400)	347 - 469 in. lbs	(2)x250 – (2)x300 ((3)x350 – (3)x400)	347 - 469 in. lbs	(3)x350 – (4)x4/0	347 - 469 in. lbs
500kVA	480V	480V	(3)x300 – (3)x350	347 - 469 in. lbs	(3)x300 – (3)x350 ((4)x350 – (4)x400)	347 - 469 in. lbs	(3)x300 – (3)x350 ((4)x350 – (4)x400)	347 - 469 in. lbs	(4)x350 – (4)x400	347 - 469 in. lbs
	600V	600V	(3)x2/0 – (3)x3/0	347 – 469 in. lbs	(3)x2/0 – (3)x3/0 ((4)x300 – (4)x350)	347 - 469 in. lbs	(3)x2/0 – (3)x3/0 ((4)x300 – (4)x350	347 - 469 in. lbs	(4)x350 – (4)x400	347 - 469 in. lbs
625kVA	480V	480V	(3)x400 – (3)x500	347 - 469 in. lbs	(3)x400 – (3)x500 ((4)x500 – (5)x350)	347 - 469 in. lbs	(3)x400 – (3)x500 ((4)x500 – (5)x350)	347 - 469 in. lbs	(5)x400 – (5)x500	347 - 469 in. lbs
	600V	600V	(3)x300 – (3)x350	347 - 469 in. lbs	(3)x300 – (3)x350 ((4)x500 – (5)x350)	347 - 469 in. lbs	(3)x300 – (3)x350 ((4)x500 – (5)x350)	347 - 469 in. lbs	(5)x400 – (5)x500	347 - 469 in. lbs
750kVA	480V	480V	(3)x600 – (4)x400	347 - 469 in. lbs	(3)x600 – (4)x400 ((5)x500 – (5)x600)	347 - 469 in. lbs	(3)x600 – (4)x400 ((5)x500 – (5)x600)	347 - 469 in. lbs	(6)x400 – (6)x500	347 - 469 in. lbs
	600V	600V	(3)x400 – (3)x500	347 - 469 in. lbs	(3)x400 – (3)x500 ((5)x500 – (6)x350)	347 - 469 in. lbs	(3)x400 – (3)x500 ((5)x500 – (6)x350)	347 - 469 in. lbs	(6)x400 – (6)x500	347 - 469 in. lbs

*1 - The cables must be selected appropriate to the specific installation parameters.
*2 - Voltage drop across power cables not to exceed 2% of nominal source voltage.
*3 - Allowable ampere-capacities based on 75 °C insulation at ambient temperature of 30 °C.
Not more than 3 conductors in conduit without de-rating.
Note: Copper conductors assumed.

TABLE 3.5 Crimp Type Compression Lug

WIRE SIZE (CODE)	WIRE STRAND CLASS	RECOMMENDATION		CRIMP TOOL REQUIRED BURNDY TYPE Y35 OR Y46	
		VENDOR	CAT. NO.	COLOR KEY	DIE INDEX
1	B	BURNDY	YA1C	GREEN	11 / 375
		ILSCO	CRA-1L	GREEN	11 / 375
	I	BURNDY	YA25-LB	---	1019
1/0	B	BURNDY	YA25	PINK	12 / 348
		ILSCO	CRA-1/OL	PINK	12 / 348
	I	BURNDY	YA25-LB	---	1020
2/0	B	BURNDY	YA26	BLACK	13
		ILSCO	CRA-2/OL	BLACK	13
	I	BURNDY	YA27-LB	---	1021
3/0	B	BURNDY	YA27	ORANGE	14 / 101
		ILSCO	CRB-3/OL	ORANGE	14 / 101
	I	BURNDY	YA28-LB	---	1022
4/0	B	BURNDY	YA28	PURPLE	15
		ILSCO	CRB-4/OL	PURPLE	15
	I	BURNDY	YA29-LB	---	1023
250 MCM	B	BURNDY	YA29	YELLOW	16
		ILSCO	CRA-250L	YELLOW	16
	I	BURNDY	YA30-LB	---	1024
300 MCM	B	BURNDY	YA30	WHITE	17 / 298
		ILSCO	CRA-300L	WHITE	17 / 298
	I	BURNDY	YA32-LB	---	1026
350 MCM	B	BURNDY	YA31	RED	18 / 324
		ILSCO	CRA-350L	RED	18 / 324
	I	BURNDY	YA34-LB	---	1027
400 MCM	B	BURNDY	YA32	BLUE	19 / 470
		ILSCO	CRA-400L	BLUE	19 / 470
	I	BURNDY	YA36-LB	---	1027
500 MCM	B	BURNDY	YA34	BROWN	20 / 299
		ILSCO	CRA-500L	BROWN	20 / 299
	I	BURNDY	YA38-LB	---	1029

NOTE: ***When using crimp type lugs, the lugs should be crimped to the specifications given in the manufacturer's instructions for both crimp tool and lug.***

FIGURE 3.1 UPS Terminal Designation

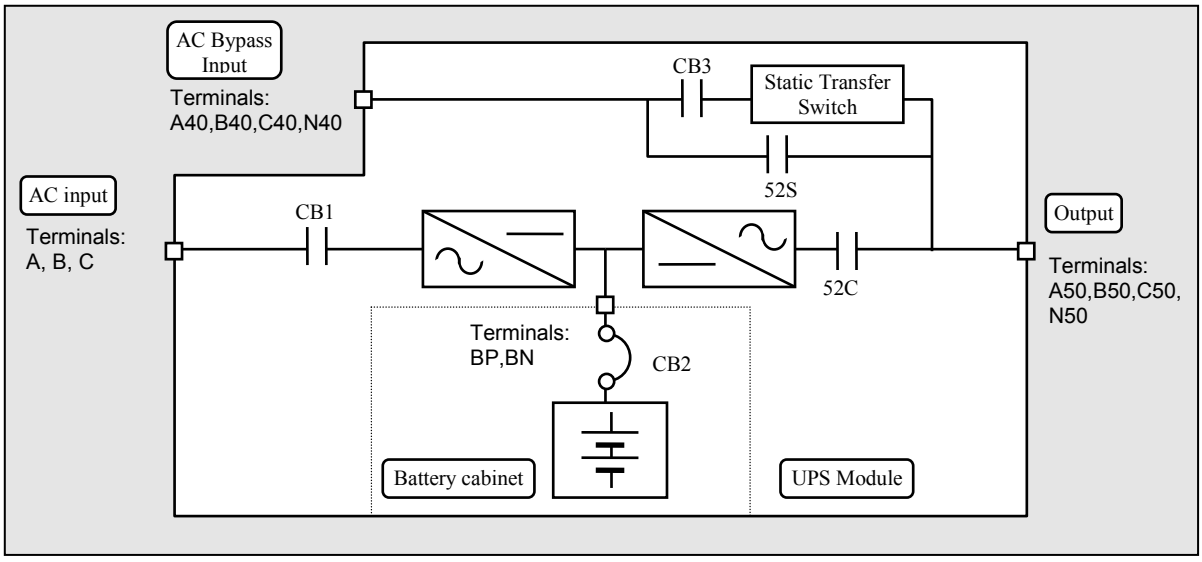


FIGURE 3.2.a.1 Diagram of input/output bus bars and terminal blocks (100kVA, 150kVA, 225kVA UPS, Input voltage 480Vac)

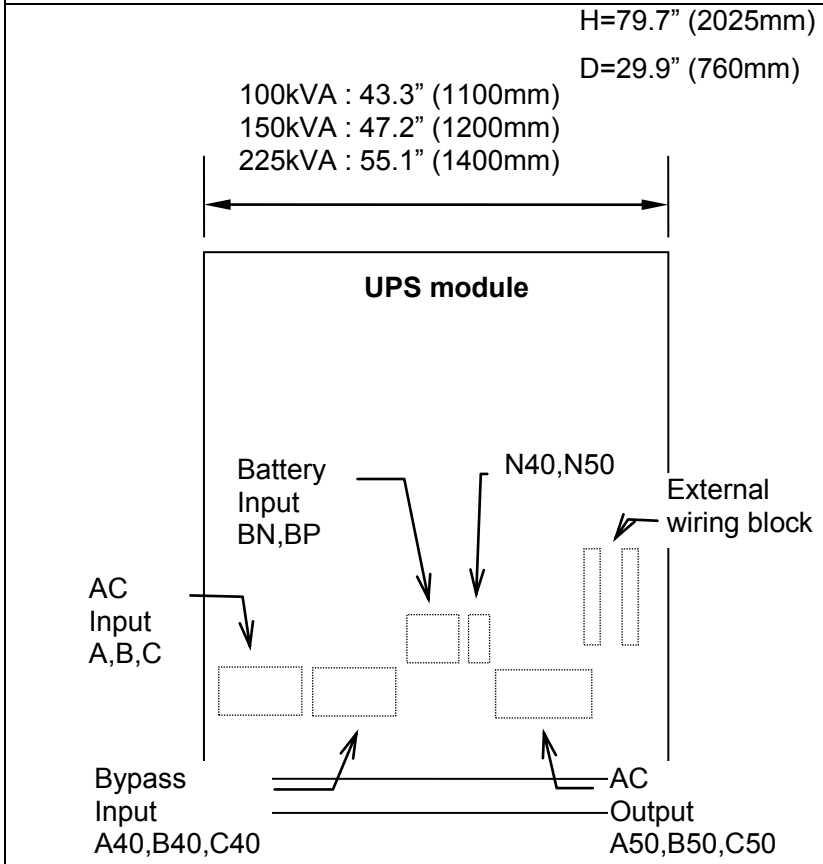
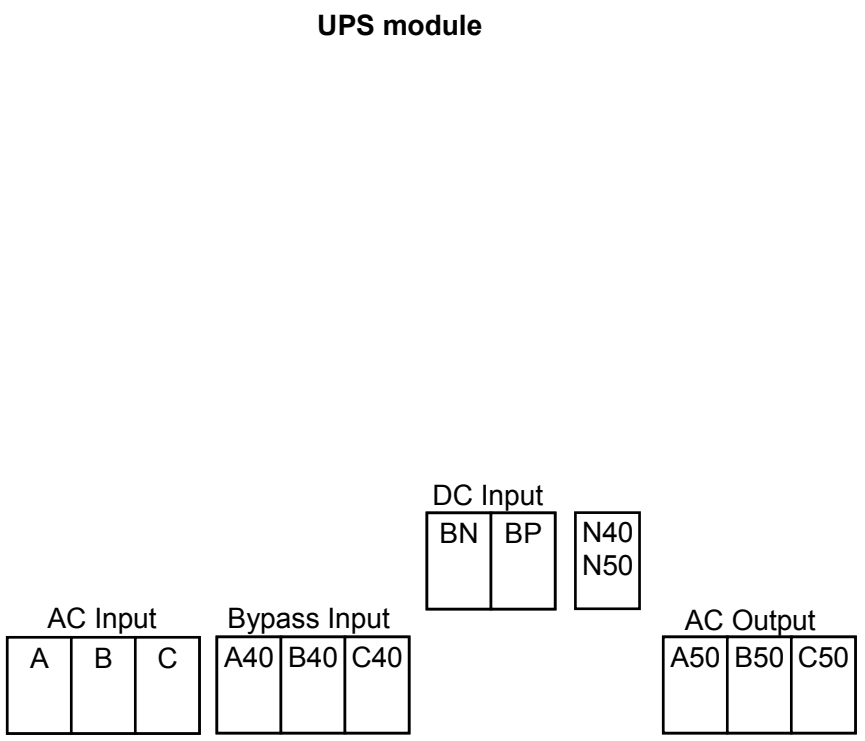
Location of bus bars and terminal blocks	Detailed Terminals
	For power terminals, use 5/16” (8mm) Diameter bolts. 

FIGURE 3.2.a.2 Diagram of Power Wire & Control Wire Inter-Connect (100kVA, 150kVA, 225kVA UPS, Input voltage 480Vac)

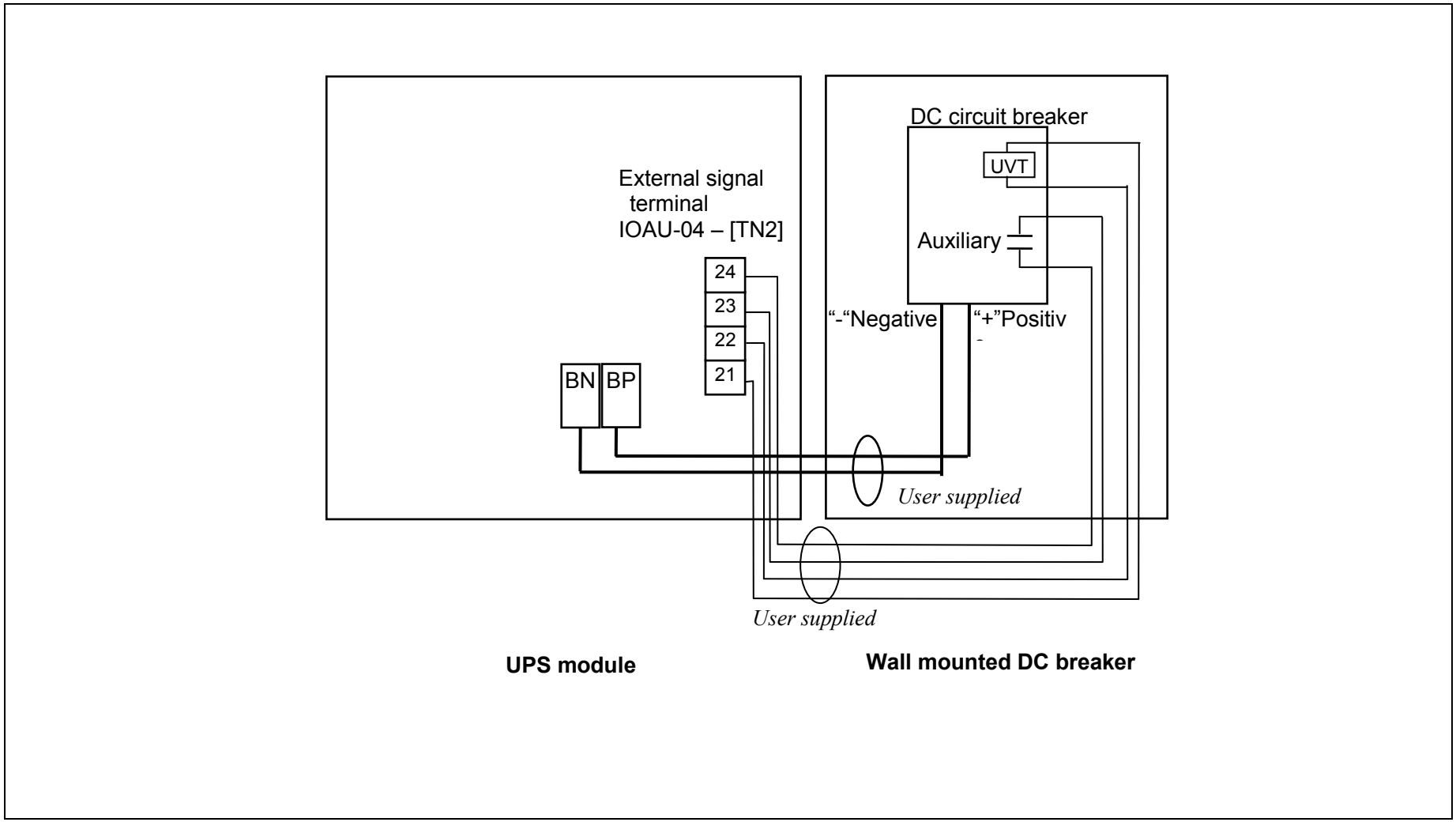
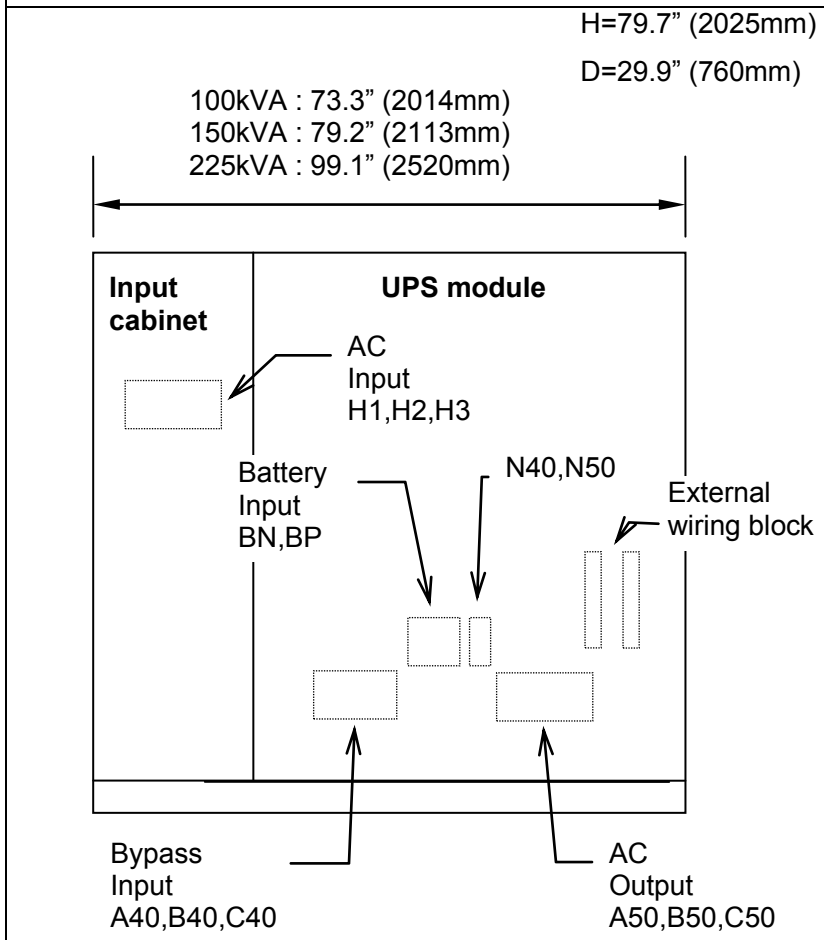
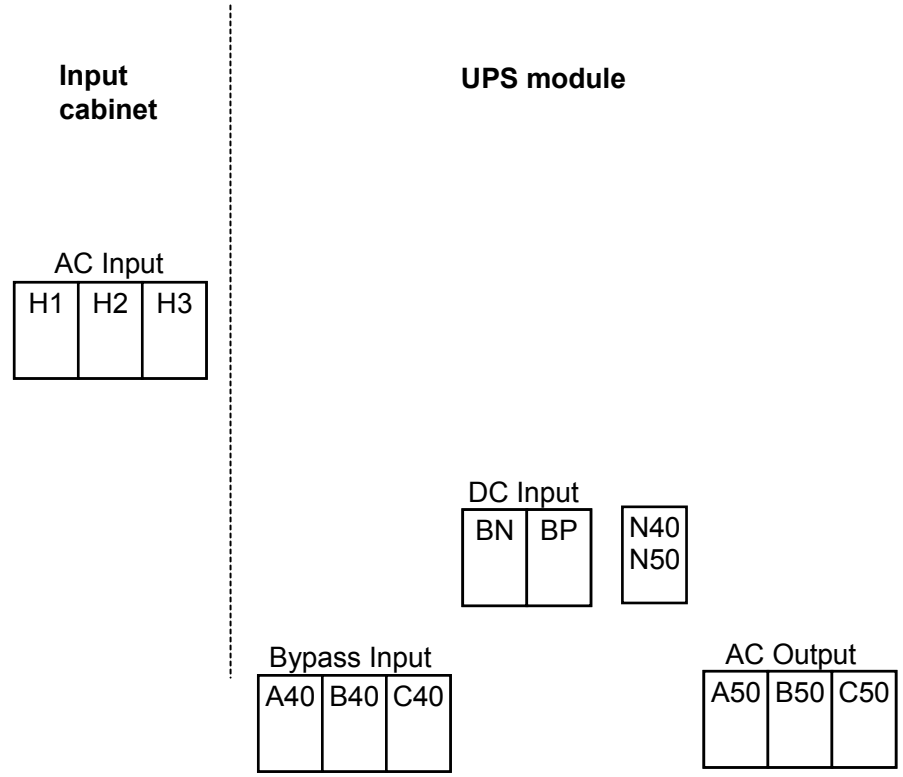


FIGURE 3.2.b.1 Diagram of input/output bus bars and terminal blocks (100kVA, 150kVA, 225kVA UPS, Input voltage 600Vac)

Location of bus bars and terminal blocks	Detailed Terminals
	

For power terminals, use 5/16” (8mm) Diameter bolts.

FIGURE 3.2.b.2 Diagram of Power Wire & Control Wire Inter-Connect (100kVA, 150kVA, 225kVA UPS, Input voltage 600Vac)

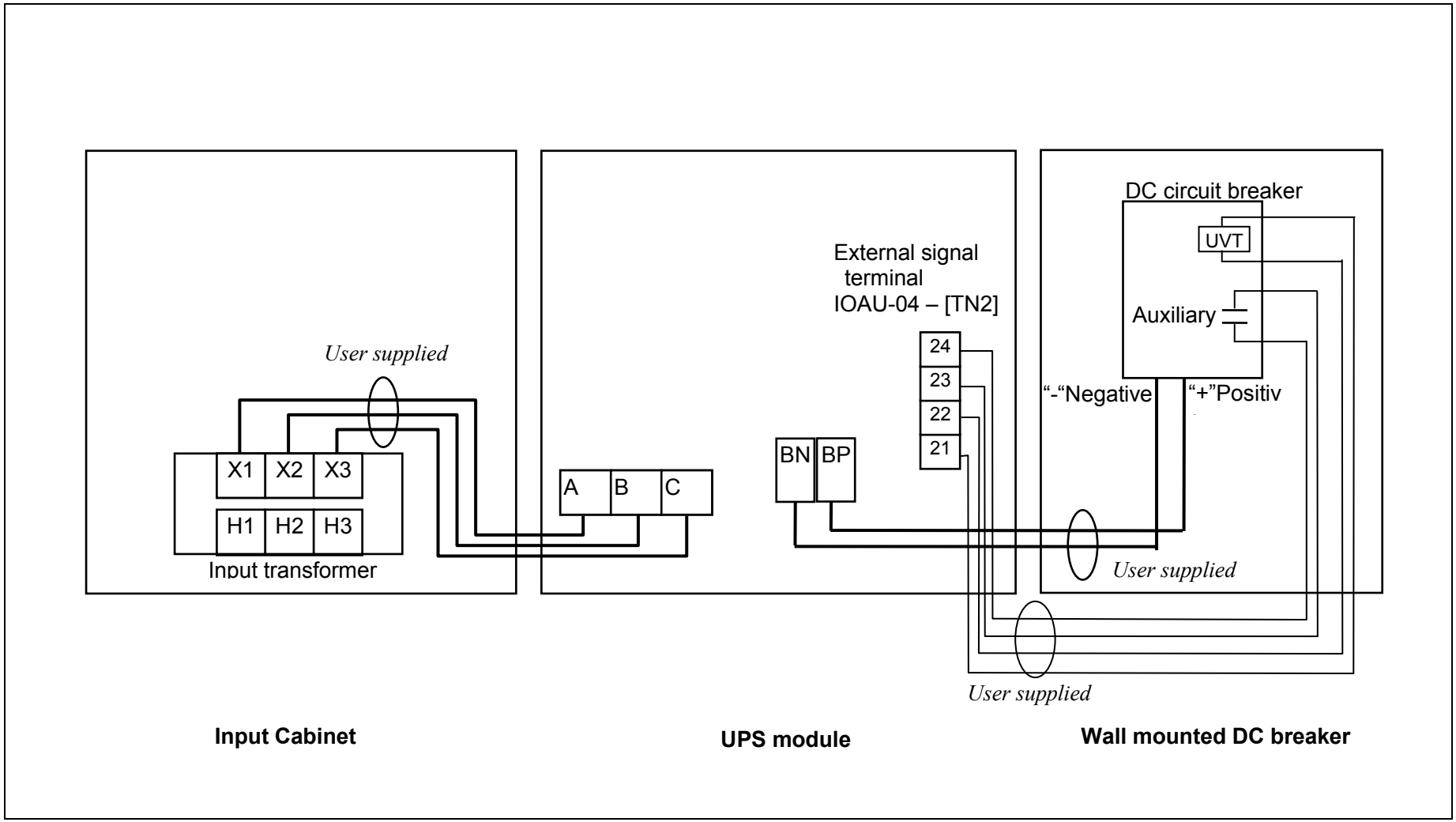
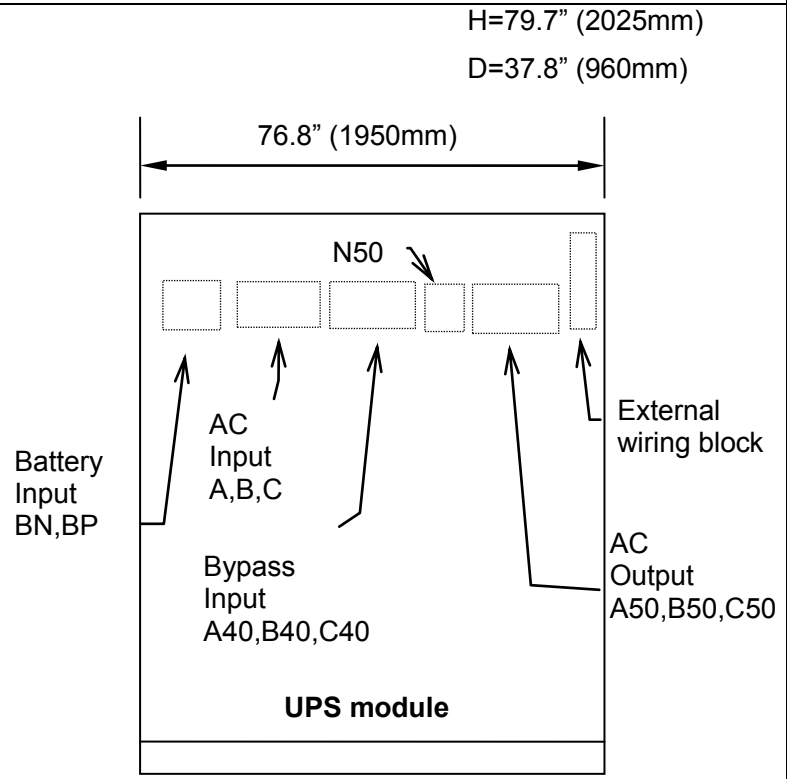
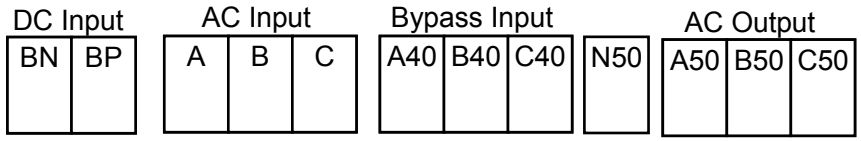


FIGURE 3.2.c.1 Diagram of input/output bus bars and terminal blocks (300kVA, 375kVA UPS, Input voltage 480Vac)

Location of bus bars and terminal blocks	Detailed Terminals
	

UPS Power Terminals use 1/2” (12mm) Diameter bolts.

FIGURE 3.2.c.2 Diagram of Power Wire & Control Wire Inter-Connect (300kVA, 375kVA UPS, Input voltage 480Vac)

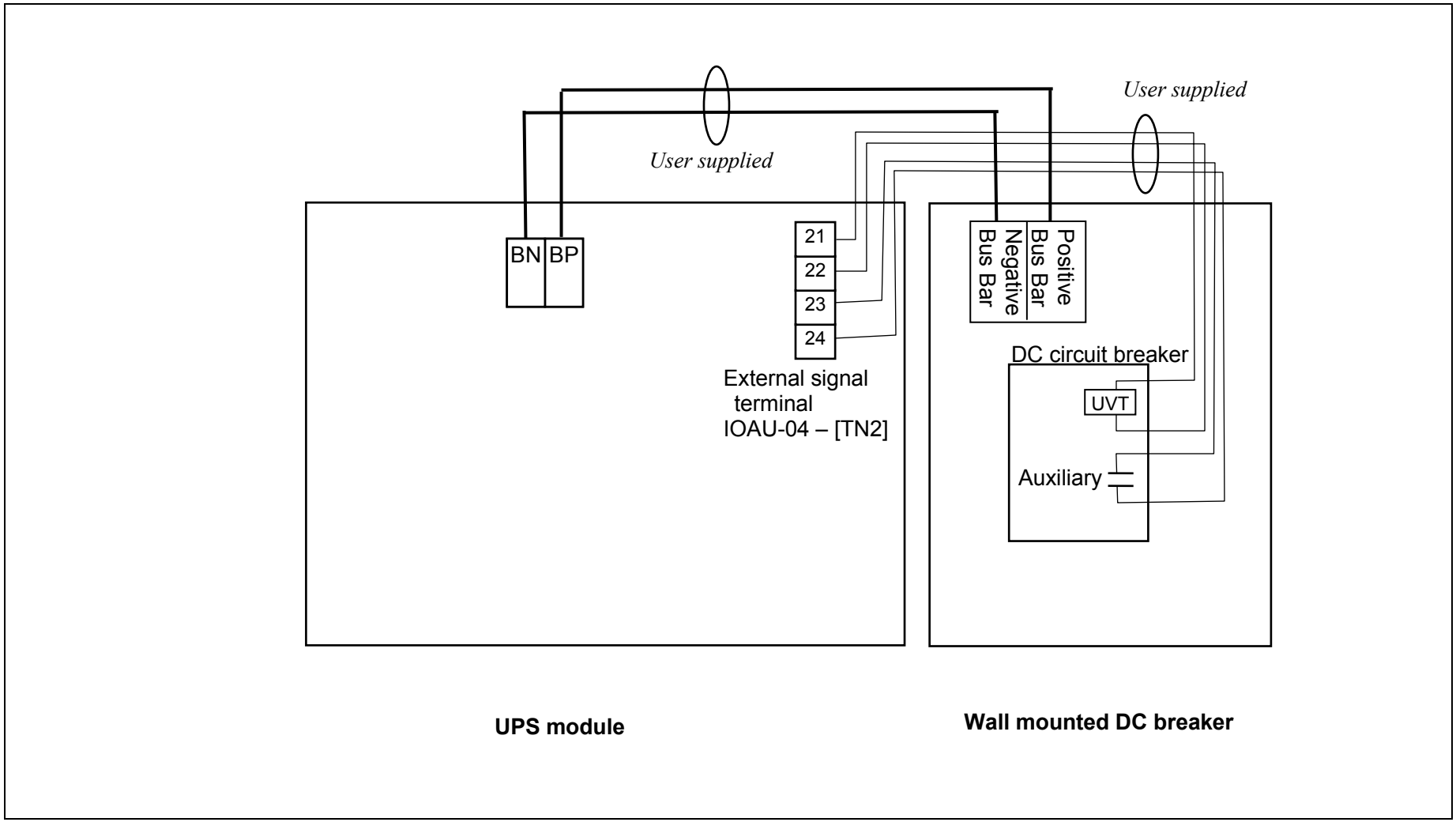


FIGURE 3.2.d.1 Diagram of input/output bus bars and terminal blocks (300kVA, 375kVA UPS, Input voltage 600Vac)

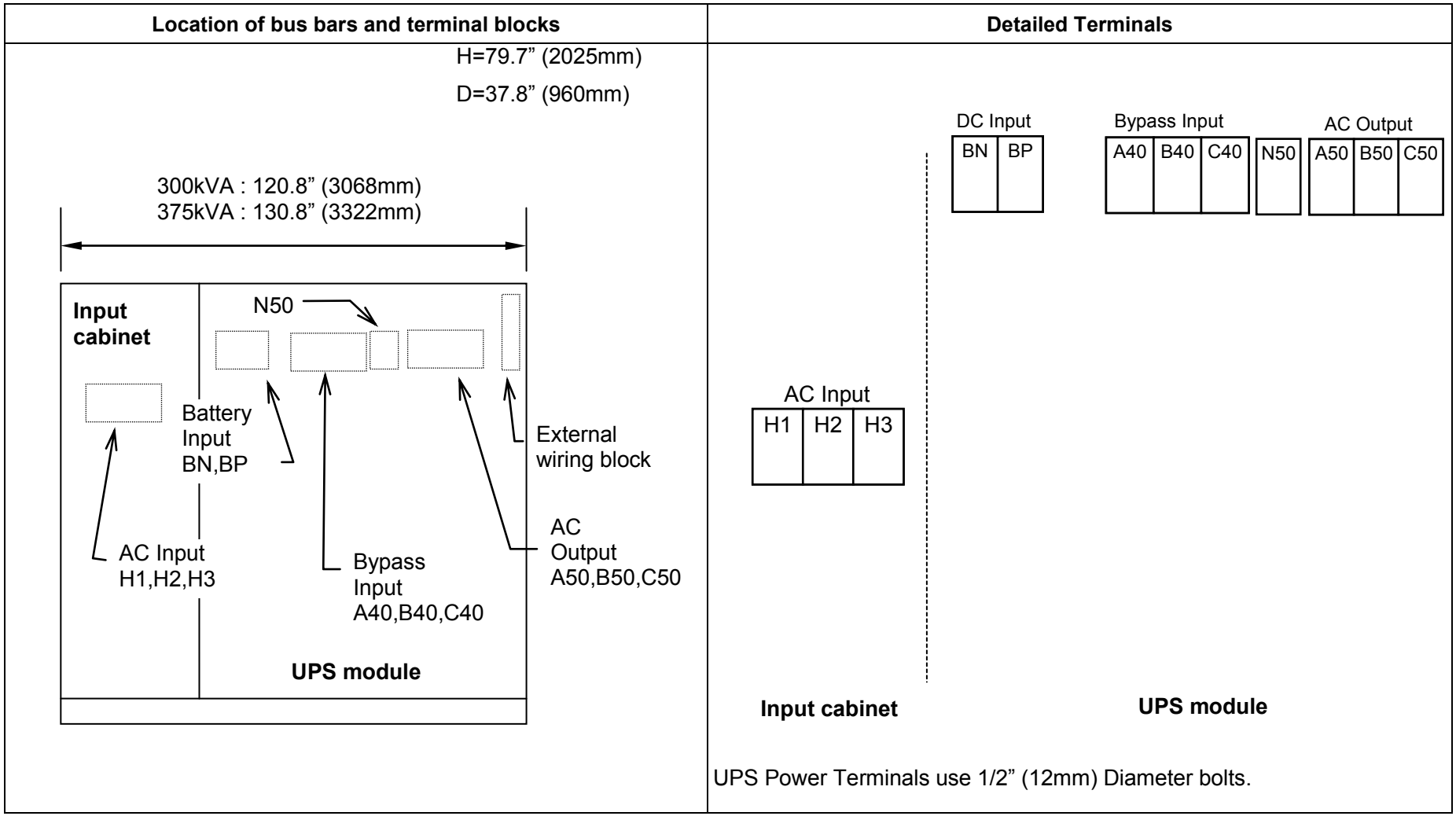


FIGURE 3.2.d.2 Diagram of Power Wire & Control Wire Inter-Connect (300kVA, 375kVA UPS, Input voltage 600Vac)

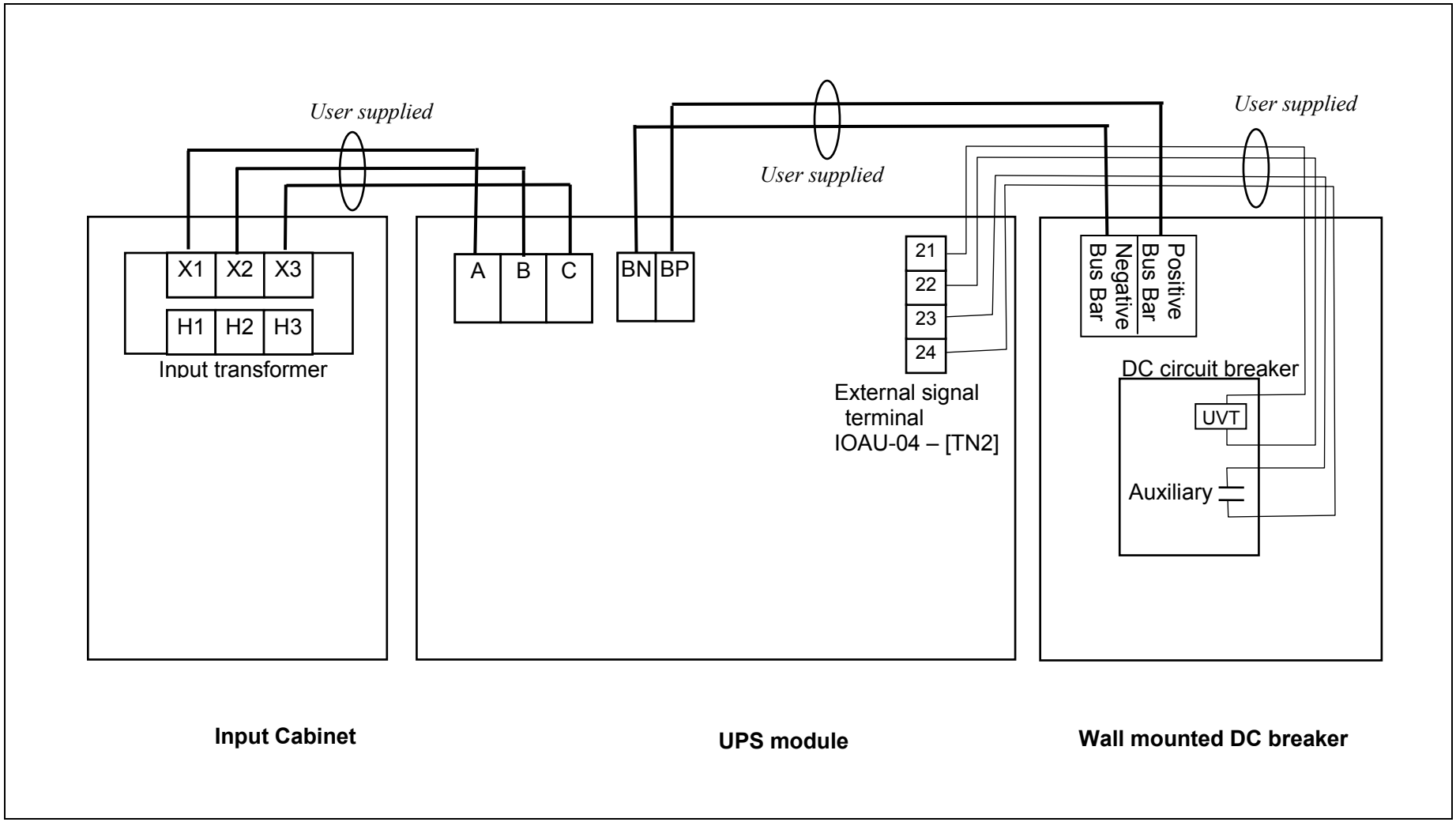
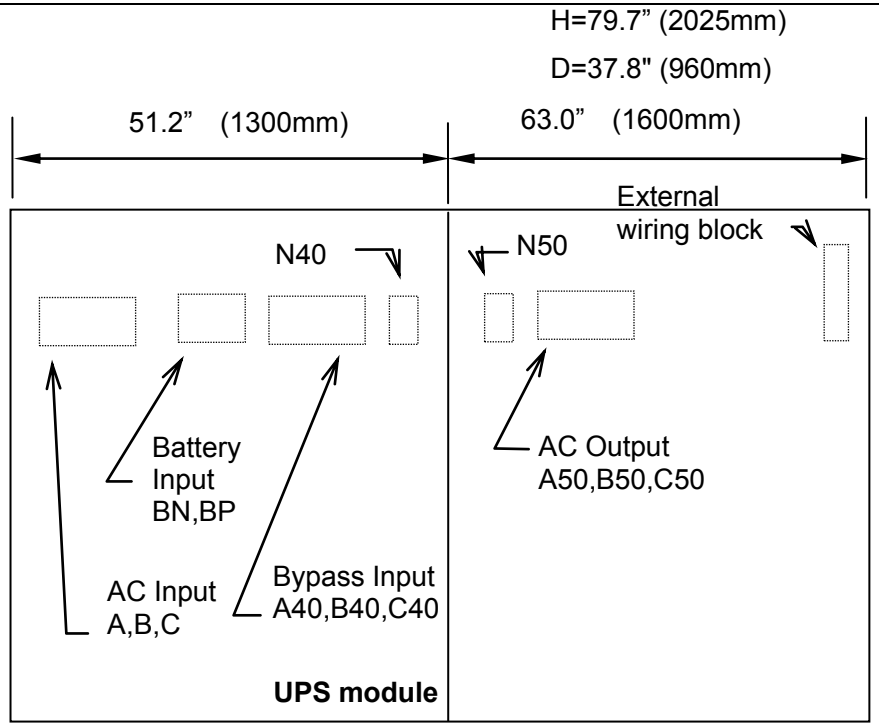
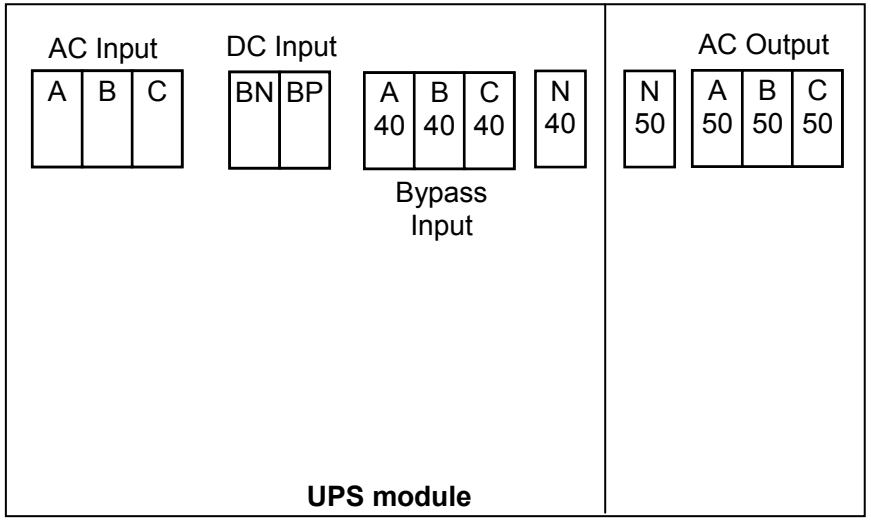


FIGURE 3.2.e.1 Diagram of input/output bus bars and terminal blocks (500kVA, 625kVA, 750kVA UPS, Input voltage 480Vac)

Location of bus bars and terminal blocks



Detailed Terminals



UPS Power Terminals use 1/2” (12mm) Diameter bolts.

FIGURE 3.2.e.2 Diagram of Power Wire & Control Wire Inter-Connect (500kVA, 625kVA, 750kVA UPS, Input voltage 480Vac)

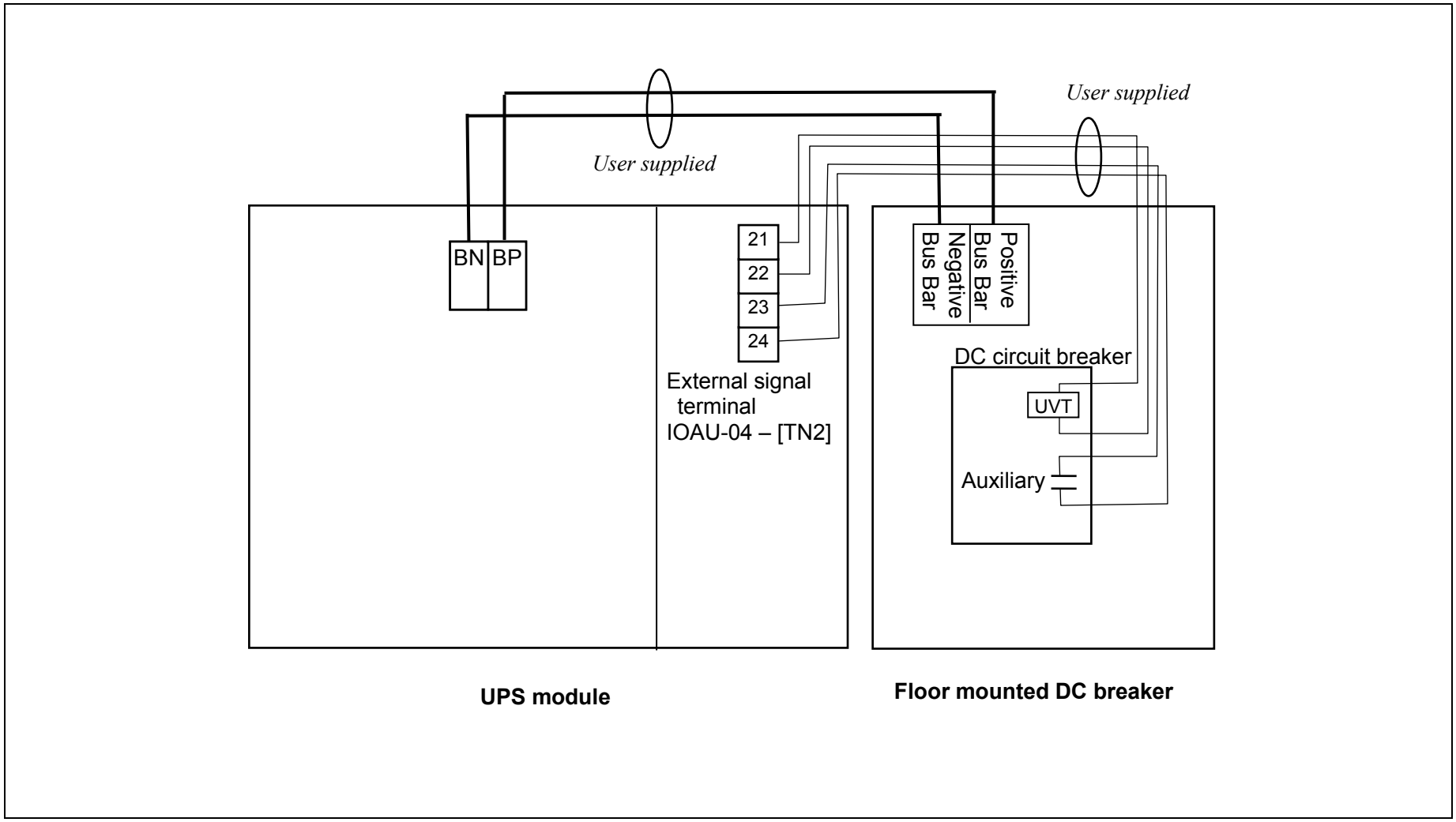


FIGURE 3.2.f.1 Diagram of input/output bus bars and terminal blocks (500kVA, 625kVA, 750kVA UPS, Input voltage 600Vac)

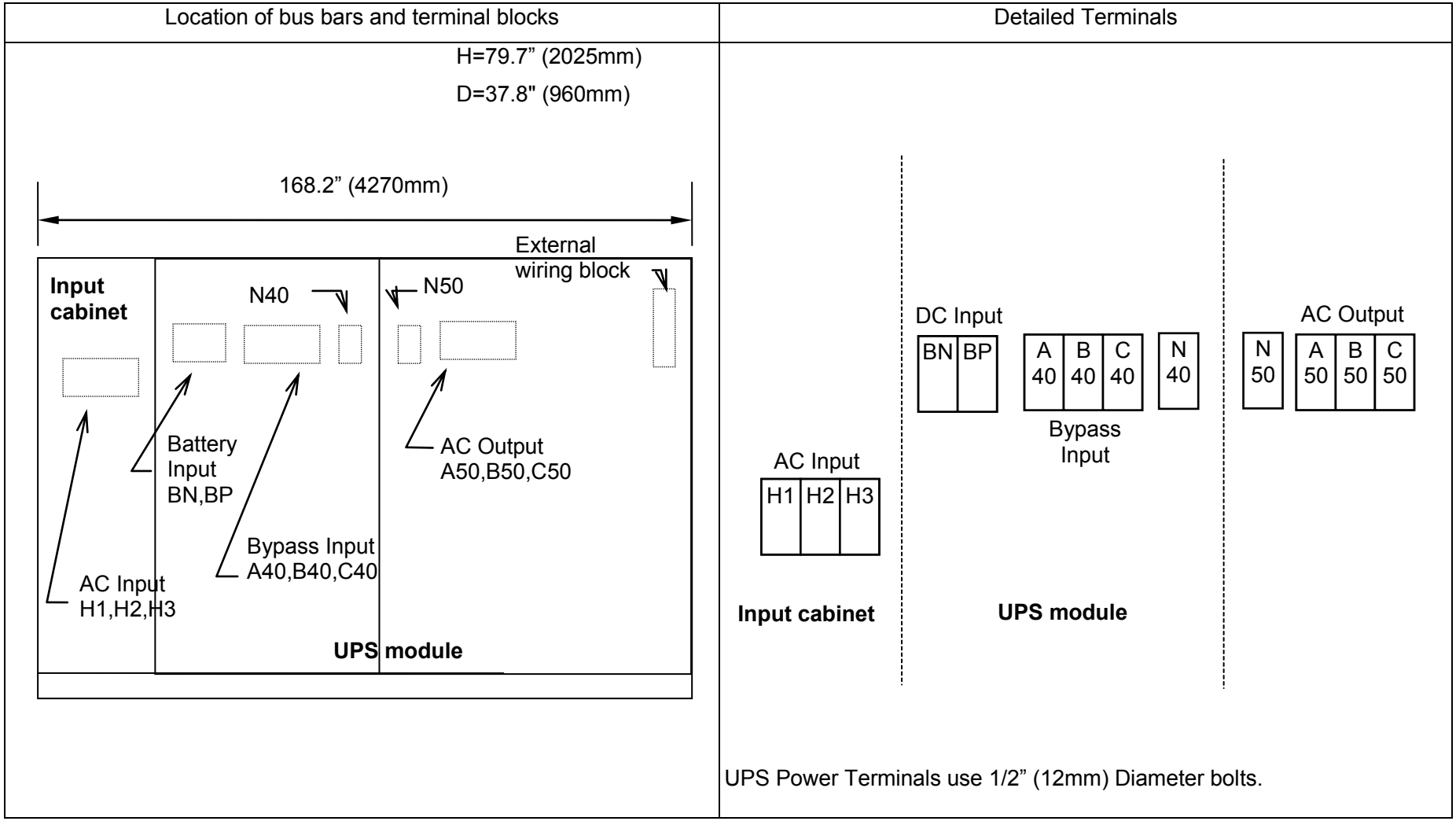


FIGURE 3.2.f.2 Diagram of Power Wire & Control Wire Inter-Connect (500kVA, 625kVA, 750kVA UPS, Input voltage 600Vac)

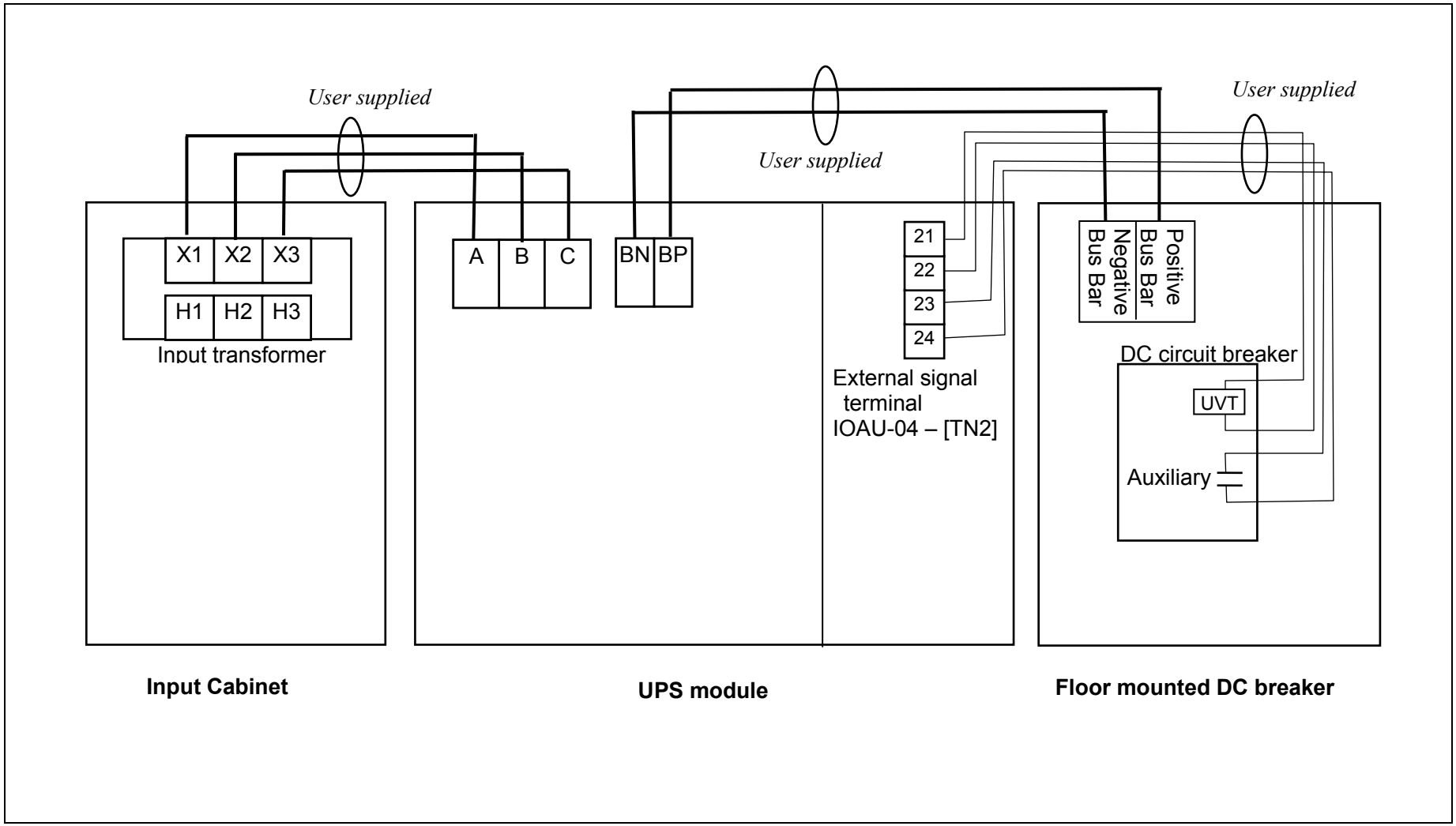


FIGURE 3.3.a Diagram of Rectifier Cabinet & Inverter Cabinet Inter-Connect 1 (500kVA, 625kVA, 750kVA UPS)

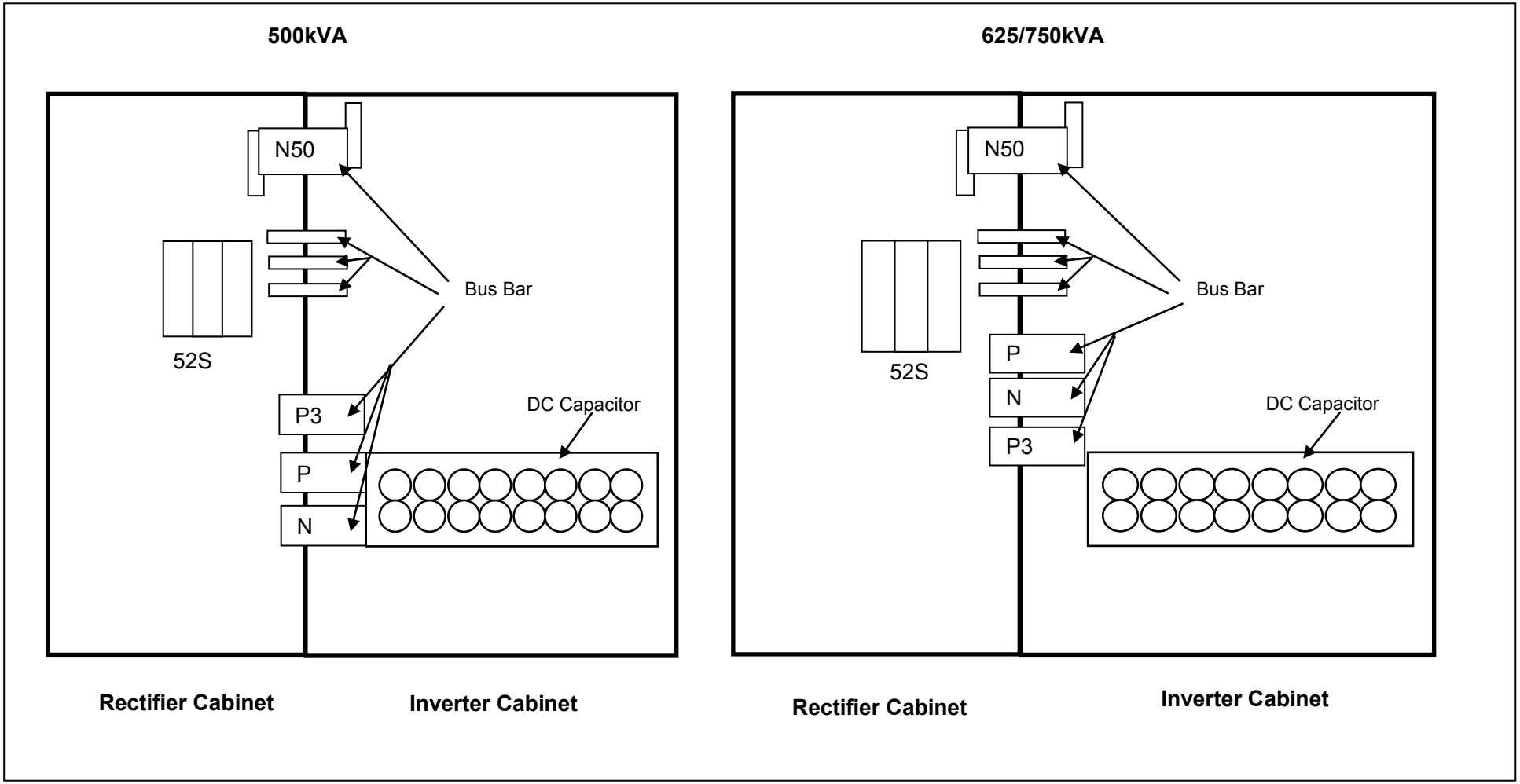
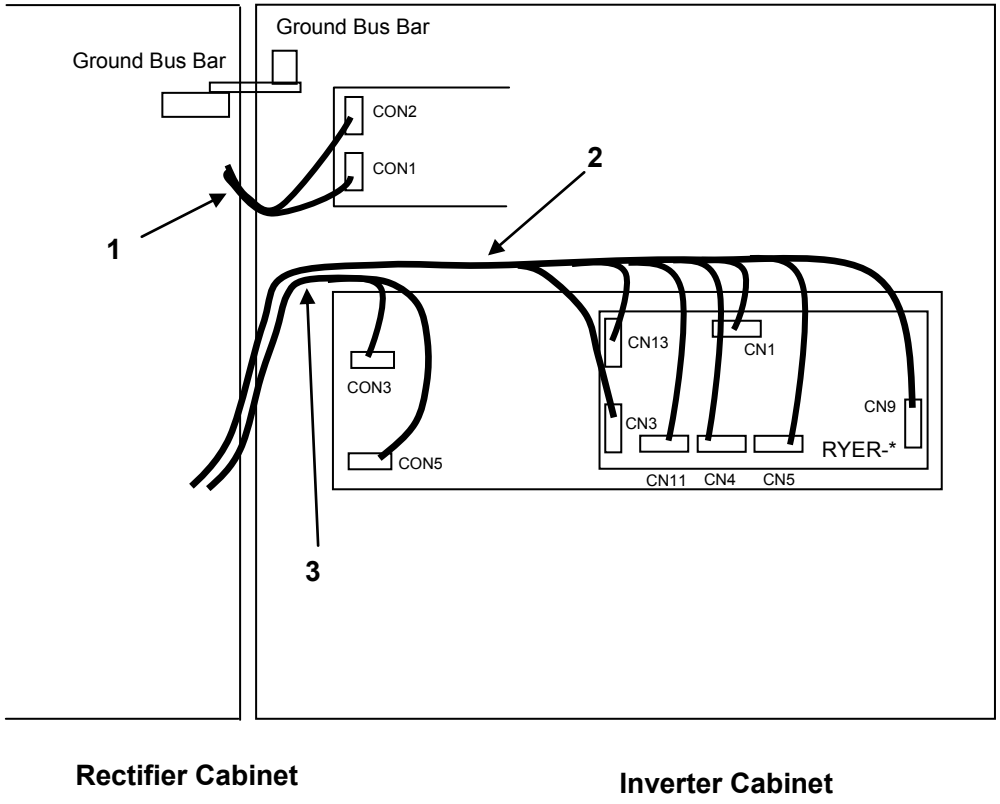


FIGURE 3.3.b Diagram of Rectifier Cabinet & Inverter Cabinet Inter-Connect 2 (500kVA, 625kVA, 750kVA UPS)



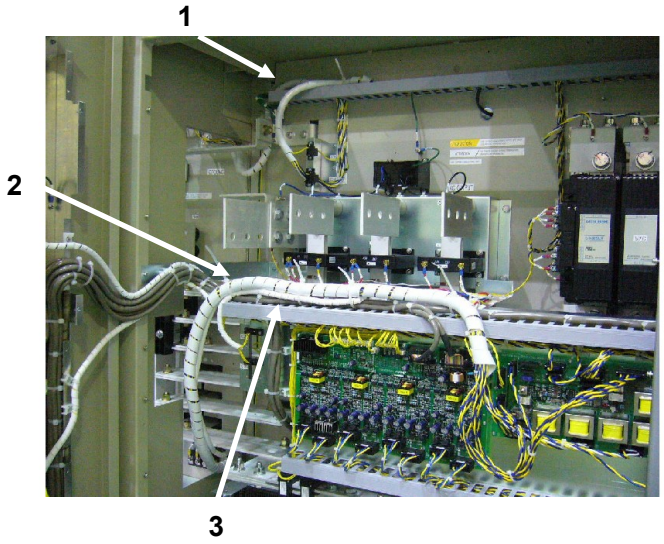


FIGURE 3.4.a Diagram of Power Wire Connect (Parallel connection)

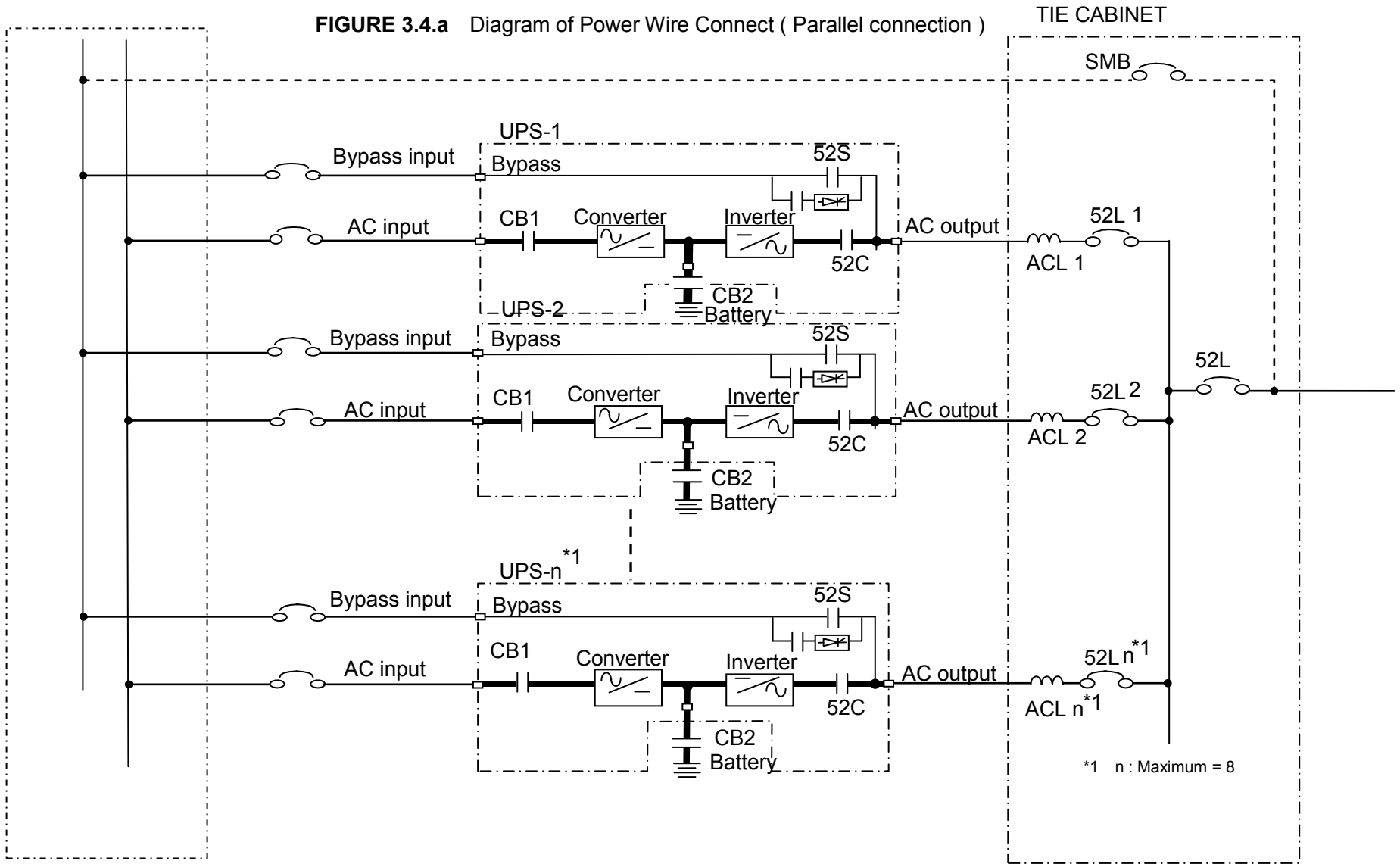


FIGURE 3.4.b Diagram of Power Wire & Control Wire Connect (Parallel connection)

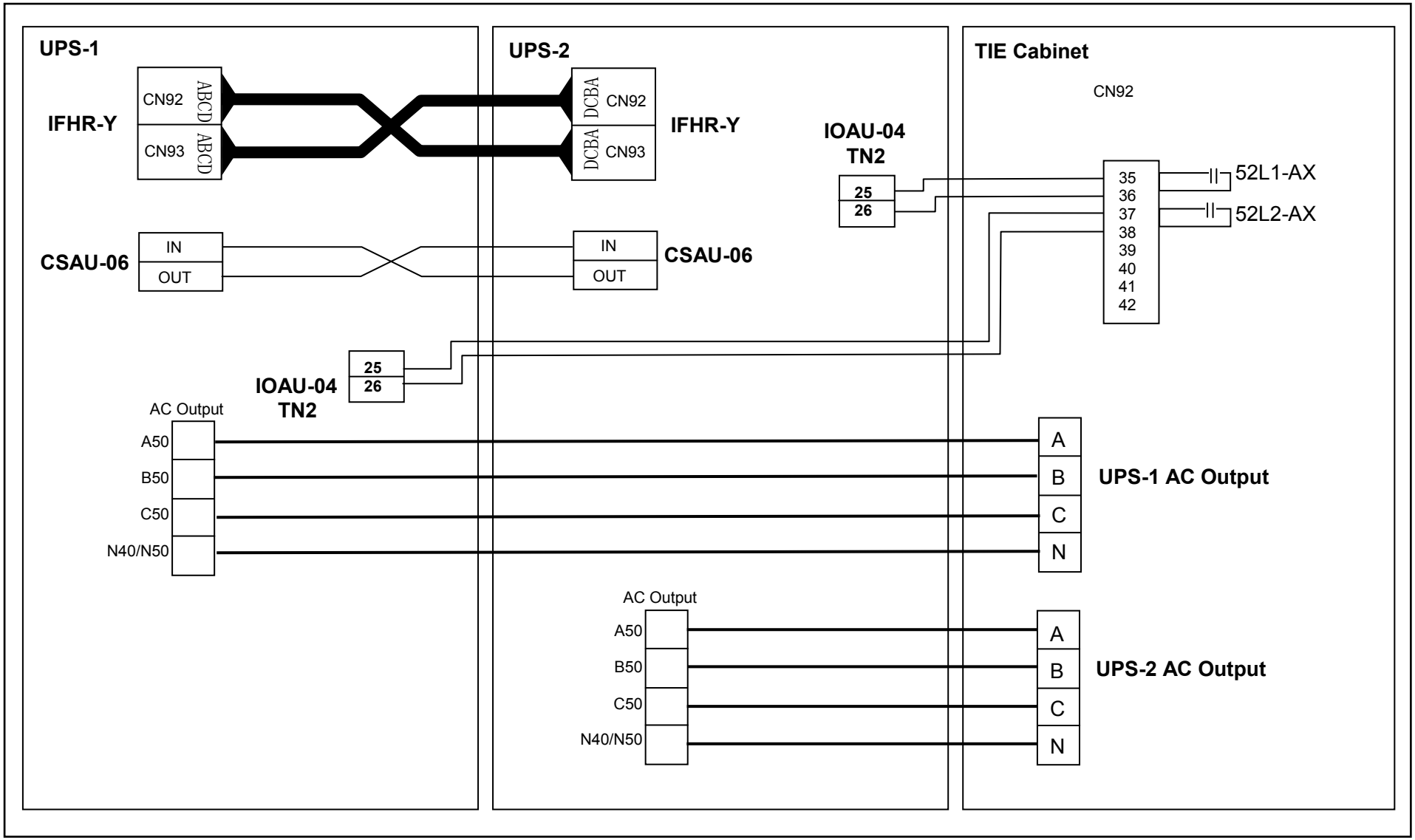
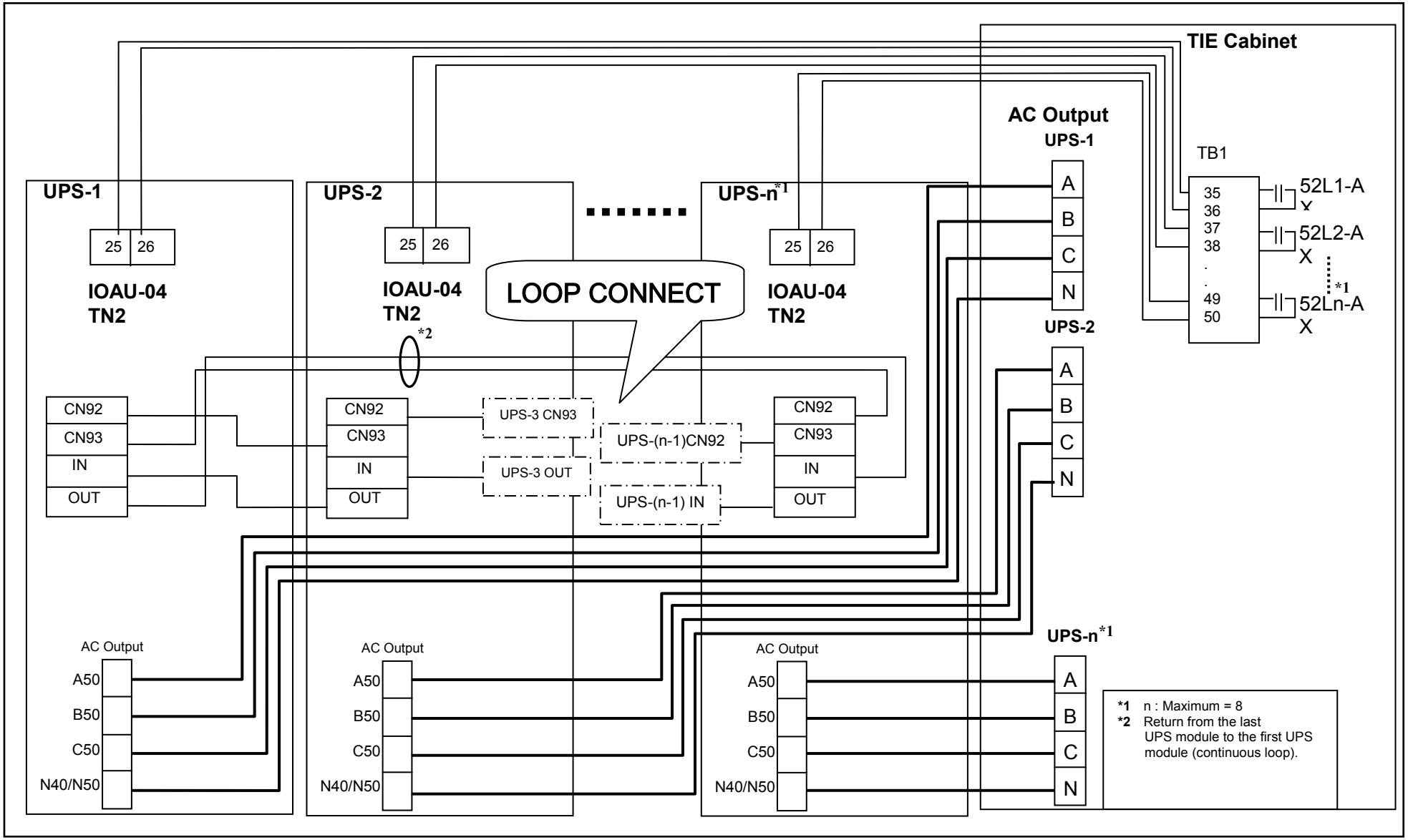


FIGURE 3.4.c Diagram of Power Wire & Control Wire Connect (Parallel connection)



3.4 Operating Procedures

For MMS, Refer to section "D) MMS Start-up Procedure".

A) Start-up Procedure

a.) Verify that the External Bypass Input Circuit Breaker for each unit is closed (Breaker is user supplied.)

b.) If a dual source is feeding the UPS, close the External AC Rectifier Input Circuit Breaker manually (user supplied).

Start-up of UPS

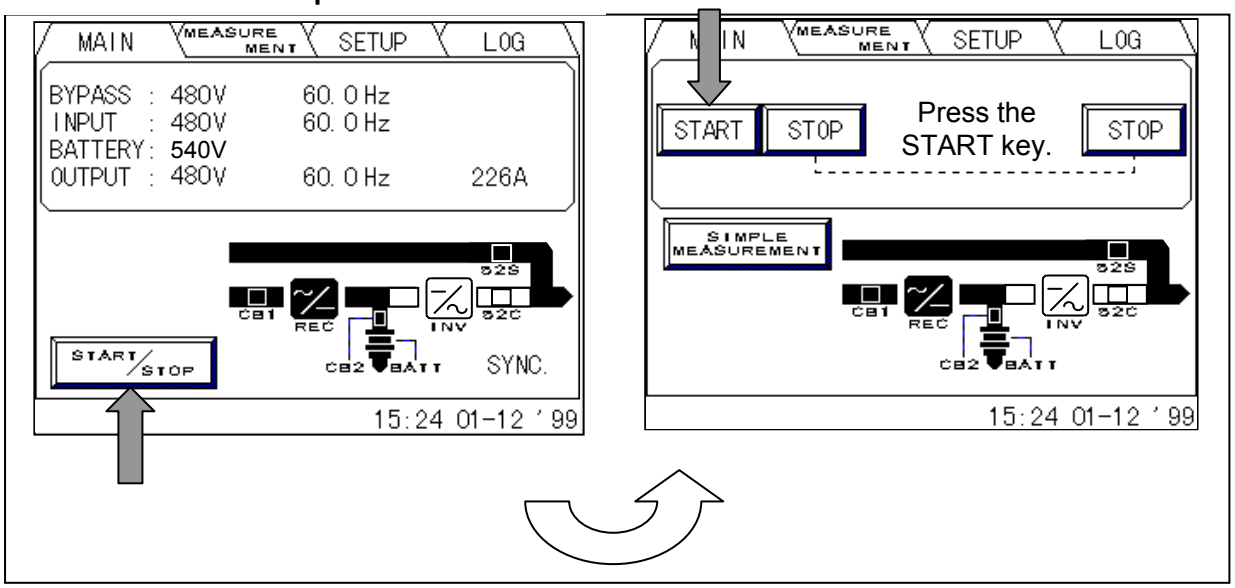
1. Verify that Control Circuit Breakers (CPM) is closed.
   (When Inverter is stopped, the Control Circuit Breaker is not normally opened)
2. The pre-charging cycle will begin and Input Contactor (CB1) will close automatically.
3. Close Battery Disconnect Circuit Breaker (CB2).
4. The inverter can now be started.

NOTE

When "REMOTE OPERATION MODE" is displayed on the LCD panel, the inverter start operation can only be performed remotely. If local inverter start operation is required (at the UPS), select "LOCAL" in "Remote/Local" selection in setup page. Select "LOCAL" mode for the purpose of this start up procedure.

5. On the LCD panel, select "START/STOP MENU" and press the "START" key.
6. The Inverter will start within 5 seconds. Start up is complete.

FIGURE 3.5.a Start-up Procedure



B) Shut-down Procedure

If a total UPS shutdown is required, verify that the critical load is OFF.

Shut-down of UPS

1. Press the "START/STOP MENU" from the Main Menu on the LCD.

NOTE

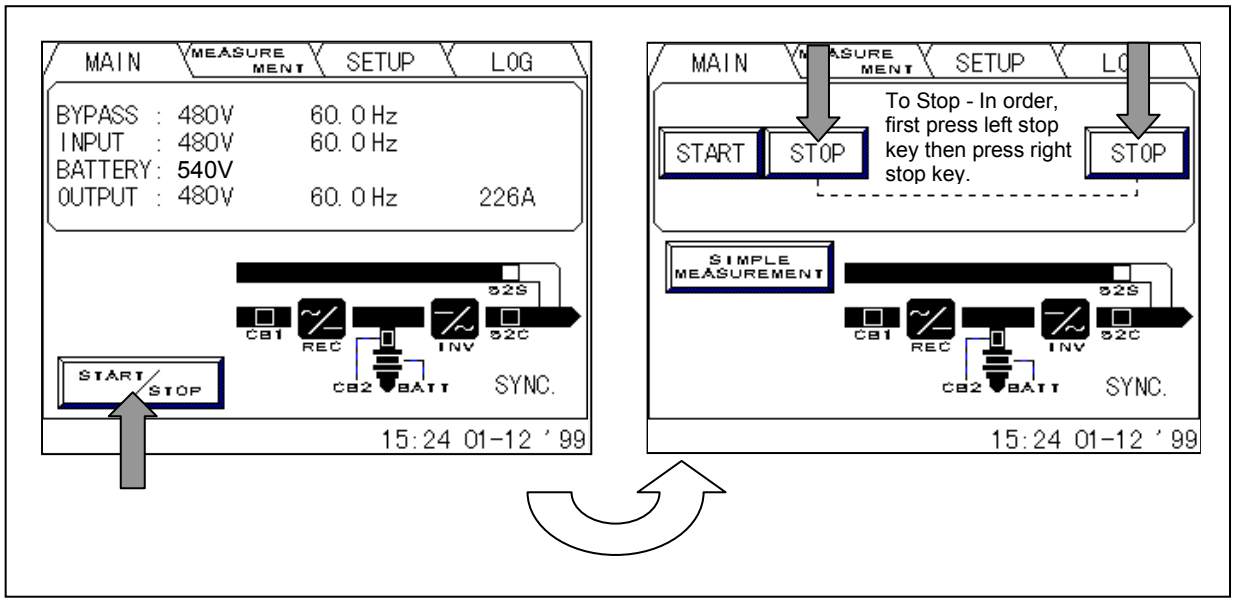
When "REMOTE OPERATION MODE" is displayed on the LCD panel, the inverter stop operation can only be performed remotely. If local inverter stop operation is required (at the UPS), select "LOCAL" in "Remote/Local" selection in setup page. Select "LOCAL" mode for the purpose of this stop procedure.

2. Press both "STOP" keys in order on the LCD.
   (First press "STOP" key on the left, then press "STOP" key on the right.)
3. In general, only the Inverter will be stopped and the Rectifier will remain energized to charge the batteries.

Opening the user supplied External Input AC Circuit Breaker (if dual source used), the External Bypass Input Circuit Breaker *and* the DC Disconnect Circuit Breaker, CB2, will shut down the load.

4. If stopping both the Rectifier and Charger is required, open the Battery Disconnect circuit breaker (CB2) manually.
5. If a dual source is feeding the UPS, open the External AC Rectifier Input Circuit Breaker (user supplied) manually.
6. If turning off all power to the critical load is desired, open the External Bypass Input Circuit Breaker (user supplied) manually.
7.

FIGURE 3.5.b Shut-down Procedure



C) Bypass Operation Procedure

UPS

1. Check for “SYNC” on the LCD.
2. Press the "START/STOP MENU" from the LCD Main Menu.
3. Press the "STOP" key on the LCD.

** Transfer from bypass to inverter.

UPS

1. Press the "START/STOP MENU" from the LCD Main Menu.
2. Press the "START" key on the LCD.

NOTE

When "REMOTE OPERATION MODE" is displayed on the LCD panel, the inverter start or stop operation can only be performed remotely. If local inverter start or stop operation is required (at the UPS), select "LOCAL" in "Remote/Local" selection in setup page. Select “LOCAL” mode for the purpose of this stop procedure.

D) MMS Start-up Procedure

a) Verify that Tie Cabinet Circuit Breaker SMB is closed.

b) Verify that Tie Cabinet System Output Circuit Breaker 52L is open

c) Verify that Tie Cabinet UPS Circuit Breakers 52L1, 52L2…and 52Ln are closed.

Start-up of UPS-1

1. Verify that Control Circuit Breakers (CPM) is closed.
   (When Inverter is stopped, the Control Circuit Breaker is not normally opened)
2. The pre-charging cycle will begin and Input Contactor (CB1) will close automatically.
3. Close Battery Disconnect Circuit Breaker (CB2).
4. The inverter can now be started.

NOTE

When "REMOTE OPERATION MODE" is displayed on the LCD panel, the inverter start operation can only be performed remotely. If local inverter start operation is required (at the UPS), select "LOCAL" in "Remote/Local" selection in setup page. Select "LOCAL" mode for the purpose of this start up procedure.

5. On the LCD panel, select "START/STOP MENU" and press the "START" key.
6. The Inverter will start within 5 seconds. Start up is complete.

Start-up of next UPS

1. The next UPS can be started in the same way as UPS-1.
2. When all UPS in MMS are started, the MMS system UPSs will simultaneously transfer from UPS MMS Bypass Operation to UPS MMS inverter Operation.
3. Verify there are no alarms on each UPS LCD and Tie Cabinet LCD (if available) Any steps to verify correct UPS MMS Inverter Operation.
4. Verify all UPS are in phase with each other and the MMS Bypass.

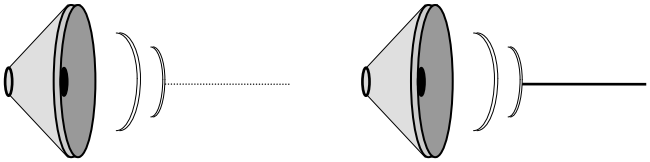
Transfer from UPS MMS Inverter Operation To UPS MMS Bypass Operation

1. Transfer MMS system to UPS MMS Bypass Operation on Tie Cabinet LCD (if available) or Transfer each UPS to bypass individually

Transfer of Load From Maintenance Bypass To inverter

1. Verify UPS MMS system is in UPS MMS Bypass Operation.
2. Transfer load from Tie Cabinet Maintenance Bypass Circuit Breaker (SMB) to system Output Circuit Breaker (52L) per MMS Tie Cabinet Maintenance Mode Interlock Operating Procedure, Part B.
3. Transfer from UPS MMS Bypass Operation to UPS MMS Inverter Operation from Tie Cabinet LCD "System Bypass Operation Screens" if available or by starting each Individual UPS from UPS LCD, select "START/STOP MENU" and press "START" key.
4. After all UPS are ready to transfer to inverter all UPSs will simultaneously transfer from internal bypass to inverter.

4 RESPONSE TO UPS FAILURE



UPS FAULT

Annunciator Silence — Depress “SILENCE ALARM” key on MAIN menu.

Recording of Fault — Refer to the list of fault codes in Section 6.0 for error description.

Primary Action — Take necessary action according to display guidance.

Information to Service Center — When faults happen, contact the Authorized Toshiba Service Representatives or call Toshiba International Corporation at **1-800-231-1412**.

NOTE

The error code indicated on the LCD display panel when an UPS alarms is very important.
In order to reduce repair time, please include this information, along with the operation and load status for all correspondence to Toshiba field service group.

5 PARTS REPLACEMENT

Contact Toshiba International Corporation or its authorized service representatives on all issues regarding the replacement of parts.

A) Battery

Battery lifetime may vary according to the frequency of use and the average ambient operating temperature. The end of battery life is defined as the state of charge resulting in an ampere-hour capacity less than, or equal to, 80% of nominal capacity.

Replace battery if its capacity is within this percentage.

B) UPS Component Parts

UPS components have a defined life expectancy (Fans, Capacitors, Filters, etc.)

Contact Toshiba International Corporation or its authorized service representatives for a complete parts replacement schedule. Recommended replacement time interval varies with operating environment.

Contact Toshiba International Corporation or its authorized service representatives for application specific recommendations.

WARNING

Any parts replacements (including modification) without authorization by Toshiba could result in personal injuries, death or destruction of the UPS.

6 FAULT CODES

This section covers fault codes, their description and required action.
At time of error :

A) Verify and record the occurrence of the alarm. Note details of alarm message displayed on the LCD display panel.

Contact Toshiba International Corporation at 1-877-867-8773.

B) If a circuit breaker has tripped, depress the toggle to reset the breaker before closing it again.

Fault Code List

Table 6.1 Fault Code

Note 9 Code indication	Status message	Contents	Guidance	Note 1 Buzzer	Note 2 External send-out contact	Note 3 Failure lamp
UF003	RECTIFIER ABNORMAL	Preliminary charge impossible	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF006	CONVERTER ABNORMAL	Mixed operation (2 minutes) (Only applied to MMS system of the common-battery.)	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF055	CONVERTER ABNORMAL	Mixed operation (1 minute) (Only applied to MMS system of the common-battery.)	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF059	INPUT CIRCUIT ABNORMAL	Input circuit abnormality	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF102	DC OVERVOLTAGE	DC Over voltage	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF103	DC UNDERVOLTAGE	DC Over voltage	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF108	CHOPPER OVERCURRENT	Chopper output overcurrent	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF109	DC VOLTAGE UNBALANCED	DC voltage unbalanced between positive and negative	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF112	DC CIRCUIT ABNORMAL	DC circuit shorted. (Quicker discharge than UF103)	CALL SERVICE ENGINEER	[2]	-	Lit on
UF151	DC VOLTAGE ABNORMAL	Does not return to float voltage after power supply is resumed (36 hours)	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF152	DC VOLTAGE ABNORMAL	Does not return to equalizing voltage after power supply is resumed	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF153	CB2 ABNORMAL	Battery disconnect circuit breaker CB2 has tripped.	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF156	CB2 TRIPPED(BATTERY OVERTEMP.)	BATTERY OVERTEMPERATURE (UF157) continues for 2 hours. (Note 5)	CHECK BATTERY	[1]	Minor	Flicker
UF157	BATTERY OVERTEMPERATURE	Detected by battery temperature sensor works for 10 sec.	CHECK BATTERY	[1]	Minor Note 4	Flicker
UF161	CB2 TRIPPED(DC VOLT. ABNORMAL)	DC VOLTAGE ABNORMAL (UF151) continues for 12 hours. (Note 5)	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF162	BATTERY ABNORMAL	Battery abnormal detected by battery self test.	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF163	BATTERY VOLTAGE ABNORMAL	Battery voltage abnormality	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF165	GATE FAULT (CHOPPER-UNIT)	IGBT module (Chopper) damaged	CALL SERVICE ENGINEER	[2]	Major	Lit on

UF166	GATE FAULT (A-UNIT)	IGBT module (A-Unit) damaged	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF167	GATE FAULT (B-UNIT)	IGBT module (B-Unit) damaged	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF168	GATE FAULT (C-UNIT)	IGBT module (B-Unit) damaged	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF170	VDB SENSOR ABNORMAL	Battery voltage sensor abnormality	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF201	INVERTER OVERVOLTAGE	Output overvoltage during inverter power supply (+ 15%)	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF202	INVERTER UNDERVOLTAGE	Output low voltage during inverter supply (-15%)	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF203	INVERTER OVERCURRENT	Inverter output overcurrent	CALL SERVICE ENGINEER	[2]	Major	Lit on
UP204	OUTPUT CIRCUIT ABNORMAL	Cross current fell out of 30%	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF209	52C ABNORMAL	52C not turned ON	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF210	52C ABNORMAL	52C not turned OFF	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF213	INV. OR CONV. OVERTEMPERATURE	Overheating of main circuit parts	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF214	COOLING FAN ABNORMAL	Abnormality of cooling fan inside panel	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF255	52C ABNORMAL	52C turned OFF during inverter power supply	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF256	OUTPUT VOLTAGE ABNORMAL	Inverter output voltage fell out of +/- 5%	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF257	52C ABNORMAL	52C not turned OFF when manual transfer	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF258	LOAD ABNORMAL	Transfer by overcurrent occured more than 4 times in 5 min.	CHECK LOAD	[1]	Minor	Flicker
UF259	ANOTHER UPS ABNORMAL	Inverter output voltage bus abnormality	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF260	LOAD SHORT	After UA810 occurred, Bypass Abnormal occurred within 1 second. (#1)	CHECK LOAD	[1]	Minor	Flicker
UF301	UPS CONTROL CIRCUIT ERROR	Control microcomputer Abnormality.	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF302	UPS CONTROL CIRCUIT ERROR	Control microcomputer Abnormality.	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF303	UPS CONTROL CIRCUIT ERROR	Control microcomputer Abnormality.	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF304	UPS CONTROL CIRCUIT ERROR	Parallel control circuit abnormality (only for MMS)	CALL SERVICE ENGINEER	[2]	Major	Lit on

UF305	UPS CONTROL CIRCUIT ERROR	Control clock abnormality	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF306	UPS CONTROL CIRCUIT ERROR	Control power source circuit abnormality	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF309	INVERTER VOLTAGE ABNORMAL	Inverter output voltage abnormality before inverter power supply (Checking inverter start-up.)	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF315	UPS CONTROL CIRCUIT ERROR	Control clock lost	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF352	CONTROL POWER SUPPLY ABNORMAL	Control circuit abnormality	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF402	52S ABNORMAL	52S not turned OFF, or 52S turned OFF without any command	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF451	52S ABNORMAL	52S not turned ON, or 52S turned ON without any command when manual transfer	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF452	CB3 ABNORMAL	CB3 open	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF453	52L OPERATION ERR.	52L operated abnormality (only for MMS)	CHECK 52L	[2]	Major	Lit on
UA801	AC INPUT VOLTAGE OUT OF RANGE	AC input voltage fell out of +/- 17% range	CHECK INPUT POWER SOURCE	[1]	Alarm	-
UA806	INVERTER OVERLOAD > 100%	Overload exceeded 105% (Note 7)	WARNING : DECREASE LOAD	[1]	Alarm	-
UA808	INVERTER OVERLOAD > 125%	Overload exceeded 125% (Note 7)	WARNING : DECREASE LOAD	[1]	Alarm	-
UA809	INVERTER OVERLOAD > 150%	Overload exceeded 150% (Note 7)	WARNING : DECREASE LOAD	[1]	Alarm	-
UA810	INVERTER OVERLOAD	Momentary over-current during Inverter power.	WARNING : DECREASE LOAD	[1]	Alarm	-
UA811	OVERLOAD TRANSFER	Overload transfer	-	[1]	Alarm	
UA812	BYPASS VOLTAGE OUT OF RANGE	Bypass voltage fell out of +13/-12% range.	CHECK BYPASS INPUT	[1]	Alarm	-
UA813	BYPASS PHASE ROTATION ERROR	Phase rotation is inverted when bypass voltage is normal	CHECK BYPASS INPUT	[1]	Alarm	-
UA814	BYPASS FREQUENCY OUT OF RANGE	Bypass frequency fell out of inverter synchronization follow-up range	CHECK BYPASS INPUT	[1]	Alarm	-
UA815	TRANSFER PROHIBITION	The transfer to bypass operation will be prohibited while the bypass abnormality occurs. (Only at transfer prohibition setting)	CHECK BYPASS INPUT	[1]	-	-

UA817	EMERGENCY STOP ACTIVATED	Emergency stop applied	-	-	Alarm	-
UA819	REMOTE START BUTTON ABNORMAL	There is an error with the remote start switch. (Only at remote setting)	CALL SERVICE ENGINEER	[1]	Alarm	-
UA820	REMOTE STOP BUTTON ABNORMAL	There is an error with the remote stop switch.	CALL SERVICE ENGINEER	[1]	Alarm	-
UA824	CB2 OPEN	Battery disconnect circuit breaker CB2 turned OFF	TURN ON CB2	[1]	Alarm	-
UA831	EMERGENCY BYPASS SWITCH ON	Emergency bypass switch turned to <Emergency>	-	[1]	Alarm	-
UA834	BATTERY DEPLETED INV. STOPPED	DC voltage dropped below final discharge end during inverter operation	-	-	Alarm	-
UA841	CONVERTER OPERATION. PROHIBITION	Converter operation interlock applied	-	-	Alarm	-
UA842	OUTPUT CIRCUIT ABNORMAL	Load bus voltage sensor abnormality. (only for MMS)	-	-	Alarm	-

#1: Output circuit may be shorted.

(Note 1) Audible annunciator: [1] intermittent sound, [2] continuous sound.

(Note 2) 1) "Major" is defined as major failure. Inverter transferred to the static bypass line;
2) "Minor" is defined as a minor failure. UPS continues to operate normally, but cause of alarm must be identified;

(Note 3) Indicates one of two possible LED illumination patterns - continuously on (lit) or intermittent (flicker).

(Note 4) External send-out possible by option setting.

(Note 5) Trips the battery breaker CB2.

(Note 6) For other than sealed-type battery.

(Note 7) If the specified time elapses, will transfer to the bypass power supply.

(Note 8) Shows only when corresponding option settings are made.

(Note 9) Code indication means:

UA+++ ---------- Alarm
UF+++ ---------- Failure
U%0++---------- Rectifier circuit failure
U%1++---------- DC circuit failure
U%2++---------- Inverter circuit failure
U%3++---------- Control circuit failure
U%4++---------- Bypass system failure
U%8++---------- Alarm
U%+00 - U%+49 -------- Major failure
U%+50 - U%+99 -------- Minor failure

*) “+” denotes any numeral from 0 to 9
*) “%” denotes either “A” or “F”

7 APPENDIX A – Installation Planning Guides

Installation Planning Guide for G8000MM 100kVA UPS

General Mechanical Information								
Dimensions (W x D x H*)	Weight	Floor Loading	Approximate Full-Load Heat Rejection	Mechanical Clearance (Inches)from UPS for Ventilation and Maintenance Access				
Inches	Lbs.	Lbs./ft.^{2}	Btu/Hr	Top	Front	Bottom	Sides**	Back
43.3" x 29.8" x 79.7"	2,061	230	18,353	24"	40"	0"	1"	0"

* Height includes removable fan housing – Frame height is 78.7."
** 0" clearance for peripheral equipment, 1" clearance for walls.

Primary AC Input (480V 3-Phase / 3-Wire)				
Maximum Input Power Demand Normal Mode (Recharge Mode)			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase
kVA	PF	Amps	Amps	AWG or kcmil at 75° C Temp. Rating
87 (93)	>0.98	105 (112)	150 AT	1/0 – 2/0

Alternate (Bypass) AC Input (480V 3-Phase / 4-Wire)				
Maximum Input Power Demand			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase // Min. – Max. for Neutral
kVA	PF	Amps	Amps	AWG or kcmil at 75° C Temp. Rating
100	0.8	120	150 AT	1/0 – 2/0 // 250 kcmil – 300 kcmil

Battery Input (480VDC Nominal)			
Battery Capacity Required for Full Load Output	Maximum Discharge at Full Load Output	Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max.
kWB	Amps DC	Amps	AWG or kcmil at 75° C Temp. Rating
86	215	225 AT	4/0 – 250 kcmil

AC Output (480/277V 3-Phase / 4-Wire)				
Rated Output Power			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase // Min. – Max. for Neutral
kVA	PF	Amps	Amps	AWG or kcmil at 75° C Temp. Rating
100	0.8	120	150 AT	1/0 – 2/0 // 250 kcmil – 300 kcm

Important Notes:

1. Maximum Current required at Primary AC Input based on full load output and maximum battery charging current.
2. Output load conductors are to be installed in separate conduit from input conductors.
3. Control wires and power wires are to be installed in separate conduits.
4. Recommended AC input and output overcurrent protection based on continuous full load current per NEC.
5. Wiring shall comply with all applicable national and local electrical codes.
6. Grounding conductors to be sized per NEC Article 250-122. Neutral conductors to be sized per NEC Article 310.15.
   - Primary AC Input: 3ϕ, 3-wire + ground.
   - Alternate AC Input: 3ϕ, 4-wire + ground.
   - AC Output: 3ϕ, 4-wire + ground.
   - DC Input: 2-wire (Positive/Negative) + ground.
7. Nominal battery voltage based on the use of VRLA type batteries (2.0 volts/cell nominal).
8. Maximum battery discharge current based on lowest permissible discharge voltage of 1.67 VPC.
9. DC wires should be sized to allow not more than a 2-volt drop at maximum discharge current.
10. Weights do not include batteries or other auxiliary equipment external to the UPS.
11. Cable sizing calculations based on the following assumptions:
    - Minimum size is smallest size based on ampacity at 30 °C.
    - No more than three current carrying conductors per conduit.
    - Neutral sized for 2 X phase current.
    - Temperature rating of copper conductors/terminals: 75 °C.
    - Reference: 2005 NEC Handbook, Table 310.16.

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

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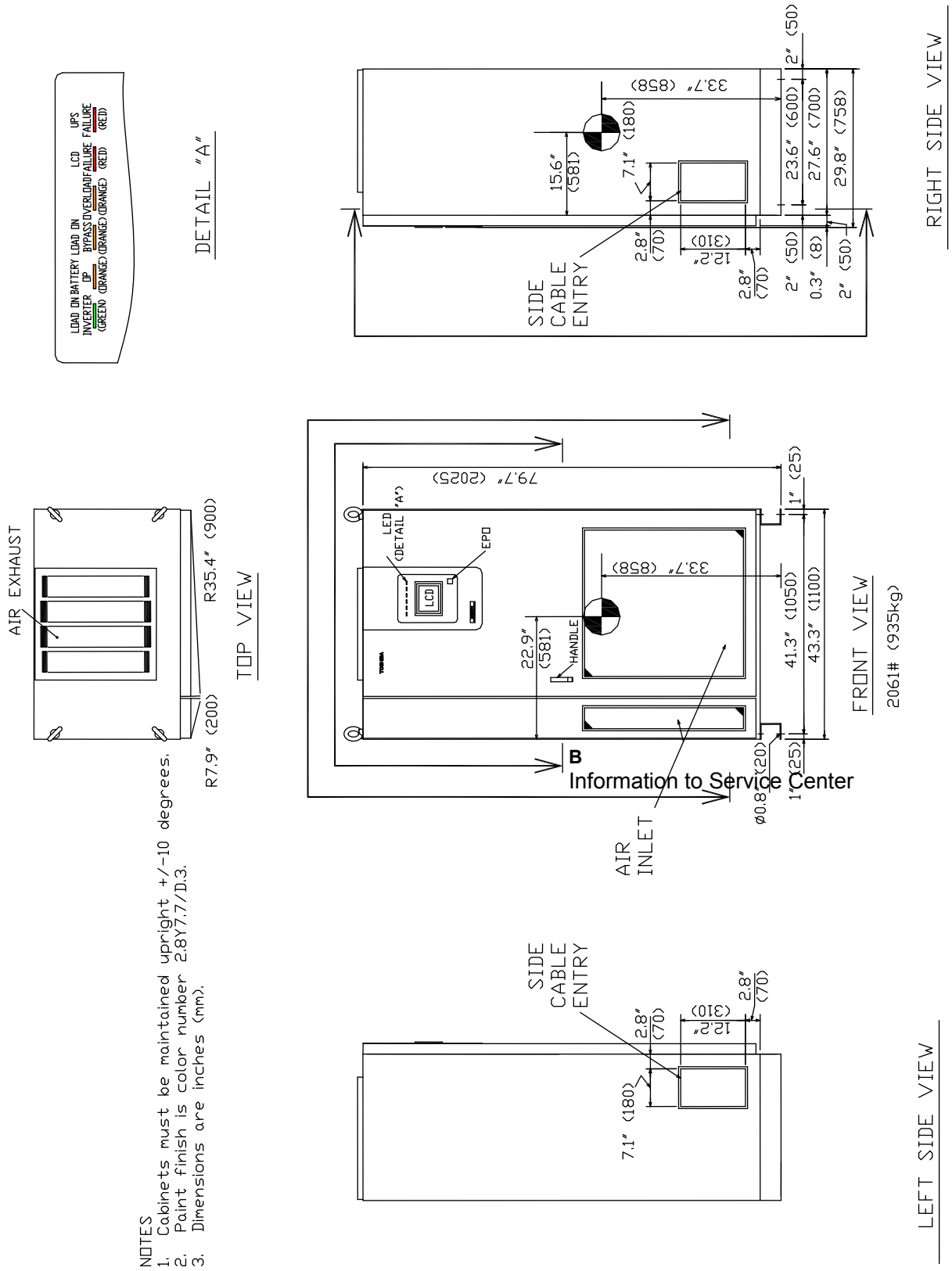
Installation Planning Guide for G8000MM 100kVA UPS



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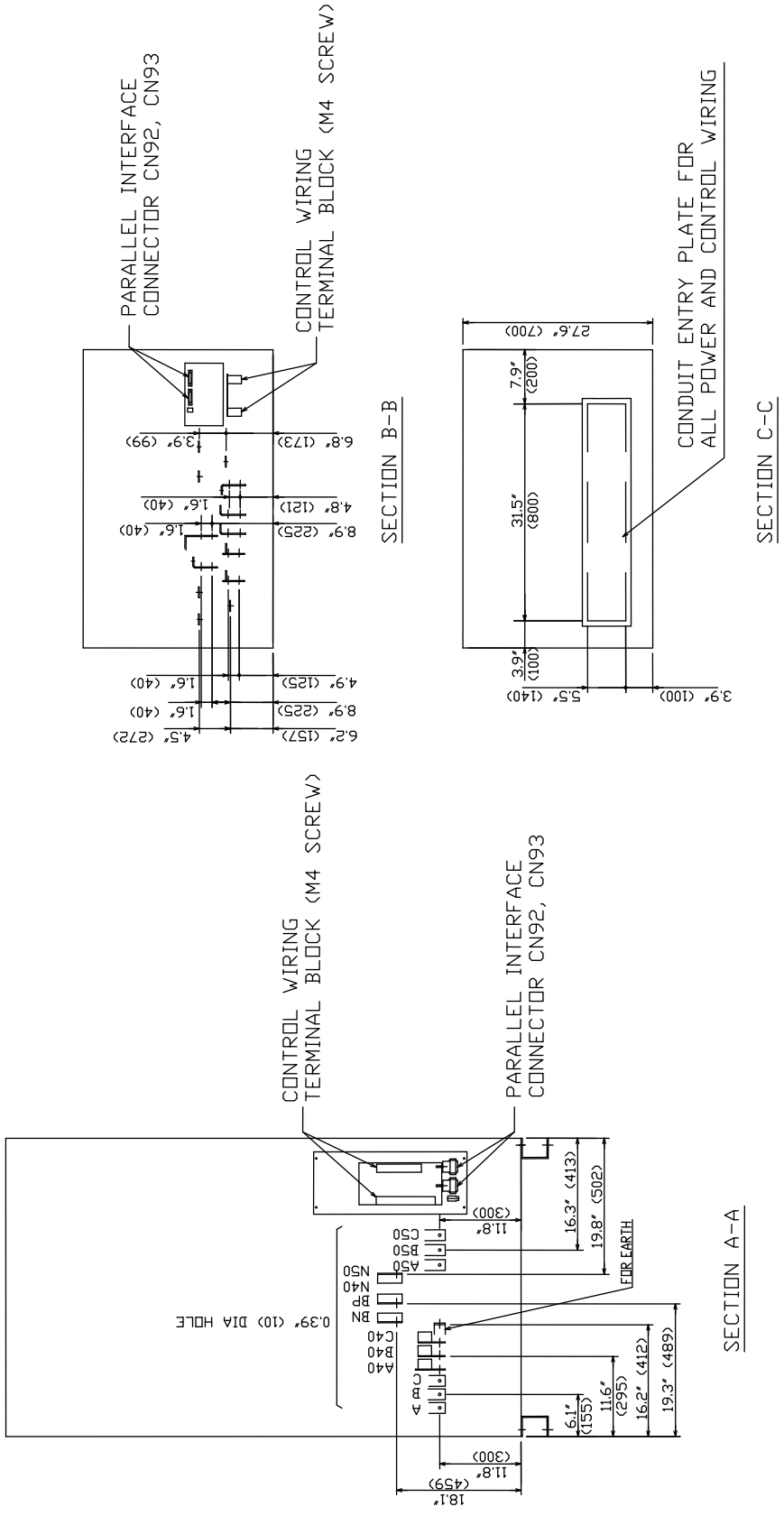

Installation Planning Guide for G8000MM 150kVA UPS

Standard System: 480V Input, 480Y/277V Output

General Mechanical Information								
Dimensions (W x D x H*)	Weight	Floor Loading	Approximate Full-Load Heat Rejection	Mechanical Clearance (Inches)from UPS for Ventilation and Maintenance Access				
Inches	Lbs.	Lbs./ft.^{2}	Btu/Hr	Top	Front	Bottom	Sides**	Back
47.2" x 29.8" x 79.7"	2579	264	28,465	24"	40"	0"	1"	0"

* Height includes removable fan housing – Frame height is 78.7."
** 0" clearance for peripheral equipment, 1" clearance for walls.

Primary AC Input (480V 3-Phase / 3-Wire)				
Maximum Input Power Demand Normal Mode (Recharge Mode)			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating
131 (140)	>0.98	158 (169)	225 AT	4/0 – 250 kcmil

Alternate (Bypass) AC Input (480V 3-Phase / 4-Wire)				
Maximum Input Power Demand			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase // Min. – Max. for Neutral
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating
150	0.8	180	225 AT	4/0 – 250 kcmil // (2) x 3/0 – (2) x 4/0

Battery Input (480VDC Nominal)			
Battery Capacity Required for Full Load Output	Maximum Discharge at Full Load Output	Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max.
kWB	Amps DC	Amps	AWG or kcmil at 75º C Temp. Rating
129	322	350 AT	(2) x 2/0 – (2) x 4/0

AC Output (480/277V 3-Phase / 4-Wire)				
Rated Output Power			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase // Min. – Max. for Neutral
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating
150	0.8	180	225 AT	4/0 – 250 kcmil // (2) x 3/0 – (2) x 4/0

Important Notes:

1. Maximum Current required at Primary AC Input based on full load output and maximum battery charging current.
2. Output load conductors are to be installed in separate conduit from input conductors.
3. Control wires and power wires are to be installed in separate conduits.
4. Recommended AC input and output overcurrent protection based on continuous full load current per NEC.
5. Wiring shall comply with all applicable national and local electrical codes.
6. Grounding conductors to be sized per NEC Article 250-122. Neutral conductors to be sized per NEC Article 310.15.
   - Primary AC Input: 3ϕ, 3-wire + ground.
   - Alternate AC Input: 3ϕ, 4-wire + ground.
   - AC Output: 3ϕ, 4-wire + ground.
   - DC Input: 2-wire (Positive/Negative) + ground.
7. Nominal battery voltage based on the use of VRLA type batteries (2.0 volts/cell nominal).
8. Maximum battery discharge current based on lowest permissible discharge voltage of 1.67 VPC.
9. DC wires should be sized to allow not more than a 2-volt drop at maximum discharge current.
10. Weights do not include batteries or other auxiliary equipment external to the UPS.
11. Cable sizing calculations based on the following assumptions:
    - Minimum size is smallest size based on ampacity at 30 °C.
    - No more than three current carrying conductors per conduit.
    - Neutral sized for 2X phase current.
    - Temperature rating of copper conductors/terminals: 75 °C.
    - Reference: 2005 NEC Handbook, Table 310.16.

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

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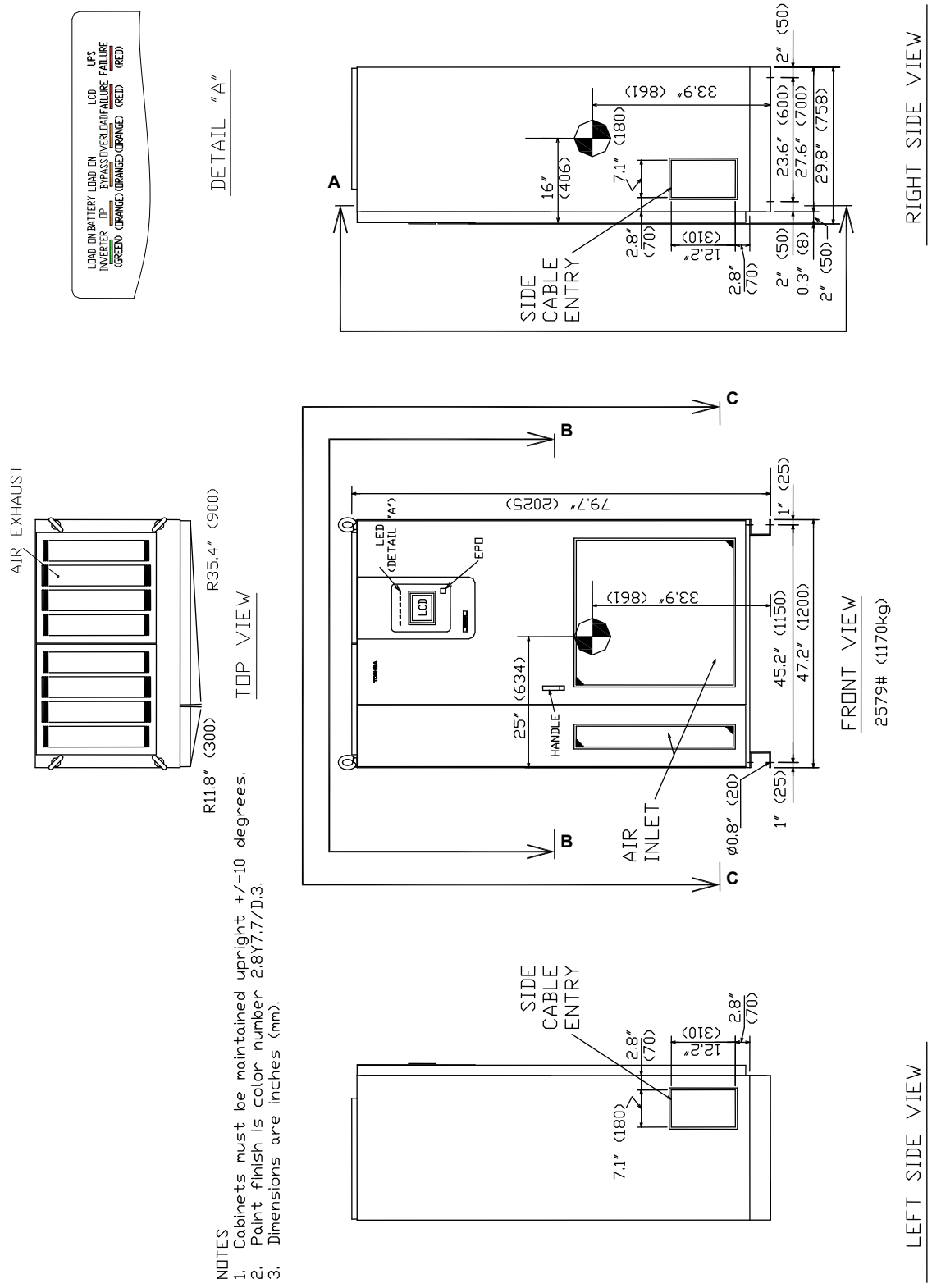
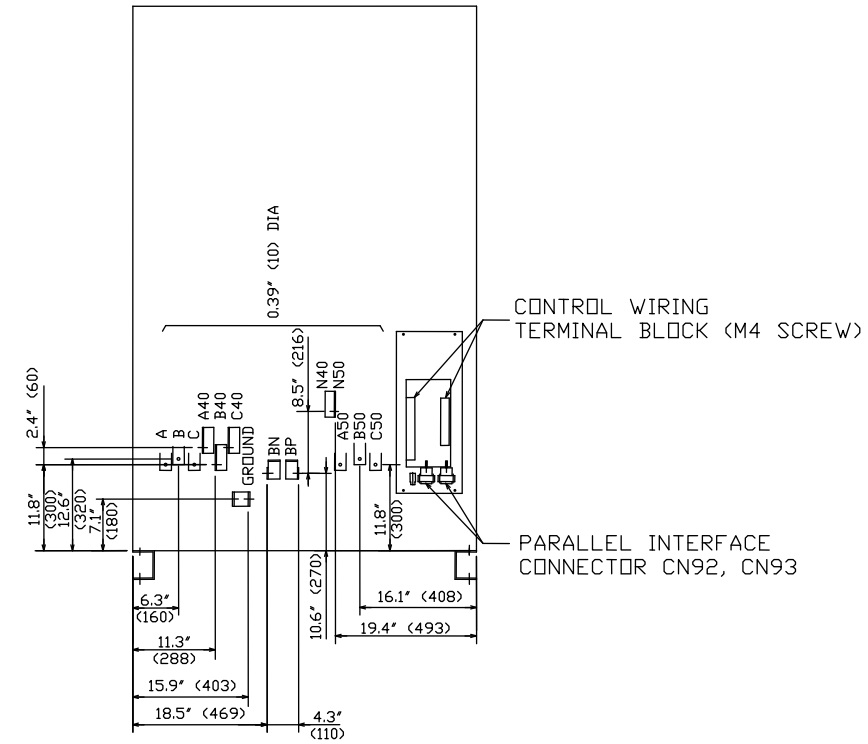
Installation Planning Guide for G8000MM 150kVA UPS



NOTES
1. Cabinets must be maintained upright +/-10 degrees.
2. Paint finish is color number 28Y7.7/D.3.
3. Dimensions are inches (mm).

Installation Planning Guide for G8000MM 150kVA UPS



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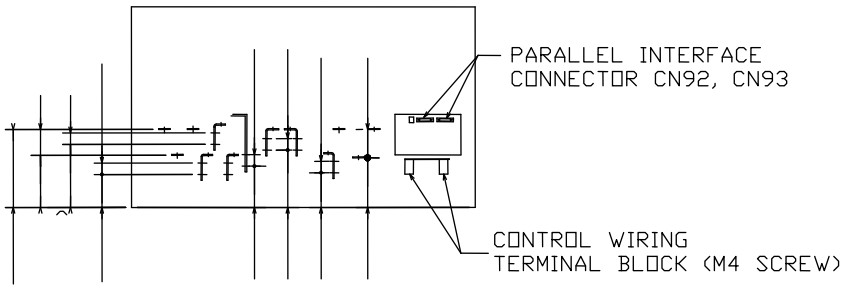

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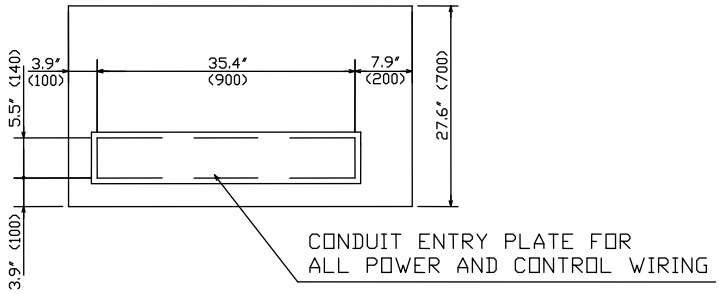

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Installation Planning Guide for G8000MM 225kVA UPS

Standard System: 480V Input, 480Y/277V Output

General Mechanical Information								
Dimensions (W x D x H*)	Weight	Floor Loading	Approximate Full-Load Heat Rejection	Mechanical Clearance (Inches)from UPS for Ventilation and Maintenance Access				
Inches	Lbs.	Lbs./ft.^{2}	Btu/Hr	Top	Front	Bottom	Sides**	Back
55.1" x 29.8" x 79.7"	3263	289	44,105	24"	40"	0"	1"	0"

* Height includes removable fan housing – Frame height is 78.7."
** 0" clearance for peripheral equipment, 1" clearance for walls.

Primary AC Input (480V 3-Phase / 3-Wire)				
Maximum Input Power Demand Normal Mode (Recharge Mode)			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating
197 (211)	>0.98	237 (254)	350 AT	500 kcmil – (2) x 3/0

Alternate (Bypass) AC Input (480V 3-Phase / 4-Wire)				
Maximum Input Power Demand			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase // Min. – Max. for Neutral
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating
225	0.8	271	350 AT	500 kcmil – (2) x 3/0 // (2) x 300 kcmil – (2) x 350 kcmil

Battery Input (480VDC Nominal)			
Battery Capacity Required for Full Load Output	Maximum Discharge at Full Load Output	Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max.
kWB	Amps DC	Amps	AWG or kcmil at 75º C Temp. Rating
194	483	500 AT	(2) x 250 kcmil – (2) x 350 kcmil

AC Output (480/277V 3-Phase / 4-Wire)				
Rated Output Power			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase // Min. – Max. for Neutral
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating
225	0.8	271	350 AT	500 kcmil – (2) x 3/0 // (2) x 300 kcmil – (2) x 350 kcmil

Important Notes:

1. Maximum Current required at Primary AC Input based on full load output and maximum battery charging current.
2. Output load conductors are to be installed in separate conduit from input conductors.
3. Control wires and power wires are to be installed in separate conduits.
4. Recommended AC input and output overcurrent protection based on continuous full load current per NEC.
5. Wiring shall comply with all applicable national and local electrical codes.
6. Grounding conductors to be sized per NEC Article 250-122. Neutral conductors to be sized per NEC Article 310.15.
   - Primary AC Input: 3ϕ, 3-wire + ground.
   - Alternate AC Input: 3ϕ, 4-wire + ground.
   - AC Output: 3ϕ, 4-wire + ground.
   - DC Input: 2-wire (Positive/Negative) + ground.
7. Nominal battery voltage based on the use of VRLA type batteries (2.0 volts/cell nominal).
8. Maximum battery discharge current based on lowest permissible discharge voltage of 1.67 VPC.
9. DC wires should be sized to allow not more than a 2-volt drop at maximum discharge current.
10. Weights do not include batteries or other auxiliary equipment external to the UPS.
11. Cable sizing calculations based on the following assumptions:
    - Minimum size is smallest size based on ampacity at 30 °C.
    - No more than three current carrying conductors per conduit.
    - Neutral sized for 2 X phase current.
    - Temperature rating of copper conductors/terminals: 75 °C.
    - Reference: 2005 NEC Handbook, Table 310.16.

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

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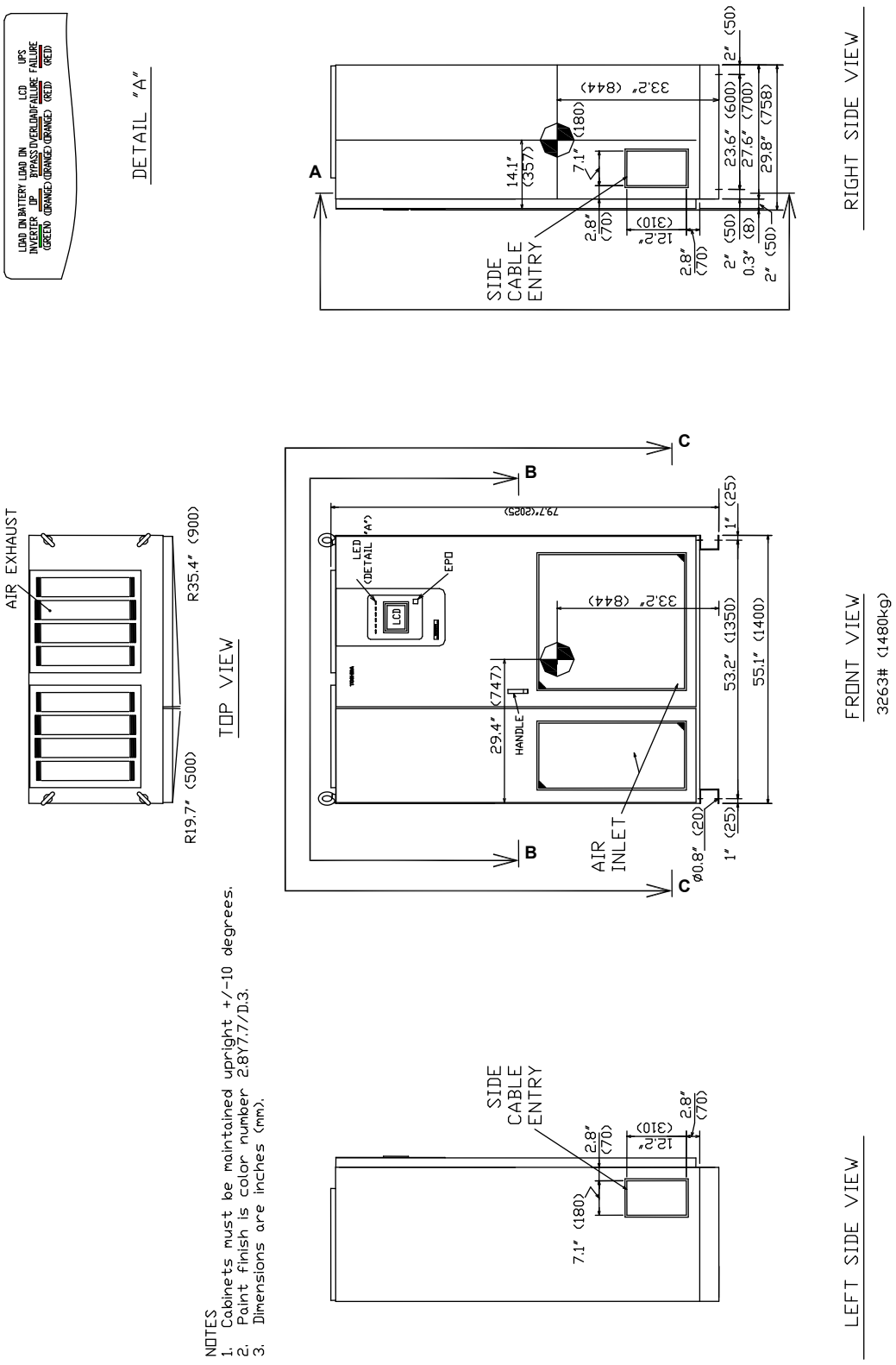

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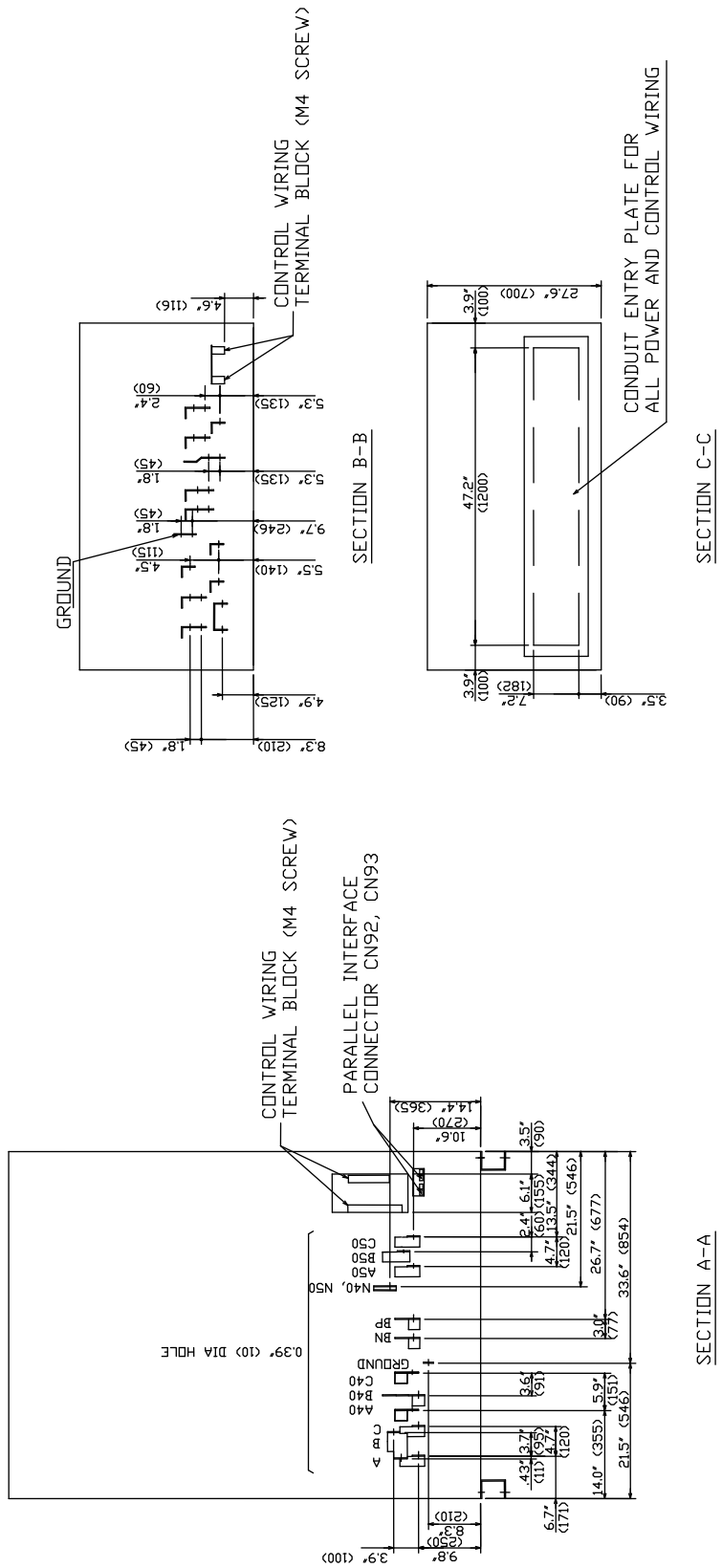

Installation Planning Guide for G8000MM 300kVA UPS

Standard System: 480V Input, 480Y/277V Output

General Mechanical Information								
Dimensions (W x D x H*)	Weight	Floor Loading	Approximate Full-Load Heat Rejection	Mechanical Clearance (Inches)from UPS for Ventilation and Maintenance Access				
Inches	Lbs.	Lbs./ft.^{2}	Btu/Hr	Top	Front	Bottom	Sides**	Back
76.8" x 37.7" x 79.7"	4,564	229	60,894	24"	43"	0"	1"	0"

* Height includes removable fan housing – Frame height is 78.7."
** 0" clearance for peripheral equipment, 1" clearance for walls.

Primary AC Input (480V 3-Phase / 3-Wire)				
Maximum Input Power Demand Normal Mode (Recharge Mode)			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase
kVA	PF	Amps	Amps	AWG or kcmil at 75° C Temp. Rating
294 (312)	>0.98	353 (376)	500 AT	(2) x 250 kcmil – (2) x 300 kcmil

Alternate (Bypass) AC Input (480V 3-Phase / 4-Wire)				
Maximum Input Power Demand			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase // Min. – Max. for Neutral
kVA	PF	Amps	Amps	AWG or kcmil at 75° C Temp. Rating
300	0.9	361	500 AT	(2) x 250 kcmil – (2) x 300 kcmil // (2) 500 kcmil – (3) x 300 kcmil

Battery Input (480VDC Nominal)			
Battery Capacity Required for Full Load Output	Maximum Discharge at Full Load Output	Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max.
kWB	Amps DC	Amps	AWG or kcmil at 75° C Temp. Rating
289	720	800 AT	(3) 250 kcmil – (3) x 350 kcmil

AC Output (480/277V 3-Phase / 4-Wire)				
Rated Output Power			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase // Min. – Max. for Neutral
kVA	PF	Amps	Amps	AWG or kcmil at 75° C Temp. Rating
300	0.9	361	500 AT	(2) x 250 kcmil – (2) x 300 kcmil // (2) 500 kcmil – (3) x 300 kcmil

Important Notes:

1. Maximum Current required at Primary AC Input based on full load output and maximum battery charging current.
2. Output load conductors are to be installed in separate conduit from input conductors.
3. Control wires and power wires are to be installed in separate conduits.
4. Recommended AC input and output overcurrent protection based on continuous full load current per NEC.
5. Wiring shall comply with all applicable national and local electrical codes.
6. Grounding conductors to be sized per NEC Article 250-122. Neutral conductors to be sized per NEC Article 310.15.
   - Primary AC Input: 3ϕ, 3-wire + ground.
   - Alternate AC Input: 3ϕ, 4-wire + ground.
   - AC Output: 3ϕ, 4-wire + ground.
   - DC Input: 2-wire (Positive/Negative) + ground.
7. Nominal battery voltage based on the use of VRLA type batteries (2.0 volts/cell nominal).
8. Maximum battery discharge current based on lowest permissible discharge voltage of 1.67 VPC.
9. DC wires should be sized to allow not more than a 2-volt drop at maximum discharge current.
10. Weights do not include batteries or other auxiliary equipment external to the UPS.
11. Cable sizing calculations based on the following assumptions:
    - Minimum size is smallest size based on ampacity at 30 °C.
    - No more than three current carrying conductors per conduit.
    - Neutral sized for 2 X phase current.
    - Temperature rating of copper conductors/terminals: 75 °C.
    - Reference: 2005 NEC Handbook, Table 310.16.

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

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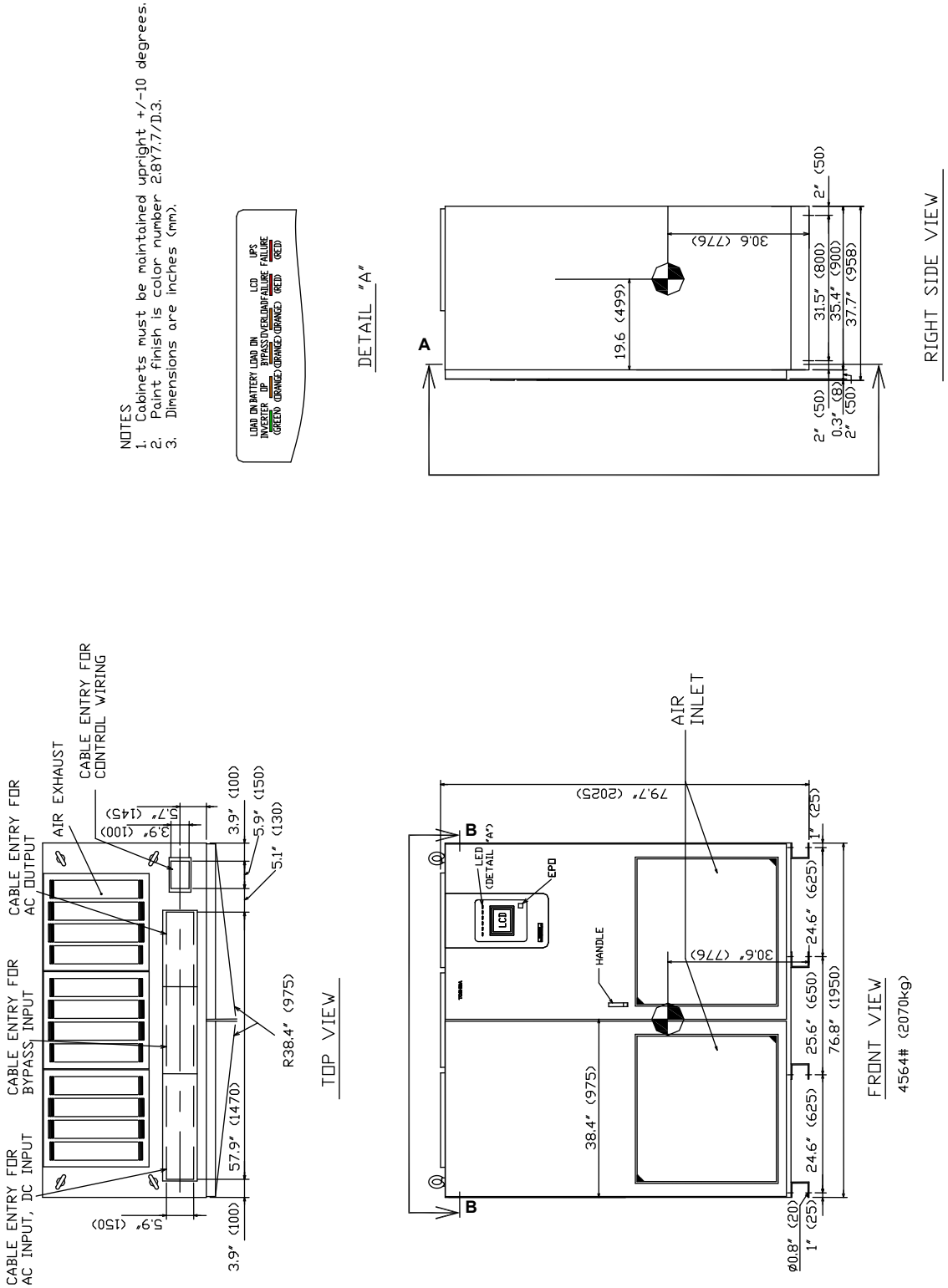
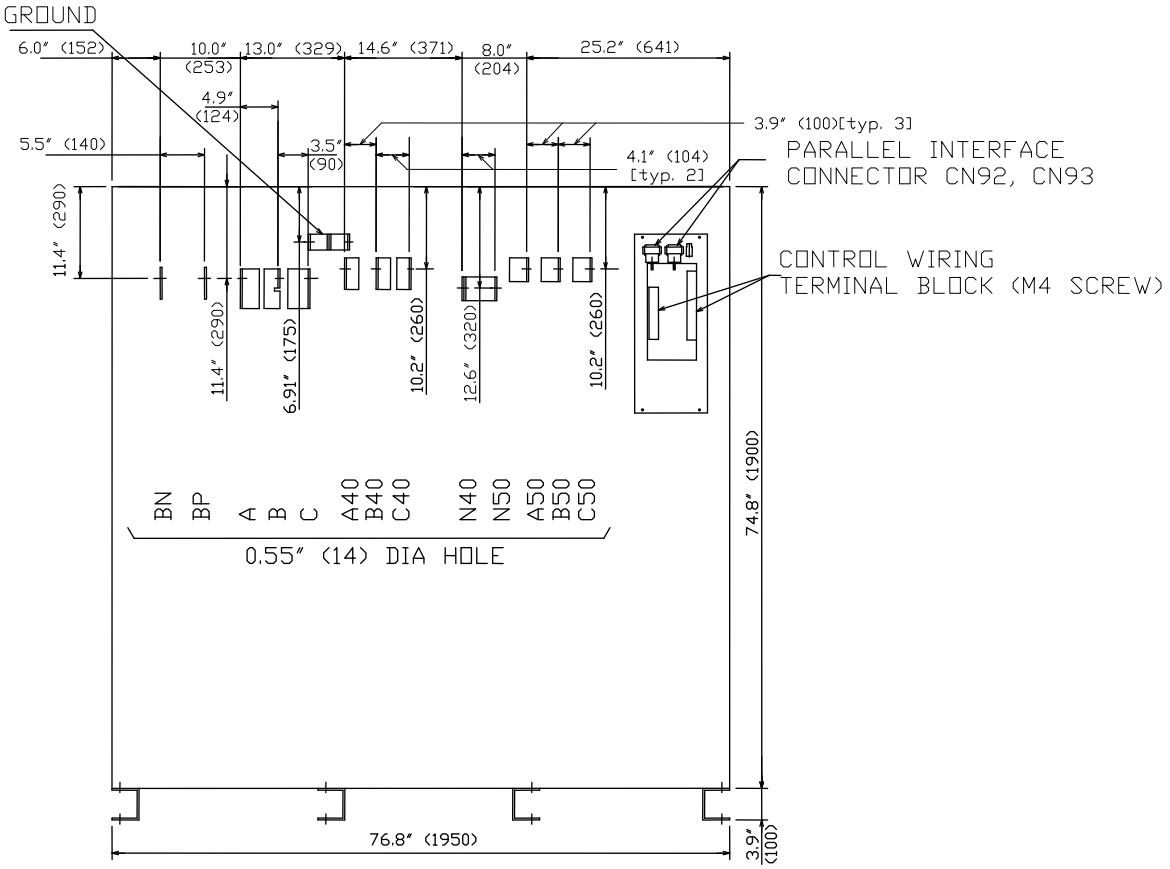
Installation Planning Guide for G8000MM 300kVA UPS



Installation Planning Guide for G8000MM 300kVA UPS



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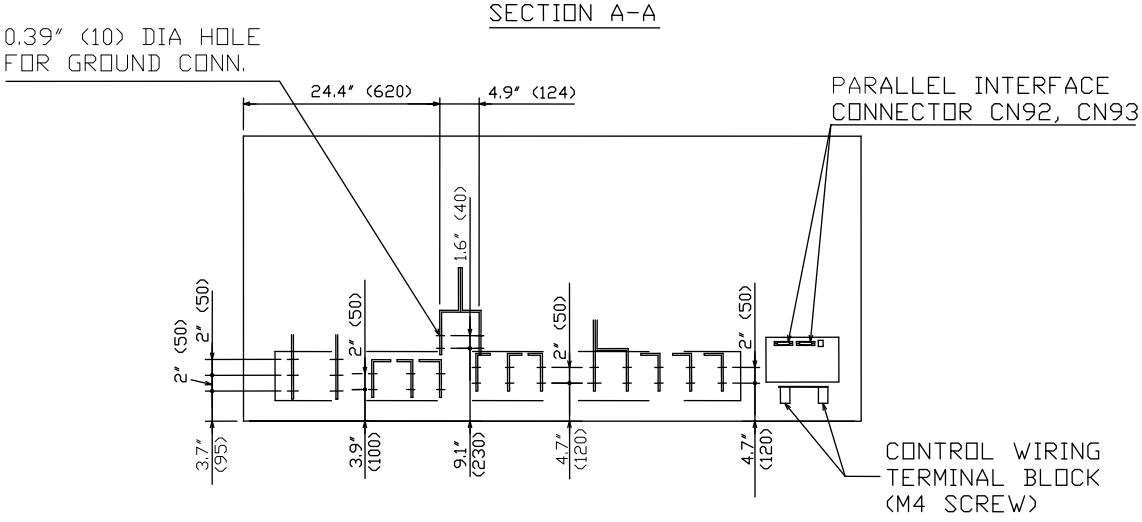

SECTION B-B

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Installation Planning Guide for G8000MM 375kVA UPS

Standard System: 480V Input, 480Y/277V Output

General Mechanical Information								
Dimensions (W x D x H*)	Weight	Floor Loading	Approximate Full-Load Heat Rejection	Mechanical Clearance (Inches)from UPS for Ventilation and Maintenance Access				
Inches	Lbs.	Lbs./ft.^{2}	Btu/Hr	Top	Front	Bottom	Sides**	Back
76.8" x 37.7" x 79.7"	4916	247	76,117	24"	43"	0"	1"	0"

* Height includes removable fan housing – Frame height is 78.7."
** 0" clearance for peripheral equipment, 1" clearance for walls.

Primary AC Input (480V 3-Phase / 3-Wire)				
Maximum Input Power Demand Normal Mode (Recharge Mode)			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating
367 (391)	>0.98	442(470)	600 AT	(3) x 3/0 – (2) x 350 kcmil

Alternate (Bypass) AC Input (480V 3-Phase / 4-Wire)				
Maximum Input Power Demand			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase // Min. – Max. for Neutral
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating
375	0.9	451	600 AT	(3) x 3/0 – (2) x 350 kcmil // (3) x 350 kcmil – (3) x 400 kcmil

Battery Input (480VDC Nominal)			
Battery Capacity Required for Full Load Output	Maximum Discharge at Full Load Output	Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max.
kWB	Amps DC	Amps	AWG or kcmil at 75º C Temp. Rating
361	902	900 AT	(3) x 350 kcmil – (4) x 4/0 kcmil

AC Output (480/277V 3-Phase / 4-Wire)				
Rated Output Power			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase // Min. – Max. for Neutral
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating
375	0.9	451	600 AT	(3) x 3/0 – (2) x 350 kcmil // (3) x 350 kcmil – (3) x 400 kcmil

Important Notes:

1. Maximum Current required at Primary AC Input based on full load output and maximum battery charging current.
2. Output load conductors are to be installed in separate conduit from input conductors.
3. Control wires and power wires are to be installed in separate conduits.
4. Recommended AC input and output overcurrent protection based on continuous full load current per NEC.
5. Wiring shall comply with all applicable national and local electrical codes.
6. Grounding conductors to be sized per NEC Article 250-122. Neutral conductors to be sized per NEC Article 310.15.
   - Primary AC Input: 3ϕ, 3-wire + ground.
   - Alternate AC Input: 3ϕ, 4-wire + ground.
   - AC Output: 3ϕ, 4-wire + ground.
   - DC Input: 2-wire (Positive/Negative) + ground.
7. Nominal battery voltage based on the use of VRLA type batteries (2.0 volts/cell nominal).
8. Maximum battery discharge current based on lowest permissible discharge voltage of 1.67 VPC.
9. DC wires should be sized to allow not more than a 2-volt drop at maximum discharge current.
10. Weights do not include batteries or other auxiliary equipment external to the UPS.
11. Cable sizing calculations based on the following assumptions:
    - Minimum size is smallest size based on ampacity at 30 °C.
    - No more than three current carrying conductors per conduit.
    - Neutral sized for 2 X phase current.
    - Temperature rating of copper conductors/terminals: 75 °C.
    - Reference: 2005 NEC Handbook, Table 310.16.

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

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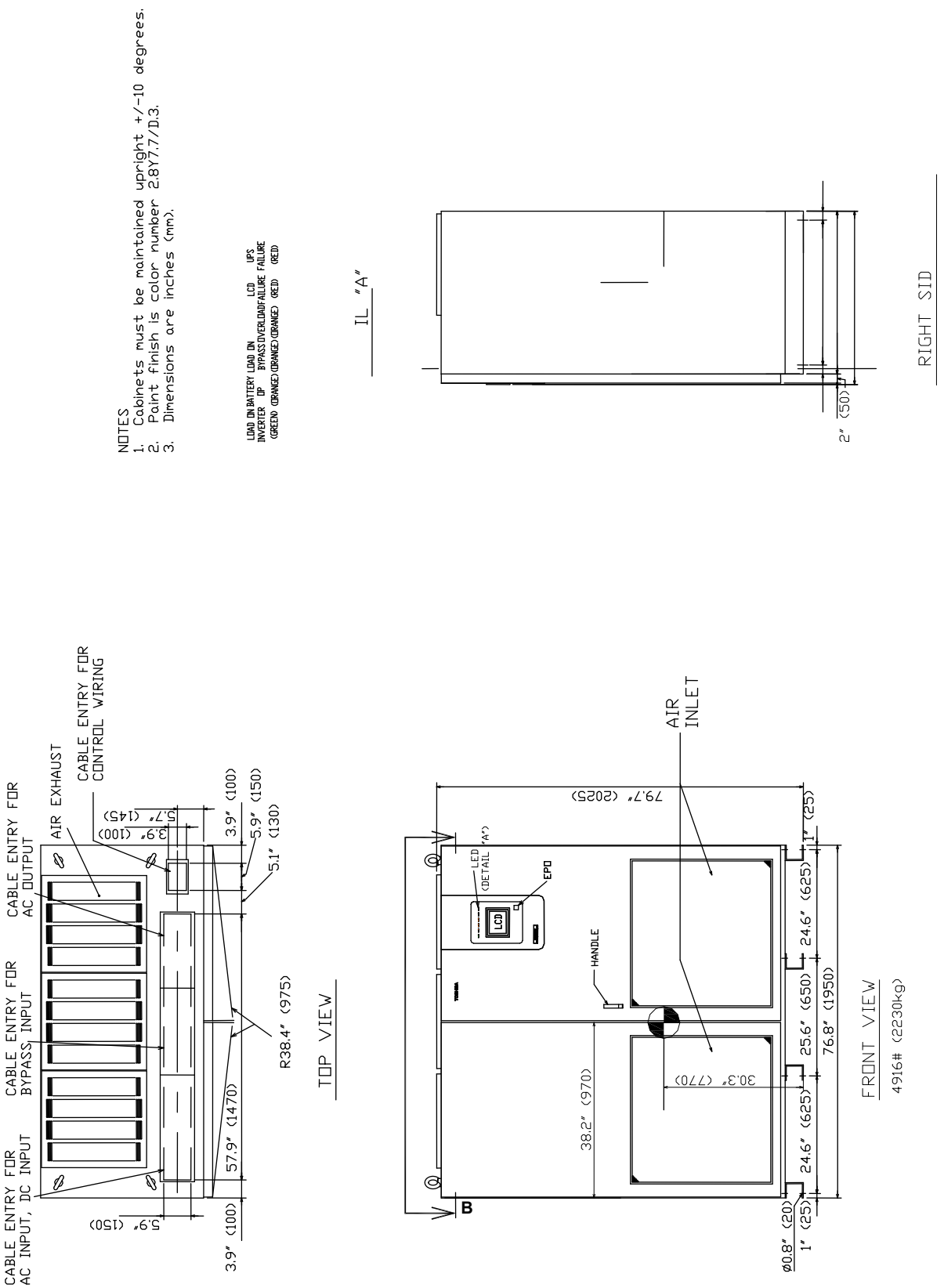

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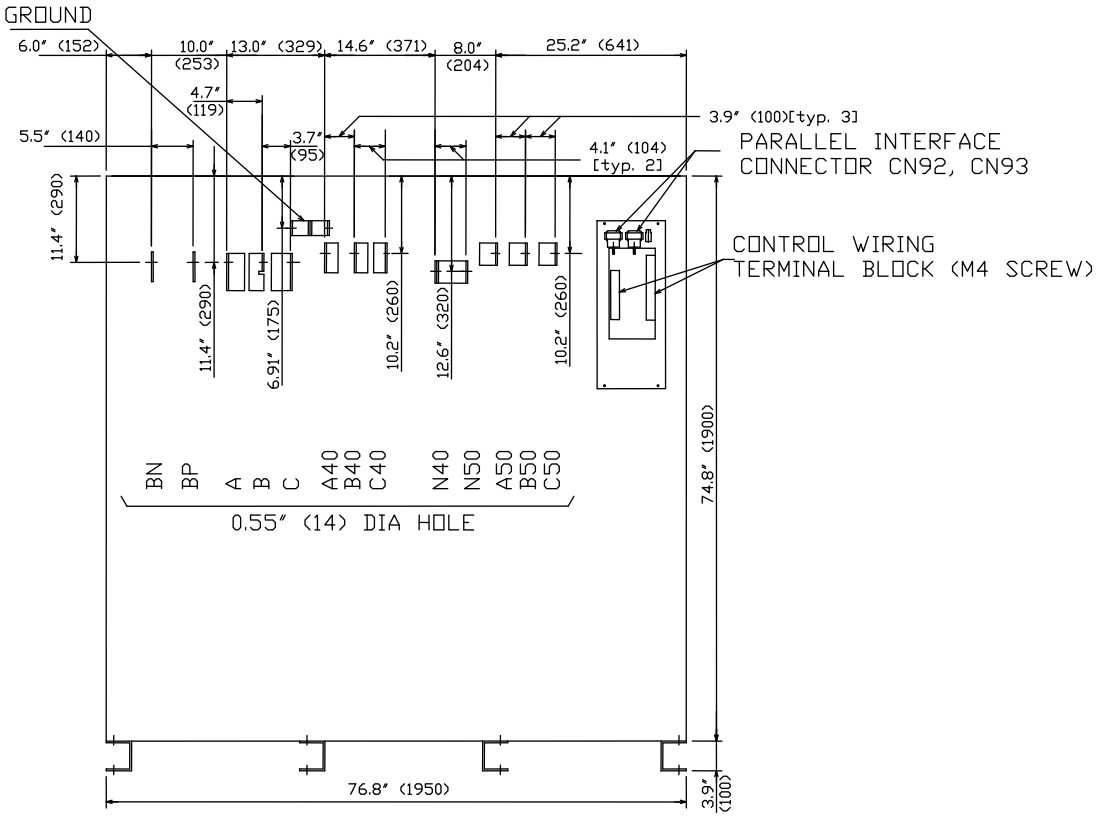

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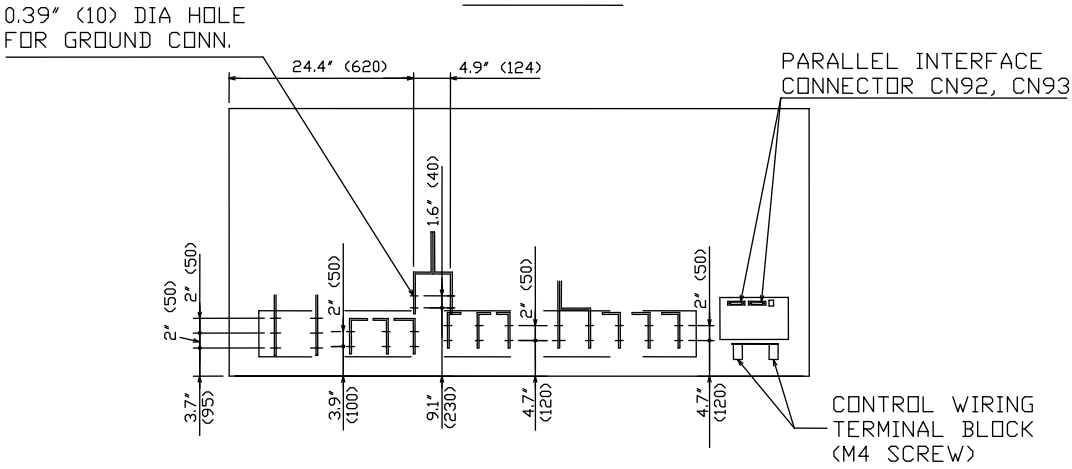

Installation Planning Guide for G8000MM 500kVA UPS

Standard System: 480V Input, 480Y/277V Output

General Mechanical Information								
Dimensions (W x D x H*)	Weight	Floor Loading	Approximate Full-Load Heat Rejection	Mechanical Clearance (Inches)from UPS for Ventilation and Maintenance Access				
Inches	Lbs.	Lbs./ft.^{2}	Btu/Hr	Top	Front	Bottom	Sides**	Back
114.2" x 37.7" x 79.7"	6,923	233	96,271	24"	43"	0"	1"	0"

Primary AC Input (480V 3-Phase / 3-Wire)				
Maximum Input Power Demand Normal Mode (Recharge Mode)			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase
kVA	PF	Amps	Amps	AWG or kcmil at 75° C Temp. Rating
488 (519)	>0.98	587 (624)	800 AT	(3) x 300 kcmil – (3) x 350 kcmil

Alternate (Bypass) AC Input (480V 3-Phase / 4-Wire)				
Maximum Input Power Demand			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase // Min. – Max. for Neutral
kVA	PF	Amps	Amps	AWG or kcmil at 75° C Temp. Rating
500	0.9	601	800 AT	(3) x 300 kcmil – (3) x 350 kcmil // (4) x 350 kcmil – (4) x 400 kcmil

Battery Input (480VDC Nominal)			
Battery Capacity Required for Full Load Output	Maximum Discharge at Full Load Output	Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max.
kWB	Amps DC	Amps	AWG or kcmil at 75° C Temp. Rating
479	1,194	1200 AT	(4) x 350 kcmil – (4) x 400 kcmil

AC Output (480/277V 3-Phase / 4-Wire)				
Rated Output Power			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase // Min. – Max. for Neutral
kVA	PF	Amps	Amps	AWG or kcmil at 75° C Temp. Rating
500	0.9	601	800 AT	(3) x 300 kcmil – (3) x 350 kcmil // (4) x 350 kcmil – (4) x 400 kcmil

Important Notes:

1. Maximum Current required at Primary AC Input based on full load output and maximum battery charging current.
2. Output load conductors are to be installed in separate conduit from input conductors.
3. Control wires and power wires are to be installed in separate conduits.
4. Recommended AC input and output overcurrent protection based on continuous full load current per NEC.
5. Wiring shall comply with all applicable national and local electrical codes.
6. Grounding conductors to be sized per NEC Article 250-122. Neutral conductors to be sized per NEC Article 310.15.
   - Primary AC Input: 3ϕ, 3-wire + ground.
   - Alternate AC Input: 3ϕ, 4-wire + ground.
   - AC Output: 3ϕ, 4-wire + ground.
   - DC Input: 2-wire (Positive/Negative) + ground.
7. Nominal battery voltage based on the use of VRLA type batteries (2.0 volts/cell nominal).
8. Maximum battery discharge current based on lowest permissible discharge voltage of 1.67 VPC.
9. DC wires should be sized to allow not more than a 2-volt drop at maximum discharge current.
10. Weights do not include batteries or other auxiliary equipment external to the UPS.
11. Cable sizing calculations based on the following assumptions:
    - Minimum size is smallest size based on ampacity at 30 °C.
    - No more than three current carrying conductors per conduit.
    - Neutral sized for 2 X phase current.
    - Temperature rating of copper conductors/terminals: 75 °C.
    - Reference: 2005 NEC Handbook, Table 310.16.

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

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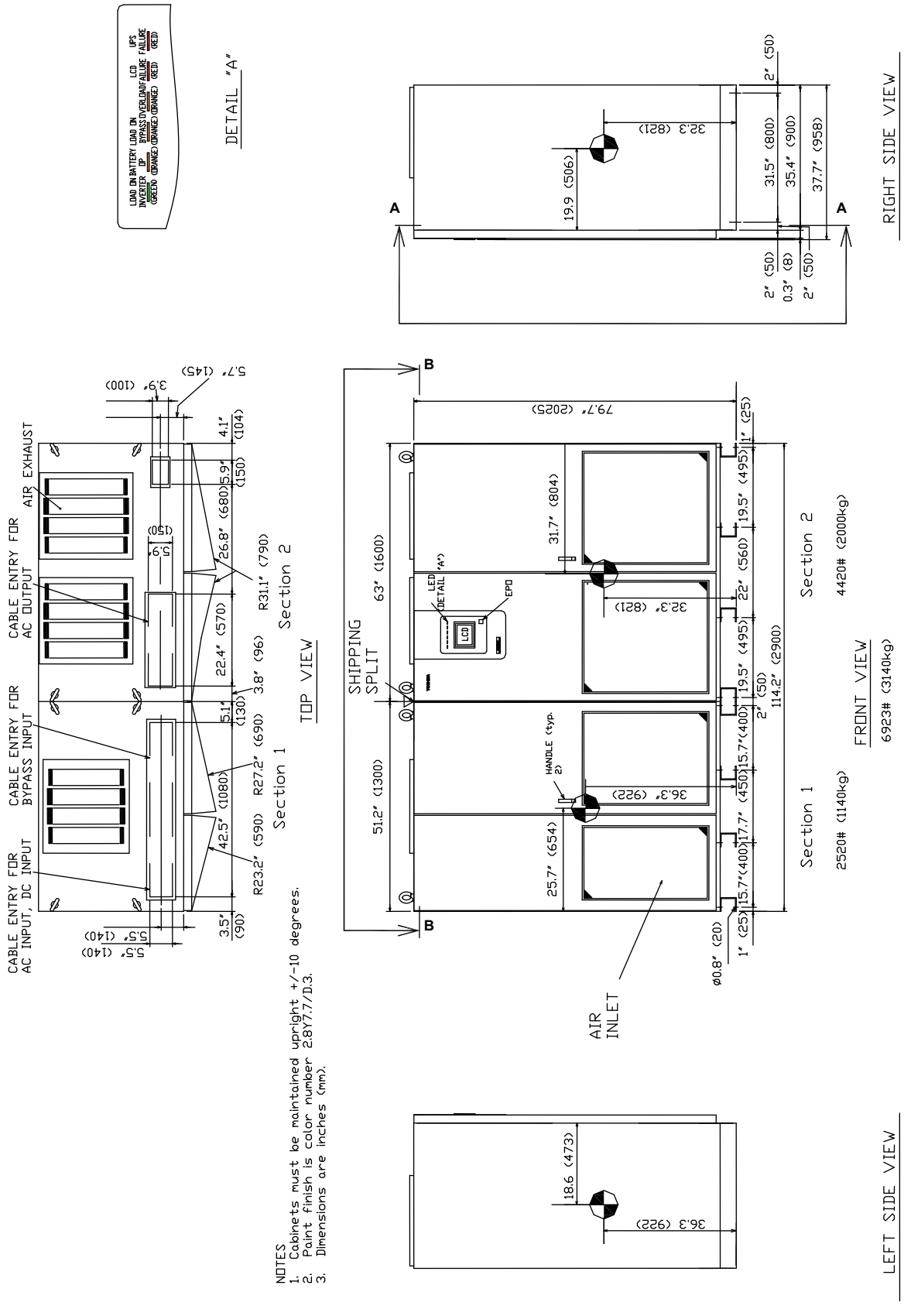

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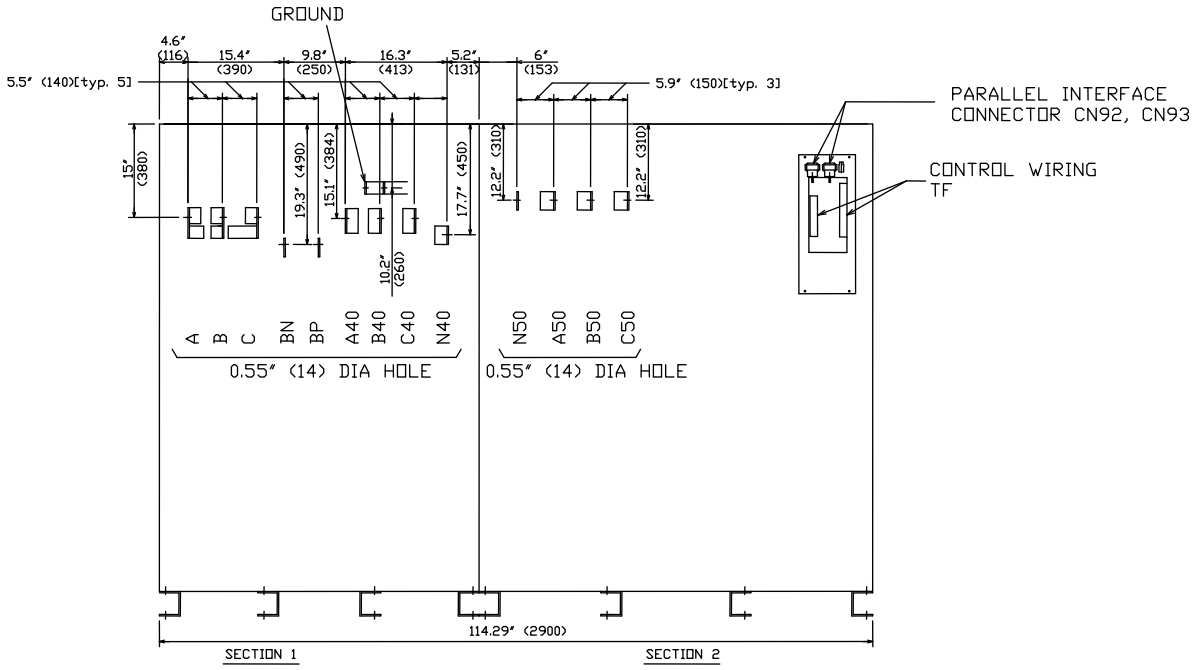

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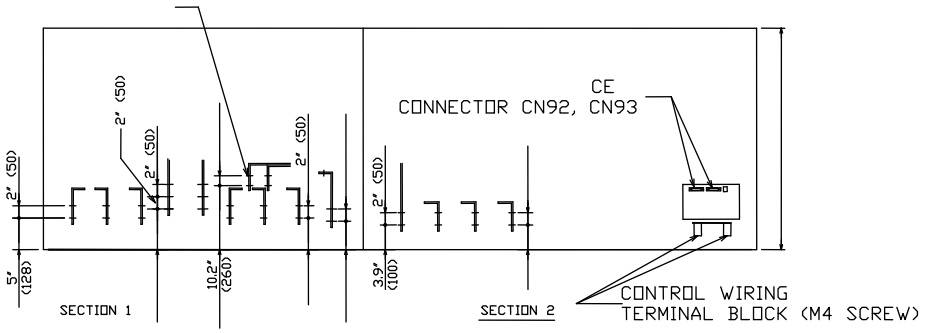

SECTION B-B

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Installation Planning Guide for G8000MM 625kVA UPS

Standard System: 480V Input, 480Y/277V Output

General Mechanical Information								
Dimensions (W x D x H*)	Weight	Floor Loading	Approximate Full-Load Heat Rejection	Mechanical Clearance (Inches) from UPS for Ventilation and Maintenance Access				
Inches	Lbs.	Lbs./ft.^{2}	Btu/Hr	Top	Front	Bottom	Sides**	Back
129.9" x 49.5" x 79.7"	9,193	207	120,339	24"	43"	0"	1"	0"

* Height includes removable fan housing – Frame height is 78.7."
** 0" clearance for peripheral equipment, 1" clearance for walls.

Primary AC Input (480V 3-Phase / 3-Wire)				
Maximum Input Power Demand Normal Mode (Recharge Mode)			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating
610 (654)	>0.98	734 (787)	1000 AT	(3) x 400 kcmil – (3) x 500 kcmil

Alternate (Bypass) AC Input (480V 3-Phase / 4-Wire)				
Maximum Input Power Demand			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase // Min. – Max. for Neutral
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating
625	0.9	752	1000 AT	(3) x 400 kcmil – (3) x 500 kcmil // (4) x 500 kcmil – (5) x 350 kcmil

Battery Input (480VDC Nominal)			
Battery Capacity Required for Full Load Output	Maximum Discharge at Full Load Output	Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max.
kWB	Amps DC	Amps	AWG or kcmil at 75º C Temp. Rating
598	1493	1600 AT	(5) x 400 kcmil – (5) x 500 kcmil

AC Output (480/277V 3-Phase / 4-Wire)				
Rated Output Power			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase // Min. – Max. for Neutral
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating
625	0.9	752	1000 AT	(3) x 400 kcmil – (3) x 500 kcmil // (4) x 500 kcmil – (5) x 350 kcmil

Important Notes:

1. Maximum Current required at Primary AC Input based on full load output and maximum battery charging current.
2. Output load conductors are to be installed in separate conduit from input conductors.
3. Control wires and power wires are to be installed in separate conduits.
4. Recommended AC input and output overcurrent protection based on continuous full load current per NEC.
5. Wiring shall comply with all applicable national and local electrical codes.
6. Grounding conductors to be sized per NEC Article 250-122. Neutral conductors to be sized per NEC Article 310.15.
   - Primary AC Input: 3ϕ, 3-wire + ground.
   - Alternate AC Input: 3ϕ, 4-wire + ground.
   - AC Output: 3ϕ, 4-wire + ground.
   - DC Input: 2-wire (Positive/Negative) + ground.
7. Nominal battery voltage based on the use of VRLA type batteries (2.0 volts/cell nominal).
8. Maximum battery discharge current based on lowest permissible discharge voltage of 1.67 VPC.
9. DC wires should be sized to allow not more than a 2-volt drop at maximum discharge current.
10. Weights do not include batteries or other auxiliary equipment external to the UPS.
11. Cable sizing calculations based on the following assumptions:
    - Minimum size is smallest size based on ampacity at 30 °C.
    - No more than three current carrying conductors per conduit.
    - Neutral sized for 2 X phase current.
    - Temperature rating of copper conductors/terminals: 75 °C.
    - Reference: 2005 NEC Handbook, Table 310.16.

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

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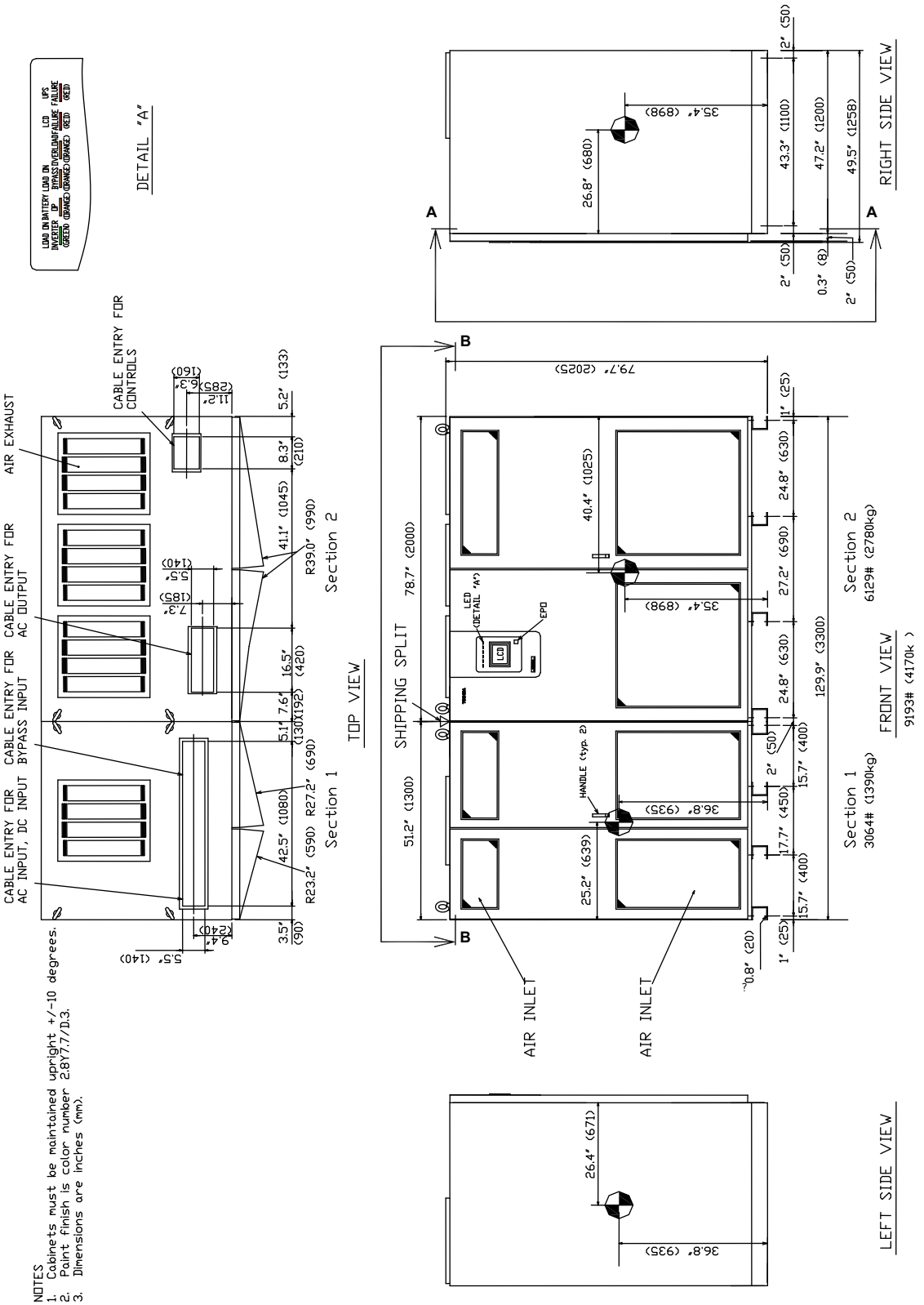

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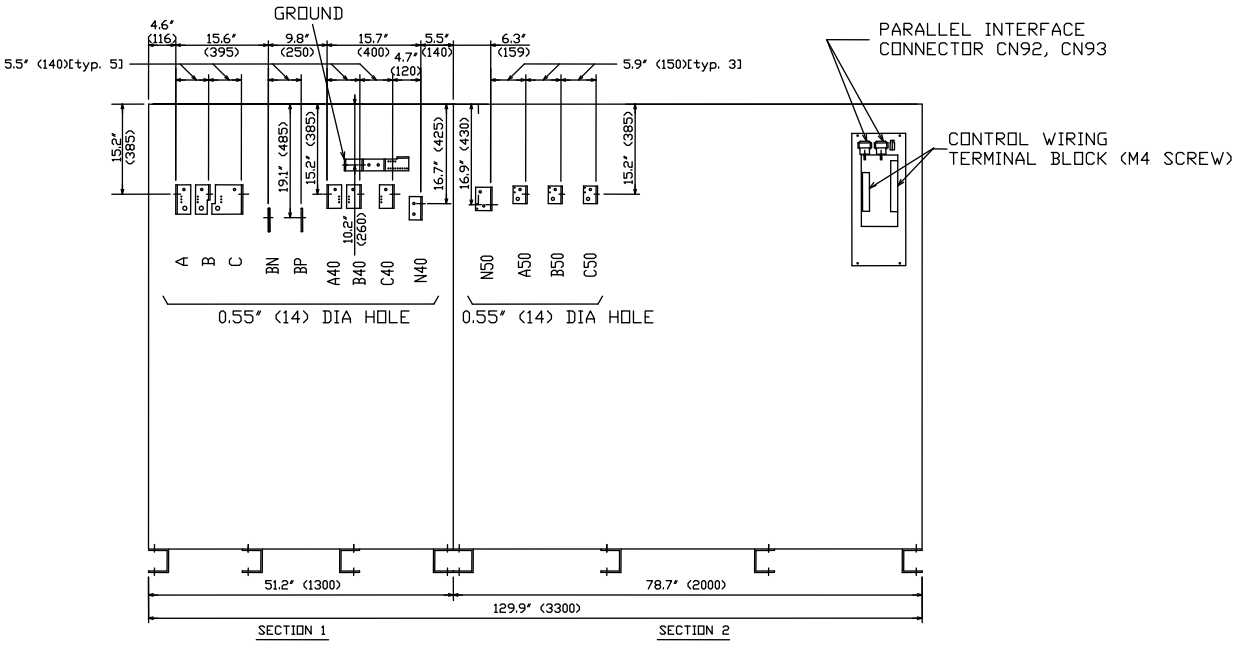
Installation Planning Guide for G8000MM 625kVA UPS



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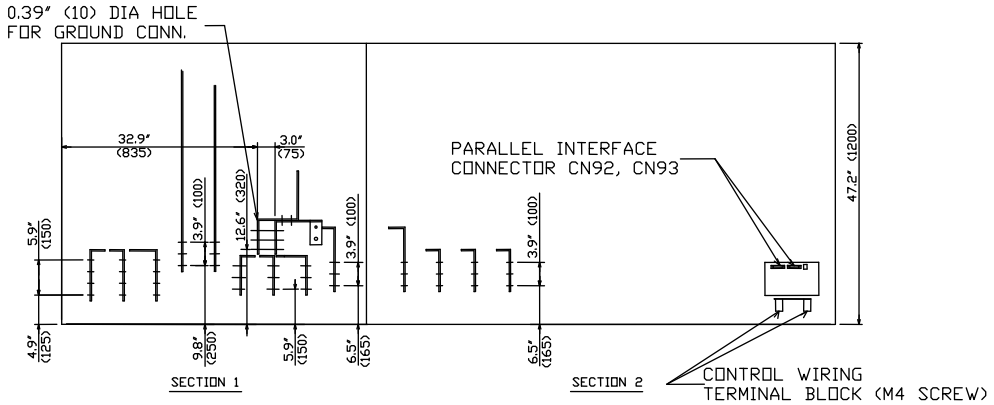

SECTION B-B

Installation Planning Guide for G8000MM 750kVA UPS

Standard System: 480V Input, 480Y/277V Output

General Mechanical Information								
Dimensions (W x D x H*)	Weight	Floor Loading	Approximate Full-Load Heat Rejection	Mechanical Clearance (Inches)from UPS for Ventilation and Maintenance Access				
Inches	Lbs.	Lbs./ft.^{2}	Btu/Hr	Top	Front	Bottom	Sides**	Back
129.9" x 49.5" x 79.7"	9,193	207	144,407	24"	43"	0"	1"	0"

* Height includes removable fan housing – Frame height is 78.7."
** 0" clearance for peripheral equipment, 1" clearance for walls.

Primary AC Input (480V 3-Phase / 3-Wire)				
Maximum Input Power Demand Normal Mode (Recharge Mode)			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating
732 (776)	>0.98	880 (934)	1200 AT	(3) x 600 kcmil – (4) x 400 kcmil

Alternate (Bypass) AC Input (480V 3-Phase / 4-Wire)				
Maximum Input Power Demand			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase // Min. – Max. for Neutral
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating
750	0.9	902	1200 AT	(3) x 600 kcmil – (4) x 400 kcmil // (5) x 500 kcmil – (5) x 600 kcmil

Battery Input (480VDC Nominal)			
Battery Capacity Required for Full Load Output	Maximum Discharge at Full Load Output	Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max.
kWB	Amps DC	Amps	AWG or kcmil at 75º C Temp. Rating
718	1792	2000 AT	(6) x 400 kcmil – (6) x 500 kcmil

AC Output (480/277V 3-Phase / 4-Wire)				
Rated Output Power			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase // Min. – Max. for Neutral
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating
750	0.9	902	1200 AT	(3) x 600 kcmil – (4) x 400 kcmil // (5) x 500 kcmil – (5) x 600 kcmil

Important Notes:

1. Maximum Current required at Primary AC Input based on full load output and maximum battery charging current.
2. Output load conductors are to be installed in separate conduit from input conductors.
3. Control wires and power wires are to be installed in separate conduits.
4. Recommended AC input and output overcurrent protection based on continuous full load current per NEC.
5. Wiring shall comply with all applicable national and local electrical codes.
6. Grounding conductors to be sized per NEC Article 250-122. Neutral conductors to be sized per NEC Article 310.15.
   - Primary AC Input: 3ϕ, 3-wire + ground.
   - Alternate AC Input: 3ϕ, 4-wire + ground.
   - AC Output: 3ϕ, 4-wire + ground.
   - DC Input: 2-wire (Positive/Negative) + ground.
7. Nominal battery voltage based on the use of VRLA type batteries (2.0 volts/cell nominal).
8. Maximum battery discharge current based on lowest permissible discharge voltage of 1.67 VPC.
9. DC wires should be sized to allow not more than a 2-volt drop at maximum discharge current.
10. Weights do not include batteries or other auxiliary equipment external to the UPS.
11. Cable sizing calculations based on the following assumptions:
    - Minimum size is smallest size based on ampacity at 30 °C.
    - No more than three current carrying conductors per conduit.
    - Neutral sized for 2 X phase current.
    - Temperature rating of copper conductors/terminals: 75 °C.
    - Reference: 2005 NEC Handbook, Table 310.16.

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

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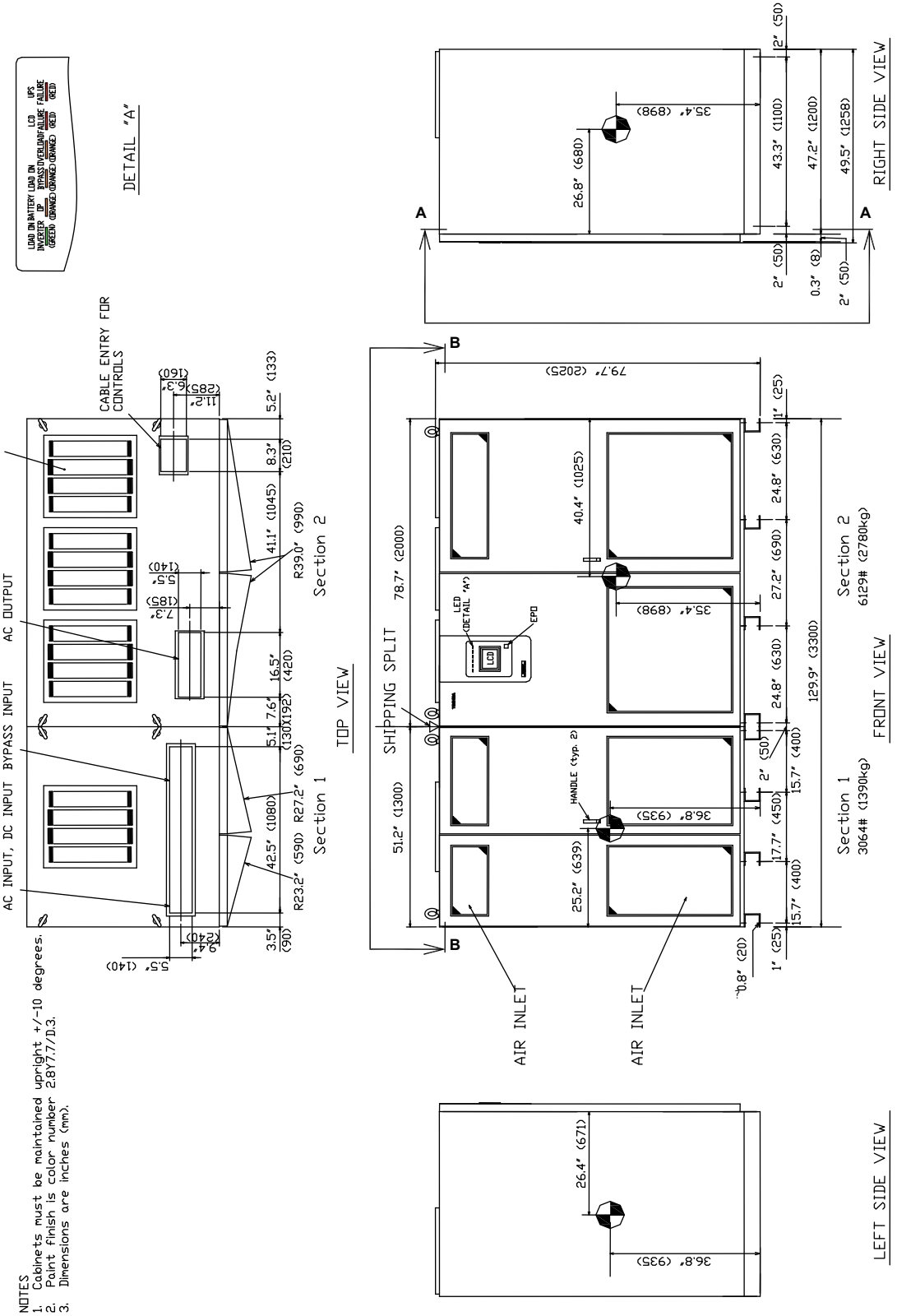

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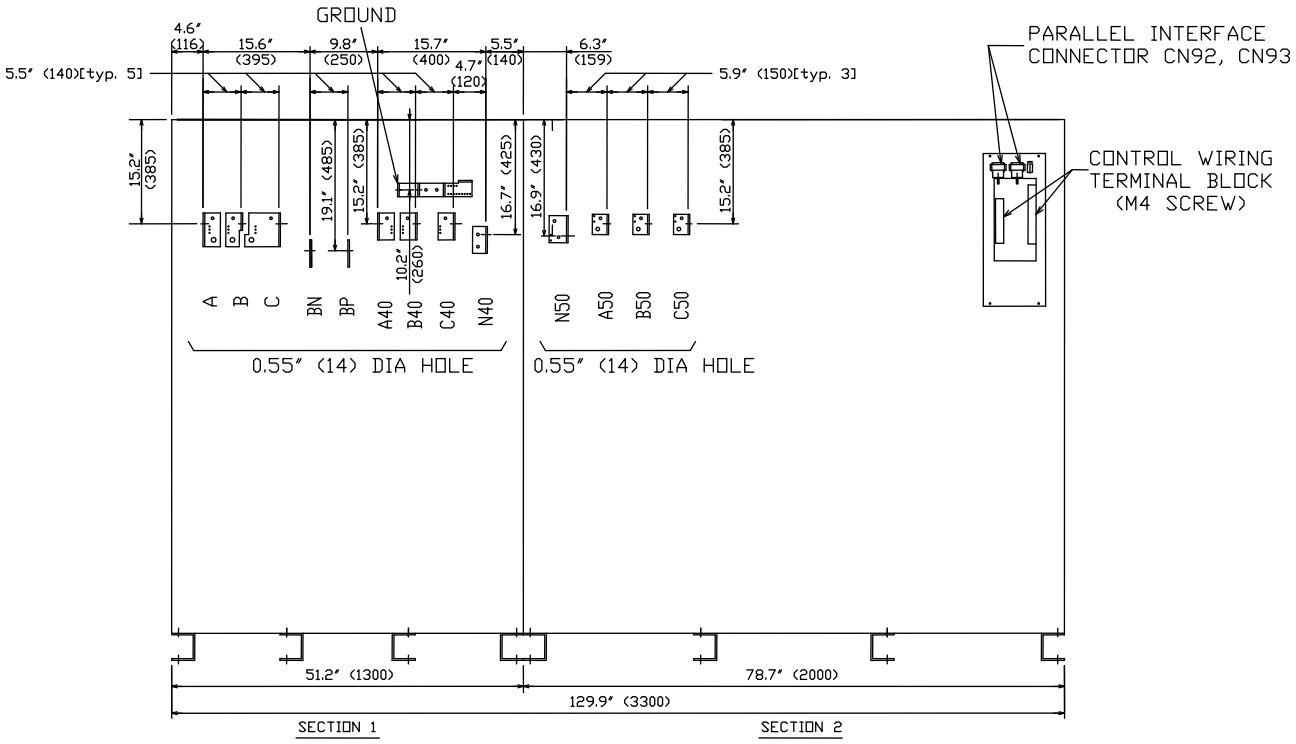

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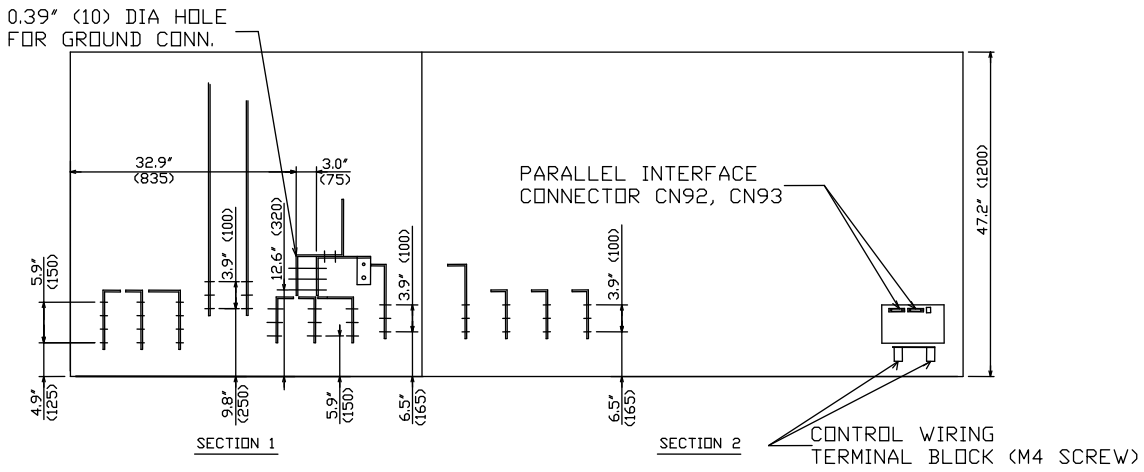

SECTION B-B

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