TOSHIBA
Leading Innovation

UNINTERRUPTIBLE POWER SYSTEM (UPS)

G9000 SERIES

INSTALLATION AND OPERATION MANUAL

480/480 V 1000kVA

Document No.: 91649-006
Reference: 4GBA0051 Rev. C
June 2015

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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 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 36 months full replacement, and an additional 7 years pro-rated 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.

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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 (855) 803-7087.

You may contact TOSHIBA by writing to:

TOSHIBA INTERNATIONAL CORPORATION.

SOCIAL INFRASTRUCTURE SYSTEMS GROUP
POWER ELECTRONICS DIVISION
13131 West Little York Rd.
Houston, TX 77041-9990
Attn: UPS Product Manager

www.toshiba.com/tic/industrial/uninterruptible-power-systems

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Table of Contents

List of Figures ii
List of Tables iii
1 HOW TO USE THIS MANUAL 1
2 INTRODUCTION 2
2.1 SAFETY PRECAUTIONS 2
2.2 GENERAL 5
2.3 DEFINITIONS 6
2.4 OPERATION OVERVIEW 7
3 SPECIFICATIONS 14
4 OPERATOR CONTROLS AND INDICATORS 18
4.1 LED DISPLAY 18
4.2 EPO BUTTON (Emergency Power Off Button) (7) 19
4.3 LIQUID CRYSTAL DISPLAY (8) 19
4.3.1 Test Mode Options 19
4.3.2 Menu 20
4.3.3 Input Power Failure 23
4.3.4 Fault Indication 23
4.4 EXTERNAL SIGNAL TERMINAL BLOCK 25
5 RemotEye 4 Introduction 29
5.1 Purpose 29
5.2 Instalation Overview 29
6 INSTALLATION AND OPERATION 32
6.1 TRANSPORTATION AND INSTALLATION 32
6.2 PROCEDURE FOR CABLE CONNECTIONS * 33
6.3 OPERATING PROCEDURES 44
7 RESPONSE TO UPS FAILURE 48
8 MAINTENENACE AND PARTS REPLACEMENT 49
9 FAULT CODES 50
9.1 BYPASS MODULE FAULT CODES 50
9.2 UPS MODULE FAULT CODES 54
10 DAILY INSPECTION 57
APPENDIX A – Installation Planning Guide (IPG) 59

List of Figures

Figure 2-1 Single Line Diagram – Normal Operation: Load powered by UPS inverter 7
Figure 2-2 Single Line Diagram – Bypass Operation: Load fed through static bypass line 9
Figure 2-3 Single Line Diagram - Battery Operation 10
Figure 2-4 UPS Parts Location 12
Figure 2-5 UPS Parts Location – Front Inside View 13
Figure 4-1 Operation/Display Panel (Front panel) 18
Figure 4-2 Main Screen 20
Figure 4-3 Start/Stop Guidance 21
Figure 4-4 Start Guidance 21
Figure 4-5 Stop Guidance 21
Figure 4-6 Input Values 22
Figure 4-7 Output values 22
Figure 4-8 Remote/Local operation and Date & Time adjustment select 22
Figure 4-9 Log menu 23
Figure 4-10 Event Log 23
Figure 4-11 Battery log 23
Figure 4-12 Main Screen (Battery Operation) 23
Figure 4-13 Measurement screen (Battery Operation) 23
Figure 4-14 Main screen (Fault indication) 24
Figure 4-15 Message Screen 24
Figure 4-16 External Signal Terminal Block TN21-25 (NEC Class2) 25
Figure 4-17 External Signal Terminal Block TN11-14 (NEC Class2) 25
Figure 4-18 Control Wiring for External Contacts 26
Figure 4-19 Remote "Start" Contact Connections 27
Figure 5-1 Location of RemotEye 4 Option in Bypass Module 29
Figure 5-2 Detailed Configuration of RemotEye 4 Options 30
Figure 5-3 IOAU-19 (IO1) and RemotEye 4 Connection - Detail 31
Figure 5-4 External Communications Connector (NEC Class 2) 31
Figure 6-1 UPS Terminal Designation 38
Figure 6-2 Diagram of input/output bus bars and terminal blocks 39
Figure 6-3 Diagram of Power Wire & Control Wire Interconnections between UPS and Battery 39
Figure 6-4 Diagram of power wire connections (Parallel Operation system connection) 41
Figure 6-5 Diagram of Power Wire & Control Wire Connect (Parallel Operation system connection 2x to 8x) 42
Figure 6-6 Detail: IFAU-16A Control Wire Connections for N units in MMS Configuration 43
Figure 6-7 LCD Screen (MMS Operation) 47

List of Tables

Table 2–1 UPS Installation Environment 4
Table 2–2 Rating of Bypass Input Circuit Breaker 5
Table 3–1 Power Specifications 14
Table 3–2 UPS Cabinet Information 14
Table 3–3 UPS Shipping Dimensions 14
Table 3–4 Specifications 14
Table 3–5 Typical UPS Efficiencies at Various Load 16
Table 3–6 MTBF of 1000kVA 16
Table 3–7 Rating of Contactors, Breaker and Fuses 16
Table 5–1 Parts List for RemotEye 4 UPS Monitoring Options 30
Table 6–1 How to transport and install the system 32
Table 6–2 List of UPS weights 32
Table 6–3 Maximum Permitted Fault Current 33
Table 6–4 Recommended Cable Sizes 36
Table 6–5 Recommended Hardware 36
Table 6–6 Crimp Type Compression Lug 37
Table 6–7 Jumper Status on IFAU16A (Parallel Interface Board) 43
Table 8–1 Standard Replacement Parts List 49
Table 8–2 Ait Filters 50
Table 9–1 Bypass Module Fault Code List 50
Table 9–2 UPS Module Faults Code List 54
Table 10–1 How to Perform Daily Inspection 57

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1 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 symbol shows potentially hazardous situation or condition which could result in personal injury or death, if not avoided.

CAUTION

Caution: A caution symbol shows potentially hazardous situation or condition which could result in personal injury or equipment damage, if not avoided.

NOTE

Note: A Note symbol shows the information the user or the service personnel should observe during the UPS operation or service work.

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.

2 INTRODUCTION

The TOSHIBA Uninterruptible Power Supply 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.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important instructions for the G9000 SERIES Uninterruptible Power Supply System that should be followed during installation and maintenance of the UPS and batteries.

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.

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.
Any modifications without authorization by TOSHIBA could result in personal injuries, death or destruction of the UPS.

2.1 SAFETY PRECAUTIONS

APPLICATION

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

PROHIBIT

*
- Life support equipment in medical operation rooms (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.

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 2–1 UPS Installation Environment

No	Item	Environment standard	
1	Installation Location	Indoors	
2	Ambient Temperature	Minimum temperature: 32°F(0°C), Maximum temperature: 104°F(40°C) The average temperature over any 24-hour period must be in the range 41° F (5°C) to 95°F(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 1980m (6500ft) above sea 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 following IEC654-4 Part 4	There should be no inflammable/explosive gas.	
		Hydrogen sulfide (H_2S)	No more than 0.003 PPM
		Sulfurous acid gas (SO_2)	No more than 0.01 PPM
		Chlorine gas (Cl_2)	No more than 0.002 PPM
		Ammonia gas (NH_3)	No more than 1 PPM
		Nitrous oxides (NO_x)	No more than 0.05 PPM
		Ozone (O_3)	No more than 0.002 PPM

WARNING 4

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

Table 2–2 Rating of Bypass Input Circuit Breaker

Capacity (kVA)	Bypass Voltage (Vac)	Bypass Rating (Aac)	Breaker (A)
1000	480	1203	1600

AC input and AC output overcurrent protection and disconnect devices shall be field supplied and installed. The DC circuit breaker (MCCB) 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.

2.2 GENERAL

The TOSHIBA G9000 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 G9000 SERIES UPS is available in 100, 160, 225, 300, 500, 750, and 1000 kVA. This manual covers the 1000 kVA mode only. Specifications are shown in Section 1.5.

This manual provides an overview of the G9000 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.

2.3 DEFINITIONS

UNINTERRUPTIBLE POWER SUPPLY SYSTEM (UPS) - All components within the UPS 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 CABINET – The metal enclosure which is the main part of UPS and composed of the Bypass module, the 3 UPS modules, and the Cable Entry Section.

UPS MODULE – The metal enclosure which contains the Converter / Inverter, Charger, and internal control systems required to provide specified AC power to a load.

CONVERTER / INVERTER – The UPS components which contain the equipment and controls necessary to convert input AC power to output AC power required by the critical load.

CHARGER – The UPS components which contain the equipment and controls necessary to regulate DC power required for battery charging and for supplying power to the Inverter.

BYPASS MODULE – The metal enclosure which contains the Bypass line, the Static transfer switch, UPS operator controls, and internal control systems.

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.

STATIC TRANSFER SWITCH – The device which connects the critical load to the bypass line when the Inverter cannot supply continuous power.

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

BATTERY – The rechargeable battery strings which supply DC power to the inverter to maintain continuous AC power to the load during AC input power failure conditions.

2.4 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.

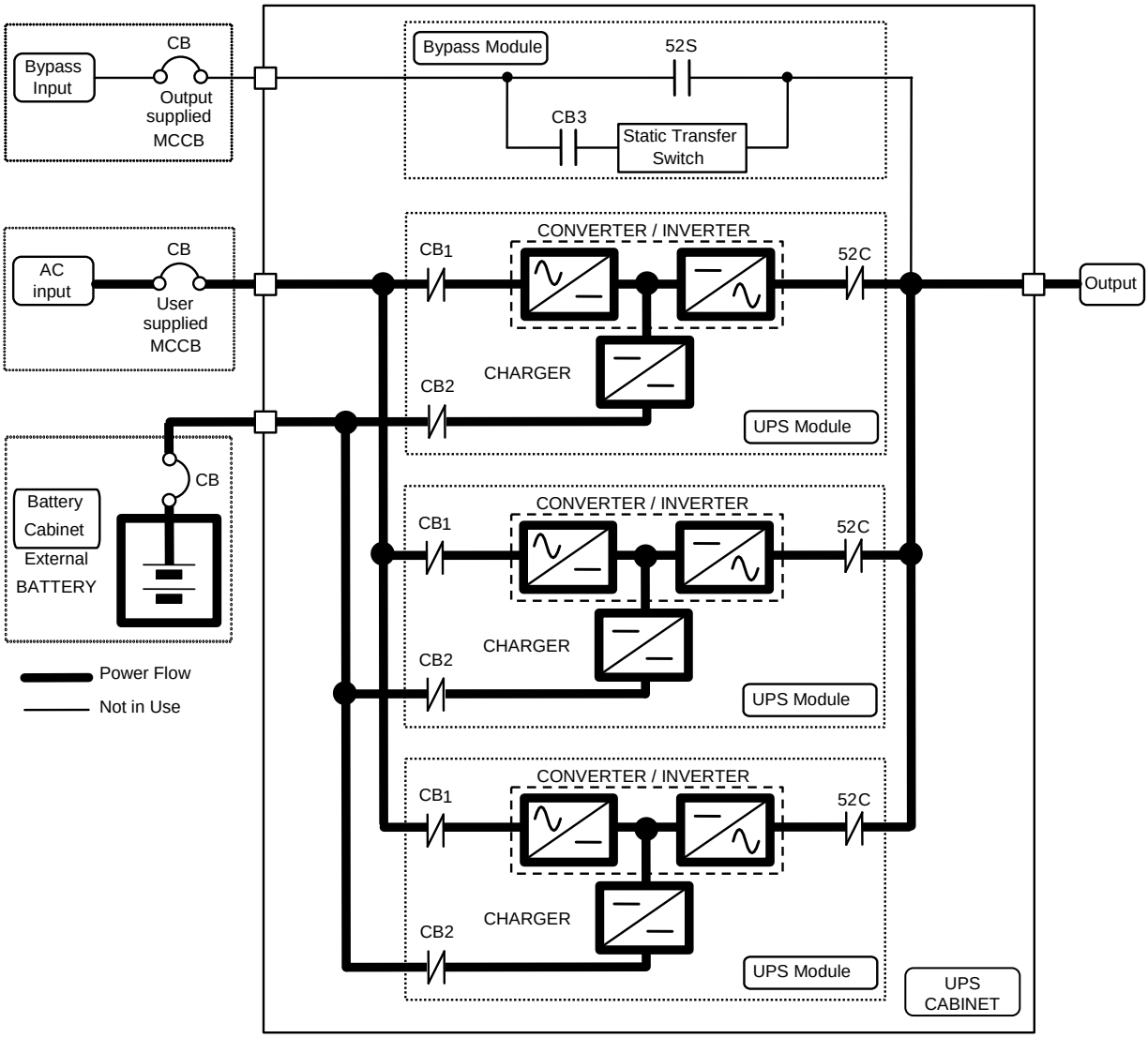


Figure 2-1 Single Line Diagram – Normal Operation: Load powered by UPS inverter

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

Referring to Figure 2-1: Input AC power is converted to DC by the Converter. 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.

The power drawn by the critical load is equally shared between all UPS whenever the system

is in the Parallel Operation. (Refer to Figure 3.4 that shows a sample of Parallel Operation System Configuration.)

In the event of a UPS module failure during Parallel Operation, the critical load power will be continually supplied and shared by all other UPS.

The Bypass Input circuit breaker (MCCB) 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 UPS internal static bypass line.

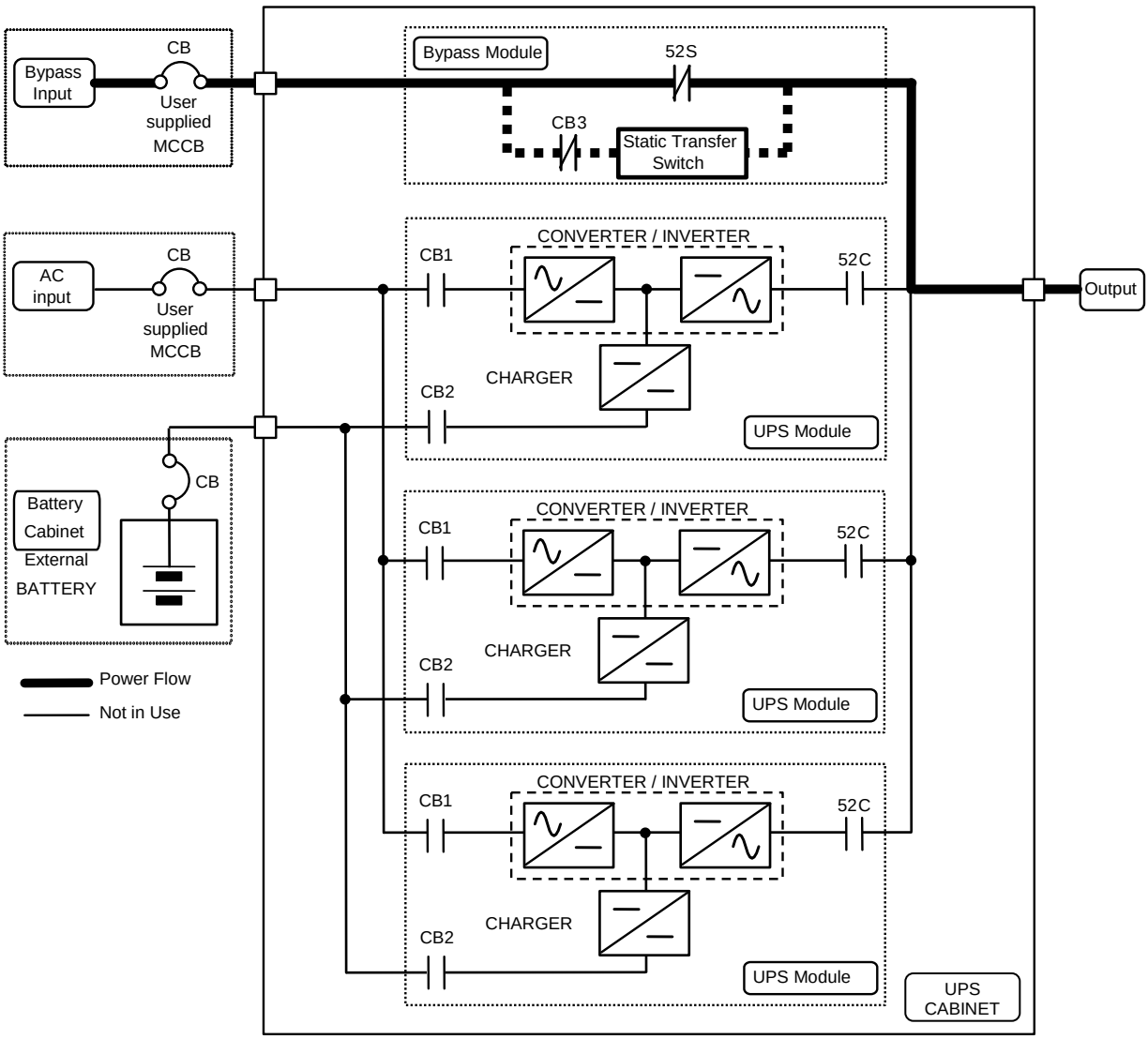


Figure 2-2 Single Line Diagram – Bypass Operation: Load fed through static bypass line

Referring to Figure 1.2: The Internal Bypass line is a Hard-wired line through 52S which supplies the critical load with unconditioned bypass input power. Upon switching to the Internal Bypass line, the Static Transfer Switch line through CB3 (herein after STS contactor CB3) supplies the power immediately, and then the Internal Bypass line through 52S supplies the power.

In the event of a switching to the Bypass line, the power to the critical load will be uninterrupted.

The purpose of this Internal Bypass line is to route power to the critical load while the UPS module is de-energized (converter and inverter), and during Start-up before the system is fully operational.

Each UPS internal static bypass line will equally share the power supplied to the critical load whenever the system is in the Parallel Operation.

In the event of a load overcurrent, the UPS transfers to bypass without interruption to the critical load. In the case of the Parallel Operation, all UPS will transfer 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 UPS battery.

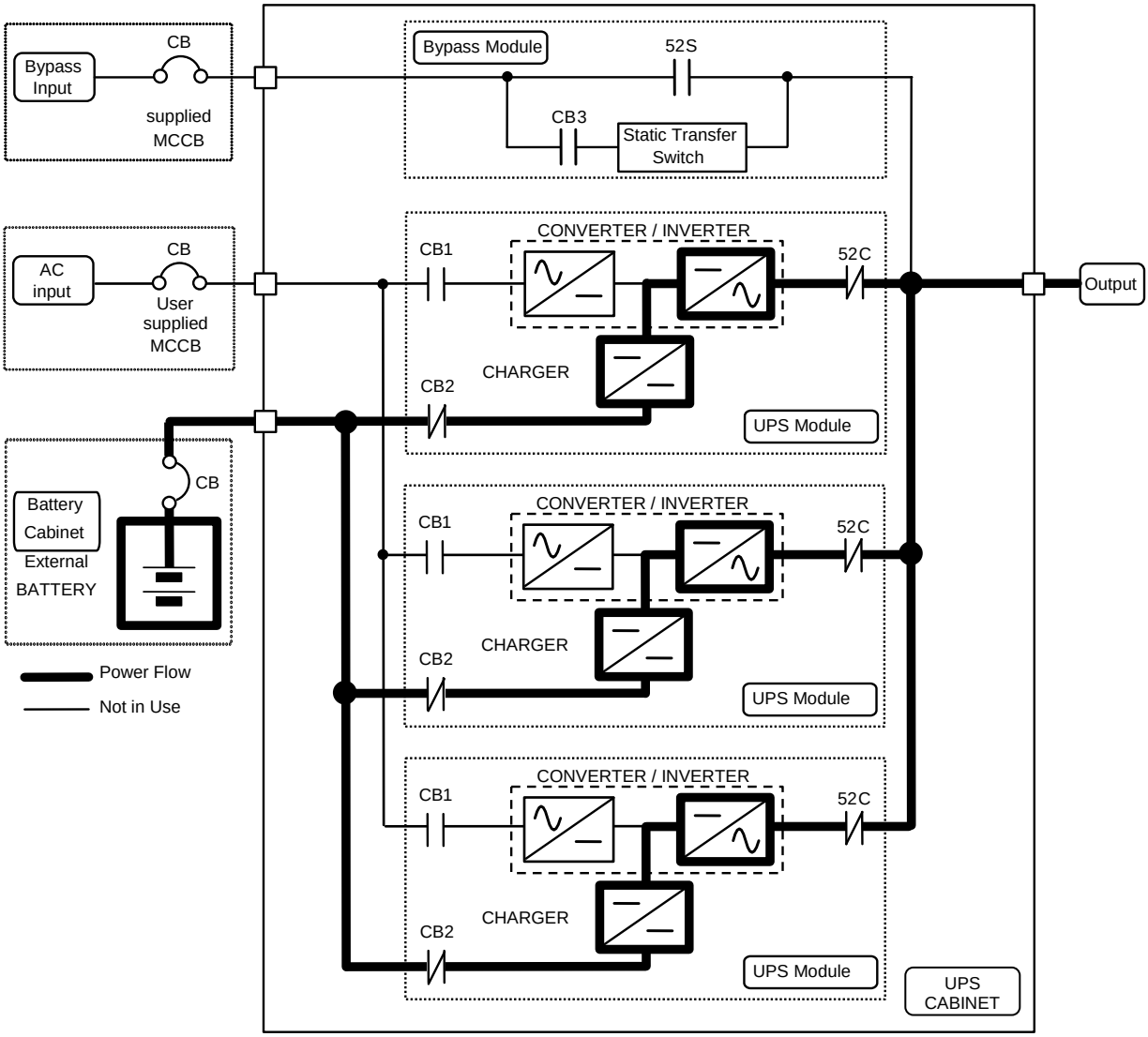


Figure 2-3 Single Line Diagram - Battery Operation

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

(s)* : In the case of the Parallel Operation

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

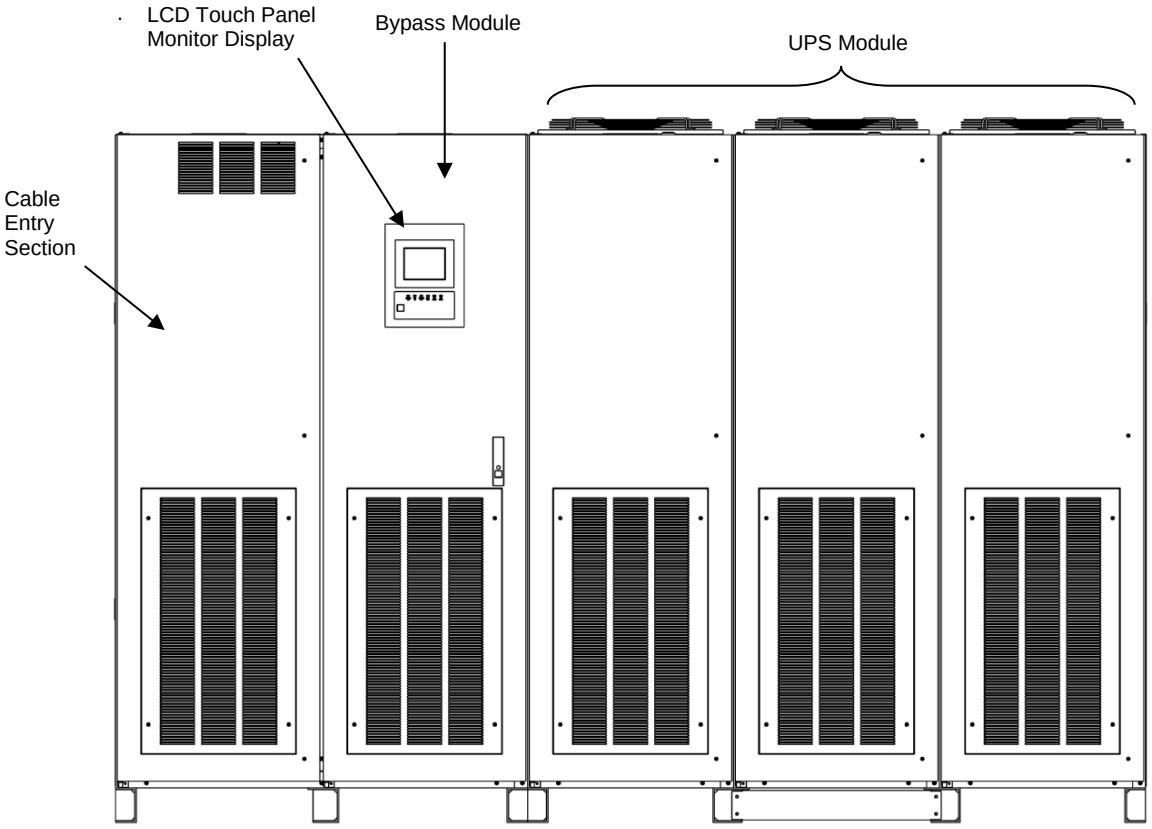
A fully charged battery will provide power for the specified time at the rated load, or longer, at a reduced load.

When power is restored after a low battery shutdown, the UPS converter(s)* automatically restarts operation, the charger(s)* recharges the batteries and the Inverter(s)* is automatically restarted without operator intervention. Load is automatically assumed by the inverter without operator intervention.

(s)* : In the case of the Parallel Operation

The power drawn by the load is equally shared between all UPS regardless of the presence or absence of the UPS that is (are) in battery operation or not whenever the system is in the Parallel Operation.

1) UPS cabinet – Front View



2) Backside of Bypass Module Door

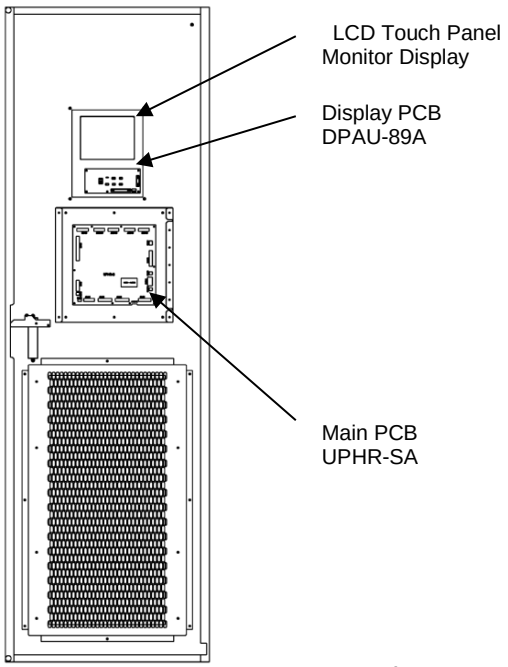


Figure 2-4 UPS Parts Location

3) UPS cabinet – Front Inside View

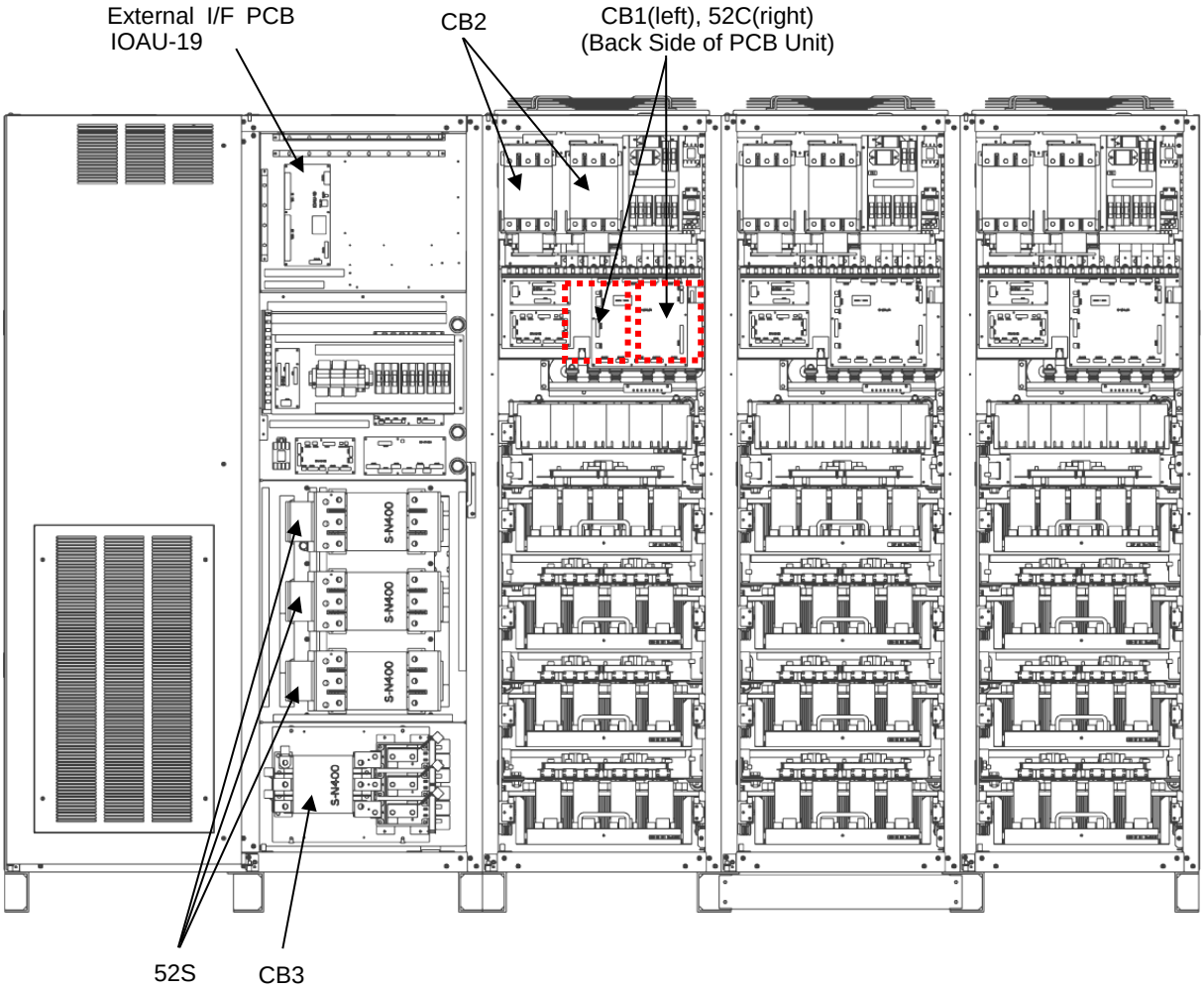


Figure 2-5 UPS Parts Location – Front Inside View

3 SPECIFICATIONS

The UPS nameplate displays the rated kVA as well as nominal voltages and currents. The nameplate is located on the backside of the Bypass Module door.

Table 3–1 Power Specifications

Rated output Power	Input Voltage 3 phase / 3 wire	Bypass Input Voltage 3 phase / 3 wire	Output Voltage 3 phase / 3 wire
1000kVA / 1000kW	480V	480V	480V

Table 3–2 UPS Cabinet Information

UPS [kVA]	Cable Entry	Width in (mm)	Depth in (mm)	Height in (mm)	Weight lb. (kg)	Heat Loss kBTU / h
1000	BOTTOM / TOP / LEFT SIDE	118.2 (3003.2)	35.5 (901.6)	80.7 (2048.6)	6283 (2850)	127.6

Table 3–3 UPS Shipping Dimensions

UPS [kVA]	Section	Width in (mm)	Depth in (mm)	Height in (mm)	Gross Weight lb. (kg)
1000	Main Cabinet	91 (2311)	44 (1118)	90 (2286)	5304 (2406)
	Landing Cabinet	55 (1397)	44 (1118)	90 (2286)	1612 (731)

Table 3–4 Specifications

G9000 1000 kVA SPECIFICATIONS	
Rated Output kVA	1000 kVA
Rated Output kW	1000 kW
AC INPUT	
Configuration	3 phase, 3 wire
Voltage	480 V +15% to -20%
Frequency	60 Hz +/-10%
Power Factor	>.99 Lagging at 25% – 115% Load
Input kVA (Max Input kVA)	1043 kVA (1127 kVA)
Walk-in Function	1 –30 Seconds (in 1 second increments)
Start-up Delay	1 –3600 seconds (selectable in 1 second increments)
Input Current Limiter	~108% Full Load Input Current
Reflected Current THD	<3% at 100% load (No Input Filter Required)
Input Current (Max Input Current)	1255 A (1356 A)
No-Load Static Loss	7.4 kW
STATIC BYPASS INPUT	
Configuration	3 phase, 3 wire
Voltage	480 V +/-10%
Frequency	60 Hz +/-5%
Bypass Overload	500% for 1 cycle

G9000 1000 kVA SPECIFICATIONS	
BATTERY	
Type	Lead Acid
Ride Through	Application Specific
Nominal Voltage	480 Vdc
Minimum Voltage	400 Vdc
Float Voltage	Up to 545 Vdc
Number of Cells	240
Max DC Ripple Current while Charging	42 A
DC Ripple Current (% of Full Load Current)	2.7%
Max DC Charge Current	200 A
Max. Discharge Current	2586 A
Batt. Capacity Required at Full Load Output	1036 kW
AC OUTPUT	
Configuration	3 phase, 3 wire
Voltage	480 V
Voltage Regulation	+/-1%
Voltage Unbalance	2% maximum at 100% unbalanced load
Voltage THD (V_{OUT})	2% maximum THD at 100% Linear Load 5% maximum THD at 100% Non-linear Load
Voltage Adjustment	±3% (User selectable)
Crest Factor	2.3
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 20ms
Output Current	1203 A
Frequency	60 Hz
Frequency Synch. Range	±1% to ± 5% (selectable in 1% increments)
Frequency Slew Rate	1 Hz/s to 5 Hz/s (selectable in 1 Hz/s increments)
Frequency Regulation	+/-0.01% in free running mode
Phase Displacement	1deg. maximum at 100% load
Power Factor	1.0 (unity)
Power Factor Range	0.7 lagging to 0.8 leading
Inverter Overload	125% for 10 minutes 150% for 60 seconds
System Overload (with bypass available)	500% for 1 cycle
MTBF w/ Bypass w/o Bypass	2,600,000 hrs. 100,000 hrs.
Withstand Rating	100,000 AIC with Optional Fuses
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
Altitude	0 to 6500 feet (1981 M) No Derating at 40° C
Location	Indoor (free from corrosive gases and dust)
Paint Color	Munsell N1.5 (Black)
Clearance Required	Top: 24 in. (610 mm) Front: 39 in. (991 mm) Rear: 0 in. (0 mm) Sides: 0 in. (0 mm) with sidecars, 1 in. (25 mm) if no sidecars used.

G9000 1000 kVA SPECIFICATIONS	
Enclosure	NEMA 1
Audible Noise	< 73 dB @ 1 m
Listings/Standards	ENERGY STAR® certified UPS, UL 1778; cUL; IEC 62040-2 Cat. C3; ISO 9001; ISO14001; ANSI C62.41 (IEEE 587 Cat. B)
Warranty	3 Years Parts and Labor
Emergency Power Off	Included
MONITORING	
Dry Contacts Included	Yes, for Input and Output Signals
RS232 Port	Included
Intelligent Monitoring (Optional)	SNMP; MODBus RTU; MODBus TCP; BACNET; METASYS
Display	LCD Touch Panel for Local Monitoring, Operation, and Control

Table 3–5 Typical UPS Efficiencies at Various Load

UNIT	% Full Load			
	25%	50%	75%	100%
1000 kVA	96.3	97.0	97.1	96.8

Table 3–6 MTBF of 1000kVA

UNIT	Mean Time Between Failure
With Bypass **Without Bypass**	2,633,910 hrs. 101,687 hrs.

Table 3–7 Rating of Contactors, Breaker and Fuses

	IDENTIFI-CATION	APPLICATION	OUTPUT CAPACITY OF EQUIPMENT
			1000kVA / 1000kW
Contactors	CB1	AC input contactor	**452A**
	CB2	Battery contactor	**285A**
	CB3	STS contactor	**452A**
	52C	Inverter output contactor	**452A**
	52S	Bypass contactor	**1278A**
	88RC	Control circuit contactor	**20A**
Breakers	User supply	Battery disconnect breaker (Recommended)	**3000A**
	User supply	AC input breaker (Recommended)	**1600A**
	User supply	Bypass input breaker (Recommended)	**1600A**
	FP, FC, FN	DC fuse	**315A / 690V**
	FBP, FBN	DC fuse	**1000A / 600V**

	IDENTIFI-CATION	APPLICATION	OUTPUT CAPACITY OF EQUIPMENT
			1000kVA / 1000kW
	FBR1, FBR2, FBR3 FBR, FBS, FBT FBO1, FBO2, FBO3	Control power fuse	**30A / 600V**
	FOA, FOB, FOC FIA, FIB FUA, FUB, FUC	Control power fuse	**12A / 600V**
	(OPTION) FSU, FSV, FSW	Bypass input fuse	**2000A / 550V**
	(OPTION) FDU, FDV, FDW	Parallel control circuit fuse (optional)	**3A / 600V**

* Rating would be changed.

4 OPERATOR CONTROLS AND INDICATORS

The G9000 Series operator controls and indicators are located on the Bypass Module door exterior.

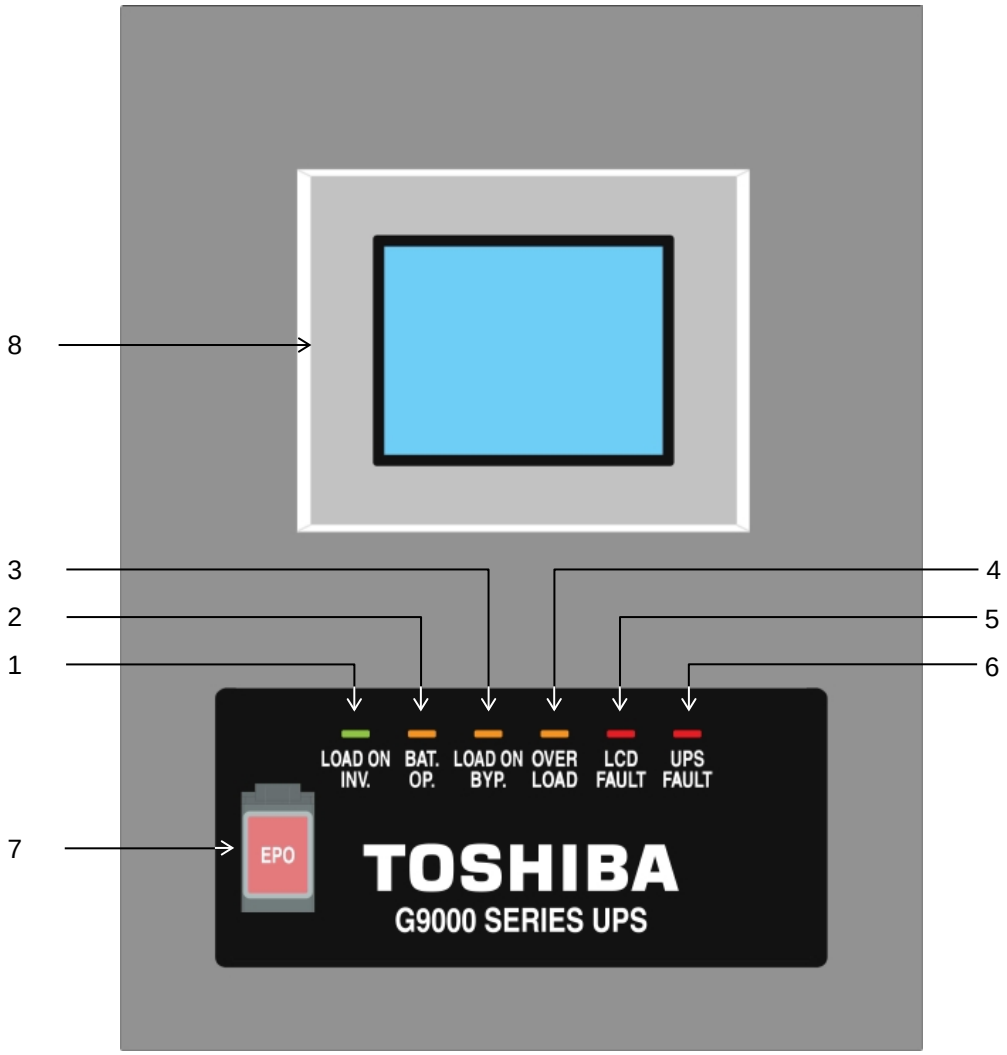


Figure 4-1 Operation/Display Panel (Front panel)

4.1 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.] (yellow)

Illuminates when power is supplied from batteries following a power failure.

3) Load on bypass [LOAD ON BYPASS] (yellow)

Illuminates when power is supplied to load devices by static bypass.
(Indicates the state of bypass transfer switch "52S".)

4) Overload [OVERLOAD] (yellow)

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.

4.2 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 and remotely.

4.3 LIQUID CRYSTAL DISPLAY (8)

The Liquid Crystal Display (LCD) touch 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 ERROR indicator is cleared after 24 hours and can be reproduced by pressing any key on the panel.

4.3.1 Test Mode Options

Several parameters and functions are available if they are enabled by a Toshiba Field Representative while the UPS is in Test Mode.

4.3.1.1 Battery Equalize Charge

The UPS "Equalize Charge" parameter is disabled by default unless the unit is sold with a wet cell battery system.

The "Equalize Charge" button can be enabled by a Toshiba Service Representative while the UPS is in Test Mode (Battery Run Setup). Once enabled, the "Equalize ON/OFF" button is located under OPERATION / SETUP.

To Initiate the Equalize Charge battery function, press the "Equalize ON/OFF" button. Equalize Charge will boost the charge voltage (500-640V) for the length of time (0-100 hrs.) specified during setup.

4.3.1.2 Battery Self Check

The UPS "Battery Self Check" function provides a periodic battery self-check at preset intervals. The parameter is disabled by default.

The adjustable Self Check cycle ships with a default setting of 720hrs. The minimum interval is 5 hrs.

When the Self Check is initiated, the converter contributes 5% of the load to the inverter for up to 200ms. If the batteries cannot reach and contribute 5% of the load or if the battery voltage falls out of tolerance, the unit will end the test and set an alarm.

4.3.2 Menu

A) MAIN MENU (Figure 4-2)

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.

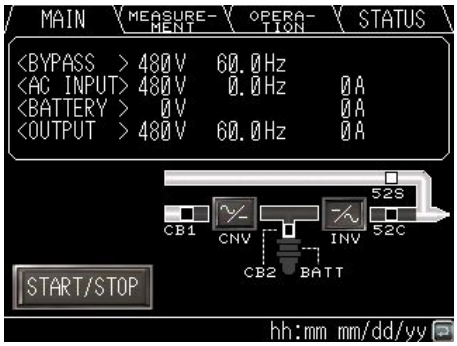


Figure 4-2 Main Screen

The following will be displayed when the START/STOP key on the MAIN MENU is pressed (Jump into **OPERATION MENU**):

1) Start/Stop Guidance (Figure 4-3 to Figure 4-5)

The display indicates the Start/Stop operation 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.

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).

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

Meaning of Icons in SMS (Single Module System)

INV START; UPS Module Startup

INV STOP: UPS Module Stop

START: Output Transfer from Bypass Line to Inverter.

STOP: Output Transfer from Inverter to Bypass Line.

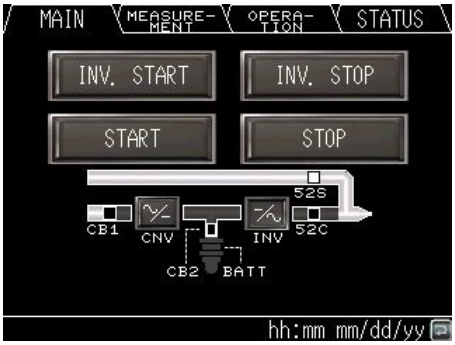


Figure 4-3 Start/Stop Guidance

Figure 4-4 Start Guidance

Figure 4-5 Stop Guidance

Follow Start/Stop guidance accordingly.

B) MEASUREMENT MENU (Figure 4-6 and Figure 4-7)
This screen shows details of measured values. Input and Output values are displayed. During battery operation, Remaining Battery Power and Run Time are also displayed.

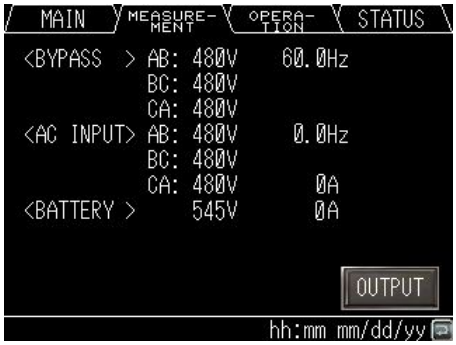


Figure 4-6 Input Values

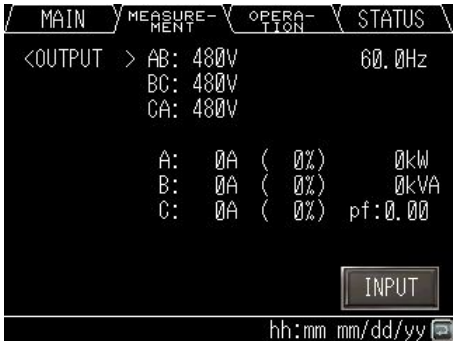


Figure 4-7 Output values

C) OPERATION MENU (Figure 4-8)
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).

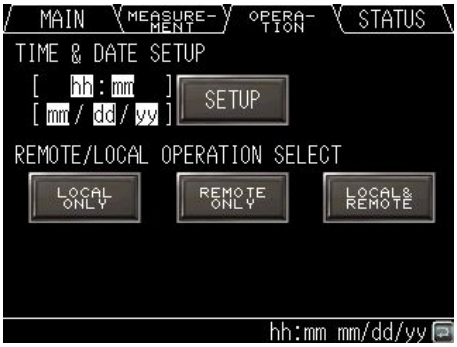


Figure 4-8 Remote/Local operation and Date & Time adjustment select

D) LOG MENU (Figure 4-9 to Figure 4-11)
This LOG MENU displays two Touch icons in EVENT LOG and BATTERY LOG.

Pressing the EVENT LOG icon will display up to 50 condition/operation records. Press ▲ or ▼ button for turning pages.

Press the BATTERY LOG icon to display the Number of battery operations and Summed (Total) battery operation time.

Figure 4-9 Log menu

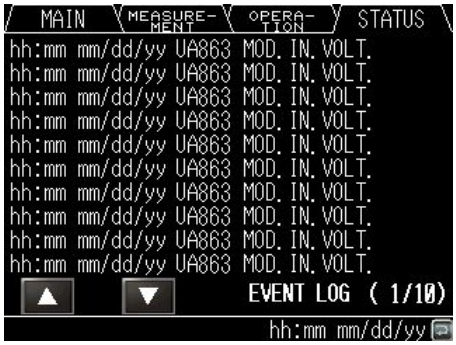


Figure 4-10 Event Log

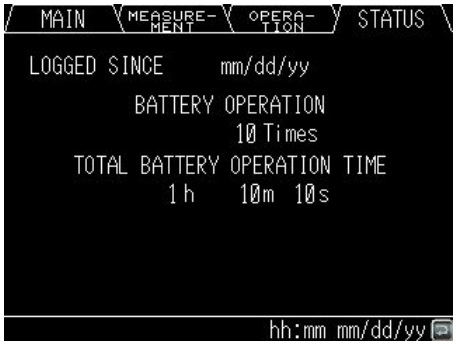


Figure 4-11 Battery log

4.3.3 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 time).

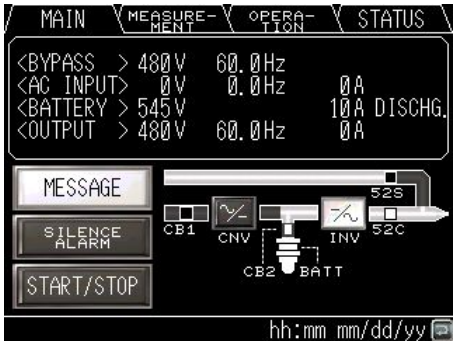


Figure 4-12 Main Screen (Battery Operation)

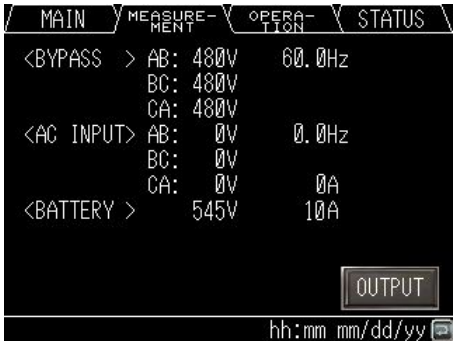


Figure 4-13 Measurement screen (Battery Operation)

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.

4.3.4 Fault Indication

“MESSAGE” and “SILENCE ALARM” icons will appear on the main menu when UPS failure condition has occurred.

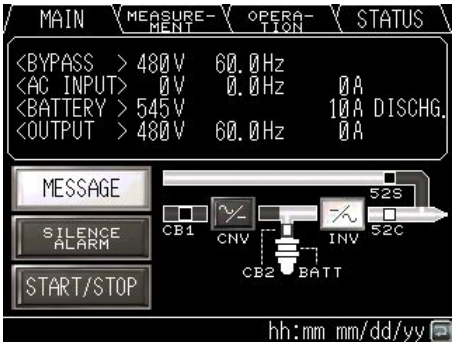


Figure 4-14 Main screen (Fault indication)

The following will be displayed when the MESSAGE icon on the main menu is pressed.

1) MESSAGE

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 are 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.

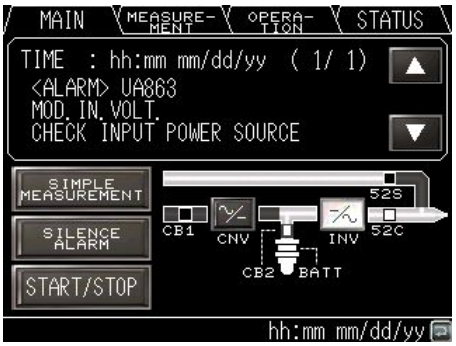


Figure 4-15 Message Screen

2) SILENCE ALARM

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

4.4 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 4-16 with a functional description of the input/output port presented. OUT1 to OUT8 are user programmable, but are factory default set being also shown in Figure 4-16.
Adding same external I/F PCB "IOAU-19", doubling signal outputs is applicable for OUT1 to OUT8.

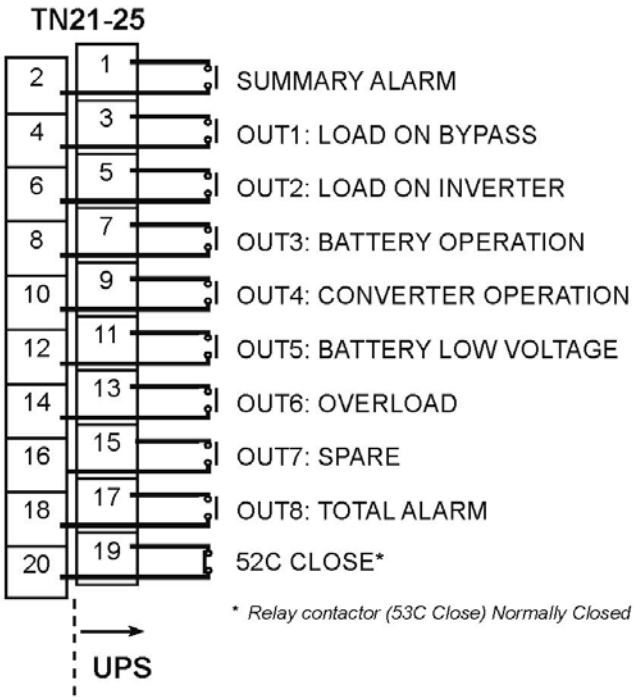


Figure 4-16 External Signal Terminal Block TN21-25 (NEC Class2)

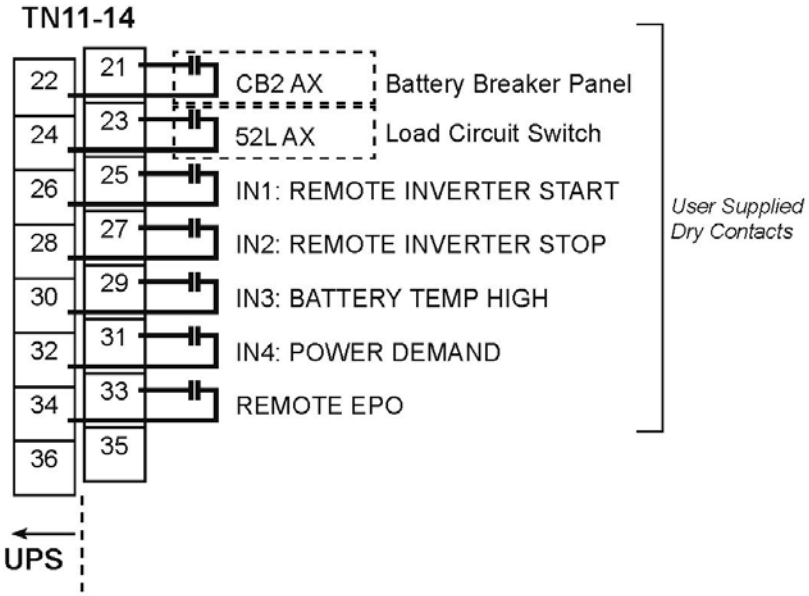


Figure 4-17 External Signal Terminal Block TN11-14 (NEC Class2)

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 4-18 illustrates a typical installation. The external relay can also be a lamp, LED, computer, etc.

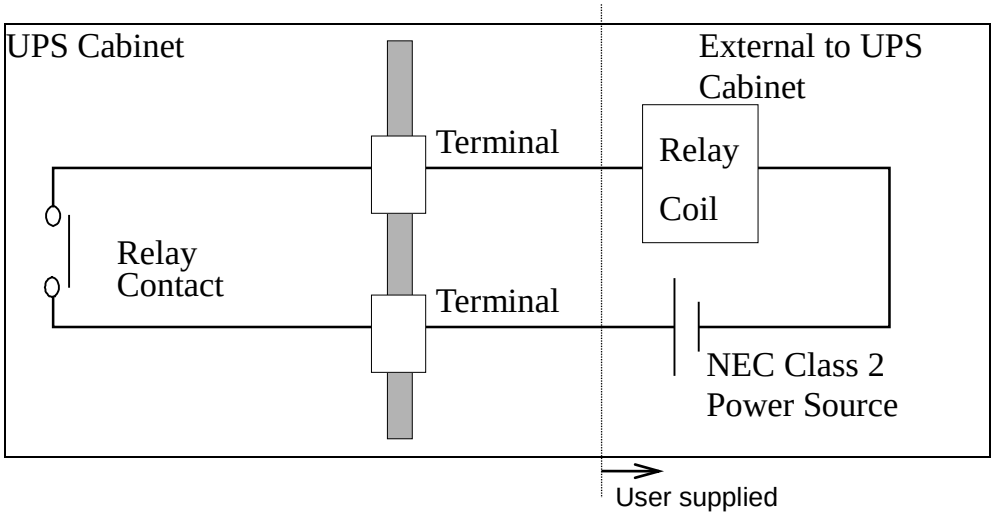


Figure 4-18 Control Wiring for External Contacts

Details of output alarm contacts : TN21-25

Terminals 1 to 2 **"Summary Alarm" contact**
Activated when a major fault has occurred with the system.

Terminals 3 to 4 **"Load on Bypass" contact (OUT1)**
Activated when the power is supplied from the static bypass input.

Terminals 5 to 6 **"Load on Inverter" contact (OUT2)**
Activated when the power is supplied by the inverter.

Terminals 7 to 8 **"Battery Operation" contact (OUT3)**
Activated when the battery is operating following an AC power failure.

Terminals 9 to 10 **"Converter Operation" contact (OUT4)**
Activated when the converter is operating.

Terminals 11 to 12 **"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 13 to 14 **"Overload" contact (OUT6)**
Activated when an overload has occurred to the system.

Terminals 15 to 16 **"Spare" contact (OUT7)**

Terminals 17 to 18 **"Total Alarm" contact (OUT8)**
Activated during major fault, minor fault and alarm events.

Terminals 19 to 20 **"52C Close" contact (OUT9)**
Activated when the inverter output contactor 52C has closed.

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 to UPS)

External contacts are provided by the user of the UPS system. Terminal voltage at the UPS is 12Vdc. Provide external dry contact accordingly.

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

Refer to Figure 4-19 for a typical wiring configuration. Although this figure applies to the remote start/stop terminals, the same wiring arrangement is used for emergency stop; power demand; and battery temperature high.

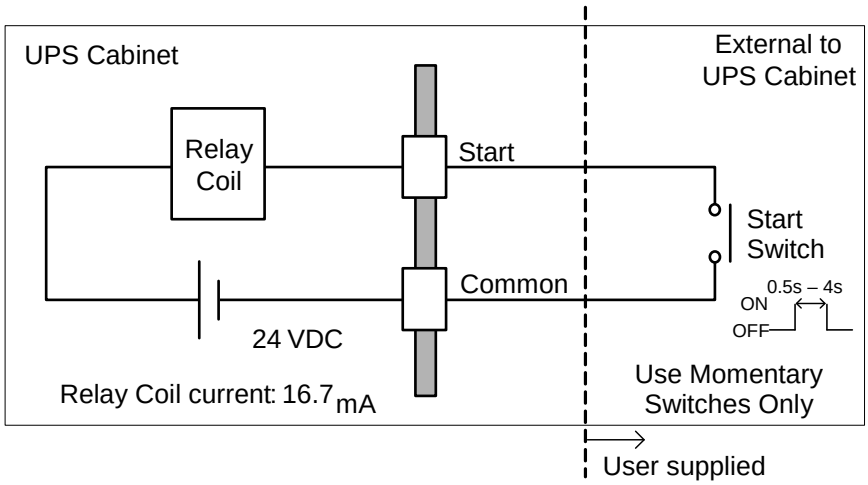


Figure 4-19 Remote "Start" Contact Connections

Details of input contacts for remote access : TN11-14

Terminals 25 to 26 **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 27 to 28 **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 29 to 30 **"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 31 to 32 **"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 33 to 34 **"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 input 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.

5 RemotEye 4 Introduction

5.1 PURPOSE

The “RemotEye 4”* is available as a UPS system monitoring tool. The RemotEye 4 supplies a network function to monitor UPS units via Simple Network Management Protocol (SNMP) and Hypertext Transfer Protocol (HTTP) methods.

5.2 INSTALATION OVERVIEW

The RemotEye 4 module is installed on an option panel in the inside of Bypass Module. The location of the RemotEye 4 option is shown in Figure 5-1 and Figure 2.14 shows the detailed configuration of the option.

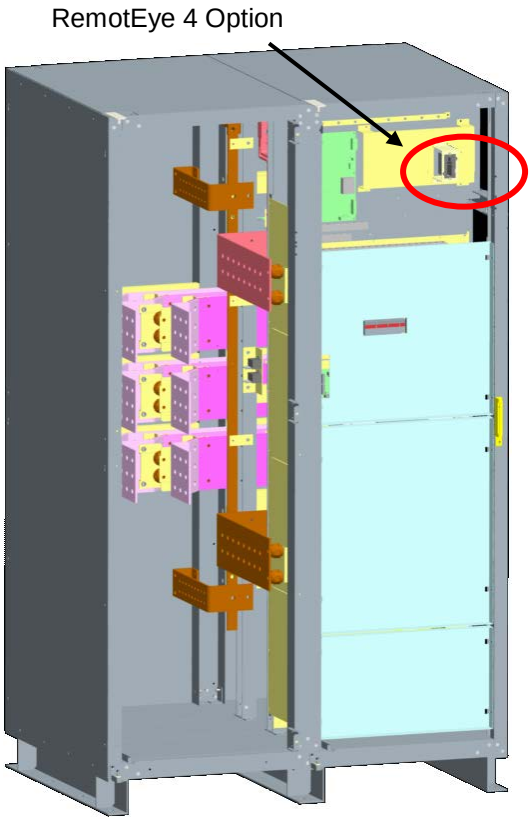


Figure 5-1 Location of RemotEye 4 Option in Bypass Module

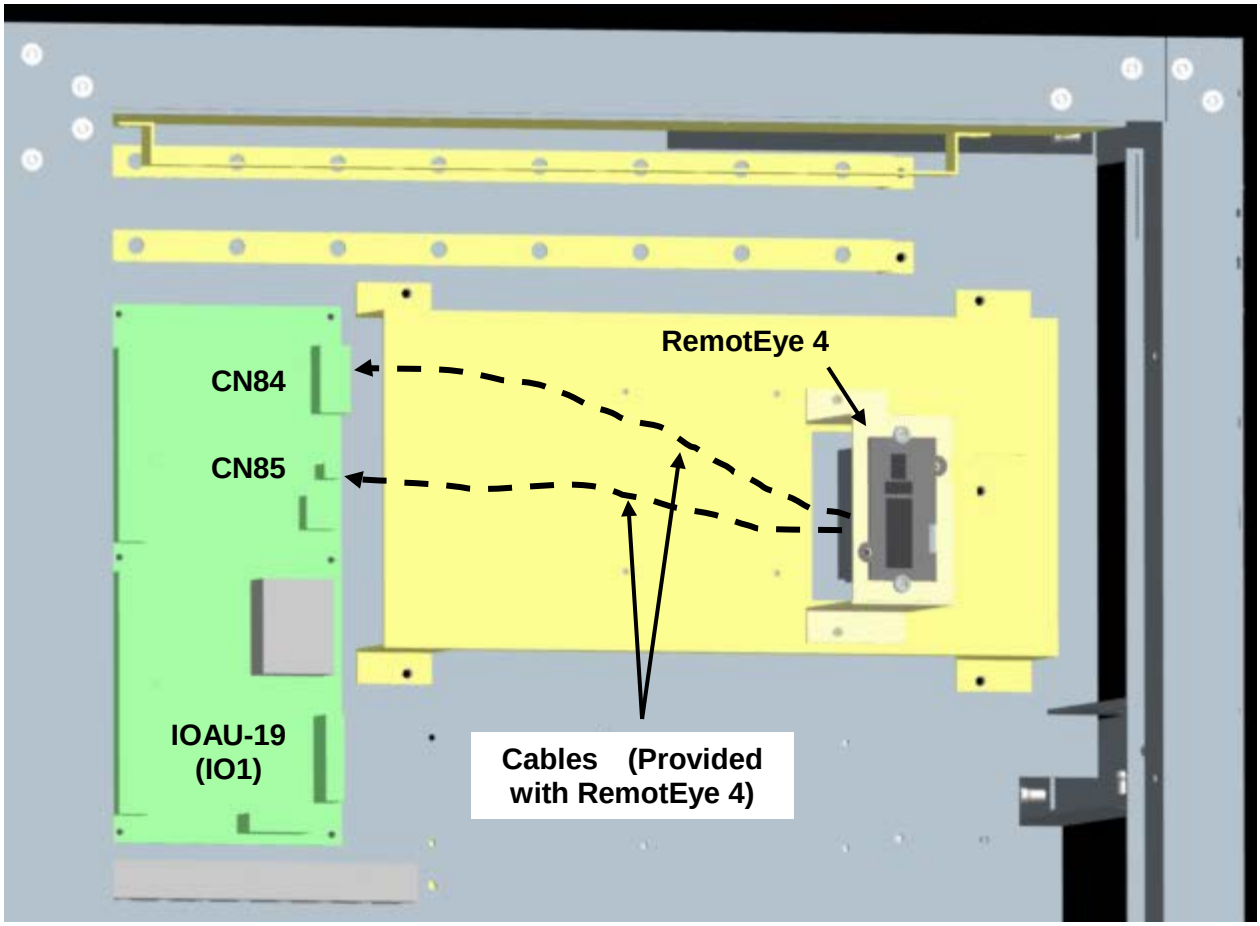


Figure 5-2 Detailed Configuration of RemotEye 4 Options

Table 5–1 Parts List for RemotEye 4 UPS Monitoring Options

Parts Number	Part Name	Quantity
1	RemotEye 4 Module	1
2	Cable	1

The Cable between RemotEye-IV and IOAU-19 PCB is included in the RemotEye-IV package. The cable can pass through under the option panel.

The RemotEye-IV communicates with the UPS via a cable. The connection is described in Figure 2.15 below. Figure 2.16 shows the detail of D-sub 9Pin on IOAU-19 PCB.

CAUTION

The UPS must be de-energized when installing the RemotEye-4 module.

** Consult Toshiba International Corporation for details on "RemotEye-IV" monitoring software and its capabilities.*

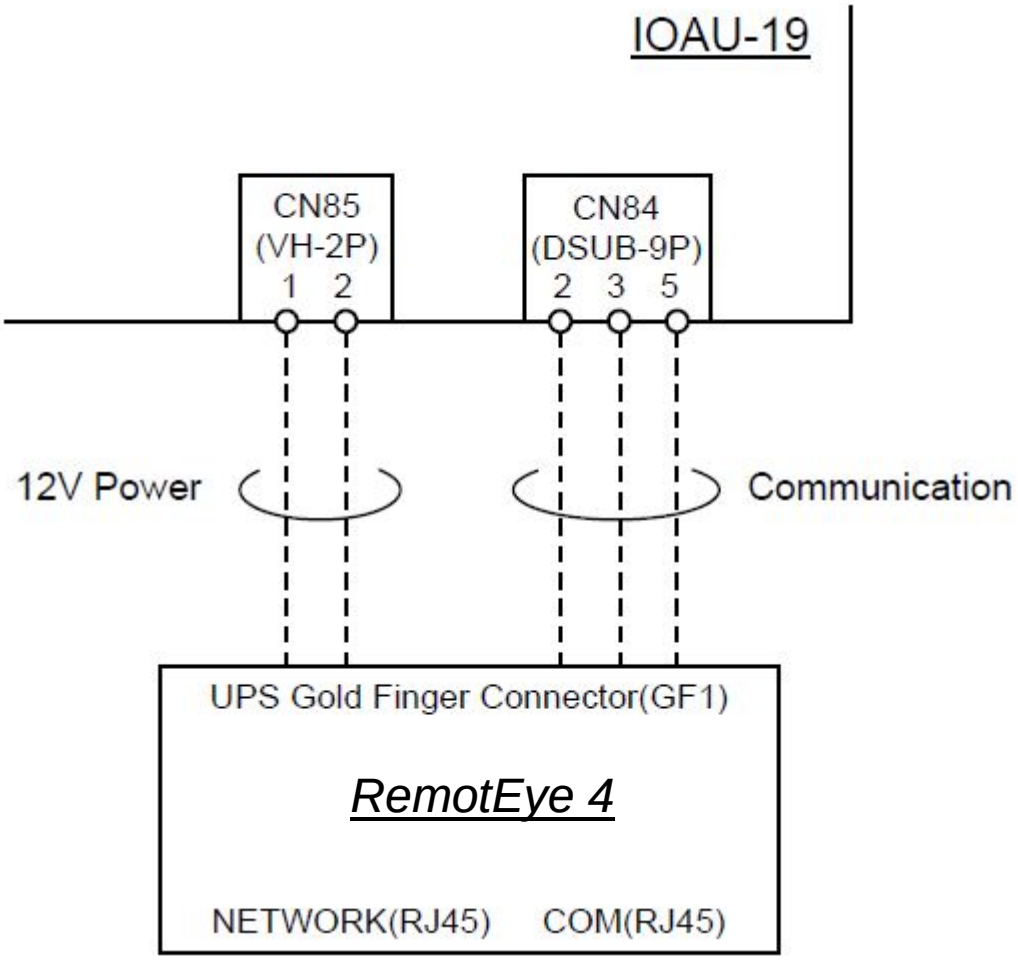


Figure 5-3 IOAU-19 (IO1) and RemotEye 4 Connection - Detail

DB9	Description	
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

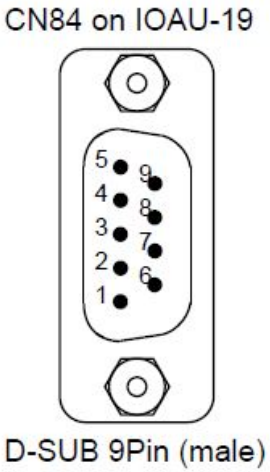


Figure 5-4 External Communications Connector (NEC Class 2)

6 INSTALLATION AND OPERATION

6.1 TRANSPORTATION AND INSTALLATION

Table 6–1 How to transport and install the system

Transportation	Installation
Transport unit with forklift or pallet jack ONLY.	Use the pre-drilled 2 or 4 holes in the each UPS channel base*, anchor the unit using appropriate hardware. (Not provided) * 4x 4-holes bases and 3x 2-holes bases

CAUTION : Do not attempt to lift cabinets using lifting eyes.

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

CAUTION : Be sure to firmly anchor the UPS on level ground.

3.2 INSTALLATION PROCEDURE

A) Note the load tolerance of the floor

Refer to Table 3.2 for list of UPS weights.

Table 6–2 List of UPS weights

UPS Capacity (kVA)	1000
Weight (lb.)	6283

B) Minimum clearance required for ventilation

Right side ..... 25 mm (1 inch) (not required when sidecars are used)
Left side ..... 25 mm (1 inch) (not required when sidecars are used)
Back side ..... 0.0 mm (0 inch)
Top side ..... 600 mm (24 inches) (for air flow)

C) Space requirement for routine maintenance

Allow for the following space at the time of installation.

Front ..... 1000 mm (39 inches)
Sides ..... 0.0 mm (0 inch)
Back side ..... 0.0 mm (0 inch)
Top side ..... 500 mm (20 inches)

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 6–3 Maximum Permitted Fault Current

UPS Capacity (kVA)	DC Voltage Rating (V)	Maximum Fault Current Permitted (A)
1000	480	25,000

6.2 PROCEDURE FOR CABLE CONNECTIONS *

1. Identify the input/output power terminal blocks as shown in Figure 3.1.

2. Connect the internal control wire and power wire.

(1) Control wire interconnections

1. Battery CB ON Auxiliary to terminal TN11-14-21,22 of external I/F PCB IOAU-19.

(2) Power wire (AC input, Bypass input, AC output) interconnections

a.) From user's distribution panel

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

b.) DC Input to UPS

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

CAUTION : After the completion of the input power cables connection:
With a phase rotation meter, check that the phase rotation of the AC Input power terminals A, B and C as well as the Bypass Input power terminals A40, B40 and C40 are correct. The proper phase rotation is clockwise
A → B → C.

3. Connect the grounding conductor from the input service entrance to the UPS Grounding Bar (E).

4. Two (2) sources feeding the UPS:
   (1) Connect the AC input power cables from the input service entrance to the AC input power terminals, identified as A, B, C in Figure 3.1.
   - Input cables must be sized for an ampere rating larger than the maximum input drawn by the converter. (Refer to equipment nameplate for current ratings.)
   - Confirm that an external bypass input circuit breaker (MCCB) is installed (refer to WARNING 4, page 1-4).
   - Connect the bypass input power cables from the input service entrance to the bypass input power terminals, identified as A40, B40 and C40 in Figures 3.1 to 3.2. 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 recommended cable sizes.

   (2) Connect the external signal terminal block as desired. Refer to section 2.4 and Figure 2.10 for functional description. 14 AWG (2 mm^2) or less, shielded conductor is recommended.

5. One (1) source feeding the UPS:
   (1) Confirm that an external input circuit breaker sized to protect both the AC 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 and C40 in Figures 3.1 to 3.2.
   - 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 3.1 to 3.2, connect jumper bypass terminals A40, B40, C40 to AC input power terminals A, B, C as identified in Figures 3.1 to 3.2.

   (3) Connect the external signal terminal block as desired. Refer to section 2.4 and Figure 2.10 for functional description. 14 AWG (2 mm^2) or less, shielded conductor is recommended.

CAUTION : UPS power terminals are supplied with stud type fittings. It is recommended that compression lugs be used to fasten all input/output power cables.

6. Procedure for Cable Connections for Parallel Operation 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 operation systems as shown in the appropriate Figures 3.4 and 3.5.

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

a.) Control wire connections

Parallel configuration wiring (Refer to Figure 3.5.)

- 52L control signal from Toshiba Tie Cabinet (TTC) to UPS-n IOAU-19 (TN11-14 – 23, 24).
- Parallel control signals for TLAIN, TLAOUT, TLBIN, TLBOUT, CAIN, CAOUT, CBIN, CBOUT, DIAIN, DIAOUT, DIBIN, DIBOUT as shown in Fig. 3.5.

b.) Power wire connections

From UPS AC Output Terminals to Toshiba Tie Cabinet (TTC) (Refer to Figure 3.4 and 3.5.)

NOTE

Straight through, shielded CAT5 or better cables with metal shrouded RJ-45 heads on both sides are to be used for the parallel control signal cables. Use of any other cables could cause erroneous communication failures.

Table 6–4 Recommended Cable Sizes

kVA Capacity	Input Voltage	Output Voltage	Input Side		Output Side		Bypass Side		DC Input Side	
			Cable Size	Torque in. lbs	Cable Size	Torque in. lbs	Cable Size	Torque in. lbs	Cable Size	Torque in. lbs
1000kVA	480V	480V	5 x 600MCM or 6 x 500MCM	347 - 469 in. lbs	5 x 600MCM or 6 x 500MCM	347 - 469 in. lbs	5 x 600MCM or 6 x 500MCM	347 - 469 in. lbs	8 x 600MCM or 10 x 400MCM	347 - 469 in. lbs

*1 – Use 75 degree C copper wire.
*2 - The cables must be selected to be equal or larger to the sizes listed in the table.
*3 - Voltage drop across power cables not to exceed 2% of nominal source voltage.
*4 - Allowable ampere-capacities based on copper conductors with 75 degree C. insulation at ambient temperature of 40 degree C.

Table 6–5 Recommended Hardware

UPS Capacity	Bolt size	Flat washer size	Split lockwasher size	Nut size
1000kVA	M12 x 40mm	M12	M12	M12

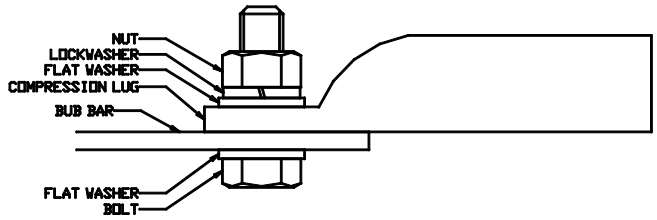


Table 6–6 Crimp Type Compression Lug

WIRE SIZE (CODE)	WIRE STRAND CLASS	RECOMMENDATION		CRIMP TOOL REQUIRED BURNDY TYPE Y35 OR Y46	
		VENDOR	CAT. NO.	COLOR KEY	DIE INDEX
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
600 MCM	B	BURNDY	YA36	GREEN	22 / 472
		ILSCO	CRA-600L	GREEN	22 / 472
	I	BURNDY	YA39-LB	---	1030
750 MCM	B	BURNDY	YA39	BLACK	24
		ILSCO	CRA-750L	BLACK	24

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.

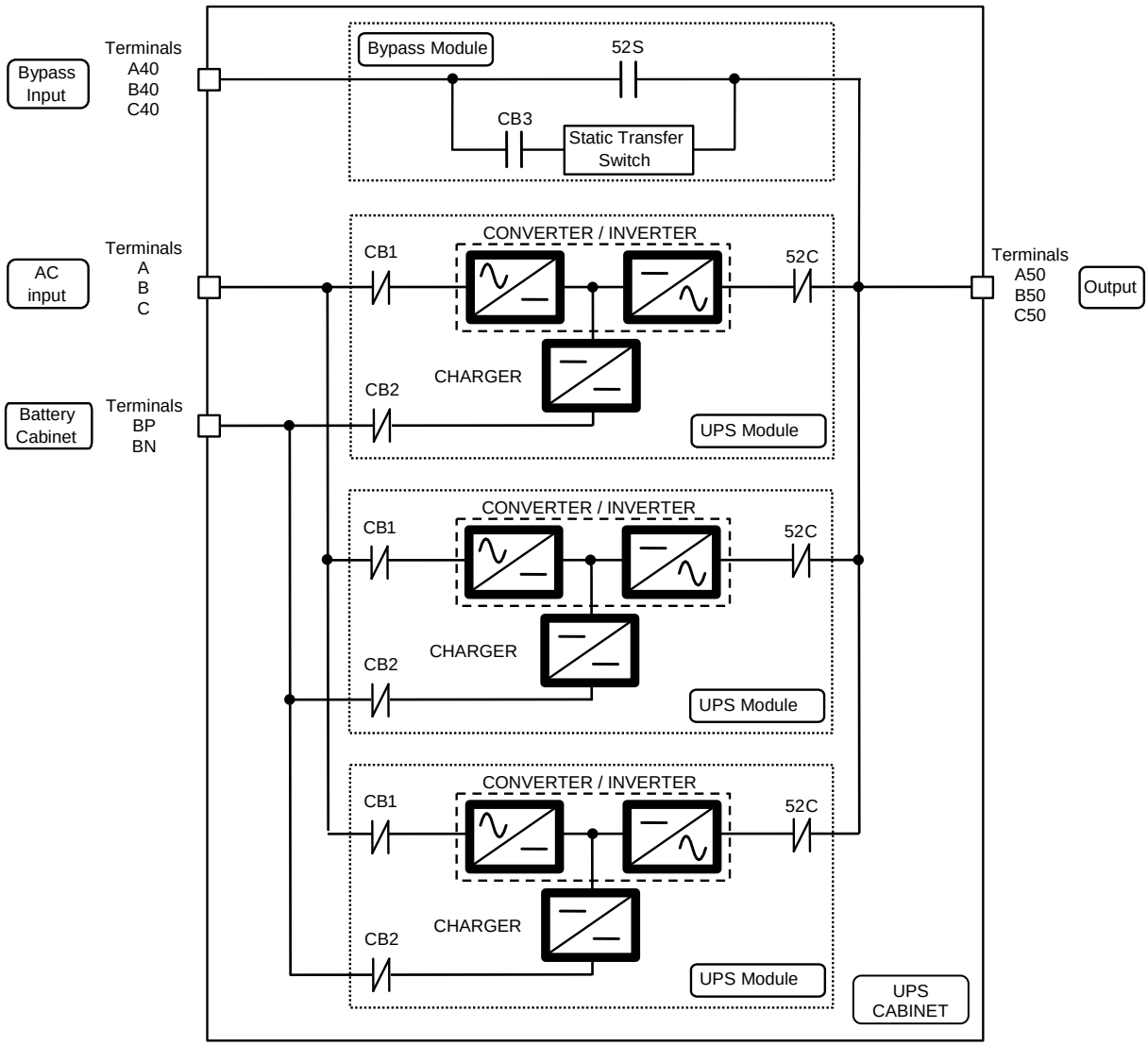
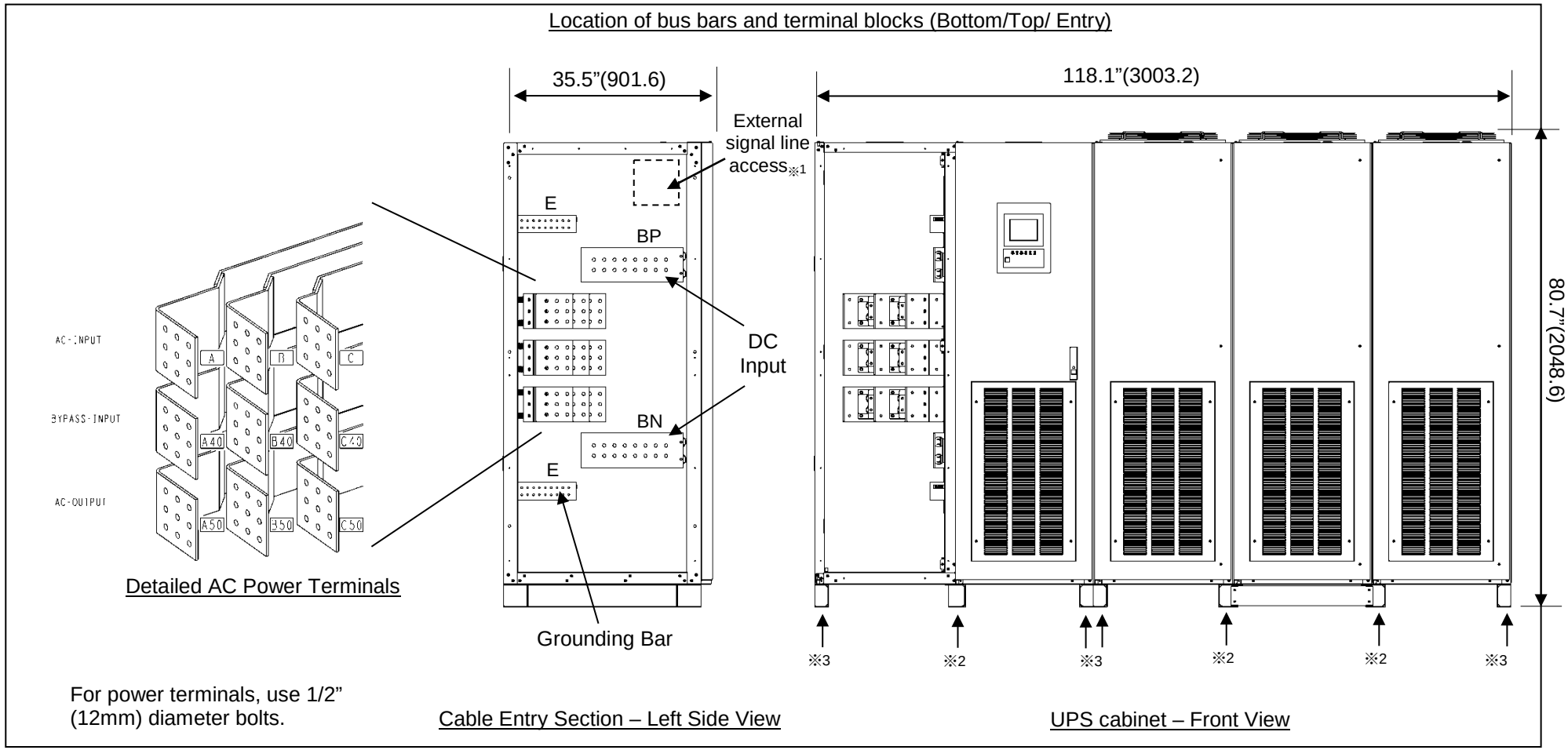


Figure 6-1 UPS Terminal Designation

Figure 6-2 Diagram of input/output bus bars and terminal blocks



※1. Signal lines should be separated to the main circuit cables with more than 100mm insulating distance. The wiring also should fix to the frame to ensure the insulating distance satisfied the condition.
※2. 3x 2-holes bases
※3. 4x 4-holse bases

Figure 6-3 Diagram of Power Wire & Control Wire Interconnections between UPS and Battery

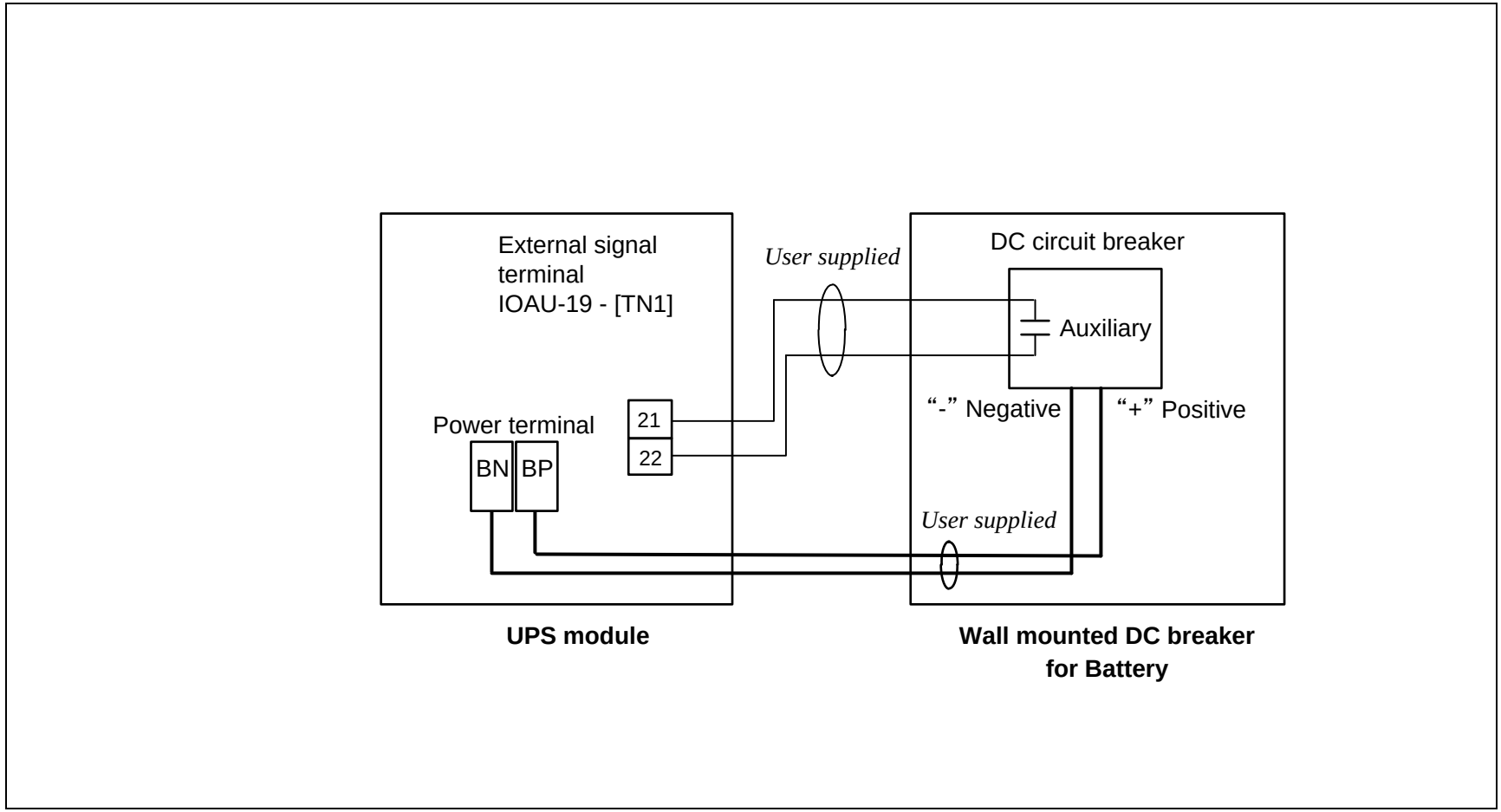


Figure 6-4 Diagram of power wire connections (Parallel Operation system connection)

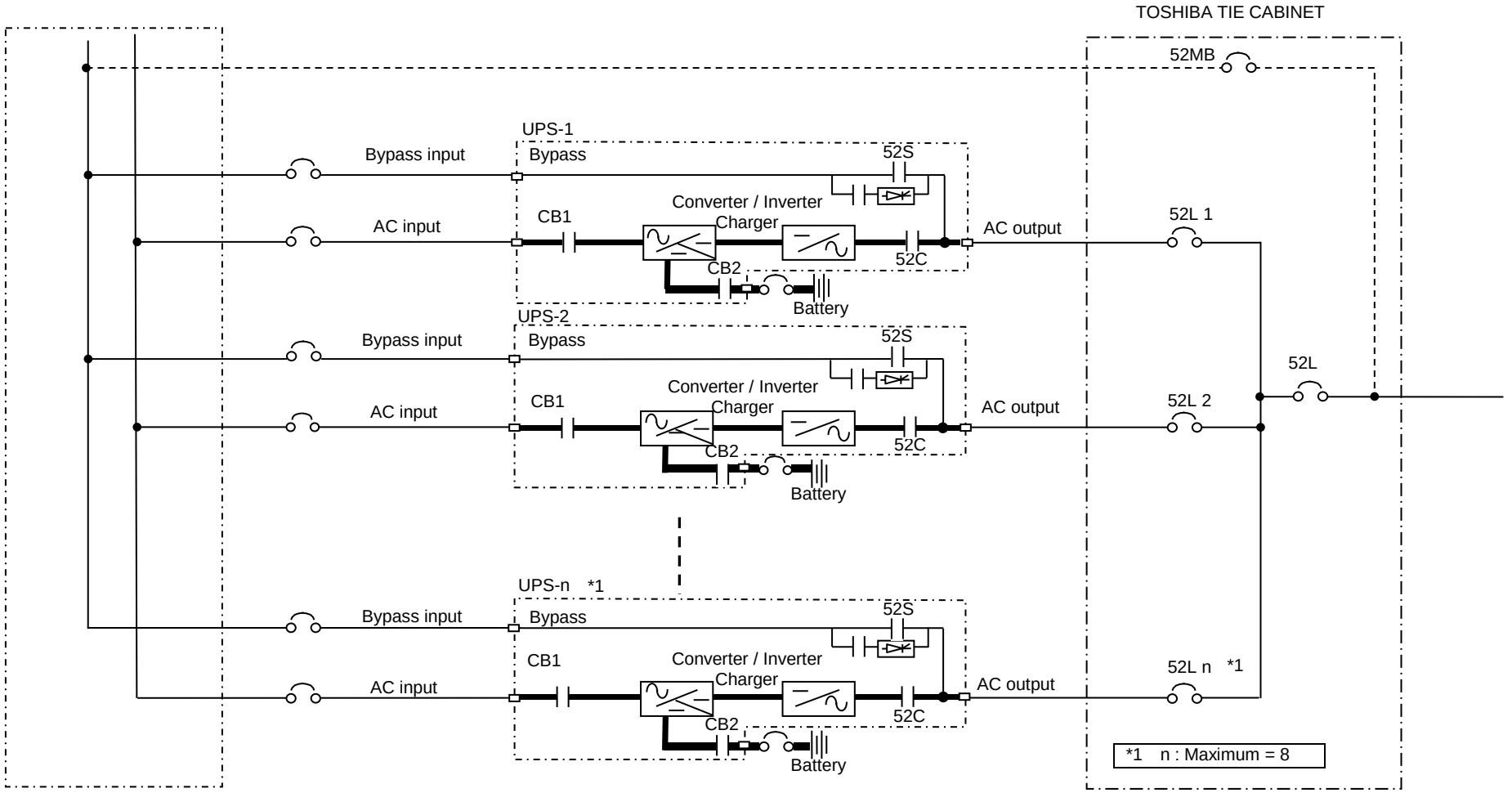
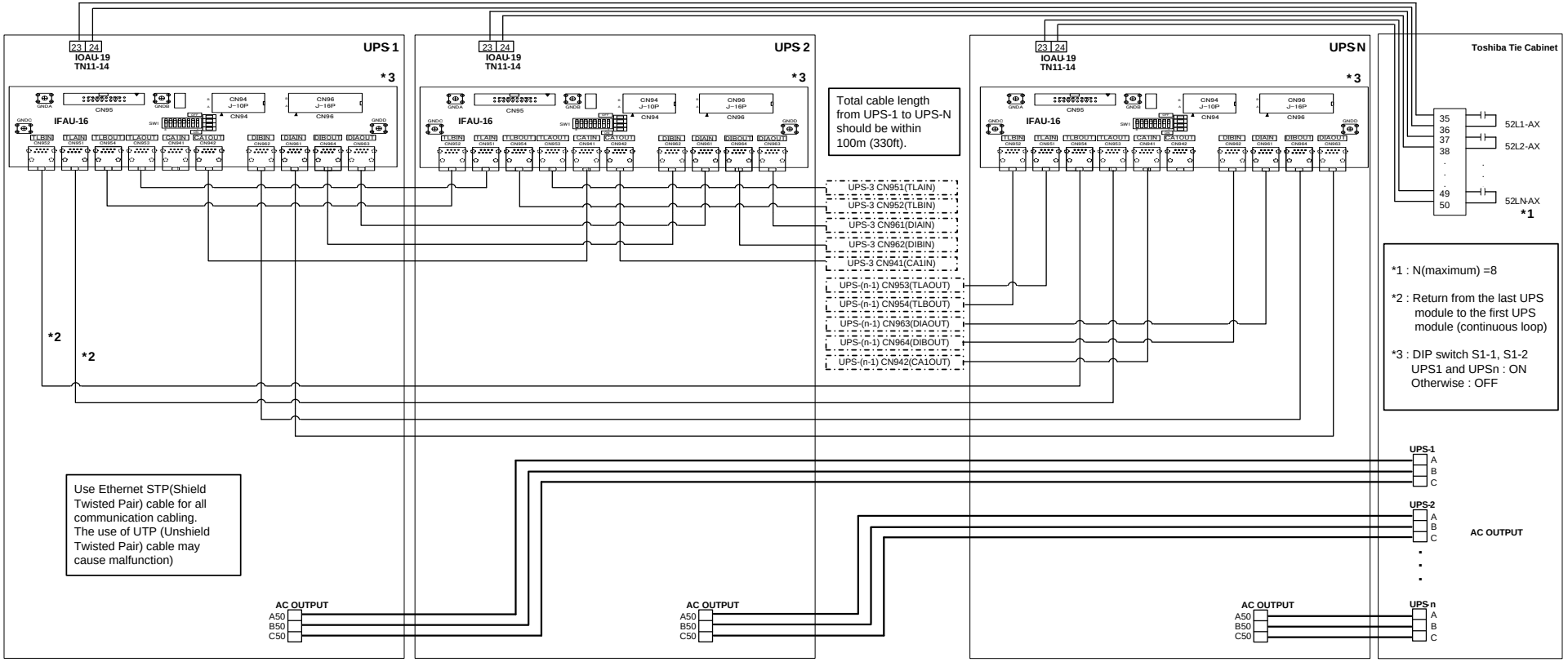


Figure 6-5 Diagram of Power Wire & Control Wire Connect (Parallel Operation system connection 2x to 8x)



- Use Ethernet STP (Shielded Twisted Pair) Cable (Cat 5 or Cat 6) with RJ45 modular connecto4rs for all communication cabling.
- Use of UPT (Unshielded Twisted Pair) Cable may cause malfunctions.
- Total cable length from UPS #1 to UPS 3N should be within 100m.

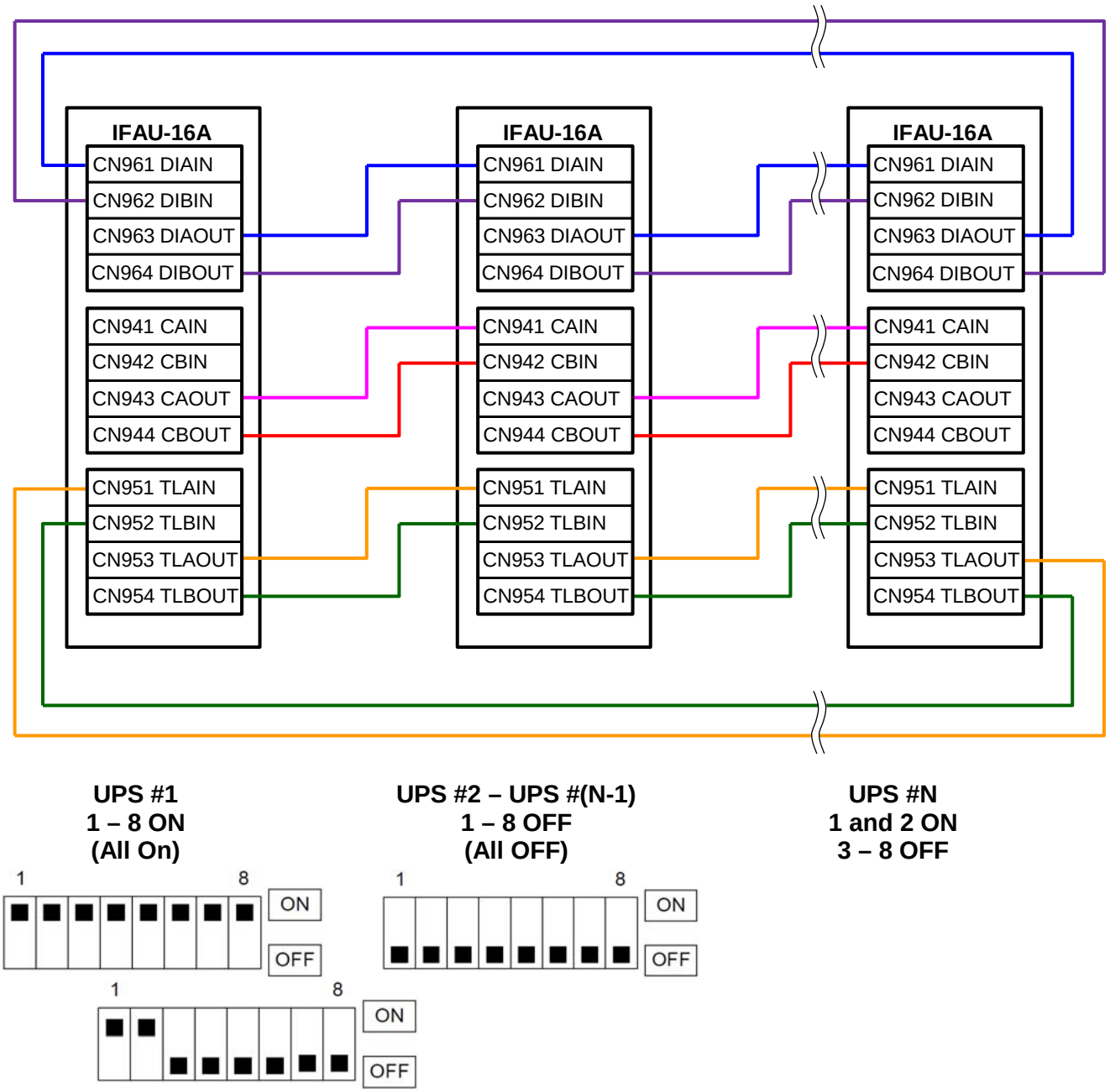


Figure 6-6 Detail: IFAU-16A Control Wire Connections for N units in MMS Configuration

Table 6–7 Jumper Status on IFAU16A (Parallel Interface Board)

No.	Device	Status
1	JP1	SHORT
2	JP6	SHORT
3	JP11	OPEN

6.3 OPERATING PROCEDURES

For Parallel Operation system, refer to section "D) MMS Start-up Procedure".
(Parallel Operation system is herein after MMS [Multi Module System])

A) Start-up Procedure

CAUTION : Before the UPS startup, the internal Bypass line starts to supply the unconditioned bypass input power to the critical load if the External input (or Bypass) Circuit Breaker is closed. Be extremely careful with closing the External input (or Bypass) Circuit Breaker.

a) Verify that the External Bypass Input Circuit Breaker for each unit is closed (user supplied).
b) Verify that Battery Disconnect Circuit Breaker is opened or in tripping position.
c) If a dual source is feeding the UPS, close the External AC Input Circuit Breaker manually (user supplied).
d) The LCD panel boots up automatically, and the screen will show that the Load is powered by bypass line.
e) On the LCD panel, select "OPERATION" tab, and then press the "START OPERATION" button to proceed UPS start-up. (Refer to Figure 2.3).
f) Follow the "START OPERATION" guidance accordingly until the completion of the inverter startup.

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 ONLY" or "REMOTE & LOCAL" in the OPERATION MENU.

B) Shutdown Procedure

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

a.) On the LCD panel, select “OPERATION” tab, and then press the “STOP OPERATION” icon to proceed UPS shutdown. (Refer to Figure 2.3)
b.) Follow the “STOP OPERATION” guidance accordingly. During the procedure, UPS will transfer the power feeding from the Inverter supply to the Bypass line supply.
c.) Both Converter and Inverter will remain energized until complete disconnection from all power sources.

NOTE : When "REMOTE OPERATION MODE" is displayed on the LCD panel, the inverter start operation can only be performed remotely. If local inverter stop operation is required (at the UPS), select "LOCAL ONLY" or “REMOTE & LOCAL” in the OPERATION MENU.

d.) If stopping both the Inverter and Converter is required, open the Battery Disconnect circuit breaker manually in accordance with guidance.

WARNING : *Verify the load is OFF if the next step is to be performed .*

NOTE : Power to the critical load is supplied through the bypass line. Power to the critical load will be lost after execution of the next step. The load will drop.

e.) If a dual source is feeding the UPS, open the External AC Input Circuit Breaker (user supplied) manually.
f.) If turning off all power to the critical load is desired, open the External Bypass Input Circuit Breaker (user supplied) manually.

CAUTION : In bypass mode, all UPS power terminals are still live. Lethal voltages are present. De-energize all external sources of AC and DC power. Before removing the covers, wait 5 minutes after de-energizing. Check no-voltage before handling UPS. Be careful for the devices even when the UPS has been de-energized, still internal devices may be hot.

C) Bypass Operation Procedure

<u>** Transfer from Inverter to Bypass</u>

1. Check for “SYNC” on the LCD.
2. Press the "START/STOP” icon on the LCD.
3. Follow the “STOP OPERATION” guidance and Press the "STOP" icon on the LCD.

<u>** Transfer from bypass to inverter.</u>

1. Press the "START/STOP" icon on the LCD.
2. Follow the “START OPERATION” guidance and Press the "START" icon on the LCD..

<u>NOTE</u> : When "REMOTE OPERATION MODE" is displayed on the LCD panel, the inverter start operation can only be performed remotely. If local inverter start or stop operation is required (at the UPS), select "LOCAL ONLY" or “REMOTE & LOCAL” in the OPERATION MENU.

D) MMS Start-up Procedure

External Circuit Check

1. Verify that Toshiba Tie Cabinet (TTC) Circuit Breaker 52MB is closed.
2. Verify that TTC System Output Circuit Breaker 52L is open.
3. Verify that TTC UPS Circuit Breakers 52L1, 52L2…and 52Ln are closed.

Start-up from UPS-1 to UPS-n

1. Start-up each UPS in accordance with “ A) Start Operation* ”. Each UPS will start Inverter Operation in synchronization with the bypass input.

*Meaning of the icons in Figure 2.3(a) in MMS
INV. START: UPS Module Startup
INV. STOP: UPS Module Stop
START: Parallel-in** **No effect in MMS Bypass Operation
STOP: Parallel-off

Transfer from Maintenance Bypass to MMS Bypass Operation

1. Close the TTC System Output Circuit Breaker 52L.
2. Open the TTC Circuit Breaker 52MB.

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 ONLY" or “REMOTE & LOCAL” in the OPERATION MENU.

Transfer from UPS MMS Bypass Operation to UPS MMS Inverter Operation

1. Transfer MMS Bypass Operation to MMS Inverter Operation from Operation Menu on any UPS LCD as shown in Fig. 3.6.

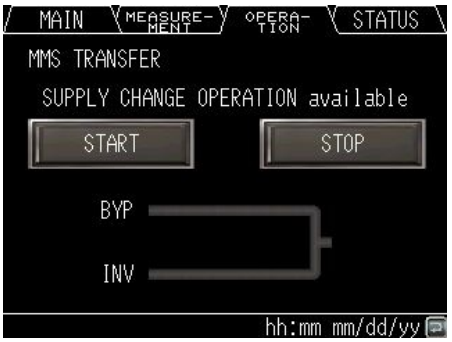


Figure 6-7 LCD Screen (MMS Operation)

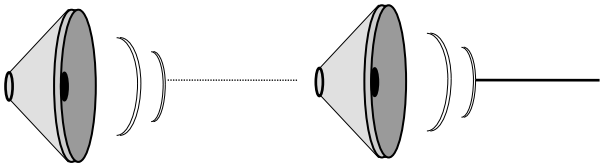
Transfer from UPS MMS Inverter Operation to UPS MMS Bypass Operation

1. Transfer MMS Inverter Operation to MMS Bypass Operation from Operation Menu on any UPS LCD as shown in Fig. 3.6.

*Meaning of the icons in Figure 3.6
START: MMS Inverter Operation
STOP: MMS Bypass Operation

7 RESPONSE TO UPS FAILURE

UPS FAULT



Annunciator Silence

Depress “SILENCE ALARM” icon 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 **1-877-867-8773**.

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.

8 MAINTENENACE AND PARTS REPLACEMENT

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

A) Recommended Maintenance

Toshiba International Corporation recommends the UPS have regular preventative maintenance (PM) visits to ensure optimum operation and longevity. Toshiba recommends two Major per year, at six month intervals.

A Major PM includes maintenance of the batteries and an offline inspection of the UPS. Contact Toshiba International Corporation Service Department at 1-877-867-8773 for further details.

B) 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 (Fan, Capacitors, Air-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, and on all issues regarding the replacement of parts.

Table 8–1 Standard Replacement Parts List

Parts name	Replace interval	Service Method
Cooling fans	5 years*	Replace with new one
Electrolytic Capacitors	15 years	Replace with new one
AC filter Capacitors	15 years	Replace with new one
Control Relays	15 years	Replace with new one
Contactors	15 years	Replace with new one
PCB	15 years	Renew UPS
Control power supply	15 years	Replace with new one
LCD	10 years*	Replace with new one
Fuses	10 years*	Replace with new one
Thermal relays	10 years	Replace with new one

* Periodic replacements are needed.

NOTE : Any parts replacements (including modification) without authorized by TOSHIBA International Corporation could result in personal injuries, death or destruction of the UPS.

C) Air Filters

D) Air filters can be obtained in bulk quantities from Toshiba International Corporation. Use only air filters specified by Toshiba.

Table 8–2 Ait Filters

UNIT	Toshiba Part Number	Quantity (per unit)
1000 kVA	T90-AF-15x30x1	5

9 FAULT CODES

This section covers fault codes, their description and required action.

In the event of a fault occurring:

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 (MCCB) has tripped, depress the toggle to reset the breaker before closing it again.

9.1 BYPASS MODULE FAULT CODES

Table 9–1 Bypass Module Fault Code List

BYPASS MODULE FAULT CODE LIST					
Code indication (Note 2)	Status Message	Meaning	Guidance	Audible Alarm	External relay contact (Note 1)
UA805	OVERLOAD	The output load current has exceeded 100% of the rated current.	WARNING: DECREASE LOAD	Intermittent sound	Overload
UA806	INVERTER OVERLOAD	The output load current peak has exceeded 220% of the rated current.	WARNING: DECREASE LOAD	Intermittent sound	Overload
UA807	INVERTER OVERLOAD	The output load current has exceeded 105% of the rated current.	WARNING: DECREASE LOAD	Intermittent sound	Overload
UA808	OVERLOAD	The output load current has exceeded 100% of the rated current during bypass supply.	WARNING: DECREASE LOAD	Intermittent sound	Overload
UA810	OVERLOAD	Short time over-current has exceeded 150% of the rated current.	WARNING: DECREASE LOAD	Intermittent sound	Overload
UA812	BYPS.VOLT.OUT RNG.	Bypass line voltage is out of the specific range.	CHECK BYPASS INPUT	Intermittent sound	Bypass Input Abnormal
UA813	BYPS.PHASE ABNL.	Bypass line power conductors are not wired in a proper phase sequence.	CHECK BYPASS INPUT	Intermittent sound	Bypass Input Abnormal
UA814	BYPS.FREQ.OUT RNG.	Bypass line frequency is out of the specific range.	CHECK BYPASS INPUT	Intermittent sound	Bypass Input Abnormal

BYPASS MODULE FAULT CODE LIST					
Code indication (Note 2)	**Status Message**	**Meaning**	**Guidance**	**Audible Alarm**	External relay contact (Note 1)
UA817	EMERG.STOP ACTIV.	The emergency stop was activated by the EPO switch or an external contact.	-	Continuous sound	-
UA821	REM. BUTTON CLOSE	The UPS cannot transfer to the bypass because the inverter output is not synchronized to the bypass.	-	Intermittent sound	-
UA822	LOC. BUTTON ABNL.	The UPS cannot transfer to the bypass because of backup generator operation.	CALL SERVICE ENGINEER	Intermittent sound	-
UA824	CB2 OPEN	The battery disconnect contactor CB2 in power converter module is opened.	CB2 OPEN	Intermittent sound	-
UA831	EMERG.BYPS.SW.ON	Emergency bypass switch has been turned on.	CALL SERVICE ENGINEER	Intermittent sound	-
UA833	52L OPEN	The load circuit breaker(52L) is turned off.	-	Intermittent sound	-
UA834	BATTERY DEPLETED	The battery voltage has reached the depleted level.	CALL SERVICE ENGINEER	-	End-of-Discharge
UA835	TRANS.INHIBITED	The UPS could not transfer to the bypass because the bypass source has an abnormality.	-	-	-
UA861	MODULE ALARM	A power converter module has detected an alarm condition.	CALL SERVICE ENGINEER	Intermittent sound	-
UA862	MODULE MINOR FAULT	A power converter module has detected a minor fault condition.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UA863	MOD.IN.VOLT.	A power converter module has detected input voltage abnormal.	CHECK INPUT POWER SOURCE	Intermittent sound	-
UA864	MODULE OVERLOAD	A power converter module has detected output overload.	WARNING : DECREASE LOAD	Intermittent sound	Overload
UA865	MOD.BAT.END	A power converter module has detected battery depleted.	CALL SERVICE ENGINEER	-	Alarm
UA866	BATT.END WA	A power converter module issues a warning on eminent battery depletion.	-	Intermittent sound	Alarm
UA890	EXTERNAL ALARM	External alarm relay turned on.	-	Intermittent sound	Alarm
UF055	CONVERTER ABNORMAL	Mixed operation (20 seconds)	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF151	BAT.VOLTAGE ABNL.	All power converter modules have detected battery float voltage abnormal.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF156	CHG.STOPPED	UF157 failure persisted for over two(2) hours.	CHECK BATTERY	Intermittent sound	Battery abnormal
UF157	BATTERY OVERTEMP.	Detection of overtemperature at the batteries.	CHECK BATTERY	Intermittent sound	Battery abnormal
UF158	BATTERY LIQUID LOW	Low level of battery electrolyte solution.	CHECK BATTERY	Intermittent sound	Battery abnormal

BYPASS MODULE FAULT CODE LIST					
Code indication (Note 2)	**Status Message**	**Meaning**	**Guidance**	**Audible Alarm**	External relay contact (Note 1)
UF161	CHG.STOPPED	UF151 failure is running for over 24 hours.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF162	BATTERY ABNORMAL	Failure detection based on battery self-check.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF163	BAT.VOLTAGE ABNL.	All converter modules have detected battery voltage abnormal.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF172	BATTERY ABNORMAL	The external relay detected the battery fault.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF202	INVERTER ABNL.	Output voltage dropped.	CALL SERVICE ENGINEER	Continuous sound	Major
UF253	CTRL.CIRCUIT ERR.	Discrepancy between output voltage and bypass voltage during bypass operation.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF254	CTRL. CIRCUIT ERR.	Inverter voltage is out of the specification level during transfer.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF256	O/P VOLTAGE ABNL.	Output voltage is out of the specified range.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF258	LOAD ABNL.	Load transfer due to overload for over 4 times within 5 minutes.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF301	CTRL.CIRCUIT ERR.	AD reference has an abnormal value.	CALL SERVICE ENGINEER	Continuous sound	Major
UF302	CTRL.CIRCUIT ERR.	Detection of an external interruption during the software execution.	CALL SERVICE ENGINEER	Continuous sound	Major
UF303	CTRL.CIRCUIT ERR.	Timer does not reset in the specified period (WDT settings)	CALL SERVICE ENGINEER	Continuous sound	Major
UF305	CTRL.CIRCUIT ERR.	Detection of an abnormal clock speed in the CPU or FPGA.	CALL SERVICE ENGINEER	Continuous sound	Major
UF306	CTRL.CIRCUIT ERR.	Control power supply voltage is below the specified level.	CALL SERVICE ENGINEER	Continuous sound	Major
UF320	CTRL.CIRCUIT ERR.	Cable disconnection in the parallel interface board during load supply (SMS).	CALL SERVICE ENGINEER	Continuous sound	Major
UF321	CTRL.CIRCUIT ERR.	Cable disconnection in the parallel interface board during load supply (Individual Bypass System).	CALL SERVICE ENGINEER	Continuous sound	Major
UF322	CTRL.CIRCUIT ERR.	Major communication error during parallel operation (ΔI).	CALL SERVICE ENGINEER	Continuous sound	Major
UF323	CTRL.CIRCUIT ERR.	Major communication error during parallel operation (CAN).	CALL SERVICE ENGINEER	Continuous sound	Major
UF324	CTRL.CIRCUIT ERR.	Major communication error in both of the CAN signals during certain period.	CALL SERVICE ENGINEER	Continuous sound	Major

BYPASS MODULE FAULT CODE LIST					
Code indication (Note 2)	**Status Message**	**Meaning**	**Guidance**	**Audible Alarm**	External relay contact (Note 1)
UF326	CTRL.CIRCUIT ERR.	Communication integrity error or No communication (SMS).	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF327	CTRL.CIRCUIT ERR.	Communication integrity error or No communication (Individual Bypass).	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF340	MODULE MINOR FAULT	A power converter module has detected major fault condition.	CALL SERVICE ENGINEER	Continuous sound	Major
UF341	#1 MAJOR FAULT	Power converter module #1 has detected major fault condition.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF342	#2 MAJOR FAULT	Power converter module #2 has detected major fault condition.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF343	#3 MAJOR FAULT	Power converter module #3 has detected major fault condition.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF344	#4 MAJOR FAULT	Power converter module #4 has detected major fault condition.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF349	MODULE MAJOR FAULT	All Power converter modules have detected major fault condition.	CALL SERVICE ENGINEER	Continuous sound	Major
UF371	CTRL.CIRCUIT ERR.	Major communication error in either of the CAN signals during certain period.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF372	CTRL.CIRCUIT ERR.	Unable to synchronize the inverter output and the bypass voltage.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF374	CTRL.CIRCUIT ERR.	Cable disconnection in the parallel interface board.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF375	CTRL.CIRCUIT ERR.	Unable to achieve synchronization for parallel operation.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF376	CTRL.CIRCUIT ERR.	No control response from another UPS although its detection is possible.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF377	CTRL. CIRCUIT ERR.	Logic signal abnormal (Supply OFF).	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF378	CTRL.CIRCUIT ERR.	No answer for sending synchronizing signal.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF381	CTRL.CIRCUIT ERR.	No module supply answer during UPS operation.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF382	CTRL.CIRCUIT ERR.	Module supply answer during UPS halt.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF383	CTRL.CIRCUIT ERR.	Module overcurrent answer continued for 10 seconds or more.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF401	52S ABNORMAL	Error to close the contactor 52S.	CALL SERVICE ENGINEER	Continuous sound	Major
UF402	52S ABNORMAL	Error to open the contactor 52S.	CALL SERVICE ENGINEER	Continuous sound	Major

BYPASS MODULE FAULT CODE LIST					
Code indication (Note 2)	**Status Message**	**Meaning**	**Guidance**	**Audible Alarm**	External relay contact (Note 1)
UF420	52L OPERATION ERR.	Load circuit breaker 52L opened during inverter operation.	CALL SERVICE ENGINEER	Continuous sound	Major
UF451	52S ABNORMAL	Error to open the contactor 52S.	CALL SERVICE ENGINEER	Intermittent sound	Minor
UF452	CB3 ABNORMAL	Contactor CB3 is not working properly.	CALL SERVICE ENGINEER	Intermittent sound	Minor

9.2 UPS MODULE FAULT CODES

Table 9–2 UPS Module Faults Code List

UPS MODULE FAULTS CODE LIST

Code indication (Note 2)	**Status message**	**Meaning**	External relay contact (Note 1)
MA801	I/P VOLT.OUT RNG.	Input line voltage is out of the specific range.	Alarm AC input abnormal
MA802	I/P FREQ.OUT RNG.	Input line frequency is out of the specified range.	Alarm AC input abnormal
MA803	I/P PHASE ABNL.	Input line power conductors are not wired in a proper phase sequence.	Alarm AC input abnormal
MA806	INVERTER OVERLOAD	The inverter output current has exceeded 110% for 1 min. or 130% for 30sec. of the rated current.	Alarm Overload
MA807	INVERTER OVERLOAD	The inverter output current has exceeded 110% of the rated current.	Alarm Overload
MA810	INVERTER OVERLOAD	Short time over-current has exceeded 150% of the rated current	Alarm Overload
MA817	EMERG.STOP ACTIV.	The emergency stop was activated by the EPO switch or an external contact.	Alarm
MA824	CB2 OPEN	The battery disconnect contactor CB2 open.	Alarm
MA834	BATTERY DEPLETED	The battery voltage has reached the depleted level.	Major End-of-Discharge
MA836	INVERTER OVERLOAD	The output load active power has exceeded 110% of the rated current.	Alarm Overload
MA870	BALANCER OVERLOAD	The UPS detected a neutral point voltage unbalance.	Alarm Overload
MF001	I/P CIRCUIT ABL.	Detection of a large variation of the reference error signal.	Major
MF002	CONV OVERCURRENT	Detection of converter overcurrent.	Major
MF003	CONVERTER ABNL.	Pre-charging circuit is not working properly.	Major
MF102	DC OVERVOLTAGE	DC voltage surpasses the overvoltage level.	Major
MF103	DC UNDERVOLTAGE	DC voltage dropped below the undervoltage level.	Major
MF104	DISCHARGE FAULT	Capacitor voltage is higher than 100V at 5 minutes after module stop.	Minor
MF108	CHOP OVERCURRENT	Detection of DC overcurrent.	Major
MF109	DC UNBALANCED	Major unbalance of the neutral point voltage.	Major

UPS MODULE FAULTS CODE LIST

Code indication (Note 2)	Status message	Meaning	External relay contact (Note 1)
MF110	ZERO PHASE OC.	Major unbalance of the neutral point voltage.	Major
MF111	CTRL.CIRCUIT ERR.	Battery current unbalance.	Major
MF112	DC CIRCUIT ABNL.	Sudden change of the DC voltage level.	Major
MF119	DC GROUND FAULT	Detection of DC ground fault.	Major
MF128	CTRL.PWR. ABNL.	Power supply voltage to IGBT driver PCB is below the specified level.	Major
MF154	CB2 ABNORMAL	During UVT, status signal from CB2 is ON.	Minor
MF159	DC GROUND FAULT	Detection of DC ground fault.	Minor
MF160	CTRL.CIRCUIT ERR.	Abnormal behavior of DC current sensor.	Minor
MF162	BATTERY ABNORMAL	Failure detection based on battery self-check.	Minor
MF163	BAT.VOLTAGE ABNL.	Battery voltage is abnormal.	Minor
MF179	DC GROUND FAULT	Detection of DC ground fault continued for 5 minutes.	Minor
MF201	INVERTER OV.	Detection of output overvoltage.	Major
MF202	IINVERTER UV.	Output voltage dropped.	Major
MF203	INVERTER OC.	Detection of inverter overcurrent.	Major
MF204	O/P CIRCUIT ABNL.	Detection of a large variation of the reference error signal (current reference and actual current).	Major
MF207	ZERO PHASE OC.	Inverter zero-sequence overcurrent.	Major
MF208	CTRL.CIRCUIT ERR.	Cross current is abnormal.	Major
MF210	52C ABNORMAL	Error to open the contactor 52C.	Major
MF213	OVERTEMPERATURE	Heatsink temperature exceeds thermal settings.	Major
MF214	COOLING FAN ABNL.	Thermal relay activated protection.	Major
MF217	INVERTER OV.	Detection of inverter output phase overvoltage.	Major
MF230	ZERO PHASE OC.	Detection of zero-sequence overcurrent.	Major
MF253	CTRL.CIRCUIT ERR.	Discrepancy between output voltage and inverter voltage, or between output voltage and bypass voltage.	Minor
MF254	COOLING FAN ABNL.	Thermal relay of cooling fan worked.	Minor
MF256	O/P VOLTAGE ABNL.	Output voltage is out of the specified range.	Minor
MF301	CTRL.CIRCUIT ERR.	AD reference has an abnormal value.	Major
MF302	CTRL.CIRCUIT ERR.	Detection of an external interruption during the software execution.	Major
MF303	CTRL.CIRCUIT ERR.	Timer does not reset in the specified period (WDT settings)	Major
MF305	CTRL.CIRCUIT ERR.	Detection of an abnormal clock speed in the DSP or FPGA.	Major
MF306	CTRL.CIRCUIT ERR.	Control power supply voltage is below the specified level.	Major
MF309	INV.VOLTAGE ABNL.	Inverter voltage is out of the specified range.	Major
MF320	CTRL.CIRCUIT ERR.	Cable disconnection in the parallel interface board during load supply.	Major
MF331	CTRL.CIRCUIT ERR.	Cable disconnection in the main driver PCB (Phase A)	Major
MF332	CTRL.CIRCUIT ERR.	Cable disconnection in the main driver PCB (Phase B)	Major
MF333	CTRL.CIRCUIT ERR.	Cable disconnection in the main driver PCB (Phase C)	Major
MF334	CTRL.CIRCUIT ERR.	Cable disconnection in the main driver PCB (Chopper))	Major
MF376	CTRL.CIRCUIT ERR.	Logic signal abnormal (Supply ON)	Minor
MF552	DUMMY FAULT	Bypass Module send fault simulation signal.	Major

(Note 1) 1) "Major" is defined as a major failure. Load transferred from the inverter circuit to the static bypass line;

2) "Minor" is defined as a minor failure. UPS continues to operate normally, but the cause of alarm must be identified;

(Note 2) Code indication means:

#A+++ ---------- Alarm
#F+++ ---------- Failure
#%0++ ---------- Rectifier circuit failure
#%1++ ---------- DC circuit failure
#%2++ ---------- Inverter circuit failure
#%3++ ---------- Control circuit failure
#%4++ ---------- Bypass system failure
#%8++ ---------- Alarm
"#" Bypass Module "U", UPS Module "M"
"+" denotes any numeral from 0 to 9
"%" denotes either "A" or "F"

10 DAILY INSPECTION

Please perform the daily inspection while the UPS is running. The daily inspection items are shown in Table 10–1.

NOTE

The customers can only inspect exterior or environment of cabinet. When the customers want to perform the detailed inspection, contact the Authorized Toshiba Service Representatives or call Toshiba International Corporation at 1-877-867-8773.

Table 10–1 How to Perform Daily Inspection

No.	Subject	Procedure			Criteria and/or Action needed
		Term	Period	Method/Tool	
1.	Environmental ambient	Dust or Gas	Daily	Visual check and smelling	Ventilate room atmosphere if dusty or smelling gas.
		Dewdrops Condensation	Daily	Visual check	Fix the dripping source Dehumidify upon necessity.
		Temperature Humidity	Daily	Thermometer hygrometer	Temperature: 32 – 104 °F Humidity: 30 – 90% No condensation. To be controlled at 77 °F or about by A/C.
2.	Cabinet Construction	Vibration or Audible noise	Daily	Touch and hearing	Check if fans have irregular sound. Contact service representative in case of abnormalities.
		Overheating	When needed	Touching exterior	Contact service representative in case of abnormalities.
		Air filter clog	When needed	Visual check	Clean/wipe if clogged or dusty.
3.	Operation	LCD sharpness Brightness Left-bottom LED	Daily	Visual check	No characters faded, illegible or any other abnormalities. Left-bottom LED should be green. Contact service representative when the LED shows red with the backlight lost.
		Indication terms: Output voltage Output current AC input voltage Output frequency Battery voltage Battery current DC voltage	Daily	Visual check	Check indication terms/values if within the adequate window. Also check indication meters on surface of optional cabinet, if installed.
4.	LEDs	4 status LEDs	Daily	Visual check	Check if LEDs turn on, off or flash according to the operation.
		2 fault LEDs	Daily	Visual check	If UPS fault LED turns on, scroll the screen to see fault codes and record the codes. Contact service representative to tell about fault codes and UPS symptom.

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APPENDIX A – Installation Planning Guide (IPG)

Installation Planning Guide for 1000kVA UPS

Standard System: 480V Input, 480V 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}	kBtu/Hr	Top	Front	Bottom	Sides**	Back
118.2” x 35.5” x 80.7”*	6613	227	112.8	24”	39”	0”	0”	0”

* Height includes removable an 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
1045 (1113)	> 0.99	1256 (1340)	1600 AT	(5) 600 kcmil – (6) 500 kcmil

Alternate (Bypass) AC Input (480V 3-Phase / 3-Wire)

Maximum Input Power Demand			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase
kVA	PF	Amps (Max.)	Amps	AWG or kcmil at 75º C Temp. Rating
1000	1.0	1203	1600 AT	(5) 600 kcmil – (6) 500 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
1036 @ 1.0 PF	2715	3000 AT	(8) 600 kcmil – (10) 400 kcmil

AC Output (480V 3-Phase / 3-Wire)

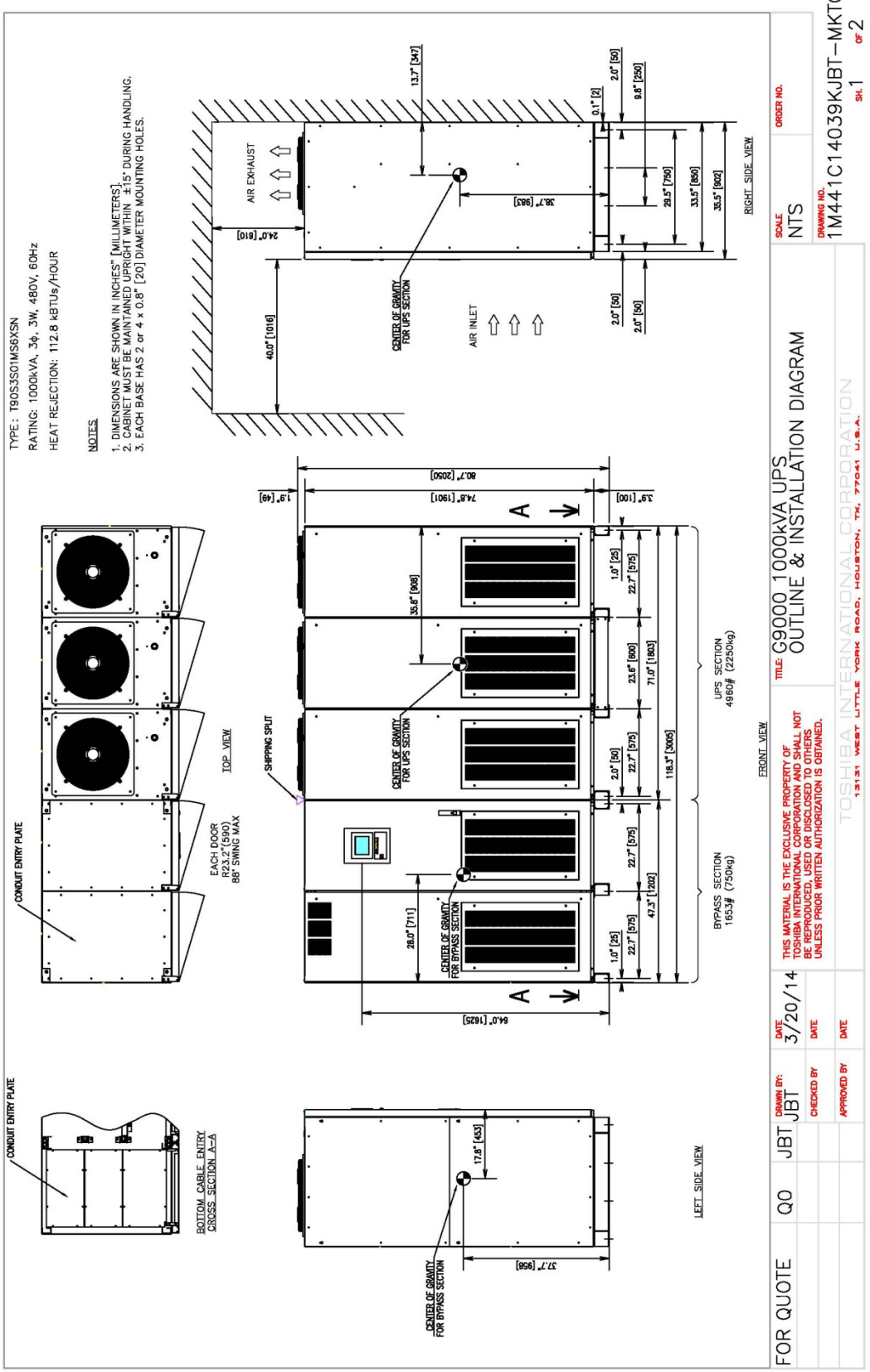
Rated Output Power			Suggested External Overcurrent Protection	External Feeder Wire Size: Min. – Max. Per Phase
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating
1000	1.0	1203	1600 AT	(5) 600 kcmil – (6) 500 kcmil

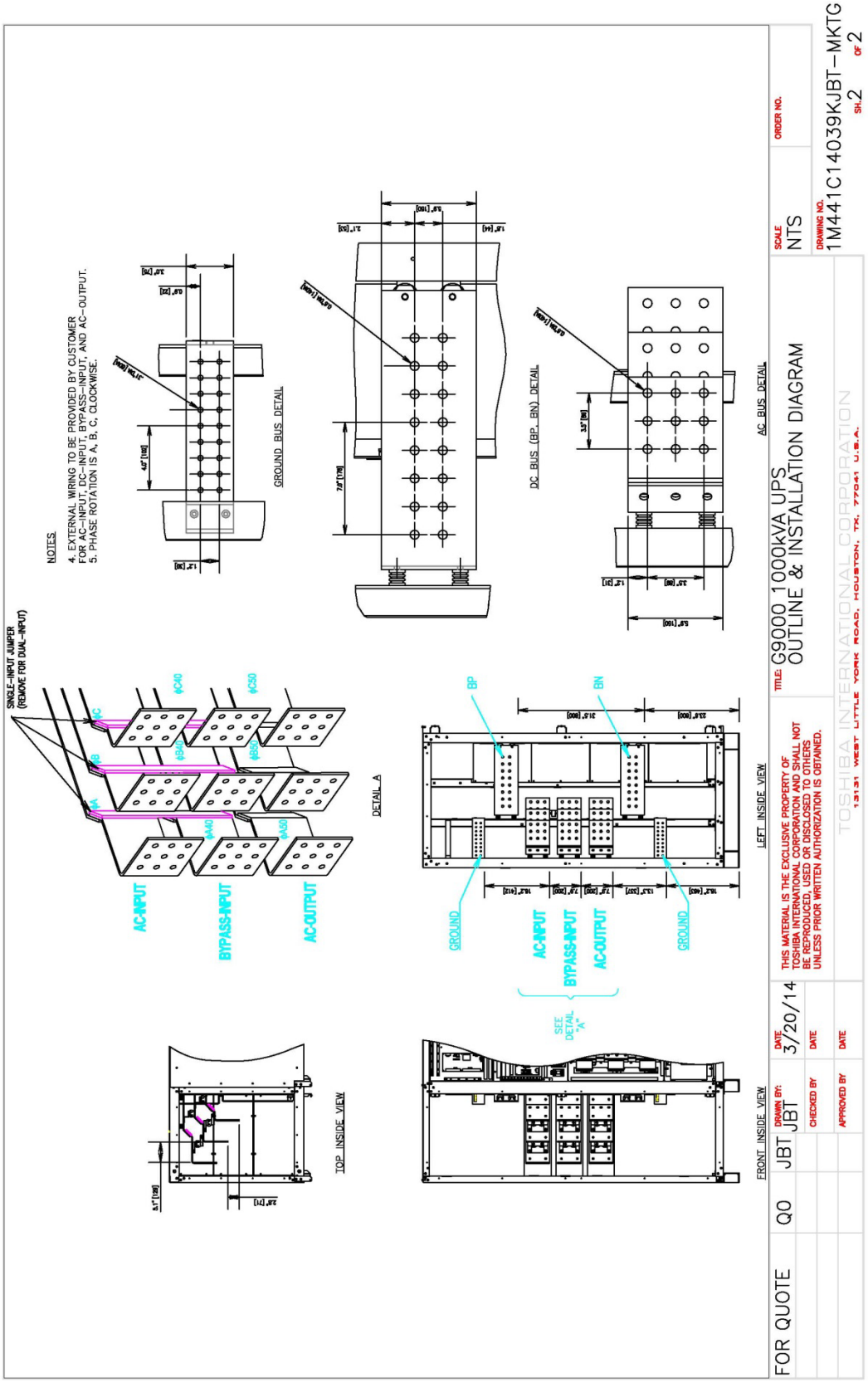
Important Notes:

1. Maximum input current is limited to 108% of the full-load input 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, 3-wire + ground.
   - AC Output: 3ϕ, 3-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.
    - Maximum size cable is based on cable bend radius limitations at the UPS terminals.
    - Not more than 3 current-carrying conductors installed in conduit in ambient temperature of 30 °C.
    - Temperature rating of copper conductors/terminals: 75 °C in conduit.
    - 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.

TOSHIBA INTERNATIONAL CORPORATION
13131 West Little York Road
Houston, TX 77041
Telephone: (800) 231-1412
Fax: (713) 896-5212
Web Site: www.toshiba.com/ind


TYPE: T90S3S01MS6XSN
RATING: 1000kVA, 3φ, 3W, 480V, 60Hz
HEAT REJECTION: 112.8 kBTUs/HOUR
NOTES:
1. DIMENSIONS ARE SHOWN IN INCHES" [MILLIMETERS].
2. CABINET MUST BE MAINTAINED UPRIGHT WITHIN ±15° DURING HANDLING.
3. EACH BASE HAS 2 or 4 x 0.8" [20] DIAMETER MOUNTING HOLES.
AIR EXHAUST
AIR INLET
CENTER OF GRAVITY FOR UPS SECTION
RIGHT SIDE VIEW
CONDUIT ENTRY PLATE
EACH DOOR REQ'S 27"(690) 88° SWING MAX
TOP VIEW
SHIPPING SPLIT
CENTER OF GRAVITY FOR BYPASS SECTION
UPS SECTION 4960# (2250kg)
BYPASS SECTION 1653# (750kg)
FRONT VIEW
BOTTOM CABLE ENTRY CROSS SECTION A-A
LEFT SIDE VIEW
FOR QUOTE
Q0
JBT
DRAWN BY: JBT
DATE 3/20/14
CHECKED BY
APPROVED BY
THIS MATERIAL IS THE EXCLUSIVE PROPERTY OF TOSHIBA INTERNATIONAL CORPORATION AND SHALL NOT BE REPRODUCED, USED OR DISCLOSED TO OTHERS UNLESS PRIOR WRITTEN AUTHORIZATION IS OBTAINED.
TITLE: G9000 1000kVA UPS
OUTLINE & INSTALLATION DIAGRAM
SCALE NTS
ORDER NO.
DRAWING NO. 1M441C14039KJBT-MKTG
SH. 1 OF 2
TOSHIBA INTERNATIONAL CORPORATION
13131 WEST LITTLE YORK ROAD, HOUSTON, TX, 77041 U.S.A.


NOTES:
4. EXTERNAL WIRING TO BE PROVIDED BY CUSTOMER FOR AC-INPUT, DC-INPUT, BYPASS-INPUT, AND AC-OUTPUT.
5. PHASE ROTATION IS A, B, C, CLOCKWISE.
GROUND BUS DETAIL
DC BUS (BP, BN) DETAIL
AC BUS DETAIL
SINGLE-INPUT JUMPER (REMOVE FOR DUAL-INPUT)
AC-INPUT
BYPASS-INPUT
AC-OUTPUT
DETAIL A
LEFT INSIDE VIEW
FRONT INSIDE VIEW
TOP INSIDE VIEW
BP
BN
GROUND
SEE DETAIL "A"
FOR QUOTE
Q0
JBT
DRAWN BY: JBT
DATE 3/20/14
CHECKED BY
APPROVED BY
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TITLE: G9000 1000kVA UPS
OUTLINE & INSTALLATION DIAGRAM
SCALE NTS
DRAWING NO. 1M441C14039KJBT-MKTG
SH. 2 OF 2
ORDER NO.
TOSHIBA INTERNATIONAL CORPORATION
13131 WEST LITTLE YORK ROAD, HOUSTON, TX, 77041 U.S.A.

TOSHIBA INTERNATIONAL CORPORATION
SOCIAL INFRASTRUCTURE SYSTEMS GROUP
POWER ELECTRONICS DIVISION
13131 West Little York Rd., Houston, TX 77041
Tel: 713/466-0277 Fax 713/466-8773
US 877/867-8773 Canada 800/872-2192 Mexico 01/800/527-1204
www.toshiba.com/tic/industrial/uninterruptible-power-systems

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